



Sauk-Suiattle Amphibian Survey Report 2011

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This report is based on weekly amphibian surveys taken in the spring of 2011 in the Reservation Slough wetland on the east 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 fifth of 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 wetland, 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. In previous years, floodwaters from the Sauk entered this channel at above 25,000 c.f.s. at the Sauk River near Sauk gage, which is a flood of roughly two-year occurrence. The slough also receives groundwater and is wet year-round, although water levels fluctuate based on flow connectivity with the main channel, which avulses frequently, sometimes close, other times far from the slough mouth. 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.

See the aerial photo from 2006 on the next page.



Sauk-Suiattle amphibian survey area (outlined in light blue)

This 5.5 acre area is a Class 1 wetland, formed by side channels of the Sauk River (at right), last occupied by the mainstem in 1949 or so. The area immediately east of the survey area is a forested upland braided with other side channels. To the north, beyond Tribal property, the wetland extends and curves back into the Sauk River floodplain. To the west is the Sauk-Suiattle Reservation (loop road with houses).

Summary of survey results

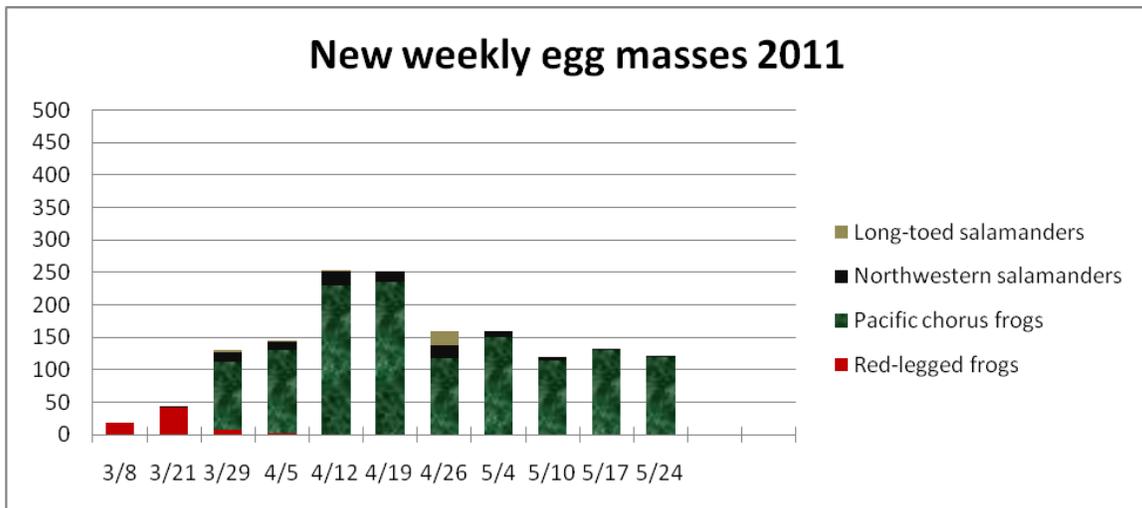
The 2011 survey found fewer egg masses than in 2010 but more than were found in 2009. In each year, the difference was primarily from Pacific chorus frogs, which can lay multiple egg masses per frog annually, (Perrill and Daniel, 1983) so conclusions about population cannot necessarily be drawn for that species. Red-legged frogs, by contrast, lay only one egg mass per frog annually, (McAllister, Leonard, 2005) and in 2011, the survey found fewer red-legged masses than in the previous three years. From 2008 through 2010, red-legged mass counts were 118, 129 and 130, but in 2011 that number dropped to 70. The reason is unclear. Northwestern salamanders also lay one mass per year (Thoms, et al., 1997), and those numbers remained steady from 2009 (104) to 2010 (107) to 2011 (103). In 2009, the salamander egg masses more than doubled from 2008 (43). The reason for that boost might have been survey improvements that allowed better access and visibility via a cataraft to the deeper habitat where salamander masses are found. The cataraft has been used since 2009.

Reasons for the variation in Pacific chorus frog breeding are unclear. In past years, water levels in the main pond had increased because of a beaver dam, causing the pond to spill and flood the adjacent clearing to a roughly average depth of 18 inches. Habitat expansion seemed one possible explanation. But water levels in the slough were considerably lower during the 2010 and 2011 survey seasons (likely because of a more distant main channel of the Sauk providing less winter flood flushes.) Other explanations could be having a more experienced crew, or some other natural explanation.

