Biology Committee Conference Call Summary
September 2, 2005

Biology Committee: Dave Speas, Tom Pitts, John Hawkins, Melissa Trammell, Tom Chart, Tom Nesler and Kevin Gelwicks. Bill Davis voiced his opinion in absentia via Dave Speas.

Other participants: Bob Muth, Pat Nelson, Tom Iseman.

1. Elkhead Reservoir Escapement. — The Committee reviewed available data and discussed escapement of nonnative fishes from Elkhead Reservoir as a result of the April 16, 2005, failure of the temporary spillway screen (see attachments). (Note: Biology Committee members had limited time to review the available data.) All participants agreed that escapement had occurred (most thought more than had occurred in past years), but there was not agreement on the levels of escapement, the degree to which escapement may have hampered our ability to manage northern pike and smallmouth bass in the Yampa River, and the biological impacts of escapement, because data analyses are not complete at this time. A total of 35 tagged smallmouth bass were recaptured from below the bridge at Craig upstream to the confluence with Elkhead Creek, representing an unknown total number of escaped fish. For tagged smallmouth bass greater than 250mm escapement ranged from 11-16% (depending on overwinter and angling mortality.) There was substantive debate on the severity of escapement based on recapture rates of smallmouth bass translocated to Elkhead from the Yampa River (in relation to translocation effort), capture probabilities, estimated reservoir population size, and added predation pressure from escaped bluegill, black crappie, rainbow trout, and possibly northern pike. There was agreement that corrective action is necessary to mitigate for escapement in 2006, but the options identified and preferences noted below do not reflect consensus.

   Participants went on to identify options for corrective action for 2006 and discussed their potential effectiveness and feasibility. From a biological perspective, the Biology Committee agreed that prevention of escapement was preferable to reacting to escapement by increasing efforts in the river. Options included 1) installation of another spillway fish screen; 2) combination of extreme drawdown, salvage, and/or renovation (including piscicide application) at or below the reservoir conservation pool, with salvage and relocation of harvested fish; and 3) increase and expansion of nonnative removal efforts in the Yampa River.

Members indicated their preferences on the three options by assigning a '1' for the most preferred alternative and a '3' for the least:

Table 1. Individual prioritization of 3 identified options. 1 is high, 3 is low. No consensus was reached.

Comments>	Translocation until fails	drying/rotenone/other	no translocation
Biology Committee	**screen**	**treatment/with Salvage**	**Expanded removal**
FWS	2	1	3
NPS	1	2	3
BOR	3	1	2
WY	2	1	3
CRWCD	3	1	2
CO	Abstain		
WRA	1	2	3
CREDA	1 (by email)	na	na
WAPA	X (not present)		
UT	X (not present)		
average	1.9	1.3	2.7

Committee members who believed a screen would be a viable option based their opinion on the assumption that the screen would not fail. Unless the spillway is screened and does not fail, participants agreed that translocation of smallmouth bass from the Yampa River into Elkhead Reservoir should cease until reservoir construction has been completed.

ASSIGNMENTS

1. Bob Muth will arrange conference call with Management Committee for direction/decision after discussing results of Biology Committee conference call.

(Attachment 1 of 2)

MEMO

To: Biology Committee and interested parties
From: John Hawkins, CSU
Date 9/2/05
Subject: Assessment of smallmouth bass escapement from Elkhead Reservoir in 2005.

The purpose of this memo is to provide information about escapement of gamefish and assess the level of escapement of tagged smallmouth bass from Elkhead Reservoir in 2005. This data will help determine whether there is a need to screen outflows of Elkhead Reservoir during continued dam construction in 2006.

In 2005, in the CSU bass study reaches (RM 100–124), bluegill and rainbow trout were common and widespread, whereas in previous years they were rare. Rainbow trout were especially abundant and most likely originated from a stocking in Elkhead Reservoir in the fall of 2004. We also captured two largemouth bass, a species which had never previously been captured in the Yampa River. These most likely originated from Elkhead Reservoir.

Apparently, bass escapement occurred relatively soon after stocking. In 2005, six smallmouth bass escaped soon after stocking. Miller Eco captured one bass in Elkhead Creek within 2 days of its stocking in the reservoir. FWS recaptured two escapees in the study site immediately downstream of the Elkhead confluence 7 and 16 days after they were stocked. CSU recaptured three bass about 5 weeks after they were stocked in the reservoir.

