Estimating the Condition of Gulf of Mexico Estuaries: National Coastal Assessment and National Estuary Program

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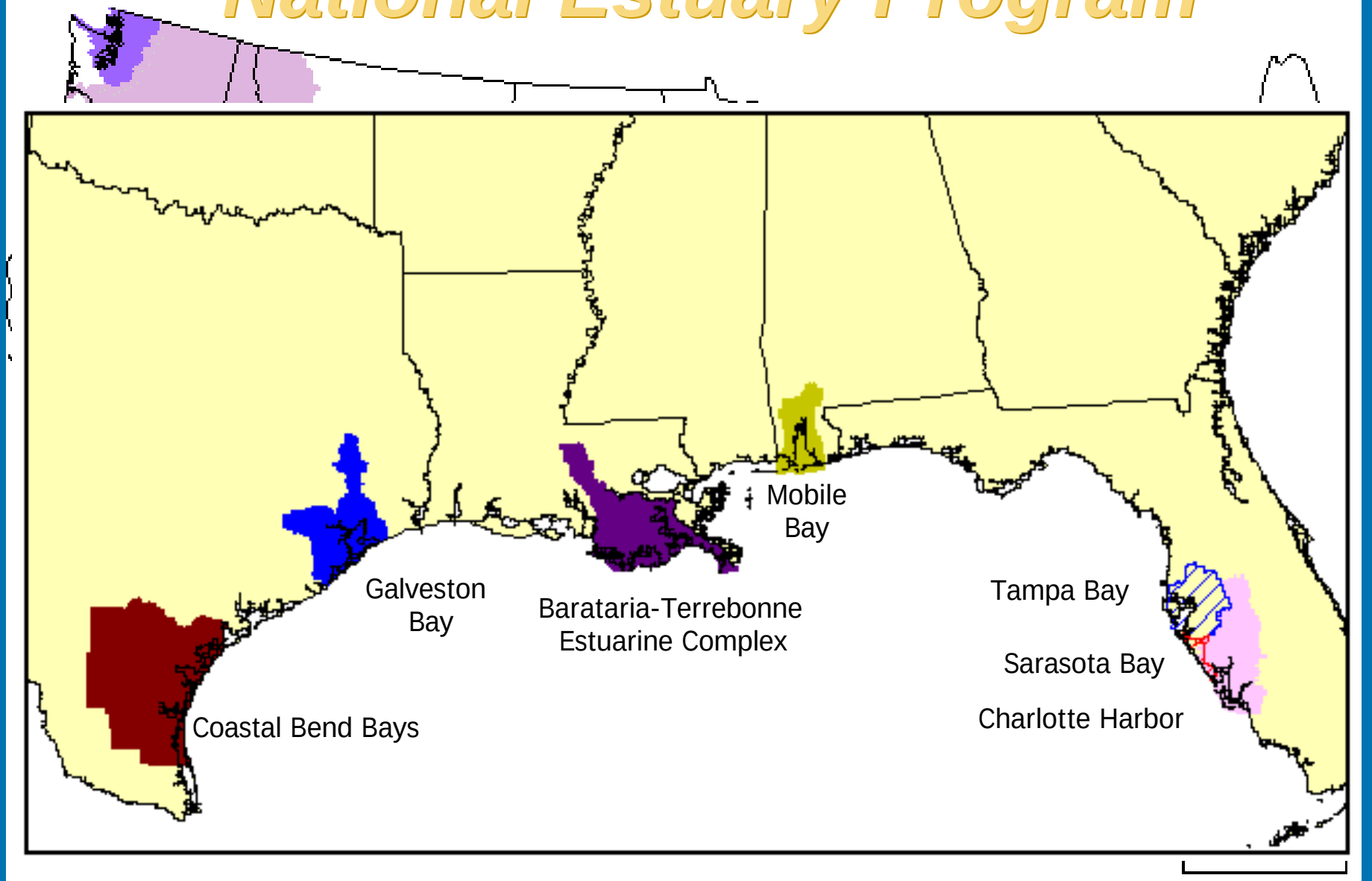
EMAP Symposium 2004

Program Goals

- **National Coastal Assessment**
  - **Assess condition of U.S. coastal resources**
  - **Create an integrated, comprehensive coastal monitoring program among the coastal states.**
- **National Estuary Program**
  - **Improve quality of estuaries of national importance**
  - **Attain or maintain water quality in estuaries by developing Comprehensive Conservation and Management Plans.**

