Thurston County Amphibian Migrations and Road Surveys

Fall 2015 to Winter 2018 Stream Team Results Summary

Thurston County Amphibian Migrations and Road Collaboration

October 9, 2018

Mission Statement of the Thurston County Amphibian Migrations and Roads Collaboration

"To support safe migrations of aquatic-breeding amphibians within Thurston County through science- and citizen-based efforts"

Project Participants

Stream Team Project Lead: Michelle Stevie (City of Olympia).

Survey Area Leads: Bonnie Blessing-Earle (Champion Drive), Jim Terry (Supporting Lead, Champion Drive), Bill Peer (Young Road), Joanne Schuett-Hames (Kaiser Road).

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Survey Participants – <u>We thank Stream Team and other participants who contributed time and expertise for these surveys.</u> See page 3 for a participant list.

Document Citation

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Cover photos: *Rough-skinned Newt adult (Flicker.com); amphibian signs accessed from the web: "amphibian migration signs"; Northwestern Salamander adult stopped under street light on chip seal road surface, Champion Drive (B. Blessing-Earle); J. Terry surveying by flashlight at the Kaiser Preserve (J. Schuett-Hames); Northern Red-legged Frog juvenile, at Capitol Land Trust Kaiser Preserve (JSH), Pacific Treefrog (JSH); Volunteers A. Wauhob, C. Darnell, K. Anderson, and C. Anderson showing the "Frog Monitoring Team" safety vests (JSH).*

INTRODUCTION

Understanding Amphibian Migrations: A Look Back in Time

So we drive over roads of asphalt. Fast. We drive over ancient geologic formations below us. These roads are crucial migration corridors for us to travel on to reach grocery stores and work, visit friends. We tend to travel fast in large vehicles.

Not only us but amphibians, use these roadways. Amphibians cross these roads, some are crushed, some 'make it'. Amphibians are not known for their speed. However, they've been crossing FOR a long long time, longer than we've been here. As the number of fast cars increase, the number of slow amphibians may decline.

So, just how long have amphibians been crossing Thurston County roads, for instance Champion Drive near Scott Lake?

Amphibians have been around a long time. Scientists suggest they evolved hundreds of millions of years ago. Western Washington (including Thurston County) was probably under water at that time. About 30 million years ago, volcanoes exploded through shallow marine water forming the Northcraft formation, which Champion Drive traverses today, and during glacial epochs till deposited on slopes below Champion Drive. You can see the swamp in the valley bottom with the marine layer lying below both.

Some experts suggest glaciers exceeded 600 feet in this area. However, at about 380 feet above sea level, it is likely that Champion Drive, like other outcrops in the lowlands, had less ice than the cool glacial valley bottoms. When could amphibians have found Champion Drive?

Fortunately, Champion Drive is near the southern extent of the last glaciation, so amphibians could have found this area after recession of glaciers, moving in from adjoining ponds or forest, perhaps roughly 10,000 years ago.

Today in Thurston County

Many pond-breeding amphibians (frogs, toads, salamanders, and newts) in Thurston County migrate between upland forested habitats, and ponds where they breed. During migrations they often cross roads where they risk being crushed by vehicles. Where traffic levels are increasing over time, amphibians and their populations are at a greater risk of being impacted.

Responding to citizen reports of large numbers of dead amphibians on Thurston County roads, in 2013 a partnership formed to work in support of safe crossings. This partnership "The Thurston County Amphibian Migrations and Roads Collaboration" includes representatives of Thurston County, City of Olympia and Thurston County Stream Teams and Stream Team volunteers, Washington Department of Fish and Wildlife, Washington Department of Ecology, and Independent Researchers.

In this summary report, we present results, key findings, and recommendations for three areas that have been a priority focus for Stream Team amphibian migration surveys during 2015-18. These areas are: Champion Drive in the Scott Lake Community, Kaiser Road near the Evergreen State College (TESC) Parkway, and Young Road on the Steamboat Island Peninsula. In each case, there are rich stories being learned about the migrating amphibians, and compelling reasons to provide measures to support safe crossings. Each survey area has a short write-up, and

corresponding Figures 1, 2, 4, 5, and 6 are survey area maps which indicate locations where highest densities of amphibians were crossing. Appendix A provides detailed survey results.

KEY FINDINGS AND RECOMMENDATIONS

Location	Key Findings	Recommendations
Champion Drive	➢ 6 migrating amphibian species ➢ ~40% of observations during evening surveys are live	➢ Add to WDFW PHS ➢ "Migrating Amphibians" signs ➢ Provide crossing structures ➢ Consider future of adjacent forest
Kaiser Road nr TESC Parkway (Unit #1)	➢ 6 migrating amphibian species ➢ Traffic levels prevent many from successful migration ➢ Traffic apps, development, and a planned access to Highway 101 will likely increase traffic	➢ Meet with City of Olympia ➢ Add to WDFW PHS ➢ "Migrating Amphibians" signs ➢ Determine/ implement measures to minimize non-local traffic ➢ Resume surveys if traffic lessens
Young Road (Units #1 - #5)	➢ 6 migrating amphibian species ➢ Many are unable to successfully migrate across this road due to normal traffic conditions ➢ Units #1 - #3 have amphibian observation densities two to five times greater than Units #4 and #5	➢ Add to WDFW PHS ➢ "Migrating Amphibians" signs ➢ Education of residents ➢ Monitor for changes in migration patterns where forest was harvested

AMPHIBIAN SPECIES WE OBSERVED

Survey Area	Champion Road			Kaiser Road Unit #1			Young Road Units #1 - #5		
Migration Year	2015-16	2016-17	2017-18	2015-16	2016-17	2017-18	2015-16	2016-17	2017-18
Pacific Treefrog (*Hyliola regilla*)	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Northern Red-legged Frog (*Rana aurora*)	**X**	**X**	**X**	**X**		**X**		**X**	**X**
Northwestern Salamander (*Ambystoma gracile*)	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Long-toed Salamander (*A. macrodactylum*)	**X**	**X**	**X**	**X**		**X**			**X**
Rough-skinned Newt (*Taricha granulosa*)	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Ensatina (*Ensatina escholzii)*	**X**	**X**		**X**	**X**				**X**

Five pond-breeding and one terrestrial-breeding (Ensatina) species of amphibians were found in each of the survey areas. Rough-skinned Newts were observed in the largest numbers, and Young Road units made up the majority of these observations. Northwestern Salamanders made up the second largest number of observations, and were the most common observations for both Champion Drive and Kaiser Road. Both Pacific Treefrogs and Red-legged Frogs were observed in moderate numbers, especially on Champion Drive and on Young Road. Of 266 newts found on the Young Road units, 29 were alive, but overall during the Young Road and Kaiser Road surveys (which occurred during daylight) most animals were mortalities. Surveys on Champion Road were held in the evening and 40% of observations were of live animals.

