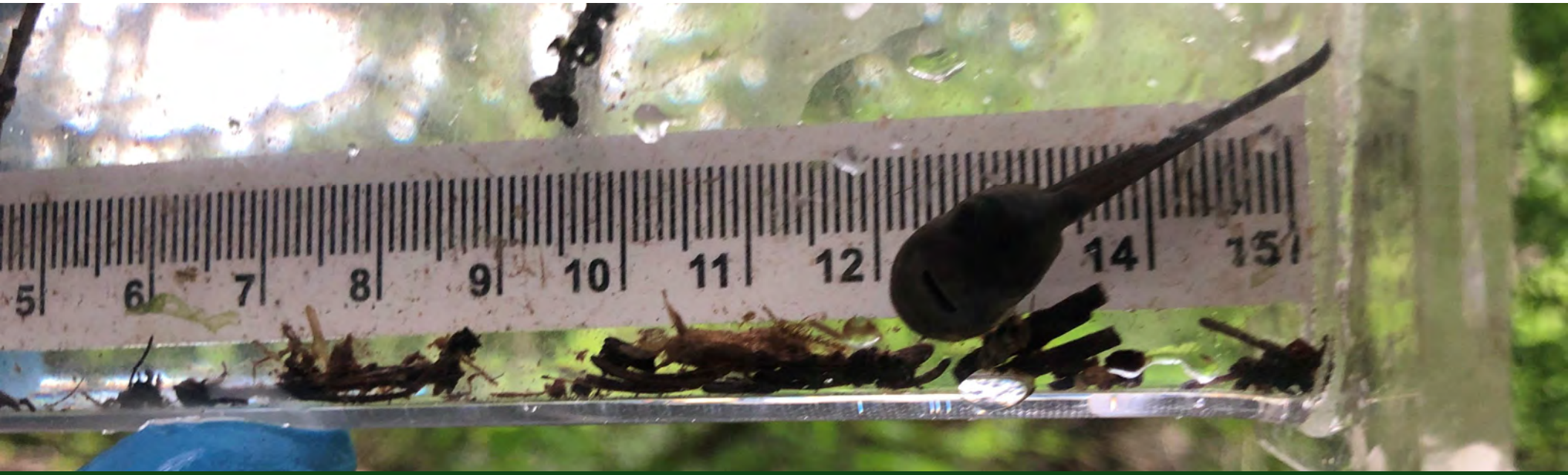


eDNA Pilot Project

AT LYNN HEADWATERS REGIONAL PARK

Robyn Worcester
NATURAL RESOURCES MANAGEMENT SPECIALIST

SCCP Conservation Connections, Oct 16, 2019

metrovancouver | REGIONAL PARKS

Metro Vancouver

21 Municipalities,
1 Electoral Area,
and 1 Treaty
First Nation

WORKING TOGETHER FOR
A LIVABLE REGION

13,557 Hectares Protected

22 Regional Parks

5 Regional Greenways

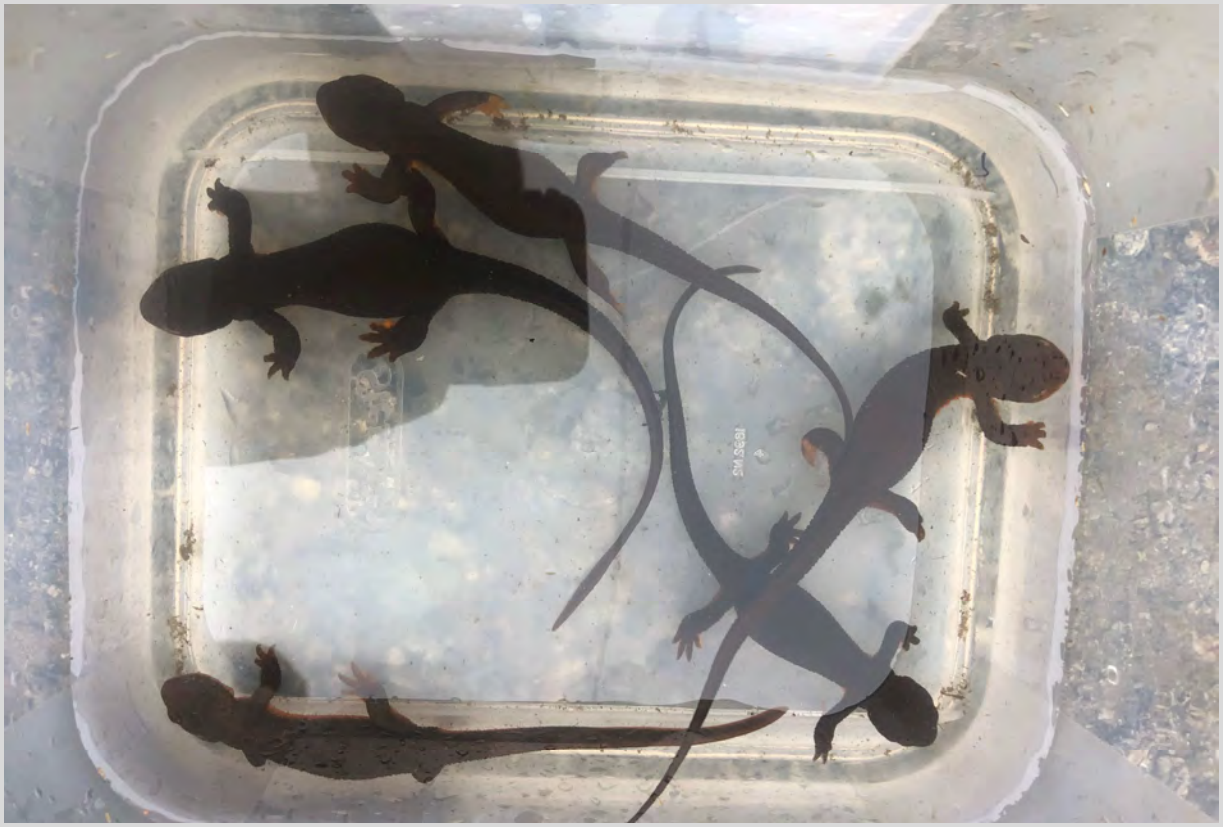
3 Regional Park Reserves

2 Ecological Conservancy Areas


OUR ROLE:
PROTECTING
Metro Vancouver's
natural areas
+
CONNECTING
people with them

What is eDNA?

- Genetic materials shed into the environment
- Most commonly used for species that use aquatic environments



Why use eDNA?

- Faster, easier, and cheaper than traditional techniques
- No animal interference required
- Helps with cryptic species
- No permits required

When to use eDNA?

- Consider species life cycle / timing
- Consider habitat - streams / rivers are most reliable
- When no abundance information is needed

How does the sampling work?