National Coastal Assessment

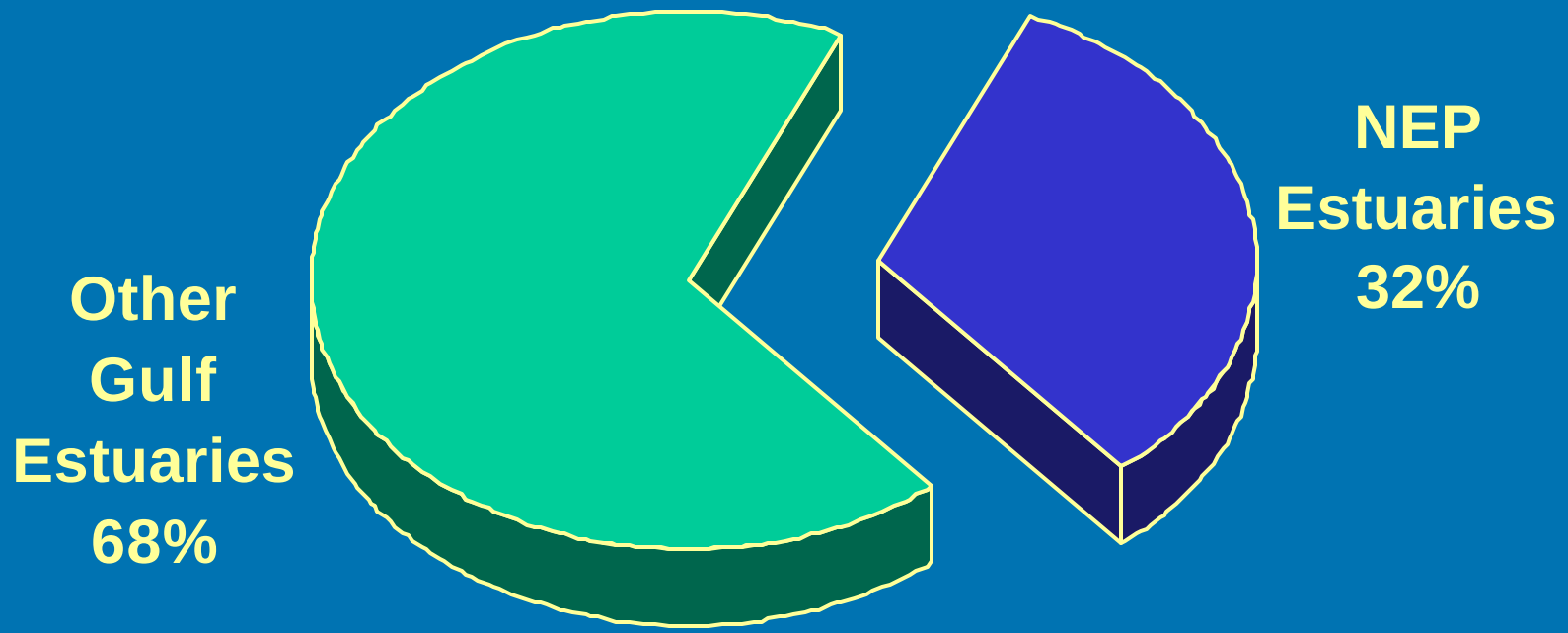
National Estuary Program



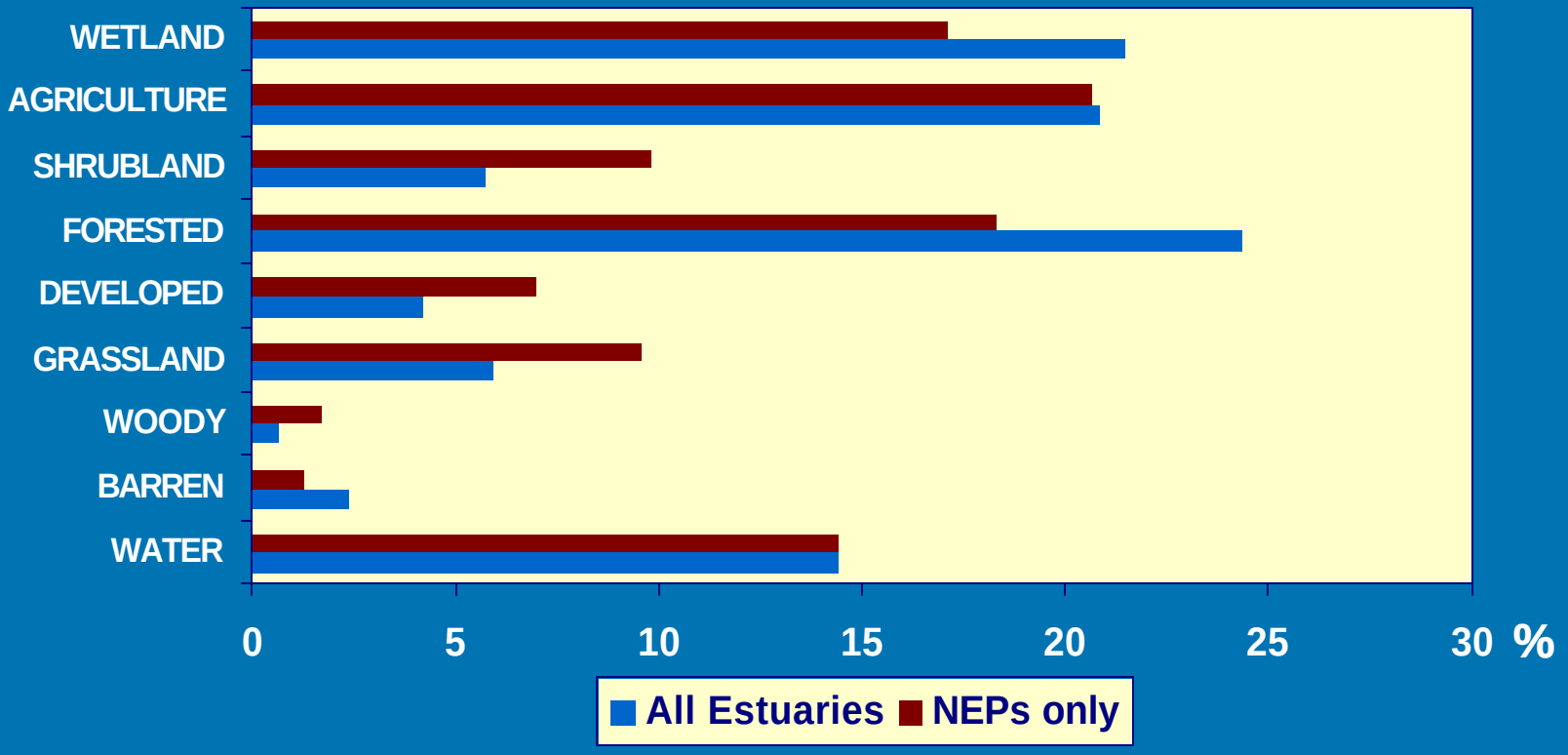
Estuarine Assessments

How well does the condition of NEP estuaries represent the condition of Gulf of Mexico estuaries?

Surface Area of Gulf of Mexico Estuaries



Gulf of Mexico Estuarine Drainage Areas Land Cover Estimates



Methods

- Probability-based survey designs
- Data collected by states using standardized field, lab, & QA protocols
- Data analysis
  - Cumulative distribution functions (CDFs) with confidence intervals
  - Maps and pie charts showing distribution of good, fair, poor conditions

Number of Stations

NCA	2000
Florida	23
Alabama	50
Mississippi	35
Louisiana	38
Texas	45

NEP	2000	2001	2002
Charlotte Harbor			30
Sarasota Bay		20	
Tampa Bay	25		
Mobile Bay	33	33	
Barataria-Terrebonne	11	14	
Galveston Bay	12	16	
Coastal Bend Bays	13	14	

Indicators

Water Quality

DIN

DIP

Chlorophyll *a*

Water Clarity

DO

Sediment Quality

Metals

Organics

TOC

Toxicity

Biological Quality

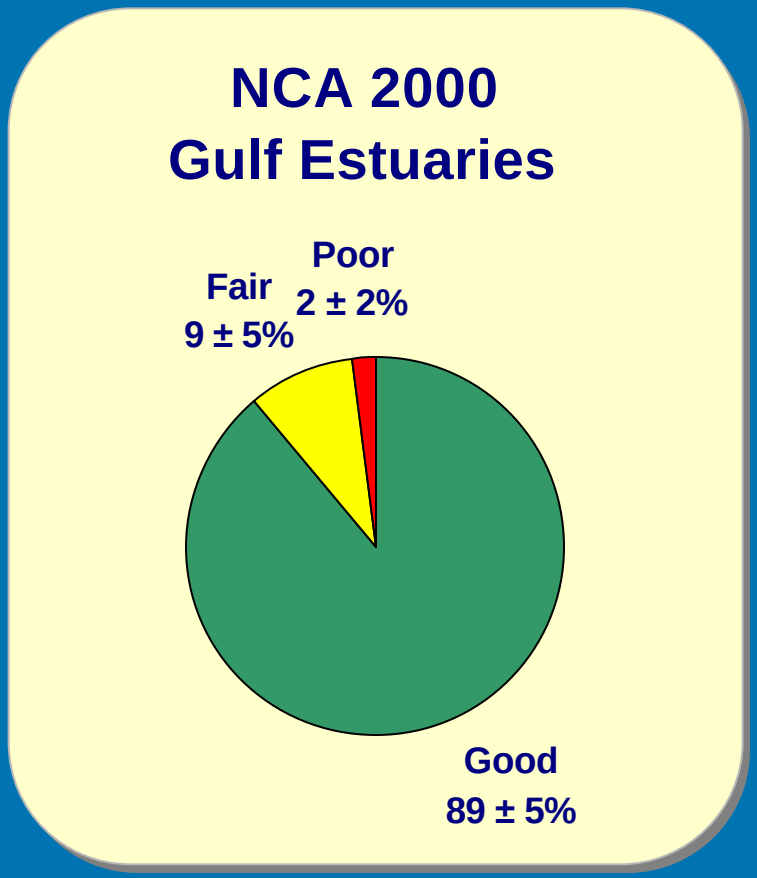
Benthic Index

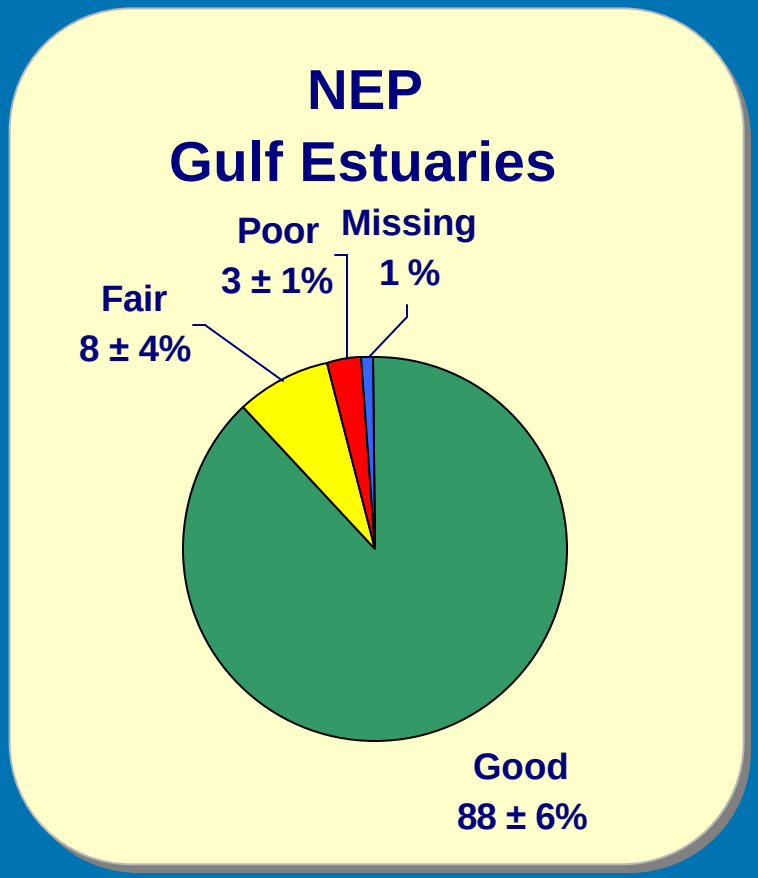
Fish Tissue Contaminants

NCA Water Quality Assessment Criteria

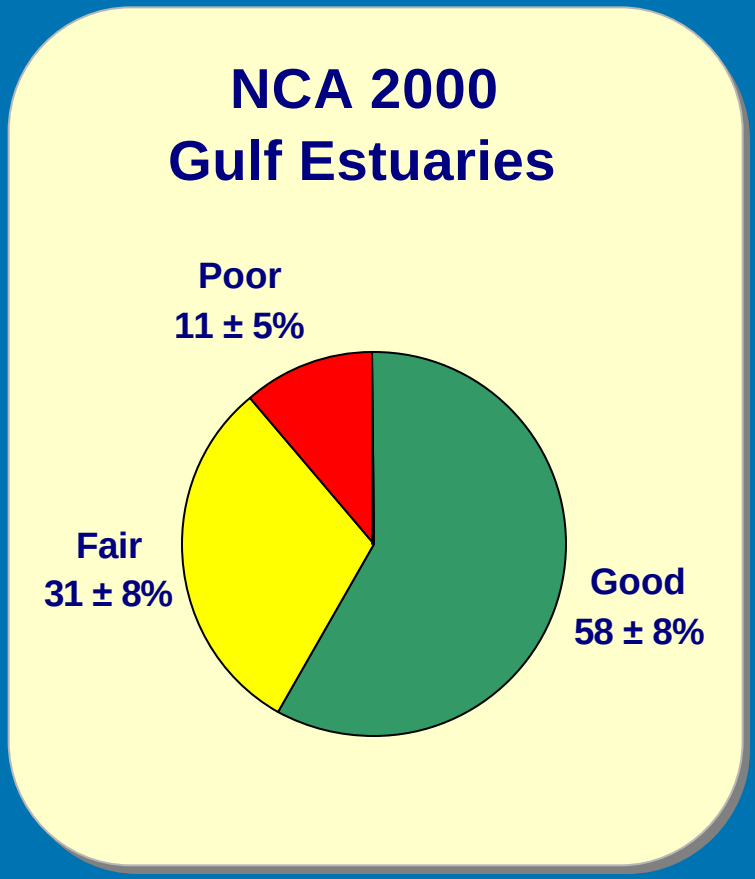
Indicator	Region	Good	Fair	Poor
DIN (mg/L)	Gulf FL Bay	< 0.1 < 0.05	0.1 – 0.5 0.05 – 0.1	> 0.5 > 0.1
DIP (mg/L)	Gulf FL Bay	< 0.01 < 0.005	0.01 – 0.05 0.005 – 0.01	> 0.05 > 0.01
Chl *a* (μg/L)	Gulf FL Bay	< 5 < 0.5	5 – 20 0.5 – 1	> 20 > 1
WCI	Gulf	> 2	1 – 2	< 1
DO (mg/L)	Gulf	> 5	2 – 5	< 2

