United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Nebraska Field Office
203 West Second Street
Grand Island, Nebraska 68801

September 12, 2011

FWS-NE: 2011-478

Jerry Kenny
Platte River Recovery Implementation Program
4111 4th Avenue, Suite 6
Kearney, NE 68847

RE: Platte River Recovery Implementation Program Bi-Annual Report 2009 & 2010

Dear Dr. Kenny: Jerry

The enclosed document represents the United States Fish and Wildlife Service (Service) response to the Platte River Recovery Implementation Program (PRRIP) 2009 and 2010 Bi-annual Report received in our office on April 18, 2011. The Service provides the following comments and suggestions for your consideration and considers the Bi-annual Report as a means for assessing progress in achieving the PRRIP milestones described in the December 7, 2005, PRRIP Document.

As you know, the Service has responsibility for conservation and management of fish and wildlife resources for the benefit of the American public under the following authorities: 1) Endangered Species Act of 1973 (ESA), 2) Fish and Wildlife Coordination Act (FWCA), 3) Bald and Golden Eagle Protection Act (Eagle Act), and 4) Migratory Bird Treaty Act (MBTA). The National Environmental Policy Act (NEPA) requires compliance with all of these statutes and regulations. It should be noted the Service and your staff have successfully worked together since the start of the PRRIP in continuing to maintain compliance with these federal laws.

The PRRIP has made excellent progress over the last two years despite many obstacles, uncertainties, and constraints out of PRRIP's control. We look forward to continued cooperation with you and your staff in the coming years to ensure ESA compliance and progress on many important facets of the Programmatic Biological Opinion (PBO) including the Reasonable and Prudent Measures and Conservation Recommendations and are committed to providing the necessary resources to facilitate successful PRRIP implementation.

Overall, communication and collaboration between the Executive Directors Office, the states of Colorado, Nebraska, and Wyoming, and the Department of Interior has provided an excellent template nationwide for effective conservation through collaboration and the implementation of adaptive management. The PRRIP also serves as a model for recovery of threatened and endangered species and the ecosystems they depend upon. We are encouraged with the PRRIP's progress on the milestones and in maintaining ESA compliance for the first increment.

We appreciate the opportunity to review and comment on this Bi-annual Report. If you have any questions or comments please contact me at (308)382-6468, extension 12, or by e-mail at mike_george@fws.gov.

Sincerely,

Michael D. George
Nebraska Field Supervisor

Enclosures

Enclosure 1- Service Comments on the Platte River Recovery Implementation Program Bi-Annual Report for 2009 and 2010

Enclosure 2- PRRIP FWCA Report: 2011 Colorado update to the Tamarack Project

Enclosure

U.S. Fish and Wildlife Service Comments on the Platte River Recovery Implementation Program Bi-Annual Report for 2009 and 2010.

August 24, 2011

I. Background

On June 16, 2006, the U.S. Fish and Wildlife Service (Service) issued a programmatic biological opinion (PBO) for the Platte River Recovery Implementation Program (PRRIP) and water-related activities[1] affecting flow volume and timing in the central and lower reaches of the Platte River in Nebraska. The action area for the PBO included the Platte River basin upstream of the confluence of the Platte River with the Loup River in Nebraska, and just the main stem of the Platte River downstream of the Loup River confluence.

The Federal Action addressed by the PBO included the following:

> 1) funding and implementation of the PRRIP for 13 years, the anticipated first increment of the PRRIP; and
>
> 2) continued operation of existing and certain new water-related activities[2] including, but not limited to, U.S. Bureau of Reclamation and Service projects that are (or may become) dependent on the PRRIP for ESA compliance during the first 13-year stage of the PRRIP for their effects on the target species[3], whooping crane critical habitat, and other federally listed species[4] that rely on central and lower Platte River habitats.

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[1] The term "water-related activities" means activities and aspects of activities which (1) occur in the Platte River basin upstream of the confluence of the Loup River with the Platte River; and (2) may affect Platte River flow quantity or timing, including, but not limited to, water diversion, storage and use activities, and land use activities. Changes in temperature and sediment transport will be considered impacts of a "water related activity" to the extent that such changes are caused by activities affecting flow quantity or timing. Impacts of "water related activities" do not include those components of land use activities or discharges of pollutants that do not affect flow quantity or timing.

