

# What if? How else?

Integrating Environmental DNA into Applied Ecology  
Latornell 2019

Jen Petruniak, *Partner & Technical Lead, Environmental Sciences*

# The Anthropocene

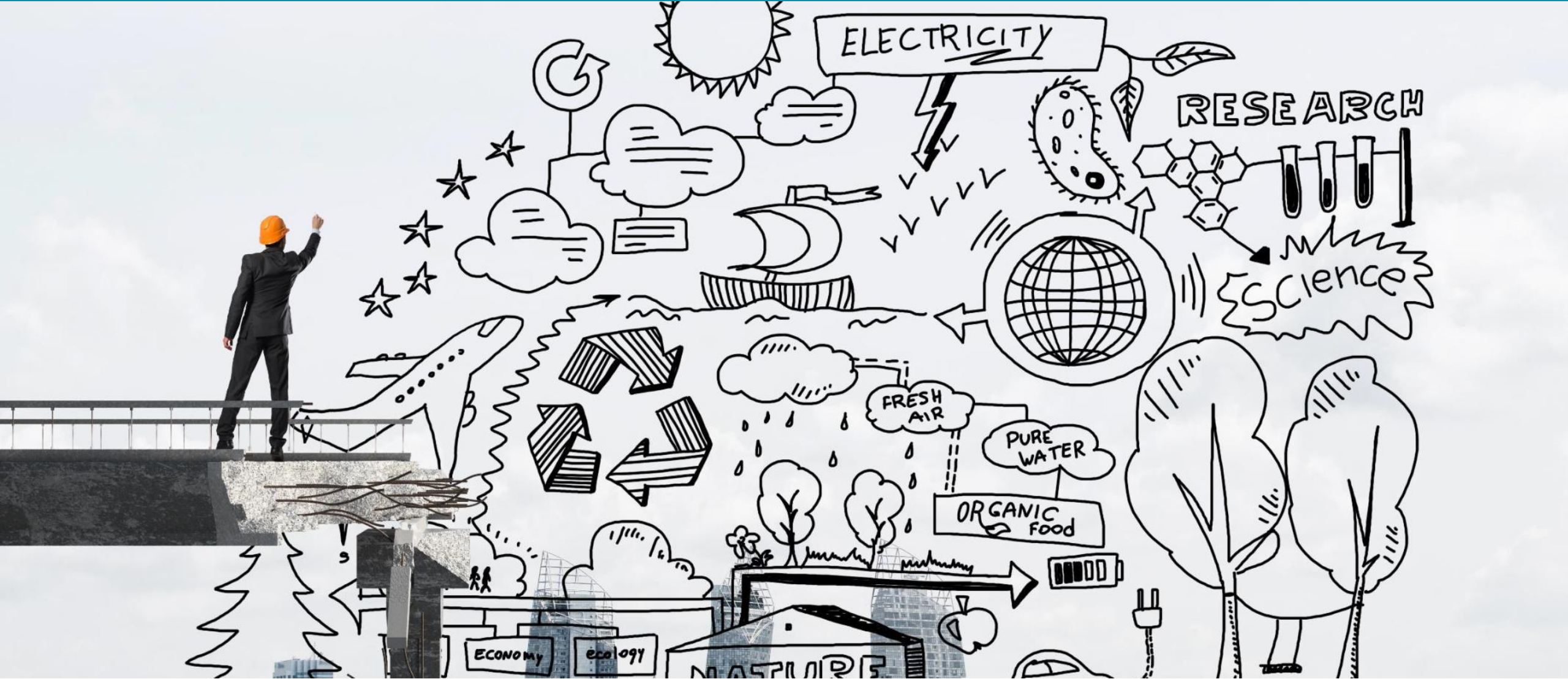
An aerial photograph of a vast agricultural landscape, likely a cornfield, showing a grid of fields and winding roads. The fields are a mix of golden-brown and green, indicating different stages of crop growth or harvest. A semi-transparent dark grey box is overlaid on the center of the image, containing white text. The overall scene is captured from a high angle, looking down on the terrain.