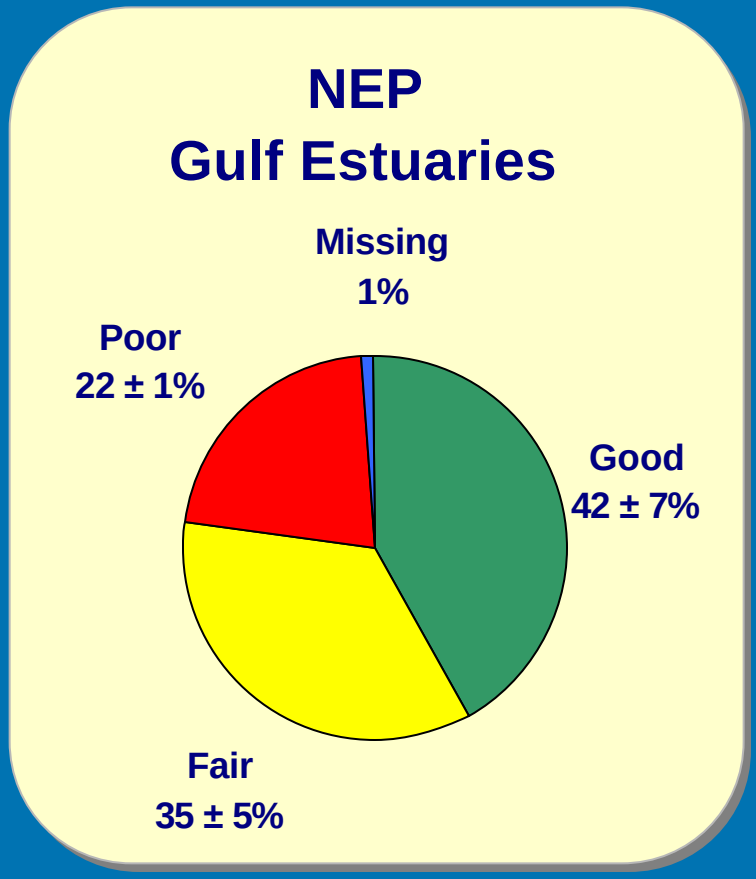
Dissolved Inorganic Nitrogen



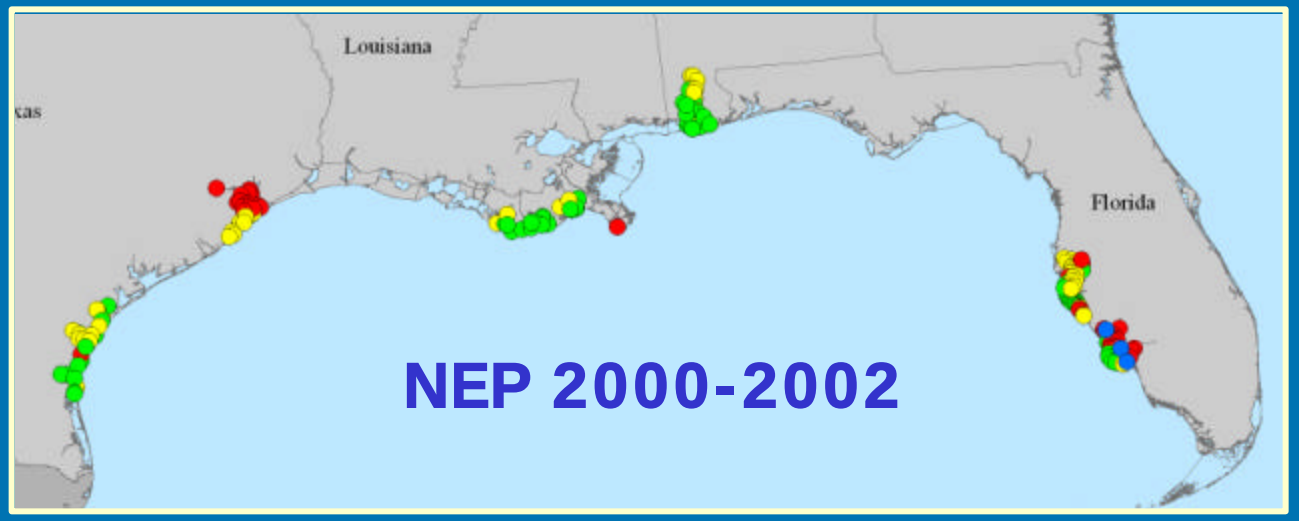


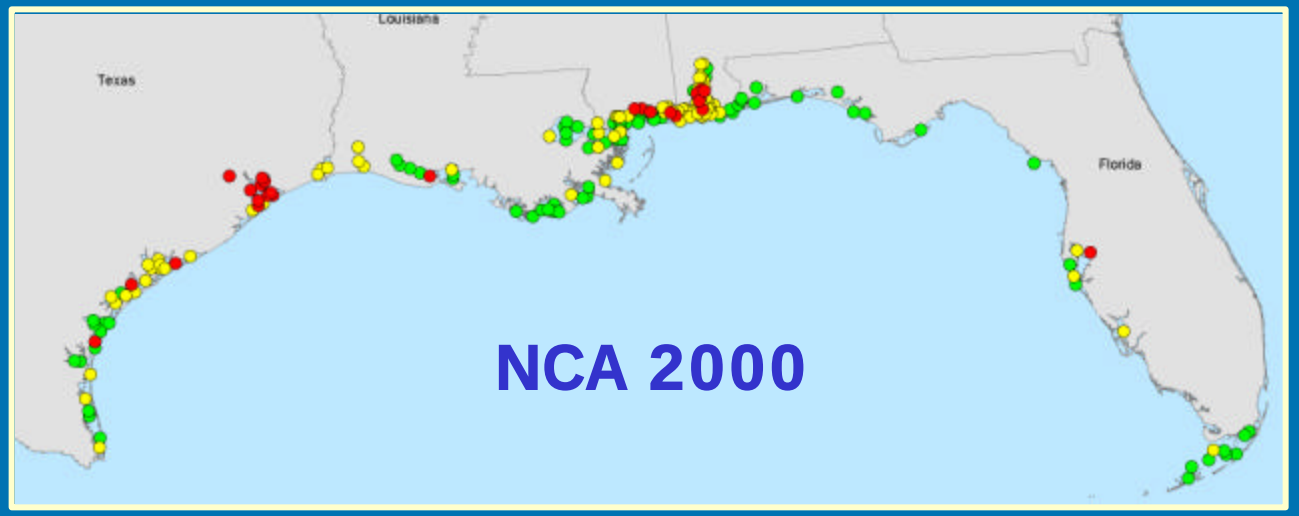
Dissolved Inorganic Phosphorus



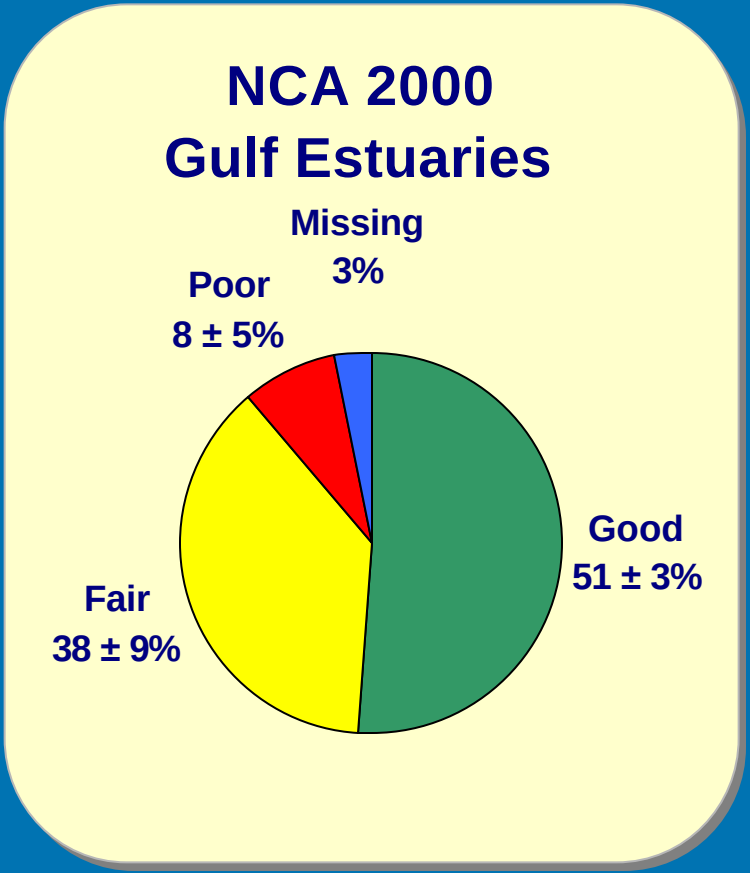


