Update on the 2016 Edwards Aquifer Habitat Conservation Plan Activities

March 23, 2017 Guadalupe River Basin and Lavaca-Guadalupe Coastal Basin Clean Rivers Program Steering Committee Meeting
SELECTED 2016 ACTIVITIES

• Annual Take Report
• National Academy of Sciences, Report 2
• USFWS-EAA Refugia for Covered Species
• Old Channel Comal River Bank Stabilization
• Comal Springs Riffle Beetle Life History Study
INCIDENTAL TAKE ANNUAL REPORT

COMMON TERMS

× “Take” is defined in Section 3(18) of the Federal Endangered Species Act as an activity that will harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or the attempt to engage in any such conduct.

• “Harass” is further defined as an intentional or negligent act or omission that creates the likelihood of injury to a listed species by annoying it to the point as to significantly disrupt normal behavioral patterns (breeding, feeding and sheltering).

• “Harm” is further defined to include significant habitat modification or degradation that results in injury or death to listed species by impairing normal behavioral patterns.

× Basically, if you do anything (intentionally or unintentionally) that disrupts the routine activities of a listed species, you have committed a “take” of that species.

× “Incidental Take” is a taking that results from, but was not the intended purpose of, an otherwise lawful activity.

× Incidental Take Permit (ITP) is a specific permit issued under Section 10 of the Federal Endangered Species Act to private parties that are conducting otherwise lawful activities that might result in the taking of an endangered or threatened species.
INCIDENTAL TAKE ANNUAL REPORT
2016

- **Review and Methods**
  - Same methodology used since 2013.
  - Document baseline area of occupied habitat for the covered species.

- **HCP Mitigation and Restoration**
  - Determine how much occupied area was disturbed during 2016.
  - No more than 10% of the covered species occupied habitat can be affected by HCP mitigation and restoration activities.

- **HCP Measures/Drought**
  - Determine how much occupied area was disturbed during 2016

- **Incidental Take Assessment**
  - Calculate incidental take of covered species
EAHCP Covered Species

Comal Springs Dryopid Beetle
*Stygocephalus comalensis*
Endangered

Comal Springs Riffle Beetle
*Heterohepitis comalensis*
Endangered

Comal Springs Salamander
*Eurycea sp.*
Petitioned

Edwards Aquifer Diving Beetle
*Haideosorus texanus*
Petitioned

Fountain Darter
*Etheostoma fonticola*
Endangered

Peck's Cave Amphipod
*Stygobromus pecki*
Endangered

San Marcos Salamander
*Eurycea nana*
Threatened

Texas Blind Salamander
*Eurycea rathbuni*
Endangered

Texas Troglobitic Water Slater
*Lirceolus smithii*
Petitioned
EAHCP Covered Species

Texas wild-rice

San Marcos gambusia
Species in the Incidental Take Permit

**Authorized for Take**
1. Fountain Darter
2. Comal Springs riffle beetle
3. Comal Springs dryopid beetle
4. Peck’s cave amphipod
5. San Marcos salamander
6. Texas blind salamander

**Take does not apply at this time**
1. Texas cave diving beetle (NL)
2. Texas troglobitic water slater (NL)
3. Comal Springs salamander (NL)
4. San Marcos gambusia (likely extinct)
5. Texas wild-rice (plant)

NL = Not listed as endangered or threatened at this time.
## EAHCP Incidental Take - 2016

