

**Oil and Hazardous Spill Access Point Inventory of
River Parishes and Northern Lake Pontchartrain**

**Dr. Russell B. Bender, Jr.
Nicholls State University**

Disclaimer

This report was prepared under a contract between Nicholls State University and the Louisiana Applied and Educational Oil Spill Research and Development Program (OSRADP). The contents of this document do not necessarily reflect the views and policies of the Louisiana Oil Spill Coordinator's Office—Office of the Governor or those of the Louisiana Applied and Educational Oil Spill Research and Development Program, nor does mention of trade names or commercial products constitute endorsement or recommendation for use by the state of Louisiana.

Citation

Bender, Russell B. and David L. Schultz. 2001: Oil and hazardous spill access point inventory for Southeast Louisiana. Nicholls State University. Louisiana Applied and Educational Oil Spill Research and Development Program, OSRADP Technical Report Series R186879, 11 p.

Acknowledgements

Discussions with and comments by Dr. David Schultz, Nicholls State University, improved the text. I am especially grateful to Stephanie O'Roufle, my student worker, who was essential to the project's completion. The project was supported by a grant from OSRADP (R186879).

Table of Contents

Abstract

List of Tables

 Access Point Ownership and Access.

List of Figures

 Facility Data.

 Store Data.

 Support Data.

 Photo Data.

 Contact Data.

1.0 Introduction

2.0 Methods

3.0 Results

4.0 Problems Encountered

5.0 Future Plans

6.0 Appendix A

1.0 Introduction

The role of invertebrates as indicators of environmental quality has received considerable attention (Magurran 1988) because of their wide distribution, responsiveness to environmental change, and fundamental importance in ecosystem function. Rosenberg (1976) and Schafer (1973) documented a reduction in invertebrate community diversity resulting from pollution and nutrient enrichment in marine ecosystems. Invertebrate communities were used successfully for assessment of oil pollution in marine invertebrate communities where initial mortality was high, abundance and diversity were reduced, and recovery was slow (Suchanek 1993; Jackson et al. 1998).

Terrestrial invertebrates have great utility as bio-indicators of upland oil pollution because of their responsiveness to microhabitat changes and their direct contact with contaminated soil. Altered invertebrate abundance has been associated with changes in plant species richness (Siemann et al. 1997), plant productivity (Siemann 1997), structural complexity of individual plants (Lawton 1983; Bach 1981), plant age (Heatwole and Lowman 1986; Lowman and Heatwole 1992), presence of specific plant species (Kaakeh and Dutcher 1992), soil moisture (Messenger 1959; Cloudsley-Thompson 1962), soil temperature (Fargo and Pepperly 1989; Reichert and Tracy 1975), and nutrient enrichment (Tomascik and Sandler 1987).

The abundance of macroinvertebrates such as Acari and Collembola were found to respond negatively to acid and sulfate salt solutions applied to forest soils in Tennessee (Craft and Webb 1984). Studies in Russia and Europe suggest that Acari, Collembola, earthworms (Terricolae), and enchytraeids (Oligochaeta) are susceptible to crude oil contamination (Filimona and Pokarzhevskii 2000). Survival and reproductive success of enchytraeids were negatively correlated with the amount of crude oil in the soil (Filimona and Pokarzhevskii 2000). These studies suggest that enchytraeid abundance may be useful as a bio-test for oil contamination in Russia. Since invertebrate communities respond to soil contaminants as well as habitat variables, they may serve as an integrated measure of environmental quality.

Changes in invertebrate community diversity may be quantified with diversity indices (Magurran 1988). Diversity indices were effective in assessing changes in reef-building corals subjected to eutrophication in the West Indies (Tomascik and Sander 1987). Wu (1982) used changing Shannon Diversity Index values to document an increase in epibenthic community diversity with increasing distance from a pollution source.

The difficulty faced by researchers attempting to derive an easy-to-use invertebrate index to habitat change is that many invertebrate species have limited distributions and may be restricted to specific habitat types. The collection and species-level identification of all organisms inhabiting a specific region is difficult, costly, and time-consuming (Hammond 1994). As a result, the applicability of these species-based indices is limited. An approach recommended by conservation biologists is to focus on single taxa that may represent all organisms within a region (Oliver and Beattie 1996; Schoenly et al. 1998).

In order for this approach to work, the single taxa must be easy to identify, cost-effective to sample, widely distributed, continuously present in all seasons, and responsive in predictable ways to environmental change (Schoenly et al. 1998). Since no single species is likely to possess all of these characteristics, we focused on multiple taxa (terrestrial organisms susceptible to capture by pit trap), and broad, easily identifiable taxonomic categories (orders). Changes in abundance of macroinvertebrate orders or changes in community composition at the order level may provide a simple ecologically sound approach to evaluating the impacts of oil pollution on upland habitat quality.

