BP Citizen Science Amphibian Monitoring Program
Egg Mass Survey Results

Spring 2015

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1.0 Project Goals

The goal of this project is to collect multi-year data on the presence and population status of amphibian species occurring within established wetland mitigation areas on BP Cherry Point's lands in Whatcom County, WA (Figure 1). These data are intended to be used to inform and guide management of BP's habitat lands and assist in making important species conservation and management decisions. Further, the project seeks to engage the public in wildlife stewardship by utilizing citizen volunteers to survey and monitor these sites for amphibians. This report presents the methods and third year results.

2.0 Methods

Volunteers were recruited through contacts with local community groups. A five-hour training session was held in late February 2015 to teach volunteers the survey methods and identification of amphibian species and egg masses. As with last year, the program benefited from volunteers that were trained and performed survey work last year to serve as mentors to this year's volunteers. The first half of the training day was conducted in the classroom with PowerPoint slides and the second half of the day took place in the field to allow volunteers hands on experience with identification of egg masses, adults and survey protocols.

The survey protocol used for this project was adapted from one already in use by several programs in the region. Using similar protocols allows the data to be compared regionally (Southwest Washington Amphibian Monitoring Project and the Woodlyn Park Zoo Amphibian Monitoring Program). The protocol focuses on identification of species presence by the identification of egg masses. This methodology works well for a number of lentic (pond) breeding species. The methodology does not detect terrestrial species as they do not breed at aquatic sites. Because the study area is located in an area dominated by wetlands, it is believed that this methodology would provide the most useful data and it is easily implemented by trained volunteers.

An additional survey method was used, because the final survey date was pushed late into the laying season and more larvae were present than eggs. To sample for the presence of larvae, mesh minnow traps were used in sample areas BRMSA-1 and 5. Nineteen traps were set in BRMSA -5 and 18 in BRMSA-1. Hand netting was also conducted and egg masses were counted if observed. Traps were set in the day prior to the survey and removed after specimens were counted on the survey day.

Surveys were conducted during three five-hour field days with four hours of actual survey time each day. Volunteers were broken into teams of 4 to 6 and were provided maps with wetlands locations identified. Each team selected their own wetlands to survey.

The protocol used is an area-constrained method where each wetland is surveyed for amphibian egg masses during the spring breeding season. This year some wetlands were surveyed twice because the first survey occurred too early in the breeding season. Each survey group slowly walked the entirety of each wetland. When an egg mass was located, the species was identified and egg mass recorded. The air temperature, water temperature and weather conditions were recorded at each wetland. Surveyors documented the number of egg masses present for each species. At the conclusion of the survey, the total number of minutes spent searching was recorded and the data were entered into an electronic database by the Northwest Ecological Services project manager.

3.0 Study Area

The study took place on lands owned and maintained by BP Cherry Point, Blaine, WA (Figure 1).

Figure 1. Vicinity Map

The study area includes three units referred to as CMA1, CMA2 and BRMSA, as shown in Figure 2. Each unit is part of a different enhancement or wetland mitigation site that was installed during different years. Wetlands were created or enhanced within each of these units. The study area is located north of Grandview Road, east of Jackson Road extending east slightly past Blaine Road. Most of the survey occurred south of Terrell Creek.

Figure 2. Study Area

4.0 Results and Discussion

Twenty six volunteers completed the five-hour training, eight were returning volunteers. Volunteers contributed 79 volunteer hours (excluding the training) to amphibian surveys over a period of three survey days during late winter and early spring of 2015.

Twenty individual wetlands were surveyed once each on March 14, March 28 and April 11, 2015. Weather conditions were mild with above average air and water temperatures for the season.

