United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6
ES

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

October 23, 2009

Mr. Dave Ponganis
U.S. Army Corps of Engineers
1125 NW Couch Street, Suite 50
Portland, Oregon 97209

Dear Mr. Ponganis:

This letter serves to formally revise portions of the Reasonable and Prudent Alternative (RPA) in the U.S. Fish and Wildlife Service's (Service) 2003 amended Biological Opinion (BiOp) to the U.S. Army Corps of Engineers (Corps). By this letter I am substituting a new RPA element at Intake Dam and the irrigation headworks on the Yellowstone River, Montana, for one which was originally identified to be taken at Fort Peck Dam. This issue has been discussed in recent correspondence between our two agencies dated August 13, 2008 (Service letter to the Corps) and May 20, 2009 (Corps response).

Although the benefits of providing pallid sturgeon passage on the Yellowstone River were recognized much earlier (Pallid Sturgeon Recovery Plan 1993), it was not until passage of the Water Resources Development Act (WRDA) of 2007 that we could consider this recovery action within the Corps' authority. The WRDA 2007 authorized the Corps to use Missouri River Recovery and Mitigation funds to assist the U.S. Bureau of Reclamation (Reclamation) with design and construction of the Lower Yellowstone Project for the purpose of ecosystem restoration. The restoration of the dam and diversion canal will address long-standing issues related to fish passage and entrainment at this location and will open up more than 150 miles of new aquatic habitat to the highly imperiled pallid sturgeon.

The original objective of flow enhancement below Fort Peck Dam was to benefit pallid sturgeon by providing a more natural hydrograph and warmer water. Although ultimately overcoming barriers to reestablishing a viable, self-sustaining pallid sturgeon may require actions at both Fort Peck and Intake dams, we have determined that providing passage and reducing entrainment on the Yellowstone River will contribute more to the recovery of pallid sturgeon than flow changes from Fort Peck Dam. Substitution of the revised RPA element for the Fort Peck elements of the 2003 RPA will contribute to avoiding the likelihood of jeopardy, is consistent with the intended purpose of the original action, consistent with the scope of the Corps authority under the WRDA of 2007, and is economically and technically feasible.

The RPA from the 2003 BiOp related to the Fort Peck contains two elements and it currently reads:

Flow Enhancement below Fort Peck Dam
To meet the biological needs for the pallid sturgeon the Service finds that the Corps shall no later than the 2004 annual operation, which will begin in March 2004:

a) *ensure that the Master Manual and the corresponding NEPA document sufficiently analyze and incorporate the capability to implement long-term flow enhancements in this reach upon completion of the Fort Peck tests (mini and full)*

b) *upon completion and evaluation of the Fort Peck tests (mini and full), assuming all technical issues have been addressed, implement flow enhancements to provide spawning cues and water temperature management at the first opportunity system storage and lake level allow.*

c) *the Corps shall, when implementing the system unbalancing, do so in a manner that starts with Fort Peck Lake at the highest elevation in the first year while achieving stable conditions in the second year.*

d) *to the extent that there are system-wide water savings from implementing the summer habitat flows below Gavins Point Dam, those savings shall be stored, to the maximum extent feasible, in Fort Peck Lake.*

Development of Fort Peck Dam Temperature Control Device Feasibility

a) *The Corps shall within 3 years prepare a study that will evaluate the feasibility of constructing a temperature control device on the upstream face of the Fort Peck Dam. The study, once completed, will be subject to an outside engineering peer review for technical and economic feasibility. The peer review will be jointly established and overseen by the Corps and Service. If the peer review determines that the project is feasible and can be built and is a cost effective management action to provide water temperature management through the summer while continuing to provide hydropower, the Corps shall implement the necessary steps to proceed with the construction of the facility.*

We are now revising the 2003 amended BiOp to read the following:

Flow Enhancement below Fort Peck Dam – Intake Montana River Restoration
Pallid sturgeon survival in the Missouri River reach below Fort Peck Dam and in the Lower Yellowstone River are ecologically linked. The fish found in the Missouri River below Fort Peck Dam are often found in the Yellowstone River and in the reach of the Missouri below the confluence with the Yellowstone. The two river reaches form one ecosystem and any river restoration efforts in the area should be viewed as benefiting both rivers and their fish populations. While water temperatures and flows identified in the existing RPA element highlighted above are important, ecological variables affecting

long-term survival of the pallid in this area, other key considerations including the amount of contiguous free-flowing river miles and the entrainment of pallids and their food are also critical to the life-history requirements of the sturgeon.

