

Draft Summary
NONNATIVE FISH MANAGEMENT WORKSHOP: 2010

December 7–8, 2010
Clarion Inn, 755 Horizon Drive (970) 243-6790
Grand Junction, Colorado

Assignments are indicated by “>”. **Recommendations indicated by red text.**

Purpose of Workshop.—Provide a forum for principal investigators of nonnative fish management projects and other interested parties to: a) discuss findings and progress related to the Recovery Program’s efforts to reduce the threat of nonnative fishes in 2010; b) elevate discussion and implementation of preventive strategies to combat nonnative aquatic species impacts and invasions; and c) identify new developments and formulate draft recommendations for the 2011 work plan.

Expected Outcomes:

Clear direction on the types of analyses needed for three collaborative presentations to be given at the Annual Researcher’s Meeting in Moab, Utah, on January 12-13, 2011. Please focus on annual data summaries, population estimates, synthesis of environmental or population trends that have been pursued, or any noteworthy events we should know about (population shifts, extraordinary environmental, etc.)

1. These presentations will summarize field data collected during 2010 and previous years as they relate to: a) smallmouth bass management; b) northern pike management; and c) native fish responses to those management actions.
2. Recommendations, with justification, to the Biology and Management Committees on how the Recovery Program could more effectively reduce the threat of nonnative fish in 2011 and out-years. (We should strive to roll these recommendations into the collaborative presentations.)

Materials to Review in Preparation for the Workshop:

- Agenda – note 15 minute limit for many presentations, plus Q&A. There will be additional time for discussion following each topic category.
- 2010 Project Annual Reports (posted to the Recovery Program’s website).
<http://www.coloradoriverrecovery.org/documents-publications/work-plan-documents/project-annual-reports.html#III>.

- Yampa River Basin Aquatic Wildlife Management Plan, October 2010 (posted to the Recovery Program's website). <http://coloradoriverrecovery.org/general-information/program-elements/nonnative-fish-management.html>
- Approach for developing the collaborative presentations by topic category (Attachment A).

Presentations for project updates (15 minutes each, including Q/A). Principal investigators should assume that their annual reports have already been read by participants and needn't summarize annual reports in their entirety. Instead, focus on (1) project highlights, such as important trends in data, new developments, observations linking target species response to environmental variables (especially flows, temperature), recommendations to improve efficiency or changes to 2011 SOW's, etc; (2) implementation of new projects or changes to existing projects. Describe preliminary observations on implementation of changes to 2010 scopes of work. What worked? What didn't? What should be changed for 2011; and (3) be prepared to address questions identified by NNFSC (following review of annual reports received on Nov 15) and distributed by early December 2010. While it may not be necessary to tailor your presentations to these questions, be at least prepared to discuss them at the workshop.

Tuesday, December 7, convene 8:00 AM

1. Introduction and welcome (P. Martinez)

- A) Workshop purpose and desired outcome
- B) Workshop structure, process (annual reports received Nov 15-Dec 3)
- C) Workshop participants' roles, responsibilities, expectations
- D) Housekeeping

Moderator – Melissa Trammell

2. Evaluation of GPP 5.0, VVP-15B & ETS-1D electrofishers and preliminary results of electrofishing raft standardization (P. Martinez & L. Kolz). Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/147.pdf

Aluminum boats: GPP 5.0 units serve our purposes, but aren't really optimal. VVP units can't perform well at higher conductivities; therefore, we can't endorse these for wide application throughout the upper basin. The new ETS MBS-1D has been tested and shows promise. **Recommend field-testing a couple of ETS units in 2011, with one going to John Hawkins' crew.** Wisconsin DNR seems to be purchasing the ETS units as they can afford them.

Rafts: **Cathodes should be placed at the rear of the raft.** Rafts require half the power of boats, and should be conducive to using VVP units (although no one is using those at this point). Rafts are fundamentally different, fishing half the area of aluminum boats. CPUE's,

of course, are not comparable. Recommend that the raft electrofishing fleet adopt a fan-style cathode consisting of four strands of 0.25-inch diameter stainless steel cable of a length that allows 46-inches of each cable strand to be submerged in the water while trailing the raft.

3. Development of an Upper Colorado River Basin Nonnative Fish Control Strategy (P. Martinez et al.)

Elements of the strategy will include:

Prevention – the foremost strategy and is required to reduce the need and expense to apply control strategies.

NNF Stocking Procedures

Hazard Analysis and Critical Control Point Planning (HACCPP) – UDWWR has made this a standard part of their hatchery operations.

Invasive species and aquatic nuisance species – national programs, stress prevention

Control – our present approach focused primarily on control (mechanical via electrofishing and nets, and screens). Additional techniques are available, but not widely implemented at this point. Other potential techniques include bounties, derbies, must-kill regulations, chemical, genetic, and biological. We have an emerging invertebrate (e.g. crayfish) problem for which control is uncertain and techniques unknown/unproven.

Research & Monitoring – We need to facilitate development and application of new techniques). Areas for research include: mechanical/movement control, environmental factors, ecological factors, and genetic biocontrol.

Policy – important to adopt policies to prevent impacts and promote recovery. Need to identify weakest-links and apply best management practices. One policy tool is the USFWS annual sufficient progress memo identifies progress and adjusts priorities. Policy is needed to address illegal stocking, which appears to continue unabated. Potential application of a water quality model, with nonnative fishes understood as biological pollutants.

