

*MULTI-ATTRIBUTE  
DECISION ANALYSIS FOR  
IMPROVING FEDERAL  
CONSERVATION PROGRAM  
EFFECTIVENESS*

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# OUTLINE

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- Environmental Quality Incentives Program
- Why Decision Analysis?
  - Avoiding common mistakes
    - Wetland Protection vs. Wetland Species
    - Is wildlife improvement more important than NPS pollution reduction?
    - What do the scores represent?
  - Complex decisions need a formal analysis

# Environmental Quality Incentives Program

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- \$17.1 billion for conservation programs
- \$ 5.8 billion for EQIP
- Conservation programs generally use ranking methods
- Agencies modify parts of this informal approach to improve program effectiveness

# Benefits of Decision Analysis

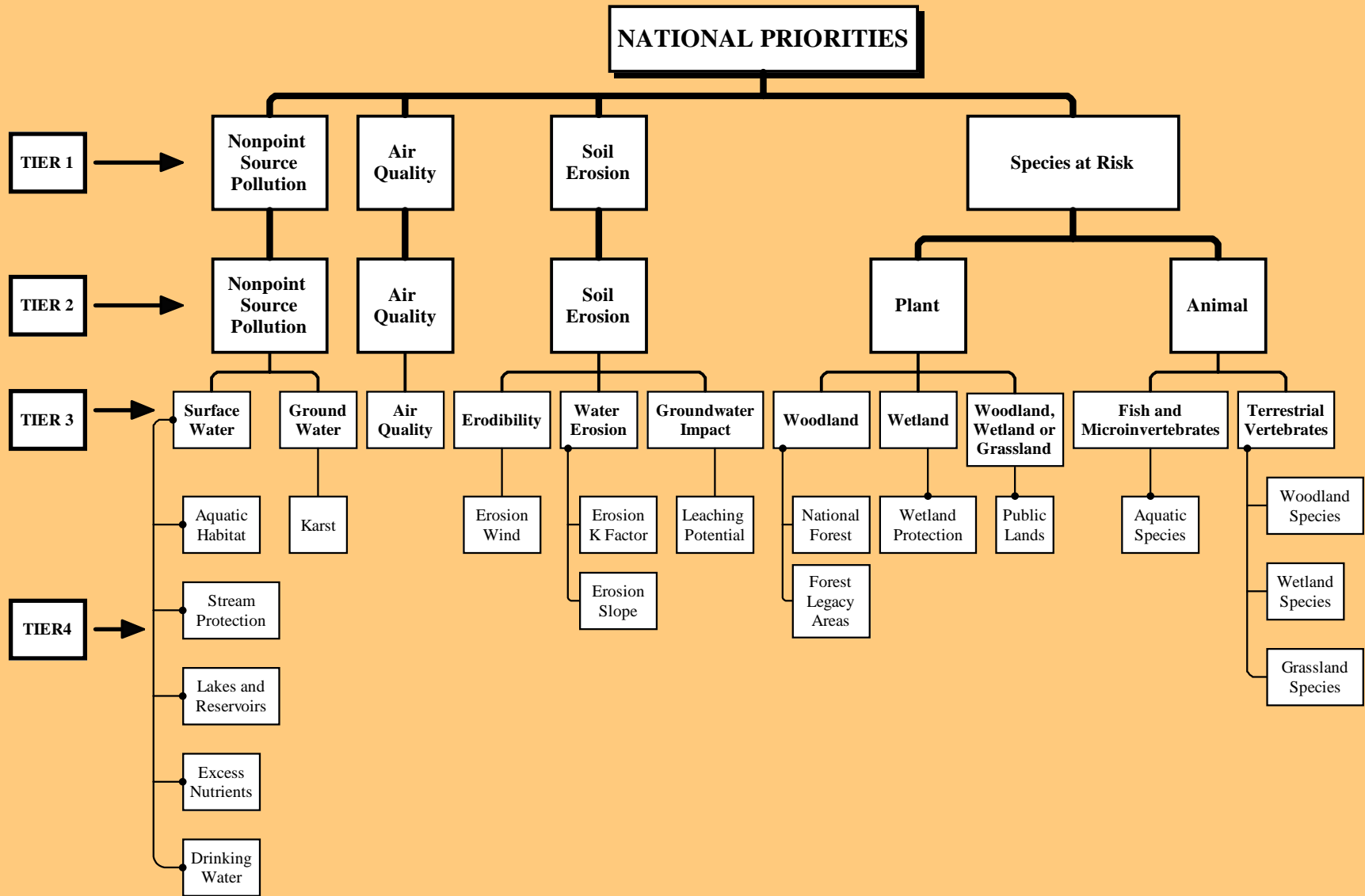
- Think systematically
- Achieve greater insight about the decision problem
- Understand tradeoffs among conflicting objectives
- Achieve well-documented, reproducible decisions