We believe that restoring fish passage and eliminating entrainment at Intake, Montana will result in a greater likelihood of meeting all the life history requirements of pallid sturgeon found in this reach than the benefit afforded by the original RPA element. Thus, the current RPA element will read:

a) The Corps shall provide funding necessary for NEPA analysis, design and construction leading to sturgeon passage at the Intake, Montana irrigation dam and diversion.

b) The Corp shall provide funding necessary for NEPA analysis and subsequent construction of Lower Yellowstone irrigation district headworks at the Intake, Montana, to address native fish entrainment at this location

c) As resources are being used for planning, design and construction at Intake, the 2020 shallow water habitat milestone will be deferred by an equal amount of time – not to exceed 4 years or 2024.

d) The Corps will not be required to conduct Fort Peck tests unless the success criteria are not achieved. This determination will be made within the first 8 years following conclusion of the construction at Intake. (Success Criteria enclosed)

e) The Corps will complete its feasibility report related to temperature improvements at Fort Peck Dam, including a review of the Milk River for possible sources of warm water.

f) The Corps, Reclamation, and Service will, in cooperation with Montana Fish Wildlife and Parks, determine the requirements and funding necessary for post-construction monitoring associated with the project. Funding this monitoring will not be a responsibility of the Corps.

Adaptive Management

While uncertainties certainly exist related to any restoration effort of this magnitude, the science supporting this project suggests that this project will lead to successful recruitment and recovery of the pallid sturgeon in this area (Upper Basin Pallid Sturgeon Workgroup May 2009 Habitat Availability and Larval Drift Issues for Pallid Sturgeon and Other Native Fishes in the Yellowstone River- White Paper 6 pp.) (enclosed). We will be using post-construction monitoring to determine success related to fish passage, entrainment reduction, and eventual recruitment.

The Service has worked with the Corps, Reclamation, and the States of Montana and North Dakota to develop success criteria that we will use to determine if the project is providing the benefits we envision. However, if these success criteria (enclosed) are not met, the 2003 amended BiOp RPA elements requiring the Corps to operate Fort Peck to benefit pallid sturgeon would be reinstated either as currently written or modified to incorporate the results of the Corps' ongoing feasibility study.

The Service is currently in section 7 consultation with Reclamation on the construction of the Intake Project and long-term operation and maintenance of the fish screen. In addition, once construction of the fish passage structure is complete, the Corps will use the project's adaptive management feature to ensure that the water velocities at the fish passage are within the predicted range, and if not, modifications shall be made to allow for fish passage. It is our understanding that post-construction fish monitoring related to the success criteria will be the responsibility of Reclamation.

If you have any questions or concerns related to this clarification, please do not hesitate to contact me at (303) 236-7920.

Sincerely,

Regional Director

Enclosures

On August 13, 2008, the U.S. Fish and Wildlife Service (Service), in a letter to the U.S. Army Corps of Engineers, indicated that: 1) if the Intake Dam passage and entrainment protection projects were to result in significant progress toward establishing a self-sustaining population of pallid sturgeon in the lower Yellowstone River and Missouri River between Fort Peck Dam and Lake Sakakawea, the Service retains the option to re-examine the need for long-term flow modifications at Fort Peck Dam; and 2) a final set of biological monitoring requirements and success criteria would be developed to evaluate if significant progress is achieved. Following are proposed success criteria, all of which must be met before the Service would consider modifying Reasonable and Prudent Alternatives related to warm water withdrawal considerations at Fort Peck Dam as described in the 2003 Biological Opinion. Final project monitoring plans are currently being developed in conjunction with the Corps, Reclamation, and other State, Federal, and NGO partners.