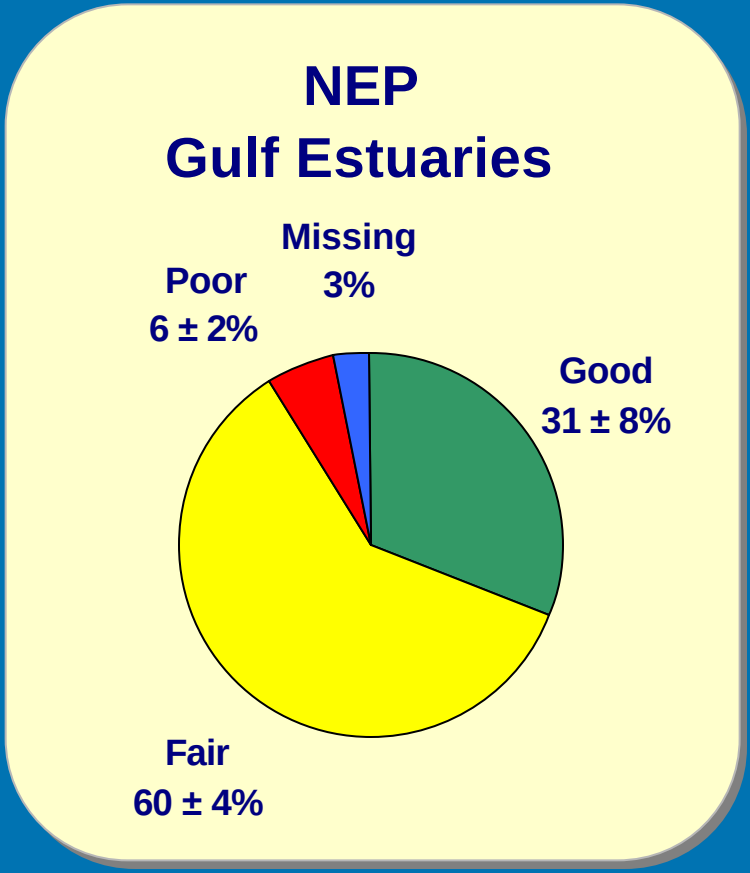
Dissolved Inorganic Phosphorus



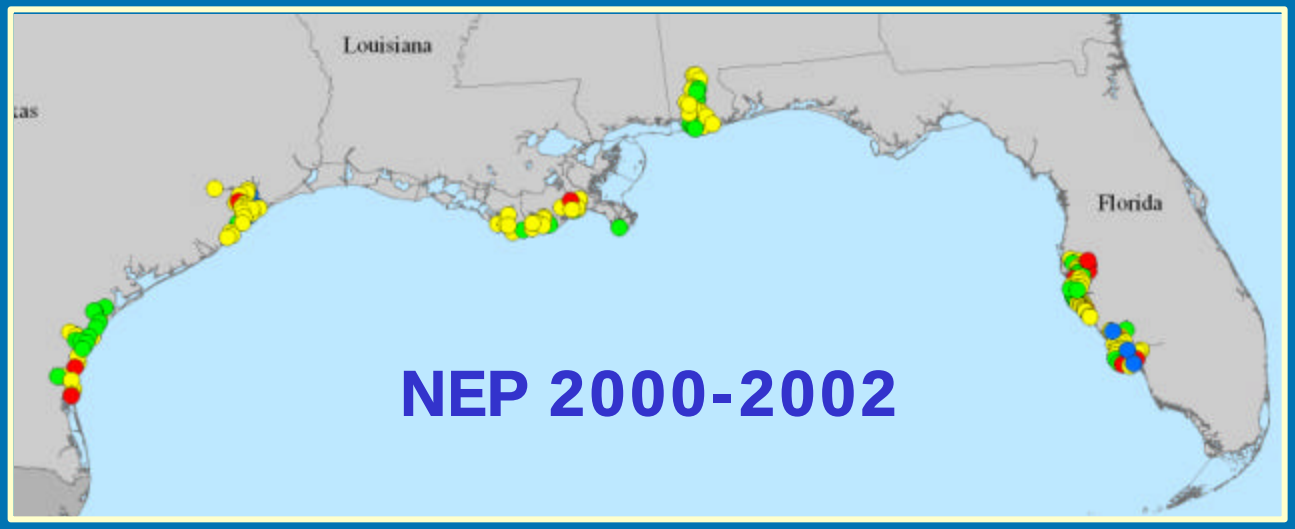


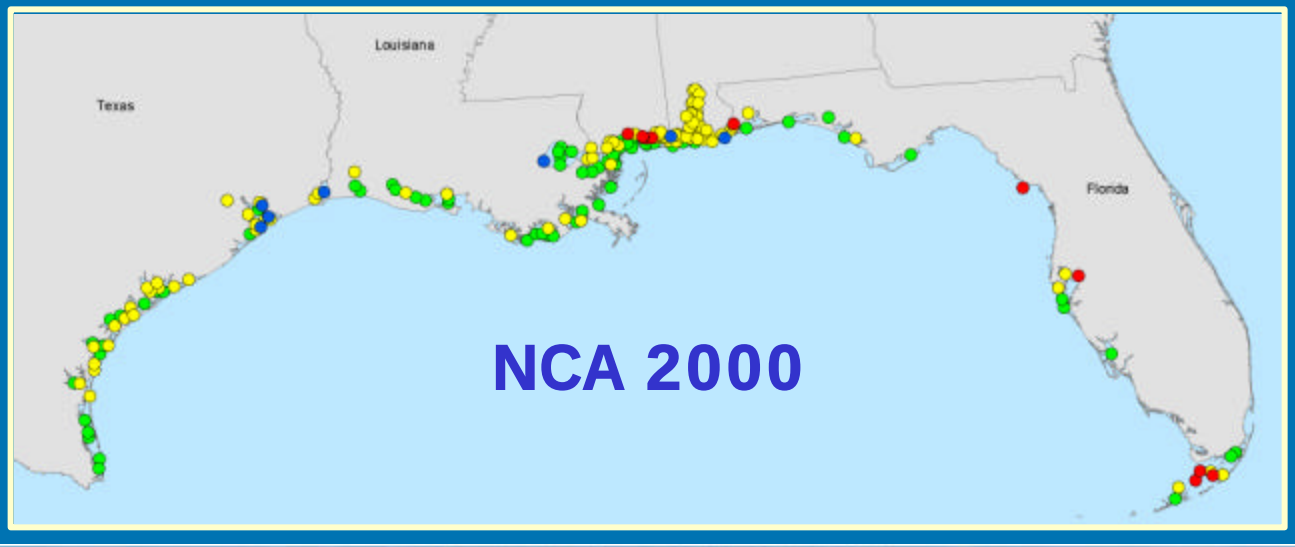
Chlorophyll a



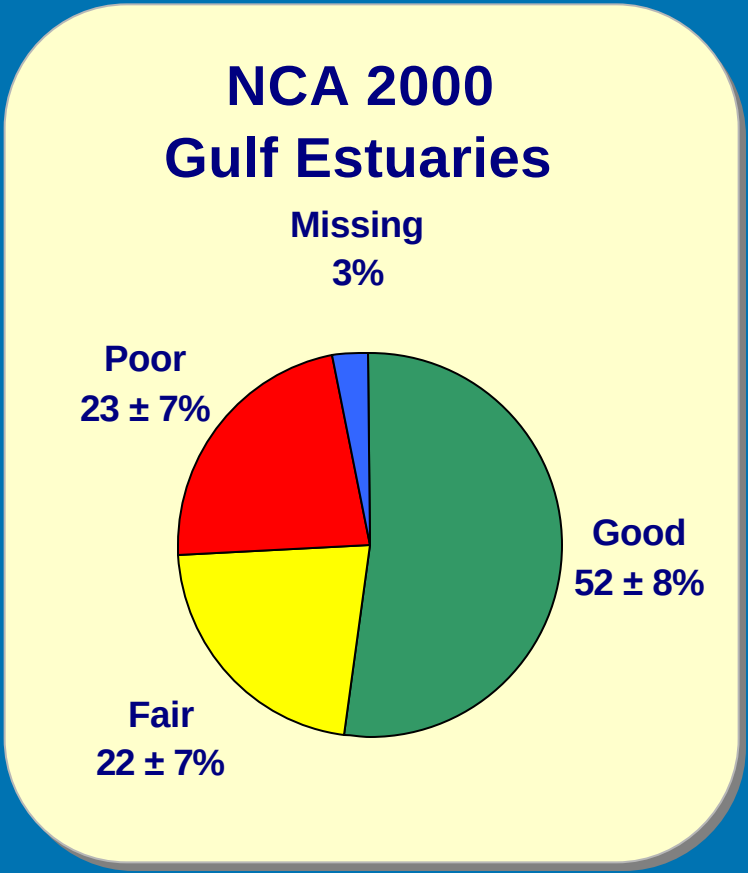


