

LOWER DOLORES WORKING GROUP
“A Way Forward”
Researchers’ Presentations to the Oversight Panel
and Legislative Committee
April 6 and 7, 2011

Note: No decisions were made at this meeting. Hard copies of the three scientists’ PowerPoint presentations are available; contact Marsha Porter-Norton at porternorton@bresnan.net.

History of Lower Dolores Working Group and “A Way Forward”: Peter Mueller and Mike Preston, members of the LDWG’s Legislative Committee, gave a brief background on the LDWG, the Legislative Committee, and “A Way Forward”. Peter said the history speaks to how important the river is to many different constituencies. After the Lower Dolores River was found preliminarily suitable for Wild and Scenic River status, the LDWG was formed to see whether an alternative management strategy could protect river values without WSR designation. In March 2010 the group decided to move forward to create a special conservation area around the Lower Dolores, and the Legislative Committee was formed to work on the details. The Leg Comm has come to consensus on most parameters of a National Conservation Area but could not agree on issues related to protecting river flows and the roundtail chub, a native fish species named by the BLM as an Outstandingly Remarkable Value on the river. The committee decided to sponsor a scientific inquiry, called “A Way Forward”, on the status of native fish in the Lower Dolores and options available to protect them.

It was asked why the roundtail chub was the only native fish named as an ORV. David Graf, regional water specialist with the Colorado Division of Wildlife, said it was largely because there was a petition to list the roundtail chub as an endangered species in the Lower Colorado River Basin. He said downstream on the river, the flannelmouth sucker and bluehead sucker were also listed as ORVs.

Mike said the Leg Comm members share a strong alignment on the importance of addressing native fish, both because of the intrinsic value of native species and because of the ramifications of an endangered-species listing. The legislation to create an NCA is pending the results of this investigation.

The three researchers chosen for the inquiry then gave PowerPoint presentations:

Kevin Bestgen, director of the Larval Fish Laboratory at Colorado State University

Dr. Bestgen described the three native-fish species of concern on the Dolores River as follows:

- Flannelmouth sucker – omnivorous, large in size and long-lived (20 or more years). It is a habitat generalist and likes deep runs, swift current, riffles and pools.
- Bluehead sucker – an algivore/invertivore that scrapes algae from rocks. It is medium in size and long-lived. It is a habitat specialist that likes riffles and runs.
- Roundtail chub – an omnivore/carnivore. It is medium in size and long-lived (20 or more years). It is a habitat generalist and likes slower currents, pools and runs.

Distribution and status: Dr. Bestgen showed maps depicting the former and current (2002) distribution of the three species in the Colorado River Basin. Historically they occurred throughout much of the basin. He said the bluehead sucker has certainly declined in the tributaries where it was formerly present. In Wyoming it has largely disappeared. The roundtail chub was formerly very widespread throughout the basin, particularly the lower basin, but is much reduced in distribution today. The

flannelmouth has disappeared from the Gila River and the Salt River Basin. Dr. Bestgen said strong populations of these species still exist, but they have all experienced substantial declines in tributaries and dam-affected reaches.

All states in the basin have granted some type of conservation status to the roundtail chub. It is the most widely recognized as a species of concern. There has been discussion of listing all three as endangered species under the Endangered Species Act.

Dr. Bestgen discussed these species' status in the Dolores River. Historical sampling in 1975 found that the three species were fairly common in the Bradfield-area reach of the river. They were also fairly abundant in the reach downstream of the San Miguel confluence, but were rarer in the middle reaches. However, they were more common than today.

A sampling for flannelmouths in 1993 on the Metaska-Bradfield reach found adult-size fish but very few small fish, indicating either no reproduction or no recruitment of fry into larger fish.

Other studies have consistently found declining numbers and biomass of the three native species on the Lower Dolores. A 2007 Dolores River longitudinal fish community profile that showed one year's sampling results over a number of different sites found low numbers throughout the reaches and very low numbers at Pyramid. However, near the San Miguel River and downstream from the confluence, the numbers increased and sampling showed a wide variety of size classes, including small fish. Dr. Bestgen said the San Miguel appears to offer a reservoir of native fish that could invade the Dolores if conditions are right.

Dr. Bestgen presented comparative data from the Green River and Lodore and Whirlpool canyons. He said conditions there are very different. Although the system below Flaming Gorge Dam is very regulated, base flows never drop below about 800 cfs. Bluehead-sucker numbers are probably 10 times as high as on the Dolores, although Dr. Bestgen said they may be in a slight decline. Flannelmouth populations are also robust and sampling has found many small fish. However, the picture for roundtail chub is not as good. Dr. Bestgen said there are probably more roundtails in the Dolores than the Green. Smallmouth bass were first documented in that river system in 2002 and Dr. Bestgen said that is very significant.

Flows and water temperatures: Dr. Bestgen presented information on hydrology and water temperatures on the Dolores for 2002, 2006 and 2008 – years with widely differing flows. He also discussed data from a report by Rick Anderson on sucker habitat and biomass as functions of discharge. Dr. Bestgen said the information showed that at a 30 cfs level the river was providing only a small percent of the bluehead-sucker habitat that could exist. Riffle-dwelling blueheads are especially affected by low flows; in a 2-inch riffle there is not a lot of habitat for a big fish, and fish are prone to predation by wading birds. He said the information is similar for flannelmouths. The graphs show that a small increase in flows provides dramatic increases in habitat and biomass.

Dr. Bestgen said flows create physical habitat, while temperatures provide important cues for reproduction. Timing of warm water in relation to flood peaks is very important. Holding flows low very early in the year means the water warms up prematurely. When the spill comes, the water becomes colder. Then, after the weather warms and the spill ends, the temperature increases again. Dr. Bestgen said this is an unnatural pattern. The water may be cold when fish have already spawned and are

incubating eggs. He presented graphs showing the effects of flows and spills on water temperature in the Dolores River.

Non-native fish: Dr. Bestgen said smallmouth bass are a particular concern because they are voraciously piscivorous and prey on native fish. He said until 1999, smallmouth bass were present in very small numbers on the Yampa River and it was believed they could not flourish there. Subsequently, their populations exploded because of drought and warming of the water. Now they constitute one-third of the fish community in certain areas.

Some bass were released into the Dolores by a spill in 1993. However, these fish seem to be largely restricted to the reach in Slickrock Canyon. Dr. Bestgen said it would be advisable to study what factors are limiting their distribution. They like cobble and clear water, so the silty environment created by Disappointment Creek may be limiting their downstream movement, and upstream the cool temperatures may hamper their movement, but that is not known. He said bass are a nest-spawning species; males guard the young. If a disturbance is introduced at the time they are on the nest, many young will not survive. Knowing when to institute such a disturbance is critical. Bass start spawning at about 16° C. water temperature and spawn for about three weeks. In 2006 and 2007, temperatures above 16° C. were occurring in April and May above Disappointment Creek. In 2005 bass probably didn't spawn until June or July. Dr. Bestgen said anything that can be done to reduce their size and abundance is beneficial for native fish.

Dr. Bestgen discussed the presence of the trout fishery. Brown trout are apparently self-sustaining in the most-upstream reach of the Lower Dolores, except in low-flow years. Browns are the most abundant trout species and show the most biomass. However, there has been a substantial decline in overall trout abundance since about 1993. Dr. Bestgen said he doesn't feel confident speculating on the reasons. Trout biomass has been increasing in recent years from the lows during the 2002 drought. He is not sure why they are responding so quickly, but their response to higher flows is clear. Trout respond positively and in synch with flows. Native fish are not as much in synch with flows.

