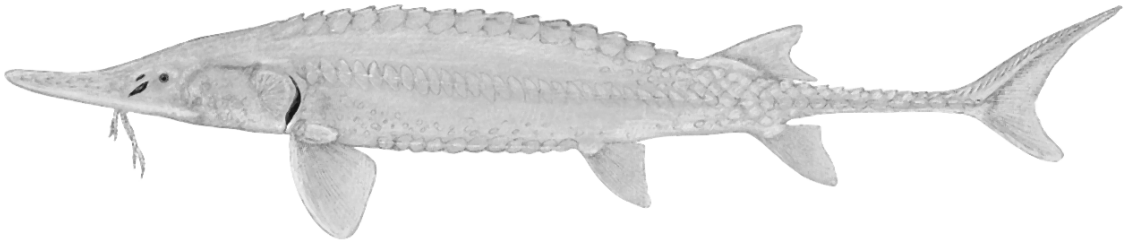
# UPPER BASIN PALLID STURGEON RECOVERY WORKGROUP



# 2004 ANNUAL REPORT

**Upper Basin Pallid Sturgeon Workgroup**
**c/o Montana Fish, Wildlife and Parks**
**1420 East Sixth**
**Helena MT 59620**

**August 2005**

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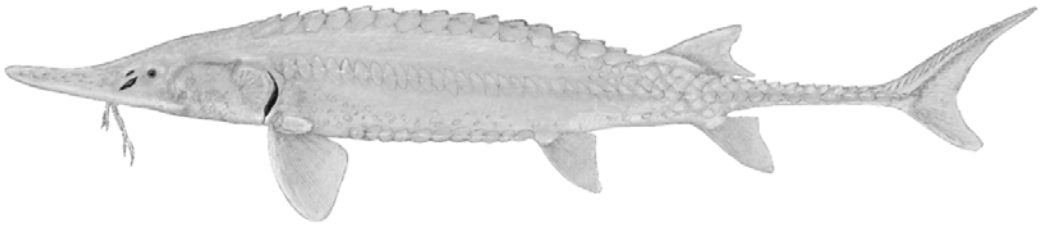

## 2004 ANNUAL REPORT

The Upper Basin Pallid Sturgeon Recovery Workgroup is comprised of representatives from Montana Fish, Wildlife and Parks, North Dakota Game and Fish, South Dakota Game, Fish and Parks, Nebraska Game and Parks Commission, Montana State University, U.S. Fish and Wildlife Service, Army Corps of Engineers, U.S. Geological Survey, PPL Montana, Western Area Power Administration, and Bureau of Reclamation.

The Upper Basin Pallid Sturgeon Recovery Workgroup coordinates and implements recovery actions for pallid sturgeon in Recovery Priority Management Areas 1,2, and 3, encompassing the Missouri and Yellowstone Rivers from the mouth of the Marias River to 20 miles upstream from the mouth of the Niobrara River. Recovery efforts in 2004 consisted of monitoring wild and hatchery reared sturgeon, continuation of the hatchery propagation program, and research into pallid sturgeon life history and habitat requirements.

This document contains the meeting notes from the Workgroup's 2004 and March 2005 meetings, as well as project reports from workgroup members, organized into field monitoring and research, propagation and fish health.

# WORKGROUP MEETING NOTES

**Upper Basin Pallid Sturgeon 2004 Annual Meeting**
**December 1-2**
**Miles City, Montana**

## INTRODUCTIONS

51 people representing 13 agencies from 4 different states
Montana Fish, Wildlife and Parks
North Dakota Game and Fish Department
Nebraska Game and Parks Commission
South Dakota Department of Game, Fish, and Parks
U.S. Fish and Wildlife Service
Army Corps of Engineers
Bureau of Reclamation
Western Area Power Administration
U.S. Geological Survey
Montana State University
South Dakota State University
Oregon State University
PPL Montana

## FIELD ACCOMPLISHMENTS/AGENCY REPORTS

### *RPMA 1*

Bill Gardner – Montana Fish, Wildlife and Parks

71 total pallids were captured in 2004, including 8 adults. Only one was new with no tags - this was the female that was spawned this year. In addition, there were 58 1997- year class recaptures; two 2001-year class, and three 2003-year class fish recaptured.

Spawning and egg collection – 5 adults were captured in 195 drifts for broodstock. Of these, there was 1 ripe female; 1 not ripe female, and 3 ripe males. The ripe female was successfully spawned.

Tagging and record compilation – PIT-tagged several thousand pallids that were released in RPMA 1.

Pallid sturgeon releases 1998 – 730 released; in 2002 there were 2,063; in 2004 there were 3,000 yearlings + 158 age-3 pallids from Bozeman

Stocking evaluation - (stocking plan) survival model predicts an 11% survival rate through age 7. This model predicts 83 should have survived, but Bill estimates 216 have survived based on recaptures. Growth rate of 1997-year class fish is about 15mm per year (between age 6 and age 7), indicating that growth is not very good. When looked at in a histogram, the growth rates are variable and distributed, so just looking at averages may not be the best way to go – also need to look at individual fish.

Dispersal – Of the 1997-year class fish recaptured at Robinson Bridge, 15 came from Loma, 20 from Judith Landing, and 26 came from Robinson Bridge release site.

2003-year class fish were radio tagged to monitor dispersal; fish were released in the Marias in 2003; in less than 1 week, more than half went past the 60-mile mark at Loma. By week 7, more than 80% had gone past Loma, and more than half past Judith landing. End result is about half are in the river, and half probably ended up in Fort Peck Reservoir.

Fall baseline sampling – Standardized 16-mile stretch for annual comparison (started in 1996). Juvenile sampling covers about 40 miles.

Paul Garrity – Montana State University - Habitat use, food habits, and growth of stocked pallid sturgeon and shovelnose sturgeon in the MO River above Ft Peck

Objectives: evaluate habitat use and spatial overlap; compare food habits of juvenile shovelnose and pallids; compare growth rates.

30 pallid and 23 shovelnose sturgeon were implanted with radio transmitters. Habitat data collected at each location. Gastric lavage done on all captured fish; and growth rate derived from measurements of recaptures. There were approximately 620 relocations of these fish.

Pallids – mean home range is 9.2 miles;
Shovelnose – mean home range is 10.2 miles

Fish did not appear to be using side channel habitat (either species).

Many different pallids were located below what was the full pool line (River Mile 1869?) in the 1980s. If reservoir levels increase to full pool, that habitat will be lost

Generally, the pallids used deeper water than shovelnose – typically 75-80% relative depth, indicating they are using main channel habitat and not shallow side channel habitat.

Food habits: Pallid – fish made up of over 80% of diet of juvenile pallids (age 6-7) – sturgeon and sicklefin chub most common. More than 80% of the diet of shovelnose was invertebrates, primarily chironomids.

Shovelnose sturgeon grew much faster than pallids: 0.04 mm/day vs. 0.07mm/day; 0.06g/day vs. 0.31g/day.

Summary

- Side channel habitat not important for age 6-7 pallid or shovelnose juveniles [Discussion that this may not be true – that the side channel is important for producing prey species that are utilized by sturgeon.]
- Fort Peck highly influences the amount of habitat for HRPS

- HRPS are dependent on sicklefin and sturgeon chubs as a food resource
- HRPS growth not as rapid as SNS

***RPMA 2***

Matt Klungle – Montana Fish, Wildlife and Parks

Study area: Fort Peck Dam to headwaters of Sak, and Yellowstone River up to Intake

Adult efforts:
Spring: 49 captures; of those 40 were recaps
Wildcat drifts: 5 samples; 2 were recaps
Fall: 13 caps; 12 were recaps.

Estimated Adult Population in RPMA 2 = 136 (86-220); extirpation is projected to be 2018. May be flawed due to spatially biased sampling with 6 x 10" nets; retention and readability of marks. More appropriate estimates will be explored.

Trend is declining, and error bars are getting tighter; predict extinction by 2018

Juvenile sampling: 274 trawls, 824 nets and 4 setlines
Fished from river mile 1732 to river mile 1557

76 hatchery reared pallid sturgeon (HRPS) recaps; tracked movements of 23 of them. 76% PIT tag retention; moved a range of 2-77 river miles, mean of 20.5 river miles, usually downstream. Growth rate of 73 of the 76 averaged 0.15mm/day

2004 Stocking Results
1,946 at river mouth
2,459 stocked at Wolf Point
2,353 stocked at Culbertson
1,591 at Intake
1,935 at Sidney

Survival evaluation of year classes: It appears that annual survival of year classes is much lower than the stocking plan estimates.

70 fish were telemetered and stocked at Sidney. 69/70 were relocated. Distance traveled was 0-24.5 river miles; mean distance was 4 river miles.

There was a concentration of juveniles in the Yellowstone near Sidney. Accounted for 40 of the 76 recaps, and represented 5 of the 6 year classes that have been stocked.

Matt Jaeger – Montana Fish, Wildlife and Parks

Yellowstone River – Suitability of the Yellowstone River for pallid sturgeon restoration

About 150 adults remaining, haven't reproduced in over 30 years, and are predicted to be extirpated by 2018.

It is critical to ID areas that provide the best opportunity for HRPS to survive until they reach sexual maturity

MO River has an altered hydrograph, temp regime, and sediment transport regime. The Yellowstone has more natural hydrograph, temp, and sediment regimes. Most adult pallids move into the Yellowstone River during spawning periods, and successful spawning has recently occurred in the Yellowstone River (Bratten).

To date, we haven't done a good job of taking advantage of the Yellowstone. Most work that has been done has been confined to the lower 70 miles below Intake Diversion.

Theory is that the reach above intake is not suitable for pallids, although there is no evidence to support that. Suspect that any larvae that have been spawned in the Yellowstone all end up in Sak. So if we can establish a population above intake, perhaps we could take advantage of the increased distance. Historically pallids were present in the river above Intake. This led to the question about what might happen if we stock pallids above Intake: this was the focus of work in 2004

Study area: Cartersville to Intake. Divided into 3 reaches: Cartersville to Tongue R; Tongue River to Fallon; Fallon to Intake

Released 5, 9, and 7 telemetered 3-year old pallids from the BFTC into the three reaches, respectively in July. Fish moved downstream, but seemed to be using the habitat within the study area. During the first thirty days, there was predominantly downstream movement, but overall, the pallids stayed in the study area. At 30-90 days, there was some upstream movement. In August, movement skewed upstream, and Sept and October, they didn't move much.

Three/21 fish moved down to Intake, and became entrained (14%).

