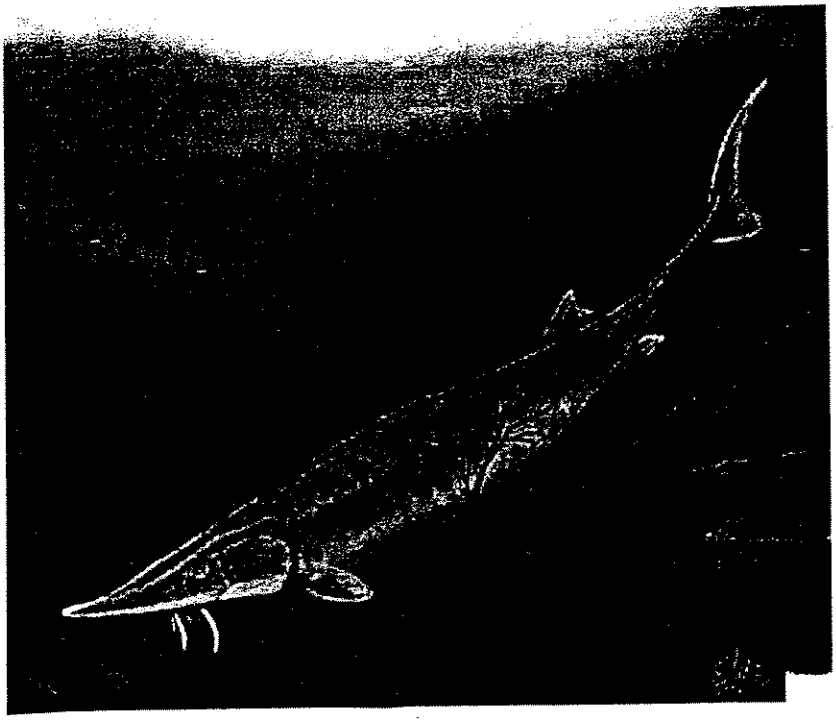
2001 Summary Report of Work Conducted by the Missouri River FWMAO on Missouri-Yellowstone River's Pallid Sturgeon



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Study Area

Sampling for pallid sturgeons was primarily conducted on the first 20 miles of the Yellowstone River upstream form it's confluence with the Missouri River and the Missouri River from the confluence with the Yellowstone River downstream to Highway 85 Bridge near Williston, North Dakota. The primary purpose for collecting pallid sturgeon for 2001 was for propagation purposes.

Methods

This office's previous years reports outline methodology and techniques used for capturing pallid sturgeon.

This year began a multi-year study of the post-spawn adult's pallid sturgeon behavior. Following the spawning of the adults in 2000, ten of the adult pallid sturgeon were implanted with a combination tag that included radio and sonic transmitters. Table 1 includes pertinent information on each of the fish tagged for this project. These fish were returned to the wild in October 2000 and initially relocated during the first weeks after release. During the spring of 2001, stationary logging stations were established at three locations to aid in the tracking of adult pallid sturgeon and help determine movements in and around the confluence of the Yellowstone River. These stations were located just upstream from the mouth in the Yellowstone River, near Fort Union on the Missouri River upstream of the Yellowstone River confluence, and downstream on the Missouri River near Erickson Island (Figure 1). In addition to the adult spawners from 2000, the five broodstock used at Miles City State Fish Hatchery during the spring of 2001 were also tagged and released.

Due to the iridovirus concerns that have surfaced over the last couple of years with the pallid sturgeon propagation program, the Upper Basin Pallid Sturgeon Recovery Workgroup strategized to develop conclusive evidence of the existence of this virus in the wild populations. This was determined to be a vital next step in providing the necessary information to prevent the introduction of the pathogen into previously unoccupied habitat where it could have serious implications to fish populations not previously exposed as well as move the pallid sturgeon recovery program forward. It was decided to spawn and hold the pallid sturgeon progeny within each watershed of origin as well as spawn and rear shovelnose sturgeon for the continuation of virus research through stress tests to express the pathogen. Stress has been found to be a contributing factor in the severity and expression of the iridovirus. This strategy would also allow for the augmentation program to continue since the fish have never left the watershed or state boundaries. It would preclude the complications of bringing carrier fish across state lines.

