FISH HEALTH AND PROPAGATION

PALLID STURGEON PROPAGATION 2004 GARRISON DAM NFH

by Rob Holm

US Fish and Wildlife Service Garrison Dam NFH, Riverdale ND

BACKGROUND/INTRODUCTION

The Pallid Sturgeon Recovery Plan (1993) established guidance for collection of wild brood fish, propagation, research needs, and reintroduction of progeny to accomplish recovery goals. This hatchery's role in the recovery effort focuses on the development of techniques for spawning and rearing of pallids and propagation for augmentation. Pallid Sturgeon propagation at Garrison Dam NFH began in 1997. Successful spawning has occurred annually since 1998. Both the 1999 and 2000 year classes propagated at Garrison were destroyed after being identified positive for Pallid Sturgeon Iridovirus (PSIV). April 2002 marked the first stocking of yearling (2001 year class) pallids from this facility. Recapture data from the stocked fish indicates that short term growth rates in the wild are comparable to that achieved in the hatchery; further suggesting that the hatchery reared fish are adjusting well to the Missouri River and it's selection of food. Recapture numbers are not sufficient to draw any conclusions on survival however, survival from this facility is comparable to other hatcheries based on the number of recaptures available.

OBJECTIVES

Objectives for this year will again emphasize augmentation. All four hatcheries used in past pallid propagation will be utilized in 2003 and if possible, Valley City NFH will again come on line for pallid research and propagation. We will attempt to collect four females and sixteen males for spawning at Garrison Dam NFH. Additional family lots produced in the Upper Basin at either Miles City or above Fort Peck will also be 'backed up' at Garrison Dam NFH. Pairing for family lots will be based on results from the Genetics Lab at UC Davis. We plan on producing (4) 1X4 matings using the twenty broodfish on station and others at Miles City SFH. Milt will be flown between the two facilities to provide the best theoretical family lots. Additional milt may be collected both above Fort Peck and in the Confluence during the spawning run which will be used in the repository and possibly to replace any nonviable males currently held as broodstock. We will also evaluate fertilization rates using cryopreserved milt from both the 0.5 and 5ml straws and experiment with optimal incubation temperatures. Total planned production from Garrison Dam includes 13,200 five inch fingerlings; 4,100 seven inch fish; and 3,700 nine inch Spring stocked fish.

Miles City SFH will be supplied with eight adults, four males and four female. In addition to spawning in June they will be culturing four family lots from 2003 to a tagable size prior to stocking in RPA #2 later in the summer. Miles City SFH will create (4) 1 X 3 matings producing 12 family lots. Six family lots will be held at Miles City SFH. The remainder will be transferred to Bozeman NFH and Garrison Dam NFH. Miles City will be producing 3,000 Fall fingerlings; 2,000 spring stocked fish; and 1,000 Summer stocked fish.

Bozeman FTC will be propagating 2003 progeny for stocking RPA #1 and taking the lead spawning riverside again on the CM Russell Refuge. Eggs from this spawning event will be held at both the Bozeman hatchery and Garrison Dam NFH. Bozeman FTC will also be able to bring in eggs from both Miles City and Garrison Hatcheries for propagation.

SPRING CAPTURE 2004

April 20- Four boats out fishing at about 9:00. Water flows are low, temperature is 47 F. Three fish caught quickly at the confluence in a single set. One of the three is CART # 34. Blood is drawn from all three and put on ice. The tagged fish, 115525534A is released. The other two, 7F7D376F73 (38#) and 7F7D3C555D (39#) are loaded on the truck for Miles City SFH. At 9:45 another three fish are netted in a single drift. One of the three, CART #30, had it's external tag ripped off. This fish was injected with Nuflor and released. The other two were cathetered. Eggs were recovered from 115716093A, a fish that had been captured previously with a irrigation gasket around it's head. The fish looked like it had recovered rather well. The third fish appears to be a male, 220F0E6207. At 10:00 CART #2 is captured, blood drawn and released. At 10:15 CART #144 is captured and released. 10:20 CART #28 is captured, tag dangling from one wire. The tag was removed and the fish given an injection of Nuflor. Ten minutes later, CART #50 is captured, a blood sample taken and the fish released. At 11:30 a fifth boat joined in. Ten minutes later pallid 1F4B225A1A is captured. This fish has been collected nearly annually - nicknamed the 'snake' for it's unusual body shape. At noon two fish are collected in a single drift 7F7F066452, a suspect male, and 115551683A, a female confirmed by catheter. Both fish are loaded on the tank headed for Miles City SFH. That ended the collections for Miles City and the driver headed off. Antibiotic injections for the Miles City fish were given at the hatchery while off-loading.

At 1:30 a 40 pound fish is captured and injected, 2204583665/7F7F066A40. Two fish are captured at 2:40, 220F0F7677 a 39 pound fish and 1F47606357, a 45 pound fish. We were unable to collect blood from the second fish (I noticed while trying to draw Nuflor from the container that the syringe has very little vacuum pressure which might be why some of the fish haven't given blood). At 3:20 the final fish was brought in, 1F4A3E1445, a 43 pound male. This fish has been previously cryopreserved but no progeny have been produced. The fish was injected and loaded. At 4:20 the truck for Garrison Dam NFH left. There were a total of seventeen fish collected, all but one recaptures. Two of the seventeen were gravid females (including the lone 'new' fish).

April 21- Five boats fishing, two fish collected immediately off the boat ramp, one a transmittered fish CART #, the second a suspect male. The suspect male, 1F477B3A65, was loaded on the tank - after it was determined to be a previously spawned fish which had lost it's internal tag (CART #38) it was released. At ~11:00 a second transmittered fish, CART #31 was captured and released. This fish was at the hatchery last year, injected but produced no milt - potentially a female. At 11:30 the third transmittered fish, CART #44 is picked up and released. CART #46 is captured at 12:30, blood taken and fish released. At 12:15 two fish are collected in a single drift, 1F477B4E51 (55lbs) and 1F4A312640 (42 lbs). The smaller fish is a confirmed male from the spawn attempt at Miles City in 1995. The larger of the two was biopsied in 1997 at GAD but sex was not determined conclusively. It was catheterized and no eggs were found. Both fish were loaded on the tank for transport to Garrison Dam NFH. At 1:50 an immature female (by catheter) was brought in. Blood was taken and after discussion it was decided to implant a transmitter in the fish. Dave Fuller performed the implant, the fish was given an injection of Nuflor (0.03cc/lb) and released downstream. A couple other CART tagged fish were recaptured from yesterday and released. At 2:00 a male captured up the Yellowstone was brought in. This fish, 1F53312736 / 1F52167900, was a 36 pound suspect male. At 3:30 pallid #3A65 which was captured and released earlier today was recaptured. At 3:45 a 62 pound female was brought in. This fish was a 'new' fish. The fish was cathetered to collect an egg sample and was given an injection of Nuflor. The egg sample was collected in a vial with saline rather than formalin to allow the eggs to be boiled prior to fixing. It was hoped that with a more uniform round shape achieved during water hardening and boiling the PI would be more precise. At 4:10 the distribution unit left for the hatchery.

April 22- Five boats fishing. First drift in the Confluence a 'new' pallid is collected, blood sample taken and PIT tag 114476216A inserted. Another male CART #27 is captured, tag torn off. This fish is injected with Nuflor and released. At 10:40 a third pallid is captured, #115679374A. Blood is taken from this fish is a 38 pound suspect male. It is injected with Nuflor and loaded on the tank without cathetering. Total time from capture to loading 10 minutes. 10:54 another "new" fish is captured in the Confluence (south shore). Blood is taken from this 41 pound fish, 114473737A, it is given a Nuflor injection and loaded on the tank. At 11:05 CART #2, 1F4A27214F, is captured, blood taken and released. At 11:45 pallid #115529097A is captured up the Yellowstone River. The fish is weighed, injected with Nuflor and loaded. Another 'new' fish is captured along the south bank of the Confluence. Blood is drawn from this fish is a 33 pound female. The fish is catheterized, injected with Nuflor, PIT tagged (454910202B) and loaded. The eggs are placed on ice in saline. At 3:40 a large female is brought in from about 6 miles up the Yellowstone. The fish is PIT tagged, 11555495A, weighted at 65 pounds and loaded. At 4:05 a suspect male is captured, 115552116A, and loaded on the second distribution unit. Later another suspect male is captured, 220E5F4928. These two fish are sent off to Garrison Dam NFH following the 3 females and 3 males that left earlier.

April 23 - Five fish collected, two new fish and three recaptures, two known males and one unknown. The larger 64 pound fish was cathetered at the hatchery - no eggs were collected. This fish was injected with Nuflor. Another fish, 7F7E55466D was also suspected a female at capture but didn't appear gravid when observed at the hatchery. This fish and the two other fish were not injected.

April 26 - At the hatchery the two fish that were suspected females from Friday's capture were catheterized to reconfirm their status. In both cases the catheter failed to collect eggs. This time all four fish collected on Friday were given Nuflor injections as well as female 11555495A. After discussing the potential benefits of Nuflor on stressed animals with Dr. Allert, the decision was made to have all fish injected. Fin clips were taken from all fish that have not had a genetics analysis performed. The fin clips were divided with part sent to the University of Cafornia, Dr May, and to Steve Krentz to forward to SIU.

April 28 - Two males (220C7D0429 & 7F7D291A07) were collected in the Confluence, blood samples taken and the fish released.

April 29- Two males (1F4A0B1A72 & 7F7F072442) and two females (recapture 1F521F363A & new 454B380D60) were collected. Blood samples were taken as well as egg samples. The two females were transported to Miles City SFH. End of collections.

SPAWNING

Egg samples from female candidates were collected at capture for all but one female (#11555495A). The Polarity Index (PI) for the fish was calculated, voucher specimens preserved

in 10% formalin, and a photo documentation assembled. The average PI of the three fish held at Garrison on April 21/22 were as follows: #216A - 0.12, #516A - 0.16, #202B - 0.20(variable). The two fish at Miles City that were preserved were #093A - 0.12, and #683A - 0.17.

The adults at Garrison Dam were held in water temperatures approximating those found in the Yellowstone and Missouri Rivers during the months preceding spawning. To alleviate concerns of stress, the females and selected males were held in a covered tank. Lights in that corner of the facility were kept off and visitors were not allowed to view the fish. A window was installed adjacent to the tank (6/25) to provide any photoperiod cues they may have lacked in the past using artificial lighting.

June 7 - we collected eggs from the four females to run maturation tests. The results of the progesterone tests were 100% positive for two females, #216A and #495A. The assay was run for 16 hours, temperature range 15-18.3°C (59-65°F). The water temperature in the tank is 58°F. The nucleus had migrated to the edge of the egg in the other two but had remained intact in all cases. A control was run with ETOH with no breakdown. The polarity index was documented for all four females with three fish in the acceptable range(0.06-0.09) and one very close (0.109). Based on PI values at capture, egg development is progressing as expected. Blood was collected at this time and analyzed for sex hormones and cortisol levels (Molly Webb, OSU) and clinical chemistry (Alan Allert, USGS).

June 9 - two males (1F4A3E1445 and 1F4A312640) were injected with LH-RH at 10:45am. The following morning at 11:00am 150 mls of milt is collected from each fish. The milt was taken by truck to the spawning site on the upper Missouri River. Spawning there began in the early morning hours of June 12. Four families were created, two with the milt from here and two from males collected at the site (7F7D487531 and 7F7E42795C). A third male was collected (1F4A4B5973) but not used as progeny from this fish were created in 2001 and stocked in all RPA's.

June 10 - data was received back from UC Davis on the genetics of the fish. Parings were made as follows based on Nei and Rogers genetic distances (Table 1).

June 13 - milt was again taken from the two males injected on the 9th, 1F4A3E1445 and 1F4A312640. The milt was stored in the refrigerator in oxygenated bags for cryopreservation. Milt from the three Fort Peck males was also brought back for cryopreservation.

June 14 - initial injections were given for the two females , 216A and 495A at 0.05 mg/kg. Males received the total dose of 0.02 mg/kg. The following morning milt was collected from the males at 8:00 am. Five of the six injected males were producing sperm. Milt collected from male 1F53312736 did not contain sperm cells. The two females were given the resolving dose of LH-RH at 8:40 am. Salt was again added to the tank after handling as the standard protocol.

A trial was set up to determine optimal incubation temperatures (Tables 7 & 8). Eggs from a single spawning attempt were divided equally into 5 treatment groups. These treatment groups were further divided into three replicates. The eggs were placed in separate jars bowls and fertilized at the final incubation temperatures. The temperatures chosen were 12, 16, 18, 20, 24 °C (53.6, 60.8, 64.4, 68.0, 75.2°F).

June 16 - eggs were recovered from both females at the 12:30 am check. The previous check at 9:30 pm amounted to a burst of abdominal fluid for both fish. Ovulation progressed well for female #216A. Eggs flowed well by palpation at each of seven collections. After the final collection, a 3ml sample of blood was collected for chemical analysis. The second female had very small egg collections but eggs appeared to be viable in all but the final attempt on the morning of June 17. Received milt from two males collected in the Upper Missouri River by the Montana FWP crew - the males were dubbed 'Lew' (114A4B5973) and 'Fred' (7F7E42795C). Milt from Lew previously cryopreserved (2001) was used to produce a family lot with female 216A. The newly received milt from both males was cryopreserved.

The afternoon of June 20 eggs were moved to the hatching tanks in anticipation of hatch. By morning hatch was progressing rapidly. Jars that held in excess of 200 mls of eggs were moved to other tanks to keep total fry numbers per tank near the target of 3,000.

June 29 - Female necropsy 495A. The fish was a 65 pound female and had very fatty ovaries. From the necropsy it appears that most of the eggs were spawned - we collected about 6,000 from this fish. The scar from the catheterization done June 7th looked good. The hole appeared completely healed over, water was forced into the duct and pressure applied - a pin hole spray of water came out. The gills of the fish looked good - no fungus or necrosis. The fish looked fine on June 25th - color was good. On June 28th it appeared pale and weak. There was bruising from the injection sites on the back of the fish and a ring on the left side. The vent was also red. At the time of the necropsy those areas were covered in fungus. When observed in the tank this morning it was laying on it's side, rigid. It's gills were bright red and it was operculating. Blood samples were taken. One sample was spun down, RBS taken out and frozen, blood smears were made. The following samples were sent to both the Bozeman FHC and Warm Springs FHC: 1) blood sample with HBSS on ice, 2) exudate from gut cavity in HBSS on ice, 3) blood sample in vacutainer. These samples in Davidsons were preserved for Bozeman: Necrotic skin/muscle tissue, gill sample, kidney, spleen, pectoral fin, ovarian, GI tract.

Spoke with Kent Ware PL Bears Bluff re. Shortnose sturgeon. He indicated that they used a drug this year, gentamicin, that gave them good results treating internal infections on their post spawn females. The treatment rate was 6 mg/kg/treatment administered in three treatments six days apart. They had problems with vibriosis, gram negative bacteria infections. It was an effective treatment on 90% of the shortnose treated. In past years they had used baytril (5 injections at 1ml/10 lbs) in combination with 20-25 ppm furnace bath with mixed results. Brian Hickson of the Warm Springs FHC suggested Baytril at 10 mg/kg.

June 29 - By 6:00pm about half of the fry have changed from random tank movements to bottom oriented. Feeding was initiated ad lib. The following day the majority of the fry are bottom oriented. Feeding is being done with vibrator feeders.

July 1 - Loaded six males for the trip back to the confluence. Met Mike Rhodes from Miles City. The broodstock from Miles City were being released and one male (220F0E6207) was needed yet at Garrison to complete spawning activities. This male was transferred to Garrison's tank and hauled back to Garrison. Males released included 1F4A3E1445, 1F4A312640, 1F53312736, 115552116A, 7F7E55466D, 431565767B. Sample count on fry in G-8 (216A X 2777) - 825 fry (eleven day old) displaced 22 mls water = 37.5 per ml.

- July 2 Miles City eggs flown in at 12:30 100 mls each from nine family lots. The fish were spawned June 29th 3 days earlier. Eggs were neurulized. Fry from the GAD spawn were released at the Culbertson, MT site. 30,000 twelve day old fry were released for the larval drift study.
- July 4 Sample count (fourteen day old fry) 870 fry displaced 39 mls water = 22.3 per ml
- July 5 Eggs from Miles City Females 452 and D60 began hatching at 2:00 pm.
- July 6 Eggs from MC female 683A began hatching at 11:00 am.
- July 7 A family composed of 1 female (401E) and three males (?) from Miles City (834, F73, 445) were brought to the hatchery. Tagging was done on the 2003 progeny yellow elastomer crosswise to the snout, PIT tag (or CWT for the small fish). The fish were stocked at three sites by Blind Pony SFH staff The group headed for Bellevue, Ne were stocked at the Plattsmouth Bridge instead as the Belluvue bridge access was blocked for construction. The other two sites were Leavenworth, KS and Booneville, MO. The fish hauled great in three 400 gallon compartments (the fourth compartment was left empty). The fish were hauled at 71 F.
- OTC marked fry for the release on the 8th. A 700 ppm solution was used. At three hours the fish looked fine. DO remained above 7 ppm and pH was buffered to 7.0. At five hours the fry were dead pH at 7.4 and DO at 7.3 ppm.
- July 8 25,000 fry were released as 17 day old fry near Culbertson for the larval drift study. Fry were taken from G-8 216A X 2777 (19.8/ml), T-83 216A X 2640 (13.3/ml) and T-67 216A X 446D (14.0/ml). Fry were boxed at 3,333 per box
- July 12 Injected female 202B and four males (6377, 7677, 374A, 6207) at 11:00 am.
- July 13 Injected female 202B with resolving dose at 8:00 am. Egg collection began at 1:00 pm with a collection of ~300 eggs. Eggs were collected about every 3 hours with good volumes taken. Milt on the other hand was hard to come by. On the first try, only #6357 was producing viable sperm. At 3:00 pm a second male #7677 provided good milt. At 6:15 pm we took milt from #374A the milt was usable. Male #6207 is producing clear milt with very little sperm cells. We opted not to use this fish. Milt quality in #374A gave out on subsequent attempts to aspirate and milt that was collected earlier looks poor. Without another option we continued to use the earlier collected milt. Blood samples were taken from all four males while spermiating. Blood was taken from the female prior to administering the resolving dose and after spawning. Samples were spun down, serum taken off and frozen. Blood smears were also made.
- July 14 Eggs were taken at 12:30 am, 11:00 am and 1:35 pm in all cases egg quality looked good. This female ovulated over a 24 hour period. The last egg take produced about 100 mls. 'Ovarian' fluid for this fish was very thick.
- July 15 2:00 am transformer was hit by lightning. We were without power temporarily. The boiler in the old building burned out a relay and the temperature study was again compromised. The eggs from most of the takes look great neurulation has occurred. The second and third collections using male 374A look poor milt quality was bad.

July 16 - Transferred 150 mls each of two family lots (202B X 6357, 202B X 7677) to Miles City to replace fish a weak family lot there. Monte flew in with the remaining 41 fry from 6452 X 737A to add to our 'broodstock' lot.

July 18 - eggs from 202B X 6357 began hatching at 2:30 pm in FT-2. Eggs from the temperature trial 1B peaked hatch in the morning and from 2B was about half hatched off by 3:00 pm

July 19 - hatching finished for the majority of 202B - peak of hatch for the 'day after' eggs.

July 20- loaded up four males to take back to the confluence (1F477B4E51, 115679374A, 115529097A, 430E452777). Took 25,000 fry to Culbertson for the larval drift study:

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202B X 374A - 60 mls @ 139/ml = 8,333
202B X 6357 - 83 mls @ 100/ml = 8,333
202B X 7677 - 54 mls @ 154/ml = 8,333
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July 22 - Inventoried eggs on incubator 5B - temperature trial (incoming water temperature 12-15-°C). Measured in a 250, 100, and 50 ml graduated cylinder (dry method)- all measurements were very close (+/- 1 ml). A total of 65 mls eggs were measured out with an egg count of 2609. Egg size was determined to be 39.5 per ml for female 202B. The same eggs were loaded in a 12 inch Von Bayer V-trough. A total of 104 eggs were counted giving an estimated size of 44,494 eggs per quart. Using the dry volume method the egg size was 37,380 per quart. The difference between the two sampling methods was 16%.

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July 23 - stocked 25,000 fry from 3 families for the drift study:
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202B X 7677 - 9,333
202B X 374A - 1,000
202B X 6357 - 14,666
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July 27 - stocked 25,000 8 day old fry from 3 families for the drift study:

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202B X 7677 - 119 mls @ 30.3/ml = 3,620
202B X 374A - 107.5 mls @ 26.8/ml = 2,880
202B X 6357 - 709 mls @ 26.1/ml = 18,500
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August 4 - Switched to a #3 Biodiet Starter feed on the larger pallids. Milt repository was moved to the Valley City NFH due to inconsistent availability of liquid nitrogen at Garrison Dam NFH.

September 3 - Switched 202B fish from #2 Biodiet to #3.

September 7-9 Tagging pallids for RPA #2 and #4 - Female lots 216A

September 9 - Blind Pony SFH up to haul pallids to Booneville and Leavenworth (Table 12).

