

STATUS OF SMITH AND BYBEE LAKE MUSSEL POPULATIONS IN 2000 AND 2001

The purpose of this report is to provide a snapshot of the mussel populations in Smith-Bybee Lakes in 2000 and 2001 and to speculate on their future. I visited Bybee Lake on August 16 and 24, 2000 and August 30 and September 19, 2001. I also visited Smith Lake on September 11 and 19, 2001. On these dates the lakes were very low and I was able to find freshwater mussel shells. I found no live mussels. The shells were from three species: *Anodonta oregonensis* (Oregon floater), *A. californiensis* (California floater) and *A. wahlamatisensis* (Willamette floater)(Photos 1, 2, 3). All are native to the lakes.

My approach was to walk all the freshly exposed bottom of both lakes to look for shells. In the areas that were still wet walking in the water was impossible due to thick, deep, almost liquid mud. The bottom of both lakes was flat, featureless mud. I walked in a grid pattern to try and find all the shells. They were easy to see at Bybee Lake on top of the damp or dried mud before the vegetation grew up (Photo 4). At Smith Lake the few mussels I found had died in place in the substrate so they were difficult to find (Photo 5). All shells were freshly dead and many still had pieces of flesh or the whole organism attached or inside the shells. I kept all the shells I found for later identification, examination and measurement. One of the specimens at Smith Lake was dead but had not decayed so I preserved it in alcohol. I likely did not find all of the shells that were present, but I believe I found a high enough percentage to draw conclusions about the mussel populations.

I found a total of 39 individuals from both lakes for both years. All were adults; most were large adults. Although live juvenile mussels are difficult to find by humans because they tend to be buried in the substrate, predators can find them. Most juvenile mussel shells I have collected in many streams and lakes were actually left from mussels that were found and eaten by predators. Because of the smell of the decaying mussels and easy visibility once the mud dried up and cracked around them, predators would have found juvenile individuals if they had been there. Since I found no juveniles and all of the adults were large (some very large), I believe there has been no successful mussel reproduction of any of the three species for many years. This could be due to declining water quality, lack of appropriate host fish species or other reasons. The fish host species for all three mussel species are unknown. I attempted to count external growth rings on the mussel shells but decided they were not distinct enough to estimate the age.

Smith Lake

Smith Lake dried up entirely in 2001. I found the remains of only five whole mussels, all of which had died in place from desiccation after burying themselves deeper in the mud. They did not move laterally to try and find deeper water. All were *Anodonta oregonensis*. I do not know why there was only one species at Smith Lake but three at Bybee Lake. Scavengers had not found the dead mussels, probably because there were

thousands of dead carp in the dried up lake available to eat and the smell of the decaying carp probably overwhelmed the smell of only five dead mussels. The mussels were not in any specific area of the lake but instead were scattered on the flat lake bottom (Photo 6).

The five individuals were exceptionally large for the species based on others I have found elsewhere. The total lengths were: 159, 162, 183, 151 and 149 mm. These lengths are not greatly different, which supports the idea that these mussels were the remainder of an old, declining population. In addition, finding only 5 individuals in a body of water the size of Smith Lake further suggests the near-end of the population.

Bybee Lake

Bybee Lake was very low in 2000 and nearly dry when I was there in 2001. Later in 2001 it did dry up. For both years combined, I found 12 *Anodonta californiensis*, 19 *Anodonta oregonensis* and 3 *Anodonta wahlamatisensis*. It is rare in Oregon to find three species of mussels in the same body of water. Only one shell (*A. wahlamatisensis*) had any holes from predation in contrast to other sites where a high percentage of the shells were obviously bitten by mammalian predators (raccoon, river otter, muskrat). All three of the *A. wahlamatisensis* shells and one each of the other two species had the valves separated or one valve missing. I believe the mussels died of high temperature, either in the water or after they were stranded, or desiccation and that birds, attracted to them by sight or smell, scavenged the mussels. Some were left in place, but most were carried to firmer ground and the contents of the shells consumed. The mussels were definitely not eaten by mammals because of the almost total lack of damage to the shells and the transport of shells away from where they originated. There were no mammal tracks in the mud but many bird tracks.