4. Nonnative Fish Stocking & Escapement

A) NNF Stock Procedures (1996, revised 2009): CDOW private permits (A. Martinez) – Procedures: If below 50 yr floodplain, can stock LMB, BCR, BGL, or WHA (triploid grass carp) with screens and berms. Above the 50-year floodplain, also can stock MSQ, but only in isolated ponds. Above 6500' and 100 yr floodplan, also CCF and FMW in isolated ponds. In rivers within or directly connected to critical habitat, no warmwater nonnative fishes may be stocked. Currently, CDOW regulations rely heavily on the 6500' elevation, and do not include the San Juan. CDOW placed notices in West Slope newspapers in 2001, 2002, 2006, and 2010. 569 permits issued since 1999 (more for grass carp than all of the other six species combined). There has been a general decline in the number of permits issued each year; likely considerable stocking happening without permits. **Stocking plan, screening, and berming should be approved by the State Agency and FWS. Screens and berms**

should be inspected annually by State Agency. Recommendations: increase frequency of stocking notices in local newspapers. Implement the 2009 revised Stocking Procedures and amend CDOW regulations to reflect the 2009 Procedures.

- B) C 18/19: progress with microchemical signatures (Wolff) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/C18-19.pdf

Sr ratios alone are sufficient to determine origins of invasive fishes in most locations. The ablation method allows determination of fish movement within a year's time. Other than walleye, little difference between strontium isotopic ratios (Sr) between species. Sr appears to remain fairly steady over time. Location is the most important predictor of Sr ratio (but do have to account for walleye effect). Can classify origins of nonnative fish using Sr ratios: a number of walleye captured in the Colorado River originated in Rifle Gap, walleye captured in the Green River appear to have come from Starvation Reservoir. Some smallmouth bass captured in the Green River appear to have originated in Flaming Gorge. Five of eight northern pike captured in the Yampa 5 of 8 had core signature consistent with Lake Catamount (however, this signature is very similar to Yampa R.). Other isotopic markers can help distinguish locations where Sr ratios alone can't.

- C) Consideration of propagule size in the establishment of nonnative fish (P. Martinez) – Propagule (size) is the number or density of adult nonnative species involved in failed or successful establishment of a self-sustaining population. The sequence for invasion is inoculum>propagule>propagule pressure>invasion (introduction>establishment>spread>impact).

Pat reviewed the literature, stocking records, etc. to determine propagule size in terms of adult fish per acre:

Species	Range	Mean
Smallmouth	0.23-3.2	1.25
Northern pike	0.06-0.52	0.24
Walleye	0.02-0.63	0.24

Thus, ~ 1 adult per 4 acres may start to establish a population. On this basis, at a target population of 30 smallmouth > 200 mm/mile translates to a propagule size of 1.25 smallmouth/acre. Propagule is residents+recruitment+immigration+escapees. Pike can rapidly proliferate in Catamount Reservoir. We have inoculums of species in new locations (e.g., burbot in Green, ...) and an increase in propagule pressure.

- D) C18/19: ideas for how to best utilize microchemistry (Johnson) – Reliable source signatures have been established. We've shown that escapement is occurring and when it occurred (e.g. walleye from Colorado River apparently escaping from Rifle Gap Reservoir in the high water years of 1994-1998). Escapement from reservoirs appears to be occurring throughout the upper Colorado river: Yampa – smallmouth bass from Elkhead; pike from Catamount and ponds; Colorado – walleye from Rifle Gap; Green –perhaps smallmouth from Flaming Gorge, walleye from Starvation. Future applications for microchemistry: determine if screening methods are

working;. **Collect otoliths from fish if you have suspicions or thoughts of investigating Sr ratios (handle with non-metallic instruments, rinse with MilliQ water, blot with clean tissue, store in labeled microcentrifuge tubes within well-labeled coin envelopes (species, TL, capture date, water body, specific location [UTM helpful]). Analysis of 5-10 fish likely sufficient to fingerprint a stable location.** River signatures are a persistent uncertainty, so want to learn if river Sr ratios are distinct from reservoirs; how SR ratios change from tailwater to downstream reaches; and if Sr ratios of river fish are as stable and discriminating as in reservoirs. Need a widely distributed, sedentary sentinel organism that accumulates Sr at the same ratio as fish otoliths. Crayfish may be the solution. Would like to **collect crayfish in selected reservoirs and in rivers at intervals downstream, then compare fish and crayfish SR ratios.** Also may do project to distinguish hatchery and wild June sucker.

- E) Stocking, screening & escapement: group discussion – Billy Atkinson thinks northern pike escapement from Catamount is decreasing, and he believes that the smaller fish now in Catamount are less mobile. Ray Tenney asked how the Program will evaluate best methods to prevent escapement, noting that screens are very expensive (as is in-river control), but costs of “bounty” programs (like the one for pike at Wolford Reservoir) are considerably less expensive. Pat Martinez added that other considerations are screen effectiveness, management, and monitoring. Anita said when CDOW investigated different kinds of screens, even ponds screened with wedge-wire screens with extremely small apertures, those all ponds were re-invaded by nonnative fishes. At least 800 ponds in Grand Valley, and so if they are sources, screens can’t solve the problem. Ray said one concern with a proposal to rotenone Elkhead and stock trout is the regulatory difficulties resulting from the fact that Elkhead is classified as a warmwater reservoir and can’t meet the coldwater water quality standards.
- a) Implementation of new 2009 Stocking Procedures
 - b) Application of microchemical techniques & signatures –
 - c) Conclusions, recommendations

5. Smallmouth bass (SMB)

- A) 125 & 98a: mid-Yampa SMB removal (Hawkins/Walford/Wright)
#125 annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/125.pdf (John will update report to correct confidence intervals of little Yampa adult abundance.); #98a annual report at ***INSERT URL WHEN REPORT POSTED***

Results from Little Yampa Canyon indicate that our estimates may be incorrect, fish may be immigrating into reach during/after estimate, fish may be recruiting from the smaller size classes. Ability to do a river-wide abundance estimate is limited. Exploitation rates in each reach aren’t really scaled to the total population. What life-history information can help us? Few smallmouth are found in the broad, sandy,

alluvial upper Maybell reach. Most spawning in the upper reach, but likely occurs river-wide (we don't know the upstream limit). Juveniles found predominantly in the upper reach, but sub-adults are predominant at Lily Park (and may represent fishes moving from the upstream reaches). A strong year-class is dominating the population.

