Southwestern Willow Flycatcher status and habitat restoration efforts on the Virgin River, Washington Co., Utah

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Southwestern Willow Flycatcher
_Empidonax traillii extimus_

**Breeding Habitat**
- Lowland riparian forest
  - Early successional
  - Heterogeneous structure
  - Dense vegetation 2-4 m height
- Associated with water
  - Still–slow moving; saturated soil
Southwestern Willow Flycatcher
*Empidonax traillii extimus*

**Breeding Biology**
- **Territorial**
  - Territory size 0.2 – 0.5 ha
- **Facultative polygynous**
- **Nests**
  - Female builds
  - Compact cup of grasses, plant fibers
  - Fork of tree, 2–5 m above ground
Southwestern Willow Flycatcher
*Empidonax traillii extimus*

**Breeding Biology**

- **Eggs**
  - Clutch size 2–4 eggs
  - Female incubates, 12–13 d

- **Parental care**
  - Male & female feed nestlings, 12–15 d
  - Fledglings remain in territory 14+ d
Virgin River at St George, UT
UDWR monitoring (2008-2020)

Virgin River at St George, UT

Microhabitat / vegetation

Population surveys

Nest monitoring
Tamarisk Leaf Beetles
(*Diorhabda carinulata*)
in St George
Tamarisk Leaf Beetles (Diorhabda carinulata) in St George

• Introduced in 2006

• Tamarisk defoliation:
  • 2008: August, *after* SWFL breeding
  • 2009: June  *peak* SWFL breeding
  • 2010: June  breeding
Tamarisk Leaf Beetles (*Diorhabda carinulata*) in St George

- Introduced in 2006

- Tamarisk defoliation:
  - 2008: August, *after* SWFL breeding
  - 2009: June
  - 2010: June
  - 2011-2017: July-August, *after* SWFL breeding
Tamarisk Leaf Beetles (*Diorhabda carinulata*) in St George

- Introduced in 2006

- Tamarisk defoliation:
  - 2008: August, *after* SWFL breeding
  - 2009: June
  - 2010: June
  - 2011-2017: July-August, *after* SWFL breeding
  - 2018: early July
  - 2019: early July
  - 2020: mid-July *late* SWFL breeding

24 June 2019

16 July 2019
Beetle-induced tamarisk defoliation

- Affects nest site microclimate
  - Higher temp, Lower RH
  - Decrease hatching success

- Affects nest concealment
  - Increase predation
  - Increase brood parasitism
Total breeding SWFLs

Number of birds

- Males
- Females

Year:
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

Values:
- Males: 16
- Females: 7
- Males: 8
- Females: 5
- Males: 6
- Females: 7
- Males: 5
- Females: 7
- Males: 6
- Females: 5
- Males: 7
- Females: 5
- Males: 6
- Females: 7
- Males: 5
- Females: 7
- Males: 6
- Females: 7
- Males: 5
- Females: 7
- Males: 6
- Females: 7
- Males: 5
- Females: 7
Total fledglings (2008-2020)

<table>
<thead>
<tr>
<th>year</th>
<th>active nests</th>
<th>fledglings</th>
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<tbody>
<tr>
<td>2008</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>2009</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>2011</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>2012</td>
<td>19</td>
<td>14</td>
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<tr>
<td>2013</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>2014</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>2015</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>2016</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>2017</td>
<td>14</td>
<td>29</td>
</tr>
<tr>
<td>2018</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>2019</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>2020</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

Average 14.4 15.5
Apparent nest success
(% of active nests producing at least 1 SWFL fledgling)

2008: 70%
2009: 13%
2010: 30%
2011: 35%
2012: 37%
2013: 80%
2014: 56%
2015: 47%
2016: 40%
2017: 71%
2018: 44%
2019: 58%
2020: 44%
Cause of Failure

- Hatch failure
- Predation
- Parasitism
- Abandoned
- Unknown

Percentage of total nests

Year: 2008 to 2020
Brown-headed Cowbird Parasitism
# Brown-headed Cowbird Parasitism

<table>
<thead>
<tr>
<th>Year</th>
<th>Active flycatcher nests</th>
<th>Parasitized nests</th>
<th>Parasitism rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>10</td>
<td>2</td>
<td>20.0%</td>
</tr>
<tr>
<td>2009</td>
<td>15</td>
<td>6</td>
<td>40.0%</td>
</tr>
<tr>
<td>2010</td>
<td>20</td>
<td>5</td>
<td>25.0%</td>
</tr>
<tr>
<td>2011</td>
<td>17</td>
<td>10</td>
<td>58.8%</td>
</tr>
<tr>
<td>2012</td>
<td>19</td>
<td>9</td>
<td>47.4%</td>
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<td>2013</td>
<td>10</td>
<td>2</td>
<td>20.0%</td>
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<td>2014</td>
<td>16</td>
<td>10</td>
<td>62.5%</td>
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<tr>
<td>2015</td>
<td>17</td>
<td>6</td>
<td>35.3%</td>
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<td>2016</td>
<td>10</td>
<td>5</td>
<td>50.0%</td>
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<tr>
<td>2017</td>
<td>14</td>
<td>2</td>
<td>14.3%</td>
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<tr>
<td>2018</td>
<td>18</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>2019</td>
<td>12</td>
<td>2</td>
<td>16.7%</td>
</tr>
<tr>
<td>2020</td>
<td>9</td>
<td>1</td>
<td>11.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>187</strong></td>
<td><strong>60</strong></td>
<td><strong>32.1%</strong></td>
</tr>
</tbody>
</table>
Brown-headed Cowbird Control