Anodonta oregonensis and *A. californiensis* shells from Bybee Lake were also of larger size than I have found elsewhere. The mean lengths for *A. californiensis* for 2000 and 2001 were not significantly different so I combined the lengths for both years. The mean length was 109.1 mm with the smallest 96 mm and the largest 119 mm. For *A. oregonensis*, the mean lengths were significantly different between years. In 2000, the mean length was 132.0 mm with the smallest 123 mm and the largest 145 mm. In 2001, the mean length was 144.0 with the smallest 127 mm and the largest 159 mm. I do not know why the mean length was larger in 2001 than 2000. As at Smith Lake, I think the mussels that died in 2000 and 2001 were part of an old remnant population that had not reproduced for a long time.

I found only three *Anodonta wahlamatisensis* shells. They were similar in size to the same species from Columbia River sites. The lengths were: 71, 80 and 82 mm.

The ratio of species found at Bybee Lake in both years was: 55.9% *A. oregonensis*, 35.3% *A. californiensis* and 8.8% *A. wahlamatisensis*. I found very similar ratios of the same species at Prescott Slough on the Columbia River near Rainier in the same two

years of low water due to drought. Those ratios were: *A. oregonensis* 51.5%, *A. californiensis* 39.8% and *A. wahlamatensis* 8.7%.

An interesting historical note to the mussels in the Smith-Bybee Lakes area is that Isaac Lea first described as new species *Anodonta oregonensis* and *wahlamatensis* from the "Wahlamat near its confluence with the Columbia River" in 1839.

Summary and Conclusions

The year 2001 saw the end of an old, dying population of three native mussel species in Smith-Bybee Lakes caused by drought. The population was similar in species ratio to another population in a slough of the Columbia River (Prescott Slough) that experienced the loss of many mussels due to the same drought.

The same fish species that inhabited the lakes before the drought will recolonize from Columbia Slough during times of higher water and flooding. These fish should carry glochidia back into the lakes to reseed the mussel population, but only if whatever factors caused the reproduction to end do not continue. With the new water control structure and water management regime to more closely mimic natural lake levels, the water quality in the lakes should improve. Mussels need water to survive so they may return to the lakes if water quality improves and there is some standing water left year-round.

Acknowledgments

Elaine Stewart, Smith-Bybee Lakes manager for Metro, encouraged me to collect mussels and information on the population. Jen Stone generously ran the statistical tests on the mussel lengths.