The survey timing for 2015 did not correlate well with the breeding period this season. The unseasonably warm winter and spring resulted in early amphibian breeding. All species were breeding about a month early. The training and first field survey occurred at the peak of egg laying for all species. The following two counts occurred after many larvae had hatched. During the March 28th and April 11 surveys volunteers were finding many hatched eggs and young larvae. In order to take advantage of the presence of larvae we switched our survey methods to include minnow traps to account and teach larval identification to the volunteers. The traps were only used in two wetlands BRMSA-1 and BRMSA-5. Egg mass counts were also made in these wetlands although the survey in BRMSA-5 was only performed during the last survey day and egg masses were not abundant.

The egg masses and/or adults of five species of amphibian were identified within the study area (Table 1). All the species detected were those that breed in aquatic habitats. No terrestrial amphibian species were detected, but none were expected as the survey protocol focused on aquatic habitats.

Table 1. Numbers of egg masses, adults and larvae observed per.

Species	Common Name	# Egg of Masses	# of Adults
Ambystoma macrodactylum	Long-toed salamander	194	0
Ambystoma gracile	Northwest Salamander	35	6*
Rana aurora	Northern red-legged frog	203	5
Pseudacris regilla	Pacific Chorus Frog	2223	13
Lithobates catesbeiana	American bullfrog	0	5

*neotenic individual

The greatest numbers of egg masses detected were those of Pacific Chorus Frogs with 2223 egg masses; followed by Red-legged Frogs with 203; 194 Long-toed Salamanders; and 35 Northwest Salamander egg masses. No Roughskin Newt or American Bullfrog egg masses were located. Roughskin Newts lay single eggs which are very hard to detect and bullfrogs would not lay eggs later in the year, so eggs would not be present.

Adults were not detected infrequently during the survey. Only six Northwest Salamanders, thirteen Pacific Chorus Frogs, five Red-legged Frogs were identified. Larva were counted, but the methodology was inconsistent so the numbers were not present. Larva of red-legged frog, Pacific Chorus Frog, Northwest Salamander and American Bullfrog were observed (primarily using minnow traps). In addition six neotenic Northwest Salamanders were located in wetlands BRMSA-1 and BRMSA-2.

Table 2 presents the number of egg masses detected for each species at each sampled wetland. The results are variable, but all sampled wetlands, that were not dry, had evidence of at least one species breeding in them.

Table 2. Numbers of egg masses per species encountered for each wetland.

	Number of Egg Masses Per Species			
Wetland	Red-legged Frog	Pacific Chorus Frog	Northwest Salamander	Long-toed salamander
CMA1-1	29	291	0	0
CMA1-2	44	93	0	9
CMA1-3	2	119	0	25
CMA1-4	7	33	0	0
CMA1-5	4	63	0	0
CMA1-6	31	123	0	0
CMA1-7	7	178	0	67
CMA2-1	4	89	0	0
CMA2-2	0	0	0	0
CMA2-3	0	1	0	0
CMA2-4	0	113	0	1
CMA2-5	0	0	0	0
CMA2-6	0	4	0	0
CMA2-7	0	75	0	0
CMA2-8	0	55	0	0
CMA2-9	35	0	0	0
CMA2-10	0	43	0	0
BRMSA-1	6	98	13	4
BRMSA-5	27	667	22	21

Figures 3 and 4 further illustrate the distribution and use of different amphibian species using the sampled wetlands for breeding within the study area. All but two sampled wetlands had evidence of at least one species utilizing them. The two that lacked breeding evidence were both dry. Of the remaining wetlands reviewed, seven had evidence of only one species (typically Pacific Chorus Frog). None of the wetlands had evidence of all five species breeding, as it was too early for bullfrogs to breed. Five wetlands had evidence of two species breeding in them and two wetlands had three species present. Four of the wetlands had very low numbers of egg masses present (CMA1-4, CMA2-3, CMA2-6), the remaining had evidence of moderate to high occupation of egg laying in areas of the wetlands.

