

U.S. Department *of* Commerce

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National Oceanic *and* Atmospheric Administration
National Ocean Service

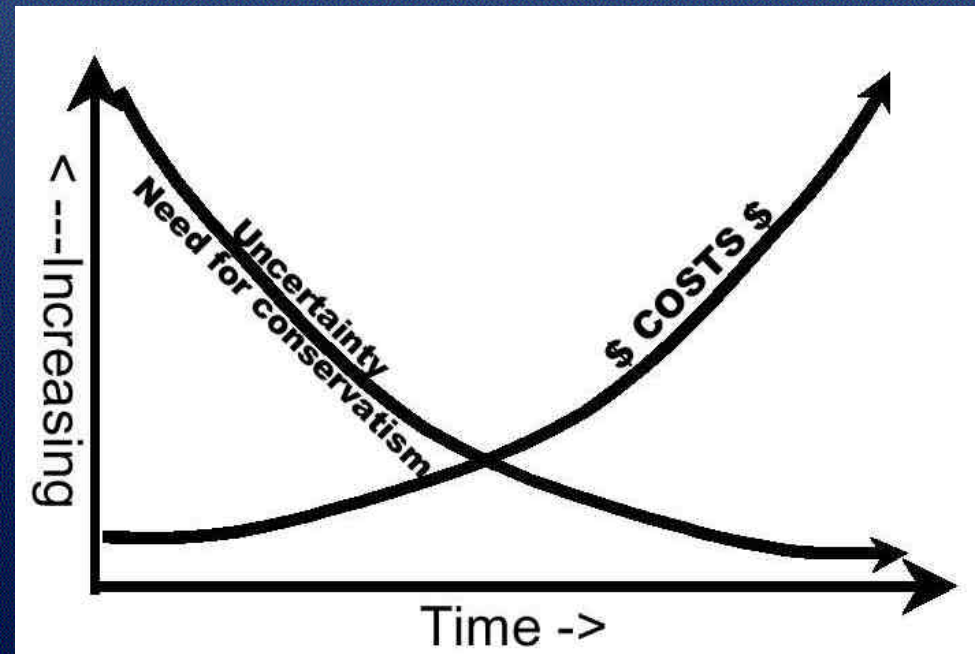


OFFICE *of* RESPONSE *and* RESTORATION

The Reasonably Conservative Approach to Natural Resource Damage Assessment

...it is sometimes better to make reasonable, conservative estimates of natural resource injuries/losses using information obtained for other purposes than to spend additional time and money on injury assessment studies.

In a case of diminishing return, at some point the additional costs to refine the conservative estimate do not justify further investment considered against the costs to provide additional habitat compensation.



Cooperative, Reasonably Conservative Injury Evaluation

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- Insert Trustee issues in remedial process
- Share RI data as soon as available/create GIS
- Working under PRP/Trustee MOA
- Habitat / resource based assessment
- "Reasonably Conservative" approach using RI data, literature and occasionally site specific studies
- Stipulation on injury quantification (Technical Memos)
- Frequent public meetings
- Goal - Earlier - In-kind restoration

General Process for each injury

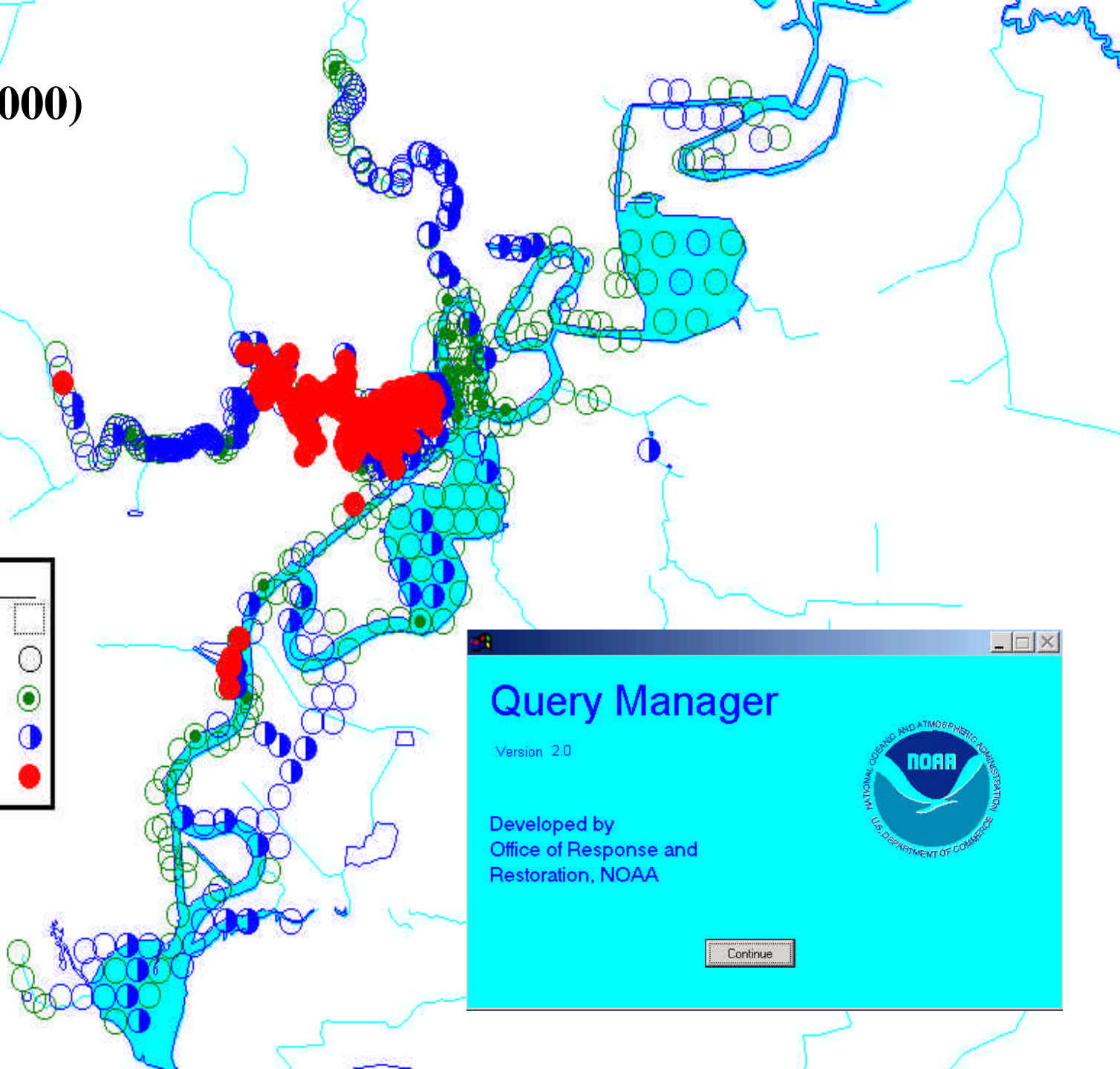
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- Map contaminant distribution in sediment
- Use scientific literature, response investigation results and focused investigations to establish injury levels
- Measure the area of each injury zone
- Perform Habitat Equivalency Analysis
- Select restoration project(s) using CERCLA regulation criteria

