

OPEN MEETING

Applied Research: Experimental Channel Design

Date: August 31 (Friday), 2012, at 10:30 a.m.

Location: San Marcos Activity Center, 501 East Hopkins Road, San Marcos, TX 78666.

Purpose: Come to a consensus regarding the basic design elements of the Experimental Channel(s) proposed for construction at the San Marcos National Fish Hatchery and Technology Center. Recommendations provided by participants should result in meaningful information that will be provided to engineers for the development of a conceptual design.

At this meeting, the following business may be considered:

1. **Call to order - Introductions of Science Committee and attendee's.**
2. **Purpose of Recommendations.**
3. **Intended use of the channel(s).**
4. **Major structural components: Spring orifice, Spring run, simulated Landa Lake (lentic habitat), Comal River (lotic habitat).**
5. **Scale of channel(s).**
6. **Number of channel(s).**
7. **Structural component specifics.**
8. **Additional considerations.**

Enclosures (5): Background Summary including web links to various artificial stream facilities, Picture Oregon Hatchery Experimental Streams, Brochure EPA P&G Experimental Channel, and Draft Template for Research Activities Conducted at Experimental Channel.

6.3.4 Habitat Conservation Plan Edwards Aquifer recovery Implementation Program

Applied Research Faculty Experimental Channel at USFWS National Fish Hatchery and Technology Center

Goal of Experiential Channel Construction at San Marcos NFHTC: To recreate the natural environment including but not limited to: channel configuration, substrate, instream debris, riparian zone structure (trees, shrubs, grass), aquatic vegetation, and other natural and anthropogenic conditions present in the Comal River. More specifically the channel(s) should at least be equipped with a means to simulate the upwelling and spring run areas (average of Comal 1, 2, and 3; Figure 1) and lotic habitat (similar to the Comal River old channel; Figure 1). If feasible the system should also be equipped with a means to simulate the lentic environment similar to Landa Lake (Figure 1).

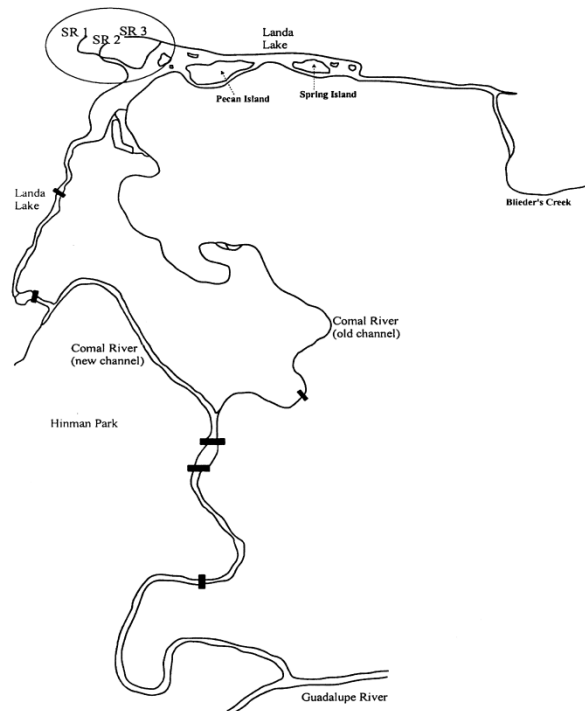


Figure 1. Locations of spring 1, 2, and 3 and area where spring run 1, 2, and 3 are located for the Comal River, Comal County Texas.

The primary research activities to be addressed as stated in the habitat conservation plan deal with Comal riffle beetle and fountain darter and specifically outline the following areas to be examined: 1) Determine habitat requirements and responses to changes in habitat for both species, 2) How does low flow directly affect both species, and 3) How does the timing, frequency, and duration of multiple low flow events effect both species where data collected can be used for model validation.

Published Structural Information: Although the designated critical habitat for the Comal springs riffle beetle encapsulates five major spring outlets (72 FR 39248) the species has only been observed at and near spring 1, 2, and 3 and areas around presumed outflows within Landa Lake (Randy Gibson pers. comm.; USFWS).

The water of Comal Springs is derived from a deep flow, phreatic conduit system. The principal recharge area lies about 100 km to the west (Brune, 1981) and the water migrates to depths more than 610 m below the surface before emerging at the springs (Ogden *et al.*, 1986). As a consequence of the deep circulation, the water is never turbid and is free from bacterial contamination when it emerges from the spring openings. Many other smaller springs and seeps discharge along the lengths of these primary spring runs and from Landa Lake (Spangler and Barr 1995).

Comal 1 has several orifices; however, the main orifice is a shallow limestone cave about 0.6 m in diameter. The spring run ranges from 9 to 13m in width and the run is about 230m before entering Landa Lake (Spangler and Barr 1995; Bowles et al. 2003).

Comal 2 has a number of orifices that vary in size. The spring run ranges from 2 to 3m in width and the run is about 66m before entering the wading pool before entering the Comal 1 spring run (Spangler and Barr 1995; Bowles et al. 2003).

Comal 3 has numerous orifices; however, the orifice with the largest discharge is about 1 m in diameter and is located beneath the escarpment bank and near the head of the run. The spring run varies from 4.5 to 8m in width and the run is about 130m before entering Landa Lake (Spangler and Barr 1995; Bowles et al. 2003).

Average discharge for these primary spring-runs ranges from 0.3 to 0.6 m³/sec (Bowles et al. 2003).

The Comal Springs riffle beetle has been associated with habitat that is free of sand and silt, and is composed of gravel and cobble ranging in size from 0.3 to 5.0 inches (8 to 128 millimeters; Bowles et al. 2003).

Literature Cited

- Bowles, D. E., C. B. Barr, and R. Stafford. 2003. Habitat and phenology of the endangered riffle beetle *Heterelmis comalensis* and coexisting species, *Mircocylloepus pusillus*, (Coleoptera: Elmidae) at Comal Springs, Texas, USA Arch. Hydrobiol. 156(3): 361-383.
- Brune, G. 1981. Springs of Texas. Volume I. Branch-Smith Inc./Fort Worth, Texas. 566 pp.
- "Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Peck's Cave Amphipod, Comal Springs Dryopid Beetle, and Comal Springs Riffle Beetle, Final Rule." *Federal Register* 72 (17 July 2007): 39248-39283. Print.
- Ogden, k E., R. A. Quick, and S. R. Rothermel. 1986. Hydrochemistry of the Comal, Hueco, and San Marcos Springs, Edwards Aquifer, Texas. Pp. 115-130. *In* Abbott, P.L., and C.M. Woodruff, Jr., eds., The Balcones Escarpment: Geology, Hydrology, Ecology and Social Development in Central Texas. Geological Society of America Annual Meeting, San Antonio, Texas. 200 pp.
- Spangler, P. J. and C. B. Barr. 1995. A new genus and species of stygobiontic dytiscid beetle, *Comaldessus stygius* (Coleoptera: Dytischidae: Bidessini) from Comal Springs, Texas. *Insecta Mundi*. 9:301-308.

Short List of Web Sites for Artificial/Experimental Streams Facility Examples:

<http://www.epa.gov/nrmrl/wswrd/wq/esf/esf.html>

<http://www.dfw.state.or.us/fish/OHRC/>

<http://www.baylor.edu/aquaticlab/index.php?id=45868>

<http://www.e-mta.eu/an-underground-stream-for-research-2/>

http://www.luc.edu/cuerp/stream_facility.shtml