PERFORMANCE REPORT

STATE: **MONTANA**

GRANT TITLE: **MONTANA ENDANGERED FISHES PROGRAM**
GRANT NUMBER: **E-7-9**

LOCATION: **MISSOURI RIVER, MONTANA**

PERIOD COVERED: **July 1, 2002 through June 30, 2003**

PROJECT PERSONNEL:
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OBJECTIVE:

1. **To determine habitat preference, movements, abundance, feeding and growth of wild pallid sturgeon in Recovery Management Area 1.**

2. **Conduct annual adult pallid sturgeon standardized netting to develop a baseline for future comparisons.**

3. **To assist with with collection of adult spawners for use in hatchery propagation efforts.**

4. **To assist with the release of hatchery-reared pallids and evaluate survival and recruitment over the years.**

5. **To coordinate and implement recovery efforts in conjunction with North Dakota, South Dakota, and the U.S. Fish and Wildlife Service.**

COSTS: **A total of $?????? in federal and state funds were expended on this project.**

RESULTS:

A total of 732 hatchery-reared (HRJ) yearling pallids (1997 year class) were released into RPMA-1 during the summer, 1998. The pallid sturgeon augmentation plan called for annual stocking of juvenile pallids for 6 consecutive years, at which time the plan will be evaluated based on its effectiveness. Finally, after 3 years of no stocking, a second pallid sturgeon release was accomplished in 2002. A total of 2,063 yearling pallids (2001 year class) were stocked at 4 locations in the study area during the summer, 2002. This report deals with evaluating the success of these re-introductions and results of the pallid sturgeon effort during 2003.

It is important to evaluate the success of the pallid sturgeon augmentation program so that problems can be resolved early on in the program. Stocking densities, age of stocked fish, acclimation and growth of

stocked fish, and location of release sites are all important aspects for evaluating survival and ultimately recruitment of the released HRJ pallid sturgeon.
The study area is a 168-mile reach of the Missouri River immediately upstream of Fort Peck Reservoir (Figure 1). Drift netting, setlining and angling were used to sample the HRJ pallids. Additionally, trawl sampling was conducted in the study area for assessing wild pallid and shovelnose sturgeon reproduction.

A total of 6 adult pallids, 24 HRJ 1997-year class pallid sturgeon (PLS-97) and 5 HRJ 2001-year class pallid sturgeon (PLS-01) were captured; 12 by netting, 4 by trawling, 2 by setlines and 17 by angling (Table 1). Table 2 is a list of the individual records for each pallid sturgeon. All of the pallid sturgeon were captured in the Robinson Bridge Section (RM 1902 - 1921), although sampling occurred throughout the entire study area.

Table 1. Effort by sampling method and number of pallid sturgeon captured in the Upper Missouri River Study Area, MT, during 2002-03.

	Effort	Adults	Juvenile-97	Juvenile-01	Total
Trammel net -	161 drifts	1	4	1	6
Spawning nets -	214 drifts	4	0	0	4
Trawl -	93 tows	0	0	4	4
Setlines -	25 sets	0	2	0	2
Angling -	---	0	17	0	17
		5	**23**	**5**	**33**

Juvenile pallid sturgeon netting survey:

Attempts were made to capture the HRJ pallid sturgeon by drifting small mesh trammel nets. A total of 1 adult, 4 PLS-97 and 1 PLS-01 pallids were captured by drift netting. Four of the 6 pallids were captured in channel cross-over habitat areas at depths of less than 6 ft. Additionally, a total of 1,056 fish, representing 17 species, were sampled while netting throughout the study area (Table 3). Shovelnose sturgeon (SNS), sauger, shorthead redhorse and goldeye dominated the catch comprising 44, 10, 9 and 7 percent of the fish sampled, respectively.