DATA COLLECTION AND ANALYSIS

Stream Team Participation

Surveys were coordinated by City of Olympia Stream Team. Participation in the 2015-18 surveys included 56 persons, with those who were volunteers contributing over 550 hours of support to this project. Volunteers included students participating in community service.

We thank Stream Team volunteers and other survey participants: Shauna Alexander, Helen Allen, Rebecca Allen, Jeannette Barecca, Mary Birchem, Emily Butler, Gerry Cichlar, Bonnie Blessing-Earle, Elizabeth Bolksteigel, William Christenson, Matthew Christofferson, Evan Clayson, Christina Darnell, Josh Diamond, Chris Earle, Matt Fidazzato, Scott Gardner, Jennifer Geisert, Marc Hayes, Ayden Hennekens, Liam Hutcheson, Betsy Johnson, Grace Kelly, Brian Kerr, Lawrence Lore, Andrew Lore, Elizabeth McManus, Chris McManus, Adrian Nelson, J.J. Nugent, Bill Peer, Cam Petshe, Rachel Petshe, Kerry Reetz, Valentina Reetz, Ansel Reeves, Kathy Reeves, Laurence Reeves, Theresa Rustemeyer, Addie Schlussel, Dave Schuett-Hames, Joanne Schuett-Hames, Cindy Sharpe, Cora Sharpe, Michelle Stevie (Lead Stream Team organizer), Cynthia Stonick, James Terry, Michelle Tirhi, Virginia Towne, Andrew Vandrush-Borgacz, Teal Waterstrat, Aerial Wauhob, Blake Willett, Roberta Woods, Amy Yahnke, and Bill Yake. *(To the best of our knowledge this list is complete; please accept our apologies if we've missed you!)*

Methods

Surveys were conducting using standard methods developed for the project[1]. Training was provided for survey participants and each survey area had a primary lead. Data were compiled on ArcGIS Online platforms provided by WDFW and analyzed in Microsoft Excel and ArcGIS Online.

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[1] *Thurston County Amphibian Migrations and Roads Collaboration (TCAMRC). 2015. Thurston County Amphibian Migrations and Road Surveys: Fall 2015 to Winter 2016 Stream Team Protocols. City of Olympia Stream Team. Olympia, WA. 18p.*

Thurston County Amphibian Migrations and Roads Collaboration (TCAMRC). 2016. Thurston County Amphibian Migrations and Road Surveys: Fall 2016 to Winter 2017 Stream Team Protocols. City of Olympia Stream Team. Olympia, WA. 32p.

Thurston County Amphibian Migrations and Roads Collaboration (TCAMRC). 2017. Thurston County Amphibian Migrations and Road Surveys: Fall 2017 to Winter 2018 Stream Team Protocols. City of Olympia Stream Team. Olympia, WA. 30p.

AMPHIBIAN MIGRATION SURVEY AREAS SUMMARIES

Champion Drive: by Bonnie Blessing-Earle (lead)

Our hope is the amphibians that recolonized and have persisted likely over thousands of years on the Northcraft formation (now including Champion Drive), can survive us.

At Champion Drive, amphibians lay eggs in the waters below but move into upland forest for the rest of the year. During these movements many cross roads.

In 2013, a local homeowner reported hundreds of dead and live amphibians on the road. Since 2013, we monitor amphibians crossing the road during the migration season, which mainly runs from early fall through spring.

Young frogs and salamanders that were just tadpoles or salamander larvae months earlier navigate from their pond >800 feet, through private forest and over Champion Drive (figs. 1 and 2). This forest sustains these frogs by providing food and shelter. Other uses of the forest include human uses by residents of the area for recreation. The forest is in the Beaver Creek headwaters, a drainage occupied by Oregon Spotted Frogs. Because spotted frogs are so highly aquatic we would not expect them to occur on Champion Drive, and have not observed them during the migration surveys.

Survey Findings

Northwestern Salamanders, Red-legged Frogs, and Rough-skinned Newts had the greatest numbers of observations, and Pacific Treefrog, Long-toed Salamander, and Ensatina were found in lesser numbers (Appendix A).

Figures 1 and 2 illustrate where highest densities of amphibians were found.

Recommendations and Next Steps

Opportunities to maintain this population include:

- Include the Champion Road survey area as a PHS area.
- Provide amphibian migration signage.
- Provide crossing structures at key migration points.
- Work with the adjacent industrial forest landowner to keep the forest in recreational and economic uses.
- Implement surveys during warm rainy conditions.