# Indiana EQIP

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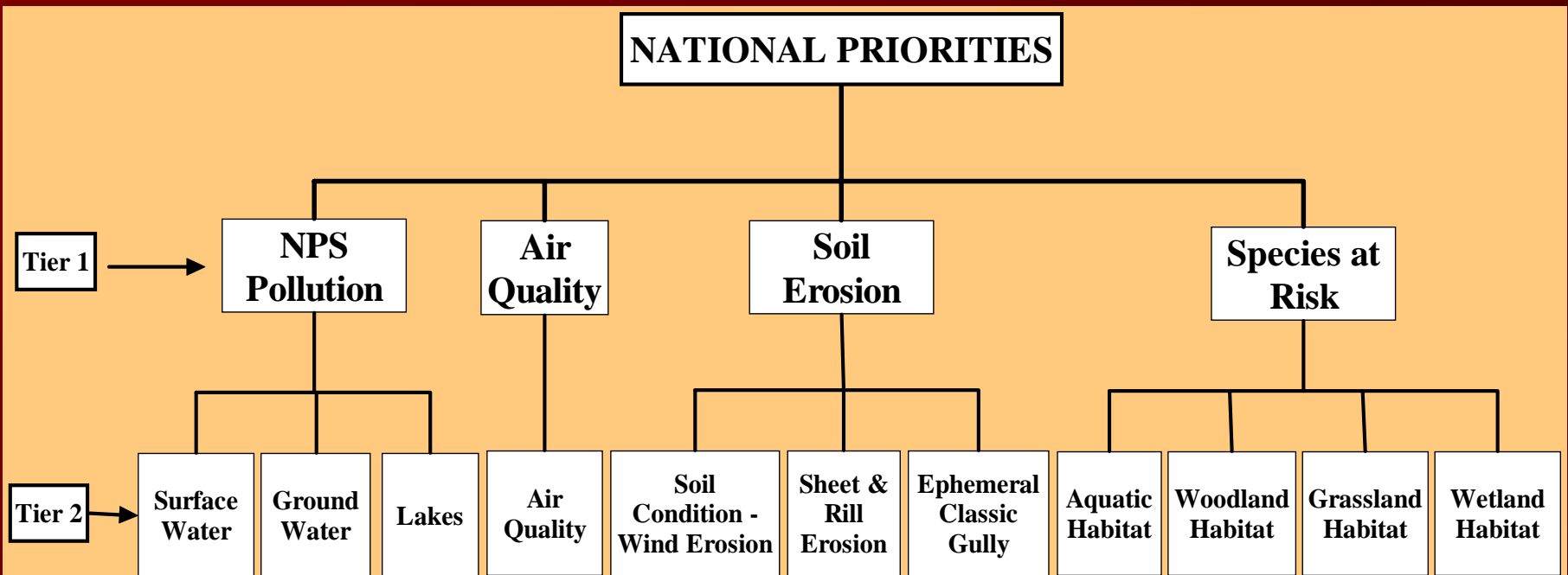
- Program changes every year
- 2004 Approach
  - 19 resource concerns, weighted equally
  - Base score + treatment score
- 2005 Approach
  - 12 resource concerns
  - Practice scores regarding relative treatment effectiveness