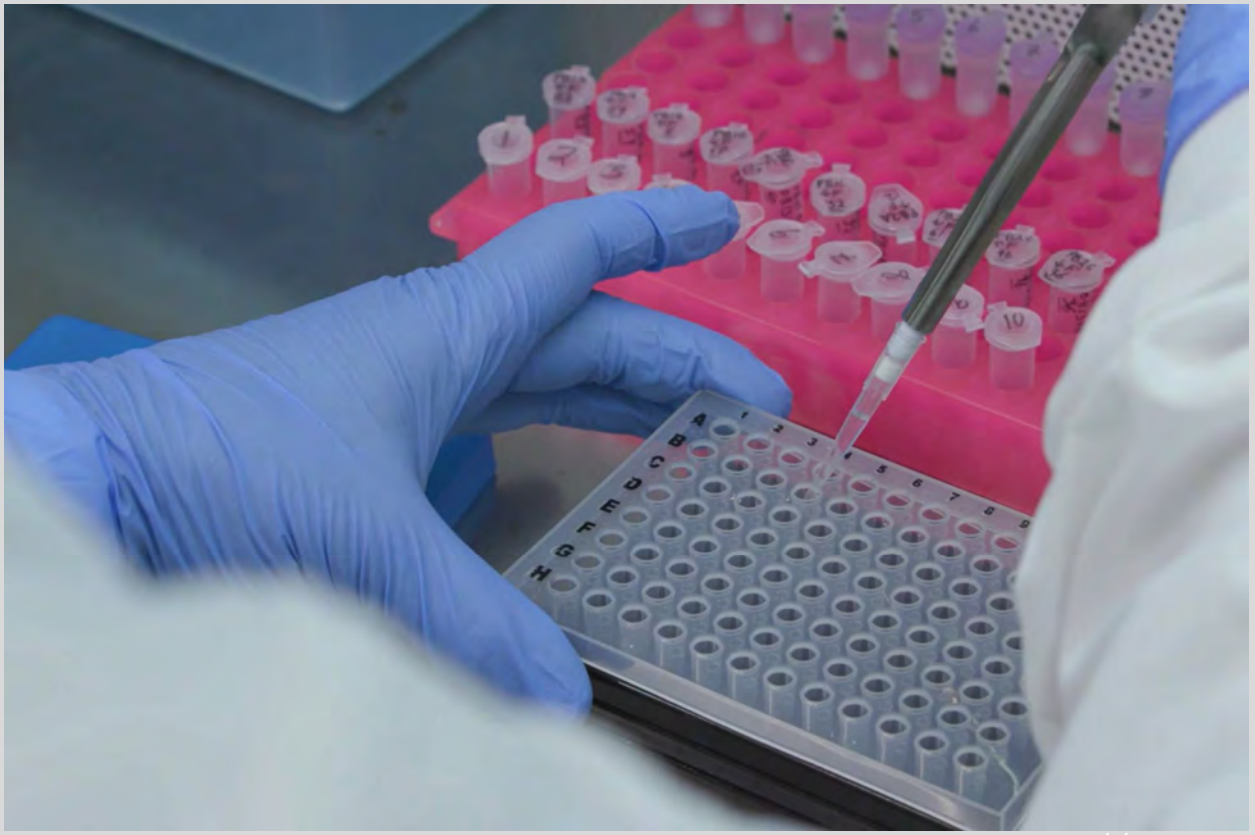
- Plan sampling sites
- Collect water samples
- Filter water to collect eDNA
- Send filters to the lab

How does the filtering work?

- Water through special filters
- Filtration with a vacuum pump
- Filter dehydrated with self-indicating silica beads

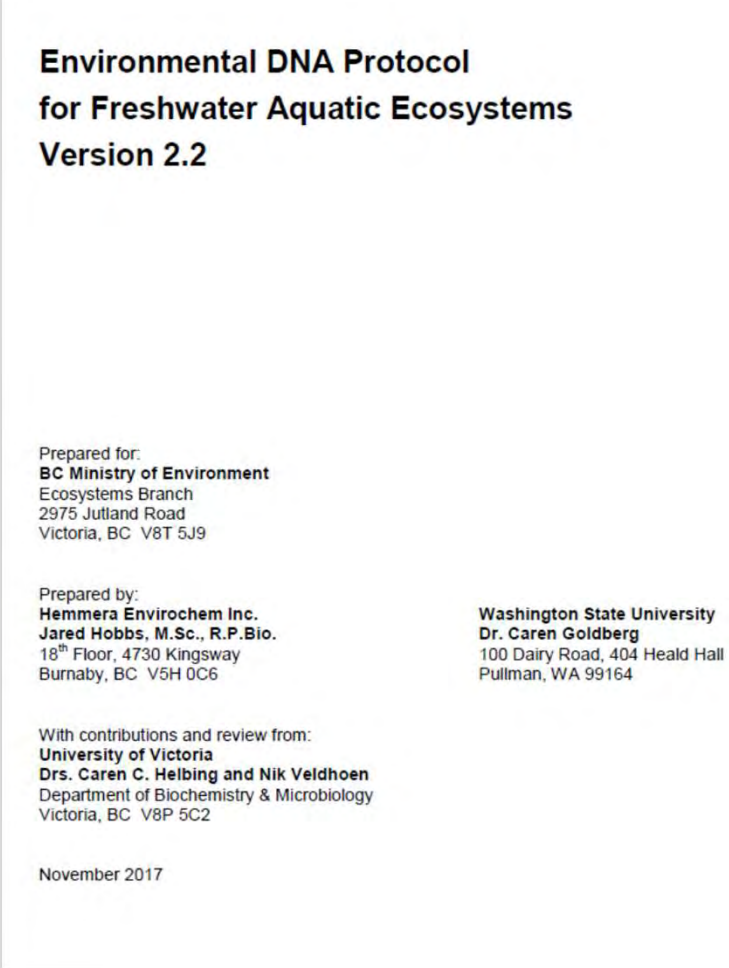
What happens at the lab?

