

SUSTAINABLE FUNDING OPTIONS FOR A COMPREHENSIVE RIPARIAN RESTORATION INITIATIVE IN THE COLORADO RIVER BASIN

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Prepared for the Walton Family Foundation



Colorado River near Moab, Utah



a non-profit alliance
working to restore riparian lands

Tamarisk Coalition

P.O. Box 1907 • Grand Junction, CO 81502

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Acknowledgements

This report was written by:

Tim Carlson, Tamarisk Coalition

Patrick Hickey, Tamarisk Coalition

Clark Tate, Tamarisk Coalition

Executive Summary

This paper is written for the purpose of exploring potential long-term and sustainable funding options that will be necessary for the successful implementation of a Colorado River Basin (CRB) riparian restoration initiative. For the purpose of this paper, **sustainable funding is defined, as a perpetual revenue stream that is sufficient in magnitude to accomplish a program's goals and reliable enough to confidently develop long-term maintenance and monitoring programs.**

Funding Mechanisms

This work included a review of funding mechanisms that have been employed in the US and internationally. Numerous considerations, explained in detail in the white paper, were taken into account when compiling this list. As an example, funding resources that are subject to federal appropriations were not evaluated because of their susceptibility to economic and political changes. Thus, they do not meet the basic definition of sustainable funding. The funding mechanisms that were considered to be potentially sustainable are organized according to five fundamental funding sources: tax based, regulatory, lending, market, and voluntary based revenue sources.

Case Studies

Two types of case studies were conducted. The first examined several different *single source federal tax programs* that have been established, or failed to become established in the US. These federal programs were evaluated to provide lessons learned that will help guide an understanding of the appropriateness of such methods to fund a CRB initiative. Funding programs of this type include: Pittman-Robertson Act of 1937; Dingell-Johnson Act Sport Fish Restoration Act of 1950; Migratory Bird Conservation Act of 1929 and the Migratory Bird Hunting Stamp Act of 1934; North American Wetlands Conservation Act of 1989; Conservation and Reinvestment Act (CARA); Harbor Maintenance Trust Fund; US Commission on Ocean Policy; The Domenici-Landrieu Gulf of Mexico Energy Security Act of 2006; and the Highway Trust Fund.

The second type of case study focused on large-scale ecological restoration initiatives that employed multiple funding sources and mechanisms, as well as other innovative funding strategies employed at smaller scales and from outside the restoration arena. Lessons learned from these case studies provide insight on programmatic issues such as how they were established, how they are managed, where funding comes from, and their ability to accomplish the goals of their program, as well as more specific funding issues that should be considered if a Colorado River initiative is undertaken. The programs reviewed include: Platte River Restoration Program; Columbia River Basin; California Bay-Delta; Everglades Restoration Program; Great Lakes Restoration Program; Puget Sound Partnership; Chesapeake Bay

Restoration Program; National Estuary Program; Murray-Darling Watershed Restoration (Australia); Working for Water Programme (South Africa); and the European Union's Water Framework Directive.

The key finding that resulted is that none of the large-scale watershed programs, even those approaching 30 years of existence, have been successful in securing or identifying long-term sustainable funding to reach their goals. Additionally, despite decades of work and billions of dollars, the large-scale restoration projects surveyed in the US have made little progress.

Funding Mechanism Viability in the CRB

Information gathered from the case studies' lessons learned was combined with professional knowledge of the political, economic, and ecologic situation in the CRB to determine the appropriateness of the funding mechanisms examined to the CRB. The funding mechanisms were applied to different geographic levels (local, state-wide, basin-wide) and rated on their potential significance, reliability, applicability, and political/social applicability to derive an overall viability ranking.

Next Steps

Subjective assessments summarized in the funding mechanism viability ranking represent a starting point for more in-depth discussions and may change based on value judgments of others. Lessons can be taken from the case studies and used to determine: 1) If any of the funding mechanisms explored are worth further consideration in the CRB; 2) How these various funding approaches might be efficiently integrated into larger funding strategies that are appropriate for the CRB and; 3) What programmatic, political, and social approaches are necessary to facilitate the implementation of the preferred strategies.

As planning for a large-scale watershed restoration continues, which may be a long process, there is benefit for watershed restoration proponents to actively pursue restoration on a grass-roots or sub-watershed level to help provide the education, awareness, and successful demonstration projects that are so critical for garnering public support for a larger initiative.

The following recommended next steps are based on the information assembled and include supporting actions that may be necessary to answer key questions:

1. Identify several potential sustainable funding mechanisms that seem to have promise and develop a rudimentary analysis of their theoretical application in the CRB including user-based revenue potential and more detailed examination of legal and political challenges. To begin this analysis, it is suggested that representatives of the Walton Family Foundation, The Nature Conservancy (TNC), and the Tamarisk Coalition hold a workshop to determine the best prospects for sustainable funding and how to move towards implementation of them.

2. A fundamental aspect of any sustainable funding mechanism is that it will take political will to institutionalize most of the mechanisms identified. Four questions need to be answered to gain this political will: 1) *What is the problem?* 2) *What are the solutions?* 3) *What are the costs?* and 4) *Who is going to pay for it?* These questions can be answered by:

- What specifically are the problems in the CRB that are imperative, in the public's view, to solve?

Potential Actions:

- Identify the full range of ecological problems in the CRB.
- Determine the root causes of these problems.
- Determine the public priorities for these ecological problems.
- Determine how best to solve or mitigate the problems that are critical public concerns.

- What are the potential solutions, their costs, and their long-term fiscal requirements?

Potential Actions:

- Conduct more detailed feasibility study of specific restoration strategies and goals. For example, for an urban water and hydro-electric utility surcharge, how many people are involved, what would the surcharge rates need to be in order to meet the expected restoration costs, what political and legal obstacles are likely to be encountered?

- Who is going to pay for this? If payment for ecosystem service approaches are envisioned then what ecosystem services are important enough, by themselves or in combination with others, which the public would be willing to support?

Potential Actions:

- Identify and describe ecological services and products of the CRB; such as water, wildlife habitat, wildfire mitigation, recreation, aesthetics, flooding, preventing the endangered species listing, etc.
- Define potential market relationships. For example, salinity control programs and downstream water users.
- Identify specific resource users and their direct or indirect relationship to (willingness to pay for) ecological services and products of the CRB.
- Determine market metrics and conduct cost/benefit analysis for individual ecological service and product markets.

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Sustainable Funding Options for a Comprehensive Riparian Restoration Initiative in the Colorado River Basin

Purpose

The Colorado River Basin (CRB) is in a state of ecological decline. Native flora and fauna that evolved over millennia within this dynamic riparian system are being replaced by non-native invasive species that are more adept at survival in the new dam controlled hydrologic regime. The shape and structure of the streams and floodplains have been noticeably altered. Nourishing flows previously carried sediment and nutrients, the building blocks of the ecological system; they have been severely diminished due to large-scale water and land use practices. The Colorado River and its tributaries are no longer functioning properly, but restoring a balance will not be easy. The costs and logistics of accomplishing this task are immense, but the benefits to future generations are great.

This paper explores potential long-term and sustainable funding options that will be necessary for the successful implementation of a basin-wide riparian restoration initiative. For the purpose of this paper, **sustainable funding is defined as a perpetual revenue stream that is sufficient in magnitude to accomplish a program's goals and reliable enough to confidently develop long-term maintenance and monitoring programs.** This paper discusses how several funding mechanisms might be received at varying geo-political scales and makes recommendations regarding future steps including strategies to create a financial plan that could combine various funding mechanisms discussed.

Information associated with the economic and political complexities of sustainable funding could easily result in a ponderous tome of a report. To better inform the reader with possible answers to the question of what sustainable funding options might work for the CRB, the purpose of this report to provide an authoritative, in-depth analysis that is succinct; i.e., informative, clearly stated, and brief.

The Restoration Initiative

The ultimate goal of the envisioned restoration initiative will be to restore and maintain critical ecologic components of the entire CRB, beyond riparian vegetation, in order to ensure that this valuable natural capital continues to be functional in the long-term. This will help to guarantee future economic viability of the region while also maintaining the intrinsic beauty of this iconic symbol of western life. The initiative will include considerations for economic and social viability of restoration, which is viewed as inseparable from the ecologic function of the system.

This is a challenging undertaking given the lack of a clear legislative mandate to conduct such work. In addition, the multiple natural and anthropogenic drivers of change, which have worked in concert to create the degraded conditions, make it difficult to draw strong connections to clear cause and effect relationships. Thus, the culpability for the decline of riparian habitat in the Colorado River system is not easily determined.

Analytical Framework

To accomplish the task of evaluating a vast spectrum of potential funding mechanisms an extensive review of published literature relevant to the topic of sustainable funding was undertaken. This was conducted in conjunction with a case study review of funding mechanisms and related management structures that have been employed for large conservation and restoration projects in the US and internationally. The specifics of these funding mechanisms, described in Appendix A, are extremely important in the evaluation of potential funding mechanism because they provide **lessons learned** from real world examples.

Case studies and their associated lessons learned are presented in Appendices B and C. Given the breadth of information involved with the topic of conservation funding, and a desire to provide a concise and useful product, it was necessary to limit the scope of the paper based on the following guidelines:

1. Grant programs that provide funding for a specific purpose over a short period of time were not evaluated because this type of funding does not meet the definition of *sustainable*. However, in many cases grants will play a role in the overall funding strategy, especially in early program development. A list of potential grant opportunities that might prove appropriate for the CRB is provided in Appendix D.
2. Funding options are described at the fundamental level of a single revenue generating or supporting mechanism. These basic funding components can further be combined in numerous variations and management structures to develop a comprehensive funding strategy.
3. Successful as well as unsuccessful funding initiatives are evaluated.
4. Case studies and their associated lessons learned, both positive and negative, are used to assess the advantages, disadvantages, and obstacles of each funding mechanism.

Two types of case studies were conducted. The first examined several different *single source federal tax programs* that have already been established, or failed to become established in the US (Appendix B). These federal case studies include conservation directed programs and programs outside the conservation arena such as the Highway Trust Fund. The second type of case study focused on large-scale ecological restoration initiatives that employed multiple funding sources and mechanisms as well as other innovative funding strategies employed at

smaller scales (Appendix C). Lessons learned from these case studies provide insight on programmatic issues such as how they were established, how they are managed, where funding comes from, and their ability to accomplish the goals of their program, as well as funding issues that should be considered if a Colorado River initiative is undertaken in earnest.

All of the watershed program case studies that are investigated, such as Puget Sound and Chesapeake Bay, include funding sources from organizations such as the Environmental Protection Agency (EPA), Army Corps of Engineers, National Fish and Wildlife Foundation, and US Department of Agriculture (USDA). These are valuable funding resources that are helping, in part, to implement restoration efforts for these projects. However, these types of resources are not considered sustainable funding sources because they are appropriations dependent. While some of the programs that do receive Congressional appropriations are relatively dependable such as USDA Farm Bill initiatives, they are still at the discretion of Congressional swings in political influence and philosophy and may be at the mercy of the economy and the rising US deficit. Therefore, these appropriations driven programs are not evaluated in the case study analysis of sustainable funding mechanisms. Appropriations do not meet the basic definition of sustainable funding.

Case studies of sustainable funding mechanisms, on the other hand, identify lessons learned from actual funding approaches that, over a long period of time, have shown their dependability of providing a steady flow of revenue even during significant administration shifts and economic swings. These mechanisms do meet the definition of sustainable funding.

For each case study developed in Appendices B and C the following general aspects are identified when information was available: primary and secondary sources of funding, types of revenue generating mechanisms employed, significance of funding mechanism relative to the financial needs of the initiative, reliability of funding mechanism with respect to duration and political vulnerability, management frameworks, and allocation methods employed by an initiative.

The compilation of funding mechanisms reviewed and summarized in Appendix A, paid particular attention to the significance and reliability of each mechanism. For example, it is important to consider the *significance* of a \$2 million federal grant versus a \$1,000 private donation. Similarly, the *reliability* of a small utility surcharge could be much greater than a large one-time donation. The significance and reliability of each revenue generating mechanism helps determine the sustainability of a larger funding strategy. Lastly, the manner in which the funds are managed is an important consideration. The management structure may strongly influence the economic efficiency and political acceptance of the initiative.

There are limitations to the accuracy of this analysis due to the difficulties associated with locating and tracking the budgetary data. This task becomes particularly difficult for large-scale, multi-faceted watershed restoration projects, or projects with nebulous project boundaries. For example, a water quality initiative may benefit from funding of stormwater surcharges, pollution control fines, agricultural education programs, wetland mitigation projects, and possibly even air quality enforcement actions in a neighboring watershed, just to name a few. This analysis problem highlights the complexity of ecological restoration and the inter-connective nature of all resource management decisions. As stated by many interviewees, “. . . if this was easy, it already would’ve been done.”

Another complication that arose in budget tracking from one program to another is that pass-through funds can be utilized by local governments that are actually derived from state or federal grants. The analysis attempts to identify the origin of the funds as opposed to the distributor of the funds. However, the means in which funds are distributed, or allocated, and ultimately how efficiently those funds are utilized *on-the-ground*, will be important considerations as best management practices for a watershed restoration initiative in the CRB.

Categories of Sustainable Funding

Organizing the vast number of funding options into categories is necessary for the purpose of providing a logical analysis of such a broad topic. The initial review found that several attempts have been made by other researchers to categorize restoration initiatives based on funding sources and management strategies (Powell & White 2001; Postel & Thompson 2005; de Groot et al. 2007; Cassin & Davis 2008; Hurd 2009). Drawing from these sources, five basic funding strategies are identified; some of which are sustainable and some that are not. Sub-categories to this list have been added that account for varying project scales as well as a sixth category to account for hybrid strategies that incorporate a mix of the five basic strategies:

- 1. Federal conservation fund capitalized by a single or a few distinct tax mechanisms (e.g. Duck Stamp).**
- 2. Appropriation funded and government managed, both federal and state.**
- 3. Government-supported market creation (e.g. Cap and Trade, Payment for Ecosystem Services).**
- 4. Self-organized private market funding (e.g. user fees, certification mechanisms, and private contracts).**
- 5. Voluntary, private, non-market funding (e.g. donations and lotteries).**
- 6. Hybrid approach involving two or more of the above funding mechanism categories.**

Sustainable Funding Mechanisms

The six funding categories listed above employ various mechanisms for the purpose of generating revenue. This paper focuses on these essential revenue generating mechanisms that provide the basic building blocks of the funding strategies discussed by other researchers. These six funding strategies are further organized into five basic categories of funding mechanisms:

- 1. Tax and Fee Based Revenue Mechanisms**
- 2. Regulatory Based Revenue Mechanisms**
- 3. Lending Based Revenue Mechanisms**
- 4. Market Based Revenue Mechanisms**
- 5. Volunteer or Philanthropic Based Revenue Mechanisms**

Federal programs that provide sustainable funding (see Appendix B) normally have only one mechanism for generating revenue. Whereas, every watershed program case study (see Appendix C) involves multiple revenue sources and these case studies would all qualify as hybrid funding strategies to varying degrees. However, most of these watershed programs used one of the above revenue generating mechanisms as the primary source of funding along with various, less significant secondary funding sources. As with investment portfolios, employing a diverse funding stream helps to maintain a sustainable long-term strategy by reducing risk. It was found that the majority of the restoration initiatives are government funded/managed efforts based primarily on various tax mechanisms and voluntary donations, but there is increasing interest in private and government sponsored market based approaches.

Case Studies

Appendices B and C respectively contain nine case studies of major federal programs and 11 case studies of large-scale watershed restoration efforts. While it is clear that other major federal, state, international, and watershed programs are available for case study analysis, it became apparent that the lessons learned from the case studies in these two appendices had reached a plateau and resources spent to analyze others would not provide significant new knowledge. The following summarizes the different aspects of these case studies and the primary lessons learned. The reader is referred to Appendices B and C for details.

Large Federal Programs

Historically, the use of a single federal tax mechanism applied to the resource users who benefit directly from the conservation spending has proved to be a reliable and significant source of conservation funding for a broad array of restoration and conservation initiatives not specific to a particular geographic area or single purpose. Seven such examples are examined and summarized below. Two additional case studies, Harbor Maintenance and Highway Trust

Funds, do not deal with environmental or conservation objectives but provide valuable lessons learned for assessing the opportunities for developing sustainable funding.

1. **Pittman-Robertson Act of 1937:** This important conservation law provides to state fish and wildlife agencies funding from a value added tax on hunting equipment for projects to restore, conserve, manage, and enhance wild birds and mammals and their habitat. Projects also funded through the Act include public use and access to wildlife resources, hunter education, and development of shooting ranges.
2. **Dingell-Johnson Act Sport Fish Restoration Act of 1950:** This Act is patterned directly after the Pittman-Robertson Act to improve fisheries by funding state fish and wildlife agencies from a value added tax on fishing gear and associated products.
3. **Migratory Bird Conservation Act of 1929** and the **Migratory Bird Hunting Stamp Act of 1934:** These Acts in combination authorized the Secretary of Interior to acquire land "for use as inviolate sanctuaries for migratory birds" and provided a funding mechanism through *Duck Stamps* for land acquisitions.
4. **North American Wetlands Conservation Act of 1989:** Since the 1780s, about 50 percent of wetlands in the contiguous US have been lost, with some states showing a 75 percent or greater loss of wetlands. With this tremendous loss of wetland habitat, combined with the drought years of the 1980s, waterfowl populations fell to precariously low levels. These decreasing trends and threats to wetland habitats led to the signing of the North American Waterfowl Management Plan (NAWMP) in 1986 by the United States and Canada. The Act provided the funding mechanism to carry out the goals of the NAWMP.
5. **Conservation and Reinvestment Act:** This Act proposed in 1999 was considered historic conservation legislation that would have enabled communities throughout the country to expand parks and recreation, preserve open space farmland, protect wildlife and endangered species, and preserve historic buildings; more than three times the amount currently spent on those purposes. The legislation failed to be passed but provides important lessons learned.
6. **Harbor Maintenance Trust Fund:** The Harbor Maintenance Trust Fund (HMTF) was established by Title XIV of the Water Resources Development Act of 1986 and modified in 1990. Prior to 1986, US Treasury General Funds were used to pay the federal share for operation and maintenance (O&M) of harbors and for the deepening of channels. The Harbor Maintenance Tax which can be considered as a value added tax are deposited into the HMTF from which Congress appropriates funds for harbor O&M purposes, principally through the Army Corps of Engineers.
7. **US Commission on Ocean Policy:** Citing a dire need to protect ocean resources from exploitation and pollution, a presidential commission urged the creation of a federal oceans trust fund supported by revenues from off-shore oil and gas royalties. The Ocean

Policy Trust Fund, similar to the Highway Trust Fund for transportation projects, would come from the annual \$5 billion in bonus bid and royalty payments made to the US Treasury for offshore oil and gas drilling, and from "new uses of offshore waters."

8. **The Domenici-Landrieu Gulf of Mexico Energy Security Act of 2006:** This Act authorized the sharing of 37.5 percent of revenues generated from royalties from a specific oil and gas lease area in the Outer Continental Shelf (OCS). Four Gulf Coast states that host production infrastructure and have drilling off their coasts share in these revenues.
9. **Highway Trust Fund:** The Highway Trust Fund (HTF) was created by the Highway Revenue Act of 1956 primarily to ensure a dependable source of financing for the National System of Interstate and Defense Highways and also as the source of funding for the remainder of the Federal-Aid Highway Program. Prior to the creation of the HTF, federal financial assistance to support highway programs came from the General Fund of the US Treasury. While federal motor fuel and motor vehicle taxes did exist before the creation of the HTF, the receipts were directed to the General Fund, and there was no relationship between the receipts from these taxes and federal funding for highways.

Lessons Learned from Large Federal Programs

The following are the important lessons from these major federal programs which, for the most part, are repeated from program to program. There is no particular order of importance implied for these lessons learned.

1. A coalition of partners with diverse interests but a common goal (e.g., improve wildlife management) coalesced around a mutually acceptable approach that achieved their common goal.
2. A strong national advocate for the program existed, often representing the very group that would pay for the program.
3. A serious problem is being addressed that was important to the broader public.
4. A clear connection is made between the revenue being generated and how it is to be used (e.g., a tax on vehicle fuel is used for highway construction and maintenance). In like manner, a lack of a clear connection between revenue source and its use is problematic (e.g., use of oil and gas severance tax to fund conservation land purchase).
5. A comprehensive plan that articulates the problem with specific goals and actions is important to gain public and political support.
6. States are required to match federal funds by dedicating revenues, but at a level that is palatable to the states.
7. In some cases, a federal excise tax already existed and was being diverted to the General Fund is identified as one that is more appropriately used for the benefit of the

users who are indirectly paying the excise tax; i.e., user pays, user benefits (e.g., tax on guns and ammunition used to support state game and fish departments).

8. In some cases a new user fee was created; however, there is a clear connection between the revenue being generated and how it is to be used. It followed the economic model of user pays, user benefits (e.g., Federal Duck Stamp program).
9. States receive the bulk of the funding with federal administration costs being very low.
10. A popular conservation program, even with wide and diverse support, can lose support if it is seen as a threat to some other important issue (e.g., private property rights).
11. A trust fund mechanism can generally prevent diversion of funds for another purpose.
12. An excise tax or added value tax, tied to commodities that remain in demand, provides a relative dependable stream of sustainable funding (e.g., hunting and fishing supplies).
13. An excise tax collected from the manufacturer/supplier is easier to collect and more acceptable than a tax paid directly by the user.
14. An excise or value added tax that is a percentage of a product's value provides increasing revenue to match with inflation (e.g., guns and ammunition have a set 11 percent tax). Conversely, an excise tax that has a fixed amount does not keep up with inflation or the changing value of a commodity (e.g., gasoline excise tax of 18.4 cents per gallon).
15. For grant programs to states, funds typically flow to states based on a formula that is considered fair with a small percentage reserved for federal agencies to administer these state grants.
16. All states benefit directly or indirectly.
17. Congress' concern about off-budget expenditures in which they have no control on expenditures is contrary to their perceived constitutional responsibilities.
18. In a poor economy, any diversion of funds from the General Fund of the US Treasury is a concern.
19. Overreaching with the use of a discrete funding source can result in failure to gain public and political support for the entire program and its funding.
20. Hurricanes Katrina and Rita as well as the Deepwater Horizon-BP Gulf oil spill may provide the visual and visceral events that have supported the passage of most of the federal conservation programs listed above as well as environmental legislation such as the Clean Water Act (CWA), Endangered Species Act (ESA), and Superfund.

Large-Scale Watershed Restoration Programs

The purpose of this case study analysis is to gain a better understanding of how to construct a cohesive and sustainable funding strategy, and more specifically to learn from the successes and failures of other initiatives. Numerous examples of both large and small conservation initiatives are examined as well as initiatives that are not directly related to conservation. Many

of these examples are referenced in Appendix A. However, actual case study analysis focused on larger conservation oriented initiatives because they tend to involve similar complicating realities as those that are anticipated in the CRB. Also, while older initiatives have more lessons to teach, newer initiatives tend to incorporate more innovative but less tested approaches. Therefore, larger restoration initiatives, both the old and new, were the focus of these case studies.

All large-scale restoration initiatives have particular issues that tend to be the focus. For some, the primary issue is water quality improvements, for others it is forest management or wildlife population maintenance. Also, physical geography, climate and socio-political environment are all significant factors governing the effectiveness of certain funding mechanisms and strategies from one place to another. Of course, all watershed issues are interrelated and thus, as expected, each of the large-scale restoration initiatives examined are multi-faceted.

To begin, a cursory review of domestic and international restoration initiatives was conducted in order to gain a sense of which initiatives have similar issues to those that are faced in the CRB. The selected case studies are listed below with a brief statement regarding why each was selected for review. Further detail is provided in the case study analysis provided in Appendix C.

1. **Platte River Restoration Program:** The Platte River Restoration Program is a watershed level program focused on balancing water quantity issues with the requirements of the Endangered Species Act. Water regulation through dams is a prominent issue in the watershed and this aspect of the program may have specific value for the CRB.
2. **Columbia River Basin Restoration:** This multi-state restoration initiative is loosely organized under the Columbia Basin Water Transactions Program. It includes a wide variety of individual watershed based initiatives that utilize innovative ideas such as certification programs and restoration credits to provide incentive for stream restoration and conservation.
3. **California Bay-Delta Restoration Program:** The California Bay-Delta is faced with the task of fairly allocating water where demand is exceeding supply and flows necessary to sustain surrounding ecosystems are competing with human needs.
4. **Everglades Restoration Program:** The Everglades Restoration Program is faced with issues similar to the CRB, limited water supplies and federally funded historical water projects altering hydrology. The federal government is highly involved in the restoration program at a level that could be deemed necessary in the CRB.
5. **Great Lakes Restoration Program:** The Great Lakes restoration effort was cited by several interviewed individuals working on other programs. It is a prominent example of an international effort that may provide useful insight concerning the interactions

between the United States and Mexico in the CRB. Invasive species are addressed in this program more prevalently than in most other case studies reviewed.

6. **Puget Sound Partnership:** The Puget Sound Partnership (PSP) is a state-level watershed initiative that incorporates a wide array of innovative funding sources.
7. **Chesapeake Bay Restoration Program:** The restoration of the Chesapeake Bay is probably the oldest example of a regional level watershed restoration initiative involving multiple states.
8. **National Estuary Program:** The National Estuary Program is a federal program that is able to leverage outside funding for watershed initiatives to match relatively small amounts through the federal government.
9. **Murray-Darling Watershed Restoration (Australia):** The Murray-Darling Watershed Restoration initiative, in Southeast Australia, possesses striking similarities to the physical and socio-political issues encountered in the CRB, including a focus on water conservation and riparian habitat restoration.
10. **Working for Water Programme (South Africa):** The Working for Water Programme (WfW) is an innovative approach to conservation that involves employment and education programs as the central focus of the initiative. The program also focuses on increasing water availability through invasive species restoration.
11. **European Union Water Framework Directive:** The European Union's (EU) Water Framework Directive covers a wide span of different governments and regulatory agencies providing an overarching framework for watershed restoration.

Lessons Learned from Large-Scale Watershed Restoration Programs

The following is a summary of many lessons learned while examining US and international large-scale watershed management programs. The first section of programmatic lessons is listed because a sustainable management structure is necessary to gain the confidence of potential funders and to effectively and collaboratively apply those funds towards ecosystem progress. The second section discusses lessons learned that apply directly to funding strategies or mechanisms. The watershed programs that indicate each lesson learned are identified for reference. There is no particular order of importance implied for these lessons learned.

An overall take away from these case studies is that the US, Australia, South Africa, the European Union, and many other developed and under-developed nations recognize that large-scale, water way restoration work is very important. The many programs in the US all seem to be reaching a turning point where funding rates have been lower than their plans necessitate and little progress has been achieved. The many regional programs are looking to each other for guidance on management, scientific, and funding structures. The next five to 10 years may be telling in terms of regional and national public and political support for watershed restoration projects.

Programmatic

Governance/Management Structure

1. An effective governance structure, with clear leadership, that includes adequate and effective representation of federal, state, and local agencies, organizations, and stakeholders is essential in a large-scale collaborative effort. [Great Lakes, California Bay-Delta, Everglades, Working for Water, Murray-Darling, Columbia River Basin, National Estuary Program]
2. Collaborative watershed efforts are created to simplify and unify the disparity of many agencies' work in the basin. However, without carefully planning a restoration management plan and well-constructed governance structure, the cooperative effort can become complicated and fragmented. [California Bay-Delta, Puget Sound, National Estuary Program]
3. It is important to consider the correct management approach for the scale of the project. [Everglades, Murray-Darling]

Goals

1. Program priorities and related expenditures must be clear for implementation to be efficient. [California Bay-Delta, Chesapeake Bay, Everglades]
2. A single set of clear, specific goals, objectives, and guidelines are essential for an effective restoration plan. [Great Lakes, Chesapeake Bay, Platte River, Working-for-Water, Murray-Darling, Everglades]
3. Short-term goals (e.g. two years) and objectives that move incrementally towards long-term goals (e.g., 25+ years) help to insulate progress from politics. [Chesapeake Bay, Puget Sound, Everglades, Columbia River Basin]
4. Large-scale ecosystem restoration projects take a very long time. As a result, it is important to set long-term goals far into the future. [California Bay-Delta, Columbia River Basin]
5. Implementation actions towards achieving program goals must be directly linked to overall ecosystem improvement. [Puget Sound, Great Lakes]
6. It is critical that current science (often in the form of complex modeling systems) defines the system's problems and informs the solutions to those problems in a large-scale restoration project. [Chesapeake Bay, California Bay-Delta, Platte River, Puget Sound, Everglades, Working for Water, Murray-Darling, Columbia River Basin]
7. Increased flows in smaller headwater streams can potentially provide more restored habitat and connectivity in the short term. The headwater preservation efforts can also indirectly benefit the mainstem streams. [Working for Water, Columbia River Basin, Puget Sound]

Effective Monitoring

1. Performance measures must be tied to program goals, clearly articulated, effectively monitored and reported, and the program must be held accountable for the achievement of these goals. [Chesapeake, Great Lakes, Columbia River Basin, California Bay-Delta]
2. An effective monitoring program is important, especially when there are long-term goals, to be able to show progress over time and to keep the public and politicians engaged. [Chesapeake, Great Lakes, California Bay-Delta, Columbia River Basin]
3. Adequate monitoring is needed to show progress, but if there is no progress the public and political support may be in danger. [Everglades]
4. Adaptive management is an invaluable tool in large-scale restoration efforts. [Great Lakes, EU Water Framework Directive, Everglades, California Bay-Delta]
5. If progress is to be made, large-scale restoration efforts must move forward in the face of scientific uncertainty, this concept is sometimes described as the precautionary principle, and is enabled through adaptive management. [Platte River, Everglades, EU Water Framework Directive]
6. Adaptive management is an important tool in large-scale restoration efforts but could be problematic when more closely associated with stakeholder desires rather than scientific uncertainty. [Platte River]

Public and Political Support

1. A *champion*, whether a politician or an organization, that works to push the program forward is extremely important. [Chesapeake Bay, Great Lakes, California Bay-Delta, Everglades]
2. Current Interior Secretary Ken Salazar is aware and supportive of large-scale restoration of rivers. [Platte River, Everglades, Chesapeake Bay]
3. An accurate understanding of the public's opinion on an issue helps to garner political attention. [EU Water Framework Directive]
4. In order to gain public support, you must appeal to the public's values. A major value of the public is "clean water and enough of it." [Chesapeake Bay, EU Water Framework Directive, Great Lakes, Everglades, Working for Water, Murray-Darling]
5. Human health is a large public concern. [Great Lakes, Chesapeake Bay]
6. Estuaries are generally the focal point of large-scale, watershed based restoration efforts due to their disproportionately high biological productivity and density of human population and development. [National Estuary Program, Chesapeake Bay, Puget Sound, California Bay-Delta]

7. Public support is necessary to gain political support. [Great Lakes, California Bay-Delta, Everglades, EU Water Framework Directive, Murray-Darling]
8. Bi-partisan support at both the public and political level is important to sustain funding. [Chesapeake Bay, Great Lakes, Everglades, California Bay-Delta]
9. Solidifying public and political bi-partisan support for the program at an early stage goes far to ensure lasting support, and thus funding, for the program. [California Bay-Delta]
10. A successful demonstration project in the watershed early on in the process is important to gain support for the entire effort. [Chesapeake, Working for Water, Columbia River Basin]
11. A sub-group targeting a specific issue can be used to draw attention to the other issues in the watershed and to accelerate progress on critical issues. [Great Lakes, Chesapeake Bay, Puget Sound, Working for Water]
12. A public and political sentiment of urgency to progress towards a healthy, sustainable ecosystem is present in several of the case studies examined. [California Bay-Delta, Everglades, Chesapeake Bay, Great Lakes, Puget Sound, Murray-Darling]
13. The laws of supply and demand are making the value of nature more apparent. [Puget Sound, Murray-Darling, Columbia River Basin]
14. The National Estuary Program is based on the Great Lakes and Chesapeake Bay efforts, indicating a level of national interest in solving these types of issues. [National Estuary Program]
15. The program must actively seek consistent and widespread public support throughout its lifespan in order to receive and maintain funding. [Chesapeake Bay]
16. In multi-state efforts more progressive states tend to lead the way for the more conservative states. [EU Water Framework Directive, Chesapeake Bay, Columbia River Basin]
17. Combining environmental objectives with the social needs of the region can provide strong political support for the program. [Working for Water]
18. Crisis triggers policy response. [Chesapeake Bay, Puget Sound, Murray-Darling, Columbia River Basin]

Regulation versus Collaboration

1. Voluntary, collaborator efforts are not enough. Regulatory force is necessary for success. [Chesapeake Bay, Columbia River Basin]
2. It is helpful to have an independent watchdog serving to regulate actions. [Chesapeake Bay, Great Lakes]
3. Collaborative efforts tend to be punctuated by periods of litigation due to a lack of or temporary stall in progress. This generally results in action that moves the collaborative program forward. [Chesapeake Bay, California Bay-Delta, Platte River]

4. It is important to recognize the potential for collaborative efforts to weaken regulatory requirements and reduce levels of funding required by polluting or benefiting industry. [California Bay-Delta, Platte River]
5. Collaboration on such a large scale is challenging to achieve and should be backed by regulation; otherwise, efforts would be so fragmented and vary so much with changing political agendas that progress would be difficult. [California Bay-Delta, Platte River, Murray-Darling]
6. Creating regional or local level partnerships help to involve local stakeholders and agencies in large-scale plans. [Great Lakes, California Bay-Delta, Chesapeake Bay, Columbia River Basin]
7. Regional partnerships help to create standards that states must abide by while allowing them flexibility in their approach; this could lend itself to a national model. [Great Lakes, Chesapeake Bay]

Statue of Authority/Legislation

1. Several large-scale, watershed restoration programs are trying to get new, more stringent legislation passed. [Chesapeake Bay, Puget Sound]
2. Embedding a large-scale, watershed restoration program in legislation, such as the Clean Water Act, provides government authorities, such as EPA, with a clear role and articulated responsibilities. [Chesapeake Bay, Great Lakes, National Estuary Program, Murray-Darling, Columbia River Basin, EU Water Framework Directive]
3. If executive or legislative actions are enacted that hold a government body responsible for watershed wide restoration efforts and results, then it is more likely that there will be government funding available to increase progress towards goals. [Chesapeake Bay, Murray-Darling, Columbia River Basin, National Estuary Program, Great Lakes, Platte River]
4. There is no statue of authority to fund conservation related activities. Thus, a management plan containing an ecosystem/watershed wide approach is important and increases likelihood that riparian and invasive species issues would be addressed. [Great Lakes, Chesapeake Bay, Everglades, Puget Sound, California Bay-Delta]
5. A specific statute of authority can be created to facilitate a comprehensive environmental river basin management on a regional scale. [Water Framework Directive, Murray-Darling]
8. The Platte River and Columbia River Basin are the only large-scale, domestic restoration project studied that do not focus on an estuary. This is likely because they are driven by ESA instead of the CWA. [Platte River, Columbia River Basin]
9. The ESA is a powerful statute of authority encouraging action and funding, especially when tied to water use. [Platte River, Columbia River Basin]

10. Strengthening the CWA regionally could substantially improve the effectiveness of the legislation. [Great Lakes, Chesapeake Bay]
11. There is precedent for the ESA and watershed wide restoration activities to regulate water flows. [Platte River, Columbia River Basin, Everglades]
12. Without statutory authority natural resource markets are not likely to develop. [Columbia River Basin, Murray-Darling]

Federal Involvement

1. Federal, or international government, involvement in watershed restoration efforts may aid in interstate and international interactions. [Puget Sound, Great Lakes, Chesapeake Bay, Platte River, EU Water Framework Directive]
2. Watershed wide, large-scale restoration efforts throughout the United States are looking to one another for guidance, legal precedence, and funding mechanisms, perhaps indicating the need for increased federal leadership. [Platte River, Puget Sound, Chesapeake Bay, Everglades, Great Lakes, California Bay-Delta]
3. The Puget Sound is actively seeking increased federal leadership. [Puget Sound]
4. The cumbersome federal process (primarily Army Corps of Engineers), while noted to be improving, is partially blamed for the slow progress in the Everglades. [Everglades]
5. The federal and state governments created the dams and water projects that are affecting the health of the Platte River, the Columbia River Basin and the Everglades and are now responsible for the restoration plan cost. Though funding levels have been lower to date for the Everglades than promised. [Everglades, Platte River, Columbia River Basin]

International Influence

1. International attention for a threatened ecosystem creates pressures on managers and politicians to act. [Everglades]
2. Shared international borders provide additional pressure to act responsibly. [Great Lakes, Puget Sound, EU Framework Directive, Columbia River Basin]

Funding

1. Despite numerous public and private funding streams, domestic restoration programs studied have not been able to develop a truly sustainable funding source. [California Bay-Delta, Chesapeake Bay, Puget Sound, Everglades, Great Lakes, Platte River, Columbia River Basin]
2. Contradicting the above lesson learned, the National Estuary Program claims to create sustainable funding plans for its projects. Though this is difficult to examine at length, it may indicate that the sum of multiple funding mechanisms (similar to those tried on a

large scale in the Chesapeake, Puget, etc.) may create sustainable funding structures at certain scales. [National Estuary Program]

3. The precautionary principle supports the EU Water Framework Directive by erring on the side of environmental action. The EU Water Framework Directive created an internal funding mechanism that aligns with this principle. [EU Water Framework Directive]
4. Investing in watershed health now is financially wise. The no-action alternative may prove to be more expensive in the long run. [Chesapeake Bay, Puget Sound, Working for Water]
5. Even if funding for the restoration projects is well defined in the short term, there is often no plan in place for long-term funding following the initial project goals. [Platte River]
6. The costs of the project must be defined in order to determine funding needs. [Chesapeake Bay, Puget Sound]
7. It is important to identify a financial plan early on in a large-scale watershed restoration effort as the amount of funds that can be expected will drive the scale and schedule of the implementation plan. [California Bay-Delta, Chesapeake Bay]
8. If budgets and funding structures are created early on in the planning process, it is more likely that the project will be funded at desired levels. [Platte River]
9. It is important to understand what funding is currently available in a watershed to create a financial plan. [Puget Sound]
10. Federal funding has generally been lower than expected and the majority of funding has come from local sources. [Puget Sound, Everglades, Chesapeake Bay, Columbia River Basin]
11. Diversified funding sources help to insulate the program from difficult financial times. [Chesapeake Bay]
12. The sum of multiple funding mechanisms works well to create a sustainable funding network at certain scales. [National Estuary Program]
13. Insulating program funds from state or federal general funds is an important step towards sustainability. [Platte River, Chesapeake Bay]
14. Public trust funds, or publicly initiated private trust funds, can be a good way to equitably raise and manage funds if an initial capitalizing agent is identified. [Great Lakes, Chesapeake Bay, Platte River]
15. Interest accrued through a trust fund adds significantly to the value of that trust. [Chesapeake Bay]
16. Public funds, as they are currently allocated, are not enough to create a sustainable, significant funding source for these watershed programs. [California Bay Delta, Chesapeake Bay, Everglades, Puget Sound]

17. As public funds have not been sufficient to achieve success, an increase use of private funds is deemed necessary by many to find success in the watershed. [California Bay-Delta]
18. Maryland is considering that water users should pay the *true* costs of water. [Chesapeake Bay]
19. Assigning the true costs of water, including environmental impacts, will likely help the EU to encourage improved efficiencies, especially in the agricultural sector, while funding the large-scale restoration of its waterways. [EU Water Framework Directive]
20. Funding revenue collected through broadly based taxes are typically *fairly* distributed to projects throughout the contributing tax base area. This is not necessarily the most efficient way to reach success in a large-scale, watershed plan. Science-based prioritization of action is helping in avoiding this *fairness* based fund distribution. [Great Lakes, California Bay-Delta]
21. When funds are generated by the public in any way it is especially important to ensure that the fees are related to specific activities and are insulated from the General Fund to ensure they are used for their original purpose. [California Bay-Delta]
22. Colorado is dedicating a portion of its Severance Tax funds to the Platte River Recovery. [Platte River]
23. Watershed wide programs do not necessarily learn from their mistakes. The latest California Bay-Delta finance plan is planning to continue relying on bond funding to some extent. Bond funding was often sold to the public by agencies and stakeholders with little input from the state legislature. The over reliance on bond funding has contributed to California's fiscal problems. [California Bay-Delta]
24. Bond funding costs more than it generates and is not a sustainable resource for a long-term project. Bonds seem more appropriate for jumpstarting a program by providing capital quickly. [California Bay-Delta]
25. Where possible, utilize the efficiencies of market economics with payments for ecosystem services strategy. [Columbia River Basin, Working for Water, Great Lakes]
26. Payments for ecosystem services are suited to cases where environmental protection goals are clearly defined and recovery is the goal. [Puget Sound, Columbia River Basin , Working for Water]
27. Markets are suited to cases where environmental protection goals are clearly defined and recovery is the goal *and* instances where there will be ongoing, unavoidable impacts from population growth and development (i.e. cap and trade). [Puget Sound]
28. Charging beneficiaries and polluters for restoration could greatly enhance large-scale restoration efforts' ability to secure funding. [Great Lakes, California Bay-Delta, Columbia River Basin, Working for Water]

29. Everglades' sugar growers are paying for restoration consistent with the polluter pays principle. [Everglades]
30. If research and practicable experience demonstrates that water can be salvaged from restoration activities then private entities will pay for the work. [Working for Water]
31. Hydropower surcharges can be a primary and sustainable financial source for riparian restoration. [Columbia River Basin]
32. Market-based mechanisms might offer a sustainable long-term solution, but the early development of the mechanisms is slow and requires more traditional financing such as federal grants. [Columbia River Basin]
33. Water users are willing to pay for restoration efforts in order to receive regulatory certainty. [Platte River, Murray-Darling]

Funding Strategies

Many of the large-scale, watershed restoration programs have created strategies to find sustainable funding. Relevant information gathered in these efforts is summarized below.

California Bay-Delta

Lessons learned from previous California Bay-Delta work seem to inform the new Delta Vision's Strategic Plan which calls for the following design principles to support sustainable funding: 1) create multiple revenue streams; 2) identify beneficiaries; 3) allocate funds consistently; 4) prevent funds from diversion in tight budget years; 5) do not create the expectation of public payment for ecosystem water requirements; 6) ensure project compliance with state and Bay-Delta laws and policies; and 7) create a method to withhold funds if such laws and policies are violated (Isenberg et al. 2008).

The Delta Vision's Strategic Plan also calls for the establishment of revenue systems outside of the State General Fund using the following methods: 1) levy a per-acre-foot fee on Delta watershed water diversions and a separate fee on water conveyed through or around the Delta; 2) use tough enforcement to ensure all funds are dedicated to the Delta Vision Plan and cannot be diverted; 3) require compliance with the Delta Vision Plan for bonds and financing mechanisms; and 4) require localities to create a localized financial plan (Isenberg et al. 2008).

Additionally, the Delta Vision's Strategic Plan calls for new revenue sources beyond traditional bond funds or public allocations. The plan identified three potential revenue generating methods: 1) mitigation and conservation banking; 2) sequestering carbon and reducing carbon emissions; and 3) and private, voluntary contributions (Isenberg et al. 2008).

National Estuary Program

The National Estuary Program (NEP) achieves their ability to leverage funds using a four step method: 1) a Management Committee or Finance Planning Committee is tasked with

developing a finance plan that identifies and evaluates possible funding sources; 2) NEPs work to develop strategic partnerships that will help obtain and leverage additional financial support; 3) successful results are demonstrated to ensure financial supporters that the organization is capable of effectively implementing plans, can be trusted to use resources wisely, and will give credit to their contributors; and 4) seed money and staff time is provided to research and develop new funding sources (EPA 2005; EPA 2010).

Puget Sound

The Puget Sound Partnership (PSP) identified a funding strategy to support Puget Sound recovery in a two part report identifying new innovative funding sources and estimates of current spending related to the Puget Sound. Three core recommendations of the innovative funding report are to: 1) create a regional payment for ecosystem services program and initiate the creation of a regional ecosystem marketplace; 2) expand green taxes and tax incentives; and 3) *vigorously promote* voluntary private sector programs (Cassin & Davis 2008). These methods of funding effectively align environmental and economic incentives, which the report deems necessary to meet the financial needs of the Puget Sound recovery effort. In order to achieve this unity, the report stated that the PSP must; 1) organize existing financial incentive efforts so they are coordinated and complimentary and form regional strategy *building blocks*; 2) develop *cost-effective compliance* mechanisms for development and business regulatory and incentive programs; and 3) leverage greater levels of private sector investment (Cassin & Davis 2008).

It is suggested that an ecosystem market place be jumpstarted using public funding to buy ecosystem services (i.e. riparian, wetland, or shoreline restoration) that could then be sold to developers to mitigate environmental impacts. The PSP would serve as an ecosystem credit *bank* and track credit procurement. These actions would, in theory, create the perception and eventual reality that units of ecosystem improvement are valuable and a viable regional market would follow. The expansion of green taxes/tax incentives and voluntary private-sector programs at state and local levels would hopefully encourage environmentally friendly actions while enhancing local governments' ability to meet Puget Sound restoration responsibilities (Cassin & Davis 2008).

Application of Lessons Learned in the Colorado River Basin

These lessons identified above, both positive and negative, must be further evaluated in light of the constraining factors specific to the CRB, including social, political, physical, and economic factors:

1. Currently, there seems to be a nationwide **opposition to taxes** for the purpose of funding public programs. This trend is perhaps more pronounced in the politically conservative Inter-Mountain West. Therefore, the use of new taxes or additional fees

to fund resource management and ecological restoration may prove to be politically difficult unless scientific and economic inquiry can provide compelling reasons for the tax or fee.

2. The body of **scientific knowledge** pertaining to the issues of water resource management and riparian ecology needs further development. Most research suggests that current water management is inefficient and the ecological implications of management objectives are profound. Conflicting research and agency objectives have created an air of uncertainty and confusion among policy makers, which creates weak justification for the large expenditures.
3. **Prevailing water policy and legal precedent** in the West is in need of updated reform. The current water policies are inefficient, tend to ignore advances in scientific understanding, and devalue a critically scarce natural resource. Even if policy makers agree with these commonly held assertions, reforming 100 years of legal precedent is not an easy task. Innovative legal and policy approaches are needed to correct or at least mitigate these complicated problems.
4. The prevailing logic among people residing in the West, which may be a function of factor #3, is that diversion and storage of water equals water conservation. It is therefore critically important to provide **educational outreach** which educates the voting public on issues such as reservoir evaporation rates, aquifer storage, forest management, floodplain ecology and advances in agricultural conservation techniques, which will all likely play a role in a more ecologically balanced water conservation strategy.
5. Water conservation in the West is appealing to a diverse audience, but the difficult issue will be **connecting conservation of water to riparian health**, which involves allowing sustainable flows; a notion that is contrary to the traditional concept of water conservation as stated in #4 and many see as a non-beneficial use.
6. Water quality and endangered species are offered protection by the CWA and the ESA, but statutory protection of other valuable natural capital is not available in most western states. Riparian habitat and headwater forests are offered no specific protection outside of the limited involvement with the CWA, ESA and National Environmental Protection Act (NEPA). These laws do provide strong protection of certain components of riparian and forest habitat, but only in limited geographic locations. **A direct legislative hook** to ensure the preservation or restoration of riparian systems is not currently available.

Funding Mechanism Viability in the Colorado River Basin

Tables 1 through 5 below provide a summary of the Tamarisk Coalition’s findings with regards to the use of specific revenue generating mechanisms within the CRB. The funding mechanisms are organized according to the five fundamental funding sources listed above (taxed based, regulatory, lending, market, and voluntary based revenue sources). Extended definitions and discussion of each of these mechanisms are provided in Appendix A.

Each of these mechanisms are rated in Appendix A as to their **Potential Significance** to raise a large sum of money, their **Reliability** to consistently provide a level of funding, their **Applicability** to the Colorado River Basin, and their **Political/Social Acceptability** to derive an **Overall Viability** ranking. This analysis represents the Tamarisk Coalition’s opinion, informed by analysis, of whether or not the mechanism should be given further consideration for the purpose of restoration in the CRB.

Tables 1 through 5 summarize each of the funding mechanisms and their overall viability for localized, state-wide, and CRB-wide initiatives. Overall viability for each of these geographic sizes is ranked as either **High** (color code Green), **Moderate** (Yellow), or **Low** (Orange). There are numerous cases where the funding mechanism is also deemed as **Not Viable** (Red) principally because the mechanism is inappropriate for the specific geographic size (e.g., property taxes could support either localized efforts or state-wide efforts but are not viable to be shared with other states in the CRB). In some cases there is a range for overall viability. For specific details on the basis for these rankings, the reader is referred to Appendix A.

Table 1: <u>Tax and Fee Based Revenue Mechanisms</u> for Ecological Restoration in the CRB (alphabetically listed)	Overall Viability		
	Localized	State-wide	CRB-wide
Access Fee (e.g., use fees, water recreation permit surcharge)	MODERATE	MODERATE	MODERATE
Ad Valorem Tax (e.g., property tax, real estate transfer tax)	MODERATE	LOW	NOT VIABLE
Cumulative Impact Fees (e.g., sprawl fee, ecosystem services impact fee)	HIGH	MODERATE to	MODERATE
		HIGH	
Energy Severance – <u>Existing Federal Rate</u> (oil, gas and coal)	NOT VIABLE	NOT VIABLE	MODERATE to
			HIGH
Energy Severance – <u>Federal Increased Rate</u> (oil, gas and coal)	NOT VIABLE	NOT VIABLE	LOW
Energy Severance – <u>Existing State Rate</u> (oil, gas, and coal)	NOT VIABLE	LOW	NOT VIABLE
Energy Severance – <u>State Increased Rate</u> (oil, gas, and coal)	NOT VIABLE	LOW	NOT VIABLE
Sand and Gravel Severance	LOW to	MODERATE	LOW
	MODERATE		
In-stream Flow Tax Credits	MODERATE	HIGH	LOW
Recreational Equipment Sales Tax – Federal and/or State	NOT VIABLE	MODERATE to	LOW to
		HIGH	HIGH
Resort Tax/Ecotourism Payments	MODERATE	LOW	LOW
Road/Bridge Toll (e.g., ecological maintenance surcharge)	LOW	LOW	LOW
Utility Surcharges and Fee-Bates	MODERATE to	MODERATE to	MODERATE to
	HIGH	HIGH	HIGH
Transbasin Ecological Surcharge	MODERATE to	MODERATE to	LOW to
	HIGH	HIGH	MODERATE
Water Diversion Fee (e.g., consumptive use tax)	MODERATE	MODERATE	LOW
Water Rights Transfer Fees	LOW	LOW	NOT VIABLE

Table 2: <u>Regulatory Based Revenue Mechanisms</u> for Ecological Restoration in the CRB (alphabetically listed)	Overall Viability		
	Localized	State-wide	CRB-wide
In-lieu Fee Program	LOW	MODERATE	MODERATE to
			HIGH
Mitigation and Bonding Requirements	LOW	LOW	LOW
Environmental Non-Compliance and Damage Fines	LOW	LOW	LOW
Reimbursement Fee	LOW	LOW	LOW

Table 3: <u>Lending Based Revenue Mechanisms</u> for Ecological Restoration in the CRB (alphabetically listed)	Overall Viability		
	Localized	State-wide	CRB-wide
Revenue Bonds	LOW to	LOW to	LOW to
	HIGH	HIGH	HIGH
Revolving Loan Fund	LOW to	LOW to	LOW to
	HIGH	HIGH	HIGH

Table 4: <u>Market Based Revenue Mechanisms</u> for Ecological Restoration in the CRB (alphabetically listed)	Overall Viability		
	Localized	State-wide	CRB-wide
Corporate Environmental Performance Incentives	MODERATE	LOW to	LOW to
	HIGH	HIGH	HIGH
Mitigation Banking (aka Offset Investment Banking)	MODERATE	LOW to	MODERATE to
		HIGH	HIGH
Permit Trading Program (aka Pollution Trading, Cap and Trade)	MODERATE	LOW to	LOW to
		HIGH	HIGH
Transferable Tax Credits for Conservation Easements (aka Development Credit Trading)	MODERATE	MODERATE	LOW
Water Rights Trading and Water Banks	MODERATE	MODERATE to	LOW
		HIGH	

Table 5: <u>Volunteer or Philanthropic Based Revenue Mechanisms for Ecological Restoration in the CRB (alphabetically listed)</u>	Overall Viability		
	Localized	State-wide	CRB-wide
Certification Program	MODERATE	MODERATE to	MODERATE to
	HIGH	HIGH	HIGH
Lottery/Gambling Revenues	LOW	LOW	LOW
Private Payments for Amenity for Services, Watershed, and/or Habitat Protection.	LOW	LOW	LOW
Tax Form – Check Off	LOW	LOW	LOW
Vanity License Plates	LOW	LOW	LOW
Voluntary Labor (aka volunteerism)	HIGH	MODERATE to	MODERATE to
		HIGH	HIGH
Voluntary Offset Investment	HIGH	MODERATE to	MODERATE to
		HIGH	HIGH
Voluntary Surcharge Program	MODERATE	LOW	LOW
		MODERATE	MODERATE

General Conclusions and Recommended Next Steps

The CRB encompasses a large geographic area including portions of seven states and disjointed population centers that depend on an extensive hierarchical network of large and small watersheds, which are heavily modified for the purpose of water distribution and use. It is likely that each population center, sub-watershed and state will have varying interests and priorities regarding the restoration of the CRB. Residents of some watersheds may be more willing to fund riparian restoration than others. Therefore, relying on local funding initiatives may be an effective approach in certain localized areas, but it is not likely to provide the coordinated and comprehensive approach that is needed to accomplish the goal of restoring and maintaining stream flows and riparian habitat in the entire basin.

Furthermore, the lower portions of the watershed stand to benefit directly from restoration efforts that are undertaken in upstream portions, while the reverse is not necessarily true. This physical arrangement necessitates a collaborative funding approach in which all beneficiaries contribute equitably to the initiative. Given the current uncertainties regarding specific scientific and economic relationships in the CRB, the early stages will almost certainly require providing incentives for voluntary participation. As water law and natural resource policy is modernized in coming years to accommodate a better understanding of ecology and services provided by natural systems, more funding opportunities will likely be created.

However, watershed efforts should not wait for all the pieces of the puzzle to fit together perfectly. Proactive pursuit of ecosystem market opportunities will help to plant the seed for other larger market based efforts down the road and also serve to bolster the growing interest in CRB restoration. Furthermore, the collective understanding with regard to basic ecosystem health of the CRB is sufficient at this time to pursue greater use of the few regulatory hooks that do provide a legal obligation to act, including the CWA, ESA and NEPA.

The subjective assessments summarized in the preceding tables represent a starting point for more in-depth discussions and may change based on value judgments of others. The analysis, although inconclusive, does provide a starting point for developing a sustainable funding strategy. As Postel and Thompson noted:

There is no 'right' approach: successful arrangements will be contoured to the needs and characteristics of individual watersheds. Options that make sense for small watersheds may differ considerably from those suitable for very large ones. Similarly, measures appropriate for relatively pristine watersheds may not be applicable to watersheds in which substantial population and economic activity already exists (2005:101).

It is critically important to recognize that lessons can be taken from the case studies and used to determine: 1) If any of the funding mechanisms explored are worth further consideration in the CRB; 2) How these various funding approaches might be efficiently integrated into larger funding strategies that are appropriate for the CRB and; 3) What programmatic, political, and social approaches are necessary to facilitate the implementation of the preferred strategies.

As planning for a large-scale watershed restoration continues, which may be a long process, there is benefit for watershed restoration proponents to actively pursue restoration on a grass-roots or sub-watershed level to help provide the education, awareness, and successful demonstration projects that are so critical for garnering public support for a larger initiative.

The following recommended next steps are based on the information assembled and include supporting actions that may be necessary to answer key questions:

1. Identify several potential sustainable funding mechanisms that seem to have promise and develop a rudimentary analysis of their theoretical application in the CRB including user-based revenue potential and more detailed examination of legal and political challenges. To begin this analysis, it is suggested that representatives of the Walton Family Foundation, The Nature Conservancy (TNC), and the Tamarisk Coalition hold a workshop to determine the best prospects for sustainable funding and how to move towards implementation of them.
2. A fundamental aspect of any sustainable funding mechanism is that it will take political will to institutionalize most of the mechanisms identified. Four questions need to be answered to gain this political will: 1) *What is the problem?* 2) *What are the solutions?* 3) *What are the costs?* and 4) *Who is going to pay for it?* These questions can be answered by:
 - What specifically are the problems in the CRB that are imperative, in the public's view, to solve?
Potential Actions:
 - Identify the full range of ecological problems in the CRB.
 - Determine the root causes of these problems.
 - Determine the public priorities for these ecological problems.
 - Determine how best to solve or mitigate the problems that are critical public concerns.
 - What are the potential solutions, their costs, and their long-term fiscal requirements?
Potential Actions:

- Conduct more detailed feasibility study of specific restoration strategies and goals. For example, for an urban water and hydro-electric utility surcharge, how many people are involved, what would the surcharge rates need to be in order to meet the expected restoration costs, what political and legal obstacles are likely to be encountered?
- Who is going to pay for this? If payment for ecosystem service approaches are envisioned then what ecosystem services are important enough, by themselves or in combination with others, which the public would be willing to support?

Potential Actions:

- Identify and describe ecological services and products of the CRB; such as water, wildlife habitat, wildfire mitigation, recreation, aesthetics, flooding, preventing the endangered species listing, etc.
- Define potential market relationships. For example, salinity control programs and downstream water users.
- Identify specific resource users and their direct or indirect relationship to (willingness to pay for) ecological services and products of the CRB.
- Determine market metrics and conduct cost/benefit analysis for individual ecological service and product markets.

Literature Cited

Cassin, J., and A. Davis. 2008. Puget sound partnership action agenda funding strategy work products. Puget Sound Partnership, Olympia, Washington. Available from <http://www.psp.wa.gov/downloads/AAAPX/funding.pdf>

de Groot, R., M. de Wit, E. J. Brown Gaddis, C. Kousky, W. McGhee and M. D. Young. 2007. Making restoration work: financial incentives. Pages 286-293 in J. Aronson, S. J. Milton and J. N. Blignaut, editors. Restoring natural capital: science, business and practice. Island Press, Washington, Covelo, London.

EPA (Environmental Protection Agency). 2005. Community-based watershed management: lessons from the national estuary program. Environmental Protection Agency. Washington, D.C. Available from <http://www.epa.gov/owow/estuaries/neprimer/documents/srNEPPrimer.pdf>

EPA (Environmental Protection Agency), Sustainable Financing Strategies, 2010. URL <http://water.epa.gov/type/oceb/nep/fund.cfm> [accessed on 20 July 2010]

Hurd, J. 2009. Innovative financial mechanisms to fund watershed restoration. Wildlands CPR, Missoula, Montana. Available from http://www.wildlandscpr.org/files/Financial_Mechanisms_0.pdf

Isenberg, P., M. Florian, R. M. Frank, T. Mckernan, S. W. McPeak, W. K. Reilly, and R. Seed. 2008. Delta vision strategic plan. Delta Vision, California. Available from http://deltavision.ca.gov/StrategicPlanningProcess/StaffDraft/Delta_Vision_Strategic_Plan_standard_resolution.pdf

Postel, S. L., and B. H. Thompson Jr. 2005. Watershed protection: capturing the benefits of nature's water supply services. *Natural Resources Forum* **29**: 98–108.

Powell, I. and A. White. 2001. A conceptual framework for developing markets and market-based instruments for environmental services of forests. Paper prepared for Developing Markets for Environmental Services of Forests, 4 October, Vancouver, BC.

Appendix A

Glossary and Examples of Sustainable Funding Mechanisms

This appendix provides a glossary of strategies that are fundamentally sustainable funding mechanisms. **Sustainable funding is defined**, for the purpose of this paper, **as a perpetual revenue stream that is sufficient in magnitude to accomplish a program’s goals and reliable enough to confidently develop long-term maintenance and monitoring programs**. These strategies are separated into the following categories:

- Tax and Fee Based Revenue Mechanisms
- Regulatory Based Revenue Mechanisms
- Lending Based Revenue Mechanisms
- Market Based Revenue Mechanisms
- Volunteer and Philanthropic Based Revenue Mechanisms

Each mechanism is briefly described along with examples of its use from case studies described in Appendices B and C and other sources. The mechanisms applicability to the Colorado River Basin (CRB) is also evaluated.

Throughout the appendix the terms *Payment for Ecosystem Services* and *natural capital* are used. These terms represent a financial and ecological appreciation of natural resources. Essentially, Payment for Ecosystem Services mechanisms seek to conserve natural resources by assigning value to the function or service provided by natural resources (a.k.a. natural capital).

Tax and Fee Based Revenue Mechanisms

Innovative tax based funding includes a variety of government initiated taxes or fees that are intended to discourage over-consumption, encourage conservation in the private sector and/or serve as a mechanism for transferring funds to maintain social equity. Such taxes and fees are collectively referred to as *green taxes* or *environmental damage fees*. While the terms *tax* and *fee* are used interchangeably, the term *fee* is used in this document as a payment made for the purpose of privilege or access as opposed to a *tax* which refers to payments that are more broadly accessed for the primary purpose of generating revenue.

The use of taxes and fees as a revenue source is an important component of most restoration efforts, even for market-based systems that are in the early stages of market development. In the current political climate a new tax proposal would not likely find enough public support,

especially in the politically conservative Intermountain West. Therefore, a new tax proposal would need to be carefully presented to the public with strong scientific and economic justifications and crafted with non-partisan language. More importantly, it is critical to have support from political leaders representing both major parties.

Water Right Transfer Fees and In-Stream Flow Tax Credits

Similar to a traditional real estate transfer fee (or tax), which is a fee applied during the transfer or sale of property, a water right transfer fee is applied during the sale or transfer of water rights. Water rights are treated as real property and are therefore generally bound by the same tax codes as real estate in most western states that operate under the prior-appropriation water allocation doctrine.

In-stream flow (ISF) water rights are water rights that keep water in the streams for the purpose of ecological function and/or recreational value. Each state has the ability to provide tax-based incentives to encourage water right owners to transfer the traditional uses of water rights, such as agriculture and industrial, to ISF rights.

Examples:

The State of Maryland has successfully dedicated real estate transfer fees for the purpose of land conservation, generating \$325 million from 1992 to 1999 for land purchases in the Chesapeake Bay watershed (Doyle & Drew 2008).

The State of Washington applies its traditional real estate excise tax (REET) to the transfer or sale of real property. Water rights constitute real property under Washington State law and are therefore subject to the same tax. The tax rate of 1.28 to 2.78 percent of the water's selling price is paid to the county in which the water right exists (WSDR 2006).

Colorado House Bill 09-1067, which became effective on August 5, 2009, allows water right owners in Colorado to receive a tax credit for donation of water rights to the Colorado Water Conservation Board (CWCB) for the purpose of environmental ISFs. "The credit shall be in an amount equal to or less than one-half of the value of the water right proposed to be donated to the board... (CSL 2009:3)".

Applicability:

It is unlikely that a new water right transfer tax would be politically acceptable, but the fact that many states apply a real estate transfer tax to water right transfers provides a good opportunity to provide a conservation incentive through a charitable tax credit for rights transferred for the use of in-stream flow conservation. As noted above, this type of tax credit to water right owners has already been enacted by the Colorado State Legislature. Of course a tax credit is not a revenue source, but it does replace the need for other funds that would be used to purchase

ISF water rights. Also, the practice could prove to be a relatively reliable source of substitute revenue that accomplishes one of the primary goals of maintaining a natural flow regime in the CRB. Applicability of real estate and water right transfer taxes should be fully explored in all CRB states as well as the applicability of ISF tax credit programs.

Recreational Equipment Tax / Luxury Tax

A tax applied to recreational equipment such as fishing poles, motor boat fuel, and guns are frequently applied to raise revenue for the resource that must be protected in order for the consumer to enjoy his/her preferred form of recreation. Also, some recreational activities result in a larger impact on the resource than other activities, which may justify varying recreational equipment taxes that are proportionate to the impact. For example, motorboats can be polluting and are typically used in reservoirs that create greater impacts on the ecology of the river system than non-motorized boats such as kayaks, which are typically found in flowing streams and probably have negligible pollution impacts on the ecology of the river system.

Examples:

The Pittman-Robertson Act of 1937 re-directed the revenue gained from an existing federal excise tax on hunting equipment (guns and ammunition) to be dedicated for the specific purpose of wildlife conservation. The tax now generates approximately \$470 million annually.

Applicability:

Research is needed to determine the potential for state or local recreational equipment taxes.

Resort Tax / Ecotourism Payments

A localized tax applied to goods and services that are associated with tourism such as hotels, camping, restaurants, bars, and luxury items can be reliable sources of revenue. The tax is intended to pay the community for maintaining the amenities, whether natural or manmade, which create the tourism draw. Revenue generated can be used to conserve and restore the natural capital that could in theory be exploited by locals for other more industrial purposes (i.e. timber sales, mining, crops, etc.). Frequently, these revenues are used for unrelated municipal improvements or to offset municipal taxes. Instead, by applying the ecotourism taxes directly to the maintenance of ecological integrity, the tax can be expanded to a market based Payment for Ecosystem Services (PES) system. Thereby, improving or maintaining the resource and consequently providing local businesses with perpetual income can be of greater long-term economic value than a one-time timber sale.

Example

Colorado has a relatively low state sales tax (two to three percent), but most ski-towns add an additional sales tax (up to eight percent in some places) on specific tourism industry services and goods.

This concept could be a useful at a local level in places like Moab, Utah where river recreation is a significant income generator. However, a 1.5 percent resort tax already exists in Moab and most other tourism supported communities, and this is the maximum Moab is allowed to charge based on Utah state law (USTC 2010).

The State of Maryland has successfully funded the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund through a dedicated rental car and motor fuel tax. This \$9.6 million dollar fund is used for water quality and watershed restoration projects.

Applicability:

Resort taxes typically are associated with discounts in local property taxes or business taxes that help the local community in a more direct manner (road maintenance, community centers, parks etc.). Using the money for restoration would probably be difficult due to the more obscure public-good of the activity. Therefore, the use of resort taxes for the purpose of natural capital restoration and maintenance would require strong economic justifications and education at the local level. This concept is particularly difficult in the CRB because the degradation of the river system is not obvious to the casual observer, and may not even be a spending priority for many local residents. However, a similar tax could be applied to specific tourism related activities such as car or boat rentals similar to the Maryland car rental tax. Although such a specific tax might not provide significant funding it could potentially provide a reliable source of funding that is directly tied to the ecological service or recreation and aesthetics.

Cumulative Impact Fee (a.k.a. Sprawl Fee, Ecosystem Services Impact Fee)

The term *cumulative impact fee* is generally associated with municipal fees that are applied to new development. The fees help pay for capital infrastructure improvements that will result from the growing community population. This places the cost of additional capital improvements (roads, sewers, schools, water treatment) into the hands of the developer and subsequently the new residents who will directly benefit from the infrastructure improvements, thereby reducing the tax burden on existing residents.

The concept of cumulative impact is also applied to environmental regulation and ecosystem management. The Council on Environmental Quality (CEQ) defined cumulative effects as, “. . . the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what

agency (federal or non-federal) or person undertakes such other actions (CEQ 2010:40 CFR § 1508.7).”

The National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) require projects to be reviewed for cumulative impacts and these impacts are frequently mitigated through various means, including in-lieu fee contributions.

Example:

New Mexico has instituted a Water Conservation Fee. According to the New Mexico Taxation and Revenue Department, every entity that operates a public water supply system must pay a water conservation fee. The fee equals three cents (\$0.03) per thousand gallons of water produced. It also applies to water that a public water supply system acquired from a person who is not a public water supply system and who has not reported and paid the fee on that water (NMED 2010). The revenue from this fee is deposited in the Water Conservation Fund for the administration of a public water supply program (NMTRD 2010). However, the name of the fund is misleading. The funds are not actually used for conservation, but rather to pay for a water quality sampling and training program for the purpose of compliance with the federal Safe Drinking Water Act (NMED 2010).

The Chesapeake Bay Watershed Blue Ribbon Finance Panel suggested a cumulative impact fee for water impacts related to increasing urban sprawl. As residency in the watershed increases so do the excess nutrients from fertilizer used for lawns and gardens. A Residential Lawn and Garden Fertilizer Tax/Surcharge on fertilizers sold for use in the watershed would raise proceeds to fund residential area nonpoint-source pollution control and to educate homeowners (CBWBRFP 2004).

Applicability:

Predicting future impacts of current actions is a difficult exercise. Had the nation possessed a better understanding of riparian ecology a century ago, then there might have been the capacity to account for the significant cumulative impacts of water projects in the CRB. If progress is to be made, large-scale restoration efforts must move forward in the face of scientific uncertainty, this sometimes described as the precautionary principle, and is enabled through adaptive management. However, the best that can be done is to apply this principle and accept that there are likely to be negative impacts associated with current actions that are not currently understood. The institutionalization of a cumulative impact fees helps to mitigate the predicted negative impacts, but can't account for a lack of foresight. Currently, there are no region-wide mechanisms available to account for external costs associated with water use. The use of a cumulative impact fees associated with new water development projects would help to mitigate external costs such as ecosystem monitoring and maintenance and perhaps mitigate future costs that are not currently known.

The retroactive application of NEPA or other similar state regulations is not a realistic possibility, but the application of cumulative impact laws such as NEPA and CEQA in combination with other regulations such as the Clean Water Act (CWA) and the Endangered Species Act (ESA), might provide a legally binding requirement for all future water diversion and storage projects to appropriately mitigate for cumulative impacts. This expanded concept of cumulative environmental impact fees could be applied to a watershed or sub-watershed for the purpose of riparian restoration. This could be accomplished by applying a cumulative impact fees to new or improved water diversions and storage facilities (also see Utility surcharges and Fee-bates).

Green Tax/Environmental Damage Tax

This tax concept embodies the broad concept that generally describes taxes applied to products/services or to companies/industries that engage in activities that are proven to be environmentally damaging or to maintain a public resource. The tax reduces demand for a public product or service and the revenue is typically used to mitigate the damages or maintain the public resource.

Example:

The State of Pennsylvania, through a voter approved ballot measure, increased the waste and pollution fees from \$6.25 per ton to \$11.25 per ton and added a new \$4 per ton fee for residential waste (POG 2010). The additional revenue is dedicated to the Growing Greener II initiative that funds a wide variety of environmental conservation and restoration projects that benefit the Chesapeake Bay.

Applicability:

This basic concept encompasses other more specific taxes such as a water surcharge or hydro-electric surcharge. A simple concept, that might represent the most sustainable means of funding restoration, is not an easy initiative to sell to a conservative population base. The concept might have more success for a municipal or county level. The concept could also form the basis for a wholesale tax-code reform that reduces income and property tax in exchange for an increase in extraction and consumption taxes.

Utility Surcharges and Fee-bates

Water surcharges are essentially additional fees paid by consumers on their water bills that are typically tied to a specific purpose, such as a utility line upgrade or repair. Fee-bate programs offer rebates to consumers who voluntarily reduce consumption of water. For example, a homeowner or business might receive a rebate or reduced rate from the local water utility for installing low-flow toilets. Conversely, excessive water use may be taxed more heavily with the use of a progressively tiered pricing structure to help fund the rebates and reduce the need for future surcharges.

Examples:

In Korea the introduction of a metric-based surcharge for piped water, coupled with environmental regulations were instituted to resolve water use conflicts between upstream and downstream users. The surcharge was paid by downstream urban consumers who were willing and able to pay for increased water quality in the rivers that supplied their potable water. The revenue generated from the water surcharge was invested in wastewater infrastructure improvements and also to provide subsidies to upstream residents to compensate for financial losses associated with tighter environmental regulations (Min 2004). “The surcharge is an earmarked water consumption tariff for piped water in order to raise revenue, rather than a full-cost based pollution preventive measure. The remaining tasks include the comprehensive reform of the pricing system to promote equity, efficiency and sustainability of water use (Min 2004:365).”

The Owens Valley Mitigation Surcharge is a fee which the residents of Los Angeles pay with their water bill. Residents pay \$0.50 per one hundred cubic feet of water (748 gallons). The Los Angeles Department of Water and Power (LADWP) generated \$325 million through surcharges on utility bills, although it is not clear exactly how much of this surcharge total is related directly to the Owens Valley Mitigation, it is clear the revenue generated for this specific purpose of ecological mitigation is significant (LADWP 2010). This example serves as a localized precedent and an effective funding mechanism for the purpose of ecological mitigation. However, unlike riverside habitat issues, connecting the degradation of the Owens Valley to the resource use is very direct. Drawing a similar cause and effect relationship between municipal water use and ecological degradation of the Colorado River may not be as simple.

The municipality of Hermanus in South Africa instituted a block rate tariff system that substantially increased cost of water to consumers. The action was initiated to control demand in the face of dwindling supply. Much of the additional revenue went to the Working for Water program for the control of invasives in one particular area (Turpie 2008).

Applicability:

Water pricing and the subsidies associated with water use by various sectors of the economy is the subject of extensive research and is now commonly applied at the municipal level for water conservation and revenue generation. Many inefficiencies exist in the water markets of the western US that are a largely an artifact of the legal system that governs the use of water. The use of surcharges and fee-bates may be a useful mechanism for overcoming these inefficiencies, particularly if their use can be broadened beyond a local utility.

Water surcharges, which can be in the form of a flat fee or a proportionate use fee, are a relatively simple user tax often employed by municipal utilities. This simple, effective approach has been successfully employed at larger federal scales, most notably in transportation. The

Interstate Highway system is funded primarily through surcharges on fuel, which is a classic user-pays scenario in which a consumable such as gasoline is used as a metric for determining the impact of an individual user on a public system.

Fee-bates take the concept of surcharges one step further, by encouraging conservation by providing a subsidy for conscientious use. For example, in the cities of San Diego, Seattle and Fort Collins (to name a few) water users can receive a rebate for installing water efficient amenities in their household, which will ultimately lower their water bill. The rebate helps to overcome the high initial investment cost of installing the new technology making conservation more accessible to a greater number of residents. However, the funding of water conservation measures is largely used in metropolitan areas as a vehicle for increased development, which ultimately only entrenches the issue of water scarcity in these areas of increasing demand and static supply. Also, by focusing on residential and commercial use of urban areas, fee-bates tend to ignore agricultural water use where inefficiencies may exist.

Currently, there are federal grants available through the Farmland Preservation Bill that help farmers and ranchers with irrigation equipment upgrades. Perhaps these grants could be bolstered through a state administered water fee-bate program. The program could assist farmers and ranchers with the purchase of more efficient irrigation technologies that would be funded by fees paid by inefficient irrigators, thus providing incentive to curtail water use and invest in new more efficient technologies. To compliment this concept, the same farmers and ranchers could then sell excess water rights to municipal users or to the state for preservation of in-stream flows (see Water Markets). Efficient farmland is then preserved while inefficient agricultural practices are weeded out by market forces.

Severance Tax

A severance tax is an excise tax on the mining or extraction of natural resources. It is based on the quantity or value of natural resources *severed* from the earth. Most states have severance taxes on the natural resources that are abundant in that state. The use of severance taxes for the purpose of conservation and ecological restoration is common due to the obvious connection to the ecological degradation that occurs with resource extraction activities.