# Objectives Hierarchy: 2004

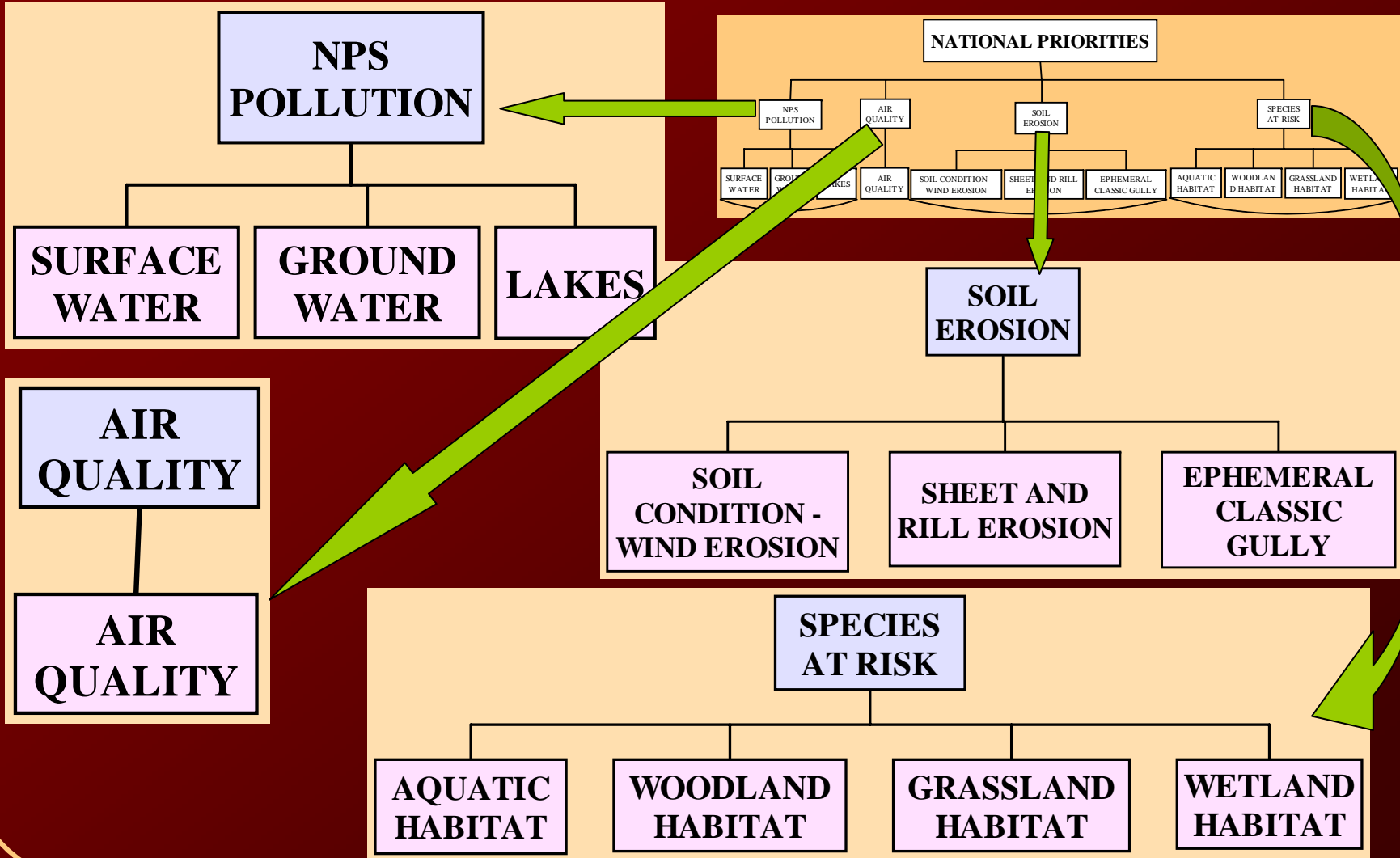




# Objectives Hierarchy: 2005



# Objectives Hierarchy: 2005



## Weighting Scheme: 2004

19 equally weighted resource concerns

Weight of each lowest level concern

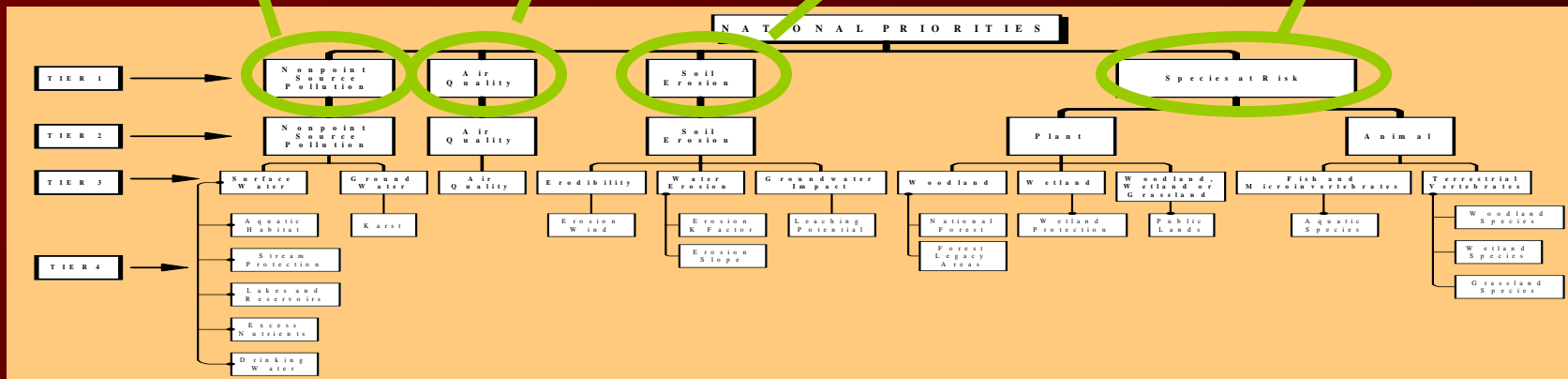
**5.263%**

***What are the aggregate weights of  
the higher level objectives?***

# Weighting Scheme: 2004

## TIER 1 OBJECTIVE WEIGHTS

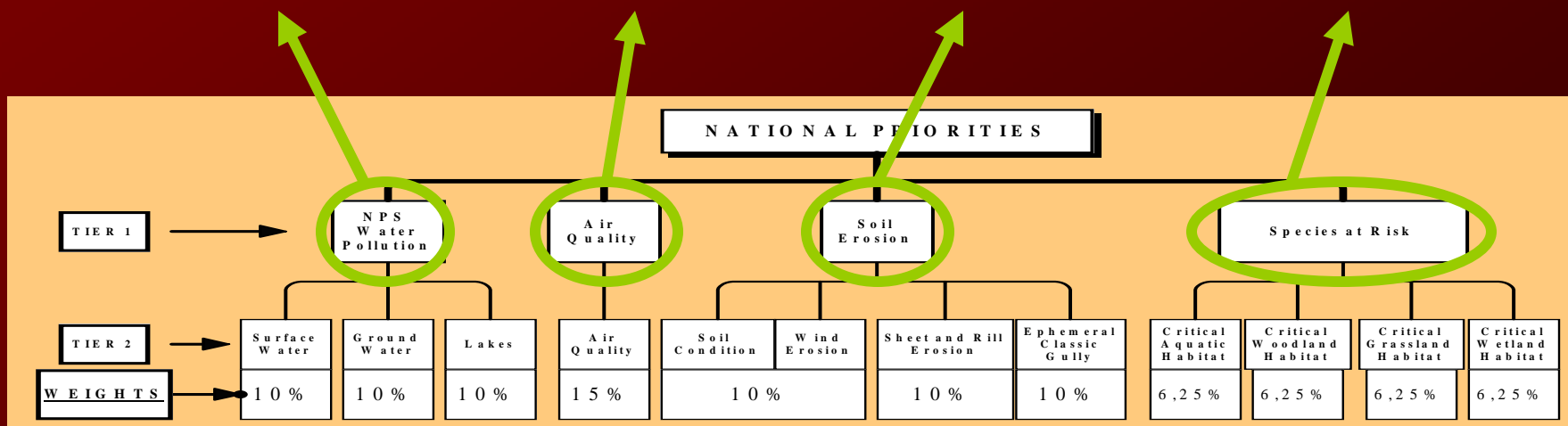