Results

Most of the field work this past year was directed toward the tracking of telemetered broodstock pallid sturgeon and the capture of broodstock pallid sturgeon for propagation efforts. Crews from Montana Department of Fish, Wildlife and Parks, North Dakota Game and Fish Department and the U.S. Fish and Wildlife Service collaborated on these efforts. Broodstock sturgeon not suitable for spawning were released or returned to the confluence region.

PIT Tag Number	Name	Code	Sex
115525534A	ALEX	34	M
115631222A	BART	14	M
115713555A	AMBER	62	F
1F47715752	ANNIE	25	F
1F477B3A65	AARON	38	M
1F4849755B	ART	18	M
1F4A004552	AL	22	M
1F4A111C6A	BEN	144	M
1F4A143350	ANDREW	50	M
1F4A27214F	BUTCH	2	M
1F4A33194B	ARCHIE	46	M
2202236E31	ARNIE	44	M
220E345E09	BRIDGET	10	F
7F7B081579	ANDRE	26	M
7F7D3C5708	BOB	116	M

Table 1. Telemetered pallid sturgeon released in 2000 and 2001 at the Yellowstone River Confluence area. Pit tag number, name, frequency code and sex are listed. Names that start with the letter "A" were released in 2000 and the names that begin with the letter "B" were released in 2001.

Using the pallid sturgeon data available for this recovery area from the basin-wide pallid sturgeon database, average fork length and relative weights were calculated over the last 11 years of sampling effort (Figure 2). Length frequency was also evaluated for the Missouri/Yellowstone River population as well(Figure 3). This analysis includes information from recaptured fish. Effort rates and catch rates were calculated for the last four years of capture efforts using the modified trammel nets(Table 2). A more complete analysis of the population from data derived from the database will be compiled in Appendix B.

Table 3 lists the 22 fish that were sampled during the month of April. The fish were captured as a the result of a cooperative effort by Montana Fish, Wildlife and Parks and U.S. Fish and Wildlife Service. The main purpose for this work was to capture broodstock pallid sturgeon that would be ready to spawn. Results of those spawning efforts will be reported in other reports.