Examples:

All seven states in the CRB have one or more state severance taxes that provide revenue to the state. Wyoming and Colorado both have oil and gas severance as well as a mineral severance. This is a much more significant revenue source for Wyoming, which ranks second in the nation with a 12.2 percent oil and gas severance (behind Alaska which has a 25 percent oil and gas severance). Wyoming's total severance collection was \$803.6 million in 2007, which composed 39.7 percent of the total annual state tax revenue. Colorado on the other hand does not take full advantage of potential severance revenue with a 1.9 percent effective severance rate on oil

and gas. Colorado collected \$136.9 million in 2007 severance, which provided 1.5 percent of the state tax revenue in 2007. Both Colorado and Wyoming utilize their severance revenue to fund county and state government as well as conservation and ecological restoration activities; (MMS 2007; USCB 2007; NCSL 2010).

Severance taxes in Colorado are imposed on up to 5 percent of the gross income at the wellhead, with a credit granted for a portion of the ad valorem taxes paid. The net result is approximately a 1 percent tax on gross production. When the local property taxes (ad valorem taxes which are assessed based on 87.5 percent of the value of production) are above 5.7 percent they completely offset state severance tax obligations. Only five of the 30+ oil and gas producing counties in Colorado have property tax rates below 5.7 percent and consequently state severance tax is only effectively required to be paid in those five counties. There is effectively no state severance tax obligation in the other 25 plus oil and gas producing counties. (UOLR 2005:5)

Federal severance taxes on federal lands and off-shore drilling also constitute a substantial revenue source for both the federal government and the state governments in which the extraction activity is occurring. However, a large portion of the funds intended for restoration are being lost to the US Treasury General Fund and therefore do not serve their intended purpose.

Applicability:

Although severance is not a new or innovative funding mechanism, there may be some innovative methods of applying existing or new severance taxes on extraction activities that directly or indirectly affect the quality of our riparian habitat. In-stream or floodplain sand and gravel mining is a prime example of an ecologically disruptive extraction activity that does not currently involve a severance tax in most states. New Mexico does impose a tax on sand and gravel at a rate of 0.125 percent of the value of the mined material (NMTRD 2010).

Water diversions could similarly be viewed as an extraction of resources and taxed accordingly. California instituted a water right fee in 2003 (CA Senate Bill 1049) that has recently been challenged. The fee, which is assessed by volume appropriated, is specifically dedicated for the purpose of funding the administrative costs of the California State Water Resources Control Board. This fee is currently being challenged on Constitutional grounds by the California Farm Bureau Federation (Sullivan 2010). The California State Supreme Court decision, due in December of 2010, may have significant implications of the ability of future water right fees and taxes in California.

With the clear ecological degradation that occurs with natural resource extraction activities, state and federal severance would appear to be a politically viable and sustainable source of

potential revenue for the purpose of CRB restoration. However, despite the clear disparity in Colorado's severance tax when compared to its neighbors, Colorado voters strongly rejected a modest severance tax ballot issue in 2008 that would have essentially increased severance income for the state to help fund higher education and conservation. The ballot issue received strong opposition from the energy production industry. This is a good example of why such a proposal needs strong bi-partisan support and public education.

The failure of the federal government to pass the Conservation and Reinvestment Act (CARA) or adequately fund the Land and Water Conservation Fund (LWCF), despite clear bipartisan and public support, suggests that revisiting such federal legislation may be a potential avenue for a significant and sustainable federal funding source. This assumes that the lessons learned from past efforts are utilized.

Access/Use fees/ Water Recreation fees

A fee that is specific to water oriented recreational activities such as boating and fishing typically termed a permit fee, docking fee or access fee. This type of flat tax generally reduces social equality by limiting access to lower income residents, but it is often necessary to prevent over use of a popular recreational destination.

Examples:

The Glen Canyon National Recreation Area (GCNRA) and Rainbow Bridge National Monument (RBNM) are located at the heart of the CRB. This joint recreational destination had an operating budget in 2007 of approximately \$16.5 million of which, 63 percent was appropriated by Congress; approximately 27 percent (\$4.1 million) came from concessions and National Park Service repair funds; and the remaining 11 percent (\$1.9 million) came from entrance and user fees (NPS 2007). The access fees go towards paying for marina and other reservoir recreation improvements which are intended to maintain water quality of the reservoir, but do not fund any ecological restoration in the CRB (NPS 2007).

In 2006 Michigan created the Conservation and Recreation Legacy Fund in Section 40 of the state constitution. The legislation provides for the state treasurer to invest funds coming in from various recreation related fees to ensure funds to develop, maintain, and administer those resources. Additionally, the fund supports conservation related activities such as land acquisition (often for public access but sometimes in coordination with habitat protection), species protection, law enforcement, restoration, and education. There do not seem to be any Clean Water Act related activities supported by these funds (MSL 2009). As stated in Michigan State Legislature Article IX, Section 40, Michigan Conservation and Recreation Legacy Fund, the fund is invested by the state treasurer and capitalized by fees from various recreation sectors, including (MSL 2009):

- Forest Recreation Account – “concessions, leases, contracts, and fees from recreational activities on state forestlands and other revenues as authorized by law,”
- Game and Fish Protection Account – “hunting and fishing licenses, passbooks, permits, fees, concessions, leases, contracts, and activities; damages paid for the illegal taking of game and fish; revenue derived from fees, licenses, and permits related to game, game areas, and game fish; and other revenues as authorized by law,”
- Off-Road Vehicle Account – “fees imposed upon the use or registration of off-road vehicles and other revenues as authorized by law,”
- Snowmobile Account – “fees imposed for the registration or use of snowmobiles; revenue derived from the use of snowmobile trails; transfers from the recreation improvement account; and other revenues as authorized by law,”
- State Park Improvement Account – “concessions, leases, contracts, fees, and permits for activities in state parks and recreation areas; damages paid to the state for illegal activities in state parks and recreation areas; and other revenues as authorized by law,”
- Waterways Account – “watercraft registration fees assessed on the ownership or operation of watercraft in the state; revenue derived from fees charged for the moorage of watercraft at state-operated mooring facilities; revenue derived from fees charged for the use of state-operated public access sites; transfers from the recreation improvement account; all tax revenue derived from the sale of diesel fuel in this state that is used to generate power for the operation or propulsion of vessels on the waterways of the state; and other revenues as authorized by law”.

Applicability:

User fees have potential to raise a small but steady stream of revenue for funding ecological improvements and maintenance. Individuals who directly use the resource should be willing to cover a small surcharge or ecological restoration fee on top of their water recreation permit fee. Fishing and hunting permits generally have several additional surcharges included with the permit fee for and the funds generally go towards maintaining the resource (i.e. Waterfowl Stamps). However, despite the severe ecological impact of dams in the CRB, recreational users of the reservoirs are not asked to contribute to watershed maintenance.

Road/Bridge Toll

The large dams of the Colorado River also serve to promote commerce by providing a bridge where passenger vehicle and freight movement would otherwise be impossible, yet no fee is required for this access. In fact, the Federal Highway Authority has recently completed a new \$240 million bridge known as the Hoover Bridge Bypass in order to accommodate the excessive

amount of vehicle traffic on the bridge which has served as a vital commerce link between Nevada and Arizona (HDBP 2010). A small toll for use of the crossing could have not only paid for the new bridge, but also helped to restore or maintain the ecosystem that has been disrupted by the presence of the dam crossing.

Examples:

The Everglades Restoration Initiative received over \$226,687 from tolls collected on the toll road known as Alligator Alley, which represents only 0.1 percent of the total annual revenue for the Comprehensive Everglades Restoration Program (CERP) (Williams et al. 2010).

Applicability:

Due to the nature of dams which tend to bridge deep valleys, many large dams incorporate a public road and thus serve as a transportation bridge. The users of the bridge benefit from the structure and therefore should in theory help to pay for the maintenance of the ecosystem that is disrupted by the dam. Such a toll, would likely receive significant objection from freight operators who generally oppose such costs due the increase in what they must charge their customers. The practicality of the toll would also need to be measured against the air quality and commerce impacts that could result from an increase in traffic congestion.

Transbasin Ecological Surcharge

A fee assessed by volume, for water that is transported out of its natural watershed. The exporting of water significantly degrades the natural ecological processes of the giving basin. The loss of ecological function can be translated into lost economic value.

Examples:

According to the State of Colorado Water Conservancy Act:

[A]ny works or facilities planned and designed for the exportation of water from the natural basin of the Colorado river and its tributaries in Colorado... shall be designed, constructed, and operated in such manner that the present appropriations of water and, in addition thereto, prospective uses of water for irrigation and other beneficial consumptive use purposes, including consumptive uses for domestic, mining, and industrial purposes, within the *natural basin of the Colorado river* in the state of Colorado from which water is exported *will not be impaired nor increased in cost at the expense of the water users within the natural basin* (Title 37, Article 45-118. General Powers, emphasis added).

In 2004, Colorado House Bill 1040 as proposed would have required that “diversions of water from one basin to another cannot result in the prospective beneficial use of water be increased in cost at the expense of the sending basin (CTU 2004).” Colorado Trout Unlimited reported

that “The bill also created a process for mitigation agreements. Unfortunately, there was no recognition of the environmental consequences of transbasin diversions, and there was no environmental representation in the mitigation agreement process (CTU 2004).” The bill was rejected on the state house floor by a narrow 30-33 vote (CTU 2004).

Applicability:

Large quantities of water are exported from the CRB water. Measures to mitigate these exports do very little to compensate for the economic and ecological impacts of the basin diversion. A small excise fee on basin water exports would be necessary under a PES/market structure to help pay for the ecological maintenance of the degraded riparian system. Due to complicated interstate compact agreements this effort would need to be accomplished on a state by state basis unless larger policy changes can be implemented on a federal level.

Regulatory Based Revenue Mechanisms

Federal environmental laws and regulations such as the Clean Water Act (CWA), Endangered Species Act (ESA) and National Environmental Policy Act (NEPA), as well as state and local laws, regulations and codes, are in place to maintain goods and services provided by our natural environment, such as clean air, water and earth resources. As these public goods are degraded individuals and firms who profit from exploitation are required to mitigate the impacts to the public resource or otherwise compensate for the economic hardships created to others. This compensatory mitigation aspect of environmental legislation can take many forms including restoration of the resource at the place of disturbance, recreating the lost resource elsewhere (offsite), or in some circumstances, when the lost or damaged resource cannot be replaced, then compensation may be in a different form (out-of-kind). This offsite or out-of-kind compensatory mitigation concept presents an opportunity for addressing similar or related resource degradation that is not specifically protected by environmental legislation. Several innovative mechanisms have evolved out of this niche opportunity.

Bonding Requirements

Typically, a project that involves substantial disturbance to natural areas will be required, through federal and state permitting processes, to post a bond in amount sufficient for the reclamation or restoration of the land or resource upon completion of the project. If the resource cannot be restored then the project proponent typically is required to conduct mitigation. The bond will be held by the project proponent for the use of restoration, but the funds will be supervised or locked by the governing authority to the task of restoration. If the project proponent cannot or will not fulfill their responsibility to restore the resource, then the bond will be released to the governing authority or specified third party for the purpose of facilitating the restoration and the project proponent loses the possibility of reclaiming any value of the bond. This is not a source of funds for the purpose of general restoration work

and in fact has historically underfunded the specified resource restoration. However, the establishment of a reliable and efficient PES system could provide opportunities for defaulted bond funds that must be spent on restoration activities.

Examples:

Reclamation bonding has become common in certain industries that involve temporary land disturbances. Some common examples include, oil pad reclamation bonds, mining reclamation bonds, and wetland mitigation construction bonds.

Applicability:

Historically environmental bonding requirements are intended to maintain the status quo (return the land to pre-project conditions). Inevitably the post project conditions are poor compared to the pre-project conditions. Therefore, the potential exists to increase bonding requirements to offset the lag-time associated with the maturation of the restoration effort and or increase the restoration acreage requirements to compensate for the fact that the post project restoration will not likely return the site to a condition of equal ecological function. These time-lag and ecological function justifications are frequently employed in the realm of wetland permitting. Therefore, it may be possible, with coordination with local Army Corps of Engineers branch offices, to identify riparian restoration sites that could be restored as part of a compensatory mitigation action (see mitigation banking, in-lieu fee program).

Environmental Non-Compliance and Damage Fines

Parties who engage in environmentally damaging activities without prior approval from the appropriate governing body are subject to enforcement actions and penalties per the federal, state or local laws, codes and regulations, which commonly involve mandatory mitigating actions as well as substantial civil penalty and criminal fines. The fines are typically deposited in the federal or state general fund or into the general fund of the enforcement entity, but in some locations these fines are instead deposited into restoration specific funds.

Examples:

In the State of Washington fines collected in connection to violations of the state Water Pollution Control Act in the coastal zone of the state including the Puget Sound, are required by state law to be deposited all monies collected as fines penalties and damages into the Coastal Protection Fund (WSL 2010), which is used to restore the state's coastal resources.

Applicability:

Research is needed to determine where CRB state environmental compliance fines are being deposited. Opportunity may be present for the dedication of non-compliance fines to specific restoration funds.

Reimbursement Fee

A reimbursement fee is a fee for costs associated with capital improvements already constructed, or under construction when the fee is established, for which a local government determines that capacity exists. This fee is related to an impact fee: Often a municipality will need to raise funds for capital improvements before the new development occurs, therefore, the new development actually pays a reimbursement fee to retroactively pay for previous capital improvements.

Examples:

No specific examples were found related to ecological restoration.

Applicability:

A system of reimbursement might be established similar to a mitigation bank, in which developers can reimburse a public or private entity that has already provided capital improvements. This type of financing mechanism might be useful for ensuring viability of a large-scale restoration effort, which helps to ensure that in-lieu fees paid for mitigation are adequate to cover the actual costs of restoration and, since restoration is already complete, the process creates a more efficient permitting process. New fees can be used to fund the next project and to also pay for maintenance and monitoring. Application of this mechanism is very limited for the purpose of CRB restoration.

Subsidy Payments Stewardship Compliance Rules

Commodity subsidies and other benefits commonly received by the agriculture and industrial sectors come with stipulations and rules that must be followed in order to receive the subsidy payment. The inclusion of land stewardship principles into public subsidy regulatory compliance requirements can have a significant impact on the land use and industrial practices of producers. Essentially, if publicly supported financial assistance is provided to a resource user, then the user is expected to conduct business in a manner that is not detrimental to other public assets.

Examples:

In the 2002 Farm Bill, commodity subsidies were the largest public funding source for farmers in the Chesapeake Bay. Thus, commodity payments are more likely to influence farmer behavior than other programs. According to Chesapeake Bay Program's 2004 estimates, if a Comprehensive Nutrient Management Plan and/or stream buffer were required as conservation compliance for commodity programs, then \$275 million in commodity payments would also serve to move towards Chesapeake Bay conservation goals (CBWBRFP 2004).

Applicability:

Almost every agricultural producer in the Colorado River Basin receives subsidies from the federal government in the form of water, land, or commodity price control. It may be reasonable to require producers receiving these public funds to adhere to land stewardship standards that include sustainable riparian management practices.

Lending Based Revenue Mechanisms

Lending strategies incorporate the concept of borrowing money to finance restoration work. This concept is inherently unsustainable due to the fact that it does not actually generate income, and in fact typically increases costs due to interest obligations. However, for the purpose of restoration, lending strategies may provide a valuable funding tool to compliment other more sustainable funding sources.

Revenue bonds

Revenue bonds are a type of federal, state or municipal bond that, unlike general-obligation bonds, are supported by revenue from a specific project such as a utility or toll bridge, which provide a future revenue source used to pay back the loan. This financing mechanism can also be utilized for restoration and conservation oriented activities.

Examples:

The Florida Everglades Restoration project, for example, utilizes bonding for most of the restoration work. However, it is important to recognize from the standpoint of sustainability, that recent economic hardship has forced the State of Florida and the South Florida Water Management District to scale back recently proposed restoration plans on the purchase of sugar cane farms. The deal has been reduced from \$2.2 billion in bond financing for 187,000 acres to \$197 million in cash reserves for a 26,800 acre purchase (SFWMD 2010).

Similarly, over half of the California Bay-Delta project is funded through voter approved state revenue bonds. Most wildlife and recreation related bond funds are paid back by the state general funds. New water infrastructure, paid for using revenue bonds, is repaid through fees on local water users. However, bonds cost more money than they generate because interest must be paid on the bonds over a set period of time that can last decades. For example, from 2000 to 2009, California received \$13 billion for water projects that will ultimately cost \$23.9 billion. This cost is negatively affecting the public's willingness to approve bond funding in the future, especially since California now has the lowest credit rating in the US (Hurd 2009).

Applicability:

Borrowing money to finance a restoration project can hardly be considered a sustainable funding option alone, but the use of bonds might be useful within the context of an integrated

PES system in which a service beneficiary has been identified that is willing to debt finance restoration that is seen as a time critical issue.

Revenue bond funds are sustainable only if they are linked to a sustainable revenue source, and preferably one that is paid back by the beneficiaries of the funded project. A simple toll road is a good example. The toll collected from the user pays back the debt associated with the infrastructure improvement and other secondary impacts including mitigating ecological or socio-economic damages.

The major hydroelectric dams that are present within the CRB essentially fit this formula. The revenue received from the sale of the electricity has been used to pay for debt of the original construction costs. However, due to a lack of scientific understanding, little to no thought was given to paying for, or mitigating, the ecological damage caused by the dam construction. After over 40 years of operation, most of the construction debt has been paid but the ecological degradation continues. It would be logical, now that the construction debt has been paid, to use future hydroelectric revenue to pay for ecological restoration and maintenance of the degraded natural system.

Revolving Loan Fund

Revolving loan funds are divided into internal and external funds. External revolving loan funds are dedicated pools of capital held by nonprofit organizations specifically to provide short-term (often low-interest) loans for land conservation to multiple organizations with a shared geographic focus or overlapping conservation goal (Levitt 2005; Clark 2007). Internal loan funds are restricted to use by a single entity such as a local land trust for the purpose of land acquisition (Levitt 2005; Clark 2007).

Examples:

The Nature Conservancy's Land Preservation Fund, is an internal fund used to lend money to chapter offices. The fund is capitalized with \$250 million in charitable contributions and \$300 million in bonds (Levitt 2005:75).

The Colorado Water Conservation Board (CWCB) manages the CWCB Construction Fund, which is a revolving loan program used to fund projects that increase the consumption of Colorado's undeveloped river entitlements and that repair and rehabilitate existing water storage and delivery facilities (CWCB 2010). The fund receives revenue from the repayment of loans, interest, and federal mineral royalty distributions. A portion of these funds are used to mitigate impacts associated with the state's water use practices. For the 2010-11 Fiscal Year approximately 16 percent (\$250,000) of the revenue will be used to fund the state Watershed Restoration Program and three percent (\$50,000) will fund In-stream Flow Engineering and Technical Support Services (CGA, 2010).

There are over 25 non-governmental regional external revolving loan funds in the US, the oldest being only about 18 years old (Clark 2007). Great Lakes Revolving Loan Fund (GLRLF), administered by The Conservation Fund (TCF), was capitalized with approximately \$6 million in philanthropic contributions by the Charles Stewart Mott Foundation. The fund provides *bridge financing* to other land conservation organizations interested in protecting land in the Great Lakes watershed (Levitt 2005).

The Colorado Conservation Trust (CCT), an intermediary organization, administers the regional external loan fund known as the Colorado Tax Credit Revolving Loan Fund (CTCRLF). This fund offers small loans to land trusts to help landowners defer transaction costs associated with the donation of land that will generate state tax credits. The loan is paid back by tax credit proceeds (Clark 2007). This financing mechanism allows land rich ranchers to make a land donation that would otherwise be difficult due to the transaction costs.

The Clean Water State Revolving Fund (CWSRF) is a federal source of funding that is derived from federal appropriations pursuant to the goals of the CWA and was recently bolstered by the American Recovery and Reinvestment Act (ARRA) (USEPA 2010). The fund, which is capitalized with federal and state contributions, acts like an environmental infrastructure bank that helps to provide low interest loans to states for localized water treatment infrastructure, nonpoint source pollution control, and watershed management. Started with the 1987 CWA amendments, CWSRF has funded over \$74 billion, providing over 24,688 low-interest loans to date (USEPA 2010). For example, the Chesapeake Bay states and municipalities utilize this funding source to improve the water quality entering the bay. The fund has grown steadily since 1987 which demonstrates its resilience to political and economic change.

Applicability:

The CRB restoration initiative could benefit greatly from the use of an existing federal revolving loan fund such as the CWSRF, or from the creation of a new fund specific to the goals of the CRB restoration initiative (similar to the GLRLF). The development of a new CRB revolving loan fund would improve flexibility of the overall funding effort by providing quick access to low interest loans for public or private entities interested in large scale restoration projects or water right acquisitions.

Market Based Revenue Mechanisms

Unlike the traditional command and control approach, market based resource management relies on basic market allocation principles. Such a program may be privately managed or managed by a government body, but either way structured program is necessary with administrative controls including clearly defined rights, transfer rules, monitoring and enforcement (Garrick et al. 2009). Even in a wholly private market arrangement, there must be

a set of rules and an appointed administrative body to monitor and enforce the transaction standards.

Permit Trading Program (a.k.a. Pollution Trading, Cap and Trade)

Pollution permit trading, first explored in the 1970s in response to growing concerns over air and water pollution, involves the establishment of an allowable limit of pollution that can or will be tolerated within a specific geographic area. Polluters buy and sell pollution permits in a market regulated by a governing agency. This type of arrangement allows an economy to maximize the efficiency of pollution or environmentally degrading activities, thereby providing incentive to increase production efficiency and decrease waste streams. The system is not a revenue generating mechanism per se, but can be used to replace the need for restoration work.

Examples:

The example that is probably most familiar to the general public is carbon trading, which has been largely debated, and employed, as a means of reducing greenhouse emissions and consumption of fossil fuels. However, other permit trading schemes have been developed with focus on other types of pollutants that might be more directly relevant to riparian restoration in the CRB.

Nutrient trading is a type of permit trading that places limits on the amount of point source discharges allowed within a specific watershed or water body. Permits are issued to production facilities, sewage treatment plants, and other entities that release measurable quantities of nutrients such as phosphorus and nitrogen. Nutrient permits can then be bought and sold within the watershed. The real beneficial aspect of a nutrient trading program is the incentive provided to non-point source generators to reduce pollution. For example, a municipal sewage treatment facility that needs to expand capacity to accommodate a growing urban population can acquire additional pollution permits by paying farmers upstream to reduce the use of pesticides and fertilizers, or by placing portions of the farm (particularly riparian zones) into conservation easements that restrict use and provide buffers to streams and water bodies. Critics of such a system point to the market pressures that will push society away from an agrarian culture, as wealthier urban communities are capable of paying farmers to reduce production and also demand additional space for urban expansion.

The Chesapeake Bay Program is currently considering a nutrient trading program that could potentially save an estimated \$1 billion in wastewater treatment costs if fully implemented.

Applicability:

This type of permit trading system can be a primary component of a Payment for Ecosystem Services (PES) program, but in itself does not necessarily constitute a PES system since the

ecosystem services provided by a functional ecosystem are not necessarily valued directly. Instead a limit is set on the allowable level of pollution that will, or can be tolerated and indirectly the value of ecological service is realized from the ability of entrepreneurs to create credits through ecological restoration or conservation measures. The cost of the restoration will in turn affect the value of the pollution permit.

The US Bureau of Reclamation's (USBR) Colorado River Basin Salinity Control Program has laid the groundwork for a water quality permit trading program within the CRB. Although the economic benefit cost analysis from the salinity control efforts have been shown to be positive (USBR 2009), the cost of the program is still paid for by general federal appropriations. If these costs can be transferred to the water users who directly benefit from the program (and ultimately the consumers of products derived from unsubsidized water), then the program could be integrated into a basin wide PES system. Real water costs will also have the effect of decreasing development rates and encouraging water conservation in the agricultural, industrial, and commercial/residential sectors.

Water Rights Trading and Water Banks

Water is unique in that it is often treated as a right instead of a commodity. The institutionalization of water rights in the West was primarily done to protect individuals and businesses that needed water to provide goods and services such as gold and corn. This system has resulted in many inefficiencies and a distorted value for water. Water banks attempt to provide a market place for the buying and selling of water while minimizing transactions costs and costs related to western water law. The bank essentially seeks to create a market value for water which can then be treated like other commodities with a value that is based on the forces of supply and demand. The downfall to such a system in the short-term is that more and more water will inevitably end up in the hands of residential, commercial and industrial users at the expense of the agricultural sector. It also creates social equality issues, because unlike gold, water is a basic necessity of life. On July 28, 2010 the United Nations General Assembly declared that access to clean water is a human right (UN 2010).

Examples:

The WaterBank in New Mexico, and Water Colorado, are organizations whose purpose is to facilitate market transactions involving various types of water, from groundwater and surface water rights, to bottled water.

The WaterBank Trust is a non-profit arm of the WaterBank, which works with willing water users and landowners in New Mexico to acquire in-stream and out-of-stream water rights for conservation purposes (WBT 2006). Similarly, the Colorado Water Trust, not affiliated with Water Colorado, is a private non-profit organization that assists land owners who wish to preserve water rights as in-stream flows for the purpose of conservation. Water Colorado are

water brokers whose goal is to help people understand the intricacies and legalities of buying and selling Colorado water rights and what owning those rights entails.

Applicability:

In order for water banks to directly serve the interests of conservation, the services provided by the natural environment must first be valued. This is a difficult task that involves considerable subjectivity, especially with respect to intrinsic values. It also runs the risk of under-valuing natural systems or placing a price tag on individual plants and animals, including endangered species. The ability to borrow or lease waters also presents an opportunity to increase flows under a water banking structure. Finally, a water bank could be used in-directly to fund conservation by applying small ecological flow transaction or transfer fees.

Corporate Environmental Performance Incentives

Market pressures associated with consumer demand may provide incentive for corporations to voluntarily adopt higher environmental standards. However, a state or federal program may be created to provide additional monetary incentives for corporations who achieve certain goals thereby increasing incentive for corporate innovation. Certain industries are more visible to the public than others. The higher the public exposure the more likely a company or industry is to be subjected to increased regulation do to public perception. In some circumstances, it may be in the collective interest of the industry to pro-actively demonstrate that the industry is acting responsible and therefore there is no need for further regulation, which typically increases costs to the regulated industry.

Examples:

The US National Ski Areas Association (NSAA) has established the Sustainable Slopes Program as a voluntary environmental initiative that partnered with state and federal agencies. The program, which includes 21 Principles of Sustainable Slopes of environmental focus, includes a category for wetlands and riparian areas. It has provided approximately \$100,000 over 10 years in grants for environmental oriented upgrades to commercial ski areas (NSAA 2010).

Another example is the Leadership in Energy and Environmental Design (LEED) program LEED is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO₂ emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts. Besides being a certification program it fits into the corporate environmental incentives concept.

Applicability:

A corporate certification program could be established for large water users like water districts, municipal utilities, and energy producers in the CRB. An independent non-profit could administer the program and possibly issue matching grants to help with river restoration projects undertaken by the water users. The water users could then advertise their river certification status, which could help with public relations and possibly put off further regulation. Also, existing programs, such as the NSAA program may be tapped for funding of local river projects. This may be a useful concept when woven with a larger market based watershed restoration strategy.

Such a strategy could potentially lead the way to a more formalized credit trading system in which water users or development projects could pay into the certification program to offset impacts or to comply with regulatory mitigation requirements.

Mitigation banking (a.k.a. Offset Investment Banking)

A market based resource maintenance approach involving the voluntary creation or restoration of a natural resource (natural capital) by a private entity with the intent to sell mitigation credits to other entities that are required by law to compensate for resource loss or degradation. This concept typically functions under a well defined regulatory framework, but could, in theory, be privately organized.

Examples:

The classic example is wetland mitigation banking which was first developed in the mid 70's in response to regulatory requirements under the CWA for compensatory mitigation. A wetland mitigation bank involves a private entrepreneur who invests in the restoration or creation of wetlands which can later be sold at private market value to other parties who are required by the CWA to mitigate for the loss of wetlands, typically due to a development project. The performance standards and service areas of the banks are closely regulated by the Corps of Engineers and EPA, but the actual sale of mitigation credits is left to the open market, which makes wetland restoration and creation a potentially profitable enterprise.

Similar to the market development that has occurred in response to the CWA's requirements for wetland mitigation, other regulatory programs such as the Endangered Species Act and Energy Policy Act, create potential for other compensatory restoration and mitigation markets. For example, hydropower producers in the Pacific Northwest, whose activities impact the health of rivers and the viability of native salmon populations, are seeking opportunities to mitigate their impacts in order to comply with federal regulations. To accommodate this need in-stream flows are being purchased to protect salmon spawning activity (Garrick et al. 2009).

The Bureau of Reclamation has worked to compensate for impacts to wetlands and other habitat that have resulted from improvements to canals and laterals in the Grand Valley of western Colorado for the purpose of salinity control.

To compensate for this loss, Reclamation worked with the US Fish and Wildlife Service and Colorado Division of Wildlife to acquire, develop, and preserve permanent wildlife habitats along the Colorado River. The program has received broad support from local governments and the public (USBR 2009). Furthermore, the work has stressed restoration of native cottonwood riparian forests, creations of wetlands, and plantings of permanent grassland and shrub habitat. Refugia ponds on two of the properties are used for endangered Colorado River fish. The areas are managed by the Colorado Division of Wildlife and the Mesa County Land Conservancy (USBR 2009).

Applicability:

Riparian Restoration Banking could be a critical component of an integrated market based system, in which riparian habitat restoration becomes a profitable private enterprise. Similar to wetland mitigation banking, riparian restoration banking could be tied to Section 404 of the CWA or possible new legislation related specifically to riparian habitat protection (Regulations similar to New Jersey's Stream Encroachment Regulations are desperately needed in western states). Also, the system could also be open to a voluntary certification program such as the Water Restoration Certificates developed by the Bonneville Environmental Foundation.

Transferable Tax Credits for Conservation

A few states (notably NC, followed by VA, CO, CT, DE, CA and SC) have passed laws allowing for the transfer of the state's income tax credit for land conservation (Levitt 2005), which is intended to help the land-rich but cash-poor landowner. This allows landowners to immediately realize a percentage of the fair market value of the land that they have elected to preserve in a conservation easement, rather than receiving the tax credit distributed over successive years of tax filings. The preservation of land also has the added financial incentive to the landowner of reducing the taxable property value of the land. In essence, an individual with a large state tax liability may buy the tax credit from the cash-poor landowner at approximately 80 percent of the tax credit value, which can be used to pay down their tax liability to the state. Presumably, the landowner would gain more value from selling their land to a developer, but many ranchers and farmers are more interested in preserving the agrarian culture of the West than maximizing personal gain. Also, from the public perspective, the land provides ecological function that is a benefit that would otherwise be lost, typically to suburban sprawl. Such a transaction requires a state inspection to assess the conservation value of the land.

Examples:

The State of Colorado passed a law establishing a system of transferable tax credits for charitable land donations in 2000. This system which puts ranchers and conservationists on the same team, is well summarized by the head of the Private Landowner Network (PLN) (Eno 2010):

- A farmer or rancher decides to make a *bargain sale* of a conservation easement worth \$500,000 in total.
- He or she gets paid only \$200,000 cash for the easement (from a source such as Great Outdoors Colorado); the remaining value of \$300,000 is the donation.
- The tax credit value for the donation is 50 percent of the donation, or \$150,000.
- The farmer or rancher can then sell the credit at about 80 percent value to a businessman who has liability for state taxes in Colorado, for about \$120,000 in cash.

In this way the businessman gets a discounted tax rate, the farmer or rancher receives \$120,000 in cash for the donation, and the state safeguards open space, wildlife habitat, and scenic views on protected lands.

The tax credit does not begin to equal the development rights on the land, but for a landowner who wants to keep his or her working land working, it can be a good deal, and a viable financial alternative to selling for development.

Applicability:

Land owners, particularly ranchers that own land with riparian components in the CRB, might benefit from placing the riparian portion of their land into a conservation easement and potentially restricting access by cattle, which have been shown to reduce the ecological integrity of the riparian corridor. The landowner might be able to receive a greater tax credit if the land riparian corridor has been restored, thereby providing additional incentive to restore native vegetation and remove cattle from the riparian zone.

Colorado, New Mexico and California are the only states in the CRB that currently have a transferable tax credits for land conservation; therefore, there might be opportunity to expand this concept to the other states in the Basin with a focus on riparian habitat conservation; perhaps an increased credit ratio could be applied for riparian lands.

Transfer of Development Rights (TDR) Programs

Similar to a cap and trade concept, development credit trading places a limit on the development potential of an area by assessing development credits to land areas, and

providing a market for the free exchange of these development credits. The concept is intended to preserve rural or natural lands and focus higher density development in urban centers.

Examples:

The State of New Jersey has developed the Pinelands Development Credits program that has successfully redirected suburban sprawl away from the large forest preserve known as the New Jersey Pine Barrens (NJDBI 2010).

In the Puget Sound watershed, King County has successfully employed TDRs to preserve 141,500 acres of rural/resource land (King County 2010).

Applicability:

This concept could potentially help to reduce impacts to native riparian zones by focusing development away from the stream edge. Also, such a program could reduce urban sprawl which may help to maintain water quality, water availability and other watershed functions associated with preserved natural areas, or it may improve socio-economic issues related to the preservation of farmland.

Payment for Performance (Conservation Stewardship) Program

A payment for performance program is not a revenue source, but is a promising incentive program. The program involves a government sponsored Payment for Ecosystem Services (PES) concept that rewards private property owners, most notably farmers and ranchers, for employing practices on their land that provide benefits to others in the watershed.

Examples:

In 2010 the National Resource Conservation Service (NRCS) initiated the Conservation Stewardship Program (CSP). “Instead of using the traditional compensation model that pays a per-acre rental rate or a percentage of the estimated cost of installing a practice, CSP pays for conservation performance (NRCS 2010),” which means; “the higher the performance, the higher the payment (NRCS 2010).”

Applicability:

The CSP program already exists and could be used directly or as a model to develop a similar program. The program has identified many land management practices that qualify for payment, including management of riparian zones in a healthy state. Therefore, this new program may have direct and immediate applicability for the CRB restoration initiative. The CSP program may also provide a starting point for evaluating land management activities within the CRB that provide a quantifiable service, which could be incorporated into a larger basin-wide Payment for Ecosystem Services approach.

Private Payments for Amenity Services/Transfer Payments

The term *amenity services* has been used to describe secondary services provided by specific land use practices (aesthetics, recreation, spiritual values, etc.), and is an example of a private Payment for Ecosystem Service (PES) system. For instance, the bucolic aesthetic of a family farm is valued highly in many societies where such landscapes are disappearing in exchange for residential sprawl and industrial farming. Therefore, the preservation of a *family farm* has added value to the surrounding community. How the farm operates may also provide other economic and ecological considerations for the community as well. For example, by practicing organic farming, with limited chemical fertilizers and pesticides, water quality is better for downstream users. Therefore, the responsible management practices of the farm are valued by the surrounding community not only for the aesthetic or cultural integrity value, but also from the real economic cost associated with treating the downstream water. This concept of transferring payments from water treatment to land preservation has gained more recognition through recent ecologic and economic research that has modeled these landscape relationships.

The operational efficiencies gained through the industrialization of farming creates greater marginal productivity for the individual farmer or firm, but this marginal increase in individual income is achieved at the expense of the surrounding community aesthetics, culture, real estate values, and water quality. As research into these relationships has increased, some private landowners and firms have determined that it is more desirable and cost effective to pay their neighbors to maintain existing land use practices or even pay their neighbor to restore or use more ecologically friendly land use practices. If the marginal cost associated with this transaction is less than treating polluted water or compensating for reduced real estate values, then keeping the lower producing family farm may represent the most economically efficient situation. This market-based arrangement begins to account for some of the externalities associated with common industrial practices.

Examples:

A purely private arrangement to pay for an ecosystem service is difficult to find, but there are a few commonly referenced examples. The French company Vittel, which is one of the largest mineral water bottlers in the world, decided to pay farmers in the watershed to switch to organic farming techniques to reduce the amount of pesticides entering the aquifer that supplies the source of their mineral water. The company also purchased and reforested farms that were in critical infiltration areas. However, even this relatively private arrangement involved government as an intermediary to provide a small amount of financial aid and legal support to help facilitate the contractual agreement (Smith et al. 2006).

Applicability:

The use of this private PES mechanism is dependent on localized conditions. There are likely to be many land use scenarios within the CRB that could benefit from this type of private contractual agreement. The key is to develop an entity, possibly a non-profit organization, which can identify these unique opportunities and facilitate the contractual agreements. This concept is generally reserved for small, grass-roots, type arrangements, but the basic concept can be expanded to a larger regionalized PES system.

Cost sharing

An individual or company may elect to share in the cost of preserving or restoring upstream resources that provide direct economic benefit to the downstream community or property owner. This concept expands the payment for amenity services concept discussed above to a larger group of beneficiaries who all benefit from the preservation, restoration and maintenance of natural areas or specific land use practices. By combining purchasing power, such a cooperative arrangement can take advantage of the economies of scale and reduce the cost associated with individual negotiations and transactions. Such an arrangement could in theory be accomplished without any government involvement, but as more stakeholders become involved this communal approach typically involves some legal and equity complications that may require government assistance to help organize a fair cost sharing arrangement.

Privately organized community cooperatives exist for a wide range of communal services resource protection. Historically, such groups with common interests in a resource have banded together to form alliances or non-governmental districts, such as water districts. The cost sharing may include a community cooperatively purchasing land that is under the threat of private development or collectively securing a senior water right to enhance the reliability of water delivery.

Examples:

Special Districts, which are essentially pseudo-government entities, focus on a specific resource or service issue in a limited geographical range. Some common examples include water, sewage, fire, hospital, mosquito, and library districts. These entities have become an increasingly popular means of organizing rural communities with a commonly valued resource of service interest and have often taken the place of local or state government agencies. The Colorado River Water Conservancy District in western Colorado was formed in 1937 by the state legislature “. . . To lead in the protection, conservation, use and development of the water resources of the Colorado River basin for the welfare of the District, and to safeguard for Colorado all waters of the Colorado River to which the state is entitled. (CRWCD 2010)”

The term cost sharing is also used within the context of government matching grants, in which public funds are used to assist a private interest that has public benefits.

Applicability:

Cost sharing is a relatively obscure term, but the idea of organizing stakeholders and pooling resources to accomplish mutually beneficial goals is an important funding strategy for a grass-roots or sub-watershed level CRB restoration initiative.

Payment for Ecosystem Services

Payment for Ecosystem Services (PES, a.k.a. Ecosystem Services Market, Ecosystem Rewards, Ecosystem Service Compensation, Ecological Value Added Tax or E-VAT) would be more aptly categorized as an economic system or funding strategy rather than simply a revenue source. The system does, however, provide a source of internalized revenue for the purpose of ecological restoration or preservation. Essentially, PES systems seek to conserve natural resources by assigning value to the function or service provided by natural resources (a.k.a. natural capital). Such a system is based upon the idea that natural systems provide goods and services that are of value to people in the watershed and that natural resource exploitation for private enterprise may not necessarily constitute the most efficient use of the resource in terms of net economic benefit. By assigning value to ecological goods and services, a PES system seeks to limit degradation of natural capital that is beneficial to the public.

There are a number of methods for capturing the value of ecological services and products, but typically a PES system taxes the price of goods and services directly involved with the degradation of the system (see Working for Water Programme example below). Or similarly, the system may pay one resource user to forego an economic opportunity that would be gained from the exploitation of a natural resource if the values of the services provided by the natural system are greater for the general populous if the resource is maintained in a more natural state (see ICMS Ecológico example below). The revenue typically generated through taxes or fees may be held in a trust fund and distributed by a committee of experts for the purpose of restoring, replacing, preserving, or enhancing the degraded or threatened natural resource. Reducing the transaction and administrative costs associated with this exchange is a critically important variable. Ideally, such a system could operate free of government involvement, but due to the typically large geo-political scale of most PES systems, the development of a PES necessitates the involvement of an organizing body, typically a state or federal government who can collect and allocate funds in an equitable and efficient manner. Once established, the system should operate based on market principles, establishing a value for the ecological services and products that can be bought, sold, and traded within a regulated market framework.

Examples:

ICMS ecológico (Brazil) is a tax-revenue proportioning (or redistribution) program that has been adopted by most states in Brazil. “ICMS” is an acronym that roughly translates to “taxes on goods and services” (Grieg-Gran 2000:1). The State of Paraná, Brazil was the first to distribute a portion of the tax revenue to counties in exchange for local conservation of forested lands (Grieg-Gran 2000). This system uses the concept of E-VATs to encourage the conservation of valuable forest ecosystems that provide immense ecosystem services to the nation (and the world), but provides income to the poor landowner for managing the forest in a healthy state rather than using their land to generate income through timber sales or potentially destructive agricultural practices.

The program is replicable in systems where local governments receive funding from the federal level. For a similar approach to work in the US, it is important to ensure a system for evaluating ecological integrity and ecosystem service criteria for disbursements in order to avoid conservation in name only. In addition, if the criteria for disbursements are based on *value added*, an evaluation by the local government must be able to determine if the participation provides greater revenue gains than the opportunity cost of resources left unexploited (Grieg-Gran, 2000).

South Africa’s Working for Water Programme focuses on the removal of the non-native invasive vegetation and the restoration of a native vegetative community for the goals of increasing water availability and other social goals. According to the natural resource economists closely involved with the project:

WfW effectively acts as a conduit for the provision of ecosystem goods and services, predominately water supply, through the control of invasive alien plants and the provision of unskilled job opportunities, using predominantly taxpayers' money. Whether this is justifiable in terms of the spread of the taxpayers versus the beneficiaries of clearing is uncertain, although it should be noted that water savings in one area have geographically widespread ramifications, and biodiversity benefits are also likely to have more than localised benefits. Though this form of transfer payment does not constitute the creation of a market for the provision of ecosystem goods and services in the strict sense, it does constitute a payment for the service delivery (Turpie et al. 2008:792).

Justifying the economic gain from restoration and conservation measures in the CRB will likely be a significant challenge. By tying the conservation initiative to a jobs creation initiative, not unlike President Roosevelt’s Civilian Conservation Corps program, a CRB PES program might gain wider appeal and political support.

The Willamette Partnership in Oregon offers a working example of an integrated watershed based PES system. This conservation initiative, which was initiated in 2008, has progressed quickly under federal grant funding through the NRCS. The partnership has already developed tools and metrics necessary for quantifying and valuing ecological services (e.g. wetlands, salmonid habitat, prairie habitat and riparian habitat) and gained significant buy-in from local private organizations and public agencies (WP 2010). The Willamette Partnership offers an excellent blue-print for the development of a PES system in the CRB that extends beyond riparian health.

On August 28, 2010 the US Forest Service (USFS) and Denver Water partnered on a plan to restore beetle kill stands of pine trees in the headwaters of the South Platte and Colorado Rivers, which help to maintain a steady and clean water source to the Denver Metro Region.

Each agency will contribute \$16.5 million for a total of \$33 million to conduct forest health restoration treatments on more than 38,000 acres of National Forest lands in northern Colorado. Goals include reducing wildfire risk, restoring areas recovering from past wildfires, and minimizing erosion (Denver Water 2010).

Applicability:

Certainly, local governments already receive federal funds in the CRB for the purpose of natural resource conservation but the funds do not typically originate from those who directly benefit from the conserved resource. Instead, the funding provided to local governments, typically in the form of federal and state grants, comes from general funds. This fact may provide political opportunity. Under the difficult economic and political conditions the nation currently faces, such an initiative may be more acceptable, particularly, in the conservative West. For example, the concept has the potential to limit expenditures from *general funds* and thereby present the possibility of reduced general taxes such as income taxes, in exchange for a more tangible user-fee or localized natural capital investments.

Considerable research and analysis is needed to determine whether or not a PES system could be employed for a particular purpose. One of the fundamental information needs is the identification of the services provided by the natural system of concern. In the table below the United Nations Environmental Partnership (UNEP) has identified some common ecosystems services typically provided by forests, oceans and cultivated or agricultural lands. The UNEP table was published within a PES guide in 2008 (Forest Trends et al. 2008).

Each of the riparian ecosystem services listed below would need to be adequately studied in order to provide realistic and quantifiable market values and monitoring metrics. Furthermore, in order to establish an efficient market with minimal transaction costs, clearly defined connections would need to be made between the services provided and the downstream

beneficiaries with organizational structures that would facilitate market transactions. A system such as the Working for Water Programme in South Africa, which largely focuses on job creation, offers a good example of how an ecosystem services program could be incorporated with an economic recovery program. This combination of objectives may help an appeal of a PES initiative to a broader audience. The recent Forests to Faucets initiative in Denver provides an excellent starting point for citizens of Colorado to understand the value of maintaining natural systems. This example is particularly interesting because it involves an additional fee on water bills in Denver that pays for ecological management in the headwaters of the CRB.

As with any market based initiative, the complications of western water law and competing private interests constitute significant hurdles in the CRB. It is likely that federal oversight would be needed if the system was to be employed for the entire CRB. The development of more localized single service markets with more discrete metrics and values (e.g. salt mitigation, flood abatement, endangered fish, water savings), might offer a starting point for a more integrated approach involving multiple services and goods like that of the Willamette Partnership example.

Table 1: Ecosystem Services of Forests, Oceans, Cultivated Land and Riparian Habitat

Ecosystem Services	Forests	Oceans	Cultivated/Ag Lands	Riparian
Environmental Goods	<ul style="list-style-type: none"> • Food • Fresh water • Fuel • Fiber 	<ul style="list-style-type: none"> • Food 	<ul style="list-style-type: none"> • Food • Fuel • Fiber 	<ul style="list-style-type: none"> • Food • Fresh water • Fuel
Regulating Services	<ul style="list-style-type: none"> • Climate regulation • Flood regulation • Disease regulation • Water purification 	<ul style="list-style-type: none"> • Climate regulation • Disease regulation 	<ul style="list-style-type: none"> • Climate regulation • Water purification 	<ul style="list-style-type: none"> • Climate regulation • Flood regulation • Water purification
Supporting Services	<ul style="list-style-type: none"> • Nutrient cycling • Soil formation 	<ul style="list-style-type: none"> • Nutrient cycling • Primary production 	<ul style="list-style-type: none"> • Nutrient cycling • Soil formation 	<ul style="list-style-type: none"> • Nutrient cycling • Primary production
Cultural Services	<ul style="list-style-type: none"> • Aesthetic • Spiritual • Educational • Recreational 	<ul style="list-style-type: none"> • Aesthetic • Spiritual • Educational • Recreational 	<ul style="list-style-type: none"> • Aesthetic • Educational 	<ul style="list-style-type: none"> • Aesthetic • Spiritual • Educational • Recreational

(Forest Trends et al. 2008, amended by Tamarisk Coalition to include Riparian Habitat)

Volunteer and Philanthropic Based Revenue Mechanisms

Voluntary programs, as the name implies, are funding approaches that a person, organization, company, or government entity can choose to voluntarily pay extra for a special service or product. Collectively referred to as voluntary environmental programs (VEP’s), “EPA claims that

the general public has saved nearly \$6 billion, conserved 603 million gallons of water, saved nearly 770 trillion British thermal units (BTUs) of energy and cut more than 438,000 tons of emissions (Darnall & Sides 2008:98)".

Certification Programs

Certification Programs, also known as product or regional certification mechanisms, establish environmental standards that are typically higher than existing enforceable standards or provide standards where none currently exist. An organization such as a business or government may choose to meet the certification program standards but they are not mandated to do so. A certifying organization will develop environmental standards based on scientific consensus and establish a process for businesses or governments to demonstrate that they are indeed meeting the standards. This typically involves verification of an independent third party, but some programs involve self-certification. The certifying third-party may be a non-profit organization or a government run program. An organization that earns certification then has the right to advertise their certification on products or facilities to gain public trust and or a market advantage (Meidinger 2001).

Certification programs are not actually funding mechanisms per se, but do provide motivation for environmentally responsible action, which replace the need for work that would otherwise require funding. The effectiveness of self-certified programs is not well understood, but they have become a very popular and seemingly cost effective means of bolstering an initiative. Furthermore, they have the added, and perhaps more important advantage of bringing public awareness to an issue. Similarly, *report card* programs are frequently used by organizations to rate companies or governments based on the established criteria. This sort of certification program does not necessarily involve the active participation or even consent of the rated parties, but is intended to provide the public with information which may lead to social and/or market pressure on non-complying parties.

Examples:

Several examples related to watershed and water use have been developed that may be directly applicable to the CRB. The Alliance for Watershed Stewardship (AWS) is a water use certification program that was initiated in part by The Nature Conservancy. The AWS is broken into regional initiatives including the Watershed Stewardship Initiative of Australia, the European Water Partnership, Water Witness International (African program), and Milwaukee Water Council.

The Bonneville Environmental Foundation (BEF), based in Portland, Oregon, has developed Water Restoration Certificates (WRC's), which allow individuals and companies to voluntarily pay to mitigate environmental impacts related to their water use. The funds are used to acquire in-stream water rights and complete ecological restoration (BEF 2010).

The USDA's Organic certification is a common and well recognized example of a government sponsored certification.

Applicability:

The use of a certification program could be a cost effective component of an integrated funding strategy for the CRB initiative and would likely bring heightened awareness to the issue of healthy riparian ecosystems. None of the certification programs reviewed have had much time to mature, so their effectiveness is not well understood, but the BEF model seems to fit well with the objectives of the CRB restoration initiative. The idea could be applied as a county-based program that would provide peer pressure on counties. Similarly, a score-card could be developed to rate counties based on their effort to restore riparian ecology. Municipalities, water districts or private land owners might also wish to participate.

Voluntary Offset Investment/Surcharge Programs

In a capitalist democracy, the consumer's purchasing choices can strongly influence public policy. Voluntary offset investments are essentially donations made by consumers or firms who are aware of the negative environmental or social implications of their consumptive or business behavior. These donations typically fund an organization or initiative that directly mitigates (or offsets) the undesirable consequences of the consumer's choice or business practices, and provide a voice to the consumer regarding the market in which they are engaged.

Examples:

Many consumer-based offset programs exist that rely on the conscience of the consumer including: carbon emission offsets for airplane flights, in which trees are planted to compensate for the fuel burned during the flight (STI 2010); renewable energy surcharges on energy bills allow consumers to voluntarily purchase slightly more expensive blocks of energy to provide support for local investments in wind, solar and other renewable energy production (Tri-State 2010).

The Business and Biodiversity Offset Program (BBOP-Forest Trends) is a partnership, organized by the Wildlife Conservation Society and Forest Trends, that develops offset credit markets that help to preserve biodiversity such as the removal of invasive species and planting of native plants, or removing livestock from sensitive areas. Under the guidance of the BBOP, Puget Sound's Bainbridge Island has developed an offset program that seeks to mitigate the damages of residential and commercial growth through investments in forest and shoreline habitat restoration and preservation (BBOP 2010). This concept can be further developed into offset or mitigation banking.

The Bonneville Environmental Foundation is a non-profit organization in Portland, OR that has developed a system of voluntary offset investment that helps to restore water quantity in

depleted streams of the Columbia River Basin. The BEF's offset investment is called the Water Restoration Certificate (WRC) and each WRC certificate represents 1,000 gallons of water that has been returned to a stream to support natural riparian and aquatic ecology. Individuals and firms are encouraged to purchase certificates to offset their water use footprint (BEF 2010).

Applicability:

The development of a voluntary offset investment program has significant potential in the CRB. This would necessitate the development of a crediting system for restoration that is based on the cost of restoration and or value of the ecological services provided by the restored system. Similar to the BEF Water Restoration Certificates, individuals or firms could purchase Colorado River Riparian Restoration Credits or Water Restoration Credits as a philanthropic gesture or as a means of offsetting disturbances and depletions. As this concept matures, the credit system could evolve into a habitat mitigation bank that could be used to help mitigate unavoidable ecological impacts elsewhere in the basin, possibly even out-of-kind mitigation for disturbances related to oil and gas exploration or other common basin land disturbances. This system could also help to inform and develop a basin wide PES system that asks water users to offset impacts to the river system.

Tax Form Check-Off and Vanity Plates

These two revenue sources constitute charitable donations for specific purposes that are typically administered through state governmental agencies. The tax form check-off is a voluntary contribution made by individuals on their annual income tax return. Vanity plates are vehicle license plates that can be purchased that advertise a cause that is important to the vehicle owner. The purchase of the plates involves an additional charitable donation to the cause above the amount required for standard plates.

Examples:

Colorado's Wildlife check-off, initiated in 1977, was the first state check-off in the nation. There are now 16 eligible charities that residents of Colorado can choose to donate to on their tax return form. Two of the 16 charities are habitat restoration oriented, including the Colorado Nongame and Endangered Wildlife Fund, which receives more donations than any other, and the Colorado Healthy Rivers Fund (CHRF). The CHRF is managed by the Colorado Water Assembly with input from the Colorado Water Conservation Board and Water Quality Control Commission. "Since the establishment of the Colorado Healthy Rivers Fund in 2003, 86,342 citizens donated over \$631,840 from their tax returns to fund 50 local water enhancement projects in Colorado (CWA 2010)."

The Chesapeake Bay Trust (the Trust) is a non-profit organization in Maryland that helps to fund watershed related restoration projects. The Trust is capitalized through specialty license plate sales, state tax form donation, private contributions and an interest accruing capital fund. In

Maryland, unlike other states, the Trust license plate is the only vanity plate available, which means it does not compete with other charities (Adams 2010, personal communication). During its lifespan, the Trust has raised over \$30 million (CBT 2010).

Applicability:

This could be a relatively easy and reliable way to acquire state funding for riparian restoration in multiple states. However, as shown in the table below, most states already have multiple charitable organizations competing for both the tax check-off donations and similar competition exists for vanity plates. This competition spreads the available funding very thin among the receiving organizations; thus, reducing the significance of the revenue source. However, riparian restoration may be a priority among some of the programs already funded, so these existing sources present potential grant funding options. Also, the absence of state check-off programs in Nevada and Wyoming might present a state-based funding opportunity in these CRB states.

Table 2: Existing State Tax Check-Off Revenue in CRB States.

BASIN STATE	# of Existing Tax Form Check-offs	Check-offs used for conservation purposes	Annual Tax Check-off Revenue for all Programs combined
Arizona	9	•Wildlife Conservation	\$3.8 million (2000)*
California	15	•Nongame and Endangered Wildlife Fund •Sea Otter Conservation	\$3.9 million (2000)*
Colorado	16	•Nongame and Endangered Wildlife Fund •Healthy Rivers Fund	\$1.8 million (2006)
Nevada	None	N/A	N/A
New Mexico	5	•Wildlife Conservation •Forest Re-Leaf	?
Utah	6	•Wildlife Conservation	?
Wyoming	None	N/A	N/A

*Source: Federal Tax Administration, Summary of Check-off Programs: http://www.taxadmin.org/fta/rate/co_chart03.html

Volunteer Labor

Volunteer labor can replace the need for funding and provide awareness and education about the issue among the individuals involved.

Examples:

Community based volunteer programs, Grand Canyon Trust volunteer programs, etc.

Applicability:

The idea of volunteer assistance is and will continue to be an important part of riparian restoration that is a key component of community involvement and education. This is a fairly reliable source of replacement revenue that could make a significant difference in terms of dollar value of labor provided depending on the volunteer’s experience and motivation. For

many grant programs it can represent a significant in-kind match that is often necessary to qualify for grants.

Lottery/Gambling Revenues

A fraction of state gambling or lottery revenues are often appropriated for natural capital restoration or social programs such as school funding. Examples include the Arizona Heritage Fund and the Great Outdoors Colorado, commonly known as GOCO. GOCO uses a portion of state lottery revenues for the preservation, protection, enhancement and general management of Colorado’s wildlife, park, river, trail and open space heritage. Voter approved in 1992, 50 percent of state lottery revenues, not to exceed a \$35 million annual cap with adjustment for inflation goes into the GOCO Trust Fund. In 2008 the adjusted cap equaled \$53.1 million. The other 50 percent is divided evenly between the Conservation Trust Fund and the Colorado State Parks Program. The Conservation Trust Fund, who’s revenues totaled \$3.7 million in 2008 (79 percent foundations, 16.7 percent individuals/corporations, 3.5 percent interest income), is dedicated to conserving environmentally vital public lands. If lottery revenue exceeds the cap, the excess funds go to the State Public School Fund (GOCO 2009).

Lottery revenues may be a useful way to secure long-term funding, but it would be competing with existing programs in states like Colorado and Arizona where lottery revenues are already focused on environmental conservation issues.

Table 3: Revenue Potential from CRB State Lotteries.

BASIN STATE	LOTTERY REVENUE PROGRAM	PURPOSE	ANNUAL PROGRAM EXPENDITURES
Arizona	Heritage Fund Plus several other programs	Wildlife Conservation	\$20 million (FY09) (ASLC 2009)
California	Calottery	Education	Unknown
Colorado	GOCO	Environmental Conservation	\$59.6 million (FY09) (GOCO 2009)
Nevada	No State Lottery	N/A	N/A
New Mexico	Legislative Lottery Scholarship	Education	Unknown
Utah	No State Lottery	N/A	N/A
Wyoming	No State Lottery	N/A	N/A

State lotteries are a relatively sustainable revenue stream and they can provide substantial funding amounts. There may be opportunity for Nevada, Utah, and Wyoming to create new state lotteries similar to Colorado and Arizona that could fund environmental conservation. Also, there may be room within the Arizona and Colorado programs to allocate a portion of the funding to river restoration work. In order to redirect existing conservation funds for the purpose of river restoration specifically, state legislators and the public would have to be

persuaded that this is a better use of these funds. It is unlikely that any state generated lottery funds could be expended on riparian restoration beyond state borders.

Lottery revenues have traditionally been fairly recession proof due to the simple unfortunate truth that people in desperate financial situations often turn to desperate solutions such as gambling. However, even lottery revenues have fallen in the current economic recession. Compared to 2007, summer lottery revenues declined in 2008 by approximately 2 percent nationwide, including decreases of 10 percent in California and 2.3 percent in Colorado (Eaton 2008).

Summary Tables of Funding Mechanism Viability in the Colorado River Basin

Tables 1-5 below provide a summary of the Tamarisk Coalition's findings with regards to the use of specific revenue generating mechanisms within the CRB. The funding mechanisms are organized according to the five fundamental funding sources identified in the primary document (taxed based, regulatory, lending, market, and voluntary based revenue sources). Extended definitions and discussions of each of these mechanisms are provided in Appendix A.

The **Overall Viability** rating in the right-hand column represents the Tamarisk Coalition's opinion, informed by our research analysis, of whether or not the mechanism should be given further consideration for the purpose of restoration in the CRB at various initiative levels (local, state, federal). The other qualifiers provided in the table are explained below:

Potential Significance: This qualifier estimates the magnitude of revenue that each source could potentially bring to a restoration initiative. If a mechanism is capable of raising a large sum of money, then it might be an important funding opportunity despite a poor reliability ranking. Such a funding source may be utilized to capitalize a trust fund that is ultimately maintained by more reliable but less significant sources. A source that is rated highly in this category would be considered a major source of funding that could make a large contribution as a standalone source. A moderate rating would indicate a less influential funding source that would likely need to be paired with other sources to create substantive funding. A low ranked source would constitute a relatively insignificant quantity of funding and would need to be paired with many additional funding sources. For example, an oil and gas severance tax would receive a high ranking due to the large quantity of funding possible, but a tax-form check off would receive a low ranking due to the fact that numerous tax-form check-offs already exist in most basin states, which distributes a pool of funding among many sources.

Reliability: This qualifier examines whether or not the specific mechanism will be viable into the future. The perpetual nature of a revenue source is a critical consideration because it allows for confidence in planning, the completion of long-term goals, and for long-term monitoring and maintenance activities. If a mechanism is reliable, then it might be an important funding opportunity despite a low significance ranking. A high ranking is given to a source that is minimally affected by shifting political leadership or economic recession. A moderate ranking is given to a source that will likely be somewhat affected by shifting political and economic interests but that will persist at some level over time. A low ranking indicates that the funding source is highly susceptible to political and economic shifts and may not persist at any level of significance over time. For example, the Land and Water Conservation Fund is funded through federal appropriations of offshore oil and gas revenues. It currently receives a low reliability ranking (despite its high significance) because it is subject to the federal appropriations process.

If US Senate Bill 2747 is passed in the current Congress then the funding source would be dedicated and the revenue would then receive a high reliability rating.

Colorado River Basin Constraints: This catch-all qualifier subjectively examines the funding mechanisms' physical, social, and economic constraints as they relate to the CRB. Factors such as demographics, population distribution, physical geography, economic drivers, aesthetic qualities and cultural identity of the CRB may strongly influence whether or not a mechanism is applicable. Also, in certain cases a mechanism has already been employed for other purposes which would exclude the mechanism from further consideration in the CRB. No ranking is provided with this qualifier due to its highly subjective nature.

Political Acceptability: Relating to social and economic realities, this qualifier builds upon the CRB constraint qualifier by specifically considering the political climate of the CRB. This climate tends to be distinct from the nation as a whole and certainly varies greatly from some of the case studies examined. This single qualifier may trump all other considerations. A high ranking describes a mechanism that has low political risk. A moderate ranking indicates that the mechanism could be passed if considerable political considerations were adequately addressed. A low ranking indicates that the mechanism would be nearly impossible to implement. For example, in the current debate over social security funding, the idea of raising the retirement age for social security benefits is a potentially significant idea, with high fiscal reliability, but the political and social acceptability is low, so the overall viability of this proposal would be low despite the other high rankings.

Overall Viability: This column summarizes the Tamarisk Coalition's opinion of the potential for the funding mechanism to support a Colorado River Basin restoration initiative based on our research and experience which is summarized in the previous four columns. This is in no way a quantitative process.

Tables 1 through 5 summarize each of the funding mechanisms and their overall viability for localized, state-wide, and CRB-wide initiatives. Overall viability for each of these geographic sizes is ranked as either **High** (color code Green), **Moderate** (Yellow), or **Low** (Orange). There are numerous cases where the funding mechanism is also deemed as **Not Applicable (N/A)** or **Not Viable** (Red) principally because the mechanism is inappropriate for the specific geographic size (e.g., property taxes could support either localized efforts or state-wide efforts but are not viable to be shared with other states in the CRB). In some cases there is a range for overall viability.

TABLE 1: Tax and Fee Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	OVERALL VIABILITY
<p>Access Fee (e.g., use fees, water recreation permit surcharge)</p>	<p>MODERATE for a state or local level program. LOW to MODERATE for a regional or federal level program. Depends largely on specific demand for resource access.</p>	<p>MODERATE to HIGH, due to the dedicated nature of the funding, and dependence on the elasticity of demand related to resource access.</p>	<p>There is a diverse array of recreational opportunities in the CRB. Most access fee opportunities have already been exploited. However, some fees could be redirected or increased to better mitigate ecological damage caused by the recreational activity, recreationalist who benefit from restoration work could be asked to pay.</p>	<p>LOW to MODERATE for any level of initiative. It would be considered a new tax or tax increase and therefore would likely require strong and simple cause and effect economic justification. Also, social equity of limiting access to low income residents should be considered.</p>	<p>MODERATE for a localized initiative. MODERATE for a state-wide initiative. MODERATE for a basin-wide initiative.</p>
<p>Ad Valorem Tax (e.g., property tax, real estate transfer tax)</p>	<p>HIGH for Local initiatives, especially when they can be tied to a special improvement district. MODERATE for State-wide programs.</p>	<p>HIGH, although some variability exists year-to-year with the value of goods purchased.</p>	<p>Most opportunities for ad valorem taxes have already been exploited. Also, ad valorem taxes are typically state or locally applied and have not been traditionally coordinated and/or shared between States. Some tax revenue could be redirected or increased to better mitigate ecological damage at a local level if residents are willing to tax themselves to maintain or restore a public resource.</p>	<p>MODERATE for discrete watersheds or sections therein if a significant problem is being addressed. LOW to MODERATE for State-wide initiatives because it would be considered a new tax NOT APPLICABLE for a coordinated Basin States initiative due to strong opposition to increased property taxes regionally.</p>	<p>MODERATE for a localized initiative. LOW for a State-wide initiative. NOT VIABLE for a Basin-wide initiative.</p>

TABLE 1: Tax and Fee Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	OVERALL VIABILITY
Cumulative Impact Fees (e.g., sprawl fee, ecosystem services impact fee)	HIGH potential significance at all geographic levels.	HIGH, especially if the fee can be tied to legislative authority.	Currently there is no cumulative impact fee collected regionally and water projects have largely circumvented NEPA requirements, but there is a clear connection between increased water use and ecological degradation in the CRB that should be a matter of national concern.	LOW to MODERATE, this would be considered a new tax, which could have significant hardships for farmers and ranchers. Would likely be more acceptable if exceptions or assistance can be provided for the agricultural industry.	<p style="background-color: #008000; color: white; padding: 2px;">HIGH for a localized initiative.</p> <p style="background-color: #ffff00; padding: 2px;">MODERATE for a state-wide initiative.</p> <p style="background-color: #ffff00; padding: 2px;">MODERATE for a basin-wide initiative.</p>
Severance, Energy– Existing Federal Rate (oil, gas and coal)	HIGH, a large potential funding source. Current use of Federals Severance Tax receipts fund some Congressionally directed funds but most tend up in the US Treasury's General Fund.	HIGH, although some variability exists year-to-year with the price of energy, severance taxes are highly reliable especially because regional and national production is steady or increasing.	If the Colorado River system and the water/riparian issues are sole recipients of funding then there may be higher political resistance. If bundled with other natural resource issues nationwide that require action then the political opposition may be less. This tax has been in existence; therefore, not a new tax.	MODERATE to HIGH, it will be considered a reduction in revenue to the US Treasury's General Fund. There will also be pressure from other national needs (e.g., renewable energy) Good potential to gain support from energy industry, who could then tout their defined contributions, and environmental organizations.	<p style="background-color: #ff0000; color: white; padding: 2px;">N/A for a localized initiative.</p> <p style="background-color: #ff0000; color: white; padding: 2px;">N/A for a state initiative.</p> <p style="background-color: #ffff00; padding: 2px;">MODERATE for a federal initiative.</p>
Severance, Energy – Federal Increased Rate (oil, gas and coal)	MODERATE TO HIGH depending on the size of the tax rate increase	HIGH, if severance tax rates are increased from present levels, they should have the same reliability as existing revenues with similar variability.	If the Colorado River system and the water/riparian issues are sole recipients of funding then there may be higher political resistance. If bundled with other natural resource issues nationwide that require action then the political opposition may be less.	LOW, increase in the existing Severance Tax rate is considered a tax increase. Energy Industry opposition.	<p style="background-color: #ff0000; color: white; padding: 2px;">N/A for a localized initiative.</p> <p style="background-color: #ff0000; color: white; padding: 2px;">N/A for a state initiative.</p> <p style="background-color: #ffff00; padding: 2px;">LOW for a federal initiative.</p>

TABLE 1: Tax and Fee Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	OVERALL VIABILITY
Severance, Energy – Existing State Rate (oil, gas, and coal)	LOW to HIGH depending on a state's energy resources.	HIGH, although some variability exists year-to-year with the price of energy, severance taxes are highly reliable especially because regional production is steady or increasing in many of the Basin States.	If the Colorado River system and the water/riparian issues are sole recipients of funding then there may be higher political resistance. If bundled with other state natural resource issues that require action then the political opposition may be less.	LOW to MODERATE, current State Severance Tax revenues are already targeted for community impacts from energy development, education, water development, etc. These sustainable funds are also under pressure by states to supplement their general fund because of the current recession.	N/A for a localized initiative. LOW to MODERATE for a state initiative. N/A for a federal initiative.
Severance, Energy – State Increased Rate (oil, gas, and coal)	LOW to HIGH, depending on a state's energy resources.	HIGH, if severance tax rates are increased from present levels, they should have the same reliability as existing revenues with similar variability.	If the Colorado River system and the water/riparian issues are sole recipients of funding then there may be higher political resistance. If bundled with other state natural resource issues that require action then the political opposition may be less.	LOW, would be a tax increase. Energy Industry opposition.	N/A for a localized initiative. LOW for a state initiative. N/A for a federal initiative.
Severance, Sand and Gravel	LOW to MODERATE, not likely to be a significant revenue source	HIGH, sand and gravel excavation is a fairly consistent industry.	Large quantities of sand and gravel are harvested from floodplains and streambeds of the CRB causing significant damage. Therefore, using these funds to restore waterways would be a fair allocation of the tax.	LOW to MODERATE, due to the fact that this would be a tax increase and Increased road construction cost. However, if the voters' sense of fairness is appealed to it could have a chance.	LOW to MODERATE for a localized initiative. MODERATE for a state initiative. N/A for a federal initiative.

TABLE 1: Tax and Fee Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	OVERALL VIABILITY
Instream Flow Tax Credits	LOW to MODERATE, depending on the terms of the tax credit, replaces need for funds, but not likely to be a significant source.	LOW to MODERATE, many variables including incentives and market conditions will affect its use. Already shown to work in Colorado	Colorado already has ISF tax credit; same program could be explored in other CRB states. Increasing values of water will place pressures on irrigation users to sell or donate water rights; this would provide a nother option for farmers and ranchers.	HIGH, as a voluntary program, there would be little political opposition, increase public awareness and provide options to rural land stewards.	MODERATE for a localized initiative.
					HIGH for a state initiative.
					LOW for a federal initiative.
Recreational Equipment Sales Tax – Federal and/or State	LOW to HIGH, depending on tax rate and need to split funding among multiple programs.	HIGH, tax associated with growing economic sector.	River and reservoir recreation including aesthetic quality is important economic industry in CRB. The hunting and Fishing industry is closely tied to riparian community health. Several recreational equipment taxes already exist in the CRB states.	LOW to MODERATE, for hunting and fishing supplies as these are already taxed. LOW to MODERATE, for other recreational items such as camping gear, campers, OHVs, boats, boat motors, rafting gear, GPS units, mountain bikes, etc. This would be a new tax and would require support beyond the conservation community. Would require industry support.	N/A for a localized initiative.
					MODERATE to HIGH for a state initiative.
					LOW to HIGH for a federal initiative.
Resort Tax/Ecotourism Payments	LOW to HIGH, depending on tax rate and need to split funding among multiple programs.	MODERATE to HIGH, tax associated with growing economic sector.	Most tourism oriented locations have already taken advantage of this concept to fund other programs. Some communities may determine that maintaining river is critical to maintaining tourism, so there may be localized potential.	LOW to MODERATE, a new tax, it would likely meet resistance during a time of already slow tourism industry.	MODERATE for a localized initiative.
					LOW for a state initiative.
					LOW for a federal initiative.

TABLE 1: Tax and Fee Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	OVERALL VIABILITY
Road/Bridge Toll	LOW to HIGH, depending on tax rate and need to split funding among multiple programs.	HIGH, tax associated with reliable transportation and commerce sectors.	Few opportunities available now that new transportation specific bridges have been constructed to bypass dams.	LOW to MODERATE, a new tax, it would likely meet resistance in a time of already slow commerce. Also, issue of air pollution and time loss associated with inefficient vehicle movement.	<p>LOW for a localized initiative.</p> <p>LOW for a state initiative.</p> <p>LOW for a federal initiative.</p>
Utility Surcharges and Fee-Bates	HIGH, a large potential funding source, but depends on rate and need to split funding among multiple programs.	HIGH, utilities are very reliable, low elasticity of service substitution.	Water and electric utilities in the CRB are highly dependent on stream flow. Combination of consumer tax with a rebate program may make new tax less politically sensitive especially when tied to water resource conservation concerns. Could be valuable component of larger basin wide PES strategy.	MODERATE, would be a new tax and therefore would likely meet political opposition. However, given social concern over water resources, the concept could be tied to other water conservation programs and gain political support.	<p>MODERATE to HIGH for a localized initiative.</p> <p>MODERATE to HIGH for a state initiative.</p> <p>LOW to MODERATE for a federal initiative.</p>
Transbasin Ecological Surcharge	HIGH, a large potential funding source depending on rates.	HIGH, transbasin demand is increasing. Large populations outside of the basin depend on CRB water	Little funding is provided to the basin to maintain the natural assets. A small excise fee on water is necessary under a PES/markets structure to compensate for the added degradation that transbasin diversions create compared to localized intra-basin diversion. Public education is needed. Regional application would require significant policy reform.	MODERATE, would be a new tax and therefore would likely meet strong political opposition. However, given social concern over water resources, the concept could be tied to other water conservation programs and gain political support.	<p>MODERATE to HIGH for a localized initiative.</p> <p>MODERATE to HIGH for a state initiative.</p> <p>LOW to MODERATE for a federal initiative.</p>

TABLE 1: Tax and Fee Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	OVERALL VIABILITY
Water Diversion Fee (consumptive use severance)	<p>HIGH, a large potential funding source, depends on rate and need to split funding among multiple programs.</p>	<p>HIGH, water delivery very reliable and already closely monitored by states, low elasticity of service substitution.</p>	<p>If the Colorado River system and the water/riparian issues are sole recipients of funding then there may be higher political resistance. If bundled with other regional water issues that require action then the political opposition may be less. This type of tax is easily assessed based on existing record keeping (would increase diversion record accuracy and integrity). Could be valuable component of larger basin wide PES strategy and reverse the inefficiencies associated with the use-it or lose-it principle.</p>	<p>LOW to MODERATE, would be a new tax and therefore would likely meet political opposition especially from water districts. Would likely increase cost of local agricultural products which would create market disadvantages.</p>	<p>MODERATE for a localized initiative.</p>
					<p>MODERATE for a state initiative.</p>
					<p>LOW for a federal initiative.</p>
Water Rights Transfer Fees	<p>MODERATE, It is likely that water right transfers will become more frequent in the future as water values rise.</p>	<p>MODERATE, rate of water market activity is affected by variable market pressures.</p>	<p>Could be bundled with other related natural resource issues that require action. Similar fees may exist in certain areas. Could be valuable component of larger basin wide PES strategy.</p>	<p>LOW, would be a new tax and therefore would likely meet political opposition especially from water districts and property right advocates.</p>	<p>LOW for a localized initiative.</p>
					<p>LOW for a state initiative.</p>
					<p>N/A for a federal initiative.</p>

TABLE 2: Regulatory Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	Overall Viability
In-lieu Fee Program	LOW to MODERATE, depends on openness of regulating agencies to accept as mitigation alternative.	MODERATE, no guarantees that the fees adequately mitigate the resource impacts.	Concept is already a part of CWA regulations, the concept could be expanded to other environmental permitting actions such as NEPA and ESA. Could be expanded to voluntary offset program and help to streamline PES market transactions.	HIGH, provides a convenient means of meeting compliance obligations. Some conservationist may object due to the tendency to enable impacts.	LOW for a localized initiative.
					MODERATE for a state initiative.
					MODERATE to HIGH for a federal initiative.
Mitigation and Bonding Requirements	LOW, bonding is generally only associated with mitigating or restoring specifically permitted disturbances. Does not actually provide new funding.	HIGH, legally binding agreement to fund restoration work and fiscal incentive to minimize impacts.	Concept is ready a part of CWA regulations, it could be expanded to other environmental permitting actions such as NEPA and ESA.	MODERATE, developers are generally opposed to bonding, but the concept is generally understood and reluctantly accepted.	LOW for a localized initiative.
					LOW for a state initiative.
					LOW for a federal initiative.
Environmental Non-Compliance and Damage Fines	LOW, non-compliance is not a significant problem, little opportunity exists.	MODERATE, legally binding, but depends on level of enforcement efforts	Development projects, new and old, have damaged riparian zones, but most are legally authorized or grandfathered. Few river impacts go unnoticed, so there is little opportunity.	HIGH, guilty parties are not likely to receive sympathy from public.	LOW for a localized initiative.
					LOW for a state initiative.
					LOW for a federal initiative.
Reimbursement Fee	LOW, does not actually provide new funding.	HIGH, system provides reliability in the process of restoration.	Essentially maintains the status quo by providing a system of paying for past restoration work, The concept could help under certain restoration strategies or a financial tool under a regionally managed program.	HIGH, provides a convenient means of meeting compliance obligations.	LOW for a localized initiative.
					LOW for a state initiative.
					LOW for a federal initiative.

