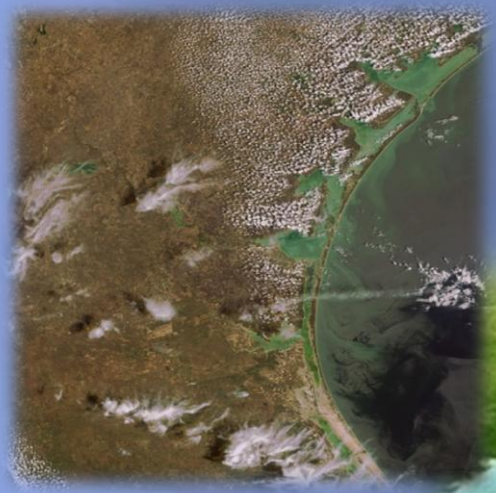
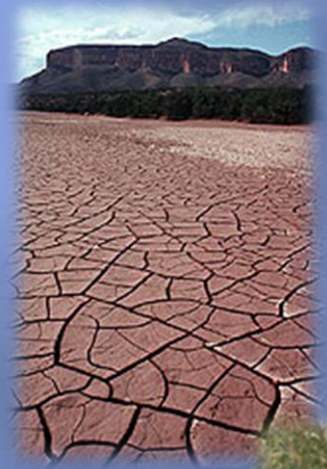
Adaptive Management and Gulf Restoration – A Perspective