Mercury (2000)

Legend


MERCURY (PPM)	
Below Detection Limit	
< ERL (0.15)	
ERL - ERM	
> ERM (0.71)	



Query Manager

Version 2.0

Developed by
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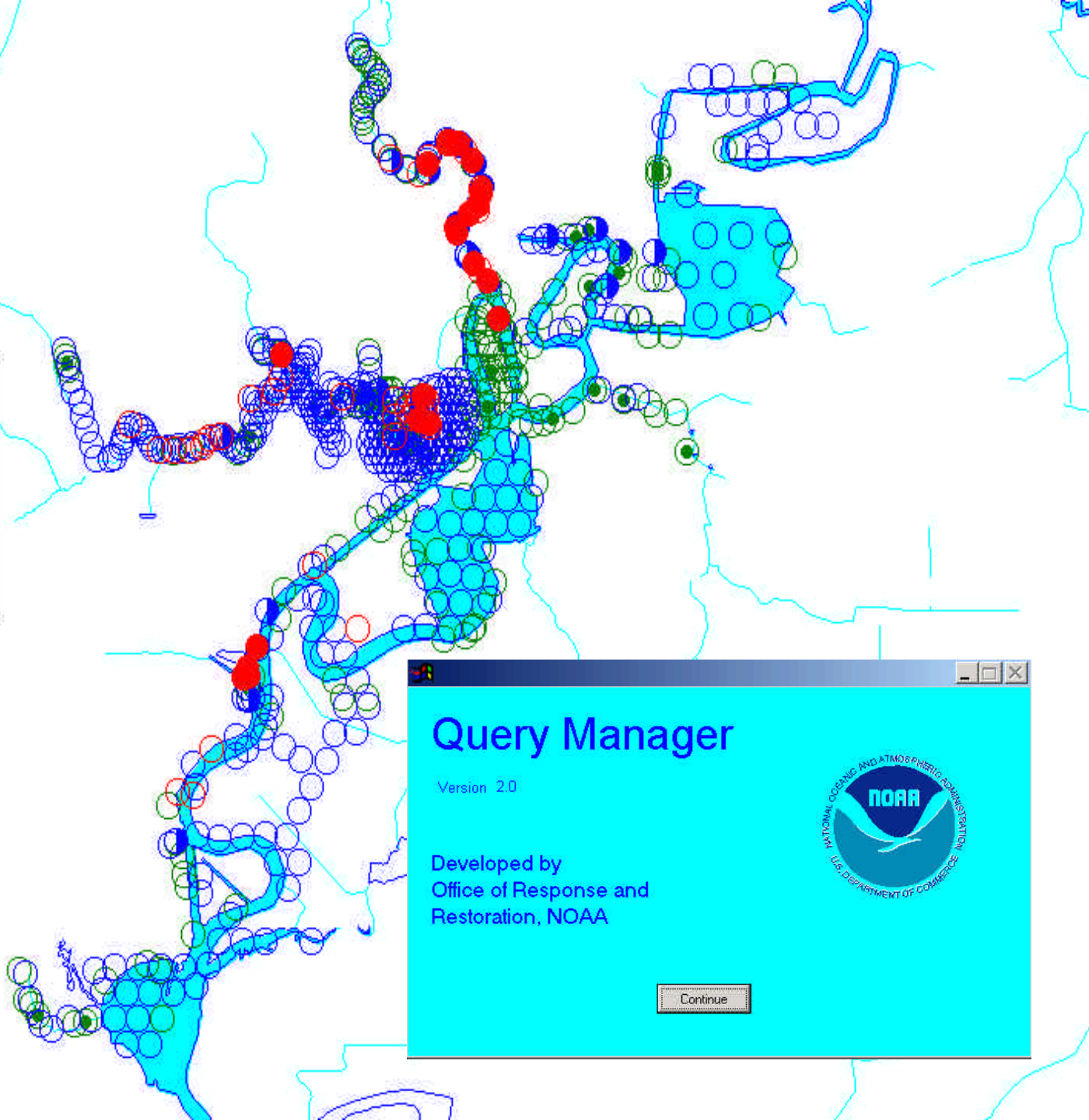
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LPAH (2000)



Legend


LPAH (PPB)	
Below Detection Limit	
< ERL (SS2)	
ERL - ERM	
> ERM (3160)	



