# Hydrocarbon Variation Across Urban Shorelines

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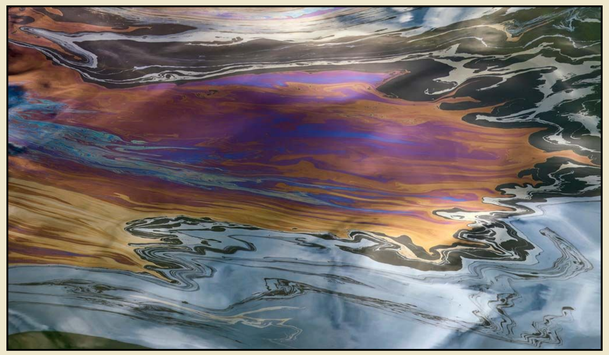
## Introduction



Urban areas can introduce hydrocarbons into local water bodies. Bridges, rocky edges, and nearby shores may accumulate oil from runoff and human activity. Using hydrocarbon detection strips, we will compare contamination at three sites: water near a bridge, water by nearby rocks, and water along a beach about 250 feet away. Understanding these patterns is important for assessing water quality in urban environments. We hypothesize that water closest to the bridge will show higher hydrocarbon levels than the other sites.

## Objectives

Examine hydrocarbon contamination in urban water samples at three sites

- Hydrocarbons (oil) detected using B3C Hydrocarbon Contamination Test strips
- Comparison of contamination between bridge, rocks (~200 ft from bridge), and beach shore (~200 ft from bridge)
- Assess variation across sites under consistent evening high-tide conditions

Evaluate the effectiveness of simple field testing for monitoring water pollution

- Test strip response time and color intensity as a semi-quantitative measure
- Record and analyze results from repeated samples to identify patterns or differences between sites

## Methods

### Oil Contamination Testing

- Study conducted over 2 days during evening high tide (~7:30 PM).
- Three sites were sampled: bridge, nearby rocks (~200 ft from bridge), and a beach shore (~200 ft from bridge)
- Water was collected using a rope-tied bucket (bridge and beach) or by dipping strips directly (rocks).
- Hydrocarbon presence was tested using B3C Hydrocarbon Contamination Tests per manufacturer instructions.
- Strips were swirled in water for 45 seconds, removed, and results were read after ~30 seconds using the color scale.
- Each site was tested 3 times, totaling 9 measurements.

## Study Sites

This study used three sampling sites as indicators of urbanization

### AREAS IN CAVENPOINT

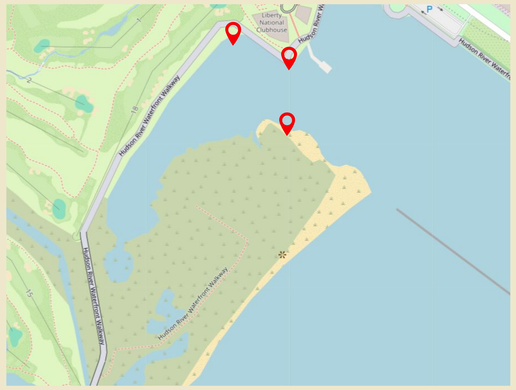
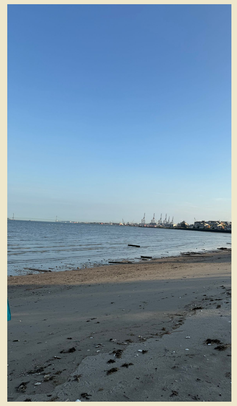



**Figure 1: locations of testing in Cavenpoint Liberty State Park: all about 200-300 feet apart from each other, stretching from the bridge to beach area**

### TESTING SITES IMAGES

Site 1: the bridge area

Site 2: the rocks area



Site 3: the beach area

**Figure 2. Three images of the sites that were tested in Cavenpoint Liberty State Park**

## Results

### Testing Site Results


### Testing Strip Oil Percentage

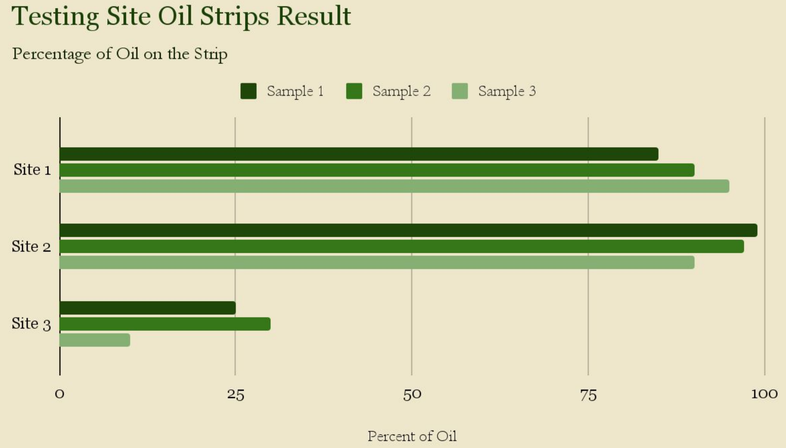



**Figure 3. Average hydrocarbon contamination (%) at three Jersey City sites: bridge, nearby rocks, and beach shore.**

## Conclusions

### Summary of Key Findings

- Hydrocarbon contamination was consistently high at the bridge and nearby rocks, with test strip readings averaging above 90%.
- The beach site showed significantly lower contamination (10–30%), suggesting reduced direct runoff influence at greater distance.
- These results support the hypothesis that sites closer to human activity and structures (bridge, rocks) accumulate more oil.
- Simple field test strips provided a reliable, semi-quantitative method for detecting localized contamination patterns.
- Overall, the study highlights how even small-scale urban runoff can lead to concentrated oil presence in certain areas of the shoreline

### Ecological Implications

- This waterfront area is home to over 50 species of birds, many of which rely on the shoreline for feeding and nesting.
- Persistent oil contamination poses risks to bird health by affecting plumage, feeding, and water quality.
- Hydrocarbons may also disrupt the aquatic food chain, reducing the availability of fish and invertebrates that birds depend on.
- The findings emphasize the importance of monitoring oil pollution to protect local biodiversity.

## Future Directions

- Conduct sampling across multiple times of day and tidal cycles to assess temporal variation in hydrocarbon levels.
- Expand testing to more urban sites to determine whether contamination patterns are consistent.
- Use more precise laboratory-based hydrocarbon analysis to validate and calibrate the strip results.
- Build an accessible webpage (using Python frameworks like Flask or Django) where community members can explore the findings and contribute additional data.
- Present findings to the local district to encourage awareness and pollution mitigation efforts.
- Develop youth- or school-led monitoring programs that use simple test strips for ongoing citizen science.

## Acknowledgements

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