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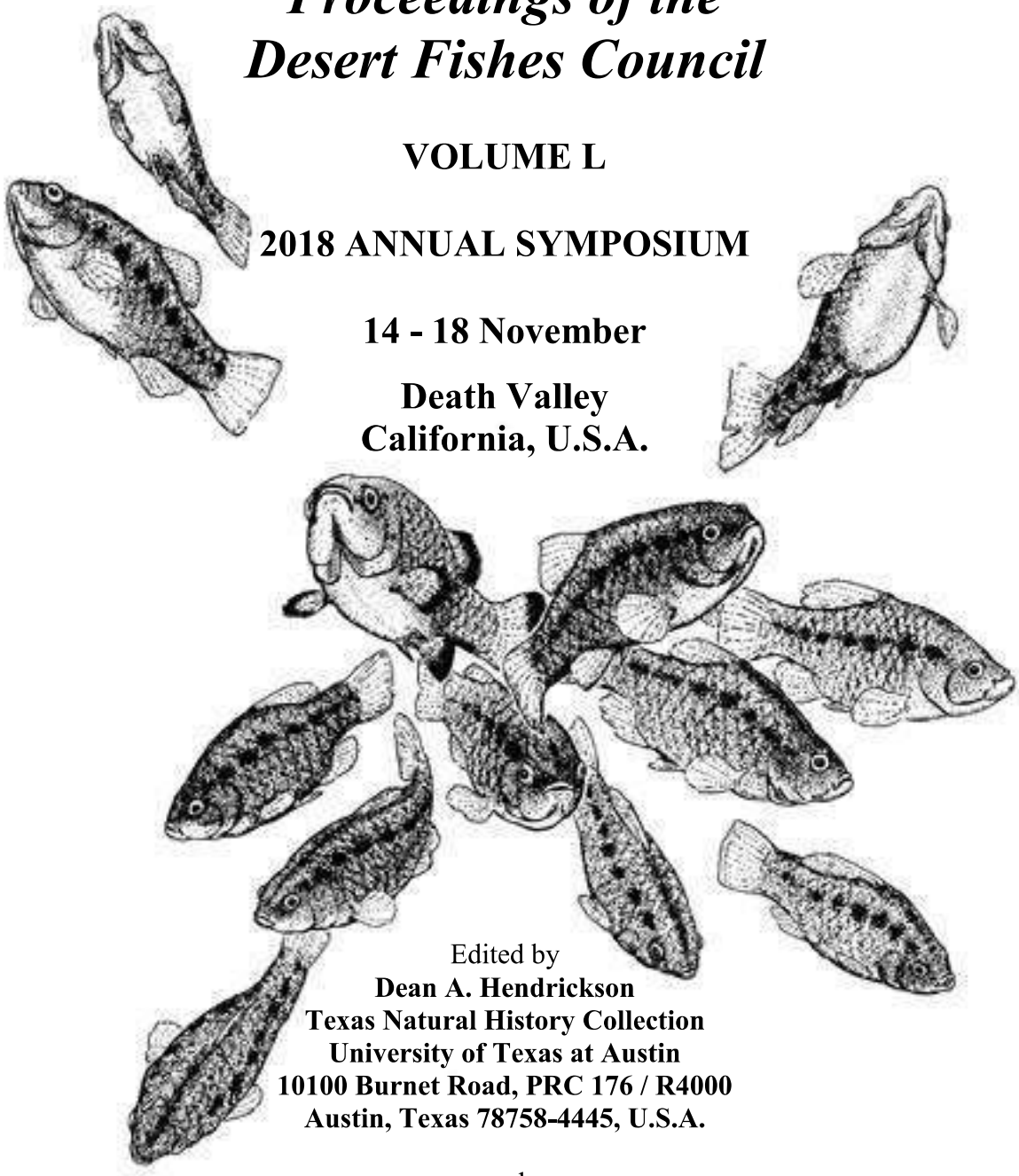

Edited by
Dean A. Hendrickson
Texas Natural History Collection
University of Texas at Austin
10100 Burnet Road, PRC 176 / R4000
Austin, Texas 78758-4445, U.S.A.

and

Lloyd T. Findley
Centro de Investigación en Alimentación y Desarrollo, A.C.-Unidad Guaymas
Carretera al Varadero Nacional Km. 6.6, "Las Playitas"
Apartado Postal 284, Guaymas, Sonora 85400, MÉXICO

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P.O. Box 337 👁 Bishop, California 93515-0337 👁 760-872-8751 Voice & Fax 👁 e-mail: secretary@desertfishes.org

MISSION / MISIÓN

The mission of the Desert Fishes Council is to preserve the biological integrity of desert aquatic ecosystems and their associated life forms, to hold symposia to report related research and management endeavors, and to effect rapid dissemination of information concerning activities of the Council and its members

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Hamdhani, Hamdhani*; Eppehimer, Drew; Quanrud, David; Bogan, Michael
(University of Arizona)

Effect of diurnal flow variability on water quality dynamics in the effluent-dominated Santa Cruz River