<table>
<thead>
<tr>
<th>COVERED SPECIES PER SYSTEM</th>
<th>HCP Mitigation / Restoration</th>
<th>HCP Measures / Drought</th>
<th>Combined Impacted Habitat 2016 TOTAL</th>
<th>INCIDENTAL TAKE</th>
<th>2016 INCIDENTAL TAKE TOTAL</th>
<th>ITP Maximum Permit Amount</th>
<th>ITP Permit Maximum minus (combined first four years)</th>
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<tbody>
<tr>
<td></td>
<td>IMPACTED HABITAT (m²)</td>
<td>NET Disturbance % OF TOTAL Occupied Habitat</td>
<td>IMPACTED HABITAT (m²)</td>
<td>HCP Mitigation / Restoration</td>
<td>HCP Measures / Drought</td>
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<td></td>
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<tr>
<td><strong>COMAL SYSTEM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fountain Darter</td>
<td>3,002</td>
<td>3.3%</td>
<td>3,637</td>
<td>6,639</td>
<td>4,503</td>
<td>5,456</td>
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<td>0</td>
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<td>Comal Springs Dryophil Beetle</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>Peck's Cave Amphipod</td>
<td>0</td>
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<td>0</td>
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<td><strong>SAN MARCOS SYSTEM</strong></td>
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<tr>
<td>Fountain Darter</td>
<td>3,652</td>
<td>4.1%</td>
<td>3,697</td>
<td>7,349</td>
<td>5,478</td>
<td>5,545</td>
<td>11,023</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Texas Blind Salamander</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Comal Springs Riffle Beetle</td>
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<td>0.0%</td>
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## Incidental Take 2013 – 2016

<table>
<thead>
<tr>
<th>System</th>
<th>Species (common name)</th>
<th>ITP Take Limit</th>
<th>2013 Take</th>
<th>2014 Take</th>
<th>2015 Take</th>
<th>2016 Take</th>
<th>Total Take</th>
<th>Remaining ITP Take</th>
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<tbody>
<tr>
<td>Comal</td>
<td>fountain darter</td>
<td>797,000</td>
<td>10,482</td>
<td>23,060</td>
<td>5,115</td>
<td>9,959</td>
<td>48,616</td>
<td>748,384</td>
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<td>11,179</td>
<td>681</td>
<td>1,564</td>
<td>0</td>
<td>0</td>
<td>2,245</td>
<td>8,934</td>
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<td></td>
<td>Comal Springs dryopid beetle</td>
<td>1,543</td>
<td>13</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>1,528</td>
</tr>
<tr>
<td></td>
<td>Peck's cave amphipod</td>
<td>18,224</td>
<td>81</td>
<td>82</td>
<td>0</td>
<td>0</td>
<td>163</td>
<td>18,061</td>
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<tr>
<td>San Marcos</td>
<td>fountain darter</td>
<td>549,129</td>
<td>16,698</td>
<td>11,909</td>
<td>13,295</td>
<td>11,023</td>
<td>52,925</td>
<td>496,204</td>
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<td></td>
<td>San Marcos salamander</td>
<td>263,857</td>
<td>1,053</td>
<td>482</td>
<td>1,059</td>
<td>0</td>
<td>2,594</td>
<td>261,263</td>
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<td>Texas blind salamander</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>10</td>
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<tr>
<td></td>
<td>Comal Springs riffle beetle</td>
<td>n/a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>n/a</td>
</tr>
</tbody>
</table>
TAKE OBSERVATIONS

- 2016 EAHCP mitigation and minimization activities did not exceed the 10% habitat disturbance rule.
- In the Comal, incidental take for fountain darters (9,959) was almost double that in 2015 (5,115) due to a pulse of flow from the Dry Comal that removed some SAV in the New Channel a month before mapping.
- In the San Marcos, incidental take for fountain darters (11,023) was about 2,000 less than 2015 (13,295) due to decreases in impacted habitat.
- There was no EAHCP incidental take of covered invertebrates or salamanders in 2016.
- Overall, the EAHCP is in good shape relative to the Incidental Take Permit.
The National Academy of Sciences (NAS) was contracted to provide an unbiased, outside scientific review of the EAHCP, its programs and its ability to achieve its goals and objectives.