The study area includes both wetlands that are temporarily ponded as well as permanently ponded wetlands. Of the wetlands surveyed this season only BRMSA-1 was permanently ponded. All other wetlands are temporarily ponded. Temporary pools also ranged in hydroperiod duration with some drying as early as early April and others appear to maintain inundated conditions until later July and August. More information on the site hydrology is described in the 2013 report. Note: 2015 was a year of particularly low rainfall and warmer than normal temperatures. Many native amphibian

species are adapted to wetlands with temporary ponding, particularly the Pacific Chorus Frog and the Long-toed Salamander. Red-legged Frogs are also successful in using these habitats, but require pooled conditions into August. Northwest Salamanders typically require more than a year to metamorphize, therefore they are usually associated with permanent ponds and waters. This species can metamorphize in a single season, but requires pooled conditions through August to be successful (Vikki Jackson personal observations). American Bullfrogs are a non-native species that require two seasons for the tadpoles to mature to adults. This species requires permanently ponded wetlands.

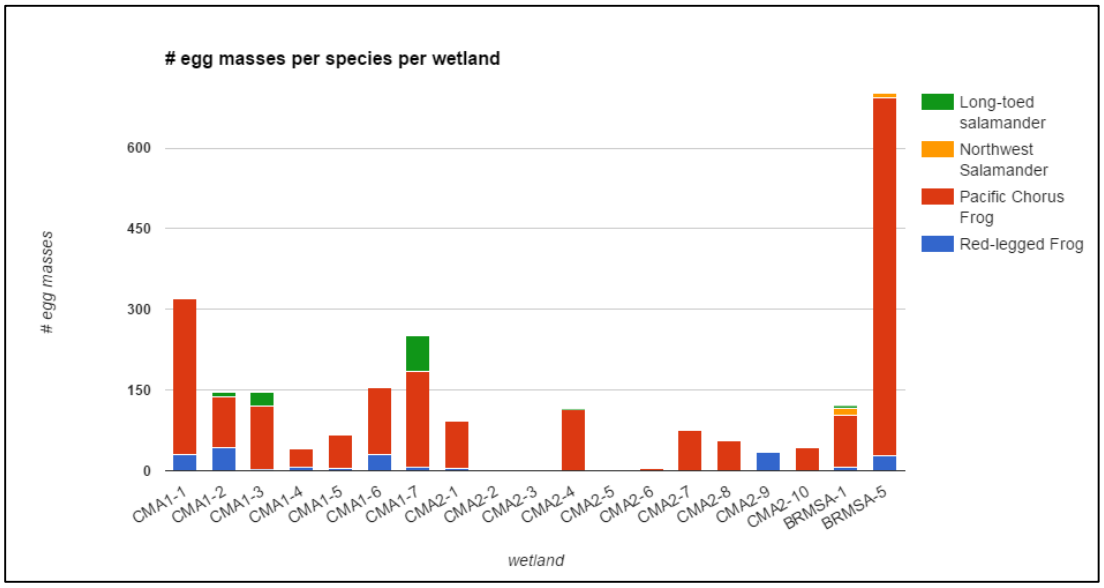

Figure 3. Numbers of Egg Masses per Amphibian Species per Wetland 2015

Data from three years of egg mass counts are available to compare at this point in the project. The years differ in the total number of overall egg masses counted (Figure 4). The total number of egg masses counted for the current survey years are as follows: 2013- 4,227; 2014- 1,116; and 2015- 2,655. The varying numbers likely represent overall fluctuations of numbers laid that year to some extent, but also 2014 and 2015 had sampling errors associated with survey dates not coinciding well with the peak breeding season for the reviewed years. Consistent observed trends include Pacific Chorus Frogs have the highest number of eggs of any species on any given survey year. Red-legged Frog were the second most abundant egg mass, but closely followed by the Northwest Salamander. No American Bullfrog eggs were detected in any year, but that is because the survey timing did not overlap with the breeding season for this species. Adult and larval Bullfrogs were detected.