Concepts necessary for the Service to evaluate if significant progress toward a self-sustaining pallid sturgeon population in the Great Plains Management Unit is being achieved:

- The criteria should have both short- and long-term components demonstrating significant progress toward establishing a self-sustaining population in the Great Plains Management Unit.
- Data indicating these short (≤ 4 years), and long-term (8 years) goals have been met should be established during the allotted time frame. Within this context, an adaptive management approach will be utilized to improve fish passage and entrainment protection performance if the short-term goals are not being met.
- While data are being gathered to document the benefits of fish passage and entrainment protection modifications at Intake Dam, the U.S. Army Corps of Engineers will continue to work with its partners toward warmer water in the Missouri River downstream of Fort Peck Dam via completion of the current feasibility study.

Proposed success criteria and associated time frames:

1) Within 4 years after completion of the fish passage and entrainment projects at Intake Dam:

    a. Pallid sturgeon movement data must document that adult and stocked juvenile pallid sturgeon can move unimpeded upstream of Intake Dam, **AND**

    b. Pallid sturgeon movement data and entrainment study results must document that adult and stocked juvenile pallid sturgeon can pass downstream of Intake Dam without being entrained into the irrigation canal.

2) Within 8 years after completion of the fish passage and entrainment projects at Intake Dam:

    a. Pallid sturgeon monitoring data must document the presence of naturally produced juvenile pallid sturgeon in the lower Yellowstone and Missouri rivers between Fort Peck Dam and Lake Sakakawea, **AND**

b. Pallid sturgeon movement data and entrainment study results must document that pallid sturgeon ($\geq$ 40 mm total length) can pass downstream of Intake Dam without being entrained, **AND**

c. Pallid sturgeon monitoring data must indicate that naturally produced juvenile pallid sturgeon survival rates can be estimated and population viability modeling data must demonstrate that survival of naturally produced pallid sturgeon is sufficient to establish a self-sustaining population in the lower Yellowstone and Missouri Rivers between Fort Peck Dam and Lake Sakakawea.

Habitat Availability and Larval Drift Issues for Pallid Sturgeon and Other Native Fishes in the Yellowstone River

Upper Basin Pallid Sturgeon Workgroup
May 2009

Intake Diversion Dam is a feature of the Bureau of Reclamation's (Reclamation) Lower Yellowstone Project on the Yellowstone River near Glendive, Montana. In order to comply with the Endangered Species Act, Reclamation and the U.S. Fish and Wildlife Service evaluated the operation of the Lower Yellowstone Project and acknowledged that impacts to pallid sturgeon should be addressed by improving fish passage and protecting fish from entrainment at Intake Diversion Dam. Reclamation has partnered with the U.S. Army Corps of Engineers to propose actions to modify the Lower Yellowstone Project, specifically Intake Diversion Dam and canal headworks, for this purpose. This action was identified as important to pallid sturgeon recovery in the original Recovery Plan (USFWS 1993) and reiterated in subsequent pallid sturgeon recovery planning and consultation documents (USFWS 2000; USFWS 2003; USFWS 2007; Upper Basin Pallid Sturgeon Recovery Workgroup 2008).

As with any restoration action for an endangered species, there is no guarantee that implementation will directly result in successful recruitment and recovery of the species. The best available scientific information suggests that the Yellowstone River contains some of the best remaining habitat for successful spawning and the potential for natural recruitment could be enhanced by providing passage at Intake Diversion Dam (USFWS 2000, USFWS 2003). Specifically, telemetered pallid sturgeon approach the dam but there is no evidence they can pass upstream (Bramblett and White 2001; Fuller et al. 2008) and extensive netting efforts up and downstream of the diversion suggest that it is a barrier to adult pallid sturgeon (Backes et al. 1994). In addition, inadequate larval drift distance is likely a major limiting factor to pallid sturgeon recruitment in this area. Pallid sturgeon biologists and the Upper Basin Pallid Sturgeon Workgroup agree that fish passage and entrainment protection at Intake Diversion Dam may restore habitat conditions that allow natural pallid sturgeon recruitment. The purpose of this document is to summarize the best available science in support of fish passage and protection measures at Intake Diversion Dam for pallid sturgeon recovery.