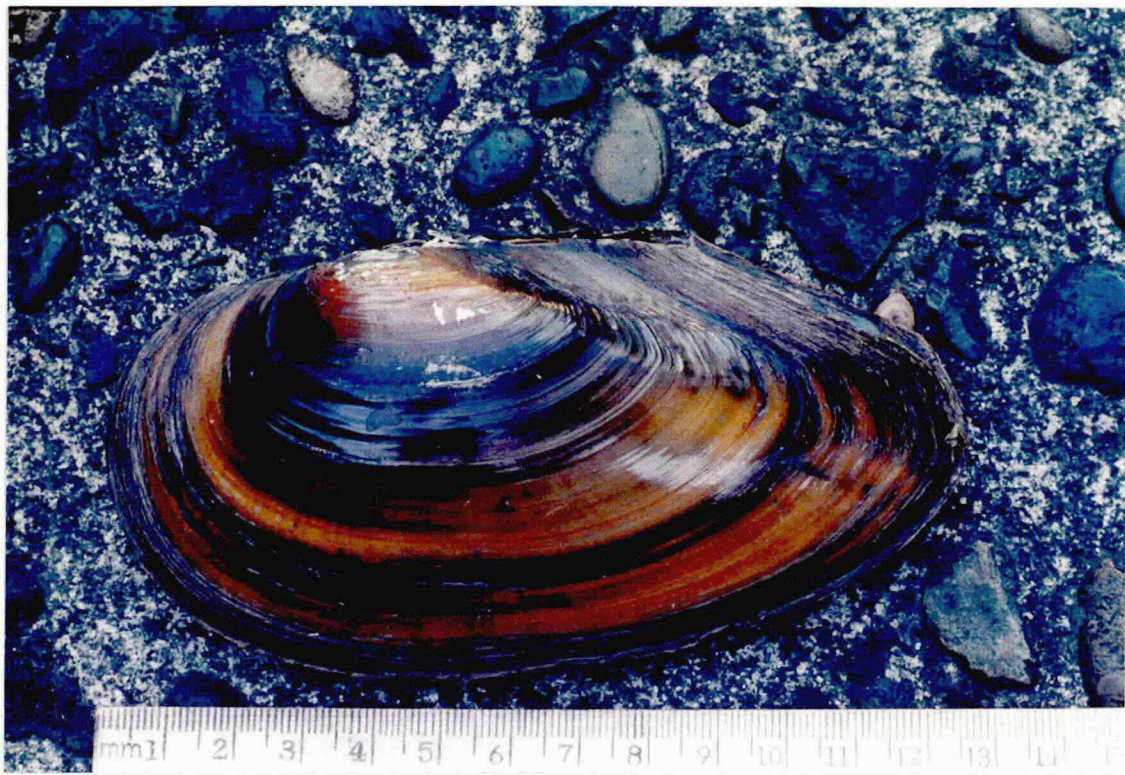


Photo 1. *Anodonta oregonensis* from Bybee Lake on August 16, 2000

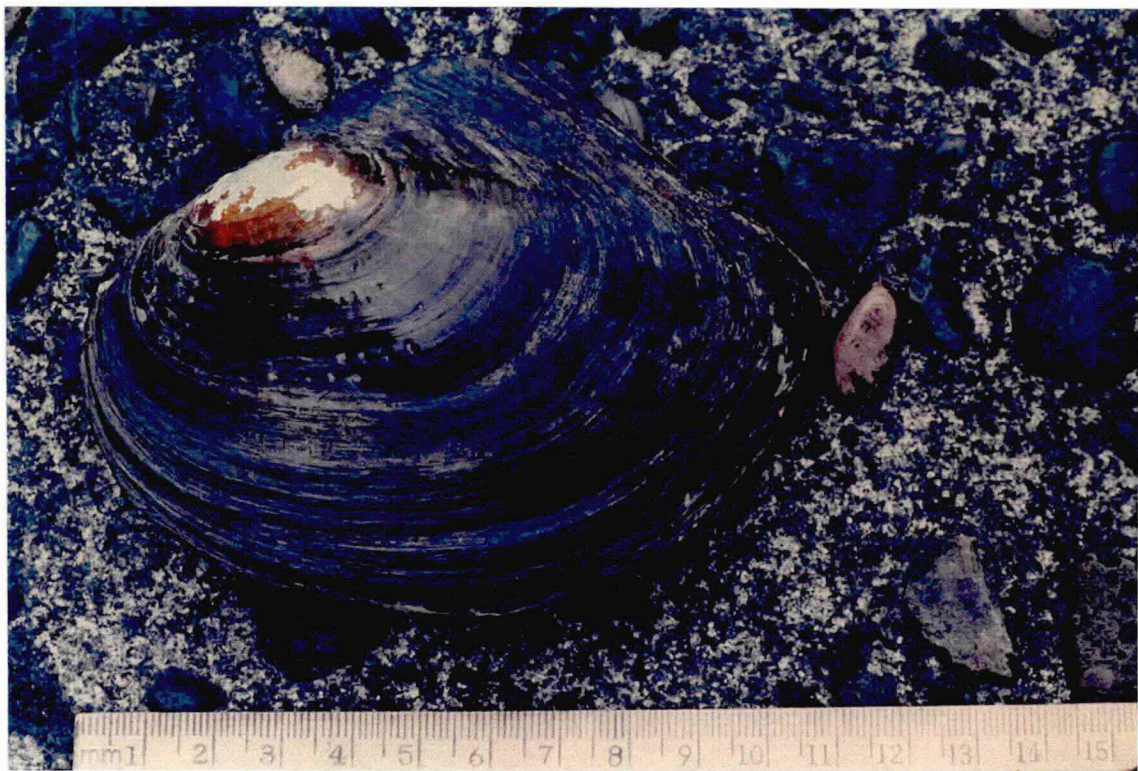


Photo 2. *Anodonta californiensis* from Bybee Lake on August 16, 2000