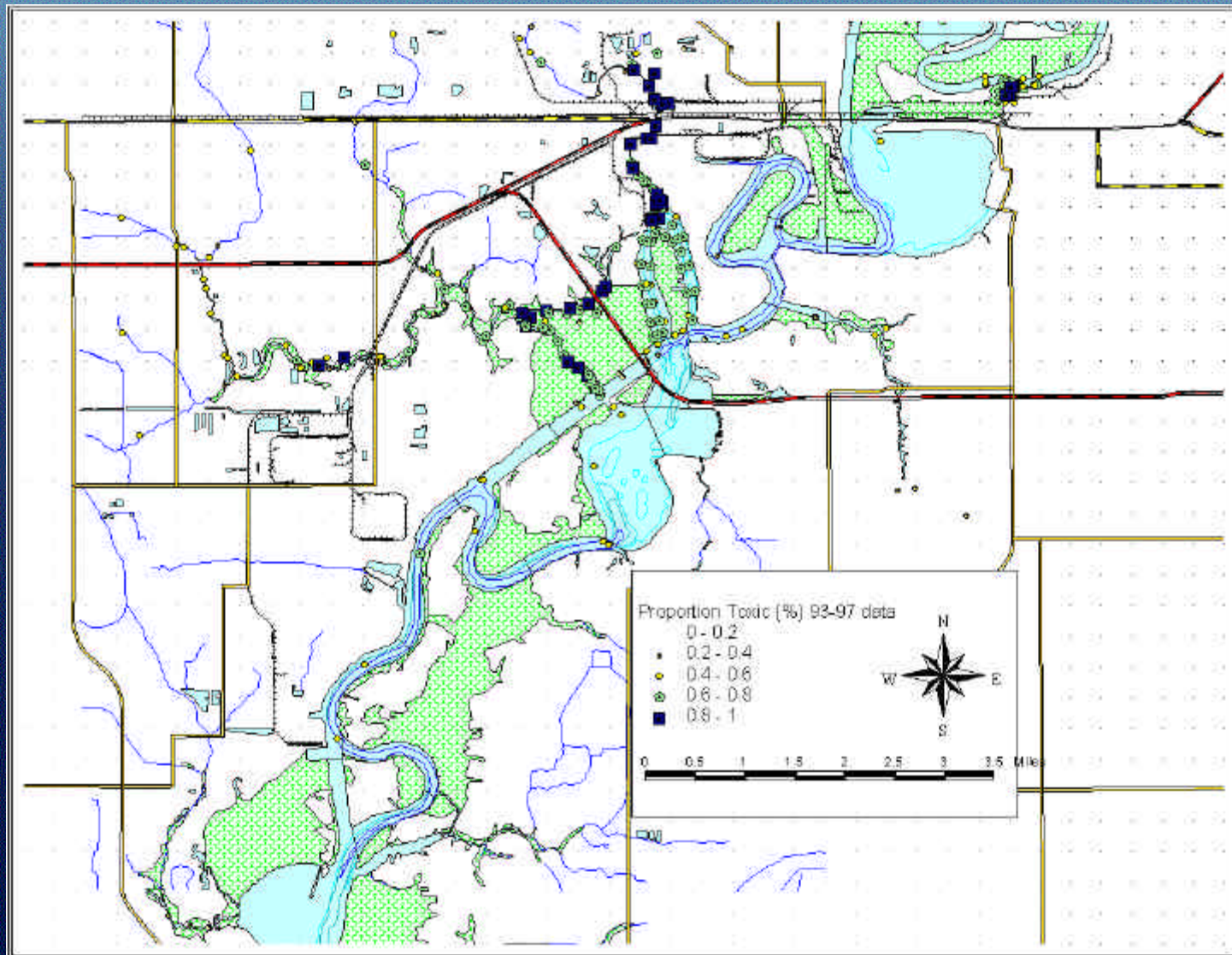
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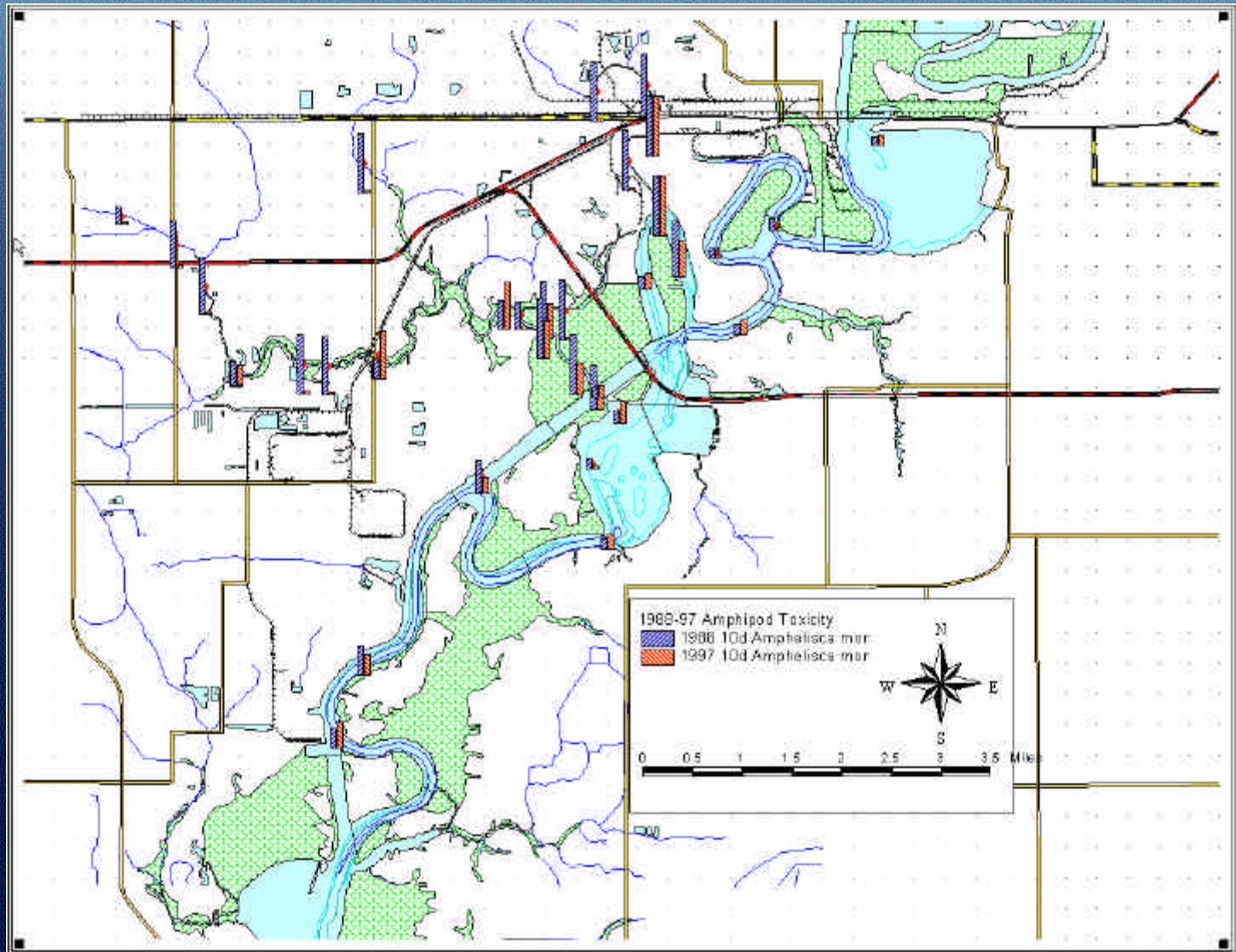
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