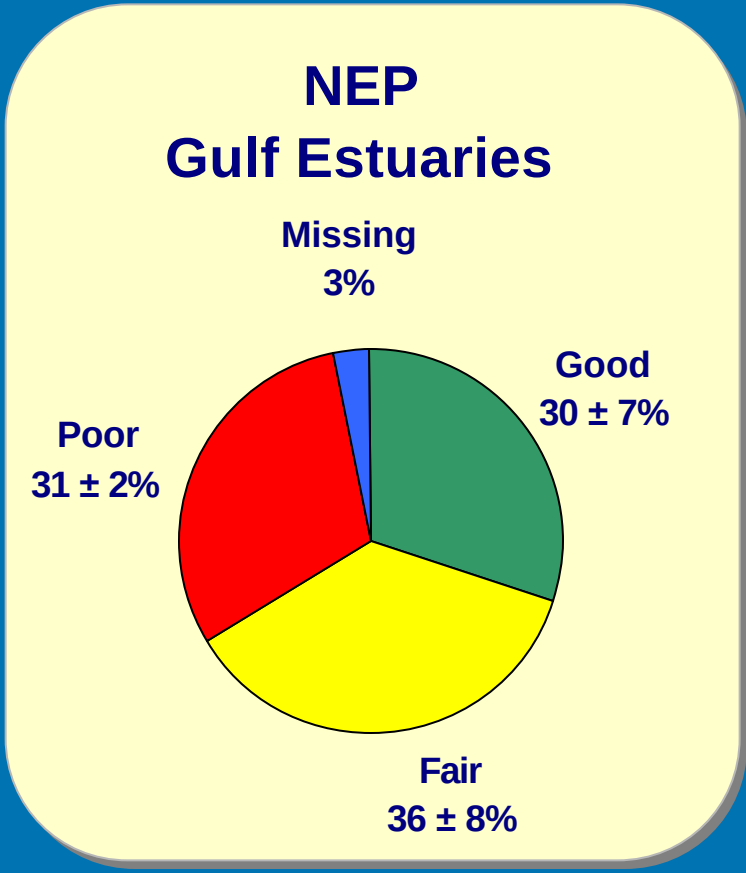
Chlorophyll a





Water Clarity





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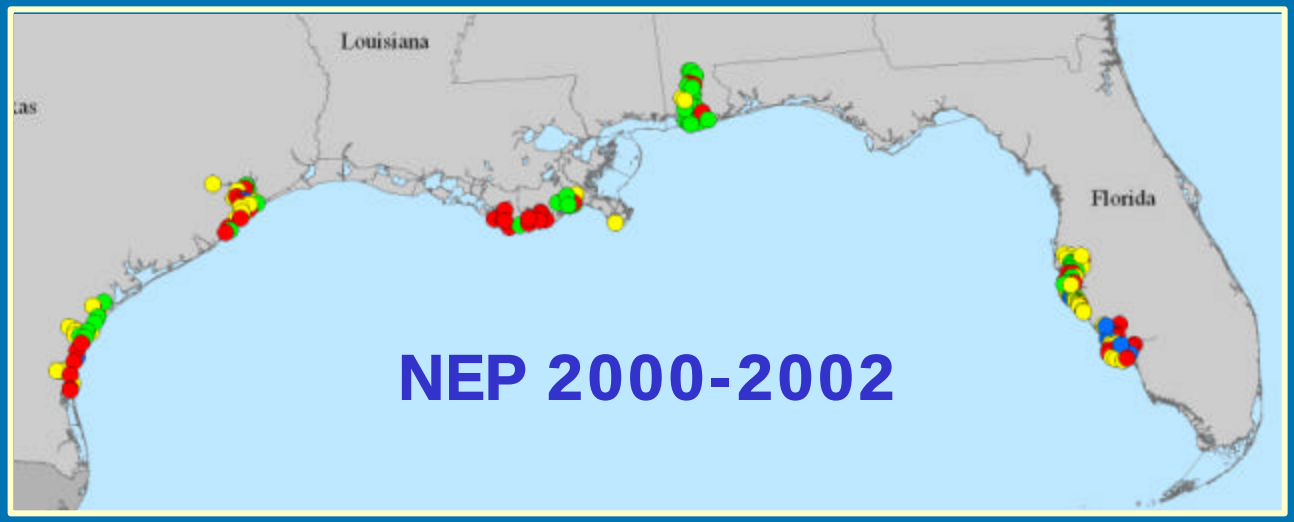
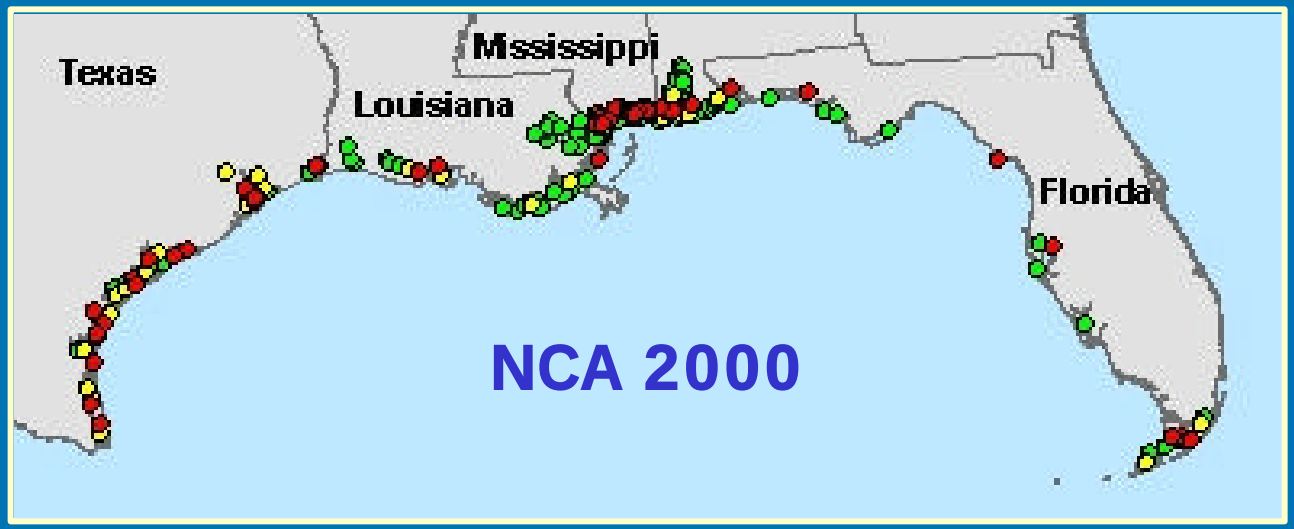
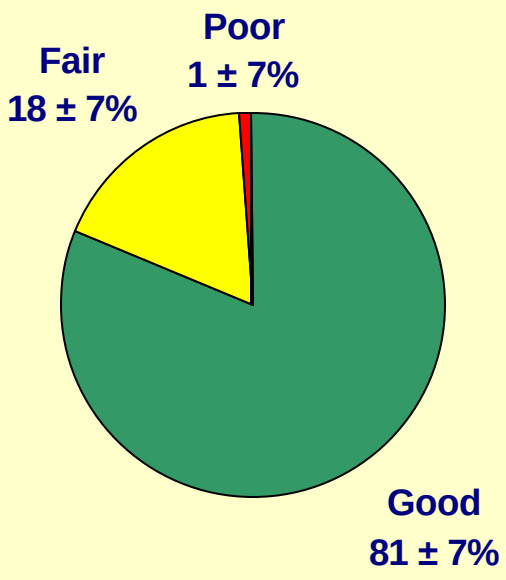