- **2013** = 53 cowbirds removed
  - Snipe Pond and Y-Drain Marsh
- **2014** = 65 cowbirds removed
  - Riverside Marsh and Schmutz Drain
- **2015** = 70 cowbirds removed
  - Riverside Marsh and Schmutz Drain
- **2016** = 77 cowbirds removed
  - Riverside Marsh and Schmutz Drain
- **2017** = 59 cowbirds removed
  - Riverside Marsh and Y-Drain Marsh
- **2018** = 20 cowbirds removed
  - Riverside Marsh and Y-Drain Marsh
- **2019** = 11 cowbirds removed
  - Y-Drain Marsh
- **2020** = 64 cowbirds removed
  - Seegmiller Marsh, Y-Drain Marsh, and Brinton Pond

- **Total 2013-2020** = **419 cowbirds**
Cowbird Control 2014-2016 – Schmutz Drain

- Parasitism rate
- Cowbirds removed

Bar chart showing the parasitism rate and cowbirds removed in 2014, 2015, and 2016.
Cowbird Parasitism – Y-Drain Marsh

<table>
<thead>
<tr>
<th>Year</th>
<th>% of active nests</th>
</tr>
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<tbody>
<tr>
<td>2016</td>
<td>83%</td>
</tr>
<tr>
<td>2017</td>
<td>25%</td>
</tr>
<tr>
<td>2018</td>
<td>0%</td>
</tr>
<tr>
<td>2019</td>
<td>0%</td>
</tr>
</tbody>
</table>

No cowbird control

Active cowbird control
SWFL numbers in St George, 2008-2020

Females: distribution shift; overall number minimal change, 2020 decline

- Riverside Marsh
- Riverside East
- River Rd Bridge
- Seegmiller Marsh
- Y-Drain Marsh
- Snipe Pond
- Brinton Pond

Total # of birds by site:

- All Sites

2008 2009 2010 2011
2012 2013 2014 2015
2016 2017 2018 2019
2020

Distribution shift observed with minimal overall change in numbers, noticeable decline in 2020.
SWFL numbers in St George, 2008-2020

Males: distribution shift; overall number minimal change after 2009 decline
Habitat use shifts (2010, 2014)
-- nest site dominant species (5m-radius)

Defoliation first coincides with peak SWFL breeding
Defoliation occurring after SWFL breeding
Defoliation occurring late SWFL breeding

Percentage of native and non-native species over the years from 2008 to 2020.
Brinton Pond
2017-2020
Microhabitat questions

-Do SWFL select microhabitat features?
  - Compare vegetation at nests & nonuse sites
  - Compare nest substrate use given availability

-Are microhabitat features associated with nest success?
  - Compare nest substrate use at successful and unsuccessful nest sites
  - Compare vegetation at successful and unsuccessful nest sites

-What do results suggest about habitat restoration and enhancement?
Nests are located in areas with high shrub and sapling density; low tree density.

Microhabitat features at nesting sites:

- Nests are located in areas with high shrub and sapling density; low tree density.
Nest success habitat-mediated

Nests more likely to fledge in tamarisk than willow substrates

$X^2 = 22.4, \text{df} = 1, P < 0.001$

Nests more likely to fledge with higher tamarisk shrub density

$P = 0.001$
Nest concealment may contribute to nest success if visual (avian) predators important

Coyote willow only

Mixed coyote willow-tamarisk

Tamarisk adds structural complexity to coyote willow-dominated habitat—increases concealment
Habitat restoration and enhancement

- Tamarisk-dominated habitat preferred by SWFL in the absence of beetle defoliation
- SWFL select for habitat with sapling undergrowth and select against habitat with mature, old-growth willow
- Tamarisk shrubs valuable when mixed with native vegetation

- 1) Reduce tamarisk density by approx. 25-30%
   - Prioritize tamarisk trees for removal

- 2) Replant thinned areas with mix of native species that provide understory structure
   - e.g. Coyote willow, cottonwood, seep-willow

- 3) Prioritize areas with appropriate hydrology
Seegmiller Marsh Restoration

2011
Riverside East Restoration - 2017
Riverside East Restoration - 2017
Priorities for future work

-SWFL habitat restoration
  - Mitigation / ACE / Flood Control Authority
    - River Rd Bridge
    - Snipe Pond
    - Riverside East
    - Springs Pond outflow
    - Seegmiller Marsh

-Continue SWFL monitoring
  - Population size, nest success, & habitat use
  - Distribution
    - expand/increase survey sites
  - Cowbird control
    - continued management in 2021
  - Identify nest predators
    - video monitoring
Partners

Lower Virgin River Fuels & Fire Council
Northern Arizona University
US Bureau of Reclamation
US Fish & Wildlife Service
Utah Division of Forestry, Fire & State Lands
Utah’s Watershed Restoration Initiative
Virgin River Program
Washington County Habitat Conservation Plan
Washington County Water Conservancy District