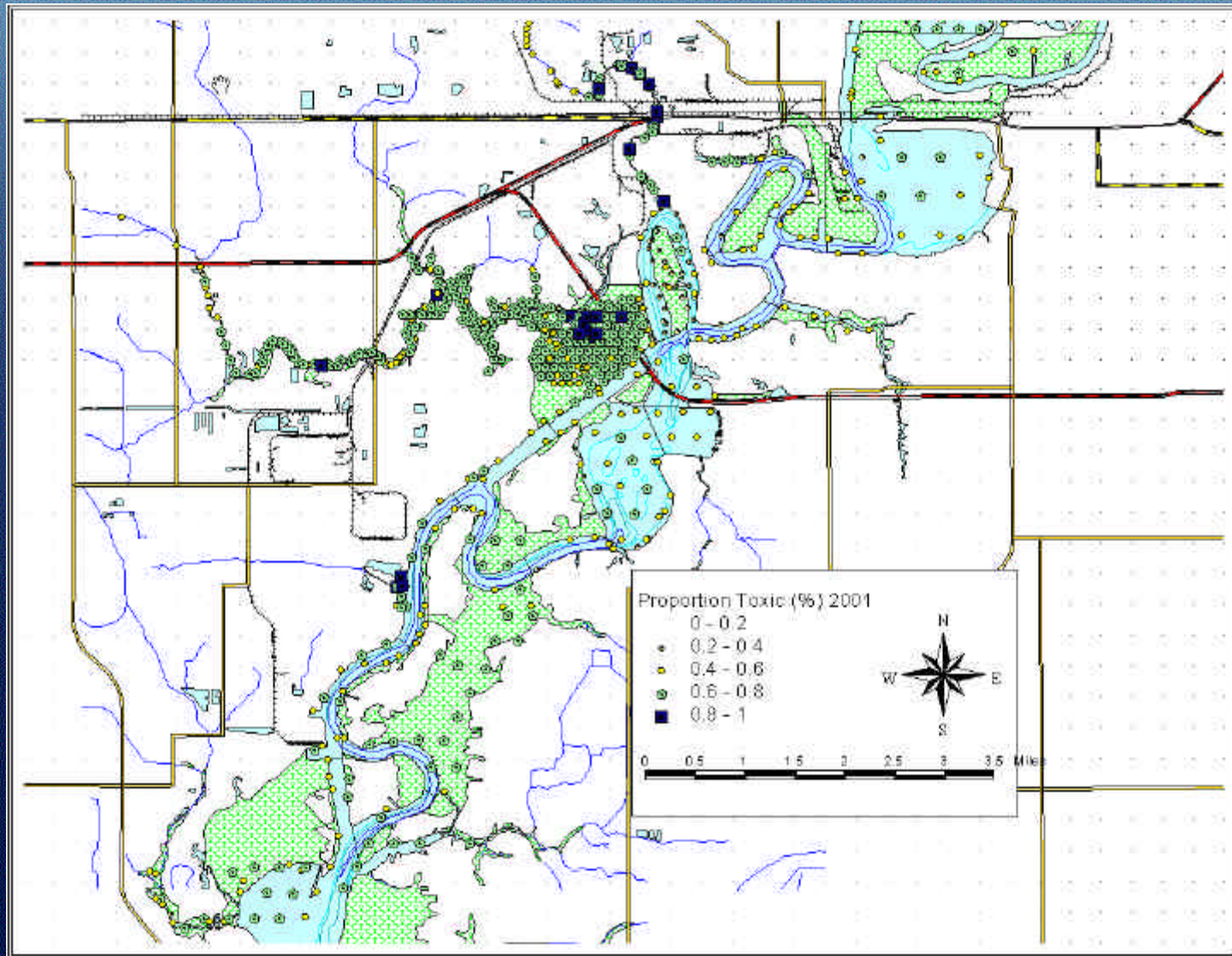
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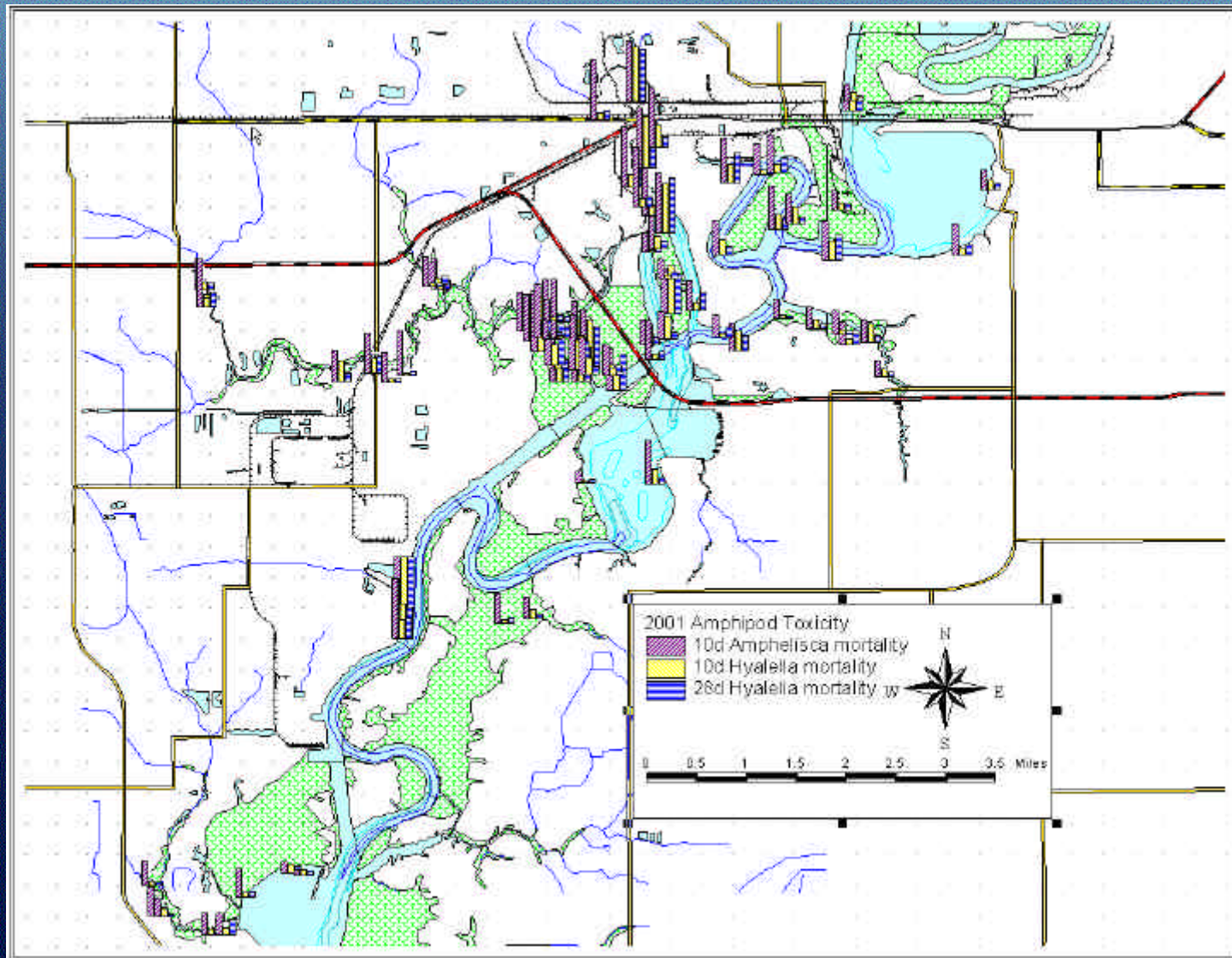