Dr. Bestgen noted the absence of white suckers in this system and said this is good because the species can explode in numbers. White suckers hybridize with other suckers, including blueheads and flannelmouths.

Dr. Bestgen said his tentative conclusions on native-fish status in the Lower Dolores are:

- Roundtail chub are uncommon in Reaches 1 and 2, moderately common downstream, and apparently the most stable of the three native species.
- Bluehead suckers are uncommon throughout the reaches and are likely declining.
- Flannelmouth suckers are uncommon and variable throughout and are likely declining.
- No reaches have strong populations of any native species.

Options for improvement: Dr. Bestgen said options include improved flows at certain times of the year, and a more-natural flow pattern with an earlier spill to decrease the temperature early in the spring. He said it is possible the fish are emerging too early. He said regular spills are important for flushing fine sediments from spawning gravel.

He said a natural flow paradigm has been adopted in many areas in the West. The intent is to re-create more-natural annual, seasonal and daily flow and temperature patterns. A natural flow paradigm tries to provide a remedy for river restoration and recovery. He said improved flows will also, however, enhance

the trout community and will reduce native fishes in those reaches where trout persist. Dr. Bestgen said managers must ask whether native-fish management goals are consistent with trout-population goals. He said trout could substantially affect native-fish populations downstream.

Dr. Bestgen said more data is needed about the early life history of native fishes. Are they failing to spawn, or are they not being recruited from juveniles? He said there is no doubt that native fish have declined since the 1990s but the mechanisms for their decline are quite uncertain.

Q & A: Rege Leach of the Division of Water Resources asked whether selective level outlet works (SLOWs) were used at Flaming Gorge. Dr. Bestgen said a selective-withdrawal system was installed after the dam was built. After the flows warmed, trout and native-fish populations responded immediately.

Mike Preston asked about the different eras on the Dolores River. Dr. Bestgen said the best conditions for native fish were probably before European settlement. The worst conditions were probably after Montezuma Valley Irrigation Company was implemented but before the dam was built, when most of the water went out of the system and none was returned to the river. In the period just after McPhee was built, there were good populations of trout and native fish. Later, conditions worsened. Dr. Bestgen said it is a misconception that native fish are responsive biologically to drought; they persist in drought conditions but they don't thrive. In the pre-dam era, native fishes existed upstream of where McPhee is now and these reaches probably played a large role in survival of these fish, providing a refuge from the downstream reaches affected by low summer flows.

Jim Bruce, hydrologic technician with the U.S. Geological Survey, asked whether there is information on the movement of fish. Jim White of the Division of Wildlife said the Dolores is a difficult place to survey; also, there are few native fish to tag and monitor. In the last five years he has caught just one bluehead that was taggable.

Dr. Phaedra Budy
Associate Professor, Department of Watershed Sciences, Utah State University

Dr. Budy discussed the components of population status: space and time. She said one of the biggest challenges in this inquiry was trying to overlay data from the different reaches. She concentrated on the Big Gypsum and Dove Creek reaches because considerable data from those sites is available.

Dr. Budy discussed data on fish status and trends related to species composition at the Big Gypsum and Dove Creek sites. She said the percent of roundtail chub among total catch has remained relatively high and stable, while the percent of flannelmouth suckers has been variable at Big Gyp and low at Dove Creek, and the percent of bluehead suckers has remained consistently very low (under 20 percent). The percent of non-native fish (non-trout) has been slowly increasing over time, with large increases in the early and mid-2000s. The percent of all non-natives (including trout) has ranged from 10 to 60 percent since the late 1980s. There is a large blip of green sunfish from 2003-06.

Dr. Budy said these statistics do not reflect a healthy native-fish complex. She said roundtail-chub numbers were variable but stable until the late 1990s but now appear to be in decline, although their proportion of the catch has not gone much below 40 percent. However, there has been a substantial decline in suckers since the 1990s. Suckers are highly imperiled in the Lower Dolores and roundtails appear to be in decline.

There also appears to be a tendency toward small adult fish among the native species. The average length on the Lower Dolores is 150 mm, which is fairly small. Dr. Budy said on the San Rafael Swell, where she works, the average is 279 mm for flannelmouths and 178 mm for bluehead suckers. The average for roundtails is 148 mm, about the same as in the Dolores River.

Dr. Budy said the situation on the Dolores River appears to be opposite of that in the San Rafael Swell and in other places in that the roundtail chubs are doing better than the native suckers.

Dr. Budy discussed the issue of recruitment. There should be evidence of 1-year-old and 2-year-old fish, but they seem to be largely missing in most years, indicating poor recruitment. She said small-sized adult fish produce dramatically fewer eggs than bigger fish. Some of the fish in the river today may be 30 to 50 years old. She said, based on population structure alone, these populations appear to be in bad shape.

Her conclusions, based mainly on the Big Gyp and Dove Creek sampling, are:

- Native suckers are highly imperiled and blueheads may be close to local extinction.
- Roundtails appear to be declining but are still present in modest numbers.
- Long-term population viability of all three native species appears tenuous.

She said there is not enough information to provide more reach-specific conclusions, but the situation appears to be worse in the upper reaches. The San Miguel River appears to be a very important source population at the lower region.

She discussed changes in hydrology that have occurred. The mean daily discharge after the dam was built is much lower than it was pre-dam; the two-year flood is also much lower. The river does not have the big flow events it did in the past that are important for habitat maintenance. Flows of 7,000 to 10,000 cfs are needed to significantly move the bed. No flows approach that amount in this post-dam period and it is unlikely that the bed is being moved. There also has been a shift in when the peak discharge occurs. It is moving into late spring, earlier than in the past.

Opportunities for spill management: Dr. Budy said if native-fish recovery is the goal, managers need to mimic the pre-dam hydrograph, with a peak flow that corresponds in timing to what the fish have evolved to. Their eggs and fry should be in the gravel when the temperature is warm. The historic peak flows may not be necessary, but the historic timing is needed. Having the water become warm early on, then become cold when it shouldn't be, is a mismatch to evolution.

Dr. Budy said when base flows are too low, there is not only less water than the fish need, it concentrates the native fish with non-native species.

She said considerable benefit could be realized for just a small increase in discharge.

Non-natives: She said the density of non-natives in the Dolores is still relatively low. She said there is some overlap among the three native species in that they all tend to eat insects and algae, but they do have some niches. However, if non-natives such as channel catfish, fathead minnows or shiners are present, they have complete overlap for food and niche space with the native species. There is strong potential for competition and also for predation.

She said once exotic fish are present in a system they cannot be eliminated, but it is possible to give native species an edge, and increasing base flows is a good way to do that. She said temperature is

tightly coupled with flow and hydrology. She said these native fish are hardy and well-adapted to a wide temperature range, but temperature changes need to occur slowly and predictably. The fact that the warm temperatures are followed by a cold blast from the spill is likely causing thermal shock.