TABLE 3: Lending Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	Overall Viability
<p>Revenue Bonds</p>	<p>LOW to HIGH, as public infrastructure is improved in the SW the use of revenue bonds could provide a large source of funding. Loss of significance over long-term as interest is paid.</p>	<p>MODERATE, if a restoration project can be tied to the revenue bond of a road or water project then the revenue would be reliable.</p>	<p>Expanding development in the CRB may present new funding opportunities. Many variables including the nature of the parent project and geographic location that would affect the use of this mechanism.</p>	<p>LOW to HIGH, depends on the nature and location of associated development project.</p>	<p>LOW to HIGH for a localized initiative.</p>
					<p>LOW to HIGH for a state initiative.</p>
					<p>LOW to HIGH for a federal initiative.</p>
<p>Revolving Loan Fund</p>	<p>HIGH, not a revenue source perse, but might be very useful for the leveraging of available funding.</p>	<p>LOW to HIGH, depends on the reliability of other sources used to capitalize the fund.</p>	<p>A financial tool, not affected by geographic application. It might provide a means of assisting private parties who are interested in restoration but don't have a dequate funds.</p>	<p>HIGH, depends on original funding source, could be capitalized with public funds, which would not be as politically acceptable as a private, nonprofit based funding source.</p>	<p>LOW to HIGH for a localized initiative.</p>
					<p>LOW to HIGH for a state initiative.</p>
					<p>LOW to HIGH for a federal initiative.</p>

TABLE 4: Market Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	Overall Viability
Corporate Environmental Performance Incentives	LOW to HIGH, not a funding source, but could provide replacement funding. Depends on the success of the program.	LOW to MODERATE, Voluntary program, dependent on social pressures.	As a voluntary program, it could be applied at local or regional scales and rely on social pressures to motivate participation. It could develop out of PES market research.	HIGH, voluntary program no political concern if maintained as a voluntary program, but likely receive considerable opposition if instituted as a regulatory program.	MODERATE to HIGH for a localized initiative.
					LOW to HIGH for a state initiative.
					LOW to HIGH for a federal initiative.
Cost Sharing	MODERATE TO HIGH, cooperative private partnerships to address regional or sub-watershed problems could be very significant.	LOW to HIGH, larger initiatives would likely require a government program to help facilitate equitable arrangements among multiple stakeholders.	Land stewardship has been shown to have significant downstream effects in the CRB. Large component of land is public in CRB, which may limit the potential for private cooperative arrangements. Limited information and private resources to explore direct watershed relationships. Could be important component of basin wide PES system.	MODERATE to HIGH, private initiative, little to no socio-political concerns.	HIGH for a localized initiative.
					MODERATE to HIGH for a state initiative.
					MODERATE for a federal initiative.
Mitigation Banking (Offset Investment Banking)	MODERATE to HIGH, depends on the service area and extent of out-of-kind compensation permitted by regulatory programs.	MODERATE to HIGH, once established, mitigation banking could provide a reliable means of mitigating watershed damages.	Increasing residential and industrial development in CRB. If riparian restoration is accepted by USACE and USFWS for CWA and ESA impacts, then the concept could have strong regional application, especially if regulatory based banking can be expanded to voluntary and entrepreneurial markets.	HIGH, market based system that streamlines regulatory process.	MODERATE for a localized initiative.
					LOW to HIGH for a state initiative.
					MODERATE to HIGH for a federal initiative.

TABLE 4: Market Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	Overall Viability
<p>Permit Trading Program (pollution trading, nutrient cap and trade)</p>	<p>MODERATE, not a funding source, but could be provide significant replacement funding</p>	<p>MODERATE to HIGH, complicated transactions, require reliable system, but once established the system could be reliable.</p>	<p>Water quality issues in the CRB include salinity control, heavy metals, water temperature (see water market regarding water quantity trading). USBOR already has started salinity control program, which could provide a starting point for basin-wide PES system.</p>	<p>MODERATE to HIGH, market based system, but requires government program oversight.</p>	<p>MODERATE for a localized initiative.</p>
					<p>LOW to HIGH for a state initiative.</p>
					<p>LOW to HIGH for a federal initiative.</p>
<p>Private Payments for Amenity for Services/Transfer Payments</p>	<p>LOW to MODERATE, private initiative typically involves localized issues, but could be significant under efficient model if established for specific resource issues.</p>	<p>LOW, highly dependent on private land owners and resource user's ability to identify resource degradation and cooperative land use connections.</p>	<p>Significant areas of public land in CRB limit applicability. Limited information and private resources to explore direct watershed relationships.</p>	<p>HIGH, private initiative, little to no socio-political concerns.</p>	<p>MODERATE for a localized initiative.</p>
					<p>LOW to MODERATE for a state initiative.</p>
					<p>LOW for a federal initiative.</p>
<p>Transferable Tax Credits for Conservation Easements (Development Credit Trading)</p>	<p>MODERATE, not a funding source, but tax credits could provide useful incentive and means of reducing costs associated with riparian land conservation.</p>	<p>LOW, dependent upon success of program and subject to economic development trends, no regulatory requirements.</p>	<p>Much of the CRB riparian area is public land that would not be included in this type of program. Requires an organized state program. Not directly related to restoration, but could help. Probably limited to state or localized programs.</p>	<p>HIGH, voluntary program might provide new income option for private land owners in CRB.</p>	<p>MODERATE for a localized initiative.</p>
					<p>MODERATE for a state initiative.</p>
					<p>LOW for a federal initiative.</p>

TABLE 4: Market Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	Overall Viability
Water Rights Trading and Water Banks	HIGH, not a funding source, but could have substantial influence on restoration success	MODERATE to HIGH, once established the system would be very reliable.	Much inefficiency exists in the current water allocation system of the CRB. 150+ years of compacts and legal precedent will make regional reforms difficult. Maybe easier on a local or state scale.	MODERATE, this is a politically sensitive topic. Large water users would likely be opposed to the use of market allocation. If provisions are made to assist agricultural producers, then the concept might be more acceptable.	MODERATE for a localized initiative.
					MODERATE to HIGH for a state initiative.
					LOW for a federal initiative.

TABLE 5: Volunteer Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	Overall Viability
Certification Program	MODERATE to HIGH, not a funding source, but could have substantial influence on public awareness and voluntary action.	LOW to MODERATE, voluntary in nature, relies on social pressures.	Growing concern for the health of the CRB will help provide legitimacy to a certification program.	HIGH, voluntary participation, little public opposition.	MODERATE to HIGH for a localized initiative.
					MODERATE to HIGH for a state initiative.
					MODERATE to HIGH for a federal initiative.
Lottery/Gambling Revenues	LOW to MODERATE, potential for high level of funding, but must compete with many other interests.	HIGH, lottery revenue is historically resistant to political and economic change.	Most lottery revenues are already allocated, some to go to conservation oriented causes, but a few states do not have lotteries.	MODERATE, generally acceptable socially and politically, but some opposition may occur from competing interests.	LOW for a localized initiative.
					LOW for a state initiative.
					LOW for a federal initiative.
Tax Form Check-Offs	LOW, Low potential due to competition with many other interests.	MODERATE, income may fluctuate with economic changes.	Tax form donation revenues are already allocated among several charitable causes; some funding already goes to conservation oriented causes. A couple states do not yet utilize this option.	HIGH, generally acceptable socially and politically, but some opposition may occur from competing interests.	LOW for a localized initiative.
					LOW for a state initiative.
					LOW for a federal initiative.
Vanity License Plates	LOW, Low potential due to competition with many other interests.	HIGH, once established the reliability would be fairly high unless other plates were added to compete for funds.	Vanity plate revenues are already allocated among several charitable causes, some funding already goes to conservation oriented causes.	HIGH, generally acceptable socially and politically, but some opposition may occur from competing interests.	LOW for a localized initiative.
					LOW for a state initiative.
					LOW for a federal initiative.

TABLE 5: Volunteer Based Sustainable Revenue Generating and Supporting Mechanisms for Ecological Restoration in the Colorado River Basin (alphabetically listed)

REVENUE MECHANISM	Potential Significance	Reliability	CRB Constraints and Opportunities	Political/Social Acceptability	Overall Viability
Voluntary Labor	MODERATE, not a funding source, but provides replacement funding by offsetting restoration costs.	MODERATE, several volunteer programs have been successful and reliable in the past. Adds some logistical complications.	Sparsely populated region reduces access to volunteer assistance. Voluntary labor is already used successfully in the CRB, could be expanded.	HIGH, highly valued social benefits.	HIGH for a localized initiative.
					MODERATE to HIGH for a state initiative.
					MODERATE for a federal initiative.
Voluntary Offset Investment	LOW to HIGH, depends on scope and success of program.	MODERATE, voluntary in nature, but once program is established it could be a reliable source.	Several ecological service and product markets could be targeted in the CRB. An offset program has significant potential in the CRB but would require further PES market research.	HIGH, voluntary program, little socio-political opposition.	HIGH for a localized initiative.
					MODERATE to HIGH for a state initiative.
					MODERATE to HIGH for a federal initiative.
Voluntary Surcharge Program	LOW, depends on scope and success of program.	MODERATE, voluntary in nature, but once program is established it could be a reliable source.	Voluntary hydro-electric and water use surcharges could be targeted in the CRB. Potential application in the CRB, especially given growing awareness in urban communities of the CRB ecological decline.	HIGH, voluntary program, little socio-political opposition.	MODERATE for a localized initiative.
					LOW to MODERATE for a state initiative.
					LOW to MODERATE for a federal initiative.

Literature Cited

Adams, H., 2010, Chesapeake Bay Trust, personal communication.

ASLC (Arizona State Lottery Commission). 2009. Fiscal year 2009 appropriations report. Arizona State Lottery Commission. Available from <http://www.azleg.gov/ilbc/09app/lot.pdf>

BEF (Bonneville Environmental Foundation), 2010. URL <http://www.b-e-f.org/> [accessed on 21 January 2011]

BBOP (Business and Biodiversity Offset Program), 2010. URL <http://bbop.forest-trends.org/> [accessed on 21 January 2011]

CBT (Chesapeake Bay Trust), About, 2010. URL www.cbtrust.org/site/c.mijPKXPCJnH/b.5435807/k.AFFA/About.htm [accessed on 12 August 2010]

CBWBRFP (Chesapeake Bay Watershed Blue Ribbon Finance Panel), Saving a national treasure: financing the cleanup of the Chesapeake Bay, 2004. URL www.chesapeakebay.net/content/publications/cbp_12881.pdf [accessed on 21 January 2011]

CEQ (Council on Environmental Quality), CEQ regulations for implementing NEPA. 2010. URL <http://ceq.hss.doe.gov/nepa/reg/ceq/1508.htm#1508.7> CWCB (Colorado Water Conservation Board), Colorado Watershed Restoration Grants, 2010. URL <http://cwcb.state.co.us/LoansGrants/colorado-watershed-restoration-grants/Pages/main.aspx> [accessed on 21 January 2011]

CGA (Colorado General Assembly), HB 10-1250, Session Laws of Colorado 2010 Second Regular Session, 67th General Assembly, 2010. URL http://www.state.co.us/gov_dir/leg_dir/olls/sl2010a/sl_381.htm [accessed on 21 January 2011]

Clark, S. 2007. A field guide to conservation finance. Island Press, Washington, D.C.

CRWCD (Colorado River Water Conservation District), 2010. URL <http://www.crwcd.org/> [accessed on 21 January 2011]

CSL (Colorado State Legislature). 2009. House Bill 09-1067. Available from http://www.coloradowatertrust.org/images/uploads/HB_1067.pdf

CTU (Colorado Trout Unlimited). 2004. End of Session Legislative Report. Available from <http://cotrout.org/CTU%20leg%20report%20-%20final%20May%202004.htm>

CWA (Colorado Water Assembly), The Colorado healthy rivers fund: a Colorado tax check-off program supporting local restoration projects, 2010. URL <http://www.coloradowater.org/cwpcf.php> [accessed on 21 January 2011]

CWT (Colorado Water Trust), 2010. URL <http://www.coloradowatertrust.org> [accessed on 21 January 2011]

Darnall, N. and S. Sides. 2008. Assessing the performance of voluntary environmental programs: does certification matter? *Policy Studies Journal* **36**:95-117.

Denver Water, Forest to Faucet: U.S. Forest Service and Denver Water Watershed Management Partnership, 2010. URL <http://www.denverwater.org/SupplyPlanning/WaterSupply/PartnershipUSFS/> [accessed on 2 February 2011]

Doyle, M. and C. A. Drew, editors. 2008. Large-scale ecosystem restoration: five case studies from the United States. Island Press, Washington, D.C.

Eaton, L. 2008. State lotteries show big declines, with rare drop in sales, a formerly recession-proof revenue stream slows. *Wall Street Journal*. Available from <http://online.wsj.com/article/SB123024947406734259.html>

Eno, A. S. 2010. A land trust of landowners for landowners. PLN (Private Landowner Network), Yarmouth, Maine. Available from <http://www.privatelandownernetwork.org/plnBlog/post.aspx?id=23>

Forest Trends, The Katoomba Group and the United Nations Environmental Partnership. 2008. Payments for ecosystem services: getting started a primer. Harris Litho, Washington, D.C. Available from <http://www.katoombagroup.org/documents/publications/GettingStarted.pdf>

Garrick, D., M.A. Siebentritt, B. Aylward, C.J. Bauer, A. Purkey. 2009. Water markets and freshwater ecosystem services: policy reform and implementation in the Columbia and Murray Darling basins. International Conference on Implementing Environmental Water Allocations, Port Elizabeth, South Africa. Available from http://www.americanrivers.org/assets/pdfs/water-supply/water-markets_garrick-et-al.pdf

GOCO (Great Outdoors Colorado). 2009. GOCO FY2009 Annual Report. Great Outdoors Colorado. Available from <http://goco.org.s57353.gridserver.com/wp-content/uploads/2010/06/FY09-ANNUAL-REPORT-web.pdf>

Grieg-Gran, M. 2000. Fiscal incentives for biodiversity conservation: the ICMS ecológico in Brazil. Environmental Economics Programme at the International Institute for Environment and

Development, London. Available from

<http://ageconsearch.umn.edu/bitstream/24135/1/dp000001.pdf>

HDBP (Hoover Dam Bypass Project), 2010. URL <http://www.hooverdambypass.org/default.htm> [accessed on 21 January 2011]

Hurd, J. 2009. Characteristics of Watershed Restoration Funding. Wildlands CPR, Missoula, Montana. Available from http://www.wildlandscpr.org/files/Funding_Characteristics_0.pdf

King County, Transfer of Development Rights Program, 2010. URL <http://www.kingcounty.gov/environment/stewardship/sustainable-building/transfer-development-rights.aspx> [accessed on 21 January 2011]

LADWP (Los Angeles Department of Water and Power), Water Rates, 2010. URL <http://www.ladwp.com/ladwp/cms/ladwp001155.jsp> [accessed on 21 January 2011]

Levitt, J. N. editor. 2005. From Walden to Wall Street: frontiers of conservation finance. Island Press, Washington, D.C.

Meidinger, E. E. 2001. Environmental certification programs and U.S. environmental law: closer than you may think. Environmental Law Institute, Washington, D.C. Available from <http://www.law.buffalo.edu/homepage/eemeid/scholarship/certlaw.pdf>

Min, B. S. 2004. A water surcharge policy for river basin management in Korea: a means of resolving environmental conflict? Water Policy 6:365-380. Available from <http://www.iwaponline.com/wp/00604/0365/006040365.pdf>

MMS (Minerals Management Service). 2007. Thirty-four states earn \$1.9 billion in royalty recipes: MMS reports FY 2007 disbursements. Press release. Available from <http://www.gomr.mms.gov/homepg/whatsnew/newsreal/2007/071204.pdf>

MSL (Michigan State Legislature). 2009. Article IX, Section 40, Michigan Conservation and Recreation Legacy Fund. 2009. Available from [http://www.legislature.mi.gov/\(S\(5qpmexmigmk4rc552ojosf55\)\)/mileg.aspx?page=getObject&objectName=mcl-Article-IX-40](http://www.legislature.mi.gov/(S(5qpmexmigmk4rc552ojosf55))/mileg.aspx?page=getObject&objectName=mcl-Article-IX-40)

NCSL (National Conference of State Legislatures), State Energy Revenues Update, 2010. URL <http://www.ncsl.org/default.aspx?tabid=12674> [accessed on 21 January 2011]

NJDBI (New Jersey Department of Banking and Insurance), Pinelands Development Credit Bank, 2010. URL <http://www.state.nj.us/dobi/pinelands/pinelandsbank.htm> [accessed on 21 January 2011]

NMED (New Mexico Environment Department), Water Conservation Fee, 2010. URL http://www.nmenv.state.nm.us/dwb/sampling/water_conservation_fee.htm [accessed on 21 January 2011]

NMTRD (New Mexico Taxation and Revenue Department), All Taxes, Severance Tax, 2010. URL <http://www.tax.newmexico.gov/All-Taxes/Pages/Severance-Tax.aspx> [accessed on 21 January 2011]

NPS (National Park Service), Glen Canyon. 2007. Budget and annual performance plan for glen canyon and rainbow bridge available for public review. Press release. Available from <http://www.nps.gov/glca/parkmgmt/upload/GLCA.RABR.Thomas.FY07.pdf>

NRCS (Natural Resource Conservation Service), Conservation Stewardship Program, 2010. URL http://www.nrcs.usda.gov/programs/new_csp/csp.html [accessed on 21 January 2011]

NSAA (National Ski Areas Association). 2010. Sustainable slopes, annual report 2010. National Ski Areas Association, Lakewood, Colorado. 2010. Available from http://www.nsaa.org/nsaa/environment/sustainable_slopes/ssar-10.pdf [accessed on 21 January 2011]

POG (Pennsylvania Office of the Governor), Growing Greener, 2010. URL www.growinggreener2.org/default.aspx?id=196#how1 [accessed on 13 August 2010]

SFWMD (South Florida Water Management District), District Acquires 26,800 Acres to Reveal the River of Grass, 2010. URL http://www.sfwmd.gov/portal/page/portal/pg_grp_sfwmd_koe/pg_sfwmd_koe_riverofgrass [accessed on 21 January 2011]

Smith, M., D. de Groot, D. Perrot-Maître, and G. Bergkamp editors. 2006. Pay: establishing payments for watershed services. International Union for Conservation, Gland, Switzerland. Available from <http://data.iucn.org/dbtw-wpd/edocs/2006-054.pdf>

STI (Sustainable Travel International), 2010. URL <http://www.sustainabletravelinternational.org/> [accessed on 21 January 2011]

Sullivan, C. 2010. Is it a water-rights fee or a backdoor tax? calif.'s high court will decide. New York Times. Available from: <http://www.nytimes.com/gwire/2010/12/02/02greenwire-is-it-a-water-rights-fee-or-a-backdoor-tax-cal-18175.html>

Tri-State, Renewable Energy, Greenpower, 2010. URL <http://www.tristategt.org/greenpower/> [accessed on 21 January 2011]

Turpie, J. K., C. Marais and J. N. Blignaut. 2008. The working for water programme: evolution of a payments for ecosystem services mechanism that addresses both poverty and ecosystem service delivery in South Africa. *Ecological Economics* **65**: 788-789.

UN (United Nations), General Assembly declares access to clean water and sanitation is a human right, UN News Centre, 2010. URL <http://www.un.org/apps/news/story.asp?NewsID=35456&Cr=sanitation&Cr1> [accessed on 21 January 2011]

UOLR (Utah Office of Legislative Research and General Counsel). 2005. Comparison of state severance taxes on oil and gas, Utah and selected oil and gas producing states. Utah Office of Legislative Research and General Counsel. Available from <http://le.utah.gov/interim/2005/pdf/00000637.pdf>

USBR (U.S. Bureau of Reclamation), Colorado River Basin Salinity Control Program, Grand Valley Unit, Title II, 2009. URL http://www.usbr.gov/projects/Project.jsp?proj_Name=CRBSCP%20-%20Grand%20Valley%20Unit%20-%20Title%20II [accessed on 21 January 2011]

USCB (U.S. Census Bureau), State Tax Collections 2005 and State Tax Collections 2007, 2011. URL <http://www.census.gov/govs/qtax/> [accessed on 21 January 2011]

USEPA (U.S. Environmental Protection Agency), Clean Water State Revolving Fund, 2010. URL http://water.epa.gov/grants_funding/cwf/cwsrf_index.cfm [accessed on 21 January 2011]

USTC (Utah State Tax Commission), 2010. URL <http://tax.utah.gov/> [accessed on 21 January 2011]

WBT (Water Bank Trust), 2006. URL <http://www.waterbank.com/waterbanktrust.html> [accessed on 21 January 2011]

Williams, B., V. Lopez, J. Outland, and G. Knecht. 2010. 2010 South Florida environmental report, appendix 7A-1: comprehensive everglades restoration plan annual report – 470 report. South Florida Water Management District. Available from http://publicfiles.dep.state.fl.us/dear/everglades/incoming/Final%202010%20SFER/Main%20Report_Volume%20I/Final_Draft/Voll_App7A-1_122409_finaldraft.pdf

WP (Willamette Partnership), 2010. URL <http://willamettepartnership.org/> [accessed on 21 January 2011]

WSDR (Washington State Department of Revenue). 2006. Special notice: water rights transfers. Special Notice. Available from http://dor.wa.gov/Docs/Pubs/SpecialNotices/2006/sn_06_WaterRightsSubjectToREET.pdf

WSL (Washington State Legislature), RCW 90.48.367 Discharge of oil into waters of the state — Assessment of compensation, 2010. URL <http://apps.leg.wa.gov/rcw/default.aspx?cite=90.48.367> [accessed on 21 January 2011]

Appendix B

Federal Sustainable Programs – Case Studies

The following case studies include a number of federal programs that have been successful in establishing sustainable funding from a variety of sources. A few examples also provide important information of unsuccessful attempts to secure sustainable funding.

Federal Conservation Programs – A Brief History

In US conservation history, the stories of parks and forests are largely federal, with states playing a minor role. But for fish and wildlife the states have been the leaders, with the federal government in a mere supporting role – at least until recently, when Congress asserted authority over endangered species with the passage of the Endangered Species Act in 1973.

Yet the endangered species recovery story of the century has been that of the state wildlife agencies. At the beginning of the century, four of the six US varieties of elk had been extirpated, while Rocky Mountain elk, pronghorn, and bighorn sheep were all near extinction. The latter species were saved not by protecting them from hunting, as some wanted to do, but by creating state agencies that had an incentive to promote the species in order to gain hunting revenue.

Massachusetts created the first state game department in 1865. New Hampshire and California followed in 1878. With populations of many major game species at very low levels, Michigan put a ten-year moratorium on elk hunting in 1879 and Wyoming did the same for bison in 1890.

Efforts to ban or regulate commercial hunting accelerated in 1887 when Theodore Roosevelt and George Bird Grinnell started the Boone and Crockett Club, which soon became the most powerful conservation organization in the country. The club is not as well known today, partly because it restricts its membership to 100 people, but those 100 people tend to be highly influential.

Bans on commercial hunting were difficult to enforce when hunters could take their wares across state lines. In 1900, Boone and Crockett Club member and Iowa Congressman John Lacey convinced Congress to pass a federal law prohibiting interstate shipping of wildlife taken in violation of a state game law. This effectively put commercial hunters out of business.

The following case studies represent sustainable funding capacities under various federal programs which have conservation as their focus. Several other federal programs that are unrelated to conservation but provide important lessons learned are also analyzed.

Pittman-Robertson Act of 1937

Background

While the Lacey Act was important for wildlife, the law that has had the greatest influence on wildlife agencies is the Pittman-Robertson Act of 1937. By the 1930s, virtually every state had wildlife agencies and enforcement of game laws. But wildlife advocates, including the newly formed National Wildlife Federation, wanted better protection for wildlife habitat.

One idea was a federal wildlife stamp whose proceeds would go for habitat acquisition and conservation. When this was proposed in the 1920s, however, it was fought by people who opposed all hunting, sports as well as commercial. The anti-hunting opposition successfully stopped the idea of a general hunting stamp and delayed the duck stamp for more than a decade.

One of the people involved in the stamp debate was Carl Shoemaker, who had directed Oregon's Fish and Game Commission and then worked as an investigator for a US Senate wildlife committee. In 1936, he helped to create the National Wildlife Federation, which he used to promote the idea of a new fund for wildlife. Just as it taxed liquor and cigarettes, the federal government had long had a 10 percent tax on guns and ammunition. Shoemaker wanted to divert this money from the federal general fund to a specific fund for wildlife.

Shoemaker convinced Senator Key Pittman, of Nevada, who chaired the committee on which Shoemaker worked, to support the proposal. He also asked Willis Robertson, a representative from Virginia, to sponsor it in the House.

Robertson, who had chaired on his state's game and fish commission, realized that the law would tempt state legislatures to fund wildlife programs mainly with federal dollars, while they could siphon off license revenues for other purposes. He said he would sponsor the bill if it required any states receiving federal habitat funds to dedicate all license revenues to fish and wildlife.

Up to that point, the states often treated fish and wildlife as a source of revenue to fund other state programs. Robertson's addition effectively turned state fish and wildlife agencies from for-profit organizations to non-profit organizations. States quickly adjusted their budgeting processes to qualify for the funds. Recognizing that they could not raid fish and wildlife revenues for other programs, most states also decided not to give fish and wildlife agencies any general funds. Some even incorporated this into their constitutions.

At the urging of organized sportsmen, conservationists, state wildlife agencies, and the firearms and ammunition industries, Congress passed the Pittman-Robertson Act within eleven weeks from introduction and it was signed into law by President Franklin D. Roosevelt on September 2, 1937.

The Wildlife Restoration Program authorized under the Pittman-Robertson Act provides grant funds to the states, the District of Columbia and insular areas (e.g., US Virgin Islands) fish and wildlife agencies for projects to restore, conserve, manage and enhance wild birds and mammals and their habitat. Projects also include providing public use and access to wildlife resources, hunter education, and development of shooting ranges.

Congressional amendments to the Wildlife Restoration Act occurred in 1951, 1954, 1970, 1972, 1997, 2000, and 2005. These amendments made changes to taxable items and tax rates as well as authorizations and distribution of the funds. An initial attempt to repeal the Act in 1938 was defeated in Congress because of the Act's strong support by hunting organizations and conservationists.

Since the original passage of the Act, numerous species have rebuilt their populations and extended their ranges far beyond what they were in the 1930s. Among them are the wild turkey, white-tailed deer, pronghorn antelope, wood duck, beaver, black bear, Canada goose, elk, desert bighorn sheep, bobcat, mountain lion, and several species of predatory birds.

Revenue

The Wildlife Restoration Program is the nation's oldest and most successful wildlife restoration program. Through the purchases of firearms, ammunitions and archery equipment the Program represents a successful *user pays, user benefits* approach to sustainable funding.

The original Act generated revenues from manufacturers' excise taxes on firearms and ammunition at an 11 percent rate. In the 1970s the excise tax was extended to archery equipment at 11 percent and handguns at 10 percent. Revenues received directly from manufacturers are deposited to the Wildlife Restoration Account, a special trust fund under the management of the US Fish and Wildlife Service (FWS). The interest earned on the Account is transferred to the North American Wetlands Conservation Fund. Import duties on firearms and ammunition are deposited in the Migratory Bird Conservation Fund.

These funds are apportioned to states, the District of Columbia and insular areas which are formulated on land area, number of paid license holders, and minimum and maximum percentages for each state. The formula for apportioning the Hunter Education component of

the Act is based on population and also includes minimums and maximum percentages for each state.

Since the Act generated its first funds in 1939 (\$890,000) annual revenues have steadily increased to approximately \$470 million in Fiscal Year 2010. Over this 70 year period more than \$6 billion have been distributed to states for wildlife management purposes. Of funds generated under the Act approximately 97 percent is distributed to the states. These federal excise taxes provided to states have been matched by more than \$1.5 billion in State funds (chiefly from hunting license fees) for wildlife restoration. Benefits to the economy have been equally impressive. National surveys show that hunters now spend some \$10 billion every year on equipment and travel. Non-hunting nature enthusiasts spend even larger sums to enjoy wildlife, on travel and on items that range from bird food to binoculars, from special footwear to camera equipment. Areas famous for their wildlife have directly benefited from this spending, but so have sporting goods and outdoor equipment manufacturers, distributors and dealers.

Revenue Distribution – *Shared Costs, Shared Benefits*

States, the District of Columbia and the US Insular Areas fish and wildlife agencies may apply for Wildlife Restoration grants through the FWS. Funds are disbursed to states for approved grants on a reimbursement basis for up to 75 percent of the project costs and insular areas up to 100 percent of the project costs. A key component of the Act is that states and insular areas are required to have assent legislation which ensures revenue from hunting license fees are used for the administration of the fish and wildlife agency. The 25 percent state match can come from a combination of hunting license fees, state appropriated funds, and in-kind contributions including third party in-kind contributions (e.g., volunteers).

The assurance of a steady source of funds kept in the trust and dedicated for a sole purpose has enabled the program's administrators, both state and federal, to plan projects that take years to complete. As noted by Congress “. . . short-term strategies seldom come up with lasting solutions where living creatures are involved.”

Use of Grant Funds by States

Of the Pittman-Robertson funds available to the states, more than 62 percent is used to buy, develop, maintain, and operate wildlife management areas. Some four million acres have been purchased outright since the program began, and nearly 40 million acres are managed for wildlife under agreements with other landowners. The Act has greatly aided in a nationwide effort to enlist science in the cause of wildlife conservation. About 26 percent of funding to the States is used for surveys and research.

Although Pittman-Robertson is financed wholly by firearms users and archery enthusiasts, its benefits cover a much larger number of people who never hunt but do enjoy such wildlife pastimes as bird watching, nature photography, painting and sketching, and a wide variety of other outdoor pursuits. Almost all the lands purchased with Pittman-Robertson funds are managed both for wildlife production and for other public uses. Wildlife management areas acquired by the states for winter range also support substantial use by hikers and fishermen, campers and picnickers. Wetlands for summer waterfowl nesting are useful to nature lovers in other seasons. Recent estimates indicate about 70 percent of the people using these areas are not hunting, and in some localities the ratio may go as high as 95 percent.

Non-Game Proposals

To help states pay for non-game programs, the International Association of Fish and Wildlife Agencies has proposed a federal non-game wildlife fund similar to the Pittman-Robertson or Dingell-Johnson Acts. Revenues would come from an excise tax on outdoor recreation equipment, such as tents, sleeping bags, and binoculars. These would be distributed to the states to promote habitat diversity.

This proposal has met with severe opposition from recreation equipment manufacturers for two reasons. First, it is a new tax, not a diversion of an existing tax like Pittman-Robertson. Second, very little recreation equipment is primarily used for non-game-related activities. Where everyone who buys a fishing rod and tackle uses it to fish, many people who buy sleeping bags or binoculars will rarely have anything to do with wildlife. For these reasons, the proposal has not gone anywhere at the national or, in most states, local level.

Lessons Learned

The following are important lessons from the original Pittman-Robertson Act and its amendments that may have applicability to the Colorado River watershed:

1. A coalition of partners with diverse interests but a common goal (i.e., improve wildlife management) coalesced around a mutually acceptable approach that achieved their common goal.
2. A serious problem was being addressed that was important to the broader public, even during a time of economic difficulties – the Great Depression.
3. A clear connection was made between the revenue being generated and how it was to be used.
4. States were required to match federal funds by dedicating revenues from hunting license fees to wildlife management.

5. A federal excise tax that already existed and going into the general fund was identified as one that is more appropriately used for the benefit of the users who were indirectly paying the excise tax; i.e., user pays, user benefits.
6. A trust fund mechanism prevented diversion of funds for another purpose.
7. An excise tax collected from the manufacturer/supplier is easier to collect and more acceptable than a tax paid directly by the user.
8. An excise tax, tied to commodities that remain in demand, provides a relative dependable stream of sustainable funding.
9. An excise tax that is a percentage of a products value provides increasing revenue to match with inflation.
10. The funds flow to states based on a formula that is considered fair with a small percentage (approximately three percent) reserved for the FWS to administer these state grants.

Sources

Code of Federal Regulations. 1937. Pitman-Robertson Wildlife Restoration Act: Title 50, Part 80, 50 Stat. 917 as amended; 16 U.S.C. 669-669k

Joint Legislative Budget Committee Staff Program Summary. 2008. Program Summary Arizona Game and Fish Department Pittman-Robertson/Dingell Johnson Special Line Item. Arizona State, Phoenix, Arizona. Available from <http://www.azleg.gov/ilbc/psfisprdj.pdf>

Nevada Outdoor Democratic Caucus, News and Links, Learn about the history of Nevada Democrats and the Outdoors, 2005. URL <http://www.nodc.us/nvdemshistory.htm> [accessed on 21 January 2011]

The Thoreau Institute, Public Lands, State Lands and Resources, State Fish and Wildlife Agencies, 2006. URL <http://www.ti.org/FWtext.html> [accessed on 21 January 2011]

United States Fish and Wildlife Service, Wildlife and Sport Fish Restoration Program, 2011. URL <http://wsfrprograms.fws.gov/home.html> [accessed on 21 January 2011]

United States Fish and Wildlife Service, Wildlife and Sport Fish Restoration Program, Grant Programs, Wildlife Restoration Program, Wildlife Restoration Program – Overview, 2010. URL <http://wsfrprograms.fws.gov/Subpages/GrantPrograms/WR/WR.htm> [accessed on 21 January 2011]

Dingell-Johnson Sport Fish Restoration Act of 1950

Background

The Dingell-Johnson Act is patterned directly after the Pittman-Robertson Act; thus, a discussion of the Dingell-Johnson Act is shortened because of the similarities with the previous discussion.

The Sport Fish Restoration Program was introduced by Congressman John Dingell of Michigan and Senator Edwin Johnson of Colorado and signed into law in 1950 by President Truman. The Act directs revenues from a 10 percent excise tax paid by the manufacturers of fishing rods, reels, creels, lures, flies, and fishing bait. The Act's passage was supported by a national campaign lead by anglers. Subsequent amendments included a three percent excise tax on trolling motors, fish finders, import duties on fishing tackle, yachts and pleasure craft, interest on the account, and a portion of motorboat fuel tax revenues and small engine fuel taxes. Monies are distributed to states according to a formula which allocates 60 percent of the grant based on the number of licensed anglers and 40 percent based on the state's land and water area, although no state may receive more than five percent or less than one percent of the total grant amount.

The Dingell-Johnson Act provides federal aid to the states for management and restoration of fish having "material value in connection with sport or recreation in the marine and/or fresh waters of the United States." In addition, amendments to the Act provided funds to the states for aquatic education, wetlands restoration, boat safety, and clean vessel sanitation devices (pumpouts), and a non-trailerable boat program. These other programs are embodied in the Coastal Wetlands Act, North American Wetlands Conservation Act, and the Clean Vessel Act.

At least thirteen amendments to the Act have occurred since it was first enacted in 1950. The most significant change was authorized under the 1984 Wallop-Breaux Amendment that among other things provided for additional funds to be captured from a portion of the federal gasoline excise taxes attributable to motorboats by a formula based on boat registrations. These gasoline excise taxes were already being collected and contained in the Highway Trust Fund. These revenues now amount to 75 percent of the overall funds collected whereas fishing equipment now represents only 18 percent. There were attempts to place a three percent excise tax on boats, trailers, and motors, but these amendments failed because of fierce opposition from the boat manufacturing industry.

Funds distributed to states for the various programs funded in the Act are collected in an account known as Aquatic Resources Trust Fund comprised of the Sport Fish Restoration Account and the Boating Safety Account. These trust funds administered by FWS are released to states through a grant program that covers up to 75 percent of the cost of approved projects

which include acquisition and improvement of sport fish habitat, stocking of fish, research into fishery resource problems, surveys and inventories of sport fish populations, and acquisition and development of access facilities for public use. The 25 percent state match can come from a combination of fishing license fees, state appropriated funds, and in-kind contributions including third party in-kind contributions (e.g., volunteers).

To be eligible to participate in the Sport Fish Restoration Program, states are required to assent to this law and pass laws for the conservation of fish which include a prohibition against the diversion of license fees for any other purpose than the administration of the state fish department.



Since the Dingell-Johnson Act generated its first funds in 1952 (\$2,695,000) annual revenues have steadily increased to over \$700 million in Fiscal Year 2010 with \$400 million distributed to states for the original purposes of Sports Fish Restoration Program. The remaining funds collected (\$300 million) are distributed to other programs (e.g., Coastal Wetlands Act) authorized by Congress. Administration costs by FWS are less than two percent.

Lessons Learned

Lessons learned from the Dingell-Johnson Act have many similarities to those from the discussion of the Pittman-Robertson Act. These include:

1. A strong national advocate existed that represented those who directly or indirectly would pay for the proposed tax.
2. A serious problem was being addressed that was important to the broader public.
3. A clear connection was made between the revenue being generated and how it was to be used.
4. States were required to match federal funds by dedicating revenues from fishing license fees to wildlife management.
5. A federal excise tax that already existed and going into the general fund was identified as one that is more appropriately used for the benefit of the users who were indirectly paying the excise tax; i.e., user pays, user benefits. In this case, it was not only the excise tax on fishing equipment but it was the excise tax on boating fuel that was being collected in the Highway Trust Fund. As importantly, attempts to place a new excise tax on commodities not previously taxed failed.

6. A trust fund mechanism prevented diversion of funds for another purpose.
7. An excise tax, tied to commodities that remain in demand, provides a relative dependable stream of sustainable funding.
8. An excise tax that is a percentage of a products value provides increasing revenue to match with inflation.
9. The funds flow to the states based on a formula that is considered fair with a small percentage reserved for the FWS to administer these state grants.

Sources

Florida Fish and Wildlife Conservation Commission. 2010. Wildlife and Sport Fish Restoration Program. Non-motorized Boat Technical Assistance Team Meeting, Tallahassee, Florida. Available from http://www.fwc.state.fl.us/docs/RecreationActivities/Paddling_SportfishRestoration_Presentation.pdf

Montana Fish, Wildlife and Parks, WildThings, Wildlife and Sportfish Restoration. URL <http://fwp.mt.gov/wildthings/usfwsrRestoration.html> [accessed on 21 January 2011]

The Thoreau Institute, Public Lands, State Lands and Resources, State Fish and Wildlife Agencies, 2006. URL <http://www.ti.org/FWtext.html> [accessed on 21 January 2011]

United States Code. 1950. Dingell-Johnson Sport Fish Restoration Act: 16 U.S.C. 777-777k, 64 Stat. 430

United States Fish and Wildlife Service, Congressional and Legislative Affairs, Laws Digest, Resource Laws, Federal Aid in Sport Fish Restoration Act, 2010. URL <http://www.fws.gov/laws/lawsdigest/fasport.html> [accessed on 21 January 2011]

United States Fish and Wildlife Service, Wildlife and Sport Fish Restoration Program, Grant Programs, Wildlife Restoration Program, Wildlife Restoration Program – Overview, 2010. URL <http://wsfrprograms.fws.gov/Subpages/GrantPrograms/WR/WR.htm> [accessed on 21 January 2011]

Wattendorf, B. 2000. A history of sport fish restoration's impact on Florida's freshwater fisheries. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida. Available from http://myfwc.com/docs/Freshwater/Freshwater_SFR_50.pdf

Migratory Bird Conservation Act of 1929 and Migratory Bird Hunting Stamp Act of 1934

Background

In 1929, the Migratory Bird Conservation Act became law and authorized the Secretary of Interior to acquire land "for use as inviolate sanctuaries for migratory birds." In 1934, in order to provide funding for land acquisitions under the Migratory Bird Conservation Act, the Migratory Bird Hunting Stamp Act was enacted. This law, commonly referred to as the "Duck Stamp Act", required waterfowl hunters 16 years of age and older to purchase migratory bird hunting stamps, referred to as duck stamps. The proceeds from the sale of the stamps were to form a special fund to be used primarily to pay for "the location, ascertainment, acquisition, administration, maintenance, and development" of bird sanctuaries pursuant to the Migratory Bird Conservation Act. Receipts from the sale of stamps are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

The act was created because conservationists and hunters were concerned about the low population numbers of wild ducks and geese. These low numbers were due to the fact that hunters were killing off these animals at an alarming rate and habitat was being destroyed through development pressures. The Act had opposition from anti-hunting groups who felt that the Act would not achieve its objectives and would only encourage more hunting.

The Act now provides approximately \$25 million annually into the Migratory Bird Conservation Fund to protect lands that were nesting and breeding grounds for the waterfowl. This not only helps to replenish the population of water fowl, but this conservation fund also helps protect marsh land from future development. At first the stamp cost one dollar. But over the years the price of the stamp steadily increased through amendments to the Act. As of 1991 the stamp costs 15 dollars.

The US Postal Service prints, issues, and sells the stamp and is reimbursed for its expenses from the Fund. The stamps can also be purchased at places other than post offices and authorized consignments to retail dealers; e.g., sporting goods stores.

A contest is held each year by the FWS to select the design of the stamp.

Since 1934, the sales of the Federal Duck Stamps have generated more than \$750 million, which has been used to help purchase or lease over 5.3



**First Federal Duck Stamp
Design by J.N. "Ding" Darling,**

million acres of waterfowl habitat in the US. These lands are now protected in the US Fish and Wildlife Service's National Wildlife Refuge System. Ninety-eight cents out of every dollar generated by the sales of Federal Duck Stamps goes directly to purchase or lease wetland habitat.

Waterfowl are not the only wildlife to benefit from the sale of Federal Duck Stamps. Numerous other bird, mammal, fish, reptile, and amphibian species that rely on wetland habitats have prospered. Further, an estimated one-third of the Nation's endangered and threatened species find food or shelter in these refuges. People, too, have benefited from the Federal Duck Stamp Program. Hunters have places to enjoy their hunting heritage and other outdoor enthusiasts have places to hike, watch birds, and visit. Moreover, the protected wetlands help purify water supplies, store flood and water, reduce soil erosion and sedimentation, and provide spawning areas for fish important to sport and commercial fishermen.

Purchase of Federal Duck Stamps is not limited to hunters. Birders and other frequenters of National Wildlife Refuges purchase a \$15 Federal Duck Stamp each year in order to gain free admission to refuges. Conservationists, collectors, and educators buy the stamps because of the value they see in the conservation efforts, ties to environmental education, and the intrinsic value of the stamps themselves.

Lessons Learned

The following are important lessons from the Migratory Bird Hunting Stamp Act and its amendments that may have applicability to the Colorado River watershed:

1. Although there was opposition, a coalition of partners with diverse interests but a common goal (i.e., improve waterfowl habitat) coalesced around a mutually acceptable approach that achieved their common goal.
2. A serious problem was being addressed that was important to the broader public, even during a time of economic difficulties – the Great Depression.
3. An innovative funding mechanism was used to fund another Conservation Act that targeted the problem and provided solutions.
4. Although a new user fee was created, there was clear connection between the revenue being generated and how it was to be used. It followed the economic model of user pays, user benefits.
5. A trust fund mechanism prevented diversion of funds for another purpose.
6. A user fees that has a set value does not account for inflation and requires subsequent amendments to raise fees.
7. The Federal Duck Stamp can also be viewed as a voluntary contribution when purchased by people who want to provide funds for a designated purpose they think is important.

8. Low administration costs with most funding used for the intended purpose.

Sources

North Dakota v. United States No. 81-773. Available from
<http://ftp.resource.org/courts.gov/c/US/460/460.US.300.81-773.html>

United States Code. 1929. Migratory Bird Conservation Act: 45 Stat. 1222, ch. 257, 16 U.S.C. § 715 *et seq.*

United States Code. 1934. Migratory Bird Hunting Stamp Act: 48 Stat. 451, 16 U.S.C. § 718 *et seq.*

United States Fish and Wildlife Service, Congressional and Legislative Affairs, Laws Digest, Resource Laws, Migratory Bird Hunting and Conservation Stamp Act, 2010. URL
<http://www.fws.gov/laws/lawsdigest/mighunt.html> [accessed on 21 January 2011]

United States Fish and Wildlife Service, The Federal Duck Stamp Office, 2011. URL
<http://www.fws.gov/duckstamps/Info/Stamps/stampinfo.htm> [accessed on 21 January 2011]

United States Fish and Wildlife Service, The Federal Duck Stamp Program, State Sales of Federal Duck Stamps 1934-2003, 2011. URL <http://www.fws.gov/duckstamps/federal/sales/sales.htm> [accessed on 21 January 2011]

North American Wetlands Conservation Act of 1989

Background

Since the 1780s, about 50 percent of wetlands in the contiguous United States have been lost, with some states showing a 75 percent or greater loss of wetlands. Since 1800, Canada has lost almost 15 percent of its total wetland base, with nearly a 70 percent loss in the central prairie slough, a 65 percent loss in Atlantic salt marshes, an 80 – 90 percent loss in urbanized regions, a 70 percent loss in Pacific estuarine marshes, and a 70 – 80 percent loss in southern Ontario and the St. Lawrence hardwood and shoreline swamps. With this tremendous loss of wetland habitat, combined with the drought years of the 1980s, waterfowl populations fell to precariously low levels.

These decreasing trends and threats to wetland habitats led to the signing of the North American Waterfowl Management Plan (NAWMP) in 1986 by the United States and Canada. This ambitious undertaking was a massive multi-national plan to recover or stabilize waterfowl populations by the end of the century and to protect, restore or enhance millions of acres of habitat. In addition to setting biological goals, the NAWMP recognized the importance of partnerships and the establishment of a comprehensive administration process to carry out its goals.

Declining waterfowl populations were not the only issues associated with the steady loss of wetlands. Wetland ecosystems provide essential and significant habitat for fish, shellfish, and other wildlife of commercial, recreational, scientific, and aesthetic values. Almost 35 percent of all rare, threatened, and endangered species of animals are dependent on wetland ecosystems. Wetlands also provide vital ecosystem services such as flood and storm control; contribute significantly to water availability and quality by recharging ground water, filtering surface runoff, and providing natural waste treatment; and provide aquatic areas important for recreational and aesthetic purposes. The implementation of the NAWMP would also benefit these other wetlands' values.

Congress agreed with the goals of the NAWMP and enacted Public Law 101-233, the North American Wetlands Conservation Act (NAWCA) on December 13, 1989. NAWCA



provides the funding and administrative direction for implementation of the NAWMP and the Tripartite Agreement with Canada and Mexico on wetlands and associated uplands habitats needed by waterfowl and other migratory birds in North America. In December 2002, Congress reauthorized the Act and expanded its scope to include the conservation of all habitats and birds associated with wetlands ecosystems. In 2006, Congress again reauthorized the Act to extend its appropriation authorization of up to \$75 million per year to 2012.

The Act converts the North American Wetlands Conservation fund established by the Pittman-Robertson Act into a trust fund, with the interest available without appropriation to carry out the programs authorized by the NAWCA. The specific objective of the Act is to help deliver funding to on-the-ground projects that protect, restore, enhance, and manage an array of wetlands and other important habitats for waterfowl, migratory birds, and other fish and wildlife. The Act recognizes that the protection of migratory birds, other species, and their habitats requires long-term planning, as well as the close cooperation and coordination of management activities by the three countries involved, which are Canada, Mexico and the United States. NAWCA funds long-term projects on both public and private lands.

Revenue

The Congressional appropriation to fund the Act’s Grants Program in Fiscal Year 2010 is \$47,647,000. Additional program funding comes from fines, penalties, and forfeitures collected under the Migratory Bird Treaty Act of 1918; from federal fuel excise taxes on small gasoline engines, as directed by amendments to the Federal Aid in Sport Fish Restoration Act of 1950, to benefit coastal ecosystem projects; and from interest accrued on the fund established under the Pittman-Robertson Act of 1937. In Fiscal Year 2010 these other sources provided almost

\$42 million in additional grant funds. NAWCA is not funded with duck stamp or hunting license sales. Only a small percentage of NAWCA funds are used for administration

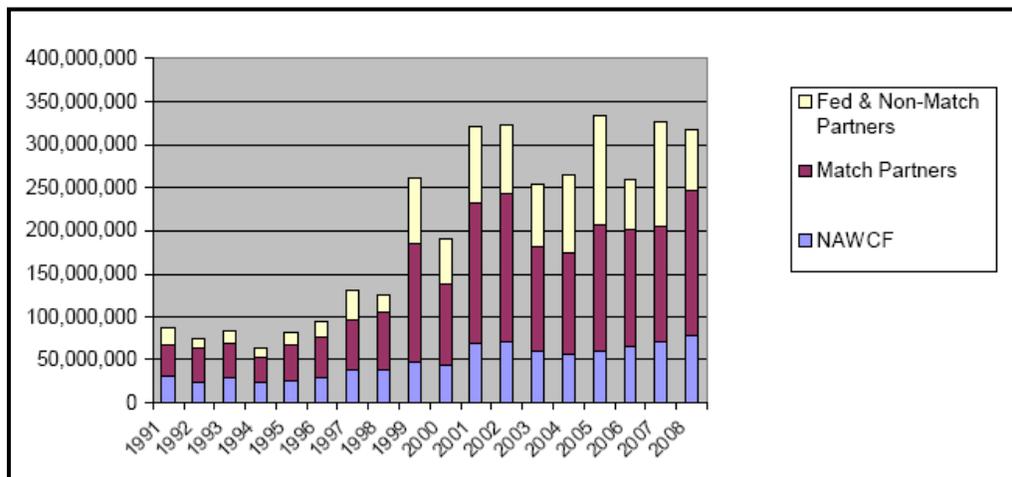


Figure 1: Partner Funds Leveraged by NAWCF Funds

with most going to on-the-ground projects. The following figure provides funding data through 2008.

Revenue Distribution

The NAWCA grant program is itself a public-private partnership. The FWS administers the grant program, while the North American Wetlands Conservation Council (Council) establishes the policies that govern the grant selection process. The Secretary of Interior appoints the US members of the Council. The following organizations are represented on Council: four state wildlife agencies (one from each Flyway); five non-profit organizations (including Ducks Unlimited); National Fish and Wildlife Foundation; and the FWS. Project proposals must ultimately be approved by the Migratory Bird Conservation Commission, which consists of the Secretary of the Interior, the Administrator of the Environmental Protection Agency, the Secretary of Agriculture, and two members from each house of Congress. The Chairman of the Council and one other member serve *ex officio* on the Commission for consideration of the Council's recommendations.

Grants require applicants to match the federal dollars they receive. In the case of NAWCA, each federal dollar must be matched with at least one dollar from a non-federal source. Matching funds typically come from state agencies, private foundations, private landowners, and non-profit organizations such as Ducks Unlimited.

Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50 percent of the United States share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands). At least 50 percent and no more than 70 percent of the funds received are to go to Canada and Mexico each year. The Council has traditionally allocated 50 percent of the funds for projects in the US, 45 percent for projects in Canada, and five percent for projects in Mexico.

Because Congress must allocate federal tax revenues among many competing programs, support has been critical from broad, bi-partisan political and public interests to ensure that sufficient funds are annually appropriated to NAWCA. Ducks Unlimited has been instrumental in this effort as well as a political and biologic strategy of funding wetland conservation projects throughout the US. This successful strategy is exemplified by:

- In the 20 years since NAWCA was passed some 4,440 partners in 2,038 projects have received more than \$1.08 billion in grants with another \$2.24 billion in matching funds and \$1.2 billion in non-matching funds.
- 25.9 million acres of wetland and associated upland habitat needed by waterfowl and other migratory birds in North America have been protected, restored, enhanced, and managed.

- Projects have been funded in all 50 US States, Puerto Rico, the US Virgin Islands, 13 Canadian provinces and territories, and 32 Mexican states.

Lessons Learned

The following are important lessons from the North American Wetlands Conservation Act and its amendments that may have applicability to the Colorado River watershed:

1. A serious problem was being addressed that was important to the broader public for many different reasons.
2. A comprehensive plan (NAWMP) was developed with specific goals and actions necessary to help alleviate the problem.
3. A coalition of partners with diverse interests but a common goal (i.e., protect, restore, and enhance wetlands) coalesced around a mutually acceptable approach that achieved their common goal.
4. A process for setting priorities and awarding grants was developed that involved federal agencies, congressional representatives, and non-profit conservation organizations.
5. A matching requirement for grants has increased available funds by over 300 percent.
6. Projects are spread throughout all 50 states and Canada and Mexico.
7. Low administration costs with most funding used for the intended purpose.
8. A major national organization (Ducks Unlimited) continues to be the champion of the program and has been instrumental in gaining broad bi-partisan as well as other conservation organizations' support.

Sources

Cornell University, Legal Information Institute, U.S. Code, Title 16, Chapter 64 North American Wetlands Conservation. URL http://www.law.cornell.edu/uscode/usc_sup_01_16_10_64.html [accessed on 24 January 2011]

Ducks Unlimited. Conservation Fact Sheet: North American wetlands conservation act (NAWCA). Ducks Unlimited, Memphis, Tennessee. Available from <http://www.ducks.org/media/Conservation/Farm%20Bill/Fact%20Sheet%20-%20NAWCA%20%28high%20res%29%20Feb%202009.pdf>

Ducks Unlimited, Conservation, Public Policy, NAWCA, Overview. URL <http://www.ducks.org/nawca> [accessed on 24 January 2011]

Response Management. 2002. A programmatic evaluation of the North American wetlands conservation act (NAWCA) in the United States and Canada: program overview and review of the literature (phase 1). Response Management, Harrisonburg, Virginia. Available from <http://www.responsivemanagement.com/download/reports/NAWCAPhase1.pdf>

United State Fish and Wildlife Service. 2010. FY 2010 budget justification: North American wetlands conservation fund. United State Fish and Wildlife Service, Washington, D.C. Available from

<http://www.fws.gov/budget/2010/2010%20Greenbook/19.%20North%20American%20Wetlands%20Conservation%20Fund%202010.pdf>

United States Fish and Wildlife Service, Congressional and Legislative Affairs, Laws Digest, Resource Laws, North American Wetlands Conservation Act, 2010. URL

<http://www.fws.gov/laws/lawsdigest/nawcact.html> [accessed on 24 January 2011]

United States Fish and Wildlife Service, Division of Bird Habitat Conservation, Grants Programs, North American Wetlands Conservation Act, 2011. URL

<http://www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm> [accessed on 21 January 2011]

United States House of Representatives, Office of the Law Revisions, Counsel, U. S. Code, Title 16, Chapter 64 North American Wetlands Conservation. URL

<http://uscode.house.gov/download/pls/16C64.txt> [accessed on 24 January 2011]

Conservation and Reinvestment Act

Background

The Conservation and Reinvestment Act (CARA) was proposed legislation that was introduced in the House of Representatives in 1999 (H.R. 701). CARA was considered historic conservation legislation that would have enabled communities throughout the country to expand parks and recreation, preserve open space farmland, protect wildlife and endangered species, and preserve historic buildings to more than three times the amount currently spent on those purposes.

CARA would have guaranteed \$3.1 billion annually for 15 years to state, federal and local conservation programs such as wildlife restoration, parks and outdoor recreation, coastal conservation and historic preservation. CARA's funding would have come from a portion of the income of federal offshore oil and natural gas leases. Since the mid-1950s, all of the revenue (about \$4-5 billion annually) collected from oil and gas leases in the Outer Continental Shelf has been sent to the Federal Treasury. Conversely, revenue from oil and gas development on onshore federal lands is generally shared 50:50 with states where development occurs. CARA would have extended this onshore precedent by sharing offshore revenues with states and needed federal conservation programs.

CARA proposed to reinvest one of the nation's finite natural resources into a lasting natural legacy of wildlife, lands, and waters. CARA was considered by many to be the most important conservation-funding legislation in half a century, leading to broad bipartisan support within Congress and across the nation. More than 5,000 conservation, civic, religious and business organizations were CARA supporters, including the National Association of Counties, US Conference of Mayors, and the National Governors' Association. In 2000-2001, the House passed CARA by an overwhelming margin of 315-102. Sixty-five senators pledged their support to CARA, yet there was never a Senate vote, and CARA was not enacted into law. The following table provides specifics on existing programs that would have benefited from CARA's passage.

Table 1: Summary of Allocation of Funds Proposed under H.R. 701

Amount	Program	Department
\$430 million	Producing coastal States for impact assistance	Interior
\$75 million	Urban Park and Recreation Recovery Act of 1978	Interior
\$150 million	National Historic Preservation Act	Interior
\$125 million	National Park Service and Indian lands restoration programs	Interior
\$350 million	Coastal States for ocean and coastal conservation	Commerce
\$25 million	Coral reef protection	Interior and Commerce
\$900 million	Land and Water Conservation Fund	Interior and Commerce
\$350 million	Wildlife Conservation and Restoration Account	Interior and Commerce
\$50 million	Urban and Community Forestry Act	Agriculture
\$50 million	Forest Legacy program	Agriculture
\$50 million	Farm and Ranch Land Protection Program	Agriculture
\$25 million	Rural Development	Agriculture
\$25 million	Rural Community Assistance Programs	Agriculture
\$60 million	Youth Conservation Corps Act of 1970	Interior and Agriculture
TOTAL: \$2,665,000,000	From the Outer Continental Shelf revenues	

In his research of CARA in the Buffalo Law Review in 2002, Owen Demuth concluded that there were several principle reasons why CARA did not receive hearings in the Senate let alone get voted on. These included:

- CARA would have provided the fully authorized funding for the Land and Water Conservation Fund (\$900 million annually). This was perceived to be a federal land grab by property rights advocates.
- Removing land via the Land and Water Conservation Act from the private sector would reduce tax revenues.
- There was concern by many members of Congress of taking significant amounts of authorized federal expenditures “off-budget” and out of the reach of elected officials.
- There was no proposed budget offset for the money the Federal Treasury would have received.

Owens found that proponents for CARA believed that the Act should be passed because:

- Safe guards were built into CARA to actually strengthen private property rights by including language that limited land purchase only from willing landowners.
- Only a trust fund model would make long-term conservation planning feasible, since applicants would no longer be subject to changes in political priorities. Supporters noted that Congress routinely passes trust fund legislation guaranteeing funding for highways and airports.
- The Land and Water Conservation Fund is a “special fund” which requires annual appropriations from Congress. Thus, any authorized expenditure that is not appropriated to achieve the Fund’s purpose remains in the General Fund of the US Treasury and may be spent for other federal activities. The result is that the Fund is almost always underfunded and unpredictable.

Supporting the need for a true trust fund mechanism for the Land and Water Conservation Fund it is noted that President Eisenhower created the Outdoor Recreation Resources Review Commission (ORRRC) in 1958 with the task of conducting a three-year inquiry into America's increasing need for open space. ORRRC concluded its study by recommending that the federal government increase its holdings through an aggressive program of acquisition that would help complete the developing National Park System. The Reagan Administration appointed its own commission to update many of the findings reached by the ORRRC. Their report reiterated many of the pro-conservation recommendations of the ORRRC, but the Commission added

many of their own. Among other suggestions, the Commission urged that the LWCF be made into a true trust fund, invulnerable to diversion for other purposes.

Lessons Learned

While this legislation did not pass, there are some valuable lessons that may apply to providing sustainable funding to the Colorado River System.

1. Even though there was wide and diverse support for this conservation measure it was seen as a threat to private property rights.
2. There was not a solid argument for the offshore oil and gas revenues being diverted from the general fund for land purchase.
3. Congress' concern about off-budget expenditures in which they have no control on expenditures is contrary to their perceived constitutional responsibilities.
4. In a poor economy, any diversion of funds from the US Treasury General Fund is a concern.

Sources

Demuth, O. 2002. Sweetening the pot: the conservation and reinvestment act reignites the property rights/land conservation debate for the twenty-first century. *Buffalo Law Review* **50**.

National Park Service, Land & Water Conservation Fund, History, 2008. URL <http://www.nps.gov/ncrc/programs/lwcf/history.html> [accessed on 24 January 2011]

North Carolina Wildlife Resource Commission, Wildlife Species & Conservation, What's Happening With The Conservation And Reinvestment Act (CARA)? 2010. URL http://www.ncwildlife.org/Wildlife_Species_Con/WSC_CARA.htm [accessed on 24 January 2011]

Zinn, J. and M. L. Corn. 2001. Conservation and Reinvestment Act (CARA), (H.R. 701) and a related Initiative in the 106th Congress. Congressional Research Service, Washington, D.C.

Harbor Maintenance Trust Fund

Background

The Harbor Maintenance Trust Fund (HMTF) was established by Title XIV of the Water Resources Development Act of 1986 (WRDA, P.L. 99-662, enacted November 17, 1986). Prior to 1986, US Treasury general funds were used to pay the federal share for operation and maintenance (O&M) of harbors and for the deepening of channels. The Harbor Maintenance Tax (HMT) was originally assessed at 0.04 percent of cargo value. This revenue was intended to pay for 40 percent of operation and maintenance (O&M) costs incurred by the Army Corps of Engineers and 100 percent of O&M costs of the St. Lawrence Seaway. Section 11214 of the Omnibus Budget Reconciliation Act of 1990 (P.L. 101-508) increased the tax from 0.04 to 0.125 percent (\$1.25 per \$1,000 in cargo value) in order to recover 100 percent of the Corps' port O&M expenditures. The HMT revenues are deposited into the HMTF from which Congress appropriates funds for harbor dredging and other purposes.



In addition to imported and domestic waterborne cargo handled at ports, the tax is assessed on the value of the ticket in the case of cruise ship passengers. Export waterborne cargo is not taxed per a 1998 Supreme Court decision that found that it violates the export clause of the Constitution, which states that, "No tax or duty shall be laid on articles exported from any state." At the time, exports generated about a third of the fund's revenues. Other court decisions (including decisions by the US Court of International Trade (CIT), the US Court of Appeals, and the US Supreme Court) have established that HMT is constitutional as applied to domestic shipments and the embarkation of cruise line passengers. Generally, coastal and Great Lakes ports are subject to the tax. A list of ports subject to the tax is codified at 19 CFR 24.24. The list does not include ports on inland rivers that are subject to the inland waterways fuel tax collected for the Inland Waterways Trust Fund. Passengers aboard ferries and cargo moving to and from Alaska (except for crude oil), Hawaii, and other US possessions are also not subject to the tax. Since 1998, nearly all of the tax revenue is generated by importers of waterborne cargo.

Revenue

Since 2003, HMTF collections have significantly exceeded funds appropriated for harbor maintenance, resulting in a large and growing surplus in the trust fund. This may be

inconsistent with users' expectations of the fee's purpose as laid out in statute and the principles of effective user fee design. Specifically, the authorizing legislation generally designates the use of HMTF collections for harbor maintenance activities. Furthermore, according to stakeholders, this misalignment between fee collections and expenditures undermines the credibility of the HMTF. According to Customs and Border Protection data and Treasury reports, in 2001 HMTF collections exceeded expenditures by about \$44 million, and by 2007 that gap had grown to over \$506 million.

There are several reasons why growth in collections has outpaced growth in expenditures. Total collections grew 101 percent from \$704 million to \$1.416 billion from 2001 to 2007. This was driven by the *ad valorem* nature of the fee—receipts grow with both volume and value of shipments. Annual harbor maintenance project expenditures, which are subject to annual appropriation, grew more slowly—from \$660 million in 2001 to \$910 million in 2007 (38 percent). Despite a large surplus in the trust fund, the busiest US harbors are presently under-maintained. The US Army Corps of Engineers estimates that full channel dimensions at the nation's busiest 59 ports are available less than 35 percent of the time. This situation can increase the cost of shipping as vessels carry less cargo in order to reduce their draft or wait for high tide before transiting a harbor. It could also increase the risk of a ship grounding or collision, possibly resulting in an oil spill. The Corps now uses a performance-based budgeting model to set harbor maintenance priorities, in which projects are prioritized primarily by the amount and value of commercial tonnage moving through the harbor or channel. As part of this effort, the Corps is developing a national estimate of the cost to make the 59 busiest channels available 95 percent of the time at their full-use dimensions, but there is no timeline for completing that study.

As of June 30, 2010, the HMTF had a theoretical balance of \$5.47 billion. However, because the HMTF is not a separate, or "off-budget," account within the federal budget, the "surplus" in the HMTF has in effect already been spent on general government activities. Over the past several years, there have been numerous attempts by Congress to require that revenues be fully utilized for their intended purpose. None of these bills have been passed out of committee.

General Accounting Office Position

In their report to Congress, the General Accounting Office (GAO) noted that as with similar situations, deciding whether and how to link HMTF collections with expenditures is complicated. On the one hand, aligning collections and expenditures can promote economic efficiency and enhance stakeholder support for the fee. On the other hand, increased spending on harbors or reduced fee collections would increase the federal deficit, unless spending in other areas was decreased or other collections or revenues were increased. Moreover, GAO's prior work showed that providing guaranteed funding levels to any one activity in the budget

protects that activity from competition with other areas for scarce resources and limits Congressional discretion to make trade-offs in spending priorities. Regardless of the approach taken, a reduction in fee receipts or an increase in appropriations, absent offsetting changes elsewhere, will increase the federal deficit. Given the fiscal pressures imposed by the nation's large and growing structural deficits, decisions about changing the HMTF will require Congress to consider HMTF's continued relevance and relative priority within the context of reexamining the base of all major federal spending and tax programs.

The HMTF is not the only fund for which revenues flow in automatically from earmarked taxes or fees and spending must be appropriated. In the 1990s the Highway Trust Fund also built up a surplus. At the time, Congress and the President modified the discretionary spending caps to provide for a separate cap on highway funding. In 1998, Congress specified a more automatic link between spending from the Highway Trust Fund and receipts into the Trust Fund. The experience with these annual adjustments, known as Revenue Aligned Budget Authority (RABA), highlighted some problems with such links. Spending was tied to estimated receipts with a retroactive adjustment; this worked only as long as the adjustments were above estimates. When receipts came in below estimated levels and would have resulted in an automatic cut in highway program funding levels, the cut was overridden.

Revenue Disbursement

Corps data indicate that a significant portion of annual HMTF disbursements are directed towards harbors which handle little or no cargo. The Oregon Inlet in North Carolina, Grays Harbor in Washington, Humboldt Harbor in California, and the Lake Washington Ship Canal and



Figure 2: Lake Washington Ship Canal and Lock in Seattle, WA.

Lock in Seattle are some of the harbors or waterways that fit this description. Commercial fishermen and recreational boat (or yacht) owners account for most, if not all, of the vessel traffic in these harbors. Fishermen and recreational boaters do not pay the HMT. Some might argue that to target one group of harbor users for assessing a fee and then to distribute revenues mostly, or entirely, in some cases, for the benefit of other users, undermines the "user fee" concept.

In addition to the distribution of HMT revenues for the benefit of non-cargo harbor users, there are also equity issues associated with HMT revenue distribution among the nation's top commercial ports. Due to geological differences, ports vary greatly in the amount of dredging they require. About one-fifth of HMTF expenditures are spent in Louisiana. The ports of

Mobile, AL, and Portland, OR also are relatively expensive to maintain. The amount of HMT revenue ports generate also varies significantly due to differences in the amount and characteristics of the cargoes they handle. Consequently, HMT revenues are redistributed from ports that are large import gateways with naturally deep channels (e.g., Los Angeles, Seattle, New York, and Boston) to lower volume ports that require frequent dredging to maintain adequate channel depths and widths.

Actual appropriations are based on planning and environmental studies developed by the Corps resulting in recommendations to Congress. Also Congress includes or “ear-marks” local projects that are considered important to their constituents.

Lessons Learned

The following are important lessons from the Harbor Maintenance Trust Fund and its amendments that may have applicability to the Colorado River watershed:

1. A new tax was approved because there was a fundamental need for sustainable funding to maintain and operate an important natural resource (harbors) that is essential for international commerce and public safety. Prior to 1986, harbor maintenance was funded entirely out of the US Treasury General Fund.
2. The distribution of funds is not based on a formula, but rather on the needs of the nation’s ports, albeit with some Congressional infusion of special projects. These inequities between revenue generation and revenue distribution are viewed, for the most part, as acceptable because the Nation overall benefits, although some raise the concern of some that it undermines the “user fee” concept.
3. Revenues are derived from an ad valorem tax that changes with the volume and value of commerce with other nations. Existing revenues significantly exceed current needs.
4. HMTF is not a separate, or “off-budget,” account within the federal budget; therefore, the “surplus” in the HMTF has, in effect, already been spent on general government activities.
5. Although a new user fee was created, there was clear connection between the revenue being generated and how it was to be used. It followed the economic model of user pays, user benefits.

Sources

Frittelli, J. 2010. Harbor maintenance trust fund expenditures. Congressional Research Service, Washington, D.C. Available from http://assets.opencrs.com/rpts/R41042_20100125.pdf

Open CRS: Congressional Research Reports for the People, R41042: Harbor Maintenance Trust Fund Expenditures, 2010. URL <http://opencrs.com/document/R41042> [accessed on 24 January 2011]

Pacific Northwest Waterways Association, Action Agenda, Fact Sheets, Harbor Maintenance Trust Fund, 2006. URL <http://www.pnwa.net/new/Articles/HMTF.pdf> [accessed on 24 January 2011]

Realize America's Maritime Promise – Harbor Maintenance Trust Fund Fairness Coalition, 2008. URL <http://www.ramphmtf.org> [accessed on 24 January 2011]

United States Government Accounting Office. 2008. Federal users fees: substantive reviews needed to align port-related fees with the programs they support. United States Government Accounting Office, Washington, D.C. Available from <http://aapa.files.cms-plus.com/PDFs/GAO%20Report%20on%20HMTF.pdf>

US Commission on Ocean Policy

Background

In 2000 Congress recognized both the promise of the oceans and the threats to them when it passed the Oceans Act of 2000 (P.L.106-256), calling for establishment of a Commission on Ocean Policy to establish findings and develop recommendations for a coordinated and comprehensive national ocean policy. Pursuant to that Act, the President appointed sixteen Commission members drawn from diverse backgrounds, including individuals nominated by the leadership in the United States Senate and House of Representatives.

The Commission held sixteen public meetings around the country and conducted eighteen regional site visits, receiving testimony, both oral and written, from hundreds of people. Overall, the Commission heard from some 447 witnesses, including over 275 invited presentations and an additional 172 comments from the public, resulting in nearly 1,900 pages of testimony.

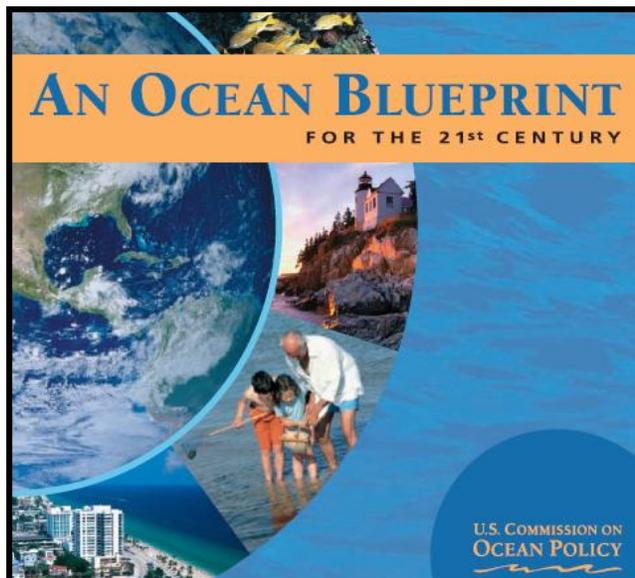
The message from both experts and the public alike was clear: America's oceans, coasts, and Great Lakes are in trouble and major changes are urgently needed in the way they are managed. The Commission learned about new scientific findings that demonstrate the complexity and interconnectedness of natural systems. It also confirmed that US management approaches have not been updated to reflect this complexity, with responsibilities remaining dispersed among a confusing array of agencies at the federal, state, and local levels.

Managers, decision makers, and the public implored the Commission for improved and timely access to reliable data and solid scientific information that have been translated into useful results and products. Another steady theme heard around the country was the plea for additional federal support, citing decades of underinvestment in the study, exploration, protection, and management of the nation's oceans, coasts, and Great Lakes. Finally, the point was made that the US must enhance ocean-related education so that all citizens recognize the role of the oceans, coasts, and Great Lakes in their own lives and the impacts they themselves have on these environments.

Following extensive consideration, and deliberation of a broad array of potential solutions, the Commission presented a preliminary report in early 2004. Comments were solicited from state and territorial governors, tribal leaders, and the public; the response was overwhelming. Commenters were nearly unanimous in praising the report, agreeing that America's oceans are in trouble, and supporting the call for action to rectify the situation. The final report, *An Ocean Blueprint for the 21st Century*, laid out the Commission's conclusions and detailed recommendations for reform: reform that needs to start immediately, while it is still possible

to reverse distressing declines, seize exciting opportunities, and sustain the oceans and their valuable assets for future generations.

The Commission on Ocean Policy's vision of the future management of oceans included better coordination at all levels of government, decisions based on excellent science and accurate information, and an informed and engaged citizenry. All of these were considered important components for future ocean management. To implement that vision, the Commission proposed many specific recommendations aimed at ensuring that the nation's ocean and coastal resources are healthy and sustainable. They recognized that



significant change, however, cannot be achieved without commensurate investment. Within 27 detailed chapters, the Commission assessed specific needs of the nation's oceans and outlined the costs associated with making improvements to our ocean policy. A summary of a few of these needs is presented in the Table 2.

The Commission also presented a proposal for meeting those costs through the establishment of a new Ocean Policy Trust Fund. Monies for the Trust Fund would be generated through resource rents from certain approved uses in federal waters, including Outer Continental Shelf oil and gas revenues that are not currently committed to other purposes. The Trust Fund would help support the new responsibilities placed on federal, state, territorial, tribal, and local governments, and, thus, avoid the imposition of unfunded mandates. The Ocean Policy Trust Fund, similar to the Highway Trust Fund for transportation projects, would come from the annual \$5 billion in bonus bid and royalty payments made to the US Treasury for offshore oil and gas drilling, and from "new uses of offshore waters" such as wind turbine farms, and wave and ocean thermal gradient energy conversion. The Trust Fund would be used to supplement, not replace, existing appropriations for ocean and coastal program.

