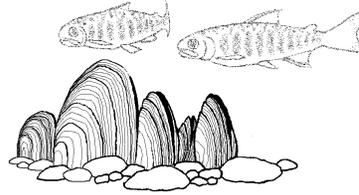


Pacific Northwest Native Freshwater Mussel Workgroup



March 4, 2008

Minutes

Attendees were: Eleanor Gaines (Oregon Natural Heritage Program), Mary Hanson (ODFW), John Fleckenstein (Washington Natural Heritage Program), Brian Adair (Entrix), Molly Hallock (WDFW), Sarina Jepsen (Xerces Society), Michelle Steg-Geltner (TNC), Al Smith (retired), and Christina Luzier (USFWS, in afternoon only). Kevin Aitkin (USFWS), Larry Zuckerman (Western Watershed Project, Idaho), and Tom Burke (retired) were on the phone.

Purpose - this was a regularly scheduled meeting of the workgroup.

Idaho mussels - Larry Zuckerman, who recently joined the mussel work group, told the group about an undescribed species of mussel in southcentral Idaho that is part of upper Salmon River basin. It was referred to in an Idaho Academy of Sciences publication by Terry Frest as the *Pehsimeroi pearlshell* and listed as a species of concern, but it has not formally described. Larry is concerned that this species is at risk.

Washington Heritage mussel ranking review – John Fleckenstein explained how the Washington Natural Heritage Program ranks species, then guided the group through the ranking process for the mussel species that occur in Washington. Group members shared knowledge of mussel occurrence, status, distribution, and threats for each species.

Overview of ranking process

Ranking is how conservation priorities are set. Ranks are set globally, nationally, and subnationally. Ranking criteria are based on the number of populations and the number of individuals in the unit being considered (i.e. global, national or subnational). Range refers to how widespread the species is, and how much of that range is occupied. Trend deals with both long and short term changes in status. Threats deal with scope, severity, immediacy and # of appropriately protected and managed occurrences. Vulnerability has to do with characteristics of the species (i.e. reproduction and environmental specificity). NatureServe Explorer is an umbrella organization for storing data about species.

A 'Q' in a Global rank means that the taxonomy is in question.

Anodonta beringiana

There was a single record for Washington, but as an “SNA”, reported in error by Henderson (1929). This species does not occur in Washington.

Anodonta californiensis

There is a question about how to treat the taxonomy for this species (note the 2007 paper in Conservation Genetics by Jer Pin Chong, Jayne Brim Box, Jeanette Howard, David Wolf, Terry Myers and Karen Mock that places *Anodonta oregonensis* and *A. kennerlyi* in the same clade, *A. californiensis* and *A. nuttalliana* in a second clade, and *A. beringiana* and *A. woodiana*—an asian species— in a third clade). Kevin Aitkin suggested that we wait to change the traditional naming of these species until any changes in nomenclature are accepted by the Malacology Union (the committee on scientific names).

In Washington, the California floater is currently ranked as an S1S2. The logic for this is that it was probably formerly common east of the Cascades, but many populations have likely been extirpated.

Number of occurrences - It is thought that there are between 1 and 20 populations (although populations are difficult to analyze in mussels, one could argue that an entire watershed is a population). The only live records west of the Cascades are in the Columbia River. Tom Burke thinks that *A. kennerlyi* may be replacing *A. californiensis* near the mouth of the Colville River where smartweed has been planted. (Note: Al Smith does not remember seeing *A. californiensis* where there is any vegetation – usually they are only in open areas; however, *A. oregonensis* (similar to *A. kennerlyi*), are found where there is vegetation).

Number of viable occurrences – it is unknown how many occurrences are viable

Number of protected occurrences – there are no sites managed for this species

Population size - unknown

Range extent - records are more or less spread across the state

Area of occupancy – this species is probably found on a lot of the lower Columbia, in the Columbia mainstem (Tom Burke said there are a lot of western floaters in main Columbia, above Hanford, in Wenatchee) – the area of occupancy is probably at least 1,000 km (1,000-5,000 km)

**Anodonta californiensis* appears to be restricted to the Columbia drainage in WA, but is found in more places in OR (on both the west and east side of the Cascades, and according to Terry Frest, they are in coastal streams)

