Fishing for eDNA

Traditional fisheries management methods rely on dedicated staff to collect and count species by hand. Environmental DNA analysis can add to the management toolkit, saving valuable time and resources.

### Sampling

Endangered coho salmon

Future eDNA Network

The ESP is a versatile and economical tool for monitoring key changes in aquatic health. This monitoring might include tracking the presence of native and non-native species, identifying harmful algal blooms, tracking pollution in our nation’s waterways, and studying ocean microbes. The existing streamgage infrastructure is ideal for creating a network of autonomous eDNA sampling stations for detecting time-sensitive changes in the environment and contributing to a more cohesive understanding of the ecosystem at large.

This research is funded in part by the Arthur Vining Davis Foundations (AVDF).

### Data Collection

<table>
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<tr>
<th>Data Collection</th>
<th>Preservation</th>
<th>Lab processing</th>
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<tbody>
<tr>
<td>Puck</td>
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<tr>
<td>ESP processing on-site</td>
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### Archival analysis

Archival analysis

Real-time analysis

### Future eDNA Network

2G ESP

Traditional

Up to 132 samples per deployment

Up to 80 samples per deployment

3G ESP

Up to 60 samples per deployment

#### Cartridge

- **Puck**
- **Case**
- **eDNA filter**
- **O-ring**

#### Puck

- **Case**

#### ESP processing on-site

- **Preservation**
- **Lab processing**

#### Data collected in a year

- **2G ESP**: 2,000 ml
- **3G ESP**: 1,000 ml

#### Up to 132 samples per deployment

- **Reagents**

#### Up to 80 samples per deployment

- **Reagents**

#### Up to 60 samples per deployment

- **Reagents**

#### Frequent water sampling

The ESP can be used to monitor for DNA changes by repeatedly collecting water samples from a single streamgage site or by monitoring multiple streamgage sites. This enables managers to detect rare and infrequent targets that would otherwise be missed by traditional sampling.

Environmental DNA, or eDNA, is the pool of DNA collected from an environmental sample. This could be water, sediment, soil, or any other suitable sample type. Environmental DNA can be collected from aquatic environments using a variety of methods, including water sampling, sediment collection, and soil sampling.

### ESP sites

- **EcoRI digest site**
- **EcoRI non-native**
- **EcoRI native**
- **EcoRI non-native**
- **EcoRI native**
- **EcoRI non-native**
- **EcoRI native**

### ESP processing on-site

- **Preservation**
- **Lab processing**

#### Real-time analysis

Real-time analysis of eDNA samples enables managers to quickly identify species of interest while the ESP is still deployed in the field. This is accomplished by performing a series of molecular techniques within the robot, returning data via a telecommunications link.

#### Archival analysis

Archival analysis

#### Filter eDNA onsite

Filter eDNA onsite

### Non-native species

- Steelhead trout
- Non-native striped bass
- New Zealand mud snails

### Traditional fisheries management methods

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<table>
<thead>
<tr>
<th>Environment</th>
<th>DNA Collection</th>
<th>DNA Analysis</th>
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<tr>
<td>Water</td>
<td>Water sampling</td>
<td>Water sample</td>
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<tr>
<td>Sediment</td>
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### Future eDNA Network

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