Freshwater
Net Environmental Benefit Analysis
Exercises

US EPA Region V

NEBA Concept

- Environmental issues are often too complex to work through in the time-frame of an emergency
- Environmental issues can be evaluated if there is time available for analysis
- Understanding of environmental issues enables response decisionmakers to incorporate environmental concerns

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- NEBA: Engage “both sides” – natural resource scientists/managers and response coordinators

NEBA Concept

Resource and response management tool designed to improve the quality and results of environmental decision making by

- Considering possible response actions
- Evaluating potential environmental impacts
- Comparing and contrasting trade-offs
- Ranking risks in order to prioritize courses of action and/or outcomes

Additional angle from the originators: Public relations - [Assembled expertise] trying to counter “myth and innuendo”

NEBA Origins

- Pioneered in 1998 – Regional Response Team, Region 9
- “Consensus Analysis Process” emerged from the San Francisco Bay Ecological Risk Assessment – could the RRT replicate this for “daily use”?
- Originally oriented toward coastal marine environments – California coast, San Francisco Bay
- Adapted to a freshwater setting by EPA Region 5 beginning with Mississippi River and Isle Royale (Lake Superior)

NEBA Practicalities

- If consensus is wanted during a response, it needs to be developed beforehand
- Lack of consensus stems from
  - Differences in ecological reference frameworks
  - Status and/or handling of information
    - Missing scientific information
    - Misleading/inconsistent information
    - Inadequate communication or information dissemination
- To paraphrase Bill Robberson, EPA Region 9, the lack of consensus seems to be an outgrowth of the ways we manage resources

NEBA Practicalities

Process needs:

- Open, honest communication
- Education about realities of natural resources management
- Education about spill response expectations and realities
- Science
- Empathy
- Decisionmaking

NEBA Process – Considerations

Practical issues:

- Small group (20-40 people), not a conference
  - Good breadth of knowledge, but few enough participants that people can talk with each other, have some breathing room
- At or near site of interest
  - Local experts implies limited budgets. Getting them involved means going to them
- “Neutral” facilitator
  - Can be an agency like EPA, can be an interested 3rd party. Best if not a heavily invested local resource person or a responder representative

NW Indiana NEBA Participants

Kenneth Brockhouse – USCG MSO Chicago

Kiley Ross – USCG MSO Chicago

Todd Webb, Property Manager – Indiana Dunes State Park

Charles Webster – Indiana Dunes National Lakeshore

David Cage, On-Scene Coordinator – Indiana Dept. of Environmental Management

Derek Nimetz – Indiana DNR, Div. of Nature Preserves

Steve Newhouse, Biological Coordination Section – Indiana Dept. of Environmental Management

Dave Anderson – NPS Damage Assessment Program

Chris Christenson – US EPA Region V

Michelle Jaster, On-Scene Coordinator – US EPA Region V

David Fritz – BP

Dave Siebold – Marathon-Ashland

Vicki May – Marathon-Ashland

Young Choi – Purdue University-Calumet

NW Indiana NEBA Participants

Who's missing?

- US Fish and Wildlife Service?
- Other regulatory agencies?
- Local government?
- Property owners' representative?

What does this imply?

- Process needs a better sales angle
  - Clear applicability
  - Integration into a broader scheme

NW Indiana NEBA Participants

Why these categories of groups?

- Local
  - Natural resource knowledge from the field
  - Active interest in the site
  - Participants in existing response resources
  - Knowledge of potential response resources
  - Most likely source of impetus for change
- Regional/National
  - Steeped in the regulations/requirements
  - Can channel resources for implementation
  - Need opportunities to connect to locals

NW Indiana NEBA - Process

Background and significance of effort

- History
- Perspective
  - a locally focused effort, not a universally focused one
- Interaction, communication
  - who's sitting around the table, what do they do, why are they here and why are they interested?
- Commitment, obligation
  - no federal regulations require this, but it may improve how some regulations are met

NW Indiana NEBA - Process

Oil spill realities

- Once oil is spilled, there will be injury to the environment
- No amount of cleanup will remove all the oil from the environment
- Fate and transport overview
- Short-term vs. long-term impacts