**Our quest for development, advancement and innovation has resulted in humans causing significant, measurable impacts on the Earth's ecosystems, including, but not limited to, climate change.**

# The Role of Government



# The Role of Applied Ecologists



## What our clients (public and private) want to know...

**What is required to obtain environmental approvals for a project?**

**What is the tried and true path forward vs. how else could we approach the situation?**

# eDNA goes mainstream

FUTURE TECHNOLOGY NATURE SPACE THE HUMAN BODY EVERYDAY SCIENCE PLANET EARTH 

Home > Nature > Loch Ness Monster: how eDNA helps us discover what lurks beneath



## Loch Ness Monster: how eDNA helps us discover what lurks beneath

For centuries, many have claimed that a creature lurks in Loch Ness. Now, by seeking out monster DNA from the loch's waters, scientists think they know what's down there.

By [Dr Darren Naish](#)

05th September, 2019 at 11:08

LIVING WORLD

## A world in a bottle of water

Revolutionary techniques using traces of environmental DNA are analyzing entire ecosystems "from microbes to wh...

By Rodrigo Pérez Ortega | 08.02.2019



**EUREKA! LAB**

### Two teens pull DNA from birds out of the air

Their new technique could help scientists track birds, using the DNA they leave behind

BY BETHANY BROOKSHIRE MAY 16, 2019 — 3:37 PM EST

JUNE 19, 2019

## New environmental DNA program makes conservation research faster, more efficient

by David Colgan, University of California, Los Angeles



### Scientists Find Significant Amount of Eel DNA in Loch Ness

Sep 10, 2019 by News Staff / Source

Published in Biology, Featured Genetics

An international team of researchers has announced the results of investigations into the environmental DNA (eDNA) present in Loch Ness, a large freshwater lake best known for sightings of the long-necked 'monster.'

### eDNA project launches first sampling event

12 Sep 2019

Share:

An international environmental DNA project that uses citizen science to monitor waterways has started this week.

FEATURED

### WASHBURN COUNTY LAKES AND RIVERS ASSOCIATION

## Invasive zebra mussels: Remain vigilant to prevent their spread

By Lisa Burns and Cathie Erickson | Washburn Co. Lakes & Rivers Association | Jun 15, 2019

### \$20M grant awarded for DNA-based ocean monitoring

August 29, 2019 on News, Waterfront

**Environmental DNA Protocol  
for Freshwater Aquatic Ecosystems  
Version 2.2**

Prepared for:  
**BC Ministry of Environment**  
Ecosystems Branch  
2975 Jutland Road  
Victoria, BC V8T 5J9

Prepared by:  
**Hemmera Envirochem Inc.**  
**Jared Hobbs, M.Sc., R.P.Bio.**  
18<sup>th</sup> Floor, 4730 Kingsway  
Burnaby, BC V5H 0C8

**Washington State University**  
**Dr. Caren Goldberg**  
100 Dairy Road, 404 Heald Hall  
Pullman, WA 99164

With contributions and review from:  
**University of Victoria**  
**Drs. Caren C. Helbing and Nik Veldhoen**  
Department of Biochemistry & Microbiology  
Victoria, BC V8P 5C2