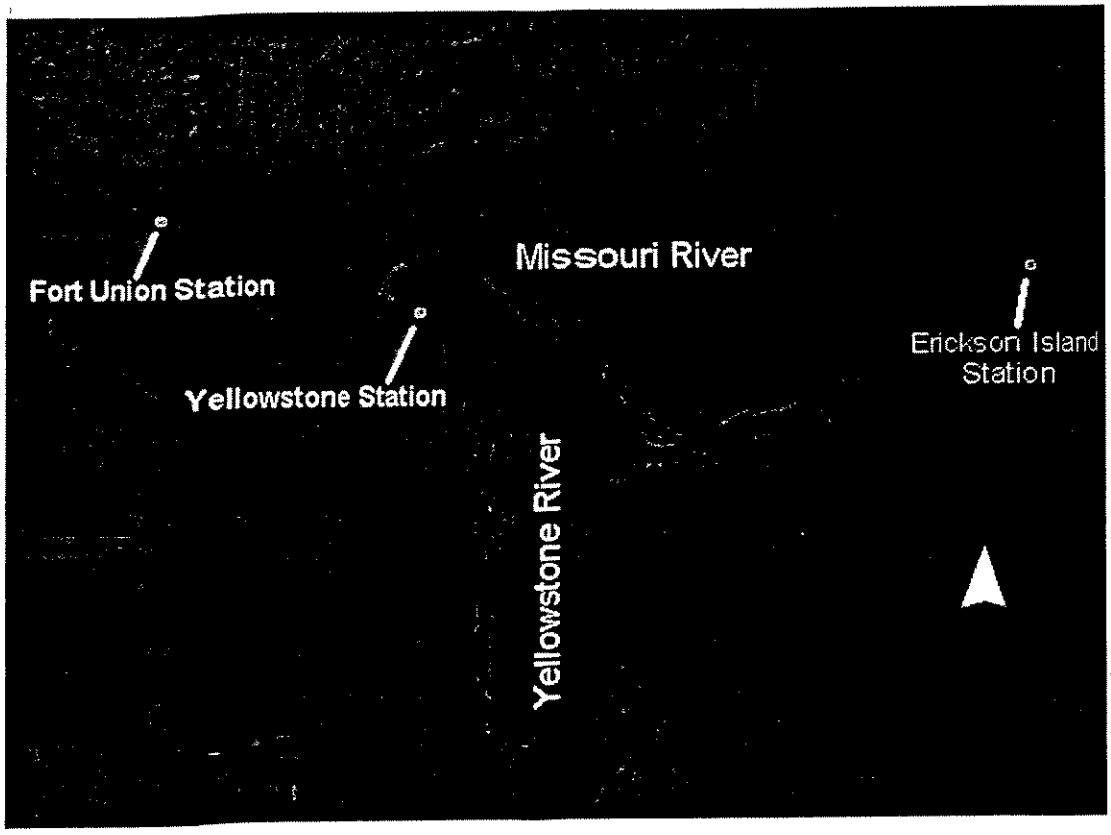

Figure 1. Telemetry logging stations and capture locations for pallid sturgeon project in 2001.

Discussion

During 1999 thru 2001, 48 pallid sturgeon were captured within a one mile section of the river near the confluence of the Yellowstone River over a short time period prior to spring runoff (Figure 1). There is an indication that this area is either very important for the pallid sturgeon or very conducive to sampling efforts. Since the areas substrate and habitat changes frequently, it is likely that confluence areas may hold some kind of significance for pre-spawn pallid sturgeon. The current study will hopefully detail some of these movements and identify areas that tend to hold pallid sturgeon.

Although catch rates were calculated, this is not a random sampling and productive habitats are targeted and caution should be used for any analysis of relative abundance. However, it does show a trend that capture techniques have become more effective during certain times of the year. Anecdotal information does suggest that flow rates and movements of the fish play a significant role in the success of netting efforts.

Pallid sturgeon effort and catch rates from 1998 through 2001.				
	1998(spring)	**1999(spring)**	**2000(spring)**	**2001(spring)**
Catch by amount of time drifting	1 pls/96 minutes	1 pls/ 147 minutes	1 pls/ 36 minutes	1 pls/ 52 minutes
Catch by # drifts	1 pls/39 drifts	1 pls/17.5 drifts	1 pls/4.8 drifts	1 pls/7.6 drifts
Average drift time	7:02 minutes	8:25 minutes	7:34 minutes	6:50 minutes
Number of pallids captured	4	4	9	7
# of drifts	157	70	43	53
Total amount of time drifting nets	6:25:24	9:49:41	5:25:05	6:02:25
CPUE	.62 pls/1 hour drifting	.41 pls/1 hour drifting	1.66 pls/1 hour drifting	1.16 pls/ 1 hour drifting

Table 2. Calculated effort and catch rates for pallid sturgeon captured by this office from 1998 through 2001.

Average length and relative weights have remained fairly constant over that past eight years (Figure 2). The data from 1992 is likely the direct result of the low sample size and sampling differences. Relative weights have ranged from 83 to 115 with an average of 100. This is indicative that the pallid population is generally in good condition. Although there does appear to be some variation over the years, this is likely the result of differences in gonadal development. A significant decline would likely indicate a severe change in environmental conditions and would warrant further investigation.