Trends – This species appears to be rapidly declining to declining over short term (decline of 10-50%) due to a decline in water quality and quantity and a disruption of its host fish. The most vulnerable populations have probably been extirpated. In the long

term, there has probably been a large to moderate decline (decline of 25-90%). Tom Burke thinks *A. californiensis* has been extirpated from much of its historic range in the Columbia system, and is still existing mainly in the side drainages. Burke notes that they appear to be gone from the area of the Columbia between Grand Coulee and the Dalles. Terry Frest did a survey in the Hanford area. Brent Tiller is doing surveys in the Hanford area. This species does not occur at high elevation. Low elevations have been very impacted by the usual factors in the west (cattle and logging on the east side of the Cascades, dams and dredging on the Columbia, habitat has been hugely modified). John and Al think that much of the damage has already been done to this species – this is a short lived species. Bruce Lang documented a population decline in *A. californiensis* in – the little Spokane River from 1968-2001. *G. angulata* and *M. falcata* decreased in numbers and *A. californiensis* was extirpated.

Threats - loss of water quality, chemical pollutants and silt, loss of water quantity, interruption of glochidial host relationships with fish. Tom Burke found misshapen shells in Lake Roosevelt that might indicate pollution problems. Michelle is concerned with issues of increased late summer flow, especially dewatering stress, that may come about with global climate change.

Scope of threats - Moderate

Severity of threats – Moderate

Immediacy of threats - High (because some populations face immediate threat)

Intrinsic Vulnerability - Moderately vulnerable to not intrinsically vulnerable; this species may be a glochidial host generalist. Al thinks that *A. californiensis* is the most adaptable of the western species. In Columbia Slough (OR), glochidia (probably *A. nuttalliana*) were found on stickleback hosts

Other considerations - taxonomy is uncertain (separation from *A. nuttalliana* is difficult), ID is difficult

Research needs - establish taxonomic relationships of anodontids, look at glochidial hosts

Inventory needs - systematic surveys of large streams and rivers with appropriate substrates, especially away from the Lower Columbia and Hanford Reach

Protection needs - Management recommendations about embeddedness could be made – this species probably needs a natural flow regime with good flood events to restore the natural substrate. Bruce Lang noted that embeddedness was rising as populations of *A. californiensis* were declining in the Little Spokane River

Revisit WA State Rank for *A. californiensis* – after the discussion, the workgroup thinks it may be more of an S2 than an S1S2 for WA. Molly suggested it may be an S2S3. Michelle was inclined to lean on the conservative end (S2) because the trend is for decline in all freshwater mussel species in North America. Brian points out that we have the same conditions here that are leading to extinctions of mussel species in the East.

Anodonta nuttaliana

Members in the work group suggests that *A. nuttaliana* is more threatened in Washington than *A. californiensis* – it should be ranked as an S1 if *A. californiensis* is ranked as an S2. In Oregon, Al knows of 3 places where *A. nuttaliana* still exists – the Blitzen, Willamette and Columbia Rivers (although it is numerous in those places). He suggests that it should probably be ranked as an S1 in Oregon.

A. nuttaliana seems to prefer lowland, slough habitats, which are rare in Washington. Tom Burke thinks he may have collected *A. nuttaliana* from the mouth of the Colville River. Al thinks that there is good habitat for *A. nuttaliana* in the Gray's River area of Washington, but nobody has looked for them. Al also suggests that there is good potential habitat for *A. nuttaliana* in areas along I-5 across the Columbia from where Trojan used to be. Apparently that area is being dredged now, so the spoils could be searched.

Anodonta oregonensis

This species is probably very common in the lower Columbia River in Washington. Tom Burke doesn't know of any occurrences in eastern Washington. It is more of a lowland species. Molly thinks that this species may have historically existed only in the Puget lowlands, and perhaps was never historically in the northeast part of Washington. This species survives in Capitol Lake, where Molly thinks they're reproducing (she has found small shells). *A. oregonensis* seems to be the most tolerant of low water quality of all of the western mussels, yet they are found in very few locations in Washington. They may exist in still water areas on the lower Columbia, but that area of Washington hasn't been surveyed. In Oregon, they occur widely on the lower Columbia and Willamette Rivers. Al did survey in The Dalles (Taylor lake) and found a really healthy population of them when the lake was drawn down. Al has also seen *A. oregonensis* in a drawn down duck pond in the mid-Willamette Valley of Oregon, and at Moon Reservoir in southeast Oregon (a BLM Reservoir). Michelle said that they are in the upper Klamath Basin (Sycan Marsh), but they are kind of isolated at that location. Further downstream, there are not as many.