Galveston Listening Session

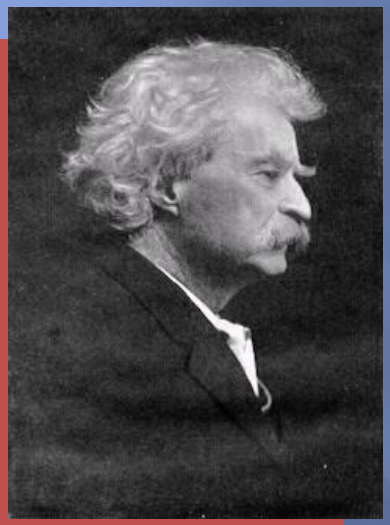
June 2011



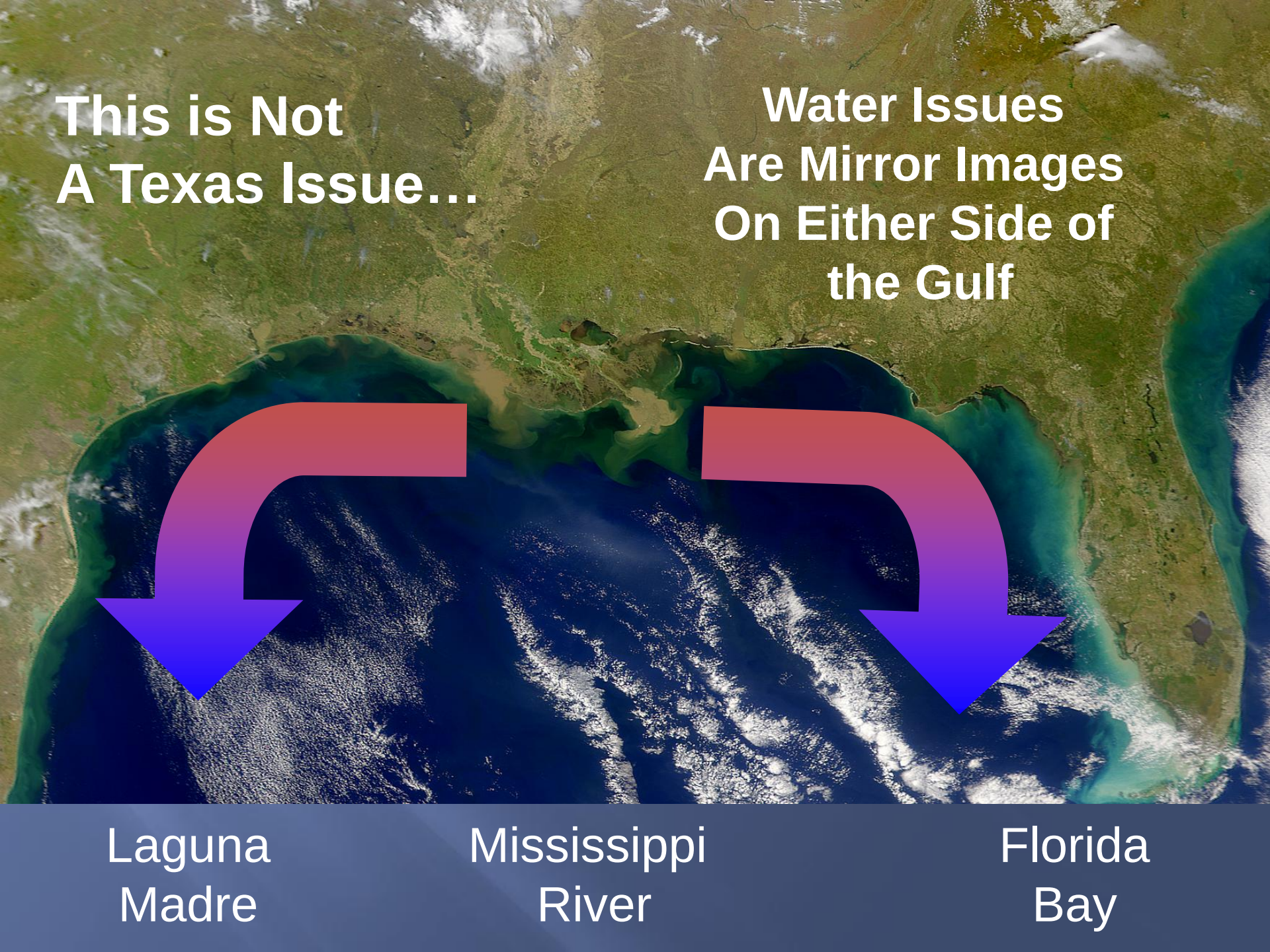


Dr. Larry McKinney
Director – Harte Research Institute
Texas A&M University Corpus Christi