B) Interagency "surge" for SMB spawners (Hawkins et al.)

Three shocking teams, eight boats, and 15 people from CSU, CDOW, and USFWS from June 22 through July 10 participated in the "surge" to interrupt spawning by the 2007 year class. They increased the re-sample rate in Little Yampa Canyon and documented adult bass occurrence in the lower 10 miles of the Craig reach. However, we're still only sampling fish during about a third of the spawning duration period (because some of the spawning period occurs when flows too low to safely sample). **Are their other techniques that would allow us to extend duration of removal into base flow (e.g., angling, smaller boats)? Intensive removal also may need to be moved into other reaches.**

C) 154: Duchesne/White R. nonnative fish mgmt. (Groves/Fuller)
Annual report at ***INSERT URL WHEN REPORT POSTED***

Spawning in the Duchesne is helped by gradual runoff and warming into late summer. Juvenile growth rates higher when summers are warmer and when population abundance is reduced. Mark described timing of smallmouth bass nest construction and spawning as they relate to temperature and timing of other native fishes entering the system.

Moderator - Krissy Wilson

D) 110: DNM-Yampa R. SMB removal (Jones) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/110rev.pdf

This is the reach just downstream of Lily Park. Bass were tagged on pass #3 (of six passes). The 2010 population estimates translate to ~57 sub-adults/mile and 16 adults/mile. The 2007 cohort continues to dominate, but the population estimate for adults didn't increase significantly. Densities were highest in the top two reaches. Most of the movement has been fish moving from the Lily Park into the Yampa Canyon reach (19 gray-tagged fish were captured from upstream). Bluehead and flannelmouth are still the most common species found in the canyon. *Gila* were sampled on pass 2 (T=112, broad size distribution). Eight recaptures from 2009 in all passes. The *Gila* were predominantly roundtail. Tildon said the **potential may exist to do some small-bodied fish sampling on a last (7th) pass.**

- E) FR-115: Green R.-Lodore/Whirpool (Bestgen) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/FR-115.pdf
 Kevin recommends continuing to remove predator fishes and to monitor fish community response to fish removal and flow and temperature monitoring. He also recommends evaluating flow or water temperature management to disadvantage smallmouth bass reproduction. Bass spawn near 16C (just before in the Yampa, just after in the Green) under declining or stable base flows, peak hatching occurs ~3 weeks later. The reproductive season is short, so can use increased flows, turbidity and/or reduced temperatures to disadvantage bass.
- F) 123a: upper Green R. SMB removal (Jones/Breidinger) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/123arev.pdf
 This is a big, 15-pass undertaking. The 2010 population estimates translate to ~25 sub-adults/mile and 18 adults/mile. By targeting the beginning of spawning for removal, more adults were removed early in the study when catch rates were higher. Catch rates continued to decline. Most movement (7 fish) was up from the Uinta Basin.
- G) 123b: mid-Green R. SMB removal (Hodge) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/123b.pdf
 As in past years, few recaptures were made, thus, the population estimate is not very reliable. A population estimate may not be a reasonable tool for this reach. The PI's recommend continuing 11 passes, focusing on bass concentration areas: 4 random complete passes (each complete pass requires 8 days), remaining 7 passes just concentrating on areas where they see more bass. Concentration areas should be defined by a smaller scale. Continue removal from Duchesne down to Tabyago. If do population estimate, would require 12 passes (to include a mark pass).
- H) 126a & b: Colo. R. centrarchid removal (Burdick/Logan) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/126ab.pdf
 The 2010 increase in smallmouth bass young of the year is of concern. Adult and juvenile abundance in 2010 was similar to 2009, however. Young of the year largemouth bass catch rates continue to increase, but most don't seem to be reaching juvenile/adult size. Bob recommends reallocating the Rifle to Beavertail Mtn. reach passes to increase removal passes in the Grand Valley.
- I) 161: SMB retrospective: abundance estimates (Breton) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/161.pdf Overview of analysis:
 Descriptive

- 19 reaches (483 rmi), 2001-2008
- 73,066 Total SMB Removed
- Tables by River/Reach/Year/Age

In-depth (6 reaches: Colorado-Gunnison, Middle Green, Echo-Split, Yampa Canyon, Lily Park, Little Yampa Canyon)

- 6 reaches (277 rmi), 2004-2008
- 66,373 (91% total removed)
- Capture-mark-recapture (CMR)
 - ...estimates of abundance, capture and recapture probabilities, etc.
- Catch-per-unit-effort (CPUE)

Assigned age and size classes. Capture-mark recapture analysis separately for each reach. Capture probabilities do tend to be higher than recapture probabilities. Bigger fish are caught with much higher probabilities than small fish. So, behavior and length effects very important (and Lincoln-Peterson estimator doesn't account for these). With this approach, was able to shrink the CV's by >50% over Lincoln-Peterson. Strong decline in adult abundances over time in Colorado-Gunnison. Middle Green: adult abundance fairly consistent, sub-adults increasing somewhat. Upstream in the Echo-Split - . Yampa canyon some evidence of decline in the adults. Lily Park some evidence of early suppression, then fairly flat. Little Yampa. Co-Gunn & Yampa Canyon some evidence of decline, but the other 4 reaches pretty flat. On Colorado River, something other than removal caused dramatic decline between 2006 and 2007. Increase in exploitation rates of adults, and to some extent sub-adults in Little Yampa Canyon. However, even though exploitation is having an effect post-removal, the numbers come back up in the next year for some reason. What's affecting the fish? Potentially dispersal/immigration. Inconsistency between exploitation rates and declines in abundance. Certainly we are making a difference, but numbers have been reluctant to decline in the presence of increasing exploitation. Exceptions appear to be a function of something other than removal. One pattern André is seeing is that we appear to have underestimated sub-adults and over-estimated adults.