During the ensuing years (2004-2010) not much action was taken to implement the recommendations of the Commission on Ocean Policy. In June, 2009 President Obama established the Interagency Ocean Policy Task Force to better meet the nation's stewardship responsibilities for the ocean, our coasts, and the Great Lakes based on the work done by the Commission. Then the Deepwater Horizon-BP Gulf oil spill happened on April 20, 2010 with the loss of 11 workers and the release of nearly five million barrels of crude oil into the Gulf of

Table 30.1 (continued) Summary of Costs Associated with Recommendations of the U.S. Commission on Ocean Policy				
	First Year Cost (millions of dollars)	Ongoing Annual Cost (millions of dollars)	Some costs in other chapters	Some costs not shown
Chapter 14: Addressing Coastal Water Pollution				
Chapter Total	\$ 11,000	\$ 53,900	Ch. 25	■
Addressing point sources	\$ 2,000	\$ 8,500	Ch. 25	■
Addressing nonpoint sources	\$ 5,000	\$ 29,800	Ch. 25	■
Addressing atmospheric deposition	\$ 4,000	\$ 15,600		
Chapter 15: Creating a National Monitoring Network				
Chapter Total	\$ 10,000	\$ 60,000	Ch. 27	■
Chapter 16: Limiting Vessel Pollution and Improving Vessel Safety				
Chapter Total	\$ 40,000	\$ 88,000	Ch. 25	■
Chapter 17: Preventing the Spread of Invasive Species				
Chapter Total	\$ 31,500	\$ 50,000	Ch. 8, 15, 25	■
Chapter 18: Reducing Marine Debris				
Chapter Total	\$ 2,000	\$ 5,000		
Chapter 19: Achieving Sustainable Fisheries				
Chapter Total	\$ 28,950	\$ 87,850	Ch. 25	■
Improvements to Fishery Councils, Commissions, and SSCs	\$ 7,650	\$ 16,550		
Enhanced cooperative research	\$ 3,000	\$ 10,000		
Improved fisheries enforcement	\$ 6,300	\$ 12,300		
Designation of essential fish habitat	\$ 5,000	\$ 15,000	Ch. 25	
Bycatch reduction	\$ 5,000	\$ 30,000		
Other measures	\$ 2,000	\$ 4,000		
Chapter 20: Protecting Marine Mammals and Endangered Marine Species				
Chapter Total	\$ 7,000	\$ 16,000	Ch. 25	
Chapter 21: Preserving Coral Reefs and Other Coral Communities				
Chapter Total	\$ 7,200	\$ 25,200	Ch. 25	
Chapter 22: Setting a Course for Sustainable Marine Aquaculture				
Chapter Total	\$ 3,000	\$ 7,000	Ch. 25	
Chapter 23: Connecting the Oceans and Human Health				
Chapter Total	\$ 2,000	\$ 10,000	Ch. 14, 15, 25	
Expand O&HH research initiative	\$ -	\$ -	Ch. 25	
Improve seafood safety and coastal water quality	\$ 2,000	\$ 10,000	Ch. 14, 15	

Table 2: Example of Summary Costs Identified by the Commission on Ocean Policy

Mexico. Shortly thereafter, on July 19th, 2010, President Barak Obama signed an Executive Order establishing the National Ocean Council. The Executive Order established for the first time a comprehensive, integrated National Policy for the stewardship of the ocean, our coasts, and Great Lakes, which sets the nation on a path toward comprehensive planning for the preservation and sustainable uses of these bodies of water. Funding for this effort in Fiscal Year 2011 was limited to development of planning and coordination to advance priority activities identified, including coastal and

marine spatial planning and geospatial modernization (\$12 million), regional ocean partnership grants (\$20 million), and integrated ecosystem assessments (\$5 million).

The Fiscal Year 2011 Budget Request also includes investment across many federal agencies for activities that support these recommendations, including: habitat restoration, water quality improvement, port and coastal security, improvements in marine transportation safety and efficiency, coastal and estuarine land protection, research and development of ocean sensor technology, catch-share based fisheries management, environmental tools to support resilient coastal communities, and ocean acidification research.

Lessons Learned

The following are important lessons from the US Commission on Ocean Policy that may have applicability to the Colorado River watershed:

1. A serious problem was being addressed that was important to the broader public for many different reasons.
2. A comprehensive plan, *An Ocean Blueprint for the 21st Century*, was developed with specific goals and actions necessary to help alleviate the problem.
3. The comprehensive plan also articulated specific areas for improvement (i.e., needs assessment) and their costs.

4. An existing sustainable revenue source not authorized for other purposes was identified; i.e., leasing of OCS lands for oil and gas exploration.
5. A major environmental disaster occurred in 2010 that may provide the impetus to institutionalize and to implement the comprehensive plan.

Sources

Federal Legislation. 2000. PL 106-256. Available from
<http://www.oceancommission.gov/documents/oceanact.pdf>

The United States Commission on Ocean Policy, 2007. URL <http://www.oceancommission.gov/>
[accessed on 24 January 2011]

The White House Council on Environmental Quality. 2010. Final recommendations of the interagency ocean policy task force July 19, 2010. The White House Council on Environmental Quality, Washington, D.C. Available from
http://www.whitehouse.gov/files/documents/OPTF_FinalRecs.pdf

The White House Office of the Press Secretary. 2010. Executive order: stewardship of the ocean, our coasts and the great lakes. The White House Office of the Press Secretary, Washington, D.C. Available from
<http://www.whitehouse.gov/files/documents/2010stewardship-eo.pdf>

The White House, the Administration, Executive Office of the President, National Ocean Council, Frequently Asked Questions. URL
<http://www.whitehouse.gov/administration/eop/oceans/faq> [accessed on 24 January 2011]

The White House, the Administration, Executive Office of the President, National Ocean Council, Priority Objectives. URL
<http://www.whitehouse.gov/administration/eop/oceans/objectives> [accessed on 24 January 2011]

United States Commission on Ocean Policy. 2004. An ocean blueprint for the 21st century. United States Commission on Ocean Policy, Washington, D.C. Available from
http://www.oceancommission.gov/documents/full_color_rpt/000_ocean_full_report.pdf

The Domenici-Landrieu Gulf of Mexico Energy Security Act of 2006

Background

On the 203rd anniversary of the Louisiana Purchase, President George W. Bush signed into law the Tax Relief and Health Care Act of 2006 (P.L. 109-432) which includes the Domenici-Landrieu Gulf of Mexico Energy Security Act.

The Domenici-Landrieu Act allows the sharing of revenues generated from royalties from a specific oil and gas lease area in the Outer Continental Shelf (OCS). The plan opens 8.3 million acres in the Gulf of Mexico to new oil and natural gas production and shares 37.5 percent



of the new revenues with Louisiana, Texas, Mississippi and Alabama. Louisiana would be the largest recipient of this revenue stream. The funds are specifically dedicated to coastal wetlands restoration, hurricane protection, levee and flood control projects in the four energy-producing states. Louisiana further buttressed the money's dedicated use by passing a constitutional amendment that specifically directed the funds to these pressing needs. An additional 12.5 percent is dedicated to the state side of the Land and Conservation Fund, which funds the acquisition of parks and green spaces across the country.

President Bush supported this legislation along with business groups such as the National Association of Manufacturers, the American Chemistry Council and the Consumer Alliance for Energy Security. This act, passed with strong bi-partisan support, was tagged as “fair share” legislation and incorporated tax relief provisions for Louisiana businesses to invest in areas impacted by Hurricanes Katrina and Rita. The fair share argument for the act is based on equalizing how onshore mineral leasing revenues are shared with states and those from OCS sources.

Under Section 105 of the Act, *Disposition of Qualified OCS Revenues* . . . revenues generated from the designated tracts of land in the Gulf of Mexico will be disbursed at 50 percent to the US Treasury General Fund and 50 percent to a special account in the Treasury from which the Secretary shall disburse (A) 75 percent to Gulf producing States and (B) 25 percent to provide financial assistance to all 50 States in accordance with Section 6 of the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 460I-8).

Lessons Learned

The following are important lessons from the Domenici-Landrieu Gulf of Mexico Energy Security Act of 2006 that may have applicability to the Colorado River watershed:

1. A serious problem was being addressed that was important to the broader public for many different reasons.
2. A federal revenue mechanism that already existed and going into the general fund was identified as one that is more appropriately used to help affected states offset environmental impacts.
3. Bi-partisan support existed, in part because of the fairness issue between how onshore and OCS mineral resources were being treated.
4. A percentage of revenues were designated for another purpose, Land and Water Conservation Fund Act, which benefited all 50 states.
5. A major environmental disaster, Hurricanes Katrina and Rita, occurred in 2005 that caused serious coastal damage to Louisiana, Texas, Mississippi and Alabama. The use of Gulf of Mexico natural resource revenues provided the logical use of these revenues for environmental protection purposes.

Although not identified in any literature search on this case study, it is speculated that energy companies did not oppose the legislation, and probably supported the Act, because they were already paying lease and royalty fees to the US Treasury and they were getting essentially no credit for how it could benefit local communities.

Sources

Bureau of Land Management. 2007. Mineral leasing act of 1920 as Amended 2007. Bureau of Land Management, Washington, D.C. Available from http://www.blm.gov/pgdata/etc/medialib/blm/ut/vernal_fo/lands_minerals.Par.6287.File.dat/MineralLeasingAct1920.pdf

Federal Legislation. 2006. H.R. 6111. Available from http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_bills&docid=f:h6111enr.txt.pdf

Office of United States Senator for Louisiana: May Landrieu. 2006. President signs into law Domenici-Landrieu gulf coast energy plan. Press Release. Available from <http://landrieu.senate.gov/releases/06/2006C20B18.html>

Highway Trust Fund

Background

The history of the Highway Trust Fund (HTF) can be traced back to 1919 when Dwight D. Eisenhower participated in the US Army's first transcontinental motor convoy from



Figure 3: Dwight D. Eisenhower (left) on the US Army's First Transcontinental Motor Convey, 1919.

Washington, D.C. to San Francisco. As he recalled later when the convoy reached San Francisco, after 62 days on the road:

... on the way west, the convoy experienced all the woes known to motorists and then some – an endless series of mechanical difficulties; vehicles stuck in mud or sand; trucks and other equipment crashing through wooden bridges; roads as slippery as ice or dusty or the consistency of gumbo; extremes of weather from desert heat to Rocky Mountain freezing . . .

This experience provided a foundation in his mind for a higher quality of roads and highways throughout the country.

During World War II, Gen. Eisenhower saw the advantages Germany enjoyed because of the autobahn network. He also noted the enhanced mobility of the Allies when they fought their way into Germany. These experiences in 1919 and during World War II shaped Eisenhower's views on highways. "The old convoy," he said, "had started me thinking about good, two-lane highways, but Germany had made me see the wisdom of broader ribbons across the land." In 1954, the second year of his presidential administration, Eisenhower made clear that he was ready to turn his attention to the nation's highway problems. He considered it important to "protect the vital interest of every citizen in a safe and adequate highway system."



Figure 4: German Autobahn, 3,870 km in 1942.

Under President Eisenhower's leadership the key elements that constituted the interstate highway program, the system approach, the design concept, the federal commitment, and the

financing mechanism, all came together with the passage of the Highway Revenue Act of 1956. On June 26, 1956, the Senate approved the bill by a vote of 89 to one (the one "no" vote was cast by Sen. Russell Long of Louisiana who opposed the gas tax increase). That same day, the House approved the bill by a voice vote. Three days later President Eisenhower signed the bill into law.

This act increased authorizations for the Federal-Aid Primary and Secondary Systems, authorized significant funding of the Interstate System, and established the HTF as a mechanism for financing the accelerated highway program. Before 1956 the HTF did not exist. Financing highway construction came from the General Fund of the Treasury. Although taxes on motor fuels and automobile products were in existence, they were not linked to funding for highways. At the time, financing for the highway program and revenues from automobile and related products were included under the public finance principle of “. . . *spend where you must, and get the money where you can.*”

Revenue

To finance the increased authorizations, the Revenue Act increased some of the existing highway-related taxes, established new ones, and provided that most of the revenues from these taxes should be credited to the HTF. Revenues accruing to the HTF from the sources in Table 3 are dedicated to the financing of Federal-Aid highways.

The passage of the Highway Revenue Act of 1956 also increased the political acceptability of the additions in the user taxes and provided dedicated revenues to finance the larger highway program known as the National System of Interstate and Defense Highways. Funding levels were set at 90:10 matching ratio between federal and state contributions. A key provision of the Act was a method of apportioning funds between states based on population, area, and road distance.

Table 3: User Fee Structure of the Highway trust Fund	
Tax Type	Tax Rate
Gasoline and gasohol	18.4 cents per gallon
Diesel	24.4 cents per gallon
Special Fuels:	
General rate	18.4 cents per gallon
Liquefied petroleum gas	18.3 cents per gallon
Liquefied natural gas	24.3 cents per gallon
M85 (from natural gas)	9.25 cents per gallon
Compressed natural gas	18.3 cents per 126.67 cubic feet
Tires: (max. rated load)	
0-3,500 pounds	No Tax
Over 3,500 pounds	9.45 cents per each 10 pounds in excess of 3,500
Truck and Trailer Sales based on gross vehicle weight (GVW)	12 percent of retailer's sales price for tractors and trucks over 33,000 pounds GVW and trailers over 26,000 pounds GVW
Heavy Vehicle Use	Annual tax: Trucks 55,000 pounds and over GVW, \$100 plus \$22 for each 1,000 pounds (or fraction thereof) in excess of 55,000 pounds (maximum tax of \$550)

In the original Highway Revenue Act of 1956, the crediting of user taxes to the HTF was set to expire at the end of fiscal year 1972, but since then, legislation has been passed to extend the imposition of the taxes and their transfer to the HTF. In Fiscal year 2008 approximately \$35 billion was collected. Like other federal trust funds, the HTF is a financing mechanism established by law to account for tax receipts that are collected by the federal government and are dedicated or "earmarked" for expenditure on special purposes.

The HTF was created as a user-supported fund. Simply, the revenues of the HTF were intended for financing highways, with the taxes dedicated to the HTF paid by the users of highways. This principle is still in effect.

Figure 5 illustrates the HTF account balance over the past five years including the economic stimulus budget increase in 2010.

Most of the excise taxes credited to the HTF are not collected by the federal government directly from the consumer. They are, instead, paid to the Internal Revenue Service by the producer or importer of the taxable product (except in the cases of the tax on trucks and trailers, which is paid by the retailer, and the heavy vehicle use tax, which is paid by the heavy

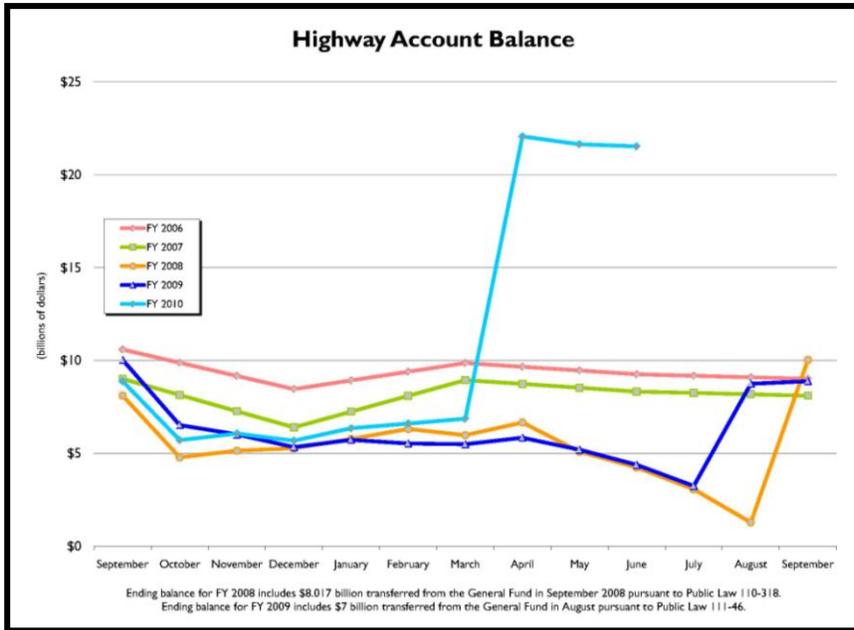


Figure 5: Highway trust Fund Balance 2006 to 2010.

Lessons Learned

The following are important lessons from the Highway Trust Fund that may have applicability to the Colorado River watershed:

1. A serious problem was being addressed that was important to the broader public.
2. A federal excise tax that already existed and going into the general fund was identified as one that is more appropriately used for the benefit of the users who were indirectly paying the excise tax; i.e., “user pays, user benefits”.
3. Bi-partisan support existed, in part because of the fairness issue between how funds are generated and how states share these funds.
4. A clear connection was made between the revenue being generated and how it was to be used.
5. States were required to match federal funds, but at a low ratio of 90:10. Note: An economic analysis is needed to determine for the CRB what would be an appropriate grant formula that is balanced with localized externalities. If successful, the actual costs to states under these matching requirements can be more than offset by revenues from added state employment, sales taxes, etc.
6. A trust fund mechanism generally prevents diversion of funds for another purpose.
7. An excise tax, tied to commodities that remain in demand, provides a relative dependable stream of sustainable funding.
8. An excise tax that is a fixed value does not provide increasing revenue to match with inflation or if demand remains constant.
9. The funds flow to states based on a formula that is considered fair.

vehicle owner). As a result, most of the federal fuel taxes come from a handful of states, those where major oil companies are headquartered, and most tire taxes are paid from Ohio, the home of the US tire industry. These taxes become part of the price of the product and are ultimately paid by the highway user.

Sources

Ambrose, S.E. 1990. Eisenhower Soldier and President. Simon & Schuster, New York, New York.

Eisenhower, D. D. 1948. Crusade in Europe. Doubleday, Garden City, New York.

FHA (Federal Highway Administration), Publications, Public Roads, Vol. 60- No. 1, Federal-Aid Highway Act of 1956: Creating the Interstate System, 2010. URL

<http://www.fhwa.dot.gov/publications/publicroads/96summer/p96su10.cfm> [accessed on 24 January 2011]

FHA (Federal Highway Administration), Publications, Public Roads, Vol. 60- No. 1, Federal-Aid Highway Act of 1956: Creating the Interstate System (Sidebars), 2010. URL

<http://www.fhwa.dot.gov/publications/publicroads/96summer/p96su10b.cfm#50> [accessed on 24 January 2011]

FHA (Federal Highway Administration), The Highway Trust Fund, 2007. URL

<http://www.fhwa.dot.gov/reports/financingfederalaid/fund.htm> [accessed on 24 January 2011]

FHA (Federal Highway Administration), The Highway Trust Fund, Status of the Highway Trust Fund, 2010. URL <http://www.fhwa.dot.gov/highwaytrustfund/index.htm#a> [accessed on 24 January 2011]

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Appendix C

Large-Scale Watershed Restoration Case Studies

Introduction

The purpose of the case study analysis is to gain a better understanding of how to construct a cohesive and sustainable funding strategy, and more specifically to learn from the successes and failures of other initiatives. Large-scale restoration initiatives, both national and international, are evaluated. The initiatives vary on whether they focus on freshwater or saltwater systems, and estuary or river systems. Each of the initiatives are multi-faceted and the evaluations include discussions on the scope of issues, physical geography, climate and socio-political environment.

These discussions informed both programmatic and funding lessons learned. These case studies were expanded beyond sustainable funding mechanisms to include programmatic lessons learned which help to inform the application of any sustainable funding strategy. Both successful and unsuccessful components of the initiatives are communicated within the case study. The applicability of these lessons learned to the Colorado River Basin varies and is communicated when appropriate.

The following programs are analyzed:

1. Platte River Restoration Program
2. Columbia River Basin Restoration
3. California Bay-Delta Restoration Program
4. Everglades Restoration Program
5. Great Lakes Restoration Program
6. Puget Sound Partnership
7. Chesapeake Bay Restoration Program
8. National Estuary Program
9. Murray-Darling Watershed Restoration (Australia)
10. Working for Water Programme (South Africa)
11. European Union's Water Framework Directive

Note: The different case studies are formatted in a manner that allows them to be treated as individual, stand-alone documents. As such, the page numbers, figures and tables that are referenced are specific to each case study.

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Platte River Restoration Program

The Platte River Case Study was conducted as the Platte River's primary issue is to balance water quantity issues with the requirements of the Endangered Species Act (ESA). The California Bay-Delta, Everglades, and Platte River are all faced with the task of fairly allocating water where demand is exceeding supply and flows necessary to sustain surrounding ecosystems are competing with human needs (Doyle & Drew 2008).

Similar challenges are found in the Colorado River Basin (CRB). Additionally, the major issue affecting the health of the river is dams and two of the three states involved in this program, Wyoming and Colorado, are located in the CRB. Thus, some of the program's political challenges are similar to those in the CRB.

Background

The Platte River is formed when the North and South Platte River flow from the Rocky Mountains in Colorado and Wyoming to meet just upstream of Lexington in central Nebraska. The Platte then courses nearly across the length of Nebraska to the Missouri River near Plattsmouth (Doyle & Drew 2008; USDOI, BOR, Platte River Environmental 2010). Fifteen major dams and reservoirs and numerous smaller projects serving agricultural and municipal needs interrupt the river's flow. Their combined storage capacity is 7.1 million acre-feet. US Bureau of Reclamation (USBR) projects account for 2.8 million of these acre-feet (Freeman 2008). This water storage network supports surface irrigation of 1,083,000 acres in Colorado, 238,000 acres in Wyoming and 608,000 acres in Nebraska. Water allocation between Colorado, Wyoming and Nebraska on the North Platte is governed by a US Supreme Court decree. Water in the South Platte is allocated between Colorado and Nebraska; Nebraska and Wyoming are in litigation concerning the North Platte decree (Aiken 1989).

Due to these diversions, the river has been dramatically altered. Naturally wide, braided channels carrying high sediment loads are now narrowed, incised, and sediment starved. Historic, low banks sparsely covered with woody vegetation now rise further above the river and are more heavily vegetated. The hydrologic regime has also shifted and spring flood pulses are now lower and less frequent. These changes have dramatically altered the habitat of several native species in the area (Crisman 2008).

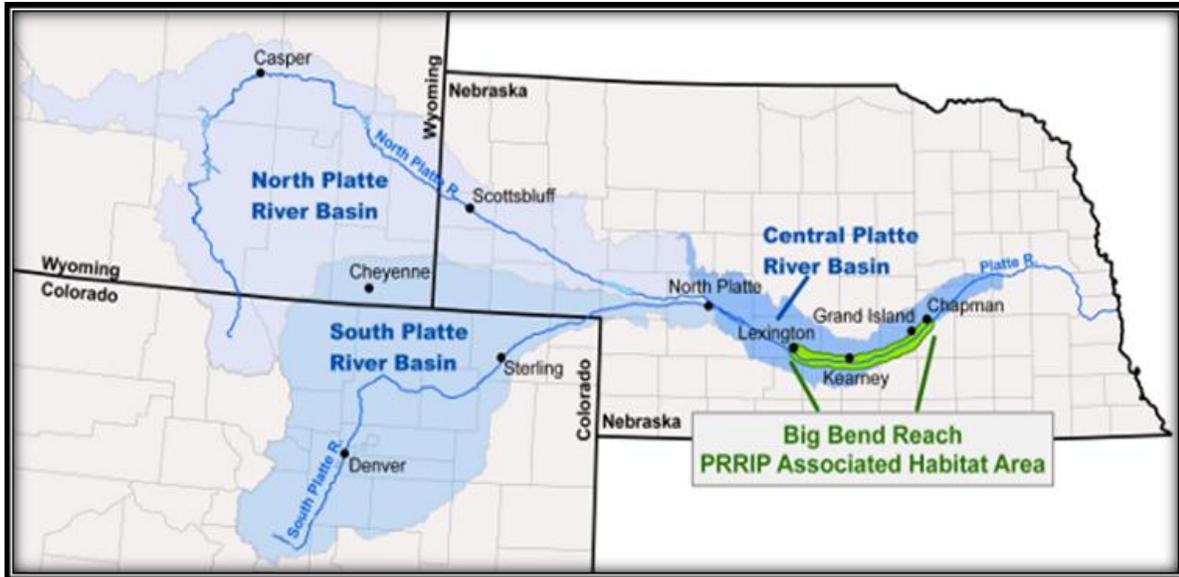


Figure 1: Platte River Recovery Implementation Program Area (Platte River 2010)

Management and Legal Structure

As a result of river manipulations, nine species, including the whooping crane, interior least tern, and pallid sturgeon are now on the endangered species list and the piping plover is listed as threatened (USGS 2006; Freeman 2008). In 1978 the US Fish and Wildlife Service (FWS) designated the 51 miles of the central Platte River between Lexington and Chapman, Nebraska, known as *Big Bend* (see Figure 1) as critical habitat for the recovery of the endangered bird species (Echeverria 2001). Additionally, the National Academy of Sciences review team “concluded that no apparently suitable alternatives exist to replace the Central Platte River habitat for migrating whooping cranes” (Freeman 2008:61). A large, ongoing assumption in the Platte River Project process is whether habitat improvements and increased flows aimed at the Big Bend area will help the endangered pallid sturgeon downstream near the mouth of the Platte River with the Missouri River (Freeman 2008).

Due to these designations, the ESA has curtailed water projects on the North, South, and Central Platte Rivers since the late 1970s in order to avoid potential *jeopardy* to the endangered species (Echeverria 2001; Freeman 2008). Water projects struggled with this issue during the late 1970s and early 1980s, prompting the FWS and USBR to initiate a Platte River Management Joint Study in 1983. They were joined by the three basin states in 1984. After a decade of negotiations to meet the needs of urban, agricultural, and environmental stakeholders with limited water resources the Joint Management Study Committee put forward a preliminary plan in 1993. This plan laid out methods for acquiring land for conservation, making water available to that land, conducting research, and monitoring results. It also laid out a preliminary budget, suggested funding sources, and a governance structure (Freeman 2008).

At the same time, the FWS was working to develop in-stream flow recommendations to support species recovery. These were announced in 1994 and concluded that to meet habitat requirements an additional 40 percent (417,000 acre feet) of the average current flow would be needed and 29,000 acres of land would need to be purchased. This finding represented the first time ESA had been applied to current water uses (Echeverria 2001). In the face of this overwhelming number, the three states and the USBR agreed to collaborate with the FWS collectively instead of facing individual evaluations (Echeverria 2001; Freeman 2008). Thus, in 1994, they signed a Memorandum of Agreement (MOA) that established the Central Platte River Basin Endangered Species Recovery Implementation Program (Echeverria 2001). Under this MOA the parties agreed to develop and implement a habitat recovery program while enabling Central Platte water users to proceed with existing and new projects in exchange for a suspension of ESA's *jeopardy* related penalties (Freeman 2008).



Figure 2: Platte River near Grand Island, Nebraska

From 1994 to 1997 the implications of the decision to collaborate became apparent while the group was working to create a Cooperative Agreement that would lead to the creation of a “defensible, basin-wide Central Platte habitat recovery program” (Freeman 2008:68). One of the biggest challenges in this process was the agreement of targeted flows, which were essentially non-negotiable. The FWS had based its suspension of jeopardy opinion on the basis of

establishing the aforementioned, additional 40 percent (417,000 acre feet) of flow and 29,000 acres of land, and the water users would not agree to this (Freeman 2008).

Eventually, the parties agreed to an adaptive management approach as part of the 1997 *Cooperative Agreement for Platte River Research and Other Efforts Relating to Endangered Species Habitats along the Central Platte River, Nebraska*. The agreement stated that the basin states would provide additional annual flows of 130,000 to 150,000 acre feet (approximately 11 percent) as an incremental measure. The results of this measure would be tracked, and the issue revisited at another time. Additionally, the 1997 Agreement stated that 10,000 acres, instead of the original 29,000, of critical habitat for the whooping crane, interior least tern, and piping plover would be restored during the first 13 years of the basin wide recovery program

(Freeman 2008). This is significant as in all three federal court decisions involving ESA interaction with water rights, significant water rights were stymied or completely forfeited to protect endangered species (Aiken 1989). This implies that existing federal regulations could have produced more favorable environmental results if the consensus process had not begun.

A huge point of contention in this decision was the determination that if these adaptive management milestones were not met, the FWS could reopen biological opinions and withdraw *jeopardy* relief (Freeman 2008). While it is not readily apparent exactly how this dispute was settled, a



Figure 3: Whooping Crain (*Grus Americana*)

2006 FWS report states that adaptive management findings will be subject to independent peer review and made available to the public. Additionally, the document states that all federally authorized and funded Platte River Projects must comply with ESA and must not jeopardize endangered species (USFWS 2006). The lack of clarity in the literature on this point may suggest a similar lack of clarity in how the Platte River Recovery Implementation Program achieves ESA compliance in reality as well.

The Cooperative Agreement was viewed positively by many as a method of avoiding ESA's frustrating, expensive, and highly uncertain case-by-case review (Aiken 1989; Freeman 2008). However, Echeverria says this about the 1997 Cooperative Agreement, "despite the fact that this agreement followed three years of discussions about whether or not to have an agreement, this new agreement was also, in large measure, another agreement to attempt to agree (2001:570)."

While cynical, this quote is fairly accurate. Though the Agreement did succeed in creating broad outlines for a species recovery plan it was essentially a mechanism to eventually develop an actual basin-wide recovery plan (Echeverria 2001; USFWS 2006).

From 1997 to 2000 the Agreement progressed towards identifying water sources to meet the agreed upon requirements, creating a land acquisition plan, and drafting a preliminary monitoring and research plan (Freeman 2008). However, in 2000 the FWS Environmental Impact Statement evaluation of the Cooperative Agreement's preliminary proposals found that the plan to release water to create habitat was not a "reasonable and prudent alternative" (Freeman 2008:77). This was due to new models showing that releasing higher flows of

sediment starved, reservoir water would actually serve to further incise channels instead of widening them. As a result of this complication, negotiations were incrementally extended (Freeman 2008).

During further negotiations, states pushed for defined habitat contributions. In contrast, the FWS wanted to emulate natural flows in the system using adaptive management which would allow more flexibility and uncertainty. These two conflicting visions were never fully resolved. However, by December 31, 2006, a decision was essential as it was feared that the Department of Interior would pull out of the process and commence individual ESA compliance work, funds were running out, and it was a national election year. Thus, progress continued when it was agreed that regulatory enforcement would be enacted only if water users failed to reach activity based milestones and not those based on actual habitat recovery (Freeman 2008).

In 2006 a *non-jeopardy* biological opinion was secured for the Platte River Recovery Implementation Program. The Program's first thirteen year increment began on January 1, 2007 (Doyle & Drew 2008). The Program's long-term goal was to improve and maintain critical habitat while ensuring that basin water projects could proceed in compliance with the Program's umbrella ESA approval. A Governance Committee representing the federal, state, water, and environmental groups involved in the process will implement the Program. The Governance Committee will be advised by water, land, technical, and independent science advisory committees. Meanwhile the FWS will regularly review the progress of all water related actions (USFWS 2006).

In May of 2008 President George W. Bush signed into law the Consolidated Natural Resources Act of 2008 which pledged to implement the federal share of the Platte River Recovery Implementation Program. Sponsors of the legislation included Senators Ben Nelson, Wayne Allard, Chuck Hagel, and, most notably, Ken Salazar. This legislation included the \$157 million originally pledged to the program by the Department of Interior (Stapilus 2008).

Critique

Echeverria (2001) felt that this decision to collaborate was part of a series of events resulting from the political climate at the time which was hostile to the ESA. He postulated that this hostility can be contributed to the spotted owl controversy, the Republican majority in the House of Representatives in the 104th Congress, and general industry opposition to the ESA. As a result, the Department of the Interior was facing a great deal of pressure to create a solution that Platte River water users would support. As Echeverria stated, "thus, the basic purpose of the Platte River process was to ratchet down the burden on water users because of ESA needs. The potential for accelerated losses of wildlife and wildlife habitat was, at best, a secondary consideration (2001:568)."

Echeverria continued by stating that the MOA was a comfort to water users as it: 1) increased their ability to control the outcome of the proposed plan, 2) increased the likelihood that mitigation efforts would be equitably shared amongst the water projects, and 3) increased the opportunity to receive federal taxpayer dollars for mitigation efforts. It also served the political purposes of the DOI by demonstrating “flexibility inherent in the ESA” (Echeverria 2001:568). Interestingly, Echeverria also states that the Bay-Delta collaboration was initiated for the same purpose and that the Platte river collaboration was modeled after the Bay-Delta and the upper Colorado River Basin endangered fish plan (2001).

All of these political and “parochial” economic benefits were gained to the detriment of ecologically driven actions and results (Echeverria 2001:560). In fact, the collaborative process essentially derailed progress on two projects hailed as promising by environmentalists. The Central Nebraska Public Power and Irrigation District (Central) and the Nebraska Public Power District (NPPD) were both up for relicensing under the Federal Power Act (FPA) and were subject to ESA requirements. The MOA essentially took over this process, ostensibly weakening its potential for meaningful action (Echeverria 2001).

It is difficult to determine whether the benefits of a collaborative process outweigh such costs. Doyle and Drew (2008) postulate that such collaborations, once established, are better able to withstand difficult political climates.

Progress

The most significant progress to date is the creation of the Platte River Recovery Implementation Program’s first thirteen year increment plan in 2007 and the signing of the program into law in 2008. Required actions mainly consist of purchasing land and water from willing sellers, restoring and managing lands, and monitoring and research of progress (USFWS 2006). There is no readily accessible information on the progress made towards the Program’s goals.

CALFED’s Influence on the Platte River Process

The California Bay-Delta Program (CALFED) is another, basin-wide settlement that attempts to resolve conflicts between water-rights and endangered species habitat. After state efforts to resolve the inherent conflict failed, a federal/state partnership was formed. The partnership initiated the National Environmental Policy Act process to determine preferred actions. The program then set a quantity of water to be provided for habitat and stated that any additional waters needed would be purchased from willing sellers with federal funding (Aiken 1989).

Many aspects of the CALFED program foreshadow the creation of the Platte River Cooperative Agreement. Aiken (1989) states these are:

1. ESA mandates convinced water users and states to negotiate about water;
2. Adaptive management process of observing how species respond to improved habitat is a key component in securing flows;
3. Water users were provided with regulatory certainty, for example if new endangered species emerged no additional water for habitat would be required; and
4. The Platte Cooperative Agreement and CALFED were handled by the same federal negotiator.

Funding

The Cooperative Agreement of 1997 laid out guidelines for funding responsibilities. The states and the federal government were both set to provide 50 percent of costs, or \$157 million each (Freeman 2008).

Federal

The Consolidated Natural Resources Act – In 2008 the Consolidated Natural Resources Act was signed into law. The Act pledged to implement the federal share of the Platte River Program. Sponsors of the legislation included Senators Ben Nelson, Wayne Allard, Chuck Hagel, and, most notably, Interior Secretary Ken Salazar. The Act authorized \$157 million in appropriations over time, the amount originally pledged to the program by the Department of Interior (Federal 2008; Stapilus 2008).

President Obama's Fiscal Year 2010 budget request for the Platte River Recovery Implementation Program is \$12 million (USDOJ, BOR, Platte River Recovery 2010).

State

The states are responsible for the remaining cost, to be paid monetarily and through in-kind contributions. Colorado will contribute \$20 million and administer the Tamarack Phase I Water Project. Wyoming will provide \$6 million and administer the Pathfinder Modification Project. It is not clear how the states are meeting their goals. Nebraska will have no monetary commitment as its land and water contributions are sufficient. The Central Nebraska Public Power and Irrigation District and the Nebraska Public Power District contributed this in-kind support through the Lake McConaughy Environmental Account and Cottonwood Ranch Habitat Area (USFWS 2006).

Species Conservation Trust Fund – In order to meet its obligation, Colorado is using its Species Conservation Trust Fund. In 1998, the Governor approved House Bill 98-1006 which created the Fund. The Fund has an operation and maintenance account as well as a capital account and is subject to annual authorization. Funding distribution is authorized by the Executive Director of the Department of Natural Resources. Excess funds are not transferred to the general fund

at the end of each year. The Capital Account was initially capitalized at \$5.1 million from the Capital Construction Fund (Colorado State 1998).

Additional investments include transfers from the Severance Tax Trust Fund. The first set of investments occurred after the severance fund was created and included \$2.2 million dollars for the operation and maintenance account and \$2.2 million for the capital account. The initiating legislation also called for \$4.4 million apiece for each fund after July 1, 2006 (Colorado State 1995).



Figure 4: Piping Plover (*Charadrius melodus*)

In 2008, the Colorado General Assembly passed Senate Bill 168, which authorized the Department of Natural Resources to expend \$7.585 million of the Species Conservation Trust Fund on the Platte River Recovery Program (Colorado State 2008; Denver Water 2008).

The South Platte Water Related Activities Program, Inc., (SPWRAP) –The South Platte Water Related Activities Program, Inc., (SPWRAP) is a non-profit corporation formed by Colorado water users (SPWRAP 2010). The purpose of SPWRAP is to support Colorado in implementing the Platte River Program and to gain representation on the governance committee and advisory groups for its members. Individual water users must be certified SPWRAP members to participate in the Platte River Program and thus to ensure that the Program will take care of the water user’s ESA responsibilities. The SPWRAP operates on the principle of fairness as described in the following statement:

The river depletions about which FWS is concerned are both the depletions that have been occurring for decades, as well as the compounding effect of future depletions. Because of that and the fact that the costs of the Program are beginning now, fairness requires that all water users in the basin pay their fair share. As a result, water users who delay becoming members will be required to pay assessments for all prior years at the time they do join (SPWRAP, Platte River:4).

As an example of the funds provided by water users, Denver Water’s assessment for its SPWRAP membership was \$821,000 in 2008. In 2007 their contribution was only slightly less. The water district expects to contribute similar levels for the next four years when the level is expected to drop (Denver Water 2008). It is unclear what other water users’ assessments amount to in total.

Lessons Learned

The following lessons learned, which may have some applicability for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the Platte River Program.

Programmatic

1. **Early versions of the Platte River program essentially documented the agreement to collaborate without defining goals or objectives.** This created many problems and delayed progress. Echeverria said this about the 1997 Cooperative Agreement . . . “Despite the fact that this agreement followed three years of discussions about whether or not to have an agreement, this new agreement was also, in large measure, another agreement to attempt to agree (2001:570).”
2. **Collaboration on such a large scale is challenging and may weaken regulations but should be backed by legislation because otherwise, efforts would be fragmented and vary with changing political agendas such that progress would be difficult.** Even though it has struggled to make progress, a major benefit of the Platte River Project might be that “collaboration in environmental decision making, once structured and practiced, will endure even under harsh political climates” (Doyle & Drew 2008:110).
3. **In order to determine a defensible path forward, FWS and USBR initiated a joint, scientific water management study.** Lengthy water projects struggled with ESA during the late 1970s and early 1980s, prompting FWS and USBR to initiate a Platte River Management Joint Study in 1983. They were joined by the three basin states in 1984.
4. **The Platte River Program is moving forward in the face of scientific uncertainty.** There is not yet a complete understanding of how the increased flows aimed at the Big Bend area will help the endangered pallid sturgeon downstream near the mouth of the Platte River. It is assumed that the flows will help though there is no clear process for the partnership to determine this.
5. **Adaptive management is an important tool in large-scale restoration efforts but could be problematic when more closely associated with stakeholder desires rather than scientific uncertainty.** The strong adaptive management approach in the Platte River is not due to scientific uncertainty but to the desire of water users to meet lower flow requirements than those recommended by a scientifically based FWS study.

The 1997 agreement stated that the basin states would provide approximately 11 percent of recommended flows and 35 percent of recommended land acquisition as an incremental measure. The results of this measure would be tracked, and the issue

revisited at another time. This is significant as all three federal court decisions involving ESA interaction with water rights, limited or completely forfeited them to protect endangered species (Aiken 1989). This implies that existing federal regulations could have produced more favorable environmental results if the consensus process had not begun.

6. **It is important to recognize the potential for collaborative efforts to weaken regulatory requirements.** Escheverria (2001) stated that such a collaborative is similar to the CALFED Record of Decision which provides water users with, 1) greater control over the plan, 2) increased likelihood that mitigation would be equitably shared, and 3) increased likelihood that federal dollars would help pay for mitigation measures. So while the collaborative process creating the Platte River Program will likely help the initiative survive harsh political times, it also creates an opportunity for members to work around strict adherence to the ESA and CWA. For example, progress continued on the Platte in 2006 when it was agreed that regulatory enforcement would be enacted only if water users failed to reach activity based milestones and not those based on actual habitat recovery.
7. **Collaborative efforts tend to be punctuated by periods of litigation due to a lack of or temporary stalled progress. This generally results in action that moves the collaborative program forward.** When progress stalled, which it often did throughout the Platte River process, regulations were used to force action. For example in December 31, 2006, agreement on a path forward was essential as it was feared that Interior would pull out of the process and commence individual ESA compliance work, funds were running out, and it was a national election year.
8. **The Endangered Species Act is a powerful statute of authority encouraging action and funding, especially when tied to water use.** In 1994 FWS recommended in-stream flow requirements to meet habitat needs. This finding represented the first time ESA had been applied to current water uses (Echeverria 2001). In the face of the intimidating requirements, the three states and the USBR agreed to collaborate with the FWS collectively instead of facing individual evaluations (Echeverria 2001; Freeman 2008).
9. **Federal involvement in watershed restoration efforts may aid in interstate and international interactions.**
10. **Water law on the North Platte is decided by the Supreme Court.** Water allocation between Colorado, Wyoming and Nebraska on the North Platte is governed by a US Supreme Court decree.

11. **The federal and state governments created the dams and water projects that are affecting the health of the Platte River and are now responsible for the restoration plan cost.** The states and the federal government were both set to provide 50 percent of costs, or \$157 million each (Freeman 2008).
12. **There is precedent for the Endangered Species Act to regulate water flows.** All three federal court decisions involving ESA interaction with water rights, significant water rights were stymied or completely forfeited to protect endangered species (Aiken 1989).
13. **The Platte River is among the few large-scale restoration projects surveyed that does not focus on an estuary. This is largely because it is driven by Endangered Species Act instead of the Clean Water Act.** The FWS designated 51 miles of the central Platte as critical habitat for the recovery of the endangered bird as “no apparently suitable alternatives exist to replace the Central Platte River habitat for migrating whooping cranes (Freeman 2008:61).”
14. **Watershed wide, large-scale restoration efforts throughout the US are looking to one another for guidance, legal precedence, and funding mechanisms.** The Platte River program was somewhat based on the Upper Colorado Basin endangered fish recovery program, and CALFED influenced the program as well.
15. **Interior Secretary Ken Salazar is aware and supportive of large-scale restoration of rivers.** Ken Salazar, as Senator, supported the Consolidated Natural Resources Act of 2008 which pledged to implement the federal share of the Platte River Recovery Implementation Program.

Funding

1. **Budgets and funding structures were created early on in the planning process and, as a result, the project appears to be funded at desired levels at least in the short term.** The 1993 plan laid out a budget and suggested funding structures. However, it is unclear if the agreed upon plan will produce the desired results and, thus, there is some uncertainty if the funding structures currently outlined will be adequate.
2. **Short-term funding for the Platte River project is well defined.** At this point it seems that all parties are meeting their obligations. The test will be whether or not the plan reaches its goals. If it does not, and more funds are necessary, the sustainability of Platte River funding will be tested.
3. **Public trust funds, or publicly initiated private trust funds, can be a good way to equitably raise and manage funds if an initial capitalizing agent is identified.** Colorado is using its Species Conservation Trust Fund to support Platte River restoration.

4. **Colorado is dedicating a portion of its Severance Tax funds to this effort.**
5. **Federal or state funding that is written into law is more secure.** In May of 2008 the President signed into law the Consolidated Natural Resources Act of 2008 which pledged to implement the federal share of the Platte River Recovery Implementation Program. This legislation included the \$157 million originally pledged to the program by the Department of Interior (Stapilus 2008). In 2008, the Colorado General Assembly passed Senate Bill 168, which authorized the Department of Natural Resources to expend \$7.585 million of the Species Conservation Trust Fund on the Platte River Recovery Program (Colorado State 2008; Denver Water 2008).
6. **If executive or legislative actions are enacted that hold a government body responsible for watershed wide restoration efforts and results, then it is more likely that there will be government funding available to increase progress towards goals.**
7. **Insulating program funds from state or federal general funds is an important step towards sustainability.** Excess funds are not transferred to the general fund at the end of each year. The Capital account was initially capitalized at \$5.1 million from the Capital Construction Fund (Colorado State 1998).
8. **Water users are willing to pay for restoration efforts in order to receive regulatory certainty.** The purpose of SPWRAP is to support Colorado in implementing the Platte River Program and to gain representation on the governance committee and advisory groups for its members. Individual water users must be certified SPWRAP members, requiring payments, to participate in the Platte River Program and thus to ensure that the Program will take care of the water user's ESA responsibilities.

Literature Cited

Aiken, J. D. 1989. Balancing endangered species protection and irrigation water rights: the Platte river cooperative agreement. *Great Plains Natural Resources Journal* **3**:119-158.

Available from

<http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1023&context=ageconfacpub>

Colorado State Legislature. 1995. Statute 39-29-109. Available from

<http://cwcb.state.co.us/legal/Documents/Statutes/39-29-109.pdf>

Colorado State Legislature. 1998. House Bill 98-1006. Available from

http://www.state.co.us/gov_dir/leg_dir/olls/sl1998/sl_259.HTM

Colorado State Legislature. 2008. Senate Bill 08-168. Available from

http://www.leg.state.co.us/CLICS/CLICS2008A/csl.nsf/fsbillcont3/075D6364BE742E1C872573DE007E8EC3?Open&file=168_enr.pdf

Crisman, T. L. 2008. A three-dimensional approach to adaptive management. Pages 89-99 in M. Doyle and C. A. Drew, editors. *Large-scale ecosystem restoration: five case studies from the United States*. Island Press, Washington, D.C.

Denver Water. 2008. Denver water: comprehensive annual financial report. Denver Water, Denver, Colorado. Available from http://www.denverwater.org/docs/assets/E5E35102-BCDF-1B42-D6262C1FD85E64FB/DW_AR20081.pdf

Doyle, M. and C. A. Drew, editors. 2008. *Large-scale ecosystem restoration: five case studies from the United States*. Island Press, Washington, D.C.

Echeverria, J. D. 2001. No success like failure: the Platte River collaborative watershed planning process. *William & Mary Environmental Law and Policy Review* **25**:559-603. Available from www.vermontlaw.edu/admin/Documents/102009noSuccessLikeFailureThePlatteRiver.pdf

Federal Legislation. 2008. S. 2739. Available from

<http://www.govtrack.us/congress/billtext.xpd?bill=s110-2739>

Freeman, D. M. 2008. Negotiating for endangered and threatened species habitat in the Platte River basin. Pages 59-88 in M. Doyle and C. A. Drew editors. *Large-scale ecosystem restoration: five case studies from the United States*. Island Press, Washington, D.C.

Platte River Recovery Implementation Program, Program Information, 2010. URL

www.platteriverprogram.org/AboutPRRIP/Pages/ProgramInformation.aspx [accessed on 26 August 2010]

SPWRAP (South Platte Water Related Activities Program), 2010. URL <http://spwrap.org/index.htm> [accessed on 23 August 2010]

SPWRAP (South Platte Water Related Activities Program). Platte River recovery implementation program – summary. South Platte Water Related Activities Program, Berthoud, Colorado. Available from http://spwrap.org/custom/summary_Documents/SPWRAP%20Summary/SPWRAP_Summary_PRRIP.pdf

Stapilus, R. 2008. CO/NE: Platte legislation signed. Ridenbaugh Press/Water Rights. Available from <http://ridenbaugh.com/waterrights/?cat=58>

USDOI (United States Department of Interior), Bureau of Reclamation, Platte River Environmental Impacts, 2010. URL www.usbr.gov/pmts/sediment/projects/Platte/platte.htm [accessed on 23 August 2010]

USDOI (United States Department of Interior), Bureau of Reclamation, Platte River Recovery Program, 2010. URL www.usbr.gov/newsroom/presskit/factsheet/factsheetdetail.cfm?recordid=6000 [accessed on 22 August 2010]

USFWS (US Fish & Wildlife Service), Mountain-Prairie Region. 2006. U.S. Fish and Wildlife Service announces release of a non-jeopardy biological opinion on the proposed Platte River recovery implementation program. News Release. Available from <http://www.fws.gov/mountain-prairie/pressrel/06-40.htm>

USGS (United States Geological Survey), The Platte River Program, a USGS Priority Ecosystems Program, 2006. URL <http://ne.water.usgs.gov/platte/index.html> [accessed on 24 August 2010].

Columbia River Basin Restoration

Within the US, The Columbia River Basin has taken the lead in innovative Payment for Ecosystem Service (PES) market development and implementation. Several organizations composed of numerous partners and stakeholders including the Columbia Basin Water Transactions Program (CBWTP), Bonneville Environmental Foundation (BEF), Willamette Partnership (WP), Deschutes River Conservancy (DRC) and Central Oregon Irrigation District (COID), are actively pursuing a coordinated PES system in the Basin. These groups and several others work together, sharing information and resources, to establish grassroot and market-based approaches to achieving sustainable water use and healthy river systems with a focus on ensuring instream flows; also a critical restoration focus in the Colorado River Basin. Necessitated by compliance with the Endangered Species Act (ESA), the development of these programs is largely financed with federal grants and hydro-electric utility fees that are included in the utility bills of local energy users.



Map of the Columbia River Basin within the US. courtesy of the BPA .

Background

According to the CBWTP, the Columbia River Basin within the US covers an area of approximately 250,000 square miles (roughly the size of Texas) and supports over seven million people (CBWTP, Finding Balance 2010). The CBWTP includes Washington, Oregon, Idaho and Montana but does not include the portion of the Basin that extends into Canada or less prominent states. The Basin is a highly productive agricultural region. Similar to the Colorado River Basin, large federal water projects including hydro-electric dams and large water diversion infrastructure have led to the over appropriation of the limited water and the degradation of riparian ecology, including the loss of approximately half of the salmon and steelhead habitat (CBWTP, Finding Balance 2010). Therefore, restoring instream flows is the primary restoration focus of this region.

Management and Legal Structure

According to information provided on the CBWTP website (CBWTP 2010), the program started in 2003 and serves as a clearinghouse of information, and provides water market administration and funding to state and watershed efforts. Managed by the National Fish and Wildlife Foundation, the central purpose of the program is to use “permanent acquisitions, leases, investments in efficiency and other incentive-based approaches” to improve instream flows in key stream reaches within the Basin states (CBWTP, The Program 2010). However, despite the market or incentive-oriented approach, the CBWTP would not likely have started without the federal endangered species listing of salmon and the subsequent salmon recovery programs established to comply with the ESA and the Northwest Power Act (Malloch 2005; Garrick et al. 2009; BPA 2010). The listing of several breeding populations of salmon and the mandate under the Northwest Power Act require that impacts to fish and wildlife habitat be mitigated.



The Bonneville Power Administration (BPA) provides the majority of funding to the CBWTP, approximately \$4 million in 2009 (NFWF & BPA 2009). The BPA is a self-financed federal agency under the US Department of Energy providing one-third of the power to the Pacific Northwest, of which 83 percent is derived from hydro-electric dams (BPA 2006). Costs to the federal utility associated with compliance with the Northwest Power Act and the ESA including direct, operational costs, replacement power and foregone revenues, now exceed \$800 million dollars annually (BPA 2010). However, some of this cost is recouped by BPA through Federal in-lieu payment of loan obligations, which is termed “US Treasury credits for fish” on the agency’s 2010 balance sheet (BPA 2010:42). The BPA 2010 financial reports states:

The Northwest Power Act also specifies that consumers of electric power, through their rates for power services, “shall bear the costs of measures designed to deal with adverse impacts caused by the development and operation of electric power facilities and programs only.” Section 4(h)(10)(C) of the Northwest Power Act was designed to ensure that the costs of mitigating these impacts are properly accounted for among the various purposes of the hydroelectric projects. As such, BPA reduces its cash payments to the U.S. Treasury by an amount equal to the mitigation measures funded on behalf of the nonpower purposes. (2010:49)

The US Treasury credits for fish totaled \$123 million in 2010 (BPA 2010:42). Therefore, although not explicitly stated, it appears that US tax payers are bearing approximately 15 percent of the cost of the ecological restoration and compliance obligations of BPA and the BPA customers are paying for the remaining 85 percent in their utility bills.

According to Bruce Aylward in his 2009 paper on market based initiatives in freshwater ecosystem restoration for the BEF: “The water trust movement – funded not from the market

but by government and regulation – is thriving and spreading (Aylward 2009). Several water conservation trusts were established in the Columbia Basin during the 1990’s including the Oregon Water Trust, the Washington Water Trust and the DRC (Aylward 2009). The DRC was founded in 1996 with “a mission to restore streamflow and improved water quality in the Deschutes River Basin (DRC 2010).” According to the DRC website “nearly 98 percent of streamflow from the Deschutes River above Bend is diverted through irrigation canals during the irrigation season (DRC, Blue Water 2010).” The non-profit DRC has formed a unique partnership with the COID, with support of the CBWTP and US Bureau of Reclamation (USBR), to address the flow problems of the Basin (Aylward 2009). Water right holders can sell excess water rights to the COID and the irrigation district then transfers a portion of these water rights to the DRC for the dedicated purpose of restoring flows in the middle reach of the Deschutes River (Aylward 2009). From 2009 to 2011 the DRC, through the USBR has received \$3.6 million of American Recovery and Reinvestment Act Funds. A private, family owned water supplier called Avion Water, which supplies water to 11,000 customers in the Basin has developed a voluntary check-off on their water bill that will allow water users to donate to the DRC. The program has already exceeded expectations by raising \$12,000 annually in its first two years which represents six percent of the DRC revenue stream (Aylward 2009; DRC, Blue Water 2010).

The BEF is a non-profit organization based in Portland, OR (not associated with the BPA). It was founded in 1998 with a focus on lowering carbon footprints with innovative voluntary market approaches. In 2003 the organization started a watershed restoration program that promised a 10-year commitment to any watershed project initiated and thereby allowing for better monitoring and maintenance (BEF, Our History 2010). BEF provided support to the Deschutes River watershed restoration initiative in 2006, and in 2010 helped to organize the CBWTP and WP and implemented their newly developed Water Restoration Credit or WRC (BEF, Water 2010). The WRC is a voluntary offset credit. Each WRC certificate represents 1,000 gallons of water that has been returned to a stream to support natural riparian and aquatic ecology (BEF, Water 2010). Individuals and firms are encouraged to purchase certificates to offset their water use footprint.

The WP is similar to the DRC in that it is a small non-profit watershed organization that works with a large number of landowners and stakeholders to develop innovative solutions to stream degradation. However, unlike DRC, which tends to rely on voluntary mechanisms the WP is investing in the development of market based mechanisms similar to the BEF Water Restoration Credit and other ecosystem service credits such as wetlands, salmon habitat, upland prairie habitat and water temperature (WP, Ecosystem Credit 2010). The WP has become established with the help of federal grants including the EPA’s Targeted Watershed

Grant Program in 2005 and the NRCS's Conservation Innovations Grant in 2007 (WP, About 2010).

Funding

The majority of funding for the CBWTP, which in turn provides funding for many of the smaller watershed initiatives, is provided by the BPA in cooperation with the Northwest Power and Conservation Council. Therefore, hydropower surcharges are the primary funding mechanism of the Columbia Basin stream restoration effort.

According to Trout Unlimited the DRC is funded by federal programs and has also obtained line-item federal appropriations (Malloch 2005).

The CBWTP utilizes cost-sharing arrangements to bolster funding and meet federal grant requirements. "From 2003 through 2007, CBWTP partners have contributed nearly \$6.3 million to water transaction funding (WestWater 2008)."

Watershed restoration projects in the Basin also receive state grant assistance. For example, the Oregon Watershed Enhancement Board is a state agency that provides grants to help Oregonians take care of local streams, rivers, wetlands and natural areas. The funds are derived from the Oregon State Lottery, Oregon's salmon license plate revenue and some additional federal pass-through funding (OWEB 2010). The salmon license plate has raised over \$5 million dollars since the program started in 1997, half of the funds go to the state parks system and half are used to mitigate damages to salmon habitat from state road projects (OWEB 2010).

An excellent summary of the restoration funding strategy currently being employed in the Columbia Basin was provided by Aylward:

Considerable creativity in catalyzing public funding and regulatory mitigation program dollars continues to feed the growth in the water trust movement. These funds are the primary source of funds to buy water rights or fund efficiency improvements. Foundations contribute philanthropic contributions, which are often small in size relative to the cost of water. Hence these funds tend to be for start-up, ancillary programmatic, communications or monitoring purposes. The water trusts also seek individual and corporate donations, but often these funds are needed and used to fill gaps that are hard to cover from the larger funding source, particularly indirect costs of the organizations. An additional financial challenge for water trusts is convincing public funders that the transaction costs of arriving at a water purchase are significant and that the post-transaction monitoring costs are essential for demonstrating transaction compliance. The cost of coordinating various agencies to monitor and evaluate the



response of ecosystems to flow restoration is another challenge that such nonprofits face... the public and mitigation sources referred above may provide \$15 million to \$20 million a year...This is not a large sum of money relative to the task. (2009:7)

Aylward went on to explain that the market mechanisms currently being developed, such as the certification credits, eco-labeling and water offsets, have great potential to provide the type of significant funding necessary to accomplish the Basin's goals of ecological sustainability.

This restoration initiative as a whole does not represent a true PES system since the payment obligations are not directly paid by the beneficiaries of the restored resource. Instead the system currently relies on voluntary contributions and mitigation obligations established through federal and state regulations. However, indirectly the users are paying to maintain the natural resource that is effected by their use, but do not necessarily benefit directly from the restoration of the natural resource. Also, the WP and BEF have started to implement some innovative ecosystem service credit systems that could provide a sustainable PES solution for the long-term. Some aspects of their PES approach include:

- Services Provided - Water availability, increased biodiversity, return of natural flow regime in rivers and wetlands – restoration of native stream biota and maintenance of cultural heritage and aesthetics.
- Commodities - Water as well as culturally and industrial important native fish species.
- Costs Avoided - Collapse of salmon fishing industry, loss of cultural heritage and aesthetics.
- Payment Mechanisms - Indirect payments by hydropower consumers through increased utility fees charged by the BPA, and voluntary contributions in the form of water right transfers. Government program administration and irrigation efficiency upgrades also paid by power users.

Progress of the Columbia River Basin Instream Flows Restoration

Overall, there seems to be an awareness and interest among the residents of the Columbia Basin riparian health, which helps to justify the politically sensitive notion of leaving water in the river. People are willing to pay for the restoration of the streams and there is a mandate for the federal agencies, especially the BPA, to do so. Consequently, the successes of the restoration efforts in the Columbia Basin are apparent.

The CBWTP's 2009 annual report claims that the program has supported 4.8 million acre feet of designated instream flows in the Columbia Basin, including 277 miles of stream (NFWF & BPA 2009).

Through a water leasing program farmers who participated in the DRC were able to earn approximately \$23.13 per acre-foot of water left in the stream and did not give up the beneficial use of their water right (WestWater 2008). In 2007 the CRC program placed 27,710 acre-feet of water into the Deschutes River system.

In 2010, the “Snake River fall Chinook (a federally listed species) set an all-time record for returns up the Snake River through Lower Granite Dam (BPA 2010).”

Lessons Learned

The following lessons learned, which may be applicable for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the Columbia River Basin program.

Programmatic Lessons Learned:

- 1. Three basic legal/policy reforms must occur to facilitate market-based riparian restoration in western states:** 1) Legitimize environmental water as a beneficial use; 2) enable trade between traditional uses and instream rights; and 3) development of an organizational structure to facilitate trade efficiently (Garrick et al. 2009).
- 2. The primary factors that influence the successful implementation of a water market for the establishment of environmental flows include.** Demand for environmental allocation, institutional capacity, overcoming administrative barriers, third party protections, and monitoring and evaluation (Garrick et al 2009).
- 3. Without statutory authority natural resource markets are not likely to develop.** “Without these public mandates and resources (e.g. policy reform and publicly supported implementation programs), voluntary provisions of instream flows might otherwise fail to deliver adequate levels of restoration due to the free rider problem associated with public goods (Garrick et al 2009).” “In the Northwest, federal legislation, such as the EPA and the Energy Policy Act, has been used to compel major water users – particularly hydropower producers and federal agencies – to invest in salmon restoration, broadly serving as a mitigation action for the impacts of private and federal projects (Aylward 2009).”
- 4. Non-profit organizations such as the Oregon Water Trust, “often developed and tested emerging statutory authority for market mechanisms by participating in multi-stakeholder rulemaking efforts to clarify administration procedures and regulations governing environmental water transfers (Garrick et al. 2009).”**
- 5. Increased flows in smaller headwater streams can potentially provide more restored habitat and connectivity in the short term. The headwater preservation efforts can**

also indirectly benefit the mainstem streams. Initial instream flow transactions of the Oregon Water Trust focused on the tributary streams “where small-scale acquisitions are an effective approach to restore connectivity and other ecological functions for flow-limited fish habitat; however, an increasing focus on scaling and integrating solutions for larger restoration goals has emphasized larger scale institutional mechanisms, such as reverse auctions, and other sources of water, including regulated storage and mitigation for impacts of groundwater pumping on surface flows (Garrick et al. 2009).”

6. **Crisis triggers policy response.** Similar to other case studies, the rapid decline in native salmon and steelhead triggered the policy reform necessary to fund large-scale restoration in the Columbia River Basin.
7. **“The opportunity to purchase water through methods that allow irrigated agriculture to continue promotes participation and acceptance of the program and helps to reduce the importance of price in the negotiation (WestWater 2008).”**
8. **“Restoration is an expensive task. Given the diffuse nature of the benefits, it is not surprising to find that once enabled by legislation, market acquisitions for instream flows in the PNW (Pacific Northwest) took off slowly (Aylward 2009).”**
9. **Applying a regional approach, similar to wetland mitigation banks, allows ecosystem restoration credits to be more marketable across larger areas.** “BEF’s regional approach enables what is called “offsite mitigation”. In other words, an entity may be having a negative impact on flow and ecosystems in its home watershed, but there may be no market framework or water trust in place. The entity can still mitigate its water footprint by buying Watershed Restoration Credits (Aylward 2009).”

Funding Lessons Learned:

1. **Hydropower surcharges can be a primary and sustainable financial source for riparian restoration.** The loss of salmon and steelhead spawning habitat has been linked to the large hydropower dams on the Snake and Columbia Rivers. Therefore, the BPA provides \$170 million annually for a fish and wildlife recovery program and a portion of the money is used to facilitate the environmental market mechanisms (Garrick et al 2009).
2. **Partnerships have been instrumental in the program’s success.** “The cost-share contributions from partners increased from \$912,582 in 2006 to more than \$3.3 million in 2007. Nearly half of the transactions received cost-share funds (WestWater 2008).”

3. **“Funding priorities and the use of cost-share partnerships will become increasingly important as water costs rise and the program continues to emphasize longer term transactions (WestWater 2008).”**
4. **Market-based mechanisms might offer a sustainable long-term solution, but the early development of the mechanisms is slow and requires more traditional financing such as federal grants.** For example, the WP has become established and developed its market tools with the help of federal grants including the EPA’s Targeted Watershed Grant Program in 2005 and the NRCS’s Conservation Innovations Grant in 2007 (WP, About 2010).

Literature Cited

Aylward, B. 2009. The role of voluntary and market-based initiatives in freshwater ecosystem restoration. Bonneville Environmental Foundation, Portland, OR.

BEF (Bonneville Environmental Foundation), About BEF, Our History. URL <http://www.b-e-f.org/meet> [accessed on 18 January 2011]

BEF (Bonneville Environmental Foundation), BEFWater. URL <http://www.b-e-f.org/water> [accessed on 18 January 2011]

BPA (Bonneville Power Administration). 2006. A better environment a better future: BPA's environmental stewardship in the Pacific Northwest. DOE/BP-3773. Available from http://www.bpa.gov/corporate/pubs/Environmental_Brochure.pdf

BPA (Bonneville Power Administration). 2010. 2010 Annual Report. Available from http://www.bpa.gov/corporate/finance/a_report/10/AR2010.pdf

CBWTP (Columbia Basin Water Transactions Program), Finding Balance, 2004-2010. URL <http://www.cbwtp.org/about.htm> [accessed on 18 January 2011]

CBWTP (Columbia Basin Water Transactions Program), The Program, 2004-2010. URL <http://www.cbwtp.org/jsp/cbwtp/index.jsp> [accessed on 18 January 2011]

DRC (Deschutes River Conservancy), 2010. URL <http://www.deschutesriver.org/> [accessed on 18 January 2011]

Garrick, D., M.A. Siebentritt, B. Aylward, C.J. Bauer, A. Purkey. 2009. Water markets and freshwater ecosystem services: policy reform and implementation in the Columbia and Murray Darling Basins. Paper submitted to the International Conference on Implementing Environmental Water Allocations, Port Elizabeth, South Africa.

Malloch, Steven. 2005. Liquid assets: protecting and restoring the West's rivers and wetlands through environmental water transactions. Trout Unlimited. Available from <http://cbwtp.org/jsp/cbwtp/library/documents/Liquid%20Assets.pdf>

NFWF (National Fish and Wildlife Foundation) and BPA (Bonneville Power Administration). 2009. Columbia Basin Water Transactions Program FY09 Annual Report. Available from http://cbwtp.org/jsp/cbwtp/library/documents/NLB_CB09_Annual_Final_webres.pdf

OWEB (Oregon Watershed Enhancement Board), 2010. URL <http://www.oregon.gov/OWEB/> [accessed on 18 January 2011]

WestWater Research, LLC. 2008. Columbia Basin water transactions program: annual economic report, 2007. WestWater Research, LLC, Portland, Oregon. Available from <http://cbwtp.org/jsp/cbwtp/library/documents/NFWF%20Annual%20Report%202007%2010.13.pdf>

WP (Willamette Partnership), About the Willamette Partnership, Funding and Partners, 2010. URL <http://willamettepartnership.org/> [accessed 13 January 2011]

WP (Willamette Partnership), Ecosystem Credit Accounting, 2010. URL <http://willamettepartnership.org/ecosystem-credit-accounting> [accessed 13 January 2011]

California Bay-Delta Restoration Program

The California Bay-Delta, Everglades, and Platte River are all faced with the task of fairly allocating water where demand is exceeding supply and flows necessary to sustain surrounding ecosystems are competing with human needs (Doyle & Drew 2008). The situation in the Colorado River Basin is similar.

Background

The California Bay-Delta, also known as the San Francisco Bay, is located at the confluence of the Sacramento and San Joaquin Rivers (USGS 2007; Doyle & Drew 2008). These rivers empty into the northern portion of the bay. These waters support the largest, most diverse wetlands in the western United States; two endangered fish species, winter-run Chinook salmon and delta smelt; and the state's most important recreational and commercial fishery (Nawi & Brandt 2008). In all, the Bay-Delta provides habitat for approximately 700 native plants and animals (Delta Vision, About 2007).

There is evidence to suggest that Native Americans sustainably managed both the Sacramento and San Joaquin Rivers in the past especially in riparian zones and wetlands. Many of these interactions were beneficial, increasing biodiversity. As European settlers moved into the area and introduced mining, land clearance, agriculture, and urbanization the condition of these rivers and their landscapes declined (Crisman 2008). Today the Bay-Delta contains 500,000 people, 500,000 acres of agriculture, and supports a \$400 billion economy (Delta Vision, About 2007).

The two rivers represent a major water source for California. Today the Central Valley Project (CVP) and State Water Project (SWP) store water upstream of the Delta and convey it through the bay to the southern end (Nawi & Brandt 2008). This system supports agriculture and urban water use in southern California. In total, the Bay-Delta basin supplies water for more than 25 million people and



Figure 1: San Francisco Bay Area (NASA photo)

three million acres of agriculture (Delta Vision, About 2007). To accomplish this massive feat, the CVP and SWP were built in the 1980s, though the CVP was initiated in the 1920s. As a result of these water projects, the Bay-Delta represents a pivotal dispersal point for the snowmelt waters of northern California into the drier areas to the south, which hold newer claims on these water rights. Thus, agriculturalists, urban dwellers, and the fishing industry are all competing for the finite fresh water resource provided by the Bay-Delta (Nawi & Brandt 2008).

Water diversions and withdraws have also affected the water quality in the Bay-Delta. Improper mixing of salt and fresh water, pollutants, storm water runoff, and nutrients all contribute to the water quality problem (Nawi & Brandt 2008).

Resolving water conflicts in the region is complex as at least twenty state and federal agencies share responsibility for aspects of the Bay-Delta, many of them following conflicting missions. Additionally, five counties and a number of cities are steadily becoming more involved in Bay-Delta issues as land use pressures and the need for flood protection increase (Nawi & Brandt 2008). As a result coordination in the Bay-Delta restoration is enormously challenging. But as Doyle and Drew find, “a major lesson of the California Bay-Delta Program is that collaboration in environmental decision making, once structured and practiced, will endure even under harsh political climates (2008:110).”

Management and Legislation

Among the earliest litigation concerning the Bay-Delta was a 1922 California Supreme Court decision that a Delta town could not force the reduction of water diversions for farmers upstream to prevent saltwater intrusion into the bay. More recent legal struggles precipitated a stronger environmental reaction. In 1978, California’s appellate court rejected the state’s Delta water quality control plan as it failed to adequately address permitted diversions and fishery needs. This issue continued through the 1980s as frustration rose over the inability of CVP and SWP to maintain adequate water quality. In 1991 these failures gained federal attention when the Environmental Protection Agency (EPA) disapproved California’s 1978 Delta water quality standards. The standards failed to comply with the Federal Water Pollution Control Act of 1972 (Nawi & Brandt 2008).

Meanwhile, in 1986 the California legislature initiated the Upper Sacramento River Fisheries and Riparian Habitat Management Plan. Though never enacted, this plan was created to preserve riparian forests where they existed and to reestablish a continuous riparian corridor along the Sacramento River. This plan recognized the importance of riparian corridors to the health of the Bay-Delta (Nawi & Brandt 2008).

Mounting concerns about the condition of the Bay-Delta were compounded when, in the 1990s, winter-run Chinook salmon and delta smelt were listed as threatened under the

Endangered Species Act (ESA). As a result, CVP was forced to consult with both the US Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS). In 1992 George H. W. Bush signed the Central Valley Project Improvement Act (CVPIA) which added fish and wildlife protection, water transfer facilitation, and several environmental requirements to the CVP's responsibilities (Nawi & Brandt 2008).

In 1993, the federal agencies working in the Delta-Bay region began to collaborate to work on problem solving. As a result, the FWS, NMFS, the Environmental Protection Agency (EPA), and the US Bureau of Reclamation (USBR) formed a Federal Ecosystem Directorate known as Club Fed. In 1994, somewhat in response to the December 15th EPA deadline to adopt water quality standards, state agencies and Club Fed began to coordinate. This was especially notable as the federal administration was Democratic at the time and the state was Republican. The result was a science based water quality standard agreement titled the Bay-Delta Accord, or the Accord. This action began a wider effort to create a large-scale, science based restoration plan to restore the Bay-Delta known at first as the California Bay-Delta Program or CALFED (Nawi & Brandt 2008).

Over the next ten years the agencies involved in CALFED worked to create this restoration plan. In 2000 a Record of Decision (ROD) under the National Environmental Protection Act (NEPA) process was issued along with a ROD Action Plan. The ROD created a framework for CALFED's processes and long-term solutions. The ROD Action Plan laid forth CALFED's path to achieving its goals of water supply reliability, ecosystem restoration and watershed management, water quality improvement and levee integrity. Operating under a principle of balanced implementation, the Action Plan was to approach all goals concurrently and to distribute funds fairly (Nawi & Brandt 2008).

In 2002 concerns were raised that the CALFED decision making process would not adequately represent the diverse agencies involved. Additionally, many thought that a new, independent agency would need to be formed to ensure that individual CALFED members did not revert to business as usual, rendering the Action Plan useless. A compromise was reached by creating the California Bay-Delta Authority, also known as CALFED or the Authority. Neither merely a coordinating body nor a *super-agency* the Authority oversees activities by approving work plans and conducting annual reviews. Membership was divided among federal, state, and regional appointments. The regions addressed were defined by CALFED as it balanced its system-wide approach by creating five regions to address local issues. The regions are the Sacramento Valley, San Joaquin Valley, Delta, San Francisco Bay, and Southern California. In 2004 Congress authorized federal participation in CALFED. Democratic Senator Dianne Feinstein was a huge influence in moving CALFED along to receive congressional support (Nawi & Brandt 2008).

Critique

While the 2000 CALFED ROD was in many respects triumph of cooperative effort, John Echeverria's research (2001) saw this accomplishment in a different light. Echeverria felt that this decision to collaborate on this and the Platte River program was a result of a political hostility to the ESA at the time. ESA was heavily contested at the time due to the spotted owl controversy, the Republican 104th House majority, and general industry opposition. Escheverria states that the collaborative ROD provides water users with, 1) greater control over the plan, 2) increased likelihood that mitigation would be equitably shared, and 3) increased likelihood that federal dollars would help pay for mitigation measures. It also served Department of Interior's purposes to make the legislation look more flexible and less onerous to the opposition.

In another review of the CALFED and Platte River programs Aiken (1989) described both programs as basin-wide settlements between water-rights and endangered species habitat. Aiken also pointed out the regulatory certainty provided to water users. He used the example that even if subsequent species were found to be endangered, no additional water other than that obligated by the ROD would be required to maintain their habitat. Interestingly, the same federal negotiator handled both programs (Aiken 1989).

Progress

The compromise that created the Authority never fully resolved the relationship between CALFED and federal and state agencies. While the agencies are responsible for implementation, the Authority is charged with oversight, a point of contention for agencies that would prefer autonomy. Such problems affected CALFED's effectiveness and the initiative struggled in the years following its authorization as the condition of the Bay-Delta declined. During this time cooperation diminished and litigation increased (Nawi & Brandt 2008).

In 2005 a critical review of CALFED was released by the California Governor. In 2006 financing authority was transferred from CALFED to the California Office of the Secretary of Resources, when the Authority failed to properly apply the principle of balanced implementation. The downturn continued in 2007 when a state committee declared CALFED dysfunctional to members of Congress. Throughout all of this theater the Bay-Delta was declining while litigation and conflict was steadily increasing. The endangered smelt declined to critically low levels prompting the federal court to intervene (Nawi & Brandt 2008).

In 2007 a report stated that CALFED policies were unsustainable and the Governor's Executive Order S-17-06 directed the creation of a *durable vision* for the Bay-Delta by 2008 (Isenberg et al. 2008a; Nawi & Brandt 2008). In response the Governor assigned a Blue Ribbon Task Force to create a new Delta Vision (Nawi & Brandt 2008). Building on CALFED, Delta Vision was meant

to broaden the program's focus to include a sustainable plan for all natural resource, infrastructure, land use, governance, and agriculture issues in the Bay-Delta. This broadened focus is a result of managers and scientists agreeing that the status quo operation of all these areas is unsustainable in the bay system. Additionally, in the face of challenges such as aging levees, climate change, seismic effects, and other factors, Bay restoration will need to be very innovative. There was a consensus that CALFED was too fragmented and complex to effectively address these mired challenges. Additionally, there was a feeling of urgency as, "failure to act to address identified Delta challenges and threats will result in potentially devastating environmental and economic consequences of statewide and national significance (Delta Vision, About 2007)."