Q & A: John Sanderson of the Nature Conservancy asked whether a flow of 3,000 cfs would be enough to clean fine sands from the gravel. Dr. Budy said she is not comfortable saying yes or no. She said the highest bed elevation in the Dolores River is always after the peak flows, which is peculiar. One hypothesis is that a large amount of sediment is coming into the system from the San Miguel River and other sources.

She was asked whether it would be best to diminish the spills to reduce the thermal shock or whether it's better to have big spills to flush out sediment. She said that is a difficult question. She said in Glen Canyon it has been found that big flows have a significant effect on gravel and sediment, but the effect tapers off quickly downstream.

David Graf, regional water specialist with the DOW, said he has been monitoring two sites and it appears to take a few thousand cfs to get anything moving in gravel. At 2,500 cfs not much is moved. In 2005 there was a prolonged spill of 4,500 cfs and that moved almost 6 vertical feet of sludge. The sustained flow was key.

David asked how many years of poor recruitment these fish populations can withstand. Dr. Budy said recruitment failure occurred during some years throughout the evolution of these species, which is why they are long-lived, but it cannot happen every year. She said it will not be possible to have optimal conditions for native fish every year, but perhaps good conditions could be provided three years in a row and then the spill and flows could be managed for other factors.

Dr. William Miller of Miller Ecological Consultants, Inc,

Dr. Miller discussed the physical environment of the Dolores. He said the majority of the river from the dam to the San Miguel River is confined by canyons or steep topography and does not have much room to move. This creates deeper pools. The bedrock and boulders act to limit the scour to peak flows and the channel is not changed much. Peak flows are lower now than during the pre-dam period.

He presented information about average daily flows at Dolores and at Bedrock over several decades. He said there are no big peaks in flows occurring post-McPhee. This means the river is probably not getting the same amount of habitat-cleaning as before. Native fish, especially roundtail chubs, can survive in pools, but smallmouth bass also like pools.

He discussed water temperatures at different sites on the river. Upstream of Disappointment Creek from 2005 to 2007, the water temperatures all rose above 20° C. for some period of time, but they are not warm enough to put much stress on fish. However, at Bedrock the temperatures would definitely put stress on trout.

He discussed water-quality issues. He said there are no long-term continuous records on these factors, but there are currently elevated metals in the lower section (Reach 6) and elevated total dissolved solids, an indicator of salts, in Reach 6 as well. These could affect native fish.

Dr. Miller discussed the biological community. In the era following European settlement, warmwater fish species, both native and non-native (carp and catfish), were present. McPhee Dam created a block in the river, and the system is now truncated. Non-native trout were stocked downstream of the dam to promote a coldwater fishery; browns have become self-sustaining and rainbow and cutthroat are currently stocked.

He contrasted the biological dynamics of the river pre- and post-McPhee. Prior to McPhee, it was a warmwater community; today there is a blended coldwater/warmwater community. In the past the top predators were roundtail chub, Colorado pikeminnow and channel catfish; today they are trout, smallmouth bass, roundtails, green sunfish and channel catfish.

He discussed the status and trends of native species.

- The roundtail chub was abundant or common at selected sites in 1971. As of 2009, it was present in reaches 4 and 5 but absent from the upstream reaches. It is also missing certain age classes.
- The bluehead sucker was abundant in all reaches in 1971 but as of 2009 appears to have very low numbers at some sites and is also missing age classes.
- The flannelmouth sucker was abundant at all sites in 1971 and by 2006-09 had declined to where it was not collected at all sites. It too is missing age classes.

All three native species appear to be declining.

Dr. Miller presented information about trout and native-fish biomass from 1993 to 2007 in the reach from Bradfield to the Dove Creek pumps. The data indicated that both trout and sucker biomass have declined severely. He said trout, especially browns, are predaceous and will eat small native fish.

He showed data on native-fish length at Big Gypsum in 2007 and the San Miguel River in 2008. At the San Miguel River confluence, the native fish showed a much better distribution of size/age class, indicating that the San Miguel is very important to the native-fish population in the Dolores. Dr. Miller said the San Miguel may be one of the reasons there are still native fish in the Dolores.

In summary, he said:

- Native fish show a declining population trend.
- Native suckers are declining in occurrence spatially.
- Not all age classes of native suckers are present. In Reaches 2-6 there are mostly large, older fish.
- Roundtail chub are still present in Reaches 4 and 5. He said he is not sure whether they are reproducing there or coming from Disappointment Creek.
- The Dolores downstream of the San Miguel, and the lower San Miguel, appear to have functioning native-fish populations and seem to be strongholds for the natives in the system.

To ensure persistence, he said, the following is needed:

- Successful reproduction (annual) in Reaches 2-6.
- Successful recruitment in Reaches 2-6 (at low levels annually, with periodic large years). He said these long-lived fish have high mortality when young, and recruit slowly into adult life stages.
- Stable or increasing native-fish populations in Reaches 2-6.

He discussed limiting factors on the native species:

- Non-native predators. He said trout in reaches 1-3 and smallmouth bass in reaches 3-6 seem to be the most important.
- Flows. There are insufficient peak flows needed to create and maintain habitat.
- Water quality. The high TDS in lower reaches, metals in Reach 6, and fine sediment from Disappointment Creek may be detrimental to fish viability.
- Water temperature. Reaches 1 and 2 are cooler than they were historically.

Potential alternatives include:

- Removal of non-natives, mainly through management and mechanical removal to depress populations.
- Changing thermal conditions to favor native fish in Reaches 2-6. Dr. Miller said it would probably be possible to maintain a good trout fishery. If water could be released in the 12° to 15° range that water would help trout and then warm quickly as it moves downstream.
- Flow manipulation to maintain habitat (peak-flow management).

Q & A: Jim White, DOW aquatic biologist, said McPhee's managers have traditionally used the lowest release points on the dam. That was the recommendation of the Biology Committee because it prevents the release of non-natives such as white suckers from higher levels of the reservoir. However, the bottom water is below the thermocline. Jim said the Fish and Wildlife Service recently said it would be a bad trade-off to release from the upper SLOWs because the risk of releasing white suckers would negate gains from temperature modification.

David said below Disappointment Creek, the river changes from clear water to a shale-dominated environment. He asked if bass thrive in a cloudy environment. Dr. Bestgen said this does not sound like good bass habitat. In the upper basin they inhabit reaches that are clear in the summer but turbid seasonally. The silty environment might be a reason for their downstream limitation.

Dr. Miller said if the river is silty it won't be good habitat for native fish either.

Shauna Jensen, hydrologist with the San Juan Public Lands Center, said the BLM sampled Disappointment Creek a couple of years and found roundtails in the lower end.

Mike Preston asked why roundtails should be more viable than suckers on the Dolores in comparison to other rivers in the basin. He asked if there is a strategy aimed at roundtails, and whether helping them is more do-able than helping the other two species, particularly as roundtails are the ORV on the Dolores.

Dr. Budy said she is not sure of the reasons for the difference. However, she said fine-tuning management for just one of the three species would be difficult, as they co-occur.

Dr. Bestgen said in a flow-depleted system what is left are pools, and that is where roundtails live. They probably have the least habitat reduction of the three native species when flows are low. He said chubs are very susceptible to predators.

Dr. Miller said roundtails occur in the same habitat as smallmouth bass, so helping roundtails would likely aid the bass as well; thus it would be necessary to take steps to reduce bass numbers. Flow manipulation might help and there would probably need to be some mechanical removal of bass.

