Southwestern Willow Flycatcher status, reproductive success, and habitat use on the Virgin River, 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
- **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
UDWR monitoring (2008-2012)

Virgin River at St George, UT
UDWR monitoring (2008-2012)

Virgin River at St George, UT

Population surveys

Nest monitoring

Microhabitat / vegetation
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
  
  • 2011: late July
    
    *after* SWFL breeding
  
  • 2012: late July
Beetle-induced tamarisk defoliation

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

- Affects nest concealment
  - Increase predation
  - Increase brood parasitism
SWFL numbers in St George, 2008-2012

Females shifted distribution, but no change overall

Number of breeding females

<table>
<thead>
<tr>
<th>Site</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tr>
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</table>

Riverside Seegmiller River Rd Bridge Riverside East Snipe Pond Y-Drain Marsh
All Sites
SWFL numbers in St George, 2008-2012

Males shifted distribution, & decreased overall

<table>
<thead>
<tr>
<th>Site</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tr>
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<td>Y-Drain Marsh</td>
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<td>10</td>
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</table>
Habitat use shifted between 2009 & 2010

**Tamarisk trees (> 8 cm)**

\[ \chi^2 = 30.2, \text{ df } = 3, \ P < 0.001 \]

**Willow shrubs (≤ 8 cm)**

\[ \chi^2 = 24.6, \text{ df } = 3, \ P < 0.001 \]

**Tamarisk shrubs (≤ 8 cm)**

\[ \chi^2 = 1.9, \text{ df } = 3, \ P = 0.59 \]
Nest substrate use shifted between 2009 & 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Willow Substrates</th>
<th>Tamarisk Substrates</th>
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<tbody>
<tr>
<td>2008</td>
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<td>2010</td>
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<td>12</td>
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<tr>
<td>2011</td>
<td>8</td>
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</table>
Reproductive success

![Graph showing cause of nest failure over years]

- **Unknown**: 0.7
- **Hatch failure**: 0.6
- **Parasitism**: 0.5
- **Predation**: 0.4

**Defoliation first coincides with peak SWFL breeding**
Nest success remains low despite habitat shift

SWFL change nest-site habitat preferences

Defoliation first coincides with peak SWFL breeding

Cause of nest failure

- Unknown
- Hatch failure
- Parasitism
- Predation

Mayfield survival probability

Percent of total nests
Nest Predation (2010-2012)

- 41% nests / year
  - Range 26-60%; n = 56

- Predators unknown
  - Mostly avian?

- Nest video (2012)
  - 1 predation event
  - Brown-headed Cowbird
Brood Parasitism (2010-2012)

- 43% nests / year
  - Range 25-59%; n = 56

-Direct effects
  - 19% nest failures
  - Reduced fecundity

-Indirect effects
  - Nest abandonment

-Cowbird control?
  - Pilot study funded (2013)
    - Feasibility
    - Effectiveness
Nest success habitat-mediated (2010-2012)?

Nests more likely to fledge in tamarisk than willow substrates

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

\( \chi^2 = 22.4, \text{ df } = 1, P < 0.001 \)

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 shrubs valuable when mixed with native vegetation

- Reduce tamarisk density by 60-70 %
  - Prioritize tamarisk trees for removal
  - Leaving tamarisk shrubs in understory

- Replant thinned areas with mix of native species that provide understory structure
  - e.g., Goodding’s willow, seep-willow