Anodonta kennerlyi

In Washington, this species is currently an S4. It is fairly widespread. They occur in higher elevation, high quality lakes, and might be in places that are more protected. Tom Burke has found this species in the Columbia, in a pond on a golf course at Alma (in Chehalis), in Fish Lake (north of Lake Wenatchee), and in the Sinlahekan River. Al has found it in Lake Kachess. Some other areas where they occur include:

Seattle area

Western Cascades Lakes, east of Seattle

Lake Roosevelt

Sol Duc River

Wenatchee River

There are no records for this species in Oregon. Al has looked in places where it should be, but has not found it.

Margaritifera falcata

Although this species is somewhat widespread, it's doing really poorly in some areas (like Bear Creek). Its current rank in Washington is S4.

We have more records for this species than the other western species. *M. falcata* seem to prefer clear, clean water, rocky substrate, and a somewhat low gradient (Al thinks gradient is really important). At Sycan Marsh, they don't occur above a steep, coarser area. We don't know if it exists in the SE corner of Washington, as it hasn't been surveyed. The habitat is likely to support anodontids, although they may exist on the edges of the Blue Mountains. Tom Burke said that it occurs in the San Poil River and Nason Creek, and that large, healthy beds still exist in some locations. Al thinks that if we looked more, we would find more. However, they are getting hammered in isolated, urban areas. In Oregon, Al thinks there have been declines, likely due to dredging in the Willamette River, but he is not aware of declines like Bear Creek. Al has found *M. falcata* up the Willamette River, about 25 miles from Portland, where it's riffly. There have been some declines around Spokane.

This species is most vulnerable where there are water withdrawals, cattle, and timbering, although they are probably less at risk than anodontids because they tend to live in higher elevation, salmonid streams that are more protected.

The group suggests that the ranking could be changed to S3S4 for WA, and S4 for OR.

Gonidea angulata

In Washington, *G. angulata* can be found in the Chehalis drainage and in the northeast corner of Washington. Al thinks they would be found in many eastern Washington streams if we looked for them. Terry Frest notes (relayed by John) that they were apparently extirpated from the Wenatchee and Yakima Rivers, although Al doesn't think they could be extirpated from upper Wenatchee. Tom has found shells and live *G. angulata* in the lower Colville area. Tom thinks he has found them in the San Poil and other areas on the Columbia. Al thinks that we would find them in many of the tributaries of the Columbia, if we looked. Tom Burke reported that a biology teacher found *G. angulata* in Toppenish Creek on the Yakama Indian Reservation in the early '90s (when there was a drought and mussels were dying). The Yakama Reservation also had *A. californiensis* and *M. falcata* in their irrigation canal (with a gravel substrate that runs year round). Al had a report of a large population in The Dalles dam pool. Perhaps they could be existing in deep areas, and so people haven't found them. They could be in the lower Columbia, but one would have to scuba dive to see them. Al found a shell at Rooster Rock (Cascade Locks, Columbia Gorge). Al also stated that they occur in the Willamette near St. Paul and Corvallis. Although, they are much more common in eastern Oregon than western Oregon. In Oregon, they occur in the Klamath, Umpqua and Willamette Rivers and are fairly widespread.

There seems to be some threat to this species, but it has a substantial distribution. Molly is unsure if it's more secure than *A. californiensis*. Al thinks that if we looked more, we'd

find more *G. angulata* than *A. californiensis*. The only good populations are in the Okanogan and Chehalis. The Spokane populations are going downhill. We don't know the lifespan of this species, although AI guesses it's 30-40 yrs because of their hard, slow-growing shells. It is suggested that they could be ranked as an S2 or as an S2S3 (to indicate that they are more stable than *A. californiensis*).

John is going to revise his ranking forms for each of the Washington freshwater mussel species and then send them out to the workgroup for review.