NPS POLLUTION	AIR QUALITY	SOIL EROSION	SPECIES AT RISK
<b>31.59%</b>	<b>5.26%</b>	<b>21.05%</b>	<b>42.10%</b>



# Weighting Scheme: 2005

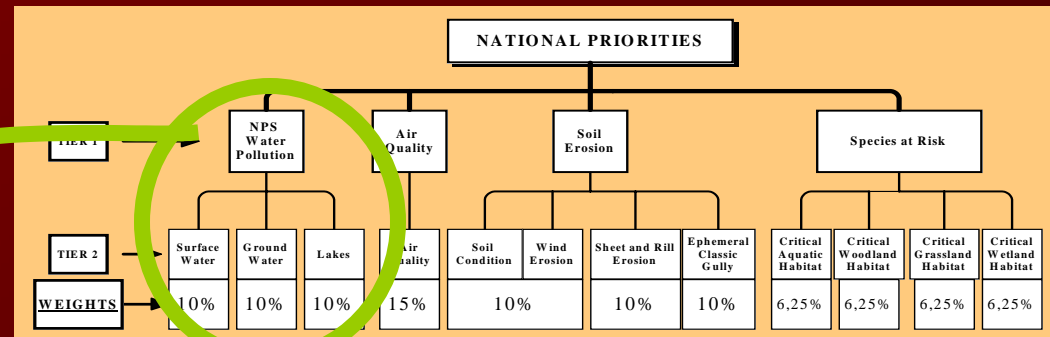
Weights of the 4 National Priorities identified

TIER 1 OBJECTIVE WEIGHTS			
NPS POLLUTION	AIR QUALITY	SOIL EROSION	SPECIES AT RISK
<b>30%</b>	<b>15%</b>	<b>30%</b>	<b>25%</b>



# Weighting Scheme: 2005

Weights are equally distributed among the sub-objectives



Tier 1 objectives	NPS Pollution (30% Total Weight)		
Tier 2 objectives	Surface Water	Ground Water	Lakes
Weights	<b>10%</b>	<b>10%</b>	<b>10%</b>

# Scoring Mechanism : 2004

- Base score: 15 points/concern detected

Treatment score: More points, depending on the level of the treatment

Examples of Sub-level Objectives Treatment Scores

Karst	Leaching Potential	Air Quality	Erosion-K Factor
<b>62</b>	<b>56</b> :Severe; <b>51</b> :High	<b>26</b>	<b>64</b> : Severe; <b>54</b> :High; <b>44</b> :Moderate