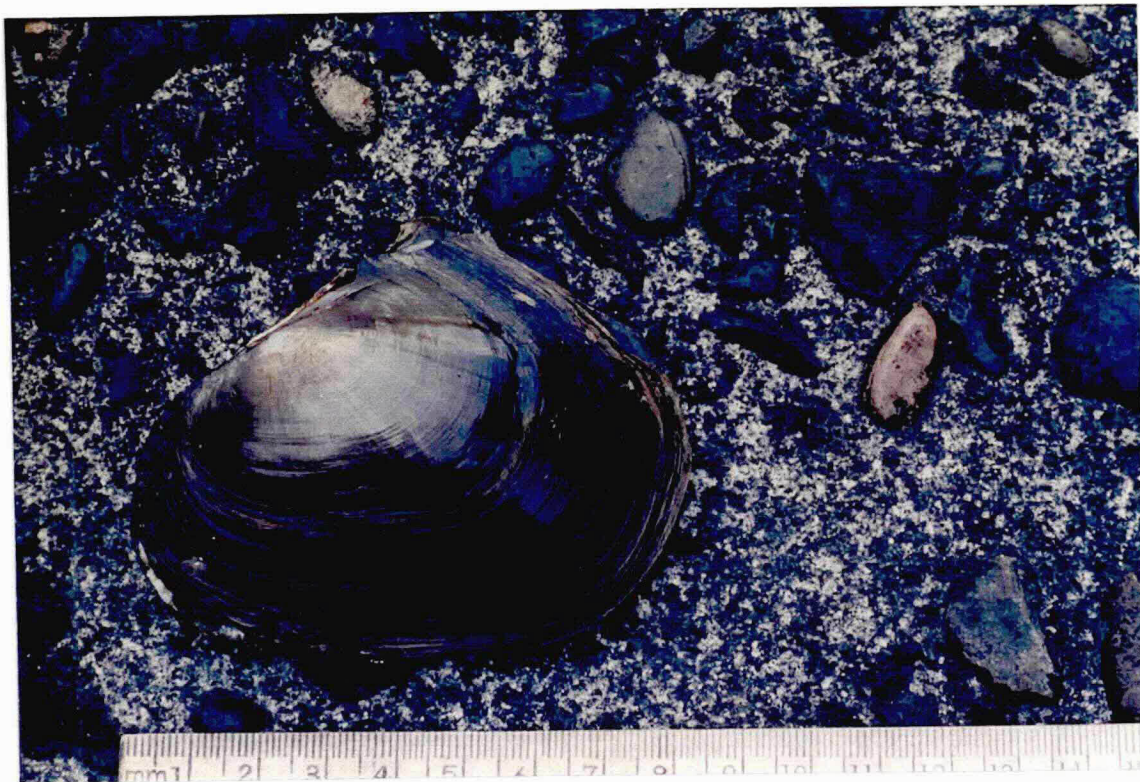


Photo 3. *Anodonta wahlamatensis* from Bybee Lake on August 16, 2000

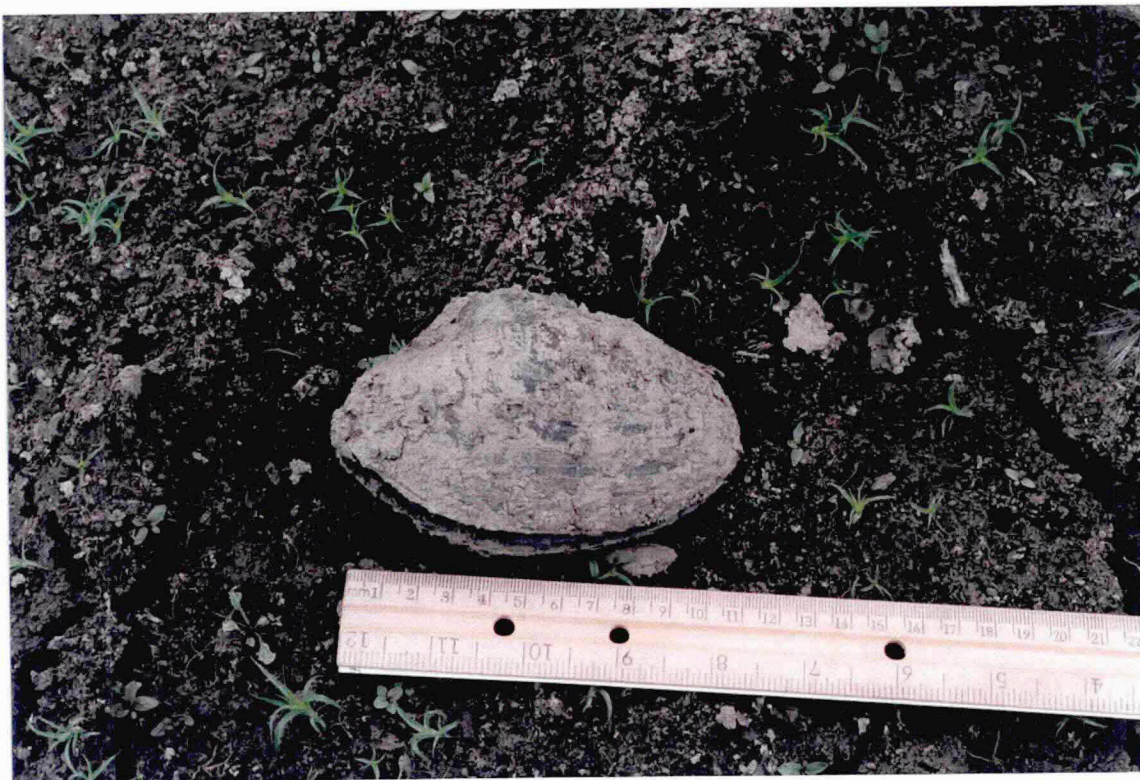


Photo 4. Scavenged *Anodonta californiensis* as