Critical Needs Document

Brian Adair is still waiting for additional responses to the Critical Needs survey, especially from: Jayne Brim-Box, Terry Frest, Jeanette Howard, Karen Mock, Bruce Lang, Jen Stone, and Brian Watson. So far, Brian has gotten survey responses from a number of people in the workgroup, as well as people with mussel expertise outside of the Pacific Northwest. Brian has done some preliminary analysis of ranks from survey responses by making a graph of benefit (y axis) vs. feasibility (x axis). The factors with total scores that fell in the upper right quadrant of the graph (those that had the highest benefit and highest feasibility) were ranked as the highest priority. The factors that fell in the upper left and lower right quadrants were ranked as medium priority, and those that fell in the lower left quadrant were ranked as lowest priority.

Brian ranked each category in terms of priority

- Priority 1: Status & trends: 4.3
- Priority 2: Biology/Ecology: 3.8
- Priority 3: Limiting factors: 3.8
- Priority 4: Human dimensions: 3.5

However, everything was ranked as "Highly important".

Four factors had a variance of greater than 1 (range of ranking was 1-5 in all cases); Brian assumed that factors with variance greater than 1 indicates disagreement on the subject. The importance of "Global Climate Change research" had the greatest amount of variance.

Status:

1. Distribution and abundance were ranked highest
2. Population trends were ranked second, although this is less feasible

Biology:

1. Hosts and Habitat
2. Population structure, taxonomy and life history

Limiting Factors (all are important):

1. Water Chemistry
2. Water Quantity
3. Sedimentation
4. Host Density and Distribution

5. Habitat Fragmentation
6. Temperature Regimes
7. Hydrologic Alteration
8. Invasive Species
9. Global Climate change

Human dimensions:

1. Legislation and Regulatory Action
2. Challenging Public Outreach
3. Scientific Inertia
4. Ecosystem valuation

All of the human dimensions ranked lower than biology, status and limiting factors. Brian suggests that challenging scientific inertia, for example, may be more important than the survey ranks suggest. We are already challenging scientific inertia, for example, with this document and the mussel yearly symposia. So, the feasibility may be greater than we thought.

Additional factors (that people listed on the survey):

1. Trophic interactions
2. Translocation & reintroduction strategies
3. Impacts of navigation channel maintenance (we may be able to get this from east coast literature)
4. Minimum viable population
5. Impact of environmental toxins
6. Determining habitat needs: is there a variation in habitat needs during different phases of their life cycle?

Al suggested that #1 and #4 are very important. Mary suggested that folks at Abernathy Fish Technology Center (USFWS) in WA may be interested in doing taxonomic research.

The mussel workgroup agreed to go with the scoring/ prioritization from the surveys as is (with the additional responses added).

Setting 5, 10, 20 year visions

5 year vision: Status (distribution, relative abundance, recruitment), outreach (mussel guide, symposium), biology (fish hosts, habitat needs [adult & juvenile]), acute issues (keep the focus on the Bear Creek die-off), begin to compile a list of recommended protocols (for assessing recruitment, habitat, host studies, etc.), museum collection reviews

*Al suggests that the two most important factors in the above 5-year list are understanding distribution and host fish

10 year vision: Population trends, quantitative abundance, taxonomy and life history,

legislative and regulatory action, limiting factors (minimum viable population, trophic interactions)

20 year vision: translocations and reintroductions

Strategies for accomplishing our vision –

To get a sense of population trend, we could visit museums, then go back to historic locations and look for occurrences. Jayne Brim Box apparently has already visited the American Museum of Natural History and photographed specimens. The Smithsonian, Chicago Field Museum, Cal Academy and some universities have good collections. There may be some sources of historical information from tribes (David Wolf, Umatilla), anthropological literature, and archaeological collections in museums.

To collect protocols, we should talk with Karen Mock, who has some protocols for sampling mussel tissue. There is a need to work out protocols for looking for juveniles. Brian has some knowledge of recruitment protocols, as does Kelly Toy.

To understand host-fishes, we may need to cooperate with a university or hatchery, as the studies require expensive equipment.

Kevin suggested that the recruitment question is very important.

Announcements

*Al got a catalog from an institute in SW OR (near Cave Junction); there is a class on freshwater mussels taught by Keith Benson of Redwoods National Park

*Donna at USFWS has extra mussel posters for anyone who wants them

*Mary Hanson at ODFW is trying to get funding for reprinting the Mussel Guide; Christina Luzier thinks she may be able to get some funding as well from USFWS office

*Kevin Aitkin updated the mussel poster with help from Al and Christina for use at the AFS meeting

Next Meeting - Tuesday, June 3, 2008 at the Natural Resources Building in Olympia, WA