Sauk-Suiattle Amphibian Survey Report 2007
Wetlands Assessment

by Scott Morris, Watershed Manager

Data collection by:
Raymond Misanes, Toby Bill and Scott Morris

With special thanks to:
Brett Gaddis of Snohomish County Surface Water Management
for field assistance and photos

5318 Chief Brown Lane
Darrington, Washington 98241-9420

(360) 436-0131
Fax (360) 436-1511

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This report is based on weekly amphibian surveys taken in the spring of 2007 in the Reservation Slough wetland on the eastern side of the Sauk-Suiattle Indian Reservation. The surveys were done as an update to the Sauk-Suiattle Wetlands Report, written in 2003. Both the original report and this update were supported by grants from the U.S. Environmental Protection Agency.

Survey objectives

The surveys were conducted in support of the Tribe's water quality program with the following objectives in mind:

1) *Assess the annual change in amphibian species and abundance.*

This year's surveys were the first of what is planned to be an annual program. Over the years, the surveys could help determine trends of amphibian populations in the lone Class 1 wetland on the 25-acre Sauk-Suiattle Indian Reservation.

2) *Analyze the data to highlight potential water quality or habitat concerns.*

Dips in amphibian numbers or species or unusual numbers of deformities could serve as an additional bellwether to the Tribe's regular water quality monitoring, alerting the Tribe to potential contamination or habitat alteration nearby.

3) *Help expand the regional amphibian database.*

Biologists throughout the Pacific Northwest have been striving for more coordinated regional amphibian monitoring that follows standardized methods. (Olson, Leonard, Bury, 1997) The Sauk-Suiattle Indian Tribe can contribute to those efforts over time by developing and improving this annual amphibian survey.

Description of survey area

The survey area covers 5.5 acres of a roughly 10-acre wetland that follows the course of an oxbow slough of the Sauk River. The survey area is confined to the portion of the wetland owned by the Tribe. Fortunately, that portion contains much of the best pond habitat. This is a Class One wetlands, according to the Sauk-Suiattle Indian Tribe Wetlands Report (2003). The National Wetlands Inventory database describes the slough as a Palustrine forested and intermittently flooded area. Aerial photos show this slough was the main channel of the Sauk River in 1949. Sometime soon after, the main channel shifted to the east and has not reoccupied the slough, although channel migration will surely happen here someday again. Floodwaters from the Sauk enter this channel at above 25,000 c.f.s. at the Sauk at Sauk river gauge, which is a moderate flood. The slough also receives groundwater and is wet year-round. Beaver, otter and wood ducks are among the many wildlife species here. The dominant plant species are red alder, Reed canary grass and cottonwood.

To the east is a forested upland area that separates the slough from the Sauk River. The upland is mainly hardwoods, including some big leaf maples, but also has some conifers such as western hemlock, western red cedar and Douglas fir in the canopy.

Summary of survey results

Egg masses

Surveys began March 8 and continued every week, ending May 31. The only exception was the survey scheduled April 5, which was missed. During those two months, we counted 325 different egg masses from three different species: red-legged

frog (*Rana aurora)*, northwestern salamander (*Ambystoma gracile*) and Pacific treefrog (*Hyla regilla*).

Northwestern salamander egg mass (submerged), April 26, 2007. Photo by Brett Gaddis

The egg mass count breaks down as follows:

- red-legged frog: 87
- northwestern salamander: 23
- Pacific treefrog: 212

Total: 322

Note, three of the counted egg masses we later realized were either double counts or over counts. Another was intact single eggs lying near the remains of a dead frog.

Amphibian sightings

Seeing and identifying actual amphibians was more difficult. We saw 114 frogs during the three months of surveying. We saw no salamanders during the entire three months, although the egg masses prove their presence. The wetland is overgrown with reed canary grass wherever the forest canopy opens, making observations more difficult.

