

UPDATE ON THE ELWHA RIVER MUSSEL (*MARGARITIFERA FALCATA*) POPULATIONS

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Abstract:

The Elwha River was surveyed in 2008 for the presence of freshwater mussels, which are potentially the largest invertebrates in the river. Several small remnant populations of the western pearlshell *Margaritifera falcata*, an environmentally sensitive species which has a life cycle closely tied to Chinook salmon, were found in the lower river where some salmon still migrate, and many more were found in a side stream near the fish rearing ponds. At the time, the large majority of the mussels in the side stream were in imminent danger of destruction due to ongoing construction related to dam removal. In fall 2008 9765 of the side stream mussels were moved to several small tributaries of the lower river by a team from the Lower Elwha Klallam Tribe, Olympic National Park, Washington Department of Fish and Wildlife, Jamestown S'Klallam Tribe, USGS, USFWS, Western Washington University, Oregon State University, Peninsula College, and Walla Walla University. The small remaining mussel populations in the river are vulnerable to scour and sedimentation once dam removal starts. In 2010, as many individuals as could be located (121 individuals) from the largest and likely oldest of these populations just below Elwha Dam were removed from the river and transplanted to one of the tributaries the earlier population had been moved to. Some mussels remain both in the main channel of the river and in the side stream near the fish rearing ponds. Both these and the transplanted populations will be monitored over the next several years as the river system reverts to its free-flowing state.

Background

Freshwater mussels are one of the largest invertebrates in many lakes and streams. The mussels provide important services to natural water bodies by filtering and purifying large amounts of water each day and by providing substrate for other species which may serve as food for fish. Their life cycle is tightly tied to that of fish, which they rely on for dispersal of their glochidia larvae. Their filter-feeding lifestyle and the longevity of some species make them useful indicator species for ecosystem health. Some species are sensitive to environmental disturbance and are negatively impacted by dams. The Elwha River dams have modified river flow and interfered with salmonid fish migrations for 100 years. We initiated a study in 2008 to determine whether any freshwater mussels existed in the Elwha River, and if so, what effect the dams may have had on their abundance and distribution. The freshwater mussels most often found in Pacific Northwest coastal rivers are *Margaritifera falcata* (the western pearlshell), a sensitive species characteristic of clean, free-flowing water and with a life cycle closely tied to Chinook Salmon.



Figure 1: Aerial view of the lower Elwha River

Discovery of Mussels

In late summer 2008 we performed a snorkeling and wading survey in the Elwha River from Glines Canyon Dam to the ocean (Figure 1). No mussels were found anywhere in the river above Elwha Dam. Three small populations of 30-150 *M. falcata* were found in the river below Elwha Dam, however. Also, several thousand *M. falcata* were found in manmade side channels associated with the industrial water intake and the fish rearing ponds. 891 of these side channel mussels were measured and weighed (Figures 2, 3). The side channels were scheduled to be dewatered in the fall of 2008 due to construction of the new industrial water intake, which would have killed the vast majority of mussels in the watershed.

First Rescue (Side Channels)

A group of scientists from the Lower Elwha Klallam Tribe, Olympic National Park, Washington Department of Fish and Wildlife, Jamestown S'Klallam Tribe, USGS, USFWS, Western Washington University, Oregon State University, and Peninsula College spent several days in October 2008 removing mussels from the industrial channel and its outflows. A total of 9765 mussels were removed. The mussels were temporarily placed in raceways at the Lower Elwha Klallam Tribe fish hatchery, then later were transplanted to several different side channels in the lower river valley. 45 of these mussels, ranging from 4.5 to 9.7 cm in length, were measured and pit tagged.

Transplanted mussels were checked visually during the summers of 2009 and 2010. Survival was good in the deeper regions of Side Channel 5 (Figure 4) but predation was a problem in shallower water. Mortality was high in Bosco Slough.