[2] "Existing water related activities" include surface water or hydrologically connected groundwater activities implemented on or before July 1, 1997. "New water-related activities" include new surface water or hydrologically connected groundwater activities including both new projects and expansion of existing projects, both those subject to and not subject to section 7(a)(2) of the ESA, which may affect the quantity or timing of water reaching the associated habitats and which are implemented after July 1, 1997.

[3] The "target species" are the endangered whooping crane (*Grus americana*), the interior least tern (*Sternula antillarum*), the pallid sturgeon (*Scaphirynchus albus*), and the threatened northern Great Plains population of the piping plover (*Charadrius melodus*).

[4] Other listed species present in the central and lower Platte River include western prairie fringed orchid (*Platanthera praeclara*) American burying beetle (*Nicrophorus americanus*) and Eskimo curlew (*Numenius borealis*).

The PRRIP document, dated October 24, 2006, became effective January 1, 2007, after the governors of Colorado, Wyoming, Nebraska and the Secretary of the Interior signed the agreement. The document was developed to guide implementation of the PRRIP throughout the 13 year first increment. During this timeframe, progress toward the PRRIP objectives for ESA compliance purposes will be measured through the achievement of the 10 "Milestones" (Milestones Report, PRRIP Document, p. 3-4). The Bi-annual Report for 2009 and 2010 (Bi-annual Report) submitted by the PRRIP and the Services response herein serves as the basic framework for reporting related to the Milestones and verifies the PRRIP progress toward achieving goals and objectives as described in the PRRIP document.

II. Land

The Land Plan contained within the PRRIP Document was developed to provide guidance in implementing the land component of the PRRIP. Milestone 5 requires implementation of the Land Plan to protect and, where appropriate, restore 10,000 acres of habitat by no later than the end of the First Increment. Through 2010, the program has acquired (through lease, fee title or sponsorship agreement) 7,955 acres. Additionally, more lands have been acquired in 2011. The Service commends the PRRIP on successful acquisition of lands within the first 4 years. Overall, the lands acquired to date provide a solid foundation for the development of habitat complexes and compilation of non-complex lands on which future land acquisition can build.

The Land Plan describes an initial focus of the PRRIP to acquire land using a strategy focusing on "habitat complexes" (approximately 9,200 acre first increment goal) while still acquiring some "non-complex habitat" (approximately 800 acre first increment goal). It is not clear in the Bi-annual Report which tracts of land and their respective acres are being credited toward complex versus non-complex lands. To ease tracking the Service recommends in future reports that the Bi-annual Report separate complex and non-complex property acres and identify the number of complexes formed through Program acquisitions. The report should also identify properties intended to support non-habitat objectives (e.g., properties supporting sediment augmentation or reregulation reservoirs), and excess land not needed by the PRRIP.

The PRRIP document and the PBO both include language related to purchasing and crediting lands protected and managed prior to July 1, 1997, for the benefit of endangered and threatened species by the Platte River Whooping Crane Trust, the National Audubon Society, The Nature Conservancy, and Central Nebraska Public Power and Irrigation District. If lands in this category have potential to benefit the target species, the Service supports acquisition of these lands and crediting them toward the long-term goal of 29,000 acres. To maximize lands in conservation and increase habitat value of the lands acquired, we believe it is appropriate and necessary to focus future acquisition on non-conservation protected land.

The PRRIP has made excellent progress in land acquisition in many bridge segments to date. Having made significant progress in total acres credited toward the 10,000 acre milestone allows PRRIP the opportunity to become more selective and strategic in

acquisitions throughout the remainder of the first increment. Accordingly, we recommend focusing future land acquisition on priority segments with little or no conservation ownership or in segments lacking a developed habitat complex.

III. Water

The Water Plan contained within the PRRIP Document provides a roadmap for projects and strategies to meet the overall program goal of reducing shortages to Service target flows by 130,000-150,000 af/yr. A number of PRRIP milestones are specifically tied to the Water Plan and there have been a number of successes. Specifically, the State of Colorado has completed and is operating Tamarack 1. Also, Central Nebraska Public Power and Irrigation and Nebraska Public Power have implemented and made operational the environmental account (EA). Finally, the Pathfinder Modification Project by the State of Wyoming is in progress despite delays due to high water and peak reservoir levels. We recommend using the Bi-annual Report to further document PRRIP Water Plan milestones.