- ‘Clean’ samples that may need it
- DNA extracted and reviewed against primers developed for target species
- qPCR technique used



Other considerations?

- Paying attention to details in field sampling and lab filtration is key to reduce contamination
- Selecting sites, timing, and weather conditions matter



Environmental DNA Protocol
for Freshwater Aquatic Ecosystems
Version 2.2

Prepared for:
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November 2017

Lynn Headwaters Regional Park Pilot

- Tested for 3 species during overlap of breeding season
- University of Victoria lab processed samples
- Film crew followed us around

Methods

- 6 sites (3 each) + one control sample = 19 samples
- DIY lab to process
- DRAFT RISC standards used

Legend

- eDNA Sampling Proposed
- Trail and Road Network

Watercourse

- <all other values>

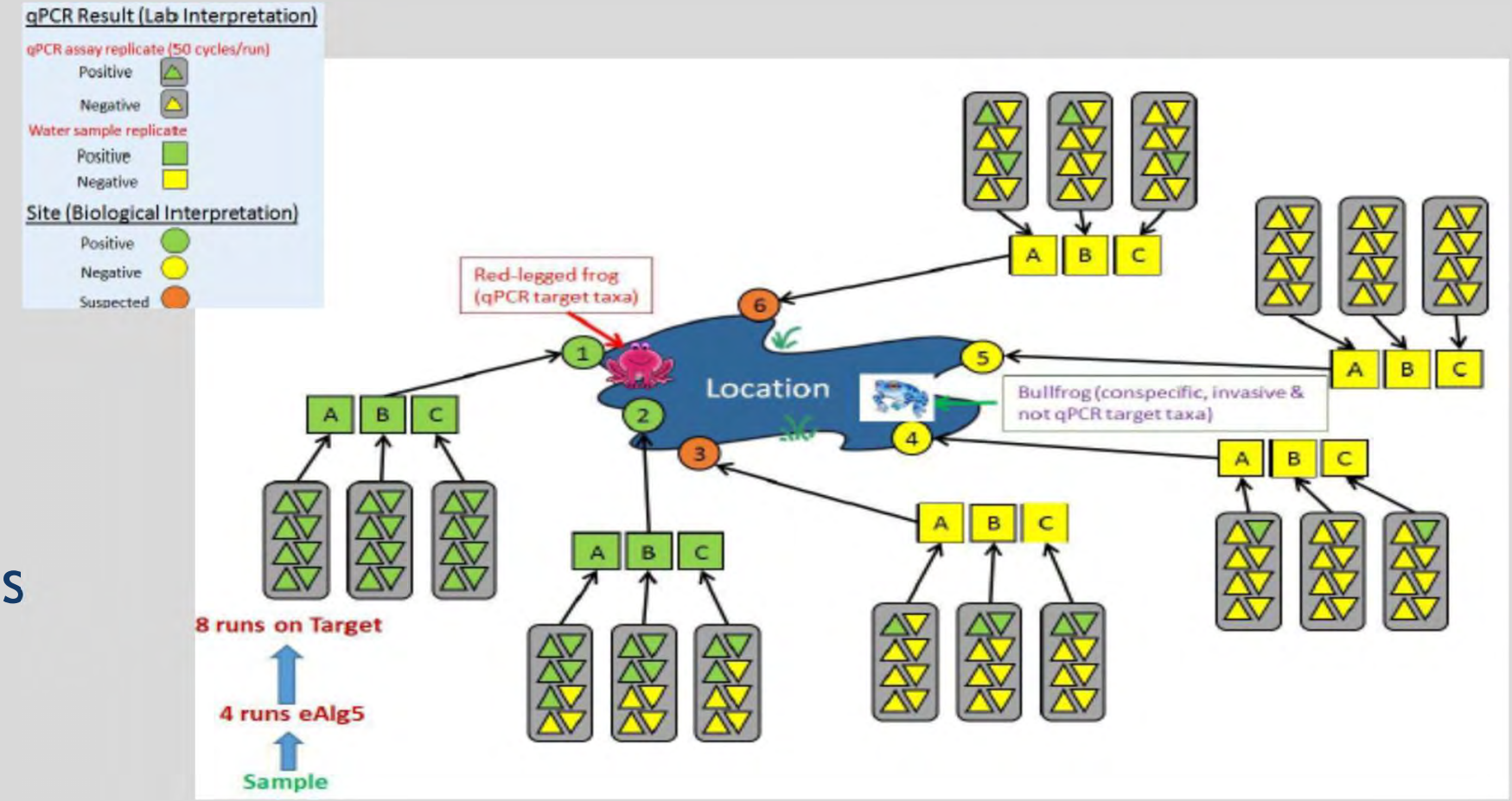
WatercourseType

- Canal
- Dam or Indefinite Storage
- Detention Pond Top
- Flume
- Hidden Drainage
- Island
- Pipeline
- Rapids
- River Stream
- River Stream Banks
- River Stream Indefinite
- River Stream Intermittent
- Sand Gravel Bar
- Slough
- Pacific Water Shrew
- Coastal Tailed Frog - Species at Risk
- Red Legged Frog

N

0 60 120 240 360 480 Meters