Additional problems with the program identified by three separate independent reviews of CALFED were discussed in the Legislative Analyst's Office (LAO) 2009 report. The reviews found that the program's governance structure was ineffective and there was no clear leadership, priorities for the program were unclear making implementation inefficient, and meaningful measures to track performance and hold the program accountable for outcomes were insufficient (CLAO 2009).

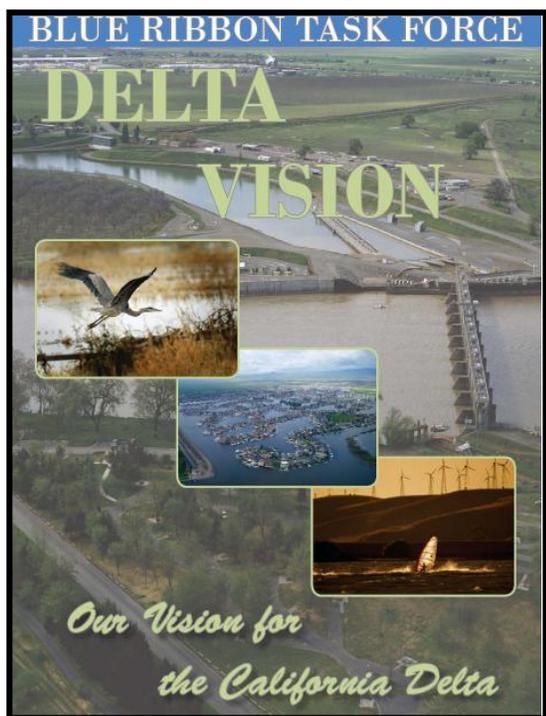
LAO's suggestions for moving forward with CALFED to surmount such issues are to improve the governance structure, set expenditure priorities, create performance measures that are tied to legislative priorities and the budget process to ensure legislative oversight and to approve a financial plan that includes the beneficiary pays principle (CLAO 2009).

In 2008, Delta Vision concluded its initial process by creating strategic recommendations for long-term, sustainable management of the Bay-Delta. Delta Vision's three main documents are the Delta Vision Final Report, Final Delta Vision Strategic Plan, and the Delta Vision Committee Implementation Report (Delta Vision, Delta 2007). The CALFED Authority was abolished by the Strategic Plan but useful aspects of its related organizations (e.g. the science committee, binding agreements in the CALFED ROD) were retained (Isenberg et al. 2008b).

Some key points in the Final Delta Vision Strategic Plan to note are that: 1) some of the plan's goals are framed in the very long-term (i.e. through year 2100) and, 2) the plan relies heavily on adaptive management to inform its process. While there are plans to create a reporting system to keep track of progress in the short-term, the exact method is as of yet unclear. This progress tracking method will also aid the Plan in following its adaptive management approach to science and management (Isenberg et al. 2008b). Thus, the method of monitoring and reporting chosen will heavily impact the ability of the Plan to track success and to remain adequately flexible to address new knowledge, technology, or basin issues. It is not yet clear whether or not Delta Vision is finding success where the CALFED Authority failed.

Science

One of the areas in which CALFED has excelled has been in science. Perhaps somewhat connected to its slow implementation progress, CALFED was able to support the development of a solid science program which informed policy decisions and adaptive management alike. Prior to CALFED *advocacy science* had been employed to reinforce agencies agenda's in the



Bay-Delta. CALFED shifted this by promoting honest discussions on difficult topics, engaging independent scientists, and opening the scientific process. By involving so many scientific sources, the program created a lot of competition for grant funding and thus has great pools of proposals to choose from for research. This beneficial approach to science carried over into the CALFED Authority (Nawi & Brandt 2008) and seems to be carrying into Delta Vision as well.

An additional boost to the use of science in the Bay-Delta is Access USGS – San Francisco Bay and Delta. Access USGS was created to disseminate information obtained through USGS's fundamental and applied research in the San Francisco estuary (USGS 2007).

CALFED – Funding

Nelson's (2010) analysis indicated CALFED's lack of a credible financial plan was a large factor in its failure to show progress and to the subsequent creation of the Delta Stewardship Council, or the Council. CALFED had planned to rely on significant state and federal funds that never materialized; the plan could not be implemented, lost credibility, and ultimately failed. The lesson that Nelson drew from this is that, "The CALFED failure taught us the danger of relying on public funds" (2010).

Federal

Appropriations – The EPA, the Army Corps of Engineers (the Corps), and the BSBP are the largest federal contributors to CALFED related projects. These funds are appropriations based. The EPA has mostly supported drinking water quality related projects though they have provided some funds for water use efficiency, restoration, science, and other issues. The EPA has supplied funds ranging between \$0.632 million in 2009 and \$97.652 million in 2005. The Corps supports mostly water management although a secondary expense is ecosystem restoration. The Corps supplied funds ranging between and \$46.535 million in 2009 to

\$103.341 million in 1999. USBR funds go mainly to ecosystem restoration projects though a secondary expense is water use efficiency. USBR funds have ranged between \$66.05 million in 2008 to \$153.38 in 1998 (USOMB 2006). Funding levels identified in the CALFED Bay-Delta Authorization Act of 2004 (PL 108-361) for these and other agencies in 2010 are shown in Table 1 (USOMB 2010).

State

CALFED’s approach to funding has been unusual. As shown in Figure 2, it has been largely a state funded initiative. As the program was developed through agency action, debate on what would be funded and at what level occurred among agencies and stakeholders. Only after consensus emerged were state legislators approached for funding or authorization. In some instances a bond would be placed directly on a ballot with the support of farmers, water agencies, and environmentalists but with no knowledge of the legislatures. These methods resulted in substantial funding for a time, as legislators had little choice but to agree. However, this process threatened the traditional funding mechanisms that were comfortable to Congress and legislators. The process asked them to approve and fund an entire plan as opposed to certain agreeable components. This was difficult as many legislators are unfamiliar with issues outside of their jurisdiction and do not have the time or staff to catch up (Doyle & Drew 2008).

Bond Funding – California water infrastructure is mainly financed by general fund-supported bonds. These are essentially tax supported, or revenue bonds, which are tied to specific revenue streams to pay off the debt. Most wildlife and recreation related bond funds are paid back by the state. Local water infrastructure is paid for using revenue bonds repaid by fees on local water users. Since 1970, \$23.4 billion in bonds (mostly general fund-supported) in bonds have been authorized by state voters. 84 percent of these have been authorized since the year 2000. These bonds often include some funding for land conservation or habitat protection (CLAO 2009).

Table 1: CALFED-Related Federal Funding, FISCAL YEAR 2010 (CALFED-Related 2010)

CALFED-Related Federal Funding Budget Crosscut Federal Fiscal Year 2010 (dollars in millions)		
	FY 2010 - Includes Category A & B	
	Pre-Existing Authority	New Authority under PL 108-361
Bureau of Reclamation	\$64.114	\$5.850
Corps of Engineers	\$79.978	\$0.000
Natural Resource Conservation Service	\$21.500	\$0.000
NOAA Fisheries	\$0.525	\$0.000
Geological Survey	\$3.729	\$3.729
Fish & Wildlife Service	\$6.519	\$0.000
Environmental Protection Agency	\$0.000	\$0.000
Total	\$176.365	\$9.579

Bonds have been a major source of funding for the CALFED Bay-Delta Program. Fifty-seven percent, or \$168 million, of the program's \$297 million state-funded budget is supplied by state bonds (CLAO 2009).

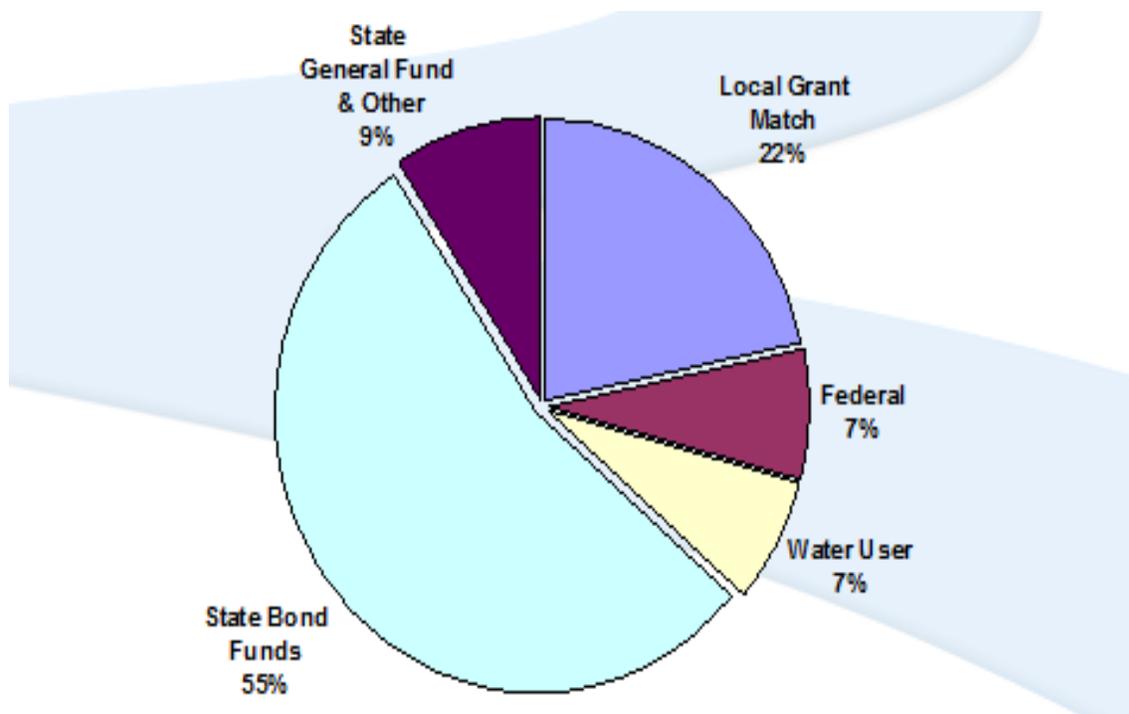


Figure 2: California Bay-Delta Program: Years 1 through 5 Cumulative Funding (CALFED 2010)

This approach worked fairly well from 2000 to 2005 when state bonds created a lot of revenue (Doyle & Drew 2008). During this time frame general funds and bonds supported most of CALFED's programs (CLAO 2005). However, bonds cost more money than they generate. For example, from 2000 to 2009, California received \$13 billion for water projects that will ultimately cost \$23.9 billion. This cost is negatively affecting the public's willingness to approve bond funding in the future, especially since California now has the lowest credit rating in the US (Hurd 2009).

The debt service portion of California General Fund expenditures for resource and environmental protection have increased from 8 percent (\$215 million) in 2000-2001 to 36 percent (\$766 million) in 2009-2010 (CLAO 2009). This steady increase in debt-service payment may soon reach nine percent of the general fund's revenues and could eventually exceed 10 percent every year for the next decade. If this occurs, debt service will be one of the fastest growing segments of California's strained general fund budget. As debt service will be paid every year regardless of other state needs (i.e. education, health care, etc.) it is important to consider the implications of these costs (Dickerson 2009). In order to alleviate the strain

continuing the present rate of bond approval the LAO recommended more stringently prioritizing, referred to by some as *rationing*, future bond issuance (CLAO 2009).

As bond funding weakened in 2005, Governor Schwarzenegger called for a long-term financial plan for CALFED (Doyle & Drew 2008). The resulting report was very critical of CALFED's current funding practices and postulated that a *beneficiaries pay* principle could potentially fund the program (CLAO 2005).

Beneficiaries Pay – As public funds for the Bay-Delta are not reaching expected levels, it became clear that increased levels of private funding must fill the gap. Nelson (2010) identifies two specific groups that should pay for Delta restoration, those whose activities degrade the Delta and those that benefit, or beneficiaries pay, from the implementation of the Delta Plan. California's Legislative Analyst's Office support the beneficiaries pay approach, as do the stakeholders (Nelson 2010). But to truly support Delta restoration, beneficiaries would need to contribute to maintain the entire system from which they benefit, including ecosystem restoration, flood programs, and water quality. The question was whether stakeholders would be willing to support such a broad effort.

The aforementioned LAO 2009 report supported Nelson's emphasis on the beneficiary pays principle. The report stated that the majority of CALFED state funding has come from taxpayer supported *general purpose* bond funds in spite of a legislative request to explore a user fee program based on the beneficiary's pays principle. Due to this, LAO stated: "The program [CALFED] is currently operating without a long-term financing plan (CLAO 2009:14)."

There are already several examples of the beneficiary pays principle in California, including the financial plan of the State Water Project (SWP), flood control programs, and water quality rights and regulation. SWP capital and operation costs are paid for by water agencies receiving water deliveries. Notably, however, it is the state's general purpose fund that supports fish, wildlife, and public recreation enhancements that benefit the wider public (CLAO 2009).

The suggestion to move forward with beneficiary pays funding to restore the Delta is being pushed forward by Assembly Bill 2029. Introduced by Assemblyman Huffam in February of 2010, this legislation directs the Delta Stewardship Council to prepare a beneficiary pays based financial plan to implement the Delta Plan (California State 2010; Nelson 2010).

The National Resources Defense Council (NRDC) recommended proceeding with this preparation in two ways. First, it recommended creating targeted fee proposals linked to specific Delta Plan activities instead of single *all purpose* fees. This is explained by the failure of the Resource Investment Fund (RIF). The RIF was an all-purpose, per capita fee to be used on a variety of water projects at the legislature's discretion. This flexibility was not welcomed by water agencies who were concerned that the funds would not be fairly distributed. The Fund

proposal failed. Targeted fees tied to specific activities would hopefully be more politically and socially viable (Nelson 2010).

Secondly, the NRDC recommended securely insulating funds raised via the beneficiary pays principle from the state deficit. It is unlikely that water users would agree to the fees if the funds were not used for their intended purpose (Nelson 2010).

Nelson encouraged the Council to complete a credible, beneficiaries pay plan early on in the process as available funds will largely drive the implementation plan. Without such a finance plan, the implementation plan would be no more successful than CALFED (Nelson 2010).

Delta Vision – Funding

The Delta Vision program has not yet quantified the costs of its implementation. Estimates for the next 10 to 15 years could range from \$12 billion to \$24 billion with a high estimate of \$80 billion. Delta Vision's Strategic Plan identifies bond funds and water contractor willingness to pay for alternative water conveyance as sources for some of these funds. But it is acknowledged that they fall far short of the goal. The Strategic Plan's Actions 7.3.1 – 7.3.3 suggested solutions to find additional funds (Isenberg et al. 2008b).

Action 7.3.1 called for some general design principles to support sustainable funding such as: 1) creating multiple revenue streams, 2) identify beneficiaries, 3) consistent allocation of funds, 4) prevent funds from diversion in tight budget years, 5) do not create the expectation of public payment for ecosystem water requirements, 6) ensure project compliance with state and Bay-Delta laws and policies, and 7) create a method to withhold funds if such laws and policies are violated (Isenberg et al. 2008b).

Action 7.3.2 calls for the establishment of revenue systems outside of the state general fund. The main methods for accomplishing Action 7.3.2 include: 1) levy a per-acre-foot fee on Delta watershed water diversions and a separate fee on water conveyed through or around the Delta, 2) use tough enforcement to ensure all funds are dedicated to the Delta Vision Plan and cannot be diverted, 3) require compliance with the Delta Vision Plan for bonds and financing mechanisms, and 4) require localities to create a localized financial plan (Isenberg et al. 2008b).

Action 7.3.3 seeks to find new revenue sources beyond traditional bond funds or public allocations. Three potential revenue generating methods were identified: mitigation and conservation banking, sequestering carbon and reducing carbon emissions, and private, voluntary contributions (Isenberg et al. 2008b).

The Delta Vision related Delta Protection Commission is authorized to create a Bay-Delta regional economic plan by 2011. The Commission recognized that bond financing will be a critical element funding the Delta Vision. Additionally, by 2010, the commission was authorized

to establish a 2010 Delta Investment Fund to create a credit base for a *resilient Delta economy*. This fund is to be capitalized by federal, state, local, and private funding with a target of \$50 to \$100 million (Delta Vision 2008).

Lessons Learned

The following lessons learned, which may have some applicability for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the California Bay-Delta Program.

Programmatic

1. **An effective governance structure, with clear leadership, that includes adequate and effective representation of federal, state, and local agencies, organizations, and stakeholders is essential in a large-scale collaborative effort.** The CALFED Authority was created to adequately represent federal, state, and local agencies while providing oversight to ensure compliance but failed to do so, which was a major factor in its dissolution. This governance structure was seen to be ineffective by many as it was fragmented and displayed no clear leadership (CLAO 2009).
2. **Collaboration on such a large scale is challenging to achieve but is necessary, otherwise efforts would be so fragmented and vary so much with changing political agendas that progress would be difficult.** Even though it has struggled to make progress, a major long-term benefit of CALFED is that “collaboration in environmental decision making, once structured and practiced, will endure even under harsh political climates” (Doyle & Drew 2008:110).
3. **Collaborative watershed efforts are created to simplify and unify the disparity of many agencies’ work in the basin. However, without careful planning, the cooperative effort can become complicated and fragmented itself.** The Delta Vision program was created in part to simplify and unify CALFED’s complicated and fragmented structure.
4. **It is important to recognize the potential for collaborative efforts to weaken regulatory requirements.** The collaborative CALFED ROD provides water users with, 1) greater control over the plan, 2) increased the likelihood that mitigation would be equitably shared, and 3) increased likelihood that federal dollars would help pay for mitigation measures (Echeverria 2001). So while the collaborative process creating CALFED will likely help the initiative survive harsh political times, it also creates an opportunity for members to work around strict adherence to the ESA and CWA.

5. **Collaborative efforts tend to be punctuated by periods of litigation due to a lack of or temporary stall in progress. This generally results in action that moves the collaborative program forward.** The lack of leadership and agency representation in the CALFED Authority impeded its effectiveness. The initiative struggled in the years following its authorization as the condition of the Bay-Delta declined. During this time cooperation diminished and litigation increased. Eventually the endangered smelt declined to critically low levels, prompting the federal court to intervene (Doyle & Drew 2008).
6. **Watershed wide, environmental plans, can allow science to detect and address issues outside of the direct authority of environmental statutes currently in place.** Existing statutes of authority that address large-scale, watershed issues are the Clean Water Act (CWA) and the Endangered Species Act (ESA). Neither of these statutes directly addresses overall system biodiversity or health. However, the National Environmental Policy Act (NEPA) process and the creation of a watershed wide environmental plan allow science to detect and address issues that lie outside the direct authority of these statutes. During this process the program goals can shift to a broader focus of regional ecosystem sustainability such as in Delta Vision. In 2000 CALFED's ROD Action Plan's goals were water supply reliability, ecosystem restoration and watershed management, water quality improvement, and levee integrity. Additionally, the Delta Vision was created in part to broaden the focus of the CALFED Program to address more sustainability issues in the region.
7. **Creating regional or local level partnerships help to involve local stakeholders and agencies in large-scale plans.** CALFED included regional partnerships and appointments along with federal and state, ensuring local involvement in the initiative.
8. **Public support is necessary to gain political support. There is a feeling of urgency to progress towards a healthy, sustainable ecosystem in the watershed.** "Failure to act to address identified Delta challenges and threats will result in potentially devastating environmental and economic consequences of statewide and national significance (Delta Vision, About 2007)."
9. **A champion, whether a politician or an organization, that works to push the program forward is extremely important.** The political champion for CALFED was Democratic Senator Dianne Feinstein. She was a huge influence in moving CALFED along to receive congressional support.
10. **Through the decades long process of creating and implementing a watershed plan, the program has recognized the need to set goals far into the future.** Delta Vision has

goals in the long-term and it is planning to rely heavily on adaptive management and monitoring to reach its goals.

11. **As a result of the long term goals, there is a strong need for effective monitoring and reporting along the way. Adaptive management is also an important component in the program as it is not known whether or not planned actions will be successful in reaching these goals.** Delta Vision has goals in the long-term and it is planning to rely heavily on adaptive management and monitoring to reach its goals. Thus, the method of monitoring and reporting chosen will heavily impact the ability of the Plan to track success and to remain adequately flexible to address new knowledge, technology, or basin issues.
12. **Program priorities and related expenditures must be clear for implementation to be efficient.** CALFED's priorities have not been clear (CLAO 2009).
13. **Performance measures must be tied to program goals, clearly articulated, effectively monitored and reported, and the program must be held accountable for the achievement of these goals.** CALFED failed partially due to its insufficiency on these accounts (CLAO 2009).
14. **A benefit of the long, slow process creating CALFED and Delta Vision, is that the level of scientific knowledge in the watershed has been highly developed.** CALFED and now Delta Vision have created an excellent, independent network of scientific knowledge and expertise to inform the program.
15. **The California Bay-Delta project influence the Platte River decision making process, indicating a national level of interest and need for guidance in watershed wide restoration efforts.**

Funding

1. **Funding revenue collected through broadly based taxes are typically *fairly* distributed to projects throughout the contributing tax base area. This is not necessarily the most efficient way to reach success in a large-scale, watershed plan.** Operating under a principle of balanced implementation, the CALFED action plan was to approach all goals concurrently and to distribute funds fairly. This was a very important principle to the effort as when it did not occur, financing authority was transferred from CALFED to the state Office of the Secretary of Resources. However, a LAO 2009 report critique of CALFED was that it had failed to prioritize projects efficiently. Simply distributing funds with a principle of fairness would not likely improve this issue.

2. **Bond funding was often pushed by agencies and stakeholders with little input from the Legislature. This may have partially led to the overuse of bond funds that is currently crippling California's finances.** The CALFED funding process was very grassroots based. This seemed to work well to gather public support to pass bond funds. However, an over reliance on bond funding has put California in rough financial times. Involving the Legislature earlier on might have helped to slow this process.
3. **To date, the program has not had a sustainable, significant funding source.** CALFED's lack of a credible financial plan was a large factor in its failure and to the creation of the Delta Stewardship Council, or the Council (Nelson 2010).
4. **Public funds, as they are currently allocated, are not enough to create a sustainable, significant funding source.** CALFED had planned to rely on significant state and federal funds that never materialized; the plan could not be implemented, lost credibility, and ultimately failed. "The CALFED failure taught us the danger of relying on public funds" (Nelson 2010).
5. **An increase use of private funds is deemed necessary by many to find success in the watershed.** CALFED had planned to rely on significant state and federal funds that never materialized; the plan could not be implemented, lost credibility, and ultimately failed. "The CALFED failure taught us the danger of relying on public funds" (Nelson 2010).
6. **Specifically, charging beneficiaries and polluters for restoration could greatly mobilize private funds and enhance large-scale restoration efforts' ability to secure funding.** The *beneficiaries pays* principle is the most commonly cited method to mobilize private funds in the watershed. The principle is pushed forward by the original CALFED plan, a Governor commissioned LAO study, and the Natural Resources Defense Council. The *polluters pay* principle is also mentioned but less forcefully.
7. **Bond funding costs more than it generates and is not a sustainable resource for a long-term project. Bonds seem more appropriate for jumpstarting a program by providing capital quickly.** For example, from 2000 to 2009, California received \$13 billion for water projects that will ultimately cost \$23.9 billion. This cost is negatively affecting the public's willingness to approve bond funding in the future, especially since California now has the lowest credit rating in the US (Hurd 2009).
8. **Watershed wide programs do not necessarily learn from their mistakes.** The Delta Vision finance plan, to be finalized in 2011, relies heavily on bonds and additional public funds to continue revenue, which could be a risky venture based on California's current financial condition. Additionally, by 2010, the Commission was authorized to establish a

2010 Delta Investment Fund to create a credit base for a *resilient Delta economy*. This fund is to be capitalized by federal, state, local, and private funding with a target of \$50 to \$100 million (Delta Vision 2008).

9. **When implementing a beneficiary pays program it is important to ensure that the fees are related to specific activities and are insulated from the general fund to ensure they are used for their original purpose.** The NRDC recommends creating targeted fee proposals linked to specific Delta Plan activities instead of single *all purpose* fees. The NRDC also recommended securely insulating funds raised via the beneficiary pays principle from the state deficit. It is unlikely that water users would agree to the fees if the funds were not used for their intended purpose (Nelson 2009).
10. **It is important to identify a financial plan early on in a large-scale watershed restoration effort as the amount of funds that can be expected will drive the scale and schedule of the implementation plan.** Nelson (2009) encouraged the Delta Vision Council to complete a credible, beneficiaries pays, plan early on in the process as available funds will largely drive the implementation plan. Without such a finance plan, the implementation plan would be no more successful than CALFED.
11. **Solidifying public and political bi-partisan support for the program at an early stage goes far to ensure lasting support, and thus funding, for the program.** Bi-partisanship influenced the Bay-Delta agreement as the federal administration was Democratic at the time and the state was Republican in 1994 when state agencies and Club Fed began to coordinate.

Delta Vision Strategies

The Delta Vision Strategic Plan learned its own lessons from previous CELFED works. Relevant information gathered in these efforts is summarized below.

1. **Lessons learned from previous CALFED work seem to inform Delta Vision's Strategic Plan which called for the following design principles to support sustainable funding:**
 - 1) creating multiple revenue streams, 2) identify beneficiaries, 3) consistent allocation of funds, 4) prevent funds from diversion in tight budget years, 5) do not create the expectation of public payment for ecosystem water requirements, 6) ensure project compliance with state and Bay-Delta laws and policies, and 7) create a method to withhold funds if such laws and policies are violated (Isenberg et al. 2008b).
2. **The Delta Vision's Strategic Plan also called for the establishment of revenue systems outside of the state general fund using the following methods:**
 - 1) levy a per-acre-foot fee on Delta watershed water diversions and a separate fee on water conveyed through

or around the Delta, 2) use tough enforcement to ensure all funds are dedicated to the Delta Vision Plan and cannot be diverted, 3) require compliance with the Delta Vision Plan for bonds and financing mechanisms, and 4) require localities to create a localized financial plan (Isenberg et al. 2008b).

3. **The Delta Vision's Strategic Plan also called for new revenue sources beyond traditional bond funds or public allocations. The plan identified three potential revenue generating methods:** 1) mitigation and conservation banking, 2) sequestering carbon and reducing carbon emissions, 3) and private, voluntary contributions (Isenberg et al 2008b).

Literature Cited

Aiken, J. D. 1989. Balancing endangered species protection and irrigation water rights: the Platte river cooperative agreement. *Great Plains Natural Resources Journal* **3**: 119-158.

Available from

<http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1023&context=ageconfacpub>

CALFED. 2010. CALFED Finance Planning. California Bay-Delta Authority, Sacramento, California.

Available from http://socalwaterdialogue.org/calendar/2004_07_20_finance.ppt

California State Legislature. 2010. Assembly Bill No. 2092. Available from

<http://switchboard.nrdc.org/blogs/bnelson/media/AB%202092.pdf>

CLAO (California Legislative Analyst's Office). 2005. Water policy issues facing the state. Pages 215-241 in CLAO editors. *The 2005-2006 budget: perspectives and issues*. Available from

http://www.lao.ca.gov/analysis_2005/2005_pandi/pi_part_5_6_water_policy_reforms_anl05.htm

CLAO (California Legislative Analyst's Office). 2009. Financing water infrastructure. LAO, Sacramento, California. Available from

www.lao.ca.gov/handouts/resources/2009/Financing_Water_Infrastructure_82609.pdf

Crisman, T. L. 2008. The ecology of bay-delta restoration: an impossible dream? Pages 147-159 in M. Doyle and C. A. Drew editors. *Large-scale ecosystem restoration: five case studies from the United States*. Island Press, Washington, D.C.

Delta Vision, About Delta Vision, 2007. URL

<http://www.deltavision.ca.gov/AboutDeltaVision.shtml> [accessed on 20 August 2010]

Delta Vision, Delta Vision Process Concludes in Strategic Recommendations, 2007. URL

<http://www.deltavision.ca.gov/index.shtml> [Accessed on 23 August 2010]

Delta Vision Committee. 2008. Delta vision committee implementation report. Delta Vision Committee, Sacramento, California. Available from

http://www.deltavision.ca.gov/DV_Committee/Jan2009/08-1231_Delta_Vision_Committee_Implementation_Report.pdf

Dickerson, J. 2009. Debt service information. California Legislative Analyst's Office, Sacramento, California. Available from

www.lao.ca.gov/2009/stadm/debt_service/Debt_Service_Information_Memo_10_30_09.pdf

Doyle, M. and C. A. Drew editors. 2008. Large-scale ecosystem restoration: five case studies from the United States. Island Press, Washington, D.C.

Echeverria, J. D. 2001. No success like failure: the Platte River collaborative watershed planning process. *William & Mary Environmental Law and Policy Review* **25**: 559-603. Available from www.vermontlaw.edu/admin/Documents/102009noSuccessLikeFailureThePlatteRiver.pdf

Hurd, J. 2009. Characteristics of watershed restoration funding. Wildlands CPR, Missoula, Montana. Available from http://www.wildlandscpr.org/files/Funding_Characteristics_0.pdf

Isenberg, P., M. Florian, R. M. Frank, T. Mckernan, S. W. McPeak, W. K. Reilly, and R. Seed. 2008a. Delta vision: our vision for the California delta. Blue Ribbon Task Force, Sacramento, California. Available from http://deltavision.ca.gov/BlueRibbonTaskForce/FinalVision/Delta_Vision_Final.pdf

Isenberg, P., M. Florian, R. M. Frank, T. Mckernan, S. W. McPeak, W. K. Reilly, and R. Seed. 2008b. Delta vision strategic plan. Delta Vision, California. Available from http://deltavision.ca.gov/StrategicPlanningProcess/StaffDraft/Delta_Vision_Strategic_Plan_standard_resolution.pdf

Nawi, D. and A. W. Brandt. 2008. The California bay-delta: the challenges of collaboration. Pages 113-146 in Doyle, M. and C. A. Drew editors. Large-scale ecosystem restoration: five case studies from the United States. Island Press, Washington, D.C.

Nelson, B. 2010. Delta stewardship council keys to success – show me the money. Switchboard, Natural Resources Defense Council Staff Blog, New York, New York. Available from http://switchboard.nrdc.org/blogs/bnelson/delta_stewardship_council_keys_1.html

USGS (United States Geological Survey), Access USGS – San Francisco Bay and Delta, 2007. URL <http://sfbay.wr.usgs.gov/> [accessed on 19 August 2010]

USOMB (United States Office of Management and Budget). 2006. CALFED related federal funding. Available from http://www.gpoaccess.gov/usbudget/fy06/pdf/ap_cd_rom/calfed.pdf

USOMB (United States Office of Management and Budget). 2010. CALFED-related federal funding budget crosscut federal fiscal year 2010. US Government Printing Office, Washington, D.C. Available from http://www.gpoaccess.gov/usbudget/fy10/pdf/ap_cd_rom/calfed_new_authority.pdf

Everglades Restoration Program

Though the Everglades receive massive amounts of rainfall compared to the Colorado River Basin (CRB) which relies on a much more limited water supply, both systems are hampered by humanity's appetite for water. Thus, it is beneficial to note how the Everglades restoration effort approaches this issue. Additionally, just as Congress authorized and funded the construction of the dams affecting the CRB's riparian system, so did they authorize and fund the Central and Southern Florida Project altering Everglades hydrology. Thus, it can be argued that the federal government's massive involvement in the restoration of the Everglades should, in all fairness, represent their responsibility to conduct similar work in the CRB. As Shannon Estenoz, who has spent her career working in the Everglades, postulated ". . . If they can't restore the Everglades; a system with one state government, one federal government, adequate funding and enormous political will; what hope is there for other systems" (Estenoz 2010)?

Background

The Everglades, often referred to as *the river of grass*, were once composed of vast sawgrass marshes and mangrove estuaries sustained by a slow moving sheet of water from Lake Okeechobee to Florida Bay (Salt et al. 2008; Living Waters). When this system was intact, the sparse human population lived mostly on high ground along the coast and on central Florida ridges (The Journey 2010). However,

anthropogenic actions were taken early on to make the area more hospitable to settlement. In 1881, four million acres were privately purchased to be drained for development and in 1882 a canal between Lake Okeechobee and the Caloosahatchee River was constructed (Salt et al. 2008). More extensive work was completed when large tracts of land flooded during the hurricanes of the 1920s. But it was another set of devastating hurricanes in the 1940s that finally forced the citizens and officials in Florida to petition the U.S. government for construction of more extensive flood control systems (Salt et al. 2008; The Journey 2010). As a

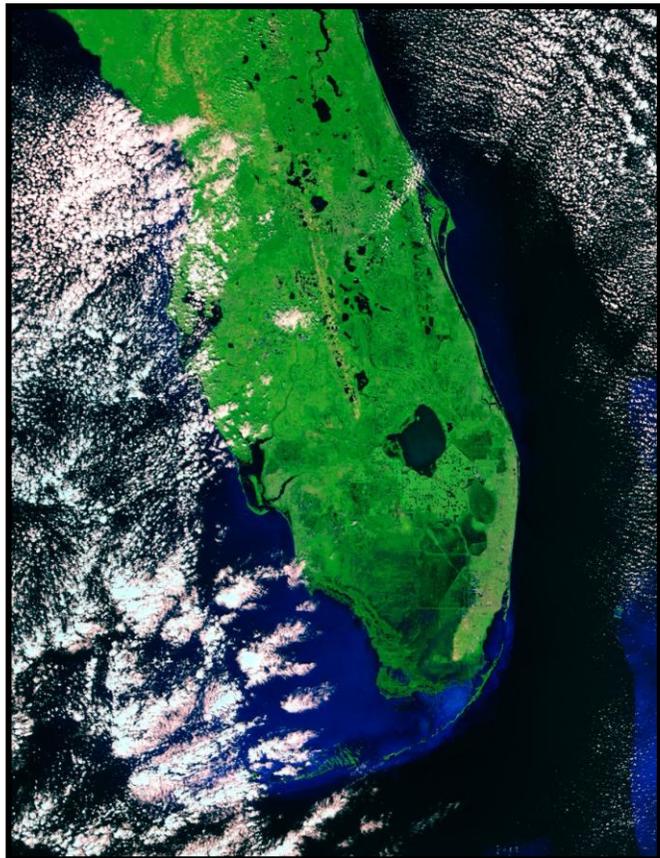


Figure 1: Southern Florida (NASA)

result, the Central and Southern Florida Project (C&SF Project) was authorized by Congress in 1947 (Salt et al. 2008).

Administered by the U.S. Army Corps of Engineers (Corps) and the South Florida Water Management District (SFWMD), the C&SF Project was . . . “the most elaborate and effective water management system in the world” (The Journey 2010). Over the course of this construction however, half of the Everglades massive river/wetland complex was drained for agricultural fields and flood control. Today nearly two million acre feet of water are diverted from the system yearly (The Journey 2010). These water diversions have tremendous effects on the quantity and quality of water throughout South Florida.

The Everglades are underlain with limestone which acts like a massive sponge during natural flow regimes to replenish Florida’s freshwater aquifer (Salt et al. 2008). Water quality concerns include toxins and an overabundance of nutrients, mainly phosphorus, which damage the water supply as well as the Everglades and Florida Bay ecosystems (Salt et al. 2008; Living Waters). Additionally, water quality is affected when sufficient amounts of fresh water do not flow into the aquifer or the Florida Bay due to the danger of salt water intrusion or the improper balance of salt in the ecosystem (Salt et al. 2008).

The C&SF Project also massively reduced the amount of water flowing into the Everglades National Park (ENP). The Park, an enormous 1.3 million-acre tract of land brimming with biodiversity, was created in the same year the C&SF Project began, 1947. At the time of its designation, ENP was already noted to be “diked, dammed, and polluted (Salt et al. 2008:5).” Due to its global uniqueness and international appeal, the ENP was also designated by the United Nations as a World Heritage Site and World Biosphere Reserve (Salt et al. 2008).

Management and Legislation

In 1970, Congress first officially recognized the detrimental impacts of water diversions from ENP and created a minimum flow requirement. In 1983, the state legislature passed the Save Our Everglades Act (SOE) thanks to the leadership provided by Governor Bob Graham. This act was important in that it was comprehensive, addressing all aspects of the South Florida ecosystem, and collaborative, requiring state agencies, the SFWMD, federal agencies, the Florida congressional delegation, and the Florida legislature to coordinate. Bi-partisan support for the SOE began when Democrat Governor Bob Graham was succeeded by Republican Governor Bob Martinez and has been a tradition ever since. Then, in 1987 Florida adopted the Surface Water Improvement and Management Act (SWIM) which required state water management districts to create plans to combat pollution and promote preservation in their waterways. This worked well for Lake Okeechobee and Biscayne Bay but created litigative issues in the larger Everglades system (Salt et al. 2008).

A 1988 lawsuit initiated by U.S. Attorney Dexter Lehtinen claimed that the state of Florida and SFWMD were failing to protect federal lands in the Everglades from excess levels of phosphorus. Attacking phosphorus, a by-product of sugar cane agricultural practices, was seen as an attack on the sugar industry though they were not named in the lawsuit. The lawsuit resulted in the creation of a SWIM plan for the Everglades by 1989. ENP was then expanded by 107,600 acres in a 1989 Act that also directed the Corps to improve water flows and to beginning restoring the natural hydrograph (Salt et al. 2008).

Though agreed upon by government agencies, the plan was contested for years by industry (Salt et al. 2008; Ashcraft). It was not until 1992 that a plan was agreed to and 1993 that sugar companies agreed to pay their share. The plan created short and long term plans to control phosphorus including the creation of wetland filtration systems termed stormwater treatment areas (STAs) and the increase of best management practices. The largest sugar growers would pay over \$800 million for the STAs over the course of 20 years (Salt et al. 2008).

The Florida Everglades Forever Act (EFA) of 1994 incorporated the terms of the 1993 settlement. The EFA legislation included provisions to protect water quantity and quality by implementing STAs, regulating industry phosphorus outputs, creating incentives for farmers to use phosphorus reducing best management practices, and controlling non-native, invasive species. The EFA also placed a tax on farmers operating in the Everglades Agricultural Area (EAA), which was created in the 1940s just south of Lake Okeechobee, as a finance mechanism (Salt et al. 2008).

Following the settlement and the EFA, Bruce Babbitt, Secretary of the Interior, spoke to the Everglades Coalition about the next steps he envisioned for restoration. Babbitt stated that efforts should address the ecosystem as a whole, be science based, and consist of a strong federal collaboration with the state, tribes, and others. This resulted in the creation of the South Florida Ecosystem Restoration Task Force (SFERTF or Task Force) which combined six federal agencies to coordinate restoration. In 1996 state, local, and tribal representatives were added. The Task Force was to coordinate interested parties, with the Army Corps of Engineers identified as the lead in project planning and implementation (Salt et al. 2008).

In 1994, the Corps conducted a study to see if the C&SF Project could be modified to improve water quality and quantity in South Florida. A Governor's Commission for a Sustainable South Florida was created in 1994 and was asked to assist the Corps in its study in 1995. An initial plan was developed in 1996 by the Commission and submitted to Congress. This plan is still considered a framework document for the region. In 1996, the Water Resources Development Act (WRDA) directed the Corps and SFWMD to create a comprehensive restoration plan (Salt et al. 2008). By 1999 the Corps and the Governor's Commission had completed the Comprehensive Everglades Restoration Plan (CERP) that was authorized by Congress under

WRDA 2000 (Salt et al. 2008; Stern et al. 2010). Scheduled for completion in 2050, CERP's projects were estimated to cost \$7.8 billion and total ecosystem restoration costs were estimated at \$14.8 billion (Salt et al. 2008).

A general spirit of cooperation has existed throughout the process. This is in no small part due to the diligent consensus building conducted throughout the process by groups such as the Governor's Commission (Salt et al. 2008).

While CERP was in the authorization process, the Task Force began to set goals for the restoration plan. The three goals decided upon; water, habitat and species, and the built environment; were determined to be of equal value and would be approached simultaneously. The water issue was to be approached by following the natural hydrologic regime as closely as possible while providing enough water to environmental, urban, and agricultural needs and ensuring water quality. The habitat and species issue is largely due to loss of habitat and increased competition from invasive species. As a result, many Everglades species are currently under Endangered Species Act (ESA) designation. Thus, restoring habitat and species competitiveness is a goal of CERP. This goal will be achieved by restoring, preserving, and protecting habitats, mainly through land acquisitions, and by controlling exotic invasive species that are outcompeting native species. The goal of achieving an improved built environment refers to sound planning and land use practices but has received little attention (Salt et al. 2008).

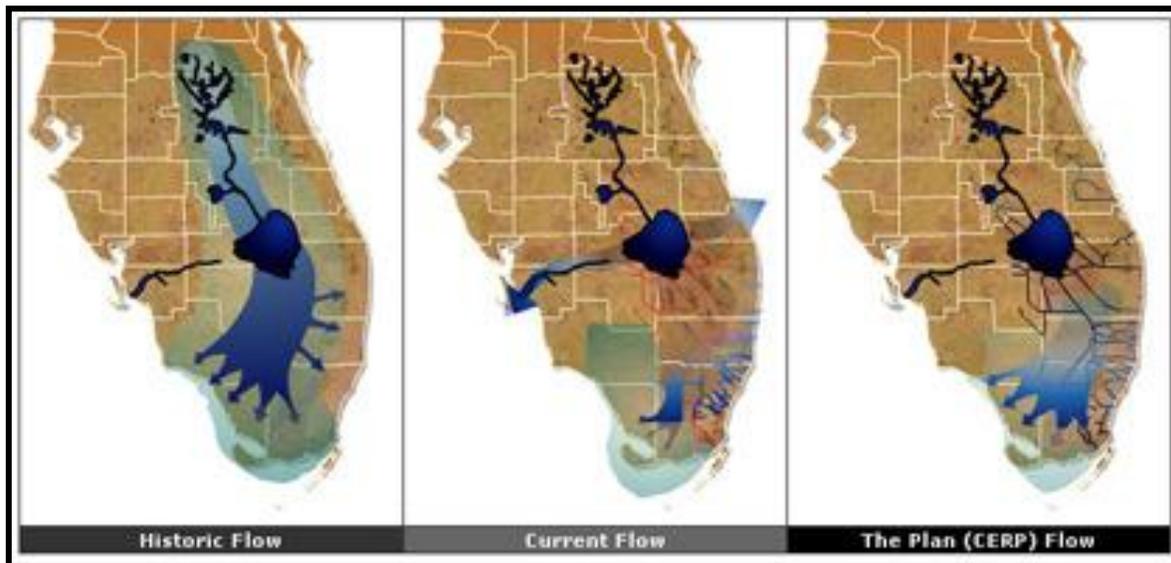


Figure 2: Historic, Current, and CERP Goals for Future Everglades Flows.

These three goals are fairly vague and there are no clear milestones to indicate either progress toward them, or their eventual completion. This has been a stumbling block for the process (Doyle & Drew 2008) and may affect long-term funding viability.

Science

The interdisciplinary, interagency Restoration, Coordination, and Verification (RECOVER) team was created by the Corps and the SFWMD to ensure proper science informed the implementation of CERP. Working to insert science into the enactment of CERP goals, RECOVER also established performance measures to assess progress made toward those goals. This may alleviate some of the goal setting and reaching issues discussed above. In recognition of the scientific challenges and uncertainties in restoring such a large and complex system, CERP relies heavily on adaptive management to incorporate new information into the plan. In this vein, CERP must be updated every five years to include the latest scientific and technical understandings (Salt et al. 2008).

To augment the science informing CERP, the Task Force established a panel of independent scientists in 1999 titled the Committee for the Restoration of the Greater Everglades Ecosystem (CROGEE). But the two parties (Corps and the SFWMD) could not agree upon which aspects of CERP CROGEE would be reviewed and assessed. Finally, in 2004 the federal government and the state contracted with the National Academy of Sciences (who also sponsored CROGEE) to create a scientific review panel. This panel meets four times a year, the first in 2004, to review restoration progress, discusses successes, addresses issues affecting goals, and reviews monitoring and assessment protocols. Its first report was published in 2006 (Salt et al. 2008).

Politics

In an action to galvanize Everglades restoration in 1997, the federal government provided \$25 million in matching funds to buy back land known as South Golden Gate Estates (31,000 acres). As Al Gore stated, "The environment is the economy and the economy is the environment (Gore 2010)."

This progress was a mark of the Clinton Administration's support for the Everglades. Support that culminated in the year 2000, the day before Congress recessed for the presidential election, when CERP became the largest restoration effort in history (Guggenheim 2010).

The years between 2000 and 2007 were very difficult for the Everglades due to a lack of political commitment from the President and the Governor (George and Jeb Bush). This period of time was marked by a lack of leadership, especially in comparison with President Clinton, who made the Everglades a national priority. Jeb Bush was good at funding the Everglades but was not considered good at managing the issues, such as growth and urban sprawl, which

caused systemic problems. The Governor also directed too much power to local governments to make decisions that should have been made at a state or federal level (Estenoz 2010).

In 2007, Charlie Crist was elected as Florida's Governor. In contrast to Jeb Bush, his style was hands-off, he appointed respected people to positions, gave them broad guidance, and then trusted them to make good decisions. In 2009 President Barack Obama, Secretary of the Interior Ken Salazar and Assistant Secretary Tom Strickland made it clear that the Everglades were a top priority. They increased the budget to \$100 million in the stimulus package, putting a lot of people to work restoring the Everglades (Estenoz 2010).

To build support for Everglades restoration various methods have been employed. One is to simply get decision makers down on the ground. “. . . The Everglades, like many ecosystems, are special, when you get important people down on the ground there, they fall in love (Estenoz 2010).”

Another method used was to frame the issue in terms of human needs; e.g., it was important for the public and policy makers to realize that restoring the Everglades is not only about restoring the ecosystem for its own sake, it is also about protecting human lives and the economy. Significant birding revenue in the Everglades identified by the Audubon Society is a good example. “. . . Everglades restoration must be considered an ‘infrastructure improvement’ or an investment in green infrastructure that secures the future of the environment and an entire region (Estenoz 2010).”

It certainly does not hurt that, politically, South Florida is powerful. It comprises 40 percent of Florida's population and as a result, the area secures a lot of electoral votes. In addition to this political clout, the Everglades has attracted significant funding support and is located in one state, so the state/federal partnership is relatively simple. “. . . With all this working in the restoration program's favor it is important to realize that if success is not realized in the Everglades is there hope to restore large scale ecosystems anywhere (Estenoz 2010)?”

Though the program has been funded in the past, federal funds have definitely ebbed and flowed with political leadership. A big test of the program will be whether or not progress can be made in the current times of fiscal crisis. On August 12, 2010, Florida voted to spend \$2 million dollars to buy 27,000 acres of land where the benefit will not be realized for five to 10 years. That kind of leadership will be necessary for success. However, as stimulus funding wanes and a Republican majority replaces the formerly Democrat House, that kind of leadership may be short-lived (Estenoz 2010).

Problems and Progress

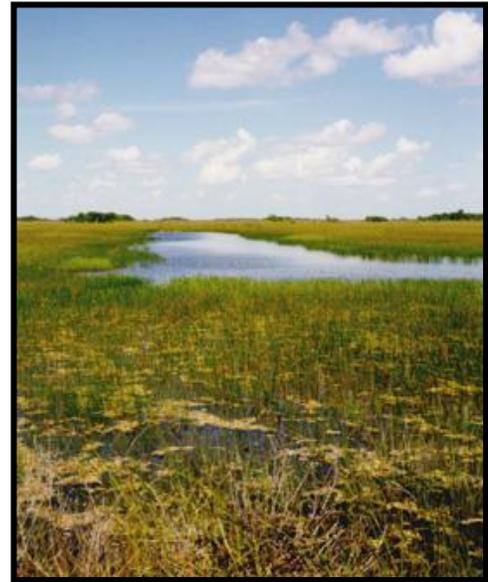
Problems

While public support for CERP has remained strong, there are several issues that concern many stakeholders. Perhaps the most pressing of these is the balance of water use in the system. Many are concerned that any water savings created by CERP would simply be absorbed by urban users with no real benefit to the ecosystem. While ecosystem restoration is the main goal of the program, many stakeholders, such as urban and agricultural interests only agreed to CERP with the understanding that their water supply would not be damaged. To alleviate these concerns WRDA 2000 stated that the state and federal government will work together to ensure that any water savings will not be consumptively used until the needs of the natural system are met. President George W. Bush and Governor Jeb Bush signed this agreement in 2002 (Salt et al. 2008).

Governor Jeb Bush, frustrated by slow progress, approved a SFWMD initiative titled Acceler8 at the cost of \$1 billion. Acceler8 targeted eight CERP projects, including water storage, to be prioritized and completed expediently. While this does serve to accelerate CERP implementation some are worried that it is a symptom of a weakening federal/state partnership and is a shift away from the original ecosystem focus (Salt et al. 2008).

Water quality is also an issue of current contention. Though a cap on phosphorus concentration in the water entering the ENP was agreed to, it has yet to be enforced. Other water quality issues, such as stormwater run-off, also continue. In 2004, the Florida legislature rolled back the set date of compliance from 2006 to 2026. The debate concerning when and how these reductions in phosphorus will occur is on-going. This issue is creating some issues in the otherwise amiable federal/state relationship (Salt et al. 2008).

Another issue of concern is that CERP contains the provision to construct wells and employ underground quarries for water storage. No one yet knows how these methods will fare on such a grand scale. Additionally, fulfilling the Modified Water Delivery Project (Mod Water) which directs the Corps to modify the C&SF Project to increase natural flows is an enormous technical problem that has yet to be solved (Salt et al. 2008).



The U.S. Government Accountability Office (GAO) completed a report on CERP progress in 2007. In this report the GAO found that estimated costs of the program were quite a bit higher than originally projected (largely due to inflation and an expanding scope of work). The report also found that the state was paying more than its agreed to 50 percent share of the costs (\$4.8 billion to the federal \$2.3 billion) due to the failure to update WRDA 2000 (Salt et al. 2008). A third issue the GAO took with CERP was its failure to properly prioritize projects to “. . . maximize the achievement of restoration goals (USGAO 2007:42).”

Progress

In 2008, the National Academy of Sciences (NAS) published their second biennial review of the program titled Progress Toward Restoring the Everglades. A summary of these results found that funding priorities and processes and strong political leadership were among the improvements that would be necessary to achieve success. The report found that CERP has not yet halted the decline of the Everglades ecosystem, much less improved that system. If the present course continues, NAS reported that the ecosystem was likely to decline further and that the project might lose its public support. Major hurdles were noted to be the cumbersome federal planning and approval processes. This impeded progress hinders action while costs rise and harmful development continues. The report also conjectured that future funding limitations will likely further inhibit successful restoration (CISREP et al. 2008).

A third biennial review was completed this year, 2010. The document reported overall improvement in the pace of restoration and improvement in the federal and state partnership since 2008, though progress remains slow. Difficulties in restoring the water quantity and quality necessary to restore the system have come to light. As a result, the report finds that more scientific analyses is needed to improve models that will help prioritize actions, funding decisions, and the potential need to determine tradeoffs such as those between water quantity and quality. In addition, communication pathways between scientists and decision makers must be improved so that such new knowledge can be implemented on the ground. Overall, the 2010 report is similar to the 2008 document. Progress is slow and the ecosystem continued to decline, making the importance of accelerating action on the ground even more important (CISREP et al. 2010).

The 2010 report also highlighted the need to maintain political and public support for Everglades restoration as work will need to continue for decades to come. To accomplish this goal monitoring and assessment of progress must clearly demonstrate and communicate the significant benefits being achieved (CISREP et al. 2010).

Funding

The federal and state governments are to equally share the costs of the CERP and the restoration of the Kissimmee River which is another ongoing effort in the area. Florida is to provide three-quarters of land acquisition costs to satisfy the habitat and species goals of the plan and all of the money required to implement the EFA. Original estimates stated that CERP's projects would cost \$7.8 billion and that total ecosystem restoration costs would approach \$14.8 billion. A GAO report in 2007 adjusted these costs for inflation and for the expansion of the scope of work and found that CERP would cost \$10.1 billion and that overall restoration would ring in at \$19.7 billion (Salt et al. 2008).

As shown in Figure 3, Florida had invested \$1.8 billion in the EFA and \$2.4 billion to implement CERP (State 2009). When CERP and non-CERP funding is combined (Figure 4), the state has invested more than \$12.2 billion and the federal government has contributed \$3.6 billion on CERP and non-CERP projects (Stern et al. 2010).

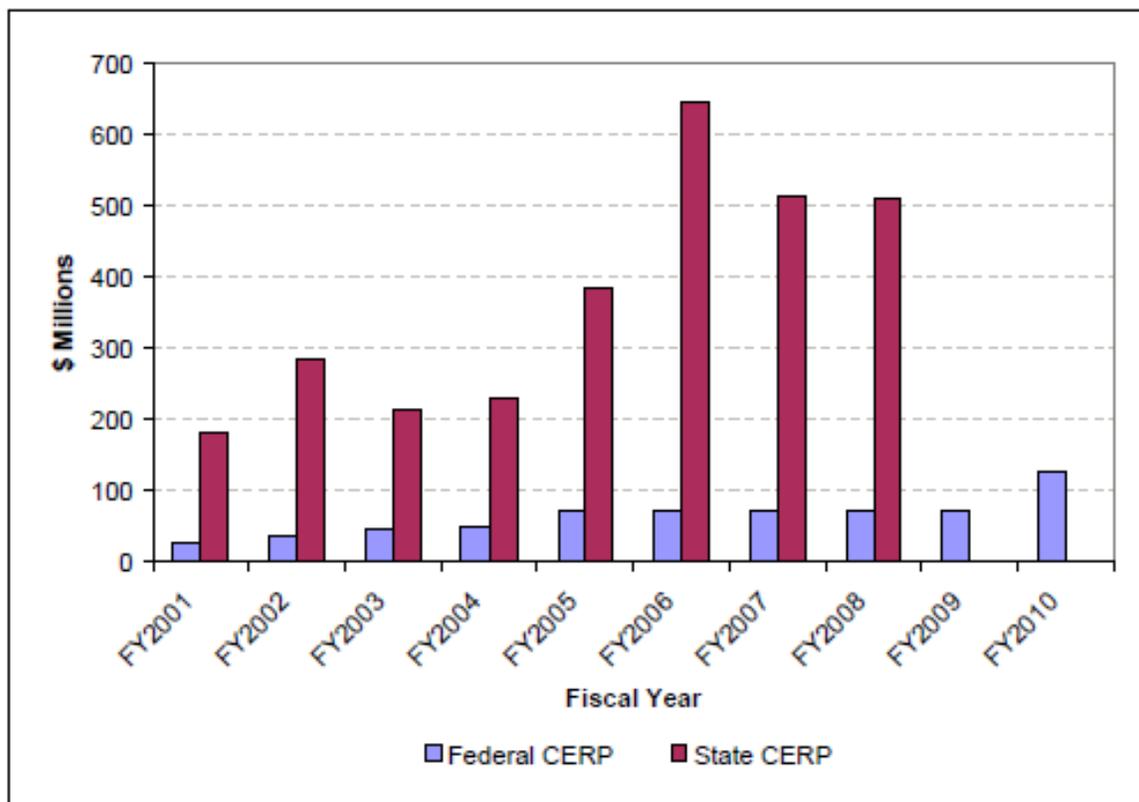


Figure 3: Federal and State CERP Funding since Fiscal Year 2001 (Stern et al 2010);
NOTE: Does not include ARRA funding and state and federal fiscal years do not align.

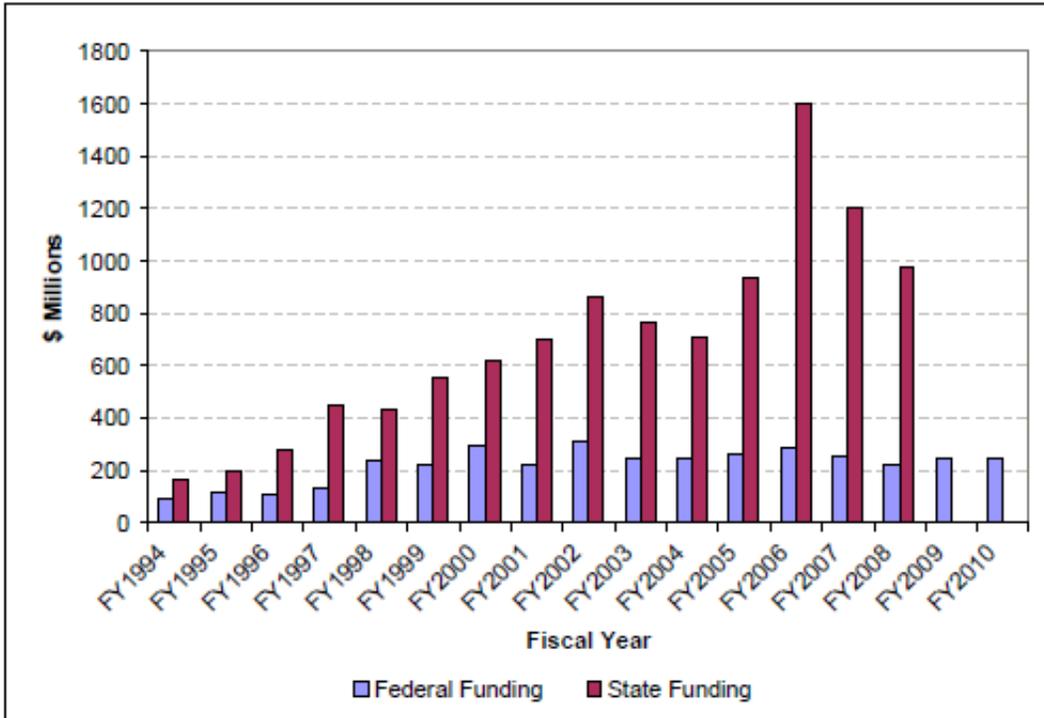


Figure 4: Federal and State Funding for Everglades Restoration, Fiscal Year 1994-2010 - CERP and Non-CERP Projects (Stern et al 2010); NOTE: Does not include ARRA funding and state and federal fiscal years do not align.

Federal

With the passing of CERP in WRDA 2000, Congress approved \$700 million in appropriations for initial Everglades’ projects. Subsequent projects must be submitted to Congress to be authorized prior to the appropriations process. Only three projects have been authorized in this manner, in WRDA 2007 (Stern et al. 2010).

Most federal funding for CERP is appropriated through WRDA (the main mechanism for funding the Corps). Other funding comes mainly from two sources, 1) the Interior and Related Agencies appropriation bill, and 2) the Energy and Water Development appropriation bill. The Interior and Related Agencies appropriations bill (Table 1) mainly funds restoration projects in Department of the Interior agencies such as the National Park Service, Fish and Wildlife Service, U.S. Geological Survey, and Bureau of Indian Affairs. The Energy and Water Development bill funds the Corps (Table 2). Various other appropriations support other government agencies (such as the National Oceanic and Atmospheric Administration and EPA) involvement in Everglades restoration at lower levels (Stern et al. 2010).

In a 2010 report to Congress three policy experts from the Congressional Research Service examined the federal role in funding Everglades Restoration. Figures 3 and 4 and Tables 1 and 2 in this document were extracted from the report. Focused on describing the process, history,

and current funding for the Everglades it describes the federal appropriation process in detail and will be updated annually (Stern et al. 2010).

Other large-scale restoration initiatives such as the Chesapeake Bay, Great Lakes, and coastal Louisiana are looking to the Everglades as “model and test case” (Stern et al. 2010:1). The report goes on to state, “Some believe the types of activities funded and the level and conditions of funding for the Everglades may set a precedent for other restoration initiatives (Stern et al. 2010:1).”

Table 1: DOI Everglades Restoration Funds, dollars in thousands (Stern et al 2010)

DOI Agencies with Everglades Restoration Funds	FY2005	FY2006	FY2007	FY2008	FY2009	ARRA^a	FY2010	FY2011 Request
National Park Service	45,116	44,704	50,563	53,893	100,433	18,537	50,570	54,843
Modified Waters Deliveries ^b	[8,000]	[24,900]	[13,300]	[14,300]	[60,000]	n/a	[8,400]	[8,000]
Fish and Wildlife Service	12,075	10,686	10,686	11,877	10,548	n/a	10,548	12,323
U.S. Geological Survey	7,738	7,771	7,771	6,800	6,907	n/a	6,907	6,907
Bureau of Indian Affairs	536	382	382	390	390	n/a	390	390
CERP Funding ^c	[8,517]	[7,889]	[7,927]	[7,907]	[7,950]	n/a	[8,040]	[8,001]
Total Appropriations	65,465	63,543	69,402	72,960	118,278	18,537	68,415	74,463

Notes:

- a. American Recovery and Reinvestment Act of 2009, P.L. 111-5
- b. Funding for the Modified Water Deliveries Project is a subset of funding for National Park Service.
- c. DOI CERP funding is appropriated within the above totals for NPS and FWS; thus it is only accounted for once in calculating the total DOI Everglades appropriation.

Table 2: Corps Everglades Restoration Funds, (\$ in thousands) (Stern et al 2010)

Corps Everglades Restoration Activities	FY2005	FY2006	FY2007	FY2008	FY2009	ARRA*	FY2010	FY2011 Request
Central and South Florida Project (C&SF)	69,400	77,000	90,588	81,704	91,615	88,425	12,700	152,330
C&SF CERP funding ^b	[64,466]	[64,466]	[64,466]	[64,466]	[64,466]	[38,000]	[120,000]	[112,000]
Everglades and South Florida Ecosystem Restoration	25,792	12,000	4,310	8,156	3,472	4,170	2,725	5,170
Kissimmee River Restoration	17,856	13,000	34,102	30,958	28,361	7,516	44,673	22,500
Florida Keys Water Quality Improvement	2,232	2,000	3,000	4,681	2,392	0	0	0
Modified Waters Deliveries Project	0	35,000	35,000	9,840	0	0	0	0
Total	115,280	139,000	167,000	135,339	125,840	100,111	180,000	180,000

Notes:

- a. American Recovery and Reinvestment Act of 2009, P.L. 111-5
- b. C&SF CERP funding is a subset of the funds that are used for C&SF activities.

After describing the federal and state funding for the Everglades (described in the *Financial Mechanism* section below) the Congressional Research Service’s report goes on to describe four funding related issues in the process. The first two involve the fact that federal funds have been lower than state funds for the projects. This is seen by some as an indication that the federal government’s dedication to the project lessening. Especially as there have been so few new CERP projects authorized. Many are expecting to see federal funding to increase as more projects are *shovel ready* for implementation. The third issue is that, since the state is spending more money, many feel that Florida has an unfair influence on project prioritization. Acceler8, noted earlier for its emphasis on water storage and flood protection projects was cited here. The final issue is phosphorus. Both the Department of the Interior and EPA are appropriating funding for projects by requiring that phosphorus levels meet state water quality standards, “Supporters of the Everglades restoration effort and of large-scale restoration efforts in other parts of the country are watching to see if the federal financial commitment keeps pace with Congressional authorization, the timeline outlined in CERP, and the financial investments by the state of Florida (Stern et al. 2010:7).”

Additional information concerning the agency by federal and state funding is provided in Figure 5 below.

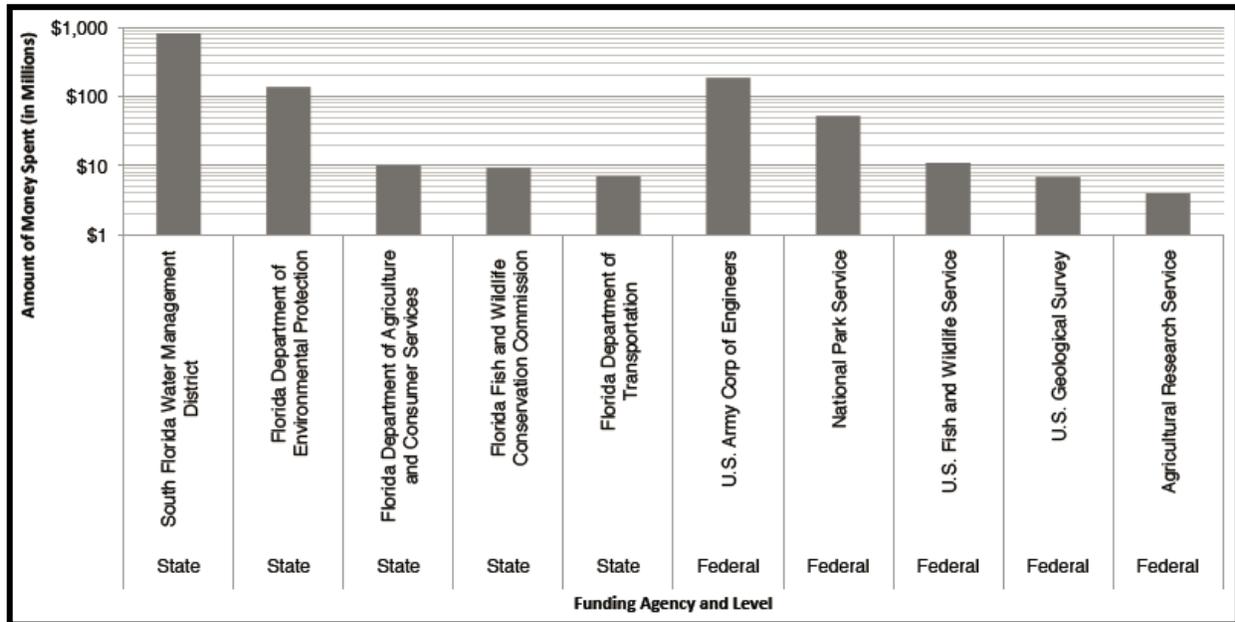


Figure 5: 2009 State and Federal Agency Budgets for Everglades Watershed Restoration Efforts (logarithmic scale) (Hurd 2009).

State

Certificates of Participation- The South Florida Water Management District (SFWMD) funds the majority of Everglades restoration related or unrelated to CERP through Certificates of Participation (COPs). COPs are similar to bonds but do not require voter approval. The debt service is funded by property tax proceeds. By the end of Fiscal Year 2008, SFWMD owed approximately \$593 million. The financial crisis is making this funding option less feasible in the future (Hurd 2009).

The Everglades Forever Act – Everglades Agricultural Privilege Act - Funding for the Everglades Forever Act (EFA) is the responsibility of Florida (State 2009). The EFA placed an *Everglades Agricultural Privilege Act* on farmers operating in the Everglades Agricultural Area (EAA), which was created in the 1940s south of Lake Okeechobee as a finance mechanism (Florida State 1994; Salt et al. 2008).

The SFWMD, the Florida Department of Environmental Protection, other state agencies, and the agricultural community share the cost of EFA implementation. Funding sources include an ad valorem tax, agricultural privilege taxes, state land funds, federal funds, excess revenues from Alligator Alley tolls, other environmental mitigation funds, and other funds. Since 1994, net revenues have totaled \$862.3 million from these sources, the majority of which are from ad valorem and agricultural privilege tax collections (State 2009).

Lessons Learned

The following lessons learned, which may have some applicability for the Colorado River Basin, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the Everglades.

Programmatic

1. **An effective governance structure, with clear leadership, that includes adequate and effective representation of federal, state, and local agencies, organizations, and stakeholders is essential in a large-scale collaborative effort.** Governor Jeb Bush bestowed a lot of decision making authority to localities. This was considered by some as inappropriate for an initiative that affects an entire region.
2. **It is important to consider the correct management approach for the scale of the project.** The difficulties experienced in applying the Surface Water Improvement and Management Act to the Everglades at large seem to indicate that small-scale, focused projects under a larger umbrella framework may be the most efficient approach.
3. **Program priorities and related expenditures must be clear for implementation to be efficient.** CERP has been criticized for not properly prioritizing its projects. Governor Jeb Bush supplied money for the project but only to fund water storage structures. This indicates that without a clearly defined prioritization mechanism the sections of the plan most appealing to leadership will be enacted first.
4. **Clear, specific goals, objectives, and guidelines are essential for an effective restoration plan.** CERP goals do not appear to meet these criteria.
5. **Short-term goals (e.g. two years) and objectives that move incrementally towards long-term goals help to insulate progress from politics.**
6. **A champion, whether a politician or an organization, that works to push the program forward is extremely important.** Governor Bob Graham provided a lot of leadership at the state level and can be seen as an Everglades Champion. Bruce Babbitt provided similar leadership at the federal level.
7. **Current Interior Secretary Ken Salazar is aware and supportive of large-scale restoration of rivers.** In 2009 President Barack Obama, Secretary of the Interior Ken Salazar and Assistant Secretary Tom Strickland made it clear that the Everglades were a top priority. They increased the budget to \$100 million in the stimulus package, putting a lot of people to work restoring the Everglades.

8. **In order to gain public support, you must appeal to the public's values. A major value of the public is *clean water and enough of it*.**
9. **Public support is necessary to gain political support.**
10. **Bi-partisan support at both the public and political level is important to sustain funding.** Bi-partisan support for the SOE began when Governor Democrat Bob Graham was succeeded by Republican Bob Martinez and has been a tradition ever since. However, political support for Everglades' restoration has risen and fallen with shifting administrations.
11. **There is no statue of authority to fund conservation related activities. Thus, an ecosystem/watershed wide approach is important, and increases likelihood that other issues would be addressed.** The Save Our Everglades Act (SOE) was very important in that it was comprehensive, addressing all aspects of the South Florida ecosystem. This type of legislation is what seems to shift the narrow focuses of Clean Water Act and ESA to an ecosystem approach.
12. **Watershed wide, large-scale restoration efforts throughout the United States are looking to one another for guidance, legal precedence, and funding mechanisms, perhaps indicating the need for increased federal leadership.** Other large-scale restoration initiatives such as the Chesapeake Bay, Great Lakes, and coastal Louisiana are looking to the Everglades as "model and test case" (Stern et al. 2010:1). The report goes on to state, "Some believe the types of activities funded and the level and conditions of funding for the Everglades may set a precedent for other restoration initiatives (Stern et al. 2010:1)."
13. **International focus on an ecosystem pressures managers and politicians to act.** The Everglades receive international attention due to its unique ecosystem and was designated by the United Nations as a World Heritage Site and World Biosphere Reserve.
14. **The cumbersome federal process (particularly associated with the Army Corps of Engineers), while noted to be improving, is partially blamed for the slow progress in the Everglades.**
15. **The federal and state governments created the dams and water projects that are affecting the health of the Everglades and are now responsible for the restoration plan cost. Though funding levels have been lower to date for the Everglades than promised.**

16. **It is critical that current science (often in the form of complex modeling systems) defines the system's problems and informs the solutions to those problems in a large-scale restoration project.** A more sophisticated scientific modeling system is said to be needed for the Everglades to better inform decisions.
17. **The Everglades program has focused on recreating the natural hydrograph.** The eventually completed 1989 SWIM for the Everglades required the recreation of the natural hydrograph for the system.
18. **Adaptive management is an invaluable tool in large-scale restoration efforts.** CERP relies heavily on adaptive management.
19. **If progress is to be made, large-scale restoration efforts must move forward in the face of scientific uncertainty, this concept is sometimes described as the precautionary principle, and is enabled through adaptive management.** In recognition of the scientific challenges and uncertainties in restoring such a large and complex system, CERP relies heavily on adaptive management to incorporate new information into the plan. In this vein, CERP must be updated every five years to include the latest scientific and technical understandings
20. **Adequate monitoring is needed to show progress, but if there is no progress the public and political support may be in danger.** The Everglades are continuing to deteriorate and if some success is not seen soon, many people fear that public support and funding for the project will be lost.

Funding

1. **Everglades' sugar growers are paying for restoration due to the polluter pays principle.** Large sugar growers could pay over \$800 million for the STAs over the course of 20 years. The EFA also placed a tax on farmers within the Everglades agricultural area to support restoration.
2. **Federal funding has been lower than the proportion promised.** Some worry that this gives the state too much power to choose how projects are implemented. This indicates that the public and other funding sources feel more confidence with some level of federal involvement if it is balanced with local input.
3. **Public funds, as they are currently allocated, are not enough to create a sustainable, significant funding source for the Everglades.**
4. **Despite numerous public and private funding streams, the Everglades have not been able to develop a truly sustainable funding source.**

Literature Cited

Ashcraft, C. NEGOTIATE Toolkit: case studies: south Florida everglades restoration. IUCN Water Programme, Gland, Switzerland. Available from <http://cmsdata.iucn.org/downloads/florida.pdf>

CISRERP (Committee on Independent Scientific Review of Everglades Restoration Progress), WSTB (Water Science and Technology Board), BEST (Board on Environmental Studies and Toxicology), DELS (Division on Earth and Life Studies), NRC (National Research Council of the National Academies). 2008. Progress toward restoring the everglades: the second biennial review, 2008. The National Academies Press, Washington, D.C. Available from <http://dels.nas.edu/Report/Progress-Toward-Restoring-Everglades/12469>

CISRERP (Committee on Independent Scientific Review of Everglades Restoration Progress), WSTB (Water Science and Technology Board), BEST (Board on Environmental Studies and Toxicology), DELS (Division on Earth and Life Studies), NRC (National Research Council of the National Academies). 2010. Progress toward restoring the everglades: the third biennial review, 2010. The National Academies Press, Washington, D.C. Available from <http://dels.nas.edu/Report/Progress-Toward-Restoring-Everglades/12988>

Doyle, M. and C. A. Drew editors. 2008. Large-scale ecosystem restoration: five case studies from the United States. Island Press, Washington, D.C.

Estenoz, S. 2010. Online Radio Broadcast. The Ocean Doctor. URL <http://www.oceandocor.org/the-largest-environmental-restoration-ever-attempted-everglades/> [accessed on 26 August 2010]

Florida State Legislature. 1994. Statute 373.4592. Available from http://exchange.law.miami.edu/everglades/statutes/state/florida/E_forever.htm#acquisition

Gore, Al. 2010. Online Radio Broadcast. The Ocean Doctor. URL <http://www.oceandocor.org/the-largest-environmental-restoration-ever-attempted-everglades/> [accessed on 26 August 2010]

Guggenheim, D. E. 2010. Online Radio Broadcast. The Ocean Doctor. URL <http://www.oceandocor.org/the-largest-environmental-restoration-ever-attempted-everglades/> [accessed on 26 August 2010]

Hurd, J. 2009. Characteristics of watershed restoration funding, in the political economy of watershed restoration series. Wildlands CPR, Missoula, Montana.

Living Waters. Everglades. Available from <http://assets.panda.org/downloads/mrwevergladescasestudy.pdf>

Salt, T. R., S. Langton and M. Doyle. 2008. The challenges of restoring the everglades ecosystem. Pages 5-33 in M. Doyle and C. A. Drew editors. Large-scale ecosystem restoration: five case studies from the United States. Island Press, Washington, D.C.

