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**Further on *Gambusia* cannibalism
Más sobre el canibalismo de *Gambusia***

KEYWORDS: predation; cannibalism; mosquitofish; geographic variation; Poeciliidae

ABSTRACT

Gambusia predation on newborn poeciliids is about 70% for females and 30% for males = half of the young survive for a month isolated with a predator. Predation is very high when adults of *Gambusia nobilis*, *Gambusia gaigei*, *Gambusia heterochir*, *Gambusia geiseri*, or *Gambusia longispinis* are used and low when *Gambusia affinis* or *Gambusia speciosa* are used as predators. Three species have had multiple populations studied; *G. affinis*, *G. nobilis*, and *G. geiseri*. The first two show much more interpopulation variation than does *G. geiseri*.

CLAVES: predación; canibalismo; pez mosquito; variación geográfica; Poeciliidae

RESUMEN

La predación en poecilidos recién nacidos es de aproximadamente 70% en hembras y 30% para machos = la mitad de los jóvenes sobreviven un mes aislados con un depredador. La predación es muy alta cuando los adultos de *Gambusia nobilis*, *Gambusia gaigei*, *Gambusia heterochir*, *Gambusia geiseri*, o *Gambusia longispinis* son usados y poco cuando *Gambusia affinis* o *Gambusia speciosa* son usadas como depredadores. Tres especies han tenido múltiples poblaciones estudiadas; *G. affinis*, *G. nobilis*, y *G. geiseri*. Las primeras dos muestran mucho más variación interpoblacional que *G. geiseri*.

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**Fishes of the continental waters of Baja California Sur, México, in the collection of the
Natural History Museum of the Universidad Autónoma de Baja California Sur
Peces de aguas continentales de Baja California Sur, México, en la colección del Museo
de Historia Natural de la Universidad Autónoma de Baja California Sur**

KEYWORDS: ichthyological collections; museums; Baja California Sur; México; freshwaters; fishes; fish collections

ABSTRACT

The Ichthyological Collection in The Natural History Museum of the Universidad Autónoma de Baja California Sur, up to date, has specimens from the ponds or "tinajas" of eight arroyos of the State of Baja California Sur. These are of the families: Cyprinidae, Cyprinodontidae, Poeciliidae, Mugilidae, Gobiidae, Eleotridae, Cichlidae.

CLAVES: Colecciones ictiológicas; museos; Baja California Sur; México; aguas continentales; peces; Colecciones de peces

RESUMEN

La Colección Ictiológica del Museo de Historia Natural de la U.A.B.C.S. hasta la fecha cuenta con ejemplares de peces colectados en las pozas o tinajas de ocho arroyos del Estado de Baja California Sur, que corresponden a las familias Cyprinidae, Cyprinodontidae, Poeciliidae, Mugilidae, Gobiidae, Eleotridae, Cichlidae.

ALDER, L.*; CROWL, T.A. (LA and TAC - Ecology Center and Department of Fisheries and Wildlife, Utah State University, Logan, UT)

Energy flow in the Green River, upper Colorado River basin: A foodweb approach

Flujo de energía en el Río Green, Cuenca Alta del Río Colorado: la cadena alimenticia

KEYWORDS: community dynamics; foodweb dynamics; predation; competition; non-native fishes; Utah; Colorado River; Green River

ABSTRACT

The Upper Colorado River is dominated by non-native fishes which we suggest negatively impact the survival of Colorado squawfish. These impacts result from competition for food as well as direct predation, especially on YOY and juvenile (2 - 5 year) squawfish. Cage experiments suggest that smallmouth bass, small channel catfish and green sunfish are particularly problematic. Given the excessive domination (both in terms of densities and biomass) of the foodweb by non-native fishes, we hypothesize that the overall energy balance in the upper basin system has been altered dramatically. We suggest that most of the energy (at all levels) now flows through the non-native components of the foodweb and that a few species in particular represent resource sinks. As a first step toward testing this hypothesis, we present a foodweb model developed from three years of data. These data represent quantitative assessments of the entire fish community, including densities, biomass, body length/gape size relationships and stomach analyses collected in a 70 mile reach of the Green River. The results estimate a previously unquantified measure of native and non-native fish distribution and density in this river section.

CLAVES: dinámica de comunidades; dinámica de la cadena alimenticia; depredación; competencia; peces no nativos; Utah; Río Colorado; Río Green

RESUMEN

El Alto Río Colorado esta dominado por peces no nativos de los cuales nosotros sugerimos impactos negativos sobre la sobrevivencia del charal del Colorado. Estos impactos resultan de la competencia por el alimento, así como por la predación directa sobre los peces del año y juveniles (2 - 5 años) del charal del Colorado. Los experimentos en el acuario sugieren que la lobina boca pequeña (smallmouth bass), los bagres de canal pequeños, y la mojarra verde (green sunfish) son particularmente problemáticos. Dada la excesiva dominancia (en términos de densidades y biomasa) de la cadena alimenticia por peces no nativos, nosotros hipotetizamos que el balance general de energía en el sistema de la cuenca alta ha sido alterado dramáticamente. Sugerimos que la mayoría de la energía (a todos los niveles) ahora fluye a través de los componentes no nativos de la cadena alimenticia y que unas pocas especies en particular representan recursos que disminuyen. Como un primer paso para probar esta hipótesis, presentamos un modelo de cadena alimenticia desarrollado en base a tres años de datos. Estos datos representan evaluaciones cuantitativas de la comunidad completa de peces, incluyendo densidades, biomasa, tamaño de la longitud del cuerpo y abertura de la boca y análisis estomacales colectados en un brazo de 70 millas del Río Verde. Los resultados estimaron un valor, no cuantificado previamente, de distribución y densidad de peces no nativos y nativos, en esta sección del río.

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The new Desert Fishes Council World Wide Web server on Internet

La nueva oferta del Consejo de Peces del Desierto en la Red Mundial en Internet

KEYWORDS: World Wide Web; Internet; electronic publishing; Proceedings of the Desert Fishes Council; fish photographs; public education; Desert Fishes Council

ABSTRACT

The Desert Fishes Council has moved into the world of electronic publishing on the Internet. Dr. John Rinne (U.S. Forest Service, Flagstaff, Arizona) has allowed the first author to scan his well-known collection of fish photographs into digital format. They have been variously cropped and enhanced, and can now be viewed in different formats or downloaded by anyone in the world with Internet access. The second author is converting the Proceedings (starting with Vol. 24 [1992 meeting]) to hypertext format, so they may be browsed, searched or downloaded. All future DFC Proceedings will be published on WWW at the same time final hard copy is sent to the printer. The World Wide Web (WWW) allows anyone who has obtained free, public domain client software (readily available on Internet), primarily one called Mosaic, to browse effortlessly through multimedia files (graphics, video, sound, formatted text) that are stored on computers around the globe. Multimedia presentations can combine real-time sound, graphics and video with text. Exploration of WWW and the DFC system using Mosaic is facilitated by hypertext links, which offer the simplicity of "point and click" movement through the "cyberspace" of WWW.

The Texas Memorial Museum of The University of Texas at Austin is providing storage space for these large DFC files at no charge as a pilot project for other WWW projects at UT, and can likely continue to provide this service for the foreseeable future if it receives the usage and growth that are predicted. All DFC members are encouraged to provide additional text, graphics and other files for inclusion in the system. Growth of the Internet has been phenomenal, and as more and more people throughout the world obtain access to it, these electronic files will allow DFC to better reach a far larger audience than was formerly possible. DFC members and others using materials provided here will be better equipped to educate the public regarding the plight of desert fishes. The system should also improve communications among ourselves and with others regarding fish conservation efforts throughout the world, and eventually should lead to reduced costs of publishing the Proceedings.

CLAVES: World Wide Web; Internet; publicaciones electrónicas; Proceedings del Consejo de los Peces del Desierto; fotografías de peces; educación pública; Consejo de los Peces del Desierto

RESUMEN

El Consejo de Peces del Desierto se ha movido dentro del mundo de las publicaciones electrónicas sobre Internet. Dr. John Rinne (U.S. Forest Service, Flagstaff, Arizona) facilitó su bien conocida colección de fotografías de peces al primer autor del presente trabajo para que las convierta a formato digital. Estas fotos pueden ser ahora vistas en diferentes formatos o cargadas por cualquiera en el mundo con acceso al Internet. Estas versiones electrónicas de las fotos pueden ser también fácilmente obtenidas, editadas o resaltadas en varias formas. El segundo autor está convirtiendo los proceedings (empezando con el volumen 24 [reunión de 1992]) a un formato de hipertexto, de esta forma pueden ser revisados, buscados o cargados. Todos los futuros Proceedings del Consejo de Peces del Desierto pueden ser publicados sobre el WWW al mismo tiempo que las impresiones finales son enviadas a la impresora. El World Wide Web (WWW) permite a cualquiera quien ha obtenido sin compromiso, un software comercial del dominio público (fácilmente disponible en Internet), principalmente uno llamado

Mosaico, revisar con el menor esfuerzo a través de los archivos de multimedia (gráficos, video, sonido, textos formateados) los cuales están almacenados en las computadoras de todo el mundo. Las presentaciones con multimedia pueden combinar sonidos reales, gráficos y videos con el texto. La exploración del sistema WWW y del DFC es facilitada por enlaces de hipertextos, los cuales ofrecen el simple movimiento "point and click" mediante el "Cyberspace" de WWW.

El Museo Memorial de Texas de la Universidad de Texas en Austin esta proporcionando gratis el espacio de almacenaje para aquellos grandes archivos del DFC como un proyecto piloto por otros proyectos del WWW, y esta dispuesto a continuar a proporcionar este servicio si el sistema del DFC recibe el uso y crecimiento predichos. Todos los miembros del DFC están motivados no solo a usar el sistema, sino también a ayudar a su crecimiento proporcionando textos adicionales, gráficos y otros archivos. Debido a que el formato de página es esencialmente equivalente que aquellas páginas de especies en peligro en la revista Environmental Biology of Fishes (EBF - el cual actualmente esta solicitando contribuciones de nuevas páginas), los autores pueden simultáneamente someter su trabajo para publicación en los sistemas DFC WWW y EBF.

El crecimiento de Internet ha sido fenomenal, y mientras más y más gente obtiene acceso en todo el mundo, estos archivos permitirán al DFC mejorar el alcance a una audiencia más lejana de lo que fue antes posible. Muchas escuelas públicas de educación básica y secundaria en los E.U. están usando el Internet, y esta pronto será un muy importante recurso educacional. Los miembros del DFC y otras personas que están usando el material proporcionado en WWW por DFC estará mejor equipado para educar con respecto a la difícil situación de los peces del desierto. El sistema deberá también facilitar las comunicaciones entre nosotros mismos y con otras personas en relación a los esfuerzos de conservación a través del mundo, y eventualmente conduciría a reducir los costos de publicación de los Proceedings.

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Cellular stress response and adaptation in the Amargosa pupfish, *Cyprinodon nevadensis*

Adaptación y respuesta al estrés celular del pez perrito de Amargosa, *Cyprinodon nevadensis*

KEYWORDS: heat-shock or stress proteins; thermotolerance

ABSTRACT

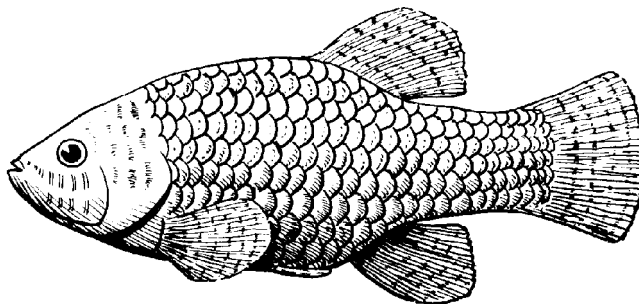
Exposure to elevated temperatures results in the induced synthesis of a suite of highly conserved proteins, referred to as heat-shock or stress proteins. Synthesis of stress proteins may be involved in acquired thermotolerance, a phenomenon in which exposure to a conditioning heat- shock confers thermal protection to a subsequent, more severe heat-shock that otherwise would be lethal. The role of stress proteins in organismic adaptation was examined in two subspecies of *Cyprinodon nevadensis* which occupy different habitats: *Cyprinodon nevadensis amargosae* inhabits a river with large seasonal temperature fluctuations, whereas *Cyprinodon nevadensis nevadensis* lives in a thermal spring with a relatively constant temperature. These studies demonstrated that both subspecies express thermotolerance. In addition, differences between the two subspecies were found in: 1) the ability to induce stress proteins and 2) the isoforms of stress70 expressed. Further, the accumulation of stress proteins was observed to be

tissue-specific within both subspecies. These data suggest that stress proteins may confer thermotolerance to these subspecies and play a role in adaptation to their respective habitats.

CLAVES: proteína de estrés o de shock calorico; termotolerancia

RESUMEN

Exposiciones a elevadas temperaturas resultan en la inducción de la síntesis de un grupo de altamente conservadas proteínas, conocido como shock calórico ó proteínas de estrés. La síntesis de proteínas de estrés puede involucrar el desarrollo de termotolerancia, un fenómeno en el cual la exposición a condiciones de shocks de calor confiere protección térmica para subsecuentes y más severos shocks de calor que de otra forma serían letales. El papel de las proteínas de estrés en la adaptación de organismos fue examinada en dos subspecies de *Cyprinodon nevadensis* los cuales ocupan diferentes hábitats: *Cyprinodon nevadensis amargosae* habita en ríos con grandes fluctuaciones de temperatura estacionales, en cambio *Cyprinodon nevadensis nevadensis* vive en manantiales termales con una temperatura relativamente constante. Estos estudios han demostrado que ambas subspecies expresan termotolerancia. En suma las diferencias entre las dos subspecies fueron encontradas en: 1) La habilidad para inducir el estrés proteínico 2) la isoforma de estrés 70 expresada. además la acumulación de las proteínas de estrés fue observada para tejidos específicos en ambas subspecies. Estos datos sugieren que el estrés proteínico puede conferir termotolerancia a estas subspecies y jugar un papel en la adaptación a sus respectivos hábitats.



NOTICE

Desert Fishes Council welcomes members' contributions of textual and image files for electronic publication on the Internet as part of the DFC World Wide Web pages (http://www.utexas.edu/depts/trnhc/www/fish/dfc/dfc_top.html). All types of electronic files containing information of potential interest to researchers, and/or the general public, and which contribute toward the DFC's mission of information dissemination relevant to desert fishes and their habitats are acceptable. All contributions are appropriately credited. Many pre-existing documents are suitable for publication here, and can be readily converted by DFC volunteers to the appropriate format. Photos and other graphics can be scanned from either slides or prints (preferable). Contact Dean Hendrickson (512) 471-9774, FAX (512) 471-9775, deanhend@mail.utexas.edu (or Texas Natural History Collections / R4000, University of Texas, Austin, TX 78712-1100) to contribute, or with questions.