Summary

- All reaches between Cartersville and Intake were occupied – indicates that the Yellowstone may be suitable for pallids, but needs further study.
- Downstream and upstream movements were observed, there was not the massive downstream exodus of fish like was predicted
- Some were entrained at intake, but sample was too small to determine significance.
- Fish were three years old and had curled fins, which may have skewed the movement results
- Several fish expelled transmitters, which is something that needs further investigations

Dave Fuller- Montana Fish, Wildlife and Parks

Quantify temp and turbidity – water temp – 17 locations

Adult pallid sampling and telemetry: 650 drifts in random bends; 2 pallids were sampled, one unmarked, and one already radioed.

2,061 manual relocations in over 10,930 km tracked. Seven ground-based logging stations, implanted additional 22 shovelnose, 20 blue suckers, and 10 paddlefish. Assisted BOR with setting up 2 additional logging stations in the Milk; examining flow and temp related movements of native fish

Documented 1 pallid up the Milk from the confluence on May 28
57% of migrating paddlefish moved in the Yellowstone
43% of paddlefish moved upstream of Wolf Point, 33% up the Milk River, and found paddlefish larvae in the Milk
Blue Suckers move down the MO, up the Yellowstone above intake, and then down the Yellowstone and back up to Wolf Point.
Shovelnose in the MO don't move much;
Pallid seem to be concentrated in the lower 10-15 miles in the Yellowstone. One has gone about 45 miles upstream. Shovelnose that were in the confluence move up the Missouri River towards the Milk River. In the fall, pallids are moving out of the Yellowstone and back to the MO.

Quantify larval fish distribution and abundance - 2,074 samples this year from six sites.
Comparing the larval fish captured with flows at the six sites during May-July.
Targeted sampling for YOY sturgeon:

2004 – 77 YOY sturgeon sampled; YOY pallids caught on July 14 (Bainville) and Sept. 29 (Nohly)
2003 - 140 shovelnose; 1 very likely pallid, and one possible or perhaps hybrid pallid based on genetics
2002 – 31 shovelnose sturgeon, 2 pallids based on morphometrics and meristics

Also conducting the Adopt a Fish program, which has been very popular.

Larval Fish Study: Pat Braaten - USGS

Side channel study: Located near Culbertson, with inside bends, outside bends, crossovers, shallow banks, sand bars, woody debris, etc. Released larval pallids and shovelnose between 1-11 days old, and determined drift rate out to 1,300 meters.

Larval pallids, ages 1,2, 5,9,11 days – 20,000-30,000 of each age
Larval shovelnose sturgeon, ages 1, 2, 6, 10 days, 10,000-23,000 of each age
Sampled at 100 meters for 0.5 to 15 minutes; 500meters for 10-43 minutes, 900 meters for 22-71 minutes, and 1300 m for 35-105 minutes

Also have estimates of surface velocity, mean velocity, and time of travel, as well as ADCP data that provides mean velocity, near bottom velocity, and time of travel.

Pallids (60-80%) were drifting more on the bottom than towards the surface

Shovelnose larvae – 58-79% drifting towards the bottom

In general, age 1,5, 11-day old pallids drifted slower than water velocity, age 2 and 9 day olds drifted slightly faster than mean velocity. In general, shovelnose drifted slower than mean velocity and slower than pallids

Calculated meidan drift distance for first 11 days of life: pallids 325 km at 0.35 m/sec to 500 km at 0.55 m/sec. Shovelnose moved 250 km at 0.35 km/sec to 425 km at 0.55 m/sec. Slower drifting fish obviously drift less distance.

300 river km of habitat between Frazer rapids and the headwaters of SAK. If velocities are at 0.45 m/sec or greater in the mainstem, then larval pallids will end up in the reservoir. Frazer rapids is where the Bi-Op calls for the temperature criteria (18 C) to be met, so it is assumed that this would be the upstream limit for pallid spawning.

Steve Krentz – U.S. Fish and Wildlife Service

Continuing telemetry study of adult pallids that were radio-tagged, and added a few additional fish in 2004. Wade will be summarizing and analyzing the data over the winter. 2000, 2001, 2002 should be returning to spawn this next spring, so we should be able to get some additional information on spawning areas.

***RPMA 3***

Rob Klumb – U.S. Fish and Wildlife Service

MO River fish community assessment and research activities

Area is from Fort Randall dam to headwaters of Lewis and Clark lake
2 segments, above the Niobrara confluence, and from Niobrara to Lewis and Clark Lake

5 bends/segment, 8 sub-samples per bend, 4 random and 1 nonrandom bend.

Pallid season and Fish Community Season using gillnets, trammel nets, hoop nets, trawls, and set lines

Recaptured 64 HRPS in 2003 (49-15); 24 (15-9) in 2004, although effort was much greater in 2003.

Growth of HRPS ranges from 1 to 52 grams per year in 2003, from 19-85 grams per year in 2004 (fish stocked from 1997-2002)

82-83% retained PIT tags.

Beam trawl and hoop nets appear not effective for pallids
Change in trawl design in 2004 caught a few chubs and shovelnose sturgeon

Gastric Lavage study was started by Wanner. Have 2 years of data for pallids and shovelnose. Data will be analyzed when Wanner returns. Pallids appear to be principally eating macroinvertebrates in RPMA3.

Bioenergetics Model: working on bioenergetics. Hope to use model to incorporate into flow simulations.

Model metabolic rate as a function of body mass and water temperature.

In 2004: Measured metabolic rate at 6 temps x 6 fish per temp.
5 experiments on yolk sak and 3-week old larvae.

In total, there were 19 experiments on 139 fish in 2003, 17 experiments on 93 fish in 2004.

Metabolic rate increased with temperature. Temperature coefficient for juvenile pallid sturgeon was 0.198. Juvenile pallid metabolism appears to be much more temperature dependent than other species.

Need to do consumption trials to determine weight and temperature relations with consumption. Also calorimetry experiments on predator and prey. Need to describe seasonal temperature regimes.

Gerald Mestel - Nebraska Game and Parks Commission

Lewis and Clark Lake may or may not have an impact on drift distance. HRPS was caught in the reservoir during a routine survey within site of the dam. Turnover is 3-4 days, so reservoir may function more as a wide spot in the river. Several tagged fish have also passed through Gavins Point dam.

Flow test out of Gavins Point is scheduled for 2006. Scope of test will likely be dependent on water availability in the system.

**FISH HEALTH**

Beth MacConnell – U.S. Fish and Wildlife Service

Fish Health Assessment: Spring 03, Fall 03, Spring 04
Sampled 60 fish per female
Gross necropsy, histology, virus status, liver condition, skin condition, condition index.

Condition index: provides relatively rapid assessment of fish condition
Length and weight,
liver color,
body fat – amount of visceral fat
blood analysis

Condition factor – lowest was a 3, most were 4, highest was 5. No significant difference between virus positive and virus negative fish

No correlation between liver color and liver histo score
No correlation between body fat observed and histo score for liver

Health assessment

Removed entire fin section from fish to determine presence and severity of virus
Also evaluated amount of mucous cells – total number in 10 fields
Look at barbells – covered with sensory epithelia, which function like taste buds. Appears the virus has negative impact on these cells. Measured as number per field.
Score amount of liver fat from 0 to 5. Middle would be the desirable range (some fat, but not so much that it is damaging)

Three of the 5 hatcheries were virus positive. Miles City and Bozeman were negative. Gavins, Garrison, and Neosho were positive. Lower severity in 2003- year class than 2004-year class.

Data show no correlation between female and virus prevalence or severity (e.g., progeny from a female at Miles City were negative, whereas progeny from the same female at Garrison were positive, with high levels of severity).

Miles City always had highest number of sensory cells. Fish at Bozeman were iridovirus negative, but did have warts – don't know how that affects score.

1.1 sensory cells per field in high virus (4-5) group vs. 6.3 sensory cells/field in the low virus (1-3) group.

2 mucous cells per fin in high virus group vs. 35/field in low virus group

No correlation between female and liver fat in 2004-year class fish. Garrison fish had scores around 2, the other hatcheries were in the 3's.

Garrison is suffering more severe viral outbreaks than the other hatcheries. They have more prolonged warm and cold periods,

Summary

- Attempts to develop condition index was unsuccessful
- Data demonstrate that viral expression is related to hatchery, not female
- Fish may not recovery after viral outbreak (sensory cells)
- Positive relationship between virus and lack of epithelial cells
- No correlation between liver fat score and virus.

Where do we go from here: PCR has been unsuccessful to date

Need to decide if we need a non-lethal test for iridovirus
Assessment criteria: what is useful, and should we do regular monitoring vs. the pre-release testing?

Jim Peterson – Montana Fish Health Coordinator

MT would like to stock all healthy stocks with no virus.
MT is using the pre-release assessment when deciding whether or not to stock fish, and desires to stock the healthiest fish. However, are looking at case by case. For example, MT issued an import permit for 130,000 fry from Garrison which was virus positive.
16,000 YOY were allowed to be stocked from Garrison in Fall 2004 – were hoping to get these stocked in the fall prior to them breaking with the virus. MT required that they be held 10 days post-tagging. They looked good, and there was not time for health screening. Jim took 10 fish for sampling at that time. Analysis of those 10 showed all 10 were heavily infected. Can't just look at them and assume they are healthy. Need to figure out what is going on at Garrison so we can stock fish from that facility without worry about the virus.

Rick Cordes – South Dakota Fish Health Coordinator

Looking at status of facility on a population basis. Assumption is that if any of the hatchery is positive, the whole facility is assumed to be positive. Can't look at this on a tank by tank basis. For all pathogens of concern.

Rob Holm – need a standardized, random selection of fish for assessment.

Question was asked what managers can do to get the iridovirus moved from classification as a pathogen of concern to a lower status on the list. Point was made that efforts should be directed towards reducing virus prevalence and severity rather than worrying about where they fall on a list.

Are there recommendations to reduce the prevalence and severity of virus?

- Need to ensure there is space in the hatchery that they fish can grow into, rather than raise them at maximum density, and then having to rush to get them out before they get sick.
- South Dakota recommends that other facilities be incorporated to spread out the numbers.
- EVER TAKE LIVE FISH FROM GARRISON NFH TO ANY OTHER HATCHERY; ALWAYS TAKE THEM AS EGGS.

Molly – what is the plan of attack? Need a list of recommendations and things to test at Garrison to try to alleviate the problem.

- Reduce densities (GNFH target densities are ½ lb. per square foot)
- Stock fish when they are scheduled to be stocked
- Need to identify who is in charge – and at the March meeting identify how many should be held at each facility, when fish will be stocked, how many, when they will be tagged, etc.