Length frequencies were calculated for adult pallid sturgeon captured from 1990 through 2001 (Figure 3). Length frequency classes were broken down into 50 millimeter length groups and the percent of fish per length group were calculated for ease in comparison. Occasionally, a smaller pallid sturgeon is sampled, 1050 to 1200 millimeters, however, these are rare. In the case of one fish sampled in 2000 and 2001, these fish were later identified as a potential hybrids based on morphological data applied to the index developed by Dryer and Krentz (1996,2000). Recruitment is totally lacking from this sub-population with the exception of the stocked fish from 1998 and 2000. These fish have been re-sampled by Montana Fish, Wildlife and Parks and anglers from 1998 through 2001.

The number of recaptures has remained fairly constant over the last three years with about half of the fish being recaptures. This year's sampling resulted in a recapture rate of 45 percent for 22 fish captured by Montana Fish, Wildlife and Parks and U.S. Fish and Wildlife Service in April. Tagging operations have taken place with these populations since 1988 with about 60 adult pallid sturgeon being tagged in the Recovery Priority Area (RPA)(above Fort Peck Reservoir) and over 213 adults being tagged in RPA 2 (Yellowstone River Confluence area). At this time, we are assuming that tag loss and mortality is negligible. However, mortality will certainly become more of an issue in the next few years as the population senescence. Mortality rates for this population have been estimated using longevity (Hoening, 1983). Given a maximum age of 50 to 60 years, average annual mortality rates are calculated at 7.6 to 8.2 percent. It is highly likely that this group of fish are the last survivors from the last years of successful recruitment, and that as they approach maximum age, mortality will increase.

As part of a project funded by the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Western Area Power Administration, and Upper Basin Pallid Sturgeon Recovery Workgroup, ten post spawn pallid sturgeon were implanted with radio/sonic transmitters in 2000. This project will utilize post spawn pallid sturgeon and long term (>3 years) transmitters to identify post and pre spawn behavior of pallid sturgeon. It is anticipated that utilizing their known sex, spawning date and movement patterns it will be possible to extrapolate potential habitats used for spawning. It is planned that approximately ten adults would be implanted each year for at least the next three years. However, this will be dependant on the number of adults available for spawning. Tracking will be accomplished with remote data logging stations as well as on the ground telemetry. Preliminary results from this project will be reported in a separate report.