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U.S. Fish and Wildlife Service, Region 1, report on conservation actions undertaken during 1993 for federally listed and candidate fishes and other aquatic species in California, Idaho, Nevada, and Oregon

U.S. Fish and Wildlife Service, Región 1, reporte sobre las acciones de conservación desarrolladas durante 1993 para los peces candidatos y enlistados federalmente y otras especies acuáticas en California, Idaho, Nevada, y Oregon

KEYWORDS: California; Idaho; Nevada; Oregon; U.S. Fish and Wildlife Service; endangered and threatened fishes; recovery plans; consultations; listings; critical habitat

ABSTRACT

The Fish and Wildlife Service Region One Ecological Services Field and State offices have conducted a variety of listing, recovery, status review, and consultation activities related to desert fishes and other aquatic species this year. These offices include the Oregon State Office (OSO), the Klamath Basin Ecosystem Restoration Office (ERO), the Nevada State Office (NSO), the Sacramento Field Office (SFO), the Carlsbad Field Office (CFO), and the Idaho State Office (ISO). The Oregon State Office developed draft recovery plans for the Warner sucker, *Catostomus warnerensis*, and Foskett Spring speckled dace, *Rhinichthys osculus* ssp.; proposed critical habitat for the Lost River sucker, *Deltistes luxatus*, and the shortnose sucker, *Chasmistes brevirostris* of the upper Klamath basin; assisted in the development of a "warranted but precluded" finding on the Bull trout, *Salvelinus confluentus*; listed the Oregon chub, *Oregonichthys crameri* as endangered; and conducted consultations on Federal projects impacting Lahontan cutthroat trout, *Oncorhynchus clarki henshawi*, Warner sucker, and the shortnose sucker. The ERO provided interagency coordination to arrange Klamath River Basin ecosystem restoration activities at a funding level averaging \$1.67 million per year over the next three years. The NSO produced or will produce in the next year draft or final recovery plans for: White River spinedace, *Lepidomeda albivallis*, Big Spring spinedace, *Lepidomeda mollispinis pratensis*, Moapa dace *Moapa coriacea*, Lahontan cutthroat, Railroad Valley springfishes, desert dace, *Eremichthys acros*, Pahrnagat roundtail chub, *Gila robusta jordani*, White River springfish, *Crenichthys baileyi baileyi*, and Hiko White River springfish, *Crenichthys baileyi grandis*. The NSO also reports on a fire impacting Moapa dace; recovery activities at Ash Meadows National Wildlife Refuge; the contracting of a habitat management plan for Ash Meadows naucorid, *Ambrysus amargosus*; an Environmental Impact Statement to assess the potential impacts of the Truckee River Operating Agreement, with benefits to cui-ui, *Chasmistes cujus*, is under development; and the development of conservation agreements for the two candidate Amargosa toad, *Bufo nelsoni* and Oasis Valley speckled dace, *Rhinichthys osculus* ssp.. The SFO reports involvement in pre-listing recovery efforts for Cowhead Lake tui chub, *Gila bicolor vaccaceps*, the Goose Lake fishes, McCloud River redband trout, *Oncorhynchus mykiss* ssp., Eagle Lake rainbow trout, *Oncorhynchus mykiss aquilarum*, Volcano Creek golden trout, *Oncorhynchus mykiss aguabonita*, and Kern River rainbow trout, *Oncorhynchus mykiss gilberti*. The SFO also received a petition to list the Eagle Lake Rainbow Trout, assisted with the Bull trout finding, reclassified the McCloud River redband trout as a Category 1 candidate, conducted consultations on Lahontan cutthroat trout, Paiute cutthroat trout, *Oncorhynchus clarki selenirus*, Little Kern golden trout, *Oncorhynchus mykiss* ssp, Owens tui chub, *Gila bicolor snyderi*, Lost River sucker, shortnose sucker, and Modoc sucker, *Catostomus microps*. The CFO pursued recovery actions for several populations of the unarmored threespine stickleback, *Gasterosteus aculeatus williamsoni*, and initiated an extensive study on the impacts

of contaminants on the Salton Sea populations of the desert pupfish, *Cyprinodon macularius*. The ISO suffered a setback when the listing of the Bruneau Hot Springsnail, *Pyrgulopsis bruneauensis*, was reversed by court order. The ISO also received a petition to list the interior redband trout, *Oncorhynchus mykiss gairdneri*, in the Kootenai drainage, and has initiated a status survey of all redband forms in southwest Idaho. The ISO has additionally been involved in recovery and conservation planning activities for the Bonneville cutthroat trout, *Oncorhynchus clarki utah*, the Bull trout, and assisted with the Bull trout finding.

CLAVES: California; Idaho; Nevada; Oregon; U.S. Fish and Wildlife Service; peces en peligro y amenazados; planes de recuperación; consultas; listas; hábitat crítico

RESUMEN

Las Oficinas Estatales y de Campo de Servicios Ecológicos, de la Región Uno de el Fish and Wildlife Service, han conducido una variedad de propuestas, recuperación, revisión de estatus, y actividades de consulta relacionadas a los peces del desierto y otras especies acuáticas este año. Estas oficinas incluye la Oregon State Office (OSO), The Klamath Basin Ecosystem Restoration Office (ERO), Nevada State Office (NSO), Sacramento Field Office (SFO), Carlsbad Field Office (CFO), e Idaho State Office (ISO). The Oregon State Office desarrolló un borrador de plan de recuperación para el matalote de Warner, *Catostomus warnerensis*, y el Foskett Spring speckled dace, *Rhinichthys osculus* spp.; propuso hábitat crítico para el matalote del Río Perdido (Lost River sucker), *Deltistes luxatus*, y el matalote nariz corta (shortnose sucker), *Chasmistes brevirostris* de la cuenca Alta del Klamath; asistió en el desarrollo de las conclusiones del reporte "warranted but precluded" sobre la trucha toro, *Salvelinus confluentus*; sobre el charal de Oregon, *Oregonichthys crameri* en peligro; y condujo consultas sobre proyectos federales que impactan sobre la trucha Lahontan cutthroat, *Oncorhynchus clarki henshawi*, el matalote Warner, y el matalote nariz corta. El ERO proporcionó coordinación de interagencias para las actividades de restauración del ecosistema de la Cuenca del Río Klamath, con fondos que promediaron \$1.67 millones de dólares por año en los siguientes tres años. El NSO produjo o producirá en el siguiente año un borrador o plan final de recuperación para: el White River spinedace, *Lepidomeda albivallis*, Big Spring spinedace, *Lepidomeda mollispinis pratensis*, Moapa dace *Moapa coriacea*, Lahontan cutthroat, Railroad Valley springfishes, desert dace, *Eremichthys acros*, Pahrnagat roundtail chub, *Gila robusta jordani*, White River Springfish, *Crenichthys baileyi baileyi*, y Hiko White River springfish, *Crenichthys baileyi grandis*. La NSO también reportó sobre un incendio que impactó sobre el Moapa dace; actividades de recuperación en Ash Meadows National Wildlife Refuge; la contratación de un plan de manejo de hábitat para el naucorido de Ash Meadows, *Ambrysus amargosus*; Los estatutos de Impacto Ambiental para evaluar los impactos potenciales del Acuerdo de Operación de Truckee River, con beneficios para cui-ui, *Chasmistes cujus*, esta en desarrollo; y el desarrollo de acuerdos de conservación para dos especies candidatas, Amargosa Toad, Bufo nelsoni y Oasis Valley speckled dace, *Rhinichthys osculus ssp.* La SFO reporta su involucramiento en esfuerzos de recuperación para el Cowhead Lake Tui Chub, *Gila bicolor vaccaceps*, los peces del Lago Goose, McCloud River redband trout, *Oncorhynchus mykiss aquilarum* trucha Volcano Creek golden, *Oncorhynchus mykiss aguabonita*, y la trucha arcoiris del Río Kern, *Oncorhynchus mykiss gilberti*. El SFO también recibió una petición para enlistar la trucha arcoiris del Lago Eagle, asesoró con las conclusiones para la Trucha toro, recategorizando a la trucha banda roja del lago McCloud en la categoría de candidato 1, condujo consultas sobre la trucha Lahontan cutthroat, la trucha Paiute cutthroat, *Oncorhynchus clarki selenirus*, trucha Little Kern golden, *Oncorhynchus mykiss ssp*, charal Owens tui, *Gila bicolor snyderi*, matalote Lost River, Matalote shortnose, y matalote Modoc, *Catostomus microps*. El CFO impulsó las

acciones de recuperación para varias poblaciones de el unarmored threespine stickleback, *Gasterosteus aculeatus williamsoni*, e inició un estudio extensivo sobre los impactos de la contaminación sobre las poblaciones de Salton sea, del pez perrito del desierto, *Cyprinodon macularius*. La ISO sufrió un retroceso cuando la propuesta sobre el Bruneau Hot Springsnail, *Pyrgulopsis bruneauensis*, fue rechazada por orden de la corte. La ISO también recibió una petición para enlistar a la trucha banda roja del interior, *Oncorhynchus mykiss gairdneri*, en el drenaje de Kootenai, y ha iniciado una evaluación del estatus de todas las formas de truchas banda roja en el Suroeste de Idaho. El ISO adicionalmente ha estado involucrado en actividades planeación de la conservación y recuperación para la trucha Bonneville cutthroat, *Oncorhynchus clarki utah*, la trucha toro, y asesoró con las conclusiones sobre la trucha toro (Bull trout).

CONTRIBUTED PAPER

Actions are listed by the lead office for a given species or issue.

OREGON STATE OFFICE - Recovery Planning: An agency/technical draft of the recovery plan for the threatened Warner sucker, *Catostomus warnerensis*, was once again submitted to the Region 1 office for review. Previous drafts have become outdated prior to finalization by continued research in the Warner Basin on this species funded through a partnership among the Service, the Bureau of Land Management (BLM), the Oregon Department of Fish and Wildlife (ODFW), and The Nature Conservancy (TNC). The Warner Basin is located in Oregon, with portions of the watershed extending into both California and Nevada. An agency/technical draft recovery plan for the threatened Foscett Spring Speckled Dace, *Rhinichthys osculus* ssp., also of the Warner Basin, was submitted to the Region for review as well.

Pre-Listing - As reported at last year's DFC Meeting, the Summer Basin tui chub is currently being studied by researchers at Oregon State University to determine if recently discovered populations represent the original form of this species. The Summer Basin tui chub was recently re-classified from C1 to C2 candidate status following a determination by the Regional Office that there was insufficient information to support a listing. The results of the Oregon State University investigation of genetic and morphometric taxonomic characteristics is expected to be completed in late 1995.

Listing - Critical habitat for the Lost River sucker, *Deltistes luxatus*, and shortnose sucker, *Chasmistes brevirostris*, of the Upper Klamath River Basin of Oregon and California was proposed in September of this year. A public comment period was opened on the proposed rule, its attendant Biological Support Document, and on the Draft economic analysis report prepared by ECO Northwest, of Eugene, Oregon. A final rule is due by court order before the end of the calendar year, but that deadline will likely not be met.

In response to petitions to list the Bull trout, *Salvelinus confluentus*, the Service published a

warranted but precluded finding in June of 1994. This finding means that the Bull trout is warranted for listing, but higher priority listing actions preclude preparation of a proposed rule. This also requires that the Service review the status of the species on a yearly basis. It also resulted in the elevation of the Bull trout from C2 to C1 candidate status.

The listing of the Willamette River's endemic Oregon Chub, *Oregonichthys crameri*, was finalized in mid-October of 1993. Last year's Region 1 report to the Desert Fishes Council erroneously stated that a decision on the listing package for the Oregon Lakes tui chub, *Gila bicolor oregonensis*, was expected from the Washington, D.C., office. The Oregon Lakes tui chub has not, in fact, been petitioned for listing and remains a category 2 candidate species. The Service regrets any confusion caused by mixing up these two similarly named species. Critical habitat for the Oregon chub has not yet been proposed.

Consultation - The Oregon State Office completed a total of 16 formal consultations on listed fishes, 15 of which were non-Jeopardy biological opinions. These consultations included 2 consultations on 2 grazing allotments impacting Lahontan cutthroat trout, *Oncorhynchus clarki henshawi*, 5 consultations on a total of 36 grazing allotments impacting Warner sucker, 4 consultations covering 11 grazing allotments impacting shortnose sucker, *Chasmistes brevirostris*, and 2 consultations covering 2 timber sales impacting the shortnose sucker. The one Jeopardy biological opinion was a reinitiation of the July 22, 1992, biological opinion on Long Term Operations of the Bureau of Reclamation's Klamath Project that focused on modifications of the Bureau's actions at Clear Lake Reservoir.

The Klamath Basin Ecosystem Restoration Office (ERO) The Klamath Basin Ecosystem Office (ERO) opened September 1993. The Office was established to provide interagency coordination, holistic planning, restoration, and outreach. ERO has had support and staff from the Fish and Wildlife Service, Bureau of Reclamation, Forest Service, and Bureau of Land

Management. ERO will conduct \$1.5 million inrestoration projects for FY 94, \$1.5 million in fiscal year 1995 and \$2.0 million in fiscal year 1996. Initial holistic planning has centered on development of seamless Geographic Information System (GIS) data for the basin and making data layers available to all management entities. Basin wide scoping meetings have been held to identify citizen concerns. ERO is unique in that it is the first national attempt to holistically plan and manage an ecosystem. Other national efforts center on coordination of current activities. ERO's emphasis is on long range ecosystem planning that will restore form and function and prevent future listings. ERO's presence in the Basin has sparked other conservation efforts and promoted more cooperation between all entities.

NEVADA STATE OFFICE - Recovery plans for endangered White River spinedace (*Lepidomeda albivallis*), threatened Big Spring spinedace (*Lepidomeda mollispinis pratensis*), and threatened desert tortoise (*Gopherus agassizii*) were approved in 1994. Copies of these recovery plans are available by contacting the Nevada State Office in Reno. Final recovery plans for endangered Moapa dace (*Moapa coriacea*) and threatened Lahontan cutthroat trout (LCT) (*Oncorhynchus clarki henshawi*) have been submitted for approval. The public comment period for the draft Railroad Valley springfish recovery plan closed in August 1994. Comments will be incorporated and the final document prepared for approval by March 1995. Draft recovery plans for endangered Steamboat buckwheat (*Eriogonum ovalifolium williamsiae*), threatened desert dace (*Eremichthys acros*), and three endangered fishes in Pahrangat Valley, including Pahrangat roundtail chub (*Gila robusta jordani*), White River springfish (*Crenichthys baileyi baileyi*), and Hiko White River springfish (*Crenichthys baileyi grandis*), will be available for public comment by late 1994.

In June 1994 a fire devastated the Moapa National Wildlife Refuge (NWR), severely impacting the endangered Moapa dace and other endemic aquatic species resident in the springs and their outflow streams. Immediate efforts were made to clean fire debris from the streams and restore habitat structure and shading to encourage recolonization by native species. Subsequent surveys revealed that at least 500 Moapa dace were killed during the fire. The entire population numbers approximately 3,800 individuals, but the refuge provided the majority of the spawning habitat for this species. The status of this fish will be closely monitored over the next few years. The National Biological Survey has been contracted to investigate the status and distribution of endemic aquatic biota of the Muddy River ecosystem, which includes one endangered fish, three candidate fish, and four candidate invertebrates.

During 1994, approximately 100 wild horses were removed to prevent destruction of the unique aquatic and terrestrial habitats within the Ash Meadows NWR. A fence will be constructed around the perimeter of the refuge to prevent future movement of horses from other areas into Ash Meadows. Approximately 200 acres of tamarisk were treated with herbicide in the Carson Slough and south of Point-of-Rocks Spring in Ash Meadows NWR. Conditions were ideal for the aerial application of the herbicide, and refuge staff are optimistic of a significant kill, although results will not be readily apparent until spring 1995. A habitat management plan for the threatened Ash Meadows naucorid (*Ambrysus amargosus*) is being developed for the Fish and Wildlife Service under contract. Ash Meadows NWR staff are continuing to remove all interior fences and debris, and they have installed new visitor facilities and revegetated closed roads. A baseline contaminants study has been proposed for the Ash Meadows NWR, but it has not yet been funded. Of specific concern is determining the origin of concentrations of PCP's in one spring on the refuge.