Goals of oil spill response

- Protect human life
- Prevent additional or continuing loss of oil
- Prevent or mitigate environmental damage

NW Indiana NEBA - Process

Introduce the local setting

- Indiana Dunes National Lakeshore, Indiana Dunes State Park
- Exceptional biological diversity
- Beaches, wetlands, dunes, prairie
- National Natural Landmarks, National Historic Landmarks

(Resource information, presented as background for the responders)

NW Indiana NEBA - Process

Introduce response strategies

- Manual removal
- Mechanical removal
- In-situ burning
- Do nothing

(Technical background for the resource managers)

NW Indiana NEBA - Process

Many levels of detail and interaction –

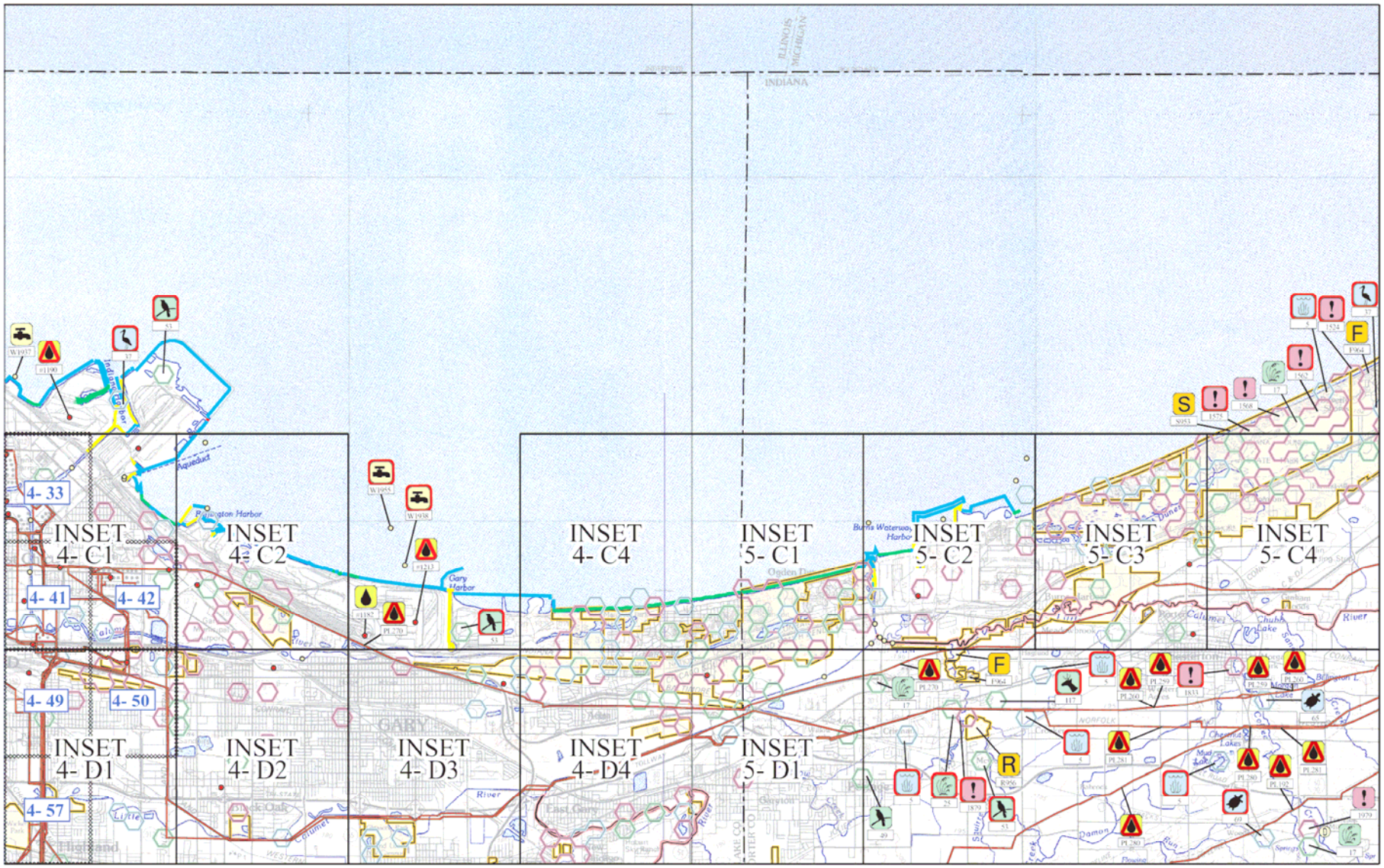
- Resource assessment
- Location, extent or prime use areas for each resource
- Characteristic or key species for each resource type
- Seasonal or life history information for important species
- 'Effects data', e.g., toxicity/physical effects of the stressors on the resources of concern
- Specific geographic areas of concern
- Population vs. Community Dynamics
- Density Dependence
- Time and Spatial Scaling
- Definition of System Boundaries
- Complex Linkages
- Keystone Species
- Uncertainty and Variability
- Cumulative Effects
- Basis of value for resource
- Resources potentially affected by one stressor but not another