ABSTRACT

The Santa Cruz River in Arizona is one of several river systems that have experienced groundwater drops and loss of perennial flow due to groundwater pumping and drought. Along with the Gila and Salt Rivers, the Santa Cruz River currently has artificially perennial reaches that are supported by effluent discharge from wastewater treatment plants. The return of perennial reaches has brought back habitat for numerous of aquatic and riparian taxa. Reliable flow rates are one of the crucial components that support healthy aquatic habitat. However, flow fluctuates dramatically in the Santa Cruz each day, depending on quantity of water used by Tucson residents, creating high and low flow "tides" each day. The effect of this daily flow variation on water quality conditions in this effluent-dominated system is unknown. The objective of this study is to quantify physical and chemical water quality factors in the Santa Cruz River (1) during high and low flow periods and (2) along gradients downstream from the effluent outfall. Since September 2017 we have been collecting water quality data (e.g. DO, pH, conductivity, nutrient levels) monthly from six reaches of the Santa Cruz River spaced ~2 miles apart during both high and low flow periods. Ammonia, which is potentially toxic to aquatic biota, was significantly higher during low flow than high flow conditions on average across the year. Gradient water quality measurements below wastewater treatment plant discharge indicated that water quality parameters tended to get better further downstream. The findings of this study suggest we should sample effluent-dominated systems during low flow periods to detect worst case water quality conditions. We hope that these data will also help us understand how effluent can be used to restore perennial river habitats in arid climates, including habitat for native desert fishes.

Blinn, Dean W.[1]; Threloff, Douglas L.[2]
(1-Northern Arizona University, Flagstaff; 2-private consultant, Ventura, California)

A long-term ecosystem monitoring protocol for Devils Hole, Nevada

ABSTRACT

The federally endangered Devils Hole pupfish, *Cyprinodon diabolis*, resides in a detached unit of Death Valley National Park in Nye County, Nevada. A number of investigations since the late 1960s have studied various aspects of the ecology of the species. Until the present, however, no attempt has been made to develop a comprehensive monitoring strategy that assesses temporal changes in the "vital signs" of the dominant ecological processes and keystone species that affect the number of Devils Hole pupfish. In 2002, a three-tiered monitoring protocol was developed to track a number of these vital signs. Each tier provides for different intensities of monitoring based on funding levels that might be available. Tier-1 is the most expensive and comprehensive monitoring protocol, while Tier-3 represents the absolute minimum program for monitoring factors that might affect pupfish number.

Abiotic variables that would be quantified in a Tier-1 program include substrate composition, water level, water temperature, solar energy levels, physico-chemical constituents (e.g., dissolved oxygen, pH, etc.), nutrients (total nitrogen and phosphorus), effects related to earthquakes and flash floods, and various parameters measured by a weather station. The biotic variables that should be documented in a Tier-1 program include mass and composition of algae, invertebrates, allochthonous carbon input, flatworm (*Dugesia* sp.) densities and distribution, and microbiological analyses involving total coliform

and fecal coliform. The estimated cost for purchasing equipment and implementing the Tier-1 protocol in year-1 is $46,750, and the annual cost in subsequent years after equipment is purchased would decline to $27,750. Abiotic parameters that would be monitored under the Tier-3 protocol include substrate composition, water level, water temperature, pH, percent oxygen saturation, and specific conductance, and earthquake, flash flood, and weather station parameters. The biotic variables assessed in the Tier-3 protocol include seasonal photodocumentation of filamentous algae, summer and winter allochthonous input, and flatworm densities and distribution. Implementation of the Tier-3 protocol would cost $36,400 in year-1 and decline to $17,400 in subsequent years.

Monitoring of critical habitats is frequently overlooked as an important tool in the conservation of natural resources. Resource managers should collect comprehensive, long-term, ecological data sets when communities are healthy in order to identify factors that may be responsible for declines in numbers of organisms at a later date.

Eppehimer, Drew*; Hollien, Kelsey; Nemec, Zach; Hamdhani, Hamdhani; Lee, Larissa; Quanrud, David; Bogan, Michael
(University of Arizona)

Implications of Using Treated Wastewater as Habitat for Desert Fishes

ABSTRACT

Quitobaquito spring and pond support the only natural populations of endangered Sonoyta pupfish and mud turtle in the United States. Despite long-term monitoring of pupfish and mud turtle populations, little is known about the food web that supports these imperiled species. To address this knowledge gap, we began a comprehensive inventory of aquatic invertebrates at Quitobaquito in April 2017. We will sample four times a year in the primary aquatic macrohabitat units at Quitobaquito, including the headspring, the pond and moat, and spring channel riffles, runs, and pools. To date, we have identified 116 aquatic invertebrate taxa from our collections, which nearly doubles the number of taxa known from previous surveys at Quitobaquito. In April 2017, moat and spring channel pool samples were the most diverse (mean taxon richness = 33 and 30, respectively). Riffle samples were the least diverse (mean taxon richness = 15), but were the primary habitat for several rare taxa (e.g. riffle beetles, aquatic moths). Several taxa greatly increased in abundance between April and June, including Helicopsyche caddisflies. The impact of these changing invertebrate abundances on pupfish and mud turtles or general food web dynamics remains to be determined. In October 2017, we will expand sampling efforts to include tissue collection from important food web components (e.g. algae, zooplankton, detritus) for use in stable isotope analyses. These analyses should yield clues as to why Sonoyta pupfish and mud turtle populations fluctuate through time at Quitobaquito

Brim Box, Jayne*; Kershner, Jeff
(US Forest Service, National Aquatic Monitoring Center)

Freshwater mollusks of the western United States: where are we today, and where are we going?