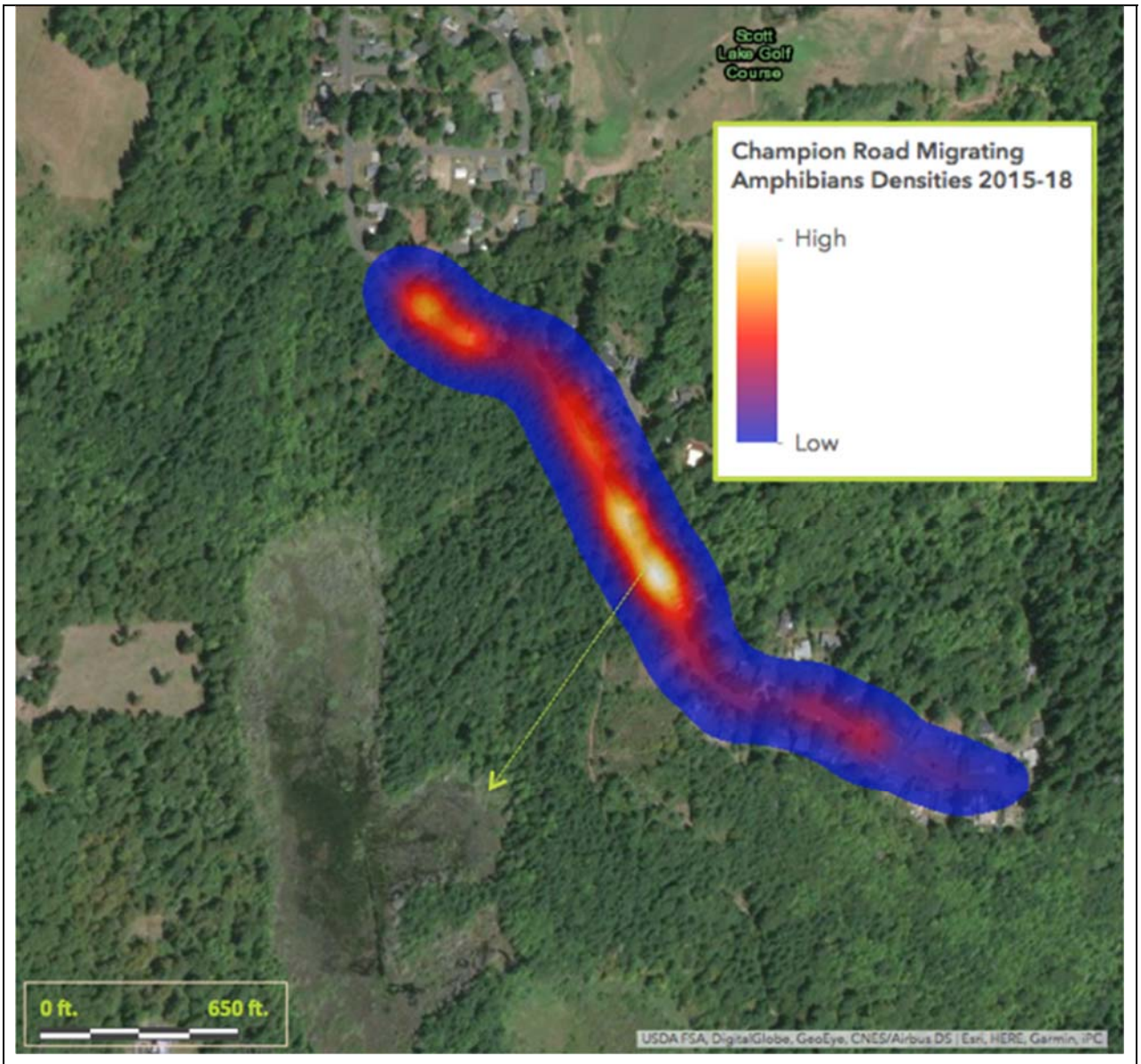
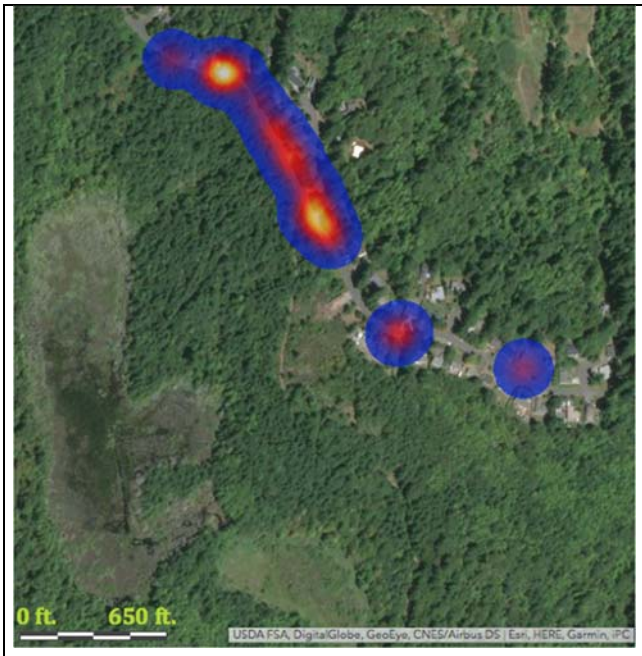
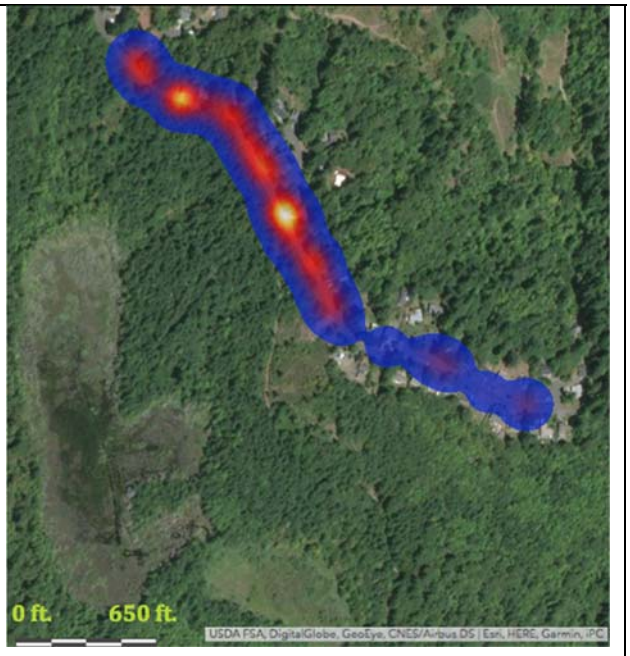