Progress continues on the reconnaissance-level water action plan (WAP) and we are optimistic the target of 50,000-70,000 af/yr of reduction to water shortages by the end of the first increment can be achieved. The J-2 re-regulating reservoir project has potential to provide a number of benefits and achieve a large portion of the WAP target. The Service also supports the continued investigation of recharge efforts along the CNPPID supply canal and the Dawson County Canal. Though re-timing water is a key piece in reducing shortages to target flows it is also important to secure water through conservation. The Service recommends continued efforts to identify projects that provide new water through conservation as well as purchase and retirement of water rights.

We recommend, when sufficient water accounting methods are developed, the PRRIP use the Bi-Annual Report to describe Water Plan and WAP contributions toward the reduction in shortages to target flows the 1947-1994 hydrologic baseline. The Bi-Annual Report should also report reductions to shortages in target flows for the years referenced in the Bi-Annual Report.

The states of Colorado, Nebraska, and Wyoming have made excellent progress in the development and implementation of their respective new depletion plans. The states' efforts are to be commended. Colorado and Wyoming depletions plans are operational while the Nebraska new depletions plan should be fully operational and capable of offsetting new depletions once PRRIP re-timing reservoirs are completed. Progress toward the development of the Federal new depletions plans are also occurring. Through 2010, 84 projects have relied on the PBO and the PRRIP for ESA compliance using the streamlined consultation process.

The three state's new depletion plans provided certain allowances for new water-resource development with ceilings on water use in Colorado contingent on South Platte flows described in their plan, and ceilings on Nebraska water use restricted by new reservoir water storage described in their plan. Additionally, each State has agreed to secure up to 350 acre-feet of water annually, if needed, to offset new Federal depletions in each state

with the understanding new federal depletions in cumulative excess of 1,050 acrefeet will not be in compliance with the Biological Opinion.. The PRRIP members should account for these allowances and report on allowance totals to the EDO on a regular basis. The Bi-annual Report provides a possible mechanism to account for these PRRIP allowances.

The Service is charged with management and operational planning of the EA account at Lake McConaughy. The channel conveyance chokepoints at North Platte and Kearney limit the Service's ability to use the EA water to implement a Short Duration High Flow (SDHF). As described in the 2009 Flow Routing Test Report, it appears unlikely that the Program can expect to create/augment peak flows in the central Platte in excess of 4,000 cfs unless:(a) there are improvements in the North Platte River at North Platte choke point capacity, (b) EA releases can be coordinated with high South Platte River inflows, (c) the conveyance efficiency of the Platte River improves through phragmites removal and/or (d) future implementation of projects that would deliver additional Program water to the top of the habitat reach for several days when needed. The Service commends the PRRIP for contributing to previous efforts in improving the North Platte chokepoint. Even after addressing necessary improvements identified in the 2009 Flow Routing Test, the Kearney chokepoint will continue to limit the PRRIP's ability to implement a SDHF magnitude flow. In 1984, the channel capacity for the flood stage of six feet at Kearney was 12,340 cfs. The safe channel capacity at Kearney is presently reduced to a value near 7,000 cfs. It will be difficult for the PRRIP to implement a SDHF flow of 6,000 to 8,000 cfs at Overton when the downstream channel capacity at Kearney continues on its current downward trend.

The Service anticipates a limited ability to implement a SDHF in the future unless actions are in place to improve PRRIP water delivery to Overton, and improvements are made to the channel capacity at Kearney. The Service recommends continuing to proactively address these issues. In the absence of the ability to implement a SDHF, water releases for species target flows, wet meadow recharge, and channel maintenance are all possible uses for EA water. The Service will work with the PRRIP to develop plans to monitor the effects of EA releases.

IV. Adaptive Management

The PRRIP has managed uncertainty through application of adaptive management. The Service is highly supportive of the work done to date and believes necessary steps are in place for successful implementation of the Adaptive Management Plan (AMP). Multiple studies have been undertaken and additional studies are planned. Additionally, the PRRIP has made considerable progress in developing a roadmap for future implementation through development of a Synthesis Report and an AMP Implementation Plan. The PRRIP should consider describing how the land complex management strategy could be incorporated within these documents.

In 2009, the Lower Platte Stage Change Study (LPSCS) looked at the adverse effects of retiming program water on pallid sturgeon habitat. We believe this study provides valuable information. Consistent with the PRRIP Document goal number 3, testing the

assumption that managing flow in the central Platte River can improve the pallid sturgeon's lower Platte River habitat, we encourage PRRIP to develop studies or research that addresses this assumption.