Results



(Taken from NRTG training notes)

Sample replicate	Collection date	Test for (TT)	eASTR4 Frequency	Lab Call	Biol Call	eRAAU1 Frequency	Lab Call	Biol Call	eSOBE4 Re-extracted	Lab
LYN1-1	14-Jun-19	ASTR,RAAU,SOBE	8/8	Y	PI	2/8	Y	PI	0/8	N
LYN1-2	14-Jun-19	ASTR,RAAU,SOBE	0/8	N	PI	1/8	Y	PI		N
LYN1-3	14-Jun-19	ASTR,RAAU,SOBE	0/8	N	PI	3/8	Y			N
LYN2-1	14-Jun-19	ASTR,RAAU,SOBE	5/8	Y	PI	0/8	N	PI	0/8	N
LYN2-2	14-Jun-19	ASTR,RAAU,SOBE	8/8	Y	PI	0/8	N	PI	0/8	N
LYN2-3	14-Jun-19	ASTR,RAAU,SOBE	6/8	Y	PI	2/8	Y	PI	0/8	N
LYN3-1	14-Jun-19	ASTR,RAAU,SOBE	5/8	Y	PI	0/8	N	PI	0/8	N
LYN3-2	14-Jun-19	ASTR,RAAU,SOBE	6/8	Y	PI	0/8	N	PI	0/8	N
LYN3-3	14-Jun-19	ASTR,RAAU,SOBE	7/8	Y	PI	0/8	N	PI	0/8	N
LYN4-1	14-Jun-19	ASTR,RAAU,SOBE	8/8	Y	PI	0/8	N	PI	0/8	N
LYN4-2	14-Jun-19	ASTR,RAAU,SOBE	0/8	N	PI	0/8	N	PI	0/8	N
LYN4-3	14-Jun-19	ASTR,RAAU,SOBE	8/8	Y	PI	1/8	Y	PI	0/8	N
1 of 1	14-Jun-19	ASTR	0/8	N	PI	0/8	N	-	0/8	N
LYN5-1	14-Jun-19	ASTR,RAAU,SOBE	0/8	N	PI	4/8	Y	PI	0/8	N
LYN5-2	14-Jun-19	ASTR,RAAU,SOBE	0/8	N	PI	6/8	Y	PI	0/8	N
LYN5-3	14-Jun-19	ASTR,RAAU,SOBE	0/8	N	PI	8/8	Y	PI	0/8	N
LYN6-1	14-Jun-19	ASTR,RAAU,SOBE	1/8	Y	PI	0/8	N	PI	0/8	N
LYN6-2	14-Jun-19	ASTR,RAAU,SOBE	4/8	Y	PI	0/8	N	PI	0/8	N
LYN6-3	14-Jun-19	ASTR,RAAU,SOBE	6/8	Y	PI	0/8	N	PI	0/8	N