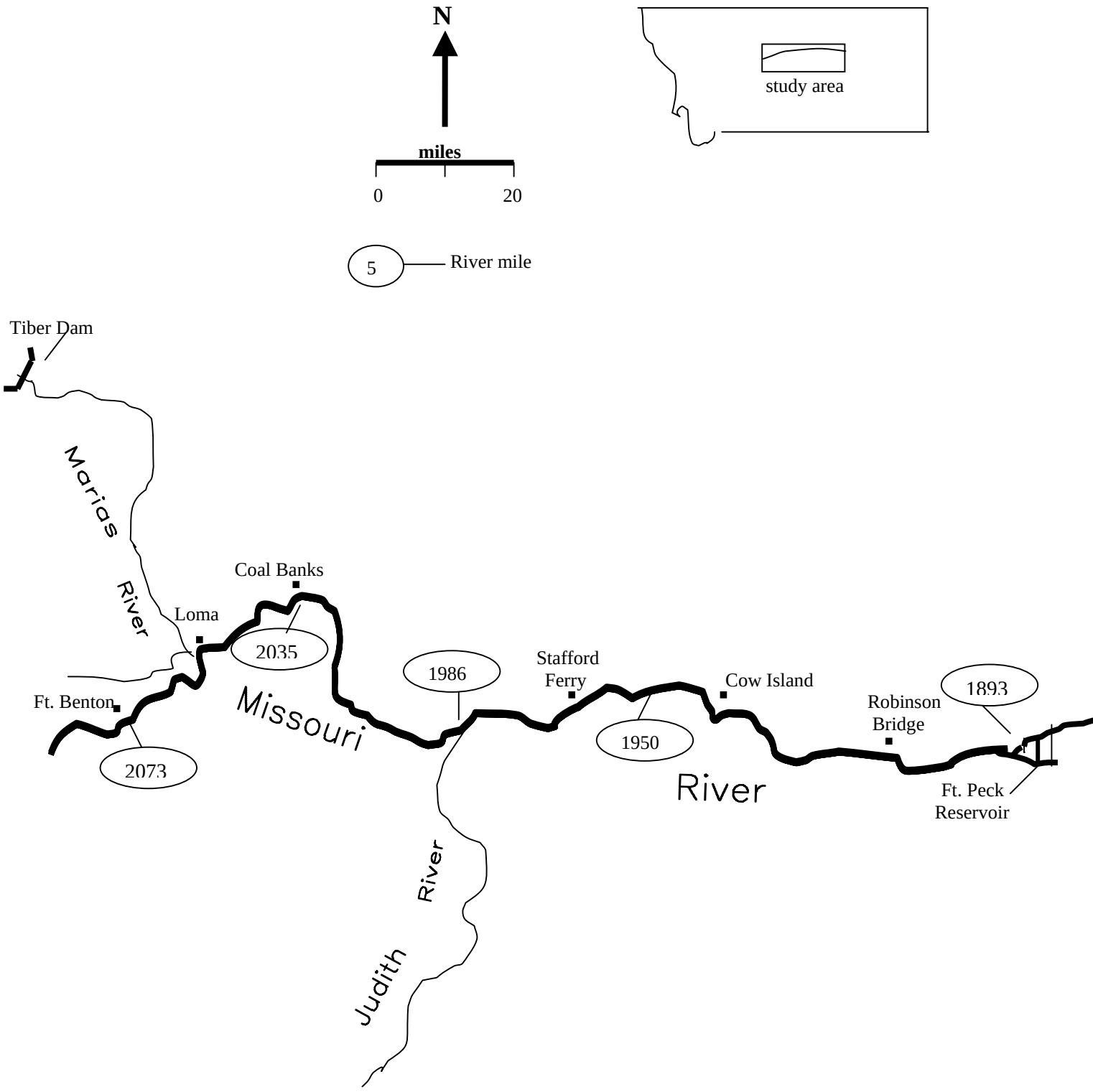

Figure 1. Map of study area

Table 2. A list of hatchery-reared pallid sturgeon captured in the Upper Missouri River, MT, 2002-03.