Dr. Bestgen said an influx of cold water at the right time can cause nest abandonment for smallmouth bass. The question is, how does that overlay with native fish?

John Sanderson said he saw a strong consensus on three points:

- High flows are important to sediment transport and habitat maintenance.
- Temperature is an issue.
- Non-natives are a problem and could become a worse problem.

Dr. Miller said because there is not much information on early life-history, it's difficult to tell if roundtails are spawning successfully. He said he doesn't see a detriment to suckers if managers target roundtails by improving peak and base flows. Flows should clean the riffles and provide better habitat for the two sucker species.

Dr. Bestgen said flannelmouths spawn first, then blueheads, then roundtails. Their eggs are probably incubating and hatching at the height of spring flows. Smallmouth bass spawn close to the time that roundtails do; 16° C. is when bass hatching starts. He said the temperature for native-fish hatching is more variable. He said in some of these reaches there aren't many adults present to spawn. Dr. Budy agreed and said the bluehead numbers are so low that fishes may not be able to find a mate.

Mike asked if stocking is an option. Jim White said there is a source of roundtails in the John W. Mumma Native Aquatic Species Restoration Facility in the San Luis Valley. There are also roundtails in Plateau Creek that could be translocated. It may be that both improved habitat and stocking are needed.

Peter said spills occur about every other year and 1,000 cfs is a benchmark for boating. He asked for recommendations regarding the spill. Dr. Miller said he would like to know how 1,000 cfs relates to sediment transport. He would like to use that water to maximize cleaning of the river. Dr. Budy said she would try to move the timing of the hydrograph to a natural one.

The scientists were asked several questions about the trout fishery. Jim White said the compatibility of trout and native fish is an issue. Bradfield Bridge has been considered the lower end of trout habitat. The DOW manages for both native fish and trout. Jim said trout numbers below Bradfield are low, about 5 to 10 pounds/acre, but they are still taking space from native fish.

Dr. Bestgen said low, warm base flows reduce trout populations. He and Dr. Budy said managers must carefully evaluate how the trout fishery may be affecting the native-fish population.

Dr. Miller said he wants to know more about the food source for both the trout and the native species and whether the food supply is adequate. David Graf said there is very little macroinvertebrate life below Disappointment Creek.

Mike explained the difference between a spill-and-fill and a fill-and-spill year for the reservoir. He said in 2008, which was a high-flow year, managers tried to address spawning flows for native fish and started the release in March to create a more-gradual transition in temperature. This could be done any time when there is good snowpack.

Vern Harrell of the Bureau of Reclamation said recommendations about moving the spill earlier fly in the face of what boaters want, which is rafting flows over Memorial Day weekend.

Mike said in 2008 there were rafting flows for 85 days, so rafters were amenable to giving something up for native fish. He said 2,000 cfs equates to two good rafting days. He said 50,000 acre-feet is the tentative “line” between a spill-fill and fill-spill year.

Dr. Miller asked whether, when a small spill is anticipated, that could be retained until the next year. Vern said no because all the water in the reservoir is allocated and contracts do not allow managers to carry over water to the next year.

Dr. Bestgen asked how often there is an opportunity to change the pattern of the spill. Mike said a big flushing flow is probably possible every five years, but not every two or three. Mike said for maybe 3 in 10 years there is a big enough spill to give multiple management options.

Peter Mueller asked if there is a way to commit to these early releases, perhaps by front-loading a larger increase in the base flows before the dam spills. He suggested the 6,000 acre-feet that MVIC has proposed for leasing to the Colorado Water Conservation Board could be used to reimburse the Project if there is no spill.

Vern said he was discouraged and asked whether native fish could be helped in the Dolores. Dr. Bestgen said there may not be reproduction and recruitment in all reaches, but there have been bigger populations in some post-dam years, so he thinks there is habitat to sustain some of these fish. If flows come at the right time, the fish can be helped, but if the right regime can occur only 2 or 3 years out of 10, that may not be enough.

Cole Crocker-Bedford, private landowner, asked whether rafting has to occur over Memorial Day or could be earlier. Mike said rafting needs can mesh with native-fish needs, but some rafting days will be lost for higher peak flows. He asked whether forgoing the trout fishery would help. Dr. Budy said she didn't think so. The amount of water need to keep temperatures cool enough for trout would also sustain base flows for native fish. Jim White agreed that helping the trout fishery would likely help native fish.

John Sanderson said the lease proposal by MVIC is for just 3 of 10 years and has to come during 120 days of the year. The scenario Peter was talking about was to take a chance and spill a little early and then if the reservoir doesn't fill, the 6,000 acre-feet can be used to make that up.

Linda Bassi of the CWCB said the lease water could be used only to bring base flows up to the instream flow of 78 cfs, but that might relieve pressure elsewhere. Dr. Miller asked whether the fish-pool water could be released earlier and the lease water could be used to replace it. Linda said yes.

Ann Oliver, Dolores River Dialogue science coordinator, suggested that when there is a low-spill year the spill could be extended later into the season to help base flows. Vern said this is a good idea but it may meet with resistance from boaters and irrigators. Amber Kelly of the San Juan Citizens Alliance said the rafters need to be consulted and they have been flexible in the past.

Marsha will flesh out the different ideas raised today and get them out to the group for comment.

April 7, 2011

The scientists gave condensed versions of their presentations from April 6.

Q & A: Dale Smith of Trout Unlimited asked about the population of cutthroat trout in the Dolores. Dan Kowalski of the DOW said the cutthroats that are currently stocked are native cutthroats. Jim White said they are a recreational population and not a conservation population.

Dr. Budy said native and non-native species all showed a notable increase in 2005, likely as a result of a big flow event. She reiterated her recommendation that if the goal is native-fish recovery, managers will have to mimic a more natural hydrograph with more natural timing of peak flow, even if the peak is not as big as historically. She said there also has to be enough water to maintain base flows all year.

Mike said McPhee is a small reservoir with an active capacity of about 230,000 acre-feet. It can't be enlarged, but more storage could be built off the river, such as at Plateau Creek. The largest spill that can be done is about 4,500-5,000 cfs. He noted MVIC's proposal for a 3-in-10-year lease of 6,000 cfs to the CWCBC. Additionally, there will likely be about 3 in 10 years where there is a big snowpack.

Don Schwindt, chair of the Dolores Water Conservancy District board, said he has a concern with Dr. Budy's recommendation to restore densities, distribution, and population structure of native fish to a minimum of 1990s levels. He said in the 1990s practically all the Project water was available for managers to use because irrigation was not fully implemented. He asked the scientists how the constraints discussed would change their recommendations.

Dr. Budy said the constraints don't affect her statements about current fish status. She said the 1990s are one option as a goalpost; it is unknown how many fish were present before McPhee. It is important to note that these fish have been very affected for a long time and are starting to decline dramatically. She said to remember that the suckers in the river now may be relics from long ago.

Dr. Bestgen agreed that constraints don't affect the conclusion that native fish are declining. Getting to the point where there is consistent reproduction in a variety of reaches is a good goal. He said the 1990s levels are not necessarily a big population.

Dr. Miller said the constraints put sideboards on changes you can make to hydrology. The question is whether incremental changes in management can be made that will be beneficial while staying within the sideboards.

Vern said spill suppression and temperature are the "low-hanging fruit". Finding extra water is more difficult. He asked whether warming Reach 1 to provide 13 more miles of habitat would help.