There is also a need to evaluate PRRIP-related alterations to discharge patterns. PRRIP alterations to the hydrograph may affect pallid sturgeon habitat with an impact on the recovery of the species. The PRRIP Document and the AMP emphasize the application of the Stage Change Study to address the connection, construction, maintenance, and evolution of pallid sturgeon habitat components. The Stage Change Study was not intended to address PRRIP's water-related effects (adverse or beneficial) outside of that related to habitat such as spawning cues, primary productivity, flows for pallid forage, etc.

V. Incidental Take reporting and Reasonable and Prudent Measures

Section 9 of ESA and federal regulations pursuant to section 4(d) of ESA prohibit the take of endangered and threatened species without special exemption. The PRRIP was issued an incidental take statement as a supplement to the PBO (page 309). The incidental take statement outlined a process for reporting incidental take. PRRIP staff was diligent in reporting incidental take to Service personnel. However, to efficiently track compliance with the PBO, the PRRIP should provide a detailed annual report of all forms of incidental take as described by the PBO. This report should list the species, the amount, and the extent of take that occurred as a result of PRRIP actions. Additionally, Reasonable and Prudent Measures were developed and included within the incidental take statement for each species. Below, we are providing a suggested outline for reporting incidental take.

1. Least Tern and Piping Plover

- **a.** inundating flows
- **b.** sandpit
- **c.** habitat restoration and land management activities
- **d.** PRRIP section 10(a)(1)(A) permits
- **e.** Inland Lakes
- **f.** monitoring and research activities

2. Whooping Crane

- **a.** monitoring and research activities
- **b.** habitat restoration and land management activities
- **c.** PRRIP section 10(a)(1)(A) permits

3. Pallid Sturgeon – No incidental take has been authorized in the PBO. Incidental take associated with section 10(a)(1)(A) permits will be documented if monitoring/research are activities implemented.

4. Bald Eagle - The bald eagle was removed from the Federal endangered species list on August 8, 2007. Bald eagles continue to be protected by the Bald and Golden Eagle

Protection Act and the Migratory Bird Treaty Act. Incidental take will not be tracked in future bi-annual Service reports.

Fish and Wildlife Coordination Act

The FWCA (FWCA; 48 Stat. 401 as amended; 16 U.S.C. 661 *et seq.*) provides a basic procedural framework for the orderly consideration of fish and wildlife conservation measures in Federal and federally permitted or licensed water development projects. According to Section 2 (a) of the FWCA, whenever any water body is proposed to be controlled or modified for any purpose by a Federal agency or by any public or private agency under a Federal permit or license, that Federal agency is required first to consult with the wildlife agency (i.e., Service or head of state fish and wildlife agency as specified under FWCA) with a view to the conservation of fish and wildlife resources in connection with that project.

The final "January 26, 2006, FWCA Report: Platte River Recovery Implementation Report" (2006) was developed as part of the PRRIP final Environmental Impact Statement to ensure consideration was given for the conservation of fish and wildlife resources in Nebraska, Colorado, and Wyoming. The Governance Committee, acting on behalf of the lead federal agency, is responsible for ensuring that FWCA resources are receiving consideration. For example, the Service has included a report developed as an update pertaining to Colorado's Tamarack Project documenting progress toward compliance with the FWCA for your consideration. The Service recommends that the PRRIP staff, the Governance Committee, and the PRRIP subcommittees review recommendations in the PRRIP FWCA to ensure FWCA resources are considered as actions are developed and implemented. The Service, through assistance on the PRRIP subcommittees, will continue to provide technical assistance and recommendations related to the FWCA. .

Conservation Recommendations

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of an action on listed species or critical habitat, to help implement recovery plans, or to develop information. Conservation recommendations are provided in the PBO (pages 328-329) for possible accomplishment by the PRRIP. The Service is pleased with the progress made on these to date such as RPM #4 and #5. We encourage the PRRIP to continue making progress on these conservation recommendations in the future.

Literature Cited

Platte River Recovery Implementation Program document. 2006.

U.S. Department of the Interior. 2006. Platte River Recovery Implementation Program Final Environmental Impact Statement.

U.S. Fish and Wildlife Service. 2006. Fish and Wildlife Coordination Act Report: Platte River Recovery Implementation Program.

U.S. Fish and Wildlife Service. 2006. Biological opinion on the Platte River Recovery Implementation Program.