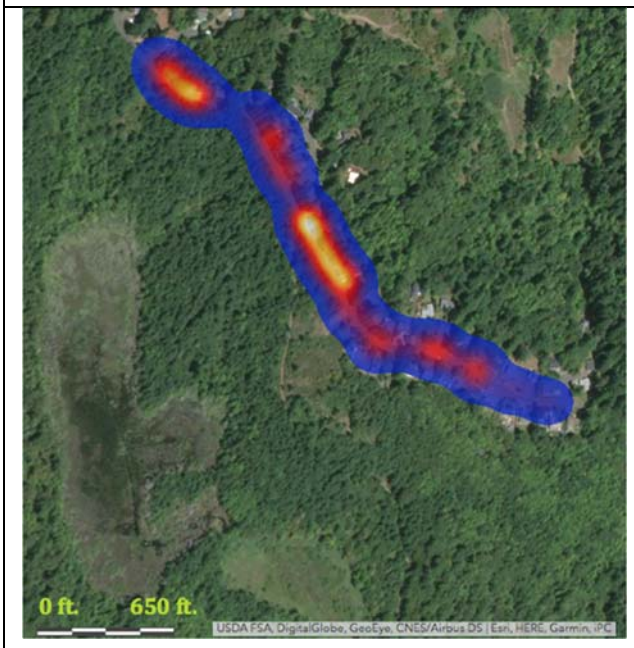
Figure 1. Densities of migrating amphibians (all species combined) along the Champion Road survey area during 2015-18. Those locations with greatest numbers of migrating amphibian observations are indicated as an increasing gradient of brighter colors of red, orange, and yellow (which has the greatest numbers of observations). The arrow pointing from the large yellow area to the nearby wetland indicates a distance of >800 feet; thus amphibians apparently are traveling >800 feet from the road crossing to reach this wetland.



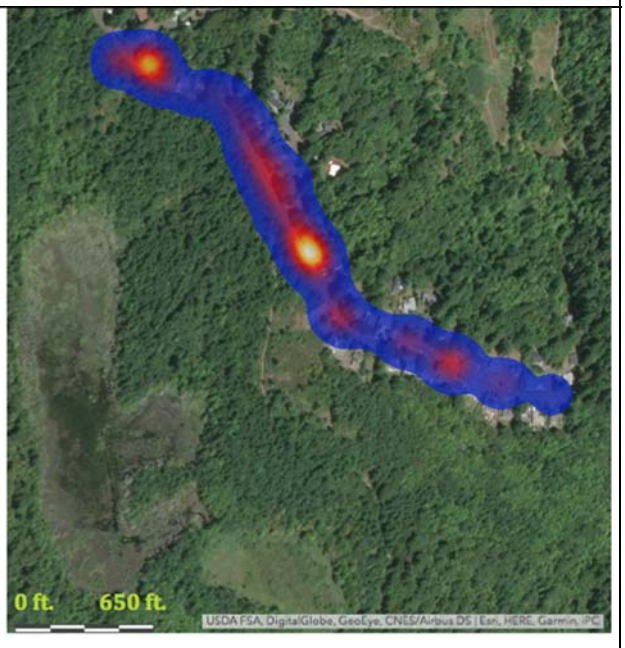
Pacific Treefrog



Northern Red-legged Frog



Northwestern Salamander



Rough-skinned Newt

Figure 2. Densities of migrating Pacific Treefrog, Red-legged Frog, Northwestern Salamander, and Rough-skinned Newt along the Champion Road survey area during 2015-18. Those locations with greatest numbers of migrating amphibian observations are indicated as an increasing gradient of brighter colors of red, orange, and yellow (which has the greatest numbers of observations).

Kaiser Road Unit #1: by Joanne Schuett-Hames (lead)

The purpose for the Kaiser Road amphibian migration studies is to assist the City of Olympia's planning for the new Highway 101 interchange. The City is interested in identifying migration hot spots and in help guiding placement of improvements to protect migrating amphibians.

Unit #1 begins at Kaiser Road and The Evergreen State College (TESC) Parkway intersection and runs ½ mile in a southerly direction. The road traverses a landscape rich with extensive wetlands associated with Green Cove Creek, riparian areas, residential and gardening or farming locations, and upland forests. Local prioritization of the Green Cove Creek watershed has resulted in permanent conservation for much of this area by the Capitol Land Trust. A special diversity of species live here including Olympic Mudminnow, American Bittern, Short-tailed Weasel, and at least six species of native amphibians, five of which are migratory pond-breeding species.

Figure 3. Example routing by "Waze" traffic app. This app indicates a primary route to the college via the TESC Parkway, and additional routes through the local rural landscape, include Kaiser Road in turquoise (accessed from the web 2018May3).

Historically this road transected rural countryside through the Kaiser family dairy. Traffic was likely light and thus impacts to migrating amphibians were light as well. The TESC Parkway was built by the early 1970's, enabling much of the college-bound traffic to bypass Kaiser Road. However, more recently, increasing levels of development in the vicinity, traffic apps such as "Waze" (fig. 3), and a stoplight at the Harrison and Kaiser roads intersection have likely supported increased traffic to this rural road, making crossing more risky for migrating amphibians. Further, to assist with traffic congestion in west Olympia, a new interchange that would access Highway 101 at Kaiser Road is being planned. This new interchange could make Kaiser Road through the migratory area a prominent choice for traffic traveling to and from locations to the north of Unit #1.

Survey Findings

Road surveys – Over the course of 21 surveys spanning October 2015 to March 2018 we observed 114 amphibians. Most were Northwestern Salamanders and Rough-skinned Newts, but we also found Pacific Treefrog, Red-legged Frog, and Long-toed and Ensatina salamanders. Of the 114, two were live.