#	PIT Number	Color	Recap date	Recap Rivermile	Release Rivermile	Recap Meth.	FL (in)	TL (lb)
1	414D675574	Green	8/20/02	1921.2	2051.2	Hk & Line	18.8	0.75
2	411D0A3152	Yellow	8/23/02	1915.8	Lost PIT	Hk & Line	20.1	0.93
3	414D58501E	Red	8/23/02	1921.2	2051.2	Hk & Line	20.6	1.11
4	4359544666	Grn/Bl	8/26/02	1904.5	1920.6	Trawl	10.5	
5	434D707260	Pnk/Bl	8/26/02	1904.5	1920.6	Trawl	11.6	
6	435E311B3F	Brn/Bl	8/26/02	1903.0	1920.6	Trawl	9.6	
7	435F205A79	Brn/Bl	8/26/02	1903.0	1920.6	Trawl	9.8	
8	411D094840	Green	8/27/02	1918.2	Lost PIT	Hk & Line	17.5	0.61
9	411D175D57	Yellow	8/27/02	1901.5	Lost PIT	Hk & Line	18.2	0.66
10	414D44475A	Orange	8/28/02	1920.5	1984.3	Hk & Line	18.2	0.75
11	414D610D5E	Red	9/24/02	1916.4	1984.3	Trammel	20.9	1.1
12	435D141E1A	Purp/Bl	9/24/02	1916.4	1920.6	Trammel	12.0	
13	G-01433	Wild	9/24/02	1916.2	1909	Trammel	50.3	29.5
14	411D2E771E	Yellow	9/25/02	1911.0	Lost PIT	Trammel	19.2	0.78
15	414D45357E	Red	4/08/03	1915.5	1921.2	Set line	20.3	0.92
16	414D54266F	Red	4/09/03	1905.6	1921.2	Trammel	20.7	1.00
17	4526652B17	Green	4/09/03	1917.2	Lost PIT	Set line	19.3	1.28
18	45292A661D	Yellow	4/09/03	1901.0	Lost PIT	Hk & line	19.4	1.11
19	414D3A5536	Green	4/09/03	1917.8	2051.2	Hk & line	17.3	0.65
20	41095B0556	Yellow	4/09/03	1902.7	2051.2	Hk & line	19.7	0.87
21	414D3A365B	Orange	4/10/03	1912.7	1984.3	Hk & line	18.1	0.75
22	414D54611B	Orange	5/29/03	1917.1	1921.2	Hk & line	19.9	0.92
23	45294F0A55	Yellow	5/30/03	1921.0	Lost PIT	Trammel	19.4	0.80
24	414D621E44	Green	6/05/03	1913.2	1984.3	Hk & line	20.2	1.10
25	45252B7F44	Green	6/05/03	1913.2	New PIT	Hk & line	19.8	0.91

Table 2. Continued.

#	PIT Number	Color	Recap date	Recap Rivermile	Release Rivermile	Recap Meth.	FL (in)	TL (lb)
26	414D6010C69	Blue	6/09/03	1915.7	1984.3	Hk & line	22.2	1.24
27	414D490E09	Green	6/10/03	1907.0	1921.2	Hk & line	19.3	0.95
28	414D556218	Orange	6/18/03	1915.6	1984.3	Hk & line	21.8	1.24
29	452A3D6110	Green	6/18/03	1915.6	Lost PIT	Hk & line	22.0	1.4
30	452A4E1F15	Wild	5/28/03	1916.0	New fish	Spawn net	50.4	33.0
31	452738076E	Wild	6/06/03	1916.3	New fish	Spawn net	57.0	37.4
32	411D0E2C5F	Wild	6/09/03	1916.0	1916	Spawn net	56.0	36.0
33	1F4A4B5973	Wild	6/13/03	1916.0	1916.0	Spawn net	49.5	28.0

Table 3. Average catch rates (no./drift) of fish sampled while drifting trammel nets in the Upper Missouri River, MT, April-October, 2002-03.

	Ft. Benton	Loma	Judith L.	Robinson	Total #
Bigmouth Buffalo				tr	1
Blue sucker			0.1	tr	3
Carp		0.2	0.1	0.2	27
Channel catfish		0.1		0.1	8
Flathead chub				tr	2
Freshwater drum		0.1		tr	4
Goldeye	6.0	2.4	0.4	0.3	71
Longnose sucker	3.0	0.4	0.6	tr	12
Northern pike				tr	1
Paddlefish				0.1	16
Pallid sturgeon				0.1	6
River carpsucker		0.4		0.5	49
Sauger		0.7	0.3	0.9	108
Shorthead redhorse	3.0	1.9	1.5	0.5	91
Shovelnose sturgeon	19.0	17.2	1.5	2.2	468
Smallmouth buffalo			0.2	0.2	21
Walleye				0.2	19
Total # fish	29	234	79	714	1,056
Total # drifts	1	10	14	136	161
Average depth (ft.)	4.5	5.6	6.6	5.4	
Average distance (yd.)	350	282	146	233	
Avg. duration (min.)	7	6.1	6.8	6.6	

Benthic trawling:

The main purpose for trawling was to evaluate pallid and shovelnose sturgeon spawning success. A total of 299 fish, representing 14 species, were sampled while trawling during August in the Judith Landing and Robinson Bridge sections (Table 4). The average physical conditions measured for the 93 tows were: Column water velocity = 2.2fps (1.3-2.8); Depth = 7.6ft (3-18); Channel location/macro-habitat = 55% channel cross-over area (CHXO), 20% inside bend area (ISB), 18% outside bend area (OSB), 1% side channel-connected (SCC), and 6% at tributary mouth (TRM). Most of the trawling occurred in the lower 36 miles of the study area between RM-1921 and RM-1885 where it is thought most of the age-0 SNS usually reside. Sicklefin chub, stonecat, channel catfish and sturgeon chub dominated the catch comprising 37, 21, 17 and 10 percent of the fish sampled, respectively.

Four hatchery reared PLS-01 were sampled trawling, all caught in deep water areas (>9 ft). Based on PIT tag numbers, these pallids were originally stocked in the general vicinity, one month prior to the date of capture. It appears that trawling is fairly effective for sampling hatchery reared yearling pallids. Only 1 age-0 SNS were sampled this year compared to 2 in 2001 (Gardner 2002). During the first year of intensive trawling (1995) a total of 28 age-0 SNS were sampled in about 100 tows (Gardner 1996) indicating this method was effective at sampling age-0 SNS when they are more numerous. Based on the low catches of age-0 SNS this year and previous years, it appears there has been poor SNS spawning success at least during the past 3 years.

Other sampling methods:

Setline fishing and angling enables us to effectively sample difficult places to net that could be important habitat areas for juvenile pallid sturgeon. Setlining is a more passive sampling technique than angling and easier to standardized, so that a fairly unbiased measure of abundance can be applied for this method. Only a minor effort, using these techniques, were initiated in 2003 because the main purpose was to evaluate the effectiveness of these unconventional methods. The setline sampling effort was light, consisting of only 25 sets over five days, however, two HR PLS-97 were captured (Table 5). Additionally, a total of 64 fish, comprised of nine other species were sampled using the set lines.

Angling was the most productive method used for capturing pallid sturgeon, particularly the PLS-97 group. Seventeen hatchery PLS-97, comprising about 50% of all pallids caught during this one-year period, were sampled while angling for approximately 100 angler hours spread out over 25 days (Table 1). Circle hooks, size 2 and 4 were used for both angling and setlines instead of the more common "J"-type hook, to prevent the pallids from swallowing the hook.

Fall pallid sturgeon standardized baseline survey:

A total of 4 pallid sturgeon were sampled while conducting the fall survey in the 16-mile Robinson Bridge trend area (Table 6). The one adult, wild, pallid sturgeon that was netted was initially captured in 1991 and subsequently captured 2 more times over the years. Three juvenile hatchery pallids, 2 PLS-97 and 1PLS-01 were also netted during the survey. This baseline survey has been completed 5 times since 1996; Table 6 summarizes these survey results.

Table 4. Average catch rates (average number/tow) of fish sampled by trawling in the Middle Missouri River, MT, 2002.

	Judith L.	Robinson	Total #
Brook stickleback		tr	1
Burbot y		tr	2
Channel catfish		tr	4
Channel catfish y		0.5	46
Flathead chub	1.0	0.1	12
Flathead chub y		0.1	9
Goldeye y		tr	1
Hybognathus spp		0.1	10
Longnose dace	0.2		3
Longnose sucker y		tr	1
Pallid sturgeon		tr	4
Shorthead redhorse y		tr	2
Shovelnose sturgeon y		tr	1
Sicklefin chub	0.7	1.2	110
Stonecat		0.3	40
Stonecat y	1.0	0.1	23
Sturgeon chub		0.2	17
Sturgeon chub y		0.1	13
# Tows	12	81	93
Avg. Depth (ft)	5.1	7.9	7.6
Avg. Col. Velocity (fps)	2.2	2.2	2.2
Macro-habitat type (%)			
CHXO	33	58	
ISB	8	22	
OSB	8	19	
SCC	8		
TRM	42		

Y = age-0 fish

Table 5. Average catch rates (average number/set) of fish sampled by set lines in the Middle Missouri River, MT, 2003.