September 10 - Loaded up Gavins Point NFH truck for the Bellevue Stocking and our unit for the Wolf Point stock site.

September 11 - Loaded our unit for the Culbertson and Sidney stock sites.

September 19 - Switched all pallids from #3 Biodiet to #2 Silver Cup Salmon.

September 22 - Have a major outbreak in two tanks. Tank 71 (216A X 2777) had 500 fish. 57 died on the 22 and 287 the following day. The fish were 'flashing' or more correctly 'darting' prior to the start of mortalities. Tank 82 had a different pattern. These fish were lethargic and off feed heading up to this date. On the 23rd there were 212 dead the days preceding and after only a handful of mortalities. FT-18 (216A X 123A) also has the same issues only on a small scale - 14 mortalities but lethargic fish.

October 8 - Loaded Blind Pony SFH truck for trip to Leavenworth Kansas and Booneville MO. The water to the Booneville stock site has been shut off and the bottled oxygen was not sufficient to keep the oxygen level up. Forty percent of the fish in that died (including 51 that were picked out at the stock site). We had tagged 3713 fish from female 202B for that site. 2199 survived the incident (Table 13). An additional 2864 fish went to the Leavenworth Kansas site (Table 14). ~20 fish that didn't look like they would survive at the time of loading were kept at the hatchery. A week later all those fish are still alive and apparently unaffected.

October 10 - Lethargic fish and high mortalities noted in the 401E X MÇ family lot tanks 50. 59, and 78. There are similar conditions in tank 10(0D60 X 1445), 73(202B X 7677), 75 (216A X 7531). The three eight foot tanks are holding tagged fish from female 202B with one of each male. So far only the green tank has shown any mortalities and those have been runt fish.

October 13 - Weighed the sample of morts from T-78. A Sample of 150 fish weighed 962 grams for a sample size of 6.4 grams/fish.

October 14 - Water temperature is 67°F. Loaded out Neosho NFH for a fingerling transfer. Three female lots - 1863 fish. The largest family lot is the female 4954 with progeny averaging 7 inched FL. The smallest was female 6452 with an average size of 5.7 inches. See Table 16.

Bozeman FHC and Jim Peterson are on site for health assessment.

October 15 - Pallids held for RPA #2 stocking are stocked at the confluence of the Milk and Missouri Rivers by boat. A total of 3482 fish were stocked (Table 15).

October 21 - Loaded out Neosho NFH for a fingerling transfer (Table 17).

October 28 - Loaded out Neosho NFH for a fingerling transfer (Table 18).

Nov 4 - Tagged 2477 pallids and transferred to the north 20 foot tank for holding. A quarantine tank is set up in N-8 as a place to put sickly fish. The idea being that the lethargic fish may be shedding virus which would impact the others. Emaciated fish were included as a potential disease threat.

Nov 19 - Tagged pallids were stocked in the Yellowstone River below the intake diversion (Table 19). Water temperature was 38°F. A sample of 100 fish were checked for CWT retention and 100% of the tags were retained. The fish also held their elastomer mark.

December 15 - 720 pallids from 23 family lots were transferred to Gavins Point NFH in our 3 compartment tank (Table 20). The fish were shipped in 6 inch perforated tubes to keep family groups separate.

December 31 - water temperature at 41°F. Stopped feeding dry diets and initiated blood worm feeding.

January 11 - Final shipment of future broodstock to Gavins Point NFH including three 2003 family lots (Table 21).

February 4 - Replaced pump bearings; water was not degassed due to lack of head pressure. Nitrogen levels increased creating gas bubbles in gill lamellae. 45 fish died as a result. After pump repairs the nitrogen levels were reduced and mortality stopped.

FALL CAPTURE

Crews were at the confluence on Nov 9 for the Fall capture. Water temperature at the confluence was 43°F. The target was 2 females and 3 males. The boats began fishing from the confluence just after 9:00 am. Two fish were caught near the confluence, one male #7F7B031F17, one female #115676635A. At about 2:00 the effort was shifted downstream. Four additional pallids were collected with the last fish, a female #115557165A, caught near Erickson Island at 3:50 pm. Two males 7F7D517479 and 7F7D2D273D were also loaded on the distribution truck for transport to Gavins Point after having blood taken and OTC injections. All fish were cathetered and egg samples preserved. An immature egg stage female was also collected #7F7D517479 as was the immature female that was CART tagged this Spring. The CART tagged fish was not cathetered but it was noted that she was not 'plump'.

DISCUSSION

Growth rates of hatchery reared pallids followed similar patterns between hatcheries. Growth within the first three months post stocking was very good with average rates between 0.5 and 0.8 mm per day - similar to hatchery growth rates (Table 27). Growth rates of pallids at large 3-12 months was down considerably (averages 0.18 and 3.0mm per day) but expected since it would likely represent winter months since most stocking is done in the Spring/Summer (Table 29). Growth was also slower after the first year at large with the growth rates of the 1-3 year old fish ranging between 0.14 and 0.23 mm per day. Average growth even at these rates still represent nearly 3 inches per year.

Data on growth rates broken out by RPA indicates that the upper RPA's are not as productive as the lower ones based on the little data that has been collected (Table 28). Days at large and size at stocking should also be considered when analyzing Table 28. Recapture data is strongest in RPA 1 and 3 with just over 2% of stocked fish being recaptured in RPA 1 and nearly 1 3/4 % recaptured in RPA 3. Unfortunately very little data was collected at stocking on fish in RPA 1 leaving growth rates in question.

Overall growth rates of pallids stocked from Garrison Dam were comparable to other facilities. Growth rates over the past three year were good indicating that the fish are effectively foraging

in spite of being virus positive. Percentage of recaptures relative to numbers stocked indicate that Garrison's survival is also comparable to other facilities.

In general, where the presence of the iridovirus in a pallid tank was documented by mortality and histology in the October sampling, the iridovirus and subsequent mortality was not a problem in the months following through to stocking in April (Table 24). Similar results were seen in 2003. Six tanks were diagnosed as virus positive in October 2003. In five of the six tanks, the fish were maintained in that tank without adding fish from other tanks. The total mid-October inventory of those five tanks was 691 fish. Mid-May the total in the tanks was 682 - a 99% survival rate over seven months. Overall seven month survival rate for the 2003 progeny was 76%.

Density at levels didn't correlate well with viral incidence or mortality (Table 26). Assuming viral expression is related to stress either the densities at Garrison were not significant enough or other stressors were masking the effects. Viral epizootic and associated mortality were present at densities below 0.3 pounds per square foot as well as above 1.5 pounds per square foot (tanks 52 and 67). The opposite was also true - no virus or mortality in those ranges (tanks 54 and 76). Even mortality didn't completely correlate with virus although generally it was the rule. In most cases a level 4/5 fin score resulted in mortality rates near 15%. There were isolated cases where mortality reached near 70% but other cases where mortality was less than 1%.

Table 1. Proposed Parings - Genetic Distances

Female	Male	Location	Rogers	Nei
	Garr	ison Dam NFH Fen		
115555495A	431565767B	GAD	0.623	1.048
	430E452777	GAD	0.592	0.827
	220E5F4928	GAD	0.546	0.642
454910202B	220F0F7677	GAD	0.608	0.763
	220F0E6207	MC	0.572	0.709
	1F47606357	GAD	0.526	0.508
114476216A	7F7E55466D	GAD	0.572	0.960
	1F53312736	GAD	0.430	0.553
	430E452777	GAD	0.401	0.341
	1F4A312640	GAD	0.438	0.310
132253516A	115529097A	GAD	0.588	0.679
	7F7F066452	MC	0.526	0.592
	-	-	-	-
	220E5F4928	GAD	0.421	0.441
Miles City	SFH Females			
115551683A	7F7D3C555D	MC	0.572	0.742
	115552116A	GAD	0.535	0.626
	114473737A	GAD	0.529	0.626
454B380D60	7F7F065834	GAD	0.617	0.886
	1F4A3E1445	GAD	0.546	0.827
	7F7D376F73	MC	0.592	0.715
1F53330401E	7F7F066A40	GAD	0.608	0.763
	1F477B4E51	GAD	0.572	0.820
	115679374A	GAD	0.572	0.763

Table 2. Pallid				ODSTOCK DAT	r A						
Tag Number	Date	Sex		2nd Tag Number	Other Info	Set Time	Location	RM	Spawn	results	Spawn Site
									Cryo	Progeny	
7F7D376F73	4/20	U	38	1F54714656	Blood taken - last caught in 1994		MO	1582			MC
7F7D437250	4/20	U	39	7F7D3C555D	Blood taken - Cath nothing - last caught in 1995		MO	1582			MC
115525534A	4/20	M		CART #34	Blood taken - released		МО	1582	no	no	
220F0E6207	4/20	U	43		Blood taken - Cath nothing	6:00	MO	1582			MC
115716093A	4/20	F	40	'GASKET'	Blood taken-Cath eggs-Released 5/25 pre-spawn	6:00	МО	1582			
1F4A363031	4/20	M		CART #30	Blood taken released- tag torn outgiven Nuflor		МО	1582	yes	yes	
1F4A27214F	4/20	M		CART #2	Blood taken - released	13:00	YE	0	yes	yes	
1F4A111C6A	4/20	M		CART #144	Blood taken - released		MO	1582	yes	yes	
132157621A	4/20	M		CART #28	Blood taken - released-tag torn - given Nuflor	3:00	МО	1582	yes	yes	
1F4A143350	4/20	M		CART #50	Blood taken - released	7:00	MO	1582	yes	no	
7F7F066452	4/20	M	25		Blood taken - ID as male in 1994	10:00	MO	1582			MC
115551683A	4/20	F	50		New fish	10:00	MO	1582			MC
1F4B225A1A	4/20	U			Blood taken - 'SNAKE' - released	5:30	MO	1582			
7F7F066A40	4/20	U	40	2204583665	Blood taken - Nuflor injection @ capture	7:00	МО	1582			GAD
220F0F7677	4/20	U	39		Blood taken	8:00	MO	1582			GAD
1F47606357	4/20	U	45	1F4A1E4336	No blood - @ GAD in 1996	8:00	MO	1582			GAD
1F4A3E1445	4/20	M	43	1F4A2F3A2E	Blood taken - milt cryo in 2002	7:00	MO	1582	yes		GAD

			DOTOCK DAT	A						
Date Date	Sex	Wt	2nd Tag	A Other Info		Location	RM	Spawn	results	Spawn Site
4/21	M	29		No blood - released	7:10	MO				
4/21	M		CART #38	Blood taken - released	4:30	YE	0	yes	yes	
4/21	U		CART #31	Released (possible female)				no	no	
4/21	M		CART #44	Released				yes	no	
4/21	M		CART #46	Blood taken - released				yes	no	
4/21	U	55		Blood taken - Biopsy scar 1997	6:00	YE	6			GAD
4/21	M	42		Blood taken - milt taken @ MC in 1995	6:00	YE	6			GAD
4/21	F			Blood -Nuflor-CART transmitter implanted						
4/21	M	36	1F52167900			YE	8.5			GAD
4/21	M		CART #38	Caught earlier in the day - Released		MO	1582	yes	yes	
4/21	F	62		Blood taken - new fish						GAD
4/22	F	39		Blood taken - new fish		MO	1582			GAD
4/22	M		CART #27	released				yes	yes	
4/22	U	38		Blood taken	13:00	МО	1582			GAD
4/22	U	41		Blood taken - new fish	8:45	MO	1582			GAD
4/22	M		CART #2	Blood taken - released	6:00	MO	1582	yes	yes	
4/22	U	35			6:40	YE	4			GAD
4/22	F	33		Blood taken - new fish- cath eggs	9:30	MO	1582			GAD
4/22	F	65		no blood or catheter - new fish	0:55	YE	5.5			GAD
	STURG Date 4/21 4/21 4/21 4/21 4/21 4/21 4/21 4/21 4/21 4/21 4/21 4/22 4/22 4/22 4/22 4/22 4/22 4/22	STURGEON Date Sex 4/21 M 4/21 F 4/21 F 4/22 M 4/22 U 4/22 U 4/22 U 4/22 F	Date Sex lbs. 4/21 M 4/21 F 4/21 M 4/21 M 4/21 M 4/21 F 4/21 F 4/21 F 4/22 F 39 4/22 M 4/22 U 4/22 U 4/22 U 4/22 T 33	STURGEON BROODSTOCK DATE Date Sex Wt Ibs. Number 4/21 M 29 CART # 4/21 M 42 4/21 F 4/21 M 36 1F52167900 4/21 M CART # 4/21 F 62 4/22 F 39 4/22 M CART # 4/22 U 38 4/22 U 41 4/22 M CART # 4/22 F 33	Date Sex Wt Ibs. Date Date	Date Sex Wt Ibs. Number No blood - released 7:10	Date Sex Wt Ibs. Number Other Info Set Location	Date Sex Wt 2nd Tag Number No blood - released 7:10 MO	Date Sex Mt 2nd Tag Number Other Info Set Ibs. Other Info Set Ib	Date Sex Mode Sex Mode Sex Mode Mod

2004 PALLID	STURG	EON 1	BROC	DDSTOCK DATA	A						
Tag Number	Date	Sex	Wt lbs.	2nd Tag Number	Other Info	Set Time	Location	RM	Spawn re	esults	Spawn Site
115552116A	4/22	M	31		jaw tag 0097 (from 1988)	6:00	MO	1851			GAD
220E5F4928	4/22	U	38			8:00	MO	1851			GAD
7F7E55466D	4/23	U	44	1F557B2071	Radio tagged in 1994, Cathetered	6:30	MO	1582			GAD
7F7F065834	4/23	M	35		spawned in 2002 at MCSFH		MO	1582	yes	no	GAD
431565767B	4/23	U	64		Cathetered - no eggs -	4:00	MO	1582			GAD
430E452777	4/23	U	51			3:00	MO	1582			GAD
1F4A111C6A	4/23	M	27		spawned at GAD in 2001	5:00	MO	1852	yes	yes	
220C7D0429	4/28	U	31	2204523542	collected in 1996 and 1999				no	no	
7F7D291A07	4/28	M			spawned in 1997 and 2003				yes	yes	
7F7F072442	4/29	M	40						no	no	
1F4A0B1A72	4/29	M	33		milt taken at GAD in 1996				no	no	
1F5330401E	4/29	F	31	1F521F363A	collected in 1995				no		MC
454B380D60	4/29	F	30		new fish				no		MC

Table 3. Female # 114476216a - Spawning Results

			Female	# 1144762 1	6a			
Time	Date	Male #	Mls Eggs	# Eggs @ 37/Ml Green	Total Egg Number Prehatch	Fry Mortality To Aug 1	Initial Survival	Inventory August 1
3:49p	6/14	Initial injection						
8:37a	6/15	Final injection						
4:30p	6/15	no eggs						
9:30p	6/15	no eggs						
12:30a	6/16	7F7E55466D	275	10175	16761	8100	38%	6435
3:45a	6/16	7F7E55466D	125	4625				
9:30a	6/16	7F7E55466D	750	27750				
3:45a	6/16	1F4A312640	920	34040				
7:30a	6/16	1F4A312640	625	23125	27676	16723	46%	12643
1:30p	6/16	1F4A312640	300	11100	12284			
5:20a	6/16	430E452777	800	29600	34780	15970	48%	16581
1:30p	6/16	430E452777	700	25900	33078			
5:20a	6/16	Cryo Trials	300	11100	13314	3584	73%	9730
9:30a	6/16	Cryo Trials	150	5550				
4:35p	6/16	Cryo Trials	96	3552				
TOTAL			5041	186517	137893	44377	51%	45389

Table 4. Female # 115555495a - Spawning Results

				Fe	male #	115555495a					
Time	Date	Male #	Mls Eggs	# Eggs @ 37/MI	Calc #/Ml	Percent Fertilizati on (Based On Prehatch)		gg Cour Prehatcl		Progeny On September 1	% Survival From Egg To 75 Days
							Live	Dead	Total		
3:42p	6/14	Initial injection									
8:41a	6/15	Resolving dose									
4:30p	6/15	no eggs									
9:30p	6/15	no eggs									
12:45a	6/16	431565767B	0.5	15	0				0		
5:30a	6/16	no eggs	0	0	-	-	-	-	-		
7:30a	6/16	431565767B	0.2	2	0	-	-	-	-		
9:30a	6/16	431565767B	20	740	47	95%	890	43	933		
1:30p	6/16	431565767B	27	999	32	91%	799	78	877		
4:40p	6/16	431565767B	18	666	78	54%	756	647	1403		
10:00p	6/16	431565767B	38	1406	30	8%	91	1043	1134		
5:15a	6/17	431565767B	45	1665	37	0.0	0	1665	1665		
TOTAL			148.7	5493	40	42%	2536	3476	6012	1348	53%

Table 5. Female #454910202b - Spawning Results

						Female	#454910202	b					
Time	Date	Male #	Mls Eggs (35 Min Post Spawn)	# Eggs @ 37/MI Green	Mls Eggs @ 39.5/Ml Neuruli zation	# Eggs @ 39.5/MI	Percent Fert (Neurulized Eggs)	Live Eggs	Research	Larval Drift	Transfer	9/1/05 Inventory	% Survival Eggs To 45 Days
11:15a	7/12	initial injection											
8:30 a	7/13	resolving dose											
12:55 p	7/13	1F47606357	8	336	425	16788	98%						
3:00 p	7/13	1F47606357	350	14700			99%	16620	6885	41504	6000		
6:30 p	7/13	220F0F7677	350	14700	375	14813	98%	14516	4126	1252	6000		
6:30 p	7/13	115679374A	550	23100	550	21725	80%	11850	8681	12214	0		
8:15 p	7/13	220F0F7677	260	10920	290	11455	98%	21291					
8:15 p	7/13	1F47606357	**750	31500	885	34958	96%	10997	10997				
10:20 p	7/13	1F47606357	325	13650	365	14418	97%	33909					
10:20 p	7/13	220F0F7677	225	9450	265	10468	72%	10381					
10:20p	7/14	115679374A	225	9450	315	12443	9%	942					
12:30 a	7/14	1F47606357	400	16800	430	16985	85%	10576					
12:30 a	7/14	115679374A	290	12180	400	15800	3%	510					
11:00 a	7/14	1F47606357	400*	16800	450	17775	71%	11218					
1:35 p	7/14	1F47606357	100	4200	110	4345	82%	14576					
TOTAL			4233	177786	4860	191970		157384	30689	54970	12000	14904	72%

* Eggs were spent into tank while stripping

^{**} Eggs used in the temperature trial experiment.