Our objectives were to: (1) quantify the effects of oil spill intensity on macroinvertebrate abundance and diversity, (2) identify macroinvertebrate orders sensitive to upland oil spill intensity, and (3) identify simple-to-use community measures that may be used to assess the effects of oil contamination on upland habitat quality.

2.0 Methods

A fenced enclosure was established in an open grassland habitat at the Louisiana Tech University Farm in North Louisiana (32° 30' north latitude, 92° 40' west longitude). The upland soils in this Shortleaf Pine-Oak-Hickory Region are sandy and well drained (Brown 1972). Within the enclosure, nine 5 x 5 m blocks were established. In each block, nine (1-m²) plots were systematically arranged 0.5 m apart. In each block, three plots were randomly chosen to receive a heavy oil treatment (0.40 cm³ oil per cm² soil surface area), three plots received a light oil treatment (0.20 cm³ oil per cm² soil surface area), and three plots served as controls. This tight grouping of plots minimized microhabitat differences within blocks. Locally acquired light crude oil was applied in May 2000. In order to capture invertebrates, pit traps consisting of a plastic funnel and a 400 ml cup containing two to three cc of ethylene glycol were placed in the center of each oiled and control plot. Pit traps (n = 81) were buried such that the top of the cup was level with the surface of the ground. Invertebrates were collected during a 10-day sampling period each season (June, September, December, March) from June 2000 to March 2002. The three-month period between collections provided adequate time for invertebrate recolonization (Bultman and Uetz 1984). Collected invertebrates were screened with a 0.071-micron sieve to eliminate debris and difficult to identify microinvertebrates. Captured macroinvertebrates and other collected organisms were counted, identified to order, oven dried for 12 hours at 38° C and weighed.

Differences in the total biomass and number of organisms captured by treatment were calculated as a percent change relative to control plots and plotted using Microsoft Excel's line-smoothing function. Hill's Family of Diversity Indices was used to quantify the diversity of captured orders (Hill 1973). Hill's Family of Diversity Indices includes N1, which is the reciprocal of the geometric mean of proportional abundances. N1 is sensitive to the presence of rare species. N2, a second index, is the reciprocal of the arithmetic mean proportional abundance and is sensitive to the abundance of common species. Richness, a count of the total number of orders, was also used to assess macroinvertebrate community diversity. A dominance index calculated as the squared sum of the importance values for each order divided by the sum of all importance values

was calculated (Odum 1971). Number of individual invertebrates and biomass were both used as importance values.

Differences in biomass and abundance of organisms in control, lightly, and heavily oiled plots were analyzed using two-way analysis of variance (ANOVA) with treatment and block as main effects. Tukey's HSD Test was used to identify differences between treatments within each order and season.

The location description consisted of a physical address or other written identifiers of the site (e.g. Big Daddy's Marina, or private launch at 38540 La Highway 22). At each site, a comment was recorded if the launch had any notable qualities that might be significant to oil spill response personnel, such as a ramp in poor condition or access restrictions (e.g. narrow roadway, high water access only, or low weight limit bridge).

Separate one-way ANOVA and Tukey's HSD Tests were conducted for each season to identify treatment effects on the mean number of organisms per trap. Diversity and dominance index values were calculated for each block, tested for normality with a Shapiro-Wilcoxon W test ($P < 0.05$), and one-way ANOVA used to determine treatment differences. One-way ANOVA also was used to determine significant differences ($P < 0.05$) in the mean number of orders per trap by treatment (Sokal and Rohlf 1995).

The water level (high, normal, low) at the time of the survey was recorded, so that depth measurements of the ramp could be viewed relative to the water level. The estimation of water level was based on watermarks on emergent structures, shoreline indicators such as vegetation or debris, and/or the evaluation made by locals at the time of the survey. Any deviation that appeared to be six inches or more from the normal level was considered sufficient to record the water level as high or low.

3.0 Results

A total of 563 access points in the parishes of Ascension, Iberville, Pointe Coupee, St. James, St. John the Baptist, and St. Landry, as well as parts of East Baton Rouge, Livingston, Tangipahoa, and St. Tammany Parishes were surveyed. Table 1 summarizes the information for each parish. All data and photographs can be retrieved from the project's database at: (<http://lamarinas.losco.lsu.edu>).

Nearly 80% of the access points that were surveyed are privately owned with no public access. These include ramps on private property and ramps and lifts on industrial sites. The remaining 20% are access points that are available to the public. Of the public access points, approximately two-thirds are semi-privately owned.