Enclosure 2

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
FISH AND WILDLIFE COORDINATION ACT REPORT:
2011 COLORADO UPDATE TO THE TAMARACK PROJECT

The Platte River Recovery Implementation Program was designed to resolve escalating conflicts between water use and endangered species protection that affect continued water use and the federal permitting of existing and planned irrigation, municipal and industrial water supply projects in the Platte River Basin in Colorado. The Tamarack projects provide Colorado an opportunity to supplement flows to the Platte River and to study the benefits of these flows on declining native species in Colorado as well as benefit target species in Nebraska.

The information presented below pertains to projects the Colorado Division of Wildlife has funded or participated in that can be utilized in evaluation or support of the Tamarack Project. Work that has been undertaken since 1999 is identified and builds upon the information collected on the Tamarack Project prior to that time. The work is presented in four areas of interest: personnel, construction projects, native species monitoring and stocking, and research.

Personnel

- The Colorado Division of Wildlife in 2007 hired a species conservation biologist that was responsible for the inventory and management of native species in the Platte River Basin. This position continues to place emphasis on the eastern plains and the area surrounding the Tamarack State Wildlife Area (SWA).
- The Colorado Division of Wildlife in 2008 hired a native species researcher whose focus is on the eastern plains native species and initially is working on determining the sampling effort that is need to ensure representative sampling of habitat and species.

- In 2011, the Colorado Division of Wildlife hired a new full time employee to operate the wells and recharge ponds on the Tamarack Ranch SWA, and to monitor recharge to the South Platte River.

Construction Projects

- Colorado Division of Wildlife funded Ducks Unlimited to design and build wetland impoundments on the Tamarack SWA. This was in cooperation with Northern Water and to date they have not been utilized due to problems surrounding water retention.
- May2007, USFWS grant funded bentonite lining of Tamarack refuge ponds; heavy equipment and labor were provided by the Division of Wildlife. Benefits are presented in the monitoring and stocking portion of this update.

Native Species Monitoring and Stocking

- September 2005, seined and salvaged 1,500 brassy minnows from refuge ponds and stocked on Tamarack SWA (1.2 miles west of Crook, CO).
- April 2006, drained refuge ponds and salvaged 14,000 brassy minnows and stocked these fish adjacent to the Tamarack SWA in the South Platte River.
- Fall 2007, sampling revealed a substantial increase in brassy minnow abundance; likely the result of reintroduction from the Tamarack.
- June 2008, restocked Tamarack refuge ponds with brassy minnows. These fish were salvaged from a pond near Horsetooth Reservoir, managed in cooperation with Northern water for brassy minnows.
- September 2008, brassy minnows spawn successful; transferred approximately 5,000 fish to South Platte River at Dune Ridge SWA.
- Since 2008 the Colorado Division of Wildlife has been conducting a plains fish monitoring program throughout eastern Colorado. The sampling described below is part of the large-scale plains fish conservation project.
- Since October 1, 2008 there have been 18 fish sampling events between the west boundary of Tamarack SWA and the state line
    - 16 of these were on the main-stem South Platte River
- A total of 26,296 fish were collected consisting of 25 species, of which three were special status species.
    - Special status species collected were:
        - Suckermouth minnow (*Phenacobius mirabilis*) – state endangered
        - Brassy minnow (*Hybognathus hankinsoni*) – state threatened
        - Iowa darter (*Etheostoma exile*)() – species of special concern
    - Other species collected were:
        - Black bullhead (*Ameiurus melas*)
        - Bluegill (*Lepomis macrochirus*)
        - Brook stickleback (*Culaea inconstans*)

  - Bigmouth shiner (*Notropis dorsalis*)
  - Central stoneroller (*Campostoma anomalum*)
  - Common carp (*Cyprinus carpio*)
  - Creek chub (*Semotilus atromaculatus*)
  - Freshwater drum (*Aplodinotus grunniens*)
  - Fathead minnow (*Pimepheles promelas*)
  - Gizzard shad (*Dorosoma cepedianum*)
  - Green sunfish (*Lepomis cyanellus*)
  - Johnny darter (*Etheostoma nigrum*)
  - Largemouth bass (*Micropterus salmoides*)
  - Longnose dace (*Rhynichthys cataractae*)
  - Mosquitofish (*Gambusia affinis*)
  - Orangespotted sunfish (*Lepomis humilis*)
  - Plains killifish (*Fundulus kansae*)
  - Plains topminnow (*Fundulus sciadicus*)
  - River carpsucker (*Carpiodes carpio*)
  - Red shiner (*Cyprinella lutrensis*)
  - Sand shiner (*Notropis stramineus*)
  - White sucker (*Catostomus commersoni*)
- Moving forward, this data will assist management to determine the amount of effort required to document changes in populations' status of these fishes. Since the Tamarack SWA is an area of higher than average plains fish species richness, it will continue to be an important sampling area for the overall plains fishes conservation efforts.
- 2010 Tamarack SWA ponds were stocked with suckermouth minnows to develop a broodstock of fish that if successful the production will be use for stocking new areas along the Platte River.