Table 6. 2004 Progeny

Female #	Male #	Eggs (OZS)	# Eggs @37- 40ml	Prehatch Eggs Retained on Station	Eggs/Fry used in Research	Larval Drift Fry Stocked	Fingerling Inventory Sept 1		g stocking	Fingerling stocking RPA #4	Hatchery Transfer Neosho	November Inventory
114476216A	7F7E55466D	1150	40250		2581	18333	9568	3745		4727		361
114476216A	1F4A312640	1845	64575		6712	18333	10876	1805		7830	599	565
114476216A	430E452777	1500	52500		7588	18333	14404	4867		8672		523
CRYO '01	1F4A27214F	546	20202				111					91
CRYO '04	431565767B						143	38				105
CRYO '02	220F107A6F						483				417	90
CRYO '02	1F477B3A65						461	311				105
CRYO PECK	7F7D487531						4340	459		3508		99
CRYO PECK	1F4A4B5973						2208	450		828	758	117
CRYO '02	116167123A						119					56
Female Total	1		177527		16881	54999	42713	11675		25565	1774	2112
115555495A	431565767B	149	5960	2536			1348			844	403	
454910202B	1F47606357	2665	105268	6000 to MC	6885	41504	7098	1770	2768	917	470	
454910202B	220F0F7677	930	36735	6000 to MC	5950	21280	4126	1252	1459	0	918	
454910202B	115679374A	1265	49968		8681	12214	3680	1489	836	650	372	
Female Total	1	1	191970		21516	74998	14904	4511	5063	1567	1760	

GAD total		10050	375457	14536	76794	259994	116582	32372	61256	7526	8147
		1	1	<u>'</u>	•		1				
115551683A	7F7D3C555D	35	36227	3500			524	106			329
MC	115552116A	38	39332	3500			145				145
	114473737A	41	42437	3500			3				0
454B380D60	7F7F065834	30	31052	3500			1439	288		651	389
MC	1F4A3E1445	20	20701	3500			468				230
	7F7D376F73	16	16561	3500			489	82			215
7F7F066452	114473737A	21	21736	3500			123				94
MC	1F4A3E1445	35	36227	3500			111				74
	7F7F065834	29	30017	3500			1282	116		600	378
	T	, ,							1		
1F5330401E	7F7F066A40	5	5175	6200 FRY@ 62/ml			3150				905
MC	1F477B4E51	2	2070	02/III							
	115679374A	6	6210								
					,	,					
Miles City TC	TAL	243	287745		0	0	7734	592	0	1251	2759
Grand Total		10293	663202	14536	76794	259994	124316	32964	61256	8777	10906

^{*} CRYO lots have female # 114476216A

Table 7. Temperature trial #1 - Female #216A

Temperature °C		12			16			18			20			24	
Incubator	5B			4B			3B			2B			1B		
mls of fertilized eggs*	190			180)		160)		180			210		
Time of First Cleavage 6/16	10:1	10 an	ı	7:40	0 am		7:0	0 am		~7:0	00 an	1	6:30) am	
% fertilization				88.3	3%		88.4	4%		87.6	5%		-		
Time of second cleavage 6/16	12:0)0pm	l	8:00	0 am		7:5:	5 am		7:50)		~6:4	45	
Time of Neurulation	<7:0	00am	1	5:30	0 pm		3:0	0 pm		4:00) am		9:00) am	
Date of Neurulation	6/20)		6/19	9		6/1	9		6/18	3		6/17	7	
Start of Hatch				<7	:00ar	n	1:3	0 pm		7:00) am		7:00) am	
Date of Hatch				6/2	7		6/2	1		6/20)		6/19)	
Finished Hatch			>2:	00 pı	n	<7:	00an	1	10:0	00am		12:0	00am		
Date Hatch Finished				6/2	3		6/2	3		6/22	2		6/20)	
Replicate	Е	M	W	Е	M	W	Е	M	W	Е	M	W	Е	M	W
Egg inventory 6/18 1:00pm mL	56	84	84	70	64	72	70	70	68	70	62	88	60	62	60
dead egg count 6/17													12	13	77
1 1 4 6/10										20	20		24	18	40
dead egg count 6/18										39 6	30	52	70	62 8	9
dead egg count 6/19 am										0	0	0	55	65	61
dead egg count 6/19 pm					32	7	11	7	13	38	22	75	87	53	7 27
									6	3	8		7	8	1
dead egg count 6/20							9	5	15 1	18	62	23	15 3	27 4	25
dead egg count 6/21	1	10	13	8	13	6	11	41	12						1

Table 7. Temperature trial #1 - Female #216A

Tubic 7. Temperature trial #1	1 011	iuic		1 1											
Temperature °C		12			16			18			20			24	
dead egg count 6/22	1	0	33							1170	6				
dead egg count 6/23	7	14	9	812	I		114	1	I	2618	8		625	8	
dead egg count 6/24	14	14	39												
dead egg count 6/25	44	56	58												
dead egg count 6/26	0	0	0												
Totals by replicate	67	94	15 2	21	45	13	13 3	53	41 2	79 7	59 8	15 0	35 07	34 16	23 22
Totals by treatment group	313			891			173	9		5339	9		1550	03	

Table 8. Temperature Trial #2 - Female 202B

Temperature °C		12			16			18			20			24	
Incubator	5B			4B			3B			2B			1B		
mls of fertilized eggs*	150			150			150			150			150		
Time of First Cleavage	1:00	am '	7/14	12:1 7/14	5 am		11:1	5pm′	7/13						
Time of second cleavage				1:00	am 7	7/14	12:1	5am	7/14	11:3 7/13	0 pm	l	11:1	5 pm	7/13
Start of Hatch				am			am			am			pm		
Date of Hatch				7/21			7/19)		7/18	;		7/17	7	
Finished Hatch				am			pm			am			pm		
Date Hatch Finished				7/22	,		7/20)		7/20)		7/19)	
Volume of eggs (mL)	177			~17′	7		~17	7		~17	7		~17	7	
number of eggs @ 39.5/mL	6992	2		6992			6992	2		6992	2		699	2	
Replicate	Е	M	W	Е	M	W	E M		W	Е	M	W	Е	M	W

Table 8. Temperature Trial #2 - Female 202B

Temperature °C		12			16			18			20			24	
Egg inventory	65	60	52	-	-	-	-	-	-	-	-	-	-	-	-
dead egg count 7/16	0	0	0	0	1	0	8	3	7	6	12	13	11	13	17
dead egg count 7/17	5	0	0	9	8	9	11	9	12	-	-	-	-	-	-
dead egg count 7/18	2	2	2	10	7	5	39	55	27	22	37	58	-	-	-
dead egg count 7/19	0	0	0	0	0	0	20	36	35	22	67	73		324	
dead egg count 7/20	23	19	13	10	12	11	51	41	32						
dead egg count 7/21	25	53	30	31	20	19	3	7	8						
dead egg count 7/22	21	33	11	22	25	47									
Totals by replicate	14 1	16 7	10 8	82	73	91	13 2	15 1	121	50	11 6	14 4	33 5	13	17
Totals by treatment group	416			246			404			310			689		
5 day post hatch mortality	167	1 *													

^{*} More to be counted (preserved)

Table 9. Milt Collections 2004

	Milt Collections Pit Tag # Amount Ini Inject Take Time Motility Characteristics Milt														
Pit Tag #	Amount Taken (mls)	Inj Date	Inject Time	Take Date	Time	Motility	Characteristics	Milt Cryo							
1F4A3E1445	150	6/9	10:45a	6/10	11:00a	95%	2% milk	N							
1F4A312640	150	6/9	10:45a	6/10	11:00a	95%	2% milk	N							
7F7E55466D	130	6/14	3:15p	6/15											
1F4A312640	130	6/14	3:18p	6/15											
431565767B	150	6/14	3:21p	6/15											

Table 9. Milt Collections 2004

			Milt	Collect	ions			
Pit Tag #	Amount Taken (mls)	Inj Date	Inject Time	Take Date	Time	Motility	Characteristics	Milt Cryo
1F53312736	-	6/14	3:27p	-	-	-	NO SPERM	N
430E452777	60	6/14	3:35p	6/15			bloody	
220E5F4928	150	6/14	3:42p					
430E452777	180	6/14	3:35p		3:50p			
1F53312736	-	6/14	3:27p		3:50p		NO SPERM	N
7F7F066A40	420	6/23	10:30a	6/25	10:30 a			N
220F0F7677	420	6/23	10:30a	6/25	10:30 a			Y
1F47606357	420	6/23	10:30a	6/25	10:30 a			N
1F4A3E1445	270	6/23	10:30a	6/25	10:30 a			Y
1F477B4E51	420	6/23	10:30a	6/25	10:30 a			N
115529097A	2	6/23	10:30a	6/25	10:30 a			N
115552116A	420	6/23	10:30a	6/25	10:30a			Y
7F7F066A40	220	6/23	10:30a	6/25	3:00p			Y
1F47606357	240	6/23	10:30a	6/25	3:00p			Y
1F477B4E51	240	6/23	10:30a	6/25	3:00p			Y
115529097A	90	6/23	10:30a	6/25	3:00p		bloody	Y

Pit Tag	Year	Source		v Size	Dewar	Cane	Motility	Motility	Motility	Represented
			(ml)	~#	#	Location #	(fresh)	(pre freeze)	(post freeze)	by progeny in RPA
7F7F054773	2000	GAD	0.5	4	1	4	90%			
2202236E31	2000	CMR	0.5	4	1	4	95%	5%		
115712453A	2000	GAD	0.5	4	1	4	85%			
1F4A004552	2000	GAD	0.5	4	1	4	90%			
1F4A33194B	2000	GAD	0.5	4	1	4	95%			
1F4A143350	2000	GAD	0.5	5	1	4	90%			
1F4A27214F	2001	MC	0.5	25	1	1				2,3,4
	2001	MC	5	3	1	2				2,3,4
1F4A111C6A	2001	MC	0.5	20	1	1				2,3,4
	2001	MC	5	4	1	2				2,3,4
115631222A	2001	MC	0.5	20	1	1				3,4
	2001	MC	5	3	1	2				3,4
7F7D3C5708	2001	MC	0.5	20	1	1				3,4
	2001	MC	5	4	1	2				3,4
411D0B4E09 (2265)	2001	CMR	5	1	1	4				1,2
, ,	2001	CMR	0.5	10	1	4				1,2
17509415139	2001	CMR	0.5	10	1	4				1,2,3,4
41476A0462	2001	CMR	0.5	20	1	4				1,2,3,4
	2001	CMR	5	1	1	4				1,2,3,4

Pit Tag	Year	Source		v Size ~#	Dewar #	Cane Location	Motility (fresh)	Motility (pre	Motility (post freeze)	Represented by progeny in
411D0E2C5F	2001	CMR	0.5	20	1	4		freeze)		RPA 1,2,3,4
	2001	CMR	5	1	1	4				1,2,3,4
1F4A4B5973	2001	CMR	0.5	5	1	4				1,2,3,4
7F7D434B54	2002	GAD	0.5	40	1	5	40%			brood
1F477B3A65	2002	GAD	0.5	10	1	5	90%			2,3,4
	2002	GAD	0.5	70	1	7	90%			2,3,4
7F7D461025	2002	CMR	0.5	40	1	6				brood
7F7F065834	2002	GAD	0.5	40	1	6				
115556461A	2002	GAD	0.5	40	1	7				
1F4772396F	2002	GAD	0.5	40	1	8	35%			
220F107A6F	2002	GAD	0.5	40	1	8	85%			2,3,4
116167123A	2002	GAD	0.5	40	1	9	75%			2,3,4
1F4A3E1445	2002	GAD	0.5	40	1	9	80%			
115544332A	2002	GAD	0.5	40	1	10	90%			
452738076E	2003	CMR	0.5	130	2	1	90%		5%	
	2003	CMR	5	6	2	3	90%			
411D0E2C5F	2003	CMR	0.5	100	2	5	90%		5+%	
	2003	CMR	5	5	2	5	90%			
452A4E1F15	2003	CMR	5	5	2	4				

Pit Tag	Year	Source		v Size ~#	Dewar #	Cane Location #	Motility (fresh)	Motility (pre freeze)	Motility (post freeze)	Represented by progeny in RPA
	2003	CMR	0.5	80	2	10	60%	30%	<1%	
	2003	CMR	0.5	100	2	6		80%	40%	
	2003	CMR	0.5	100	2	2			5%	
132157621A	2003	GAD	0.5	70	2	4	95%		1-5%	1,2,3,4
7F7D372A6B	2003	GAD	0.5	50	2	8	70%	30-80%	20%	
132313521A	2003	GAD	0.5	70	2	8	70%	1-25%	5%	4
1F521B1E56	2003	GAD	0.5	80	2	6	80%	0-80%	1 - 5%	3,4
	2003	GAD	0.5	70	2	1			<1%	3,4
1F4A13592B	2003	GAD	0.5	70	2	9	85%	50-85%	35%	
7F7D291A07	2003	GAD	0.5	80	2	7	80%	1-20%	20%	3,4
1F4A363031	2003	GAD	0.5	80	2	7	50%	0-5%	50%	1,4
115675486A	2003	GAD	0.5	70	2	10	60%	30-70%	50%	1,2,3,4
1F47760123	2003	MC	0.5	70	2	3	65%	65%	1-2%	1,3,4
115669540A	2003	MC	0.5	60	2	2	50%	55%	<1- 2%	1,2,3,4
132114552A	2003	MC	0.5	80	2	9	40%	40%	1%	2,3,4
220E5F4928	2004	GAD	0.5	100	1	9	80%			
1F4A312640	2004	GAD	0.5	100	1	8	85%			1,4
431565767B	2004	GAD	0.5	99	1	7	95%			2,4
430E452777	2004	GAD	0.5	100	1	7	95%			2,4

Pit Tag	Year	Source		v Size ~#	Dewar #	Cane Location	Motility (fresh)	Motility (pre	Motility (post freeze)	Represented by progeny in
						#		freeze)		RPA
7F7E55466D	2004	GAD	0.5	100	1	5	90%			4
1F4A4B5973	2004	CMR	0.5	100	1	3	90%			1,2,3,4
7F7D487531	2004	CMR	0.5	100	1	3				4
7F7E42795C	2004	CMR	0.5	100	1	5	95%			
220F0E6207	2004	MC	0.5	100	2	5				
7F7E55466D	2004	GAD	0.5	100	1	5*	90%			4
430E452777	2004	GAD	0.5	100	1	7*	95%			2,4
7F7E42795C	2004	CMR	0.5	55	1	5*	95%			
220F0F7677	2004	GAD	0.5	100	1	10	90%			2,4
1F4A3E1445	2004	GAD	0.5	100	1	10	95%			1,4
115552116A	2004	GAD	0.5	50	1	8	90%			4
115552116A	2004	GAD	0.5	50	1	9	90%			4
115529097A	2004	GAD	0.5	50	1	6	90%			
115529097A	2004	GAD	0.5	50	1	3	90%			
7F7F066A40	2004	GAD	0.5	100	2	3	85%			
1F47606357	2004	GAD	0.5	100	2	1	80%			2,4
1F477B4E51	2004	GAD	0.5	100	2	8	40%			
220F0E6207	2004	MC	0.5	100	2	6*	45%			
7F7F065834	2004	GAD	0.5	100	2	7	85%			2,4
7F7D437250	2004	MC	0.5	100	2	9	95%			2,4

Table 10. Milt Repository at Valley City NFH

Pit Tag	Year	Source		v Size ~#	Dewar #	Cane Location #	Motility (fresh)	Motility (pre freeze)	Motility (post freeze)	Represented by progeny in RPA
115679374A	2004	GAD	0.5	70	2	2	95%			2,4
114473737A	2004	GAD	0.5	70	2	3	85%			
7F7D376F73	2004	GAD	0.5	70	2	10	85%			4
Total Stra	ws (inclu	ding 5 ml)	4372						

Dewar Capacity: 2000 ½ ml straws (10 straws/cane - 20 canes/canister - 10 canisters/dewar)

Fifty-eight males are represented in the repository as of 2004. Twenty-seven are not represented through progeny in the Missouri River.

Table 11. 2003 Pallid Sturgeon Progeny - July 8, 2004 Stocking

Female	Male	Bellevue, NE	Leavenworth, KS	Booneville, MO	Total
44426F185B	7F7D291A07	48	48	45	141
(7B7B016070)	1F521B1E56	78	68	67	213
	41475D3C5D	220	218	220	658
	1F4A363031	41	42	35	118
TOTAL		387	376	367	1130
7F7F054855	115669540A	40	31	40	111
	115675486A	70	66	70	206
	132313521A	39	65	0	104
TOTAL		149	162	110	421
132256586A	132114552A	99	108	99	306
	132157621A	122	114	125	361
	1F47760123	71	66	71	208
TOTAL		292	288	295	875
GRAND TOTAL	J	828	826	772	2426
WEIGHT (LBS)		80.5	73.6	71	225
NUMBER/POU	ND	10.3	11.2	10.9	10.8
LENGTH (IN)		8.9	8.6	8.7	8.7

Table 12. 2004 Pallid Sturgeon Progeny, September 9-11, 2004 Stocking

Family	Booneville,	Leavenwort	Bellevue,	Culbertson,	Wolf	Sidney,	Total
	MO	h, KS	NE	MT	Point, MT	MT	
216A X 7531	1144	1143	1221	75	309	75	3967
216A X 5973	276	276	276	150	150	150	1278
216A X 446D	1595	1566	1566	1213	1150	1382	8472
216A X 2640	3368	3582	880	681	681	443	9635
216A X 2777	3378	2603	2691	1700	1750	941	13063
Length (in)	3.4	3.2	3.2	3.3	3.3	3.4	3.3
Weight (lbs)	51.8	42.8	31.0	18.4	19.4	16.5	179.9
#/lb	188.4	214.3	214	207.6	208	181.3	202.3
Total	9761	9170	6634	3819	4040	2991	36415
Red elastomer tag	left parallel	right parallel	across	left parallel	left parallel	left parallel	

^{*} all fish were CWT and red elastomer tagged

Table 13. October 8, 2004 - RPA #4 Stocking.

	Female		July	Aug	Sept	Current Inventory OCT 1	Monthly % Mortalit	A	Booneville MO Number	Weight (lbs)	Corrected Number	Correct Weigh	t Leavenwo t hKS Number	
FT-2	202B	6357	977	77	2	199	1.0%	69		0.0	0	0.0	0	0.0
FT-8	202B	6357	122	83	2	297	0.7%	0	297	4.0	176	2.3	0	0.0
FT-16	202B	6357	2779	428	4	290	1.4%	160		0.0	0	0.0	0	0.0
T-54	202B	6357	-	-	-	700	0.0%	150		0.0	0	0.0	0	0.0
T-57	202B	6357	-	0	73	1165	5.9%	147		0.0	0	0.0	892	11.0
T-63	202B	6357	82	191	0	569	0.0%			0.0	0	0.0	19	0.2
T-77	202B	6357	194	358	8	706	1.1%	674		0.0	0	0.0	37	0.5
S-8	202B	6357	-	-	1	3084	0.0%		1928	25.7	1142	15.2	502	6.2
FRY	202B	6357	1012	-	-	0	0.0%			0.0	0	0.0	0	0.0
LOT T	OTAL		5166	1137	90	7010	1.3%	120	2225	29.7	1318	17.6	1450	17.9
			-	•	•		Total to	RPA #4		•	2	768	•	
FT-3	202B	7677	201	94	1	150	0.7%	150		0.0	0 0	.0 0.	0.0	ı
FT-12	202B	7677	18	46	2	150	1.3%	150		0.0	0 0	.0 0	0.0	ı
T-60	202B	7677	-	-	4	951	0.4%	951		0.0	0 0	.0 0	0.0	ı
T-61	202B	7677	-	-	2	998	0.2%	399		0.0	0 0	.0 2	87 3.5	
T-73	202B	7677	17	366	1	949	0.1% 3	360		0.0	0 0	.0 0	0.0	ı
G-8	202B	7677	-	-	0	1769	0.0%		1024	13.7	606 8	.1 5	66 7.0	
T-76	202B	7677	118	-	0	0	0.0%			0.0	0 0	.0 0	0.0	

Table 13. October 8, 2004 - RPA #4 Stocking.

Tank #	Female	Male	July	Aug	Sept	Current Inventory OCT 1	Mont % Morta	•	RP A #2	Booneville MO Number	Weight (lbs)	Correc Numl		Corrected Weight	Leavenwort hKS Number	Weight
LOT T	OTAL		354	506	10	4967	0.2%	2010)	1024	13.7	606	8.1	853	10.5	
			<u> </u>				Total	to RPA	A #4			ı	14:	59		
FT-6	202B	374A	230	63	2	150	1.3%				0.0	0	0.0	20	0.2	
FT-13	202B	374A	46	84	0	150	0.0%				0.0	0	0.0	20	0.2	
T-56	202B	374A	-	-	0	700	0.0%				0.0	0	0.0	150	1.9	
T-69	202B	374A	36	351	5	298	1.7%				0.0	0	0.0	308	3.8	
T-74	202B	374A	-	-	1	699	0.1%			81	1.1	48	0.6	63	0.8	
N-8	202B	374A	-	-	0	1675	0.0%	1200)	383	5.1	227	3.0	0	0.0	
T-64	202B	374A	95	-	-	0	0.0%				0.0	0	0.0	0	0.0	
LOT T	OTAL	I	407	498	8	3672	0.2%	1200)	464	6.2	275	3.7	561	6.9	
					I	1	Total	to RPA	A #4				83	6	I	
						Subtotal				3713	49.5	2199	29.	3 2864	4 35.3	
						Number/po	und			75.0		75.0		81.1	<u> </u>	
						Total Numl	per					<u> </u>	500	63		

Table 14. Garrison Dam NFH 2004 Pallid Sturgeon - October 8, 2004 Stocking

Female	Male	Leavenworth, KS			Booneville, MO			
		Number	Lbs	Length	Number	Lbs	Length	
454910202B	1F47606357	1450	17.9	4.5	1318	17.6	4.6	
	220F0F7677	853	10.5	4.4	606	8.1	4.6	
	115679374A	561	6.9	4.4	275	3.7	4.6	
GRAND TOTAL		2864	35.3	4.4	2199	29.4	4.6	
NUMBER/POU		81.1	•		74.8			

Table 15. Garrison Dam NFH 2004 Pallid Sturgeon - October 15, 2004 Stocking

Table 13. Garrison Dam 1111 2004 Lama Sturgeon - October 13, 2004 Stocking								
Female	Male	Missouri / Milk River Confluence, MT						
		Number	Lbs	#/lb	size(in)			
454910202B	1F47606357	1200	20.9	57	5.0			
	220F0F7677	1082	19.4	56	5.0			
	115679374A	1200	22.2	54	5.1			
GRAND TOTAL	3482	62.5	56	5.0				

Table 16. Neosho NFH Transfers from Garrison Dam NFH - October 13, 2004

Tank	Female	Male	Number	Weight (lbs)	Length (in)	#/lb	Grams per
							fish
T-61	495A	767B	164	8.6	7.2	19.1	23.8
T-67	495A	767B	241	12.0	7.1	20.1	22.6
T-76	495A	767B	203	10.0	7.1	20.3	22.4
Lot Total			608	30.6	7.1	19.9	22.8
FT-6	202B	374A	40	1.4	6.3	28.6	15.9
FT-13	202B	374A	40	1.4	6.3	28.6	15.9
T-56	202B	374A	285	7.6	5.8	37.5	12.1
T-74	202B	374A	285	7.6	5.8	37.5	12.1
Lot Total			650	18.0	5.8	36.1	12.6
FT-24	6452	5834	36	1.2	6.2	30.0	15.1
FT-25	6452	5834	96	2.0	5.3	48.0	9.5
T-52	6452	5834	173	3.8	5.4	45.5	10.0
T-58	6452	5834	371	9.1	5.6	40.8	11.1
Lot Total			676	16.1	5.5	42.0	10.8
TOTAL			1934	64.7	6.2	29.9	15.2

Table 17. Neosho NFH Transfers from Garrison Dam NFH - October 21, 2004

Tank	Female	Male	Number	Weight (lbs)	Length (in)	#/lb	Grams per
T-61	495A	767B	104	6.4	7.6	16.3	fish 27.9
T-67	495A	767B	42	2.6	7.6	16.2	28.1
T-76	495A	767B	85	6.6	8.2	12.9	35.3
Lot Total			231	15.6	7.8	14.8	30.7
T-81	216A	2640	361	15.9	6.8	22.7	20.0
FT-22	216A	2640	99	0.9	4.0	110.0	4.1
FT-23	216A	2640	139	1.6	4.3	86.9	5.2
Lot Total			599	18.4	6.0	32.6	13.9
							1
FT-28	0D60	5834	96	5.0	7.2	19.2	23.6
FT-29	0D60	5834	118	4.0	6.2	29.5	15.4
FT- 27	0D60	5834	168	5.8	6.3	29.0	15.7
T-72	0D60	5834	269	9.6	6.3	28.0	16.2
Lot Total			651	24.4	6.4	26.7	17.0
TOTAL			1481	58.4	6.6	25.4	17.9

Table 18. Neosho NFH Transfers from Garrison Dam NFH - October 28, 2004

Tank	Female	Male	Number	Weight (lbs)	#/ lb	Grams per fish	Length (in)
T-54	202B	6357	348	11.4	30.5	14.9	6.2
T-63	202B	6357	372	20.0	18.6	24.4	7.3
FT-16	202B	6357	97	2.8	34.6	13.1	5.9
FT-2	202B	6357	100	3.0	33.3	13.6	6.0
Lot Total	202B	6357	917	37.2	24.7	18.4	6.6
T-80	216A	7A6F	211	11.4	18.5	24.5	7.3
FT-26	216A	7A6F	115	1.2	95.8	4.7	4.2
FT-27	216A	7A6F	91	1.2	75.8	6.0	4.6
Lot Total			417	13.8	30.2	15.0	6.2

Table 18. Neosho NFH Transfers from Garrison Dam NFH - October 28, 2004

Tank	Female	Male	Number	Weight (lbs)	#/lb	Grams	Length
						per fish	(in)
T-66	216A	5973	377	19.2	19.6	23.1	7.1
T-55	216A	5973	381	11.4	33.4	13.6	6.0
Lot Total			758	30.6	24.8	18.3	6.2
TOTAL			2092	81.6	25.6	17.7	6.5

Table 19. November 19 2004, Intake Stockings, Yellowstone River, MT.