- George Jordan needs recommendation of what we want to do in the upper basin; George will solicit the same information from the other work groups, and then the FWS will need to determine numbers and priorities.
- FWS (Don Campton) is completing a report on whether genetic id is valid for determining origin of pallids. Should be decided soon.
- States should seek clarification from FWS RD on who has authority for decision- making.
- If ES will have authority on recommendations/decisions that are made, then they need to be here and be part of the discussions.

Biologists requesting fish should consider requesting fewer fish if we think that density is the problem.

If we can use genetic markers as a means of marking fish to stock, then you don't need a mobilization of forces to tag. If accepted, then there shouldn't be questions about whether fish can be stocked. They should be stocked so densities don't exceed recommendations.

**PROPAGATION**

Miles City – Mike Rhodes, Montana Fish, Wildlife and Parks

Took 360,000 eggs on July 1. Two females had bad quality eggs. Eye up averaged around 80%. Of those that hatched there were a bunch of weak fish. Once up on food, about the 2nd week in August, a lightning storm went through, knocked out power. Although generator kicked in, there was problem with the phase of electricity, resulting in poor performance of pumps, and a bunch of silt getting flushed on top of the little fish, killing all but about 2,500 of them.

Molly will help with maturation assays next year.

MILES CITY NEEDS TO KNOW WHEN THE FISH CAN BE STOCKED OUT and WHERE – THEY NEED TO GO OUT IN AUGUST.

Garrison National Fish Hatchery – Rob Holm, U.S. Fish and Wildlife Service

Stocking strategy ironed out last fall – 80,000 to RPMA 4; 36,000 to RPMA 2.

Currently Garrison National Fish Hatchery currently has 7,500 2004-year class fish at hatchery representing 27 families; 1,500 may go to Gavins as brood stock. Wants them out of the hatchery in May, so the facility is empty and cleaned out before next spawn. PIT tag them in April.

Never went over ½ pound per square foot density until Oct., 2004, although there were some tanks that did. If a tank breaks with virus, then he doesn't mess with them.

Questions to ponder/recommendations:
- Since GNFH has a record of virus problems, should they raise fish at a lower density? E.g., 0.3 lbs./ft. sq.

- GNFH should be directed to immediately kill enough fish in infected tanks to minimize densities
- Have the propagation committee review the propagation plan and compliance with propagation plan – especially at Garrison.
- Of 13 tanks, 4 were less than .5 lbs/ft sq., 6 were slightly or greater above (.51-.61 lbs/sq. ft), and three were significantly greater than that (1.16-1.19 lbs/ft sq.).

Gavins Point NFH – Herb Bolig, U.S. Fish and Wildlife Service

Gavins has become the primary brood stock facility. In 2004, they completed the new brood stock facilty – 24,000 square feet Advanced Rearing and Broodstock Facility.

They are holding 8 different year classes of future broodstock representing 38 families, ranging in size from .35 lbs to 10 lbs. per fish. Garrison has an additional 20+ families from the 2004-year class to incorporate into the brood.

Zebra mussels have been located below in Lewis and Clark Lake, so they are within the water supply. Haven't seen any veligers or adults in the hatchery.

Helped Miles City spawn their fish during 2004

Received eggs from Fort Peck spawning (4 families), running them at warmer temps and lower densities, and are having no problems with them (no problems). Possibly temperature and density in combination may be the key to the virus.

Are holding five adults (2 females and 3 males) that were collected in Fall 2004 for spawning in June 2005.

Herb requests that Bozeman FTC help Miles City with spawning at Miles City.

Fort Peck Hatchery - Paul Santavy/Gary Bertelloti, Montana Fish, Wildlife and Parks

Hatchery scheduled to open in August 2005. Hatchery building is approximately 27,000 square feet. It will have 40 ponds, 8 raceways, and specific room designed for sturgeon. There will be 12 six-foot circular tanks, plus additional 40+ rectangular tanks that could be used for sturgeon. Water is filtered, then goes through drum filter and UV system.

Bozeman Fish Technology Center

Matt Toner

160 three year old fish stocked into RPMA 1

Spawned 1 female x 2 males from RPMA 1. Made 2 family lots from them, plus sperm from two other males from RPMA 2 for a total of 4 family lots. Incubated eggs for 24 hours on river water before moving them to the FTC.

Looked pretty good until they started going on feed, then there was a large post-hatch mortality. Water temperature dropped about 10 degrees prior to spawning the female, and that may have had something to do with the high mortality.

1,347 fish are on hand right now representing 4 families.

Still looking into fin curl problem. Will be working with Rick Barrows on some starter feed diets.

Molly Webb

Potential for plasma sex steroid as a biomarker for sex and reproductive state of pallid sturgeon.

3 classes of sex steroids:

Androgens (testosterone)
Estrogens
Progestins

Fish have sex and maturity specific steroid concentrations.

Have been looking at the use of steroids to predict sex and stage of maturity in adult white sturgeon

93% non-reproductive females classified correctly
100% non-reproductive males correctly classified
X% reproductive females correctly classified
Y% reproductive males correctly classified

2004 Pallids:

63 plasma samples analyzed
samples analyzed blind
based on other sturgeon species, guessed sex of each sample using steroid levels
correctly classified sex of 89% of the samples (38 of 43 animals correctly sexed)
misidentified animals:
one female at ovulation
one female with fatty ovaries misidentified twice
one male with low kt level

Two females at Garrison with fatty ovaries had low E2 compared to females with normal ovaries.

<u>Summary</u>

- Steroid concentrations may be able to predict ovarian regression and egg quality.
- Steroid concentrations may not be used to determine spawning readiness
- Plasma testosterone and estradiol may be used to confirm sex and maturity in pallid sturgeon.

## AGENCY REPORTS

Army Corps of Engineers – Mark Drobish

Providing propagation assistance to the various hatcheries involved with pallid sturgeon. Highlight this year was the new building at Gavins Point.

Providing funding for standardized monitoring. Contracted with consultant to conduct an independent science review of the standardized protocol. In the upper basin, Stancill's crew is doing segments 5 and 6. South Dakota will be doing a segment. Krentz's crews will do the reaches from the confluence to Sak. Negotiations are underway to cover the reaches from Fort Peck to the North Dakota border.

Bureau of Reclamation – Sue Camp

Intake – a concept report has been completed but can't be distributed at this point.
Issues include passage and entrainment. Looks like a screen to prevent entrainment is pretty solid, but options for passage are more sketchy. Alternative for passage being considered include an inflatable wier vs. a rock fishway.

Hoping to have a plan out as a draft BA for discussions with the USFWS.

George – recommends the workgroup make comments on what priorities are and needs. Recommend letter go to the BOR and USFWS. George, Brad, and Matt J. will draft a letter for the workgroup – needs to be to them prior to December 14.

BOR has drafted a plan of study for the upper MO reservoirs that included studies for pallid sturgeon and hydraulic needs. Met with the USFWS, but didn't have time to do consultation prior to renewal of contracts, but they did agree that the BOR should proceed. Regional leadership board will meet on this in the next couple of weeks.

Research – BOR received funding to put two telemetry base stations on the Milk this year – blue suckers, shovelnose, and paddlefish all passed these stations, the highest one at Tampico.

U.S. Fish and Wildlife Service – George Jordan

This group needs to make hard decisions. Overlying focus should be what is best and required to recovery the pallid sturgeon.

## ANNUAL REPORT

An annual report was compiled for 2003. Copies of the report were sent on a CD to all workgroup members.

2004 reports are due to Ken by June 1, 2005. Ken will provide format guidelines that everyone must follow.

## PROPAGATION PLAN

Propagation Plan was submitted to the USFWS in 2003. USFWS responded that they received it, but they haven't done anything with that beyond that.

The plan has been in place for over a year, and has hopefully been implemented, but there is not anything in place to ensure compliance or adherence to the plan.

Recommendation – The most concerns are around the continued virus problems at Garrison, and it was recommended a sub-set of committee meet at Garrison to review procedures there. Bob recommends that the hatchery managers and other management folks with concerns meet and review procedures, help brainstorm ideas, and develop recommendations. Gerald recommends lower hatcheries be included in the discussions just so they can gain from the discussions.

## STOCKING PLAN

Upper Basin Workgroup agreed to have a sub-committee develop a stocking plan. The committee was comprised of several individuals from different agencies between December 2002 and March 2004. In August 2004, the Upper Basin Workgroup received a letter from the U.S. Fish and Wildlife Service's regional office in Denver stating that, "we propose that the team already in place in the upper basin be expanded to include members of the middle and lower basin and proceed to resume discussions and re-write the plan as soon as possible." In response, Montana Fish, Wildlife and Parks finalized a stocking plan for RPMAs 1 and 2, and submitted it as a stocking plan for Montana, with North Dakota's concurrence. Montana FWP indicated they would not expend additional resources to rewrite the plan and would stand by the stocking plan that was submitted for RPMAs 1 and 2.

Wayne is working on a range wide stocking plan that will be submitted to the USFWS.

George asked the group to prioritize upper basin RPMAs in terms of stocking. How do we do that? Recommendation was that we identify a minimum number of fish for each RPMA – stocking plan does that. It also prioritizes by hatchery (not RPMA).

Roadmap – there is a plan from Montana, there will be a plan from RPMA 4, there may be a plan from the USFWS for the upper and middle basins. Once these are done, the USFWS will need to meld them and prioritize them into a single stocking plan.

## AFS PEER REVIEW RECOMMENDATIONS

Develop a Mission Statement – Core voting group will draft a mission statement, and send draft out to the group for review, with the goal to finalize by March

Need guidance on how the core voting group should function – recommendation that the core voting group develop guidelines for themselves.

- Recommendation was that we follow something like the AFS Chapter organization with a governing board of 2 or 3 people, with specific committees to address specific issues.

- Bill G. feels we should advance to the advocacy level, with formal voting when required. The whole group should vote on really contentious issues, the core group votes on day-to-day issues.
  - Who is the voting body – everyone in the room, a couple delegates from each state, some other format
  - Status of decisions dictates what type of decision-making needs to occur
- Voting team members need to represent their discipline, not their agency, and approach issues as a representative of their discipline.
- Recommendation that Matt K replace Kevin, and Fred Ryckman replace George on Habitat, and George Jordan participate as an ad hoc representative representing the rangewide recovery program. Change the name from core voting group to review board or governing board.

Decision

Governing Board
Ken – Chair
Mgmnt –
RPA 1 - Bill Gardner
RPA 2 - Matt Klungle
RPA3 – Wayne Stancill
Fish Health – Crystal
Propagatoin – Herb
Habitat – Fred Ryckman
Research – Pat Braaten

Group will help define their role over the next few months, develop by-laws, etc.
George will take recommendations from group and be liaison between the work group and the USFWS (Ecological Services).