1/8 = neg

Results

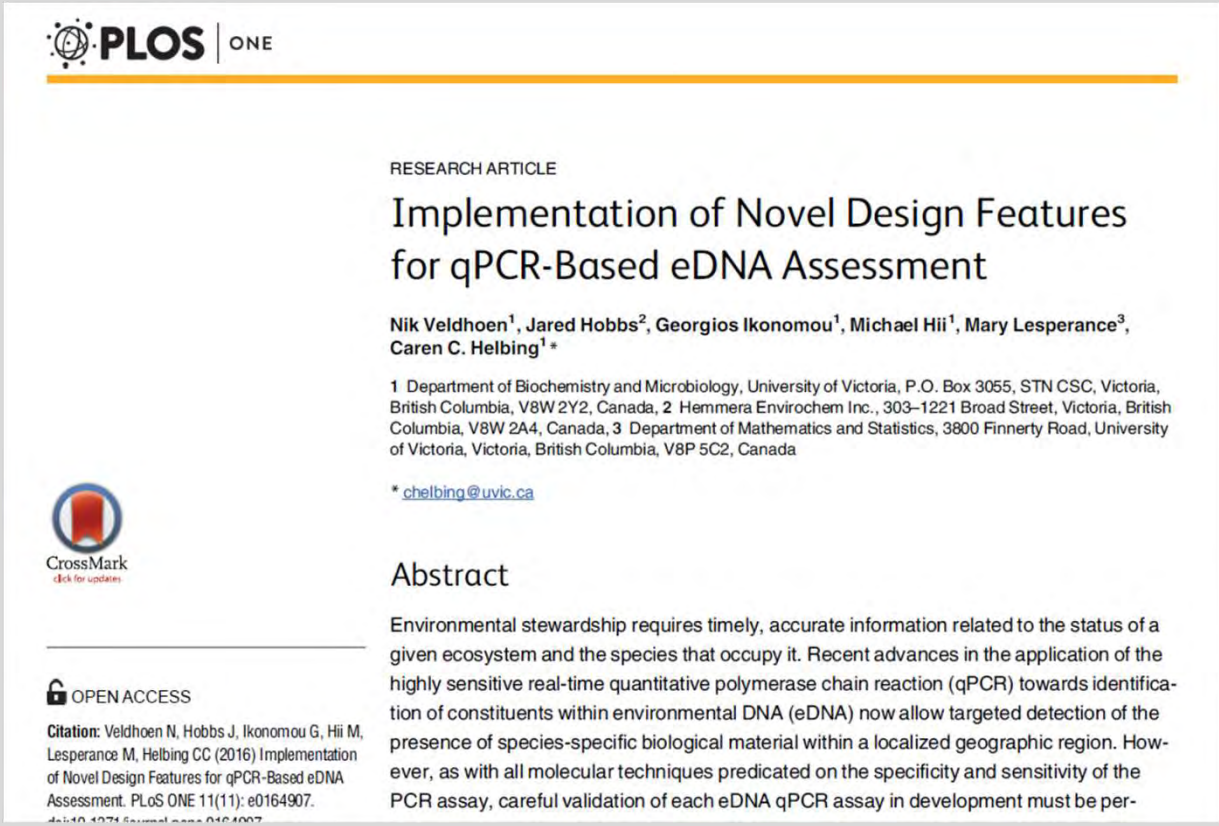
- Tailed frogs in most of the fast streams
- Red-legged frogs in the low energy areas
- No Pacific Water Shrew detected

Future Projects

- Grant funding
- New primers

Learn more

- Training through Natural Resources Training Group
- Provincial standards developed by Hemmera (published in PLOS One)



PLOS | ONE

RESEARCH ARTICLE

Implementation of Novel Design Features for qPCR-Based eDNA Assessment

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CrossMark click for updates

OPEN ACCESS

Citation: Veldhoen N, Hobbs J, Ikonomou G, Hii M, Lesperance M, Helbing CC (2016) Implementation of Novel Design Features for qPCR-Based eDNA Assessment. PLoS ONE 11(11): e0164907.

Abstract

Environmental stewardship requires timely, accurate information related to the status of a given ecosystem and the species that occupy it. Recent advances in the application of the highly sensitive real-time quantitative polymerase chain reaction (qPCR) towards identification of constituents within environmental DNA (eDNA) now allow targeted detection of the presence of species-specific biological material within a localized geographic region. However, as with all molecular techniques predicated on the specificity and sensitivity of the PCR assay, careful validation of each eDNA qPCR assay in development must be per-

Questions?

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