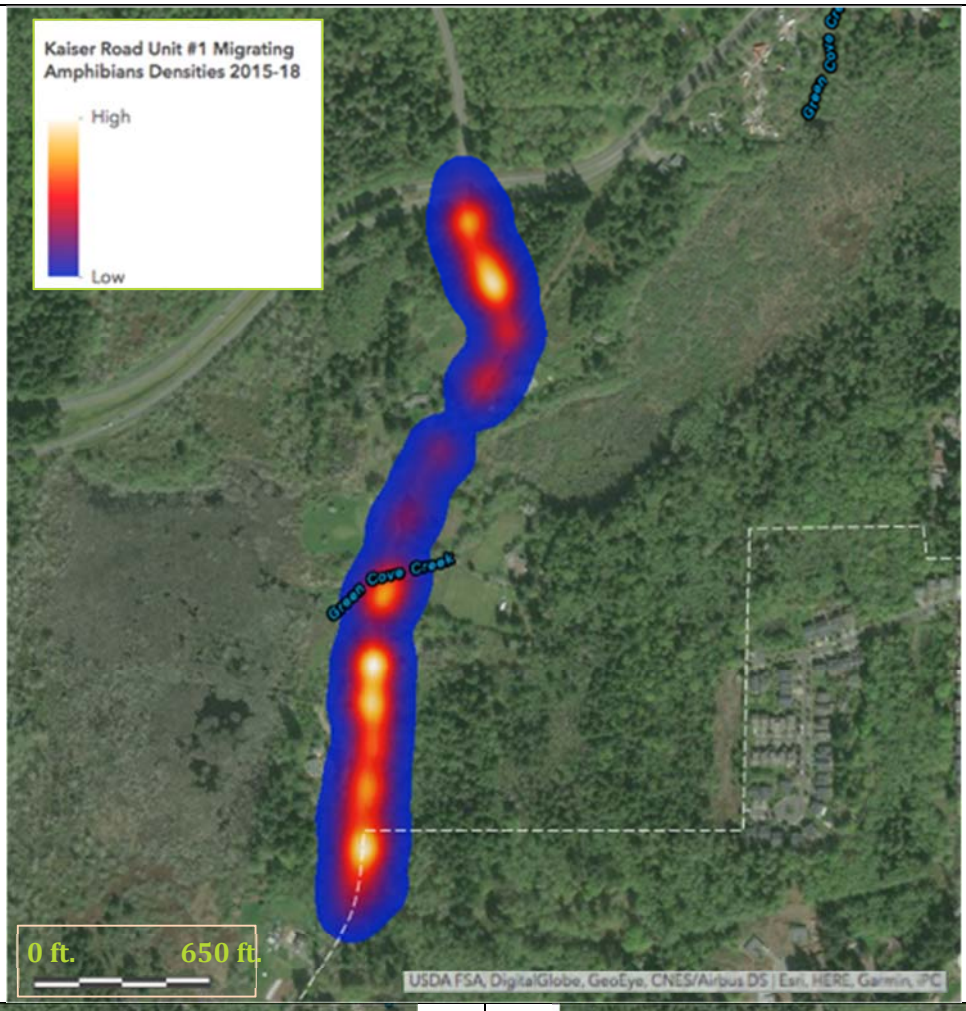
The density maps (fig. 4) indicate where highest densities of amphibians were found. The forested area near the junction with the TESC Parkway was important for Northwestern Salamanders, as well as the stretch of road south of the crossing of Green Cove Creek. Conversely, Rough-skinned Newts were primarily observed at the creek crossing (but on the road), and their highest densities occurred on a road segment south of the creek. The other species weren't found in substantial enough numbers to identify important crossing areas, but in total, large areas along the road were important for migrating amphibians. This makes sense due to the proximity and adjacency of the Green Cove Creek wetlands.

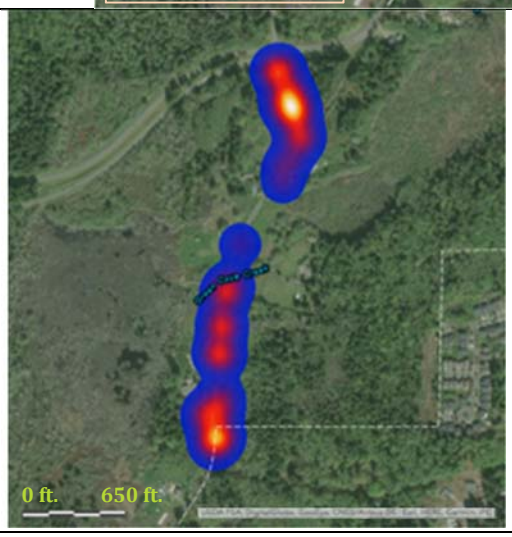
Drift fence installation at CLT Kaiser Preserve (Jan. 2018). Laurence Reeves and Michelle Stevie in photo. (*Photo: J. Schuett-Hames)*

Drift fence surveys – During February to April 2018 in collaboration with Capitol Land Trust at their Kaiser Preserve, we implemented three evening surveys of a 165-foot long drift fence. The surveys ran from 6:30 or 7:15 to 9:30 PM. Surveys of the adjacent road segment occurred every ½ hour. In total, we found 10 live amphibians at the fence (4 Northwestern Salamander, 4 Pacific Treefrog, and 2 Northern Red-legged Frog). On the road we found 16 amphibians (6 Northwestern Salamander, 4 Rough-skinned Newt, 4 Northern Red-legged Frog, and 2 Pacific Treefrog). Of these, eight were live and we assisted them across the road in their direction of travel, and the other eight were mortalities.