State of Florida, Everglades Forever, Clean Up & Restoration, Funding, 2009. URL <http://www.dep.state.fl.us/evergladesforever/restoration/funding.htm> [accessed on 27 August 2010]

Stern, C. V., P. A. Sheikh and N. T. Carter. 2010. Everglades restoration: the federal role in funding. Congressional Research Service, Washington, D.C. Available from <https://ncseonline.org/nle/crsreports/10Apr/RS22048.pdf>

The Journey to Restore America's Everglades, Everglades: a Brief History, 2010. URL http://www.evergladesplan.org/about/learn_everglades.aspx [accessed on 26 August 2010]

USGAO (United States Government Accountability Office). 2007. South Florida ecosystem restoration is moving forward but is facing significant delays, implementation challenges, and rising costs. USGAO, Washington, D.C. Available from <http://www.gao.gov/new.items/d07520.pdf>

Great Lakes Restoration Program

The Great Lakes case study represents a watershed initiative of an international nature that could not only provide useful information concerning a large important watershed but could also apply to the interactions between the United States and Mexico in the Colorado River Basin.

Background

The Great Lakes region, which comprises one of the largest freshwater ecosystems in the world, supports over 30 million people, drains over 200,000 square miles of land, and impacts both local and national economies (USEPA, Great Lakes, Basic 2008; Leb 2010; USEPA, Great Lakes 2010; GLIATF 2009). The economy of the Great Lakes region, which comprises the world's third largest economy (GLIATF 2009), is an important artery of commerce. It is supported primarily by heavy industry (including steel manufacturing and automotive production) and farming, but also supports an \$18 billion a year recreational fishing and hunting industry.



Figure 1: Great Lakes: Superior, Michigan, Huron, Erie and Ontario (NASA).

Over time environmental pressures on the lakes became apparent from increased toxic pollution, nutrient pollution, invasive species, and habitat degradation (Leb 2010; USEPA, Great Lakes, Basic 2008). Agricultural chemicals, elevated soil runoff, urban waste, industrial discharge, disposal site leachate, and atmospheric deposition on the lakes' large surface area are some of the major contributors to these increased pollution levels. The effects of such polluted inflows are exacerbated by the low outflow rates of less than one percent per year, thus pollutants become more concentrated over time (USEPA, Great Lakes, Basic 2008). The massive inflows of chemicals have embedded in the sediment layers of the lakes and are thus extremely difficult and expensive to address. Human health risks posed by these toxins are among the largest drivers of the restoration work in the Great Lakes (USEPA, Great Lakes, State 2010).

While the main focus of concern in the Great Lakes system is the persistence of toxic chemicals in sediment storage, a large secondary concern is the presence of aquatic invasive species such as the zebra mussel and sea lamprey (Leb 2010). The pressures of terrestrial, exotic, invasive species, plant or animal are not mentioned often in literature concerning the restoration of the Great Lakes.

Management and Legal Structure – International

The Boundary Waters Treaty of 1909 set the initial framework for cooperation between Canada and the US on issues regarding Great Lakes' water quantity and quality, navigation and dispute settlement. The Treaty also created the International Joint Commission (IJC), also known as the Great Lakes Basin Authority. Comprised of three Commissioners from each country, the Commission is an independent entity that is subject to no government authority. The IJC cooperates to manage and protect their shared water resources for current and future generations, which plays a large role in environmental management issues (Leb 2010; IJC 2010).

The international and federal nature of the Lakes' boundaries complicated the initial response to environmental issues in the Great Lakes (Leb 2010; USEPA, Great Lakes Basic 2008). Though local, fragmented efforts began as early as the 1960s, it was in 1972 that a basin-wide, international approach to these issues was taken with the Great Lakes Water Quality Agreement (GLWQA) between the United States and Canada (USEPA, Great Lakes, GLWQA 2009; Leb 2010). Renewed in 1978, this legislation committed to specific goals, objectives and guidelines to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin ecosystem (USEPA, Great Lakes, GLWQA 2009). The GLWQA was renewed again in a 1987 amendment, increasing accountability through required biannual reports, creating timelines, and strengthening the programs, practices, and technologies used to meet the agreement's goals (Leb 2010; USEPA, Great Lakes, GLWQA 2009).

The 1987 Agreement included implementation protocols titled, *Remedial Action Plans (RAP) for Areas of Concern (AoC)* and *Lakewide Management Plans (LAMP)*. AoCs are those harbor or tributary areas where high concentrations of persistent sediment toxins or other problems have impaired or restricted the benefits provided by the lakes such as drinking water, fishing, boating, and swimming (USEPA, Great Lakes Legacy 2009; USEPA, Great Lakes, The Great Lakes Legacy 2009). States and provinces are responsible for creating and implementing the RAPs for AoCs. They are free to implement this responsibility as they see fit, being either hands-on or allowing localities to take the lead. The result is a *grassroots environmental democracy* that empowers the public within AoC areas. Federal assistance with these plans is available on request and progress is monitored in terms of individual projects and overall success (USEPA, Great Lakes Areas 2008).

Lakewide Management Plans (LaMP) are overarching plans that assess, protect, restore, and monitor the ecosystem health of each Great Lake. Canada and the US are responsible for creating these plans with the aid of state and provincial governments (USEPA, Great Lakes Water 2009). This coordination should ensure that the plan coordinates the work of government, tribal, and non-governmental partners as well as the public in each Lake ecosystem (USEPA, Great Lakes, Lakewide 2009).

Unable to implement projects, the IJC primarily serves as an implementation *watchdog* by settling disputes as well as monitoring and reporting on progress made on the GLWQA. The Commission is also explicitly authorized to develop a public information program under the agreement. The IJC has been known to use this mandated public interaction to pressure governments into taking action to fulfill GLWQA obligations (Leb 2010).

Another major international management structure was created in 1997 when the US and Canada created the Great Lakes Binational Toxics Strategy. This Strategy created a framework for Environment Canada (EC) and the USEPA to coordinate with one another, and their respective constituents, to prioritize persistent toxic substances to be eliminated (Leb 2010). The main purpose of this strategy is to “. . . protect and ensure the health and integrity of the Great Lakes ecosystem (USEPA, Great Lakes Binational 2008).”

Management and Legal Structure – Canada

The Canadian Federal Great Lakes Program was created in 1989 along with a Great Lakes Action Plan. This Plan is generally renewed every five years to protect the water quality and ecosystem health of the Great Lakes. Led by Environment Canada (EC), the Program is a partnership bringing together six federal departments and one federal agency. This Program leads cooperation with the US through the GLWQA and with Canadian provinces through the Canada-Ontario Agreement described below (EC, Canadian 2010).

In 2007 Canada created a mechanism to coordinate federal and provincial implementation of the GLWQA titled the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem. The Canada-Ontario Agreement has since moved beyond the pollution control focus of the GLWQA and began taking an ecosystem approach by targeting land use, habitat protection and restoration, emissions, and human health research (Leb 2010; EC, Canada-Ontario 2010).

Management and Legal Structure – United States

The US Environmental Protection Agency (EPA) needed a more effective mechanism to handle their responsibilities associated with the GLWQA. As a result, Section 118 of the Clean Water Act created a Great Lakes National Program Office (GLNPO) in November of 1977. The GLNPO was EPA's first regionally based office. The GLNPO is responsible for coordinating US federal activities with all other stakeholders including three EPA Regions, the eight lake states, Canadian provinces and nations, US Tribes, counties, and municipalities (USEPA, The Great Lakes National 2009).

In 2004, an Executive Order by George W. Bush designated the Great Lakes as a national treasure and created a Great Lakes Interagency Task Force (IATF). The IATF brought together 11 agencies and cabinet-level departments at the Secretary level to drive federal policies, priorities, and programs for the Great Lakes (GLIATF 2009; USEPA, Great Lakes 2010). The Executive Order also formed a Regional Working Group (RWG) of the IATF to provide federal coordination for on-the-ground activities (GLIATF 2009).

In addition, the IATF was directed to form a Great Lakes Regional Collaboration (GLRC) to bring together states, localities, tribes, regional bodies, and other stakeholders to implement Great Lakes restoration strategies. The GLRC released the Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes in 2005 after a yearlong process involving public, government, industry, NGO, and academic input that fostered strong bi-partisan support (GLIATF 2009). According an EPA website, the IATF and GLRC are serving to greatly improve the coordination, efficiency, and effectiveness of restoration programs by promoting regular meetings and dialogue (GLIATF 2009).

Management and Legal Structure – States

State coordination in the region began when the eight US states bordering the lakes became part of the Great Lakes Commission in a 1955 Great Lakes Compact. Additionally, in 1983, their governors created the Council of Great Lakes Governors to protect their water resources and hold their economic status within the nation (Leb 2010). Both of these organizations coordinate with Ontario and Quebec and are able to operate beyond the priorities created in the GLWQA (Leb 2010).

The states are required to work towards meeting the requirements of the 1987 GLWQA. To this end, in 1995, the eight states and the EPA created the Great Lakes Final Water Quality Guidance, or the Great Lakes Initiative, a comprehensive restoration plan focused on enforcing science-based water quality standards for 29 pollutants. Under the Initiative, states must provide Guidance Submissions that the EPA approves or disapproves in any proportion as it aligns with the Initiative (USEPA, Great Lakes Initiative 2010). When it was first passed it was considered, “EPA’s first attempt to address water quality on a regional, basinwide basis, it paves the way for similar efforts for the Gulf of Mexico and other water bodies” (Renner 1995:416A).

Along with this praise, the Initiative sparked significant controversy centered mainly on implementation provisions that controlled industrial permits and enforcement decisions. Immediately after it was passed, the House of Representatives prepared limiting legislation and industry groups challenged the ruling in court. Mainly industry argued that more enforcement for point pollution sources was inefficient as the larger problem lay with non-point pollution sources (Renner 1995). Nevertheless, the Initiative has persisted, essentially creating a regionalized version of the federal Clean Water Act that many in the Chesapeake Bay region would like to see repeated there.

Progress

In the 1970s, major pollutant discharge reductions resulted in visible improvements in the health of the Great Lakes and reopened many beaches (USEPA, Great Lakes, Introduction 2008). As more was understood about the persistent nature of pollutants trapped in sediments and subtle impacts in the lakes’ ecosystems, later agreements required a more sophisticated, scientific approach to measuring success. In 1994, the State of the Lakes Ecosystem Conference (SOLEC) was initiated by the US and Canada as a forum to discuss progress in the lakes every other year. In the year following each SOLEC the two governments jointly prepare a State of the Lakes Report based largely on the conference process (USEPA, Great Lakes, State 2010).

The State of the Great Lakes 2009 reported on the conditions in the Lake for 2008. Overall, the status of the Great Lakes was stated to be mixed as some aspects of the ecosystem were improving as others declined. The state of contamination, human health, biotic communities, resource utilization, and land use/land cover were all reported to be mixed. Progress in restoring coastal zones and aquatic habitats was also said to be mixed with the state of invasive species (185 aquatic and 157 terrestrial) in the lakes being considered poor. The management challenges to improve this condition included creating invasive species prevention and control strategies for the entire basin, establishing and enforcing aquatic invasive regulations that inhibit spread, and to better understand vector and donor regions as well as the biology of

potential invaders. There were no clear success stories in any aspect of the Great Lakes' recovery (USEPA, Great Lakes, State 2010).

These unclear results occurred in spite of the relative success several programs have had in meeting goals. For example the IATF supported the GLRC Strategy by committing to 48 near-term actions to restore the great lakes. Of these, 40 have been completed and the majority of the rest are on track for completion. The US federal share of one third (200,000 acres) of protected/restored wetlands goal was met in 2008. Additionally, the IAFT Great Lakes Watershed Restoration Grants Program has provided almost \$3 million in federal funds leveraged over \$4.5 million in non-federal funds (GLIATF 2009). And yet actual on-the-ground success is elusive.

In contrast, as of 2006, of the 43 areas of concern identified by the 1987 GLWQA, only three were delisted and two were noted to be improved (Leb 2010). Of the 17 Areas of Concern located in Canada, two have been fully recovered and one is being monitored for recovery as the associated action plan has been completed (EC 2009).

Serving its intended *watchdog* purpose, the IJC has been critical of the 1987 Agreement's Remedial Action Plans for Areas of Concern for failing to adequately coordinate with the efforts of the Lakewide Management Plans and with work in the upper reaches of watersheds. The IJC cites the lack of a comprehensive watershed management approach in the current agreement as the main cause of this failing (Cited in Leb 2010).

The International Union for Conservation of Nature's (ICUN) *SHARE Toolkit Case Study* analysis of the Great Lake's Initiative describes another weakness in the Great Lakes management. The case study points out that while, initially innovative, management and legal frameworks for the GLWQA now lags behind recent science and trends in management structure (Leb 2010). Indeed, the Great Lakes program does not seem to have a clear adaptive management goal. The IATF may be addressing this issue as it is striving to proactively respond to emerging issues for which there may not be effective existing programs (GLIATF 2009).

Funding

The costs of enacting the GLWQA and various other initiatives are shared by the US federal, state, and local governments as well as by Canada. The US and Canadian governments and Great Lakes states employ various funding mechanisms to support their part in the restoration effort. The following funding sources are some of the more prominent ones being used.

Federal

The Great Lakes Legacy Act of 2002 – The Great Lakes Legacy Act of 2002 was enacted to fund the implementation of action plans in the 31 designated Areas of Concern within US territory

(USEPA, Great Lakes Legacy 2009). Funding consists of appropriations from Congress and is only available to projects within the US and 35 percent of the funding must come from state and local sources. The EPA's Great Lakes National Program Office (GLNPO) administers the Legacy Act which was reauthorized by Congress in 2008 and signed into law (USEPA, Great Lakes, The Great Lakes Legacy 2009). This action also reauthorized EPA's GLNPO for two years with level funding. So far, 900,000 cubic yards of sediment have been removed and five projects have been largely completed at a federal cost of \$53 million which leveraged \$44 million non-federal dollars (USEPA, Great Lakes Legacy 2009).

The Legacy Act authorized \$270 million in funding over five years beginning in fiscal year 2004: \$50 million for projects, \$3 million for research, and \$1 million for public information (USEPA 2003). Appropriations received to date by fiscal year: 2004 - \$9.9 million; 2005 - \$22.3 million; 2006 - \$29.3 million; 2007 - \$30 million; 2008 - \$34.5 million (USEPA, Great Lakes 2009).

EPA programs – EPA has a Great Lakes office authorized under the Clean Water Act which administers various programs. In 2009 their budget of \$22 million supported office operations, discrete restoration projects, education/outreach efforts, and research. The Congressionally approved budget for 2010 was significantly expanded to provide \$475 million for a new, EPA led, restoration initiative building on the previous work of the IATF (United States Federal Legislature 2009). This money will support the Great Lakes Restoration Initiative (GRLI) in targeting the most pressing issues in the Great Lakes (USEPA, Great Lakes, Great Lakes Restoration 2010). The IATF developed a plan to allocate the funding to mitigate these issues which are: 1) toxic substances in Areas of Concern, 2) invasive aquatic species, 3) nearshore health and non-point source pollution, 4) habitat and wildlife protection and restoration, and 5) accountability, monitoring evaluation, communication and partnerships (USEPA, Great Lakes Restoration 2009).

Canada

Great Lakes Sustainability Fund – Of the 17 Areas of Concern located in Canada, two have been fully recovered and one is being monitored for recovery as the associated action plan has been completed. Canada's Great Lakes Sustainability Fund (GLSF) was created in 2000 to fund the restoration of the remaining 14 AoCs in Canada (EC 2009). The fund provides technical and financial assistance for initiatives that improve fish and wildlife habitat, remediate contaminated sediment, promote landowner stewardship, control wastewater related pollution, and reduce beach bacterial contamination. The fund is administered by Environment Canada in consultation with seven additional governmental departments (EC 2009). Starting in 2000, the fund was capitalized at \$30 million over the course of five years as part of the Great Lakes Basin 2020 Action Plan (EC 2004). The GLSF provides technical support and up to one-

third of total project costs. The GLSF has currently been renewed until at least 2015 (EC, Great Lakes 2010).

State

The Great Lakes Protection Fund – The Great Lakes Protection Fund is a private, non-profit corporation that was formed in 1989 by the Governors of the Great Lakes states to be a permanent source of financial support to restore the lakes (GLPF, Frequently 2003). The Board of Directors, which holds fiduciary responsibility, meets quarterly to govern the fund and is composed of two governors appointed representatives from each member state (GLPF, Frequently 2003; GLPF, About 2003). The Fund supports projects that lead to tangible improvements in the Great Lakes’ ecosystem health; promote the interdependence of healthy ecologic and economic systems; and are innovative, creative, and venturesome (GLPF, About 2003). Interestingly, the fund supports ecologic and economic interdependence by funding projects working to create ecological wealth in the Great Lakes region through market mechanisms. By pursuing the idea that the Great Lakes can benefit from specific buyer/seller transactions, the Fund Directors believe that, “. . . these market mechanisms will make the true costs and benefits of ecosystem restoration increasingly transparent (GLPF, Using 2003).”

Seven of the eight Great Lakes states provided a one-time contribution to capitalize the Fund’s permanent endowment at \$81 million. Indiana is the only non participating state. This endowment is then invested to produce income, two-thirds of which is dedicated to regional Great Lakes projects. The remaining third of the earnings are distributed annually to the member states in proportion to their original contribution to support their Great Lakes related responsibilities. The Fund has no matching requirements though it encourages applicants to leverage its grants to increase funding opportunities (GLPF, Frequently 2003).



Figure 2: Funding Sources for the Clean Michigan Initiative

The Clean Michigan Initiative – The Clean Michigan Initiative is a 1998 voter-approved \$675 million bond issue to improve and protect Michigan’s water resources through the 10 programs that appear in the pie chart below (MDNRE 2001-2010). All of the programs listed have some direct or indirect benefit to the Great Lakes. The Clean Michigan Initiative passage to sell general obligations bonds to be dispersed from the State’s General Fund was acknowledged as a sure thing at the time in 1998 (Monsma 1998). First, the initiative had been marketed well. Second, it had broad, bipartisan support with politicians on both side of the aisle lined up in support, and there was no organized opposition. Third, this environmental issue played well at the polls in Michigan: past performance included overwhelming approval of the \$800-million Quality of Life Bond (1988) and constitutional amendments protecting the Michigan Natural Resources Trust Fund (1984 and 1994). In today’s economic climate and especially in Michigan, with the second highest unemployment rate in the US at 12.8 percent (October 2010 Bureau of Labor statistics), it would be more problematic to get this initiative passed (Michigan DNR 2011; Katz 2002a, Katz 2002b; Derenzy et al. 2008).

National Non-Profit

National Fish and Wildlife Foundation – The National Fish and Wildlife Foundation (NFWF) is a non-profit organization created by Congress in 1985 to direct public conservation funds to the highest priority environmental issues and matches these dollars with private contributions. NFWF focuses on preserving and restoring wildlife species and their habitats using innovative and wide ranging techniques to address these conservation challenges. Partnerships throughout the public and private sectors are the key to success for the foundation’s ability to draw on expert knowledge to help formulate conservation solutions and leverage adequate funds to enact them. The Keystone, Charter, IDEA, and Venture Programs are the major funding distribution methods of NFWF. The Charter Program addresses specific conservation needs in coordination with federal agencies, corporations, and other entities, often in a specific geographic area. One of these Charter Programs is the *Sustain our Great Lakes Program* (NFWF, What We Do 2010).

This grant program was created in 2006 and consists of a partnership among, ArcelorMittal (a global steel company), the National Oceanic and Atmospheric Administration, the National Fish and Wildlife Foundation, the Natural Resources Conservation Service, the EPA, the US Fish and Wildlife Service, and the US Forest Service (*Sustain our Great Lakes*, About 2009; *Sustain our Great Lakes*, Projects 2009). Designed to support the GLRI implementation, the program supports initiatives designed to address habitat and ecosystem restoration goals developed by the Great Lakes Regional Collaboration (NFWF, *Sustain* 2010). Since 2006, NFWF’s *Sustain Our Great Lakes* has awarded 103 grants worth \$12.1 million to 78 different organizations working in all eight states and both provinces within the Great Lakes basin. Grantees matched *Sustain*

Our Great Lakes grant funding with an additional \$14.9 million, for a total programmatic conservation investment of \$27.0 million (Sustain our Great Lakes, Projects 2009).

The Healing Our Waters (HOW): Great Lakes Coalition – The Healing Our Waters Coalition was created in 2004 to address this issue. A coalition of national, state and local entities and individuals dedicated to Great Lakes restoration, HOW was launched by a \$5 million, five year grant from the Wege Foundation. This coalition was formed to turn the Great Lakes agenda formulated at the Healing Our Waters summit in 2004 into a reality by organizing, in Andy Buchsbaum’s words, “a national constituency for effective action” to push meaningful policy changes at the federal level (Putten & Helsel 2004).

HOW’s mission is to ensure that there is a sustainable Great Lakes restoration plan as well as the federal and state funding necessary for implementation. The National Parks Conservation Association organizes the Coalition and serves as the national fiscal agent for the grant. The National Wildlife Federation’s Great Lakes Natural Resources Center in Michigan serves as a regional fiscal agent for the Coalition (Putten & Helsel 2004; HOW 2006).

Lessons Learned

The following lessons learned, which may be applicable for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the Great Lakes program.

Programmatic

1. **An effective governance structure, with clear leadership, that includes adequate and effective representation of federal, state, and local agencies, organizations, and stakeholders is essential in a large-scale collaborative effort.** PA’s Great Lakes National Program Office (GLNPO) was to coordinate federal and regional/local entities. But later the creation of the federal coordination group IATF and regional/local coordination group GLRC made the GLNPO’s job more manageable.
2. **Clear, specific goals, objectives, and guidelines are essential for an effective restoration plan.** The 1972 GLWQA was renewed in 1978 to create specific goals, objectives and guidelines.
3. **Multiple sets of goals confuse the process.** 1987 GLWQA AoCs are not being restored but 2004 GLRC goals are.
4. **Performance measures must be tied to program goals, clearly articulated, effectively monitored and reported, and the program must be held accountable for the achievement of these goals.** The GLWQA was renewed again in 1987 to increase

accountability by requiring biannual reports; creating timelines; and strengthening the programs, practices and technologies used to meet the agreement's goals.

5. **Implementation actions towards achieving program goals must be directly linked to overall ecosystem improvement. If program goals are being met but the desired results are not being reached, the goals need to be revisited. This emphasizes the need for adaptive management.** The State of the Great Lakes 2009 reported on the conditions in the Lake. Overall, the status of the Great Lakes was mixed as some aspects of the ecosystem were improving as others declined.
6. **Appropriately designed, in-depth monitoring programs are necessary in order to articulate program results or public support and funding could be lost.** More understanding about the persistent nature of pollutants trapped in sediments and the subtle impacts to the lakes' ecosystems informed latter agreements to require a more sophisticated, scientific approach to measuring success.
7. **Adaptive management is an invaluable tool in large-scale restoration efforts.** Adaptive management is not a highly emphasized goal of the Great Lakes. This is apparent in the fact that initially innovative management and legal frameworks for the GLWQA now lags behind goals.
8. **Public support is necessary to gain political support.** The IJC has been known to use mandated public interaction to pressure governments into taking action to fulfill GLWQA obligations.
9. **A champion, whether a politician or an organization, that works to push the program forward is extremely important.** “. . . There are already federally supported, regional efforts to restore the Florida Everglades, the Chesapeake Bay and the Louisiana coastal region. . . (HOW 2004-2011)” said Representative Vernon J. Ehlers (R-MI). “. . . These programs are sustained because a strong coalition of committed individuals and organizations rallies to support them. Hopefully, this report will spark a similar effort across America supporting the restoration and protection of the Great Lakes (HOW 2004-2011).”
10. **Bi-partisan support at both the public and political level is important to sustain project support and funding.** Bi-partisan support for the Great Lakes was solidified in the following two ways: 1) funding was sent to the program by both a Republican and Democrat President; 2) the GLRC released the Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes in 2005 after a yearlong process involving public, government, industry, NGO, and academic input that fostered strong bi-partisan support (GLIATF 2009).

11. **In order to gain public support, you must appeal to the public's values. A major value of the public is clean water and enough of it.**
12. **Human health is a large public concern.**
13. **There is a public and political sentiment of urgency to progress towards a healthy, sustainable ecosystem.**
14. **Creating region or local level partnerships help to involve local stakeholders and agencies in large-scale plans.** States and provinces are responsible for creating and implementing the RAPs for AoCs. They are free to implement this responsibility as they see fit. The result is a *grassroots environmental democracy* that empowers the public within AoC areas.
15. **Regional partnerships like the GLWQA help to create standards that states must abide by while allowing them flexibility in their approach – this could lend itself to a national model.** While states are able to operate beyond the priorities created in the GLWQA (Leb 2010), they are required to work towards meeting the requirements of the 1987 GLWQA.
16. **Embedding the Great Lakes Program in legislation provides EPA with a clear role and articulated responsibilities.** The EPA needed a more effective mechanism to handle their responsibilities associated with the GLWQA. As a result, Section 118 of the Clean Water Act created a GLNPO in November of 1977.
17. **Strengthening the CWA regionally could sustainably improve the effectiveness of the legislation.** When the Great Lakes Final Water Quality Guidance, or the Great Lakes Initiative, was first passed it was considered, "EPA's first attempt to address water quality on a regional, basinwide basis, it paves the way for similar efforts for the Gulf of Mexico and other water bodies" (Renner 1995:416A). The Initiative has essentially created a regionalized version of the federal Clean Water Act that many in the Chesapeake Bay region would like to see repeated there.
18. **There is no statue of authority to fund conservation related activities. Thus, an ecosystem/watershed wide approach is important– and increases likelihood that invasive species issues would be addressed.** The IJC has been critical of the 1987 Agreement's Remedial Action Plans for Areas of Concern for a failing to adequately coordinate with the efforts of the Lakewide Management Plans and with work in the upper reaches of watersheds. The IJC cites the lack of a comprehensive watershed management approach in the current agreement as the main cause of this failing (Cited in Leb 2010).

19. **Federal, or international government, involvement in watershed restoration efforts may aid in interstate and international interactions.**
20. **Shared international borders provide additional pressure to act responsibly.**
21. **The Chesapeake Bay looks to the Great Lakes watershed wide, large-scale restoration effort for guidance, legal precedence, and funding mechanisms, perhaps indicating the need for increased federal leadership.**
22. **It is helpful to have an independent watchdog.** Unable to implement projects, the independent IJC primarily serves as an implementation *watchdog* by settling disputes as well as monitoring and reporting on progress made on the GLQA.
23. **A sub-group targeting a specific issue can be used to draw attention to the other issues in the watershed and to accelerate progress on critical issues.** A major international management structure was created in 1997 when the United States and Canada created the Great Lakes Binational Toxics Strategy. The main purpose of this strategy is to “protect and ensure the health and integrity of the Great Lakes ecosystem” (USEPA, Great Lakes Binational 2008).

Funding

1. **Funding revenue collected through broadly based taxes are typically *fairly* distributed to projects throughout the contributing tax base area. This is not necessarily the most efficient way to reach success in a large-scale, watershed plan. Science based prioritization of action is helping in avoiding this *fairness* based fund distribution.** The 1987 Agreement included implementation protocols titled, *Remedial Action Plans for Areas of Concern* and *Lakewide Management Plans (LAMP)*.
2. **Where possible utilize the efficiencies of market economics of an ecosystem system services strategy.** By pursuing the idea that the Great Lakes can benefit from specific buyer/seller transactions, the Great Lakes Protection Fund believes that, over time, “. . . these market mechanisms will make the true costs and benefits of ecosystem restoration increasingly transparent (GLPF, Using 2003).”
3. **If executive or legislative actions are enacted that hold a government body responsible for results, then it is more likely that there will be government funding available to increase progress towards goals:** 1) In 2004, an Executive Order by George W. Bush designated the Great Lakes as a national treasure and created a Great Lakes Interagency Task Force (IATF). The IATF brought together 11 agencies and cabinet-level departments at the Secretary level to drive federal policies, priorities, and programs for the Great Lakes (GLIATF 2009; USEPA, Great Lakes 2010). 2) A national presence helps

to ensure the presence of federal funds. 3) The Great Lakes received yet another boost when President Obama's 2010 budget provided \$475 million for a new, EPA led, restoration initiative building on the previous work of the IATF. This money will support the GLRI in targeting the most pressing issues in the Great Lakes (USEPA, Great Lakes, Great Lakes Restoration 2010).

4. **Charging beneficiaries and polluters for restoration could greatly enhance large-scale restoration efforts' ability to secure funding.** Michigan applies the principle of beneficiaries pay but only applies it to the relatively low revenue tourism, hunting, and fishing sectors.
5. **Public trust funds, or publicly initiated private trust funds, can be a good way to equitably raise and manage funds if an initial capitalizing agent is identified.** The Great Lake states' Great Lakes Protection Fund and Canada's Great Lakes Sustainability Fund both generate substantial funds for Great Lakes restoration. Grant funds, such as those from the Great Lakes Protection Fund can be used to promote the creation of ecosystem services market.
6. **Despite numerous public and private funding streams the Great Lakes restoration program has not been able to develop a truly sustainable funding source.**

Literature Cited

Derenzy, J., S. Sandell, S. Erickson, and A. Smits. 2008. Michigan sets the pace for redevelopment. Brownfields.com. Available from <http://www.co.grand-traverse.mi.us/Assets/Departments/Brownfield/BRA+News+Article.pdf>

EC (Environment Canada), Government of Canada Commits \$1.5 Million to Great Lakes Cleanup, 2004. URL http://www.ec.gc.ca/media_archive/press/2004/040216_n_e.htm [accessed on 4 February 2011]

EC (Environment Canada), Backgrounder: Great Lakes Sustainability Fund, 2009. URL www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=57C0304D-4625-47F7-878C-0F73300E03C5 [accessed on 18 August 2010]

EC (Environment Canada), Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem, 2010. URL www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=B903EE0D-1 [accessed on 18 August 2010]

EC (Environment Canada), Canadian Federal Great Lakes Program, 2010. URL www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=B390F88B-1 [accessed on 18 August 2010]

EC (Environment Canada), Great Lakes Sustainability Fund, 2010. URL www.ec.gc.ca/raps-pas/default.asp?lang=En&n=F328E319-1 [accessed on 18 August 2010]

GLIATF (The Great Lakes Interagency Task Force) and Great Lakes Regional Collaboration. 2009. Building on Success. United States Environmental Protection Agency, Chicago, Illinois. Available from http://epa.gov/greatlakes/iatf/building_on_success.pdf

GLPF (Great Lakes Protection Fund), About the Fund, 2003. URL www.glpf.org/about/index.html [accessed on 18 August 2010]

GLPF (Great Lakes Protection Fund), Frequently Asked Questions, 2003. URL www.glpf.org/faq/index.html [accessed on 18 August 2010]

GLPF (Great Lakes Protection Fund), Using Market Mechanisms for Environmental Improvement, 2003. URL www.glpf.org/interest/market.html [accessed on 18 August 2010]

HOW (Healing Our Waters), Great Lakes Coalition, National Agenda for Great Lakes Restoration Calls for Strong Federal Leadership and Funding, 2004-2011. URL <http://www.healthylakes.org/news-events/press-release/national-agenda-for-great-lakes-restoration-calls-for-strong-federal-leadership-and-funding> [accessed on 13 January 2011]

HOW (Healing Our Waters), Great Lakes Coalition, About the HOW Coalition, 2006. URL www.healthylakes.org/about-us/about-how-coalition/about-the-how-coalition#more-108 [accessed on 18 August 2010]

IJC (International Joint Commission), Who We Are, 2010. URL http://www.ijc.org/en/background/ijc_cmi_nature.htm#What [Accessed on 20 August 2010]

Katz, D. 2002a. Origin of the clean Michigan initiative. Mackinac Center for Public Policy, Midland, Michigan. Available from <http://www.mackinac.org/4793>

Katz, D. 2002b. The clean Michigan initiative: an assessment. Mackinac Center for Public Policy, Midland, Michigan. Available from <http://www.mackinac.org/archives/2002/s2002-05.pdf>

Leb, Christina. 2010. SHARE toolkit: Case Studies: Information and participation in the North American Great Lakes. IUCN Water Programme, Gland, Switzerland. Available from <http://cmsdata.iucn.org/downloads/greatlakes.pdf>

MDNRE (Michigan Department of Natural Resources and Environment), Clean Michigan Initiative (CMI) Overview, 2001-2010. URL http://michigan.gov/deg/0,1607,7-135-3307_31116--,00.html [accessed on 18 August 2010]

Michigan DNR (Department of Natural Resources), What is the Michigan Natural Resources Trust Fund (MNRTF)?, 2011. URL http://www.michigan.gov/dnr/0,1607,7-153-39002_16791-39513--,00.html [accessed on 9 February 2011]

Monsma, J. C. 1998. Michigan ballot proposal C – clean Michigan initiative. Public Sector Consultants, Lansing, Michigan. Available from <http://www.pscinc.com/Portals/0/Publications/PSR/Periscop/1998/101698.html>

NFWF (National Fish and Wildlife Foundation), "Sustain Our Great Lakes" Program Announces \$1.5 Million in Grants to Protect and Restore Great Lakes, 2010. URL http://www.nfwf.org/AM/Template.cfm?Section=Charter_Programs_List&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=12729 [accessed on 18 August 2010]

NFWF (National Fish and Wildlife Foundation), What We Do, 2010. URL www.nfwf.org/Content/NavigationMenu/WhoWeAre/WhatWeDo/default.htm [accessed on 18 August 2010]

Putten, M. V. and A. K. Helsel. 2004. Great Lakes coalition launched with \$5 million grant. National Parks Conservation Association, Washington, D.C. Available from www.npca.org/media_center/press_releases/2004/page-27600493.html

Renner, R. 1995. EPA Great lakes guidance hits a squall. *Environmental Science & Technology* **29**: 416A–419A

Sustain our Great Lakes, About Us, History, Genesis of the Program, 2009. URL www.sustainourgreatlakes.org/AboutUs/History.aspx [accessed on 18 August 2010]

Sustain our Great Lakes, Projects: Across the watershed, we're putting resources into action, 2009. URL <http://sustainourgreatlakes.org/Projects/Overview.aspx> [accessed on 18 August 2010]

United States Federal Legislature. 2009. Public Law 111-88. Interior Department and Further Continuing Appropriations, Fiscal Year 2010. Available from <http://www.gpo.gov/fdsys/pkg/PLAW-111publ88/pdf/PLAW-111publ88.pdf>

USEPA (United States Environmental Protection Agency). 2003. Great Lakes Legacy Act of 2002 Overview & Planning. Great Lakes National Program Office. Available from <http://www.epa.gov/glla/Legacy%20Act%20Overview-RAPs.pdf>

USEPA (United States Environmental Protection Agency), Great Lakes Areas of Concerns (AoCs), Remedial Action Plans (RAP), 2008. URL <http://epa.gov/greatlakes/aoc/rap.html> [accessed on 18 August 2010]

USEPA (United States Environmental Protection Agency), Great Lakes, Basic Information, 2008. URL <http://epa.gov/greatlakes/basicinfo.html> [accessed on 10 July 2010]

USEPA (United States Environmental Protection Agency), Great Lakes Binational Toxics Strategy, 2008. URL <http://www.epa.gov/glnpo/p2/bns.html> [accessed on 10 July 2010]

USEPA (United States Environmental Protection Agency), Great Lakes, Introduction: The Great Lakes, 2008. URL <http://epa.gov/greatlakes/atlas/glat-ch1.html#The%20Evolution%20Of%20Great%20Lakes> [accessed on 18 August 2010]

USEPA (United States Environmental Protection Agency), Great Lakes, GLWQA (The Great Lakes Water Quality Agreement), 2009. URL www.epa.gov/glnpo/glwqa/1978/index.html [accessed on 10 July 2010]

USEPA (United States Environmental Protection Agency), Great Lakes, Lakewide Management Plans (LaMP), 2009. URL www.epa.gov/greatlakes/lamp/index.html [accessed on 18 August 2010]

USEPA (United States Environmental Protection Agency), Great Lakes Legacy Act Success Stories – Legacy Act Projects Tackle Great Lakes Pollution, 2009. URL

<http://www.epa.gov/greatlakes/sediment/legacy/glla-factsheet-200901.pdf> [accessed on 18 August 2010]

USEPA (United States Environmental Protection Agency). 2009. Great Lakes Restoration Initiative Proposed 2010 Funding Plan. USEPA, Great Lakes National Program Office, Chicago Illinois. Available from www.epa.gov/greatlakes/glri/GLRIProposed2010FundingPlan050509.pdf

USEPA (United States Environmental Protection Agency), Great Lakes, The Great Lakes Legacy Act, 2009. URL www.epa.gov/glla/index.html [accessed on 18 August 2010]

USEPA (United States Environmental Protection Agency), Great Lakes Water Quality Agreement 1978, Annex1 – Specific Objectives, 2009. URL www.epa.gov/glupo/glwqa/1978/annex.html#ANNEX%202 [accessed on 18 August 2010]

USEPA (United States Environmental Protection Agency), The Great Lakes National Program Office, 2009. URL www.epa.gov/greatlakes/about.html [accessed on 10 July 2010]

USEPA (United States Environmental Protection Agency), Great Lakes, 2010. URL <http://epa.gov/greatlakes/index.html> [accessed on 11 July 2010]

USEPA (United States Environmental Protection Agency), Great Lakes, Great Lakes Restoration Initiative, 2010. URL www.epa.gov/greatlakes/glri/index.html [accessed on 18 August 2010]

USEPA (United States Environmental Protection Agency), Great Lakes Initiative, 2010. URL www.epa.gov/waterscience/standards/gli/ [accessed on 18 August 2010]

USEPA (United States Environmental Protection Agency), Great Lakes, State of the Lakes Ecosystem Conference (SOLEC), 2010. URL www.epa.gov/greatlakes/solec/index.html [accessed on 18 August 2010]

Puget Sound Partnership

The Puget Sound is a good example of a large-scale restoration effort that employs various different funding mechanisms that combine to create a funding base. It is also a state-led effort that is looking for more federal support.

Background

The Puget Sound is an extremely productive system that has long supported human life (PSAT 2005). Spanning the border between the United States and Canada, the Sound is located in both the State of Washington and the Province of British Columbia (PSWQAT 2000). The Puget Sound's environmental integrity is worth a great deal within its basin economically. Tourism tied to the region's natural beauty and recreational opportunities generates \$9.5 billion annually. Private sector jobs in the region support a \$102 billion payroll annually, partially due to the area's high quality of life. Additionally, the Sound supports a fishing and shellfish industry, conservatively valued at \$147 million annually. This fishery is hugely important to the local population. A 1998 study conducted by the University of Washington, found that households in the western portion of the state are willing to pay \$8 billion over 20 years to increase migratory salmon populations by 50 percent (DOE 2008).



Figure 1: Puget Sound (NASA)

As in most environmental movements, it has been the loss of such ecologically based economic activities that spurred conservation activities. Human activity first began to negatively affect the Puget Sound in the mid 1800s when logging, steam sawmills, and other industrial development became common in the region (PSAT 2005; PSA 2008). In the 1920s, pulp mills became prevalent, severely damaging the shellfish industry (PSA 2008). But it was not until toxic contamination,

shellfish growing area closures, dead whales, and fish stock declines of the late 1970s and early 1980s that the public was motivated to support a true Puget Sound program (PSAT 2005).

Today, pollution is still the main environmental issue affecting the health of the Sound. Degraded water and sediment quality is due largely to stormwater runoff, municipal and industrial discharges of nearly a billion gallons a day, sewage systems, and boat discharges. Marine species such as salmon, groundfish, orca whales, and shellfish suffer as a result of degraded water and sediment quality, as well as from degradation and loss of habitat due to development, over-fishing, and variations in ocean conditions in general. Additional issues in the Sound include various aquatic nuisance species that threaten the diversity and abundance of native species (PSWQAT 2000).

These issues are predicted to only worsen as the regional population grows. In 1960, when environmental regulations were just getting underway, 1.8 million people lived in the Puget Sound region. In 2008, almost 4.4 million people resided there and by 2020, 5.1 million people will live and work in the area (WOFM 2010).

Management and Legal Structure

In 1983 Washington State legislation initiated momentum towards a Puget Sound program by establishing a citizen committee to study the Puget Sound and recommend actions to improve and protect its water quality. This initiation solidified Washington State's status as the lead in Puget Sound restoration, a position it still occupies today (Evergreen 2009). This committee found the water quality issues in the Sound to be extremely complex and that workable



solutions were difficult to agree upon or coordinate due to the many decision making entities in the basin (Parker 2003). The Puget Sound basin includes 108 cities, 12 counties, 12 conservation districts, 12 local health jurisdictions, 28 local port districts, three regional governmental bodies, 22 tribes, 14 state agencies, nine federal agencies (PSWQAT 2000). As a result of these difficulties, the committee recommended the creation of a long-term, comprehensive management plan (Parker 2003).

In 1985 the Puget Sound Water Quality Authority was created by the Washington State Legislature to develop such a plan by 1991 when a sunset clause scheduled the Authority to expire. Composed of a governor appointed chair and six staff, the Authority was charged with

developing the plan with the help of an advisory committee (composed of 77 stakeholder representing members) and a scientific review panel (Parker 2003). The Puget Sound Water Quality Management Plan was completed in 1987 (PSAT 2005). The Plan was updated in 1989, 1991, 1994 and 1996 to reflect shifts in environmental issues and management (PSWQAT 2000). In 1987 the Puget Sound was designated as a National Estuary Program (NEP) site (USEPA, National 2010) and in 1991 the US Environmental Protection Agency (EPA) approved the Plan as a federal Comprehensive Conservation and Management Plan as required by section 320 of the Clean Water Act (CWA) (PSWQAT 2000).

Authorizing legislation for the Puget Sound Water Quality Authority expired in 1996. It was replaced by the Puget Sound Water Quality Action Team and Puget Sound Council which were created by the Washington State's Puget Sound Water Quality Protection Act. The Action Team and Council are charged with coordinating government actions and updating the plan for the protection and restoration of the sound and are managed by a governor appointed chair (PSWQAT 2000).

The Puget Sound Water Quality Management Plan was updated again in 2000 (PSWQAT 2000). Beginning in 2001, the Action Team and Council developing, every two years, an action plan and budget to implement the long-term Puget Sound Water Quality Management Plan (PSWQAT 2000; PSP 2008).

Due to the fact that many threats persisted in the Puget Sound, the Washington State legislature created a new state agency, the Puget Sound Partnership (PSP), in 2007. The Partnership was tasked with creating an *Action Agenda* to lead the Puget Sound to a restored state by 2020, ensure accountability within the system created to implement the Action Plan and achieve a healthy Sound, and to engage citizens in the restoration effort by building public awareness (PSP, 2009 State 2010). Composed of a community of citizens: local, state, and federal governments; tribes; scientists; and businesses, the Partnership created an Action Agenda in 2008 (PSP, About 2010; USEPA, Puget 2010). This document has been approved by the EPA as the new Comprehensive Conservation and Management Plan required of a NEP (USEPA, Puget 2010).

Controversy

In May of 2010, the PSP's first audit revealed cost overruns, law breaking contract practices, and errant use of state money to purchase gifts. No legal action is being initiated as there was no evidence of fraud found in the process of the audit. A partnership official claimed that start-up challenges at the agency led to the questionable expenditures. One of the complaints involves the manner in which the Partnership outsourced the completion of a project. The partnership was supposed to create a foundation that would raise private money to supplement its public funding. This effort was outsourced to expensive, private lawyers when it

would generally have been handled internally. The foundation has been created on paper but is still not staffed (Schrader 2010).

Proposed Legislation

The Puget Sound Recovery Act of 2009 (H.R. 4029 / S. 2739) was introduced in the US Congress most notably to: 1) require the EPA Administrator to establish an EPA Puget Sound Program Office in Washington to work with the PSP, 2) require the Administrator to appoint a director of the new program office that would link the Administrator with Puget Sound work, 3) establish a Puget Sound Program Advisory Council, and 4) require the President to report federal agencies' roles and expenditures in Puget Sound restoration as part of the annual budget. This bill is currently in committee (CWN, Puget Sound 2009).

The Clean Water Restoration Act is a proposed amendment to the Federal Water Pollution Control Act (i.e. the Clean Water Act) to strengthen the original legislation which has been weakened over the last 10 years. Specifically, the Clean Water Restoration Act would replace the term *navigable water* to describe its jurisdiction with the term *waters of the United States*. This shift would strengthen the Clean Water Act (CWA) and hopefully increase its effectiveness (CWN, Clean Water 2009).

Environment Washington, a statewide environmental advocacy group, purports that these two pieces of legislation would be very beneficial to Puget Sound restoration efforts. The Puget Sound Recovery Act of 2009 would assist ongoing efforts within the Sound while the Clean Water Restoration Act would protect all wetlands surrounding and waterways feeding the Sound (Environment 2010).

Progress

When created in 2007 the PSP was required to produce a biennial *State of the Sound* report to document the status of the ecosystem, implementation plans, and funding sources. It is hoped that these plans will help to inform decisions and accelerate the recovery of the Puget Sound. The first such report was completed in 2009 with the challenging goal of linking implementation actions to ecological outcomes. This report records ecosystem status for each of the six goals in the Partnership's authorizing statute including: human health, human well-being, species and food webs, habitats, water quantity, and water quality (PSP, 2009 State 2010).

In general, results indicated that human actions have resulted in a stressed and degraded ecosystem. Eight of the 20 indicators displayed a worsening trend and five showed no apparent trend. The remaining seven are showing improvement such as substantial increases in shellfish populations, modest increases in Chinook and Hood Canal summer chum, a slight decrease in development, decreases in polycyclic aromatic hydrocarbons in Elliott Bay sediments, and a general increase in freshwater quality. This progress tracking mechanism is a precursor to a

more in-depth performance management system that is planned to link budgeting, planning, research, and actions to efficiently allocate funds (PSP, 2009 State 2010).

Funding

The majority of funding for Puget Sound Initiatives comes through local governments at 44 percent, while the federal government contributes around 30 percent and Washington State contributes approximately 26 percent. The majority of federal funding comes from general appropriations though many agencies (see Figure 2) contribute at different levels (Hurd 2009).

Public sector funding for Puget Sound protection and restoration is estimated at \$564 million annually. Additionally, annual wastewater and mitigation spending, which prevent or reduce additional harm to the Sound, are estimated to be \$799 million and \$646 million respectively. Approximately 46 percent of these funds could be realigned to meet PSP priorities (Evergreen 2009).

Federal

Federal funding accounts for approximately \$456 million (23 percent) of annual public sector spending for the Puget Sound. Approximately \$171 million of this is spent on protection and restoration, \$43 million on wastewater treatment, and \$242 million on mitigation measures. An estimated \$60 million of these funds are provided as grants or loans on the state or local level; as a result these funds have been removed from state and local spending estimates (Evergreen 2009).

Grant and Loan Programs -There are many federal grant and loan programs that provide support to the Puget Sound. They are distributed by formula, Congressional appropriation, or through a competitive process to the states. The following are such programs that most commonly support the Puget Sound (Evergreen 2009):

- Competitive Federal Grants – These include the US Department of Agriculture (USDA) Farm Bill Incentive, EPA targeted watershed grants, the US Fish and Wildlife Service (FWS) cooperative endangered species fund, and many others.
- State Revolving Loan Fund – This fund is a major contributor to state water quality infrastructure.
- Federal Highway System – The Highway System is both a major source of environmental impact and mitigation spending.

- Direct Congressional Appropriations– Such appropriations support the EPA, PSP, Washington State’s Pacific Coastal Salmon Recovery Fund, and Sound Transit, which is a major contributor to mitigation spending.

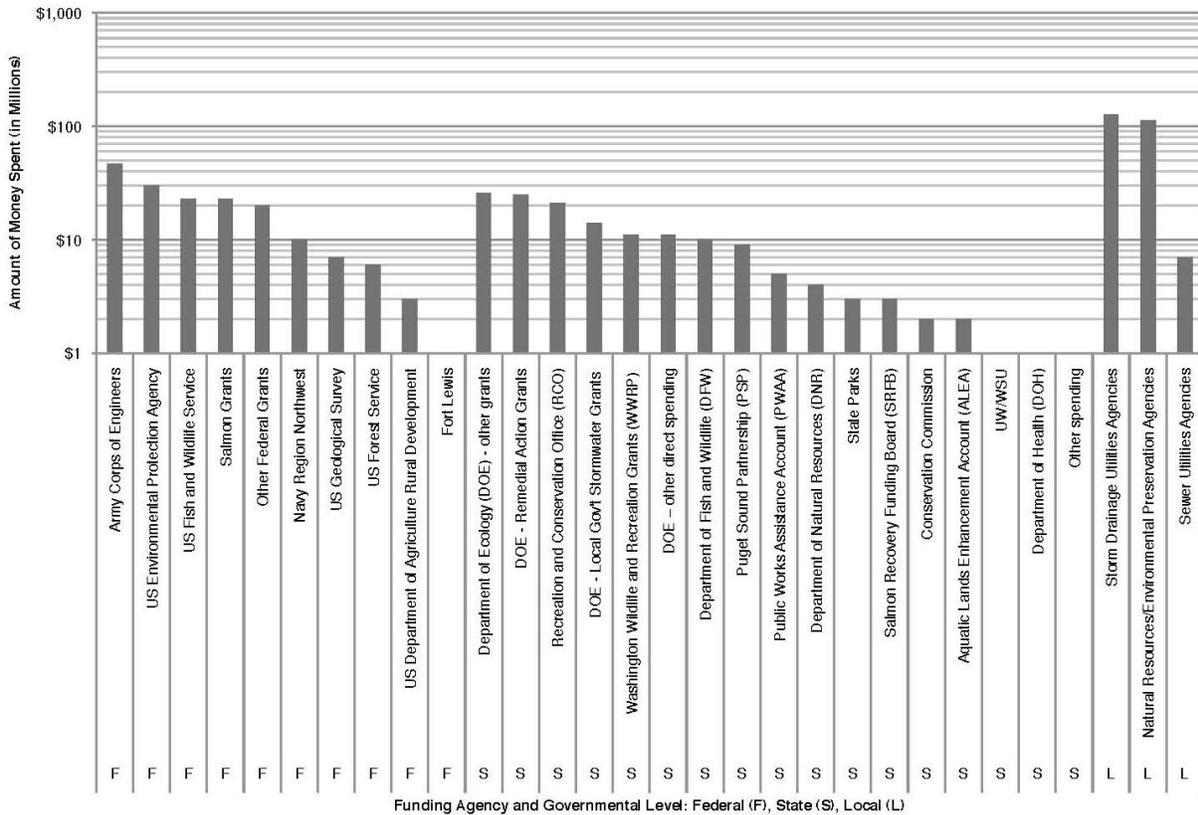


Figure 2: Estimated Puget Sound annual restoration effort funds from federal, state, and local agencies – scale is logarithmic (Hurd 2009)

Spending on Property and Facilities - Environmental regulation compliance is required on 3.5 million acres of the Puget Sound basin that are owned and managed by the federal government. Many of these regulations have a direct impact on the Sound’s health. The most prominent of these are as follows (Evergreen 2009):

- 1) Clean Water Act Compliance – Planning, monitoring, program management, and permitting mostly funded by EPA and the Army Corps of Engineers.
- 2) Endangered Species Act Compliance – Largely conducted and financed by National Oceanic and Atmospheric Administration Fisheries, FWS, and the Army Corps of Engineers.

State

State funding accounts for approximately \$443 million (22 percent) of annual public sector spending for the Puget Sound. Approximately \$148 million of this is spent on protection and restoration, \$145 million on wastewater treatment, and \$150 million on mitigation measures. Well over half of this money is passed through to other entities via grants (62 percent) and loans (three percent). Only 35 percent is spent directly by state agencies (Evergreen 2009).

At the state, there are several specialized funding mechanisms supporting Puget Sound restoration. The Washington Department of Ecology, which supports many Puget Sound projects, is funded largely by the State Building Construction Account filled by bond proceeds. Grants, donations, general funds, and other sources round out the Department's funding.

The 2001-2003 plan budgets for state agencies was \$86.7 million, the 2003-2005 plan budget was \$27.8 million, and the 2005-2007 budget was funded at \$182 million (PSP 2008).

Grant and Loan Programs - Most state funds are distributed through competitive grants, and include: infrastructure loans (funded by tax and loan repayments) (Public Works Board 2010); infrastructure and project grants for habitat protection and restoration, grants to support local watershed groups, and grants to local governments to develop land use plans (Evergreen 2009).

Spending on Property and Facilities – Washington State owns approximately 950,000 acres of upland and 2,461 miles of shoreline in the Puget Sound Basin. The state spends funds to preserve and manage these lands, maintain and mitigate highway related issues, and to improve fish hatchery operations (Evergreen 2009).

Science and Technical Assistance -The State's Department of Ecology, Department of Natural Resources, and Conservation Commission provide funds for technical assistance to farmers and foresters and for Puget Sound science and monitoring (Evergreen 2009).

Regulatory Compliance -The State must manage the regulatory permitting, monitoring, and enforcement of numerous state and federal laws. Two of these laws are particularly relevant to the Puget Sound. The Department of Fish and Wildlife uses Hydraulic Project Approvals to enforce hunting and fishing regulations. The Department of Ecology enforces the Shoreline Management Act and the National Pollutant Discharge Elimination System (NPDES) (Evergreen 2009).

Local

At the local level, there are several specialized funding mechanisms supporting Puget Sound restoration. Locally, most stormwater mitigation funds come from storm drainage utility agencies (Hurd 2009).

Local funds account for approximately \$1,111 million, or 55 percent, of public sector spending for the Puget Sound every year. Approximately \$246 million of this is spent on protection and restoration, \$611 million on wastewater treatment, and \$254 million on mitigation measures. These estimates exclude approximately \$176 million in pass-through funds from federal and state governments (Evergreen 2009).

Public Benefit Rating System (PBRs) and Timber Land Program - The PBRs and Timber Land programs reduce property taxes based to match the current use of the land as opposed to the *highest and best* use of the land. These are incentive based payment for ecosystem services (PES) systems that reward good land stewardship (King County 2010).

Watersheds and Local Government Programs to Support the Recovery Effort - Though local watershed agencies are staffed at the local level, they are mostly funded by the state (Evergreen 2009).

Spending on Property and Facilities - Approximately 170,000 acres of the Puget Sound Basin are owned and managed by local governments. Spending is concentrated largely on improving and operating wastewater and storm water treatment as well as water supply systems (Evergreen 2009).

Science and Technical Assistance - Local government employed scientific experts and conservation district staff provide conservation related technical assistance to landowners (Evergreen 2009).

Regulatory Compliance - Local governments implement local laws and regulations that impact the health of the Puget Sound (Evergreen 2009).

Private Sector

Mitigation Banking - There are several privately operated wetland mitigation banks that exist or are under development in the Puget Sound basin (Habitat Bank 2010).

Spending on Routine Environmental Compliance - Private industry must fund monitoring and reporting on permit compliance and equipment upgrades to meet evolving permit requirements (Evergreen 2009).

Spending on Utility Fees and Charges - Homeowners, businesses, and industries pay sewage, water, and stormwater service fees that support local and region utility operation. As these fees are generally redistributed by local governments most of these funds are recorded in that section. It is worthwhile to note that, in 2006, an average single-family home in King County, Washington paid \$70.87 per month for sewage, water, and stormwater services (Evergreen 2009).

Spending on Voluntary Environmental Improvements - As public interest in green facilities and processes increase, many businesses and industries are voluntarily improving their operations to gain certifications such as Leadership in Energy and Engineering Design or Salmon-Safe (Evergreen 2009).

Non-Profit

Non-profit organizations in the Puget Sound contribute significantly to funds available to protect and restore the environment, awarding over \$15 million for projects in 2007 alone (Evergreen 2009).

Funding 2009 to 2011

An estimated \$400 million has been allocated from the Washington State budget to implement the 2009 to 2011 Action Agenda. The largest portion of this, \$260 million or 64 percent, is from the capital budget. The operating budget accounts for \$116 million or 29 percent and the transportation budget covers \$23.7 million or 6 percent. \$132 million in federal and local funds have also been earmarked; most of it is composed of stimulus dollars. Overall, federal stimulus dollars have accounted for \$150 million of Action Agenda implementation. The gap in expected funds versus identified funds is \$202 million. Thus, additional funding sources must be identified to reach the 2020 deadline (PSP, 2009 State 2010).

Inconsistencies in these cost estimates and in the relative spending levels of federal, state, and local entities described in the sections above are due to difficulties in tracking and assigning fund sources (Evergreen 2009).

Additionally, on September 9, 2010, the EPA awarded the Puget Sound science grants in the amount of \$13 million. This money will be used for multiple science projects working to protect the Sound as well as for a Puget Sound Research Institute at the University of Washington, Tacoma (Associated Press 2010).

Innovative Funding Strategy

The PSP identified a funding strategy to support Puget Sound recovery in a two part report identifying; 1) new innovative funding sources, and 2) estimates of current spending related to the Puget Sound. Completed in December of 2008, the first section identified innovative funding sources by examining programs that already *align financial incentives with environmental outcomes* and discerning key lessons learned as they apply to a Puget Sound regional context (Cassin & Davis 2008). This section is discussed below. The second section, completed in January of 2009, characterized and often quantified current funding sources for Puget Sound restoration. The purpose of this section was to provide a baseline of financial knowledge to compare to future spending; to better understand the size and accessibility of revenue sources which can help to determine which should be prioritized for further analysis

and action; and to recognize and record current agency and enterprise expenditures to restore the Sound (Evergreen 2009). This information is summarized next.

Three core recommendations of the innovative funding report were to: 1) create a regional payment for ecosystem services program and initiate the creation of a regional ecosystem marketplace; 2) expand green taxes and tax incentives; and 3) *vigorously promote* voluntary private sector programs (Cassin & Davis 2008). These methods of funding effectively align environmental and economic incentives, which the report deems necessary to meet the financial needs of the Puget Sound recovery effort. In order to achieve this unity, the report stated that the PSP must; 1) organize existing financial incentive efforts so they are coordinated and complimentary and form regional strategy *building blocks*; 2) develop *cost-effective compliance* mechanisms for development and business regulatory and incentive programs; and 3) leverage greater levels of private sector investment (Cassin & Davis 2008).

It is suggested that an ecosystem market place be jumpstarted using public funding to buy ecosystem services (i.e. riparian, wetland, or shoreline restoration) that could then be sold to developers to mitigate environmental impacts. The Partnership would serve as an ecosystem credit *bank* and track credit procurement. These actions would, in theory, create the perception and eventual reality that units of ecosystem improvement are valuable and a viable regional market would follow. The expansion of green taxes/tax incentives and voluntary private-sector programs at state and local levels would hopefully encourage environmentally friendly actions while enhancing local governments' ability to meet Puget Sound restoration responsibilities (Cassin & Davis 2008).

The report also pointed out that the value of nature is becoming increasingly apparent and the laws of supply and demand increasingly favorable as functional ecosystems are increasingly rare, and thus, increasingly valuable. While there are many environmental benefits to consider, those related to water are the most important to address in the Puget Sound (Cassin & Davis 2008).

Lessons Learned

The following lessons learned, which may have some applicability for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the Puget Sound Program.

Programmatic

- 1. Collaborative watershed efforts are created to simplify and unify the disparity of many agencies' work in the basin. However, without carefully planning a (restoration management plan) and well-constructed governance structure, the cooperative effort can become complicated and fragmented.** When progress stales, a new lead agency for

the program is often created. In 2007, due to the fact that many threats persisted in the Puget Sound, the Washington State legislature replaced the Puget Sound Water Quality Action Team and Puget Sound Council with a new state agency, the PSP.

2. **Short time frames for accomplishing steps towards goals help to ensure progress.** Beginning in 2001, the Action Team and Council developed an action plan and budget every two years to implement the long-term Puget Sound Water Quality Management Plan (PSWQAT 2000; PSP 2008).
3. **Implementation actions must be directly linked to overall ecosystem improvement.**
4. **It is critical that current science (often in the form of complex modeling systems) defines the system's problems and informs the solutions to those problems in a large-scale restoration project.** The Puget Sound program was initiated by a Washington State directed citizen study that determined a comprehensive plan was needed.
5. **A public and political sentiment of urgency to progress towards a healthy, sustainable ecosystem is present in the Puget Sound.**
6. **Crisis triggers policy response.**
7. **There is no statute of authority to fund conservation related activities. Thus, a management plan containing an ecosystem/watershed wide approach is important and increases likelihood that riparian and invasive species issues would be addressed.**
8. **Federal involvement in watershed restoration efforts may aid in interstate and international interactions.** Although Washington State shares a boarder with Canada it has not involved the nation in its Puget Sound Initiative. This may be due to the lack of a strong Canadian federal presence in the watershed.
9. **Regional watershed restoration programs are looking to one another for guidance.** The Puget Sound seems to have learned from other initiatives, directly citing the Everglades and Chesapeake Bay Programs, that it is difficult to link implementation actions to improvement in overall ecosystem conditions but that it is important to do so (PSP, 2009 State 2010).
10. **The Puget Sound is looking for increased federal leadership.** The Puget Sound is a state led initiative. Even though the Sound is involved in the National Estuary Program it is trying to get more national/federal attention by trying to get an EPA office to help.
11. **The condition of the Puget Sound is modestly improving.** Eight of the 20 indicators displayed a worsening trend and five showed no apparent trend. The remaining seven

are showing improvement such as substantial increases in shellfish populations, modest increases in Chinook and Hood Canal summer chum, a slight decrease in development, decreases in polycyclic aromatic hydrocarbons in Elliott Bay sediments, and a general increase in freshwater quality.

12. **A sub-group targeting a specific issue can be used to draw attention to the other issues in the watershed and to accelerate progress on critical issues.** Households near the Bay are very willing to pay for the recovery of salmon. This is another example of a specific issue (e.g., tamarisk) pulling in public interest and funds to a larger system.
13. **Estuaries are generally the focal point of large-scale, watershed based restoration efforts due to their disproportionately high biological productivity and density of human population and development.**
14. **Increased flows in smaller headwater streams can potentially provide more restored habitat and connectivity in the short term. The headwater preservation efforts can also indirectly benefit the mainstem streams.**

Funding

1. **The Puget Sound has not yet found a sustainable funding source.** The PSP is achieving some limited success but needs more sustainable funding to continue progress. Three core recommendations of the innovative funding report are to: 1) create a regional payment for ecosystem services program and initiate the creation of a regional ecosystem marketplace; 2) expand green taxes and tax incentives; and 3) *vigorously promote* voluntary private sector programs.
2. **The majority of funding has come from localities.** While this is not ultimately raising enough funds it does serve the purpose of involving the local public.
3. **Public funds, as they are currently allocated, are not enough to create a sustainable, significant funding source for these watershed programs.**
4. **Payments for ecosystem services are suited to cases where environmental protection goals are clearly defined and recovery is the goal.** (Evergreen 2009).
5. **Markets are suited to cases where environmental protection goals are clearly defined and recovery is the goal *and* instances where there will be ongoing, unavoidable impacts from population growth and development (i.e. cap and trade).** (Evergreen 2009).
6. **The costs of the project must be defined in order to determine funding needs.**

7. **It is important to understand what funding is currently available in a watershed.** It is helpful to understand if there is potential to better utilize what funding sources are available and to confirm whether or not they are sufficient to reach program goals. This is also helpful as many disparate funding sources may be able to be coordinated such that they are complimentary to one another.
8. **The laws of supply and demand are making the value of nature more apparent.** The value of nature is becoming increasingly apparent and the laws of supply and demand increasingly favorable as functional ecosystems are increasingly rare, and thus, increasingly valuable. While there are many environmental benefits to consider, those related to water are the most important to address in the Puget Sound (Cassin & Davis 2008).
9. **The no-action alternative may prove to be more expensive in the long run.**

Literature Cited

Associated Press. 2010. EPA awards 13 million for Puget Sound restoration. The Seattle Times, Seattle, Washington. Available from

http://seattletimes.nwsourc.com/html/localnews/2012846023_restore09.html

Cassin, J., and A. Davis. 2008. Puget sound partnership action agenda: financing strategy – I. New innovative funding sources. Puget Sound Partnership, Olympia, Washington. Available from <http://www.psp.wa.gov/downloads/AAAPX/funding.pdf>

CWN (Clean Water Network), Clean Water Restoration Act, 2009. URL

<http://www.cleanwaternetnetwork.org/issues-actions/legislation/clean-water-restoration-act>

[accessed on 10 August 2010]

CWN (Clean Water Network), Puget Sound Recovery Act of 2009, 2009. URL

<http://www.cleanwaternetnetwork.org/issues-actions/legislation/puget-sound-recovery-act-2009>

[accessed on 10 August 2010]

DOE (Washington State Department of Ecology). 2008. Focus on Puget Sound: economic facts. Washington State Department of Ecology. Available from www.ecy.wa.gov/pubs/0601006.pdf

Environment Washington, Preserving Puget Sound, 2010. URL

<http://www.environmentwashington.org/water/puget-sound> [accessed 20 August 2010]

Evergreen Funding Consultants. 2009. Puget Sound partnership action agenda: financing strategy – II. Estimates of spending related to Puget Sound. Evergreen Funding Consultants, Seattle, Washington. Available from www.psp.wa.gov/downloads/AAAPX/funding.pdf

Habitat Bank, Welcome, 2010. URL <http://www.habitatbank.com/> [accessed on 20 August 2010]

Hurd, J. 2009. Innovative financial mechanisms to fund watershed restoration. Wildlands CPR, Missoula, Montana. Available from

http://www.wildlandscpr.org/files/Financial_Mechanisms_0.pdf

King County, Resource Protection Incentives, 2010. URL

<http://www.kingcounty.gov/environment/stewardship/sustainable-building/resource-protection-incentives.aspx> [accessed on 20 August 2010]

Parker, P. 2003. Puget Sound case study: fact sheet. The Rhode Island General Assembly.

Available from http://www.rilin.state.ri.us/gen_assembly/baytrust/Briefing.htm

PSA (Puget Soundkeeper Alliance), Pollution in Puget Sound, 2008. URL <http://pugetsoundkeeper.org/about-puget-sound/pollution-in-puget-sound> [accessed on February 10, 2011]

PSAT (Puget Sound Action Team). 2005. Puget Sound initiative: brief history of Puget Sound conservation efforts. State of Washington Office of the Governor, Seattle, Washington. Available from http://pugetsoundkeeper.org/files/PSI_brief_history.pdf

PSP (Puget Sound Partnership), Conservation and recovery plans for Puget Sound (pre-2007), 2008. URL http://www.psparchives.com/our_work/pscrp/pre07_pscrp.htm [accessed on 11 August 2010]

PSP (Puget Sound Partnership). 2010. 2009 state of the sound. Puget Sound Partnership, Olympia, Washington. Available from http://www.psp.wa.gov/downloads/SOS09/09-04534-000_State_of_the_Sound-1.pdf

PSP (Puget Sound Partnership), About the Partnership, 2010. URL <http://www.psp.wa.gov/aboutthepartnership.php> [accessed on 11 August 2010]

PSWQAT (Puget Sound Water Quality Action Team). 2000. 2000 Puget Sound water quality management plan. Puget Sound Water Quality Action Team, Olympia, Washington. Available from http://www.psparchives.com/publications/puget_sound/manplan00/MGMTPLAN.pdf

Public Works Board, Washington State Department of Commerce, Public Works Loan Programs, 2010. URL <http://pwb.wa.gov/programfor1.aspx?ActiveView=0> [accessed on 15 August 2010]

Schrader, J. 2010. Puget Sound funds misspent. The Olympian, Olympia, Washington. Available from <http://www.theolympian.com/2010/05/14/1238342/puget-sound-funds-misspent.html>

USEPA (United States Environmental Protection Agency), National Estuaries Program, Puget Sound (NEP Profile), 2010. URL http://water.epa.gov/type/oceb/nep/programs_ps.cfm [accessed on 10 August 2010]

USEPA (United States Environmental Protection Agency), Puget Sound, Partners, 2010. URL <http://epa.gov/pugetsound/partnerships/index.html> [accessed on 20 August 2010]

WOFM (Washington Office of Financial Management), Washington state growth management population projections for counties: 2000 to 2030, 2010. URL <http://www.ofm.wa.gov/pop/gma/projections07.asp> [accessed on 10 August 2010]

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Chesapeake Bay Restoration Program

Unlike the previous Everglades, Puget Sound, and California Bay-Delta case studies which each had only one state involved, the Chesapeake Bay involves multiple states. Lessons learned through this case study may have value to a Colorado River Basin restoration initiative.

Background

Extending over 64,000 square miles throughout six states and the District of Columbia, the Chesapeake Bay is the nation's largest and most biologically diverse estuary. Heavily influenced by 50 major freshwater tributaries, the most prevalent of which is the Susquehanna River, (Doyle & Miralles-Wilhelm 2008) the ratio of land-to-water in the Bay watershed is 14:1, the largest of any coastal water body in the world (Lape 2010). Thus, the fate of the Bay is as closely tied to environmental regulations and land use policies of these seven state legislative bodies as it is to federal regulation.

By the early 1970s the environmental degradation the Chesapeake Bay suffered was obvious to anyone connected to the Bay, especially to fishermen and sailors (Doyle & Miralles-Wilhelm 2008). The Bay's fishery and recreational boating comprise two of the most important human connections to the Bay and are a large driving force behind the desire to restore the Bay (Dawson et al. 2010, personal communication).



Figure 1: Chesapeake Bay (NASA)

In the late 1970s, responding to the local understanding of the degraded state of the Bay, US Senator Charles *Mac* Mathias (R-Md.), a devoted sailor and fisherman, decided to make *saving the Bay* a national priority (Doyle & Miralles-Wilhelm 2008). Following Mathias's leadership, Congress directed the Environmental Protection Agency (EPA) to conduct a \$27 million, five-

year study to analyze the rapid loss of wildlife and aquatic life in the Chesapeake Bay (Doyle & Miralles-Wilhelm 2008; CBP 2009).

An example of their findings and that of the National Academy of Science was the decline of the Chesapeake Bay oyster. Decimated by decades of heavy fishing, deadly diseases (*Dermo* and *MSX*), and environmental pressures, native oysters in the Bay today number less than one percent of levels a century ago (Figure 2). As recently as 1980, the Chesapeake Bay accounted for roughly 50 percent of the US oyster harvest, but over the past decade this number declined to just one to five percent.

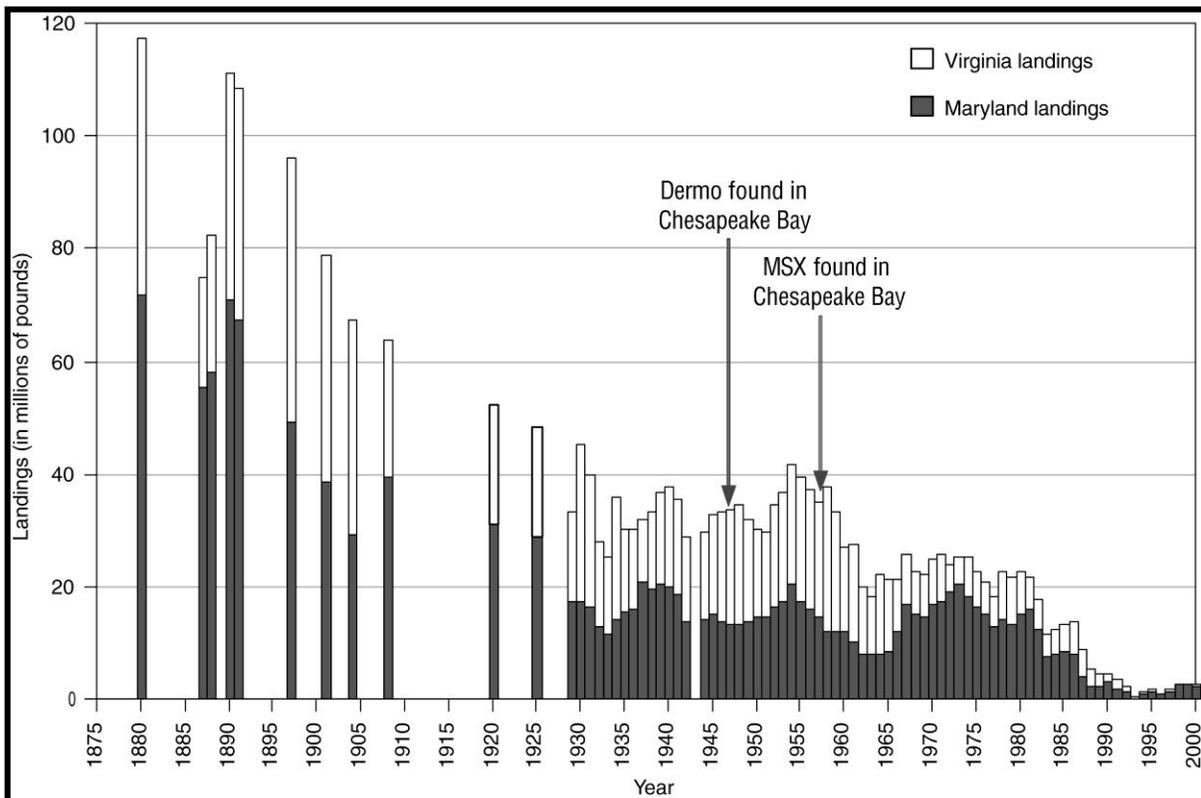


Figure 2: History of commercial oyster landings in the Chesapeake Bay. Data from the Chesapeake Bay Program and the National Marine Fisheries Service (NAS 2010)

The Bay’s oyster populations “once yielded harvests estimated at millions of bushels a year, earning the Bay’s reputation as an ‘immense protein factory’. But when its populations were large, this oyster did far more than feed people. The oysters also kept the water clear—by filtering the water of algae and other suspended materials at an estimated rate of five liters of water an hour. In addition, oysters grow in clusters that form reefs, providing a place for countless crabs, snails, sponges and juvenile fish to live: all of the nooks and crannies created by oyster reefs encompass some 50 times the surface area of a comparable-sized area with a flat bottom (NAS 2010).”

Management and Legal Structure

In 1980, while the EPA study was still underway, Maryland and Virginia formed the Chesapeake Bay Commission (CBC) to recommend changes to existing management of the Bay. Joined by Pennsylvania in 1985, the CBC consists largely of legislators, some of which have now been with the program since its inception, lending consistency to its work (Doyle & Miralles-Wilhelm 2008). The CBC sponsored a Bay-wide conference in 1983 to consider the results and recommendations of the original, seven year, EPA study (Doyle & Miralles-Wilhelm 2008). This resulted in the first agreement between the states and EPA, known as the 1983 Chesapeake Bay Agreement, making the Chesapeake the first estuary in the nation targeted by Congress for restoration and protection (Doyle & Miralles-Wilhelm 2008; CBP 2010). The agreement was signed by the three state governors, the mayor of D.C., the administrator of the EPA, and the chairman of the CBC this agreement essentially created the “general spirit of cooperation and coordination” among these parties (Doyle & Miralles-Wilhelm 2008:182).

While this general agreement did not put forward any specific goals for the watershed it did define several important entities, including the Chesapeake Bay Executive Council and the Chesapeake Bay Program). The Executive Council, which was created to structure the state-federal partnership, is recognized as a management component that is necessary for success. The Executive Council is in charge of establishing policy direction, leads the effort of public support, signs documents setting goals and policies for the Bay, and assumes responsibility for the progress made under Bay agreements (CBP 2008; Doyle & Miralles-Wilhelm 2008).

The EPA led CBP was initiated in 1983, though not formalized until 1987, to address the excess nutrient pollution identified in the original study as the Bay’s main environmental problem. The CBP serves as the liaison among the Bay states (at the time VA, MD, and PA), and between the Bay states and the federal government (Doyle & Miralles-Wilhelm 2008). As a result the CBP is seen by the EPA not as a federal program, but as a “. . . unique regional partnership dominated by its state partners (Doyle & Miralles-Wilhelm 2008:182).”