Dr. Miller said if Reach 1 became a coolwater area instead of coldwater, it would allow for a trout fishery and would help the warmwater fish. However, concerns about using the upper SLOs and non-natives might preclude this. Dr. Bestgen said he believes the potential for native fish in Reach 1 is near zero even if the temperatures were raised, because of brown trout.

Dr. Budy said she can't say whether just the "low-hanging fruit" will save these fish. A thermal shock can eliminate one entire year class, so eliminating that problem could have a big impact. Whether those

juvenile fish would then survive is unknown. If the river goes almost dry one month later those fish will likely die.

Dr. Bestgen said as you increase the flows, you increase the percentage of habitat available as well as the potential for biomass at a particular site.

The scientists were asked to clarify the threat of predation. Dr. Miller said new non-natives are present that were not present before the dam, especially smallmouth bass. Brown trout also eat fish. Dr. Budy said the presence of exotics is fairly reach-specific, but natives are in decline overall, and the proportion of non-natives is still relatively low in the Dolores.

Dr. Bestgen said any management action to alter flows or water temperature should not let smallmouth bass increase.

Dr. Budy said all three researchers are amazed that no white suckers have invaded the river.

Marsha asked whether an adaptive-management model featuring compromise and give-and-take over a 10-year period might help native fish without ruining other interests. The researchers said yes. Dr. Bestgen said much could be learned about this system if different flow management were in place. Dr. Budy said managers have to be willing to change management based on what they learn.

It was agreed that more data is needed on:

- Early life stages of native fish, especially in the San Miguel River and below the confluence
- Temperatures required for native fish to spawn and hatch
- Sediment monitoring and what flows are needed to clean out the channel
- Geomorphology
- Diet of brown trout and other non-natives
- Impact of trout on native species
- Limiting factors on smallmouth bass

Next steps: The researchers will identify data gaps. Marsha said the researchers will come back in May to meet with the Oversight Panel and Legislative Committee after meeting with each other. They will then present do-able opportunities. Over the summer the Leg Comm will continue to work on legislation for the NCA and will bring that back to the LDWG. The LDWG will probably meet in July.

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LOWER DOLORES WORKING GROUP
“A Way Forward”
Researchers’ Final Presentations to the Oversight Panel
and Legislative Committee
June 7 and 8, 2011

Status of native fishes in the Lower Dolores and opportunities for improvement:
Scientists’ combined report

Dr. Kevin Bestgen, director of the Larval Fish Laboratory at Colorado State University, gave a PowerPoint presentation representing Phase 2 of “A Way Forward”. He said the presentation was a compendium of the findings by all three researchers – himself, Dr. Phaedra Budy (associate professor, Utah State University) and Dr. William Miller (Miller Ecological Consultants, Inc.) from Phase 1, combined with opportunities for improvement. The researchers used different approaches but reached similar conclusions. Their recommendations generally apply to all reaches of the Lower Dolores. **Their PowerPoint and report are available at ??????**

Native-fish status: Dr. Bestgen said these taxa were once widely distributed throughout the Colorado River Basin but are now largely extirpated in areas of the basin. That has resulted in the granting of special status to these species in many states, as well as discussion of federal listing of all three as endangered species. He said the roundtail chub, bluehead sucker and flannelmouth sucker are all in decline on the Lower Dolores. The bluehead sucker is probably the rarest of the three species in the study area. No reaches have strong populations of any species. He said there is a high level of consensus among the researchers on this.

Dr. Bestgen said, in places such as the Colorado River and the Lower Gunnison, the combined biomass for the three species is 138-422 kilograms per hectare. In the early 1990s on the Lower Dolores at Big Gypsum, the combined biomass was found to be 20-60 kg/ha. The contemporary biomass on the Dolores at Big Gypsum is 0.6 kg/ha. This represents a huge reduction in biomass and abundance in the study area. Dr. Bestgen said 0.6 kg/ha represents perhaps just a single fish. The scientists are in consensus that this is a very low-level fishery, near extinction.

Dr. Bestgen said reasons for the decline include:

- Reduced peak and base flows
- Associated direct and indirect thermal effects
- Negative effects of cold- and warmwater non-native fishes
- Loss of connectivity

All the reasons are important and interacting; there is not a single over-riding reason for the decline.

Dr. Bestgen suggested an interim recovery goal might be to restore the species’ biomass to the levels of the early 1990s and additionally to re-establish basic population life-history processes:

- Annual spawning and recruitment
- Wider distribution and higher abundance
- Viable age-size structure

Opportunities for improvement

The researchers discussed the Action, Benefit, Method(s), Schedule and Effectiveness, and Issues and Uncertainties involved in each of the following opportunities:

- **Spill management.** The researchers said the spill is at lower magnitude than in pre-dam years; the current regime occurs later than is natural; and there is pre-spill water warming, then sudden temperature suppression from the spill that can create “thermal shock” for these warmwater fish. Water levels below 50 degrees greatly increase mortality in larvae, especially if the temperature drop is rapid. The researchers believe improving the magnitude and timing of the spill would provide correct cues for spawning, discourage coldwater non-natives, and provide sediment transport and habitat maintenance.
- **Base-flow management.** Current base flows are lower than recommended in previous habitat-based studies. Improving the base-flow regime could provide more habitat and forage for native fish at all life stages, give them more escape cover, provide thermal buffering in downstream reaches, especially in drought years, and improve water quality.
- **Geomorphic processes (sediment-flushing flows).** Sedimentation is occurring because of reduced peak flows, resulting in degraded spawning habitat and decreased instream productivity. Sediment clogs interstitial spaces, leaving no place for the fish to reproduce. Sediment flushing flows would remove fine sediments, loosen the gravel bed, improve reproductive success and increase primary and secondary productivity, such as algal productivity (important because algae are eaten by invertebrates, which are then eaten by native fishes). The researchers said this would require a spring release of 2,000 to 7,000 cfs every 2 to 5 years along with monitoring to determine effectiveness.
- **Geomorphic processes (habitat-maintenance flows).** There is preliminary evidence of channel incision, possibly due to reduced overbank flows and vegetation encroachment. Habitat-maintenance flows would create and maintain habitat for all life stages of fish. Variability in habitat is important because fish need different habitat at different life stages. The researchers said the flows should replicate the pre-dam hydrologic regime. The extent of flooding, along with vegetation growth and bar growth, would need to be documented through photographs.
- **Thermal-regime modification.** The low-level release early in spring causes early warming, followed by later temperature suppression. This provides incorrect cues for native fish, reduces their growth, and triggers thermal shock, especially at early life stages. The temperature drops from nearly 65 degrees down to 50 degrees. Thermal-regime modification to change the thermal release to match the natural pattern would provide correct cues for native fish, reduce potential thermal shock, increase growth and survival of native species, promote seasonal thermal variation to increase insect diversity and productivity, and reduce trout distribution and abundance.

There was considerable discussion of this opportunity. The scientists said one way to achieve thermal-regime modification would be to utilize the higher selective level outlet works (SLOWs) in the dam. However, all agreed the issue of escapement of non-native fish such as smallmouth bass, white suckers and walleyes into the river from the higher outlets would have to be resolved. The researchers said they are amazed that white suckers are not already present downstream and said every effort should be made to prevent their introduction, as they will hybridize with native suckers. At present the Lower Dolores is one of the only high-elevation reaches in the Colorado River Basin where there is not a great deal of hybridization occurring.