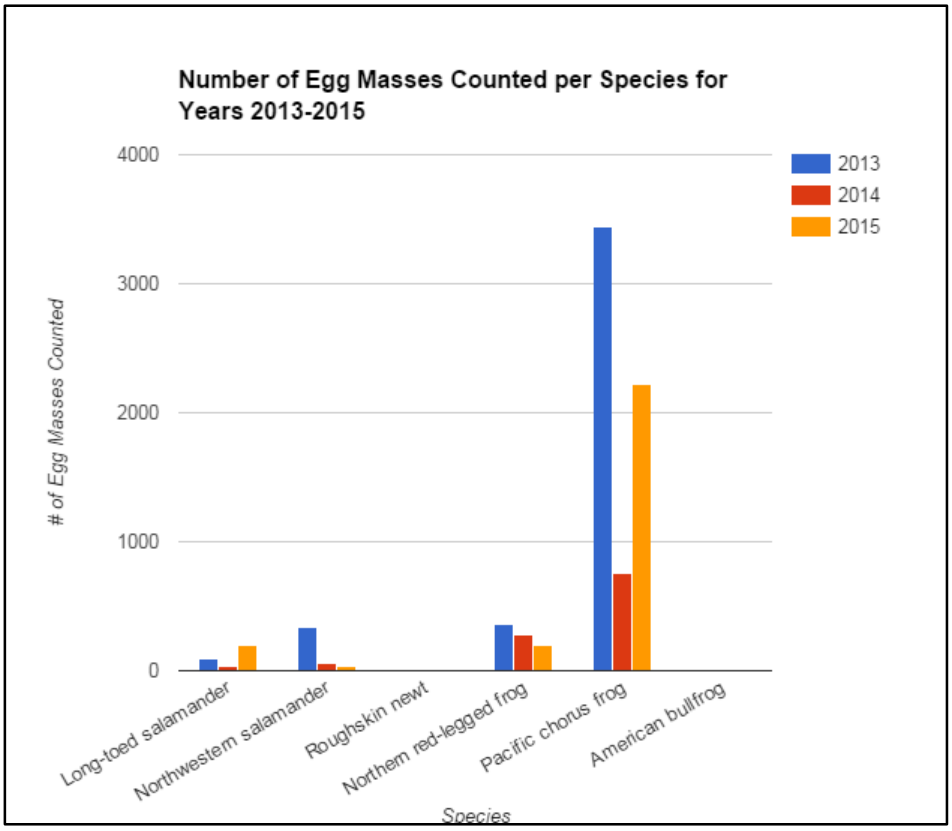

Figure 4. Numbers of Egg Masses per Amphibian Species for Years 2013-2015

As observed in the 2013 and 2014 surveys, 2015 results showed the temporarily pooled wetlands exhibited the similar diversity of native species as those permanently ponded in the study area. However the only permanently ponded wetland surveyed this year was BRMSA-1. Within the temporary wetlands, those with a longer duration of pooled conditions had greater diversity than those that had short durations. American Bullfrogs were only detected in BRMSA-1 in 2015 and Northwest Salamanders and/or egg masses were primarily found in BRMSA-1 and BRMSA- 5. The outlet to BRMSA-5 has been blocked by beaver and the wetland would normally be permanently flooded (in part), but agencies involved in wetland regulation have required the removal of the beaver dam to allow the wetland to seasonally dry to control bullfrogs. This may be effective, but could limit the success of Red-legged Frogs and Northwest Salamander in this wetland. Pacific Chorus Frogs and Long-toed Salamanders occupied the pools with the shortest hydroperiods. Red-legged Frogs occurred in temporary wetlands with long hydroperiods and permanent ponds within the study area. No bullfrog egg masses were detected because they breed later than when the survey occurred, however adults were found in BRMSA-1. Bullfrog presence has been associated with decreased diversity of native amphibians in a number of studies. The results of this survey do not reflect this as being the case. All native amphibian species detected in the review area were breeding in both wetlands where adult bullfrogs were found. The numbers of native amphibians breeding in these two wetlands were also high. Caution should be used when reviewing

the results and conclusions associated with bullfrogs as the survey did not occur during their breeding season (June/July) and occurred as they were just becoming active after winter dormancy.