found from Bybee Lake on August 24, 2000.



Photo 5. Dead *Anodonta oregonensis* from Smith Lake on September 11, 2001

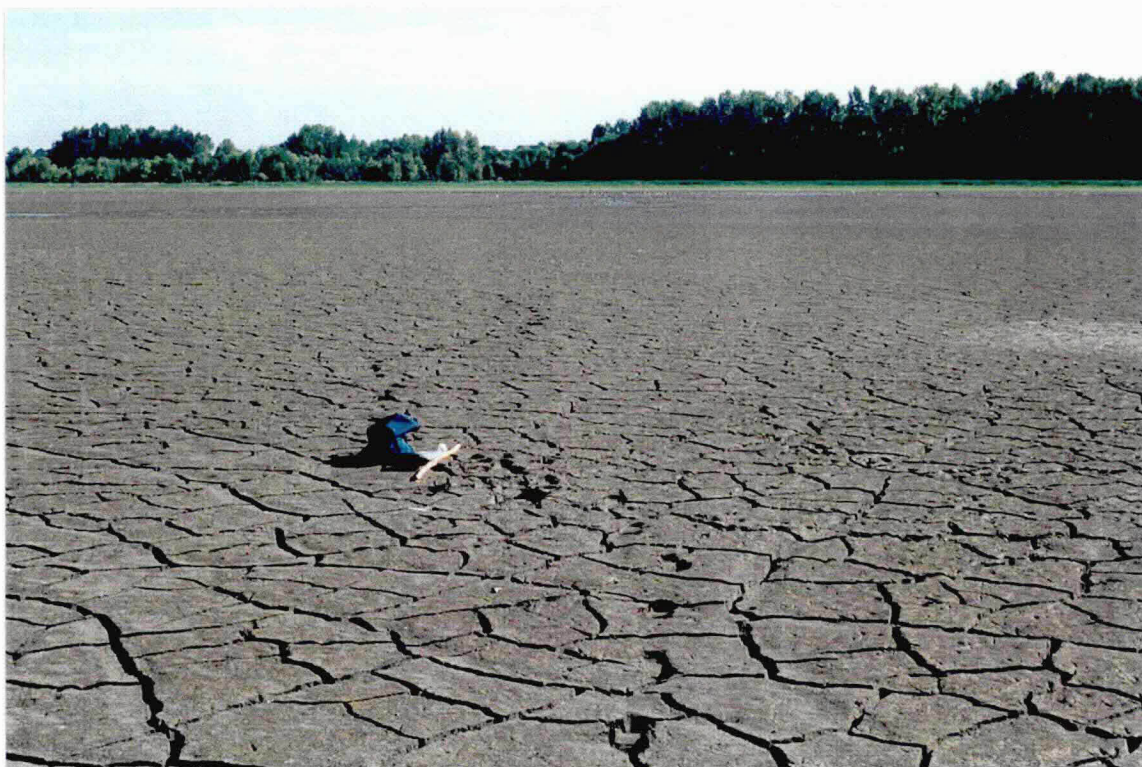


Photo 6. Smith Lake on September 11, 2001