▪ **Reduce effects of coldwater invasive species (discontinue stocking of cutthroat and rainbow trout).**

The researchers said this would reduce competition for food and extend upstream distribution of warmwater fishes. However, they said the benefits might be only moderate, as this would not affect the highly predaceous brown trout, which are self-sustaining.

▪ **Reduce effects of coldwater invasive species (reduce brown-trout reproductive success).** The researchers said because brown trout are so predaceous of other fish, reducing their numbers would increase survival and distribution of native species. This could be accomplished through changes in flows at key times to strand brown-trout eggs, changes in fishing restrictions, and increased water temperatures. However, the researchers said the browns cannot be eliminated and warmer water could benefit smallmouth bass, which are a warmwater species.

▪ **Reduce effects of warmwater invasive species:** Smallmouth bass are of particular concern because they too are highly piscivorous. The researchers said they could be reduced through a release of cold water at the precise time the male bass are guarding the larval nests, to promote nest abandonment. They agreed that smallmouth bass are a serious concern and at present seem very localized on the Lower Dolores, so keeping them in check would be highly beneficial.

▪ **Supplement (stock) native fish:** The researchers said there may be so few native fish in the river at present that they might not be able to respond to other changes designed to benefit them. Stocking of native species would increase their abundance and distribution. However, conditions would have to be improved to ensure success.

In summary, the researchers said that, based mostly on studies done at the Big Gypsum and Dove Creek sites, the long-term population viability of all three native species appears tenuous. There are many opportunities to improve their distribution and abundance. More information is needed on a number of factors, including early life history, sediment-flushing and bed mobility. The researchers said it appears the greatest opportunities for improvement lie in improved base and peak flows. Reduction of non-native species could also provide significant benefits, and other opportunities such as water-quality and riparian improvements might play a limited role. Some considerations are:

- Recognize that this is a complex system with complex issues.
- Each opportunity has complexities and costs.
- No single factor is responsible for the decline of these species.
- Reverting to a natural hydrograph and natural temperatures is a fallback when no information exists.
- Something different must be done to reverse the trend in native-fish abundance, but do no harm.

The researchers ranked the relative benefits of the opportunities and concluded that the two most beneficial would be changes in the timing and magnitude of the spill, and improved base flows. Sediment-flushing and habitat-maintenance flows would be the third- and fourth-ranked opportunities. The researchers said base flows have been severely depleted and increasing them is probably the single most important action.

Discussion

Base flows: There was a comment that higher base flows would not mimic what occurred pre-dam. Dr. Bestgen said the researchers are not recommending a single base flow or a completely natural flow;

however, natural processes are the ones the native fish evolved with. In a natural hydrograph, base flows are highest following the spring peak.

Some people said that, pre-dam, the base flows commonly dried up in summer yet the native fish were abundant. It was also stated that before the dam, native fish lived in pools in the dam's current location and upstream through the area where the reservoir now sits. Dr. Bestgen said studies by Holden (1971) and Valdez (1981) found the fish weren't abundant everywhere. He said there probably were pools in that area because it was close to the diversion sources. Dr. Miller discussed how the dam severed connectivity with refuge areas such as Beaver Creek that could contribute back to the overall population. All these small things add up.

Jim White, aquatic biologist with the Division of Wildlife, said today there are year-round flows, whereas before the dam, there were times when the river dried up. The piece that's missing is the high peak flows and the length of time it took for the flows to drop off. He said in a big water year, there could be base flows into July or August, sometimes 200 to 300 cfs. Those may have been years when native fish thrived and survived, and then in other years they were sitting in the pools. David Graf, water resource specialist with the DOW, said he had studied MVIC diversions and flow at the Dolores gauge and the readings showed that in high water years the river did go dry, but not till July or August. On low years it went dry in June.

Several people asked about specific base-flow recommendations. The scientists said their recommendations separate base flows from habitat-management flows and sediment-flushing flows. Base flows occur after the peak and into late summer, when the discharge is not changing dramatically from day to day. Some studies have already been done to determine what those should be, and they indicate that current base flows are far below the level needed to support the native fishery. Dr. Budy said in evolutionary history the fish didn't have a minimum base flow of 78 cfs every year. There were years when the fish had complete recruitment failure. By calling for an "improved base-flow regime" the researchers are trying to show flexibility.

DRD science coordinator Ann Oliver asked about the most critical period for base flows. The researchers said they believe the most critical period is the summer months. They agreed if 6,000 acre-feet or any additional water were available, the time to use it would be during the growth season (late June through mid-September). But simply providing more habitat that is too cold or full of predators does no good. The researchers said 6,000 acre-feet would not provide sediment-flushing or habitat flows and would not be enough to buffer thermal shock on the ascending side of the spill, so it would be better utilized for base flows. Jim White said 6,000 acre-feet starting April 1 would provide flows of 90 to 100 cfs for 30 to 60 days in a non-spill year. Ann said thermal shock is not an issue in a non-spill year.

David Graf said consultant Chester Anderson has said 300 cfs would be needed to keep the temperature below 15 to 16 degrees in mid-May.

The researchers said an addition of 5 or 10 cfs probably wouldn't do much. Jim White said most of the base flows are aimed at June through August. The base flows are partly to provide cooler temperatures for the trout, but also to improve habitat. Dr. Miller said if warmer water from the higher SLOWs could be provided, perhaps the base flows could stay the same.

The researchers said good reproduction has to occur in just 1 in 10 or 1 in 5 years, not every year. It may be enough to have a small peak in multiple years and a big one occasionally. But if flows are 1,500 cfs every year, that may not be enough for cleaning of the river bed plus better timing of temperatures.

Dr. Bestgen cited work by Rick Anderson, who developed a mathematical relationship between discharge and percent of habitat available. The graphs showed for bluehead and flannelmouth suckers, the amount of habitat provided by base flows in this system is very low. However, the curve is steep and considerable benefit can be achieved by adding a small amount of water. He said the researchers agree that, while increasing base flows is not the only solution, it is critical. While higher base flows would be beneficial during the summer growth period, it would also be good to have higher flows for adult fish so they can be healthy and reproduce, find deep pools in which to over-winter, and escape wading birds.

Vern Harrell of the Bureau of Reclamation said he does not envision the base flows changing in a major way, and asked what could be done differently with the 32,000 acre-feet from the fish pool in summer. Dr. Miller said more than 32,000 acre-feet may be needed. He said accessing the “dead pool” might be helpful but might require more infrastructure.

DWCD Manager Mike Preston said the opportunities to grow native fish are better below the confluence with the San Miguel River. Above the San Miguel there are limitations because of irrigation, so increasing base flows there is tied to the amount of the spill. If the fish-pool water can be released over nine months instead of 12, that is helpful.

Effects of coldwater fishery: There was discussion of whether the coldwater fishery below the dam is detrimental to native fish. Matt Clark of Trout Unlimited said the overlap between coldwater predators and warmwater fish is slight, and asked why reducing the coldwater fish would be beneficial. Dr. Miller said there is probably 15 miles of overlap with warmwater habitat. Brown trout need to consume five times their body mass annually and when they reach 12 inches in size, they eat almost exclusively fish.