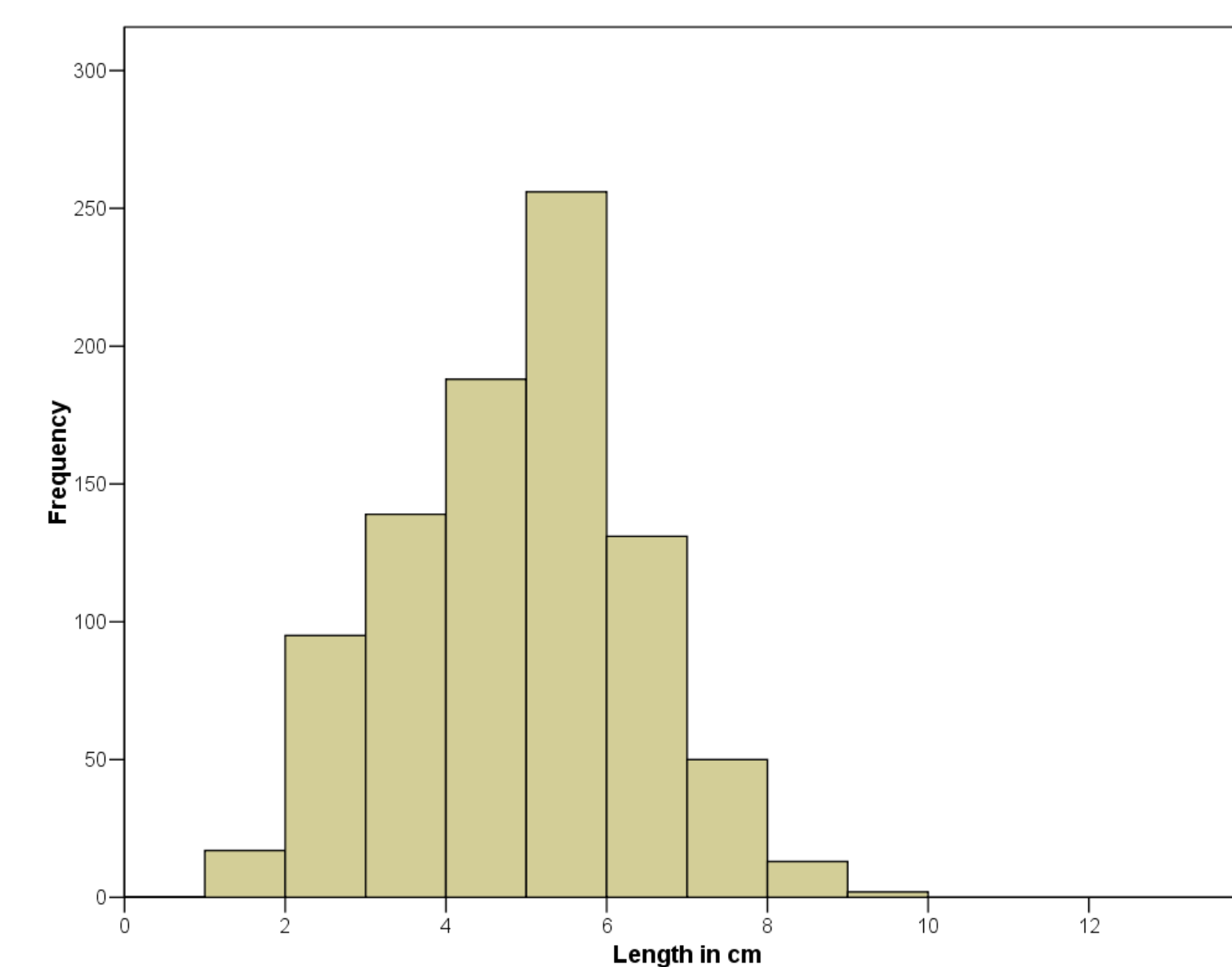


Figure 2: Size distribution of 891 *Margaritifera falcata* mussels from the side channels near the Fish ponds and industrial water outfall, 2008.