Tank	Female	Male	Tagged #	Weight (lbs)		#/lb	Stock Number
CRYOPRE	ESERVATION L	OTS			()	L	
T-79	216A	3A65	100	6.2	7.6	16.1	99
FT-22	216A	3A65	119	1.8	4.8	66.1	117
FT-23	216A	3A65	96	1.2	4.5	80.0	95
T-55	216A	767B	38	2.4	7.7	15.8	38
LOT TOT.	AL		353	11.6	6.2	30.4	348
FEMALE 2	216A				l		
T-53	216A	2777	134	7.6	7.4	17.6	132
T-64	216A	2777	141	8.8	7.6	16.0	139
LOT TOT.	AL		482	16.4	6.2	29.4	476
FEMALE 2	202B				l		
FT-1	202B	6357	155	1.8	4.4	86.1	153
FT-8	202B	6357	172	2.4	4.6	71.7	170
FT-11	202B	6357	250	3.2	4.5	78.1	247
LOT TOT.	AL		577	7.4	4.5	78.0	570
FT-12	202B	7677	24	0.8	6.2	30.0	24
N-8	202B	7677	148	5.2	6.3	28.5	146
LOT TOT	AL		172	6.0	6.3	28.7	170
				I	l		I
FT-6	202B	374A	85	4.0	7.0	21.3	84
FT-13	202B	374A	52	2.0	6.5	26.0	51

Table 19. November 19 2004, Intake Stockings, Yellowstone River, MT.

Tank	Female	Male	Tagged #	Weight (lbs)		#/lb	Stock Number
FT-15	202B	374A	119	1.4	(in) 4.4	85.0	117
Γ1-13	202B	3/4A	119	1.4	4.4	83.0	11/
T-74	202B	374A	37	1.6	6.8	23.1	37
LOT TOTAL	J	1	293	9.0	6.0	32.6	289
FEMALE 0D6	50				1		l
FT-29	0D60	5834	30	1.6	7.2	18.8	30
T-51	0D60	5834	262	10.8	6.7	24.3	259
LOT TOTAL			292	12.4	6.7	23.5	288
				<u>l</u>	<u>l</u>		1
T-77	0D60	6F73	83	3.2	6.5	25.9	82
LOT TOTAL	<u> </u>		83	3.2	6.5	25.9	82
FEMALE 645	2			<u> </u>	<u> </u>	<u> </u>	1
FT-24	6452	5834	118	4.0	6.2	29.5	116
LOT TOTAL	<u> </u>		118	4.0	6.2	29.5	116
FEMALE 683	A			I	<u> </u>		l
FT-7	683A	555D	32	2.0	7.6	16.0	32
FT-17	683A	555D	75	4.6	7.6	16.3	74
LOT TOTAL			107	6.6	7.6	16.2	106
GRAND TOT	AL		4043	125.0	6.0	32.3	3991

Fish for the Intake stocking on the Yellowstone River were tempered 5 days prior to stocking from 65°F to 48°F prior to hauling. At the site they were tempered another 5°F to 43. The water temperature in the river was 38°F. The fish hauled well. While tempering at the site, 100 fish were selected for a CWT retention check. All 100 fish held a tag two weeks post tagging. The fish also had red elastomer marks consistent with the year class (parallel, left).

Table 20. December 25, 2004 Future Broodstock for Gavins Point from Garrison (2004 Progeny - Seven females - 23 family lots)

Tank	Female	Male	Ship #	Weight (G)	#/Lb	Length (In)	Ship Date
T-79	216A	3A65	30	1236	11.0	8.7	12/15/2004
T-68	216A	214F	30	406	33.5	6.0	12/15/2004
FT-18	216A	123A	30	768	17.7	7.4	12/15/2004
T-80	216A	7A6F	30	1580	8.6	9.4	12/15/2004
T-71	216A	7531	30	892	15.3	7.8	12/15/2004
T-66	216A	5973	30	746	18.3	7.3	12/15/2004
T-55	216A	767B	30	1095	12.4	8.3	12/15/2004
T-70	216A	466D	30	1198	11.4	8.6	12/15/2004
T-65	216A	2640	30	1595	8.5	9.4	12/15/2004
FT-20	216A	2777	30	433	31.5	6.1	12/15/2004
T-76	495A	767B	30	1466	9.3	9.2	12/15/2004
T-63	202B	6357	30	1017	13.4	8.1	12/15/2004
FT-3	202B	7677	30	729	18.7	7.3	12/15/2004
T-74	202B	374A	30	754	18.1	7.3	12/15/2004
T-51	0D60	5834	30	895	15.2	7.8	12/15/2004
T-75	0D60	1445	30	750	18.2	7.3	12/15/2004
T-77	0D60	6F73	30	961	14.2	8.0	12/15/2004
FT-19	6452	737A	30	565	24.1	6.7	12/15/2004
FT-28	6452	1445	30	759	17.9	7.4	12/15/2004
T-52	6452	5834	30	468	29.1	6.3	12/15/2004
FT-7	683A	555D	30	1509	9.0	9.3	12/15/2004
T-81	683A	116A	30	952	14.3	7.9	12/15/2004
T-78	401E	MIX	60	1051	25.9	6.5	12/15/2004
Total Numb	per	<u> I</u>	720	21825	15.0	7.8	12/15/2004

Table 21. January 11, 2005 Future Broodstock for Gavins Point from Garrison (2004 Progeny - Seven females - 23 family lots; 2003 Progeny -Two females - 3 family lots)

Tank	Female	Male	Ship #	Weight (Kg)	Weight (Lbs)	#/Lb	Length (In)	Ship Date
T-79	216A	3A65	30	1.48	3.26	9.2	9.2	1/11/2005
T-68	216A	214F	30	0.64	1.41	21.3	7.0	1/11/2005
FT-18	216A	123A	30	0.74	1.63	18.4	7.3	1/11/2005
T-80	216A	7A6F	30	1.52	3.35	9.0	9.3	1/11/2005
T-71	216A	7531	30	0.84	1.85	16.2	7.6	1/11/2005
T-66	216A	5973	30	0.88	1.94	15.5	7.7	1/11/2005
T-55	216A	767B	30	1.24	2.73	11.0	8.7	1/11/2005
FT-4	216A	466D	30	0.46	1.01	29.6	6.2	1/11/2005
S-8	216A	2640	30	1.38	3.04	9.9	9.0	1/11/2005
FT-20	216A	2777	30	0.56	1.23	24.3	6.6	1/11/2005
T-76	495A	767B	30	1.72	3.79	7.9	9.7	1/11/2005
T-16	202B	6357	29	0.70	1.54	18.8	7.2	1/11/2005
FT-73	202B	7677	45	0.82	1.81	24.9	6.6	1/11/2005
T-13	202B	374A	30	0.72	1.59	18.9	7.2	1/11/2005
T-51	0D60	5834	30	0.90	1.98	15.1	7.8	1/11/2005
T-10	0D60	1445	30	0.46	1.01	29.6	6.2	1/11/2005
T-77	0D60	6F73	30	0.90	1.98	15.1	7.8	1/11/2005
FT-26	6452	737A	23	0.54	1.19	19.3	7.2	1/11/2005
FT-9	6452	1445	23	0.64	1.41	16.3	7.6	1/11/2005
T-25	6452	5834	30	0.62	1.37	21.9	6.9	1/11/2005
FT-6	683A	555D	30	1.42	3.13	9.6	9.1	1/11/2005
T-81	683A	116A	30	0.98	2.16	13.9	8.0	1/11/2005
T-78	401E	MIX	60	1.20	2.64	22.7	6.8	1/11/2005
Total Numb	er		720	21.36	47.05	15.3	7.8	1/11/2005
				2003 Proge	ny			
S-20	4855	521A	69	9.60	21.15	3.3	13.0	1 cross mark
S-20	6070	3031	74	10.50	23.13	3.2	13.1	no elasomer
S-20	6070	592B	6	1.16	2.56	2.3	14.5	1 parallel
Total Numb	er		149	21.26	46.83	3.2	13.1	

Table 22. April 21 & 25, 2005 Stocking - 2004 Progeny

	1 & 25, 2005 Stocki		T	
Family	Tank #	Sioux City, IA	Kansas City, MO	Total
216A X 446D	4,G8	135	123	258
216A X 2640	65,66,S8,80	226	324	550
216A X 2777	53,64	119	235	354
216A X 214F	1	11	6	17
216A X 3A65	79	42	4	46
216A X 7A6F	3,5	18	10	28
216A X 7531	10	11	8	19
216A X 5973	70	25	31	56
216A X 767B	6,7	18	17	35
495A X 767B	59,61,67,68,76	340	33	373
202B X 6357	2,54,56,63	225	124	349
202B X 7677	9,57,60,73,71	294	264	558
202B X 374A	74	70	157	227
0D60 X 5834	72 & 51	91	182	273
0D60 X 1445	75	70	51	121
0D60 X 6F73	77	116	43	159
6452 X 737A	11	9	8	17
6452 X 5834	58,69	103	47	150
683A X 555D	52,55,62	220	89	309
683A X 116A	81	82	37	119
401E X MCM	8 ,50,78,82,83	174	417	591
MIX X MIX	N8	151	139	290
Weight (lbs)		180	140	320
Length (in)		8.0	7.6	7.8
TOTAL		2546	2349	4895

Table 23. Stocking/Production Summary

Garrison Dam NFH 2004 Stocking/Production Summary											
Stock Location	Size (inches)	Date	Number								
Culbertson, MT	fry	June/July	130000								
Fingerling stock RPA #4	3.3	Sept 9-10, 2004	25565								
Fingerling stock RPA #2	3.3	Sept 10-11, 2004	10850								
Fingerling stock RPA #4	4.5	Oct 8, 2004	5063								
Neosho NFH	6.3	Oct 13, 2004	1863								
RPA #2 - Milk River Conf	5.4	Oct 15, 2004	3482								
Neosho NFH	6.6	Oct 21, 2004	1481								
Neosho NFH	6.5	Oct 28, 2004	2092								
RPA #2 - Intake Stocking	6.1	Nov 18, 2004	2445								
Gavins Point Transfers	7.8	Dec 15, 2004	720								
Gavins Point Transfers	7.7	Jan 11, 2005	729								
Gavins Point Transfers (2003 progeny)	13.1	Jan 11, 2005	149								
RPA #4 - Sioux City, IA	8.0	April 21, 2005	2546								
RPA #4 - Kansas City, KS	7.6	April 25, 2005	2349								
TOTAL			189334								

Table 24. Hatchery Production Summary - 2004 Progeny

9	đ	Tanks	Inventory April 20-22	y - 2004 Prog Initial Inventory feeding fry	Larval stockings and research	Fingerling stockings	Hatchery Transfer	fer								% Survival from feeding fry (not including fry stock)			
216A	466D	4,G8	258	38642	20914	8472	60	Jun 3594	July 4506	Aug 151	Sept 267	Oct 261	Nov 157	Dec 2	Jan ()	Feb*	Mar	Apr 0	50%
210A	400D	4,08	238	38042	20914	84/2	00	3394	4306	131	207	201	137	2	U	1	1	U	30%
216A	2640	65,66,S8,80	550	52806	25045	9635	659	12998	3725	193	0	1	0	0	6	9	0	0	39%
216A	2777	53,64	354	58750	25921	13539	60	5590	10350	2416	372	39	104	5	0	14	0	0	43%
216A	214F	1	17	212	0	0	60	-	106	8	9	7	4	1	0	1	1	1	36%
																	_		
216A	3A65	79	46	609	0	315	60	-	101	31	3	53	0	0	0	1	0	0	69%
216A	123A		0	157	0	0	60	-	38	2	33	18	0	6	0	0	0	0	38%
216A	7A6F	3,5	28	643	0	0	477	-	112	20	1	5	0	0	0	1	0	0	79%
	-1				•		•	•	1	•			•	•	•	•	•	1	
216A	7531	10	19	6550	0	3967	60	756	1452	35	1	259	1	0	0	4	0	1	62%
216A	5973	70	56	3175	0	1278	818	339	601	37	0	36	10	0	0	0	0	0	68%
216A	767B	6,7	35	216	0	38	60	-	79	2	0	0	1	1	0	3	0	0	62%
																_			
495A	767B	59,61,67,68 ,76	373	2231	0	0	904	653	236	43	0	15	7	0	0	5	0	0	57%
	T						T		T					T _	1	T	1 -	T -	
202B	6357	2,54,56,63	349	60685	48389	4538	976	-	5166	1137	90	35	0	5	18	34	0	1	48%
202B	7677	9,57,60,73,7	558	31834	27230	2711	75	-	357	509	10	343	23	18	16	28	22	12	73%
202B	374A	74	227	25152	20895	2325	710	-	407	504	8	13	62	1	1	0	0	0	77%

Table 24. Hatchery Production Summary - 2004 Progeny

\$	đ	Tanks	Inventory April 20-22	y - 2004 Prog Initial Inventory feeding	Larval stockings and research	Fingerling stockings	Hatchery Transfer									% Survival from feeding fry (not including fry			
				fry															stock)
								,					_	_	_				
0D60	5834	51,72	273	3323	0	292	701	-	1753	87	11	196	10	0	5	4	1	0	38%
0D60	1445	75	121	1361	0	0	60	-	987	45	18	122	7	1	0	1	0	5	13%
0D60	6F73	77	159	2481	0	83	60	-	2081	93	5	0	0	0	0	1	0	0	12%
	I	1	l		l		l					1		ļ	Į.		1	I	1
6452	737A	11	17	329	0	0	53	-	219	12	0	0	14	14	1	9	0	0	21%
6452	1445		0	715	0	0	53	-	598	15	0	18	5	26	0	0	0	0	7%
6452	5834	12,58,69	150	1913	0	118	660	-	750	55	15	74	29	62	17	7	1	0	49%
	l			<u> </u>					<u> </u>			<u> </u>							
683A	555D	52,55,62	309	1362	0	107	60		803	41	5	33	4	0	0	1	0	0	35%
683A	116A	81	119	469	0	0	60	-	256	31	1	2	0	0	0	0	0	1	38%
683A	737A		0	9	0	0	0	-		6	0	3	0	0	0	0	0	0	0%
															•	•			
401E	MIX	8 ,50,78,82,8 3	591	4074	0	0	120	-	1121	57	2	2053	128	2	5	6	3	4	17%
	1		1		I		1	1	1	1	1	1	1	1	ı	ı	1	ı	1
MIX	MIX	N8	290	687	0	0	0	-	-	-	-	-	348	49	22	15	14	13	42%
												•							
Totals			4899	298380	168394	47418	6866	23930	35804	5525	851	3586	914	193	91	145	43	38	46%

^{*} February nitrogen saturation resulted in higher than normal mortality over a 4 day period.

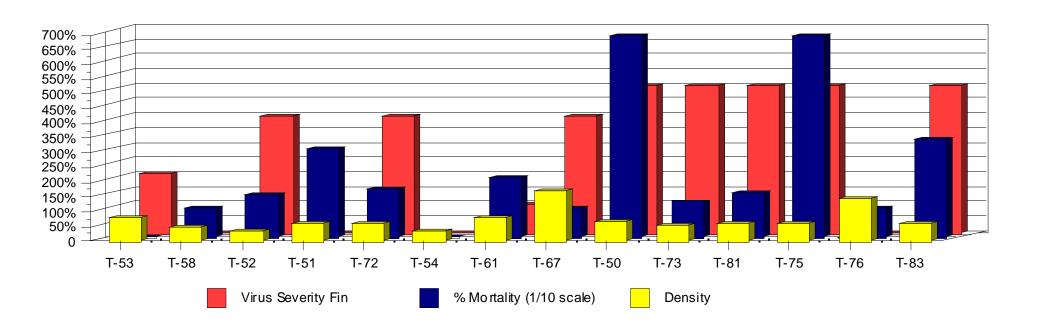
Table 25. Pallid Density Index and Mortality Table

Table 25.				ortanty 1										1		
Tank	Female .	Male.	# of Fish	Length (in)	Weight (lbs)	April 13 Density			7 N	Months	Morta	lity			% Mort Last 3 Months	Viral status (Oct)
							Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar		
1	216A	214F	17	6.5	0.65	0.13	-	-	-	-	-	0	1	1	11%	
2	202B	6357	16	7.8	1.05	0.21	77	2	1	0	2	9	8	0	52%	
3	216A	7A6F	14	9.5	1.66	0.34	-	-	-	-	-	0	0	0	0%	
4	216A	446D	18	6.4	0.65	0.13	1	2	1	41	1	0	1	1	10%	
5	216A	7A6F	14	9.0	1.45	0.30	-	-	-	-	0	0	1	0	7%	
6	216A	767B	18	8.8	1.70	0.35	-	-	-	-	0	0	3	0	14%	
7	216A	767B	17	8.5	1.45	0.30	-	-	-	-	-	0	0	0	0%	
8	401E	MIX	8	9.3	0.90	0.18	-	-	-	-	0	0	0	1	11%	
9	202B	7677	34	5.3	0.70	0.14	-	-	-	-	1	12	21	22	62%	
10	216A	7531	19	7.1	0.95	0.19	-	-	-	-	0	0	4	0	17%	
11	6452	737A	17	6.3	0.60	0.12	-	-	-	-	2	1	9	0	37%	
12	6452	5834	0	0.0	0.00	0.00	-	-	-	-	0	0	2	0	100%	
50	401E	MIX	166	6.6	6.60	0.34	-	1	608	12	1	0	0	0	0%	+ 4/5
51	0D60	5834	137	7.3	7.50	0.38	-	6	14	0	0	4	2	0	4%	NEG
52	683A	555D	92	8.3	7.40	0.38	-	-	-	-	0	0	0	0	0%	
53	216A	2777	165	7.3	9.10	0.46	-	0	0	2	2	0	3	0	2%	+ 1 /2
54	202B	6357	116	6.8	5.20	0.27	-	0	1	0	0	1	16	0	13%	NEG