November 2017

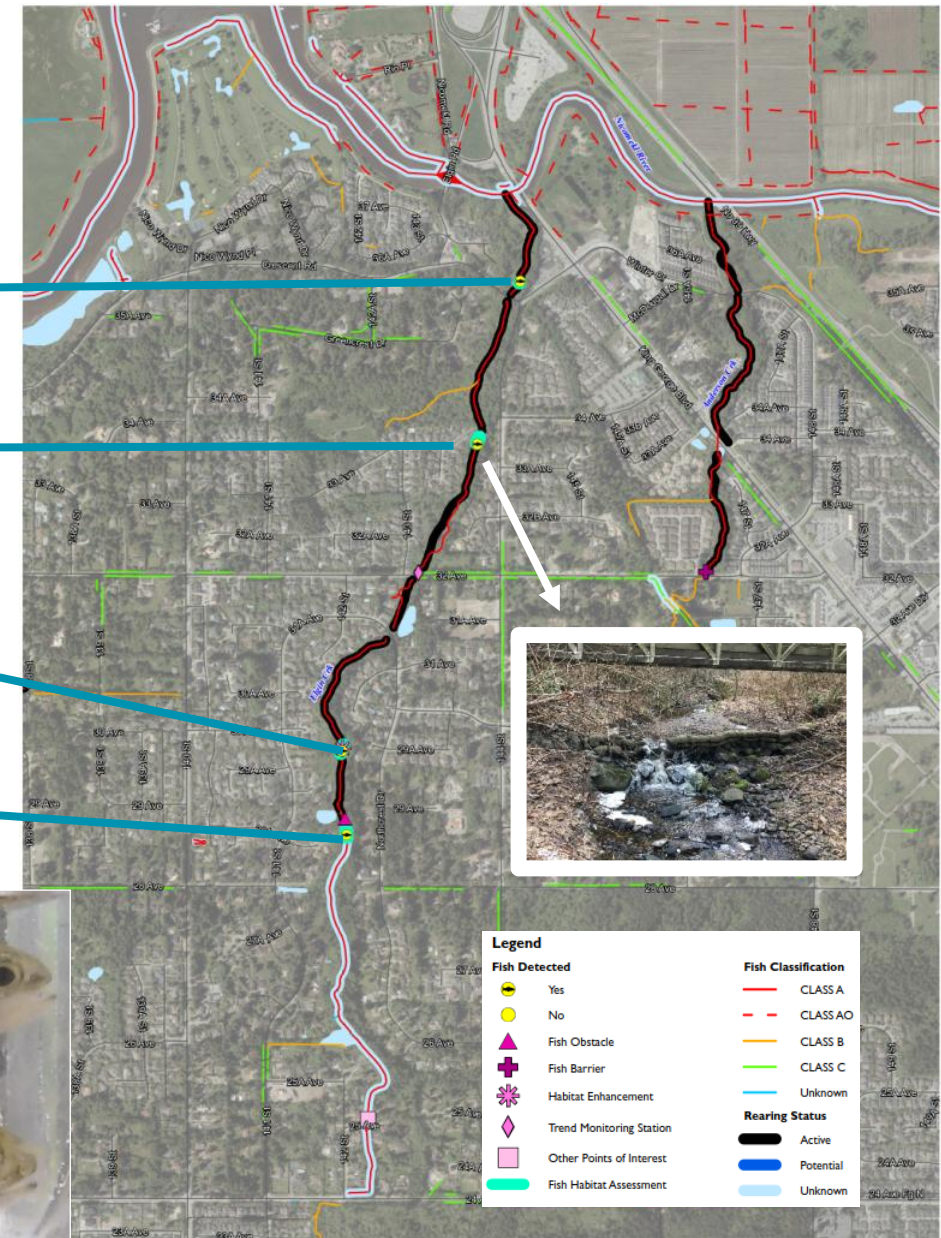


# Salmon Habitat Restoration Program

- City of Surrey (BC) program to educate businesses and the community on salmon stewardship and employs youth to enhance fish habitat
- For a specific creek, the City wanted to determine the extent of salmonid above potential in-water obstacles
- Combined habitat assessment, minnow trapping (MT) and eDNA techniques



Site	Common Name	eDNA	Minnow Trapping
1	Coho Salmon	Present	3
	Cutthroat Trout	Present	1
2	Coho Salmon	n/a	2
	Cutthroat Trout	n/a	4
3	Coho Salmon	Present	1
	Cutthroat Trout	Not detected	0
4	Coho Salmon	Not detected	n/a
	Cutthroat Trout	Present	n/a