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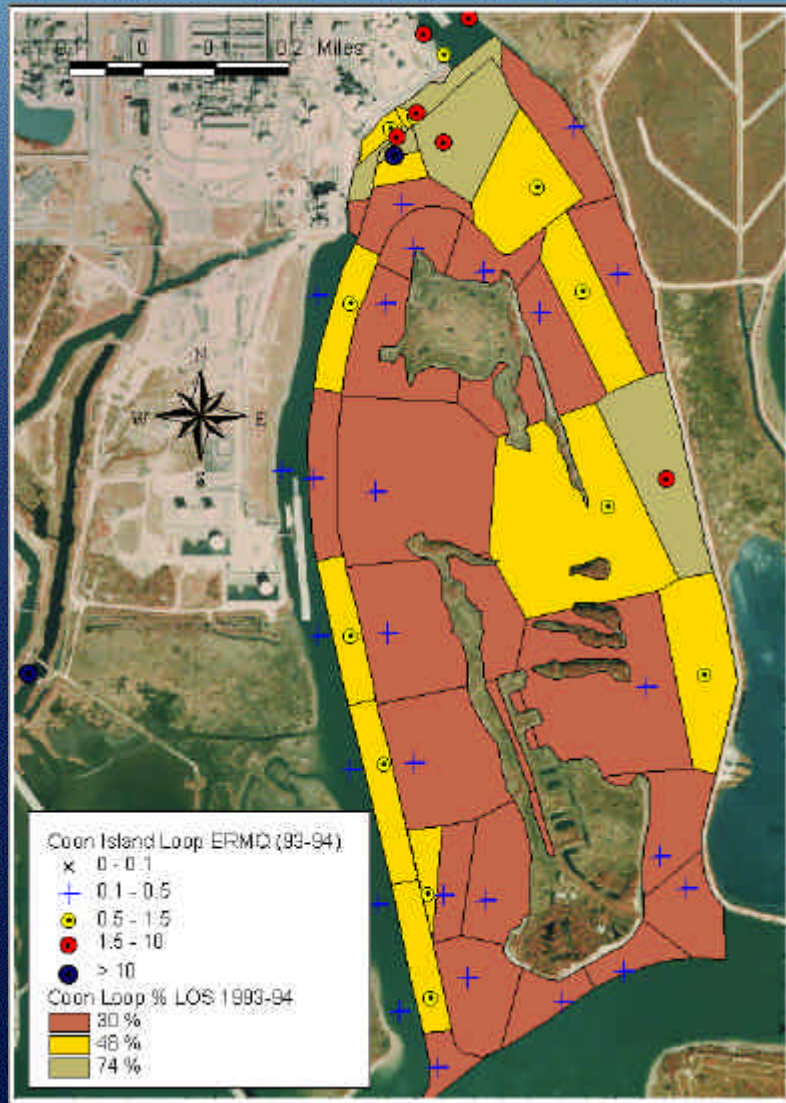
Information Sources Used Benthos Assessment