55	683A	555D	95	8.0	6.80	0.35	_	_	_	Ι_	1	0	0	0	0%	
												ļ				
56	202B	6357	113	7.5	6.65	0.34	-	-	-	-	0	6	8	0	11%	
57	202B	7677	157	6.5	6.10	0.31	-	-	-	-	2	3	3	3	5%	
58	6452	5834	112	7.4	6.44	0.33	3	11	4	0	62	17	2	1	15%	NEG
59	495A	767B	83	9.1	8.75	0.45	-	-	-	-	-	0	0	0	0%	
60	202B	7677	195	6.8	8.45	0.43	-	4	119	6	1	1	1*	1	2%	
61	495A	767B	74	8.9	7.30	0.37	-	-	10	7	0	0	4*	0	5%	+ 0/1
62	683A	555D	122	8.2	9.30	0.47	-	2	32	4	0	0	1*	0	1%	+ 4/5
63	202B	6357	104	7.8	6.90	0.35	191	0	0	0	1	2	2*	0	4%	
64	216A	2777	189	8.0	13.64	0.70	3	2	1	2	0	0	11*	0	6%	
65	216A	2640	128	9.0	13.25	0.68	7	0	1	0	0	0	5*	0	4%	
66	216A	2640	99	9.1	10.60	0.54	-	-	-	-	0	0	2*	0	2%	
67	495A	767B	49	9.2	5.30	0.42	-	0	2	0	0	0	1*	0	2%	+2/4
68	495A	767B	50	8.8	4.70	0.37	-	-	-	-	1	0	0*	0	0%	
69	6452	5834	38	5.9	1.10	0.09	-	-	-	-	1	0	3*	0	7%	
70	216A	5973	56	7.6	3.50	0.28	-	-	-	-	1	0	0*	0	0%	
71	202B	7677	67	6.8	2.95	0.23	-	-	-	-	0	0	1*	1	3%	
72	0D60	5834	136	7.0	6.45	0.33	-	4	85	7	1	1	2*	1	3%	+ 3/4
73	202B	7677	105	6.6	4.30	0.22	366	1	113	8	0	0	2*	0	2%	+ 5
74	202B	374A	227	7.0	10.90	0.56	-	1	0	32	0	1	0*	0	0%	
75	0D60	1445	121	6.3	4.25	0.22	-	-	-	2	0	0	1*	0	1%	

76	495A	767B	117	9.1	12.20	0.62	27	0	3	0	0	0	0*	0	0%	NEG
77	0D60	6F73	159	7.5	9.25	0.47	-	-	-	0	0	0	1*	0	1%	
78	401E	MIX	164	6.7	6.95	0.35	57	1	276	25	0	3	1*	2	4%	
79	216A	3A65	46	8.6	4.10	0.33	31	4	49	0	0	0	1*	0	2%	
80	216A	2640	60	9.0	6.20	0.49	-	-	-	-	0	0	0*	0	0%	
81	683A	116A	119	8.0	8.50	0.67	-	-	-	0	0	0	0*	0	0%	
82	401E	MIX	118	7.0	5.70	0.45	-	-	-	11	0	0	3*	0	2%	
83	401E	MIX	135	7.0	6.35	0.50	-	-	162	32	2	2	2*	0	3%	+ 4/5
S8	216A	2640	263	9.0	26.60	0.53	-	-	-	0	0	6	2	0	3%	
N8	Nurse	Tank	290	6.7	12.20	0.24	-	-	-	-	49	22	15	14	15%	
G8	216A	446D	240	8.2	18.56	0.37	-	-	-	116	0	0	0	0	0%	
Totals /	Averages		5637	7.6	311.8	0.35			760	18	1468	307	131	91	100	
			•	· · · · · · · · · · · · · · · · · · ·		% Mont	thly Mo	ortality	9%	0%	20%	5%	2%	3%	2%	

Shaded mortality blocks indicate tanks that were sampled for iridovirus on October 14, 2004. The viral score represents the fin score and has a range from 0 to 5 with a level 5 being severe.



^{*} February nitrogen saturation resulted in higher than normal mortality over a 4 day period.

Table 26. Density, Iridovirus and Mortality (October 2004)

Tank Number	T-53	T-58	T-52	T-51	T-72	T-54	T-61	T-67	T-50	T-73	T-81	T-75	T-76	T-83
Female	216A	6452	6452	0D60	0D6 0	202B	495A	495A	401E	202B	216A	216A	495A	401E
Male	2777	5834	5834	5834	5834	6357	767B	767B	MCX	7677	2640	7531	767B	MC X
# of fish	300	571	366	555	521	700	451	395	899	949	478	372	640	499
Length (in)	7.0	4.8	4.8	5.2	5.3	4.0	6.2	7.2	4.6	4.2	4.7	6.0	5.4	4.6
Grams/fish	22	7	7	9	9.3	4	15	23.7	6.3	4.7	6.5	14	20	6.3
Pounds	14.5	8.8	5.6	11.0	10.7	6.2	14.9	20.6	12.5	9.8	6.8	11.5	28.2	6.9
Density (pounds/ft2)	0.75	0.45	0.29	0.57	0.55	0.32	0.77	1.66	0.64	0.51	0.55	0.59	1.45	0.56
virus barb *	2	0	18	0	13	0	1	1	17	19	28	12	0	13
virus fin *	2	0	4	0	4	0	1	4	5	5	5	5	0	5
% mortality	0.0%	0.7%	13.9%	2.5%	16.3%	0.1%	2.2%	0.5%	67.6%	11.9%	15.1%	67.7%	0.5%	32.5%
Actual Mort	0	4	51	14	85	1	10	2	608	113	72	252	3	162

Table 27. Growth Rates of Recaptured Hatchery Stocked Fish

Hatchery	Num	% of	Months	Num	% of Recaps	Days at	Ave	Growth	Stock	Recap
	5455	5%	<3	11	3%	30	-	-	-	354
			3-12	0	0%	-	-	-	-	-
			12-36	3	1%	393	-	-	-	344
	5918	6%	<3	33	9%	45	32	0.72	254	265
			3-12	16	5%	339	59	0.18	268	316
			12-36	15	4%	428	70	0.17	269	325
Garrison Dam NFH	68933	65%	<3	14	4%	46	35	0.84	221	247
			3-12	13	4%	288	83	0.30	266	314
			12-36	33	9%	644	136	0.23	246	379
Gavins Point NFH	13688	13%	<3	15	4%	29	27	0.57	352	360
			3-12	18	5%	294	54	0.20	348	397
			12-36	37	11%	702	84	0.14	412	487
			>36	131	38%	1778	106	0.09*	535*	541
Neosho	5491	5%	<3	3	1%	61	32	0.54	282	314
			3-12	2	1%	519	154	0.29	259	413
			>12	5	1%	211	58	0.27	264	322
Blind Pony SFH	5967	6%	<3		0%					
			3-12		0%					
			>12		0%					
TOTAL	105452	100%		349	100%					

^{*}represents a group of 23 six year old fish stocked at Verdel, NE in 2000

Table 28. Growth Rates broken out by RPA

Hatchery	RPA	Num	% of	Num	Days	Ave	Growth/	Stock	Standard	Recap	Standard
·		Stkd*	Total	Recap	at	Growth at	day	Length	Deviation	Length	Deviation
			Stocked		Large	Large	(mm)	(mm)	(mm)	(mm)	(mm)
						(mm)					, , ,
Bozeman NFH	1	5297	88%	14	108	6	0.06	425	138	351	89
	2	158	1%	0	393	-	-	-	-	-	-
Miles City SFH	2	5918	53%	70	253	44	0.17	267	31	309	38
Garrison Dam NFH	2	1626	15%	35	471	72	0.15	257	37	326	51
	3	841	31%	7	613	196	0.32	210	18	406	35
	4	19061	56%	19	270	124	0.46	230	45	312	134
Gavins Point NFH	1	690	12%	115	1724	-	-	-	-	507	67
	2	3410	31%	39	668	52	0.08	339	88	405	109
	3	1863	69%	40	987	93	0.09	495	91	588	97
	4	5107	15%	13	431	72	0.17	391	107	484	121
	5	2618	29%	2	16	-	-	-	-	-	-
Neosho	4	5491	16%	10	228	69	0.30	268	30	338	52
Blind Pony SFH	4	4436	13%								
	5	6368	71%								
TOTAL		62884		364							

^{*2004} Stockings not included

Table 29. Growth rate as a function of stocking date

Stocking Period	Growth Rate (mm/day)	Growth SDEV	Average Days at Large	Average Size at Stocking	Average Size at Recapture	Recaptures per RPA				Number of Fish Sampled *
						1	2	3	4	
March-May	.365	.206	457	303	423	0	1	14	12	25
June-Aug	.363	.426	967	318	425	126	134	27	12	134
Sept-Dec	.216	.209	516	398	444	3	9	6	18	28
Sample Size	187	187	358	196	354	129	144	47	42	362

^{*} Only 187 of the 362 recaptures have growth data (primarily no length data at stocking)

Table 30. Recapture rates as a function of RPA.

RPA	Number of	Total	% Recaptured	River	Average	Stock	Recap	Growth Rate	Days at	Weight grams
	Recap	Stocked	of Available	Miles	age	Length	Length	(mm)	Large	
1	129	5987	2.15%	180	5	-	491	-	1549	437
2	144	27889	0.52%	300	2	283	338	0.385	417	149
3	47	2704	1.74%	70	5	453	561	0.142	952	585
4	42	62719	0.07%	811	2	291	369	0.446	311	268
5	2	6153	0.03%	1154	-	-	-	-	16	-
Total/Ave	364	105452	0.35%	2515	4	329	427	0.322	877	335

Table 31. Hatchery Stocking Summary to May 2005 (fry not included)

Hatchery	RPA 1 Stock Number	RPA 2 Stock Number	RPA 3 Stock Number	RPA 4 Stock Number	RPA 5 Stock Number	Total Stock Number
Bozeman NFH	5297	158				5455
Miles City SFH		5918				5918
Garrison Dam NFH		18403	841	54584		73828
Gavins Point NFH	690	3410	1863	5107	2618	13688
Blind Pony SFH				4436	6368	10804
Neosho NFH				5491		5491
TOTAL	5987	27889	2704	69618	8986	115184

BOZEMAN FISH HEALTH CENTER SUMMARY OF PALLID STURGEON ACTIVITIES FOR 2004

- Histological Examination* of Pallid Sturgeon sampled (troubleshooting and health assessment cases) during 2004.
- Gavins Point NFH
 - '03 Pallid Sturgeon
 100 fish collected 7/04; 54% positive for iridovirus (1.9)
 - '04 Pallid Sturgeon
 5 fish collected 9/14/04; 100% negative for iridovirus.
- Garrison Dam NFH
 - '03 Pallid Sturgeon
 153 fish collected 5/04; 96% positive for iridovirus (4.0)
 - '04 Pallid Sturgeon
 16 fish collected 9/13/04; 19% positive for iridovirus (severity2.7)
 - 10 fish collected 9/24/04; 50% positive for iridovirus (3.6); 50% w/ severe fungal infection (unable to determine virus status in this group)
 - 87 fish collected 10/04; 67% positive for iridovirus (4.3) fish
 - 20 collected 12/04; 100% positive for iridovirus (3.5)
- Miles City NFH
 - '03 Pallid Sturgeon
 120 fish collected 2/04; 100% negative for iridovirus
 - '04 Pallid Sturgeon
 6 fish collected 8/6/04; 100% negative for iridovirus
- Bozeman Fish Tech Center
 - '03 Pallid Sturgeon
 180 fish collected 3/04; 100% negative for iridovirus
 - '04 Pallid Sturgeon
 5 fish collected 9/14/04; 100% negative for iridovirus

^{*}overall fish condition was evaluated but only iridovirus status results presented.

- Analyzed fish health assessment data collected 2003 progeny 4 facilities (>650 fish sampled) representing 3 females and presented results at December 2004 Upper Basin Workshop.
- Initiated iridovirus monitoring study at Garrison Dam NFH in October 2004
- Continued working with Dr. Ron Hedrick on development of DNA based assays for pallid sturgeon iridovirus.

Pallid Sturgeon Annual Report 2004 Bozeman Fish Technology Center 4050 Bridger Canyon Road, Bozeman, MT 59715

INTRODUCTION

The Bozeman Fish Technology Center (BFTC) became involved with the pallid sturgeon recovery efforts in June of 2000. The location, water source, and hatchery capacity for rearing pallid sturgeon made the BFTC an ideal facility to join the restoration efforts of the pallid sturgeon. Primarily, the decision was primarily due to the absence of iridovirus detection above Fort Peck Dam and a positive detection below the dam. Annual iridovirus evaluations occur every year during the spawning effort with adult shovelnose and pallid sturgeon captured above Fort Peck Dam. As of June 2004, the iridovirus has not been detected in Recovery Priority Area #1 (RPA). There are concerns that the virus might be a limiting factor to the recruitment of YOY pallid sturgeon. Fish spawned above Fort Peck Dam only would be allowed for mitigation efforts in RPA #1. However, years when pallid sturgeon are not captured in RPA #1 for spawning efforts a sub-sample of eggs from below the dam would be incubated at the BFTC. Pending iridovirus evaluations, a negative status for the iridovirus from the testing would permit fish to be stocked into RPA #1.

OBJECTIVE

Objectives were established during the annual pallid sturgeon March meeting at Miles City, MT. Four to five families would be reared to a size ≥ 8 " for tagging purposes. Eggs would be collected from streamside spawning efforts at Jones Island on the Charles M. Russell Refuge (CMR) located in RPA #1. One to two females and two to four males would be the targeted catch. A sub sample of eggs from each family lot would be sent to Gavins Point National Fish Hatchery (GPNFH) for future brood. In the event that no ripe females were captured from RPA #1 eggs from Miles City State Fish hatchery and or Garrison Dam National Fish Hatchery could be transported and reared at the BFTC.

Spring Capture June 2004

Spring capture of adult pallid sturgeon was very successful capturing two females and three males. One of the females was determined that it would not produce any eggs for the 2004 spawning season. A radio transmitter was implanted and the fish was released. The other female was gravid and was transported back to the Jones Island spawning station. One of the three males captured was represented in the population from a previous spawn and was not utilized for producing a family lot. However, milt still was collected and sent to Garrison National Fish Hatchery for cryo-preservation. The other two males were not represented from previous spawns and were utilized to produce two family lots. For additional capture information see Performance Report, Upper Missouri River 2004 by Bill Gardner.

SPAWNING

The spawning process for the stream side efforts was also successful. There were concerns about the unstable water temperatures but a mechanism to control water temperature was not available. The female that was gravid was a new capture (132211792A). The two males that were used for spawning were recaptures but neither of the males were captured in the previous four years. After phone conversations with Rob Holm (and many more phone calls on Rob's part), male gametes from the Garrison National Fish Hatchery (GNFH) were permitted to be transported to the Jones Island spawning site. Two additional family lots were created with the GNFH males to create a total of four family lots.

• 6/6/04 - The female was tubed to determine a polarity index. Results from three eggs indicated a PI of 0.11, 0.08, and 0.09. The eggs had a two tone color with a crescent shape. A lighter color was observed around the germinal vesicle and a darker color surrounding the rest of the egg. The belly of the fish felt soft towards the vent but still firm towards the pelvic fins. Two males were also tubed to see if there was any milt production. Neither of the males produced any milt.

Upon phone conversations with Herb Bollig and Rob Holm it was recommended to wait a few more days prior to injection.

• 6/9/04 – All three males were injected at 7:30 pm with LHRH at 20 ug/kg. Two ml of saline was added to a 1 mg vial of LHRH to make a 0.5mg/ml solution. Dosages were as follows:

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132235554A (Lenny) was 14 kg = 0.55 ml
7F7E42795C (Fred) was 16 kg = 0.64 ml
1F4A4B5973 (Lew) was 14 kg = 0.55 ml
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The purpose for injecting the males was to assure that there would be viable milt prior to injecting the female.

- 6/10/04 Checked all three males at 7:00 am. Fred was the only male to produce milt. Checked males again at 11:00 am. All three males were producing milt. Tubed female at 1:00 pm to determine a Polarity index. Results from three eggs were 0.09, 0.09, and 0.08. Female was injected twice. The priming dose (10% of total) was administered at 6:00 pm. One ml of saline was added to a 1 mg vial of LHRH resulting in an injection of LHRH at 100 ug/kg at 6:30 pm
- 6/11/04 Administered resolving dose (90% of total) at 6:30 am. Dosages were as follows: 132211792A (Glenda) was 14kg = 1.4 ml
 Priming dose = 0.14 ml 6:30 pm
 Resolving dose = 1.26 ml 6:30 am

Female was feeling much softer throughout her belly. Eggs had a similar appearance as they did before with the two tone crescent color. Collected milt from all males at 7:00 am. All males are producing milt very well.

- 6/11/04 Palpated female at 4:00, 6:00, and 8:00 pm. No eggs were collected. Gave female a four hour intermission.
- 6/12/04 Palpated female at midnight and collected approximately 200 eggs. Gave female another four hour intermission. Palpated again at 4:00 am and collected 100 ml of eggs. A lot of ovarian fluid was released at first. The eggs collected at 4:00 am did not flow very smooth from the oviduct. Gave female a three hour rest. Began to palpate female at 7:00 am and collected 300 ml. At 9:30 am worked female and collected 375 ml. Eggs were flowing very smooth from oviduct. A good stream of eggs were released then stopped abruptly even with additional palpations. At 11:30 am collected 175 ml. Female looks good with no signs of stress still very energetic when handling. At 1:30 pm collected another 375 ml. At 3:30 pm collected 175 ml of eggs. At 3:30 pm each family lot had an equal representation of 375 ml of eggs. With the amount of eggs collected and the representation of each family a decision was made to release the female rather continue with the palpations. At 4:00 pm the female was released. At the time of release the female looked very good. There was no sign of stress and she was still very energetic.
- Looked at eggs from earlier spawns and they are showing signs of cleaving. Very high percentage (> 90) of eggs from earlier spawns has this condition.
- 6/12/04 After last spawn at 3:30 pm eggs were double bagged (with oxygen) sealed and transported to the BFTC.
- 6/12/04 Bill Gardner was notified that the spawning process was complete. Montana Fish Wildlife and Parks staff implanted radio transmitters in all three males and released them on 6/13/04.

Egg Allotment

Time	Lot#	Lot#	Lot #	Lot#	Total ml
	(male)	(male)	(male)	(male)	collected
6/11/04	132235554A	1F4A312640	1F4A3E1445	7F7E42795C	
4:00pm					0 ml
6:00pm					0 ml
8:00pm					0 ml
Midnight	200 eggs				200 eggs
4:00am				100 ml	100 ml
7:00am	300 ml				300 ml
9:30am		225 ml	150 ml		375 ml
11:30am				175 ml	175 ml
1:30pm		150 ml	225 ml		375 ml
3:30pm	75 ml			100 ml	175 ml
Total/family	375 ml	375 ml	375 ml	375 ml	1500 ml

- Injected female priming @ 6/10/04 6:30 pm, resolving @ 6/11/04 6:30 am
- Injected males @ 6/09/04 7:30 pm
- Female PIT tag no. 132211792A

Water temperatures during spawning

6 th	7:00 am	68.5°
7 th	7:00 am	63.5°
8 th	7:00 am	59.2°
9 th	7:00 am	58.1°
10 th	7:00 am	60.8°
11 th	7:00 am	61.8°

• Hobo thermo logger has since been purchased to monitor temperature through out the spawning process for 2005.

INCUBATION

Eggs were incubated on flow through water throughout their incubation period. Flow through spring water was used rather than re-use (typically used at the BFTC) to avoid any fungal infection from high organic loads. After hatch, fish were kept on flow through water until the previous year class was stocked and re-use systems could be sterilized. At no time were two year classes of fish on the same water system. During rearing of the 2004 year class, there was no mechanism in place to treat the flow through water. A small UV system has since been purchased for the specific use of rearing pallid sturgeon eggs and fry. This will allow the BFTC to keep year classes separate and treat the small volume of water used in the early stages of pallid incubation and rearing (< 30 GPM). The new UV system is rated at 90,000 uWs/cm² @ 28 GPM. Water temperature during the incubation process was approximately 61.3° F. Water temperatures were recorded every morning. A hobo thermo logger has since been purchased to monitor the temperature for the 2005 season.

Even though hatch rates were excellent for all of the family lots, survival was low. There was no quantitative analysis completed to determine exact hatch and survival rates. Rates were only estimated and are as follows:

Lot (male tag)	1445	2640	554A	795C
Hatch rate	> 90%	> 90%	> 90%	> 80%
Survival to age	7.1%	0.5%	1.1%	0.2%
4 months				
Male origin	Garrison	Garrison	Upper Missouri	Upper Missouri

- Rates and survival was based on estimated number of eggs collected.
- 6/12/04 4:30 pm transported pallid eggs to the BFTC.