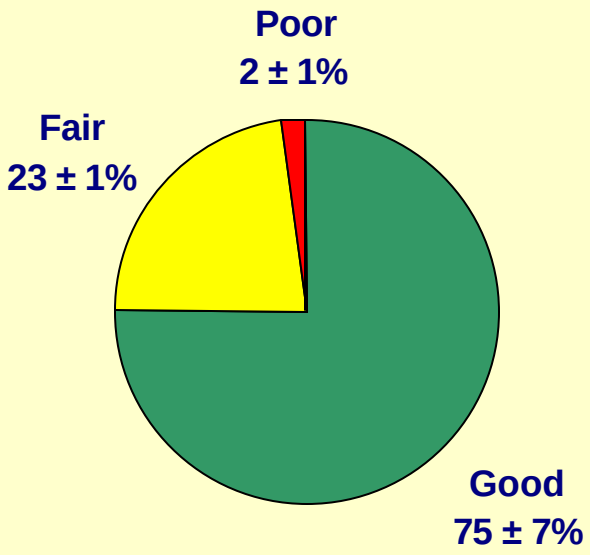


Dissolved Oxygen

NCA 2000
Gulf Estuaries

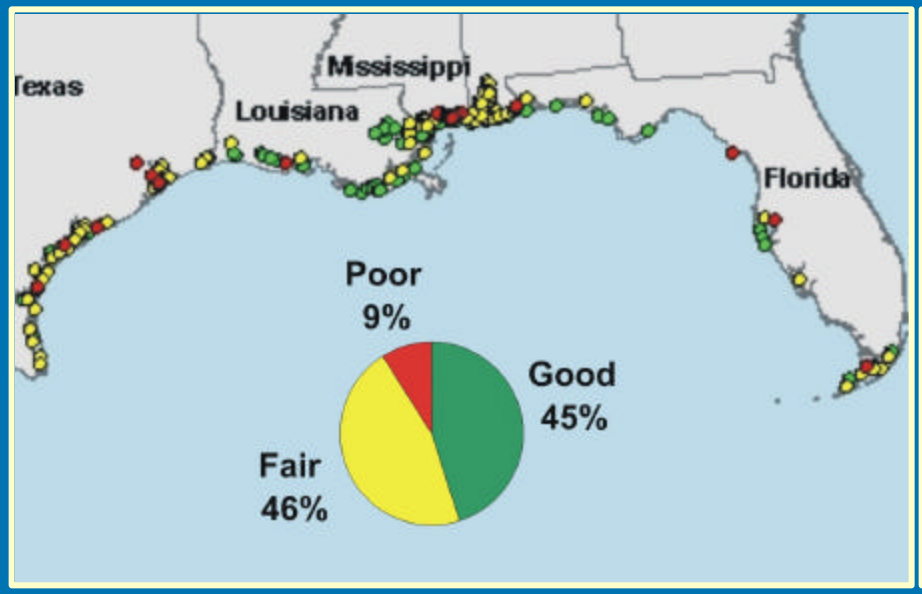


NEP
Gulf Estuaries

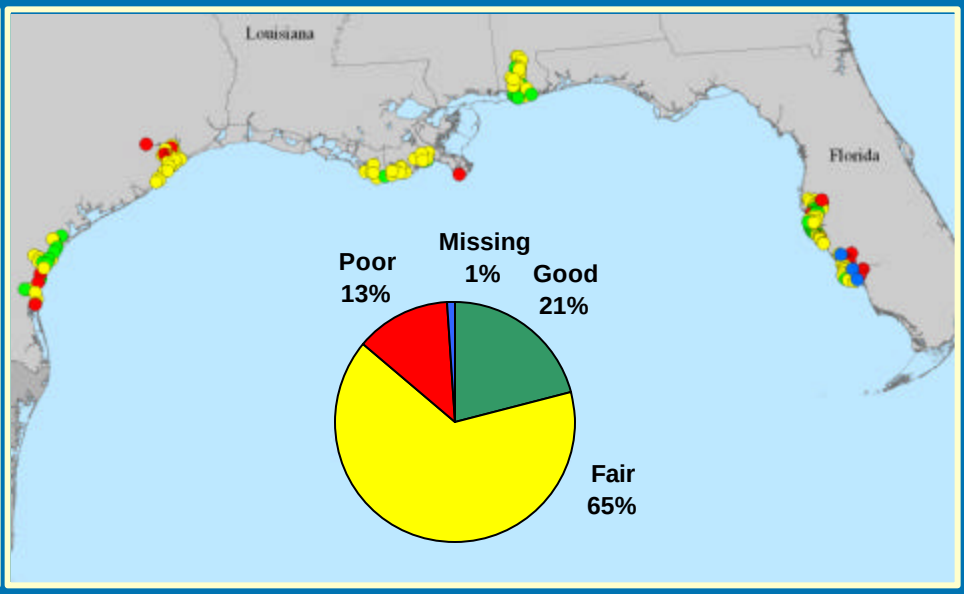


Water Quality Index

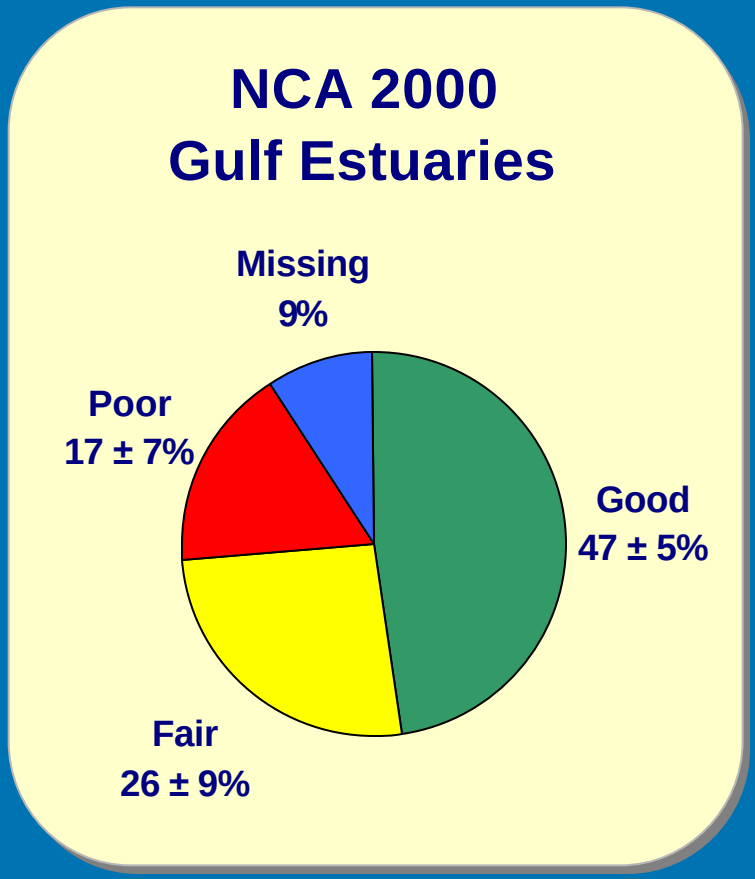
NCA 2000

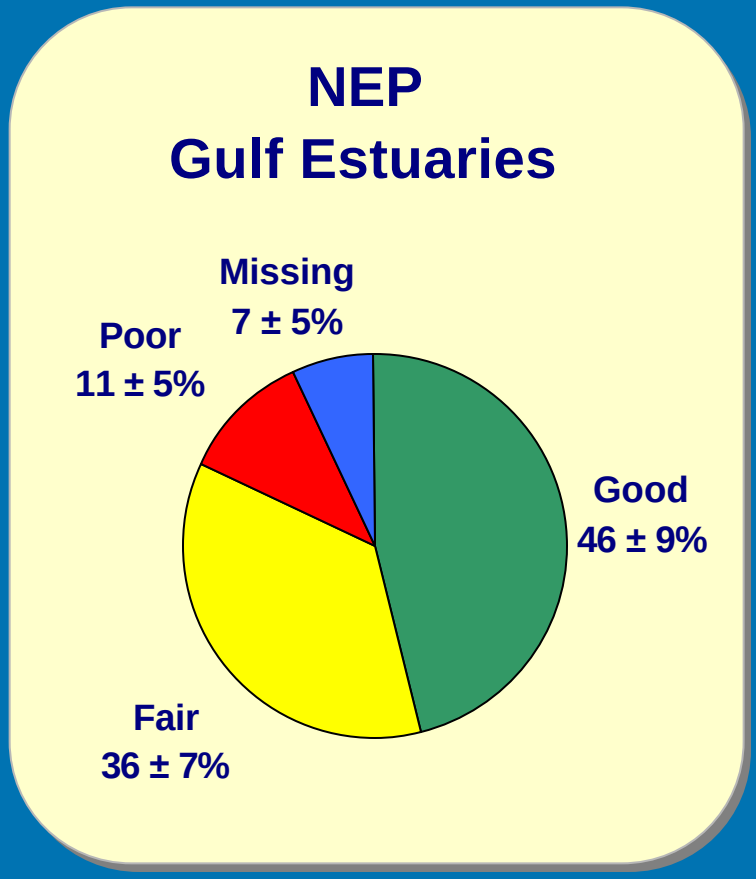


NEP 2000-2002



Benthic Index





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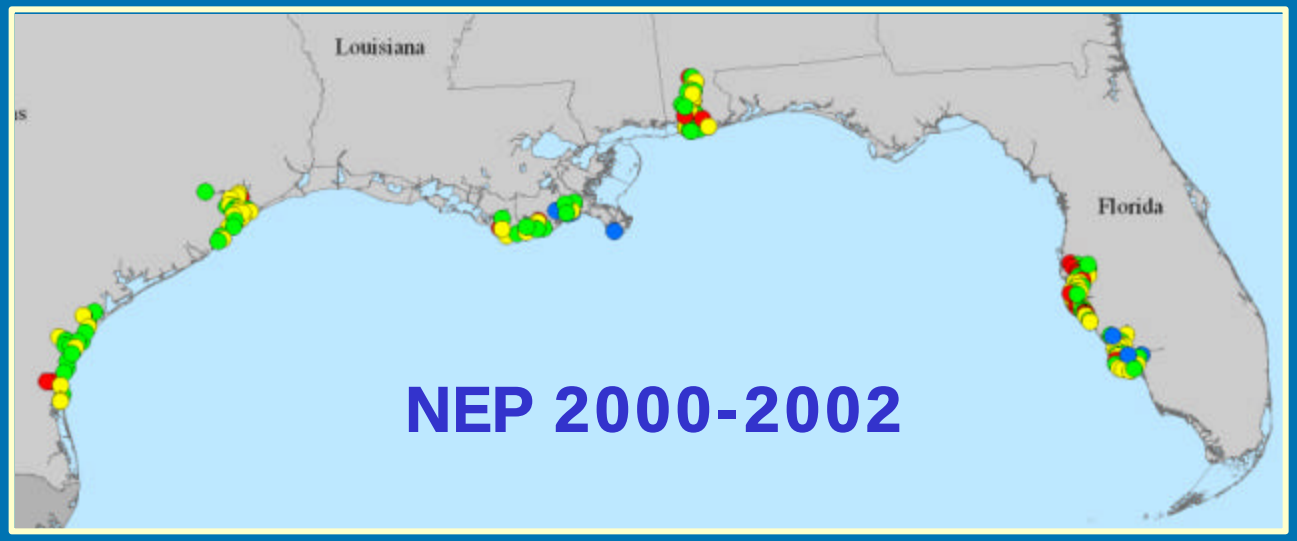
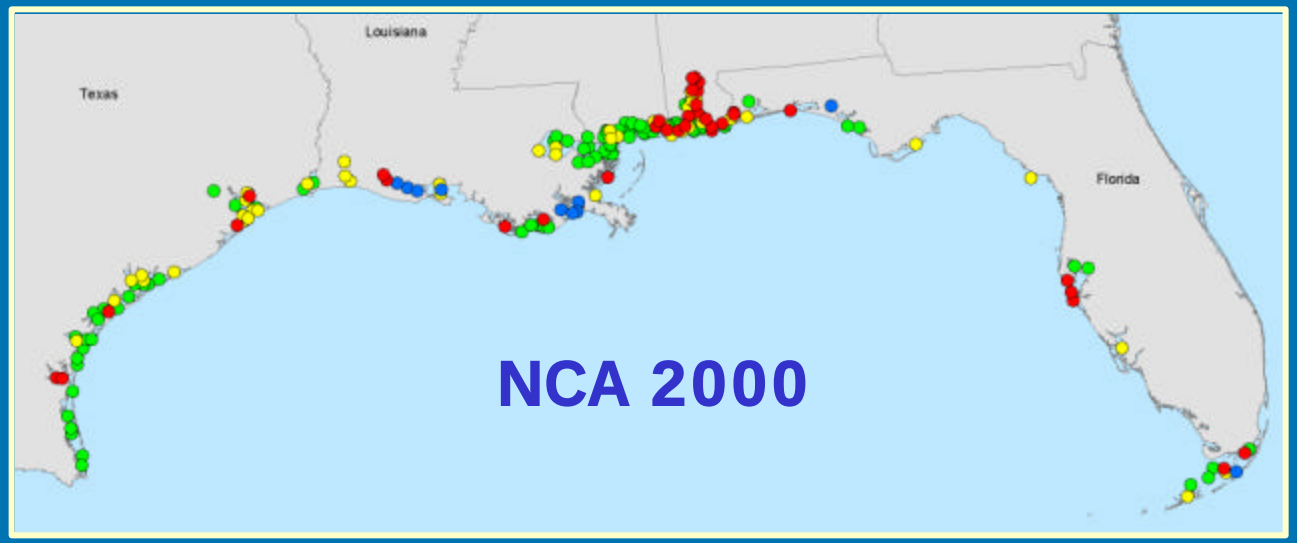