The Nevada Ecological Services State Office is preparing an Environmental Impact Statement to assess the potential impacts of the Truckee River Operating Agreement (TROA), required under Public Law 101-618 (Truckee-Carson-Pyramid Lake Water Rights Settlement Act). TROA will provide drought storage for the cities of Reno and Sparks, Nevada, in Federal reservoirs without infringing on entitled water rights. TROA must also enhance spawning flows in the Truckee River for endangered cui-ui (*Chasmistes cujus*) and threatened LCT.

Nevada Ecological Services State Office is continuing to work with the Bureau of Land Management, The Nature Conservancy, Nevada Division of Wildlife, and private landowners near Beatty, Nevada, to implement recovery actions and develop conservation agreements for the Amargosa toad (*Bufo nelsoni*) and Oasis Valley speckled dace (*Rhinichthys osculus* ssp.), candidates for listing as threatened or endangered.

SACRAMENTO FIELD OFFICE - Pre-Listing - The Sacramento office initiated or cooperated in pre-listing recovery efforts for Cowhead Lake tui chub, Goose Lake fishes, McCloud River redband trout, Eagle Lake rainbow trout, Volcano Creek golden trout, and Kern River rainbow trout. The Forest Service is initiating Conservation Agreements for some of these species impacted by grazing allotments, etc.

Through consultation with the California Department of Fish and Game, U.S. Forest Service, and private landowners, the stocking of hatchery rainbow trout has been stopped in the upper McCloud River drainage and efforts to improve habitat conditions have been initiated or expedited.

Listing - The McCloud River redband trout was recommended for re-classification from C2 to C1. Two petitions for listing the Eagle Lake rainbow trout were received and a draft positive 90 day finding was submitted to the regional office. Information on bull trout in California was sent to the Olympia office for use in the warranted but precluded one year finding released on this species.

Consultation - Four formal consultations for 15 Forest Service grazing allotments were completed that affected Lahontan cutthroat trout, Paiute cutthroat trout, Little Kern golden trout, and Owens tui chub. Grazing standards were developed with the help of the U.S. Forest Service, Oregon State and Nevada State offices of the U.S. Fish and Wildlife Service. Informal consultations (that will become formal consultations) on several other allotments that affect Lost River, shortnose, and Modoc suckers resulted in reduced impacts from grazing.

One formal consultation was completed for Forest Service timber harvests in Modoc sucker watersheds. Consultations on three private timber harvests that may affect Lahontan cutthroat trout were also completed.

CARLSBAD FIELD OFFICE - The unarmored threespine stickleback (UTS) recovery team has been active this past year. The Service provided input on two projects. The recovery team reviewed a proposal by the Natural Heritage Foundation (NHF) to create an artificial refugium with the use of secondary treated effluent. The proposal, however, lacked important details such as water quality, vegetational treatment of effluent, discharge from the ponds, water flows, etc. This proposed project was located on Baldwin Lake, near Big Bear Lake, in the San Bernardino Mountains.

The recovery team also received water quality and invertebrate information collected last year for several potential refugia on the San Bernardino National Forest (SBNF) for the Shay Creek population of UTS. One location, Juniper Springs, best represented the Shay Meadow location where this population currently exists. The SBNF is in the process of preparing a Biological Assessment and Biological Evaluation for the use of Juniper Springs as a refugium for the Shay Creek population. The recovery team assessed the physical setting of Juniper Springs and suggested that the pond be fenced with range fencing encompassing a large portion of the meadow surrounding the pond to improve water quality. Cattle currently utilize the pond for water and the meadow for grazing. The pond exhibits evidence of high levels of nutrients. The meadow downstream of the pond also has great potential for enhancement as habitat with some minor excavations to create meandering channels through the meadow.

A desert pupfish study by the Contaminants Branch began in June 1994 with collections of sailfin mollies to serve as surrogates for the endangered desert pupfish. In June 1994, seven drains that had a history of

use by both desert pupfish and sailfin mollies were sampled. A sufficient number of mollies were collected for chemical analysis in three of the drains. Desert pupfish were not observed in any of the drains sampled in June. Fish surveys and collections continued during July-September 1994. This sampling schedule included the months of August- September when the Imperial Irrigation District (IID) surveyed agricultural drains for desert pupfish. The IID Survey Team was able to provide samples from a total of 10 drains. The Service is submitting a total of 32 samples of sailfin mollies from 13 drains for chemical analysis. Of greatest interest are selenium, boron and pesticide levels in the tissues of these fish. This study is part of the Salton Sea National Irrigation Water Quality Program.

IDAHO STATE OFFICE - In an unprecedented decision, an Idaho district judge removed the Bruneau Hot Springsnail (*Pyrgulopsis bruneauensis*) from the endangered species list on December 14, 1993. The district court set aside the January 1993 listing of the snail as endangered because of procedural and due process violations. However, the district court affirmed the scientific basis for the listings concluding that "the Fish and Wildlife Service articulated a rational connection between the factors identified and the choice made." An appeal of the district court decision was filed in May 1994 by the Land and Water Fund of the Rockies (LAW Fund); a decision of this appeal is expected later this year. Also, the LAW Fund submitted a petition to re-list the springsnail early in 1994 which the Service is currently reviewing.

Monitoring of Bruneau Hot Springsnail populations and the regional ground water aquifer continues throughout 1994.

The Service received a petition to list the interior redband trout (*Oncorhynchus mykiss gairdneri*) in the Kootenai drainage as a threatened or endangered species on April 4, 1994. The 90-day finding for this listing petition, prepared by the Idaho State office, is currently under review by the Service. The Idaho State Office has also received notice that a petition to list the desert redband trout is likely to be filed in the near future. In response to this notice, the Idaho State Office is initiating a status review of the redbands of southwest Idaho.

The Idaho State Office is: (1) working with the Caribou National Forest to implement management measures that protect the remaining pure-strain populations of the Bonneville cutthroat trout (*Oncorhynchus clarki utah*) in Idaho, (2) convened an interagency working group to develop a Conservation Agreement for long-term protection, and (3) participating with Region 6 (Service) in a status review of the sub-species throughout its range. This species of cutthroat trout is native to the Bonneville basin, similar to the Yellowstone cutthroat trout. Differences are mainly in larger, more evenly distributed spots on the sides of the body and in generally fewer scales in the lateral series. Found primarily in small headwater streams, they generally

range in size from 2 to 9 in., with lake populations reaching 30 in.

The Bonneville cutthroat trout is included as a category 2 candidate (C2) species in the November 21, 1991 Animal Notice of Review (56 FR 58804). In Idaho, only a few pure-strain stream and one lake populations of the species remain. This species has declined dramatically throughout its historic range, especially in Idaho. This decline has paralleled the introduction of non-native trouts and continued habitat alteration and destruction of preferred habitats from grazing and logging practices. Remaining stream populations occur on the Caribou National Forest primarily within in the Thomas Fork drainage; most are located within the Montpelier Elk Valley Cattle Allotment. The Caribou National Forest in cooperation with the Caribou Livestock Association, Idaho Soil Conservation Commission, and Idaho Department of Fish and Game have finalized a Conservation Agreement (CA). The CA is being routed for signature to the cooperating agencies.

In March 1985, the Service (Region 6) prepared a Proposed rule to list the Bonneville cutthroat trout as threatened with critical habitat. In subsequent discussions of the proposed rule with the Forest Service and Idaho, Utah, and Wyoming Fish & Wildlife staff, the Service determined that further information was needed prior to any listing decision. As a prototype for two CA's being finalized for this species, the Service will be closely monitoring the implementation and compliance of this CA. In Idaho, the Caribou Livestock Association represents 17 livestock permittee for the Montpelier Elk Valley cattle allotment. The Association intends to sign the CA.

The Idaho State Office initiated a letter to the Regional office requesting that regional coordination of bull trout issues be conducted out of the Idaho State Office. This request also means establishment of a regional coordinator for these issues. The Idaho Department of Fish and Game is considering the establishment of a comparable position for Idaho. The intent of these two positions will be to work with all entities to implement the April 4, 1994 Conservation Strategy for Bull Trout (CSBT).

The CSBT, which was written by a interagency team from Idaho, has been recognized as a key document for recovery by all State Fish and Wildlife agencies, the U.S. Forest Service, and the BLM Districts that are affected by the species candidate status. Other State Fish and Game agencies, the Forest Service, and BLM are adopting the CSBT and modifying it to local conditions. It remains to be seen just how pervasive implementation will be done. By implementing the CSBT through a sub-basin approach, manageable Conservation Agreements can be developed that will allow for annual compliance and review. This will put the Service in a very strong position to judge whether threats are being reduced and the inadequacy of existing regulatory mechanisms are being addressed when conducting the annual review of the status of bull trout under a CI category. In Idaho, the Idaho Department of Fish and Game does not want to loose its authority to manage fish resources in streams and rivers where bull trout are found. The BLM and Forest service do not want to address another listed fish species which has a broad range in Idaho. All these agencies appear to be motivated to implement the CSBT.

WILLIAMS,R.D.*; MADDUX,H.R.; YOUNG,D.A. (Utah Field Office, Ecological Services, Fish and Wildlife Service, Salt Lake City, UT)

Agency Report for the Utah Field Office, Fish and Wildlife Service

Reporte de Agencia para la Utah Field Office, Fish and Wildlife Service

KEYWORDS: consultation; Utah; Conservation Agreement; Virgin spinedace; June sucker; least chub; Bonneville cutthroat trout

ABSTRACT

The Utah Field Office of the Fish and Wildlife Service continued to be involved in desert fishes conservation activities. Numerous consultations were completed in the Virgin River basin, and a draft Conservation Agreement was drafted regarding the Virgin spinedace *Lepidomeda mollispinis mollispinis*. June sucker *Chasmistes liorus liorus* experienced another drought during spawning in 1994, and Service negotiations were beneficial in securing minimum flows during spawning activities in the lower Provo River. Additionally, a consultation was completed with the Bureau of Reclamation regarding operations of the Provo River Project which will result in guaranteed minimum flows during June sucker riverine occupation. The Agency/Public review draft of the June sucker Recovery Plan will be available this fall. A listing package for the least chub *Iotichthys phlegethontis* was submitted to Region 6 for finalization. The Service is working with the Utah Division of Wildlife Resources in developing a Conservation Agreement for Bonneville cutthroat trout *Oncorhynchus clarki utah*. Numerous consultations were completed in the Colorado and Green River basins.

CLAVES: consulta; Utah; Acuerdo de Conservación; Virgin spinedace; matalote de Junio; least chub; trucha Bonneville cutthroat

RESUMEN

La Utah Field Office de el Fish and Wildlife Service continúa involucrada en las actividades de conservación de los peces del desierto. Numerosas consultas fueron completadas en la cuenca del Río Virgin, y un borrador de acuerdo de conservación fue esbozado en torno al Virgin Spinedace *Lepidomeda mollispinis mollispinis*. El Matalote de Junio (June sucker) *Chasmistes liorus liorus* experimentó otro pequeño período de lluvias durante el desove de 1994, y las

negociaciones del Servicio fueron benéficas para asegurar los flujos mínimos durante las actividades de desove en el Bajo Río Provo. Adicionalmente, una consulta fue completada con el Buró de Reclamaciones en relación a las operaciones del Proyecto Río Provo, el cual resultará en garantizar los flujos mínimos durante la ocupación ribेरina del matalote de Junio. La Agencia/Público revisó un borrador del Plan de Recuperación del matalote de Junio el cual estará disponible en este otoño. Una lista de propuestas para el least chub *Lotichthys phlegethontis* fue sometida a la región 6 para finalización. El Servicio esta trabajando con la Utah Division of Wildlife Resources en desarrollar un Acuerdo de Conservación para la Bonneville cutthroat trout *Oncorhynchus clarki utah*. Numerosas consultas fueron completadas en las cuencas del Río Colorado y Green.

MINCKLEY, C.O. (U.S. Fish and Wildlife Service, Arizona Fisher Resouce Office, Parker, Arizona)

Summary of Arizona Fishery Resource Office activities, 1994

Sumario de actividades de la Oficina de Recurso Pesquero de Arizona, 1994

KEYWORDS: Colorado River; Arizona; California; Grand Canyon

ABSTRACT

The following is a summary of 1994 activities for the three Arizona Fishery Resource Offices. Additional activities for AESO and Fish Health are anticipated but had not been received prior to the development of this summary. They will be presented if received.

PINETOP OFFICE - During June, approximately five miles of Ord Creek, on the Fort Apache Indian Reservation were renovated to remove brook trout and to prepare the stream for introduction of pure Apache trout. This was conducted by the AZFRO staff, members of the White Mountain Apache Game and Fish Department, YCC members and volunteers. Additionally, the staff of the Pinetop Fish Health Center conducted disease surveys on the creek during the renovation. Currently, electroshocking surveys are assessing the success of the renovation.

This summer fish migration barriers were constructed on Big Bonito and Squaw Creek by the YCC crew and volunteers of the White Mountain Apache Tribe. Work was also started on a fish migration barrier on Flash Creek, and minor repairs were made to barriers on Paradise and Ord Creeks.

Members of AZFRO and the Pinetop Fish Health Center sampled streams throughout the Fort Apache Indian Reservation to determine the genetic purity of Apache trout. Based on this work, it was discovered that the genetic pool of the Big Bonito Creek stock is in jeopardy. This resulted in the drafting and implementation of the Apache Trout Contingency Plan in conjunction with the Apache Trout Recovery Team. This fall, Flash Creek fish, which represent the final remaining pure stock of Apache Trout from the Big Bonito drainage, will be taken into the Alchey/Williams Creek National Fish Hatchery for propagation and restocking to the drainage after renovation.

FLAGSTAFF FISHERY RESOURCE OFFICE - The Flagstaff office conducted two spring and two summer sampling trips into the Little Colorado River to assess/monitor stream habitat and habitat use by humpback chub and other native fishes. Humpback chub appeared to commence spawning in mid-winter; appearance of a broad range of YOY fishes suggested a protracted spawning season. Surveys were also conducted in Grand Canyon tributaries (Paria, Bright Angel, Shinumo; Tapeats, Deer, Kanab, Havasu) to assess/monitor stream habitat and habitat use by native fishes.

A pilot study of cryopreservation of razorback sucker sperm was also carried out during the Lake Mohave roundup, March 1994. Successfully fertilized eggs in the field with cryopreserved milt. Conducted pilot study on cryopreservation of bonytail chub sperm at Dexter NFH in May; eggs were successfully fertilized with cryopreserved sperm. We are preparing to conduct a pilot study on humpback chub in 1995.

Finally, a draft final report on GCES contracted studies was completed on June 30. A final version is expected by 1 October.

PARKER FISHERY RESOURCE OFFICE - Razorback suckers - To date, a total of 90 razorback suckers have been released into Colorado River waters from isolated growout facilities. This includes 86 from the high levee pond growout facility at Cibola NWR and 4 from Pittsburgh Point Cove on Lake Havasu. During a two week period in March 230 razorback suckers were taken in the annual research on Lake Mohave by Service personnel. 24% were recaptures.

During March-April an estimated 110,000 razorback sucker eggs were fertilized and delivered to Willow Beach National Fish Hatchery. Currently, it is estimated that 10,000 fish ranging from one to 12 inches are being held at the hatchery. These fish were collected from several different areas on Lake Mohave at different times of the month. One to one matings were performed and a standard quantity of eggs were taken (25 ml) each time. These fish were produced to determine if retrofitting of this hatchery to a warm water facility would make it feasible to produce native fish.