Pallid sturgeon were listed as an endangered species in 1990. One of the described listing factors was habitat fragmentation and loss, including alteration to morphology, hydrology, temperature regime, cover, and sediment/organic matter transport of the Missouri River resulting from construction of six mainstem dams (USFWS 1993). In the Missouri River between Fort Peck Dam and the headwaters of Sakakawea Reservoir and the Yellowstone River (RPMA 2) almost all remaining wild pallid sturgeon are adults (USFWS 2007). The absence of younger fish in this population is indicative of spawning or recruitment failure. Spawning and recruitment failure of pallid sturgeon is attributed to a combination of disruption of natural spawning cues, obstruction of migration routes, and inundation of spawning and nursery areas caused by mainstem impoundments (USFWS 1993; USFWS 2007). Pallid sturgeon are hypothesized to require habitat conditions that include natural flow and temperature regimes to cue pre-spawning migrations and elicit spawning behavior (USFWS 1993). After hatching, larval pallid sturgeon drift downstream for about 11 days, which requires several hundred kilometers of free-flowing river downstream of spawning areas (Kynard et al. 2007; Braaten et al. 2008). Accordingly, for successful pallid sturgeon spawning and recruitment to occur habitat conditions must include 1) intact migration and spawning cues, 2) suitable physical spawning habitats, 3) adequate larval drift distances, and 4) suitable rearing habitats. Potential for these habitat requirements to be satisfied exists in the Yellowstone River if proposed modifications to Intake Diversion Dam and canal are implemented.

The near-natural hydrograph and associated temperature and sediment regimes characteristic of the unimpounded Yellowstone River (White and Bramblett 1993) combine to provide one of the best habitat templates and opportunities to support pallid sturgeon recovery in the upper Missouri River basin. Current habitat conditions include intact migration and spawning cues and habitats; most extant adult pallid sturgeon in RPMA 2 migrate into the lower Yellowstone River each spring (Bramblett and White 2001) and subsequent spawning has been documented (Fuller et al. 2008). However, inadequate larval drift distances (~150 kilometers) between known spawning reaches and the present headwaters of Sakakawea Reservoir may not exist. Accordingly, inadequate larval drift distances are one of the leading hypotheses to explain recruitment failure in RPMA 2. Pallid sturgeon must access spawning areas upstream of Intake Diversion Dam to provide adequate larval drift distances. Intake Diversion Dam has likely impeded movements of pallid sturgeon in the Yellowstone River since construction in 1907 and currently serves as a barrier to wild adult (Backes et al. 1994; Bramblett and White 2001; Fuller et al. 2008) and hatchery-reared juvenile pallid sturgeon (Jaeger et al. 2006; Jaeger et al. 2007). Pallid sturgeon were historically documented at least 180 kilometers upstream of Intake Diversion, which is about 430 kilometers above the present headwaters of Sakakawea Reservoir, during times of the year when spawning is known to occur (Brown 1955; Brown 1971).

If pallid sturgeon passage at Intake Diversion Dam results in spawning at upstream locations then it is possible that adequate larval drift distances exist for natural recruitment to occur. Results from laboratory and field studies suggest that the cumulative distance drifted by larval sturgeon during ontogenetic development is related to water velocity. For example, under low velocity (< 0.10 m/s) laboratory conditions, larval pallid sturgeon drifted about 13 km (Kynard et al. 2002). Additional laboratory studies suggested that larval pallid sturgeon would drift about 300 km at velocities of about 0.30 m/s (Kynard et al. 2007). In field studies, Braaten et al. (2008) modeled cumulative drift distance as a function of velocity. Results suggested that the average larval pallid sturgeon would drift about 245 km at a mean water column velocity of 0.30 m/s, but drift distance for the average larvae would increase to 530 km at mean water column velocities of 0.60 m/s. However, results also identified variability in drift rates and cumulative drift distance exhibited by the larvae. Specifically, a portion of the drifting larvae exhibited a cumulative drift distance that was less than the average drifting larvae. For example, the slowest 10% of the drifting would be expected to drift about 470 km at a mean water column velocity of 0.60 m/s. The slowest drifting 1% of the larvae would be expected to drift about 420 km. Providing passage at Intake Diversion Dam would allow access to an additional 264 kilometers of habitat with intact migration and spawning cues and result in a cumulative 510 kilometers of free-flowing river between Cartersville Diversion Dam, which is the next upstream barrier on the Yellowstone River, and current pool levels in Sakakawea Reservoir. This additional increase in the length of free-flowing riverine habitat would likely provide adequate drift distance for at least a portion of the larvae.

