Riparian Vegetation Response to High-Magnitude Dam Releases on the Dolores River, SW Colorado

PRESENTERS:
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BACKGROUND:

The Dolores River is a model for flow management decisions that are increasingly informed by robust science in efforts to support native fish and more natural floodplain dynamics. Multiple drought years and low flows cause challenging shifts in river bank vegetation – could a "big spill" in 2017 reverse this trend?

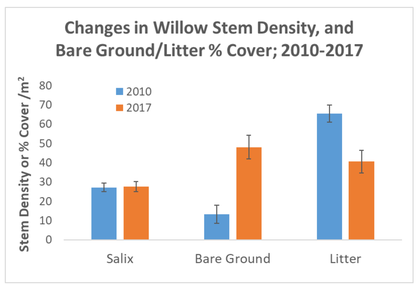
METHODS

- Compared willow stem density in transects along banks from 2010 (post-drought) with 2017 (post-spill).

A typical willow transect, 2017

RESULTS of 2017 spill:

- **Channel scour improved** fish habitat.
- **Groundwater recharge** was **substantial**.
- Willow **stem density** did **not change** pre-(2010) vs post-spill (2017) (n=36, p=0.9).
- Post-spill sediment deposition **increased bare ground** and **decreased litter** cover (n=36, p≤0.01)



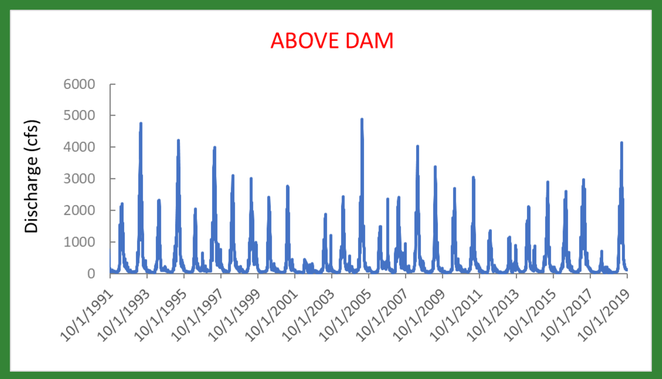
Learn more:

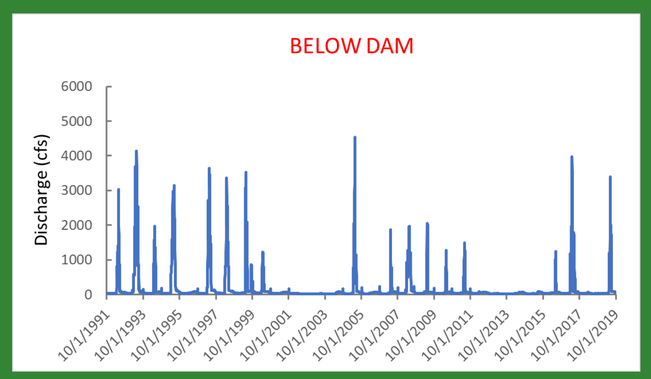
- Data, repeat photos, and summaries of 2017 pre- and post-spill monitoring coming soon to **doloresriver.org**

After 4 years of drought & low flow (~20 cfs in photo)
(Photo: Gigi Richard)

After prolonged spill with 4000 cfs peak (~300 cfs in photo)
(Photo: Julie Knudson)

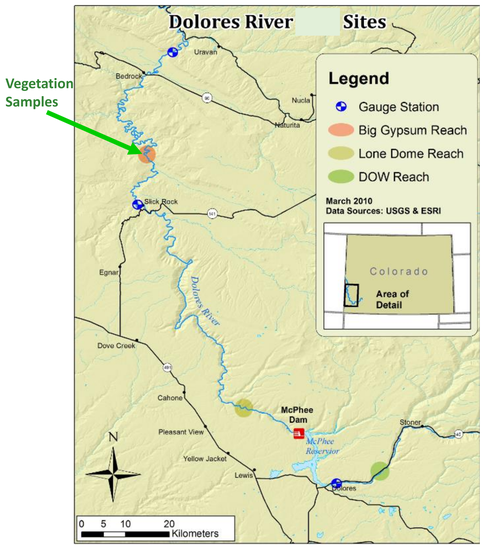
Higher magnitude dam spills have **many benefits**, but it takes **more than one** moderate flow event **to scour** vegetation-armored **banks**.





Dolores River hydrographs, 1990-2019
Multi-year drought and low flows lead to bank-armoring willow growth and channel narrowing.

from USGS gage *Dolores River at Dolores* (above dam) and Colorado DWR gage *Dolores River Below McPhee* (below dam)



FLOW INFO:

- Peak flows pre-dam 3000-8000 cfs
- Post-dam peaks 4000 cfs only in 1993, 2005, 2017 (2019 peak = 3500);
  Average peak = 800-2000 cfs.
- Drought flows = 15-80 cfs, → bank armoring

2003 river banks (at low flow) vs. 2017 river bank (at higher flow). Willow growth in the intervening 14 years has armored banks and reduced habitat complexity in and out of channel. (Photos: G. Richard; C. Dott)

KEY TAKE-HOMES:

- High magnitude spills have many benefits!
- Multiple years of low flow leads to bank armoring
- 1 year high flow not enough to un-do – but what about *multiple* years of high flows? …post-2019…?
- **Timing** of high flows key for recruitment of cottonwood; 2017 spill may have missed this window
- Riparian habitat – **novel system?** Down-scaled flow → fundamentally **different** floodplain
- Max flows now possible are not high enough magnitude (max 4000) to re-set the system

Download the poster!