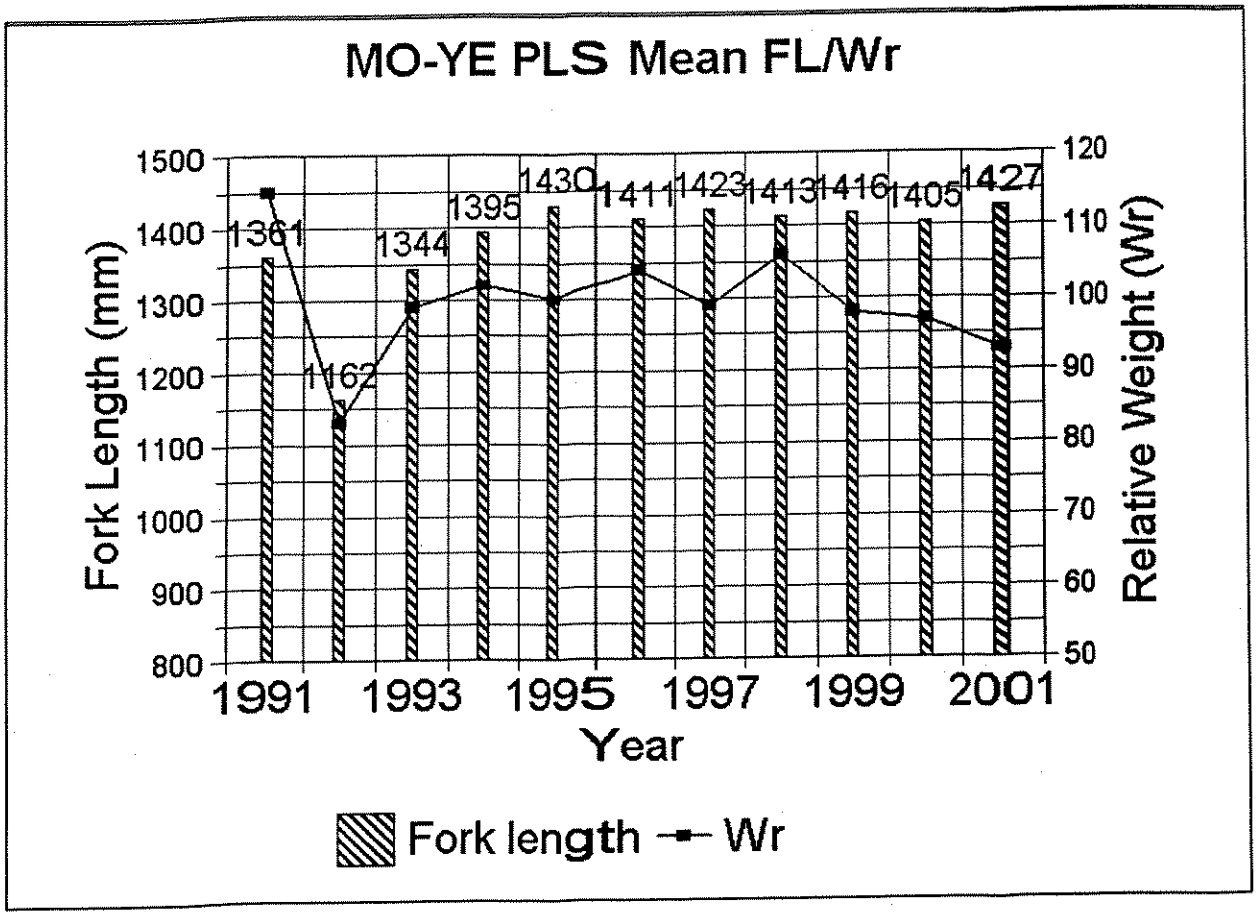

Figure 2. Average fork length and relative weight (Wr) for pallid sturgeon captured in RPA #2 in western North Dakota and eastern Montana from 1991 through 2000.