Additionally, during February and March personnel from the Service participated in harvesting wild razorback sucker larvae from Lake Mohave with other members of the native fish group. In conjunction with this 1200 larvae were transferred to the Parker FRO and held and reared to replenish the broodstock at Dexter NFH. Two hundred two-four inch fish were delivered to Dexter in October 1994.

During 1994 no bonytail chubs were produced from the Office Cove as it was breached shortly after establishment allowing fish to escape into the lake and non-indigenous fish to enter the cove. When it was poisoned, no native fish were taken. However, a total of 58 adult bonytail chub have been removed from the Hassayampa River Preserve (The Nature Conservancy) and released into Lake Havasu during 1994. Six thousand 1-2 inch fish were produced from 44,000 fry provided to the Parker FRO in April of 1994 and introduced into two facilities on Lake Havasu.

During 1994, as part of the efforts of the Lake Havasu Native Fish Project in partnership with Bureau of Land Management and other agencies, three additional barriered habitats were developed on Lake Havasu for native fish. Additionally, a isolated habitat was developed adjacent to Lake Havasu. Two facilities in operation on Lake Havasu in 1993 were also re- poisoned to prepare them for receiving bonytail chubs in October.

One isolated facility has also been developed on Imperial NWR. In addition to this four ponds on the La Paz County golf course have been developed for native fish.

The Pinetop Fish Health Office examined fishes for disease from No Entry Cove and from the Hassayampa River Preserve. Nothing of significance was found. However, upon examination of two bonytail chub which died subsequent to the initial examination, the Asian tapeworm was found.

In summary, twelve native fish isolated habitats are in place along the lower Colorado River, below Davis Dam. These include the following sites on or adjacent to Lake Havasu: Pittsburgh Point Cove No Entry Cove Office Cove - Bill Williams River NWR Twin Cove South - Havasu NWR Twin Cove North - Havasu NWR Bulkhead Cove. In addition:

Four ponds on the La Paz County golf course High Levee Pond - Cibola NWR Hidden Lake - Imperial NWR. Currently all are stocked with bonytail chub produced by Dexter National Fish Hatchery and Technology Center. The total acreage is estimated at 25 acres.

Besides these activities, Parker FRO has produced the Little Colorado Spinedace Recovery Plan which was published in the Federal Register on 23 September 1994. The Lower Basin Management Plan for Indigenous Big River Fishes was also produced and is currently under review.

CLAVES: Río Colorado; Arizona; California; Gran Cañón

RESUMEN

El siguiente es un sumario de las actividades de 1994 de las tres Oficinas de Recurso Pesquero de Arizona. Actividades adicionales de la AESO y Fish Health están anticipadas pero no fueron recibidas previo al desarrollo de este sumario. Estas serán presentadas si se reciben.

PINETOP OFFICE - Durante Junio, aproximadamente cinco millas de Ord Creek, en la Reservación India del Fuerte Apache fueron renovadas para remover la trucha de arroyo y para preparar el arroyo para la introducción de trucha Apache pura. Esto fue llevado a cabo por el personal de la AZFRO, miembros del Departamento de Caza y Pesca White Mountain Apache, miembros de la YCC y voluntarios. Adicionalmente, el personal del Centro de Salud Piscícola de Pinetop condujo estudios de enfermedad en el arroyo durante la renovación. Constantemente, estudios de electropesca están determinando el éxito de la renovación.

Este verano se construyeron barreras de migración de peces sobre el Arroyo Big Bonito and Squaw por el personal de la YCC y voluntarios de la Tribu Apache de White Mountains. Se inició también el trabajo sobre una barrera de migración en el Arroyo Flash, y se hicieron reparaciones menores en los arroyos Paradise y Ord.

Miembros de la AZFRO y del Centro de Salud Piscícola de Pinetop muestrearon arroyos a través de toda la Reservación India del Fuerte Apache para determinar la pureza genética de la trucha Apache. Con base en este trabajo, se descubrió que el pool genético del grupo del Arroyo Big Bonito esta en peligro. Esto tuvo como resultado el borrador y la implementación del Plan de Contingencia de la Trucha Apache en conjunción con el Equipo de Recuperación de la Trucha Apache. Esta otoño, peces del Arroyo Flash el cual representa el último grupo puro remanente de la Trucha Apache del drenaje del Big Bonito, serán tomado en la Granja Nacional de Peces del Arroyo Alchey/Williams para la propagación y reubicación en el drenaje después de la renovación.

OFICINA DEL RECURSOS PESQUEROS DE FLAGSTAFF - La Oficina de Flagstaff condujo dos viajes muestreos de verano y dos de primavera al Pequeño Río Colorado para evaluar/monitorear hábitat de corriente y uso del hábitat por el charal jorobado y otros peces nativos. El charal jorobado parece comenzar a desovar a mitad del invierno; la aparición de un amplio rango de peces jóvenes de un año sugirió una estación alargada de desove.

También se llevaron a cabo estudios en los tributarios del Gran Cañón (Paria, Bright Angel, Shinumo; Tapeats, Deer, Kanab, Havasu) para evaluar/monitorear el hábitat de corriente y uso del hábitat por peces nativos.

Un estudio piloto de criopreservación de esperma del matalote jorobado se realizó también durante el muestreo del Lago Mohave, en Marzo de 1994. Huevos exitosamente fertilizados en el campo con esperma criopreservado. Se llevó a cabo un estudio piloto sobre criopreservación de esperma de charal elegante en el Dexter NFH en Mayo; los huevos fueron fertilizados exitosamente con esperma criopreservado. Nos preparamos para conducir un estudio piloto de charal jorobado en 1995.

Se completó un reporte borrador final sobre los estudios contratos de GCES en Junio 30. Una versión final se espera para el 1 de Octubre.

OFICINA DE RECURSO PESQUERO DE PARKER - Matalote Jorobado - A la fecha, se han liberado un total de 90 matalotes en las aguas del Río Colorado en instalaciones de crecimiento aisladas. Esto incluye 86 de la presa alta Levee en Cibola NWR y 4 de Pittsburgh Point Cove en el Lago Havasu. Durante un período de dos semanas en Marzo se tomaron 230 matalotes jorobados en la investigación anual en el Lago Mohave por personal del Servicio. El 24% fueron recapturas.

Durante Marzo-Abril un estimado de 110,000 huevos de matalotes jorobados fueron fertilizados y entregados a la Granja Nacional de Peces Willow Beach. Normalmente, es estimado que 10,000 peces que varían de una a 12 pulgadas están siendo mantenidos en la granja. Estos peces fueron colectados de varias áreas diferentes en el Lago Mohave en fechas diferentes en el mes. Se realizaron desoves de uno en uno y se tomó una cantidad estándar de huevos (25 ml) cada vez. Estos peces fueron producidos para determinar si la readecuación de esta granja a una instalación de agua caliente haría factible el producir peces nativos.

Adicionalmente, durante Febrero y Marzo el personal del Servicio participó en la cosecha de larvas de matalotes jorobados silvestres del Lago Mohave con otros miembros del grupo de peces nativos. En conjunción con esto, 1200 larvas fueron transferidas al Parker FRO, donde fueron llevadas a juveniles y mantenidas para reponer los grupos de reproductores en NFH Dexter. 200 de 2-4 pulgadas fueron entregados en Dexter en Octubre de 1994.

Durante 1994 no se produjeron charales elegantes en la Office Cove pues fue dividida poco después del establecimiento, permitiendo a los peces escapar hacia el lago y a los peces no indígenas entrar. Cuando fue envenenada, se tomaron peces no nativos. Sin embargo, un total de 58 charales adultos han sido removidos de la Reserva del Río Hassayampa (del Nature Conservancy) y liberados en el Lago Havasu durante 1994. Seis mil peces de 1-2 pulgadas fueron producidos de 44,000 pececillos proporcionados al Parker FRO en Abril de 1994 e introducidos en dos instalaciones en el Lago Havasu.

Durante 1994, como parte de los esfuerzos del Proyecto de Peces Nativos del Lago Havasu en cooperación con el Bureau of Land Management y otras agencias, se desarrollaron tres hábitats obstruidos adicionales en el Lago Havasu para peces nativos. Adicionalmente, un hábitat aislado fue desarrollado junto a Lago Havasu. Dos lugares accesibles en operación en el Lago Havasu en 1993 fueron también re-envenenadas para prepararlas para recibir charales elegantes en Octubre. Un lugar disponible aislado ha sido también desarrollado en el Imperial NWR. En suma a esto, cuatro presas en el campo de golf del Condado de la Paz han sido desarrolladas para peces nativos.

La Oficina de Salud Piscícola de Pinetop examinaron peces para detectar enfermedades de No Entry Cove y de la Preservación del Río Hassayampa. No se encontró significancia. Sin embargo en la examinación de dos charales elegantes que murieron después del examen inicial, se encontró un gusano asiático (Asiatic tapeworm).

En resumen, doce hábitats aislados de peces nativos están situados a lo largo del Río Colorado, hacia abajo de la Presa Davis. Estos incluyen los siguientes sitios en o adyacentes al Lago Havasu: Pittsburgh Point Cove, No Entry Cove, Office Cove - Bill Williams

River NWR, Twin Cove South - Havasu NWR, Twin Cove North - Havasu NWR Bulkhead Cove. En suma: Cuatro pozas en el campo de golf del Condado de La Paz High Levee Pond - Cibola NWR Hidden Lake - Imperial NWR. Actualmente todas están pobladas con charales elegantes de la Granja Piscícola Nacional y Centro Tecnológico de Dexter. El área total se estima en 25 acres.

Además de estas actividades, Parker FRO ha producido el Plan de Recuperación del Little Colorado Spinedace el cual fue publicado en el registro federal del 23 de Septiembre de 1994. Un Plan de Manejo para los peces indígenas de la Cuenca Baja del Río Big fue también producido y actualmente esta bajo revisión.

MONTOYA, E.* (EM - Navajo Nation, Fish and Wildlife Department, Natural Heritage Program, Window Rock, AZ)

Navajo Natural Heritage Program's Little Colorado River basin data bases

Base de datos de la cuenca del Pequeño Río Colorado, del Navajo Natural Heritage Program

KEYWORDS: Little Colorado River basin; data base; annotated bibliography; GIS; Navajo Natural Heritage Program; Navajo Fish and Wildlife Department

ABSTRACT

The Navajo Natural Heritage Program is in the process of developing data bases on the Little Colorado River (LCR) basin. Currently, a draft version of an annotated bibliography in dBase format has been developed under a Cooperative Agreement with the Bureau of Reclamation-Glen Canyon Environmental Studies. There are 1799 citations in the data base. A Geographic Information System (GIS) data base on the LCR basin is also being developed utilizing Arc-Info. This includes aspects of hydrology, biology, and geology, including endangered, threatened, and sacred flora and fauna. This also includes current and projected LCR basin threats. Current sources include data base searches, requests to tribal, federal, state, local, and private agencies, as well as personal contacts and interviews. This LCR data base is available as a reference to help in the decisions affecting the LCR basin. The LCR annotated bibliography is available to all agencies who request a copy; Attn: Ruby Hale and/or Mike Tremble.

CLAVES: cuenca del Pequeño Río Colorado; base de datos; listado bibliográfico; Sistema de Información Geográfico; Navajo Natural Heritage Program; Navajo Fish and Wildlife Department

RESUMEN

El Navajo Natural Heritage Program está en el proceso de desarrollo de la base datos de la cuenca del Pequeño Río Colorado (Little Colorado River (LCR)). Recientemente una versión de borrador de un listado bibliográfico en formato dBase, ha sido desarrollado bajo un Acuerdo Cooperativo con el Buró de Reclamación de Estudios Ambientales Glen Canyon. Hay 1799 citas en la base de datos. Una base de datos en Sistema de Información Geográfica (GIS) en la cuenca del LCR, está comenzando a desarrollarse utilizando Arc-Info. Esta incluye aspectos de hidrología, biología y geología, flora y fauna en peligro, amenazada y sagrada. Esta además incluye amenazas actuales y proyectadas de la cuenca LCR. Las fuentes recientes incluyen la búsqueda de base de datos solicitudes a las tribus, agencias federales, estatales, locales y privadas, así como también contactos personales como entrevistas. Esta base de datos del LCR esta disponible como una referencia para ayudar en las decisiones que afecten la cuenca del LCR. El listado bibliográfico del LCR esta disponible para todas las agencias que soliciten una copia; atención Ruby Hale y/o Mike Tremble.

PROPST, D.L. (New Mexico Department of Game and Fish, Santa Fe, NM)

Native fish research and management in New Mexico during 1993 and 1994

Investigación y manejo de peces nativos en Nuevo México durante 1993 y 1994

KEYWORDS: New Mexico; Pecos River; Rio Grande; San Juan River; Zuni River; Gila River

ABSTRACT

Research and management of native fishes in New Mexico during the past two years concentrated on the Pecos, Rio Grande, San Juan, Zuni, and Gila basins. Work on the Pecos River mainly involved research to characterize the inter-relationships of reservoir controlled river flows and the fish community, and particularly to characterize the dynamics of Pecos bluntnose shiner, *Notropis simus pecosensis*, populations. The imperiled status of Rio Grande silvery minnow, *Hybognathus amarus*, prompted a long-term effort in the Rio Grande to resolve its taxonomic status and characterize its distribution, status, life history, and response to variable reservoir controlled flow regimes. Research on the San Juan River included evaluating effects of variable flows on the tailwater trout and macroinvertebrate communities below Navajo Dam and characterizing the fish communities of secondary channels and investigating their seasonal and annual dynamics. The main impetus for San Juan research is to develop strategies for recovery of Colorado squawfish, *Ptychocheilus lucius*, and razorback sucker, *Xyrauchen texanus*, in the basin. During the past two years the status and distribution of Zuni bluehead sucker, *Catostomus discobolus yarrowi*, was determined and studies have been initiated to characterize its biology. Annual monitoring of fish communities at six permanent sites in the Gila-San Francisco drainage, initiated in 1983, continued. While the status of loach minnow, *Rhinichthys cobitis*, seems to have remained fairly stable at most sites, that of spikedace, *Meda fulgida*, appears to have declined. The permanent site on East Fork Gila River enabled monitoring of one of two "viable" populations of roundtail chub, *Gila robusta* in the basin. During 1993-1994, White Creek was renovated and stocked with Gila trout, *Oncorhynchus gilae*, fertilized eggs were obtained from McKnight Creek for development of a brood stock to aid recovery efforts, Gila trout were re-established in Main Diamond Creek (type locality), several streams inventoried to assess suitability for renovation, eight populations monitored, and 150 individuals evacuated from Spruce Creek during a wildfire which threatened the population. Local opposition to several planned recovery activities forced

postponement of needed actions. Status of Gila trout has improved since 1989, when proposed downlisting was postponed because natural events severely reduced two wild populations and eliminated another, to the point that downlisting may be soon recommended.