Figure 4: Transplanted *Margaritifera falcata* mussels in Side Channel 5, 2009

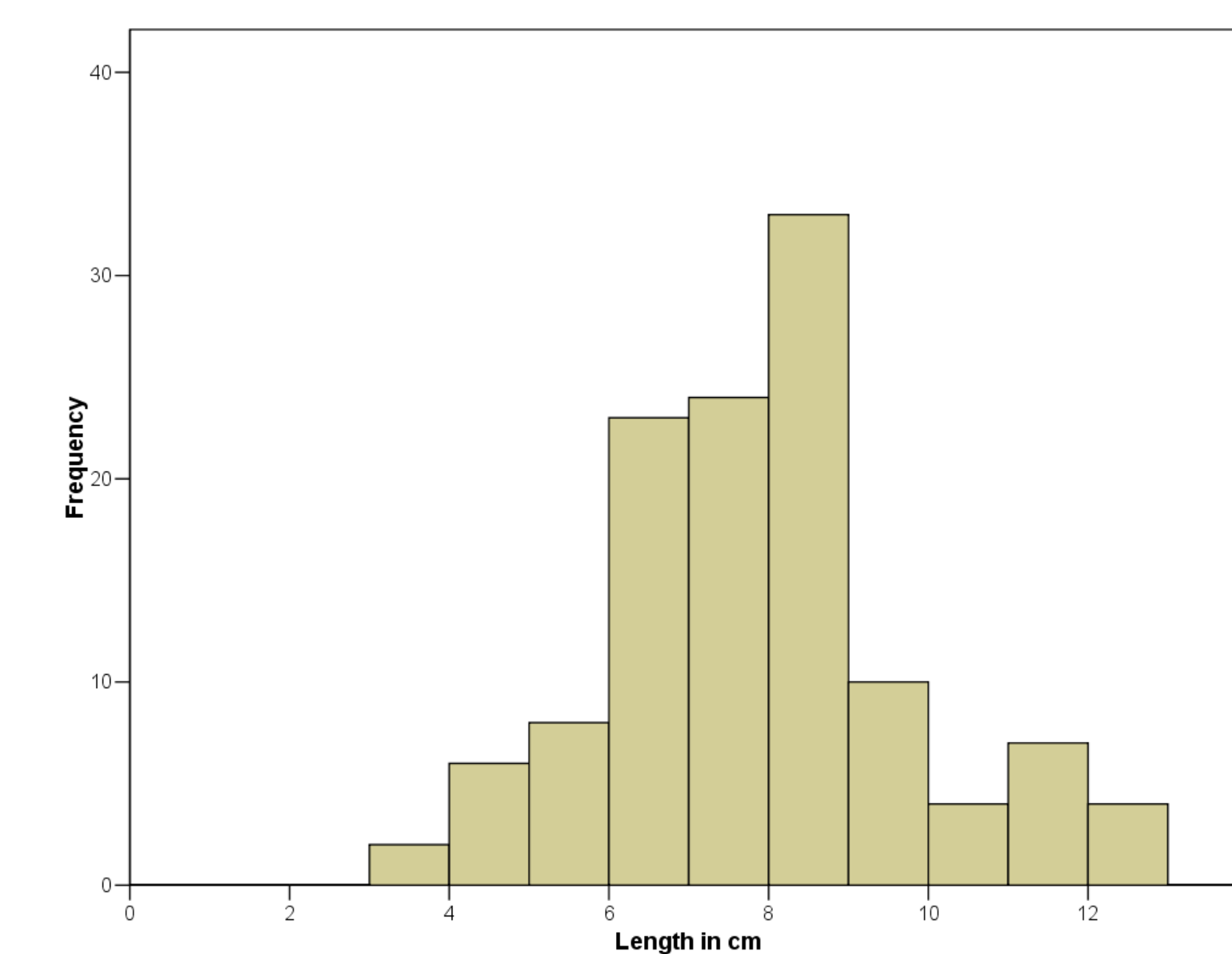
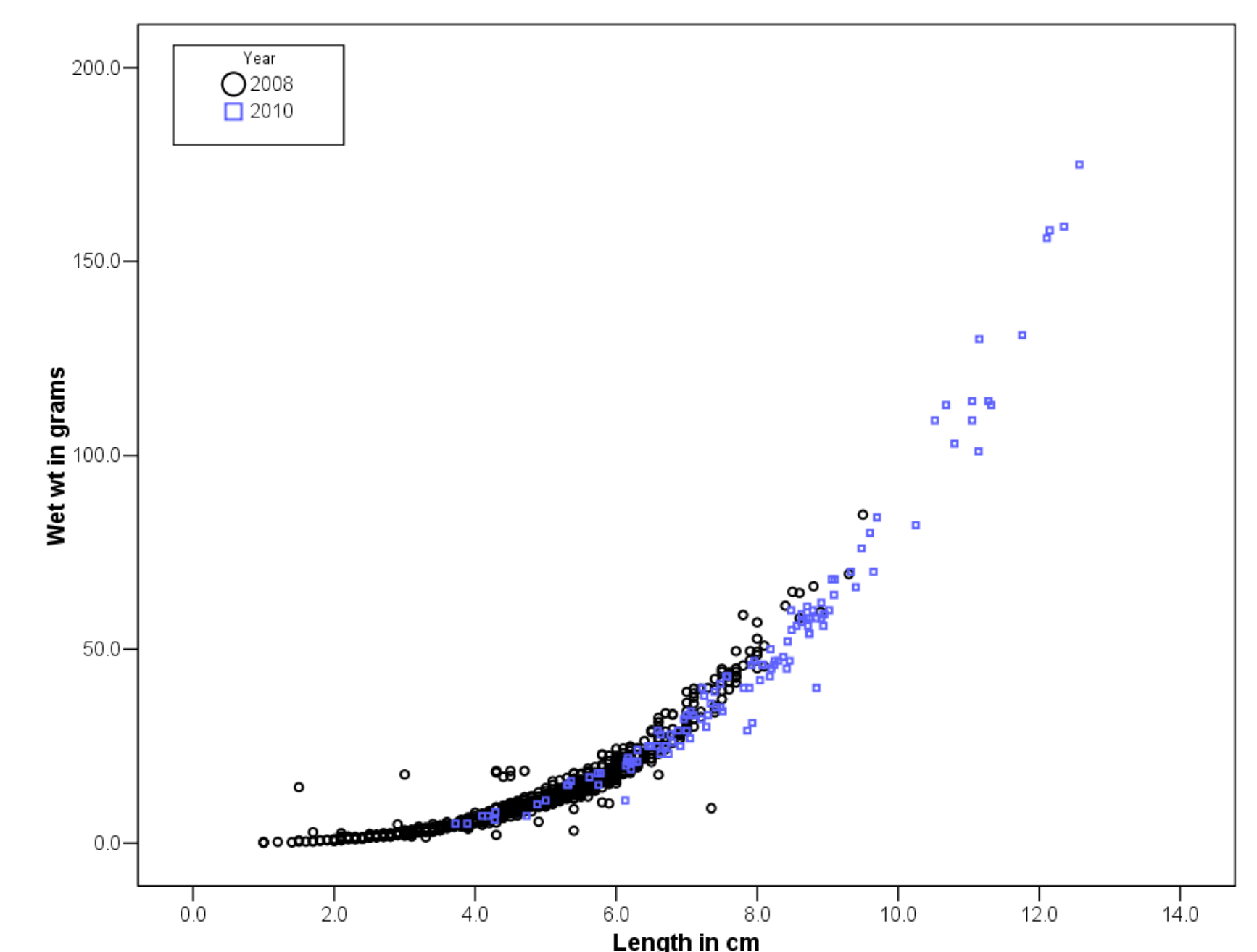


