Spatial Distribution and Effects of Sewage on Puakō’s Coral Reefs

Goals

- Use chemical and biological tools to determine if sewage is entering coastal waters
- Determine if sewage is impacting water quality
- Assess coral reef community-level response to sewage

Objectives

1. **Dye Tracer Studies**: Use dye to document connection between cesspools and ocean
2. **δ¹⁵N Seaweed Measurements**: Evaluate presence and spatial extent of sewage near- and offshore
3. **Fecal Indicator Bacteria & Nutrient Measurements**: Determine if DOH water quality standards are exceeded
4. **Benthic Community Responses**: Assess responses of corals, fishes, and macroinvertebrates to wastewater
Findings

Dye travel time was 3 days from cesspool to ocean, only observed at low tide and localized

\[ \delta^{15}N (\%) \]

Sewage \( \delta^{15}N = +7 \) to +20 %
Soil N \( \delta^{15}N = +2 \) to +5 %
Fertilizer/Kiawe \( \delta^{15}N = 0 \) to +3 %

\[ \begin{array}{c}
3.57 - 4.15 \\
4.16 - 5.63 \\
5.64 - 7.04 \\
7.05 - 8.85 \\
8.86 - 11.70 \\
\end{array} \]

Fecal indicator bacteria (Enterococcus & C. perfringens) and \( \delta^{15}N \) seaweed values indicate sewage presence at multiple locations

Remaining Work

- Two more dye tracer experiments
- Nutrient, bacteria, and \( \delta^{15}N \) seaweed measurements including offshore seaweed cage experiments
- Coral and fish sampling

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