Environmental Flow Regime
Trinity and San Jacinto Rivers

Presentation to the
Texas Environmental Flows Science Advisory Committee

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• “Hydrology and Hydraulics. The convention of instream flow science is changing … to a range of flows that account for seasonal and inter-annual variation, magnitude, timing, frequency, and rate of change (IFC, 2002; Poff et al., 1997; Postel and Richter, 2003).

• These hydrologic attributes translate into different levels of flow: subsistence flows, base flows, high flow pulses, and overbank flows.” pg. 33
Trinity at Rosser
Season selection

[Bar chart showing months of December to November with bars indicating days <10% tile flow and pulse flows.]
Dry Base Flow (25\textsuperscript{th} percentile)

Shallow riffles and pools

- Blacktail shiners, juvenile flathead and channel catfish
- Riffle-adapted invertebrates
Normal Base Flow (35th percentile)

Pools and backwaters

- Bullhead minnow, largemouth bass, bluegill sunfish
- Water stored in stream banks supports shoreline plants
Wet Base Flow (50^{th} percentile)

Deep pools and runs

- Golden shiner, gizzard shad, flathead catfish
- Water stored in stream banks
East Fork San Jacinto at Cleveland
25th percentile daily average flow (1940-2009)
Pulse Flows

- Spawning triggered
- Seeds deposited and germinating for riparian plants
- Water into tributaries, sloughs, backwaters, and riparian zones
- Saturation of high banks
- Woody debris moved
Trinity at Romayor
50th percentile daily average flow
Trinity River at Oakwood
Aug 19, 1985, flow=641 cfs

- Wet base
- Low pulse
- Medium pulse

[Image: A river bank with labeled features]
(unpublished NWF analysis)
Trinity nr Oakwood

- Overbank flow near 60,000 cfs
- Flow over 20,000 cfs for 25 days
Overbank Flows

- Gar spawn, juveniles and larvae dispersed into isolated water bodies
- Water, sediment, nutrients nourish floodplain
- Scouring and depositional features created and maintained
- Adjacent water bodies flushed, recolonized by aquatic species
- Maintains plants in their respective hydrologic habitat
Trinity at Romayor
Total annual flow (acre-ft)

Without overbank flows

With overbank flows
East Fork San Jacinto at Cleveland

Total annual flow (acre-ft)
Trinity at Rosser
(Percent occurrence of subsistence and base flows from 10/87 to present)

<table>
<thead>
<tr>
<th></th>
<th>Subsistence</th>
<th>Dry</th>
<th>Normal</th>
<th>Wet</th>
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<tr>
<td>Winter</td>
<td>0</td>
<td>0</td>
<td>&lt;.1</td>
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<tr>
<td>Spring</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>38</td>
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<tr>
<td>Summer</td>
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<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fall</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
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</tbody>
</table>
Trinity at Rosser
Mean number of pulses (1939-1952)
Uncertainty

**Decreases** – with subsistence and base flows greater than flow regime recommendation

** Increases** – with subsistence and base flows lower than flow regime recommendation

** Increases** – with distance from flow regime site on the Trinity River

** Increases** – in tributaries
Questions

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