Science by the Seat of the Pants

Examples and Experiences

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The Hunt for Submerged Oil

The question:
- “Can you guarantee me that this oil has not submerged?”

The answer:
- No, but I can demonstrate the following:
  - 1. Whether oil is abundant in the water column
  - 2. Whether oil is abundant on the bottom

Fine Print: (Lack of abundance does NOT indicate absence)
Review

What causes submerged oil?
- Oil is heavier than the receiving water…
- Oil entrains sediment (sand)…
- Oil encounters vertical currents…

If none of these conditions exist…

THE OIL CAN NOT SINK

Why? Sir Isaac Newton says so!
Can you prove that the oil will floats?
How dense is this oil?

Now, cut the density of the test water in half.
Finding the Oil

- Spacial Data
  - Data collected over a given area
- Point Data
  - Data collected in a specific place
- Temporal Data
  - Data collected over time
Sorbent Chain Drag
Sorbent Anchors
Monitoring Plan

- Traps/Drags/Bombs deployed at X locations
- Devices are checked at Y interval
- Degree of oiling is observed and recorded
- If oil is observed, Z action is taken
  - More traps (increases resolution)
  - More frequent monitoring (defines time of greatest impact,
Monitoring Types

- Sorbent Drag
  - Spacial Data
- Sorbent Anchors
  - Point Data
- Sorbent Traps
  - Temporal Data
Case Study

- Little Lake, LA
- Crude oil
- "Fragmented" marsh
- Poor access
Protecting Wildlife

The Question

- Will the oil on the vegetation contaminate waterfowl (or other animals) who use it?
- Is there anyway to minimize contamination?

The Answer

- I don’t know, but I think I can measure the “stickiness” of the oil, draw conclusions from that and design a solution.
The “Sorbent Duck”

I don’t THINK so!
Sorbent Duck

- Cut sorbent boom or “bilge pillow” attached to 50 ft. of line.
- The design is simple, inexpensive, made from available resources and fast.
- Method is repeatable and easy to explain.
Sorbent Duck in Practice

Before

After
Broadcast Barrier

- Which material will work best?
- Must:
  - Broadcast
  - Stick on the oil
  - Be biodegradable
  - Provide good coverage
  - Be approved
Bench Scale Test

Documentation
Field Testing

- Problem
- Control
- Test Application
- Proof of Concept
Sampling
Implementation
When is a beach clean?

- Home Heating Oil
- No sheenings
- No visible oil
- 4 months until tourists
Species at Risk

- The Question
  - How do we ensure that the beaches will not impact the users?

- The Answer
  - We need to determine the pathway of exposure, the offending element and eliminate it.

- The problem
  - You can’t see it
  - You can’t feel it
  - But…you can smell it!

- So…how do we determine “clean”? 
Determining “Clean”

- If odor is the agreed pathway of “injury” to the resource users, then how is “clean” determined?
Sensory Analysis

- Sensory Panel Design
- Analysis Methodology
- “Pass - Fail” Levels
- Sampling Collection Plan
- USE CONTROL SAMPLES
The Orange: It not just for breakfast anymore!

- Measure current velocity
- Measure current direction
- Measure erosion rate
- Identify natural collection areas
Oranges As Drogues
Toxicity Testing On A Budget
Toxicity

- A stream
- Chemical contaminants
- A previous fish kill

Is the water still lethal to fish?

Let's torture some fish.
What is needed for **LC 50, Texas Style**

- Materials:
  - Cages, line, anchor

- Specimen:
  - Fish (what species?)

- A Plan & Agreement (what is “success”)

- Being crazy enough to think you can sell this plan to the trustees.

*Let's torture some fish.*
Shoreline Cleaning Chemicals

Questions

1. Will shoreline cleaners be effective?
2. Which shoreline cleaner should be used

Develop a Plan
Got Questions?