Conservation geneticist/outreach and education – send letter to agencies requesting this expertise to participate in the process.

**FUNDING PROPOSALS**

There were 16 proposals submitted totaling $1,039,121. There is $200,000 available. Each proposal applicant gave a quick overview of their project. Each member of the group then provided their top 5 rankings, and recommended dollar amount.
The following proposals ranked out in the top:

D. $ 79,432
- $ 32,500from the BOR

G. $ 61,500
- $ 25,000from the BOR

J. $105,000

C. $ 11,568+ 5000 from garrison

PPl will try to get 10,000 from MO-TAC for Guy-Gardner proposal.

Next meeting: Nov. 30-Dec. 1, 2005
March 9-10, 2004

**Upper Basin Pallid Sturgeon Workgroup**
**March 9, 2005 Work Plan Meeting**
**Miles City, Montana**

## INTRODUCTIONS

26 people in attendance representing
Montana Fish Wildlife and Parks
U.S. Fish and Wildlife Service (Montana, North Dakota, South Dakota)
North Dakota Game and Fish
Garrison NFH
Gavins Point NFH
Bozeman Fish Technology Center
Miles City SFH
Fort Peck SFH
WAPA
PPL

## RECOVERY TEAM MEETING

Recovery Team met in St. Louis in association with the Scaphyrhynchous conference in January. Genetics was a big discussion topic – recent work shows that upper MO fish are different from upper Mississippi fish. This leaves questions about RPMA 4 – which is in between. Recommendation was that RPMA fish be stocked from parents originating in RPMA 4. Other recommendations include:

- Establish genetic database
- Establish committee of geneticists
- Establish central repository for genetic data and samples.
- Work towards establishing a standard set of markers
- Localize parental stock for propagation of pallids in RPMA

Recovery team will meet again tentatively in mid-Summer with geneticists. Will also convene again in Sept.-Oct to look at revisiting the recovery plan and bring it up to date.
Want to have the basin workgroups meet closer together so the recovery team can assimilate information from the basin workgroups, and possibly have the workgroups host the recovery team on a rotating basis.

## GENETICS REPORT – SEE ABOVE.

If RPMA 4 results show that their genetics are a mix of the upper and lower basins, then they and the recovery team will have to evaluate how to proceed. For 2005, RPMA 4 recommends caution and discontinuation of stocking of upper basin progeny. Final report is due that will compare RPMA 1-3 with RPMA 4 with those in the middle Mississippi. 69,000 upper basin fish have already been stocked in RPMA 4 and will be part of the genetic pool in the future.

There is some question about what they call a pallid sturgeon (vs. a hybrid). Recommendation is that they confirm genetic purity of "pallids" before they are used in the stocking program.

USFWS wants to convene a panel of geneticists, provide them with available data and questions, let them review and analyze, and then make recommendations to the recovery team.

**BUREC CONSULTATION RE: UPPER MO FLOWS**

The Upper Basin Workgroup recommended that a letter be sent from the workgroup to Reclamation requesting they (BuRec) initiate consultation with the USFWS regarding operations of their projects on the Upper Missouri above Ft. Peck on pallid sturgeon and other listed and non-listed species. Before that letter could be sent, Reclamation had sent a letter to the USFWS requesting such consultation, so the Upper Basin letter was not necessary.

**INTAKE DIVERSION**

At the December workgroup meeting, the workgroup agreed that a letter should be sent from the workgroup to Reclamation expressing concern about the phases of construction and size of the proposed bypass channel.

The letter was sent on January 27, 2005. An excerpt from that letter is as follows:

"Initially it was presented to us that BOR would likely fund construction of the bypass channel first, as that is the least expensive phase of construction. Our workgroup sees this as a serious threat to pallid sturgeon. We recommend that BOR proceed with this project by addressing entrainment first, by installing the proposed fish screen within the irrigation canal, and then completing the project by construction of fish passage devices and dam replacement. Although some fishes can migrate upstream over Intake Dam (Dave Fuller, MTFWP), it is likely that the dam hinders upstream spawning migrations. Should BOR continue with this project and allow passage before entrainment is addressed, there is a high probability that these spawning adults and progeny from the spawners would be removed from the population via entrainment in Intake Canal, and their genetic contribution to pallid sturgeon recovery efforts would be lost. For example, high probability of entrainment in Intake Canal is supported by the BOR's own research; 537,459 (+/- 198,908) fish were entrained in 1996, 382,609 (+/- 24,487) fish were entrained in 1997, and 809,820 (+/- 154,000) fish were entrained in 1998 (Hiebert et al. 2000). More recently, 3 of 21 (14.3%) telemetered juvenile pallid sturgeon released in the Yellowstone River between Forsyth and Fallon, Montana were entrained in Intake Canal (Matt Jaeger, Montana Fish, Wildlife and Parks, personal communication). These losses are staggering and quite frankly unacceptable. Given these data, we feel that eliminating entrainment is the highest priority and must be addressed before fish passage."

There has been no response from Reclamation

## REVIEW OF GARRISON PROPAGATION PROCEDURES

At the December meeting, the workgroup recommended that a sub-committee of the propagation committee review implementation of the propagation plan that was developed by the Upper Basin Workgroup in 2003. A group of 4 people from Montana FWP (Snyder, Peterson, Rhodes, Santavy) met with Garrison staff on January 26-27 and reviewed all aspects of the propagation program at Garrison. After review and analysis, this sub-committee developed a report with 23 recommendations that include:

- Increased filtration
- Increased UV disinfection
- Water quality issues related to entrainment of smelt on the water intake
- Need for a back-up power supply
- Need for additional heated water dedicated to pallid sturgeon culture
- Rearing densities
- Need and process for timely stocking decisions
- Need to establish marking/tagging schedules
- Disease management
- Avoid bringing live fish into the facility

Report detailing results will be finalized and submitted to the workgroup by the end of March 2005.

Recommended that the final report be transmitted as a recommendation from the workgroup to the recovery team, as well as the State Fisheries Administrators with the recommendation that the State's encourage the USFWS administrators implement the recommendations. Send copies to Stemple, Pratschner, WAPA Regional Director, Casey Kruse.

## MILES CITY STATE FISH HATCHERY WATER ISSUE

In 2005, Miles City initiated some construction to revamp their settling ponds. Mike had requested that the ponds be done consecutively vs. concurrently. However, the contractor bid the project and demanded that both ponds be done at once (these supply the hatchery with river water), so both ponds were done at once, and the pallids were put on strictly well water. Soon after, some pallids started dying – and the fish health folks could find no disease. Said they are acting and look like they have been exposed to some type of contaminant. Turns out the well water had high concentrations of sodium bicarbonate. To avoid more mortality, the pallids were transferred to Bluewater State Hatchery until the construction was completed. Pallids were transferred with minimal impact, and will be transferred back to Miles City in mid-March.

In the past, Mike has had the eggs/fry on a combination of well and river water. Suspects that maybe the well water has led to reduced fry survival, so in 2005 he will use only river water. The risk is that if something happens to the water supply, all will be lost.

## (USFWS) FISHERIES VS. ECOLOGICAL SERVICES

USFWS has to hold themselves to the same standards as they require of outside groups/agencies. This is done through intra-FWS consultation. Examples include allowing stocking of fry, approval of stocking plans. USFWS is attempting to avoid last-minute issues so that the intra-FWS consultation can occur in a more predictable process. Should be more involvement from ES from here on out. They need to assess the impacts and responses of proposed actions, and make sure they are consistent with the 2000 and 2003 BiOps.

## UPPER BASIN STOCKING PLAN

Wayne Stancill was working on a rough draft of a rangewide plan. That has been submitted to the Ecological Services office in Bismarck, after which it is anticipated it will go to the workgroups for their review and comment. What was proposed was to use the upper basin plan as a template for a rangewide plan. USFWS felt that a framework was needed, and that framework could function as the basis for intra-FWS consultation. Then any future stocking done under that framework should be authorized without the lengthy process. Expect this to move forward later this spring (2005).

Genetics report from the USFWS, promised as part of the discussions re: the stocking plan, should be released soon (done by Don Campton at USFWS Abernathy facility). Indicates that fry/larvae can be genetically marked, and this is a valid technique for use for marking pallids, just like other tagging methods

It was recommended that the USFWS use the "Montana Stocking Plan for RPMA 1 and 2" as an Appendix to the "framework" that the USFWS has drafted.

If workgroup is going to develop other plans, need to include ES folks on the committee to participate as part of the committee to ensure their concerns are addressed.

## UPPER BASIN PROPAGATION PLAN

Roger Colllins (USFWS – ES) will provide some minor recommended revisions to the Propagation Committee to incorporate into the Propagation Plan. The revisions will incorporate some of the new genetic information coming from Campton, and if OK with the propagation committee, will be integrated into the plan and then ES will recommend that the USFWS Regional Office approve it.

## FORT PECK WATER LEVELS

Going down……..Obviously there will be no test flows in 2005 given the runoff forecasts.

## FORT PECK HATCHERY

Construction resumed after a January break. Major tanks, filter, UV stuff is in the building. Projected completion date in Sept. 1. Will have a dedicated sturgeon room with twelve 6-foot

circular tanks, so should be able to raise 1,000-1,200 nine-inch fish per year. Won't be able to start raising pallid until 2006.

**GAVINS POINT UPDATE**

- Adult broodstock (2 females and 3 males) were captured near the confluence in November and are being held at Gavins, on a live diet. They are doing good and gaining weight. Keep water temperature elevated so they stay on feed.
- Project spawning them sometime in mid-June.
- There is a push to collect broodstock from RPMA 4 (3 F:9 M) and spawn them for stocking in RPMA 4. One issue is that the water in the wild is warmer than the water in the hatchery.
- Have representatives from the recent spawning incorporated into the brood.
- Eight different year classes of pallid sturgeon broodstock representing 65 families and over 3,000 individuals.
- In July, got eggs of 4 different families from above Ft. Peck. Having some mortality in fish from two of the families. Appears it might be iridovirus, but awaiting for results from the Fish Health folks.
- USGS folks used endoscope and ultrasound on twelve 1992-year class fish (lower basin). One female appears capable of spawning this year, and another that maybe could spawn next year.

**PIT-TAG DATABASE**

Missouri River Fisheries Assistance Office (Ryan Wilson) is working on a web-based application where the pit-tag information should be available on the web to enable biologists to access pit tag and color tag data over the web. Pilot application should be available in the next few months, with a final within the next year.