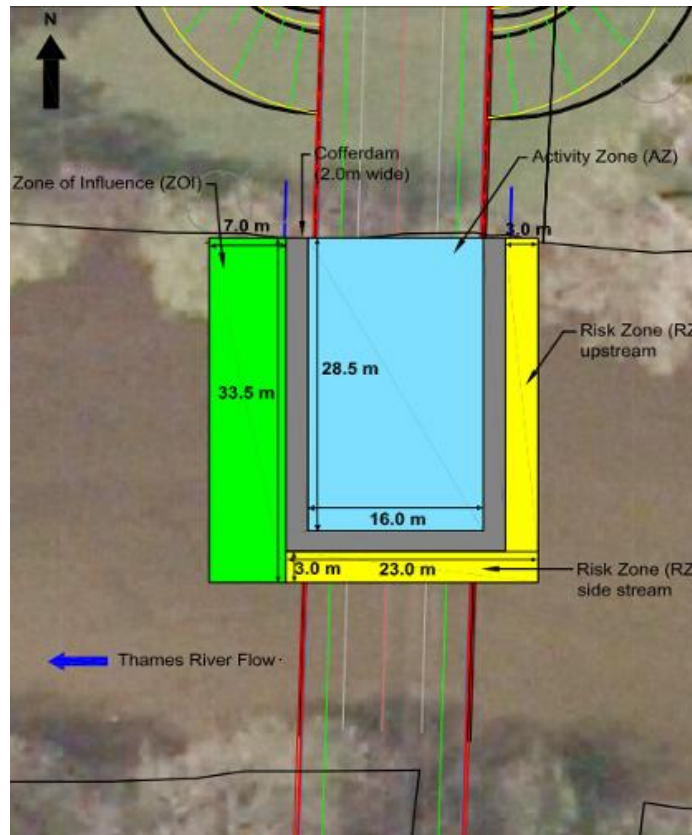


- Coho salmon and cutthroat trout detected upstream of sandbag wall, confirmed not a fish barrier
- eDNA sampling and minnow trapping yielded similar results for fish presence and distribution
- Future investment for stream protection and habitat enhancement at Elgin Creek



# Building a Bridge

- Two-span bridge design with 1 pier
- Potential for freshwater mussel SAR
- Client required to pay for relocation without confirmation species is present
- Limited relocation timing window for mussels
- Prescribed search area 1,000 m<sup>2</sup>
- Schedule constraints + Budget implications



## Where eDNA can help:

- Provide evidence of SAR presence and validate costs and schedule constraints
- Needs from academia to link with government: establish parameters for eDNA survey methodology that align with the Protocol for the detection and relocation of freshwater mussel species at risk in Ontario-Great Lakes Area (DFO 2008)
- Needs from regulators: accept eDNA survey results

# Managing Drainage

- Steps that must be taken to minimize adverse effects:
- If the species is a turtle species, the person must not reduce the level of the water in an area of a drainage works or ditch where a member of the turtle species is **likely** to be hibernating.
- How do we balance protecting property and protecting species?



## Where eDNA can help:

- Provide evidence of SAR presence to improve decision-making
- Needs from academia and government: approved sampling protocols to determine absence from a system in advance of drainage management

# Summary

Environmental DNA is an important step in advancing our abilities to collect ecological data.

- Academia, government and industry all have roles to play in implementing how eDNA can complement traditional ecological monitoring. But there should be agreement in the how....***Is it possible to “standardize” the collection of eDNA in the field?***
- Given the pace of innovation and increase in early adopters, interest in applying eDNA is widespread. ***What are the benefits and drawbacks of implementing eDNA now to support decision making as part of environmental assessments and permitting?***

# Thank You for Attending

Questions or to Continue the Conversation:  
Jen Petruniak  
Dillon Consulting Limited  
Email: [jpetruniak@Dillon.ca](mailto:jpetruniak@Dillon.ca)  
[@jen\\_petruniak](#); [@Consult\\_Dillon](#)  
Tel: 416-671-6825