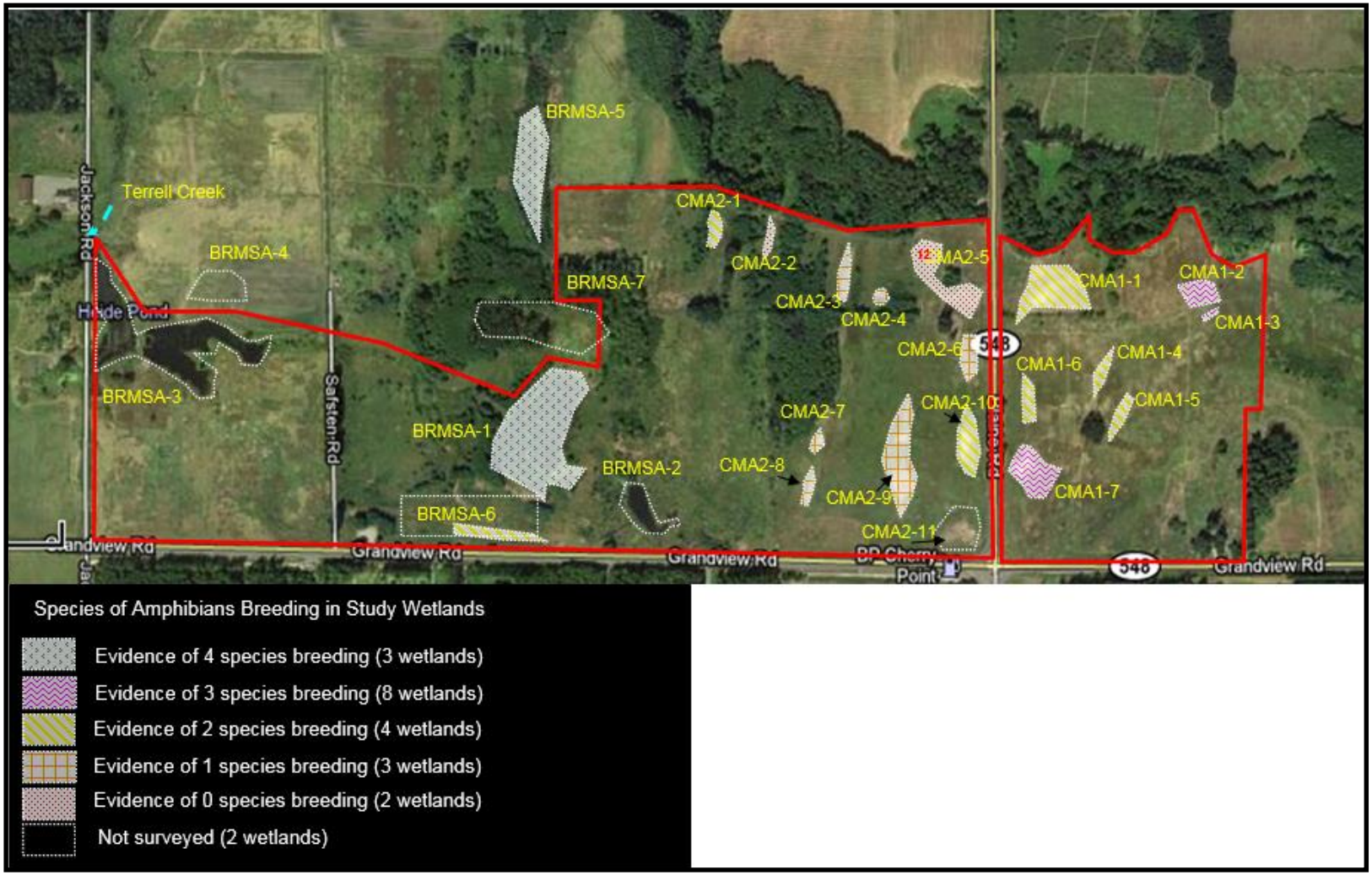

Figure 5. Numbers amphibian species recorded breeding in surveyed wetlands for 2015.