***Treatment of important concerns  
provide more points***

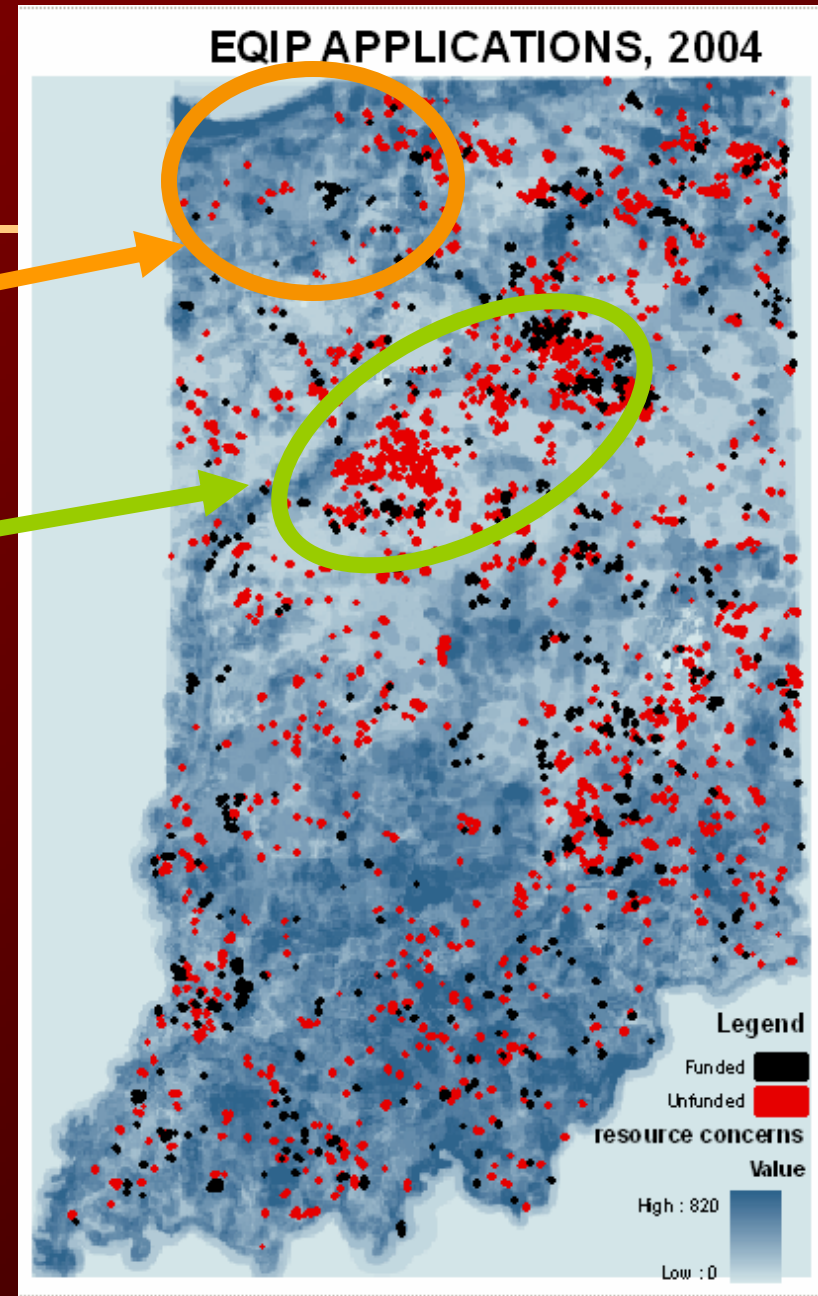
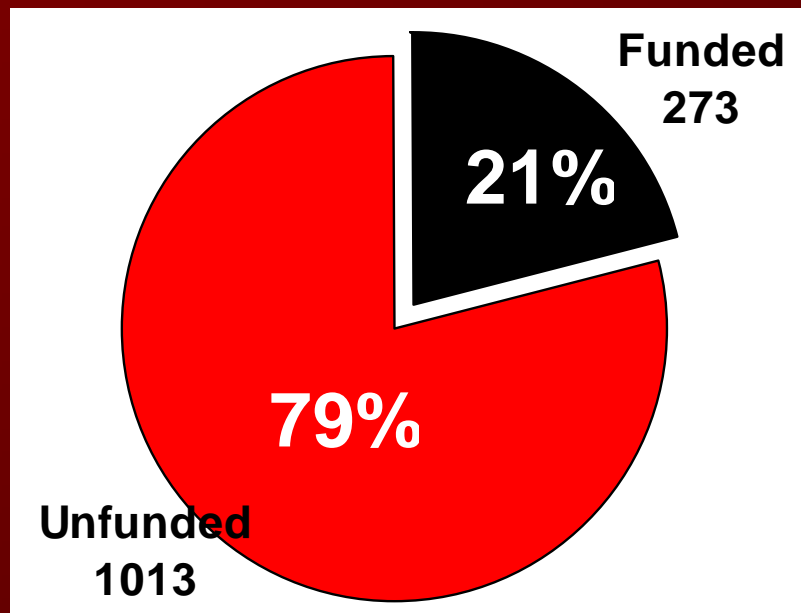
# Scoring Mechanism : 2005