**2005 STOCKING OF 2004 YEAR-CLASS FISH**

| Hatchery | No. Fish | No. Families | Recommend |
|---|---|---|---|
| Gavins | 1200 | 28 (4 from RPMA 1) | 600 – RPA 3<br>600 – RPA 2 |
| Garrison | 5000 | 13 (major families) | 5000 – RPA 2 |
| Miles City | 1600 | 6 (1 very weak) | 300 Yellowstone study<br>100 MSU study<br>1200 – RPA 1 |
| Bozeman | 1250 | 4 (1000 in 1 family) | 1175 - RPA 1<br>75 – Yellowstone study |

- Hatchery Managers will be provided list of sites where individual stocking will occur
- Hatcheries will be provided color/site tagging scheme for the elastomere
- 16,777 fingerlings were stocked in RPMA 2 = 4,000 equivalent 9" fish

- Study fish will be classified as experimental and will not count toward the stocking goals (475 for Yellowstone and MSU studies).
- Plant Tickets will be provided to hatchery managers, with request that they complete them when they stock in Montana.
- Jim Peterson will coordinate fish health assessment needs

**2005 STOCKING SCHEDULE**

| Hatchery | Function | When | Who |
|---|---|---|---|
| Gavins | Tag | Late Aug – Early Sept. | |
| | Stock | Late August – Early September | |
| | Health | Summer 2005 | |
| Garrison | Tag | Week of April 11 | |
| | Stock | Mid-April | Garrison (4), WAPA (3), |
| | Health | Immediately | Bismarck FWS (5) |
| Miles City | Tag | Week of April 11 | FWP Ft. Peck Crews, George |
| | Stock | Mid-April | |
| | Health | Immediately | |
| Bozeman | Tag | Week of August 1 | Bozeman FTC, WAPA |
| | Stock | August 15 | |
| | Health | | |

**2005 BROODSTOCK AND PROPAGATION**

| Hatchery | No. Adults Needed | Number Families | Fingerlings to be Stocked | When |
|---|---|---|---|---|
| Gavins | 2F/3M* | 6 | 20,000 | Late Aug |
| Garrison | 4F/12M | 12 | 50,000 | Late Aug |
| Miles City | 2F/3M | 6 | 50,000 | Late Aug |
| Bozeman | 1F/3M | 4 | ?????? | Late Aug |

*2 Females and 3 males already at Gavins from Fall collection; therefore, 6 Females and 15 males will be needed from RPMA 2; 1 Female and 3 males from RPMA 1.

Broodstock Collection is scheduled to begin on April 18th. USFWS will supply 2 boats and crews; Fort Peck MFWP will supply 3 boats and crews, and Yellowstone FWP 1 boat and crew. It was suggested that transport tanks be pre-positioned at Williston in case additional several females are captured on the same day that will need to be transported to different facilities.

There was a discussion about the potential to stock fingerlings out in late summer if all goes well with broodstock collection and spawning. If yes, then those fish will need to tagged, and

arrangements will need to be made to get them stocked out when they need to get stocked out. Schedule for tagging and stocking is as follows:

Garrison fingerlings to be marked on week of August 26
- Bismarck FWS Office
- Fort Peck FWP Office
- North Dakota Game and Fish Williston Office
- South Dakota FWS Office
- Bozeman FTC
- WAPA
- Corps of Engineers

Mark Miles City fingerlings to be marked on week of August 26
- Glendive FWP (5)
- Miles City Hatchery
- Helena FWP

Gavins Point fingerlings to be contacted in early September
- South Daktoa Game, Fish, and Parks
- South Dakota FWS
- Nebraska Game and Parks Commission
- Corps of Engineers

The default marking will be elastomer and coded wire tags. However, it was recommended that a committee be established to develop tagging recommendations based on data needs, use of tag returns, cost vs. benefits, pros and cons of different tagging methods, etc.

Needs: A tagging protocol – do we have to tag; what is the tagging information used for, what do the biologists want, how do we use this data, etc. Tagging Committee has been appointed to have recommendations by May 31 Gardner, Klumb, Matt Jaeger, Steve Krentz, Rob or Herb

**FALL BROODSTOCK COLLECTION**

After much juggling of schedules around a number of different hunting openers (pheasants, antelope, archery big game, general season big game, waterfowl, etc., etc., etc.), the last week in October (week of October 24th) was selected as date when fall collection will occur. Goal will be 2 females and 3 males. This assumes that the 2004 fall collected adults spawn without problems and we want to continue this. Herb will let everyone know by mid-summer. Signed up to collect fall broodstock:
- Gardner
- Fuller – 2
- FWS Bismarck
- Baxter –2

Drivers needed will be determined as time approaches
Next Meeting: November 30 – December 1, 2005

# WORKGROUP LETTERS AND DOCUMENTS

**Upper Basin Pallid Sturgeon Workgroup**

c/o P.O. Box 200701
Helena, MT 59620

January 27, 2005

Maryanne Bach, Regional Director
U.S. Bureau of Reclamation
Great Plains Region
PO Box 36900
Billings MT 59107

I am writing on behalf of the Upper Basin Pallid Sturgeon Recovery Workgroup. The Upper Basin Workgroup is comprised of biologists and managers with expertise in pallid sturgeon recovery issues, representing 11 different state and federal natural resource management agencies within the States of Montana, North Dakota, and South Dakota. At our recent meeting held December 1-2, 2004, it was brought to our attention that the Bureau of Reclamation (BOR) has completed the Value Engineering (VE) study to address fish passage and entrainment at the Lower Yellowstone Irrigation Project's Intake Dam. While there was much discussion centered on the positive benefits of addressing entrainment and passage, there was some concern raised about the phases of construction and size of the proposed bypass channel.

Initially it was presented to us that BOR would likely fund construction of the bypass channel first, as that is the least expensive phase of construction. Our workgroup sees this as a serious threat to pallid sturgeon. We recommend that BOR proceed with this project by addressing entrainment first, by installing the proposed fish screen within the irrigation canal, and then completing the project by construction of fish passage devices and dam replacement. Although some fishes can migrate upstream over Intake Dam (Dave Fuller, MTFWP), it is likely that the dam hinders upstream spawning migrations. Should BOR continue with this project and allow passage before entrainment is addressed, there is a high probability that these spawning adults and progeny from the spawners would be removed from the population via entrainment in Intake Canal, and their genetic contribution to pallid sturgeon recovery efforts would be lost. For example, high probability of entrainment in Intake Canal is supported by the BOR's own research; 537,459 (+/- 198,908) fish were entrained in 1996, 382,609 (+/- 24,487) fish were entrained in 1997, and 809,820 (+/- 154,000) fish were entrained in 1998 (Hiebert et al. 2000). More recently, 3 of 21 (14.3%) telemetered juvenile pallid sturgeon released in the Yellowstone River between Forsyth and Fallon, Montana were entrained in Intake Canal (Matt Jaeger,

Montana Fish, Wildlife and Parks, personal communication). These losses are staggering and quite frankly unacceptable. Given these data, we feel that eliminating entrainment is the highest priority and must be addressed before fish passage.

We are also concerned about the ability of the proposed bypass channel to successfully attract and pass pallid sturgeon because of its small size. Intuitively, it is difficult to believe that a rock fishway channel about 1% of the width and perhaps a smaller percentage by discharge of the Yellowstone River will provide adequate attractant flows for pallid sturgeon. Although White and Mefford (2002) suggest that velocities of 2 to 4 ft/s will serve as adequate attractant flows for sturgeon, their assessment is misleading in that they unrealistically and inaccurately define attraction velocity as the velocity at which a fish begins to move upstream rather than the proportion of river discharge necessary to attract sturgeon to a bypass structure. Additionally, pallid sturgeon most frequently use relatively deep main channel areas and avoid side channel habitats that are similar to the proposed bypass channel (Bramblett and White 2001; Paul Gerrity, Montana Cooperative Fishery Research Unit, personal communication). Accordingly, the likelihood of pallid sturgeon locating and using the proposed bypass channel is ambiguous and it should not be relied upon as the sole means of providing fish passage. We recommend that pallid sturgeon passage, especially during spawning periods and concurrent high flows, be provided principally by modifications to Intake Dam (i.e., replace dam with Obermeyer gates) that allow direct mainstem passage over the dam itself, and the bypass channel be relied upon only as an auxiliary means of passage during low flow periods when movements over the dam may not be feasible.

We would appreciate the opportunity to further review and comment on specific designs for screening structures, dam modifications, and bypass channel from the VE study, as well as the research reports used to formulate these designs, at your earliest possible convenience.

Sincerely,

Ken McDonald
Chair, Upper Basin Pallid Sturgeon Recovery Workgroup

Cc: George Jordan, Pallid Sturgeon Recovery Coordinator
Dan Jewell, MT Area Office, Bureau of Reclamation

**Upper Basin Pallid Sturgeon Workgroup**

c/o P.O. Box 200701
Helena, MT 59620
406-444-7409

June 20, 2005

Dr. Ralph Morganweck
U.S. Fish and Wildlife Service
134 Union Blvd.
Lakewood, CO 80228

Dear Dr. Morganweck:

Enclosed for your review and implementation is a final report of a Review of Pallid Sturgeon Culture at Garrison Dam NFH (GDNFH) by the Upper Basin Pallid Sturgeon Workgroup Review Team, March, 2005. This report is the result of a site visit and review by members of the Upper Basin Pallid Sturgeon Workgroup with expertise in propagation and hatchery operations. This report describes the observations made by the Review Team during its review of the Garrison Dam NFH facility and pallid sturgeon program, and includes recommendations for improving the pallid sturgeon propagation program at GDNFH. The report contains 26 recommendations that are summarized at the end of this letter. We in the Upper Basin Workgroup feel these recommendations should be implemented as soon as possible to improve the overall health status of pallid sturgeon reared at Garrison National Fish Hatchery, as well as the ability to use those fish for recovery efforts.

This evaluation of the pallid sturgeon rearing facilities and protocols at GDNFH was undertaken by the Upper Basin Workgroup to assess compliance with the collaboratively developed Pallid Sturgeon Propagation Plan that was submitted to the USFWS in June, 2004, and to identify ways to reduce or eliminate the incidence of Pallid Sturgeon Iridovirus (PSIV) at that facility. PSIV is causing significant clinical disease and mortality among pallid sturgeon reared there. It is also resulting in difficult management decisions that may impact pallid sturgeon recovery.