- J) 161: SMB population dynamics/modeling (Breton) André described and demonstrated a simplified model, showing the effects of different exploitation rates, etc. Brett Johnson noted the importance of tracking potential change in size at first recruitment. Dave Speas asked about the definition of exploitation.
- K) Elkhead reservoir: SMB translocation, tagged SMB escapement, fish tagging in reservoir? (P. Martinez/Wright/Hawkins). The 2010 sufficient progress letter contains this action item: "Based on their analysis of smallmouth bass recapture information, CDOW and the Recovery Program must decide, prior to the 2011 sampling season, if Elkhead Reservoir can continue to serve as a translocation site for smallmouth bass removed from the Yampa River." Pat pointed out that an arbitrary escapement threshold (e.g., 10%) may not be taking into account smallmouth bass propagule pressure or proliferative capacity. Boyd began a pilot tagging study in

2010 for smallmouth bass and northern pike. 89 pike were tagged and released during the tagging study (70) and the standardized survey (19). 229 bass > 100 mm were tagged (204 in tagging study, 25 in standardized survey). **Boyd was able to identify bass concentration areas for 2011 recapture effort to enable an abundance effort. Also would like to do an intensive pike effort in October 2011.** John Hawkins provided a preliminary summary of smallmouth bass escapement data from Elkhead Reservoir. Since 2003, a total of 5,628 bass have been translocated into Elkhead and 2,687 into the Justice Center pond (only Elkhead was used in 2010). So far, 265 smallmouth bass have been recaptured from the river that are known to have been translocated into Elkhead. They generally are captured in the river within 2 years of stocking. John outlined **questions we'd like to answer:**

- Does timing of stocking in relation to whether the reservoir is spilling or not play a role in whether fish escape?
- Does tagging and translocation have an effect on fish behavior that makes those fish more likely to escape than resident fish?
- Do certain size fish escape at a greater rate than others?
- Have environmental conditions changed to encourage bass to move and be pulled into the spillway?
- Does the new dam entice fish into the spillway?
- Are resident fish escaping at the same rate as tagged translocated fish?

John needs to check to see if any escaped fish were caught in the river prior to the next spill.

L) Smallmouth bass group discussion:

- a) Insights from SMB synthesis
- b) Standardized nonnative fish removal targets: by basin, by river, by reach?
- c) Adjustments to SMB removal & management
- d) Conclusions, recommendations

Bill Miller asked if we know to what extent the translocated fish are contributing to the spawn in Elkhead Reservoir. Tom Chart acknowledged that we may be taking fish from the harsh river environment and putting them into a more hospitable spawning environment in the reservoir. Ray noted out that our back-flushing operations also kill a lot of fish at Elkhead with a high approach velocity on the drum screens. Melissa suggested that translocating fish into Elkhead Reservoir is a huge, unacceptable waste of time and money in light of the escapement we've detected. Sherm said he'd prefer to reserve judgment until André completes his analysis. Sherm wondered if the fish killed by the back-flushing operations are attracting adult bass that then get washed over the spillway. John Hawkins said it does seem more fish are escaping with the new reservoir configuration (Bill Miller pointed out that the other change is that we now add adult fish to the reservoir via translocation). Tom Chart said the Program must make a decision on whether to continue translocating fish into Elkhead before the 2011 sampling season. André described the difficulties of

extrapolating an actual estimate of escapement without having designed a study to do so, (though it is possible to make an extrapolation, nevertheless). That said, even the 265 minimum number known to have escaped seems a large number. Melissa emphasized the need to establish criteria for how many escaped fish are too many. Pat pointed out that a formal study of escapement can be conducted with fish already in the reservoir, without the need to continue translocation. In light of the weaknesses identified in our mechanical removal, Dave Speas wondered how our translocation efforts and subsequent escapement may be magnifying our problems. Further, how politically desirable is it to have smallmouth in Elkhead? (That's not a biological question, of course.) Anita pointed out that the decision on Elkhead has huge ramifications across the entire western slope – *the ?stocking procedures? indicate that if escapement is detected from any water stocked with nonnative fish ,then stocking will be re-evaluated basinwide. Is this what Anita said?*

Paul Badame suggested that the Echo to Split 16-pass effort should perhaps be moved downstream. Tom Chart suggested making this contingent on what's being seen in the field. (PI's, BC to discuss details)

If >PI's could submit their data through 2010 to Travis within 6 weeks, he could export the 2009 and 2010 data to André as one unit in time for André to include those data in the model.

Shane said André seems to be showing that the adult smallmouth bass population is very resilient and we need to understand whether our exploitation is *only ? or if we need to ?*

John Hawkins suggested brainstorming novel techniques. John thinks we should continue “the surge” and suggested that there may be ways to extend coverage of the spawning period (e.g., if the Service could extend another two weeks). PI's need to have further discussion re: coordination, how to sample better at <1,000 cfs (e.g., after July 4). Rafts might be tried (they are effective in smaller areas). Hawkins said the bass spawning areas don't typically have other species present, so that would minimize the potential for harm to native fishes using the raft technique.

Another option would be to consider encouraging a volunteer angling effort (John Hawkins related that 4 people caught >300 bass angling 4 hours in Juniper in a sort of refugia pool in the fall). Cameron emphasized the need to maintain the surge to keep after the 2007 cohort. The group discussed different ways (e.g., different boat configurations) for targeting smallmouth throughout more of the spawning period as flows drop.