- 6/13/04 Looked at 10 to 20 eggs per family. Very high percentage of eggs are developing well. Cleaving is very apparent. Eggs are rolling gently with in the jar.
- 6/15/04 Looked at 10 to 20 pallid eggs per family. Very high percentage of eggs are showing signs of early notochord development > than 85%.
- 6/16/04 Sent Gavins Point a representative sample of all family lots for future brood.
- 6/17/04 Pallid eggs are showing clear sign of notochord development. Eggs look excellent so far at this stage.
- 6/18/04 Pallid eggs are beginning to hatch in the afternoon. Water temperature is still @ 61.5°F.
- 6/20/04 Emptied all egg jars into tanks. All family lots look like > 90% hatch. Fry are using the full water column. No mortality has been observed and fry look good.
- 6/28/04 Yolk plug was still visible in pallid sturgeon. Began to give some cyclo-peeze (crushed micro crustaceans) to acclimate them to feeding. Looked at some pallid fins under scope for development, so far they looked good. 7/4/04 Pallid sturgeon had all pasted their yolk plug. Fed 24 hr/day and cleaned tanks in the morning and at night. Used a feed manufactured at the BFTC and added cyclo-peeze 3 to 4 times daily. Some of the fins had a concave appearance to them when looking through scope. Some of the fish had frayed edges on the pectoral and caudal fins. However, fins were very fragile. Could easily make deformities during examinations (tweezers).
- 7/8/04 One lot of pallid sturgeon was experiencing high mortality (7F7E42795C). Could easily see the fish that were going on to feed and the ones that were not. All lots were experiencing mortality. Typically the fish that were not going on to feed were the majority of the mortalities. Took 5 fish to the fish health center.
- 7/12/04 Mortality seemed to be stabilizing. Still seen some torn edges on the pallid fins.
- 7/14/04 Looked at some pallid sturgeon and saw some external parasites. The parasites where not in high numbers. The majority of the parasites examined are around the gills and operculum. Contacted the fish health Center and discussed possible treatments. It was agreed that the fish were still too small to handle any type of formalin or oxytetricycline treatment.
- 7/27/04 Contacted Gavins Point and they sent a few fish up from the same family lots for fin evaluations. Some of the fish had similar torn edges on the pectoral and caudal fins. Did not seem to be as many fish with that condition or as severe from Gavins Point. Have not touched fish to count yet.
- 8/13/04 Noticed fin curl on pallid sturgeon.
- 8/27/04 Most of the pallid sturgeon were still using the full water column. Growth variances between family lots were beginning to show.
- 9/13/04 There were still some mortality occurring. Fish were on average 1.5". Four external parasites were observed. The parasites were not in high densities but still caused irritation. *Costia, Gyrodactylus*, and two unknown organisms were observed exteriorly. One of the unknowns was thought to be a native snail in the early life stages. Neither of the unknowns were observed in high numbers and both were rare to find.
- 9/14/04 Treated some shovelnose sturgeon with formalin 100 ppm for 40 minutes (7:00 am). Fish handled the treatment very well. Treated 1 tank of pallid sturgeon in the afternoon. Pallids also handled the treatment very well.

- 9/15/04 Treated the rest of the pallid tanks with 100 ppm formalin @ 30 minutes. All of the pallid tanks handled the treatment very well.
- 10/3/04 Noticed external parasites on sturgeon again and mortalities were beginning to rise. Treated fish with 50 ppm @ 40 minutes. Fish handled the treatment very well. Post treatment, no external parasites were observed.

PROPAGATION

The 2004 year class was reared with flow through water until the 2003 year class was stocked and the water re-use system could be sterilized. Twelve 4' tanks were used for the first four months of rearing. Once the 2003 class was stocked, the 2004 class was moved to twelve 6' tanks and transferred to a water re-use system (10/20/04). Mortality was high for the first few months. Getting fish to actively feed and external parasites accounted for the majority of the mortality. A portable UV system has since been purchased to eliminate external parasites during flow through operations.

Temperature was reduced for several months to simulate a thermo regime. This year the temperature was only reduced for a two month period. Fish were very lethargic and their condition was reducing on the cooler water temperature. As noticed in the past, when water temperature is reduced to 55° F, the fish are below growth and feeding rates radically diminishes. Previous year classes of pallid sturgeon reared at the BFTC have handled the cooler water temperatures for longer durations. However, this year (2004 class) the pallid sturgeon seemed more sensitive to the cooler temperatures. Also, growth rates for the 2004 class compared to previous year classes were significantly reduced and slower.

Temperature (° F)

Month	High	Low	Average	Comments
June	63.2	58.4	60.8	
July	63.2	58.4	60.8	
August	70.2	60.1	65.1	
September	73.4	68.2	70.8	
October	72.1	62.5	67.3	
November	69.7	66.8	68.5	
December	67.9	60.2	64.1	
January	60.1	50.2	55.1	
February	55.2	50.1	52.1	
March	64.6	62.7	63.6	
April	65.6	62.9	64.2	
May- Release	70.2	64.3	67.3	Expected

Mortality was similar to previous years with high mortality for the first few months and gradually slowing. There was high incidence of morality in April which was associated with a power disturbance (details are listed below). Mortality and growth varied amongst all family groups for the first few months.

Fish were not handled until September when they were approximately 1.5" to reduce stress. When handling did occur it was conducted as rapid as possible and fish remained in water when possible. Tanks were cleaned twice daily for 1.5 months and cleaned once a day for the remainder of the rearing. A small sub sample of fish was weighed and measured to establish condition factors and to calculate feeding rates for the first seven months.

Mortality

Month	Total	Total %	Comments
	Mortality		
June	NA		Received eggs and hatched
July	NA		Did not handle
August	NA		Did not handle
September	205	13.3 %	
October	91	6.0 %	
November	44	3.1 %	
December	23	0.9 %	
January	60	4.3 %	
February	23	1.7 %	
March	12	0.9 %	Mostly runts
April	269	22.8 %	See report below

Date: April 12, 2005

Subject: Pallid sturgeon mortality April 10th, 2005.

By: Matthew Toner, Hatchery Manager, Bozeman Fish Technology Center

Contact: (406) 587-9265 x 115; matt toner@fws.gov

BACKGROUND

The Bozeman Fish Technology Center rears pallid sturgeon as part of captive-rearing of wild spawned pallid sturgeon. Each spring staff assists with river-side spawning on the Missouri River and fertilized eggs are brought back to our station for rearing. Although our facility is not set-up for large-scale production, rearing at the Bozeman Fish Technology Center has been important because pallid sturgeon at our site have remained free of sturgeon iridovirus. We work closely with the State of Montana Fish Wildlife and Parks to collect the fish, rear them according to Recovery Team standards and provide yearling pallids to meet annual stocking goals. Pallid sturgeon are kept on a flow-through system when they arrive to prevent fungus accumulation on eggs. After they are large enough (1-2"), they are moved to a recirculation system to allow more efficient water use. We keep track of daily mortality and sample monthly for size and weight to track growth. Feeds have been developed to encourage growth and discourage deformities through the on site feed lab. In addition to the yearling pallids, we have 20-30 four year old sturgeon targeted for stress, blood-hormone and radio-tagging movement studies. In addition, Montana State University will be conducting a study on 2004 post release survival.

All fish on site are cared for daily including feeding and cleaning. This includes weekend duty.

INCIDENT

On the morning of April 9th starting at 8 am, Yvette Converse checked, cleaned and fed fish on site according to weekend protocols. Young of year (YOY) pallid sturgeon were fed; water was flowing. Upon arrival on April 10th at 7:00 am, Matt Toner found that water to re-use system #2 (out of 3 recirculating systems) was not flowing. Water remained in the tanks, but without flow, water quality was diminished. Matt started the back-up pump and water began to flow. At that time, YOY and four year old pallid sturgeon were on re-use system #2. The four year old pallid sturgeon were not affected by the reduce water flow due to the light density (six fish/6' tank). However, five tanks of the YOY pallid sturgeon were affected. Higher density tanks were more affected than low-density tanks; however, all fish densities were kept below recommended values set forth by the pallid sturgeon propagation handbook of 0.5 lb/ft² (draft form). As a result of diminished water quality and most likely, low oxygen, a total of 262 YOY pallid sturgeon died. The remaining 1047 YOY pallid sturgeon were alive and under usual care at the Bozeman Fish Technology Center.

FISH DISPOSITION

All pallid sturgeon mortalities were placed in Ziplock baggies in the freezer. We will retain these for one month. If no other use for these is suggested, the fish will be properly disposed.

EVALUATION

The reduced water flow condition is believed to have been caused by a power interruption at the local power sub-station. This interruption caused pump #1 to malfunction. The internal malfunction of the pump has not been examined yet, but Matt Toner plans to look at the pump within the next week. The power interruption also disrupted an alarm notification system (Zetron unit). The notification system would normally send phone calls to two mobile phone units (staff members carry phones for evening on-call and week-end duty) then begin to call staff members at their residence with a pre-programmed alarm message until the alarm is acknowledged. With this power disruption, a fault occurred in the battery of the Zetron unit, and no phone messages were sent.

PREVENTION

At the present time all alarm systems are relying on phone lines and electrical components of some kind. Additional measures are being pursued to build in back-up features to the alarm notification and pump failure systems. Matt Toner and Jon Gilleen (Bozeman Fish Technology Center maintenance mechanic) are working a redundant system to prevent fish kills by triggering oxygen during a flow cut-off. In the event of a phone and/or power disruption, a reserve oxygen supply will be initiated. The system is independent from any electrical system. If the phone system is not operable to send an emergency alarm and a pump failure occurs, oxygen will begin to flow to the culture tanks. This system will have a 24 hr supply of oxygen, increase the response time to an alarm, and reduce any mortality within 24 hr of the event of a pump failure. All additional systems are planned to be completed within 45 days of April 10th, 2005.

STOCKING

Fish are planned to be stocked in mid August 2005. Fish will be individually weighed and measured. Presently, the plan is to PIT and elastomer tag fish prior to release. There are approximately 1024 pallid sturgeon remaining at the BFTC of that 150 fish will be used for experimental purposes.

- Ninety will be used for the Assessment of post stocking dispersal of age 1 pallid sturgeon: Implications for acclimation and remote incubation: Principal investigator – Christopher Guy
- Eighty will be used for the Transmitter expulsion rates of telemetered juvenile hatchery reared pallid sturgeon: Principal investigator Matthew Jaeger

All other fish will be transported to the Missouri River and stocked at five separate locations. Tagging and transportation date is to be determined by BFTC and Montana Fish Wildlife and Parks Lewistown office.

Family Lot: As of 3/28/05

Male #	Female #	Male origin	Total #
7F7E42795C	132211792A	Upper Missouri	33, Possibly will be
			transported to Gavins Pt.
			for future brood.
132235554A	132211792A	Upper Missouri	164
1F4A312640	132211792A	Garrison	69
1F4A3E1445	132211792A	Garrison	1049

FISCAL YEAR 2004 STURGEON ACTIVITIES AND ACCOMPLISHMENTS

by Herb Bollig

Gavins Point National Fish Hatchery 31227 436th Avenue Yankton, South Dakota 57078-6364 Herb Bollig@fws.gov

December 6, 2004

The Gavins Point National Fish Hatchery (NFH) has been involved with the spawning, rearing, tagging, stocking, and other recovery activities, of the endangered pallid sturgeon for 14 years. The Gavins Point NFH was designated as the lead facility for the propagation and stocking of pallid sturgeon with lesser emphasis on the paddlefish, shovelnose sturgeon, sturgeon and sicklefin chubs, and the surrogate flathead chub. There has been some discussion in the last few years about our hatchery, also, rearing the endangered Topeka shiner. Our field station is currently holding 38 families (7 year-classes) of future (captive) pallid sturgeon broodstock; rearing one year-class of juveniles for stocking purposes; sampling these fish for disease; conducting INAD (LHRH) investigations; holding cryopreserved sperm (milt), and completed more modifications to our existing buildings (Endangered Species and Sturgeon buildings) to accommodate this endangered species. Our facility received \$1,435,000 of reimburseable funding from the U.S. Army Corps of Engineers to construct the new Advanced Rearing and Broodstock Holding Facility for pallid sturgeon, which contains a 3,000 gallon/minute microfiltration/UV disinfection unit, twelve-20' diameter tanks, and eight-30'diameter tanks. There is a built-in expansion capability that will allow for the future addition of three-30' diameter tanks and one 20'- tank.

Fiscal Year 2004 was the seventh consecutive year that pallids were stocked in the Missouri River Basin from our hatchery, with this year's fish being stocked in RPMA's 3 and 4. Eggs from four crosses (families) made from the spawning of pallid sturgeon adults from above Fort Peck Reservoir in Montana were shipped to our hatchery for stocking and future broodstock development. Pallid Sturgeon Recovery Plan (PSRP) objectives were addressed through agency cooperation, research, and hatchery propagation. Up until the new building was constructed this year, our hatchery was operating at or near capacity in an effort to produce fish that will be stocked in high Recovery Priority Management Areas (RPMA) throughout the upper Missouri River and tributaries. No spawning of any pallid adults occurred at our hatchery during Fiscal Year 2004; but spawning did occur, again, at the Miles City SFH, MT, with the Gavins Point NFH taking the lead on this work. We have an excellent partnership with the Montana Fish, Wildlife, and Parks, and the staff at the Miles City SFH, Miles City, MT, and have successfully spawned pallids at their facility for the last four years, because of this cooperative effort. Disease inspections (for iridovirus and other diseases) have been conducted twice-yearly at our hatchery for the last several years with the pallid sturgeon testing positive, but not symptomatic, except for the young-of-the-year group. Sturgeon propagation and stocking continues to be seriously impacted by the viral concerns.

The short-term goal of the PSRP is to prevent extinction of the pallid sturgeon species. This may only be possible by removing adults from the wild, propagating and stocking the juvenile fish, and establishing captive broodstock populations. The long-term recovery objective of this plan is to recover and restore these fish in the freeflowing reaches of the Missouri River Basin. The overall objective is to downlist and delist this endangered species by 2040 through protection and habitat restoration activities, providing that the following criteria are met: 1) naturally reproducing, self-sustaining populations exist within each recovery area, and that 2) a minimum of 10 per cent of the sturgeon population within each recovery area is comprised of mature females.

The following is an account of what has been accomplished at the Gavins Point NFH for pallid sturgeon recovery during the 2004 Fiscal Year, chronologically:

A total of 2,719 pallid sturgeon fingerlings weighing 72.4 lbs. were transferred from the Garrison Dam NFH to the Gavins Point NFH for future broodstock development and stocking purposes. There was a total of eight family crosses represented among the fish that arrived. - 10/6/03

The Gavins Point NFH hosted the second meeting of the Propagation Committee whose attendees were involved with the updating of the Pallid Sturgeon Propagation/Genetics Plan. Representatives from state and federal hatcheries; fish health centers (R3 & R6); Regional Offices (R3 & R6); Montana Fish, Wildlife, and Parks (Bob Snyder); Columbia, Missouri FRO; and Missouri River FWMAO, ND, were here to provide input and complete this project. - 10/7-8/03

A total of 1,600 pallid sturgeon fingerlings weighing 52.4 lbs. were transferred from the Garrison Dam NFH to the Gavins Point NFH for future broodstock development and stocking purposes. - 10/15/03

There was a conference call between Region 6 Fisheries, engineering, contracting, and Gavins Point NFH personnel regarding the design, funding, and specifications for the new **Advanced Rearing and Broodstock Holding Facility** for pallid sturgeon. This teleconference kicked off the process to have the new building constructed, which will enhance the recovery of this endangered species. Funding for this project was provided by the Corps of Engineers, and, at this time, they wanted the building to be designed, contract awarded, and constructed with all funding expended by the end of Fiscal Year 2004. Much of the work was completed force account. - 10/27/03

Herb Bollig completed the questionnaire that was developed by the Upper Basin Pallid Sturgeon Recovery Review Committee. The responses from this questionnaire were used by the committee to obtain a general sense of the issues that may be impeding recovery efforts and possible solutions. The Workgroup requested that the Western Division of the American Fisheries Society conduct a peer-review of the existing workgroup, and make recommendations regarding the implementation of the plan to enable the workgroup to function effectively and efficiently. - 10/30/03

Various groups and individuals from the Corps of Engineers were here during the month of November to visit our facility, determine our needs, and review our justification for the construction of the new **Advanced Rearing Broodstock Holding Facility** for pallid sturgeon. These included the Environmental Advisory Board, T & I Committee staff, Secretary of the Army, John Woodley, Brigadier General William Grisoli, Lieutenant Colonel, Peter Taylor, George Dunlop, James L. Connaughton, Larry Cieslik, and Kenneth Cooper. 11/4/03, 11/8/03, 11/19/03

Information was provided to the Propagation Committee concerning updates to the Pallid Sturgeon Propagation Plan. Areas of interest were maximum rearing density recommendations for three length sizes of fish, feed chart information, length/weight records, and suggestions for what we want reported in or with the Fish Health Assessment and what form (tabular, graph, etc.). - 11/6/03

A summary of last year's pallid sturgeon activities was completed and forwarded to the Missouri River FWMAO, Bismarck, ND; to be included in the future publication entitled Pallid Sturgeon Update. - 11/17/03

A supplemental needs list was completed and provided to the Corps Of Engineers for items that were needed to culture pallid sturgeon during Fiscal Year 2004. - 11/20/03

Herb Bollig completed the writing of the Captive Broodstock section of the Pallid Sturgeon Propagation Plan, and this document was forwarded to committee chair, Bob Snyder, Montana Fish, Wildlife, and Parks. - 11/25/03

Terry Melloy (Bucon/GSA, Kansas City, MO) and Steve Kneifl (Kelly Klosure Installation Services/GSA, Fremont, NE) were both here to discuss specifications and site conditions for the new **Advanced Rearing and Broodstock Holding Facility** for pallid sturgeon prior to each company placing a bid for its construction under the Request For Quotations (60181-3-Q043). - 12/01/03, 12/11/03

Herb Bollig completed the Pallid Sturgeon Propagation Summary for the Corps of Engineers for the Corps of Engineers and forwarded a copy to Mark Drobish, USACOE, Yankton, SD, for their use. - 02/03/04

Herb Bollig completed the abstract entitled "Culture of Pallid Sturgeon at the Gavins Point NFH" for the presentation that he made for the South Dakota Academy of Sciences meeting held at Cedar Shore Resort, Chamberlain, SD, on 4/2/04. 02/13/04

Mark Farr, Waterways Experiment Station, Vicksburg, MS, confirmed the presence of zebra mussel veligers in the samples sent to him by Larry Hesse. They were found from samples collected in the Fort Randall reach (near Verdel, NE) and below Gavins Point (St. Helena, NE). The Fort Randall reach is the Missouri River section above Lewis and Clark Lake, the water supply for our hatchery. We may find that this may pose some real ramifications for our program in respect to operations, stocking, endangered species program, and fish and egg requests. - 02/13/04

Notification was received from the USACOE that the funding for the new Advanced Rearing and Broodstock Holding Facility for pallid sturgeon was now available for use to construct the building. The funding for the building and microstrainer/ultraviolet light disinfection systems was in the area of \$1,400,000. The actual contract for the new pallid sturgeon culture building was awarded on March 18, 2004. An additional funding allotment of \$23,000 was added for the Fiscal Year 2004 operations of the endangered species program. - 02/18/04

The hatchery staff attended the Annual Pallid Sturgeon Planning Meeting at the Corps of Engineers Visitor Center, Yankton, and South Dakota. Such issues as zebra mussels, propagation and stocking plan updates, tagging, pallid sturgeon stocking, facilities improvements, spawning and rearing, adult capture and crosses, responsibilities, sexing of fish, staging of eggs, cathetorization, etc. were discussed. - 03/4-5/04

Both of the LHRH hormone INAD Project Worksheets for paddlefish and pallid sturgeon were forwarded to the National INAD Office, Bozeman, MT. Project study numbers were assigned for this work for this year. - 03/31/04

Herb Bollig attended the 89th Annual Meeting of the South Dakota Academy of Science at the Cedar Shore Resort, Oacoma, SD. The presentation entitled "Culture of Pallid Sturgeon at Gavins Point NFH" was given to the attendees of the Plenary Session. - 04/02/04

Iridovirus samples (histological and PCR) were taken from three 2003 year-class pallid sturgeon juveniles exhibiting symptoms of this disease. These were shipped to the Bozeman FHC, MT, for analysis and identification of the disease. These fish were later found to have iridovirus. - 04/13-15/04

The Gavins Point NFH held its second Annual Open House. Additionally, a short ground breaking ceremony was held for the new Advanced Rearing and Broodstock Holding Facility for pallid sturgeon with individuals attending from the Corps of Engineers, Fish and Wildlife Service (Gavins Point NFH and Regional Office), and the contracting company (Bucon, Inc./Welfl Construction). Between 200 and 300 people attended the Open House. A story about the pallid sturgeon and the open house and ground breaking ceremony was published in the Yankton Daily Press and Dakota newspaper written by Jay Gravholt and broadcast by the local radio stations. - 04/15-17/04

Twenty pallid sturgeon juveniles were sent to Terry McDowell at the University of California, Department of Medicine and Epidemiology, Davis, CA, for them to do research on the iridovirus that infected the 2003 year-class. - 04/22/04

Congressman of the 5th District in Iowa, Steve King, was here with Iowa Agricultural Representative, Wayne Brincks, for a visit and tour of the hatchery, aquarium, and endangered species program. He was very interested with the Missouri River issues, culture and stocking of pallid sturgeon, survival after stocking, and some of the partnerships that have been formed to get all of this work completed. - 04/23/04

A request was submitted to the Division of Fisheries, Engineering, and Contracting for the Sole Source Purchase of a rotating drum microstrainer and ultraviolet light disinfection systems to be installed in the new pallid sturgeon culture building. The request was for the purchase of this equipment valued at \$248,795. - 04/28/04

The various families of 2003 year-class pallid sturgeon, reared within the Endangered Species Building, were sample counted, inventoried, and split into tanks in order to give them the proper amount of room to grow. - 05/17-19/04

Initial testing of the treatment needed to eliminate zebra mussel veligers within our hatchery water supply when fish are, also, present. Various fish species were used to determine the effects of the 750 ppm potassium chloride with none of them showing ill effects. - 06/03/04