	- C. P. U. E. - Judith L.	Robinson	Total # Fish
Carp	0.1	0.1	2
Channel catfish	0.6	0.1	6
Flathead chub	0.6	0.6	15
Goldeye	0.9	1.1	26
Pallid sturgeon		0.1	2
Sauger	0.3	0.1	4
Shorthead redhorse	0.4	0.2	6
Shovelnose		0.1	1
Stonecat	0.1	0.1	2
Walleye	0.3		2
Total # Fish	23	43	66
# Sets	7	18	25

Table 6. Sampling statistics recorded for the pallid sturgeon standardized sampling program in the Upper Missouri River, MT, 1996-2002.

	1996	1997	1999	2000	2001	2002
Pallid Strugeon:						
Number sampled	3	1	1	3	4	4
Avg. Wt. (lb)	38.0	40.6	0.33*	0.61*	0.60*	7.90*
Number/drift	0.06	0.02	0.02	0.06	0.08	0.08
Shovelnose Sturgeon:						
Number sampled	225	131	153	392	274	128
Avg Wt. (lb)	3.15	3.17	3.30	3.42	3.40	3.70
Number/drift	4.5	2.6	3.1	7.8	5.5	2.6
Average drift duration (min)	6.3	6.5	6.7	7.1	7.2	7.0
Average drift distance (yd)	239	294	239	222	281	259
Average depth @ drift site (ft)	7.1	8.3	7.1	6.0	4.7	5.4

Juveniles present in sample

Pallid sturgeon sightings, July1, 2002 to June 30, 2003:

Angler reports of pallid sturgeon sightings were recorded by MSU graduate students, FWP creel clerk, game wardens and the pallid sturgeon crew. All sighting reports were scrutinized for identification and accuracy because of the taxonomic similarities between pallid and the commonly caught shovelnose sturgeon. Only pallid sturgeon sightings that included observations of colored elastomere marks on the ventral rostrum, presence of a transmitter, actual measurements of inner and outer barbel lengths (OBL $\geq$ 2X IBL), body length measurements (TL > 48 inches) or weight (>16 lbs.) were accepted as valid sightings.

Angler reports:

Number caught while snagging for paddlefish = 1 (adult)
Number caught while bait fishing = 0

Pallid crew sampling:

Number caught in 6x10 gillnets	= 4 (adults)
Number caught in trammel nets	= 6 (1 adult, 4 PLS-97, 1 PLS-01)
Number caught by trawling	= 4 (all PLS-01)
Number caught by gill netting	= 2 (all PLS-97; Ft. Peck R)
Number caught by angling	= 17 (all PLS-97)
Number caught by set lines	= 2 (all PLS-97)

Only 1 confirmed angler caught and released pallid was reported this year; this adult was caught while snagging for paddlefish. This spring the usual paddlefish creel was not conducted and is probably a factor for the lower number of sightings by the public. Several pallid sturgeon were observed by fisheries crews this year and probably is the results of more effort, presence of more hatchery pallids and improved sampling efficiencies at catching hatchery pallids.

Propagation assistance:

Preserving a representation of the Upper Missouri River pallid sturgeon gene pool is an important goal for recovery. To that end, a pilot effort was initiated in 2000 to test the feasibility of collecting sperm from wild male pallids in this area and ship the fresh milt to Garrison National Fish Hatchery (GNFH) for use in their pallid sturgeon propagation program and cryopreserve representative sperm samples. Results from the initial effort proved worthwhile and collection of pallid sperm from the wild population was incorporated into my work plan.

River flow conditions during June, 2003 were somewhat normal, with discharges ranging from about 9,000 to 16,000 cfs during June. However, these higher June flows made netting for adult pallid sturgeon considerably more difficult than it had been during the low run-off years. Four males were captured and examined for spawning readiness. A list the pallid sturgeon captured and their sizes and tag numbers are presented in Table 7. All of the male pallids were sexually mature and held in a 16 ft diameter tank for staging. Propagation in the study area did not occur again this year because a female

pallid was not captured. Sperm samples from all the male pallid sturgeon were shipped to GNFH and cryopreserved for use in the future propagation effort.

Table 7. A list of pallid sturgeon spawners captureded during spring 2003, Upper Missouri River, MT.