A combination of higher average velocities and increased habitat complexity result in ambiguous larval drift distances in the Yellowstone River. Both laboratory and field trials indicate that drift rate and total drift distance of larval pallid sturgeon is related to water velocity; larvae drift longer distances at higher velocities (Kynard et al. 2007; Braaten et al. 2008). Average Yellowstone River velocities during periods of expected larval drift can exceed 1.00 m/s whereas laboratory and field investigation of larval drift rates and resultant predictions of total drift distance occurred at upper velocities ranging from 0.30 to 0.60 m/s. However, increased habitat complexity in the Yellowstone River may make direct extrapolation of larval drift distances modeled under lower habitat complexity inappropriate. Larval drift rates decrease from average water velocities as habitat complexity increases due to entrainment of drifting larvae in areas of reduced velocity such as eddies (Kynard et al. 2007; Braaten et al. 2008). Continuous exposure to eddies and channel complexity during the entire larval drift period will likely reduce cumulative distance drifted by larvae as suggested by Braaten et al. (2008) and observed during 2007 when larval pallid sturgeon were allowed to free drift throughout a 180-km reach of the mainstem Missouri River (Braaten et al., in preparation). Higher habitat complexity in the Yellowstone River relative to that of previous studies suggests that drifting larvae will be more frequently exposed to and resultantly entrained in lower velocity habitats such as eddies, secondary channels, and boundary layers associated with coarser substrates which reduces predicted drift distances (Braaten et al. 2008). The Yellowstone River provided 35 to 50% more area of slow current velocity habitat patches than the Missouri River during periods when larval drift occurs, which may result in slower larval drift rates than those modeled in the Missouri River (Bowen et al. 2003). Previous larval drift studies occurred in smooth bottomed tanks with limited rock material (Kynard et al. 2007) or over sand and silt substrates (Braaten et al. 2008) whereas Yellowstone River substrate above Intake Diversion Dam is predominately gravel and cobble (Bramblett and White 2001). Increased roughness associated with gravel and cobble substrates results in thicker low-velocity boundary layers on the stream bottom than with sand or silt substrates (Gordon et al. 1992). Because larval pallid sturgeon drift at or near the stream bottom (Kynard et al. 2007; Braaten et al. 2008) entrainment in low-velocity boundary layers or interstitial spaces within the substrate could reduce drift rates and distances from those expected based on average velocity. Laboratory studies incorporating limited rock cover provide somewhat contradictory results; pallid sturgeon did not attempt to use rock cover at low velocities (Kynard et al. 2002) but did attempt to hold position behind rocks at higher velocities (Kynard et al. 2007). Larval drift rates associated with gravel substrates are lower than those associated with sand substrates for other sturgeon species (NWSRI 2007). About 283 kilometers of seasonal and perennial secondary channels accompany the 379 kilometers of mainstem channel of the Yellowstone River below Cartersville Diversion (Jaeger 2004). Average and bottom velocities of secondary channel habitats were significantly lower than those of mainstem habitats ($P < 0.001$; Jaeger et al. 2008), which would reduce drift rates of fish entrained in these habitats. In summary, it is anticipated that the average larvae will drift faster in the Yellowstone River than described in laboratory (Kynard et al. 2007) or field investigations (Braaten et al. 2008) because of higher velocities but a combination of other physical factors will result in shorter total drift distances than predicted by water velocities alone.

