Southwestern Willow Flycatcher status and habitat restoration efforts on the Virgin River in St George, Utah

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Utah Division of Wildlife Resources
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
- **Monogamous... mostly**
- **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
Southwestern Willow Flycatcher Recovery Plan (USFWS. 2002)

• Purpose:
  – Establish recovery goals and objectives
  – Recommend site-specific management
  – Estimate time and cost

• Six Recovery Units established
  – Encompass the extant of breeding range, which includes seven States (AZ, CA, CO, NV, NM, TX, UT)
  – Based on large watershed and hydrologic units (i.e. river basin boundaries)
  – Further subdivided into Management Units
    • Based on small hydrologic units (i.e. river drainages)
    • Include specific river reaches
    • 4-7 Management Units located within Recovery Units
St George Study Area

• Lower Colorado Recovery Unit
• Virgin Management Unit
  – Lower Santa Clara River from Pine Valley to Virgin River (UT)
  – North Fork of Virgin River in Zion NP to East Fork of Virgin River (UT)
  – Virgin River from Rockville to Beaver Dam Wilderness Area (UT)
  – Virgin River from Littlefield (AZ) to Lake Mead (NV)
• Critical Habitat designation (UT)
  – Berry Springs downstream to AZ state line (29.5 mi)
  – Utah DWR monitoring:
    • 5.5 mi within Washington City and St George
    • Additional surveys near Santa Clara City and Hurricane
UDWR monitoring (2008-2016)

Virgin River at St George, UT

Population surveys

Nest monitoring

Microhabitat / vegetation
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
  - 2010: June
  - 2011: late July
  - 2012: late July
  - 2013: late July
  - 2014: late July
  - 2015: late Aug
  - 2016: varied
Beetle-induced tamarisk defoliation

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

- Affects nest concealment
  - Increase predation
  - Increase brood parasitism
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>4</td>
<td>20.0%</td>
</tr>
<tr>
<td>2013</td>
<td>0</td>
<td>2</td>
<td>0.0%</td>
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<tr>
<td>2014</td>
<td>10</td>
<td>5</td>
<td>50.0%</td>
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<tr>
<td>2015</td>
<td>47</td>
<td>4</td>
<td>47.4%</td>
</tr>
<tr>
<td>2016</td>
<td>4</td>
<td>2</td>
<td>50.0%</td>
</tr>
</tbody>
</table>

Total: 134, 55, 41.0%
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
- **Total 2013-16** = **265 cowbirds**
Cowbird Control 2014-2016 – Schmutz Drain

- Parasitism rate
- Cowbirds removed
Total breeding SWFLs

- Males
- Females

<table>
<thead>
<tr>
<th>Year</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>2009</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>2010</td>
<td>11</td>
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<td>2011</td>
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<td>2012</td>
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<td>2014</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>2015</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>2016</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

# of birds
Apparent nest success
(% of active nests producing at least 1 SWFL fledgling)
<table>
<thead>
<tr>
<th>Site</th>
<th>Active nests&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Parasitized nests</th>
<th>Failed nests</th>
<th>Successful nests&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Total fledglings</th>
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</thead>
<tbody>
<tr>
<td>Riverside Marsh</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Riverside East</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>River Road Bridge</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Seegmiller Marsh</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>11</td>
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<tr>
<td>Y-Drain Marsh</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Snipe Pond</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>All sites combined</strong></td>
<td><strong>10</strong></td>
<td><strong>5</strong></td>
<td><strong>6</strong></td>
<td><strong>4</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

<sup>1</sup> Nests with confirmed Southwestern Willow Flycatcher eggs or nestlings.

<sup>2</sup> Nests producing ≥ 1 fledgling.
Total fledglings (2008-2016)

<table>
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<tr>
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<th>active nests</th>
<th>fledglings</th>
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<tr>
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<td>15</td>
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<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>
Habitat use shifts (2010, 2014)
-- nest site dominant species (5m-radius)

Defoliation first coincides with peak SWFL breeding
Defoliation occurring after SWFL breeding
SWFL numbers in St George, 2008-2016

**Females** distribution shift; overall minimal change, 2014-16 decrease
SWFL numbers in St George, 2008-2016

Males distribution shift; overall decline since 2009; 2014-16 decrease
Seegmiller Marsh
-tamarisk dominated

Snipe Pond
-willow dominated

2008-2009:

2010-2013:
2010-2013:

Seegmiller Marsh
-tamarisk dominated

Snipe Pond
-willow dominated

2014-2016:
Recommended Recovery Actions

• 1: Increase and improve currently and potentially suitable habitat

• 6.1: Determine habitat characteristics that influence occupancy and reproductive success
  – Plant species / habitat structure
    • Use vs. availability of exotic & native plant species
  – Microhabitat / microclimate
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?
Nest success habitat-mediated (2010-2011)

Nests more likely to fledge in tamarisk than willow substrates

\[ X^2 = 22.4, \, df = 1, \, P < 0.001 \]

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
Nest substrate and success

[Bar chart showing percentage of willow and tamarisk substrate over years 2008 to 2016, with trend line indicating nest success.]
Shrub and sapling stems (≤8 cm)

- High shrub and sapling density; low tree density

SWFL select nest sites (2012-2015):

- Lower number of willow trees than number of tamarisk trees
Habitat restoration and enhancement

- Tamarisk-dominated habitat (tamarisk trees = canopy) again becoming suitable for SWFL

- Tamarisk shrubs valuable when mixed with native vegetation

- Reduce tamarisk density by 50-60 %
  - Prioritize tamarisk trees for removal

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

- Prioritize areas with appropriate hydrology
January 28, 2014

February 3, 2014

Seegmiller Photo Point #3
January 11, 2016

April 20, 2016

River Rd Bridge
2016
River Rd Bridge
2016

August 4, 2016

November 3, 2016
Priorities for future work

-SWFL habitat restoration
  -Mitigation / ACE / BSA - Eagle Scout / FCA
    -River Rd Bridge
    -Above Johnson Diversion (JD 6)
    -Riverside East
    -Riverside Marsh
    -Y-Drain

-Continue SWFL monitoring
  -Population size, nest success, & habitat use
  -Distribution
  -Cowbird control
    - continued management in 2017
  -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