From 2003–2005 we stocked 3734 smallmouth bass in Elkhead Reservoir, of which 2485 were Floy tagged (Table 1). These fish were originally captured in the Yampa River and moved to Elkhead Reservoir on the day of capture. They were all stocked at the reservoir boat ramp located approximately ½ mile from the dam spillway. During construction in 2005, the dam was notched and unscreened water spilled out of the reservoir during spring runoff. By July 2005, 35 of the stocked fish had escaped from the reservoir and were recaptured by crews sampling the 45 miles between Elkhead Creek confluence and Government Bridge near Lay, Colorado (Table 2). I attempted to estimate what percent of the stocked fish escaped from the reservoir and moved to the study reaches of the FWS, DOW, and CSU downstream of the confluence. There are a few considerations in determining the percentage of bass escapement from the reservoir. First, the recaptured, tagged escapees represent a proportion of all tagged escapees including those not recaptured in the study reaches. Second, fish stocked in the reservoir represent a proportion of all bass in the reservoir. Finally, stocked fish in the reservoir were subject to mortality that reduced their numbers before they escaped

To reduce and simplify assumptions, I evaluated escapement only for fish stocked in the reservoir in 2004. This avoided complications related to multi-year mortality of fish stocked in 2003 and an unknown amount of ongoing fish escapement occurring concurrently with ongoing

stocking in 2005. The total number of escapees was calculated for each study reach. The calculation required knowledge of the number of passes, number of recaptured escapees, and probability of capture. The first two variables varied among reaches and based on previous sampling we conservatively assumed a constant capture probability of 8% for all reaches and passes. There were 26 recaptures of escaped smallmouth bass in the Yampa River in 2005, not including one captured by Miller Eco. in Elkhead Ck. We estimated that these 26 recaptured fish represented a minimum of 69 escapees from the 2004 stocking that resided in the study reaches (See attached spreadsheet).

Next, I estimated the number of stocked fish that survived angling and over-winter mortality and remained in the reservoir at the start of spring runoff in 2005. Smallmouth bass stocked in 2004 totaled 1591 fish >150 mm, including 846 < 250 mm and 745 $\geq$ 250 mm. A length division at 250 mm (10 inches) is important because it is the minimum length of smallmouth bass stocked in the reservoir in 2005. Like all bass in the reservoir, stocked fish were subject to mortality. Although it probably varied by age (or length), we can reasonably assign a mortality of between 25 and 50% and estimate the number of stocked fish that were in the reservoir prior to spring 2005 (Table 3).

We can estimate percent escapement by dividing the number of escapees by the number of bass in the reservoir at the start of 2005. For bass of all sizes (> 150 mm TL), escapement was 6–9 % if mortality is assumed between 25 and 50%. For large bass (> 250 mm TL) escapement ranged from 11–16% depending the number of bass > 250 mm remaining in the reservoir after mortality of 25–50% (Table 4).

If we assume that escapement rates are similar for tagged and untagged bass and if we know the size of the reservoir population, then we can calculate the total number of reservoir bass that escaped from the reservoir and occupied the study reaches during spring sampling. This number does not include bass that escaped and moved to other reaches. For example, if the reservoir had 20,000 smallmouth bass and escapement was 11%, then 2200 bass are assumed to have escaped and moved to the 50-mile study reach.

In 2005 we stocked 657 smallmouth bass (>=250 mm TL) that we captured from the Yampa River.

Abundance estimates for smallmouth bass in the control and treatment reaches were similar in 2004 and 2005 (Table 5).

Abundance estimates for northern pike in the middle Yampa River (RM 135–45) were similar in 2004 and 2005 (Table 6). These estimates were based on fish captured by DOW (Lori Martin) and CSU.

Table 1. Number of smallmouth bass stocked into Elkhead Reservoir from 2003–2005 (2005 data are preliminary).

	Length at stocking			
Year	untagged or < 150 mm	Floy tagged 150–249 mm	Floy tagged > =250 mm	Total stocked
2003	38	126	99	263
2004	1174	846	745	2765
2005	37	12	657	706
Total all years	1249	984	1501	3734

Table 2. Number of tagged smallmouth bass that escaped from Elkhead Reservoir and were recaptured in each study reach of the Yampa River.

		Year originally stocked in Elkhead			
Agency	Reach (RM)	2003	2004	2005	Total
Miller Eco	Elkhead Ck.	0	1	1	2
FWS	170–135	0	9	2	11
DOW & CSU	135–124	2	2	1	5
CSU-Control	124–112	0	8	1	9
CSU-Treatment	112–100	0	7	1	8
Total all reaches		2	27	6	35

Table 3. Number of smallmouth bass stocked in Elkhead Reservoir in 2004 and estimated number surviving to spring 2005.

	Number of fish surviving with a mortality of:	
Number of fish stocked	25% mortality	50% mortality
1591	1193	796
745	559	373

Table 4. Percent escapement of smallmouth bass from Elkhead Reservoir in 2004 based on the number of bass remaining in the reservoir after two different mortality scenarios. Eighty-five percent of escapees (n=59) were > 250 mm TL.