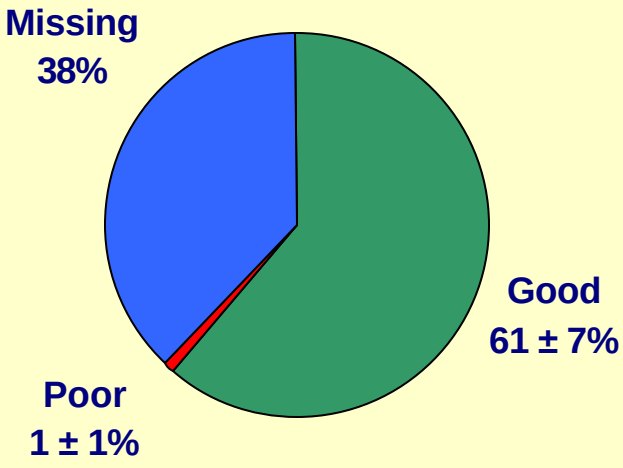


NCA Sediment Quality Assessment Criteria

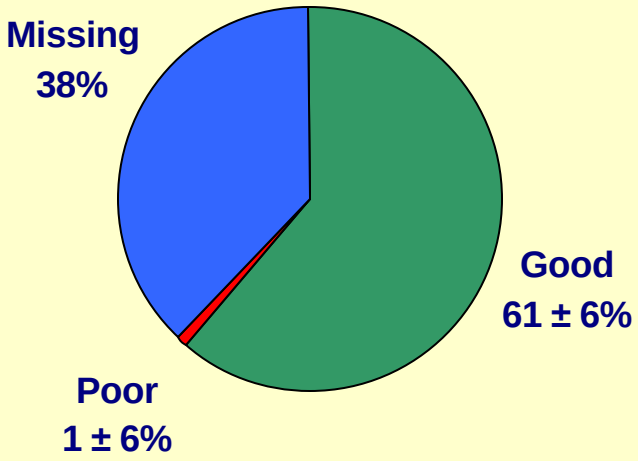
Indicator	Good	Fair	Poor
Ampelisca Survival (%)	= 80		< 80
Number of Contaminants	0 > ERM < 5 > ERL	= 5 > ERL	= 1 > ERM
TOC (%)	< 2	2 – 5	> 5