Pacific treefrog, April 26, 2007. Photo by Brett Gaddis

The count of frogs breaks down as follows:

- red-legged frog
  - juveniles: 35
  - adults: 6
- Pacific treefrog
  - juveniles: 18
  - adults: 13
- Unidentified: 42

Total: 114

Of all these frogs, we saw no deformities. One of the frogs included in this count was actually the remains (one red leg) of a red-legged frog that appeared to have been eaten by a predator.

Red-legged frog, April 26, 2007. Photo by Brett Gaddis

Summary of protocols

Protocols are detailed in the Tribe's "Surface Water Quality Monitoring Manual and Standard Operating Procedures." In summary, two to four people spread out through the Tribe's 5.5-acre portion of the wetland, looking for amphibians and their egg masses in a Visual Encounter Survey. We looked in the most likely terrestrial habitat, and we also focused concentrated efforts in and near the wet spots, which proved to have hundreds of egg masses throughout the spring. Egg masses were flagged and given individual numbers to avoid double counting and to track their development. In a few

areas where a single species' egg masses were too numerous and dense to separate individually, the area was flagged and a cumulative count was made for that spot. Such subtotals allowed us to monitor the timing of the peak and decline of egg-laying at each spot, even though individual egg mass development could not be tracked there. Egg masses that were flagged were tracked for health with weekly estimates of the percentage of eggs that appeared dead. For our field identification guide, we used "Amphibians of Oregon, Washington and British Columbia," (1996) by Charlotte C. Corkran and Chris Thoms.

We also kept watch for any amphibians as we moved through the survey area, keeping track of age and species whenever possible. We tried to capture by hand any amphibian we saw, to facilitate identification. We kept them moist while handling the animals, then released them once identified.

Another aspect to the field work was a wetland habitat survey. Again, we followed protocols in the Tribe's water quality manual. This was less of a priority, given that the wetland habitat had been well delineated and described in the Tribe's wetland inventory in 2003. Nonetheless, we spent a few hours during the original survey on March 8, 2007 detailing the different habitat covers and noting some of the basic plant species. Subsequent weeks were devoted to the amphibian surveys. For both the amphibian and habitat surveys we developed our own data forms based on those protocols. The forms are attached in this report.

Discussion of results

Looking at the data from a general overview, we found exclusively one species, red-legged frogs and their egg masses, throughout most of March. (*See Tables 1 & 2*.) The egg masses were more submerged at the beginning of March, then started floating to the surface in the next few weeks. Tails also began to develop inside the individual egg cells, and the masses grew frothy.

Our first northwestern salamander egg masses showed up March 29. By that time, we noticed some of the red-legged egg masses had started to hatch and break up. Even so, we were also finding new red-legged egg masses. We did not see or catch as many frogs in March as in the next two months.

We saw our first Pacific treefrog April 12, although we heard calling throughout March, and presumably many of those were Pacific treefrogs. By this time, almost all of the red-legged egg masses were hatched with only remnant jelly remaining. We found a few new northwestern salamander egg masses that week and April 19, but not much new beyond that.

On April 26 we recorded our first Pacific treefrog egg masses. It is possible that egg masses from this species had been present in previous weeks, and we simply overlooked them. They are considerably smaller and harder to find, until you know what you're looking for, and this was the first season of egg-mass surveys for all three of us on the crew. Egg masses exhibited all stages of development, from simple eggs, to tails developing and near hatching, to tiny tadpoles swimming. Having said all that, it is still interesting to note that April 26 was the first survey we saw significant numbers of Pacific treefrogs. Before that, we only saw one.

By late April we were seeing and capturing more frogs. Our peak numbers of frogs counted were 29 on April 26. We counted 25 on May 5.

By May, almost all signs of red-legged egg masses were gone. The northwestern salamander eggs showed slow but significant development, with tails growing and the masses turning green. Almost all were initially found submerged, then started to rise as

they turned green, eventually floating, before hatching. Tails on the eggs grew substantially before hatching. Many of the salamander egg masses had not yet hatched by the end of May, when the survey ended.