	25% mortality	50% mortality
Number of bass > 150 mm TL remaining in reservoir	1193	796
Percent of escapement given 69 escapees in study reach	69/1193 = 6%	69/796 = 9%
Number of bass > 250 mm TL remaining in reservoir	559	373
Percent of escapement given 59 escapees in study reach	59/559 = 11%	59/373 = 16%

Table 5. Abundance estimates, 95% Confidence Interval, and capture probability for smallmouth bass in the Yampa River.

Reach	Year	Samples	Abundance Estimate (95% CI)	Capture Probability
12-mile-control & treatment	2003	5-passes	5121 (4526–5835)	6%
12-mile control	2004	5-passes	1362 (1128–1692)	10%
	2004	2-passes	1413 (825–2591)	12%
	2005	2-passes	1546 (976–2117)	9%
12-mile treatment	2004	2-passes	1325 (788–2414)	17%
	2005	2-passes	1301 (398–2206)	6%

Table 6. Abundance estimates, 95% Confidence Interval, and capture probability for northern pike from the middle Yampa River.

Reach	Year	Samples	Abundance Estimate (95% CI)	Capture Probability
Middle Yampa RM 135–45	2004	2-passes	974 (769–1279)	23%
Middle Yampa RM 135–45	2005	2-passes	719 (557–883)	27%

(Attachment 2 of 2)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Colorado River Fish Project
1380 South 2350 West
Vernal, UT 84078

Memorandum

To: Mr. Pat Nelson

From: Mr. Sam Finney

Date: 30 August 2005

Subject: Escapement of Northern Pike from Elkhead Reservoir

Introduction

As per our discussion yesterday I would like to take the time to further explain the data and its analysis associated with the escapement of northern pike (NP) from Elkhead Reservoir (EH) and into the Yampa River in the Hayden to Craig (98b) reach.

Empirical Data

There is a large set of empirical data associated with the evidence for NP escapement from EH. The two most telling pieces of information are the CPUE differences above and below the confluence of the Elkhead River between 2004 and 2005 and the population estimates below and

above the confluence between 2004 and 2005. I work under the assumption that all NP coming from EH are remaining downstream of the Elkhead confluence in the Yampa River during our sampling period. I feel this assumption is valid based on the differences in CPUE between areas downstream and upstream of the Elkhead confluence in 2004 and 2005 (Figure 1) and from the downstream movement trends of recaptured fish in 2005.

The CPUE in 2-mile subreaches above the confluence decreased in all but one reach between 2004 and 2005 (Figure 1). Conversely, the CPUE in reaches below the confluence increased or remained analogous in 2005. It is important to note that CPUE in 2005 are skewed and depressed for reaches below the Elkhead confluence. In 2004, we had equal effort by subreach throughout the entire study area, whereas in 2005 we concentrated efforts on several occasions below the Elkhead confluence. This shrinks CPUE below the Elkhead confluence as more fish are removed from the river during more removal passes. For illustration, the total number of pike removed in each reach for 2005 is included in the figure.

Population estimates of adult NP above and below the Elkhead confluence between 2004 and 2005 indicate that we were effective removing NP from the areas above the confluence (Table 1). Below the confluence, the effect of Elkhead escapement negated our efforts. Estimates of population size become diluted when I break them up by reach (as indicated in the 95% C.I.'s), but you can see the gist of my argument. There were fewer NP in the reaches above the Elkhead between 2004 and 2005 and drastically more in the reaches below the confluence between the 2 years.

In addition to the evidence from CPUE and population estimate data, several less telling, yet important tidbits of information point to the escapement of NP from EH. First, in 2004 we captured 2 fish over 1000mm (both above the confluence) while in 2005 we captured 5 over 1000mm (4 above the confluence). This is despite the fact that we were very effective at removing larger fish in 2004. I feel strongly that these fish came from EH where pike growth rates are higher than the Yampa River (CDOW, unpublished data). Similarly, we had no significant effect at removing larger NP in 2005. This may be due to an immigration of larger average size pike from EH. We also had no significant decline in CPUE in 2005 as would be expected. We also encountered pike that had numerous lacerations different from those that would be expected from normal spawning behavior. The majority of these fish were found below the Elkhead confluence as well.

Conclusions

Bruce Haines and myself are currently working to better quantify the escapement of northern pike from EH. Preliminary results, although not thoroughly reviewed, indicate a large proportion of NP in the study area below the Elkhead confluence in 2005 came from Elkhead Creek. Until we reach that point I must urge you to realize that the escapement of northern pike from EH was dramatic in 2005. Negative effects from this escapement are numerous and include, but are not limited to, negative interactions of introduced fishes with native and endangered fishes, a long, unforeseen continuation of the removal of pike from this reach that has many monetary and

sociopolitical implications, and detriment to scientific results and conclusions.