As described in the attached report, in order to rear virus-free sturgeon at GDNFH, the water filtration and UV systems require serious renovation. First level filters with state-of-the-art UV systems should be considered. The Review Team believes one contributing factor to the PSIV problem is overcrowding. In order to avoid overcrowding, adequate rearing space must be held

in reserve. The Review Team believes it is a mistake to rear too many fish without having adequate rearing space into which pallid sturgeon can be thinned. The Review Team recommends replacing the large white plastic tank in the sturgeon building with several round tanks that can be used for this reserve rearing space. Definite stocking goals must be established, including time of stocking, so GDNFH will be able to determine well in advance how many fish it can rear for stocking at a specific time.

The Review Team believes a HACCP plan for GDNFH should be developed that considers all management activities related to sturgeon rearing at the facility. This plan must include a serious commitment to the HACCP plan by all hatchery staff.

We realize that many of the recommendations in the attached report will be costly to implement. However, we believe that the dire situation facing pallid sturgeon merits those expenditures, from whatever sources can be tapped to assist. The Upper Basin Pallid Sturgeon Workgroup stands ready to assist the USFWS to secure needed resources – just let us know how we can help. We also feel that by implementing the recommendations in the attached report, there will be a greater probability of being able to utilize for recovery purposes all of the fish reared at Garrison Dam NFH, rather than incurring the costs of rearing progeny only to not be able to stock them.

The Upper Basin Pallid Sturgeon Recovery Workgroup is comprised of more than 40 biologists and resource managers from several state and federal resource management agencies that have jurisdiction for the management and recovery of pallid sturgeon and their habitat in Recovery Priority Management Areas 1, 2 and 3. These include Montana Fish, Wildlife & Parks, North Dakota Game and Fish Department, South Dakota Department of Game, Fish and Parks, U.S. Fish and Wildlife Service, Bureau of Reclamation, and Western Area Power Administration. These biologists and resource managers collectively have the greatest knowledge of pallid sturgeon and their recovery needs in the upper Missouri River basin, and they represent the best available knowledge about the management, conservation, and recovery of pallid sturgeon in the upper Missouri River basin.

The Upper Basin Pallid Sturgeon Workgroup appreciates your consideration of this critical issue.

Sincerely,

Ken McDonald
Chair, Upper Basin Pallid Sturgeon Workgroup

C: Mike Stemple, USFWS, Denver
Greg Pratschner, USFWS, Denver
George Jordan, USFWS, Billings
Rob Holm, USFWS, Garrison Dam NFH

## SUMMARY OF THE RECOMMENDATIONS FOR IMPROVING THE PALLID STURGEON PROGRAM AT GARRISON DAM NATIONAL FISH HATCHERY

### DEGASSING COLUMNS

- Evaluate the effectiveness of the current degassing system.
- Make the degassing system fully effective and maintainable.
- Evaluate the sizing of the packed columns with respect to flows and develop an operational range for flows through the system.
- Investigate the suitability of a vacuum degassing or other system if the current system cannot be adapted to be effective and maintainable. Install this new system as soon as possible.

### WATER FILTRATION

- Improve the present filtration system to reduce the amount of material allowed to pass through the degassing columns and into the headtanks.
- Explore methods to further remove the suspended silts that affect the effectiveness of UV disinfection.

### HEAD TANKS

- Improve the hygiene of the two head tanks.
- The accumulated materials in the head tanks need to be tested for the presence of fish pathogens to determine if they are a health threat.

### UV DISINFECTION

- Increase UV disinfection to a minimum effective dosage of 318,000 mW/sec/cm2.
- Investigate other disinfection methodologies if incoming silt levels prevent effective UV disinfection.

### POWER SUPPLY

- Install automated power generation equipment dedicated to provide power to the sturgeon building and associated equipment in the event of a power outage.

### HEATED WATER

- Make the pallid sturgeon the priority use for heated water.

- Provide heated water to the sturgeon building by some other means, (e.g. boiler, reuse from salmon building, powerhouse wastewater) if pallid sturgeon cannot be given priority use of the currently available warm water.

**REARING DENSITIES**

- Increase production capacity and alleviate density issues by funding the purchase of additional tanks.

- Continue to maintain tanks within the recommended densities

**DISEASE MANAGEMENT**

- Evaluate methods to improve tank-to-tank isolation including separating the adult spawning area from the sturgeon production area.

- Develop a HACCP plan to identify all possible PSIV routes of entry into the hatchery and spread within the hatchery.

- The sturgeon building's rearing units, equipment, water supply lines and water treatment units should be disinfected annually prior to reuse.

- Live pallid sturgeon should only be transferred between facilities as a last resort, in emergency situations!

- Except for adult pallid sturgeon or forage fish for them, do not bring live fish into the sturgeon building, for any reason.

**WORKGROUP RESPONSIBILITIES**

- The Workgroup should identify the specific people that will make stocking decisions and streamline these processes as much as possible.

- Assign tagging and marking responsibilities at the annual March Workgroup coordination meeting.

- The USFWS must make a final decision regarding the stocking of fry and fingerling pallid sturgeon.

- Develop specific stocking goals (fish numbers and length, release sites, marking requirements, etc.) for each facility.

- Determine the source of PSIV infection. Explore the feasibility of treatments or eradication of PSIV. Evaluate the life history, tolerance to temperatures, UV exposure levels and the potential of vaccines.

- Above all, all agencies must recognize that this virus is a very real disease threat. We cannot ignore the potential impact this virus can have on our wild sturgeon stocks. Every effort must be made to control PSIV at GDNFH and reduce the impact of the virus on wild and hatchery stocks.

**REVIEW OF PALLID STURGEON CULTURE AT GARRISON DAM NFH**
**BY THE UPPER BASIN PALLID STURGEON REVIEW TEAM**
**MARCH 2005**

At the December 2004 annual winter meeting of the Upper Basin Pallid Sturgeon Workgroup, the Workgroup requested a review of the culture of pallid sturgeon at Garrison Dam National Fish Hatchery (GDNFH). A Review Team was tasked with evaluating the entire facility and its hatchery management practices and assessing what changes might be made to reduce or eliminate clinical disease outbreaks, especially pallid sturgeon iridovirus (PSIV), in pallid sturgeon at this facility.

On January 26, 2005 a team of representatives from MFWP and USFWS with expertise in fish health and fish culture met at GDNFH to collaboratively review that hatchery's pallid sturgeon culture program and facility. Members of the Review Team were:

Rob Holm, USFWS, Garrison Dam NFH Manager
John Gravning, USFWS, Garrison Dam NFH
Jerry Tishmack, USFWS, Garrison Dam NFH
Bob Snyder, FWP, Native Species Coordinator
Jim Peterson, FWP, Fish Health Coordinator
Mike Rhodes, FWP, Miles City SFH Hatchery Manager
Paul Santavy, FWP, Fort Peck SFH Hatchery Manager

This report describes the observations made by the Review Team during its review of the Garrison Dam NFH facility and pallid sturgeon program. Recommendations for improving the pallid sturgeon program at GDNFH are made. These 26 recommendations are summarized at the end of the report.

PSIV is a serious problem at GDNFH. It has been a persistent problem and is a constant threat to hatchery stocks as well as to pallid and shovelnose populations in the waters in which these fish are stocked. Recommendations in this report are made to help reduce the impact of the virus, but until the virus is controlled within GDNFH, it remains a fish health threat. It must be recognized that fish stocked from GDNFH are carriers of the virus, even though at the time of stocking they may not demonstrate signs of disease.

## WATER SUPPLY

The water that supplies Garrison Dam NFH comes from the penstocks within Garrison Dam that carry water from the bottom of Lake Sakakawea to the turbine room within the dam. This water is not filtered or screened at the intake or before it enters the hatchery complex. At the hatchery, this water is divided to supply water to three separate buildings and the outside ponds. To maintain hydrostatic head within the water supply delivery system, there is no settling pond to allow suspended materials to settle out.

There are two sources of water for the sturgeon building. The primary source is water that is filtered, degassed and UV disinfected in the sturgeon building. Additional water can be diverted

from the salmon building. This second source is degassed in the salmon building prior to entering the water treatment equipment in the sturgeon building. The availability of optimal water temperature and flows varies with the facility's fish production cycles and the incoming water temperature. Currently the demand for heated water during the winter and early spring creates problems for maintaining both optimal flows and temperatures. This year GDNFH has opted to reduce the flow rates to maintain temperatures at recommended levels. These lower flows may contribute to stress and disease associated with less than optimal water quality. However, the benefits of maintaining the sturgeon in higher water temperatures should offset the risks caused by low flows. How long these temperatures can be maintained without impacting either the sturgeon or other fish production operations is unknown.

The water supply and treatment system at GDNFH is complex. Some of this complexity comes from the piecemeal addition of equipment as new needs and demands have been identified over time and existing systems were retrofitted to accommodate new equipment. The design of the water supply and treatment systems requires a significant amount of effort and expertise by the hatchery staff to keep it operating. In order to use and maintain them, an intimate understanding of how the components of the system work and interact is needed.

The incoming water supply filters and screens are difficult to maintain and are of questionable efficacy. Depending on the numbers of smelt entrained, cleaning and replacing filters and screens may require the daily manipulation of valves and the loosening and re-tightening of cover plate bolts to access and replace filter medium. Some filters are subject to plugging by debris and do not prevent entrained debris, including fish and aquatic invertebrates or parts of these organisms, from passing through the system. The system is not conducive to easy cleaning, flushing, or periodic disinfection.

Flour-like clay silt is not removed by the existing filtration system. Ninety-six percent (96%) of the post-filtration suspended solids range from 2 to 16 microns in size. Of these, sixty-seven percent (67%) are in the 4 to 8 micron size range. This suspended clay can reduce the effectiveness of the various UV disinfection units, but is extremely difficult to filter out using conventional means. Installation of more powerful UV equipment could offset the problems with filtration and could increase the effectiveness and efficiency of the physical plant. The staff at GDNFH should be commended for their efforts to deal with the current system.

**DEGASSING COLUMNS**

High levels of dissolved gas can cause stress, tissue damage and even death in fish. Dissolved gas supersaturation is a significant problem at GDNFH. The hatchery staff has maintained a record of gas saturation measurements at the facility. These data clearly show a history of high levels of total gas supersaturation.

The efficiency and effectiveness of the packed columns to remove dissolved gases to acceptable levels is suspect. Because of problems with debris accumulations and the difficulties of removing the debris, Koch rings have been replaced by a series of angled perforated plates. Additionally, there is no dispersal screen at the top of the columns and the columns appeared to be sized too small for flows. During periods of extremely high levels of dissolved nitrogen in the

incoming water, oxygen injection is used to displace dissolved nitrogen. GDNFH will evaluate the effectiveness of the current and alternative degassing column designs.