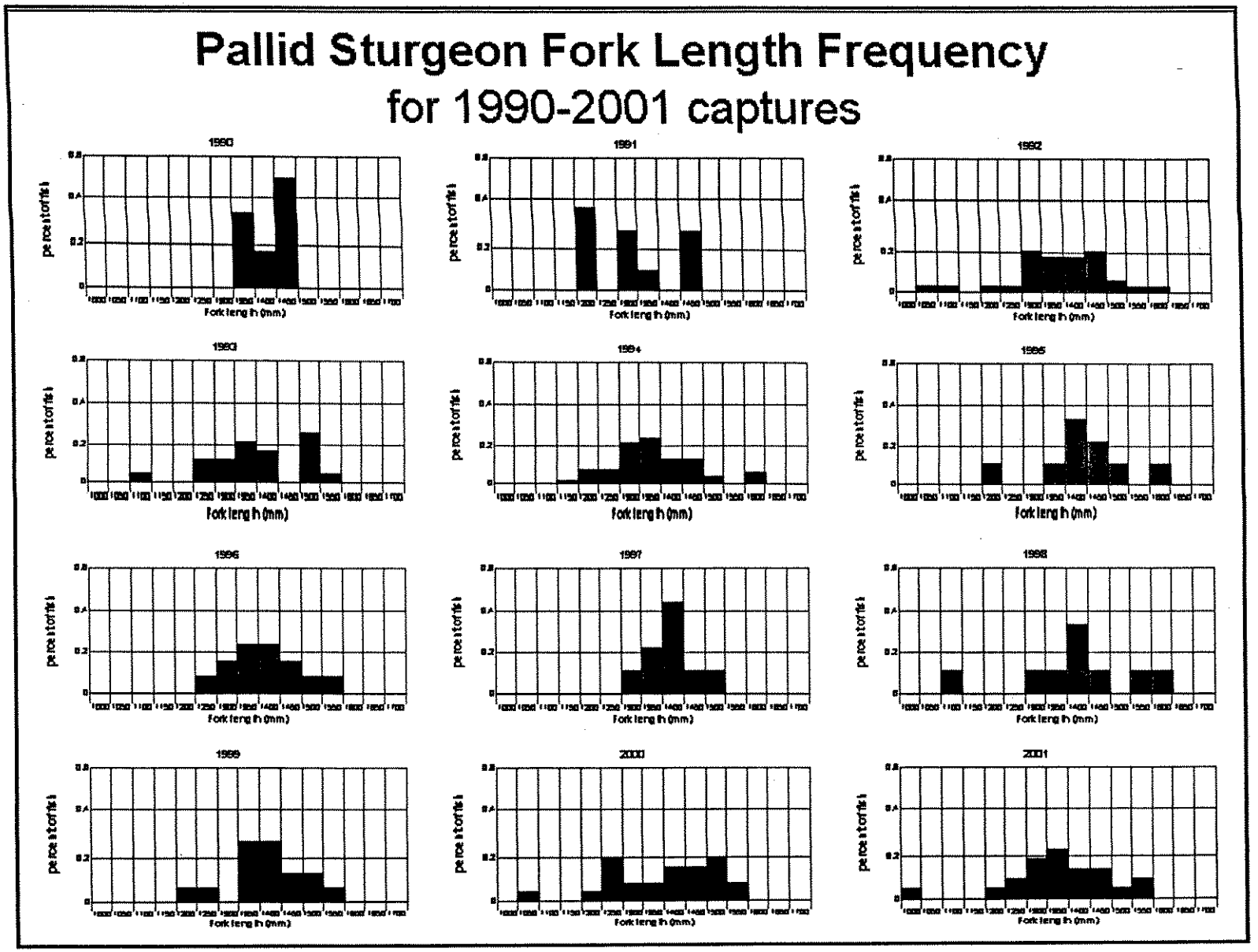

Figure 3. Fork length frequency for pallid sturgeon from RPA #2 in western North Dakota and eastern Montana from 1990 through 2001.

PIT tag #	Date of Capture	Location of capture: River & Rivermile (RM)	Sex	Fork Length	Weight	Years Previously Sampled	Field Crew
115529097A	04/25/2001	Mo/Ye Confluence 1581.5	U	1356	14857		MTFWP
115544332A	04/24/2001	Mo/Ye Confluence 1581.5	F	1610	25600		USFWS
115631222A[B]	04/24/2001	Mo/Ye Confluence 1581.5	M	1340	13257		USFWS
115669540A	04/25/2001	Mo/Ye Confluence 1581.5	U	1330	13257		USFWS
115676635A	04/25/2001	Mo/Ye Confluence 1581.5	F	1550	25142		USFWS
115679374A	04/25/2001	Mo/Ye Confluence 1581.5	U	1420	17828		MTFWP
1F477B4E51[A]	05/09/2001	Yellowstone River - 6.8	M	1533	21744	1997, 1999	MTFWP
1F482F3F2B[A]	04/25/2001	Mo/Ye Confluence 1581.5	U	1365	13257	1999	MTFWP
1F4A111C6A[AB]	04/24/2001	Mo/Ye Confluence 1581.5	M	1405	13714	1999	MTFWP
1F4A27214F[AB]	04/26/2001	Mo/Ye Confluence 1581.5	F	1541	22857	1999, 2000	MTFWP
1F4A363031[A]	04/25/2001	Mo/Ye Confluence 1581.5	M	1448	17828	1998, 1999	MTFWP
1F4B225A1A[A]	04/24/2001	Mo/Ye Confluence 1581.5	U	1395	14171	1998, 2000	USFWS
220E345E09[B]	04/24/2001	Mo/Ye Confluence 1581.5	F	1615	27971		MTFWP
220E587576	04/25/2001	Mo/Ye Confluence 1581.5	U	1092	5350		MTFWP
220E5F4928	04/26/2001	Mo/Ye Confluence 1581.5	U	1465	18742		MTFWP
220F0F7677	05/09/2001	Yellowstone River - 6.8	U	1500	15855		MTFWP
220F107A6F	04/25/2001	Mo/Ye Confluence 1581.5	M	1455	16914		MTFWP