Whiskey is for Drinking and Water is for Fighting

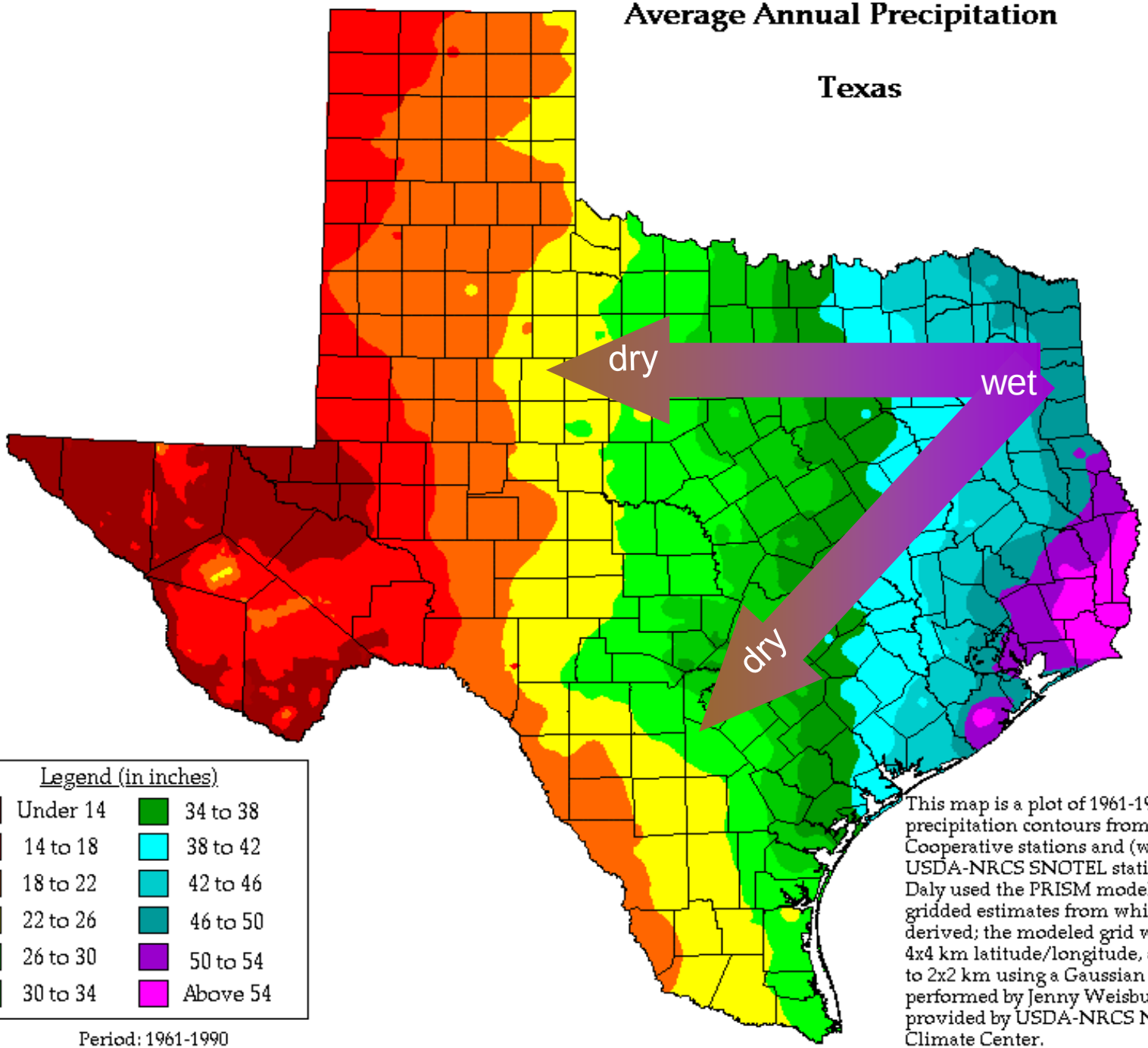


Mark Twain


This is Not
A Texas Issue…
Water Issues
Are Mirror Images
On Either Side of
the Gulf
Laguna
Madre
Mississippi
River
Florida
Bay

Average Annual Precipitation

Texas



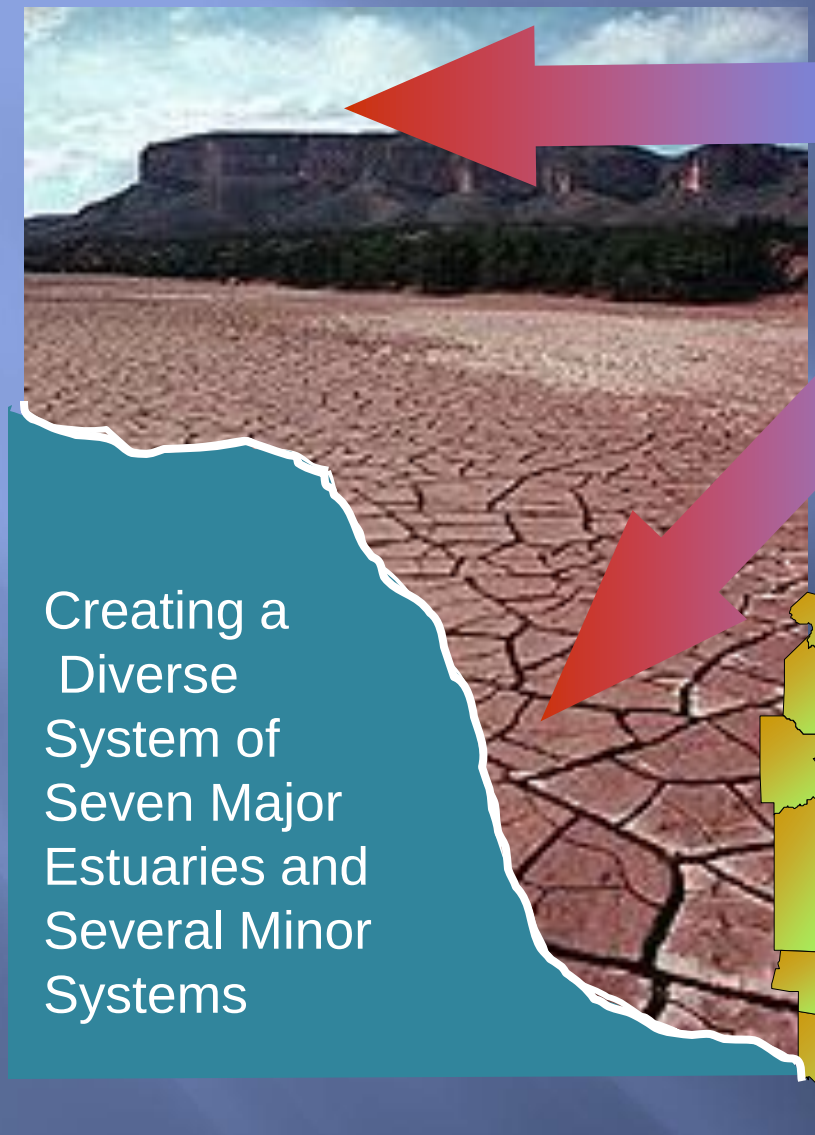
Legend (in inches)