PIT #	DATE	FL (in)	WT (lb)	Rivermile	Sex	Recap
452A4E1F15	May 28	50.5	33.0	1916.0	M	No
452738076E	June 6	57.0	37.4	1916.3	M	No
1F4A4B5973	June 13	49.5	28.0	1916.0	M	Yes
411D0E2C5F	June 9	56.0	36.0	1916.0	M	Yes

Shovelnose Sturgeon Irido Virus assistance:

The Shovelnose Sturgeon Irido Virus (SSIV) was first discovered in a group of yearling shovelnose sturgeon at Gavins Point National Fish Hatchery during December, 1998. It was unknown where the virus originated, although most investigators suspect it may have originated from wild sturgeon brought into the hatchery. Because of the uncertainty of the virus origin, the viruses virulence and concern for wild sturgeon populations in Montana, FWP suspended all pallid sturgeon stocking (from outside sources) in RMA-1, beginning in 1999, until more information becomes available. This partial suspension of stocking pallid sturgeon in RMA-1, now in its 5th year, has severely limited recovery efforts in the area. Not only has this suspension reduced numbers of pallids released , but also, has reduced the number of families (genetic variability) that can be stocked. RMA-1 is loosing its value as a secondary brood stock reserve. Therefore, it is important to increase our knowledge on SSIV and re-evaluate the stocking restriction in this area relative to SSIV concerns. The USFWS Fish Health Lab, Bozeman, MT, initiated SSIV sampling of wild sturgeon in 1999 and this effort, along with the FWP health biologists, continues to collect samples each year. Tissue samples were collected from 50 shovelnose sturgeon from the Upper Missouri River, during 2003. These samples were fixed in a preservative and sent to the lab for histological analysis. Results from this sampling is still pending, although previous years collections have never tested positive for SSIV.

Evaluation of pallid sturgeon reintroduction and other observations:

The second release of hatchery pallid sturgeon into RMA-1 since the program began in 1998 was completed July 23 and 24, 2002. These pallids were from the local Upper Missouri River stock comprised of 5 families (1 female mated with 5 males). The reason for the 4 year delay between releases was because of SSIV concerns expressed from FWP. A total of 418 pallids were released in the Missouri River at Marias River confluence (RM-2051), 375 at Coal Banks Landing (RM-2031), 375 at Judith Landing (RM-1984) and 895 at Robinson Bridge area (RM-1921); 2,063 in all. The reason for greater numbers released at Robinson was because 476 PLS-01 were designated for research purposes (age validation, radio telemetry and anatomical condition), and therefore, compensate for any effects or losses associated with studying these fish. The PIT tags of the individual pallids were recorded and released at specified release sites so that we could evaluate survival success for a particular release location. The pallids were received in good condition, although a portion had some evidence of pectoral fin deformity as a result of undetermined nutrient/mineral deficiencies in their hatchery diet. The PLS-01 averaged 9.2 inches fork length (range = 6.5 - 16.0) and weighed an average of 0.11 lb (9.0 fish/lb). At the time of release river flow was about 5,000 cfs, slightly below average for this time of year and water temperatures ranged 70 -75 F.

Attempts were made to sample as many juvenile pallids as possible for evaluation of growth, movement patterns, habitat selection and abundance estimates. All release site areas were sampled, although a greater amount of effort was directed in the Robinson Bridge area. A total of 28 hatchery juvenile pallids were captured during the period July1, 2002 and June 30, 2003. Of this total, PIT tags were found in only 68% of the juvenile pallids. Only 5 PLS-01 out of the 2,063 released were subsequently captured; all in the summer/fall, 2002. Based on PIT tag readings, all 5 fish were originally released in the Robinson Bridge area.

Most of the hatchery pallids that were captured were from the PLS-97 group, stocked in 1998. These fish were age-5 during 2002 and age-6 during 2003. All PLS-97 were captured in the Robinson Bridge area although only 29% were initially stocked in the area. Clearly, most of the pallids captured in the Robinson Bridge area were from the upriver release sites; 43% of the PLS-97 originated from Judith Landing and 29% from Marias River Confluence. Past information on the PLS-97 group shows the same trend where 63% of the pallids captured at the Robinson Bridge were originally released at the upriver sites (Gardner 2001 & 2002).

A total of 38 PLS-97's have been captured and measured over the past 6 years. Table 3 shows the average fork length for these pallids, although sample size is generally low. Over the last 2 years the PLS-97 group has been growing at the rate of 1.2 inches per year. There has not been a PLS-97 recaptured for a second time in the past 5 years of sampling, indicating a fairly high density and, therefore, indicating a high survival rate of the PLS-97's in RMA-1. A very rough estimate will be made next year using years 3-5 as the marking run and year-6 as the recovery run. Based on the survival rate estimates from the Stocking Plan (Upper Basin Pallid Sturgeon Workgroup, 2003) there should be a population of 74 PLS-97 pallids in RMA-1 after year-6.