NW Indiana NEBA - Process

Scenario

- Predefined, modeled if possible (animations are always well received...)
- Provides a focal point for discussion
- Makes the possibility more “real”
- This time:
  - 50,000 gallons of Arabian medium crude
  - Released into Indiana Harbor Canal, flows out into Lake Michigan
  - Westerly winds carry product to National Lakeshore

NW Indiana NEBA - Process

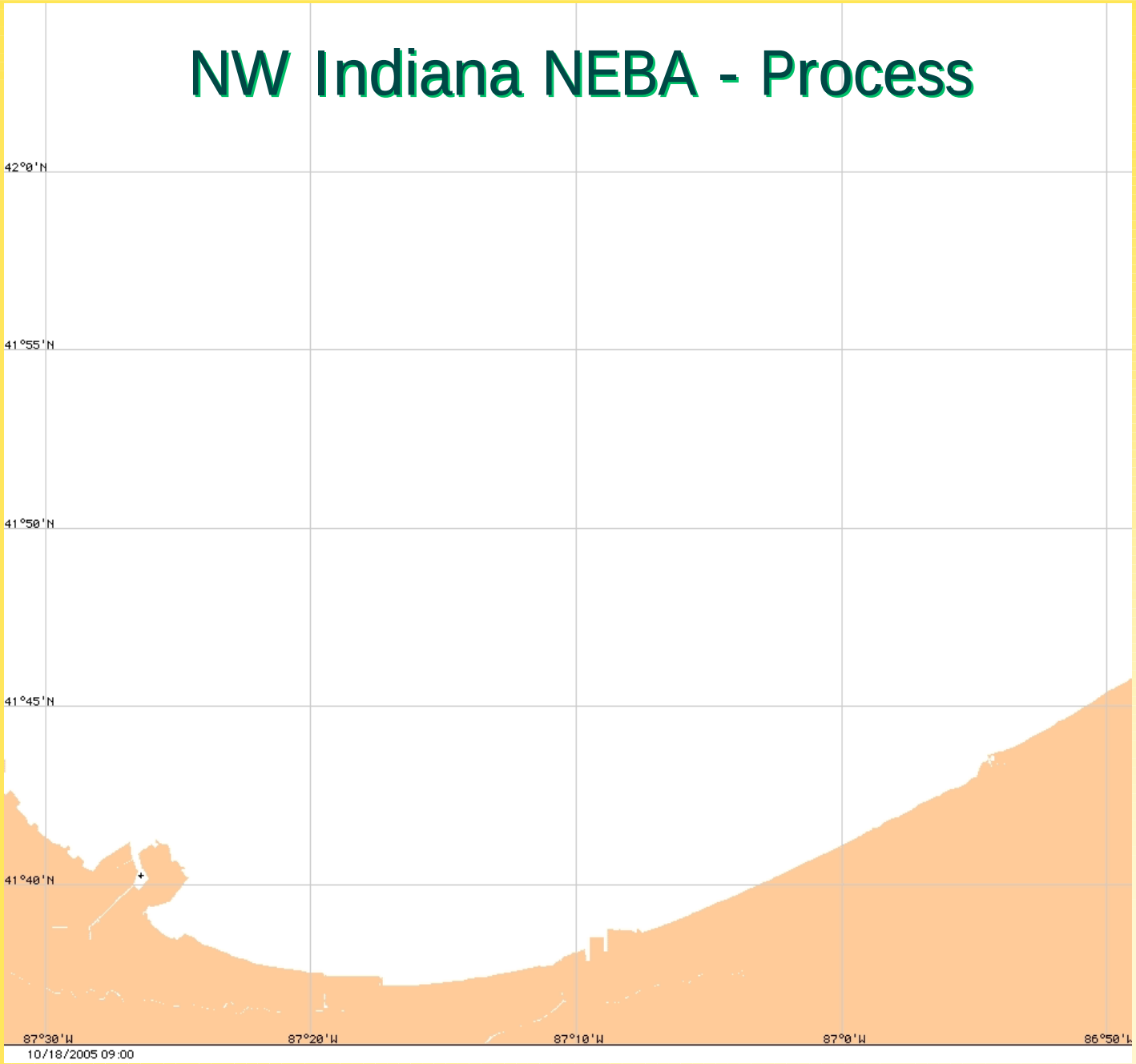


NW Indiana NEBA - Process

Oil Name = ARABIAN MEDIUM CRUDE
API = 29.5
Pour Point = 14 deg F
Wind Speed = constant at 10 mph
Wave Height = computed from winds
Water Temperature = 55 deg F
Time of Initial Release = October 18, 0900 hours
Total Amount of Oil Released = 50,000 gal

Hours into spill	Released gal.	Evaporated percent	Dispersed percent	Remaining percent
1	50,000	6	0	94
2	50,000	11	0	89
4	50,000	16	1	83
6	50,000	19	1	80
8	50,000	21	1	78
…				
114	50,000	29	2	70
120	50,000	29	2	69

NW Indiana NEBA - Process



NW Indiana NEBA - Process

Relative Risk Matrix

- Ecosystem categories
  - Beach
  - Industrial
  - River/canal
- Ecosystem zones
  - Terrestrial
  - Shoreline
  - Open water
  - Coastal wetland
  - Nearshore
  - Water quality

NW Indiana NEBA - Process

Relative Risk Matrix (cont.)

- Resource categories
  - Vegetation
  - Mammals
  - Birds, migratory and resident
  - Herptiles
  - Fish
  - Macroinvertebrates