CLAVES: Nuevo México; Río Pecos; Río Grande; Río San Juan; Río Zuni; Río Gila

RESUMEN

La investigación y manejo de peces nativos en Nuevo México durante los pasados dos años se concentraron en las cuencas del Pecos, Río Grande, San Juan, Zuni, y Gila. El trabajo en el Río Pecos incluyó principalmente investigaciones para caracterizar la interrelación de los reservorios que controlan los flujos con la comunidad de peces, y particularmente para caracterizar la dinámica de la población del Pecos bluntnose shiner, *Notropis simus pecosensis*. El estatus del Río Grande silvery minnow (especie en peligro), *Hybognathus amarus*, requiere de esfuerzos a largo plazo en el Río Grande para determinar su estatus taxonómico y caracterizar su distribución, estatus, historia natural, y respuesta a los regímenes del flujo variable del reservorio. La investigación en el Río San Juan incluye la evaluación de los efectos de la variación de los flujos sobre la trucha y las comunidades de macroinvertebrados que viven abajo de la cuenca de la presa Navajo, y caracteriza las comunidades de peces de canales secundarios y el estudio de la dinámica estacional y anual. El principal interés de la investigación del San Juan es el desarrollo de las estrategias para la recuperación del charal del Colorado *Ptychocheilus lucius*, y el matalote jorobado, *Xyrauchen texanus*, en la cuenca. Durante los pasados dos años el estatus y distribución del Zuni bluehead sucker, *Catostomus discobolus yarrowi*, fue determinado y los estudios han iniciado para caracterizar su biología. El monitoreo anual de la comunidad del pez en seis sitios permanentes en el cuenca del Gila-San Francisco, inició en 1983 y aún continúa. Mientras que el estatus del loach minnow, *Rhinichthys cobitis*, aparenta tener remanentes lejanamente estables en la mayoría de los sitios, como el spikedace, *Meda fulgida*, aparenta tener un decremento. En un sitio permanente en East Fork Gila River se habilitó el monitoreo de una de las dos poblaciones viables del charal aleta redondeada, *Gila robusta* en la cuenca. Durante 1993-1994, White Creek fue recuperado y poblado con un grupo de trucha de Gila, *Oncorhynchus gilae*, los huevos fertilizados fueron obtenidos de Mcknight Creek para desarrollar el pie de cría, para complementar los esfuerzos de recuperación, la trucha de Gila fue re-establecida en Main Diamond Creek (localidad tipo), algunos arroyos fueron monitoreados para evaluar la disponibilidad de recuperación, ocho poblaciones fueron monitoreadas, y 150 individuos evacuados de Spruce Creek durante un incendio forestal que amenazaban la población. La oposición local a varias actividades de recuperación planeadas, llevaron a posponer las acciones que se necesitaban. El estatus de la trucha del Gila ha mejorado desde 1989 cuando la propuesta de quitarlo como especie enlistada fue pospuesta debido a eventos naturales que redujeron dramáticamente a dos poblaciones y eliminaron a otra, a tal grado que dicha propuesta pueda ser recomendada para después.

LENTSCH, L.D.* (LDL - Utah Division of Wildlife, Salt Lake City, Utah)

Utah's Native Fish Program: A review of activities in 1994

Programa de Peces Nativos de Utah: Una revisión de las actividades en 1994

KEYWORDS: Utah; native fishes

ABSTRACT

The native fish program within the Utah Division of Wildlife (UDWR) is divided into four major components: (1) native fish (not federally listed), (2) Virgin River fish, (3) June sucker, and (4) Colorado River Fish (Upper Basin and San Juan). During 1994, UDWR was restructured and these programs were added with sportfish programs into a new Aquatic Section. Despite a significant reduction in force, efforts in the native fish programs have generally been maintained. In some cases, the program has expanded. Activities within each component are summarized and highlights are presented.

CLAVES: Utah; peces nativos

RESUMEN

El programa de peces nativos en The Utah Division of Wildlife (UDWR), está dividida en cuatro componentes principales: (1) peces nativos (no federalmente enlistados), (2) peces del Río Virgin, (3) June sucker (matalote de Junio), y (4) peces del Río Colorado (cuenca alta y San Juan). Durante 1994 la UDWR fue re-estructurada y estos programas fueron sumados en los programas de pesca deportiva en una nueva Sección Acuática. A pesar de una significativa reducción de fuerza de trabajo, los esfuerzos en los programas de peces nativos generalmente han sido mantenidos. En algunos casos el programa se ha expandido. Las actividades en cada componente se presentan en forma sumaria y enfatizada.

BOLSTER, B.C.* (BCB - California Department of Fish and Game, Inland Fisheries Division, Endangered Species Project, Rancho Cordova, CA)

California Department of Fish and Game Agency Report - 1994
Reporte de Agencia del California Department of Fish and Game - 1994

KEYWORDS: California; springsnails; desert pupfish; Shoshone pupfish; Owens Valley; Klamath basin; Goose Lake; Death Valley; genetics

ABSTRACT

GOOSE LAKE FISHES - Goose Lake is a large, shallow, alkaline lake on the Oregon- California border. Recent drought and agricultural diversion in the arid Goose Lake Basin caused the lake to dry completely the past three years. The Basin contains the following endemic Species of Special Concern: Goose Lake lamprey (*Lampetra tridentata* ssp.), Goose Lake redband trout (*Oncorhynchus mykiss* ssp.), Goose Lake tui chub (*Gila bicolor thalassina*) and Goose Lake sucker (*Catostomus occidentalis lacusanserinus*).

The Department participates in the Goose Lake Fishes Working Group. The Group provides a mechanism for conflict resolution between resource managers and landowners, and is developing a cooperative plan to hopefully preclude the need to list these species. The Department had a field crew at Goose Lake for the past two field seasons. In 1993, the crew habitat-typed one of the major tributaries, Willow Creek and its tributaries. In 1994, the various habitat types were surveyed for species composition. The lake's remnant trout population is gone, but may be recolonized by remaining stream populations. Relatively good numbers of suckers and chub were found. Lamprey were not very abundant. Some of the tributaries included exotic brown trout and fathead minnows.

MODOC SUCKER - Until 1973 the Modoc sucker (*Catostomus microps*) was known only from its type locality, Rush Creek in Modoc County, where it was first collected in 1898. It is now known to occur in nine streams. Until surveys of six of the streams by the USFWS (Scoppettone et al.) in 1992, this federal- and state-listed endangered species was thought to be on the brink of extinction. The 1992 survey indicated that the species is relatively secure in five of the six streams surveyed. Department activities include ongoing review of timber harvest plans and flow monitoring at some sites.

SHORTNOSE AND LOST RIVER SUCKERS - California populations of the shortnose sucker (*Chasmistes brevirostris*) and Lost River sucker (*Deltistes luxatus*) continue to be in peril. Major populations of these federal- and state-listed species occur in the Clear Lake Reservoir watershed in the upper Klamath River and Lost River systems of extreme northeastern California. Recent drought conditions have reduced the habitat available and long-term effects are unknown. In October 1992, Clear Lake reservoir reached the lowest elevation since 1935 and was only 5% of the reservoir's total capacity. Populations in small reservoirs above Clear Lake may have been eliminated due to desiccation during the summer of 1992. Some of these populations may have been reestablished via spawning runs in the spring of 1993, but significant upstream migration may have been precluded by low downstream discharge in Willow Creek, a major tributary. Suckers captured in 1992 and early 1993 exhibited signs of stress, possibly due to low lake levels. The condition factors improved by late summer 1993.

The Department contracted with the National Biological Survey (Gary Scoppettone) to determine the population density, food habits, age class structure, daily and seasonal movement patterns and seasonal limnological conditions in Clear Lake Reservoir and the other major California population site, Tule Lake.

The Department also let a contract to determine the genetic status and taxonomic relationships of suckers in the Klamath basin. Dr. Don Buth at UCLA has presented the following preliminary results:

1. A set of loci has been determined that will identify the four species and allow recognition of putative hybrids.
2. To date, no allozyme evidence for hybridization between shortnose suckers and Klamath largescale suckers has been revealed in the Clear Lake Reservoir sample. More specimens need to be examined.
3. To date, no allozyme evidence for hybridization between shortnose suckers and Klamath smallscale suckers has been revealed in the Copco Lake sample. More specimens need to be examined. Final results are not available due to administrative delays.

LAHONTAN AND PAIUTE CUTTHROAT TROUT - Within the last five years the Department has successfully restored Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) to five streams with the California portion of the Lahontan Basin. This effort has increased the amount of occupied or restored habitat from 17 stream miles to 36, and the total number of populations to 14. A century ago, this federally- listed threatened fish occupied an estimated 1,000 miles of habitat in California. The closely related Paiute cutthroat trout (*Oncorhynchus clarki seleniris*), a federally-listed threatened subspecies, has been adversely affected by introgression with introduced rainbow trout (*Oncorhynchus mykiss*). This has resulted in the loss of Paiute cutthroat trout from all but two tiny tributaries of its endemic habitat, Silver King Creek. Repeated chemical treatments have eradicated introgressed fish from the Silver

Creek drainage. As a result, pure Paiute cutthroat trout have been restocked or restored to eight stream miles within the drainage.

UNARMORED THREESPINE STICKLEBACK - The Recovery Plan for the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) indicates that this state- and federally listed subspecies is restricted to the Santa Clara River drainage in Los Angeles County and the San Antonio Creek drainage in Santa Barbara County and an introduced population in San Felipe Creek, San Diego County. Recent allozyme analysis by Dr. Don Buth at UCLA further restricts the range of *G. a. williamsoni* to the Santa Clara River drainage. The San Antonio Creek form may be unique. The Santa Clara River population suffered losses due to an oil spill after the January 1994 Northridge earthquake. Development pressures are increasing as is the number of water rights applications.

The recently discovered undescribed Shay Creek unarmored threespine stickleback is still restricted to one pond at Shay Meadow and an introduced population at Sugarloaf Meadow, both in the San Bernardino National Forest, San Bernardino County. The Shay Meadow population is highly vulnerable to water withdrawals, so the Recovery Team is actively pursuing another transplant site. Juniper Springs, also in the San Bernardino National Forest, was identified as a potential site by Dr. Jonathan Baskin while under contract to the Department.

OWENS VALLEY FISHES - In 1983, the Department, BLM and the USFWS funded a contract to produce a recovery plan for listed aquatic, wetland and riparian species of the Owens Valley floor, including the Owens tui chub (*Gila bicolor snyderi*) and Owens pupfish (*Cyprinodon radiosus*). A management plan will also be produced to include non-listed species of concern such as Owens speckled dace (*Rhinichthys osculus* ssp.), Owens sucker (*Catostomus fumeiventris*) and springsnails (Hydrobiidae). The Los Angeles Department of Water and Power, the valley's major landholder, is cooperating with the contractors to date. The contractors (Sada et al.) expect to have a draft recovery plan completed by late spring 1995.

Existing populations of Owens pupfish are again in bad shape. Due to ongoing problems with habitat maintenance and non-native piscivores, numbers have plummeted at all but two refugium locations. Desert Pupfish

Spring and summer monitoring found most natural and refugium populations of desert pupfish (*Cyprinodon macularius*) to be thriving. However, monitoring of Salton Sea tributary irrigation drains by the Department and the local irrigation district found fewer pupfish than 1993 and higher numbers of non-native fishes like mollies and tilapia.

OTHER PUPFISHES - Collections and laboratory work continue for the Department's contract with Dr. Bruce Turner, who is assessing the molecular genetics of Death Valley drainage *Cyprinodon*, with emphasis on the Shoshone pupfish (*Cyprinodon nevadensis shoshone*). Dr. Turner has agreed to include samples in his analysis from any other California pupfish populations we can provide for him, i.e., *Cyprinodon macularius* and *C. radiosus*. Results should be available by summer 1995.

CLAVES: California; caracol de manantial; pez perrito del desierto; pez perrito Shoshone; Valle Owens; Cuenca Klamath; Lago Goose; Death Valley; genética

RESUMEN

PECES DEL GOOSE LAKE - El Goose Lake es un lago grande, poco profundo, alcalino sobre el límite de Oregon y California. Sequías recientes y desviación de aguas agrícolas en la cuenca árida del Lago Goose provocaron que el lago se secara completamente los pasados tres años. La cuenca contiene las siguientes especies endémicas de interés especial: la lamprea del Lago Goose (*Lampetra tridentata* ssp.), trucha de banda roja del Lago Goose (*Oncorhynchus mykiss* ssp.), el charal Goose Lake tui (*Gila bicolor thalassina*) y el matalote del Lago Goose (*Catostomus occidentalis lacusanserinus*).

El Departamento participó en el grupo de trabajo de peces del Lago Goose. El Grupo proporcionó un mecanismo para la resolución del conflicto entre el manejo de recursos y propietarios, mediante el desarrollo de un plan cooperativo para excluir la necesidad de enlistar estas especies. El Departamento tuvo un personal de campo en el Lago Goose Lake durante las pasadas dos estaciones. En 1993, el personal tipificó el hábitat de uno de los tributarios mayores, el Willow Creek y sus tributarios. En 1994, los varios tipos de hábitat fueron registrados para composición de especies. La población remanente de trucha del lago desapareció, pero puede ser recolonizada por poblaciones remanentes de la corriente. Un número relativamente bueno de matalotes y charales fueron encontrados. Las lampreas no fueron encontradas muy abundantemente. Algunos de los tributarios incluyeron exóticos como la trucha café y fathead minnows.

MATALOTE MODOC (MODOC SUCKER) - Hasta 1973 el modoc sucker (*Catostomus microps*) fue conocido solamente en su localidad tipo, Rush Creek en Modoc County, donde fue primeramente colectado en 1898. Ahora se sabe que ocurre en nueve arroyos. Hasta las evaluaciones de seis arroyos por el USFWS (Scoppettone et al.) en 1992, estaba al borde de la extinción según las listas federal y estatal. El recorrido de 1992 indicaba que la especie esta

relativamente segura en cinco de las seis corrientes registradas. Las actividades del Departamento incluía revisar los planes de aprovechamiento forestal y el monitoreo de flujos en algunos sitios.

MATALOTE NARIZ CORTA Y DEL RÍO LOST (SHORTNOSE Y LOST RIVER SUCKERS) - Las poblaciones en California del shortnose sucker (*Chasmistes brevirostris*) y Lost River sucker (*Deltistes luxatus*) continúan estando en peligro. Las poblaciones mayores de esta especie enlistada federal y estatalmente ocurren en el embalse del Lago Clear en los sistemas de la cuenca superior del Río Klamath y Río Lost del extremo noreste de California. Condiciones de sequía reciente han reducido el hábitat disponible y los efectos a largo plazo son desconocidos. En octubre de 1992, el embalse del Lago Clear alcanzó la elevación más baja desde 1935 y fue solamente el 5% de la capacidad total del embalse. Las poblaciones en pequeños embalses arriba del Lago Clear habían sido eliminados debido a la desecación durante el verano de 1992. Algunas de estas poblaciones pudieron restablecerse vía corrida de la freza en primavera de 1993, pero una migración significativa no pudo efectuarse por la baja descarga río abajo en Willow Creek, un tributario mayor. Los matalotes capturados en 1992 y principios de 1993 exhibieron signos de estrés, posiblemente debido a los bajos niveles del lago. Las condiciones de los factores mejoraron para fines de verano de 1993.

El Departamento fue contactado por el National Biological Survey (Gary Scopettone) para determinar la densidad de población, hábitos alimenticios, estructura por clases de edad, patrones de movimiento diarios y estacionales y condiciones limnológicas estacionales en el embalse del Lago Clear y el sitio de la otra población principal de California, Lago Tule.

El Departamento también realizó un contrato para determinar el estatus genético y relaciones taxonómicas del matalote en la cuenca Klamath. El Dr. Don Buth en UCLA ha presentado los siguientes resultados preliminares:

1. Un juego de loci ha sido determinado que puede identificar las cuatro especies y permitir el reconocimiento de los supuestos híbridos.