4.0 Problems Encountered

The principal problem encountered in this survey was lack of access to potential boat launches behind locked gates. Although a few of these sites were eventually accessed, many required return trips. Since the 9/11 attack on the Twin Towers in New York City, access to industrial sites has been limited. At some industrial sites, a lengthy

interview with a security officer was needed for access. Occasionally, a three week paper chase was required before access was granted. At other sites, we were simply denied access. At several semi-private launches, employees would not give any information until their manager or owner gave permission. Multiple trips were required in some cases to gain access to a single site. Before 9/11, owners of private ramps were all every civil, but after 9/11, many owners became very protective of their properties. We therefore recommend that crews wishing to access the launches bring a letter of introduction from the Oil Spill Coordinator, a letter from the local sheriff's office, and several business cards.

5.0 Future Plans

Data for the first two projects are on the website: <http://lamarinas.losco.lsu.edu>. Within the next few months, the data from this project should also be posted. Future studies relating to this project should include a continuation of the survey into areas north of I-12 in the Florida Parishes, as well as areas along other major waterways in the state. Within two to five years, information gathered in these three projects should be updated.

Access Point Ownership and Access

| Parish | Public | Semi-private | Private | Total |
|----------------------|------------|--------------|------------|------------|
| Ascension | 5 | 2 | 9 | 16 |
| East Baton Rouge | 3 | 0 | 4 | 7 |
| Iberville | 23 | 3 | 54 | 80 |
| Livingston | 3 | 11 | 147 | 161 |
| Pointe Coupee | 15 | 9 | 55 | 79 |
| St. James | 13 | 0 | 8 | 21 |
| St. John the Baptist | 12 | 1 | 29 | 42 |
| St. Landry | 9 | 6 | 12 | 27 |
| St. Tammany | 16 | 9 | 84 | 109 |
| Tangipahoa | 9 | 2 | 3 | 14 |
| West Baton Rouge | 2 | 1 | 4 | 7 |
| Total | 110 | 44 | 409 | 563 |

Table 1. Access points surveyed by parish, ownership, and accessibility. Public access sites are owned by public agencies or governmental units. Private sites are owned by private parties and allow no public access. Semi-private sites are owned by private parties and allow access for a fee. The total number of access points for the parish is estimated in the last column.

6.0 Appendix A

Facility Data

| | | |
|---------------------------------|--------------------|------------------|
| Facility ID (date zone – site#) | Contractor | Crew |
| | Date | Time |
| | Inspection Team | |
| Latitude | Longitude | Parish |
| Location Description: | | |
| Comment: | | |
| USGS Quadrangle Name | Available Lighting | Nearest Waterway |

| |
|---------------------------------|
| Water Level (High, Normal, Low) |
|---------------------------------|

| Ramp material | Width | Length | Depth at end of launch0 | Depth at 10 feet | Depth at 20 feet | Slope degrees |
|---------------|-------|--------|-------------------------|------------------|------------------|---------------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Lift type | Max. Length | Max. Width | Max. Weight |
|-----------|-------------|------------|-------------|
| | | | |
| | | | |

| Available Parking Vehicles | Count | Length | Width |
|----------------------------|-------|--------|-------|
| | | | |
| | | | |
| 18 Wheelers Y/N: | | | |

Store
Facility ID:

Data

| | | |
|--------------|---------------------------------|--------------|
| Store ID | Name | Address |
| Address (2) | City | State |
| | | Zip |
| Phone Number | (2 nd) Phone Number | Fax – Number |
| e-mail | web | |

| Store ID | Name | Address | |
|--------------|---------------------------------|--------------|-----|
| | | | |
| Address (2) | City | State | Zip |
| | | LA | |
| Phone Number | (2 nd) Phone Number | Fax - Number | |
| | | | |
| e-mail | web | | |

| Store ID | Name | Address | |
|--------------|---------------------------------|--------------|-----|
| | | | |
| Address (2) | City | State | Zip |
| | | LA | |
| Phone Number | (2 nd) Phone Number | Fax - Number | |
| | | | |
| e-mail | web | | |

| Store ID | Product ID |
|----------|------------|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Support

Facility ID:

Data

| Fuel ID | Capacity-Gal. | Fuel vehicle Y/N | Fuel trailer Y/N | Fuel vessel Y/N |
|---------|---------------|------------------|------------------|-----------------|
| | | | | |

Potable Water Available Y/N

| Power-type | Max-Amps |
|------------|----------|
| | |

Photo Data:

| Photo format | Object | Photo-File-Name |
|--------------|--------|-----------------|
| | | |
| | | |
| | | |
| | | |

Contact Data

| Contact ID | Name | Address | |
|------------|-----------|---------|-----|
| | | | |
| Address 2 | City | State | Zip |
| | | LA | |
| Phone (1) | Phone (2) | Fax | |
| | | | |
| E-mail | Web | | |

| Contact ID | Name | Address | |
|------------|-----------|---------|-----|
| | | | |
| Address 2 | City | State | Zip |
| | | LA | |
| Phone (1) | Phone (2) | Fax | |
| | | | |
| E-mail | Web | | |