

Statement of Work

Patuxent River Damage Assessment of the Chalk Point

Oil Spill on Shallow Water and Intertidal Benthos

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The proposed study will survey three Patuxent River sites to assess whether any oil-related impacts could be found from the April 2000 oil spill. The sites have been chosen to represent exposure to different quantities of the oil released at PEPCO's Chalk Point facility.

STUDY DESIGN

Sites. We will contrast samples from 3 sites, each in a different tributary or creek entering the Patuxent River (Figure 1). The sites were chosen based on the advice of a representative of the Trustees and differ in the degree of their exposure to oil. The most heavily-oiled site is in Swanson's Creek, the moderately-oiled site is in Trent Hall Creek, and the reference or control site that received no oil is in Hunting Creek.

Every effort was made to choose specific locations within the creeks that share similar environmental characteristics other than their exposure to oil. Based on field examination, sites were chosen that had significant amounts of sands and muds (sandy muds to muddy sands), were located in areas close to or adjacent to marshes, and had similar wave exposure.

Sampling Design. All 3 sites will be sampled on the same day. Samples will be collected from the lower intertidal to shallow subtidal zone immediately adjacent to the shore. Samples will be collected during the time period between mid and low tide and taken in water < 0.3 m depth. Every effort will be made to sample from the same tidal height or water depth at all 3 sites.

Sample Number. Ten replicate samples of each type will be collected at each of the 3 sites. Sampling locations will be at least 1 m apart and chosen randomly (see below).

Sample Types. The proposed sampling program concentrates on the intertidal to shallow subtidal fauna that inhabits the sediments. Two types of samples will be taken at each creek site:

a. Core Samples. At each of the 3 field sites a 20-m transect line marked at 1 m intervals will be placed parallel to the shore. Samples will be taken at 10 of the 1-m marked locations along the transect. These 10 locations will be chosen randomly. At each of the 10 locations a meter stick will be centered perpendicular to the transect line and parallel to the surface of the water, and the actual sample location will be randomly marked at either end of the stick. Thus the 10 replicate samples will be collected at 10 random locations along a 20-m transect with each sample randomly collected 0.5 m above or below the transect.

Each sample will be collected as a core sample. These cores will be approximately 15 cm in diameter and 20 cm in depth. Approximately 3.5 l of sediment will be sampled by each core. The sediment collected from each replicate core will be placed in a separate plastic lidded container, returned to the laboratory and refrigerated. Initial processing of the cores, consisting of sub-sample collection and sieving of the bulk of the sediment for macroinvertebrates, will be done within 24 h of collection. Sub-samples will be taken after the mixed core sediments in each container. Sub-sampling will include the collection of 100 g of the sediment for grain size analysis and 20 ml that will be frozen for subsequent analysis of organic matter content.

1. **Macroinvertebrate Samples.** The remaining bulk of the sediment will be sieved using a 500 μm screen. All material retained on the sieve will be fixed in formalin and stained with Rose Bengal. After approximately 1 wk samples will be transferred into alcohol. Subsequently, samples will be examined using a dissecting microscope and all macroinvertebrate organisms will be identified and counted.
2. **Sediment Grain Size Analysis.** The 100 g sample will be sieved using a series of stacked screens with mesh sizes of 1.000, 0.500, 0.250, 0.125 and 0.062 mm (Butler and McManus 1979, Buchanan 1984). The sediment will be sieved wet to avoid aggregation of the finer particles as a consequence of drying. All water and sediment passing through the 0.062 mm sieve will be retained and filtered to retrieve the fine silt - clay sediments (Butler and McManus 1979). The proportion of the sample in each of the 6 size classes will be determined by volume and dry weight and used to characterize the sediment and any differences within and among the 3 field sites.
3. **Organic Matter Content.** The 20-ml frozen samples will be analyzed using the ignition method (McCave 1979, Rosa et al. 1991) for organic matter content. Each sample will be dried at 60° C, weighed, combusted at 450° C, and then re-weighed. The difference in weight before and after combustion will be used to estimate the proportion of organic matter in each sample. Combustion will be at 450° C to avoid the combustion of any shell (carbonate) material in the samples (Rosa et al. 1991).

b. Chemistry Samples. A 200-g sediment sample from the top 5-10 cm of the bottom will be collected adjacent to each core sample. Each sample will be collected by hand-scooping a sample with the hand covered by a new disposable glove for each sample. Each sample will be placed in a collection jar supplied by Entrix and sealed. Samples will be conveyed at the sampling site to a representative of the NRDA Trustees or Entrix for disposition.

Environmental Data. We will take a variety of background environmental data each time a site is sampled. These data will include salinity, water temperature, field observations on the presence of oil, sampling time, and the water depth of each core sampling site.

Data Analysis. Differences in the composition and structure of the communities at the three sites will be compared. As appropriate, these analyzes will include standard classification and ordination analyzes. Populations of key species will also be contrasted among the sites. In general a one-way analysis of variance will be used to compare abundances at the 3 sites. However, if environmental variables such as oil contamination or sediment grain size varies significantly within a site, then regression analyzes will be used.

References

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