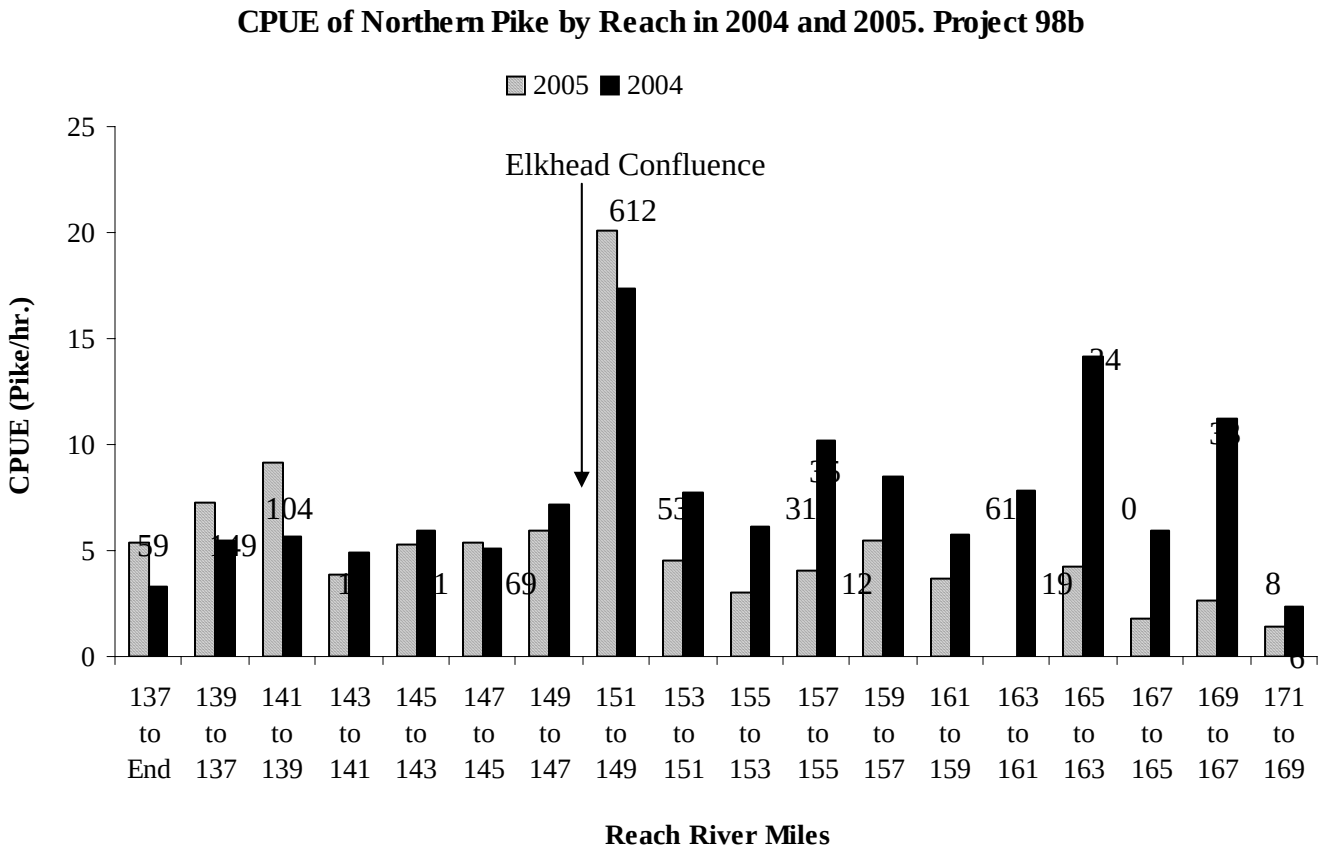

Figure 1. Catch per unit effort (NP/hr) for two-mile subreaches in 2004 and 2005. Numbers over the histogram bars indicate the number of pike removed in each individual subreach in 2005. The location of the Elkhead confluence is indicated.

Table 1. Adult population estimates and adult fish removed for reaches above and below the Elkhead River confluence between years 2004 and 2005.

	2004	2005
Adult Population Estimate Below Elkhead Confluence	284 (184-384)	2024 (494-3554)
Adult Northern Pike Removed Below Elkhead Confluence	348	394
Adult Population Estimate Above Elkhead Confluence	1656 (949-2363)	901 (488-1314)
Adult Northern Pike Removed Above Elkhead Confluence	784*	408

* Electrofishing and fyke netting combined effort