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- ◆ Site Analytical Chemistry RI/FS data (nature & extent results)
- ◆ Sediment Quality Triad studies (SQT)
- ◆ RI Ecological Risk Assessment & literature survey for growth effects, survival effects, reproduction effects - Hg behavioral effects
- ◆ Sediment Effects Benchmarks and Indices, LRM Proportion Toxicity Estimates

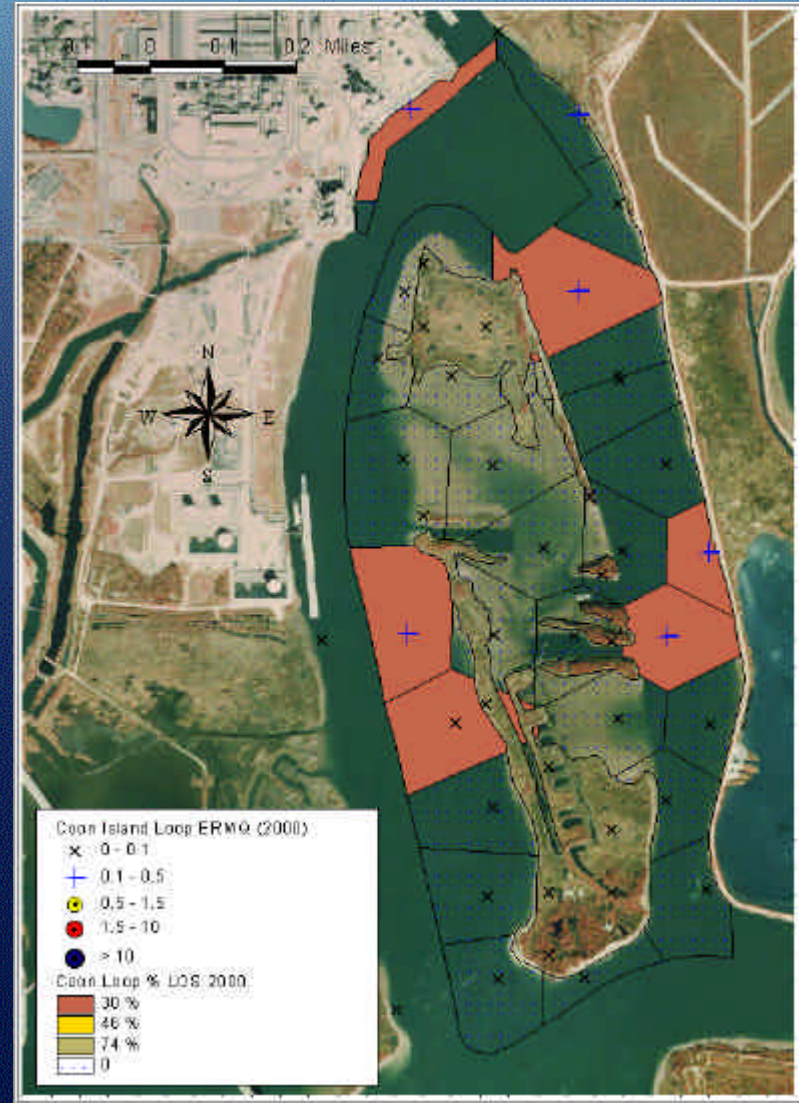
Measure the area of each injury zone

1993



2000

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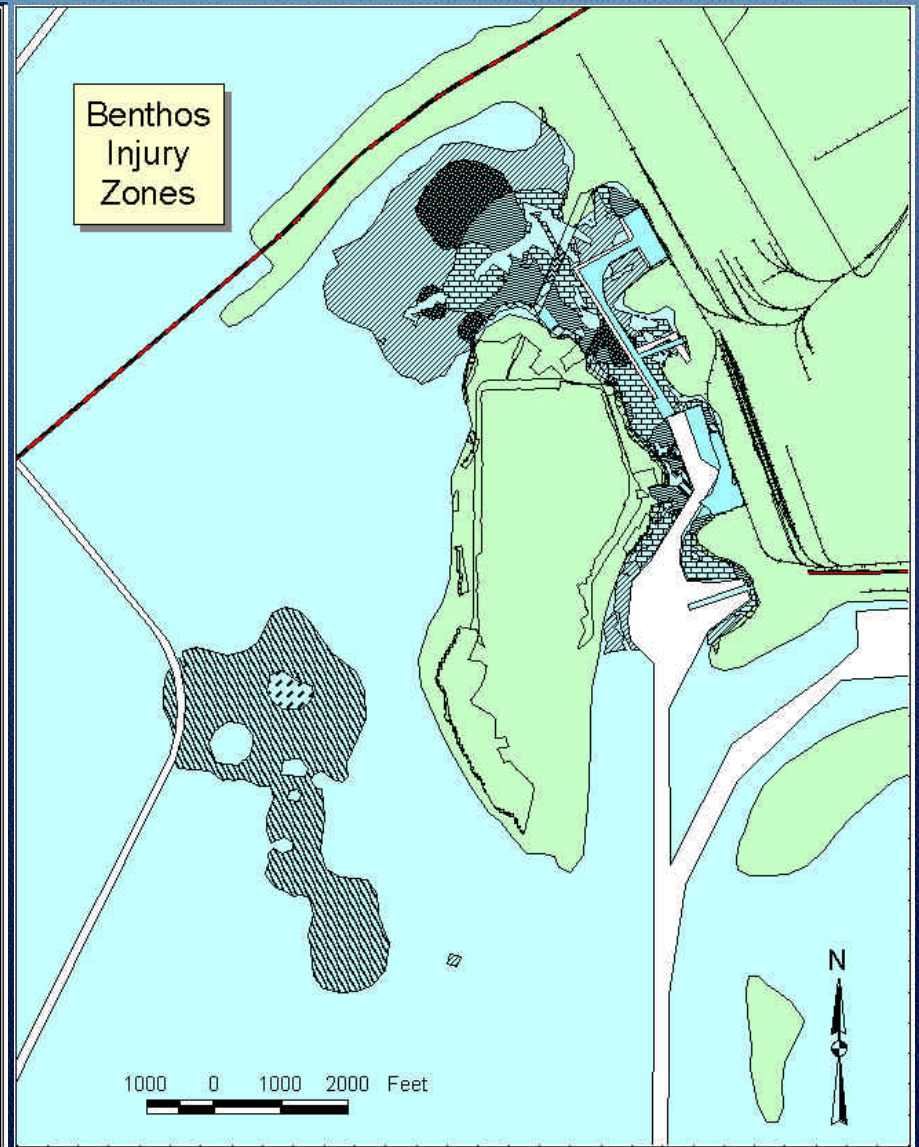
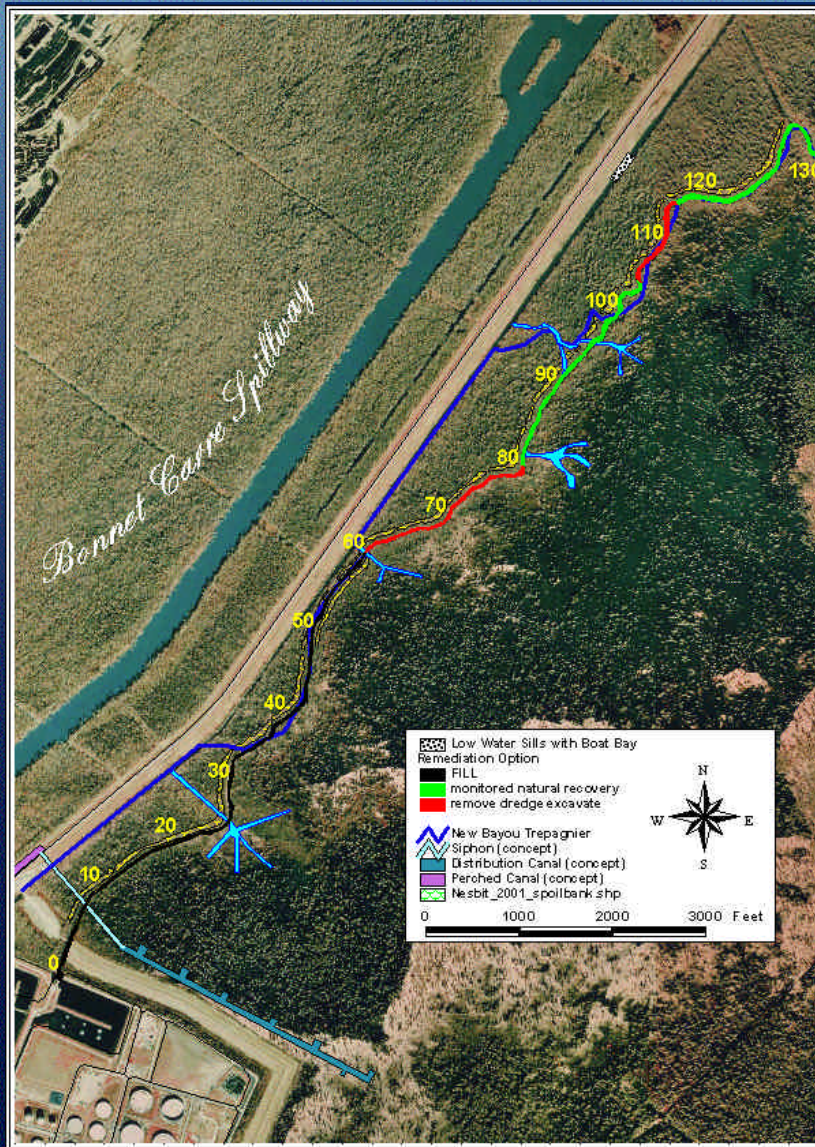
Example of Restoration Requirements