Herb Bollig and Craig Bockholt traveled to the Miles City SFH, MT, to cathetorize the three pallid sturgeon adult females that were located there for spawning purposes. Eggs were collected from two females, boiled in Ringer's solution, and sectioned in order to determine the position of the nucleus within the egg. Polarization indices were calculated for both females, and were in the range of 0.15-0.17 - much to great for spawning this early. From the looks of the eggs, we predicted that actual ovulation and spawning would probably occur in two to three weeks. - 06/7-8/04

Approval was received from the Bozeman FHC, MT, and the State of South Dakota to import pallid sturgeon eggs from the Bozeman FTC and three families of pallid sturgeon juveniles from the Miles City SFH, MT. Rick Cordes faxed copies of the Importation Permits to our hatchery for our files. - 06/16/04

Pallid sturgeon eggs were received from the Bozeman FTC, MT, after the recent spawning of adults captured from above Fort Peck Reservoir. According to Matt Toner there were approximately 150 ml. Of eggs from each of the four crosses (families) with the sample count running about 42 eggs/ml. giving us a total of 25,200 eggs. Tim Schroeder met Matt at Spearfish, SD, which was about midpoint between Yankton and Bozeman. These eggs started hatching on the next day after receipt. - 06/17/04

Craig and Herb returned to the Miles City SFH, MT, to cathetorize the three pallid sturgeon adult females and determine egg stage and potential ovulation date. Polarization Indices for all three females averaged 0.10, with us making the decision to return in a week to commence spawning of these fish. Temperatures of the hatchery water was near 64 degrees Fahrenheit. - 06/21-22/04

Herb and Craig returned to Miles City to check the adult female pallid sturgeon and stage the eggs. We determined that the polarization indices were in the area of .08 and decided to spawn the fish. Over a period of nearly 18 hours a total of 12 different family crosses were made using the eggs from the four females and nine different males. Egg total was in the area of nine quarts @ approximately 50,000 eggs/quart = 450,000 eggs. - 06/28-30/04

Linda Vannest and Marlene Rodarte, Bozeman FHC, MT, were here to lethally sample 100 of the 2003 year-class pallid sturgeon juveniles. These fish were examined for disease, fatty livers, lesions, etc., primarily iridovirus, prior to any stocking or movement of fish to another fish hatchery. Incidentally, the fish sampled were 9.87 lbs. @ 10.2 fish/lb. = 100 fish and averaged nearly 9.7 inches in length. They had grown a little over 2 inches in length during the month of June. The time of sampling varied somewhat from what previously had occurred, and was during the summer when fish are experiencing a fast growth period. We are anticipating the fish will show improvement in the iridovirus prevalence and severity. - 07/08/04

Brad Penner, Nebraska Educational TV, Lincoln, NE, was here to tour our hatchery facilities and videotape the various year-classes and families of pallid sturgeon. He was interested in the methods used to propagate, tag, and stock this species. - 07/12/04

The hatchery crew completed the PIT-tagging of the 51 pallid sturgeon fingerlings weighing 7.83 lbs. These fish were stocked at Boyer Chute, NE, as part of the ceremonial stocking event scheduled there on 8/2/04 at 1:00 p.m. - 07/20/04

The general temperature histories for the 2002 and 2003 year-classes were completed and emailed to Crystal Hudson, Bozeman FHC, MT. Additionally, the Fiscal Year 2002 and 2003 Sturgeon Activities and Accomplishments reports were forwarded to her, which includes the Lot History-Production for these two year-classes, plus all of the others that we have on station. - 07/26/04

Herb Bollig attended the Lewis and Clark celebration of the Boyer Chute NWR, Fort Calhoun, NE. Part of the celebration was the ceremonial stocking of 51 juvenile pallid sturgeon with various dignataries from the Corps of Engineers, U.S. Fish and Wildlife Service, American Rivers, State of Nebraska, Audubon Society, and others.

Stocking and tagging information for pallid sturgeon was forwarded to Kristine Nemec, COE, Omaha, NE, for Recovery Priority Management Area (RPMA) No. 3. This included the number, weight, and tagging method for these fish for the last several years. - 08/04/04

The Gavins Point NFH hosted the joint Region 3 - Region 6 Pallid Sturgeon Coordination Meeting that was held at the Best Western Kelly Inn, Yankton, SD. USFWS personnel from both Regions representing Fish Health Centers, Fish and Wildlife Management Assistance Offices, hatcheries, Regional Offices, and Ecological Services attended the meeting. Discussions were on disease, nutrition, tagging, rearing facilities and densities, stocking, propagation, disposal, etc. - 08/11-12/04

Pallid sturgeon milt (sperm) from 10 males was transferred from the Garrison Dam NFH to the Gavins Point NFH for further long-term preservation. - 08/12/04

The LHRHa3: Results Report Form for the LHRH INAD (Study Number 8061-04-18) was forwarded to the Bozeman INAD Office with all of the pallid sturgeon data generated during the spawning effort that occurred in late June at the Miles City SFH, MT. - 08/17/04

The pallid sturgeon Fish Health Assessment Report was received concerning the results of the 2003 year-class juveniles that were sampled in early July. These juveniles resulted from the spawning of three adult females. The assessment describes a low incidence of iridovirus, a normal fatty liver condition, and normal hematocrits. - 08/19/04

Rearing and production data, and our assessment of this information concerning the pallid sturgeon 2003 year-class fish at our hatchery, was provided to the Great Plains FWMAO, SD. This information, along with the Pre-Release Fish Health Assessment and the Moderate Fish Health Risk Score of 85, will be used to develoop the Risk Assessment for these fish prior to them being stocked in RPMA # 3 or RPMA # 4; and prior to any future pallid sturgeon future broodstock being shipped to our hatchery from Bozeman FTC, MT, and Garrison Dam NFH, ND. - 09/07/04

Craig Bockholt traveled to the Garrison Dam NFH, ND, with our large distribution truck in order to assist them with the coded-wire-tagging and elastomere tagging of small pallid sturgeon fingerlings. Additionally, we loaned our coded-wire-tagging machine and tag detector to Garrison until the tagging and stocking are completed. - 09/07/04

Craig Bockholt and Mark Drobish (COE) returned to our hatchery from the Garrison Dam NFH with a load of 6,634 tagged pallid sturgeon fingerlings destined for stocking in the Missouri River at the Bellevue, NE, stocking site. Once the distribution truck reached our hatchery, it was refueled and new drivers (Tim Schroeder and Jeff Powell) stocked the fish. - 09/10/04

The new rotating drum micrstrainer/ultraviolet light disinfection systems were delivered. These units were purchased from EMA Marketing, Philomath, OR, for \$248,795, and will be installed in the new Advanced Rearing and Broodstock Holding Facility for pallid sturgeon to condition the water prior to entering the large, circular fiberglass tanks that will be used for culture of the endangered pallid sturgeon. - 09/13/04

Dale and Darlene Svacina started their work to assemble, sand, and fiberglass the 20 circular, fiberglass tanks within the new pallid sturgeon culture building. - 09/13/04

Four pallid sturgeon juveniles from the 2004 year-class were sampled, preserved, and forwarded to the Bozeman FTC, MT, in order to compare the fin condition of our fish with those reared at their facility. The Bozeman Fish Technology Center has had a problem with fin curl in their sturgeon, and we do not. Everything appears to be the same, except for the water quality. - 09/14/04

The Standard Operating Procedures For The Distribution Of Fish from our facility was forwarded to Jim Peterson and Bob Snyder, Montana Department of Fish, Wildlife, and Parks. This information was requested, and needs to be approved by them, prior to any pallid sturgeon being distributed from our hatchery into their State. This is particularly true in light of the fact that zebra mussel veligers have been discovered in the Missouri River below Fort Randall Dam, our hatchery water supply. - 09/28/04

In response to the request by Todd Turner, Region 3, we developed a summary of our current and anticipated capacities for adult and juvenile pallid sturgeon within our endangered species

complex. This, also, included numbers and dimensions of juvenile and adult raring tanks we currently use, the number and dimensions of juvenile and adult rearing tanks we will have after our new culture building is completed, and when our endangered species facility expansion is completed. - 09/30/04

After receiving the Fish Import Permit from the State of South Dakota, authorizing the stocking of 2003 year-class pallid sturgeon, 515 pallid sturgeon weighing 140 lbs. from this year-class (8 families) were PIT-tagged and elastomere tagged. Staff from the Yankton Corps of Engineers Office and the hatchery crew completed this work. Pallid sturgeon juveniles from this same year-class (10 families) were PIT-tagged and elastomere tagged for retention as future broodstock. - 10/06/04

The eight pallid sturgeon families, tagged yesterday, were stocked into the Missouri River at the Chief Standing Bear Bridge, NE (77.4 lbs. @ 3.50 fish/lb. = 271 fish; 12.52 inches fork length) and Sunshine Bottoms, NE (62.6 lbs. @ 3.90 fish/lb. = 244 fish; 12.14 inches fork length). - 10/07/04

The Fish Import Permit was received from the State of South Dakota allowing the transport of one family of 2003 year-class pallid sturgeon broodstock from the Bozeman FTC, MT, to the Gavins Point NFH. - 10/08/04

All of the 1997 year-class future pallid sturgeon broodstock were moved from the two 20' circular tanks within the Endangered Species Building to two of the 30' diameter tanks within the new culture building. This allows us to now accept adult pallid sturgeon broodstock from the Upper Missouri River Basin of Montana and western North Dakota and hold them within the Endangered Species Building until spawning occurs next June 2005. - 10/20/04

All of the 2001 and 2002 year-classes of pallid sturgeon future broodstock were moved from the Endangered Species Building and Sturgeon Building, respectively, into the new culture building. - 10/21/04

The State of South Dakota issued a Fish Import Permit for the purpose of allowing adult pallid sturgeon broodstock to be brought into the State from the Yellowstone/Missouri River confluence in western North Dakota to our hatchery. - 10/29/04

One family of future pallid sturgeon broodstock was transported to our hatchery from the Bozeman FTC, MT, by Matt Toner. An importation permit was received from the State of South Dakota allowing us to bring these fish into the state. Disease certification was received to justify this move. -10/09/04

Five adult pallid sturgeon (2 females and 3 males) were transported from the Missouri River confluence area of western North Dakota to our hatchery after the capture effort had collected all of these fish in one day. -11/10/04

Throughout the entire year the Gavins Point NFH has been storing pallid sturgeon milt (sperm) in the Taylor-Wharton cryogenic refrigerator that has been delivered to our field station from the Garrison Dam NFH, ND, and Warm Springs FTC, Warm Springs, GA.

In an effort to provide captive pallid sturgeon broodstock with a more complete diet selection, the hatchery staff has been hatching disease-free, rainbow trout eggs and rearing the resultant fish to fingerling size in order to feed these fish to our large, pallid sturgeon future spawners. They have been consuming these fish quite well, and it is our hope to continue this effort on into the future

ADDENDUM

The hatchery staff continues to make many on and off-site presentations concerning endangered species and other parts of the hatchery program to school children, philanthropic organizations, civic groups, and campground visitors. During hatchery tours visitors receive a summary of the past and present accomplishments of the paddlefish and sturgeon production programs.

SPAWNING

All of the pallid sturgeon adults used during the spawning activities at the Miles City SFH, Miles City, MT, were captured from the Missouri River near its confluence with the Yellowstone River in western North Dakota during the spring of 2004.

All of the four female and three male pallids were spread out and held in four 10 ft. diameter circular tanks. Water temperature at spawning time was 66 degrees Fahrenheit. Both well and river water were combined to get that temperature. Both males and females were given their first (initial) dose of LHRH at 4:30 p.m. MDT on 06/28/04. The resolving dose was given to the four females at 8:00 a.m. MDT on 06/29/04. All three of the injected males produced large amounts of milt for the fertilization process after receiving only the initial/first injection of hormone.

The females began ovulating between 4:00 and 4:30 p.m. MDT on 06/29/04, and were spawned between that time and 11:30 p.m. that same day, starting about 24 hours after their first injection. They were spawned, again, the next morning between 6:30 a.m. and 12:00 noon. The relatively short ovulation time was probably due to the optimum temperature (and temperature units) and the correct staging of the eggs. None of the males or females died during the spawning period. The females and males were all hand-stripped to obtain their gametes. A total of nearly 450,000 green eggs were produced from the females with and eyeup of 56.1 per cent and a hatch of 36.1 per cent. All eggs were incubated in jars located within the hatchery using the 66 degree Fahrenheit water that was provided. All males and females were retained on station for a short period of time after spawning for some post-spawning reconditioning and restocking. The survival and condition of the adults was quite good. The cathetorization process, egg staging, LHRH injections (doses and frequency), egg collection, egg incubation, hatching, and rearing

were all completed as outlined within the Pallid Sturgeon Propagation Plan that was updated in FY 2004, which is still in draft.

We feel that the holding and spawning effort turned out well. The egg staging and spawning effort was nearly the same as in 2001 when we had good results. Percent eyeup and hatch were disappointing. As mentioned last year, more research needs to be done with egg staging and spawning in order to determine exactly when injections should be administered and when fish can be spawned. The eggs appeared to be in the correct stage for induced ovulation (Polarization Index = 0.08), and sperm motility was excellent after activation.

The following are the crosses made and the approximate quantity of eggs from each cross:

- 1) 115551683A Female X 7F7D3C555D Male35 oz. of eggs
- 2) 115551683A Female X 115552116A Male38
- 3) 115551683A Female X 114473737A Male41
- 4) 454B380D60 Female X 7F7F065834 Male30
- 5) 454B380D60 Female X 1F4A3E1445 Male 20
- 6) 454B380D60 Female X 7F7D376F73 Male 16
- 7) 1F5330401E Female X 7F7F066A40 Male 5
- 8) 1F5330401E Female X 1F477B4E51 Male 2
- 9) 1F5330401E Female X 115679374A Male 6
- 10) 7F7F066452 Female X 114473737A Male 21
- 11) 7F7F066452 Female X 1F4A3E1445 Male 35
- 12) 7F7F066452 Female X 7F7F065834 Male 29

Total 278 oz. of eggs (8.7 quarts)

By the time these eggs were completely water-hardened, there were approximately 9 quarts or about 450,000 eggs.

FUNDING

U.S. Fish and Wildlife Service, Pallid Sturgeon Fish Hatchery Operations \$117,484 (Subactivity 64220-1311-0000)

U.S. Army Corps of Engineers, Pallid Sturgeon Operations (Propagation) \$27,758.45⁽¹⁾ (Subactivity 64220-1937-0017)

U.S. Army Corps of Engineers, Advanced Rearing and Broodstock Holding Facility For Pallid Sturgeon (Subactivity 64220-1937-6012) \$1,395,588.55⁽¹⁾

REARING

The rearing characteristics of the eight year-classes of pallid sturgeon, currently held at the Gavins Point NFH, can be found by viewing the following eight tables that summarize the annual production and future broodstock development within the three sturgeon buildings devoted to this activity at our hatchery. The ninth section is a summary of the first eight sections. We are holding future broodstock from eight year-classes (a total of 38 families) at the time of the writing of this report. More stocking fish and future broodstock from the 2003 and 2004 year-classes were transferred to our hatchery from the Garrison Dam NFH, ND, and after the spawning of pallid sturgeon adults above Fort Peck Reservoir, MT, during the year. All smaller production fish and future broodstock are being fed a 3:1 ratio of Silver Cup Salmon # 2 and BioDiet Grower 2.0 millimeter diets, respectively. All larger broodstock are being fed a 1:1 ratio of Silver Cup 5.0 mm. Extruded Slow Sinking (ESS) and BioDiet 5.0 mm. Broodstock Diet. Live, small fingerling rainbow trout were fed to the larger future broodstock mostly during the fall, winter, and early spring.

⁽¹⁾Superscripts denote all costs for that Subactivity, including overhead charges.

Station: Gavin	s Point NFH			Lot Numb	er: PLS-ZZW	-92-MO		Numbe	er of Eyed Egg	s:		
Initial Feeding	 >		Date: 6/15/92		Weight: 1 lbs.(547gms)		fish L 1.9158 inches	ength: 48.660)2 mm			
Month 1			Fish or	n Hand Last D	ay of Month	Morts	F	ish Shipped		Fish Added	V	Veight Gain (pounds)
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date
10-31-03	12	94.0	36.0893	.0138	.0521	0	0		0	_	0.0	566.8
11-30-03	12	94.1	36.0896	.0138	.0521	0	0		0		0.1	566.9
12-31-03	12	94.2	36.0896	.0138	.0521	0	0		0	_	0.1	567.0
01-31-04	12	94.5	36.0896	.0138	.0521	0	0		0		0.3	567.3
02-29-04	12	94.6	36.0896	.0138	.0521	0	0		0		0.1	567.4
03-31-04	12	95.0	36.0896	.0138	.0521	0	0		0		0.4	567.8
04-30-04	12	100.0	36.0896	.0138	.0521	0	0		0		5.0	572.8
05-31-04	12	105.0	37.3436	.0149	.0562	0	0		0		5.0	577.8
06-30-04	12	95.2	37.3436	.0149	.0562	0	0		0		0.0	577.8
07-31-04	12	97.4	37.3436	.0139	.0522	0	0		0		2.2	580.0
08-31-04	12	100.4	37.3436	.0143	.0538	0	0		0		3.3	583.0
09-30-04	12	105.0	37.3436	.0149	.0562	0	0		0		4.6	587.6

		Fish Fee	ed Expended		Conversion	Feed	Current	Temp	erature Units	Temp.
Month 14	Month		To Date			Cost/ Pound	Month's Length	For Month	To Date	Units Per Inch Gain
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19	Gain 20	Increase 21	22	23	To Date 24
10-31-03	4.0	4085.0	\$2182.75		7.21	\$3.85	0.0000	25.5	3120.5	91.3
11-30-03	3.5	4088.5	2188.07		7.21	3.86	0.0000	13.5	3134.0	91.7
12-31-03	3.5	4092.0	2193.39	1	7.22	3.87	0.0000	10.0	3144.0	92.0
01-31-04	3.0	4095.0	2197.95	10.0	7.22	3.87	0.0000	9.5	3153.5	92.3
02-29-04	3.0	4098.0	2202.51	1	7.22	3.88	0.0000	8.8	3162.3	92.5
03-31-04	3.0	4101.0	2207.07	7.5	7.22	3.89	0.0000	12.3	3174.6	92.9
04-30-04	3.0	4104.0	2211.63	0.6	7.16	3.86	0.0000	20.6	3195.2	93.5
05-31-04	5.0	4109.0	2219.23	1.0	7.11	3.84	1.2540	25.2	3220.4	90.9
06-30-04	7.0	4116.0	2229.87	1	7.12	3.86	0.0000	31.2	3251.6	91.9
07-31-04	13.0	4129.0	2250.54	5.91	7.12	3.88	0.0000	33.4	3285.0	92.7
08-31-04	13.0	4142.0	2271.21	4.33	7.10	3.90	0.0000	31.4	3316.4	93.6
09-30-04	13.0	4155.0	2291.88	2.83	7.07	3.90	0.0000	31.0	3347.4	94.5

Station: Gavin	tion: Gavins Point NFH				Lot Number: PLS-MRW-97-FR				Number of Eyed Eggs: 166,000			
Initial Feeding	<u></u> >		Date: 7/15/97	Number: 12,	830 Weigh	t: 1.0 lbs.	Length	1: 0.5775				
Month 1			Fish o	n Hand Last D	ay of Month	Morts	F	Fish Shipped		Fish Added	V	Veight Gain (pounds)
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date
10-31-03	102	362.0	28.2635	.0091	.1281	0	0		0		0.0	2144.5
11-30-03	102	362.2	28.2635	.0091	.1281	0	0		0		0.2	2144.7
12-31-03	102	364.0	28.2635	.0091	.1281	0	0		0		1.8	2146.5
01-31-04	102	367.0	28.2635	.0091	.1281	0	0		0		3.0	2149.5
02-29-04	102	369.0	28.2635	.0091	.1281	0	0		0		2.0	2151.5
03-31-04	101	371.0	28.2635	.0091	.1281	1	0		0		2.0	2153.5
04-30-04	98	385.0	28.2635	.0091	.1281	3	0		0		14.0	2167.5
05-31-04	98	415.0	29.8476	.0098	.1390	0	0		0		30.0	2197.5
06-30-04	98	467.0	30.9555	.0107	.1509	0	0		0		52.0	2249.5
07-31-04	98	489.0	31.3986	.0110	.1557	0	0		0		22.0	2271.5
08-31-04	98	500.0	31.6150	.0112	.0582	0	0		0		11.0	2282.5
09-30-04	98	510.0	31.8088	.0113	.1603	0	0		0		10.0	2292.5