Based on escapement detected at this point, Melissa proposed that the group make the technically-based recommendation that we act in a precautionary way for the endangered and native fishes and *not* translocate fish into Elkhead in 2011 even if we aren't able to determine the escapement rates and criteria by that time. Dave

Campbell agreed, in that prevention is the most prudent approach and translocating fish into a reservoir where they can escape is just the opposite approach. Pat agreed, noting we're perpetuating a point source of invasive species. If we're going to move forward with a prevention focus, it makes no sense to continue translocating fish into Elkhead. No one in the group disagreed with this recommendation. With regard to PR, there will still be fish in Elkhead for anglers to catch. Ray suggested **perhaps anglers could be paid for fish they remove from Elkhead** (utilizing the person who inspects boats for aquatic invasive species at the ramp). Cameron asked about paying anglers to remove fish from the river, suggesting that this would be a higher priority. Billy suggested mechanical removal from Elkhead would be faster, if we decide we need to do that. Billy questioned the access anglers would have to effectively remove fish from the river.

5:45 PM: Adjourn

Wednesday, December 8, convene 8:00 AM

Dave Speas – Moderator

6. Northern pike (NOP)

- A) 98a: Yampa R. NOP removal, translocation & escapement within critical habitat (Wright) ***INSERT URL WHEN REPORT POSTED***
Catch rates were highest during the first two removal passes. CPUE decreased during peak runoff. “Surge” complemented pike removal objectives, accounting for 30% of removal. 94% of pike handled were removed. 46% recovery of tagged fish. 72.4% exploitation rate. 6 pike were captured in river that were previously translocated to Loudy-Simpson Pond. 5 Loudy-Simpson escapees were from the 100 taken there in 2009 (5%). All pike were translocated to State Park Headquarters Pond in 2010. **Recommendations: Repeat “surge” and consider reallocation of effort to periods when pike catch rates are highest. Continue combined estimate between 98a and 98b, including the well-synchronized effort achieved in 2010. Continue CDOW work to control source populations. Maintain landowner contacts. Officially discontinue translocation to Loudy Simpson Pond.**
- B) 98b: Yampa R. NOP removal, translocation & escapement above critical habitat (Webber, 15 min) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/98b.pdf
When releasing marked fish, Aaron returns them to the same place they were caught. In analyzing recaptures, most were found within a mile of the original capture site. Captured one pike that had been put in State Headquarters Pond in 2008 (thus, must have been moved by an angler, since pond has no connection to river). Caught 3 pike that had escaped from Loudy-Simpson, so **Aaron also recommends discontinuing Loudy-Simpson translocation. Further, Aaron**

recommends removing fish from Loudy-Simpson. Aaron also recommends considering euthanizing, instead of translocating fish. Mark-recap estimate is 806, depletion estimate 742. Of 183 pike released, 79 were not recaptured (equivalent to a week's work of recaptures). Why do a mark-recapture estimate if a depletion estimate provides good data and doesn't require releasing fish back to the river? Pete asked if we would lose information on pike movement if we didn't do mark-recapture and Aaron said he believes we have some good movement information already, so he thinks it's more valuable to remove the fish. Bruce said he believes marking fish pays off in the long run; André agreed. Shane asked André if we could do river-wide population estimates every 2 to 3 years. André said this might work, but could affect the precision of the estimates. Kevin said some information would be lost.

C) Upper Yampa reservoir & pond NOP removal (Atkinson)

Northern pike numbers have dropped in Stagecoach since 2005, but walleye are increasing. Pike removal continues at Catamount, with 1,530 fish removed in 2010. Working on Phase III of Chuck Lewis SWA restoration. Also worked on two private ponds in 2010 (Lufkin and Bald Eagle Lake). Considering work on the 66-acre Steamboat South Pit in the future. Continued net sampling of Yampa SWA, only caught pike (23) in South Pond, but this area is of concern and we need to add riprap or find some other method to prevent erosion that will connect in future years.

D) 123: Green R. NOP removal (Hodge/Bestgen/Jones)

No northern pike caught in 20 fyke net nights, but did catch 39 white sucker. Also caught 9 pike and 39 white sucker in 1.2 electrofishing hours. Recommend continue this maintenance-level removal of northern pike.

E) Northern pike group discussion (1 hr) to address:

- a) Translocation, escapement, movement from upstream sources
- b) CDOW Yampa River Basin Aquatic Wildlife Management Plan
- c) Is a SMB-style synthesis warranted?
- d) Conclusions, recommendations

Since pike aren't part of the Yampa Aquatic Mgmt Plan, Pat suggests going to depletion-only in Aaron's buffer zone. Kevin said an estimate does provide some picture of other things going on in the system (e.g., big pulses of fish), but it may be worth the tradeoff. However, doing a depletion estimate before runoff would sacrifice the number of fish caught. If the objective is to catch as many fish as possible, Aaron would prefer to target a 2-week pre-runoff period where he knows he'll catch a lot of fish, and then go back in after runoff when he knows he'll catch a large number of fish again. Dave suggested looking at how abundance estimates and CPE compare to see if we could scale back estimates to only every few years. Pat said he sees population estimates in the buffer zone as irrelevant in light of the upstream "pike factory." Michelle S. agreed with

Shane's recommendation to only make population estimates every few years, and focus on depletion in the interim years. Tom Chart emphasized the need to address the source areas of pike.

Pat asked if the Yampa River Basin Aquatic Wildlife Management Plan adequately addresses the upper Yampa pike population (timeframes and resources are not identified). Does the Program need to consider applying resources to better control these populations? Tom Chart said that Service comments on the plan included taking this to the next level to identify a management strategy to eliminate pike in the drainage. The Plan didn't go that far, with CDOW's response back to FWS indicating that they thought perhaps some balance could be found. Sherm said the balance is that they only have Billy to work on this and they can't predict future budgets. What they can do will depend on access to private property, etc. Chart asked how the Program can assist with this work. Aaron noted that if we don't translocate fish, that should free up some resources for additional work (although we still have to properly dispose of the fish removed). Sherm asked if the Program would entertain a SOW to berm the Yampa SWA ponds. Dave Speas suggested the Biology Committee follow up what can be done in the upper Yampa (e.g., perhaps the same crew that evaluated the RM 151 backwater needs to take a look at this site). Tom Chart expressed the concern about the walleye in Stagecoach. Dave Campbell noted the San Juan Program uses capital funds for this kind of backwater habitat restoration. Michelle recommended the BC take an in-depth look at how the Program can help CDOW in the upper Yampa. Sherman suggested a photo characterization of the Yampa River (akin to what was done on the Colorado and Gunnison) might be helpful. Dave Speas and Tom Chart said they think the 2008 aerial photography went all the way up to Catamount. Michelle said that other Service programs (e.g. Partners) might be able to help with berming work on private lands. Pat asked about Catamount timeframe and Billy said the MOU goes through CDOW at which time they'll evaluate where they are with trout broodstock, but Billy anticipates pike work would continue.