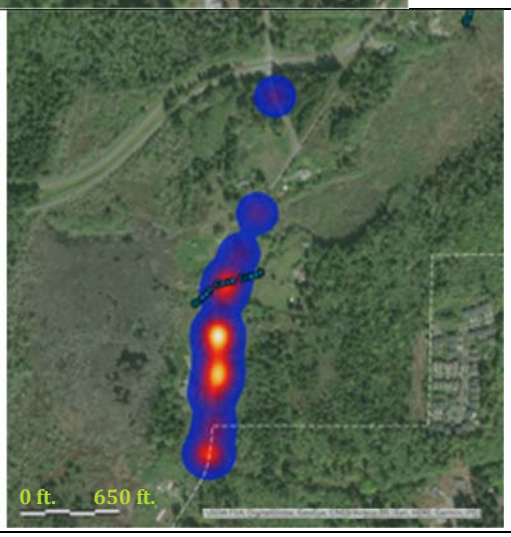
Recommendations and Next Steps

- Meet with City of Olympia to (1) provide an overview of identified migration hot spots, and (2) help guide placement and consideration of improvements to support migrating amphibians.
- Include Unit #1 along Kaiser Road as a PHS area.
- Sign this road section as "Caution – amphibians crossing next ½ mile". Include both frogs and salamanders in the depiction if possible.
- Consider and implement measures to encourage drivers that don't live or visit within this biodiverse area to use main thoroughfares such as the TESC Parkway.
- Further surveys: current traffic levels on the road make this a difficult survey area. The drift fence is promising and it allows surveys to occur off the road, but it appears many animals do not make it across the road to the drift fence. Most promising could be to reinstitute surveys at a time when measures to lessen traffic have been implemented.
- Traffic data: City of Olympia is developing baseline traffic data for Kaiser Road. This can be used in an adaptive management fashion to monitor effectiveness of traffic lessening measures. Traffic levels can also be compared with amphibian population robustness metrics.





Northwestern Salamander



Rough-skinned Newt

Figure 4. Top: Densities of migrating amphibians (all species combined) along the Kaiser Road Unit #1 survey area during 2015-18. Bottom left: Northwestern Salamander. Bottom right: Rough-skinned Newt. Locations with higher numbers of observations are indicated as an increasing gradient of brighter colors of red, orange, and yellow.

Young Road Units #1 - #5: by Bill Peer (lead)

A total of 28 surveys were conducted in this area between October 2015 and March 2018. Over 500 amphibians were observed. Unfortunately, most of the amphibians were mortalities caused by residential traffic. Live amphibians were also seen, on occasion, and were gladly helped across the road.

Young Road NW is located on Steamboat Island Peninsula and runs through a primarily residential area. There is also horse property, and an Alpaca ranch and cattle as one approaches the intersection of Young Road NW and Gravelly Beach Rd. NW. The road runs near Eld Inlet between Steamboat Island Road and Gravelly Beach Road. This area includes the "Heart of the Peninsula" wetland complex. Area streams include the fish/salmon bearing Frye Cove Creek, which runs through Frye Cove County Park, and then into Eld Inlet. The full survey area is 3.6 miles long, and includes three units on Young Road NW, and additional units for 61st Avenue NW, and Boardman Road NW. Figures 5 and 6 show the survey areas.

Photo: Paul Bratescu, Animal Explorer

I grew up in southern California and moved to Olympia 3 years ago after having lived there about 59 years. In the early 1960's we had toads in our yards and flood control dams where we could go see thousands of tadpoles followed by mini toads each spring. They pretty much disappeared before the 1970's arrived.

I was brought up to appreciate nature and was always fascinated by the life cycle of amphibians, moths and butterflies. My spouse and I were thrilled to find amphibians on our property when we moved to Olympia but we were disheartened by all the deaths seen on our road. I think it is important to collect amphibian survey data for the Stream Team because:

- I don't want these wonderful creatures to disappear from our beautiful surroundings like occurred in southern California. I enjoy seeing them and knowing they are all around me.
- I hope to increase the awareness of my neighbors and hopefully get them to ask questions about what they can do to help our not often seen neighbors.
- Add to the scientific knowledge about these amphibians through data collection.

Survey Findings

Rough-skinned Newts were noted in the highest numbers, followed by Pacific Tree Frogs, Northwestern Salamanders and Northern Red-legged Frogs. A smaller number of other species were tallied during this time frame.

The majority (55%) of these animals were observed in Unit #2, while 19% were in Unit #1, and 17% were in Unit #3. Units #4 and #5 each included 5% of the observations.

Monthly observation densities for the combined Young Road units ranged from <1 to 3 animals per 1000 ft. (Appendix A). However, importantly, when the units were individually analyzed, densities of amphibians observed in Units #1, #2, and #3 were double to as much as five times greater than densities on Units #4 and #5.

Figures 5 and 6 illustrate where highest densities of amphibians were found.

Recommendations and Next Steps

- Road signs
    - Design and installation of Amphibian Migration signs to support education of area residents.
    - Perhaps signs could reference a website or have a phone number with a recording that directs interested parties to a webpage that has educational information and information about future events.
    - Possible suggestions for sign locations are: Young Road NW near intersection of Boardman Road (driving from Steamboat Island Road) and one located on Young Road immediately after turning off Gravelly Beach Road, (driving towards Steamboat Island Road). (Note: need to determine if signs would be of benefit on 61st. Numbers declined this past year.)
- Include Units #1, #2, and #3 as PHS areas.
- No longer survey Unit #5 which runs from intersection of Steamboat Island Road and Young Road NW, or Unit #4 which runs from the intersection of 61st Avenue and Boardman Road to Young Road NW. Both units have only small numbers of observations.
- Update the GIS Survey App to include the option of "Young Road Units 1, 2, and 3" as a survey area.
- Establish exactly what type of data would be of benefit to biologists and road engineers, and how best to present the data in the future.
- Monitor for changes in migratory pathways in Young Road Unit #2, where forest patches adjacent to the road were clear-cut this past year. These locations are among those with the highest densities of amphibian observations. It will be important to see if relative densities of amphibian observations decrease or remain unchanged, as this could change potential locations for crossing structures in the future.