5.0 Conclusions

Results from the 2015 egg mass survey were similar to those from 2014 and 2013, but some wetlands did differ in the diversity of species utilizing them and total eggmass counts. Overall the numbers of egg masses detected were fewer than found in 2013, but higher than in 2014. This is more likely due to sampling irregularities rather than a reflection of the use of wetlands by amphibians in the study area. The sampling period appears to have missed the peak breeding season. This year's survey found similar species diversity in seasonally inundated pools and permanent pools, although wetlands with short hydroperiods usually were used by only Pacific Chorus Frogs. This was also seen in the 2013 and 2014 survey. Permanent ponds and long duration temporary wetlands often had four native species breeding verses 2 to 3, as in many of the short season temporary pools. Native amphibian species were found to use all surveyed wetlands for breeding. The non-native American Bullfrog was located only in one permanent pond within the review area, but the survey took place before their breeding season and when this species was just coming out of hibernation. Two other ponds likely have bullfrogs (BRMSA-2 and BRMSA-3) likely have bullfrogs, but they were not included in this year's survey. One amphibian species (Roughskin Newt) was detected during the 2014 survey, but was not detected in 2013 or 2015 surveys.

Volunteers provided similar high quality results as seen in the 2013 and 2014 surveys. 2015 was the first year with a large number of returning surveyors that served as mentors for the new volunteers. This appears to have improved the confidence of new volunteers in their species identification. Data sheets completed by volunteers asked the volunteers to rate their confidence in identifying egg masses to species. Based on the responses, the volunteer's confidence in identification increased as they performed more surveys. Long-toed salamander egg masses were difficult for volunteers to locate and identify. The presence larvae this season provided excellent opportunities for volunteers to learn how to identify this life stage.

Summary

The use of volunteers to collect data was again very successful. Volunteers provided accurate data and allowed good coverage of survey areas in a limited survey period, although some species such as long-toed salamander may have been less accurate than more than the species. The results suggest the mitigation areas within the study area are providing suitable conditions for native amphibian breeding. Amphibian usage continues to be high within the study area. All surveyed wetlands, except two wetlands in the study area were used by at least one species for breeding. 2015 survey results did show a trend of a slightly decreased diversity of species breeding in individual wetlands. Prior years tended to have 2 to 3 species present, but 2015 tended towards 1 or 2 species. Wetlands with the greatest diversity of species use were the permanent or nearly permanent ponds (BRMSA-1 and BRMSA-5). The study area includes wetlands

that provide a range of hydrologic conditions that provide suitable habitat for species requiring permanent water conditions and those able to utilize temporary waters for breeding. Although weather conditions in 2015 indicate that temporary wetlands are less successful than wetlands with longer hydroperiods during drought years.

6.0 Recommendations

Continued monitoring is necessary to determine if there are changes in relative use of the wetlands for amphibian breeding. The data collected in over the past three years provide general baseline conditions. This year's survey results have added to the data regarding amphibian usage of wetlands within the study area and how they respond in a less than ideal climate situation. Future monitoring will establish if and how amphibian use of these wetlands changes as the mitigation area vegetation becomes more established and mature. The survey results appear to provide good results for species that breed early, but surveys should occur slightly early when warmer conditions are expected during the breeding season. We would also recommend a later survey (around June) to determine where bullfrogs may be breeding within the study area. Preliminary data indicates bullfrogs are present, but the extent of their presence and effects of native amphibian species require further investigation. This survey protocol is excellent for determining the presence and general population status of lentic breeding amphibians, but terrestrial species require additional survey work and methods. Volunteers would be excellent for gathering this data as well.