- Scoring matrix for practices: treatment effectiveness
- Points reflect a qualitative scale (categorical)
- Make the qualitative scale quantitative
  - Summation
  - Weighting

	Aquatic Habitat	Woodland Habitat	Grassland Habitat	Wetland Habitat	Ground Water	Lakes	Surface Water
<b>Practice name</b>	<b>SPECIES AT RISK</b>				<b>NPS WATER POLLUTION</b>		
Access Road	2	2	0	0	0	1	1
Conservation Cover	4	0	4	0	4	4	4

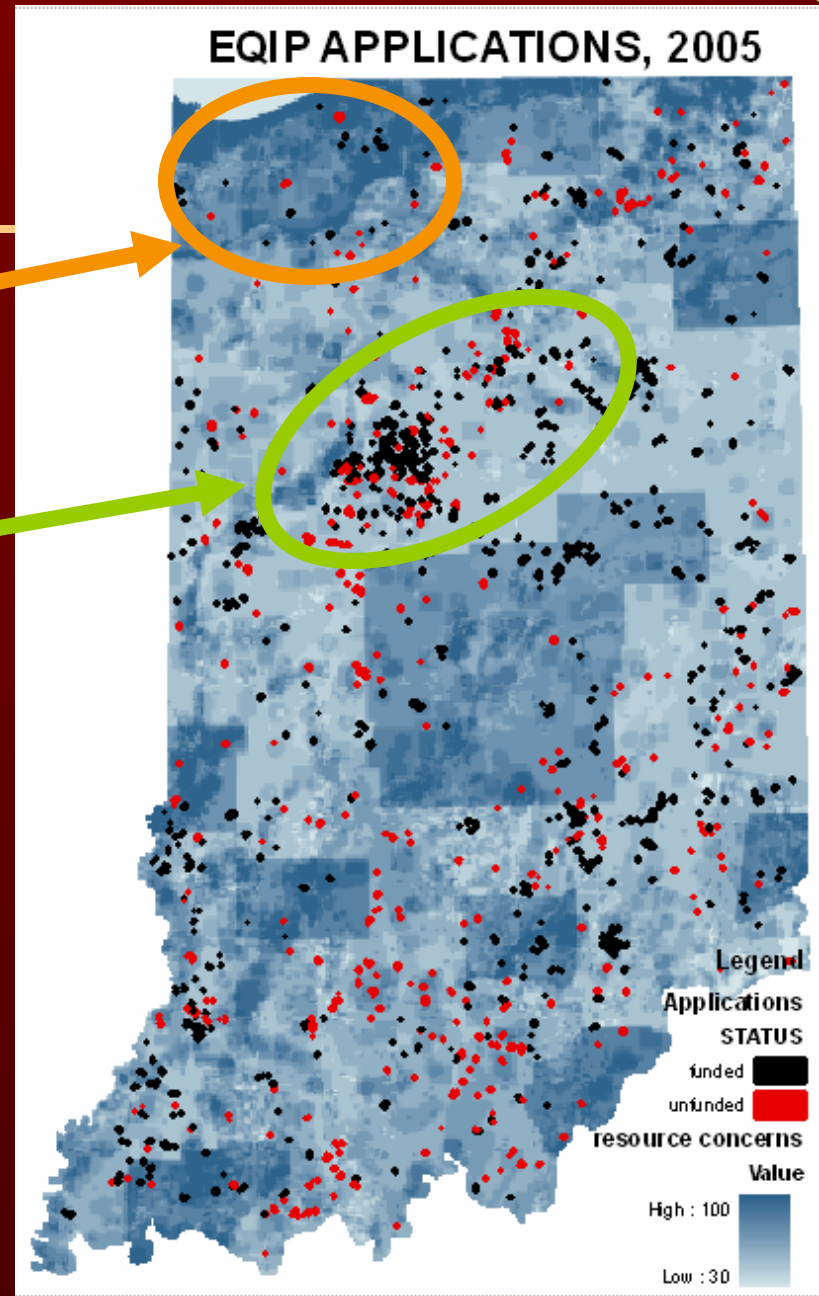
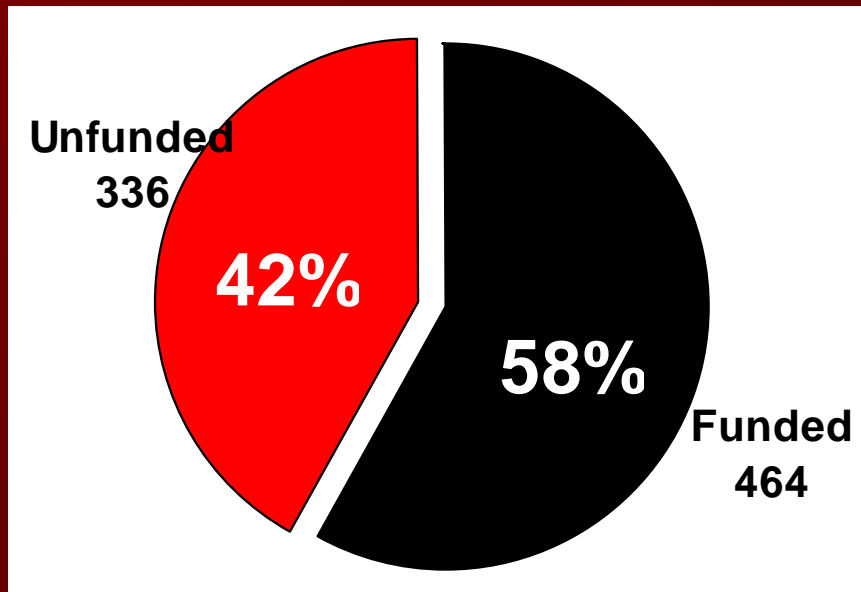
# 2004 Applications

- Concentration of concerns
- Concentration of applications



# 2005 Applications

- Concentration of concerns
- Concentration of applications



# Improving Program Effectiveness

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- Comprehend the impact of program changes
- Compare program impacts quickly and effectively
- Identify measurable attributes and indicators

# Next Steps

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## **FORMAL DECISION MAKING PROVIDES STRUCTURE TO APPROACH COMPLEX PROBLEMS**

Environmental decisions are often complex, conflicting, and multi-faceted with different priorities and objectives

Formal decision models help public policy makers solve their complex, conflicting problems effectively and systematically

# Next Steps

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**Construct a formal, structured, multiple criteria decision model that is broadly applicable to current Federal Conservation Programs by following the decision analysis procedure and methods**

Thank You

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QUESTIONS?