Flood Control Dams/Construction Runoff Impacts On Endangered Species Habitat in the San Marcos River
San Marcos River Circa 1970

- Much smaller City and Tx State
- Aquarena Springs
  - Ralph the swimming pig
  - Underwater shows
- Deep river
  - 3 meter diving board
  - Recreation area
  - ~ 150 cfs springflow
  - Edwards Aquifer supply
San Marcos River Today

Shallow river system

- < 2 feet deep
- Fine silts on bottom
- Impacts critical habitat
- Cloudy water on summer days
- Habitat Conservation Plan in effect
Potential Future Sediment Removal Sites

HCP Sediment Dredge Sites
Upper San Marcos River

HCP Sediment Dredge Sites
Lower San Marcos River
San Marcos River Dredging

~$220,00 / year

10-year program
What Happened?

1970 flood killed two, flooded 405 buildings and 15 miles of roadways. Spurred flood control project.

Rapid Southwest Texas State and City growth, increased construction runoff.

Urbanization of Sessom Creek watershed before stormwater control measures, degrading creek.
Aggradation Recipe

Degrading tributaries

+ construction runoff
- lower annual flood flows

= River deposition
Flood Control Dams

Managed by the Upper San Marcos Flood Control District
Soil Conservation Service Dams

- Low flow outlets
- 4’ to 5’ culverts in dams
- 50’ to 100’ in height
- Emergency spillways – 300 feet

- 2013 Halloween Flood protection
- Reduced City 1998 flood damages
- Slight emergency spillway damage
## Flow Summary

<table>
<thead>
<tr>
<th>Location</th>
<th>1-YR</th>
<th></th>
<th>2-YR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Dams (cfs)</td>
<td>Existing (cfs)</td>
<td>Pre-Dams (cfs)</td>
<td>Existing (cfs)</td>
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<tr>
<td>At Aquarena Springs Rd.</td>
<td>12,489</td>
<td>444</td>
<td>18,578</td>
<td>833</td>
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<tr>
<td>At Purgatory Creek</td>
<td>14,181</td>
<td>1,811</td>
<td>21,173</td>
<td>2,725</td>
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<td>Downstream of IH-35</td>
<td>17,279</td>
<td>2,501</td>
<td>24,469</td>
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<table>
<thead>
<tr>
<th>Location</th>
<th>25-YR</th>
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<th>100-YR</th>
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<td>Pre-Dams (cfs)</td>
<td>Existing (cfs)</td>
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<td>At Aquarena Springs Rd.</td>
<td>47,899</td>
<td>2,836</td>
<td>68,833</td>
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<td>At Purgatory Creek</td>
<td>62,755</td>
<td>10,571</td>
<td>86,062</td>
<td>15,740</td>
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<tr>
<td>Downstream of IH-35</td>
<td>72,320</td>
<td>15,176</td>
<td>104,418</td>
<td>21,933</td>
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</table>

100-year event today is less than a 2-year event pre-dam construction
# Velocity Summary

## Potential modification goal

- Increase discharge for frequent events
- Maintain flood control benefits for the 25- and 100-year storms

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<tr>
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<td>Pre-Dams (ft/sec)</td>
<td>Existing (ft/sec)</td>
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<tr>
<td>At Aquarena Springs Rd.</td>
<td>2.84</td>
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<td>At Purgatory Creek</td>
<td>7.26</td>
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<tr>
<td>Downstream of IH-35</td>
<td>4.76</td>
<td>0.99</td>
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<td>Pre-Dams (ft/sec)</td>
<td>Existing (ft/sec)</td>
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<td>At Aquarena Springs Rd.</td>
<td>4.82</td>
<td>1.61</td>
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<td>At Purgatory Creek</td>
<td>11.51</td>
<td>6.33</td>
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<tr>
<td>Downstream of IH-35</td>
<td>8.63</td>
<td>4.87</td>
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1998 Flood

- Emergency spillway flows about 6 feet deep
- Significant river flooding
- River was not scoured

- Why? 12+ years limited flow, river deposition, deep rooted plants??
Other Protective Measures

City of San Marcos Regulatory Revisions
- 4’ cut and fill limitations for development
- 2-year detention added
- Recent erosion control training event
- Revised Land Development Code, late 2015

Texas State Habitat Conservation Plan Participation
- Focus on construction erosion control practices
- River sediment/invasive species removal

Sessom Creek Erosion Assessment (City)
- Erosion repair projects, two recently designed
- Planned wastewater line project
Summary

- Design dams to maximize flood and habitat goals

- Conceptual dam modifications increase annual peak flows and reduces 100-year flow rate, is it enough? Need additional study

- Ensure development regulations manage creek erosion
  - Mimic frequent storm events
  - Maximize recharge
  - Minimize creek degradation

- Effective, enforced construction erosion controls
  - City of San Marcos
  - Texas State University
Contact Info

Tom Hegemier, P.E.
tom.hegemier@rpsgroup.com
512-326-5659