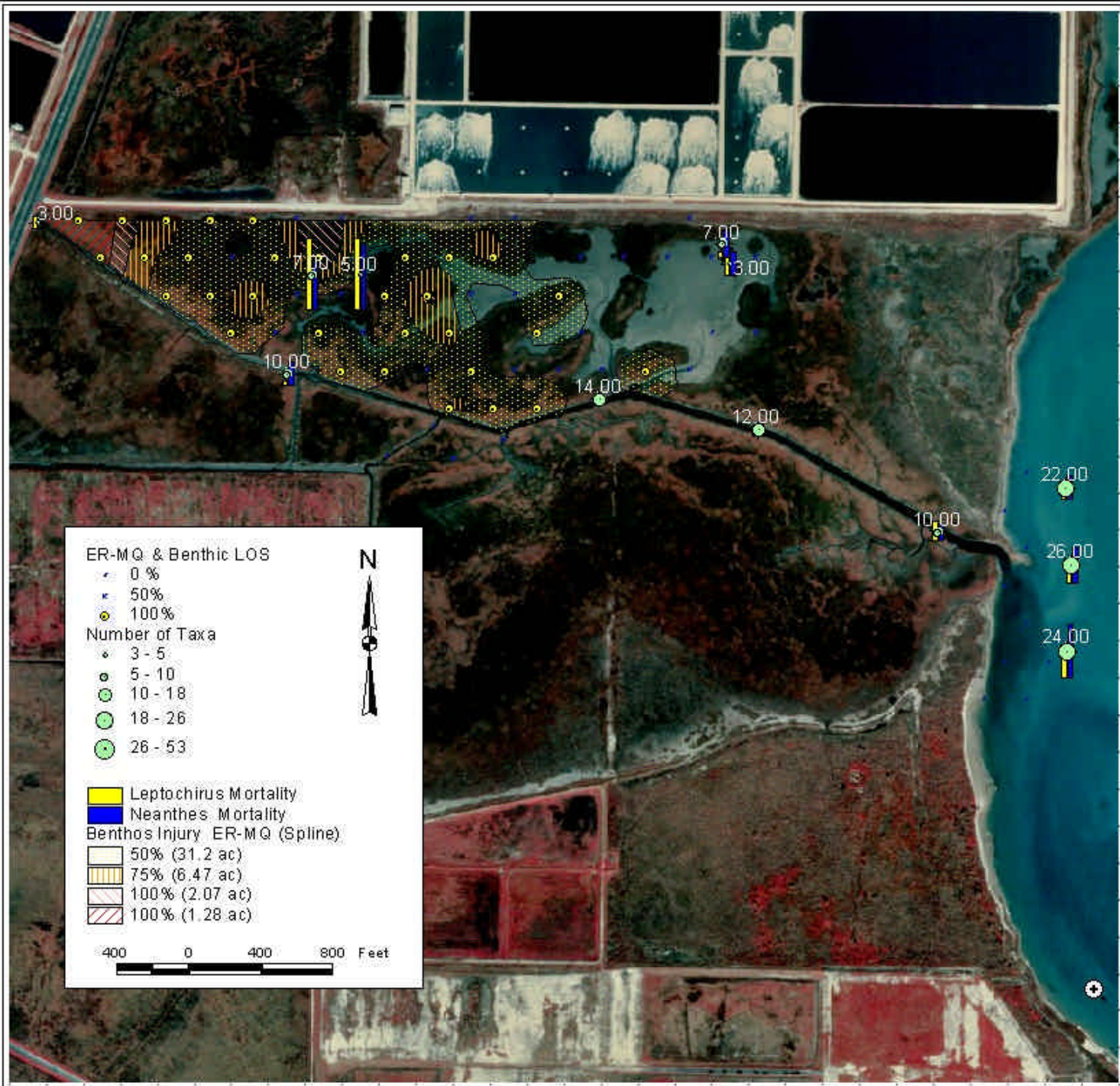
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<u>INJURED SYSTEM</u>	<u>REQUIRED COMPENSATION</u>
• Bayou	10 Acres
• <u>Meander</u>	<u>45 Acres</u>
TOTAL	55 Acres*

* Acres are expressed in terms of emergent marsh

** Amount may vary depending on type of habitat created if something other than emergent marsh





- ◆ Benthos (oyster reef, open water & salt marsh)
- ◆ Birds
- ◆ Fish
- ◆ Terrestrial habitats
- ◆ Ground Water (RWC determined no injury)
- ◆ Surface Water (RWC determined no injury)

Typical Restoration Strategies

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Injury

Oyster Reef

Marsh

Soft-bottom Benthos

Terrestrial

Recreational Fishing

Restoration

Oyster Reef creation

Marsh creation

Marsh/Reef creation

Terrestrial enhancement

Piers/Boat Ramps

- Stabilization and preservation of wetlands lost due to:
 - Subsidence
 - Salinity changes
 - Development within the coastal zone
 - Wind and shoreline erosion
- Restoration/creation of bottomland hardwood wetlands
- Coastal zone /shoreline preservation and protection (Chenier Plains)

Some of the Criteria to Consider During Restoration Scoping

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- **Geographic proximity**
- **Ecological similarity**
- **Political proximity**
- **Long term ownership of project site(s)**

Types of Restoration Projects Typically Considered

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- Emergent Marsh Creation/ Enhancement
- Restoration of Bottomland Hardwood Wetlands and Pimple Mound Features
- Acquisition / Preservation of Forested Freshwater Wetland
- Enhancement/ Preservation of Upper Brackish Water Wetlands for Calcasieu Estuary

Questions?

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A statistician is someone
who can draw a straight
line from an unwarranted
assumption to a foregone
conclusion...

- Yale Hirsch

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CONSULTING

IF YOU'RE NOT A PART OF THE SOLUTION,
THERE'S GOOD MONEY TO BE MADE IN PROLONGING THE PROBLEM.

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"We work hard on this lazy river," a deep-voiced actor says as the camera lingers on the Housatonic, which GE was ordered to clean at a cost of \$250 million by the EPA. "In the past three months alone, GE has removed more than 5,200 cubic yards of river sediments and 3,200 cubic yards of bank soil, making the Housatonic River a safe and beautiful place for everyone."

GE, we bring good things back to life.



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Long, E.R., D.D. MacDonald, S.L. Smith and F.D. Calder. 1995. Incidence of adverse biological effects within ranges of chemical concentrations in Marine estuarine sediments. *Environmental Management* 19:81-97

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