**RECOMMENDATION**

GDNFH needs to have a fully effective, maintainable degassing system to prevent gas bubble disease in pallid sturgeon. The effectiveness of the current system needs to be evaluated.

An evaluation of the sizing of the packed columns with respect to flows needs to be completed and an operational range for flows through the system (minimum and maximum flow per column) needs to be developed. (Note: PR Aqua in British Columbia is a good consultant for degassing columns.)

If the current system cannot be adapted to be effective and maintainable, the suitability of a vacuum degasser or other system should be investigated. If a preferable method to reduce dissolved gasses is identified, this system should be installed.

**WATER FILTRATION**

The filters used to remove debris and suspended solids vary from stainless steel cartridges to washable fiber filters. The operation and maintenance of the various filters were demonstrated to the Review Team. Cleaning of the "bag filters" is cumbersome and time consuming. The sturgeon building filtration uses a state of the art automatic self-cleaning filter. An internal stainless steel cartridge is capable of filtering suspended particles down to 15 microns in diameter. The current initial screening system is not completely effective and occasionally allows large debris, including small fish and fish parts, to pass into the degassing system. The final filters in the sturgeon building provide sufficient removal of organic debris, but do not remove suspended clays less than 15 microns in diameter.

**RECOMMENDATION**

The incoming filter system used at GDNFH is in need of review and possibly replacement. Installation of a drum filter was discussed. A pressurized sliding filter of some sort to filter out large debris, such as fish, is advisable.

The filtration system has to be improved to reduce the amount of material allowed to pass to the degassing columns and into the head tanks. In 1996-97 GDNFH had a very serious problem with entrained smelt and other fish passing into the head tanks in the salmon building. Although smelt are not seen in the head tanks as much now because the smelt population in the lake is reduced, the expectation is that with future increases in the smelt population, the problem will reappear unless something is done to improve the filtration system.

**HEAD TANKS**

Organic and inorganic detritus is allowed to accumulate in the two, large head tanks that capture the water from the degassing columns. This material can potentially accumulate to depths up to

18 inches and has included large parts of fish that have passed through the system's filters. The current design and the inability to shut off water in the system because of the perpetual need to supply water through the system for fish culture prevents the periodic removal of this accumulated material that can act as a medium for undesirable organisms including fish pathogens. Whether fish pathogens are in this accumulated material is untested.

**RECOMMENDATION**

The hygiene of the two head tanks needs to be improved. The inorganic and organic material that passes through the degassing columns into the head tanks cannot be allowed to accumulate. Suggestions on how to solve this problem included: periodic (weekly) flushing through the current drain plugs into floor drains (this may require enlarging the current drain plugs); siphoning the material from the head tanks; or not allowing the material to precipitate out in the head tanks by either keeping it in suspension with the use of a bubble or water manifold or by withdrawing water from multiple sites within the tank, rather than the single water line currently used.

The accumulated materials in the head tanks need to be tested for the presence of fish pathogens to determine if they are a health threat.

**UV DISINFECTION**

The salmon building UV disinfection unit does not have a wiper to reduce buildup on the UV unit's tubes. The single tube, medium pressure UV unit in the sturgeon building does have an automatic wiper. However, suspended fine silt compromises this unit's effectiveness to disinfect the incoming water to the sturgeon room. While the 15 micron stainless steel cartridge filter removes much of the larger suspended materials from the incoming water, suspended fine (<15 micron) clay silt is not removed by the current filtration system. Silt levels in the supply water increases when wind-caused wave action stirs up reservoir bottom sediments. The current low water level in the reservoir increases the entrainment of this fine silt. This suspended silt can inhibit the UV light transmission within the UV treatment unit and, thus, the effectiveness of disinfection.

The sturgeon building UV unit must be able to completely disinfect the water supplying the sturgeon tanks, even at elevated turbidities. The UV unit should be periodically evaluated to measure its effectiveness, both seasonally and with varying silt loads.
Recommendation:

Two conditions reduce the effectiveness of the UV disinfection unit in the sturgeon building: suspended clays reduce light transmission in the unit, and the unit does not generate a high enough UV dosage to be effective during periods of high turbidity or on more resistant fish pathogens. Methods to further remove the suspended silts that affect the effectiveness of UV disinfection need to be explored. Also, based on a dosage needed to control Costia sp., a parasite known to have infected GDNFH pallid sturgeon, UV disinfection must be increased to a minimum dosage of 318,000 mW/sec/cm2 during periods of maximum turbidity.

If no effective method can be found to use UV disinfection with the incoming silt levels, other disinfection methodologies should be investigated, evaluated, and installed.

**POWER SUPPLY**

Even with its proximity to a major power generation facility, GDNFH experiences periodic power outages (6 events in 2004). GDNFH employs electrical pumps, electrical heaters, electric shunts to detect and backwash plugged water supply screens and filters, and electrical UV disinfection units that disinfect incoming water. GDNFH has no backup electrical power generation capability. During power failures, sturgeon building water temperatures dramatically fluctuate (as much as 25° F), and UV systems no longer disinfect incoming water. Electrical outages cause stress in the pallid sturgeon raised at GDNFH, while increasing the opportunities for their infection by parasites and pathogens.

**RECOMMENDATION**

Install automated power generation specifically to provide electricity during power outages to the sturgeon building's boilers, pumps and UV equipment.

**HEATED WATER**

There are currently two sources of heated water for pallid sturgeon culture at GDNFH. During the summer and throughout the fall a heat pump is used to supply warm water directly to the sturgeon building for sturgeon culture. Unfortunately, the heat pump does not work in the winter months due to its inability to extract heat from reservoir water at low winter temperatures. Three large 2.2 million BTU boilers heat water for use in either the salmon building or the sturgeon building. GDNFH is currently under contract with North Dakota Game and Fish to produce various species of fish to support recreational fisheries in North Dakota. The trout and salmon programs at GDNFH currently are given priority use of boiler-heated water during late fall through early spring, reducing the amount of heated water available for rearing pallid sturgeon. The lower priority juvenile pallid sturgeon over-wintered in the sturgeon building cannot be kept at more optimum rearing temperatures because of the limited availability of heated water. Recommendation:

It is in the best interest of the pallid sturgeon reared at GDNFH that they be made the priority for the limited available heated water. However unfortunate, the reality is that, as with Miles City SFH, there are demands for the production of fish species other than pallid sturgeon from GDNFH. The pallid sturgeon programs at these facilities often compete with other programs for limited hatchery resources. If pallid sturgeon cannot be given priority use of the currently available warm water, water heated by some other means needs to be provided to the sturgeon building.

Heated water could be provided to the sturgeon building by installing a new boiler specifically designated to heat water for sturgeon culture. This new boiler would require a backup power supply to prevent thermal spikes during power outages (see above).

Another option to provide heated water to the sturgeon building is to reuse wastewater from the salmon building in the sturgeon building, although this has the potential to spread pathogens to the sturgeon building if the water not disinfected or if the disinfection equipment breaks down or fails due to a power outage. The salmon building drain lines could be extended (using the stub-outs currently in place in the salmon building drain lines) to the sturgeon building and then connected to the sturgeon building water supply lines.

The Garrison Dam powerhouse uses lake water to cool the power plant generators and then discharges this wastewater into the tailrace. This heated water could be used for the culture of pallid sturgeon if a method to capture and transport this heated water to the GDNFH sturgeon building could be found.

**REARING DENSITIES**

Pallid sturgeon inventories at GDNFH need to be thinned to tank capacities at two critical periods: soon after fry go on feed and in the fall to reduce the hatchery population to its over-winter capacity. Keeping fry and juvenile pallid sturgeon below maximum recommended rearing densities continues to be a problem at GDNFH. The reasons can be grouped into two broad categories: administrative/process problems and hatchery management/fish health problems.

Three age classes of pallid sturgeon are available for stocking:

1. Fry. These fish are available during the first month following hatching. Fish managers must indicate at the March meeting if they will accept stocking of pallid sturgeon fry and where these fish can be stocked.

2. Fingerlings. Fingerlings are available in September. Based on current estimates of survival, fingerlings are stocked at a 4:1 ratio (four fall-stocked fingerlings are equal to one spring-stocked yearling). Fish managers in the Workgroup must fully understand that current hatchery capacities cannot provide all requested yearling fish. Therefore, fingerlings must be stocked in order to meet the stocking requests. These should not be considered surplus fish, but rather a primary component of the RPMA stocking request.

3. Yearlings. These are fish held over winter for stocking in April. While fish managers may prefer pallid sturgeon of this age, current hatchery capabilities are insufficient to provide enough yearlings to meet the total stocking requests of all upper basin RPMAs. GDNFH currently has the capacity to supply 5000 yearlings in April.

It has been difficult for GDNFH to obtain permission to stock out surplus fish in a timely manner because the complex decision process involves discussions and decisions among many intra-agency management tiers and multiple agencies. With no pre-determined stocking goals or a consistent policy for stocking of fry and fingerlings, it is difficult, if not impossible, to reduce hatchery sturgeon populations before they exceed hatchery capacities. In effect, the hatchery manager is kept from managing his hatchery populations.

Requests for assistance have generally been ignored and decisions affecting the outstocking of sturgeon have not occurred in a timely manner. When fish have to be marked or tagged prior to release, there has to be a commitment by the Workgroup to provide sufficient personnel to accomplish these tasks.

If the recommendations from this review are implemented, the expectation is that GDNFH will be less impacted by PSIV outbreaks. This will simplify the discussions and decision processes regarding the stocking of GDNFH pallid sturgeon.

The above difficulties resulted in sturgeon exceeding acceptable densities while decisions were made or fish were tagged. With no alternatives to reduce densities, sturgeon were held too long and permitted to outgrow their tank space.

**RECOMMENDATION**

Do not allow pallid sturgeon to reach maximum recommended density limits.

GDNFH must dedicate tank space that is available when stocking decisions or tagging delays the outstocking of fish surplus to the hatchery's overwinter carrying capacity. GDNFH has submitted a proposal to add 18 additional tanks that will increase the hatchery's capacity by a third. Before unacceptable rearing densities are achieved, main production tanks should be thinned into these newly acquired tanks until these surplus fish can be stocked. This dedicated tank space should be managed to prevent over-crowding, not to expand current production capabilities.

A final decision by USFWS regarding the stocking of fry and fingerling pallid sturgeon needs to be made. Montana's pallid sturgeon stocking plan that establishes stocking goals for RPMAs 1 and 2 incorporates the stocking of sub-yearling pallid sturgeon. Until RPMA-specific stocking plans are developed and production goals are developed for each hatchery, it will continue to be difficult to manage hatchery populations within recommended densities.