Jim White said brown trout are indeed predatory but they will eat whatever is the most abundant food source, and that is mottled sculpin. He said during the highest base-flow years in the early stages of the Dolores Project, the trout fishery benefited, but native fish were also fairly abundant. As contracts were implemented and flows decreased, the trout and native fish both declined. Abundant-water years were good for trout and native fish both, indicating they occupy somewhat separate niches in the ecosystem.

There was discussion of what would be entailed if the DOW were to develop new guidelines regarding the trout fishery. The DOW representatives said they could cease stocking trout (specifically, rainbows) at any time, but that the DOW is a public agency and eliminating the trout fishery might require institutional steps that would trigger a NEPA process. Jim said this is not a trout fishery that is significant statewide. Matt said he is not convinced the trout and native species are incompatible and he would like more information about how many native fish the browns might be eating. Dr. Miller said there are many unknowns, but the native fish evolved in a system where the only other predators were roundtail chub and northern pikeminnow. The trout are additional stressors in the system. Dr. Miller said browns are opportunistic and have been shown to eat many native fish on the San Juan River. They have been elevated to one of the top 100 invasive species in the world. Matt said there is a difference between abandoning the trout and shifting the management emphasis to include native fish. He said there is support in the local TU chapter for improving ecological conditions and helping native fish, but not for eliminating the trout fishery. Jim said the rainbows are much more tied to cold water and don't seem to pose as much threat as browns. The researchers agreed rainbows are not a major problem.

There was discussion of whether adding 1 1/2 reaches upstream from Bradfield would provide a significant benefit to native fish. The researchers said, when species are in such decline, any measures to help them could be significant. These species move great distances and historically did occur there in high densities. Taking away two more reaches of the river may mean there is not the area needed for full life history.

David said he and Jim represent the DOW but do not speak for them officially. They said there is a common assumption that the DOW's management priority for the Dolores River is trout. However, 90 percent of the Dolores River (by miles) is managed as a warmwater native fishery and the remainder takes advantage of the cold water from the dam. The DOW doesn't see the coldwater and warmwater fisheries as incompatible. The reason for the presence of cold water is the risk of escapement if warmer water were released from the higher SLOWs. Even if the higher SLOWs could be used, there might not be much of an increase in warmwater fish habitat and the change could draw the bass upstream.

Dr. Bestgen agreed smallmouth bass are an unknown factor and it is uncertain what would happen if the warm water were extended upstream. This question needs a lot of thought because smallmouth bass are a major threat. Jim said smallmouth bass have expanded upstream since 2007.

Endangered-species listing: Shauna Jensen, hydrologist with San Juan Public Lands, asked whether the whole Dolores River Basin should be looked at when deciding the status of native fish. Mike agreed it is legitimate to ask whether there is enough water to support native fish above the San Miguel confluence, but the Endangered Species Act and the WSR suitability study may mandate that goal.

It was asked whether this part of the river is likely to be designated as critical habitat if the native species were listed as federally endangered. The researchers said typically a species is listed range-wide and then the U.S. Fish and Wildlife Service makes a determination as to what is critical habitat. Whether the Dolores reaches would be included is not known; it depends on the recovery goals and how many fish of each species the agency wants to see. Once the recovery goals are established, management units are set, and within those there might be core areas that have to have a certain number of adult fish. The Dolores might be one core area within a management unit. It was asked whether there could be a call on water from the Dolores to benefit critical habitat somewhere else in the system, even if the Dolores itself were not critical habitat. Dr. Bestgen said it is possible but not likely. It was noted there is a rangewide conservation agreement in place for the bluehead sucker, roundtail chub and flannelmouth sucker to try to avoid a listing.

Smallmouth bass: It was asked whether it is possible to send a pulse of water downstream to flush male bass from their nests without harming the natives. The researchers said this is possible if well-timed. The pulse could be as short as one day. In low-velocity habitat the flow might increase from 50 cfs to 500. The researchers said real-time data on temperature would be invaluable.

Adaptive management: Marsha said the DRD Steering Committee has talked about setting up a more formal adaptive-management (AM) program. This would be designed to take a 5- or 10-year view of the river and set up management goals for different types of flow years to allow managers to react quickly to opportunities. Some comments were:

- Dr. Budy said adaptive management means not just adapting to the situation, but adapting to what is learned from the management.

- David said a problem is the link between a functional, rigorous program for flow management and the legislative proposal. The NCA proposal won't prescribe flow management. If WSR suitability is to be removed, then the AM program has to be fairly rigorous concerning flows and managers have to be committed to making changes when studies show something is needed. There must be specific triggers to change management. It can't just be more monitoring or you will just watch the fish go away.
- Shauna Jensen, hydrologist with the San Juan National Forest, said AM is monitoring-intensive. She isn't sure this group has that capability. Marsha said it may not be this group that does the monitoring.
- Ed Warner, resources division manager with the Bureau of Reclamation, said the BOR would not support a very formal AM process, but would support an informal one such as this. He prefers a cooperative atmosphere, not a formal one.
- The scientists said there is 24 years of hydrology data that could be used to set up trigger points and build scenarios. Some early-life-stage sampling could answer some key questions and show whether native fish reproduced and recruited. Without that information it's difficult to make decisions about what is good and bad for native fish. They suggested modifying the thermal regime three or four years in a row and seeing how the fish respond. They said habitat monitoring is also needed.

Legislative Committee: Peter Mueller of The Nature Conservancy and facilitator Marsha Porter-Norton said the Leg Comm is discussing measures that can be taken both inside and outside the NCA legislation, and wants to create flow guidelines in a collaborative fashion *outside* the legislation. The Leg Comm did **not** have consensus to prescribe flows in the legislation. Some comments were:

- Making major changes in reservoir management would require a NEPA process, but if experiments show that something is beneficial, a commitment needs to be made to do it.
- Native fish must be put on a par with other obligations in some formal manner, or managers could be sued for not prioritizing trout and boating as per Dolores Project documents.
- The NCA is being created to get rid of WSR suitability. If flows and fish issues are handled informally, will suitability stay in place?
- There must be a legitimate alternative to protect the flow-dependent Outstandingly Remarkable Values if native fish are not addressed in the NCA.

Peter recommended bringing concerned parties together to develop flow guidelines, with native fish as one of the targets. The results would be brought to the BOR, which would initiate a NEPA process with the preferred alternative being the group's developed guidelines. Ed said he would prefer that to legislation. Ed said the BOR will not support putting anything in the legislation that affects dam operations or the Dolores Project. Cole Crocker-Bedford, private landowner, said one of the strong concepts of the Legislative Committee was support for Dolores Project contracts. He said the Leg Comm envisions the legislation as protecting local irrigators and water-users by taking WSR off the table and taking steps to aid native fish to preclude an endangered-species listing.

Marsha said although the Leg Comm did not have consensus to put anything in the legislation that would regulate fish management or flows, the conservation community and BLM do want assurance that the ORV of fish will be protected if WSR is taken off the table. Ed said it sounds like the committee and BOR have the same goal, and noted that BOR is part of the three-species agreement.

In their final remarks, the researchers praised this collaborative process. Dr. Budy said she would encourage people not to use uncertainty as a reason to do nothing. Dr. Bestgen said the group needs to decide upon a goal and he would encourage people to take bold steps to see big effects. Dr. Budy said if native-fish recovery becomes the goal, money will be available from different sources to help with that goal.