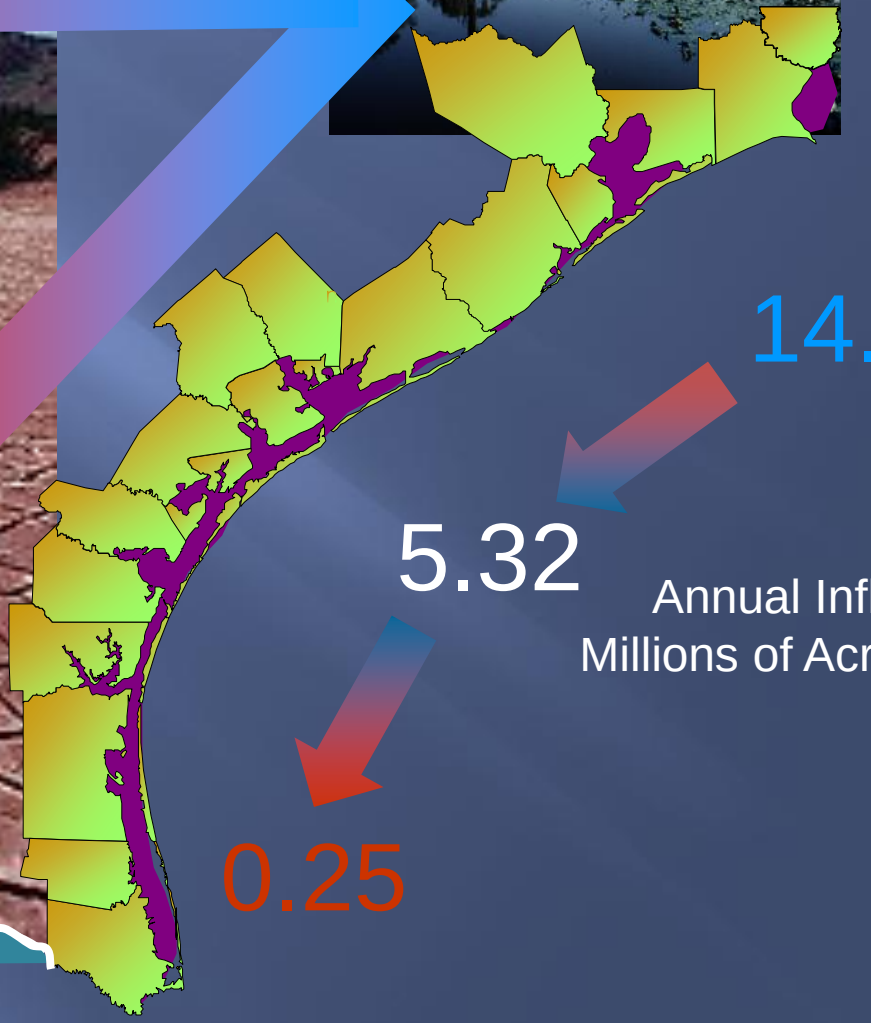
Under 14	34 to 38
14 to 18	38 to 42
18 to 22	42 to 46
22 to 26	46 to 50
26 to 30	50 to 54
30 to 34	Above 54

Period: 1961-1990

This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) USDA-NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisburg. Funding was provided by USDA-NRCS National Water and Climate Center.