Figure 5: Size distribution of 121 *Margaritifera falcata* mussels from the main river population just below Elwha Dam, 2010. Note that the average size and maximum size are larger than in the side channels.

Figure 3: Wet weight as a function of shell length for *Margaritifera falcata* mussels collected from the side channels (black circles) and from the main river population just below Elwha Dam (blue squares)



Second Rescue (Main River)

In late summer 2010 several of us returned to rescue the mussel population just below Elwha Dam. This population had the largest and oldest individuals in the main river but would likely not survive the scour and siltation expected after dam removal. We removed 121 mussels from this population, which was all we could find. The mussels ranged from 3.7 to 12.6 cm in length and from 5 to 175 g in wet weight (Figures 5, 3). These mussels were transplanted to Side Channel 5.

Mussels Remaining in the River

Since mussels may bury themselves and be difficult to find, there are likely a few mussels left just below Elwha Dam. A scattered population of about 30 also exists about 1/2 km above the industrial water intake in the main river. These will be directly affected by changes in river flow and sedimentation after dam removal. A sizeable group of mussels also still exists in the side channels near the industrial water intake and the fish rearing ponds. While these are partly protected from river flow they may be vulnerable to siltation, or may be washed out if the river changes its channel. The mussels in Side Channel 5 are not entirely safe from flood or siltation events either, but are farther removed than those near the industrial water intake.

Future Plans

We plan to monitor survivorship among the few remaining mussels in the main river and among the more abundant populations in the side channels near the industrial water intake and fish ponds over the next several years as the river system reverts to its free-flowing state. We will also monitor the transplanted population in Side Channel 5, which may be somewhat more removed from siltation and flood events. If the river channel stabilizes at a future date some of these may be transplanted back into the river.

Acknowledgements

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