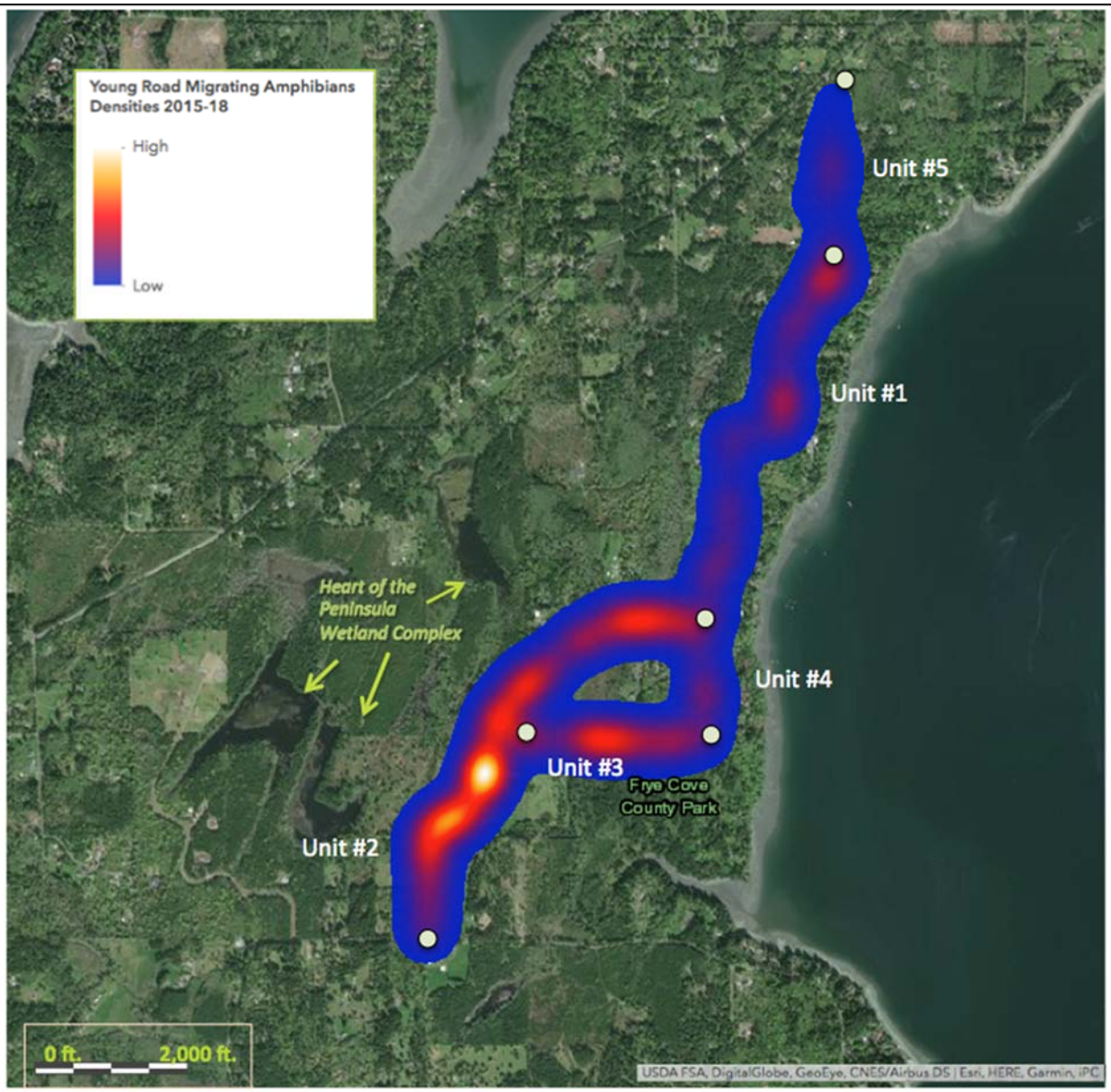
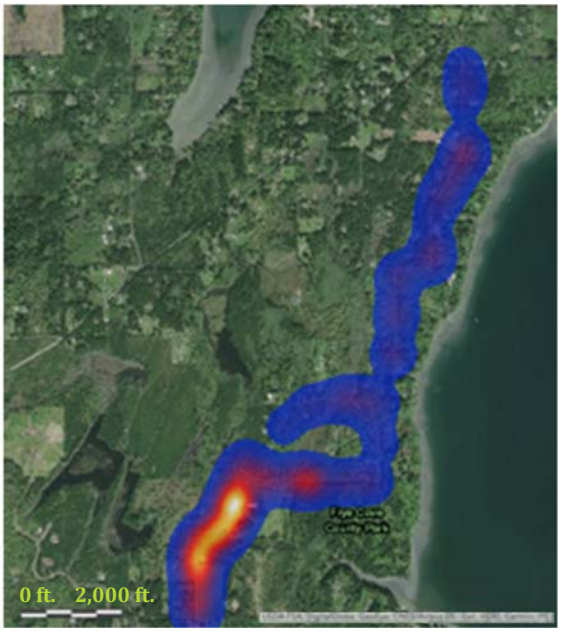
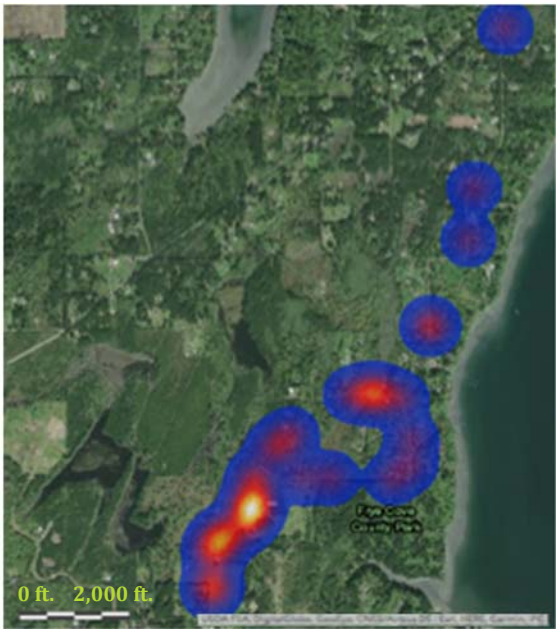


Figure 5. Unit locations (between "dots"), and densities of migrating amphibians along the Young Road survey area during 2015-18. Those locations with greatest numbers of migrating amphibian observations are indicated as an increasing gradient of brighter colors of red, orange, and yellow (which has the greatest numbers of observations). Note the proximity of the brightest and thus most dense areas of amphibian migrations to the "Heart of the Peninsula Wetland Complex".