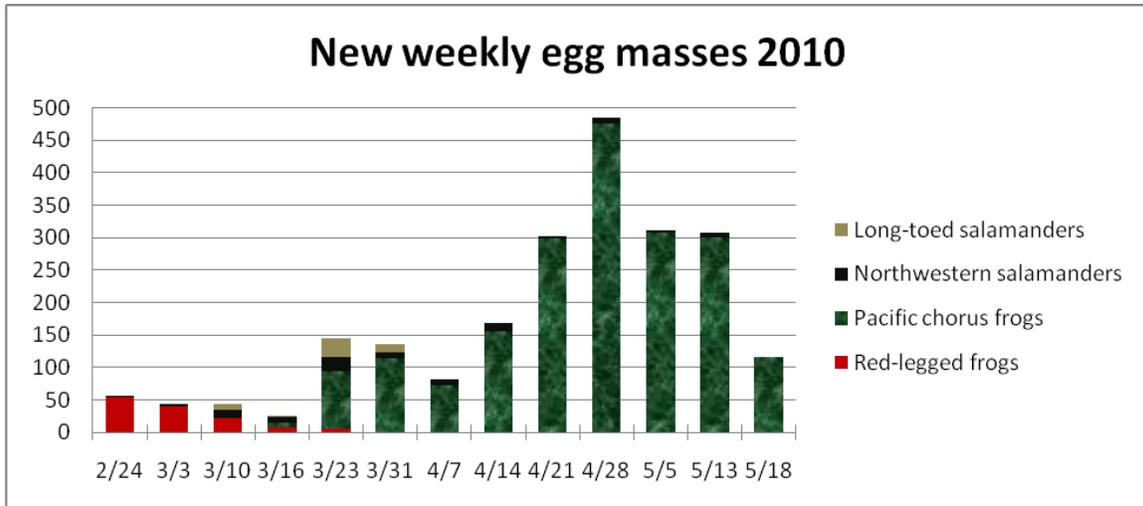
Egg masses

Surveys began March 8 and continued every week, ending May 24. The only exception was the survey that should have occurred March 15 but was missed because of a week-long training that involved the whole crew. The only other variations occurred April 12 and April 19 – in both of those weeks, the surveys spilled over to the following day because the crew was reduced to one person and could not cover the whole area in one day. By May 24, the survey tallied 1,531 different egg masses from four different species: red-legged frog (*Rana aurora*), Northwestern salamander (*Ambystoma gracile*), long-toed salamander (*Ambystoma macrodactylum*) and Pacific chorus frog (*Hyla regilla*).

Graph 1



Graph 2



The egg mass count in **2008:**

- Red-legged frog:	118
- NW salamander:	43
- Pacific chorus frog:	195
Total:	357

Egg masses in **2009:**

- Red-legged frog:	129
- NW salamander:	104
- Pacific chorus frog:	1,209
Total:	1,442
Unidentified:	18
(probably PCFs)	

Egg masses in **2010:**

- Red-legged frog:	130
- NW salamander:	107
- Pacific chorus frog:	1,933
- Long-toed salamander:	51
- Unidentified:	15
Total:	2,236

Egg masses in **2011:**

- Red-legged frog:	70
- NW Salamander:	103
- Pacific chorus frog:	1,330
- Long-toed salamander:	28
- Unidentified:	0
Total:	1,531



This was the second year long-toed salamander eggs (left) were positively identified, although it seems likely they were present in previous years and mistaken by less experienced crews to be chorus frog masses.

It should be noted that the 2011 survey started a week later than past surveys because snow was still blanketing the survey area. By March 8, snow still completely covered the ground, so surveys were restricted to inundated areas.

Amphibian sightings

The survey identified 334 amphibians using the Visual Encounter Survey technique. This is considerably more than surveyed here in past years.

Amphibian sightings:

2007	114
2008	90
2009	240
2010	184
2011	334



Of those 334 amphibians, 97 were red-legged, 192 were Pacific chorus frogs, 29 were Western toads and 14 were unidentified. Also, for the first time, two adult Northwestern salamanders were found and identified (see photo above.)

The 2011 survey found the most Western toads (29) of any of the years. Western toads are listed as a “species of concern” in Skagit County by both the U.S. Fish and Wildlife Service and the Washington state Department of Fish and Wildlife. Since the surveys began in 2007, Western toads have only been found in one other survey year. In 2011, all 29 were juveniles. No toad egg strings have ever been found, possibly because the survey ends too soon each year. The rise in numbers could simply be a greater

abundance in the survey area of shallower, warmer water that toadlets prefer (see photo left.)



Egg mass numbers for red-legged frogs and Northwestern salamanders would seem more reliable than sightings as an indicator of abundance, because each female only lays one egg mass – sightings, on the other hand, can be subject to weather, which affects amphibian activity levels. So while the numbers of red-leggeds found in the survey rose considerably in 2011, the egg mass numbers dropped by almost

half. No obvious explanation was apparent.