Research

Hydrology and Physical Science Research

Tamarack State Wildlife Area Recharge Project. John Stednick, PhD, College of Natural Resources, Colorado State University. Funded by Species Conservation Trust Fund.

- The current project at Tamarack is to determine the hydrologic connection between the recharge ponds and the streamflow on the South Platte River. We are using the existing monitoring well network to collect water samples. The South Platte water quality signature is different than the groundwater signature, so we can assess the degree of water 'mixing' by the chemical changes. The monitoring effort has been ongoing since 2002. To quantify the hydrologic connection, a series of nested piezometers were installed at 4 cross sections on the South Platte River between Crook Bridge and Red Lion Bridge. Particle track modeling in MODFLOW suggested that 2 sections will be unaffected and 2 sections will

receive recharge waters. The piezometers were installed near the river at depths varying from 46 to 57 feet to the Brule Shale. The well logs were sands to depth, with a shallow layer of gravelly clay at the top of the shale. Tracer (deuterium) monitoring will be conducted this summer to quantify flow rates.

Past physical science research at Tamarack has included:

- Water quality monitoring to assess mixing.
- Beckman NA. 2007. Quantifying groundwater and surface water mixing at a conjunctive use site. Fort Collins: Colorado State University Theses/Dissertations. 170 pages.
- Watt JT. 2003. Water quality changes at a streamflow augmentation project, lower South Platte River, Colorado. Fort Collins: Colorado State University Theses/Dissertations. 87 pages.
- Electrical resistivity imaging to the Brule Shale.
- Poceta JA. 2005. Electrical resistivity imaging of eolian and alluvial sediments along the South Platte river, Northeatern Colorado. Fort Collins: Colorado State University Theses/Dissertations. 58 pages.
- Microgravity changes with groundwater mounding.
- Gehman CL, Harry DL, Sanford WE, Stednick JD, Beckman NA. 2009. Estimating specific yield and storage change in an unconfined aquifer using temporal gravity surveys. Water Resources Research 45(16).

Fishery Research

Development of rigorous sampling protocols for the estimation and abundace of Colorado Eastern Plain Fishes. Harry Crockett and Ryan Ftizpatrick, Colorado Division of Wildlife

- The overall project goals were/are to: 1) update the status of all plains fish species since the previous basin-wide assessment, which was done in the mid-90s (Nesler et al 1997), and 2) in the course of doing so, determine the minimum sufficient effort required to effectively monitor plains fish on an ongoing basis. We considered several levels of information to be essential for an adequate status assessment including 1) status of rare species / species of concern, for specific populations and range-wide; 2) basin-wide status of all species including common ones; 3) status of streams and/or hydrologic units (HUCs), as represented by fish community trends. Clearly, a sampling frame consisting of randomly selected or otherwise demonstrably representative reaches is essential for valid range- or basin-wide inference. However, with most of the plains under private ownership,

obtaining access and coordinating with landowners is vastly more burdensome than sampling at sites having established access. We therefore utilized a dual-frame sampling approach combining sites selected according to a spatially balanced, randomized (GRTS) sample, with pre-established sites repeated from Nesler et al (1997) and having, as much as possible, a spatial distribution comparable to those from the GRTS sample. Our hope was that results from the two sampling frames would prove sufficiently similar that we could largely or entirely utilize pre-established sites in future monitoring, with confidence that they were representative (perhaps recalibrating with a random sample at infrequent intervals). We also evaluated the amount of effort required to detect species when present, by conducting at least three passes at each site, utilizing at least two gears (multiple passes needed in order to estimate non-detection rate).

Past biological research with Eastern Plains fish:

- Scheurer, J.A. and K.D. Fausch. 2002. Brassy Minnow in Colorado Plains Streams: Identification, Histroical Distribution, and Habitat Requirements at Multiple Scales. Final report to: Colorado Water Research Institute, Colorado State University and the Colorado Division of Wildlife. 148 pages.