Additional ecosystem and connectivity restoration efforts could further increase the amount of habitat available for larval drift in the Yellowstone River. Discussions are ongoing to develop fish passage alternatives at Cartersville Diversion Dam, which would open an additional 90 kilometers of river. Suitable habitat may also be created by manipulating pool elevations in Sakakawea Reservoir; juvenile pallid sturgeon occupy lotic habitats created by receding reservoir water levels in Fort Peck Reservoir (Gerrity et al. 2008) although it is unknown whether similar conditions exist in the headwaters of Sakakawea Reservoir. Tributaries to the Yellowstone River may also contribute to increased larval drift distances. Although pallid sturgeon were historically present at the mouth of the Tongue River (Brown 1955), access was substantially reduced by a series of three diversion dams that were constructed beginning in the 1890's. Fish passage has been provided at the two lower diversions, which opens access to more than 160 kilometers of habitat in the Tongue River.

Providing fish passage and screening at Intake Diversion Dam benefits the entire native fish assemblage and contributes to restoration of the Yellowstone River ecosystem. At least 32 fish species may be affected by Intake Diversion Dam (White and Bramblett 1993; Hiebert et al. 2000). Evidence of restricted passage at Intake Diversion Dam exists for many native Yellowstone River fishes. Sauger catch rates in the reach downstream of this structure are four times greater than those in upstream reaches (Jaeger 2005), juvenile shovelnose sturgeon are much more abundant downstream of the diversion than upstream (Backes et al. 1994), and movements of paddlefish are impeded at low flows. Massive losses of fishes to entrainment also occur at Intake Diversion. About 576,629 fish of 36 species are annually entrained at Intake Diversion, of which as many as 8% or 46,130 are sturgeon (Hiebert et al. 2000).

In conclusion, the Upper Basin Pallid Sturgeon Workgroup is strongly supportive of renovating Intake Diversion Dam as a means of providing passage for pallid sturgeon and other native fishes. In addition, the Workgroup strongly supports constructing a fish screening system that will prevent or minimize entrainment of pallid sturgeon and other native fishes. Available scientific data suggest that fish passage and entrainment protection at Intake Diversion may restore habitat conditions that allow natural pallid sturgeon recruitment to occur. Accordingly, the Upper Basin Pallid Sturgeon Workgroup believes that this project provides one of the best opportunities to achieve natural pallid sturgeon recruitment in the upper Missouri River basin.

LITERATURE CITED

Backes, K. M., and W. M. Gardner, D. Scarnecchia, P. A. Stewart. 1994. Lower Yellowstone River pallid sturgeon study IV and Missouri River creel survey. Montana Fish, Wildlife and Parks Report, Helena.

Bowen, Z. H., K. D. Bovee, T. J. Waddle. 2003. Effects of shallow-water habitat dynamics and floodplain connectivity. Transactions of the American Fisheries Society 132:809-823.

Braaten, P. J. and D. B. Fuller, L. D. Holte, R. D. Lott, W. Viste, T. F. Brandt, R. G. Legare. 2008. Drift dynamics of larval pallid sturgeon in a natural side channel of the upper

Missouri River, Montana. North American Journal of Fisheries Management 28:808-826.

Bramblett, R. G., and R. G. White. 2001. Habitat use and movements of pallid and shovelnose sturgeon in the Yellowstone and Missouri Rivers in Montana and North Dakota. Transactions of the American Fisheries Society 130:1006-1025.

Brown, C. J. D. 1955. A record-sized pallid sturgeon, Scaphirhynchus album, from Montana. Copeia 1:55-56.

Brown, C. J .D. 1971. Fishes of Montana. Big Sky Books, Bozeman, Montana.

Fuller, D. B., M. E. Jaeger, M. Webb. 2008. Spawning and Associated Movement Patterns of Pallid Sturgeon in the Lower Yellowstone River. Upper Basin Pallid Sturgeon Recovery Workgroup 2007 Annual Report. Upper Basin Workgroup, U.S. Fish and Wildlife Service, Bozeman, Montana.

Gerrity, P. C., C. S. Guy, and W. M. Gardner. 2008. Habitat use of juvenile pallid sturgeon and shovelnose sturgeon with implications for water-level management in a downstream reservoir. North American Journal of Fisheries Management 28:832-843.

Gordon, N. D., T. A. McMahon, and B. L. Finlayson. 1992. Stream Hydrology. John Wiley & Sons, Chichester, England.

Hiebert, S. D., R. Wydoski, and T. J. Parks. 2000. Fish entrainment at the lower Yellowstone diversion dam, Intake Canal, Montana, 1996-1998. USDI Bureau of Reclamation Report, Denver, Colorado.