The timing of these sightings started later than 2010, but similar to 2009. In 2009, only two frogs were identified until April. In 2010, surveys started encountering significant numbers of frogs by March 10 (and even found one in late February.) By the end of March 2010, 60 frogs had been identified. In 2011, while some began appearing in March, most amphibians were found in April and May.

Of all these frogs, no deformities were recorded.

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. Searches focus in particular on the most likely terrestrial habitat, and concentrated efforts were made in and near the wet spots at various depths. Amphibians were tallied by species and age (juvenile or adult). If species could not be determined easily, attempts were made to capture the animal by hand. The amphibian was kept moist while being handled, and released as soon as positively identified.

Egg masses were flagged and given individual numbers to avoid double counting and to assess their development. In past years, this included revisiting each egg mass to track the progress of development, as well as weekly estimates of the percentage of eggs in each mass that appeared dead, but this data collection proved too time-consuming by mid-2009 because of the abundance of Pacific chorus frog egg masses. The data-collection method was modified at that time to simply identify new egg masses without revisiting old ones. Development data (eggs or tails) was still collected for the new masses.

Field identification guides used were "Amphibians of Oregon, Washington and British Columbia," (1996) by Charlotte C. Corkran and Chris Thoms, and "Amphibians of the Pacific Northwest," (2005) edited by Lawrence L.C. Jones, William P. Leonard and Deanna H. Olson.

Discussion of results

While in 2008 and 2009 water levels rose in the survey area, expanding suitable amphibian breeding habitat, that trend reversed starting in 2010 and continued in 2011, with noticeably lower water levels and shrinking pond habitat. The mainstem of the Sauk River moved farther away from the mouth of the slough, which probably resulted in lower water levels. The grass next to the main pond had been especially favored by Pacific chorus frogs for breeding in 2008 and 2009, but the lower water levels visibly constricted the area of breeding habitat in 2010. This did not seem to affect the chorus frogs, however, as surveys in 2010 recorded almost 2,000 egg masses for that species, far more than 2009, when water levels expanded potential breeding habitat. In 2011, egg mass numbers dropped to 1,330, still more than in 2008 and 2009.

The variation in numbers of chorus frog egg masses has raised questions about whether differences in survey effort or experience could be exaggerating the differences of the annual totals. This seems most likely the case in 2007 and 2008, the first two years of the survey, when crews were least experienced in identifying the small chorus frog egg masses. In those years, 212 and 195 chorus frog masses were found, respectively. The possibility that egg masses were undercounted those years should be considered, because later years found at least 1,000. The survey in 2007 did not use any kind of boat to access deeper water and to see the edges from a different perspective. In 2008, a canoe was used, which was a marked improvement, although still not as good for visibility as the cataraft, which was used starting in 2009 and allows direct visibility underneath the boat.

From 2009 to present, the surveys are more directly comparable. Training and experience levels of the crews were more consistent and the use of the cataraft continued. Another factor to consider is survey effort, which is measured by number of surveyors multiplied by hours surveyed. Survey effort was less in the first two years (see next page.)

Survey effort, weekly average:

2007	5.33
2008	6.38
2009	11.56
2010	10.93
2011	10.26

Typically, surveys begin in late February to try to find egg masses of long-toed salamanders, which breed in winter when temperatures are above freezing (Bull, 2005). This can even mean January in some lower elevations, but farther inland in places such as the Sauk River where the winter climate is colder, long-toed salamanders could be expected to breed later than in Puget Sound. (Marc P. Hayes, Washington Dept. of Fish and Wildlife, personal communication.) In 2011, snow still covered the survey area into early March, so surveys did not start until March 8.

In 2010, surveys documented the first positively identified egg masses of long-toed salamanders, throughout most of March, 51 total. In 2011, long-toed salamander masses were again found, this time 29 in total. Given how much the egg masses of this species resemble eggs from Pacific chorus frogs, the potential exists for surveys from previous years to have misclassified some salamanders eggs as chorus frog masses. To guard against such errors, the surveyors had been trained to recognize the difference and were specifically looking for long-toed masses in previous years, but the possibility still exists, given the similarities.

In 2011, surveys recorded 29 sightings of Western toads, all juveniles. In the previous four years of surveying, Western toads were only found during the 2008 survey. One explanation could be that the survey area featured more of the warm, shallow water that Corkran and Thoms say the species prefers.

Predation is another factor to consider. In 2007, surveys routinely encountered garter snakes, but subsequent years have found less. In 2011, only 3 snakes were spotted, all in May. In 2009 and 2010 no snakes were seen. Other signs of predation were sparse as well.