ABSTRACT

The western states contain at least six endemic mussel species, and many endemic snail species. Records of western freshwater mollusks date from the mid-1800s, but there is a dearth of current information on their distribution and abundance, in part because a comprehensive survey throughout their distributional ranges has not been done. There is also confusion regarding the taxonomic status of western species, and the exact number of valid species that occur in the region is not clear. Although several western states recognize that mollusk populations are declining, conservation and recovery efforts are hampered by the lack of basic information on western mollusk genetics, zoogeography, systematics and host fishes. In addition, the conservation status for most western mollusks is unknown.

DFC HYDROLOGIC BASIN AND AGENCY REPORT COORDINATORS

The following people were responsible for coordinating agency and other input to reports presented on activities in each area during the year between meetings of the DFC.

Areas Coordinator
Nadine Kanim, U.S. Fish and Wildlife Service, Yreka Field Office, 1829 S. Oregon Street, Yreka, California 96097. Phone: (530) 842-5763, FAX (530) 842-4517, Email:Nadine_Kanim@fws.gov

Oregon (State of, and upper Pit River drainage of California):
Rollie White, U.S.F.W.S., Oregon State Office, 2600 S.E. 98th Avenue, Suite 100, Portland, OR 97266, Phone: (503) 231-6179, FAX: (503) 231-6195, Email: rollie_white@fws.gov

California (State of, except for Pit and Klamath drainages of northeast California and mainstem lower Colorado River):
Steve Parmenter, California Department of Fish and Game, 407 W. Line Street, Bishop, CA 93514, Phone: (760) 872-1171, FAX: (760) 872-1284, Email: spar@dfg.ca.gov

Nevada (State of, except for Virgin River):
Anita Cook, Nevada Department of Wildlife, 1100 Valley Road, Reno, NV 89512, Phone: (775) 688-1532, FAX: (775) 688-1595, Email: acook@ndow.state.nv.us; Cynthia Martinez, U.S.F.W.S., Southern Nevada Field Office, 4701 N. Torrey Pines Drive, Las Vegas, NV 89130, Phone (702) 515-5230, FAX: (702) 515-5231, Email: cynthia_t_martinez@fws.gov

Bonneville Basin (western Utah, far-eastern Nevada, southern Idaho, and far-southwestern Wyoming):
Matthew E. Andersen, Utah Department of Natural Resources, Division of Wildlife Resources, 1594 W. North Temple, Suite 2110, Salt Lake City, Utah 84114, Phone: (801) 538-4756, FAX: (801) 538-4745, Email: matthewandersen@utah.gov

Upper Colorado River (upstream of Glen Canyon Dam on Powell Reservoir, including Green, Gunnison, Dolores, and San Juan rivers):
Timothy Modde, U.S.F.W.S., Colorado River Fish Project, 1380 S., 2300 W, Vernal UT 84078, Phone: (435) 789-0354, FAX: (435) 789-4805, Email: tim_modde@fws.gov

Lower Colorado River (including Little Colorado, Virgin, Bill Williams, and Gila rivers):
Sally Stefferud, Phone: (602) 274-5544, Email: stefferud@cox.net

Upper/middle Rio Grande and Pecos rivers, including Tularosa and Guzman basins of New Mexico (downstream to the confluence of the Rio Grande [Río Bravo] and Río Conchos):
Jim Brooks, U.S.F.W.S., New Mexico Fishery Resources Office, 3800 Commons Avenue, N.E., Albuquerque, New Mexico, 87109, Phone: (505) 342-9900, FAX: (505) 342-9905, Email: jim_brooks@fws.gov

Texas (State of):
Gary Garrett, Texas Parks and Wildlife Department, Heart of the Hills Fisheries Science Center, HC 7, Box 62, Ingram, Texas 78025, Phone: (830) 866-3356, FAX: (830) 866-3549, Email: gary.garrett@tpwd.state.tx.us

Northwestern Mexico (including the peninsula of Baja California):
Alejandro Varela-Romero, Universidad de Sonora, DICTUS - Departmento de Investigaciones Cientificas y Tecnologicas, A.P. 1819, Hermosillo, Sonora, Mexico, Phone: [011] (52) 62 12 19 95, FAX: [011] (52) 62 12 32 71, E-mail: avarela@guayacan.uson.mx

Northeastern Mexico (Río Bravo [Rio Grande] area) and Mexico (national):
Salvador Contreras-Balderas, A.P. 504, San Nicolas de los Garza, Nuevo Leon, Mexico 66450, Phone: [011] (52) (8) 376-2231, Home: [011] (52) (8) 313-1641, Email: saconbal@axtel.net

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by Hamdhani Hamdhani

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