  - Microinvertebrates
- Recovery options
  - Natural recovery
  - Manual/mechanical removal
  - In-situ burning

NW Indiana NEBA - Process

Relative Risk Matrix (cont.)

- Species stressors
  - Air Pollution (evaporating oil and in-situ burning)
  - Aqueous Exposure (inhalation or ingestion of whole oil droplets or dissolved components of the oil in the water column)
  - Physical Trauma (mechanical impact from equipment, boats, etc)
  - Physical Oiling/Smothering (due to direct contact)
  - Thermal (heat exposure from ISB)
  - Waste (exposure due to contact with waste generated by oil spill)
  - Indirect (food web, ingestion of contaminated food, etc.)

Species Stressor Matrix

Ecosystem Type	**Terrestrial**	Recovery Category	
		NR	**MR**
Species Grouping	Vegetation		
	Mammals		
	Birds		
	Herptiles		
	Macroinvertebrates		

Ecosystem Type	**Coastal Wetlands**	Recovery Category	
		NR	**MR**
Species Grouping	Vegetation		
	Mammals		
	Birds		
	Herptiles		
	Fish		
	Macroinvertebrates		
	Microinvertebrates		

Ecosystem Type	**Shoreline**	Recovery Category	
		NR	**MR**
Species Grouping	Vegetation		
	Mammals		
	Birds		
	Herptiles		
	Macroinvertebrates		
	Microinvertebrates		

Ecosystem Type	**Nearshore**	Recovery Category	
		NR	**MR**
Species Grouping	Vegetation		
	Mammals		
	Birds		
	Herptiles		
	Fish		
	Macroinvertebrates		
	Microinvertebrates		