Pros and Cons of the Scientists' Recommendations

Marsha presented a set of principles, developed by her, Peter and Mike, to consider in discussing the alternatives. They were:

- The alternatives need to be based on science.
- Dolores Project water contracts and allocations and Colorado water law need to be respected.
- The alternatives need to have promise they will support the persistence of native fish in the river.

There was consensus to approve and use the principles in discussing potentially do-able alternatives. The group then proceeded to analyze and have in-depth discussions about the researchers' recommendations, and they added some of their own. This took up most of the day. The participants voted on the ideas using a scale of 1 to 4 and using the following criterion:

- (1) We can and should work on this now.
- (2) This option will take some time, will need some education and consensus building. It is more complex but should be explored.
- (3) This option will take a considerable amount of time and may or may not work but it should stay on the table.
- (4) We deem this option to not be do-able and it should not be explored at this time.

As each vote was taken, the ideas, concerns, "likes", "dislikes", opportunities and reasons for voting were noted. It was stated by the facilitator before the voting started that these votes are to gauge where support is for the recommendations and are not binding in terms of any institutions' commitments or requirements. The purpose of the votes, Marsha stated, is to see where the group is "at" in terms of support for the recommendations and to see if "a way(s) forward" can be defined.

(Please see attachment at the end of this document that shows the average of the votes. Note that the ideas below the blue line were generated by the Panelists and the recommendations above the blue line are from the scientists.)

Final discussion and next steps

For the last half hour, the group spent some time brainstorming the next steps. The immediate next step is that the scientists will produce a final report this summer. It will be widely disseminated. The Legislative Subcommittee needs to meet again and work out the flows, fish and water language in the National Conservation Area legislative parameters document -- with the new knowledge and information and ideas about river/fish management generated through AWF.

Next, the group was asked how the potentially do-able alternatives that were supported broadly could be implemented. A range of options was discussed. John Whitney, representing Sen. Michael Bennet's office, said the Senator is very interested in the legislation and encourages the process. He will be happy to work with this group to get this drafted into legislation.

It was agreed that a goals statement should be written. Mike and Peter volunteered to write it. They also were asked to design a process for the next phases; for creating the statement; and for involving diverse local voices.

Mike said fleshing out the opportunities to help native fish is an important step. However, he said if recommended measures become mandatory, there will be more institutional resistance. It is better to give the institutions a direction and challenge them to work toward those goals.

It was agreed that there needs to be a process to establish flow guidelines and recommendations. Jim said simply creating a management team as the outcome to protect the fish probably isn't sufficient. Marsha said exploring and developing a workable adaptive-management strategy and structure could be the panel's recommendation. There was broad agreement. She said it appears that something centralized is needed to help establish flow guidelines, not just the Biology and Spill committees. Jim said the Biology Committee, which is charged with managing the base fish pool, has not been able to have everybody at the table, and there is a need for a team that includes decision-makers. Jim said DOW's recommendation has been to manage the spill for native fish, but that may violate the legal commitment to rafting. It would be helpful to bring rafters more into the process on the biology side to work out a compromise.

There was discussion of reopening the Environmental Assessment that established the fish pool. Mike said it should first be decided what change in management is desired before changing the EA, as that is a costly, time-consuming process. He said some steps can be taken through Categorical Exclusions and by working within existing or possibly newly-created structures. Mike said there may be no need to change the EA because it appears the trout fishery is being left in place, so steps can be taken to help native fish without the formal process.

DWCD hydrologist Ken Curtis said he doesn't believe flow management can be centralized locally because the BOR's ability to operate the reservoir cannot be superseded. Marsha said she wondered if bringing together representatives of DOW, Division of Natural Resources, BOR, DWCD, and MVIC, as well as rafters, to talk about a locally crafted management plan that would not usurp federal authority.

David suggested creating a decision tree for different types of flow years. He advised blending all these decision-making bodies into the decision tree and creating a more "nested" approach.

Concern was expressed about whether this would simply be creating more discussion and more process without concrete results. Marsha emphasized that it seems like what the group was saying is that the next phase should be efficient and nimble way and set up to make decisions. Ken said a local group could be useful for connecting all the individual entities (silos).

The day ended with a summary of all the ideas about how to take this to the next phase. It was noted that the Leg Comm will be meeting throughout the summer to work on next steps. Peter and Mike, as co-managers of *A Way Forward*, will also be meeting to ensure this work continues, it was noted.

Everyone was thanked for their participation.

Attachment to the June Panel Notes

Title: **Panel and Legislative Committee's Analysis of Potentially Do-Able Alternatives (for A Way Forward)**

Please refer to the chart on the next page....

Potentially Do-Able Alternatives	Criteria for evaluation by number			
<p>In order to be proactive and avoid a listing of the native fish and to work to ensure their persistence in the Lower Dolores River, the following potentially do-able alternatives are considered: (blue ones = suggested by scientists and red one suggested by Panel)</p> <div data-bbox="300 787 613 928" style="border: 1px solid black; background-color: #c8e6c9; padding: 5px; margin: 10px auto; width: fit-content;">Average of Panel votes are shown in green</div>	<p>(1) <i>We can and should work on this now.</i></p>	<p>(2) <i>This option will take some time, will need some education and consensus building. It is more complex but should be explored.</i></p>	<p>(3) <i>This option will take a considerable amount of time and may or may not work but it should stay on the table.</i></p>	<p>(4) <i>We deem this option to not be do-able and it should not be explored at this time.</i></p>
A - Spill management (no new water -- see "O" below) ("Managed Release")	1.11			
B - Base flow management (no new water -- see "O" below)	1.79			
C – Geomorphic processes: Sediment flushing flows	Not voted on but discussed in A			
D – Geomorphic processes: Habitat maintenance flows	Not voted on but discussed in A			
E - Thermal regime modification	1.75			
F – Reduce coldwater fish effects: cease stocking			3.58	
G – Reduce coldwater fish effects: reduce reproduction	1.67			
H – Reduce warmwater fish effects: disadvantage bass reproduction	1.5			
I – Supplement native fish	Not voted on			

In order to be proactive and avoid a listing of the native fish and to work to ensure their persistence in the Lower Dolores River, the following potentially do-able alternatives are considered: (blue ones = suggested by scientists and red one suggested by Panel)	<i>(1)We can and should work on this now.</i>	<i>(2) This option will take some time, will need some education and consensus building. It is more complex but should be explored.</i>	<i>(3) This option will take a considerable amount of time and may or may not work but it should stay on the table.</i>	<i>(4)We deem this option to not be do-able and it should not be explored at this time.</i>
J – Establish a locally supported, non-mandated management program (a.k.a. ‘adaptive management’)	Not voted on but was discussed			
K –Develop flow recommendations and guidelines within the constraints	A recommended action step. Not voted on.			
L – Support a policy that places management emphasis on native fish	Discussed in broad terms.			
M - Work to resolve management goals/priorities/directives so they are consistent with an emphasis on native fish	Discussed in broad terms.			
N - Support the exploration of use of the Selective Level Outlet Works(SLOWs)			3.41	
O – More water (discussed as part of spills and base flow above)	1.69			
P – Mechanically alter the channel	No time to discuss			
Q – Add woody debris to the river	No time to discuss			