Meetings following the 1983 Agreement were scarce and progress stalled. Members of the CBC decided that a new and higher level of commitment including specific goals and timetables was required to make meaningful progress resulting in the Chesapeake Bay Agreement of 1987. The 1987 agreement ushered in the elevated level of commitment for all parties that the CBC desired by setting goals, objectives, and a timeline of commitments; water quality; population growth and development; public information, education and participation; and governance structure (Doyle & Miralles-Wilhelm 2008). The most ambitious of these goals were those related to water quality, though they were quickly softened when nutrient load reductions were limited to controllable sources. Subsequently many sources were written off as

uncontrollable, significantly altering the capacity for meaningful change (Doyle & Miralles-Wilhelm 2008).

Also in 1987, Section 117 of the Clean Water Act (CWA) formally authorized the creation of the Chesapeake Bay Program Office, outlined its official responsibilities, and authorized appropriations for its administrative and granting costs (CBP, About 2010). Section 117 precludes the CBP from the National Estuary Program (NEP) as it provides EPA funding (Magee 2010, personal communication).

Many of the goals of the 1987 Agreement were meant to be accomplished by the year 2000. Thus, the Bay partners decided to measure progress towards these goals and redefine priorities based on increased scientific understanding before the millennium (Doyle & Miralles-Wilhelm 2008). Goals that had not been met were reassessed and new targets and implementation strategies were created. These efforts lasted three years and involved 300 scientists, resource managers, policy makers, and citizens, culminating in the creation of the agreement titled Chesapeake 2000. Nearly 100 restoration commitments are made in this document but they are organized into five main categories. The first and premier category is the protection and restoration of living resources. The next two goal categories are seen as integral to achieving the first goal and are to protect and restore vital habitats and to improve water quality. The final two focus areas are managing lands soundly, and engaging individuals and local communities. The timeframe for achievement of these goals was set for 2010 (CBP, Chesapeake 2005; Doyle & Miralles-Wilhelm 2008).

The creation of specific goals and timetables in the Agreement of 1987 and Chesapeake 2000 has allowed for relatively streamlined collaboration and action on the ground. In contrast, the California Bay-Delta, Platte River, and Everglades restoration projects have struggled to reach a consensus as the restoration approaches were less concrete and more conceptual (Doyle & Drew 2008). According to Doyle and Drew (2008) the main obstacles to CBP progress have been a lack of financial planning and regulatory force.

Recent Developments for the Chesapeake Bay

Much of the CBP's history has been characterized by a consulatory method of collaboration that involved little enforcement or regulatory power (Doyle & Miralles-Wilhelm 2008). The Chesapeake Bay Watershed Blue Ribbon Financial Panel saw this as a liability in their 2004 report, stating: “. . . Laws and regulations should be vigorously enforced, saving taxpayer dollars and ensuring both the protection of the environment and a level playing field for all (CBWBRFP 2004:3).”

Slowly, this trend has shifted as goals and deadlines were not met (Loop et al. 2010, personal communication). In 2007, the EPA and Bay states announced that at their current rate of

progress the 2010 goals would not be met until decades after the target date, if at all (CBF, Litigation 2010). In October 2008, the Chesapeake Bay Foundation (CBF) and its partners sent the Bush Administration's EPA a notice of intent to sue if it did not set science-based pollution caps, provide accountability, and impose consequences for failure (CBF, Litigation 2010; Magee 2010, personal communication). As no progress was made, CBF filed suit on January 5, 2009 (CBF, Litigation 2010).

President Obama took office on January 20, 2009 and in of that year Executive Order 13508 was issued, providing more money for the EPA and more enforcement power (CBF, Litigation 2010; Loop et al. 2010, personal communication). The Executive Order created a Federal Leadership Committee to oversee agency efforts to restore the Bay which included the following requirements by September 9, 2009: 1) the EPA will define the next steps necessary to restore water quality in the Bay; 2) the US Department of Agriculture (USDA) will target resources related to agricultural conservation practices that will better protect the Bay and its rivers; 3) the Department of Defense must strengthen storm water management practices; 4) the Department of Interior (DOI) and Department of Commerce must assess and plan for the impact of climate change on the Bay and expand environmental research, monitoring and observation to strength science based decision making for the Bay; and 5) the DOI must expand public access to the Bay and its rivers. These reports were integrated by the Federal Leadership Committee into a coordinated Bay restoration strategy by May 12, 2010 (described below). This strategy is to receive annual updates in a Chesapeake Bay Action Plan describing federal funding allocations toward Bay restoration in the coming year and report on past progress (CBEO 2010).

The *Strategy for Protecting and Restoring the Chesapeake Bay Watershed*, released on May 12, 2010, created rigorous regulations to restore clean water, implement new conservation practices on four million acres of agricultural land, conserve two million undeveloped acres, and restore oysters in 20 Bay tributaries. It also increased regulation and accountability by requiring federal agencies to establish and meet two year milestones toward set goals. Additionally, this strategy is organized to target actions where they can have the greatest impact (CBEO 2010).

Some of the most significant developments under the strategy include: 1) the EPA is implementing total maximum daily load (TMDL) requirements for Bay waterways; 2) the USDA is providing farmers with more resources to limit pollution and is leading a watershed-wide environmental services market to generate tradable water quality credits for installing effective conservation practices; and 3) the DOI will launch a collaborative Chesapeake Treasured Landscape Initiative to expand land conservation efforts. But perhaps the most important shifts

are two overarching components of the plan. One is to benefit the economy and job markets through these actions by conserving working farms, increasing oyster aquaculture, supporting conservation corps programs and green jobs, and developing an environmental marketplace. The second is to increase efficiency of work by targeting work where improving resources will have the greatest impact: where the most pollution will be controlled, where the fish and wildlife have the highest potential to be restored, and where habitat and land are in the most need of protection (CBEO 2010).

In short, as Secretary of the Interior Ken Salazar stated:

Under the leadership of President Obama, our strategy provides the blueprint for finally restoring the Chesapeake Bay to health – its bountiful wildlife, abundant fish and shellfish, beautiful waterways and rich wetlands. My department, which has 13 refuges and 51 units of the National Park System throughout the watershed, will play a key role in the plan, working hand-in-hand with other federal agencies, states, local communities and other stakeholders to restore this national treasure cherished by so many (CBEO 2010).

Additionally, Section 117 of the CWA expired in 2005 and the Chesapeake Clean Water and Ecosystem Restoration Act were introduced to Congress on October 20, 2009 to reauthorize the law. The CBF has asserted that “. . . passing a reauthorized bill will be the most important legislation for the Chesapeake Bay since the CWA was established 37 years ago (CBF, Legislation 2010).” This version of Section 117 would make the law more stringent by providing substantial incentives to states to reduce pollution, requiring state implementation plans and deadlines aimed at a 2025 completion date, and outlining concrete consequences for failing to meet commitments (CBF, Legislation 2010; Magee 2010, personal communication). The new version would also expand current funding levels by authorizing \$2.125 billion in new federal money for Bay projects. A Bay-wide nutrient trading program is also being considered at an estimated benefit to farmers of \$58 to \$215 million for nitrogen trading (Swanson 2009). The Chesapeake Bay Foundation’s political strategy to help push this legislation through Congress is to attach it to one of the other great water bills such that for San Francisco Bay. This method would keep detractors from overcoming all the good work and good will that would come out of the bill (Magee 2010, personal communication).

If the Chesapeake Clean Water and Ecosystem Restoration Act passes, the EPA will be able to make clean water regulations specifically for the Bay watershed. This type of shift could prove to be a testing ground for national rule making changes (Loop et al. 2010, personal communication).

Another recent shift in the Bay area was the creation of the Choose Clean Water Coalition (CCWC) in 2008 to lead a more collaborative and coordinated method to seek federal leadership in the restoration of the Chesapeake Bay. The CCWC was created by the National Wildlife Federation, and modeled after the Great Lakes *Healing our Waters* initiative to organize the multitude of non-profit organizations working towards Bay restoration (Falk et al. 2010, personal communication).

Progress

Despite decades of effort, the CBP has surprisingly few success stories. The 2010 State of the CBP found that, although there was a six percent increase in Bay health since 2008, the overall health of the Bay is still plagued by poor water quality, degraded habitats, and low fish and shellfish populations (CBP, 2010 State 2010). Modest gains that have been achieved were due to increases in the adult blue crab populations, expansion of submerged aquatic vegetation (SAV), improvements in water clarity, and bottom habitat health (CBP, 2010 State 2010).

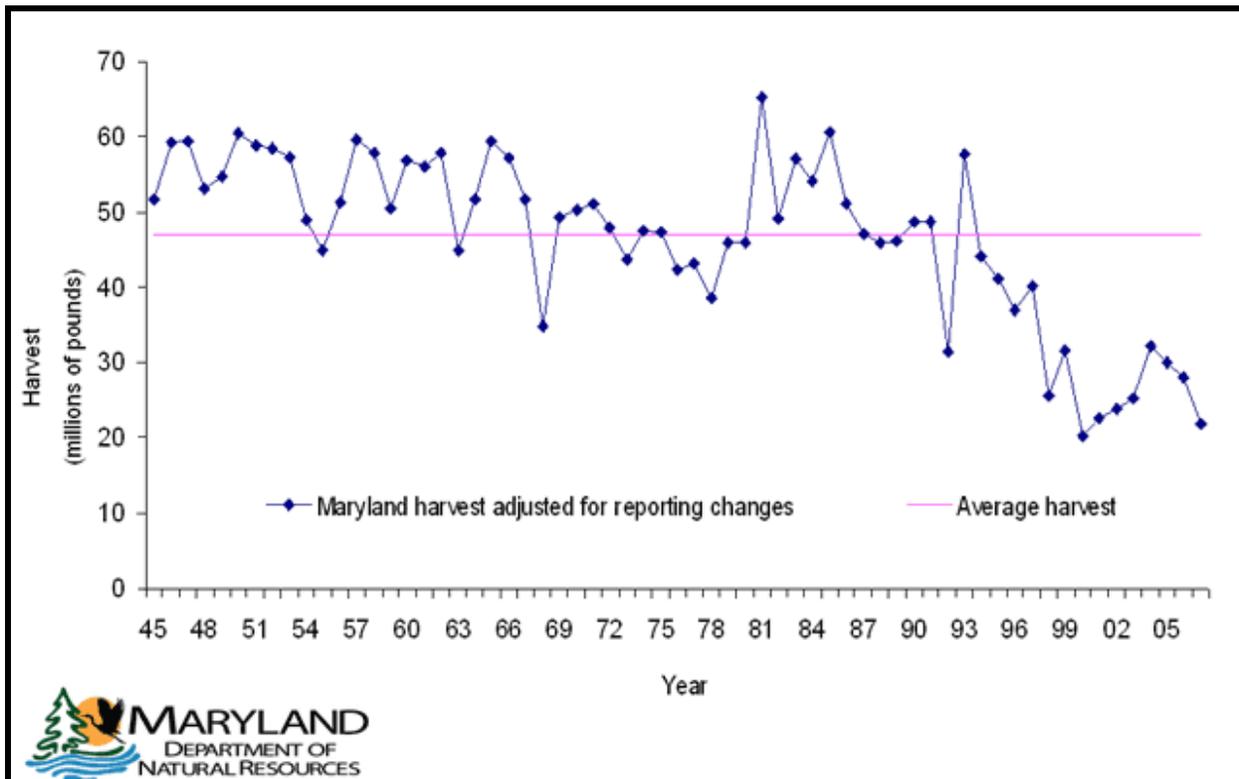


Figure 3: Maryland Chesapeake Bay Blue Crab Harvest 1945-2007

A large factor in the improvement of the blue crab population was the Bi-State Blue Crab Advisory Committee (BBCAC) created by Maryland and Virginia in 1996 (Doyle & Miralles-Wilhelm 2008). The BBCAC was created to focus on the issues surrounding the overharvesting of the crab population and to give independent advice to the management parties. The committee helped integrate science into the management process and involve political leaders

at high levels to maintain support for their provisions. Though disbanded in 2003 due to a lack of funds the initiative did successfully focus on the blue crab issue driving forward action (Doyle & Miralles-Wilhelm 2008). This model suggests that choosing to prioritize a single issue in the watershed while working towards overall goals can create recognizable progress.

This need for prioritization applies not only to discrete issues but also to distinct geographical areas. The CBP does not have enough funding to complete all the goals it has set forth. As a result it is essential that what funding is available is allocated to appropriately prioritized projects, but this is not occurring (Dawson et al. 2010, personal communication). This is largely due to the equitable nature of distributing funds and the challenge of integrating funding and implementation approaches across so many jurisdictions (CBWBRFP 2004; Dawson et al. 2010, personal communication). For example, 60 percent of the freshwater in the Bay flows from the Susquehanna River (Dawson et al. 2010, personal communication). Focusing on restoring that river from the beginning would have made a big difference in the watershed and in working towards the progress of the CBP (Dawson et al. 2010, personal communication). Additionally, the fact that the program is largely funded by state and local initiatives (see Figure 4) means that projects and progress have been incremental and localized, falling far short of the agreed upon Chesapeake 2000 goals (Doyle & Miralles-Wilhelm 2008; Hurd 2009).

Exacerbating the lack of progress is the fact that the costs of restoring the Bay will continue to rise as over 100,000 people move into the watershed every year, further contributing to its decline. “. . . Simply put, restoration efforts are being overtaken by current trends (CBWBRFP 2004:2).” Due to the rising costs of meeting restoration goals, and the agreed upon necessity of reaching them, it is financially wise to invest in the Bay restoration now (CBWBRFP 2004). For this reason, the Bay needs a truly sustainable funding source large and well managed enough to meet CBP goals and to sustain those results over time.

Funding and Financial Planning

The CBP has never reached the level of national focus that would allow for funding adequate to achieve its goals. In the past few years the wars, federal deficit, and lack of public interest in restoration have perpetuated this issue (Doyle & Miralles-Wilhelm 2008). Indeed Doyle and Drew (2008) feel that the ability of the Bay states to maintain the capacity and political will to fund the program will dictate the overall success of Bay restoration.

Hurd asserted that there is sufficient political and social will in the Chesapeake Bay to fund restoration efforts (2009). Moreover, Hurd (2009) pointed out that current localized and diverse funding sources working towards common goals insulate the Chesapeake Bay restoration efforts from the failure of any one financial resource.

As shown in Figure 4, Maryland has provided a large portion of the funding from state sources. A progressive state with a traditionally heavy tax burden and relatively powerful governor, Maryland has implemented several mechanisms to raise *special* state funds dedicated to the Chesapeake Bay cause (Doyle & Miralles-Wilhelm 2008; Hurd 2009). Maryland also has the most to gain from Bay restoration efforts and so is motivated to make a substantial difference (Dawson et al. 2010, personal communication). Maryland is continually seeking to increase its leadership role in raising funds for Bay restoration efforts. In a 2008 report commissioned by the state to research funding mechanisms it was stated that:

Public drinking water systems should adjust their rate structures to cover the costs of operation and maintenance, projected infrastructure needs, long-term planning and the identification and development of new water sources for the future. New development should be assessed fees sufficient to cover the infrastructure and other costs of providing water (Wolman 2008:10).

Conversely, Virginia is a more traditionally conservative state with fewer taxes and a less powerful governor (Doyle & Miralles-Wilhelm 2008). For this reason Virginia has fewer government funds to dedicate towards fulfilling their portion of the Chesapeake Bay goals. Of course this can shift from one administration to the next. When Democrat Tim Kaine was governor, 2006 to 2010, Virginia kept pace with Maryland’s progressive approach to Chesapeake restoration efforts (Loop et al. 2010, personal communication).

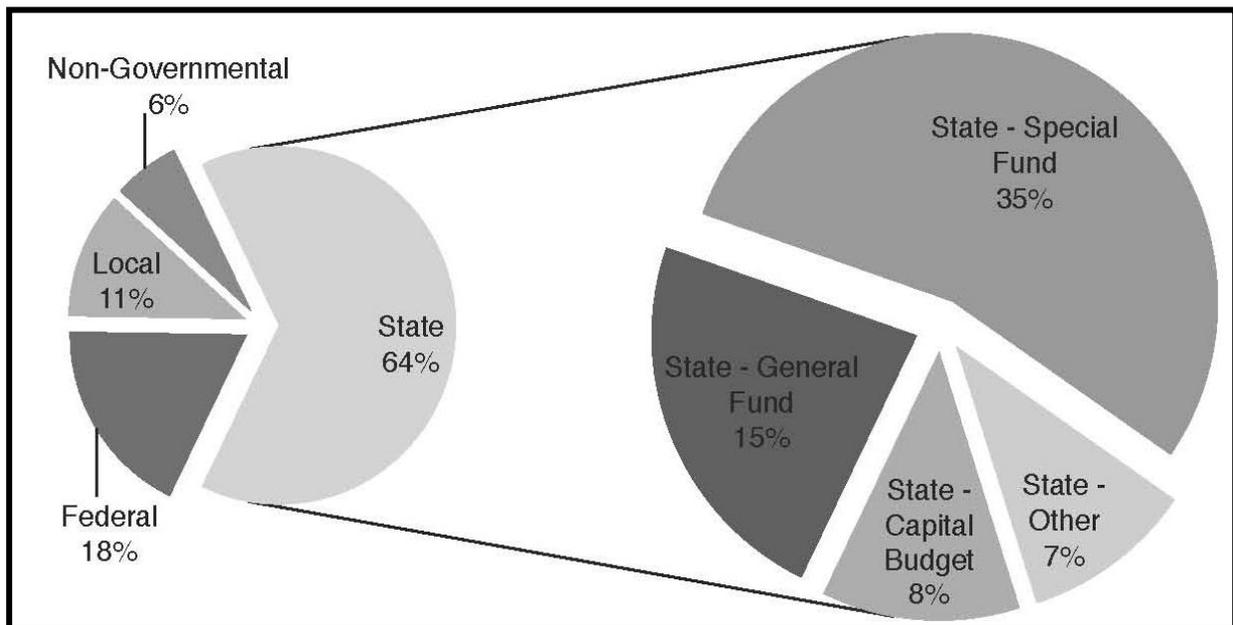


Figure 4: 2003-2010. Estimated funding levels from federal, state, local, and non-governmental sources for Chesapeake Bay restoration (Hurd 2009:13).

In 1997, Virginia created the Water Quality Improvement Fund to finance point source pollution reduction to improve Chesapeake Bay health funded by state appropriations. Pennsylvania, New York, and West Virginia have also been difficult to bring along in the process as they are less directly connected to the Bay (Dawson et al. 2010, personal communication). These three states have not created financial resources to the same degree as Maryland (see Figure 5), and so are struggling to meet the financial obligations of Chesapeake Bay 2000 (Falk et al. 2010, personal communication).

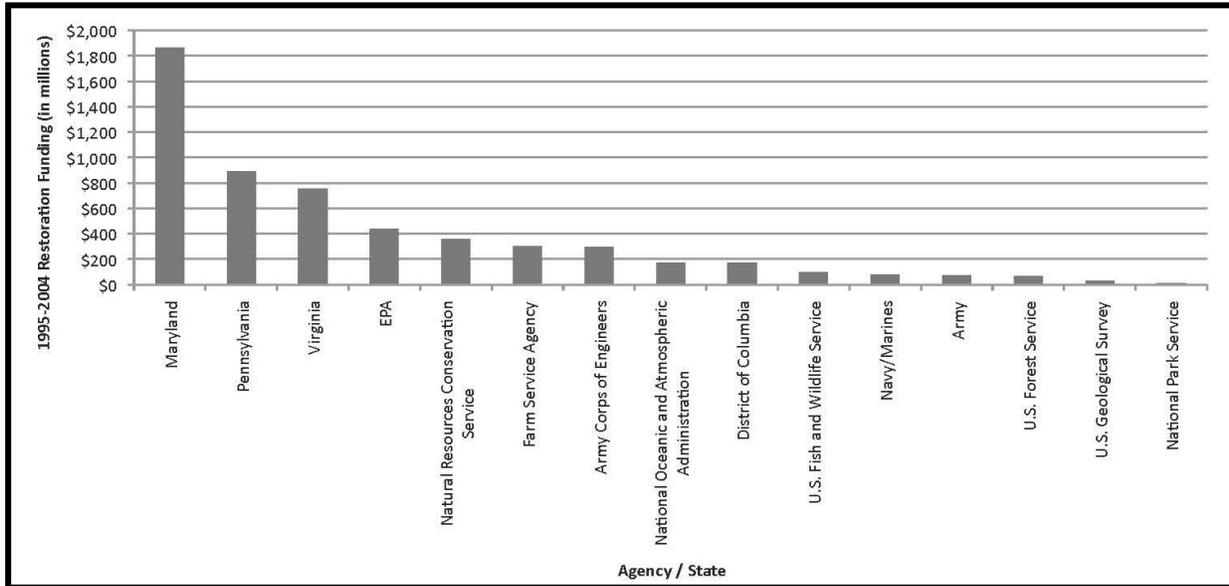


Figure 5: 1995-2004 Level of Chesapeake Bay restoration funding provided by state and federal agencies (Hurd 2009:14).

Federal

Direct Congressional Appropriation - The CBP is funded by a Congressional appropriation mandated by Section 117 of the Clean Water Act. Due to this inclusion, the CBP feels that it does have a sustainable funding source though it will likely rise and fall over time (Loop et al. 2010, personal communication). According to the CBP, it has steadily received between \$20 and \$30 million since its inception. The Executive Order 13508, issued in 2009, elevated these funding levels to \$50 to \$63 million each year, likely through 2012 (Loop et al. 2010, personal communication). This funding stream, approximately 75 percent of which is granted to state projects, will allow the CBP to continue to gain ground towards the Program’s goals though the extent may vary (Loop et al. 2010, personal communication). However, this source is probably not significant enough to achieve success as the current lack of progress in the basin indicates that funding levels are inadequate or will need to be extended well into the future.

Clean Water Act State Revolving Loan Fund - The CWA State Revolving Loan Fund (SRF) was created in the 1987 Amendments to the Act (USEPA, Clean 2010). Through the SRF, the EPA provides grants to all 50 states which then provide loans to aid localities in updating

wastewater treatment plants at lower interest rate loans than other lenders (USEPA 1999). While scientific information has been driving funding towards projects where the *biggest bang for the buck* is possible, the EPA is now starting to council states on how they should spend SRF funds, which should improve distribution efficiencies (Loop et al. 2010, personal communication). The SRF acts like an environmental infrastructure bank (USEPA, Clean 2010). Repayment of the loan funds provides a renewable source of funding and ensures that the cost of pollution is repaid by the polluters themselves, ensuring some level of fiscal sustainability (CBWBRFP 2004). The American Recovery and Reinvestment Act (ARRA) of 2009 provided the SRF with \$4 billion for high priority wastewater projects (USEPA, Clean 2010).

Market for Ecosystem Services – The USDA is now leading an Office of Environmental Markets for the Chesapeake Bay Watershed. This is a good model for agricultural communities as it is a *carrot rather than a stick* (Loop et al. 2010, personal communication). These markets are under development (USDAFS 2010).

Partnerships with Non-profits, Foundations, and State Agencies - Although EPA is leading the charge, several other federal agencies have Chesapeake Bay related programs and funding sources. The grant programs described below are provided by these federal agencies and their partners. While the origin of these funds were not tracked, they are an example of how federal funding levels for the Chesapeake work to leverage money from other sources.

Mini Grant Program – Supported by a partnership with the National Oceanic and Atmospheric Association Bay Watershed Education and Training Program, this grant program awards up to \$5,000 to promote awareness of and participation in the restoration and protection of the Chesapeake (CBT, About 2010).

Living Shorelines Grant Program – Partners with the National Oceanic and Atmospheric Administration (NOAA) Restoration Center and the Maryland Department of the Environment make grants to projects that encourage the use of natural habitat elements to protect shorelines from erosion while providing critical habitat. This program serves Maryland, Virginia, and Washington D.C. (CBT, About 2010).

Urban Greening Grant Program – Partners in this grant program include Tree Baltimore, the US Forest Service, and the Maryland Department of Natural Resources Forest Service Division. These grants fund the implementation of *greening* projects in Maryland. Such projects include reducing stormwater runoff, improving air quality, and enhancing urban quality of life (CBT, About 2010).

Fisheries and Headwaters Grant Program – Partners with the Fish America Foundation and the NOAA Restoration Center distribute grants for projects that will enhance Maryland fisheries (CBT, About 2010).

State - Maryland

Bay Restoration Fund - The Bay Restoration Fund was created in 2004 to provide funds for the Chesapeake Bay. The fund was primarily created for wastewater treatment and agricultural produced non-point source pollution programs (Hurd 2009; Dawson et al. 2010, personal communication). This fund is capitalized by a \$30 annual equivalent dwelling unit fee, collected as a \$2.50 monthly fee per house or business that is connected to a wastewater treatment plant, as well as a \$30 yearly fee per house or business with an on-site disposal system. The Statute allocates 60 percent of these fees to Maryland Department of Energy and 40 percent to the Maryland Department of Agriculture for their Cover Crop Program (MDE, Programs 2010).

Maryland Land Conservation Program - Since 1969, real estate transfer taxes have funded land conservation in Maryland. However, recent state and national budget pressures have caused Maryland legislatures to move many of these dedicated funds into the general budget and to lose ground on land conservation efforts (POS, Funding; POS, Saving). To counter this loss of funds, community action groups are pressuring the legislature to use the funds for their legally designated purpose of purchasing lands. Several legislatures have introduced bills to accomplish just that; suggesting prohibition of transfer of land conservation funds without repayment, requiring legislative oversight for state resource land sales, and suggesting that voters have a chance to comment on state land sales (POS, Funding). When paired with federal grants, county matching funds, and private foundations, this fund has protected 19,000 acres each year from 1992 to 1999 and has generated \$325 million that was spent on land conservation in the Chesapeake Bay watershed (Doyle & Miralles-Wilhelm 2008).

Conservation Reserve Enhancement Program- This program uses the Commodity Credit Corporation (CCC) incorporated in the Farm Bill to pay farmers to take land out of production in Chesapeake Bay Basin riparian areas by renting the land for a period of 15 years while replanting trees which are allowed to grow (USDAFSA 2009; Dawson et al. 2010, personal communication). This program has been very successful. However, ultimately it failed because so many farmers wanted to participate that the agricultural community was concerned that it would lose too much cropland (Dawson et al. 2010, personal communication). USDA total program payments were estimated to be \$165 million for land rental payments and \$33 million for cost-share payments. It was estimated that Maryland would spend \$1 million in cost-share and an addition \$89 million in other direct and in-kind contributions (USDAFSA 2009).

The Chesapeake and Atlantic Coastal Bays 2010 Trust Fund - The Chesapeake and Atlantic Coastal Bays 2010 Trust Fund was created in November of 2007 to provide a dedicated funding source that would focus on the most important non-point source pollution control projects (BayStat 2009). This fund is not politically secure, however. As a result, in 2008, the Maryland

legislature cut the fund by \$25 million to ease the strain of a \$300 million budget deficit (Hurd 2009).

Generated by rental car and motor fuel tax revenue, the Trust Fund was valued at \$9.6 million in 2009 and over \$6 million was budgeted for cover crops, buffer plantings, and animal waste management. These practices are expected to receive \$13.9 million in 2010 while the overall funding is expected to reach \$25 million this year. If approved by the Trust, \$11.3 million will be dedicated to urban and suburban storm water projects and comprehensive watershed restoration programs over the next two fiscal years (BayStat 2009).

Chesapeake Bay Trust: State Government Created Non-profit - The Maryland based Chesapeake Bay Trust started in 1985 by the Maryland General Assembly. Its creation is due to the personal initiative of the governor who judged that there was strong public support for protecting the Bay and its tributaries (Adams 2010, personal communication). This independence was important due to public mistrust of government and to isolate the money raised from the state's general funds (Adams 2010, personal communication). A non-profit organization, the Trust raises \$4 million in contributions annually, over 90 percent of which are directed towards grant programs in all of Maryland's counties and for some work in D.C. and Virginia (CBT, About 2010). During its lifespan, the Trust has raised over \$30 million (CBT, About 2010).

The Trust is capitalized through specialty license plate sales, state tax form donations, private contributions and an interest accruing capital fund. License plate sales and tax form donations do well due to a lack of competition (Adams 2010, personal communication).

State – Virginia

Water Quality Improvement Fund - In 1997 the Virginia General Assembly created the Water Quality Improvement Fund to finance point source nutrient reduction requirements for the Chesapeake Bay and its tributaries (Table 1). The Act that created the fund directs the Department of Environmental Quality to use it to financially and technically assist local governments and individuals in reducing point source pollution (Virginia 2010).

Table 1: Summary of Virginia Appropriations by Fiscal Year (FY) to the Water Quality Improvement Fund (Virginia 2010)

Period	Funds for Bay Point Source Projects (million dollars)
FY 1998	\$10.00
FY 1999	\$37.10
FY 2000	\$27.64
FY 2001	\$10.30
FY 2005	\$12.57
Interest earned (through FY 05)	\$8.16
FY 2006	\$80.28
Interest earned (FY 06)	\$1.57
FY 2007	\$197.33
Interest earned (FY 07)	\$8.46
FY 2008	\$5.00
FY 2009	\$0.48
FY 2010 - Approved Bond Proceeds	\$250.00
TOTAL DEPOSIT =	\$648.89

State – New York

New York State Industrial Finance Program - New York State established the NYS Industrial Finance Program (IFP) that provides tax exempt and taxable conduit loans to private entities and then uses the profits to make low interest loans for environmental facilities. CBWBRP feels that this program could be expanded to other states with success (CBWBRFP 2004).

State – Pennsylvania

Growing Greener II - In 2005 a voter approved Growing Greener II Act was passed to invest in growing the economy through strategic investments in environmental conservation, resource preservation, farm production, preserving open spaces, revitalizing communities, and improving the quality of life in the state. Some of this funding will address pollution, land conservation, and river restoration activities associated with the Chesapeake Bay (POG 2010).

Waste and pollution fees were expanded from a rate of \$6.25 per ton to \$11.25 per ton to fund Growing Greener II at \$625 million over five years (POG 2010). Additionally, a new \$4 per ton fee will be charged for residential and a new 15 cents per pound fee on the industrial release of toxic chemicals. These funds will serve to prevent funding shortfalls in current environmental programs, finance the proposed Growing Greener bond that will serve to meet the capital costs of Growing Greener II, and fund new programs under Growing Greener II (POG 2010).

Non-Profit Foundations

The Campbell Foundation for the Environment - Observing that efforts to restore the Bay are *crippled by lack of sustainable funding* the Foundation seeks to build capacity for the partnerships that support measurable environmental change. Supporting organizations and entities with the skills to effectively message and highlight Bay issues in the media is a priority as it promotes awareness of Bay issues (Campbell Foundation 2010). The Campbell Foundation grants funds to build capacity for stronger, scientifically based environmental action resulting in informed management of living resources and habitats, innovative reduction of nutrient and sediment pollution, and enhanced stewardship and commitment (Campbell Foundation 2010).

National Fish and Wildlife Foundation - The National Fish and Wildlife Foundation is a non-profit organization created by Congress in 1985 to direct public conservation funds to the highest priority environmental issues and matches these dollars with private contributions. NFWF focuses on preserving and restoring wildlife species and their habitats using innovative and wide ranging techniques to address these conservation challenges. Partnerships throughout the public and private sectors are the key to success for the foundation's ability to draw on expert knowledge to help formulate conservation solutions and leverage adequate funds to enact them. Using its extensive network of funders NFWF has leveraged over \$635 million federal dollars into over \$1.5 billion dollars for conservation throughout the nation (NFWF 2010).

The Keystone, Charter, IDEA, and Venture Programs are the major funding distribution methods of NFWF. The Charter Program addresses specific conservation needs in coordination with federal agencies, corporations, and other entities, often in a specific geographic area. One of these Charter Programs is the Chesapeake Bay Stewardship Fund (NFWF 2010).

The Chesapeake Bay Stewardship Fund partners with the CBP to strategically catalyze innovative, sustainable, and cost-effective conservation actions to restore the Chesapeake Bay (NFWF 2011). Two grant funds are supported by this fund, the Chesapeake Bay Small Watershed Grant Program and the Innovative Nutrient and Sediment Reduction Program. In 2010 \$3.4 million and \$5.8 million were dispersed respectively to these programs (NFWF 2011). Funding for the CBSF is mainly supplied by EPA, the US Forest Service, and NOAA (NFWF 2011).

Chesapeake Bay Funders Network (CBFN) - The Chesapeake Bay Funders Network (CBFN) is a funding collaborative specializing in training programs that build capacity in watershed organizations to improve program efficiency to more effectively impact the health of the Bay. Co-chaired by the Chesapeake Bay Trust and the Keith Campbell Foundation for the Environment, the CBFN creates opportunities for funders to pool resources and exchange information to increase the protection and restoration of the Chesapeake Bay watershed (CBT, About 2010).

Chesapeake Bay Blue Ribbon Finance Panel (CBWBRFP)

In December of 2003, the CBP attempted to identify the funding necessary to meet goals throughout the watershed and to address the funding gap by creating the Chesapeake Bay Watershed Blue Ribbon Finance Panel (CBWBRFP). The CBWBRFP was responsible for identifying innovative funding sources to remove the Bay and its tributaries from the CWA's impaired waters list by 2010 (CBP, Blue 2005; Doyle & Miralles-Wilhelm 2008). The CBWBRFP panel determined that, "business as usual will not accomplish the task before us. Current efforts to control nutrient and sediment pollution are too modest and too fragmented, and lack the kind of directed coordination required for a region-wide strategy (CBP 2004)."

Thus, the panel's central recommendation was to create a regional Finance Authority, stating, "In the end, only an ambitious financing partnership, with meaningful investment by federal state and local partners, will remove the ongoing threat to the Chesapeake Bay and ensure the rightful restoration of our national treasure (CBWBRFP 2004:4)."



As noted by the panel, part of the issue of acquiring adequate funds to achieve the CBP's goals is to identify their true cost. In January 2003, the Chesapeake Bay Commission (CBC) sponsored an effort to catalogue the costs associated with meeting the goals of Chesapeake 2000 for Virginia, Maryland and Pennsylvania. The results are provided in the publication *The Cost of a Clean Bay: Assessing Funding Needs Throughout the Watershed* (CBP, About 2010). Assessing current funding sources along with this cost information, the report identified a funding gap of \$12.8 billion (CBC 2003).

These publications were followed by the CBC's *Cost-Effective Strategies for the Bay: Six Smart Investments for Nutrient and Sediment Reduction* which demonstrated that by strategically investing in the restoration efforts likely to yield larger results, the costs of the CBP could be reduced (CBP, About 2010).

It was also recognized that, following the initial capitalization, an additional funding stream would be necessary to support the Authority over the long-term. This is in no small part due to the realization that pressures on the Bay will only continue to increase overtime as populations, development and deforestation continue to spread across the watershed. So while it is most cost-effective to begin investing in the Bay now, long-term revenue streams are also necessary. Thus, the CBWBRFP found that the Authority would need to identify mechanisms for a sustainable revenue stream collected and partially implemented by the states (CBWBRFP 2004). The panel did not identify specific sources of these funds although they did state they could be supplied by several funding mechanisms suggested by the Panel's subcommittees (surcharges

on water and sewer fees, septic fees, and development fees) many of which are described below.

CBWBRFP Suggested Funding Mechanisms

The following list of possible funding mechanisms for the CBP is suggested by the CBWBRFP (CBWBRFP 2004).

Finance Authority - The panel's central recommendation was to create a regional Finance Authority funded by the federal government (80 percent) and the Bay states (20 percent) at \$15 billion dollars accrued over the course of six years. This Authority would generate sustainable funds while prioritizing and distributing them to projects throughout the Bay (CBP, Blue 2005; Doyle & Miralles-Wilhelm 2008). Modeled after the CWA's SRF, the Authority would have provided grants along with revolving loans to target certain areas and populations such as agricultural and urban communities (CBWBRFP 2004). However, the report offered no specific origin for these state or federal funds and consequently it did not produce results (Doyle & Miralles-Wilhelm 2008).

Surcharges on Water and Sewer Fees - This recommendation is to expand Maryland's Chesapeake Bay Watershed Restoration Fund to all the states in the Chesapeake Bay Partnership (CBWBRFP 2004).

Increase Farm Bill Funding for the Chesapeake Bay and Increase the Efficiency of Federal Cost Share Programs - Farm Bill funding in the Chesapeake Bay region is relatively low compared with other areas in the country. More of these funds should be provided to help farmers and to encourage innovative programs to reduce pollution. The federal cost share of these programs should also be increased to the maximum limit in order to account for lost income to the farmer (CBWBRFP 2004).

Fully Implement the Conservation Security Program (CSP) -The Conservation Security Program (CSP), which has recently been replaced with the Conservation Stewardship Program (CSP), was introduced in the 2002 Farm Bill to strengthen land and water conservation while creating a financial mechanism to support/subsidize farms. The CBWBRFP estimated that the CSP could bring \$42 million dollars to farmers in the Chesapeake Bay region much of it in the form of incentive payments to encourage conservation (CBWBRFP 2004).

Expand the Conservation Compliance Requirements for Farm Bill Commodity Payment Programs - In the 2002 Farm Bill, commodity subsidies were the largest public funding source for farmers in the Chesapeake Bay. Thus, commodity payments are more likely to influence farmer behavior than other programs. If a Comprehensive Nutrient Management Plan and/or stream buffers were required as conservation compliance for commodity programs, \$275

million in commodity payments would also serve to move towards Chesapeake Bay conservation goals (CBWBRFP 2004).

Hardship and Innovation Fund - This program was suggested as a federal program that would supplement the CWA's SRF as a *gap financing* tool for impoverished communities. This fund would provide \$200 million of new federal money to support those communities where wastewater treatment upgrades at a level necessary to reach CWA standards would be a true economic hardship (CBWBRFP 2004).

Pilot Program to Allow 30 percent of the SRF Appropriations to be Distributed as Grants – At the time of the CBWBRFP's report in 2004, the CWA required that SRF Funds must be distributed by the states as loans. Allowing states to use a percentage of the fund for grants would, along with the proposed Hardship and Innovation Fund, aid communities that could not afford the loan repayment (CBWBRFP 2004).

Create a Nutrient Trading Program for Municipal and Industrial Wastewater Plants - Establishing a nutrient cap and trade system that would meet Chesapeake Bay Tributary Strategy allocations could save an estimated \$1 billion in wastewater treatment costs if fully leveraged (CBWBRFP 2004). Maryland and Pennsylvania are experimenting with this suggestion. They are finding it difficult as the program is in its infancy and there are enormous economic and non-point source pollution detection complexities to overcome (Dawson et al. 2010, personal communication).

Establish Tax-exempt Financing for Industrial Wastewater Facilities at the State Level - CBWBRFP feels that the New York State Industrial Finance Program could be successfully expanded to other states (CBWBRFP 2004).

Ensure State Revolving Fund (SRF) Capacity through Increased Capitalization - The SRF program will unlikely be sufficient to fund the stormwater and non-point source pollution management needs of the Chesapeake Bay region in the long-term. Thus, funding for the SRF should be increased and partially dedicated to these types of programs (CBWBRFP 2004).

Establish Stormwater Utility User Fees at the Local Level to Fund Stormwater Management Programs - As localities have a legal responsibility to establish and enforce stormwater management requirements, they need a sustainable funding source to support this responsibility. This funding source should be composed of sliding scale storm water fees based on the amount of impervious surfaces created in a given development. It is estimated that this could raise between \$115 million and \$229 million annually in the Chesapeake Bay watershed (CBWBRFP 2004).

Develop Financial Incentives to Reduce Cost of Urban Retrofits – Incentives, such as grants, negative interest rate loans, or principle buy-back programs, could be used to fund the initial costs of urban retrofits in communities that have current or planned storm water utility programs. Operation and maintenance would be funded by stormwater utilities (CBWBRFP 2004).

Establish a Residential Lawn and Garden Fertilizer Surcharge at the State Level - As residency in the watershed increases so do the excess nutrients from fertilizer used for lawns and gardens. A Residential Lawn and Garden Fertilizer Tax/Surcharge on fertilizers sold for use in the watershed would raise proceeds to fund residential area non-point source pollution control and to educate homeowners (CBWBRFP 2004).

Approaches such as Transfer or Purchase of Development Rights to Fund Protection of Green Spaces at the Community Level - Transfer of Development Rights and Purchase of Development Rights are two policies used to slow the rapid loss of farmland and open space. Such policies protect land by transferring or purchasing the right to develop an undeveloped area and transferring them to an already developed location to encourage growing densely. Costs of purchases are recovered from developers receiving the transfers (CBWBRFP 2004).

Enact and Implement Safe, Accountable, Flexible and Efficient Transportation Equity Act (SAFETEA) - A new version of the Transportation Equity Act (TEA-21), SAFETEA includes a provision to mitigate stormwater associated with highways and roads. The CBWBRFP estimated that \$100 million would be available for stormwater improvements in the basin states over six years (CBWBRFP 2004). **Note: SAFETEA was passed in 2005 (USDOT 2010)*

Increase Funding for Conservation Reserve Enhancement Program (CREP) - As of 2006, The CREP has supported over 90 percent of riparian forest buffer restoration in the Chesapeake Bay basin. At current appropriation levels, CREP will not be sufficient to meet the buffer goals for the watershed. CBWBRFP recommended increasing the fund by \$60 million annually (CBWBRFP 2004).

Enforce Federal and State Clean Air Laws - Enforcing existing clean air laws would serve to reduce air sources of pollution to the Chesapeake watershed, working towards both clean water and clean air goals (CBWBRFP 2004).

Extend Vehicle Tax Incentives - Motor vehicles contribute to the air pollution that degrades the health of the Bay. Providing tax incentives that encourage the public to purchase vehicles using fuel efficient and cleaner technologies would help to lessen this impact (CBWBRFP 2004).

Lessons Learned

The following lessons learned, which may have some applicability for the Colorado River Basin, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the Chesapeake Bay Program.

Programmatic

1. **It is critical that science defines the system's problems and the solutions to those problems in a large-scale restoration project.** The first step in Chesapeake Bay restoration efforts was a congressionally directed, five year study to define and analyze the issues. As a result the problems of the Bay are understood as is the work necessary to fix them (Magee 2010, personal communication).
2. **It is important to correctly prioritize projects.** As funding is typically limited, it is important to prioritize projects by where the benefit will provide the most value. This approach is difficult to balance with politics, as some districts or watershed groups might feel slighted (Dawson et al. 2010, personal communication). Additionally, if local funds are supporting the majority of the initiative the result will be fragmented, localized projects.
3. **Clear, specific goals, objectives, and guidelines are essential for an effective restoration plan.** The 1983 CBP Agreement was updated in 1987 to provide more specific goals and timelines. Additionally, in the beginning of the Bay program, goals were set too far away, allowing elected governments to push them off to the next term. Now, state progress towards long-term Bay goals is measured every two years. In contrast to the Chesapeake, the California Bay-Delta, Platte River, and Everglades restoration projects have struggled to reach a consensus as their restoration approaches were less concrete and more conceptual (Doyle & Drew 2008). Interestingly, these programs are all based on water quantity issues.
4. **Short time frames for accomplishing steps towards goals help to ensure progress.** The two year goals established by the 2010 *Strategy for Protecting and Restoring the Chesapeake Bay Watershed* are proving to be important for public relations (Dawson et al. 2010, personal communication; Loop et al. 2010, personal communication). If the two year goals are not met EPA can mandate what next steps must be taken to meet them, keeping progress on track (Loop et al. 2010, personal communication).
5. **An effective monitoring program is important to be able to show progress over time and to keep the public and politicians engaged.** Failing to adequately monitor the work they have done has hurt the Program's ability to show results (Dawson et al. 2010, personal communication).

6. **A successful demonstration project in the watershed is useful in gaining support for the entire effort.** One of the big mistakes the Chesapeake Bay Program made was neglecting to complete a successful and well monitored case study early in the process to show the public and policy makers (Dawson et al. 2010, personal communication).
7. **A *champion*, whether a politician or an organization, that works to push the program forward is extremely important.** Charles Mathias (R-MD) championed the Chesapeake effort. But all key players who continue to work towards Chesapeake restoration fall into this category.
8. **Current Interior Secretary Ken Salazar is aware and supportive of large-scale restoration of the Chesapeake Bay.**
9. **Bi-partisan support at both the public and political level is important to sustain support and thus, funding** (Dawson et al. 2010, personal communication; Loop et al. 2010, personal communication; Magee 2010, personal communication).
10. **Consistent and widespread public support is necessary to receive and maintain a project and its funding.** Although the sailors and fishermen connected to the Bay first initiated the restoration effort, there is not overwhelming public support for or knowledge of the Chesapeake Bay restoration initiative in the area. However, there are key players that do understand the importance of this work that keeps it moving forward. In order to better involve the public, a basic message is used which consists of providing clean water and reestablishing the iconic oyster and crab populations. This simple message does provide a level of public and bipartisan support and thus funding, but it is not enough (Loop et al. 2010, personal communication).
11. **Creating regional or local level partnerships help to involve local stakeholders and agencies in large-scale plans.**
12. **Human health is a large public concern.**
13. **A public and political sentiment of urgency to progress towards a healthy, sustainable ecosystem is present in the Chesapeake Bay.**
14. **Crisis triggers policy response.**
15. **A statute of authority holding agencies responsible for reaching the goals of the program is Important.** Much of the CBP's success is due to its connection to the CWA (Magee 2010, personal communication).

16. **There is no statute of authority to fund conservation related activities. Thus, a management plan containing an ecosystem/watershed wide approach is important and increases likelihood that riparian and invasive species issues would be addressed.**
17. **It is helpful to have a watershed wide restoration effort written into law with associated funding.**
18. **Regulatory force is necessary for success.** Voluntary efforts are not quite adequate; enforcement power is needed for success (Harrison 2010, personal communication). Much of the CBP's history has been characterized by a consolatory method of collaboration that involved little enforcement or regulatory power (Doyle & Miralles-Wilhelm 2008). According to Doyle and Drew (2008) the main obstacles to CBP progress have been a lack of financial planning and regulatory force. Slowly, this trend has shifted as goals and deadlines are not met and EPA has become more involved (Loop et al. 2010, personal communication).
19. **It is helpful to have an independent watchdog serving to regulate actions.**
20. **Collaborative efforts tend to be punctuated by periods of litigation due to a lack of or temporary stall in progress. This generally results in action that moves the collaborative program forward.**
21. **If executive or legislative actions are enacted that hold a government body responsible for results, then it is more likely that there will be government funding available to increase progress towards goals.** In 1987, Section 117 of the CWA formally authorized the creation of the Chesapeake Bay Program Office.
22. **The program is trying to get new, more stringent legislation passed.** The Chesapeake Bay Foundation has asserted that "passing a reauthorized bill will be the most important legislation for the Chesapeake Bay since the CWA was established 37 years ago" (CBF, Legislation 2010). This version of Section 117 would make the law more stringent by providing substantial incentives to states to reduce pollution, requiring state implementation plans and deadlines aimed at a 2025 completion date, and outlining concrete consequences for failing to meet commitments (CBF, Legislation 2010; Magee 2010, personal communication). The new version would also expand current funding levels by authorizing \$2.125 billion in new federal money for Bay projects.
23. **Strengthening the CWA regionally could substantially improve the effectiveness of the legislation.**

24. **Regional partnerships help to create standards that states must abide by while allowing them flexibility in their approach; this could lend itself to a national model.**
25. **One progressive state in the watershed can set an example.** A progressive state with a traditionally heavy tax burden and relatively powerful governor, Maryland, has implemented several mechanisms to raise *special* state funds dedicated to the Chesapeake Bay cause (Doyle & Miralles-Wilhelm 2008; Hurd 2009).
26. **Federal involvement in watershed restoration efforts may aid in interstate and international interactions.**
27. **The Chesapeake Bay often looks to the Great Lakes for guidance, legal precedence, and funding mechanisms, perhaps indicating the need for increased federal leadership.**
28. **Estuaries are generally the focal point of large-scale, watershed based restoration efforts due to their disproportionately high biological productivity and density of human population and development.**
29. **A sub-group targeting a specific issue can be used to draw attention to the other issues in the watershed and to accelerate progress on critical issues.** The BBCAC was created to focus on the issues surrounding the overharvesting of the crab population and to give independent advice to the management parties. Though disbanded in 2003 due to a lack of funds the initiative did successfully drive the blue crab issue forward and the species has seen a slight recovery (Doyle & Miralles-Wilhelm 2008).

Funding

1. **Hidden fees can raise a lot of money.** Maryland's *flush fee* was hidden in the property tax bill which helped to reduce its political vulnerability (Falk et al. 2010, personal communication).
2. **Despite its numerous public and private funding streams, the Chesapeake Bay does not have sustainable funding that is significant enough to achieve its goals.** The EPA feels that their agency's funding is sustainable because of its connection to the CWA (Loop et al. 2010, personal communication). However, this funding is a small portion of what is needed to reach Chesapeake Bay goals. Much of money needed is and will be coming from the states, which have less reliable funding streams, although Maryland is doing relatively well. So, after over 25 years of effort, the Chesapeake Bay still remains without a reliable, significant sustainable funding source (Loop et al. 2010, personal communication). A lack of financial planning has been one of the leading factors in the

lack of CBP progress (Doyle & Drew 2008). The CBWBRFP was created to address this need but has ultimately been unsuccessful.

3. **Public funds, as they are currently allocated, are not enough to create a sustainable, significant funding source for these watershed programs.**
4. **The costs of the project must be defined in order to determine funding needs.**
Understanding projected costs is important for setting project goals. EPA's Environmental Finance Center can be a resource to help establish out what people will pay (Dawson et al. 2010, personal communication).
5. **It is important to identify a financial plan early on in a large-scale watershed restoration effort as the amount of funds that can be expected will drive the scale and schedule of the implementation plan.**
6. **Federal funding has generally been lower than expected and the majority of funding has come from local sources.**
7. **Maryland is considering that water users should pay the *true* costs of water.** In a 2008 report commissioned by the state to research funding mechanisms it was stated that public water systems should adjust their rates to cover the cost of water (Wolman 2008).
8. **Investing in watershed health now is financially wise.** Due to the rising costs of meeting restoration goals, and the agreed upon necessity of reaching them, it is *financially wise* to invest in Bay restoration now (CBWBRFP 2004).
9. **Funds raised specifically for a watershed program must be insulated from government general funds.** Maryland General Assembly passed legislation to set up an organization that would be independent of the government to raise funds (Dawson et al. 2010, personal communication). In contrast the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund is not politically secure. As a result, in 2008, the Maryland legislature cut the fund by \$25 million to ease the strain of a \$300 million budget deficit (Hurd 2009)
10. **Diversify funding sources help to insulate the program from difficult financial times.** (Harrison 2010, personal communication)
11. **Public trust funds, or publicly initiated private trust funds, can be a good way to equitably raise and manage funds if an initial capitalizing agent is identified.**
12. **Interest accrued through a trust fund adds significantly to the value of that trust.** The Chesapeake Bay Trust has existed for about 25 years, in that time they have built a

substantial capital fund that accrues significant interest, which is an added funding source (Dawson et al. 2010, personal communication).

Interviewees Suggestions for the CRB

Throughout the interviews with individuals affiliated with the Chesapeake Bay Program there were numerous suggestions provided by interviewees, based on their experience, to aid any efforts to establish a watershed program for the Colorado River system. These are provided below from both the programmatic and funding perspective.

Programmatic

1. **Connecting to people's values is the best way to motivate them.** Focus on the fundamentals, for the Chesapeake that is *clean water and enough of it*. The CBP focuses on what would be lost through inaction. Actions have to be shown to impact the individual, everything is value based (Dawson et al. 2010, personal communication; Loop et al. 2010, personal communication; Magee 2010, personal communication).
2. **The messaging with which the initiative approaches the politicians and the public must be carefully considered.** It is important to be careful with the choice of wording from the beginning. For example, NEVER use the word *tax*. Use "*investment*" instead. Similarly, do not use *riparian or flood events*. Say *riverside and nourishing flows* (Dawson et al. 2010, personal communication). A succinct story is needed to communicate to politicians (Bryer 2010, personal communication).
3. **Maintaining a good working relationship with the press helps to engage the public and politicians.** (Harrison 2010, personal communication)
4. **Gaining the support of the agricultural community can go a long way towards the watershed goals.** The agricultural community has an enormous impact on the health of the Chesapeake Bay (CBWBRFP 2004; Dawson et al. 2010, personal communication; Falk et al. 2010, personal communication). Outreach to the farmers is critical. Although many distrust the government, if a partnership can get even one individual on board and show them how they can benefit, they will tell their neighbors and other farmers may follow (Dawson et al. 2010, personal communication).
5. **It may be helpful to regulate water flow rates as TMDL's regulate pollution rates.** Could water flow be seen as an account to be regulated as it connects to the physical, *chemical, and biological* health of the water (Bryer 2010, personal communication)?
6. **The public has a strong sense of fairness.** There is a wide array of water users in the watershed and it is important for them to understand that what one person does with

the water affects the economic well-being of another (Bryer 2010, personal communication).

Funding

1. **Interviewees suggested the following funding mechanisms:** 1) Add a \$5 voluntary contribution to Park Pass sales that would be collected by states and distributed to a chosen organization; 2) Voluntary fees at the supermarket (i.e. bag fees); 3) T-shirt sales at REI, Bass, Patagonia; and 4) Think about small dollar amounts that have massive appeal (Harrison 2010, personal communication).
2. **A broad scope of work is necessary to find broad support and funding.** Focusing on one species in a watershed is too narrow to achieve the sustainable funding that is needed (Loop et al. 2010, personal communication). The scope of the CRB initiative should be broadened with other related initiatives to garner greater support for funding (Falk et al. 2010, personal communication).
3. **Creating a regional entity to raise funds helps appeal to a broad base of revenue sources.** (Harrison 2010, personal communication).
4. **The Farm Bill or another agricultural grant program might provide a good funding source.** (CBWBRFP 2004; Magee 2010, personal communication)

Literature Cited

Adams, H., 2010, CBT (Chesapeake Bay Trust), personal communication.

BayStat, Chesapeake and Atlantic Coastal Bays Trust Fund SFY 2011 Annual Work and Expenditure Plan, 2009. URL www.baystat.maryland.gov/trustfund_info.html [accessed on 12 August 2010]

Bryer, M., 2010, The Nature Conservancy, Chesapeake Bay, personal communication.

Campbell Foundation, Chesapeake, 2010. URL www.campbellfoundation.org/chesapeake [accessed on 12 August 2010]

CBC (Chesapeake Bay Commission). 2003. The cost of a clean bay: assessing funding needs throughout the watershed. Chesapeake Bay Commission, Annapolis, Maryland. Available from www.chesbay.state.va.us/Publications/C2Kfunding.pdf

CBF (Chesapeake Bay Foundation), Litigation, CBF's Lawsuit Against EPA, Background, 2010. URL www.cbf.org/Page.aspx?pid=1837 [accessed on 15 August 2010]

CBF (Chesapeake Bay Foundation), Legislation, Strengthening Section 117 of the Clean Water Act, 2010. URL www.cbf.org/Page.aspx?pid=1653 [accessed on 15 August 2010]

CBP (Chesapeake Bay Program), Blue Ribbon Finance Panel, Financing Authority, 2004. URL http://archive.chesapeakebay.net/info/blue_ribbon_panel_financing.cfm [accessed on 12 August 2010]

CBP (Chesapeake Bay Program), Blue Ribbon Finance Panel, 2005. URL <http://archive.chesapeakebay.net/blueribbon.htm> [accessed on 12 August 2010]

CBP (Chesapeake Bay Program), Chesapeake 2000 Agreement, 2005. URL <http://archive.chesapeakebay.net/c2k.htm> [accessed on 12 August 2010]

CBP (Chesapeake Bay Program), About Us, Committee Activities, Chesapeake Executive Council, 2008. URL www.chesapeakebay.net/exec.htm [accessed on 12 August 2010]

CBP (Chesapeake Bay Program), About Us, Overview, History of the Chesapeake Bay Program, 2009. URL www.chesapeakebay.net/historyofcbp.aspx?menuitem=14904 [accessed on 11 August 2010]

CBP (Chesapeake Bay Program), About Us, 2010. URL <http://www.chesapeakebay.net/aboutus.aspx?menuitem=14001> [accessed on 12 August 2010]

CBP (Chesapeake Bay Program). 2010. 2010 State of the Chesapeake Bay Program. Chesapeake Bay Program, Annapolis, Maryland. Available from <http://archive.chesapeakebay.net/ec2010/State%20of%20Program10.FINAL.pdf>

CBT (Chesapeake Bay Trust), About, 2010. URL www.cbtrust.org/site/c.mijPKXPCJnH/b.5435807/k.AFFA/About.htm [accessed on 12 August 2010]

CBWBRFP (Chesapeake Bay Watershed Blue Ribbon Finance Panel). 2004. Saving a national treasure: financing the cleanup of the Chesapeake Bay. Available from www.chesapeakebay.net/content/publications/cbp_12881.pdf

CBEO (Chesapeake Bay Executive Order), About the Executive Order, 2010. URL <http://executiveorder.chesapeakebay.net/page/About-the-Executive-Order.aspx> [accessed on 12 August 2010]

Dawson, F. B. Michael, J. Raulin and T. Parham, 2010, MDNR (Maryland Department of Natural Resources) personal communication. 2010.

Doyle, M. and C. A. Drew editors. 2008. Large-scale ecosystem restoration: five case studies from the United States. Island Press, Washington, D.C.

Doyle, M. and F. Miralles-Wilhelm. 2008. The culture of collaboration in the Chesapeake Bay program, Pages 175-203, in Doyle, M. and C. A. Drew editors. Large-scale ecosystem restoration: five case studies from the United States. Island Press, Washington, D.C.

Falk, H., R. Ewing and P. Marx, 2010, CCWC (Choose Clean Water Coalition), personal communication.

Harrison, V., 2010, Campbell Foundation, personal communication.

Hurd, J. 2009. Characteristics of Watershed Restoration Funding. Wildlands CPR, Missoula, Montana. Available from http://www.wildlandscpr.org/files/Funding_Characteristics_0.pdf

Lape, Jeff. 2010. Chesapeake Bay Program Update. Local Government Advisory Committee Meeting, PowerPoint Presentation. April 23.

Loop, T., J. Edwards and G. Barraco, 2010, CBP (Chesapeake Bay Program), personal communication.

Magee, B., 2010, Chesapeake Bay Foundation personal communication.

MDE (Maryland Department of the Environment), Programs, Water Programs, Quality Financing, Mission Statement, 2010. URL http://textonly.mde.state.md.us/programs/Water/QualityFinancing/MissionStatement/Pages/Programs/WaterPrograms/Water_Quality_Finance/mission_statement/index.aspx [accessed on 14 August 2010]

NAS (National Academies of Science), Ocean Science and Stewardship Publications: Marine Ecosystems, 2010. URL http://dels-old.nas.edu/oceans/marine_ecosystems_part_2.shtml [accessed on 2 December 2010]

NFWF (National Fish and Wildlife Foundation), Grant Programs, Funding Opportunities, Chesapeake Bay Stewardship Fund, 2011. URL http://www.nfwf.org/AM/Template.cfm?Section=Chesapeake_Bay_Stewardship_Fund&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=46&ContentID=15358 [accessed on 19 January 2010]

NFWF (National Fish and Wildlife Foundation), What We Do, 2010. URL www.nfwf.org/Content/NavigationMenu/WhoWeAre/WhatWeDo/default.htm [accessed on 12 August 2010]

POS (Partners for Open Space). Funding for land conservation cut – again. Available from www.partnersforopenspace.org/pdf/POS_fact_sheet_2-18.pdf

POS (Partners for Open Space), Saving Maryland Lands. URL www.partnersforopenspace.org/saving.htm [accessed on 12 August 2010]

POG (Pennsylvania Office of the Governor), Growing Greener, 2010. URL www.growinggreener2.org/default.aspx?id=196#how1 [accessed on 13 August 2010]

Swanson, A. 2009. Reauthorizing and strengthening clean water act section 117 for the Chesapeake Bay watershed. Chesapeake Bay Commission. Available from www.chesbay.state.va.us/Presentations/Nov09/Swanson%20Reauth%20Presentation.pdf

USDAFS (United States Department of Agriculture Forest Service), Ecosystem Services, USDA Office of Environmental Markets, 2010. URL www.fs.fed.us/ecosystemservices/OEM/index.shtml [accessed on 14 August 2010]

USDAFSA (United States Department of Agriculture, Farm Service Agency), Newsrooms, Fact Sheets, Maryland Conservation Reserve Enhancement Program, 2009. URL www.fsa.usda.gov/FSA/newsReleases?area=newsroom&subject=landing&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20090424_consv_en_mdcrep.html [accessed on 12 August 2010]

USDOT (United States Department of Transportation), Federal Highway Administration, Legislation, Regulations and Guidance, Safe, Accountable Flexible, Efficient Transportation Equity Act: A Legacy for Users, 2010. URL www.fhwa.dot.gov/safetealu/ [accessed on 12 August 2010]

USEPA (United States Environmental Protection Agency). 1999. The clean water state revolving fund program. United States Environmental Protection Agency, Washington, D.C. Available from www.epa.gov/owm/cwfinance/cwsrf/cwsrf.pdf

USEPA (United States Environmental Protection Agency), Clean Water Financing, Clean Water State Revolving Fund, 2010. URL www.epa.gov/owmitnet/cwfinance/cwsrf/ [accessed on 12 August 2010]

Virginia Department of Environmental Quality, Programs, Water Quality Programs, Chesapeake Bay Program, Water Quality Improvement Fund, 2010. URL www.deq.virginia.gov/bay/wqif.html [accessed on 12 August 2010]

Wolman, G. M. 2008. Water for Maryland's future: what we must do today. Advisory Committee on the Management and Protection of the States Water Resources. Available from www.mde.state.md.us/assets/document/WolmanReport_Vol1.pdf

National Estuary Program

The National Estuary Program is a federal program that is able to leverage outside funding for watershed initiatives to match relatively small amounts through the federal government. The case study provides an example of how a national scale-program can be used to incorporate multiple large-scale watershed initiatives.

Background

Created by Congress in 1987, the National Estuary Program (NEP) was modeled after the Environmental Protection Agency's (EPA) Great Lakes and Chesapeake Bay Programs to attain and maintain water quality in both coastal and non-coastal watersheds. The focus on estuaries specifically is due to their disproportionately high biological productivity and density of human population and development. An amendment to the Clean Water Act, Section 320, officially established NEP. Section 320 calls for EPA to identify qualified estuaries and address water quality issues such as public water supplies, fish and wildlife habitat, recreation, as well as point and non-point pollution sources. Estuaries can be identified directly by the EPA or nominated by state governors (USEPA 2005; USEPA, NEP 2010).

Once an estuary is selected as a NEP project a Comprehensive Conservation Management Conference is held involving a collection of committees composed of local, regional, state and federal stakeholders to form the local decision-making framework (USEPA 2005; USEPA, NEP 2010). This framework includes setting program goals, identifying environmental problems and their sources, as well as planning actions to resolve these issues. EPA participates in this process, providing technical and financial assistance, and reviewing performance. Generally this is a three to five year process focusing on stakeholder consensus (USEPA 2005). Thus, although each estuary or watershed identified may have a different suite of issues, NEPs process ensures a consistent, collaborative approach to finding solutions.

The four cornerstones of the NEP are to focus on watersheds, integrate science into the decision-making process, foster collaborative problem solving, and to involve the public (USEPA 2005). This process produces a Comprehensive Conservation and Management Plan (CCMP) which establishes priority actions, research, and funding options (USEPA, NEP, Comprehensive 2010). The progress of these CCMP's are to be evaluated by environmental indicators that each NEP develops and then evaluates in *State of the Bay* reports that are completed every three to five years (USEPA, NEP, State 2010).

The successes that the NEP program achieved are attributed both to the consistent implementation of the four cornerstones of the NEP process and to the ability of the program to develop long term, sustainable funding strategies. As demonstrated in Figure 1, NEP's raise

\$14 for every \$1 provided by EPA on average.

Examples of sustainable funding sources that NEPs identify include: Clean Water State Revolving Fund programs, stormwater utility fees, municipal bond funding, fines and settlements, tax abatements and incentives, and sales fees.

For instance, the Puget

Sound Financial Planning Committee identified potential funding through taxes on watercraft, litter, fish and shellfish, pesticides, gasoline, and toilet paper (USEPA 2005; USEPA, NEP, Sustainable Financing Strategies 2010).

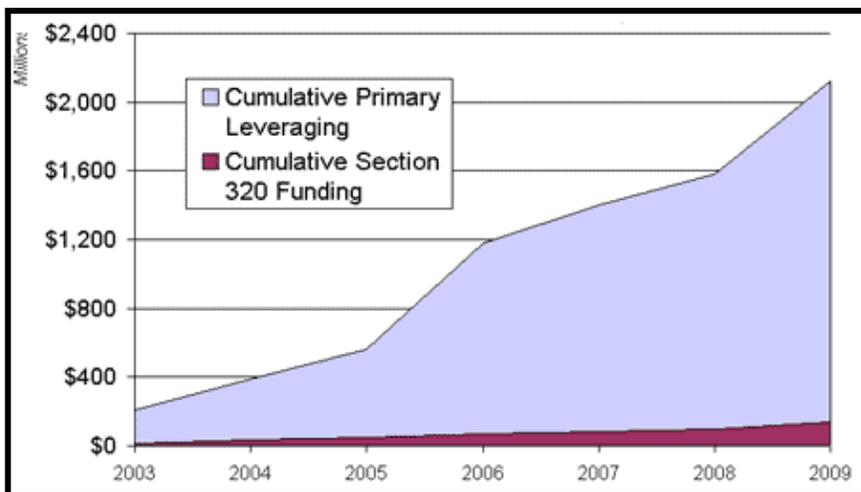


Figure 1: Chart of NEP Financial Leveraging from 2003 – 2009

NEP achieves this ability to leverage funds using a four step method. The first step is tasking the Management Committee or Finance Planning Committee with developing a finance plan that identifies and evaluates possible funding sources. These plans assess existing revenues such as taxes, fees, and assessments while identifying new sources such as: municipal dept or private foundations. Secondly, NEPs work to develop strategic partnerships that will help obtain and leverage additional financial support. The third step is to demonstrate successful results to ensure financial supporters that the organization is capable of effectively implementing plans, can be trusted to use resources wisely, and will give credit to their contributors. Finally, it is important to provide seed money and staff time to research and develop new funding sources (USEPA 2005; USEPA, NEP, Sustainable Financing Strategies 2010).

Examples of funding mechanisms that have been successfully implemented by NEP organizations are listed below. These examples, for the most part, represent regional or local approaches operating under the NEP.

Funds to Cover Operating Costs

County General Budget

The Peconic Estuary Program Office (New York) was created as part of the Office of Ecology in the Suffolk County Department of Health Services. As a result of this relationship Suffolk County's general budget covers most of the estuary program's operating costs. Suffolk County has a history of environmental investments creating a high level of return and the estuary program presents its budget as such (USEPA 2005).

Technical Assistance Fees

The Buzzards Bay Project in Massachusetts raises money for its operating costs by including technical assistance fees on partner grant applications of 10 to 30 percent. This cost covers staff, printing, and outreach expenses and is fully itemized for the benefit of the grantor (USEPA 2005).

Table 1: Funding Mechanisms Used by the National Estuary Programs
(USEPA, NEP, Sustainable Financing Examples 2010)

National Estuary Program (NEP)	Funding Mechanism	Amount of Funding	Use of Funding
Partnership for the Delaware Estuary	Annual Appeal	\$29,779 in 2005	General support
Casco Bay Estuary Partnership (ME)	Special Appeal	\$56,000	Lobster habitat study and relocation effort
Narragansett Bay (RI) Estuary Program	Grant and Partnership	\$600,000	Habitat restoration
Indian River Lagoon NEP (FL)	License Plate Program	\$400,000 annually	Habitat restoration and environmental education
Coastal Bend Bays and Estuaries Program (TX)	Supplemental Environmental Project	\$1.5 million	Land acquisition and habitat restoration
Peconic Estuary Program (NY)	Real Estate Transfer Tax	\$169 million through January 2004	Land preservation
Tampa Bay Estuary Program (FL)	Interlocal Agreement	At least \$415,000 annually	Bay restoration and water quality improvements

Funding

State Line-Item Funding

The Galveston Bay Program and Coastal Bend Bays and Estuaries Program in Texas worked with local representatives to develop language for a state bill to provide funding for their work. The programs also educated statewide representatives about their work and recruited local governments, non-profits, and citizens to support the measure. As a result the Texas State Legislature supports the estuaries programs with line-item funding of approximately \$1 million for each program every year (USEPA 2005).

The Delaware Center for the Inland Bays also employed methods to educate their state legislature about their work. As a result, the state legislature provided specific monies for various projects and line-item funding was later used to leverage additional support (USEPA 2005).

Annual Appeal

Using capacity building funds from a foundation grant, the Delaware Estuary NEP worked to increase their unrestricted funding rates through annual funding appeals. The following lessons were learned:

- Increasing outreach work aimed at knowledge of and support for their program is important.
- By shifting its focus from a mass mailing to more personalized requests to fewer people (1,000), they found that specific and personal appeals make a difference.
- The partnership continues to refine this shift by further dividing this group into: past givers, lapsed or never givers, board member contacts (with personalized letter from the board member), and board members. Each of these groups received personalized materials and donation requests. Past givers are asked to increase their gift every year.
- Appeals should be sent on a regular basis (the end of the calendar year could be best). The Delaware NEP gained success by sending a second mailing in the spring to anyone failing to respond in the fall.
- Recognizing donors is important. Special note cards were given to anyone donating over \$75 and the Partnership lists everyone who donates in its activity report.

Using these methods the Partnership received an average gift of \$163 from 183 people, totaling \$29,779 (USEPA 2005; USEPA, NEP, Sustainable Financing Examples 2010).

Partnering to Secure Grant Funding/Foundation Grants

Save the Bay, a non-profit in Narragansett Bay, Rhode Island, partnered on a coastal mapping project with the Narragansett Bay Estuary Program, a university-based group, this helped to secure funding from the Pew Charitable Trusts (\$200,000). The Narragansett Bay Estuary Program then used this funding to leverage more resources from state and federal grant funds (\$400,000) (USEPA 2005; USEPA, NEP, Sustainable Financing Examples 2010).

Special Appeal/Capital Giving Campaign

The Casco Bay Estuary Partnership in Maine quickly raised money for research when a dredging project was thought to threaten the local lobster population. The Chair of the Board wrote special appeal letters to bayside property owners, businesses, and local cities while the director contacted the Maine Department of Transportation to collectively raise \$56,000 in three weeks. The research was successfully completed and proper mitigation efforts were undertaken with the help of volunteers (USEPA 2005; USEPA, NEP, Sustainable Financing Examples 2010).

Affinity Credit Card

The Long Island Sound Study NEP in New York, partnered with the Connecticut Department of Environmental Protection, which developed the proposal and fronted operating costs, to

develop a Long Island Sound affinity credit card. The Long Island Sound Study now receives \$5 for every application it receives for the card and one half of one percent of the interest of purchases made with the card (USEPA 2005).

License Plate Revenue

In 1995 the Indian River Lagoon Estuary Program, in Florida, began earning yearly revenue for habitat protection projects from specialty license plate payments. 12,000 signatures, gained with the help of local McDonald's restaurants, of pledged license plate purchasers accompanied the program request to the Florida State legislature. In addition the Program paid a \$15,000 onetime fee to the Florida DMV for administration costs (USEPA 2005; USEPA, NEP, Sustainable Financing Examples 2010).

One of the greatest obstacles to the success of the license plate was the fact that there are over 100 specialty license plates in the State of Florida, 20 of which are specific to environmental causes (Florida 2008; USEPA, NEP, Sustainable Financing Examples 2010). As a result, the Program needed the license plate to be visually distinctive and well marketed. The plate was the first to feature a fish, the snook, which drew in fisherman, a large contingent in the state. To promote the new license plates Anheuser-Busch and the Florida Outdoor Advertising Association donated a combined \$75,000 of billboard space and a local car dealership provided every new car sold with an Indian River Lagoon license plate for three months. In addition, the Program sent out mail promotions to plate owners, and advertised in regional and state angler magazines. In 2009 the license plate ranked 16th out of 103 specialty license plates (USEPA, NEP, Sustainable Financing Examples 2010).

The license plate earned over \$4 million in its first seven years. The NEP website, last updated June 11, 2009 reported that the license plate continues to generate about \$400,000 dollars a year (USEPA, NEP, Sustainable Financing Examples 2010). However, the Florida DMV website reported 8,493 Indian River Lagoon license plates were renewed and 345 new plates were sold for a total of 8,838 plates in 2010. This equals revenue of a little over \$130,000 (Florida 2008). Overall, these license plate funds have raised more than the total revenue raised as matching funds (USEPA, NEP, Sustainable Financing Examples 2010).

Stormwater Utility Fee (Investment)

In Sarasota County, Florida a stormwater utility fee funds a stormwater management program outlined in the Sarasota Bay NEP's Management Plan. In accordance with this plan, the fee is used to encourage property management that limits stormwater runoff. \$100 million dollars have been raised by the fee to support planning, maintenance, and capital improvement actions (USEPA 2005).

State Bond Act

\$100 million of the New York State Clean Air/Clean Water Bond Act was committed to wastewater treatment, stormwater and non-point source pollution control, and wetlands restoration projects through a memorandum of understanding signed by the governor and legislative leaders and facilitated by the Long Island Sound NEP Citizen Advisory Committee. This decision was precipitated by New York State's willingness to work with, and provide funding for NEPs (USEPA 2005).

Taxes

\$4 million is raised annually for a Natural Lands Trust through new property taxes in Ocean County, New Jersey. Widely approved by voters and based on public opinion polls the taxed constituted a 1.2 cent raise per \$100 of valuation. All lands acquired will allow public access (USEPA 2005).

Tax Credits and Low-Interest Loans

The Massachusetts Clean Water State Revolving Fund encourages homeowners to upgrade their sewage systems by providing interest-free loans to communities who, in turn, lend the money to individuals. Real estate taxes are used to repay the loans. This program is supported and advertised by the Buzzards Bay Project and Massachusetts Bays Program (USEPA 2005).

Real Estate Transfer Tax

The Peconic Bay NEP partnered with a non-profit organization to gain the benefits of a two percent real estate transfer tax in the county. This tax was made possible by NEP's history of building partnerships with local organizations and communities. As a result the tax was passed despite 10 years of heavy opposition from state and national level real estate and builder lobbies. \$70 million was raised in less than three years through this tax to acquire land for conservation. \$169 million was raised as of 2004 and it is likely that by the end of the fund's lifespan (2020) total additional revenues will reach \$556 million. Peconic Bay's outreach effort were partially based on their research efforts including an economic valuation of the estuary, its impact on the local economy, detailed land use information, and development and population trends. This information focused on the potential to improve the quality of life and of the environment with an increase in green spaces. However, it is estimated that with this fund, only 10 percent of *critical* land parcels could be protected. Other options include restricting clearing, clustering requirements, rezoning, overlay districts, easements, development right purchasing, and better land use practices. It is estimated that implementing clearing restrictions and clustering requirements would protect an area of land that would cost an estimated \$382 million to acquire (USEPA 2005; USEPA, NEP, Sustainable Financing Examples 2010).