Sediment Toxicity

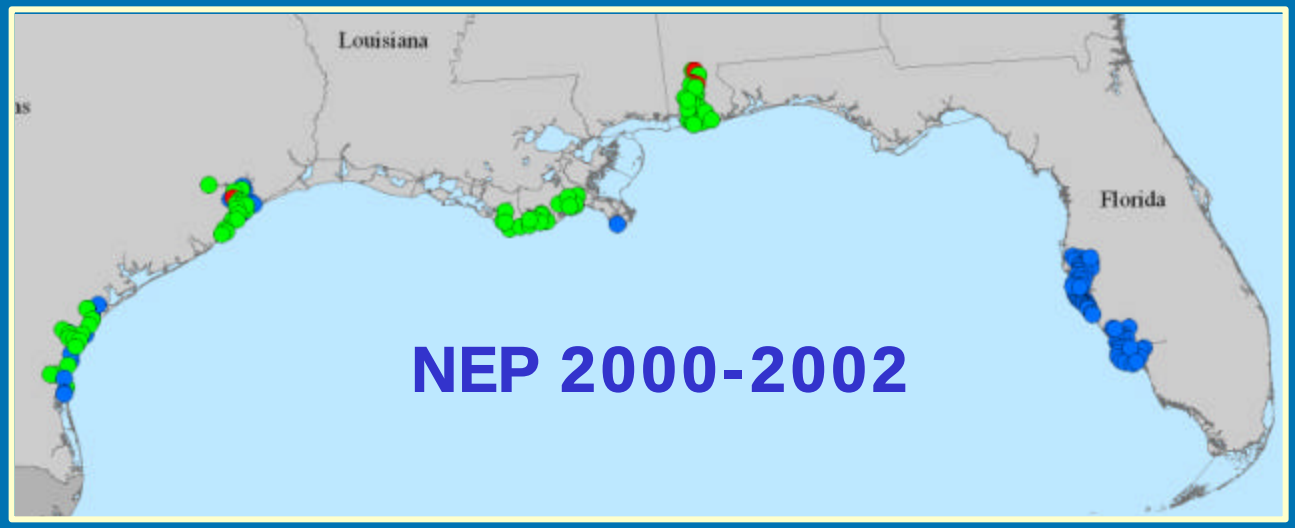
NCA 2000
Gulf Estuaries

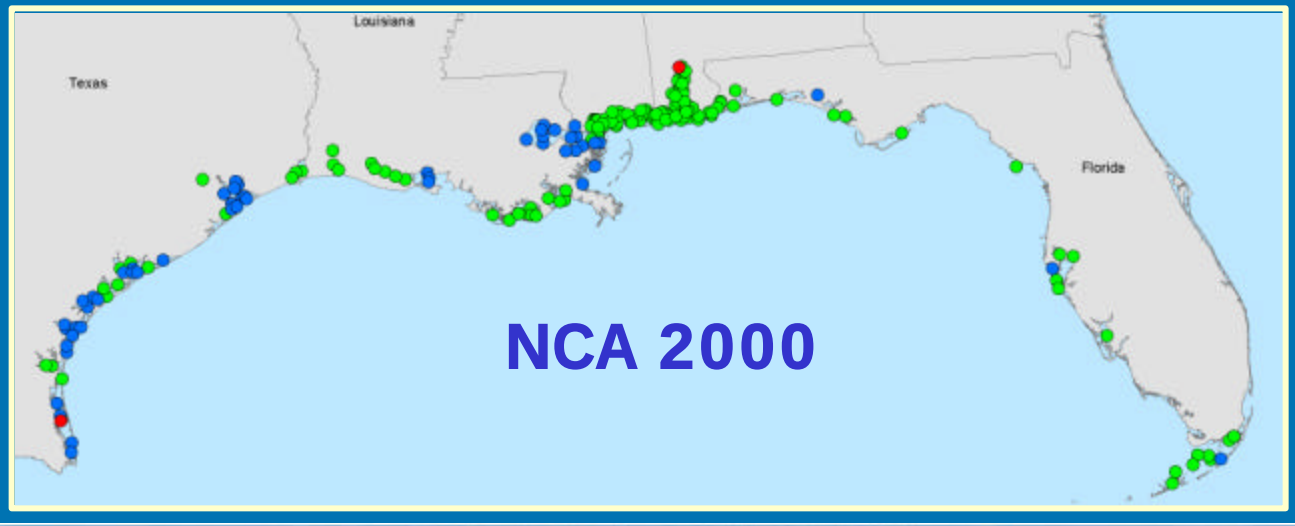


NEP
Gulf Estuaries



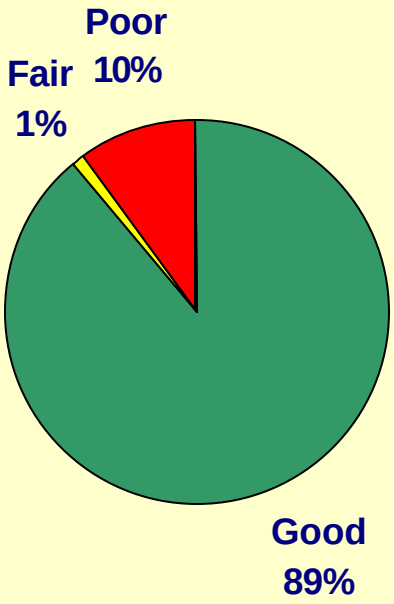
Sediment Toxicity





Sediment Contaminants

NCA 2000
Gulf Estuaries



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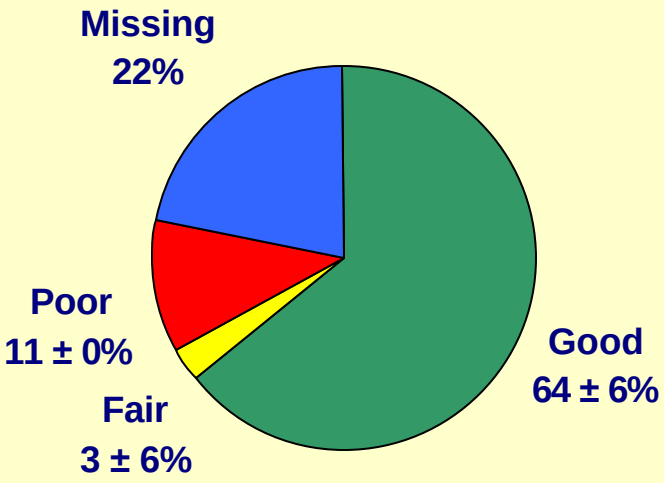
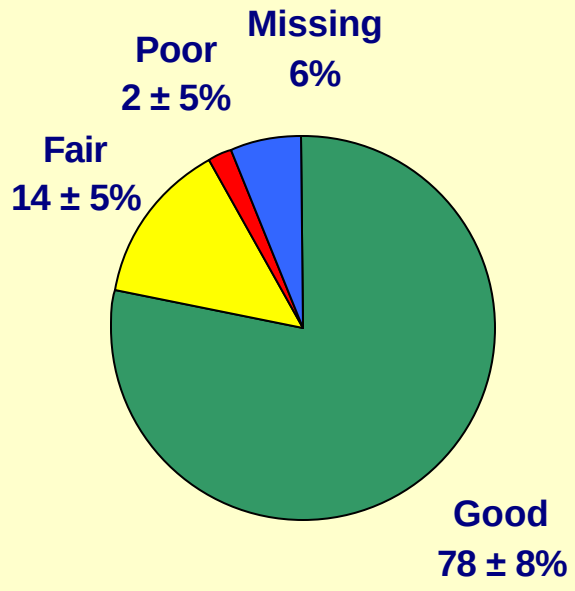
Gulf Estuaries

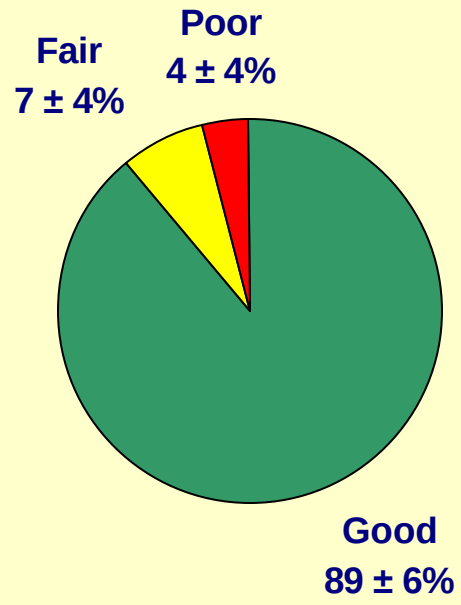


Total Organic Carbon

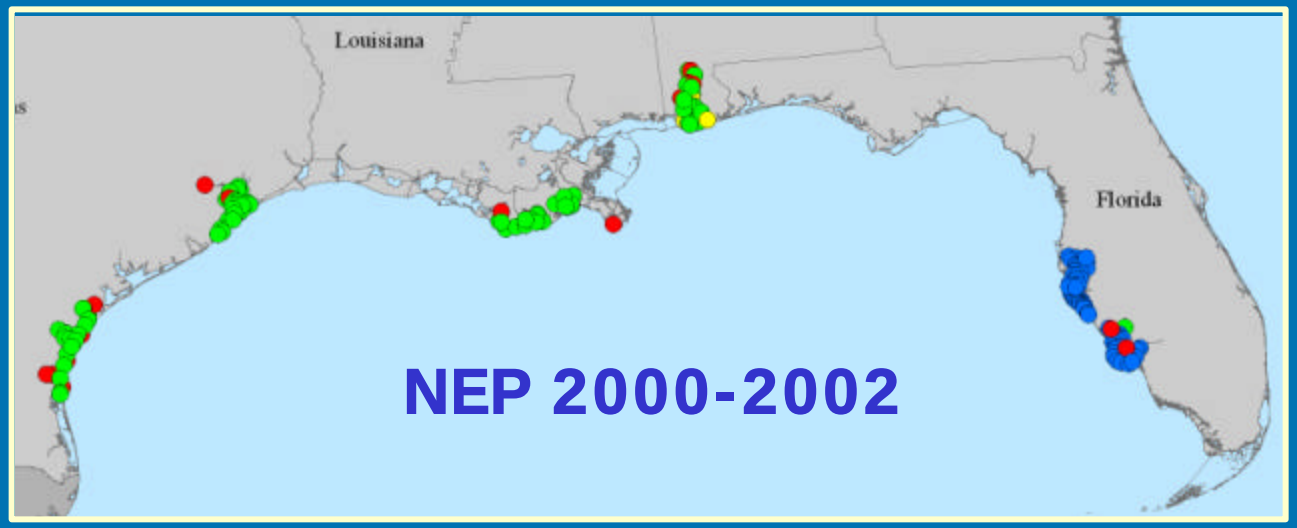
NCA 2000
Gulf Estuaries

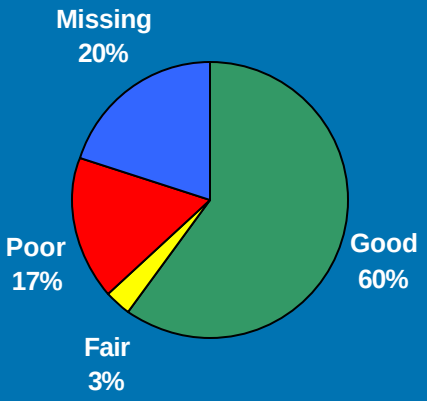


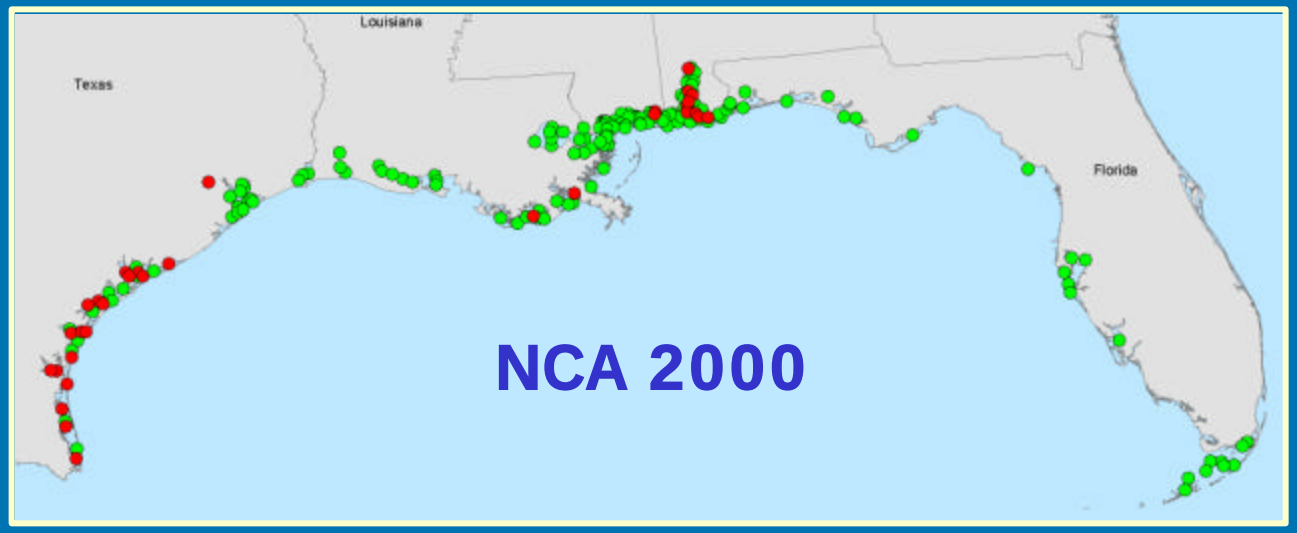
NEP
Gulf Estuaries

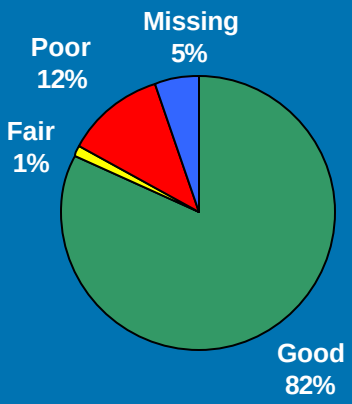


Sediment Quality Index









NCA Regional Scoring Criteria

Indicator	Good	Fair	Poor
DIN, DIP, Water Clarity	< 10% Poor and > 50% Good	10-25% Poor or > 50% Fair + Poor	> 25% Poor
CHL, WQI, Benthic Index	< 10% Poor and > 50% Good	10-20% Poor or > 50% Fair + Poor	> 20% Poor
Contaminants, DO, SQI	< 5% Poor and > 50% Good	5-15% Poor or > 50% Fair + Poor	> 15% Poor
Toxicity	< 5% Poor		> 5% Poor
TOC	< 20% Poor	20-30% Poor	> 30% Poor

Condition of Gulf of Mexico Estuaries

	NCA	NEP
DIN		
DIP		
CHL		
Clarity		
DO		
Water Quality		

	NCA	NEP
Toxicity		
Contam		
TOC		
Sediment Quality		
Benthic Index		

SARASOTA
bay
National Estuary Program
CHARLOTTE HARBOR
National Estuary Program
COASTAL BEND
BAYS & ESTUARIES PROGRAM
Galveston Bay
ESTUARY PROGRAM
EMAP
TAMPA
Estuary Program
Barataria-Terrebonne
NATIONAL ESTUARY PROGRAM
Mobile Bay National Estuary Program