Ecosystem Type	**Reefs**	Recovery Category	
		NR	**MR**
Species Grouping	Vegetation		
	Birds		
	Fish		
	Macroinvertebrates		
	Microinvertebrates		

Ecosystem Type	**Open Water**	Recovery Category	
		NR	**MR**
Species Grouping	Vegetation		
	Birds		
	Fish		
	Macroinvertebrates		
	Microinvertebrates		

Stressor Key:
1. Air Pollution
2. Aqueous Exposure
3. Physical Trauma
4. Physical Oiling
5. Thermal
6. Waste
7. Indirect (food web, etc.)

Recovery Categories:
NR – Natural Recovery
MR – Mechanical Recovery

Ecosystems:
Terrestrial – Inland habitat beyond the high water mark and/or splash zone.
Coastal Wetlands – Emergent vegetation and wetland habitat hydrodynamically linked to Mississippi River waters.
Shoreline – From the normal waterline to the limit of the high water mark/splash zone.
Nearshore – Shallow waters (approximately 4–10 feet in depth) from the limit of emergent vegetation line outward.
Reef – Submerged aquatic structures supporting specific plant and animal life beyond the nearshore.
Open Water – Beyond the limit of the nearshore and not including reef structures.

NW Indiana NEBA - Process

Relative Risk Matrix (cont.)

- "Risk ranking key"

		RECOVERY			
		> 7 years (SLOW) **(1)**	3 to 7 years **(2)**	1 to 3 years **(3)**	< 1 year (RAPID) **(4)**
% of RESOURCE	> 60% (LARGE) **(A)**	1A	2A	3A	4A
	40 to 60% **(B)**	1B	2B	3B	4B
	20 to 40% **(C)**	1C	2C	3C	4C
	5 to 20% **(D)**	1D	2D	3D	4D
	0 to 5% (SMALL) **(E)**	1E	2E	3E	4E

Figure 2. The proposed Risk Square.

NW Indiana NEBA - Process

Risk Ranking Matrix -
Levels of Concern
Indiana Dunes National Lakeshore
March 29-30, 2005

		Potential Length of Recovery			
		Probable Population Collapse	Long-term (4-7 years)	Intermediate-term (2-3 years)	Short-term (1 year)
Degree of Resource Impact	Catastrophic	1A	2A	3A	4A
	Critical	1B	2B	3B	4B
	Marginal		2C	3C	4C
	Negligible		2D	3D	4D

*Dark gray cells represent a **high** level of concern.*
*Light gray cells represent a **moderate** level of concern.*
*Unshaded cells represent a **limited** level of concern.*

NW Indiana NEBA - Process

Relative Risk Matrix Results

- Each “resource category” includes one or more key species – especially vulnerable and/or especially valuable
- Discuss and rank everything for natural recovery first
- Discussion during the ranking process – record notes on impact types, sensitivities, relative significance, etc.
- The discussion that starts here is the foundation for whatever consensus develops by the time the exercise is completed

NW Indiana NEBA - Process

Relative Risk Matrix Results (cont.)

- Discuss and rank species resources for mechanical recovery
- Response options change by habitat. Note suggestions, questions, unresolved issues.

Final Result

- Species risks prioritized by response
- Basis for development of detailed local response plans
- Shared insights and new communication channels for key response planning groups

NW Indiana NEBA – Process Issues

- Limitations caused by the scenario approach
  - Restricts dialogue
  - Can intimidate or frustrate resource managers
- Breadth of impact factors
  - Seasons
  - Variety of species present
  - Species calendars (spawning, migration, etc.)
  - Spill sources
- Lack of follow-up
  - No tools
  - No strategies
  - No support

NEBA – Planned Changes

- Limited use of scenarios
- Standard species and habitat overviews
  - Site-specific species info still desirable
- Standard response technique overviews
- Incorporate healthy species into the equation
- Strategy and/or support for next steps (minimum); Better = meeting structure and product designed for follow-up

NEBA – Planned Changes

- Integration with other efforts
  - Contingency Plan
  - Advanced planning