2. A la fecha, ninguna evidencia de alozima para hibridización entre shortnose suckers (matalote nariz corta) y Klamath largescale suckers (matalote escamas grandes del Klamath) ha sido revelada en la muestra del embalse del Lago Clear. Necesitan examinarse más especímenes.

3. A la fecha, la muestra del Lago Copco, no han revelado la existencia de evidencias de alozimas por hibridación entre el matalote shortnose (matalote nariz corta) y el matalote Klamath smallscale (matalote de escamas pequeñas del Klamath). Es necesario examinar más evidencias. Los resultados finales aún no están disponibles debido a retrasos administrativos.

TRUCHAS CUTTHROAT, LAHONTAN Y PAIUTE - En los últimos cinco años el Departamento ha restaurado exitosamente la Trucha Lahontan cutthroat (*Oncorhynchus clarki henshawi*) en cinco arroyos de la porción de California de la Cuenca Lahontan. Este esfuerzo ha incrementado la cantidad de hábitats ocupados o restaurados de 17 a 36 millas de arroyos, y el número total de poblaciones a 14. A un siglo de distancia, este pez enlistado federalmente ocupó aproximadamente 1,000 millas de hábitats en California. Estrechamente relacionada, la trucha Paiute cutthroat (*Oncorhynchus clarki seleniris*), una subespecie enlistada federalmente en peligro de extinción, ha sido afectada adversamente por la introgresión con la trucha arcoiris (*Oncorhynchus mykiss*). Esto ha resultado en la pérdida de la trucha Paiute cutthroat de todos menos dos delgados tributarios de su hábitat endémico, el Silver King Creek. Tratamientos químicos repetidos han erradicado los peces afectados por la introgresión del drenaje del Silver Creek. Como resultado, la trucha Paiute Cutthroat ha sido reintroducida o restaurada en ocho millas de arroyos en el drenaje.

UNARMORED THREESPINE STICKLEBACK - El Plan de Recuperación para Unarmored Threespine Stickleback (*Gasterosteus aculeatus williamsoni*) indica que esta subespecie estatal y federalmente enlistada como amenazada, esta restringida al drenaje del Río Santa Clara en el Condado de los Angeles y el drenaje del San Antonio Creek en el Condado de Santa Barbara, y una población introducida en San Felipe Creek, en el Condado de San Diego. Análisis recientes de alozimas por el Dr. Don Buth en la UCLA, restringen el rango de *G. a. williamsoni* al drenaje del Río Santa Clara. En esencia, el San Antonio Creek quizás sea el único. La población del Río Santa Clara sufrió pérdidas debido al derrame de petróleo ocasionado por el terremoto de Northridge en Enero de 1994. Las presiones del desarrollo se están incrementando así como el número de solicitudes de derechos de agua.

El recientemente descubierto Shay Creek unarmored threespine stickleback esta hasta ahora restringido en la poza de Shay Meadow y una población introducida en Sugarloaf Meadow, ambas en San Bernardino National Forest, Condado de San Bernardino. La población de Shay Meadow es altamente vulnerable a la remoción de agua, debido a esto el Equipo de Recuperación esta activamente promoviendo otros sitios de trasplantes. Juniper Springs, también en el San Bernardino National Forest, fue identificado como un sitio potencial por el Dr. Jonathan Baskin mientras se encuentra bajo contrato por el Departamento.

PECES DEL VALLE OWENS - En 1983, el Departamento, BLM y el USFWS financiaron un contrato para realizar un Plan de Recuperación para las especies acuáticas de humedales y riparias enlistadas del Valle Owens, incluyendo el charal Tui de Owens (*Gila bicolor snyderi*) y el pez perrito del Owens (*Cyprinodon radiosus*).

Un Plan de Manejo también será producido para incluir especies no enlistadas de interés tales como el Owens speckled dace (*Rhinichthys osculus* ssp.), el matalote de Owens (*Catostomus fumeiventris*) y los caracoles de manantiales (Hidrobiidae). El Los Angeles Department of Water and Power, el responsable principal del valle, esta cooperando con los consultores a la fecha. Los consultores (Sada et al.) esperan tener un primer borrador completo del plan de recuperación, para finales de la primavera de 1995.

Las poblaciones existentes del pez perrito de Owens están de nuevo en malas condiciones. Debido a problemas con el mantenimiento del hábitat y piscívoros no nativos, han decaído en todos, menos en dos localidades de refugio.

PEZ PERRITO DEL DESIERTO (DESERT PUPFISH) - Los monitoreos de primavera y verano encontraron en recuperación la mayoría de las poblaciones naturales y de refugios del pez perrito del desierto (*Cyprinodon macularius*). Sin embargo, los monitoreos en los drenajes de irrigación tributarios del Salton Sea, por el Departamento y el distrito de irrigación local, encontraron menos peces que en 1993 y números más altos de peces no nativos como mollies y tilapias.

OTROS PECES PERRITO (PUPFISH) - Las colecciones y el trabajo de laboratorio continúan mediante el convenio del Departamento con el Dr. Bruce Turner, quién esta evaluando la genética molecular del *Cyprinodon* del drenaje del Death Valley, con énfasis en el pez perrito Shoshone (*Cyprinodon nevadensis shoshone*). El Dr. Turner ha acordado incluir muestras en su análisis de cualquier otra población de peces perrito de California que nosotros podamos proporcionarle, como *Cyprinodon macularius* y *C. radiosus*. Los resultados podrían estar disponibles para el verano de 1995.

GARRETT, G.P.* (Texas Parks and Wildlife Department)

Agency Report for the Texas Parks and Wildlife Department

Reporte de Agencia de Texas Parks and Wildlife Department

KEYWORDS: Río Grande; Río Conchos; Chihuahuan Desert; Balmorhea; Texas; México; ciénega

ABSTRACT

The Department continues its efforts in desert fishes conservation. The four major ecoregions of the Rio Grande have been surveyed for fish community structure and analysis continues. These data will be used to aid in proper management decisions for this unique resource as well as provide guidelines for environmental protection and mitigation as economies develop on both sides of the border. The Chihuahuan Desert Fishes Survey is underway and we have recently completed a 1,300 mile round-trip through Chihuahua, México, collecting fishes in the Rio Conchos drainage to determine status of several Federal Category 2 species. Construction has now begun on what will become a functional desert ciénega at Balmorhea State Park. This will not only provide proper, secure habitat for two endangered fishes, but will also provide a natural area for other indigenous flora and fauna.

CLAVES: Río Grande; Río Conchos; desierto Chihuahuense; Balmorhea; Texas; México; ciénega

RESUMEN

El Departamento continúa su esfuerzo en la conservación de los peces del desierto. Las cuatro ecorregiones mayores del Río Grande, han sido evaluadas mediante la estructura de comunidades, y los análisis aún continúan. Estos datos serán usados para apoyar las decisiones de manejo apropiadas para estos recursos únicos, así como para proveer una línea para la protección ambiental y la mitigación como el desarrollo económico en ambos lados de la frontera. Los muestreos de peces del Desierto Chihuahuense, están en proceso y recientemente se han completado un recorrido de 1,300 millas por Chihuahua, México, colectando peces en la Cuenca del Río Conchos, para determinar el estatus de diversas especies de la categoría Federal 2. La construcción ha empezado ahora sobre lo que será una ciénega funcional del desierto en el Parque Estatal Balmorhea. Esta no solamente proveerá un hábitat propio, seguro para dos peces en peligro, si no también proveerá una área natural para otra flora y fauna indígena.

HEINRICH, J.E. (Nevada Division of Wildlife, Region III, Las Vegas, NV)

Status of Nevada fishes
Estatus de los peces de Nevada

KEYWORDS: dace; Nevada; Pahrnagat Valley; poolfish; razorback sucker; roundtail chub; speckled dace; spinedace; springfish; tui chub

ABSTRACT

The Nevada Division of Wildlife has begun to enlarge the native fish program to fit the demand of needs across the State of Nevada. During fiscal year 1994 a seasonal native fish survey crew was active in the northern portion of the state and funding is now available for a full time position in the northern region. The native fish program continues monitoring, status evaluation, and program coordination for all species and sub-species of endemic fish within the geographic boundaries of the state of Nevada. Currently, 57 are listed by the United States Fish and Wildlife Service (FWS). Of these 57 listed species; twenty (20) have been listed as endangered and five (5) species have been listed as threatened. Major program effort continues to concentrate on the federally listed species. Summaries of activities from priority species follow:

WHITE RIVER SPRINGFISH *Crenichthys baileyi baileyi* - Numbers of springfish at Ash Spring have done well since the resort went into bankruptcy. In 1994, from mark-and-recapture estimates, numbers of springfish were estimated to be at a very respectable 49,000 fish in Ash Spring. One and two year old fish dominate the population. Ash Spring is still available for purchase. The outflow of this spring (Burns Ranch) contains the only population of Pahrnagat roundtail chub, *Gila robusta jordani*. The last dive estimate in September 1993, tallied 153 adults, and 457 juveniles. Recently, the Burns Ranch was sold, hopefully the new owners will be as cooperative as the previous owners.

HIKO WHITE RIVER SPRINGFISH *Crenichthys baileyi grandis* - Populations were monitored at Hiko, Crystal, and Blue Link Springs.

The Hiko population was monitored by a mark-and-recapture effort through a independent contract with Mr. John Pedretti. Numbers were 11,340 + -1750 fish. The springfish at Crystal Spring remain at a severely depressed level, the current dive estimate was only 68 fish.

WHITE RIVER SPINEDACE *Lepidomeda albivallis* - Estimates continue to indicate less than 50 fish remain in a single spring on State lands at the Kirch Wildlife Management Area. Several projects continue at this location to secure habitats for this threatened fish. A contract with the National Biological Survey will continue at this site to gather habitat requirement information and assist in recovery of this species. Pahrump poolfish, *Empetrichthys latos latos*- Census work was conducted on the three populations of Pahrump poolfish at Corn Creek, Spring Mountain Ranch State Park, and Shoshone Ponds Refugium. Populations within the Las Vegas area were monitored by John Pedretti through contract agreements. All populations are stable at 5,660, 15,040, and 2,900, respectively.

VIRGIN RIVER FISHES - In October of 1993, 1,500 woundfin, *Plagiopterus argentissimus*, were received from Dexter National Fish Hatchery and Technology Center. These fish were tagged and released into Nevada reaches of the Virgin River. Along with small numbers of resident native fish, a high of 23 marked fish were captured by a Bio/West crew in February. During woundfin surveys, small numbers of adult Virgin Fiver roundtail chubs, *Gila robusta seminuda*, were found in the river below Mesquite, Nevada.

RAZORBACK SUCKER *Xyrauchen texanus* - Involvement with several recovery activities continue on Lake Mead and Lake Mohave. On Lake Mead, in 1994, with the help of Bio/West personnel, sampling efforts were expanded to all areas of the Overton Arm and Boulder Basin in hopes of finding additional aggregations of fish. This was quite time consuming and produced no additional fish. Over the season only 4 fish were captured, all just outside the Las Vegas Bay Marina. Most curious of these fish was a young 14 inch fish. Efforts over the last 4 years on Lake Mead have resulted in 50 razorback suckers captured, tagged, and released.

BIG SPRINGS SPINEDACE *Lepidomeda mollispinis pratensis* - Good numbers of individuals were again found throughout areas of desingated critical habitat. Forty young fish were taken to the University of Nevada, Las Vegas under the direction of Fran Taylor for research on habitat preferences and behavior in hopes that information gained can also be applied to the White River spinedance.

RAILROAD VALLEY SPRINGFISH *Crenichthys nevadae* - Catch per unit effort values for Railroad Valley in 1994 were comparable to past years. Populations at all springs remained stable. Populations in the Duckwater Valley;

Big Warm Spring, and Little Warm Spring, continue to be depressed. The isolated introduced populations at Sodaville and at Hot Creek Canyon remain at stable levels although they have shown slight impacts from recent habitat alterations and development.

RELICT DACE *Relictus solitarius* - With the addition of a summer survey crew working on this species, an additional 5 sites of historic distribution have been documented, to bring the total to 24 sites. These are dace populations that have not been surveyed since 1980. Ruby Valley, Butte Valley, Steptoe Valley, Goshute Valley, and Spring Valley surveys have now been completed.

MUDDY (MOAPA) RIVER - Surveys again concentrated on distribution and abundance of the Moapa roundtail chub, *Gila robusta ssp.* Chub and springfish populations seem to be very healthy. After a serious fire on the Moapa Valley National Wildlife Refuge the Moapa dace, *Moapa coriacea*, appears to have maintained numbers in the Warm Springs area.

VIRGIN RIVER SPINEDACE *Lepidomeda mollispinis mollispinis* - After completion of the 1994 survey it was again substantiated that these fish are no longer found in Nevada waters. Surveys have been done consecutively for the last 5 years without success. The NDOW is co-operating in development of a conservation agreement for this subspecies and the native fish program is supporting the initial planning of experimental reintroductions in historic habitats below Schroeder Reservoir.

TUI CHUB *Gila bicolor* - Collections of all tui chub populations within Nevada were made in 1994 and submitted to Phil Harris at Oregon State University. Under the direction of Dr. Douglas Markle, (mt) DNA techniques will be used to assess tui chub taxonomy in Nevada and describe genetic population structure.

CLAVES: dace; Nevada; Valle Pahrnagat; peces de pozas; matalote jorobado; charal aleta redondeada; speckled dace; spinedace; springfish; charal tui

RESUMEN

El Nevada División of Wildlife ha comenzado a aumentar los programas de peces para ajustarse a la demanda de necesidades a lo largo del estado de Nevada. Durante el año fiscal 1994 un equipo de evaluación estacional de peces nativos se encontraba activo en la porción Norte del estado y actualmente hay fondos disponibles para el puesto de tiempo completo en la región norteña. El programa de peces nativos continúa monitoreando, evaluando el estatus y coordinando el programa para todas las actividades u subespecies de peces endémicas dentro de los confines del Estado de Nevada. En la actualidad 57 se encuentran enlistados por el United States Fish and Wildlife Service (FWS). De esas 57 especies enlistadas: veinte (20) se encuentran enlistadas como en peligro de extinción y cinco (5) como amenazadas. El mayor esfuerzo del programa continúa concentrado en las especies enlistadas federalmente. A continuación se presentan resúmenes de las actividades en especies prioritarias:

SPRINGFISH DEL RÍO WHITE *Crenichthys baileyi baileyi* - Las cantidades de springfish han mejorado en Ash Spring desde que quebró el balneario. En 1994, con base a los estimados de captura-recaptura, se estimó que las cantidades de springfish se encontraban en el muy respetable nivel de los 49,000 peces en Ash Spring. La población se encuentra dominada por peces de uno y dos años. Ash Spring se encuentra aún disponible para su compra. La corriente de este manantial (Rancho Burns) contiene la única población del charal aleta redondeada Pahrnagat *Gila robusta jordani*. La última evaluación en Septiembre de 1993, mostró 153 adultos y 457 juveniles. El Rancho Burns fue vendido recientemente, esperamos que los nuevos dueños sean tan cooperadores como los anteriores.

SPRINGFISH DEL RÍO HIKO WHITE *Crenichthys baileyi grandis* - se monitorearon las poblaciones en los manantiales Hiko, Crystal y Blue Link.

