AQUATIC eDNA FOR STATE AND FEDERALLY LISTED SPECIES

eDNA applications
Overview

- What is eDNA?
- Why eDNA?
- How do you collect eDNA?
- Applications
What is eDNA?
eDNA comes from biological material shed into the environment in the form of tissues, cells, feces, and naked DNA.
eDNA is a particle
Water
Why we do eDNA

1. Where are they?
2. How many are there?
3. How are they doing?
When does it make sense to use eDNA?

- Is the species rare or cryptic?
- Can you get a permit to survey otherwise?
- Do other survey techniques work?
- What is the goal of the survey?
How does this work?
Pump Apparatus

A) Cordless drill (brushless)
B) Pump ½” driver bit
C) Peristaltic Pump mounted to 2x6
Filter apparatus

Filter Apparatus
A) Sterivex™ filter (0.45um)
B) Silicon tubing
C) Tube adaptor
D) Inlet caps
E) Outlet caps
Complete Apparatus
Sampling and capping
Probability of detecting (PoD) DNA in the environment given a set of variables

Variables effecting PoD

- Volume
- Filter pore size
- Distance from source
- Biomass
- # Filters
How many filters?

* Eric Waits and Roy Martin
US EPA
Applications
Determining PoD of Delta Smelt at CVP

This distance configuration can be adjusted based on access/safety.
What is Delta Smelt PoD at CVP?

PoD ≈ 0.6

- **Volume**: ≈300 ml
- **Filter pore size**: = 0.45 µm
- **Distance from source**: ≈ 200 m
- **Biomass**: = 100 fish
- **# Filters**
  - N = 1
  - N = 5
  - PoD = 99%
Giant Garter Snake eDNA

Gregg Schumer, Eric Hansen, and Scott Blankenship
Site 1 Distance away from source

<table>
<thead>
<tr>
<th>Distance</th>
<th>GGS DNA?</th>
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<tbody>
<tr>
<td>1000m</td>
<td>-</td>
</tr>
<tr>
<td>500m</td>
<td>-</td>
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<tr>
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<td>+</td>
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<td>50m</td>
<td>+</td>
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<tr>
<td>0m</td>
<td>+</td>
</tr>
</tbody>
</table>
Results: Site 2

- Sample A: +
- Sample B: +
- Sample C: +

Legend:
- Los Banos Wildlife Area Complex
- Grasslands Water District
- Federal Refuge
- Mendota Wildlife Area Complex
- Highway
- San Joaquin River
- Trapline
- GGS DNA
Development of Environmental DNA (eDNA) Methods for California Red-Legged Frog (*Rana draytonii*)

Gregg Schumer, Dan Chase, and Rob Schell
Field Survey
Translating Data and Communicating eDNA data
Molecular Diagnostic Report
Shiny is an R package that enables building interactive web apps

https://fishsciences.shinyapps.io/edna-visualization/
Terminé

Thanks!