		Fish Fee	ed Expended		Conversion	Feed	Current	Temp	erature Units	Temp.
Month 14	Month		To Date			Cost/ Pound	Month's Length	For Month	To Date	Units Per Inch Gain
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19	Gain 20	Increase 21	22	23	To Date 24
10-31-03	22.0	8130.0	\$4839.19	0.00	3.79	\$2.26	0.0000	25.0	1834.0	66.2
11-30-03	19.0	8149.0	4868.07	0.00	3.80	2.27	0.0000	14.0	1848.0	66.7
12-31-03	11.0	8160.0	4884.79	6.11	3.80	2.28	0.0000	11.6	1859.6	67.2
01-31-04	14.0	8174.0	4906.07	4.67	3.80	2.28	0.0000	13.2	1872.8	67.6
02-29-04	12.0	8186.0	4924.31	6.00	3.80	2.29	0.0000	12.4	1885.2	68.1
03-31-04	13.0	8199.0	4944.07	6.50	3.81	2.30	0.0000	14.5	1899.7	68.6
04-30-04	14.0	8213.0	4965.35	1.00	3.79	2.29	0.0000	21.4	1021.1	69.4
05-31-04	20.0	8233.0	4995.75	0.67	3.75	2.27	1.5841	26.3	1947.4	66.5
06-30-04	41.0	8274.0	5058.07	0.79	3.68	2.25	1.1079	31.0	1978.4	65.1
07-31-04	74.0	8348.0	5175.73	3.36	3.68	2.28	.4431	32.4	2010.8	65.2
08-31-04	45.0	8393.0	5247.28	4.09	3.68	2.30	.2164	32.2	2043.0	65.8
09-30-04	88.0	8481.0	5387.20	8.80	3.70	2.35	.1938	31.4	2074.4	66.4

Station: Gavins	s Point NFH			Lot Numb	er: PLS-MRW	/-98-FR		Number of Eyed Eggs:				
Initial Feeding	>		Date: 7/1/98	Number: 2,00	0 Weight:	16094 lbs.	Lengtl	h: .5775 inche	es			
Month 1			Fish or	n Hand Last D	ay of Month	Morts	I	Fish Shipped		Fish Added	V	Veight Gain (pounds)
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date
10-31-03	54	127.0	24.8919	.0097	.1020	0	0		0		0.0	532.2
11-30-03	54	127.1	24.8919	.0097	.1020	0	0		0		0.1	532.3
12-31-03	54	128.0	24.8919	.0097	.1020	0	0		0		0.9	533.2
01-31-04	54	130.0	24.8919	.0097	.1020	0	0		0		2.0	535.2
02-29-04	54	131.0	24.8919	.0097	.1020	0	0		0		1.0	536.2
03-31-04	54	132.0	24.8919	.0097	.1020	0	0		0		1.0	537.2
04-30-04	54	140.0	24.8919	.0097	.1020	0	0		0		8.0	545.2
05-31-04	54	150.0	26.2044	.0109	.1145	0	0		0		10.0	555.2
06-30-04	54	189.0	28.1424	.0128	.1343	0	0		0		39.0	594.2
07-31-04	54	198.0	28.5495	.0132	.1387	0	0		0		9.0	603.2
08-31-04	54	210.0	29.0729	.0138	.1445	0	0		0		12.0	615.2
09-30-04	54	220.0	29.4934	.0142	.1492	0	0		0		10.0	625.2

		Fish Fee	ed Expended		Conversion	Feed	Current	Temp	erature Units	Temp.
Month 14	Month		To Date			Cost/ Pound	Month's Length	For Month	1575.0 1589.5 1599.8 1609.5 1618.1 1629.6 1649.9 1675.2	Units Per Inch Gain
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19	Gain 20	Increase 21	22	23	To Date 24
10-31-03	9.0	3145.0	\$1893.17	0.00	5.91	\$3.56	0.0000	25.0	1575.0	64.8
11-30-03	6.0	3151.0	1898.01	0.00	5.92	3.57	0.0000	14.5	1589.5	65.4
12-31-03	6.0	3157.0	1902.85	6.67	5.92	3.57	0.0000	10.3	1599.8	65.8
01-31-04	7.0	3164.0	1908.49	3.50	5.91	3.57	0.0000	9.7	1609.5	66.2
02-29-04	6.0	3170.0	1913.33	6.00	5.91	3.57	0.0000	8.6	1618.1	66.5
03-31-04	6.0	3176.0	1918.17	6.00	5.91	3.57	0.0000	11.5	1629.6	67.0
04-30-04	7.0	3183.0	1923.81	1.00	5.84	3.53	0.0000	20.3	1649.9	67.9
05-31-04	10.0	3193.0	1931.87	1.00	5.75	3.48	1.3125	25.3	1675.2	65.4
06-30-04	21.0	3214.0	1948.80	0.54	5.41	3.28	1.9380	31.8	1707.0	61.9
07-31-04	37.0	3251.0	1978.64	4.11	5.39	3.28	.4071	33.5	1740.5	62.2
08-31-04	50.0	3301.0	2018.96	4.17	5.37	3.28	.5234	32.1	1772.6	62.2
09-30-04	45.0	3346.0	2090.51	4.50	5.35	3.34	.4205	31.7	1804.3	62.4

Station: Gavin	tion: Gavins Point NFH				Lot Number: PLS-MRW-99-FR				Number of Eyed Eggs: 124,680				
Initial Feeding	<u></u> >		Date: 7/10/99	Number: 29,	000 Weigh	t: 2.26	Length:	0.5775					
Month 1			Fish o	n Hand Last D	ay of Month	Morts	I	Fish Shipped		Fish Added	V	Veight Gain (pounds)	
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date	
10-31-03	62	147.0	24.8832	.0113	.0991	1	0		0		0.0	1221.2	
11-30-03	62	147.1	24.8832	.0113	.0991	0	0		0		0.1	1221.3	
12-31-03	62	149.0	24.8832	.0113	.0001	0	0		0		1.9	1223.2	
01-31-04	62	150.0	24.8832	.0113	.0991	0	0		0		1.0	1224.2	
02-29-04	62	151.0	24.8832	.0113	.0991	0	0		0		1.0	1225.2	
03-31-04	62	153.0	24.8832	.0113	.0991	0	0		0		2.0	1227.2	
04-30-04	62	160.0	24.8832	.0113	.0991	0	0		0		7.0	1234.2	
05-31-04	62	175.0	26.3342	.0127	.1108	0	0		0		15.0	1249.2	
06-30-04	62	193.4	27.1596	.0136	.1187	0	0		0		18.4	1267.6	
07-31-04	62	203.4	27.5857	.0140	.1229	0	0		0		10.0	1277.6	
08-31-04	62	213.4	28.0015	.0145	.1270	0	0		0		10.0	1287.6	
09-30-04	62	225.0	28.4587	.0151	.1318	0	0		0		11.6	1299.2	

		Fish Fee	ed Expended		Conversion	Feed	Current	Temp	erature Units	Temp.
Month 14	Month		To Date			Cost/ Pound	Month's Length	For Month	To Date	Units Per Inch Gain
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19	Gain 20	Increase 21	22	23	To Date 24
10-31-03	9.0	5291.0	\$2903.41	0.00	4.33	\$2.38	0.0000	25.0	1231.0	50.6
11-30-03	6.0	5297.0	2912.53	0.00	4.34	2.38	0.0000	13.8	1244.8	51.2
12-31-03	7.0	5304.0	2923.17	3.68	4.34	2.39	0.0000	10.0	1254.8	51.6
01-31-04	7.0	5311.0	2933.81	7.00	4.34	2.40	0.0000	9.3	1264.1	52.0
02-29-04	6.0	5317.0	2942.93	6.00	4.34	2.40	0.0000	8.2	1272.3	52.3
03-31-04	6.0	5323.0	2952.05	3.00	4.34	2.41	0.0000	11.2	1283.5	52.8
04-30-04	7.0	5330.0	2962.69	1.00	4.32	2.40	0.0000	20.3	1303.8	53.6
05-31-04	10.0	5340.0	2977.89	0.67	4.27	2.38	1.4510	25.5	1329.3	51.6
06-30-04	21.0	5361.0	3009.81	1.14	4.23	2.37	0.8254	31.5	1360.8	51.2
07-31-04	36.0	5397.0	3067.05	3.60	4.22	2.40	.4261	33.9	1394.7	51.6
08-31-04	50.0	5447.0	3146.55	5.00	4.23	2.44	.4158	32.0	1426.7	52.0
09-30-04	45.0	5492.0	3218.10	3.88	4.23	2.48	.4572	31.6	1458.3	52.3

Station: Gavin	s Point NFH			Lot Numb	er: PLS-MRV	V-2001-FR		Numbe	Number of Eyed Eggs: 124,680			
Initial Feeding	<u></u> >		Date: July, 2001	l Number:	475 lbs. W 6	eight: 27.81	bs. Le	ength: 7.9587				
Month 1			Fish or	n Hand Last D	ay of Month	Morts	F	ish Shipped		Fish Added	V	Veight Gain (pounds)
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date
10-31-03	103	100.9	18.9946	.0161	.0759	0	0		0		1.4	178.0
11-30-03	103	102.2	18.9946	.0161	.0759	0	0		0		1.3	179.3
12-31-03	103	102.9	18.9946	.0161	.0759	0	0		0		0.7	180.0
01-31-04	103	103.6	18.9946	.0161	.0759	0	0		0		0.7	180.7
02-29-04	102	104.1	18.9946	.0161	.0759	1	0		0		0.5	181.2
03-31-04	102	104.8	18.9946	.0161	.0759	0	0		0		0.7	181.9
04-30-04	82	88.5	18.9946	.0161	.0759	20	0		0		0.0	181.9
05-31-04	82	84.2	18.9946	.0161	.0759	0	0		0		0.0	181.9
06-30-04	82	96.1	20.0755	.0145	.0684	0	0		0		11.9	193.8
07-31-04	82	115.1	21.2254	.0164	.0775	0	0		0		19.0	212.8
08-31-04	82	124.8	21.7623	.0174	.0819	0	0		0		9.7	222.5
09-30-04	81	135.8	22.4221	.0183	.0865	0	0		0		11.0	233.5

		Fish Fee	ed Expended		Conversion	Feed	Current	Temp	erature Units	Temp. Units Per
Month 14	Month		To Date			Cost/ Pound	Month's Length	For Month	To Date	Inch Gain
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19	Gain 20	Increase 21	22	23	To Date 24
10-31-03	26.0	824.0	\$785.57	18.57	4.63	\$4.41	0.0817	25.2	467.5	42.4
11-30-03	14.0	838.0	795.37	10.77	4.67	4.44	0.0000	13.0	480.5	43.5
12-31-03	14.0	852.0	805.17	20.00	4.73	4.47	0.0000	12.3	492.8	44.7
01-31-04	14.0	866.0	814.97	20.00	4.79	4.51	0.0000	13.0	505.8	45.8
02-29-04	13.0	879.0	824.07	26.00	4.85	4.55	0.0000	13.0	518.8	47.0
03-31-04	13.0	892.0	833.17	18.57	4.90	4.58	0.0000	15.0	533.8	48.4
04-30-04	10.0	902.0	840.17	0.00	4.96	4.62	0.0000	21.5	555.3	50.3
05-31-04	14.0	916.0	849.97	0.00	5.04	4.67	0.0000	26.0	581.3	52.7
06-30-04	40.0	956.0	877.97	3.36	4.93	4.53	1.0809	31.7	613.0	50.6
07-31-04	66.0	1022.0	924.17	3.47	4.80	4.34	1.1499	35.0	648.0	48.8
08-31-04	80.0	1102.0	997.95	8.25	4.95	4.49	0.5369	35.0	683.0	49.5
09-30-04	80.0	1182.0	1071.73	7.27	5.06	4.59	0.6598	32.7	715.7	49.5

Station: Gavin	tion: Gavins Point NFH				er: PLS-MRV	V-2002-FR		Numbe	Number of Eyed Eggs: 124,680			
Initial Feeding	5 >		Date: 7/16/2002	Number: 2	20,953 We i	ight: 6.47 lb	s. Le i	ngth: 1.5761				
Month 1			Fish or	n Hand Last D	ay of Month	Morts	I	Fish Shipped		Fish Added	V	Veight Gain (pounds)
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date 13
10-31-03	243	76.5	13.3791	.0152	.0817	0	0		0		18.0	1192.0
11-30-03	242	77.4	13.3791	.0152	.0817	1	0		0		0.9	1192.9
12-31-03	242	77.9	13.3791	.0152	.0817	0	0		0		0.5	1193.4
01-31-04	242	78.4	13.3791	.0152	.0817	0	0		0		0.5	1193.9
02-29-04	242	78.9	13.3791	.0152	.0817	0	0		0		0.5	1194.4
03-31-04	242	80.2	13.3791	.0152	.0817	0	0		0		1.3	1195.7
04-30-04	206	72.6	13.3791	.0152	.0817	36	0		0		0.0	1195.7
05-31-04	206	92.1	14.9094	.0164	.1235	0	0		0		19.5	1215.2
06-30-04	194	94.5	15.3093	.0164	.1235	12	0		0		2.4	1217.6
07-31-04	192	149.2	17.6839	.0224	.1637	2	0		0		54.7	1272.3
08-31-04	189	182.5	18.9104	.0256	.1930	3	0		0		33.3	1305.6
09-30-04	187	183.5	19.0046	.0256	.1379	2	0		0		1.0	1306.6

		Fish Fee	ed Expended		Conversion	Feed	Current	Temp	erature Units	Temp. Units Per
Month 14	Month		To Date			Cost/ Pound	Month's Length	For Month	To Date	Inch Gain
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19	Gain 20	Increase 21	22	23	To Date 24
10-31-03	21.0	2307.0	\$3329.66	1.17	1.94	\$2.79	0.3002	26.0	385.0	32.6
11-30-03	7.0	2314.0	3338.69	7.78	1.94	2.80	0.0000	15.3	400.3	33.9
12-31-03	8.0	2322.0	3349.01	16.00	1.95	2.81	0.0000	9.5	409.8	34.7
01-31-04	8.0	2330.0	3359.33	16.00	1.95	2.81	0.0000	9.0	418.8	35.5
02-29-04	8.0	2338.0	3369.65	16.00	1.96	2.82	0.0000	9.2	428.0	36.3
03-31-04	8.0	2346.0	3379.97	6.15	1.96	2.83	0.0000	10.8	438.8	37.2
04-30-04	7.0	2353.0	3389.00	0.00	1.97	2.84	0.0000	20.2	459.0	38.9
05-31-04	12.0	2365.0	3404.48	0.62	1.95	2.80	1.5303	25.5	484.5	36.3
06-30-04	18.0	2383.0	3427.70	7.50	1.96	2.82	0.3999	31.5	516.0	37.6
07-31-04	40.0	2423.0	3479.30	0.73	1.90	2.73	2.3746	35.0	551.0	34.2
08-31-04	72.0	2495.0	3545.71	2.16	1.91	2.72	1.2265	35.0	586.0	33.8
09-30-04	40.0	2535.0	3582.60	0.00	1.94	2.74	.1000	33.0	619.0	35.5

Station: Gavin	Lot Number: PLS-MRW-2003-FR				Numbe	Number of Eyed Eggs:								
Initial Feeding> Date: July, 2003				Number:	4,319 Weig	ht: 124.8	Length	: 6.4004	6.4004					
Month 1			Fish or	n Hand Last D	Hand Last Day of Month Mo			Fish Shipped		Fish Added		Weight Gain (pounds)		
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date		
10-31-03	4292	130.2	6.4972	.0170	.0802	27	0		0		5.4	5.4		
11-30-03	4388	135.6	6.4972	.0170	.0802	10	0		106	3.0	5.4	10.8		
12-31-03	4334	137.5	6.4972	.0170	.0802	54	0		0		1.9	12.7		
01-31-04	4217	132.7	6.4972	.0170	.0802	117	0		0		0.0	12.7		
02-29-04	3624	126.9	6.7916	.0170	.0802	593	0		0		0.0	12.7		
03-31-04	3054	109.4	6.7916	.0170	.0802	570	0		0		0.0	12.7		
04-30-04	961	31.0	6.6217	.0062	.0296	2093	0		0		0.0	12.7		
05-31-04	819	40.5	7.5552	.0076	.0357	142	0		0		9.5	22.2		
06-30-04	1033	111.8	9.6220	.0130	.0612	0	0		0		71.3	93.5		
07-31-04	925	143.0	10.4066	.0153	.0723	8	100	10.0	0		41.2	134.7		
08-31-04	855	203.1	12.2650	.0185	.0872	13	51	8.8	0		69.6	204.3		
09-30-04	325	91.2	12.9125	.0150	.0706	15	515	140.0	0		28.1	232.4		

Month 14		Fish Fee	ed Expended		Conversion	Feed	Current	Temp	erature Units	Temp.
	Month		To Date			Cost/ Pound	Month's Length	For Month	To Date	Units Per Inch Gain
	Pounds 15	Pounds 16	Cost 17	For Month 18			Increase 21	22	23	To Date 24
10-31-03	32.0	32.0	\$41.28	5.93	5.93	\$7.64	0.0968	12.0	12.0	124.0
11-30-03	35.0	67.0	86.43	6.48	6.20	8.00	0.0000	13.0	25.0	250.0
12-31-03	30.0	97.0	125.13	15.79	7.64	9.85	0.0000	13.0	38.0	380.0
01-31-04	23.0	120.0	154.80	0.00	9.45	12.19	0.0000	13.6	51.6	516.0
02-29-04	20.0	140.0	180.60	0.00	11.02	14.22	0.2944	12.8	64.4	164.6
03-31-04	10.0	150.0	193.50	0.00	11.81	15.24	0.0000	14.6	79.0	201.9
04-30-04	10.0	160.0	206.40	0.00	12.60	16.25	0.0000	20.0	99.0	253.1
05-31-04	23.0	183.0	236.07	2.42	8.24	10.63	0.9335	24.5	123.5	106.9
06-30-04	70.0	253.0	326.37	0.98	2.71	3.49	2.0668	33.0	156.5	48.6
07-31-04	126.0	379.0	533.01	3.06	2.81	3.96	0.7846	35.5	192.0	47.9
08-31-04	193.0	572.0	849.53	2.77	2.80	4.16	1.8584	36.0	228.0	38.9
09-30-04	180.0	752.0	1144.73	6.41	3.24	4.93	0.6475	32.5	260.5	40.0

Station: Gavins Point NFH				Lot Number: PLS-MRW-2004-FR				Numbe	Number of Eyed Eggs: 25,200					
Initial Feeding	Number: 2,213 Weight: 0.20 lbs. Length:				th: 0.5775	0.5775								
Month 1			Fish or	n Hand Last D	ay of Month	Morts	I	Fish Shipped		Fish Added		Weight Gain (pounds)		
	Number 2	Weight 3	Length 4	D.I. 5	F.I. 6	Number 7	Number 8	Weight 9	Number 10	Weight 11	Month 12	To Date		
07-31-04	1276	1.65	2.4529	.0036	.0168	937	0		0		1.45	1.45		
08-31-04	1248	11.3	4.4732	.0089	.0421	28	0		0		9.65	11.1		
09-30-04	1240	35.2	6.3654	.0146	.0691	6	2	0.1	0		24.0	35.1		

		Fish Fee	ed Expended		Conversion	Feed	Current	Tempera	ture Units	Temp. Units Per	
Month 14	Month	To Da				Cost/ Pound	Month's Length	For Month	To Date	Inch Gain	
	Pounds 15	Pounds 16	Cost 17	For Month 18	To Date 19	Gain 20	Increase 21	22	23	To Date 24	
07-31-04	6.0	6.0	\$18.12	4.14	4.14	\$12.50	1.8754	23.3	23.3	12.4	
08-31-04	18.0	24.0	72.48	1.87	2.16	6.53	2.0203	36.2	59.5	15.3	
09-30-04	38.5	62.5	146.02	1.60	1.78	4.16	1.8922	34.5	94.0	16.2	

HATCHERY PRODUCTION SUMMARY (Intensive Culture)

Station: Gavins Point NFH			Peroid Covered: October 1, 2003 through September 30, 2004										
			To Date This Fisca										
Species/Strain and		Fish on Hand Last Day of Period					F	eed Expended	Conver-	Percent			
Stock		T				Gain	Pounds	Costs	sion 10	Survival 11			
1	Number 2	Weight 3	Length 4	D.I. 5	FI 6	7	8	9					
PLS-ZZW-92-MO	12	105.1	37.3435	.0149	.0562	20.8	74.0	\$115.21	3.56	100.0			
PLS-MRW-97-FR	99	510.0	31.8088	.0113	.1603	148.0	373.0	581.45	2.52	97.1			
PLS-MRW-98-FR	54	220.0	29.4934	.0142	.1492	93.0	210.0	204.60	2.26	100.0			
PLS-MRW-99-FR	62	225.0	28.4587	.0151	.1318	78.0	210.0	328.37	2.69	98.4			
PLS-MRW-2001-FR	81	135.8	22.4221	.0183	.0865	56.9	384.0	304.36	6.75	78.6			
PLS-MRW-2002-FR	187	183.5	19.0046	.0256	.1379	132.6	249.0	280.03	1.99	93.5			
PLS-MRW-2003-FR	325	91.2	12.9125	.0150	.0706	232.4	752.0	1144.73	3.24	23.0			
PLS-MRW-2004-FR	1240	35.2	6.3654	.0146	.0691	35.1	62.5	146.02	1.78	56.0			
Totals/Averages	2060	1505.8				796.8	2314.5	\$3104.77	2.90	38.7			