During the Review Team's visit to GDNFH, Montana's hatchery management software HATCH3 was demonstrated and its utility as a tool to manage hatchery rearing densities was discussed. HATCH3 or a similar tool can project fish growth and determine when unacceptable densities will be reached soon after pallid sturgeon fry go on feed. This will assist with determining when, where and how many fry and fingerling will be released and when critical decisions, tagging and fish health testing must occur. The process to manage densities will be:

- Once fry are on feed (approximately 2 weeks post hatch), the availability of fry surplus to hatchery carrying capacity is known. Biologists, managers and administrators will be immediately informed so that fry stocking sites and times can be determined. Surplus fry will be stocked before individual tank capacities are exceeded.

- When fry are on feed and undergo the typical initial die-off associated with this, density threshold dates (when fish will meet maximum densities) are calculated for fingerlings and over-wintered fish. All appropriate fish health personnel, administrators, managers, and

biologists will be notified of the window within which tagging/marking, fish health monitoring, and stocking site determination must occur. This window is determined by when the fish will be large enough to tag and when fish have to be stocked to maintain acceptable stocking densities.

Hatchery managers know how many fish of specific sizes they can raise each year. However, they need to do a better job of communicating this information to administrators and management biologists.

The Workgroup should identify the specific people that will make stocking decisions and assign tagging and marking responsibilities at the annual March Workgroup coordination meeting.

**DISEASE MANAGEMENT**

The sturgeon building is kept fairly dark, with a small window providing some diffused light in order to provide a natural photoperiod. The Review Team agreed that the light in the building was appropriate. The adult holding tanks at GDNFH provide excellent holding facilities for wild adult pallid sturgeon.

The primary reason for this hatchery review is the presence of PSIV at GDNFH. All recommended mitigation efforts are suggested in an effort to limit the presence of the virus and its impact on the pallid sturgeon at GDNFH and the waters into which fish from the hatchery are stocked. Previous strategies to reduce impacts of PSIVat GDNFH, while helpful, have failed to control the virus. It is unknown what impact this virus is having on wild sturgeon stocks, but our experience with hatchery stocks clearly demonstrates this virus has the potential to have serious negative impacts on sturgeon populations.

Since GDNFH recognizes there is a problem with PSIV, the hatchery staff needs to be aware of every possible source of transmission of the virus within the facility. The hatchery staff does a good job isolating individual tanks and avoiding the spread of disease by dedicating individual brushes and tools for each tank. However, the brushes are made of wood. It would be desirable to have brushes and tools used for sturgeon culture made of metal, plastic or fiberglass. The use of more rigid protocols to increase tank-to-tank isolation, such as using rubber gloves and disinfecting them between each tank, was discussed. This is an excellent idea, which should be considered. Use of footbaths, rubber aprons and gloves and a rigid disinfection protocol should be considered at all pallid sturgeon facilities and incorporated into hatchery HACCP (Hazard Analysis Critical Control Point) plans.

The hatchery crew must ensure that water used to transport captured wild adults and water from the tanks containing adults does not contaminate other sturgeon rearing units at the facility. This will be particularly difficult during spawning, since water is splashed from the adult tanks during the spawning process. Stocking yearlings prior to spawning would help alleviate this problem.

Although difficulties in obtaining permission to stock pallid sturgeon yearlings have recently prevented it, periodic disinfection of the entire pallid sturgeon rearing facility has occurred in the

past. The periodic, complete disinfection of the pallid sturgeon facility including the water supply lines and treatment equipment should be a goal.

The Review Team discussed HACCP as a tool to identify the critical control points for PSIV to spread between tanks and hatcheries. GDNFH's current HACCP plan was developed at the request of the State of Wyoming to ensure fish sent from GDNFH to Wyoming did not result in introductions of aquatic nuisance species or fish pathogens into Wyoming. A HACCP plan will help protect the hatchery and all waters into which pallid sturgeon from GDNFH are stocked.

Live pallid sturgeon known to be positive for the PSIV are transferred from GDNFH to other hatcheries, including Gavins Point NFH, Neosho NFH and Blind Pony SFH, only after careful consideration through a risk management process. The receiving hatcheries have experienced clinical outbreaks and mortality from PSIV. A particular concern is the possible negative impact of the virus on the pallid sturgeon broodstock at Gavins Point NFH. Transferring live fish of any kind between hatchery facilities should not be considered a normal practice. Live fish should only be transferred between facilities as a last resort, in emergency situations.

Except for the adult pallid sturgeon, no wild fish will be brought into the pallid sturgeon rearing area.

**RECOMMENDATION**

Evaluate methods to improve tank-to-tank isolation, including separating the adult holding area from the sturgeon production area.

The USFWS has requested all of its hatcheries to develop HACCP plans. GDNFH should write a HACCP plan to identify all possible PSIV routes of entry into the hatchery and spread within the hatchery.

The sturgeon building's rearing units, equipment, water supply lines and water treatment units should be disinfected annually prior to reuse.

Live pallid sturgeon should only be transferred between facilities as a last resort, in emergency situations!

Except for adult pallid sturgeon and forage fish for them, do not bring live fish into the pallid sturgeon rearing area, for any reason.

**SUMMARY**

This evaluation of the pallid sturgeon rearing facilities and protocols at GDNFH was undertaken to identify ways to reduce or eliminate the incidence of PSIV at that facility. PSIV is causing significant clinical disease and mortality among pallid sturgeon reared there. It is also resulting in difficult management decisions that may impact pallid sturgeon recovery.

In order to rear virus-free sturgeon at GDNFH, the water filtration and UV systems require serious renovation. First level filters with state-of-the-art UV systems should be considered. The Review Team believes one contributing factor to the PSIV problem is overcrowding. In order to avoid overcrowding, adequate rearing space must be held in reserve. The Review Team believes it is a mistake to rear too many fish without having adequate rearing space into which pallid sturgeon can be thinned. The Review Team recommends replacing the large white plastic tank in the sturgeon building with several round tanks that can be used for this reserve rearing space. Definite stocking goals must be established, including time of stocking, so GDNFH will be able to determine well in advance how many fish it can rear for stocking at a specific time.

The Review Team believes a HACCP plan for GDNFH should be developed that considers all management activities related to sturgeon rearing at the facility. This plan must include a serious commitment to the HACCP plan by all hatchery staff.

GDNFH has a serious iridovirus problem, with clinical disease due to PSIV. If the recommendations from this review cannot be implemented or fail to prevent outbreaks of clinical PSIV, discontinuing the rearing of pallid sturgeon at GDNFH should be contemplated. GDNFH has an excellent adult holding facility and the staff has considerable expertise in successfully spawning wild pallid sturgeon. Eggs from GDNFH could be shipped to Bozeman FTC, Miles City SFH, Fort Peck SFH or Gavins Point NFH for rearing. PSIV may be vertically transmitted, but eggs can safely be shipped to other hatcheries where fish can be reared disease-free. This has been demonstrated with pallid sturgeon eggs shipped from GDNFH to Miles City SFH and the Bozeman Fish Technology Center.

The Upper Basin Workgroup and its participating agencies need to commit to providing assistance to Upper Basin hatcheries to maintain their sturgeon populations within recommended guidelines. This includes providing personnel for tagging and marking at the times required by hatcheries. Stocking goals for each hatchery must be identified at the annual March coordination meeting.

A summary of the recommendations for improving the pallid sturgeon program at Garrison Dam National Fish Hatchery appears at the end of this report. The Review Team encourages the Upper Basin Pallid Sturgeon Workgroup and its associated agencies to implement the recommendations identified in this review.

Summary of the Recommendations for Improving the Pallid Sturgeon Program at Garrison Dam National Fish Hatchery

**DEGASSING COLUMNS**

- Evaluate the effectiveness of the current degassing system.

- Make the degassing system fully effective and maintainable.

- Evaluate the sizing of the packed columns with respect to flows and develop an operational range for flows through the system.

- Investigate the suitability of a vacuum degassing or other system if the current system cannot be adapted to be effective and maintainable. Install this new system as soon as possible.

**WATER FILTRATION**

- Improve the present filtration system to reduce the amount of material allowed to pass through the degassing columns and into the headtanks.

- Explore methods to further remove the suspended silts that affect the effectiveness of UV disinfection.

**HEAD TANKS**

- Improve the hygiene of the two head tanks.

- The accumulated materials in the head tanks need to be tested for the presence of fish pathogens to determine if they are a health threat.

**UV DISINFECTION**

- Increase UV disinfection to a minimum effective dosage of 318,000 mW/sec/cm2.

- Investigate other disinfection methodologies if incoming silt levels prevent effective UV disinfection.

**POWER SUPPLY**

- Install automated power generation equipment dedicated to provide power to the sturgeon building and associated equipment in the event of a power outage.

**HEATED WATER**

- Make the pallid sturgeon the priority use for heated water.

- Provide heated water to the sturgeon building by some other means, (e.g. boiler, reuse from salmon building, powerhouse wastewater) if pallid sturgeon cannot be given priority use of the currently available warm water.

**REARING DENSITIES**

- Increase production capacity and alleviate density issues by funding the purchase of additional tanks.

- Continue to maintain tanks within the recommended densities

## DISEASE MANAGEMENT

- Evaluate methods to improve tank-to-tank isolation including separating the adult spawning area from the sturgeon production area.

- Develop a HACCP plan to identify all possible PSIV routes of entry into the hatchery and spread within the hatchery.

- The sturgeon building's rearing units, equipment, water supply lines and water treatment units should be disinfected annually prior to reuse.

- Live pallid sturgeon should only be transferred between facilities as a last resort, in emergency situations!

- Except for adult pallid sturgeon or forage fish for them, do not bring live fish into the sturgeon building, for any reason.

## WORKGROUP RESPONSIBILITIES

- The Workgroup should identify the specific people that will make stocking decisions and streamline these processes as much as possible.

- Assign tagging and marking responsibilities at the annual March Workgroup coordination meeting.

- The USFWS must make a final decision regarding the stocking of fry and fingerling pallid sturgeon.

- Develop specific stocking goals (fish numbers and length, release sites, marking requirements, etc.) for each facility.

- Determine the source of PSIV infection. Explore the feasibility of treatments or eradication of PSIV. Evaluate the life history, tolerance to temperatures, UV exposure levels and the potential of vaccines.

- Above all, all agencies must recognize that this virus is a very real disease threat. We cannot ignore the potential impact this virus can have on our wild sturgeon stocks. Every effort must be made to control PSIV at GDNFH and reduce the impact of the virus on wild and hatchery stocks.