Report #2 Contents

1. **INTRODUCTION**

2. Hydrologic Modeling-Ecological Modeling

3. Biological & Water Quality Monitoring

4. Applied Research Program

5. Minimization & Mitigation Measures
NAS REPORT 2

HIGHLIGHTS

• The Ecological model was developed on a scientifically sound basis.
• The EAHCP team adapted its procedures to provide more scientific input to better identify, solicit and review Applied Research Projects.
• The EAHCP team developed a database management system that provides greater data access for research and management of the systems.
• The water quality and biological monitoring programs were reviewed and modified by scientists and stakeholders, making it more efficient by being better integrated with existing programs (such as GBRA’s CRP), and more targeted to the listed species and their habitat.
• The implementation of key minimization and mitigation measures are characterized by competent project teams, sustained effort, and adequate initial performance monitoring.
Refugia for EAHCP Covered Species

The HCP defines a refugium as:

“A population of a Covered Species, housed at a series of aquatic facilities, for the purpose of reintroduction of the Covered Species into the Comal or San Marcos systems, in the event the Covered Species go extinct in their native habitat.”
EAA – USFWS Refugia Contract

- Contract extends through duration of ITP – 2028.
- Scope of Work identifies six primary tasks:

**Task 1. Provide Refugia Operations**
- Standing stock & salvage stock

**Task 2. Research**

**Task 3. Propagation & Husbandry**

**Task 4. Reintroduction**

**Task 5. Reporting**

**Task 6. Meetings & Presentations**
## EAHCP Species Stocking Overview (Listed)

<table>
<thead>
<tr>
<th>Covered Species</th>
<th>Standing #</th>
<th>Standing + Salvage #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fountain Darter (Comal)</td>
<td>1,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Fountain Darter (SM)</td>
<td>1,000</td>
<td>2,500</td>
</tr>
<tr>
<td>Texas wild-rice</td>
<td>430</td>
<td>1,500</td>
</tr>
<tr>
<td>Texas Blind Salamander</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>San Marcos Salamander</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Comal Springs Salamander</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Peck’s Cave Amphipod</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Comal Springs Riffle Beetle</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Comal Springs Dryopid Beetle</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Edwards Aquifer Diving Beetle</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Texas Troglobitic Water Slater</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>
Task 2 - Research

Species Prioritization Identified in Contract
1. Listed species the least is known about: TX Blind salamander, CSRB, CSDB, Peck’s cave amphipod;
2. Additional listed species: San Marcos Salamander, Fountain Darter, Texas wild-rice
3. Non-listed species: Texas Cave Diving Beetle, Texas Troglobitic Water Slater, and Comal Springs Salamander

<No work is planned for the San Marcos gambusia since it is probably extinct.>

Research Categories Prioritized in Contract
1. Collection
2. Husbandry
3. Propagation
4. Reintroduction/Genetics

<All 4 categories will be determined for the listed species before work with non-listed species.>
INFRASTRUCTURE ADDITIONS

× SMARC
  • 1,000 ft² quarantine building
  • 2,500 ft² rearing bldg. for darters, salamanders, & invertebrates

× UNFH
  • “Old Tank House” renovated into quarantine building
  • 1,400 ft² of “New Tank House” renovated for invertebrates
OLD CHANNEL COMAL RIVER BANK STABILIZATION PROJECT

Before

After
Thirty-two pairs in randomly assigned experimental groups (8 groups, w/4 replicates), with different substrate combinations (leaves, rocks, cloth, bare). Same basic design being used to study egg deposition, hatching success and larval development. Major points so far:

• Developed non-lethal method to determine CSRB gender for breeding pairs.
• Data suggests a 2 male:1 female gender ratio in the wild.
• The cloth used in lures benefitted propagation and husbandry. It is hypothesized this is due to biofilm production on the cotton surface.
• Eggs were predominantly laid on leafy substrates; even more so if cloth were included.
• Egg production declines with time in captivity as did the survival of the adults.
• Eggs hatch in about 25 days
• Larval development appears to develop over 4 months.
Male or Female CSRB?
~3 days

A few large cells
Clearly a larva

21 days

Newly hatched larva

25 days