Jaeger, M. E. 2004. An empirical assessment of factors precluding recovery of sauger in the lower Yellowstone River: movement, habitat use, exploitation and entrainment. Master's thesis. Montana State University, Bozeman.

Jaeger, M. E. 2005. Southeast Montana warmwater streams investigations. Montana Department of Fish, Wildlife and Parks Report F-78-R-5, Helena.

Jaeger, M. E., and M. A. Nelson, G. Jordan, S. Camp. 2006. Assessment of the Yellowstone River for pallid sturgeon restoration efforts annual report for 2005. Pages 85-95 *in* Upper Basin Pallid Sturgeon Recovery Workgroup 2005 Annual Report. Upper Basin Workgroup, U.S. Fish and Wildlife Service, Bozeman, MT.

Jaeger, M. E., and T. Watson, M. A. Nelson, G. Jordan, S. Camp. 2007. Assessment of the Yellowstone River for pallid sturgeon restoration efforts annual report for 2006. Pages 27-44 *in* Upper Basin Pallid Sturgeon Recovery Workgroup 2006 Annual Report. Upper Basin Workgroup, U.S. Fish and Wildlife Service, Bozeman, MT.

Jaeger, M. E., and T. Watson, A. Ankrum, M. A. Nelson, J. Rotella, G. Jordan, S. Camp. 2008. Assessment of pallid sturgeon restoration efforts in the Yellowstone River annual report for 2007. Upper Basin Pallid Sturgeon Recovery Workgroup 2007 Annual Report. Upper Basin Workgroup, U.S. Fish and Wildlife Service, Bozeman, MT.

Kynard, B., E. Henyey., and M. Horgan. 2002. Ontogenetic behavior, migration, and Social behavior of pallid sturgeon , Scaphirhynchus albus, and shovelnose sturgeon, S. platorynchus, with notes on the adaptive significance of body color. Environmental Biology of Fishes 63:389-403.

Kynard, B., E. Parker, D. Pugh, and T. Parker. 2007. Use of laboratory studies to develop a dispersal model for Missouri River pallid sturgeon early life intervals. Journal of Applied Ichthyology 23:365-374.

NWSRI. 2007. Nechako White Sturgeon Recovery Initiative 2007-2008 Annual Report. Prince George, BC.

Upper Basin Pallid Sturgeon Recovery Workgroup. 2008. A 10-Year strategy for recovery of pallid sturgeon in the Upper Missouri River Basin. http://www.fws.gov/filedownloads/ftp_region6_upload/George%20Jordan/Pallid%20Sturgeon/Pallid%20Sturgeon%20Basin%20Workgroup%20Minutes%20and%20Reports/Upper%20Basin%20Workgroup/2007%20UPPER%20BASIN/DRAFT%2010%20Year%20Strategy/. Accessed 02-24-2009.

U.S. Fish and Wildlife Service. 1993. Pallid Sturgeon Recovery Plan. Bismarck ND.

U.S. Fish and Wildlife Service. 2000. Biological Opinion on the operation of the Missouri River main stem reservoir system, operation and maintenance of the Missouri River bank stabilization and navigation project, and operation of the Kansas River system. Denver CO and Ft. Snelling, MN.

U.S. Fish and Wildlife Service. 2003. Amendment to the 2000 Biological Opinion on the operation of the Missouri River mainstem reservoir system, operation and maintenance of the Missouri River bank stabilization and navigation project, and operation of the Kansas River system. Denver CO and Ft. Snelling, MN.

U.S. Fish and Wildlife Service. 2007. Pallid Sturgeon *(Scaphirhynchus albus)* 5-Year Review Summary and Evaluation. Pallid Sturgeon Recovery Coordinator, Billings, MT.

White, R. G., and R. G. Bramblett. 1993. The Yellowstone River: its fish and fisheries. Pages 396-414 *in* L. W. Hesse, C. B. Stalnaker, N. G. Benson, J. R. Zuboy, editors. Restoration planning for the rivers of the Mississippi River ecosystem. Biological Report 19, National Biological Survey, Washington, D.C.