Need to reach conclusion on Loudy Simpson Pond.

With regard to a smallmouth bass-style synthesis, we have limited resources. Need to assess whether can do population estimates only every few years, what information would be lost, etc. Also need to talk about RM 151 backwater and Yampa SWA ponds. (To be discussed by BC next week.)

7. Native fish response

- A) 140: Yampa R. (Bestgen) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/nna/140.pdf
Yampa River adult pikeminnow continue to decline (only pikeminnow population which is declining). YOY bass removal continues to increase, with >13,000 YOY

bass removed in 2010. The percent of native fishes in both the backwater and main channel samples continues to increase over time. They see an increase across all sites (based on environmental factors), but also increase in treatment reaches apparently attributable to nonnative fish removal. Recommend continue this work, continue earlier sampling, sampling in Lily Park, investigate base flow supplementation, and continue bass early life-history studies.

- B) 144 (138): Green R.(Monroe) Annual reports at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/mna/144.pdf&pli=1 and **INSERT #138 URL WHEN REPORT POSTED**

2009 and 2010 had highest catch of native fishes. Nonnative numbers remain stable. Recommend continuing this work. The group discussed how few nonnatives are captured in this work, but the ISMP protocol may not be well-suited to centrarchid capture. Despite the high numbers of YOY pikeminnow in the backwaters, pikeminnow in the drift sampling are about average. Backwaters were very deep this year, affecting sampling efficiency. Tom Chart asked if there were any differences in distribution between 2009 and 2010 and Matt said they'd still like to look at that further.

- C) 158: Green R. nonnative fish removal in backwaters (Monroe/Jones) Annual report at www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2010/mna/158.pdf

Most pikeminnow caught in backwaters blocked with quarter-inch mesh.

Recommendations: 1) increase the number of backwaters blocked by different mesh sizes; 2) continue to block selected backwaters using various blocking techniques; compare the Split Mountain drift net data and backwater sampling data to Echo Park.

- D) Native fish response group discussion

- a) Yampa/Green R. native fish responses

With regard to a question about expanding this work, Kevin said he doesn't know if at this point how useful it would be to try to apply their control method on a larger scale.

- b) Colorado R.: new native fish response SOW update?

This will be addressed through the Aspinall Study Plan.

- c) Native fish reintroduction or supplementation needed?

- d) Conclusions, recommendations

8. Other nonnative aquatic species and removal techniques

- A) 150: Green R. white sucker removal (Hedrick/Breen) (See 123b) In the upstream reach (Echo) seeing ~2% white suckers and ~2% nonnative hybrid suckers. More fish captured at low flows. Downstream in Desolation Canyon almost 100%

native suckers (perhaps further from Duchesne R. source population).

Recommend continue white sucker removal efforts in all projects using various sampling techniques and habitats, and perhaps increasing efforts in side channels later in the year. If future hybridization studies are warranted, conduct during the low-flow pass in early spring or fall.

White River sampling conducted 2008-1010, nonnative threats to this system minimal. Natives appear to be winning the battle (pikeminnow and the three species). Likely due to the fairly natural flow regime/riparian establishment.

Need to recognize the importance of these tributary systems. Dave noted similar discussions this year at DFC about the importance of preserving parts of the watershed that are doing fairly well.

- B) 125: carp/sucker removal (Hawkins/Walford) More white suckers in Little Yampa Canyon than Lily Park. Seeing reductions in both areas. Native fish abundance exceeded nonnative abundance in the 1-mile reaches in Lily Park for the first time in 2010. For carp, fewer, but larger fish in Little Yampa Canyon than Lily Park. Carp eradication is possible in Little Yampa Canyon. Capturing white sucker and carp hasn't been a problem. Recommendation: continue this work, including the control-treatment approach in Little Yampa Canyon. Consider tagging carp and white suckers with floy tags for movement studies (would add more work). Consider PIT-tagging flannelmouth and bluehead sucker in LYC. Begin carp and white sucker removals in other locations.
- C) 110 & 123a: channel catfish, burbot, walleye (Jones) Did catfish control in Echo to Split Mtn reach in 2010; still pervasive with very high abundance. Control not making a dent, but there are few large fish. The 500 mm burbot was alarming. Should determine the risk burbot pose for the native fishes. Escapement from Flaming Gorge more likely through bypass tubes than turbines, but the latter probably isn't impossible. What are our critical control points for burbot in Flaming Gorge? Also have seen some increase in walleye captures. Krissy said that UDWR is considering/planning rotenone treatment of Red Fleet Reservoir. Travis said walleye captures were up in the Colorado River pikeminnow population sampling, also. Tom Chart suggested taking otoliths from all burbot or walleye captured.

John Hawkins – Moderator

- D) White & hybrid sucker removal at Grand Valley passages (Burdick et al.) At Redlands, 5% of the 116,300 fish processed over 15 years were white suckers, 1% white x blue, 1% white x flannel. At Government Highline, 6% of the 58,299 fish processed over 5 years were % white suckers, 1% white x blue, 2% white x flannel. Hybridization considered to be a primary impediment to conservation efforts of native catostomids. Abundance of hybrids is increasing and in some cases, bluehead and flannelmouth have disappeared. Implications of nonnative catostomids and their hybrids hybridizing with razorbacks are far-reaching, with

the potential to erode razorback genetic integrity. In 2010, 6 longnose sucker were trapped at Redlands and 15 at Government Highline.