PIT tag #	Date of Capture	Location of capture: River & Rivermile (RM)	Sex	Fork Length	Weight	Years Previously Sampled	Field Crew
2224076523	05/09/2001	Yellowstone River - 5.3	U	1424	15402		MTFWP
7F7B026102[A]	05/09/2001	Yellowstone River - 6.8	U	1473	19932	1992	MTFWP
7F7D3C5708[AB]	04/26/2001	Mo/Ye Confluence 1581.5	M	1394	19657	1992	MTFWP
7F7D7C2447[A]	05/09/2001	Yellowstone River - 6.8	U	1254	9966	1994	MTFWP
7F7F06672B[AB]	04/24/2001	Mo/Ye Confluence 1581.5	F	1435	21942	1992	USFWS

[A] indicates recapture

[B] indicates that this fish was used for spawning during 2001

Future Recommendations

- Modify stocking strategy to incorporate a two prong approach to augmenting existing populations or develop methodology to stock fish as early as possible and maintain survival.

  Begin stocking of hatching eggs or fry initially, holding sufficient eggs for rearing to fingerling to one year old. This strategy would allow fish to be stocked when potential imprinting processes are taking place and would remove excess fish from culture facilities early in the process, thus eliminating the need to euthanize excess fish not needed for recovery purposes. The stocking of advanced fingerling progeny has been shown to have survival and recruitment success, so should be considered for continuation.

- Concentrate collection of broodstock during the fall prior to spawning, using spring captures only when necessary.

  Using this procedure increases our likelihood of having a successful propagation and reduces the amount of stress to the fish. Research and results to date would suggest that holding these adult fish over winter prior to spawning decreases the amount of stress during the spawning and does not have an adverse affect to propagation efforts.

- Continue augmentation program of pallid sturgeon and intensify monitoring of juvenile pallid sturgeon populations in their habitats.

- Ensure that all facilities that hold pallid sturgeon have adequate capability to keep densities low enough and conditions favorable for culturing pallid sturgeon to decrease likelihood of diseases and stress.

- Investigate the impacts to larval sturgeon survival of downstream riverine habitats.

  It is suspected that successful reproduction is occurring, however, lack of recruitment could be one of the main limiting factors of the pallid sturgeon population.

- Develop/utilize facilities to retain a secondary source of pallid sturgeon progeny as a backup source for stocking purposes.

  Culturing the pallid sturgeon progeny at one facility, could allow a catastrophic event to eliminate that year's work. The main goal would be to culture excess pallid sturgeon at a second facility that would serve as a reservoir in the event that the primary source of pallid sturgeon broodstock would be lost or unsuitable for stocking purposes.

- Continue to improve sampling efficiency of juvenile sturgeon.

- Continue to increase efforts to develop fish by-pass on low-head dams on Yellowstone River and the tributaries to allow fish passage by pallid sturgeon to utilize the middle Yellowstone

River for spawning purposes, as well, modify water intakes to reduce potential impacts by entrainment.

- Evaluate streamside modifications (rip-rap, weirs) and the impacts they may have on various in-channel habitats, especially shallow sandbar habitats.

Literature Cited

Hoening, J.M. 1983. Fishery Bulletin: Vol. 82, No. 1, pp 898-902.

Krentz, Steven and Mark Dryer. Character Index for Pallid Sturgeon and Shovelnose Sturgeon. Bismarck, ND:US Fish and Wildlife Service. 1:96:1-4, 1996 (Updated, 2000).