La población de Hiko se monitoreo por medio de captura-recaptura llevada a cabo por medio de un contrato independiente con el Sr. John Pedretti. Se estimó un número de 11,340 (+-1750) peces. Los springfish en el manantial Crystal se encuentran a un nivel fuertemente deprimido, resultando en un número de 68 en la presente evaluación.

SPINEDACE DEL RÍO WHITE *Lepidomeda albivallis* - Los estimadores continúan indicando que quedan menos de 50 peces en un sólo manantial en terrenos nacionales, en Kirch Wildlife Management Area. En ésta localidad, se continúan muchos proyectos para asegurar los hábitat para este pez amenazado. En este sitios se continuará un contrato con el National Biological Survey para reunir información de requerimientos de hábitat y ayudar en la recuperación de ésta especie.

PAHRUMP POOLFISH *Empetrichthys latos latos* - El trabajo de censado se llevó a cabo en las tres poblaciones de Pahrump poolfish en Corn Creek, Spring Mountain Ranch State Park y Shoshone Ponds Refuge. Las poblaciones dentro del área de Las Vegas fueron monitoreadas por John Pedretti a través de acuerdos contractuales. Todas las poblaciones se encontraron estables a 5,660, 15,040 y 2,900, respectivamente.

PECES DEL RÍO VIRGIN - en Octubre de 1993 se recibieron 1,500 woundfin *Plagopterus argentissimus* de Dexter National Fish Hatchery and Technology Center. Esos peces fueron etiquetados y liberados en la porción de Nevada del Río Virgin. Junto con unos cuantos peces nativos residentes, una alta de 23 peces marcados fueron capturados por un equipo de Bio/West en Febrero. Durante las evaluaciones del woundfin se encontraron unos pocos adultos del charal aleta redondeada del Río Virgin, *Gila robusta seminuda*, en la parte río abajo de Mesquite, Nevada.

MATALOTE JOROBADO *Xyrauchen texanus* - Se continúa el involucramiento con diversas actividades de recuperación en el Lago Mead y en el Lago Mohave. En el Lago Mead, en 1994, con la ayuda del personal de Bio/West, se expandieron los esfuerzos de muestreo para todas las áreas del Overton Arm y de la cuenca de Boulder, con la esperanza de encontrar agrupaciones adicionales de estos peces. Esta actividad consumió gran cantidad de tiempo y no arrojó presencia adicional de peces. a lo largo de la temporada se capturaron cuatro peces, todos en las inmediaciones de Las Vegas Bay Marina. Lo mas curioso de esos peces fue un juvenil de 14 pulgadas. Los esfuerzos a lo largo de los últimos cuatro años en el Lago Mead han dado como resultado la captura, etiquetado y liberación de 50 matalotes jorobados.

SPINEDACE DE BIG SPRINGS *Lepidomeda mollispinis pratensis* - Se encontró nuevamente una buena cantidad en áreas designadas como hábitat crítico. Se llevaron 40 peces juveniles a la University of Nevada, en Las Vegas, bajo la dirección de Fran Taylor, para llevar a cabo investigación concerniente a preferencia de hábitat y comportamiento, con la esperanza de que la información obtenida pueda ser utilizada en el spinedace del Río White.

SPRINGFISH DE RAILROAD VALLEY *Crenichthys nevadae* - Los valores de captura por unidad de esfuerzo para Railroad Valley en 1994 son comparables con los de años pasados. Las poblaciones en todos los manantiales se mantienen estables. Las poblaciones en Duckwater Valley, Big Warm Spring y Little Warm Spring continúan en declive. Las poblaciones aisladas introducidas en Sodaville y en Hot Creek Canyon se mantienen en niveles estables, aunque han manifestado ligeros impactos por recientes alteraciones al hábitat y desarrollos.

RELICT DACE *Relictus solitarius* - Con la adición de un equipo de evaluación de verano trabajando con esta especie, se han documentado cinco sitios de distribución histórica, lo cual da un total de 24 sitios. Estas son poblaciones de dace que no han sido monitoreadas desde 1980. Las evaluaciones de Ruby Valley, Butte Valley, Steptoe Valley, Goshute Valley y Spring Valley no han sido completados.

RÍO MUDDY (MOAPA) - Nuevamente se concentraron las evaluaciones en la distribución y abundancia del charal Moapa aleta redondeada, *Gila robusta* spp. Las poblaciones del charal y del springfish parecen estar muy saludables. Después de un serio incendio en el Moapa Valley National Wildlife Refuge, el Moapa dace, *Moapa coriacea*, parece haber mantenido sus números en el área de Warm Springs.

EL SPINEDACE DEL RÍO VIRGIN *Lepidomeda mollispinis mollispinis* - Después de las evaluaciones de 1994 se sostiene nuevamente que este pez no se encuentra en las aguas de Nevada. Las evaluaciones han sido hechas consecutivamente por 5 años sin éxito. El NDOW esta cooperando en desarrollar un acuerdo de conservación para esta subespecie y el programa de peces nativos esta apoyando la planeación inicial de reintroducciones experimentales en hábitats históricos abajo del Reservorio Schroeder.

EL CHARAL TUI *Gila bicolor* - Colecciones de todas las poblaciones del charal Tui en Nevada fueron hechas en 1994 y remitidas a la Universidad Dr. Phil Harris del Estado de Oregon. Bajo la dirección Dr. Douglas Markle, técnicas de ADNmt serán usadas para evaluar la taxonomía del charal Tui en Nevada y describir la estructura genética de la población.

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Maximizing options, minimizing regrets - The A.Z.A. breeding program for endangered desert fishes

Maximización de opciones, minimización de lamentos - El programa A.Z.A. de reproducción de peces en peligro del desierto

KEYWORDS: agency-public aquarium collaboration; captive breeding programs; cyprinodonts; goodeids; Mexican fishes; poeciliids; reintroduction

ABSTRACT

Captive breeding programs have played a useful role in the conservation of endangered terrestrial organisms and most zoos in North America have long been involved in such undertakings. The involvement of public aquaria in comparable efforts on behalf of endangered aquatic organisms, by way of contrast, dates from a resolution passed at the 1989 meeting of the Association of American Zoos and Aquariums, calling for the establishment of captive breeding programs for the endangered fishes of Lake Victoria, the deserts of North America and the Appalachian region. On the basis of input solicited at the 1989 meeting of the DFC, the desert fish program, focusing upon species native to northern Mexico, was initiated later that year. Eight A.Z.A. member institutions initially opted to participate in this program. That number has now increased to sixteen. In addition to maintaining breeding populations of designated species, fourteen participants have committed display space to desert fishes and used such exhibits to advocate conservation of their habitats.

The program initially included three endangered *Xiphophorus* and ten goodeid species already under culture at the Aquarium for Wildlife Conservation in New York and the Belle Isle Aquarium in Detroit. A memorandum of understanding signed in 1991 between the Aquarium for Wildlife Conservation and the Universidad Autónoma de Nuevo León in Monterrey brought captive-bred founder stock of the Sandia Valley and El Potosi cyprinodonts and of the goodeid *Allotoca maculata* from the Centro para la Reproducción de los Peces del Desierto en Peligro de Extinción into the program. The Dallas Aquarium has played a key role on the large-scale propagation and subsequent dissemination of these species. Seventeen Mexican fishes are currently being managed under breeding protocols intended to promote long-term maintenance of genetic diversity.

The goal of this *ex situ* breeding program is reestablishment of viable populations of the species under culture within their historic range. In the near term this seems unlikely for most of the Mexican species under management. However, collaborative projects involving American species such as those undertaken by the Dallas Aquarium and the Texas Department of Parks and Wildlife to restore populations of *Gambusia senilis*, *Cyprinodon pecosensis* and *Cyprinodon eximius* demonstrate that such a goal is attainable. The expertise and material resources that A.Z.A. member institutions can contribute to the conservation of North American desert fishes are significant. As management agencies come to appreciate value of their potential contributions to this endeavor, the number of such joint projects should increase.

CLAVES: colaboración entre acuarios y agencias públicas; programas de reproducción en cautiverio; cyprinodóntidos; goodeidos; peces mexicanos; poeciliidos; reintroducción

RESUMEN

Los programas de reproducción en cautiverio han jugado un papel importante en la conservación de organismos terrestres en peligro y la mayoría de los zoológicos en Norteamérica han estado involucrados por largo tiempo en tales cuestiones. El involucramiento de los acuarios públicos en esfuerzos comparables de conservación de organismos acuáticos en peligro, en contraste, data desde una resolución tomada en la reunión de 1989 de la Asociación de Acuarios y Zoológicos Americanos, que llamó al establecimiento de programas de reproducción en cautiverio para peces en peligro del Lago Victoria, los desiertos de Norteamérica y la región de los Apalaches. En esta base de acuerdo a la solicitud de 1989 por parte del DFC, el programa de peces del desierto enfocado a especies nativos del norte de México fue iniciado después del año. Ocho instituciones de la A.Z.A., inicialmente optaron por participar en este programa. Este número ahora se ha incrementado a 16. En adición al establecimiento de poblaciones reproductivas de especies designadas, 14 participantes han acordado en mostrar espacios para peces del desierto y usarlos como exhibidores para promover la conservación de sus hábitats.

El programa inicialmente incluyó tres especies en peligro *Xiphophorus* y tres especies de goodeidos para mantener en cultivo en el Aquarium for Wildlife Conservation en Nueva York y el Belle Isle Aquarium en Detroit. Una carta de entendimiento firmada en 1991 entre el Aquarium for Wildlife Conservation y la Universidad Autónoma de Nuevo León en Monterrey, trajo un stock fundador para reproducción en cautiverio de ciprinodontidos del Sandia Valley y el Potosí y del goodeido *Allotoca maculata* del Centro para Reproducción de los peces del desierto en peligro de extinción, hacia el programa. El Acuario de Dallas ha jugado un papel principal en la propagación a gran escala

y subsecuente diseminación de estas especies. Diecisiete peces mexicanos actualmente están siendo manejados bajo proyectos de reproducción que intentan promover a largo plazo el mantenimiento de la diversidad genética.

Los objetivos de este programa de reproducción *ex situ* es el restablecimiento de poblaciones viables de las especies bajo cultivo, en sus rangos históricos. En el corto plazo esto significa que la mayoría de las especies mexicanas estarán bajo manejo. Sin embargo, los proyectos de colaboración que involucran especies americanas como aquellas llevadas por el Acuario de Dallas y el Texas Department of Parks and Wildlife para restaurar poblaciones de *Gambusia senilis*, *Cyprinodon pecosensis* y *Cyprinodon eximius* demostraron que tal meta es alcanzable. Los expertos y recursos materiales que las instituciones miembros del A.Z.A. con que pueden contribuir a la conservación de los peces del desierto de Norteamérica son significativos. Así cuando las agencias de manejo llegan a apreciar el valor de sus contribuciones potenciales a esta causa, el número de proyectos conjuntos se podrá incrementar.

FUTURE MEETINGS

1995 - Reno, Nevada, U.S.A.

1996 - La Paz, Baja California, México

1997 - Death Valley National Park, Furnace Creek, California, U.S.A.



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**Historic distribution and current status of the razorback sucker
in Lake Mead, Nevada-Arizona**
**Distribución histórica y situación actual del matalote jorobado
en el Lago Mead, Nevada-Arizona**

KEYWORDS: razorback sucker; Lake Mead; Nevada; historic distribution; status; Colorado River

ABSTRACT

Although occupancy of Lake Mead by razorback suckers (*Xyrauchen texanus*) has been documented since the reservoir's formation, the majority of management emphasis and research interest has focused on the larger extant population in Lake Mohave immediately downstream. Most literature references to the Lake Mead razorback population are anecdotal and historic observation records are scattered and poorly organized. A review of Nevada Department of Wildlife (NDOW) and other agency field records documented observation or collection of 66 adult razorback suckers in the period 1952 to 1980, with the largest number of collection sites in the Overton Arm and Greg Basin/Grand Wash areas of the reservoir. No agency capture records have been located for the period 1980 to 1989. Intensive sampling efforts for razorback suckers by NDOW since 1990 have resulted in the capture of 49 razorback suckers at three locations, all in the February through April period. Gill net sampling lakewide in 1991 through April 1994 included 328 net nights at 62 locations, and trammel net sampling at 17 locations for 232 net nights.

CLAVES: matalote jorobado; Lago Mead; Nevada; distribución histórica; estatus; Río Colorado

RESUMEN

No obstante de que la ocupación del lago Mead por parte del matalote jorobado ha sido documentada desde la formación de los reservorios, la mayor parte del interés sobre manejo e investigación se ha enfocado hacia la población mas extensa en el lago Mohave inmediatamente arroyo-abajo. La mayor parte de las referencias literarias sobre el matalote del lago Mead son registros de tipo anecdótico y los registros históricos son dispersos y pobremente organizados. Una revisión del Departamento de Vida Silvestre de Nevada (NDOW) y otros registros de campo de las agencias observados y documentados o colecciones de 66 matalotes adultos en el período de 1952 a 1980, con el numero más amplio de sitios de colectas en el Overton Arm y el área de Greg Basin / Grand Wash en el reservorio. No se han localizado registros de captura por la agencia para este período de 1980 a 1989. Esfuerzos de muestreo intensivo para los matalotes por NDOW desde 1990 han resultado en la captura de 49 matalotes jorobados en tres localidades, todos en los períodos de Febrero a Abril. El muestreo con agalleras a lo amplio del lago en 1991 hasta abril de 1994 incluye 328 redes nocturnas en 62 localidades y el muestreo con transmallos en 17 localidades por 232 redes nocturnas.

CONTRIBUTED PAPER

Because of a lack of recruitment and loss of adult fish over time, mainstem reservoir populations of the razorback sucker *Xyrauchen texanus* in the lower Colorado River basin are considered to be generally absent with the exception of Lake Mohave, which has a large but rapidly declining adult population estimated at not more than 25,000 individuals. The presence of the large Lake Mohave population has logically focused research and recovery efforts on that reservoir and little recent effort has been placed on quantifying the status of other relict reservoir populations. This presentation summarizes current knowledge on the status of razorback suckers in Lake Mead.

Jonez and Sumner (1954) reported razorback suckers as widespread throughout Lake Mead during their studies in the early 1950's, with particular concentrations observed in inflow areas and along gravel shores during the spawning period. Field notes from NDOW biologists in the 1950's mention occasional observations of "hundreds" of suckers in pelagic areas of the Boulder Basin, and near the mouth of the Muddy

River in the upper Overton Arm. Although sightings of adult razorback suckers in Lake Mead were reported as common through at least the early 1970's (Allan and Roden, 1978), almost all reports are anecdotal and few documented collections or observations exist in published literature or agency field records. A review of NDOW and Arizona Game and Fish field records documented collections or observations of 66 adult razorback suckers in the period 1952 to 1980. These observations occurred at 25 locations in all four major areas of the lake, and from a variety of methods.

Eight adult razorback suckers were reported as killed in the Boulder Basin by deep water detonations in June 1962 (Melander, 1962) and may indicate use of deeper pelagic lake zones outside of the spawning period. The detonations occurred at a 200-foot depth one mile north of Saddle Island, and also killed approximately 1,000,000 juvenile and adult game fish.

The majority of known collection sites (23 of 36) for razorback sucker during the 1952-1980 period are concentrated in the Overton Arm and Gregg's

Basin/Grand Wash portions of the lake. An additional eight records are from the Temple Bar area immediately adjacent to the lower Gregg's Basin. These areas, along with Las Vegas Wash, represent inflow areas and tend to be more productive than the relatively sterile central Virgin and Boulder basins. Sampling efforts represent a broad base of sites, times and methods throughout most areas of the reservoir. Thirty of 44 documented NDOW contacts occurred in the November to May period when razorbacks are most likely to be found in shallow water littoral zones. All of the NDOW records outside of that winter/spring time frame occurred near or above Temple Bar.