- E) Catamount rusty crayfish removal (Atkinson) This species is native to the Ohio River basin. Billy reviewed the species' life history. This species needs permanent water. The female stores sperm over-winter until ready to fertilize; therefore, one female can start a new population. They mature at age 1 and have a life span of 3 – 4 years. Potential impacts include: deplete invertebrate populations; displace native crayfish, destruction of aquatic plant beds, affect fish populations through competition/predation; accelerate expansion of undesirable fish populations. Their impacts are exacerbated due to higher metabolic rates and size. CDOW signed an order prohibiting transport of live crayfish from the Yampa River basin. Highest density on the northwest shore of the lake. Majority of the crayfish found at 2 – 7 foot depths. 20,395 crayfish removed from the lake in 2010. In the fall 2010 pike diet analysis, 33% had crayfish.
- F) Update on fixed & floating weir technology (Monroe)
Leisa described the operation of floating weirs (which might be considered for the Duchesne River) and fixed weirs (which might be considered for the Stewart Lake Drain and Ashley Creek). Weirs have the advantage of being non-permanent, movable, and relatively inexpensive. They are also a passive means of tracking PIT tagged fish.
- G) Other species/techniques group discussion:
- a) How do we address sucker hybridization issue & standardize hybrid identification (i.e. CSU, WY protocols, etc.). Longnose sucker now a factor? Implications for razorback sucker? Pat asked if we feel that we can accurately quantify white sucker hybridization at this point. Pete Cavalli said that the accuracy on pure fish is excellent (not confused with hybrids). **Different offices have been using a variety of keys and visual tools; those could be posted on the listserver to share or sent to Pat to review/compile.** Kevin said there's back-crossing/introgression among whites, blues, and flannels. Also potential flannelmouth/razorback hybrids (discussion of a low-keeled form of razorback for years). Aaron said white sucker are everywhere in the upper Yampa reach. Cameron suggested expanding removal incrementally, emphasizing Lily Park. Could we end up shifting pike predation pressure from white suckers to native fishes? Pete asked if any genetic work has been done to determine if there's been any influx of Utah sucker. Melissa suggested beginning to examine white suckers to determine when they reach sexual maturity. Tom Chart suggested reviewing previous work (e.g., Anderson) to see how white sucker distribution has changed through time.

- b) Concern about increasing walleye in Green River. Sources: Red Fleet Reservoir, Duchesne River? >Start saving otoliths.
- c) Burbot? Don't know if they may be escaping through dam or via bait-bucket transfers. Enforcement? The group discussed penalties and rewards and the need for consistency between the two as well as throughout the basin. Aaron expressed concern that the marketing strategy encouraging people to fish for burbot in Flaming Gorge may create demand where it didn't previously exist (e.g., Red Fleet). >Start saving otoliths.
- d) How might we encourage additional work on crayfish? Share identification information. Pat Martinez recommended becoming familiar with folks that have crayfish expertise and looking for additional funding sources. Tom Chart noted that Colorado has recently extended the no live transport of crayfish to the entire west slope.
- e) Future utility of weirs? Based on experience in Idaho, Aaron suggested we might be able construct weirs ourselves at a considerably lower cost. Krissy noted that the big cost is labor to check the live traps daily. Boyd wondered about the potential to install something at the bottom of the Elkhead spillway. We would need to look at other options, as well.
- f) Conclusions, recommendations – Dave Speas suggested that if we discontinue translocating fish, we issue a press release explaining why. Tom Chart and others suggested we'll need to do much more (public meetings, etc.)

9. Nonnative fish database formatting & handout (Francis). Travis distributed standardized codes and described the data files. The two components for the nonnative database are: 1) site/effort data; and 2) fish collection data. Issues with past data submission have included: 1) missing data (mark, recapture, relocation, pass number); 2) multiple versions of data entries; 3) inconsistencies among reach descriptions (perhaps each PI could set some standardized naming protocols); and 4) incorrect abbreviations. The sampling gear code list may need to be updated (e.g., seines and trammel nets are rarely reported to size). The role of the UCRB nonnative database is to: 1) maintain useful repository of data; 2) archive original data files; 3) provide a single point of contact for any data queries; and 4) potentially standardized/synthesized data reporting with André's improved relational database. Sherm asked if it's time to go to 3-letter species codes, and if so, how hard will it be to go back and replace the old codes. Travis said the replacement would be simple. André suggested a simple way to do this using a lookup table. What needs to be done is to finish a relational database that field folks can use for data input and get that delivered to the PI's (this will be time-consuming is beyond the scope of André's work). Dale described the San Juan Program's 6-letter code. PI's should review list and send Travis a list of any missing species.

Krissy asked about data from endangered and native fishes being tagged in other (e.g., 3-species) studies. Aaron suggested we would be wise to have one repository for all PIT tag data. Data are due March 15 each year. If Travis hasn't received data, he needs to tell the Program Director's office. Tom Chart suggested that if data need much cleaning up, it should go back to the PI's.

10. Wrap-up: comments on workshop format, other issues. The loud timer was useful. Given how this meeting has changed, John Hawkins asked if it should be connected to the researchers meeting in the future? Dave thought it would difficult, in that folks outside the Program wouldn't have the background for the shorthand format we're using in this workshop. Pat emphasized the need to keep this meeting informal with plenty of discussion time. Tom Chart and Dave Speas thought this meeting is too important for work planning to defer it to the researchers meeting. Michelle asked if condensing presentations to results and recommendations would allow us to get to discussion more quickly. Krissy said she thinks the brief review of what/where is a helpful reminder. Boyd said the discussion was good, but didn't always seem to come to closure. Tom Chart and others clarified that the workshop group is not a decision-making entity, so the discussion is more vetting than coming to closure on recommendations/decisions. What about synthesis reports? Tom Chart said synthesis reports they are due in March 2011. >The Nonnative Fish Subcommittee will see what their recommendation was and re-submit that to the BC for consideration next week.