It has long been recognized that re-establishing normal high spring flows in tributary streams is important for pallid sturgeon spawning migrations (Dryer and Sandvol, 1993). Gardner (1990) presented historic information regarding pallid sturgeon use at the confluence of the Marias River during a high flow event. Although the Marias River is dammed, it remains the largest tributary to the Upper Missouri River upstream of the Yellowstone. Because of this importance, FWP has been encouraging BOR to provide a spring pulse out of Tiber Dam when conditions are favorable. During 2002 conditions were favorable for a spring pulse and the BOR was able to provide a large spring discharge into the lower Marias River. High flows lasted for several weeks and peaked at 5,300 cfs on June 20. This was the greatest flow in the Lower Marias River since 1975 and was well over the estimated bankfull flow of

3,936 cfs. We didn't observe any pallid sturgeon at the Marias River confluence area, but were not too surprised due to the difficulty sampling under high flow conditions and the extremely low numbers of adult pallid sturgeon. High spring flow releases from Tiber Dam should be provided every 3-5 years when conditions are favorable.

An unusual mini-flood event occurred in the study area that seemed to have an interesting effect on the hatchery pallid sturgeon. Heavy rains in the area produced high river flows that were double of the preceding weeks flow (from 4,840 to 11,400 cfs). High flows lasted only about 5 days, however, we observed that 3 of 4 PLS-01 that were radio tagged drifted downstream 30-40 miles into the delta area of Fort Peck Reservoir. We did observe that 2 of the 3 radio pallids returned back upriver once the high flows subsided. Mike Ruggles, FWP reservoir biologist, reported other observations that further suggest pallid sturgeon drifted into the reservoir as a result of the sudden high flows were reported by. Ruggles captured and released two hatchery pallid sturgeon , PLS-97, (along with several wild shovelnose sturgeon) a few days after the high river flow event while conducting his annual netting surveys at the upper end of the reservoir. Very few, if any, sturgeon are usually sampled in the Fort Peck Reservoir wide netting surveys.

Table 3. Average sizes of the 1997- year class pallid sturgeon captured over the years since being released in 1998. Upper Missouri River, MT, 1998-2003.

	------ Average Fork-length (in.) at Age-class -----					
	1yr	**2yr**	**3yr**	**4yr**	**5yr**	**6yr**
Pallid juvenile-97 -	11.5	15.3	18.2	17.3	18.8	19.5
Number measured -	3	3	5	7	9	11

RECOMMENDATIONS

1. Continue with the intensive drift netting for HRJ pallid sturgeon. The success of the 1998 pallid release remains unknown and recapturing these fish will give better information on acclimation, survival and desirable release locations. Additional sampling methods such as angling and setlines should be added to the sampling program and a measure of effort should be devised so that these methods can provide an accurate, quantifiable catch rate index.

2. The fall pallid sturgeon abundance survey should be continued on an annual basis as funding allows. The HRJ pallid sturgeon should be approaching a size where they are more effectively sampled and this effort will more accurately describe their abundance in the area.

3. The Upper Missouri River pallid sturgeon gene pool needs to be preserved. Efforts to collect sperm from ripe males and eggs from females should continue as conditions allow. The fresh sperm should be either used during the current propagation year or stored in cryopreservation.

4. Continue sampling for age-0 pallid and shovelnose sturgeon with the trawl. Trawling has provided a considerable amount of information on shovelnose spawning success and the distribution and abundance of several unique fish species such as the sicklefin and sturgeon chubs

5. Annual releases of hatchery pallid sturgeon are essential for developing a pallid population with a genetically diverse and sound age structure. This is not happening in RMA-1 because of the difficulty with propagation and a severely restrictive ban on releasing hatchery pallids in the area due to SSIV concerns. These potential fish that were not stocked due to the ban were invaluable because of the impending threat of extinction in the area. A more reasonable disease management plan needs to be devised for the pallid sturgeon culture facilities so that releases of pallid sturgeon will occur on a regular basis in RMA-1.

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Prepared by: William M. Gardner September 12, 2003