Table 1. Egg mass development

Survey date	New egg masses	Red-legged	NW salamndr.	Pac. tree
March 8	40	40	0	0
March 15	28	28	0	0
March 23	4	4	0	0
March 29	26	17	9	0
April 12	3	0	3	0
April 19	2	1	1	0
April 26	174	0	5	169
May 4	32	0	3	29
May 10	6	0	0	1
May 17	8	0	1	7
May 24	2	0	1	1
May 31	0	0	0	0

Table 2. Amphibian sightings

Survey date	Total frogs seen	Red-legged	Pac. tree	Unidentified
March 8	3	1	0	2
March 15	0	0	0	0
March 23	3	0	0	3
March 29	0	0	0	0
April 12	6	3	1	2
April 19	2	0	0	2
April 26	27	8	12	7
May 4	25	8	8	9
May 10	11	6	3	2
May 17	18	9	4	5
May 24	10	6	3	1
May 31	no data			

Complicating factors

The potential to under-count amphibians in this survey seems more likely than over-counting, for a few reasons. First, the wetland area is big, 5.5 acres, and thus difficult to cover in fine detail for three people. Second, the Reed canary grass in the wetland's openings is very thick. The grass provides excellent cover for amphibians, making them hard to observe. As the grass greens up through the spring, visibility reduces even more. Under the forest canopy, the canary grass is shaded out, but the salmonberry and other native vegetation is still dense and requires careful observation to spot a frog.

Even so, our slow movement through the survey area stirred up numerous frogs, and we were able to catch and identify well more than half of them. We documented many others that eluded our grasp. Typically, the frogs were found far enough apart and/or with visible distinctions that made it easy to rule out double counting. On a few occasions, we saw a frog that was too close and too similar to the last one, traveling in a

similar direction, so that we ruled out counting it again. While it is possible mistakes were made, such errors were probably very few.

Access to all available habitat was another factor that probably contributed to some sort of under-count. One large pond had a small section near its center that was too deep and/or too mucky to safely wade, so we might have missed counting some egg masses there. We probably didn't miss too many red-legged masses, which are bigger and can be seen from farther away, but we might have missed dozens of the smaller Pacific treefrog egg masses.

Another complicator was the sheer number and density of Pacific treefrog egg masses in some places. Flagging and tracking individual masses was impossible in such locations. The best we could do was count the overall numbers of masses in a well-defined area, and compare those numbers week to week. Again, under count seems the more likely scenario than double count, although it is impossible to tell. There may have been times when a mass hatched and a new one replaced it the next week, which would mean our count would miss that new one. It is difficult to estimate how big that under count might have been. By counting the same areas each week, though, we can at least track the trend of egg-laying and hatching at each spot.

This inability to flag and track some individual treefrog egg masses was perhaps the biggest weakness of our survey method. Another problem with our method is we were restricted to surveying only the Tribe's portion of the wetland. That leaves out a few more acres of adjacent good pond habitat plus a few acres of upland riparian forest that were not surveyed. It is possible that from one year to the next, breeding could shift into the unsurveyed portions of the pond areas or vice versa. If so, future surveys using these methods could register increases or decreases in population that might actually be simple shifts in the egg mass distribution within the overall wetland. Thus, for future surveys, we are looking into developing a more statistically valid survey method such as a grid or transect system.

For the flagged egg masses, we kept track of the health of each one, estimating each week what percentage of eggs in each mass was dead. This proved to be more difficult than anticipated. Some masses we thought might be dying simply had algae growing and were later found quite healthy, with tadpoles developing. Our data should improve over the years, with experience, but this year's egg mass health numbers are not very reliable to trace on a graph. The data is more helpful in the aggregate, showing that we did not find disturbing frequencies of dead masses.

We had a few recordings of masses that we, in our inexperience, originally thought were long-toed salamander or spotted frog. Each turned out on closer inspection to be one of the three species listed in this report. This was not much of a factor in the data quality – we were able to correct such mistakes as we learned. For example, long-toed salamanders have egg masses somewhat similar to Pacific treefrogs, but they lay those eggs much earlier in the year and should not have been around in May. We will need to start surveys in January to see if we can find any long-toed salamander eggs.