Still planning 3 presentations at researchers meeting? Yes: smallmouth bass by John Hawkins, northern pike by Boyd Clayton, and native fish response by Matt and Kevin (should include native fish response, young-of-year, and #158). And André's synthesis presentation, of course. Close out with André's, then allow some additional time for discussion (panel of the collaborative presenters and André).

Basinwide strategy draft by late spring in advance of the sufficient progress memo, so plans to have a draft to the Nonnative Fish Subcommittee out in advance of that.

Adjourn 3:45 PM

ATTACHMENT A

Suggested Approach for Developing the Collaborative Presentations

General Approach — PI's will need to come prepared for a productive workshop (please see Prep work below). At the workshop:

- Discuss 2010 results.
- How do the PI's best get their message across?? Discuss additions, deletions, or modification of the 2009 data presentations. Please come prepared to discuss alternative approaches to data presentations. If we determine that the task this year largely consists of adding 2010 data to the 2009 analyses – our job is relatively easy.
- Provide Leads with copies of raw data or commitments to provide them in the near future.
- We should encourage other PI's, or the PD's office, to take on specific analyses, which contribute to the collaborative presentations – document those commitments and schedule due dates.

Specifics

- Prep work:
 - Everyone please review the 2010 Annual Reports prior to showing up and bring copies with you.
 - PI's please bring your data files/laptops if available.
 - Please review the previous years' collaborative presentations (posted on the Program's website).
- The 2009 presentations should serve as templates. If there are better ways to tell the story let's make the necessary adjustments, e.g.:
 - Standardize the data presentations – population estimates and catch indices for $\text{smb} \geq 200\text{mm TL}$ and $< 200\text{mm TL}$ from everyone – should make for more powerful comparisons.
 - Continue to examine in detail the smallmouth bass and northern pike movement data.
- Native fish response data: consider the 2007- 2010 environmental conditions in relation to the small bodied fish sampling (including Projects 22f, 138, and 140).
- Discuss observations and results as they relate to the 2010 water year. Answers to the following should be reflected to some degree in the collaborative presentations.
 - a. How was your sampling affected?

- b. How was habitat affected?
 - c. How were your target species affected? (Any and all observations are fair game.)
 - d. How might your observations relate to future experimentation on the use of flow/temperature manipulations to disadvantage nonnative fish?
- 2011 Work Planning – as in 2010, there may be less time for open discussion at the Researchers Meeting than we've had at previous NNF workshops; it will be important that the group focuses on their highest priority issues. As was done last year, let's try to close out each collaborative presentation with the pertinent recommendations. Please remember that any changes to the 2011 Work Plan will have to be approved by the BC and MC.

Workshop Participants

Cameron Walford, Larval Fish Lab
André Breton, Colorado State University
John Hawkins, Larval Fish Lab
Dave Speas, U.S. Bureau of Reclamation
Brian Wolff, Colorado State University
Brett Johnson, Colorado State University
Kevin Bestgen, Larval Fish Lab
Brandon Albrecht, Environmental Groups
Melissa Trammell, National Park Service
Anita Martinez, Colorado Division of Wildlife
Kenneth Breidinger, Utah Division of Wildlife Resources
Paul Badame, Utah Division of Wildlife Resources
Pat Martinez, Upper Colorado River Endangered Fish Recovery Program, USFWS
Tom Chart, Upper Colorado River Endangered Fish Recovery Program, USFWS
Angela Kantola, Upper Colorado River Endangered Fish Recovery Program, USFWS
Leisa Monroe, Utah Division of Wildlife Resources
Michelle Hodge, Utah Division of Wildlife Resources
Matt Breen, Utah Division of Wildlife Resources
Harry Crockett, Colorado Division of Wildlife
Sherman Hebein, Colorado Division of Wildlife
Dean Riggs, Colorado Division of Wildlife
Sarra Jones, Utah Division of Wildlife Resources
Krissy Wilson, Utah Division of Wildlife Resources
Aaron Webber, U.S. Fish and Wildlife Service
Tildon Jones, U.S. Fish and Wildlife Service
Dana Winkelman, Colorado State University (Coop Unit)
Boyd Wright, Colorado Division of Wildlife
Ed Wick, Retired
Becky Mitchell, Colorado Department of Natural Resources
Dave Campbell, San Juan River Recovery Program, USFWS
Scott Durst, San Juan River Recovery Program, USFWS
Bill Miller, Miller Ecological Consultants
Doug Osmundson, U.S. Fish and Wildlife Service
Dale Ryden, U.S. Fish and Wildlife Service
Michelle, Shaughnessy, U.S. Fish and Wildlife Service
Travis Francis, U.S. Fish and Wildlife Service
Koreen Zelasko, Larval Fish Lab
Angela Hill, Larval Fish Lab
Shane Capron, Western Area Power Administration
Kevin Thompson, Colorado Division of Wildlife
Jenn Logan, Colorado Division of Wildlife
Lori Martin, Colorado Division of Wildlife
Bob Burdick, U.S. Fish and Wildlife Service
Bruce Haines, U.S. Fish and Wildlife Service (retired)

Pete Cavalli, Wyoming Game and Fish Department
Billy Atkinson, Colorado Division of Wildlife
Lindsey Lesmeister, U.S. Fish and Wildlife Service
Mark Fuller, U.S. Fish and Wildlife Service
Ray Tenney, Colorado River Water Conservation District
Doug Osmundson, U.S. Fish and Wildlife Service
Patty Gelatt, U.S. Fish and Wildlife Service