No records of collections or contact with razorback sucker could be found in available agency field records between 1980 and 1990. Extensive gill and trammel netting was conducted on Overton Arm during the 1986-1988 period by the University of Nevada, Las Vegas, in conjunction with the cooperative nutrient enhancement project, including sites where historic collections of adult razorbacks had occurred. No records of razorback sucker captures were found in field data files from those efforts. The lack of observations or contacts incidental to other routine sport fish sampling activities indicates a probable reduction in occurrence when compared to the more frequent observations through the early 1970's. However, changes in agency sampling techniques in the 1980's, such as use of mid-water and meter-net trawling and decreased use of conventional net surveys, may have significantly decreased the opportunity to contact or observe adult razorback suckers for much of this period.

Current dedicated Lake Mead razorback survey efforts began in April 1990 when NDOW personnel observed an apparent spawning aggregation of approximately 15 adult suckers in the Blackbird Point area of Las Vegas Wash. Three adult razorbacks were collected using electrofishing equipment and apparent spawning behavior was observed. Specific sampling efforts were not conducted in 1991, although a single adult razorback sucker was captured at Bark Bay on Overton Arm in March during spring gill net surveys.

Intensive trammel net surveys targeted specifically at razorback suckers in known areas of occurrence were initiated in spring 1992. Efforts were concentrated at Blackbird Point, near Las Vegas Wash, and Echo Bay on Overton Arm, based on 1990 collections and reports of recent observations. A total of 25 adult razorback suckers were captured at the two locations, 12 at Blackbird Point and 13 at Echo Bay.

Efforts for 1993 were expanded to include historic collection locations and other sites thought to have characteristics of preferred razorback spawning habitat, primarily the presence of well-washed coarse gravel or cobble substrate and exposure to limited wave action to reduce siltation. A total of 92 trammel net nights of survey were conducted at 21 sites in all four primary basins. The majority of sets were placed in the January

through April period. A total of 21 adult razorback suckers were captured during 1993, all at the Blackbird Point (11) and Echo Bay (10) sites. All captures occurred in trammel net sets during the months of February and April. In 1994 a total of 113 trammel net nights of sampling effort were conducted at 40 sites lakewide. A total of five razorback suckers were captured, all at the Blackbird Point site.

Adult razorback suckers captured in Lake Mead since 1990, with only two exceptions, have been marked to facilitate identification in the event of recapture. Initially five fish were tagged using Floy brand T-lock anchor tags. Beginning in March 1992 all adult fish were tagged using PIT tags provided by the Bureau of Reclamation. Through 1994 a total of 42 adult fish were marked by NDOW personnel using PIT tags. A total of six recaptures of PIT tagged fish were documented in 1993, from fish tagged in 1992 or 1993, three at Blackbird Point and three at the Echo Bay site.

Observations of the historic population of razorback suckers in Lake Mead appear to closely follow predicted trends for captive populations in lower basin mainstem reservoirs. Jonez and Sumner (1954) reported razorbacks as abundant and widespread throughout the lake with particular seasonal occurrence in inflow and potential spawning areas. In the early 1950's the impoundment was 15 to 20 years old and a logical assumption is that entrapment of resident adult fish from dam closure or a high level of survival and recruitment of juvenile fish from spawning at the time of impoundment would result in retention and observation of relatively large numbers of older-aged adult fish at the time of their studies. Jonez and Sumner specifically mentioned observations of fish in the 290 mm to 620 mm or larger size range, and that at no time were fish smaller than 290 mm observed in Lake Mead. Although their length estimates appear to be based only on visual observations, and age estimation of adult razorbacks based on length measurements is highly subjective, it is probable that most of the adult fish observed by Jonez and Sumner dated to a period at or near the time of reservoir filling. Their lack of observations of smaller adult fish supports the presumption that significant recruitment to the population was not occurring during this period. Both anecdotal and documented observations throughout the historic period indicate that adult fish were broadly distributed throughout the reservoir, including upper lake areas to Paiute Point and throughout the Overton Arm. A decline in anecdotal observations of adult fish after the mid-1960's correlates with the predicted longevity of the species and indicates a probable loss of the original cohort of adult fish to old age in the 1970's and 1980's.

However, infrequent but consistent captures of adult razorbacks in Lake Mead from the late 1960's through 1993 clearly indicate the presence of a second younger cohort of fish in the lake, since adults currently being contacted would need to be greater than 55 years

old to predate significant impoundment, considerably in excess of any reasonable projections of species longevity. This occurrence could logically result from either survival and recruitment in the reservoir of juvenile fish at some point, or movement into the impoundment of adult or juvenile fish from adjacent riverine habitats upstream. The majority of captured fish, based on limited knowledge of adult razorback growth patterns, appear to have been in the 20 to 30 year age ranges at the time of capture. Variability in individual fish growth makes it virtually impossible to determine known age for adult specimens from capture measurements, or if these observed fish represent a single annual cohort or represent moderate survival and recruitment over a span of years. Interpretation of the available data does indicate probable recruitment of the existing population in the early-1960's to mid-1970's. Of particular interest is the capture by AGFD in 1967 of six adult fish averaging 231 mm TL (McCall, 1979). Age estimation using available growth history curves indicates a probable age for these fish at time of capture of three to five years (McCarthy and Minckley, 1987). Although exact capture locations were not available these fish were collected in upper portions of the lake in or near Arizona.

Three primary events in the mid-1960's affected hydrologic characteristics of Lake Mead and associated upstream riverine habitats. The closure of Glen Canyon Dam in 1963 significantly modified hydrologic and limnologic characteristics of the Colorado River downstream to Lake Mead. Displacement downstream of resident adult and juvenile razorback suckers from occupied river and tributary habitats as a result of these changes is at least a probability. Secondly, the reduced inflow into Lake Mead from the upper Colorado River basin as a result of the filling of Lake Powell modified reservoir storage levels and fluctuation patterns for a several-year period, with reservoir surface elevation reduced to as low as 1060 feet, 120 feet below current levels. Increased channelization of upstream portions of the reservoir and temporary exposure of previously submerged spawning habitats were two obvious structural impacts of the storage reduction. Finally, permanent modification of seasonal fluctuation patterns in reservoir storage levels is a continuing impact of Glen Canyon Dam operations, which has had an identified negative impact on spring-spawning sport fish species (Morgensen and Padilla, 1982). The first two of these events correlate closely with presumed recruitment dates for the Arizona specimens collected in 1967.

Based on recent collections and observations, the existing population of razorback suckers in Lake Mead appears to be composed almost entirely of large adult fish, which correlates closely to observations in Lake Mohave. Except for a single 366 mm TL specimen captured in 1994, recently captured fish show a range of 467 to 765 mm TL averaging 563 mm TL, indicating a probable age range of adults as 20 to 30 plus years old

and a lack of significant recruitment to the population. This is somewhat less than the estimated average age of Lake Mohave adult razorbacks (Burke and Mueller, 1993), but more accurate age estimation would not be possible without destructive sampling of adult fish. Although localized spawning behavior has been observed since 1990, no direct evidence of successful reproduction, larval emergence, or juvenile survival and recruitment has been observed or documented through the 1994 sampling effort. Current distribution and occupancy, at least during the spawning period, appears to be limited to a small number of sites in the Boulder Basin and Overton Arm, which represents a restriction in distribution compared to historic capture records from the 1960's and 1970's. Contact with adult razorback suckers at recent capture sites represents concentrated sampling effort at known areas of use with species specific methods, primarily trammel nets, so there may be other areas of seasonal occupancy which have not been located. However, intensive lakewide gill net surveys since 1990 have shown a much lower capture rate for adult razorbacks when compared to the same methodology used in the 1970's, which supports the premise that current numbers and distribution of adult fish are very limited. Increased use of trammel net by-sets during lakewide sampling efforts began in 1993 and this will assist in better defining possible occupancy of suitable habitats by razorback suckers in areas of the reservoir where presence has not recently been documented.

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Seasonal movements of razorback sucker in the middle Green River, Utah
Movimientos estacionales del matalote jorobado en el Medio Río Green en Utah

KEYWORDS: razorback sucker; telemetry; movements; habitat use; spawning

ABSTRACT

Seven adult razorback sucker *Xyrauchen texanus* were collected over spawning bars in the Middle Green River, Utah, and implanted with radio transmitters in the spring of 1993. Fish habitat use was monitored during the first summer and seasonal movement and spawning fidelity was observed during the second year following spawning. None of the razorback suckers implanted with transmitters moved over 42 km from their wintering sites to spawning sites. Greatest movement occurred during post-spawning and mid-summer location changes, with several movements exceeding 100 km. Most fish spent the summers of 1993 and 1994, and all fish spent the winter of 1993-1994 in Split Mountain Canyon in Dinosaur National Monument. During the first summer most fish occupied deep, slower velocity macrohabitats.

Of the six surviving adult males implanted, four returned to the spawning sites used the previous year. One male spawned at a different site and the remaining male either spawned at a previously unknown spawning location or may not have spawned in 1994. Movement to spawning locations appeared triggered by discharge rather than temperatures, however, greatest movement activity occurred during a combination of rising discharge and maximum daily water temperatures exceeding 14°C.

CLAVES: matalote jorobado; telemetría; movimientos; uso de hábitat; desove

RESUMEN

Siete adultos de matalotes jorobados *Xyrauchen texanus* fueron colectados en las áreas de desove del Medio Río Green, Utah, y marcados con radios transmisores en la primavera de 1993. El uso de hábitat del pez fue monitoreado durante el primer verano y movimiento estacional, la fidelidad del desove fue observada durante el segundo año siguiente al desove. Ninguno de los matalotes jorobados implantados con radio transmisores se movieron mas de 42 km desde sus sitios de invierno a los sitios de desove. Los movimientos más grandes ocurrieron durante el post-desove y a mediados del verano, con varios movimientos que excedieron los 100 km. La mayoría de los peces se mantuvieron el verano de 1993 y 1994, y todos los peces se mantuvieron el invierno de 1993-1994 en Split Mountain Canyon en Dinosaur National Monument. Durante el primer verano la mayoría de los peces se mantuvieron en la profundidad, y en macrohábitats de bajas velocidades.

De los seis machos adultos sobrevivientes con radios, cuatro regresaron a los sitios de desove usados en el año anterior. Un macho desovó en un sitio diferente y los machos restantes desovaron en localidades de desove previamente desconocidas, o pudieron no haber desovado en 1994. Los movimientos a las localidades de desove parecen ser motivadas por descargas más que por la temperatura, sin embargo, los movimientos más grandes ocurren durante una combinación de una elevación de las descargas y temperaturas diarias máximas del agua que exceden los 14°C

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Morphological changes related to growth in razorback sucker, *Xyrauchen texanus*
Cambios morfológicos relacionados al crecimiento en el matalote jorobado *Xyrauchen texanus*

KEYWORDS: morphometrics; allometry; razorback sucker; thin-plate splines

ABSTRACT

Allometric responses in organisms may have extensions to many ecological and evolutionary questions. In catostomids, information regarding allometric changes associated with large size and great age are essentially lacking. Allometric responses in razorback sucker, *Xyrauchen texanus*, have been quantified. Preliminary analyses have indicated marked sexual dimorphic and ontogenetic shape change in this species. Geometric morphometric techniques have been used to clarify and provide directionality to these changes. Analyses involved thin-plate spline functions to

quantify neurocranial and vertebral shape change in razorback suckers. Ecological and evolutionary ramifications are discussed.

CLAVES: morfométricos; alometría; matalote jorobado; thin-plate splines

RESUMEN

Las respuestas alométricas en organismos pueden resultar en algunas preguntas ecológicas y evolutivas. En catostómidos, la información referente a cambios alométricos asociados con gran tamaño y edad son esencialmente escasos. Las respuestas alométricas en el matalote jorobado, *Xyrauchen texanus*, han sido cuantificados. Análisis preliminares indican marcas de dimorfismo sexual y cambio en la forma ontogénica en estas especies. Técnicas de morfometría geométrica han sido usadas para clarificar y dar direccionalidad a estos cambios. Los análisis implican funciones de "thin-plate spline" para cuantificar cambios en la forma neurocranial y vertebral en el matalote jorobado. Las consecuencias ecológicas y evolutivas son discutidas.

[HUBBS STUDENT PAPER COMPETITOR]

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**Allozyme variation and population structure in the razorback sucker, *Xyrauchen texanus*
Variación alozimática y estructura de población en matalote jorobado, *Xyrauchen texanus***

KEYWORDS: propagation; allozymes; population structure; razorback sucker

ABSTRACT

The management and recovery of the razorback sucker is going to have to include large-scale propagation. Choice of breeding stock and decisions about release sites must be made from an informed perspective. If genetically divergent stocks exist, they may have to be managed and propagated separately. To address this question, non-lethal tissue samples (muscle and fin) were obtained from razorback suckers from locations throughout its remaining native range in the Colorado River system. Allozyme variation was assessed for the gene products of 38 loci; 17 loci were polyallelic. All populations were in equilibrium, expressed some heterozygote excess, and had levels of heterozygosity comparable to other catostomid fishes. No obvious pattern of major allelic variation was revealed, although the metapopulation is not in equilibrium. Direct comparison of our extreme geographic samples, Upper Basin Green River vs. Lower Basin Lake Mojave, reveals a low $F_{st} = 0.029$ but with variant alleles shared at only 3 of 10 polyallelic loci. Stock sources could include Green-Yampa Rivers and/or Lake Powell and/or Lake Mojave. We recommend against using the few remaining razorbacks from the Upper Colorado population in a breeding program because of its reduced variation due to genetic drift, which may also have enhanced its proportion of genes introgressed from hybridization with flannelmouth suckers.

CLAVES: propagación; alozimas; estructura de la población; matalote jorobado

RESUMEN

El manejo y recuperación del matalote jorobado tiende a incluir la propagación a gran escala. La elección del linaje reproductivo y las decisiones acerca de los sitios de liberación deben de ser hechas desde una perspectiva informada. Si existen linajes divergentes genéticamente, estos pueden tener que ser manejados y propagados separadamente. Para contestar esta pregunta, muestras no letales de tejido (músculo y aleta) fueron obtenidos de matalotes jorobados en localidades remanentes de su rango distribucional original en el sistema del Río Colorado. La variación alozimática fue evaluada mediante los productos de los genes de 38 loci; 17 loci fueron polialélicos. Todas las poblaciones que estuvieron en equilibrio expresaron algo de exceso heterocigótico, y tuvieron niveles de heterocigocidad comparable a otros catostómidos. No fueron revelados patrones obvios de variación alélica mayor, aunque la metapoblación no está en equilibrio. La comparación directa de muestras geográficas extremas, Cuenca Alta del Río Green vs Cuenca Baja del Lago Mohave, revelan un bajo $F_{st}=0.029$ pero con alelos variantes repartidos en solamente 3 de 10 loci polialélicos. Las fuentes de los linajes podrían incluir los ríos Green-Yampa y/o el Lago Powell y/o el Lago Mohave. Recomendamos no usar los pocos matalotes remanentes de la población del Alto Colorado en un programa de reproducción, por su reducida variación producto de la deriva genética, lo cual también puede fortalecer su proporción de genes no deseados como producto de la hibridación con el matalote boca de franela (flannelmouth sucker)