Supplemental Environmental Project (SEP)

Between 1990 and 1997, Koch Petroleum had over 300 oil and gasoline product spills in six states. As part of the resulting settlement between Koch Petroleum, the State of Texas, and the US Department of Justice, the Coastal Bend Bays and Estuaries Program in Corpus Christi, Texas received \$1.5 of \$5 million dedicated for SEPs. Coastal Bend Bays and Estuaries Program were likely recognized to receive this funding for several reasons: 1) in 1994 a 100,000 gallon oil spill occurred in the area served by the estuary program, 2) the estuary program has built strong relationships in industry and in state government through a history of public involvement; 3) it was recognized that the program could implement projects with low overhead expenses. The funding came with two major stipulations; the Coastal Bend Bays' plan for distributing the funds had to be completed in one month and all of the funds had to be expended within 18 months. The Program's streamlined process and strong, diverse partnerships helped them achieve these goals. Additionally, \$2.5 million in funding was secured as matching funds for the initial \$1.5 million (USEPA, NEP, Sustainable Financing Examples 2010).

Interlocal Agreement

The Tampa Bay Estuary Program (TBEP), in Florida, adopted a formal Interlocal Agreement in 1998 committing 15 partners – including the city, county, state, a water management district, regional planning council, a port authority, the EPA, and the Army Corps of Engineers – to achieve the goals of TBEP's bay restoration plan. A portion of this commitment for local government partners and the water management district agreed to provide financial support to TBEP, providing at least \$415,000 annually as a match for EPA's cooperative agreement funding (USEPA 2005).

This interlocal agreement was made possible by the following factors: 1) the water management district's representative, a contract attorney, sat on the TBEP Policy Board conceived of the idea and worked to push it through; 2) there was a tradition of regional cooperation among the bay scientists and managers that enabled the consensus agreement; 3) there was an incentive for joining members that this would be a non-regulatory approach to resource management; 4) the TBEP had a record of affordable implementation and the added costs of the agreement each year was insignificant in proportion to their annual budgets (USEPA, NEP, Sustainable Financing Examples 2010).

Summary

NEP reports many successes achieved via this program (USEPA, NEP 2010). However, it is not readily apparent what defines this success. It could indicate that the NEPs formed have remained operational or that some of them have met some or all of the goals set forth in their respective management conferences. It would take more in-depth look at each of these

initiatives' CCMP's and *State of the Bay* reports to more fully understand the levels of success achieved.

Lessons Learned

The following lessons learned, which may have some applicability for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the National Estuary Program.

Programmatic

1. **NEP is based on the Great Lakes and Chesapeake Bay efforts, indicating a level of national interest in these large-scale restoration projects.**
2. **Estuaries are generally the focal point of large-scale, watershed based restoration efforts due to their disproportionately high biological productivity and density of human population and development.** NEP focuses on estuaries for these reasons.
3. **It is helpful to have a watershed wide restoration effort written into law with associated funding.** An amendment to the Clean Water Act, Section 320, officially established NEP. Section 320 calls for EPA to identify qualified estuaries and address water quality issues such as public water supplies, fish and wildlife habitat, recreation, as well as point and non-point pollution sources.
4. **Embedding a large-scale, watershed restoration program in legislation, such as the National Estuaries Program, provides government authorities, such as EPA, with a clear role and articulated responsibilities.**
5. **NEP has outlined a three to five year, structured approach to organize state, local, and federal interactions to restore an estuary.** Once an estuary is selected as a NEP project a Comprehensive Conservation Management Conference is held involving a collection of committees composed of local, regional, state and federal stakeholders to form the local decision-making framework (USEPA 2005).
6. **NEP has outlined the content of a restoration management plan.** At a management conference a Comprehensive Conservation and Management Plan established priority actions, research, and funding options (USEPA, NEP, Comprehensive 2010). The progress of these CCMPs is to be evaluated by environmental indicators that each NEP develops and then evaluates in *State of the Bay* reports that are completed every three to five years.

Funding

1. **The sum of multiple funding mechanisms works well to create a sustainable funding network at certain scales.** EPA claims that NEP's success is directly attributable to their ability to secure long-term funding citing State Revolving Fund programs, stormwater utility fees, municipal bond funding, fines and settlements, tax abatements and incentives, and sales fees. Historically, NEPs raise \$14 for every \$1 provided by EPA on average, indicating that perhaps these mechanisms work well on smaller scale systems.
2. **NEP achieves this ability to leverage funds using a four step method:** 1) a Management Committee or Finance Planning Committee is tasked with developing a finance plan that identifies and evaluates possible funding sources, 2) NEPs work to develop strategic partnerships that will help obtain and leverage additional financial support, 3) successful results are demonstrated to ensure financial supporters that the organization is capable of effectively implementing plans, can be trusted to use resources wisely, and will give credit to their contributors, and 4) seed money and staff time is provided to research and develop new funding sources (USEPA 2005; USEPA, NEP, Sustainable Financing Strategies 2010).

Literature Cited

Florida Department of Highway Safety and Motor Vehicles, About Us, Division of Motor Vehicles, Specialty License Plates Index, 2008. URL <http://www.flhsmv.gov/dmv/specialtytags/> [accessed on 20 July 2010]

USEPA (United States Environmental Protection Agency). 2005. Community-based watershed management: lessons from the national estuary program. Environmental Protection Agency. Washington, D.C. Available from <http://www.epa.gov/owow/estuaries/nepprimer/documents/srNEPPrimer.pdf>

USEPA (United States Environmental Protection Agency), NEP (National Estuary Program), 2010. URL <http://water.epa.gov/type/oceb/nep/index.cfm> [accessed on 20 July 2010]

USEPA (United States Environmental Protection Agency), NEP (National Estuaries Program), Comprehensive Conservation and Management Plans, 2010. URL http://water.epa.gov/type/oceb/nep/ccmp_index.cfm [accessed on 20 July 2010]

USEPA (United States Environmental Protection Agency), NEP (National Estuary Program), State of Our NEP Estuaries, 2010. URL <http://water.epa.gov/type/oceb/nep/bay.cfm> [accessed on 20 July 2010]

USEPA (United States Environmental Protection Agency), NEP (National Estuary Program), Sustainable Financing Examples from the National Estuary Program (NEP), 2010. URL <http://water.epa.gov/type/oceb/nep/fundexamples.cfm#table> [accessed on 20 July 2010]

USEPA (United States Environmental Protection Agency), NEP (National Estuary Program), Sustainable Financing Strategies, 2010. URL <http://water.epa.gov/type/oceb/nep/fund.cfm> [accessed on 20 July 2010]

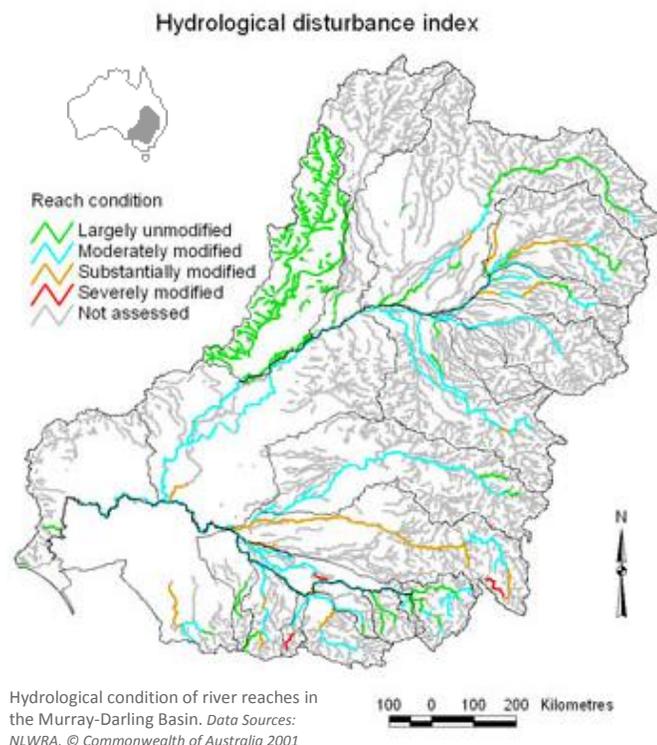
Murray-Darling Watershed Restoration (Australia)

“Australia is tackling a challenge that has never yet been surmounted anywhere in the world: to restore a major river system to a healthy state so that it can sustain its environment, enhance and maintain the services it provides, and support the communities and industries that depend on it (MDBA 2009:2).” The challenges facing the people of the arid Murray-Darling Basin are strikingly similar to those present in the geographically similar Colorado River Basin: economic dependence on an over-allocated and dwindling water supply, riparian habitat decline, stream salinity increases, and increasing dominance of invasive species. The Murray-Darling Basin restoration initiative employs a government managed Payment for Ecosystem Services (PES) approach that includes water rationing to accommodate basic ecological function and water market development to more efficiently utilize the scarce resource. Essentially, this approach amounts to a cap and trade water allocation program.

Background

The Murray-Darling Basin covers approximately one million square kilometers (386,100 square miles) or one-seventh of the continent. It incorporates Australia's three longest rivers: the Murray River, the Darling River and the Murrumbidgee River (ADSEWPC, Environment 2010). The basin is home to a large diversity of flora and fauna and ecologically significant wetlands systems. The “Basin is also very important for rural communities and Australia's economy. Three million

Australians inside and outside the Murray-Darling Basin are directly dependent on its water. About 85 per cent of all irrigation in Australia takes place in the Murray-Darling Basin, which supports an agricultural industry worth more than AUD\$9 billion (\$8.6 billion US) per annum (ADSEWPC, Environment 2010).”



Hydrological condition of river reaches in the Murray-Darling Basin. Data Sources: NLWRA. © Commonwealth of Australia 2001
Figure 1: Hydrological conditions of river reaches in the Murray-Darling Basin.

Management and Legal Structure

Australia initially adopted Britain's riparian common law doctrine, which did not give ownership of the water under or on the land, but gave the land owner unlimited right to appropriate and otherwise use the water for any purpose onsite or off (McKay 2008, ADSEWPC, Water 2010). In 1886 the common law doctrine was replaced with a state vested system in which each state controlled the licensing of water, which would eventually be perceived as water rights. When the states formed the federal commonwealth in 1901 the states fought to maintain control of their water (McKay 2008). Then in 1978 the Commonwealth passed the National Water Resource Financial Assistance Act, which greatly increased federal control of water. A cap on diversion quantity was imposed in 1995, which has been heralded as the most important decision in Australian water history, successfully reducing the risk of further environmental degradation (McKay 2008).

In 2004 the National Water Initiative (NWI) was signed, which is a state and territory intergovernmental agreement to better manage Australia's water resources; "an enduring blueprint for water reform (NWC 2007)." The National Water Commission Act of 2004 established the National Water Commission (NWC), which is tasked with advising the Council of Australian Governments (COAG) on national water issues and progress of the National Water Initiative. The Australian Water Resources (ARW) 2005 report provided the NWC with a baseline assessment of Australia's water resources, examining three core areas of concern: water availability, water use, and river and wetland health (NWC 2007).

Building on the NWI, the Commonwealth Water Act 2007 established the independent Murray-Darling Basin Authority (MDBA), which has recently released a basin wide management plan.

The plan will seek to protect and restore key environmental assets — rivers, streams, wetlands, forests, floodplains and billabongs — and key ecosystem functions. These ecological functions are essential to the life of the rivers and their surrounding landscapes, as well as to human activities and cultural values. The Basin Plan must also take into account the impact of this protection and restoration on individual communities, industries, regions, and the wider economy (MDBA 2009:3).

Special provisions have been made to ensure that critical human water needs are met (ADSEWPC, Water 2010). In July of 2008 the Intergovernmental Agreement on the Murray-Darling Basin Reform was signed by all states and territories involved leading to a 2008 Water Act Amendment that established the precedent for interstate cooperation. Among other principles the Act required key water policy reform measures including: "(a) competitive neutrality and independently regulated water market and trading arrangements across the southern connected Basin; (b) water charging regimes that reflect the full cost of supply to end users, including environmental externalities where feasible and practical (COAG 2008:21)."

The MDBA restoration plan incorporated *Sustainable Diversion Limits* or SDLs which are:

Limits on the quantities of surface water and groundwater that can be taken from the Basin water resources . . . This is defined as the level at which water in the Basin can be taken from a water resource without compromising key environmental assets, key ecosystem functions, key environmental outcomes or the productive base of the water resource (MDBA 2009:7).

In order to mitigate the expected socio-economic impacts associated with the reductions in water allocations, the Australian government is actively purchasing existing water entitlements from willing sellers and from a share of the water savings made through the program's national water plan including irrigation efficiency upgrades (MDBA 2009). The government is also investing in irrigation infrastructure improvements to reduce water consumption. "A portion of the water savings generated by this work will also be used by the Commonwealth to minimize the gap between current diversions and the new SDLs (MDBA 2009:9)."

"[W]ater entitlements, along with planned environmental water provided for under the Basin Plan, will be used to protect and restore environmental assets such as wetlands and streams, including those in the Murray–Darling Basin (MDBA 2009:9)." The Basin Plan will also include a water quality and salinity management plan, water market, trading and charge rules, as well as a socioeconomic analysis and monitoring plan. The water rights acquired by the Commonwealth become part of the Commonwealth environmental water holdings.

A 'Pilot Salinity Control Agreement' was developed in 1999 with Macquarie River Food and Fibre (MRFF), an association of 600 farmers in the Macquarie River watershed.

The agreement provides financing for tree planting as a cost-effective strategy for reducing salinity in river systems. The MRFF purchases salinity credits from State Forests based on water use by restored forests in the upper watershed. Farmers pay \$45 US/ha/year. The funds generated are used for restoring natural vegetation on public and private land. The aim is to restore 40 percent of the cleared forest, which is necessary to reverse the salinization process (Smith et al. 2006:25).

The newly established water market is to be managed by the Australian Competition and Consumer Commission (ACCC), including the establishment of market regulations and pricing as well as monitoring and enforcement of the market rules.

Progress

The outcomes for integrated management of water for the environment have not yet been achieved (ADSEWPC, Environment 2010). However, the Basin Plan was finalized in 2009 and the actual implementation phase is not scheduled to begin until mid 2011. As of April, 2010 the

Australian government had already purchased 803 gigaliters (651,003 acre feet) for AUD\$1.28 billion (\$1.22 billion US) and 15 percent of this water has been specifically allocated for 29 river, floodplain and wetland sites (ADSEWPC, Environment 2010). AUD\$300 million (\$285 million US) was earmarked in the 2009-2010 budget for on-farm irrigation efficiency upgrades (ADSEWPC, Environment 2010).

The water market development is not a funding source per se, but it does help to replace the need for funding. According to a report produced by Australia's NWC:

[E]conomic modeling commissioned for this study estimated that water trading in the southern Murray-Darling Basin (sMDB) increased Australia's gross domestic product by [AUD]\$220 million [\$209 million US] in 2008–09 through reallocations of water used in agriculture. The total production benefits were even greater within the sMDB (more than [AUD]\$370 million [\$351.5 million US] in 2008–09), indicating that water trading maintained productive capacity within the sMDB, which would otherwise have moved to other parts of Australia (outside the sMDB). The modeling estimated that all sMDB states benefited from trading: net benefits were [AUD]\$79 million [\$75 million US] for New South Wales, [AUD]\$16 million [\$16 million US] for South Australia and [AUD]\$271 million [\$257.5 million US] for Victoria in 2008–09 (NWC 2007).

However, according to independent research, Australia's capped water market is not effectively achieving environmental goals and in fact it has increased consumptive use of water resources in the basin despite the cap:

More efficient water use and shifting water usage to higher value-added users is not necessarily compatible with the environmental goal of reducing aggregate water use in order to increase environmental flow . . . Sharing decision-making about water allocations between the private and public sectors is potentially attractive in that it provides an alternative to a fully top down governance system and can hopefully utilize informed micro-level decision-making by users. However, the limits of this mode of governance in this case have been demonstrated (Bell & Quiggin 2008:726).

Funding

The 2009/2010 Water for the Future program budget, totaling AUD\$12.9 billion (\$12.3 billion US), is entirely derived from federal appropriations pursuant to the Water Act of 2007 (ADSEWPC, Environment 2010). There is no specific revenue source that directly funds this initiative. For example a key element to the Basin restoration plan is a AUD\$3.1 billion (\$2.9 billion US) government water entitlement (water right) purchase from willing sellers. The funding for these purchases came from federal appropriations, not a dedicated funding source such as water use fees seen in other examples. Aside from the large sums of federal spending,

the initiative also looks to develop self sustaining water markets to help re-allocate water to more efficient uses with hopes that this will encourage conservation and increase environmental flows necessary for sustaining the ecological recovery.



Figure 2: Example of riparian restoration activities in the Murray-Darling River Basin (Photo courtesy of Murray Darling Basin Authority).

Lessons Learned

The following lessons learned, which may have some applicability for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the Murray-Darling Basin Initiative.

Programmatic

- 1. Water trading offers an important and potentially significant means of maintaining the socio-economic viability of a water scarce region.** “[W]ater trading in the sMDB increased Australia’s gross domestic product by [AUD]\$220 million [\$209 million US] in 2008–09 through reallocations of water used in agriculture (NWC 2007).” “Typically, sellers of allocations received cash injections that helped them cope with drought and, in some cases, to manage debt. Purchasers maintained production or kept permanent plantings alive, thereby salvaging future production from long-lived assets . . . Sellers of entitlements turned to more opportunistic irrigation or ceased irrigation altogether. Purchasers have developed new irrigation activities or improved their reliability of supply (NWC 2007).”
- 2. Water trading may have negative localized effects including social and economic declines. Although, this has been shown to be a minimal concern in the sMDB, there is still a public perception that water trading is bad for rural communities.** “[S]ome of those consulted still link outward water entitlement trading with economic and social

decline. Many others highlighted the difficulty of differentiating between the various drivers of change underway in their communities (NWC 2007).”

3. **Water trading has had negligible positive environmental benefits by increasing instream flows during droughts, but may also increase salinity and groundwater recharge. The slight increase in salinity was mitigated through the Basin Salinity Management Strategy.** “Water trading has generally moved water downstream, leading to environmentally beneficial increases in flows at the ends of many tributaries. Hydrological assessments indicate no detectable impact of overall water trading patterns on key ecological assets in the sMDB, including The Living Murray Icon sites, Ramsar-listed wetlands and nationally important wetlands... Water trading increased instream salinity in the Murray over the study period (NWC 2007).”
4. **“Water allocation trading (water leasing) helped irrigators manage variation in seasonal water availability (NWC 2007)”, but the selling of water entitlements (water rights) “facilitated long-term industry investment, contraction or exit by individuals and firms (NWC 2007).”**
5. **Market restrictions between territories (states) constrain the ability of the system to adjust to localized drought conditions.** “Irrigators stand to benefit most by trading with other users who have different patterns of water availability and demand (NWC 2007).”

Funding

1. **In response to a water crisis, Australia has passed meaningful water reform legislation and appropriated the necessary funding. The public perception of an immediate crisis and the strong federal legislative mandate has provided reliable and significant funding despite the lack of a dedicated revenue source.**

Literature Cited

ADSEWPC (Australian Department of Sustainability, Environment, Water, Population and Communities), Environment Home, Water, Water locations, Murray-Darling Basin, 2010. URL <http://www.environment.gov.au/water/locations/murray-darling-basin/index.html> [accessed on 20 January 2011]

ADSEWPC (Australian Department of Sustainability, Environment, Water, Population and Communities), Water Legislation, 2010. URL <http://www.environment.gov.au/water/australia/water-act/index.html> [accessed on 20 January 2011]

Bell, S. and J. Quiggin. 2008. The limits of markets: the politics of water management in rural Australia. *Environmental Politics* **17**:712-729.

COAG (Council of Australian Governments). 2008. Agreement on Murray-Darling Basin Reform. Available from http://www.coag.gov.au/coag_meeting_outcomes/2008-07-03/docs/Murray_Darling_IGA.pdf

McKay, J. 2008. The legal framework of Australian water: progression from common law rights to sustainable shares. L. Crase editor. *Water policy in Australia: the impact of change and uncertainty*. Future Press, Washington, D.C.

MDBA (Murray-Darling Basin Authority). 2009. The basin plan: a concept statement. Murray-Darling Basin Authority, Canberra City, Australia. Available from <http://www.mdba.gov.au/files/publications/basin-plan-concept-statement.pdf>

NWC (National Water Commission), 2007. URL <http://www.water.gov.au/default.aspx> [accessed on 20 January 2011]

Smith, M., D. de Groot, D. Perrot-Maître, and G. Bergkamp editors. 2006. *Pay: establishing payments for watershed services*. International Union for Conservation, Gland, Switzerland. Available from <http://data.iucn.org/dbtw-wpd/edocs/2006-054.pdf>

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Working For Water Programme (South Africa)

The Working for Water Programme (WfW) is a watershed restoration initiative that focuses on the removal of invasive woody vegetation for the purpose of increasing water availability based in South Africa. Aside from the clear similarities in the restoration objectives to the Colorado River Basin (CRB), the program provides an interesting example of how an ecological restoration oriented initiative can be successfully coupled with a social welfare initiative under a pseudo-market based scheme managed by a federal agency.

Background

“A national review of potential stream-flow reduction by invading alien plants, conducted by the CSIR and funded by the Water Research Commission, found in 1997 that a total area of about 10.1 million hectares (6.8 percent) of South Africa and Lesotho had already become invaded to varying degrees of density. These invasions were estimated to be reducing the national mean annual runoff by about 3,300 million cubic meters (6.7 percent of national runoff) (DWA 2010).” If left untreated the water loss may exceed 16 percent of available runoff in the future (Blignaut et al. 2007).

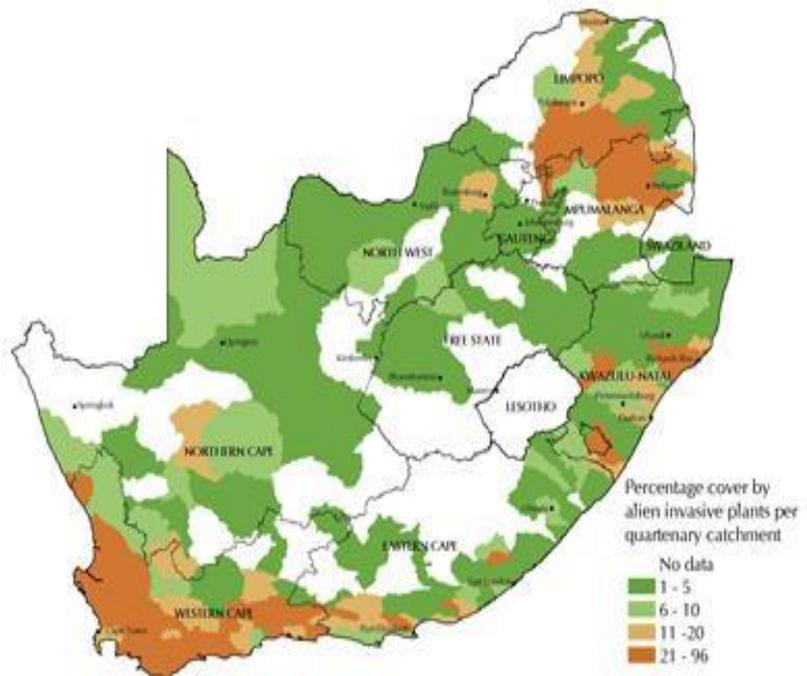


Figure 1: Working for Water program area in South Africa (Map courtesy of the RSA Department of Environmental Affairs).

The Working for Water Programme (WfW) is an innovative conservation approach instituted by the Republic of South Africa’s (RSA) Department of Water Affairs and Forestry (DWAF) in 1995. The public works program seeks to create an ecological restoration program that also creates jobs to alleviate high unemployment and poverty in South Africa and increase social welfare by hiring women, youth, and disabled (SA 2005). The program hires unskilled workers from poor communities to remove invasive non-native vegetation that had reduced water availability. A program goal is to remove non-native vegetation and restore a native vegetative community to provide a substantial quantity of water for the downstream users and also increase biodiversity.

Furthermore, the program contains a social development component focused on educating the poor about HIV/AIDS and provides child care for working mothers. The conservation end of the program focuses on increasing water availability through invasive species management, which is an objective in common with the CRB initiative.

Management and Legal Structure

The WfW Programme, started by the former minister of water affairs Kader Asmal with a R\$25 million (\$3.75 million US) grant, is seated within South Africa's DWAF. Largely due to the social development aspect of the program, it is managed and funded almost entirely by a federalized program with substantial inter-agency funding. However, there is a small private contribution to hire private contractors to complete some of the clearing and revegetation aspects of the restoration work. In RSA like the US, land owners are legally obligated to control weed species, but due to the costs associated, these regulations are typically not enforced or land owners are provided subsidies to complete the work (Turpie et al. 2008).



Water Affairs
Agriculture, Forestry and Fisheries
Environmental Affairs



WfW effectively acts as a conduit for the provision of ecosystem goods and services, predominately water supply, through the control of invasive alien plants and the provision of unskilled job opportunities, using predominantly taxpayers' money. Whether this is justifiable in terms of the spread of the taxpayers versus the beneficiaries of clearing is uncertain, although it should be noted that water savings in one area have geographically widespread ramifications, and biodiversity benefits are also likely to have more than localised benefits. Though this form of transfer payment does not constitute the creation of a market for the provision of ecosystem goods and services in the strict sense, it does constitute a payment for the service delivery (Turpie et al. 2008:792).

South Africa has also developed the idea of Streamflow Reduction Activities (SFRA), which aim to increase water availability by taxing plantation forestry activities that grow exotic trees that consume greater volumes of water than native vegetation. The government would tax the plantations based on the quantity of streamflow reduction. However, according to the International Union for Conservation of Nature and Natural Resources "the forestry sector disputes the hydrological evidence behind new and increased charges, because of the complexity of interactions between landscape and hydrology in land-use mosaics (Smith et al. 2006:79)." As a result, "SFRA policy may be simplified to avoid future disputes, basing SFRA

payments on land use instead of hydrological criteria. Liability for SFRA payments would then be much more easily assessed, making the policy more acceptable to the forestry sector and the overall scheme more effective (Smith et al. 2006:79).”

Progress

During the first seven years about one million hectares (2.5 million acres) of invasive alien plants were cleared, which has yielded an estimated release of 48 –56 million cubic meters (39,000 to 45,000 acre-feet) of additional water per annum (DWAF 2006). “The programme has provided jobs and training to approximately 20,000 people from among the most marginalized sectors of society per annum. Of these, 52 percent are women (DWA 2010).” Because of adequate funding, the program experienced rapid growth (Sadan 2004). Presidential Policy Coordination Director, Mastoera Sudan, suggested that this rapid growth may have created substantial managerial problems with rapid staff turnover due to stressful working conditions.

Funding

The program’s early development was initially funded by the Reconstruction and Development Programme (RDP). From 1997 to 2004 the program was funded from the Poverty Alleviation Fund within the National Treasury. In 2004 the program funding was changed to the Expanded Public Works Programme. The program has relied on a variety of funds primarily stemming from the federal government and to a lesser extent from private donations and international aid.

The program received approximately R\$400 million (\$60 million US) in 2003 (Turpie et al. 2008) primarily from poverty relief programs (inter-government transfers) and R\$58 million (\$8.7 million US) coming from water use fees through the DWAF. In recent years this total has been reduced to only R\$100 million (\$15 million US) in 2010/2011 and R\$300 million (\$45 million US) in 2011/2012, which is now primarily funded by general tax revenues derived from the National Treasury (NTRSA 2009).

Funding sources 1995-2006 (Turpie et al. 2008:792):

- Poverty relief programs
- DWAF core funding
- Water tariffs through DWAF (Water Resource Management Fees)



- Water tariffs through other water management authorities
- Local authorities and TCTA
- Foreign funding – Finland and Norway
- Private sector – formal funding partnership with the private sector agencies came to an end; clearing by private sector companies is still on-going but not reported.

DWAF contributes approximately R\$58 million (\$8.7 million US) per year. The primary dedicated funding source for the WfW Programme is an earmarked water tax that is weighted according to affordability, assurance of supply, and equity. A total of \$3 to \$7 million US is generated annually through the DWAF water tariff (Turpie et al. 2008).

Logging companies worked with the program to harvest the biomass that was cleared. General funds of the WfW program are paid to contractors; therefore, this may not be a net gain in funding and it may undermine the program's focus on poverty alleviation.

Local water utilities instituted the water surcharges that helped fund the WfW program. For example, the Municipality of Hermanus instituted a block rate tariff system that substantially increased cost to consumers. The action was initiated to control demand in the face of dwindling supply. Much of the additional revenue went to the WfW to control invasives in the catchment (Turpie et al. 2008).

The municipality of George is funding invasives control at R\$400,000 (\$60,000 US) per year, which is paid either to WfW or the Western Cape Nature Conservation Board (Turpie et al. 2008). Trans Caledon Tunnel Authority which raises revenue through water fees to its customers paid R\$8 million (\$1.2 million US) to WfW over three years to control invasives in the Berg River Dam catchment, which supplies farmers around Cape Town.

A non-profit from Finland donated R\$358,000 (\$50,000 US) to the WfW from 2005-2008 (Turpie et al. 2008) and Finland and Norway donated over \$3 million US at the start of the program. The reason for the interest from these international sources was not indicated in available WfW documentation.

Lessons Learned

The following lessons learned, which may have some applicability for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the WfW Program.

Programmatic

1. **Scientific and economic research (and consensus) is needed to support program objectives.** Extensive research on the environmental impacts of non-native invasive plants has provided the base for the work developed by WfW, and real improvements in

water quantity have already been realized (Watershed Markets 2007). However, “the forestry sector disputes the hydrological evidence behind new and increased charges, because of the complexity of interactions between landscape and hydrology in land-use mosaics (Smith et al. 2006:79).”

2. **Removal of invasive, non-native vegetation can potentially provide a significant quantity of water for downstream users, which provides a strong economic incentive to pursue ecological restoration in an arid region.** During the first seven years about one million hectares of invasive alien plants were cleared, which has yielded an estimated release of 48 –56 million cubic meters of additional water per annum (DWAF 2006).
3. **The no-action alternative may prove to be more expensive in the long run.** “If we do not clear invading alien plants in 10 to 20 years we will lose 30 percent of our run-off to rivers. In 20 to 40 years 74 percent will be lost (Watershed Markets 2007).”
4. **If a program is funded adequately, then quick success and expansion of the program could lead to administrative problems.** Rapid program growth may lead to managerial problems including rapid staff turn-over and stressful working conditions (Sadan 2004).
5. **Combining environmental objectives with the social needs of the region can provide strong political support for the program.** “...the programme aims at fulfilling its environmental goals, through the provision of social benefits to the most vulnerable groups, and the combination of both has earned the programme wide national support (and increasing funding, both from social and environmental interests) as well as 35 national and international awards (Watershed Markets 2007).”

Funding

1. **Connecting the restoration initiative with a social program can provide a significant funding source.** The program received approximately R\$400 million (\$60 million US) in 2003 (Turpie et al. 2008) primarily from poverty relief programs (inter-government transfers).
2. **Funding sources may shift as the initiative matures.** The program’s early development was initially funded by the Reconstruction and Development Programme. From 1997 to 2004 the program was funded from the Poverty Alleviation Fund within the National Treasury.
3. **A water fee or tariff may not adequately pay for a large regional initiative.** A total of \$3 to \$7 million US is generated annually through the DWAF water tariff (Turpie et al.

2008). This direct payment from the program beneficiaries represents only about 15 percent of total WfW funding.

4. **A water fee can be justified on the basis of basic supply and demand concept. With dwindling supply the price paid must increase to encourage conservation. The additional revenue can be used for multiple conservation issues including ecological maintenance.** Municipality of Hermanus instituted a block rate tariff system that substantially increased cost to consumers. The action was initiated to control demand in the face of dwindling supply. Much of the additional revenue went to the WfW to control invasives in the municipality's water supply source area (Turpie et al. 2008).
5. **If research and practicable experience demonstrates that water can be salvaged from restoration activities then private entities will pay for the work.** Trans Caledon Tunnel Authority which raises revenue through water fees to its customers paid R\$8 million (\$1.2 million US) to WfW over three years to control invasives in the Berg River Dam catchment, which supplies farmers around Cape Town.

Literature Cited

Blignaut, J. N., C. Marais, and J. K. Turpie. 2007. Determining a charge for the clearing of invasive alien plant species (IAPs) to augment water supply in South Africa. *Water South Africa* **33**: 27-34.

DWA (Republic of South Africa Department of Water Affairs), Projects and Programmes, Working for Water, 2010. URL <http://www.dwaf.gov.za/wfw/> [accessed on 20 January 2011]

DWAF (Republic of South Africa Department of Water Affairs and Forestry). 2006. Strategic plan 2004/5-2006/7. South African Department of Water Affairs and Forestry, Pretoria, South Africa. Available from <http://www.dwaf.gov.za/Documents/Other/Strategic%20Plan/MultiYear04Chap1.pdf>

NTRSA (National Treasury Republic of South Africa). 2009. Estimates of public expenditure, water affairs and forestry. National Treasury Republic of South Africa, Pretoria, South Africa. Available from <http://www.treasury.gov.za/documents/Estimates%20of%20Public%20Expenditure/2009/default.aspx>

SA (South African) Government Information, Key Issues, Government Programs and Economic Opportunities, Environmental Programmes, 2005. URL <http://www.info.gov.za/issues/govtprog/envIRON.htm#wat> [accessed on 20 January 2011]

Sadan, M. 2004. Gendered analysis of the working for water programme: a case study of the Tsitsikama working for water project. Institute of Democracy in South Africa, Pretoria, South Africa.

Smith, M., D. de Groot, D. Perrot-Maître, and G. Bergkamp editors. 2006. Pay: establishing payments for watershed services. International Union for Conservation, Gland, Switzerland. Available from <http://data.iucn.org/dbtw-wpd/edocs/2006-054.pdf>

Turpie, J. K., C. Marais and J. N. Blignaut. 2008. The working for water programme: evolution of a payments for ecosystem services mechanism that addresses both poverty and ecosystem service delivery in South Africa. *Ecological Economics* **65**: 788-789.

Watershed Markets, Case Studies, Africa, South Africa – Working for Water, 2007. URL http://www.watershedmarkets.org/casestudies/South_Africa_Working_for_water.html [accessed on 20 January 2011]

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The European Union Water Framework Directive

Background

Environmental issues were first addressed by the European Economic Community, a precursor to the European Union (EU), in the early 1970s. In 1992 the Maastricht Treaty formed the EU and initiated an environmental program guided by the precautionary principle (EC, The European 2010). As a part of the EU, the European Commission (or the Commission) is a governing body composed of one representative from each member state that is responsible for proposing legislation to the European Parliament and for implementing laws that are passed (EC, The European 2010).

The precautionary principle, which guided the creation of the EU's environmental program, refers to the concept that large-scale restoration efforts must move forward in the face of scientific uncertainty. In 2000, the principle was elaborated upon by the Commission and was further developed at the 1992 Rio Conference on the Environment and Development (Europa, Glossary 2010). The resulting interpretation stated that the principle will be applied to environmental issues, "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (Commission 2000:11). In other words, mitigation actions should be taken when the available scientific evidence, even if incomplete, suggests that the current level of protection from a potential threat, environmental or other, is inadequate (Commission 2000). Three rules were set forth to guide when the precautionary principle is observed; 1) an independent evaluation of the level of scientific uncertainty must be completed, 2) an assessment of the potential risks and consequences of inaction must be completed, and 3) all interested parties must participate in the study of potential action. After these actions are taken, a decision will be made whether or not to act depending on whether the determined level of risk is *acceptable* (Europa, Glossary 2010).

Over time, the EU has worked to coordinate fragmented and reactionary regulations to create regional level integrated management with a preventative focus. In water policy, this shift towards integration was manifested in the European Water Framework Directive (WFD) which was initiated in 1995 and adopted in 2000 (Leb 2010). The WFD repealed seven old directives, effectively streamlining European water policy (EC, Environment 2010).

Europe's water resource sustainability is threatened by ground water salination, reduced flows, and diffuse pollution produced largely by agriculture (Europa 2006). In response, Europe's citizens and environmental organizations began to demand cleaner rivers, lakes, groundwater, and beaches (EC, Environment 2010). These feelings were confirmed by the opinion polls

conducted by Eurobarometer, a public opinion sector of the Commission formed in 1973 to track public sentiments (EC, Public 2010). A recent poll showed that nearly half of individuals

across all 25 EU member states named water pollution in their top five environmental concerns. Water pollution was listed by as many of 71 percent of respondents in individual countries. This public awareness and concern is a large reason behind the Commission's prioritization of water issues in its agenda. In order to demonstrate progress, create public awareness of the program, and to achieve lasting success, public participation is a huge part of WFD's strategy (EC, Environment 2010).

Water Framework Directive

The key aims of the WFD are to 1) expand the

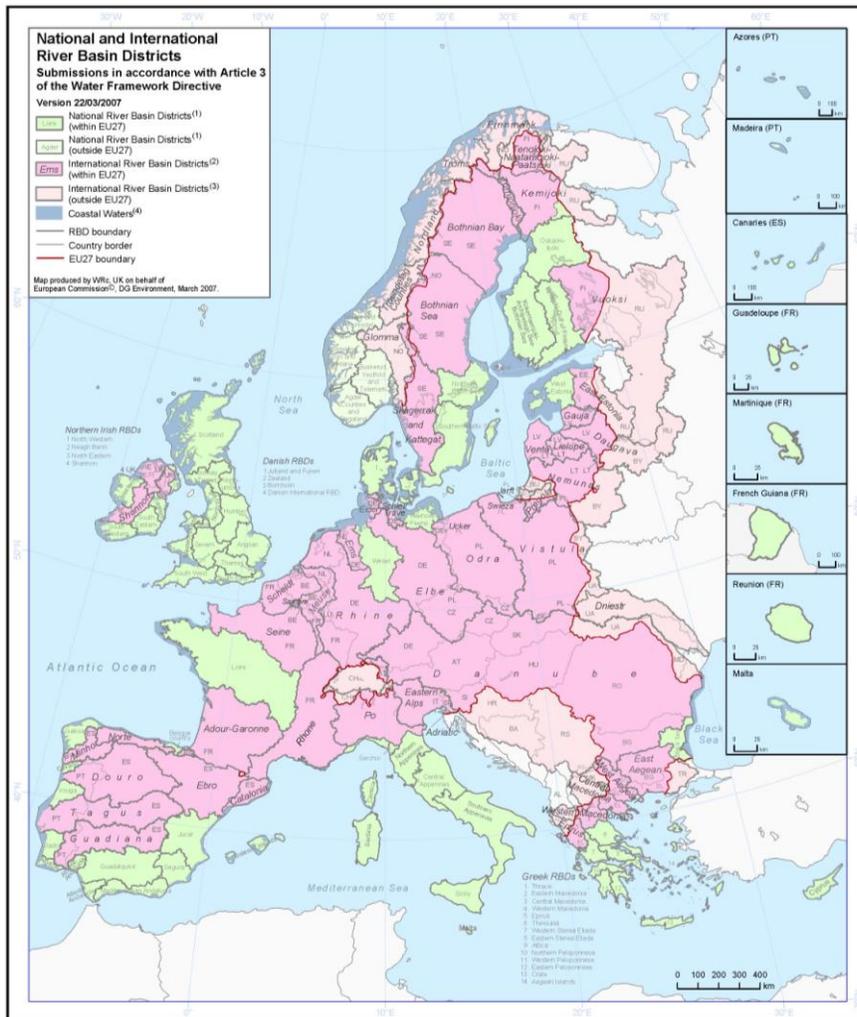


Figure 1: River Basin Districts in Europe.

scope of water protection to all surface and ground water, 2) achieve *good status* for all waters by a set deadline, 3) conduct water management actions based on river basin boundaries, 4) combine the approach to emission limit values and quality standards, 5) get the prices right (account for the true cost of water), 6) ensure citizen participation and education, and 7) streamline legislation (EC, Environment 2010).

Among the most compelling aspects of the WFD is the concept of *good status* of a water body. This refers to the condition achieved through the protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water. However, where *overriding policy objectives* interfere, derogations are allowed as long as appropriate mitigation actions are taken (EC, Environment

2010). This creates a statute of authority for ecological restoration that highly values biodiversity. For example, the directive has requirements for not only the abundance of aquatic invertebrate species, but for their diversity as well (Gumiero 2010, personal communication).

Additionally, the directive requires the creation of a management unit for each water basin. This creates an organized support system for and regulation of the progress of watershed groups. Each unit is required to complete a River Basin Management Plan (which will be updated every six years) that will account for the protection of aquatic ecology, unique and valuable habitats, drinking water resources, and bathing water (EC, Environment 2010).

The Framework carries with it the power to enforce these requirements as it is “binding upon member states with respect to the results that have to be achieved” (Leb 2010:2). Methods for attaining results are left up to the states but the directive must be transposed into national law. If a member state is not applying an EU law (such as WFD) correctly it can open an infringement procedure through a legal action known as a *letter of formal notice*. The country has a deadline to submit observations with respect to the allegation. If it is not resolved the Commission refers the state to the Court of Justice which has the power to impose penalty payments (Leb 2010).

The WFD also serves to streamline fragmented policies governing water quantity and quality. This helps to improve efficiency by creating consistency (EC, Environment 2010).

But perhaps the most important aspect of the WFD is its pledge to account for the true cost of water. In doing so the WFD approached the most contentious of its policies. Countries with a large, subsidized agricultural base were the most resistant to the legislation (Leb 2010).

WFD defined *water price* as “the unit or overall amount paid by users for all of the services that they receive in terms of water, including the environment” (Europa 2006). In an official communication the European Commission advocated the use of water pricing but not a policy of *pricing alone* (Europa 2000). Water pricing must be employed in combination with other EU policies (e.g. agricultural) to properly incentivize sustainable water use (Europa 2000; Europa 2006). The WFD will also serve as a useful mechanism to integrate water pricing into environmental protection through the creation of its river basin management plans (Europa 2000).

As stated by Environmental Commissioner Margo Wallstrom, “as with other scarce resources, water has a price, which users and polluters must pay. Through adequate water pricing we can ensure that water resources are protected at lower costs and help preserve water resources of high quality for future generations (Europa 2000).” She went on to state that “Several Member

States already make use of water charging, and we are not starting from scratch” (Europa 2000).

Critiques

Reactions to the WFD differed. The European Parliament, which is composed of directly elected representatives for all member states, found WFD deficient in some of areas. In contrast, the European Council, composed of member state ministers, wanted to weaken certain safeguards for water protection, in response to practical enforcement and economic concerns (Leb 2010).

Representatives throughout Europe in the water preservation field feel that the WFD is too ambitious, pushing to accomplish too many goals in too short a time frame (Franklin 2010, personal communication; Gumiero 2010, personal communication; Guti 2010, personal communication). However, they are encouraged by many of the increased environmental focus and regulatory authority that comes with the initiative and have an optimistic outlook regarding the legislation overall (Driver 2010, personal communication; Franklin 2010, personal communication; Gumiero 2010, personal communication; Guti 2010, personal communication; Piégay 2010, personal communication).

Progress

At this early stage in such a large-scale effort it is difficult to know whether or not the effort will succeed. Likely this will depend on the effectiveness and cooperation of member states’ implementation. Implementation is already occurring at an uneven rate and some areas already lag behind. Financial and technical assistance from the Commission could help these states catch up (Leb 2010).

Despite the legislation’s attention to funding issues, it is becoming apparent that member states are struggling to attain adequate funds to complete the first stages of the initiative (Osborn 2009). Thus, it seems that the users’ pay principle needs to be paired with another finance plan.

Funding - Users Pay the True Cost of Water

Water prices are rising around the globe due to ever increasing demands. The Earth Policy Institute estimates that they have risen 27 percent in the US, 32 percent in the United Kingdom, 45 percent in Australia, 50 percent in South Africa, and 58 percent in Canada. Such water prices generate substantial revenues. Transparency International estimated annual contracts and infrastructure projects in Western Europe, North America, and Japan at \$210 billion annually (Associated 2010).

The globally growing demand for water is presenting an enormous opportunity for water service businesses. Many feel that this also implies a greater responsibility. As the World Business Council for Sustainable Development (WBCSD) stated, “with population growth and economic development accelerating demand for everything, freshwater is becoming scarcer, and the full value of water is becoming increasingly apparent (Associated 2010).”

As of 2000, water pricing policies varied through the EU with costs being only partially recovered and environmental and resource costs are rarely considered at all. One of the major tenets of the WFD is that getting the *prices right* for water in Europe will encourage sustainable use and help to meet the goals of WFD in a cost-effective manner (Europa, European 2010). This was to be completed by 2010 (Associated 2010). In order for such a pricing mechanism to be effective, it must:

- 1) Be based on the costs and benefits of water use with the evaluation considering the costs of direct services as well as environmental and resource costs (Commission 2000). For example, the following issues should be considered (Associated Press 2010):
 - a. Infrastructure and maintenance
 - b. Transportation from the source to the user
 - c. Collection and treatment
 - d. Environmental costs such as reduced water levels and pollution affecting ecosystems and human health under the polluter pays principle.
 - e. Subsidies to ensure that water is affordable to certain populations or industries such as farming.
- 2) Be directly linked to the water quantity used and/or the pollution produced to ensure the pricing provides incentives both to reduce use and pollution levels (Europa, European 2010).

Subsidies may also be necessary to ensure that water is affordable to agriculture and the poor (Associated 2010). In Santiago, Chile water stamps are used in the model of food stamps to ensure that water is available to the poor (Liu 2000).

As stated earlier, perhaps the most innovative and important aspect of this policy is its focus on including environmental and resource costs. Such pricing policy will better recover water costs by assessing and internalizing environmental costs (Europa 2000).

To accurately set water costs to reflect their true costs, the WFD requires that each member state conduct an economic analysis of water use. This analysis must include environmental and resource costs in accordance with the polluter pays principle. Implementation of this process has been slow. As of 2007, only 14 of 25 member states had completed the initial reporting stage of the economic analysis (Associated 2010).

But as the subsidies briefly mentioned above suggest, applying economic principles directly to water is further complicated by the fact that water is not simply a commodity, it is a necessity of life. Thus, a basic principle of WFD is, “water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such” (European Parliament 2000:1).

United Nations’ (UN) Human Rights Council is currently conducting a feasibility study to determine if access to drinking water and sanitation could be designated as a basic human right. This report is expected in 2011. Leading the way, the United Kingdom (UK) in 2006 had already determined that access to water is a basic human right (Associated 2010).

The international community, including the UN, encouraged the privatization of water services as a solution to dealing with increasing costs. Many countries in Europe, led by France, took this advice. Recently they are reversing that trend and moving back towards public management. But it is felt by many in the field that a combination of public and private resources and systems will be necessary to meet demands. This also helps to stifle corruption in either public or private sectors which Transparency International found to be an enormous problem in developing and developed nations’ water sector. Its recommendations to limit this global phenomenon were to 1) strengthen independent, regulatory oversight; 2) ensure fair competition for water contracts; and 3) promote transparency and participation in water policies (Associated 2010).

Agriculture and Water Pricing

Agricultural irrigation, urban uses, and manufacturing comprise the main water demands in Europe (Associated 2010; Europa, European 2010). Of these, agricultural irrigation represents the largest use, estimated at 69 percent of water consumption at the EU level. This is likely a low estimate as illegal and unmetered water withdrawals are extremely common. This is clearly illustrated in Spain where approximately 45 percent of groundwater supplied to crops, golf courses, and urban areas is taken illegally (Associated 2010).

Current water pricing for agriculture is particularly inefficient. Currently subsidies for agriculture may actually encourage the inefficient use of water. By assigning true costs to water the EU hopes to encourage improved efficiencies in this sector (Associated 2010). As in the US, however, this is a difficult and complicated venture. One issue is that lower water quality standards are needed for agriculture as compared to drinking water. Thus, it is difficult to compare the treatment of other sectors to agriculture (Associated 2010). Another issue is that it is difficult and expensive to meter and record all water withdrawals made by the widely dispersed, rural agricultural sector in order to apply pricing mechanisms (Driver 2010, personal communication). A third, and not to be underestimated factor, is the power of the agricultural

lobby in the EU (an issue mirrored in the US) which will make it difficult to gain public and political support for any pricing changes (Leb 2010).

Lessons Learned

The following lessons learned, which may have some applicable for the Colorado River watershed, are broken down into those that are programmatic and those that are representative of the funding or financial mechanisms used by the EU's WFD.

Programmatic

1. **WFD provides the statute of authority for comprehensive environmental river basin management on a regional scale.** WFD sets specific operational and technical implementation obligations for EU states to be implemented by them using competent authorities for each river basin district.
2. **This international government involvement is aiding international environmental interactions.**
3. **Shared international borders provide additional pressure to act responsibly.**
4. **WFD has enacted a mechanism for adaptive management.** The EU continuously refines policy guidelines on a regional level through “multi-country dialogue within the framework of the Common Implementation Strategy (Leb 2010:5).”
5. **An accurate understanding of public values and public opinion on an issue helps to garner political attention. A major public value is *clean water and enough of it*.** The Eurobarometer allows the EU to gauge public opinion and shape policy accordingly.
6. **More progressive EU member states are leading the way for the more conservative states.** France is ahead of the curve as the WFD is partially based on its environmental policies (Piégay 2010, personal communication).
7. **The precautionary principle may support the European Union's WFD by erring on the side of environmental action.** The EU functions under the precautionary principle and applies it to environmental issues. This principle is becoming increasingly influential in the US (SEHN 2010).

Funding

1. **The WFD created a funding mechanism approach within its legislation that aligns with the EU's precautionary principle.**

2. **Assigning the true costs of water, including environmental impacts, will likely help the EU to encourage improved efficiencies, especially in the agricultural sector, while funding the large-scale restoration of its waterways.**

Literature Cited

Associated Press. 2010. Water, business and sustainability. Euractiv, London, United Kingdoms. Available from <http://www.euractiv.com/en/sustainability/water-business-sustainability/article-173757>

Commission of the European Communities. 2000. Communication from the commission on the precautionary principle. Commission of the European Communities, Brussels, Belgium. Available from http://ec.europa.eu/dgs/health_consumer/library/pub/pub07_en.pdf

Driver, A., 2010, Environment Agency, personal communication.

EC (European Commission), Environment, Water, Water Framework Directive, Introduction to the new EU Water Framework Directive, 2010. URL http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm [accessed on 12 August 2010]

EC (European Commission), Public Opinion, 2010. URL http://ec.europa.eu/public_opinion/index_en.htm [accessed on 2 September 2010]

EC (European Commission), The European Commission at work, Basic Facts, 2010. URL http://ec.europa.eu/atwork/basicfacts/index_en.htm [accessed on 3 September 2010]

Europa, Press Services, Press Releases, Press Release RAPID, Commission paves way for more efficient water pricing, 2000. URL <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/00/889&format=HTML&aged=0&language=EN&guiLanguage=en> [accessed on 2 September 2010]

Europa, Summary of EU Legislation, Environment, Water protection and management, Pricing and long-term management of water, 2006. URL http://europa.eu/legislation_summaries/environment/water_protection_management/l28112_en.htm [accessed on 12 August 2010]

Europa, European Commission, Environment, Resources, Legislation, Communication from the Commission to the Council, the European Parliament and the Economic and Social Committee: Pricing Policies for Enhancing the Sustainability of Water Resources, 2010. URL http://ec.europa.eu/environment/docum/00477_en.htm [accessed on 13 August 2010]

Europa, Glossary, Precautionary Principle, 2010. URL http://europa.eu/scadplus/glossary/precautionary_principle_en.htm [accessed on 3 September 2010]

European Parliament and the Council of the European Union. 2000. Directive 2000 /60/EC: establishing a framework for community action in the field of water policy. 2000. Official Journal of the European Communities **327**: 1-72. Available from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT>

Franklin, P., 2010, National Institute of Water and Atmospheric Research, personal communication.

Gumiero, B., 2010, University of Bologna, personal communication.

Guti, G., 2010, Danube Research Institute, personal communication.

Leb, C. 2010. SHARE toolkit: case studies: compliance, enforcement and dispute settlement under the EU water framework directive. IUCN Water Programme, Gland, Switzerland. Available from http://cmsdata.iucn.org/downloads/eu_wfd.pdf

Liu, S., 2000. Water pricing towards sustainability of water resources: a case study in Beijing. Lund University, Lund, Sweden. Available from http://www.lumes.lu.se/database/alumni/99.00/theses/liu_shao.pdf

Osborn, A. 2009. Water framework directive behind schedule. Utility Week. Available from <http://www.utilityweek.co.uk/features/europe/water-framework-directive-behi.php>

Piégay, H., 2010, Université de Lyon, personal communication.

SEHN (The Science and Environmental Health Network), Precautionary Principle, 2010. URL <http://www.sehn.org/precaution.html> [accessed on 3 September 2010]

Appendix D

Grant Opportunities Available for Riparian Restoration

The following information lists possible grant opportunities available for addressing riparian restoration. This information is referenced from the *Colorado River Basin Tamarisk and Russian Olive Assessment*, which was prepared by the Tamarisk Coalition for the seven Colorado River Basin States in December 2009. A copy of the full report is available at www.tamariskcoalition.org

This list of grant opportunities has been compiled as a tool to be used as a starting point for grant funding research. This list is not exhaustive and is designed only to provide an overview of available grants. For more detailed information, the resources listed below can be accessed or the funding source can be directly contacted.

- ✓ Environmental Grantmaking Foundations www.environmentalgrants.com
- ✓ Center for Invasive Plant Management www.weedcenter.org
- ✓ Federal Government www.grants.gov

The tables are divided into Non-profit Foundations, Corporate, and Other Funding Sources; Federal and State Grants; and Congress Chartered Foundations. The activities funded by the grantors have been categorized as Advocacy, Education, Policy, Direct Action, Research, and Start Up. The following categories are defined to aid in selecting appropriate grants. Individual grantors may define categories somewhat differently.

Advocacy (Adv) includes activities associated with communicating about riparian issues such as organizing community meetings or distributing public education materials.

Education (Edu) involves direct education programs to a targeted group.

Policy (Pol) is defined as activities related to influencing and/or developing environmental policies.

Direct Action (Dir) includes activities such as volunteerism, control, revegetation, and other direct implementations.

Research (Res) is defined as planning and implementing basic scientific research.

Start Up (SU) is defined as funds for a new project (“seed money”) or funds for a new organization.

Geographic information is included to indicate the physical locations that are emphasized by the grantor. The geographic information included in this report only reflects grants that are applicable to the seven Colorado River Basin States.

Blank spaces indicate that no information was available. **Grants and grantors are subject to change at any time for a variety of reasons. Funding sources are contacted for the most current information.**

Non profit Foundations, Corporate, and Other Funding Sources

Organization	Website	Geography	Award Range	Adv	Edu	Pol	Dir	Res	SU
Abelard Foundation West	www.commoncounsel.org	US	\$9,000 to \$12,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acorn Foundation	http://www.commoncounsel.org	Western US	\$5,000 to \$10,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Afognak Foundation		ID, WY	\$10,000 to \$100,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aksel Nielson Foundation		CO	\$100 to \$15,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Altria	www.altria.com	Altria plant locations	\$2,500 to \$50,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
American Express Philanthropic Program	home3.americanexpress.com/corp/csr.asp	US	varies	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
American Forests	www.americanforests.org	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
American Honda Foundation	http://corporate.honda.com/american/philanthropy.aspx	US	\$20,000 to \$87,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
American Landscape and Nursery Association	http://www.anla.org/research/growing_effectiveness.htm	US	\$5,000 to \$25,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
American Wildlife Conservation Foundation	http://www.americanwildlifeconservationfoundation.org/grants.htm	US		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Organization	Website	Geography	Award Range	Adv	Edu	Pol	Dir	Res	SU
Barbara Smith Fund	www.jaf.org	US	\$1,000 to \$10,000	<input type="checkbox"/>					
BASF	http://www.emnrd.state.nm.us/FD/FWHPlan/documents/matchgrantprogram.pdf	US	up to \$20,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BASF Invasive Vegetation Management Vegetation Management Matching Grant		US	\$20,000 as non-federal matching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ben and Jerry's Foundation	www.benjerry.com/foundation	US	\$1,001 - \$15,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Beneficia	www.beneficiafoundation.org	US	,000. In most instances, grants are	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BF Foundation		NM, CO	\$500 to \$7,500	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boat US	www.boatus.com/foundation/cleanwater/grants	US	\$1,000 - \$4,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boeing - Global Corporate Citizenship	http://www.boeing.com/company/offices/aboutus/community/focus_objectives.html	US	state, CO \$5,000 to \$10,000, CA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Bradshaw Knight Foundation	www.bkfund.org	CO, Delta County	\$30 to \$30,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bridgeston Firestone Trust Fund	http://www.bridgestone-firestone.com/trustfund.asp	US		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Brindle Foundation		NM	\$2,500 to \$30,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bydale Foundation		US	\$2,500 to \$25,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Caleb C. and Julia W. Dula Educational Charitable Foundation		US	\$5,000 to \$50,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Captain Planet Foundation	www.captainplanetfdn.org	US	\$250 to \$2,500	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cedar Tree Foundation	cedartreefound.org	US	\$5,000 to \$200,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Center for Invasive Plant Management	www.weedcenter.org			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Charles Delmar Foundation		US	\$250 to \$3,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Charles Stewart Mott	www.mott.org	US	\$100,000 to \$500,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cheeryble Foundation		US	\$900 to \$50,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Christensen Fund	www.christensenfund.org	S.W. US	\$50,000 to \$200,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Cinnabar Foundation		WY, MT	\$1,000 to \$9,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clark Charitable Trust		US	\$1,000 to \$15,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Colorado Tree Coalition	http://www.coloradotrees.org/	CO	\$500-\$1500	<input type="checkbox"/>					
Community Foundation Serving Boulder City	http://www.commfound.org/grants/funds.html	Mostly CO		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conservation and Research Foundation		US	\$100 to \$3,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Conservation Trust Grants from National Geographic Society	www.nationalgeographic.com/research/grant/rg2.html		\$15,000 to \$20,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Donnell Initiative Fund		CO	\$10,000 to \$20,000	<input type="checkbox"/>					
Doris Duke Charitable Foundation	http://www.ddcf.org/page.asp?pageId=1	US	\$125,000 - \$2mil multi-year grant	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eddy Foundation		US	\$150 to \$10,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Education Foundation of America	www.efaw.org	US	\$30,000 to \$160,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
El Pomar Foundation	www.elpomar.org	CO	\$2,500 to \$10,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Elinor Patterson Baker Foundation		US	\$2,000 to \$75,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Environmental Systems Research Institute (ESRI) Conservation Technology Support Program	http://www.conservationgis.org/aa_gisgrant.html	US		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Trust		CO	\$5,000 to \$27,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ESRI Conservation Program	http://www.conservationgis.org/aa_esrigrants.html	US		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ESRI Grant Assistance Program	http://www.esri.com/grants/	US		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fairfax Foundation		US	\$1,000 to \$75,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Firman Fund		CO	\$1,000 to \$15,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FishAmerica Foundation	www.asafishing.org/faf	US	\$7,500.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ford Foundations	http://www.fordfound.org/	US		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Ford Motor Company Fund	www.ford.com	US	\$600 to \$1,200,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Freeport-McMoRan Copper and Gold	http://www.fcx.com/envir/pdf/community/CharitableGivingGuidelinesJune2007Update.pdf	US		<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Fund for Wild Nature	www.fundwildnature.org	US	\$1,000 to \$3,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gates Foundation	http://www.gatesfamilyfoundation.org/	CO	\$20,000 to \$220,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General Service Foundation	http://www.generalservice.org/default.htm	Western US	\$25,000 - \$100,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gibbet Hill Foundation		US	\$10,000 to \$122,500	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Great Outdoors Colorado Open Space	http://www.goco.org/Home/tabid/106/Default.aspx	CO		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Harder Foundation	www.harderfoundation.org	CO, ID, MT, NV, OR, UT, WA, WY	\$1,000 and \$35,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Harris and Frances Block Foundation	www.blockfound.org	US	Small grants	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hawley Family Foundation		US	\$2,000 to \$50,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Helen K. and Arthur E. Johnson Foundation	http://www.johnsonfoundation.org/	CO	\$25,000 to \$100,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermountain West Joint Venture Project	http://iwjv.org/	Intermountain West	Max \$100,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
J.M. Kaplan Fund, Inc.	www.jmkfund.org	Border regions	\$75 to \$220,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jacob and Terese Hershey Foundation		CO, TX		<input checked="" type="checkbox"/>	<input type="checkbox"/>				
James M. Cox Foundation		Areas in which Cox Enterprises	\$20,000 to \$200,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
James M. Cox Jr. Foundation		Areas in which Cox Enterprises	\$20,000 to \$45,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jenifer Altman Foundation	http://jaf.org/apply/index.html	US	\$1,000 to \$10,000	<input checked="" type="checkbox"/>					
Justine & Leslie Bialy Charitable Trust		Pre-selected in CO	\$12,500 to \$17,538	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Katz Family		US	\$1,000 to \$28,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lawrence Foundation	http://thelawrencefoundation.org			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Liz Claiborne and Art Ortenberg Foundation	www.lcaof.org	Northern Rocky Mountain Region	\$50,000 to \$200,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Maki Foundation		Rocky Mountain Region	\$3,000to \$10,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Max and Anna Levinson Foundation	www.levinsonfoundation.org	Southwestern US	\$2,500 to \$5,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
McGrath Investment Foundation		CO, OR	\$8,500 to \$14,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Mitsubishi Corporation Foundation for the Americas	http://www.mcfamericas.org/	US	\$20,000 - \$500,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nathan Cummings Foundation	www.nathancummings.org	US		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
New Mexico Energy	http://www.emnrd.state.nm.us/FD/	NM	up to \$85,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
New-Land Foundation		AK, CO Plateau	\$5,000 to \$30,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Norcross Wildlife Foundation Inc.	www.norcrossws.org	US	Max \$10,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patagonia	www.patagonia.com	US	\$3,000 to \$8,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
R.E.I	www.REI.com	US		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ralph L. Smith Foundation		CO, AZ, CA, OR	\$1,000 to \$62,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RBC Blue Water Project	http://www.rbc.com/donations/blue-water.html	US	up to \$500,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Rockefeller Family Fund, Inc.	www.rffund.org	US		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rockefeller Philanthropy Advisors	www.rockpa.org	US		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ruth H. Brown Foundation		CO, Western US	\$5,000 to \$20,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sandler Family Supporting Foundation		US	\$20,000 to \$500,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sears-Swetland Foundation	http://foundationcenter.org/	US		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shapiro Family Charitable Foundation		US	\$250 to \$2,500	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steven C. Leuthold		US	\$100 to \$40,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Surdura Foundation	www.surdna.org		\$50,000 to \$200,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tapeats Fund		US	\$2,500 to \$50,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Conservation Alliance	http://www.conservationalliance.com/grants	North America	up to \$35,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Conservation Fund Kodak American Greenway Awards Program	http://www.conservationfund.org/kodak_awards	US	\$500-\$2,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The George S. and Dolores Doré Eccles Foundation Preservation and Conservation Grants	http://www.gsecclesfoundation.org/preservation/index.html	UT	\$1,000 to \$1,000,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Tides Foundation	www.tides.org/tides-foundation/index.html	US	\$10,000 - \$200,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tides Foundation	www.tidesfoundation.org	US	\$7,000 to \$10,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tiffany & Co. Foundation	http://www.tiffanyandcofoundation.org/grants/	US	\$30,000 up to \$1,000,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tourism Cares - Worldwide Grant Program	http://www.tourismcares.org/RelId/606053/ISvars/default/WorldwideGrant_Prog.htm	US		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Towards Sustainability Foundation		US	\$2,500 to \$50,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Town Creek Foundation	www.towncreekfdn.org	US	\$5,000 to \$75,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toyota USA Foundation	www.toyota.com/about/our_commitment/philanthropy/education/grants/	US	\$90,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trout Unlimited	http://www.tu.org/site/c.kkLRJ7MSKtH/b.3198137/k.9DD6/EmbraceASStream.htm	US	up to \$10,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Turner Foundation	http://www.turnerfoundation.org/grants/gp.asp	AZ, NM		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Unity Avenue Foundation	www.srinc.biz	US	\$4,000 to \$20,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wallace Genetic Foundation	www.wallacegenetic.org	US	\$25,000 to \$40,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Weeden Foundation	http://www.weedenfdn.org			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Western Colorado Community Foundation	http://www.wc-cf.org/	Western CO	\$500 and \$1,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Whole Systems Foundation	www.whole-systems.org	US	\$500 to \$5,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wiegers Family Foundation		CO	\$250 to \$75,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Wilburforce Foundation	www.wilburforce.org	AZ, MT, ID, UT, NM, OR, WA, WY	\$10,000 to \$650,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wildlife Forever	http://www.wildlifeforever.org/	US	\$1,000 to \$10,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wildlife Habitat Policy Research Program	http://www.whprp.org	US	\$50,000 to \$190,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
William and Flora Hewlett Foundation	www.hewlett.org	Western US	\$20,000 - \$50,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
William C. Kenney Watershed Protection Foundation	http://www.kenneyfdn.org/	CO, AZ, CA, MT, NV, NM, OR, UT	\$5,000 to \$75,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
William E. Weiss Foundation		US	\$5,000 to \$25,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
William H. & Mattie Wattis Harris Foundation		US	\$1,000 to \$10,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Winn Foundation Trust		US		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Winslow Foundation		US	\$250 to \$100,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Wolcott Family Foundation	http://www.wolffoundation.org/	CO	\$1,000 - \$7,500	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Organization</u>	<u>Website</u>	<u>Geography</u>	<u>Award Range</u>	<u>Adv</u>	<u>Edu</u>	<u>Pol</u>	<u>Dir</u>	<u>Res</u>	<u>SU</u>
Wyoming Community Foundation	http://www.wycf.org/grants.asp	WY	various	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wyss Foundation	www.wyssfoundation.org	Intermountain West	\$1,000 to \$300,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Federal and State Funding Sources

Organization	Website	Geography	Award Range	Adv	Edu	Pol	Dir	Res	SU
Arizona Department of Parks and Recreation	www.azstateparks.com/grants/downloads/FY2009_SLIF_Rating_Criteria.pdf	AZ	\$10,000 - \$50,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arizona Department of Water Resources (ADWR)	http://www.awpf.state.az.us/	AZ	\$4 million will be available for awards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Arizona Game & Fish	www.azgfd.gov/w_c/heritage_program.shtml	AZ	\$10,000 - \$50,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arizona State Parks	www.pr.state.az.us/partnerships/grants/grants.html	AZ	\$10,000 - \$500,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arizona Water Protection Fund	http://www.awpf.state.az.us/	AZ	\$30,000- \$300,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Army Corps of Engineers	http://www.aocweb.org/emr/Portals/2/Section%202006%20Restoration%20Grants.pdf	US	35% local match of total project costs required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AZ Dept of Env Quality - Water Quality Improvement grants	http://www.azdeq.gov/environ/water/watershed/outreach.html-grants	AZ		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
AZ Game and Fish Department	http://www.azgfd.gov/w_c/heritage_apply.shtml	AZ	up to \$100,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Organization	Website	Geography	Award Range	<i>Adv</i>	<i>Edu</i>	<i>Pol</i>	<i>Dir</i>	<i>Res</i>	<i>SU</i>
U.S. Bureau of Reclamation (USBR)	http://www.usbr.gov/newsroom/presskit/factsheet/factsheetdetail.cfm?recordid=3	Western US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
U.S. Fish and Wildlife Service (USFWS)		US	10% non-federal match required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Bureau of Indian Affairs	www.federalgrantswire.com/bureau-of-indian-affairs-department-of-the-interior-federal-grants.html	Reservations	\$2,000 - \$10,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Bureau of Indian Affairs	www.federalgrantswire.com/bureau-of-indian-affairs-department-of-the-interior-federal-grants.html	Reservations	\$10,000 - \$1,000,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Bureau of Indian Affairs	www.federalgrantswire.com/bureau-of-indian-affairs-department-of-the-interior-federal-grants.html	Reservations	\$1,500 - \$22,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Bureau of Land Management (BLM)		NM	\$1,000 - \$75,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Department of Commerce National Oceanic and Atmospheric Administration (NOAA)	http://www.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/partners_funding/callforprojects4.html	US	\$30,000 - \$250,000, 1:1 match required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Dept. of Agriculture	http://www.ers.usda.gov/Briefing/InvasiveSpecies/preis.htm	US	\$50,000 to \$250,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
US Dept. of Agriculture	grants.gov	US	\$146,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Organization	Website	Geography	Award Range	<i>Adv</i>	<i>Edu</i>	<i>Pol</i>	<i>Dir</i>	<i>Res</i>	<i>SU</i>
US Dept. of Agriculture	www.nrcs.usda.gov/programs/whip	US	Up to 75% Cost Share.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Dept. of Agriculture	http://wsare.usu.edu/	Western US	\$15,000 to \$150,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
US Dept. of Interior		Colorado River (excluding UT)	\$20,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
US Dept. of Interior		US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Environmental Protection Agency (EPA)	http://www.epa.gov/owow/wetlands/restore/5star/index.html	US	\$5,000 to \$20,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Environmental Protection Agency (EPA)	http://www.federalgrantswire.com/surveys-studies-investigations-training-demonstrations-and-special-purpose-grants-for-		\$15,000 to \$4,970,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
US Environmental Protection Agency (EPA)	http://www.epa.gov/twg/	US	Max \$900,000, 25% local match of total project costs required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Environmental Protection Agency (EPA)	http://www.epa.gov/owow/wetlands		Loans can cover 100% of eligible costs. Interest rates between market rate and 0%.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US Environmental Protection Agency (EPA)	http://www.epa.gov/owow/wetlands/	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Organization	Website	Geography	Award Range	<i>Adv</i>	<i>Edu</i>	<i>Pol</i>	<i>Dir</i>	<i>Res</i>	<i>SU</i>
US Fish and Wildlife Service	http://www.fws.gov/coloradofishandwildlife/	CO	Cost share of 50% encouraged but NOT required	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
US National Park Service (NPS)	www.nps.gov/ncrc/programs/ccsp/	US	\$7,000 to \$21,000, 1:1 non-federal match required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
US National Park Service (NPS)	www.nps.gov/rtca/	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA with technical support from NRCS	http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=cep	US	A Federal annual rental rate is offered, plus cost-share of up to 50% of eligible costs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA Animal and Plant Health Inspection Service (APHIS)		US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USDA APHIS	www.aphis.usda.gov/planthealth/	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USDA Cooperative State Research, Education and Extension Service (CSREES)	http://www.csrees.usda.gov/fo/weedyinvasivespeciesnr.i.cfm	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USDA CSREES	http://www.invasivespeciesinfo.gov/docs/news/teamtam/tamarisk%20grants%20ARS.%20CSREES.%20FSDoc	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USDA Forest Service (FS)	http://www.invasivespeciesinfo.gov/docs/toolkit/usdagrants2007.pdf	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Organization	Website	Geography	Award Range	<i>Adv</i>	<i>Edu</i>	<i>Pol</i>	<i>Dir</i>	<i>Res</i>	<i>SU</i>
USDA Natural Resources Conservation Service (NRCS)	http://www.nrcs.usda.gov/Programs/WRP/	US	Options are permanent easement, 30-year easement, and restoration cost-share agreements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA NRCS	http://www.nrcs.usda.gov/programs/cig/	US	\$75,000 to \$500,000 Max \$1 Million	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA NRCS			50% match required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USDA NRCS		US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USDA NRCS	http://www.nrcs.usda.gov/programs/cta/	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA NRCS	http://www.nrcs.usda.gov/programs/watershedsurvey/	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA NRCS	www.usda.gov	US	EQIP may cost-share up to 75% of the costs of certain conservation practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA NRCS	http://www.nrcs.usda.gov/programs/glci/	US	\$50,000 to \$500,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USDA NRCS and FS		Grasslands		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Organization	Website	Geography	Award Range	<i>Adv</i>	<i>Edu</i>	<i>Pol</i>	<i>Dir</i>	<i>Res</i>	<i>SU</i>
USDA, Economic Research Service (ERS)	http://www.ers.usda.gov/briefing/InvasiveSpecies/preism.htm	US		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
USFWS	http://wsfrprograms.fws.gov/Subpages/GrantPrograms/LIP/LIP.htm	National	Reimbursement basis for up to 75% of the project costs up to \$200,000.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USFWS	http://ecos.fws.gov/partners/viewContent.do?viewPage=home	US	1:1 Match	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USFWS	http://www.fws.gov/nativeamerican/	National	maximum award for any one project under this program is \$200,000.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USFWS	http://www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm	US	Max \$75,000, 1:1 non federal match required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wyoming Department of Agriculture	wyagric.state.wy.us/news/eminsectmgmtinfo/2009EIMGApplicationFinal.doc	WY	\$200,000 awarded annually	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wyoming Wildlife and Natural Resource Trust	http://wwnrt.state.wy.us/application.htm	WY	\$600,000 in 2006. Wyoming Legislature added \$1,500,000 in 2007	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Congress Chartered Foundations

Organization	Website	Geography	Award Range	Adv	Edu	Pol	Dir	Res	SU
National Environmental Education Foundation (NEEF)	www.neetf.org	US		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
National Fish and Wildlife Foundation (NFWF)	www.nfwf.org	US, Golf Courses	Max \$30,000, 1:1 non federal match required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
National Forest Foundation (NFF)	www.natlforests.org	US	\$500 to over \$100,000, 1:1 non federal match required	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
National Parks Foundation (NPF)	www.nationalparks.org	National Parks		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
National Science Foundation (NSF)	http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5361	U.S.	\$75,000 to over 1 million	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NFF	www.natlforests.org	US	Max of \$50,000, 1:1 non federal match required	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Organization	Website	Geography	Award Range	<i>Adv</i>	<i>Edu</i>	<i>Pol</i>	<i>Dir</i>	<i>Res</i>	<i>SU</i>
NFWF	www.nfwf.org	US	2:1 non federal match required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NFWF	www.nfwf.org	US	\$5,000 to \$15,000, 1:1 matching funds required	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
NFWF	www.nfwf.org	US		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NFWF	www.nfwf.org	US	\$5,000 to \$20,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NFWF	www.nfwf.org	US	\$10,000 to \$50,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NFWF	www.nfwf.org	US	\$5,000 to \$20,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Organization	Website	Geography	Award Range	<i>Adv</i>	<i>Edu</i>	<i>Pol</i>	<i>Dir</i>	<i>Res</i>	<i>SU</i>
NFWF	www.nfwf.org	ConocoPhillips Presence	Min \$25,000, 1:1 non federal match required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NFWF	www.nfwf.org	US	\$50,000-\$300,000, 2:1 non federal match required	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NFWF, USFWS, National Wildlife Refuge System, National Conservation Training Center (NCTC), and National Wildlife Refuge Association	http://www.fws.gov/refuges/education/natureOfLearning/index.html	US	\$10,000 for start-up; \$5,000 for continuing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>