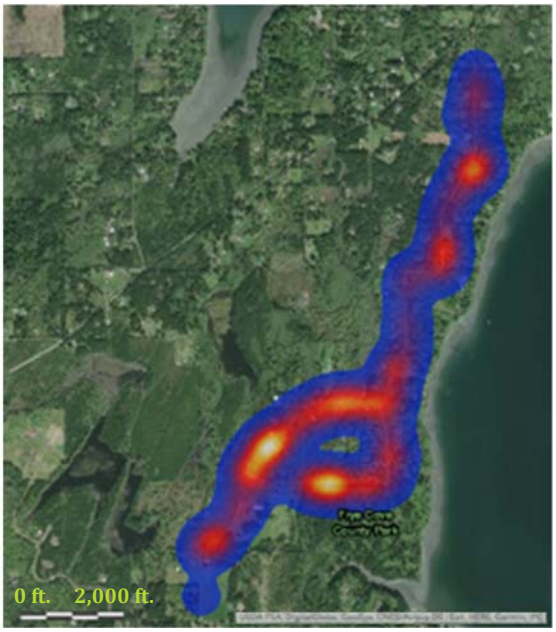


Pacific Treefrog



Northern Red-legged Frog

Northwestern Salamander



Rough-skinned Newt

Figure 6. Densities of migrating Pacific Treefrog, Northern Red-legged Frog, Northwestern Salamander, and Rough-skinned Newt along the Young Road survey areas during 2015-18. Those locations with greatest numbers of migrating amphibian observations are indicated as an increasing gradient of brighter colors of red, orange, and yellow (which has the greatest numbers of observations).

APPENDIX A. MONTHLY SPECIES COUNTS BY SURVEY AREA

Champion Dr.

MigrationYear	2015-16							2016-17							2017-18						
Survey Month	Oct	Nov	Dec	Jan	Feb	Mar	Total	Oct	Nov	Dec	Jan	Feb	Mar	Total	Oct	Nov	Dec	Jan	Feb	Mar	Total
Number of Surveys	2	2	0	1	2	2	9	2	4	0	0	2	4	12	1	1	0	1	0	2	5
Pacific Treefrog (*Hyliola regilla*)	1	2		1	1	6	11	0	0			4	1	5	6	0		0		1	7
Red-legged Frog (*Rana aurora*)	7	1		0	1	2	11	3	0			2	0	5	116	0		2		0	118
Northwestern Salamander (*Ambystoma gracile*)	47	13		3	8	2	73	48	4			15	5	72	1	0		2		2	5
Long-toed Salamander (*Ambystoma macrodactylum*)	1	0		0	0	0	1	0	0			3	0	3	0	0		0		0	0
Rough-skinned Newt (*Taricha granulosa*)	30	3		8	9	3	53	7	9			22	4	42	5	4		10		4	23
Ensatina(*Ensatina escholzii*)	1	0		0	1	0	2	2	1			0	0	3	0	2		0		0	2
Total	87	19		12	20	13	151	60	14			46	10	130	128	6		14		7	155
Total Alive	44	5		3	7	6	65	43	0			10	1	54	40	1		4		4	49
Percent Live	51	26		25	35	46	43	72	0			22	10	42	31	17		29		57	32
Avg # of Amphibians/1000 ft./Survey	15	3		4	3	2	6	10	1			8	1	4	45	2		5		1	11

Kaiser Rd. Unit #1

Number of Surveys	2	1	1	2	3	0	9	1	1	0	2	1	0	5	2	1	1	2	0	1	7
Pacific Treefrog (*Hyliola regilla*)	4	0	0	1	0		5	3	1		0	0	0	4	0	0	0	0		2	2
Red-legged Frog (*Rana aurora*)	0	0	0	1	1		2	0	0		0	0	0	0	0	0	1	0		1	2
Northwestern Salamander (*Ambystoma gracile*)	6	4	1	5	8		24	8	1		3	1	0	13	3	8	1	3		10	25
Long-toed Salamander (*Ambystoma macrodactylum*)	1	0	0	0	0		1	0	0		0	0	0	0	0	0	0	1		0	1
Rough-skinned Newt (*Taricha granulosa*)	0	1	0	2	14		17	0	1		0	1	0	2	0	0	0	1		12	13
Ensatina(*Ensatina escholzii*)	2	0	0	0	0		2	0	1		0	0	0	1	0	0	0	0		0	0
Total	13	5	1	9	23		51	11	4		3	2	0	20	3	8	2	5		25	43
Total Alive	0	0	0	0	0		0	1	1		0	0	0	2	0	0	0	0		0	0
Percent Live	0	0	0	0	0		0	9	25		0	0	0	10	0	0	0	0		0	0
Avg # of Amphibians/1000 ft./Survey	2	2	0	2	3		2	4	1		1	1	0	1	1	3	1	1		9	2

Young Rd. Units #1 - 5

Number of Surveys	0	0	0	0	1	2	3	3	3	2	2	1	3	14	1	2	2	2	1	3	11
Pacific Treefrog (*Hyliola regilla*)					14	3	17	25	9	1	11	24	9	79	21	22	0	2	17	21	83
Red-legged Frog (*Rana aurora*)					0	0	0	16	3	0	5	0	0	24	5	3	0	1	0	2	11
Northwestern Salamander (*Ambystoma gracile*)					4	4	8	1	0	1	4	2	0	8	13	18	6	2	2	6	47
Long-toed Salamander (*Ambystoma macrodactylum*)					0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3
Rough-skinned Newt (*Taricha granulosa*)					15	24	39	29	21	2	16	15	16	99	11	41	8	24	18	26	128
Ensatina(*Ensatina escholzii*)					0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
Total					33	31	64	71	33	4	36	41	25	210	55	84	14	29	37	55	274
Total Alive					0	0	0	2	0	0	2	3	9	16	2	1	0	2	2	8	15
Percent Live					0	0	0	3	0	0	6	7	36	8	4	1	0	7	5	15	5
Avg # of Amphibians/1000 ft./Survey					2	1	1	1	1	0	1	2	0	1	3	2	0	1	2	1	1