Texas Climate Gradient Is Reflected In Inflows to Texas Estuaries…





14.7

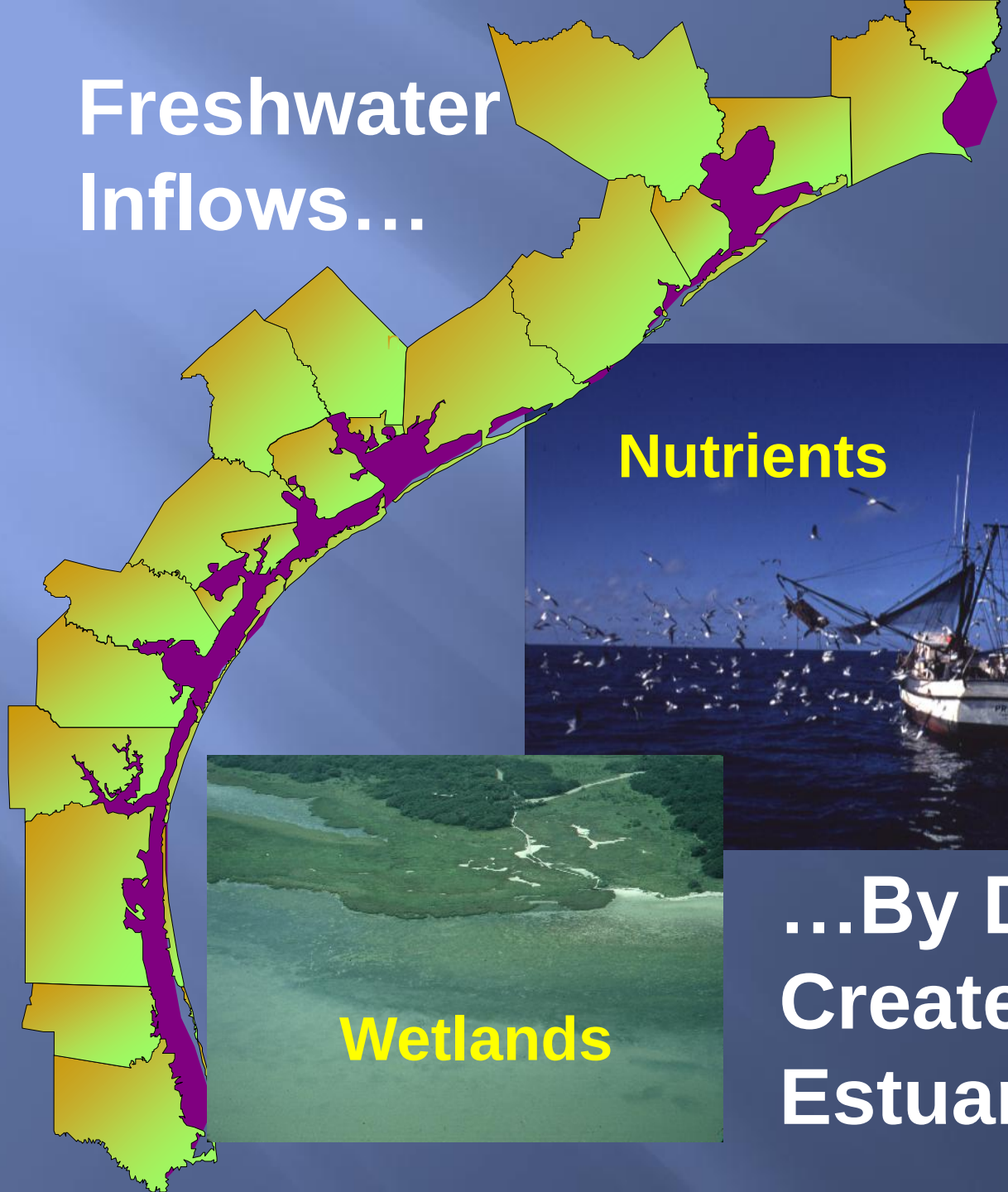
5.32

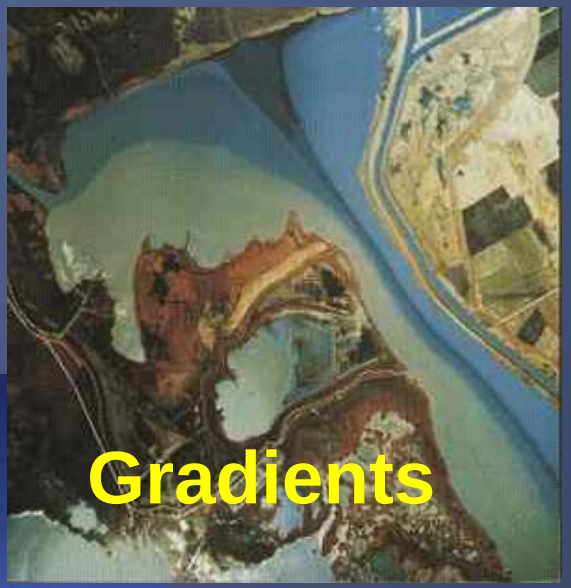
Annual Inflow
Millions of Acre Feet

0.25

Creating a Diverse System of Seven Major Estuaries and Several Minor Systems

Freshwater Inflows…





Gradients

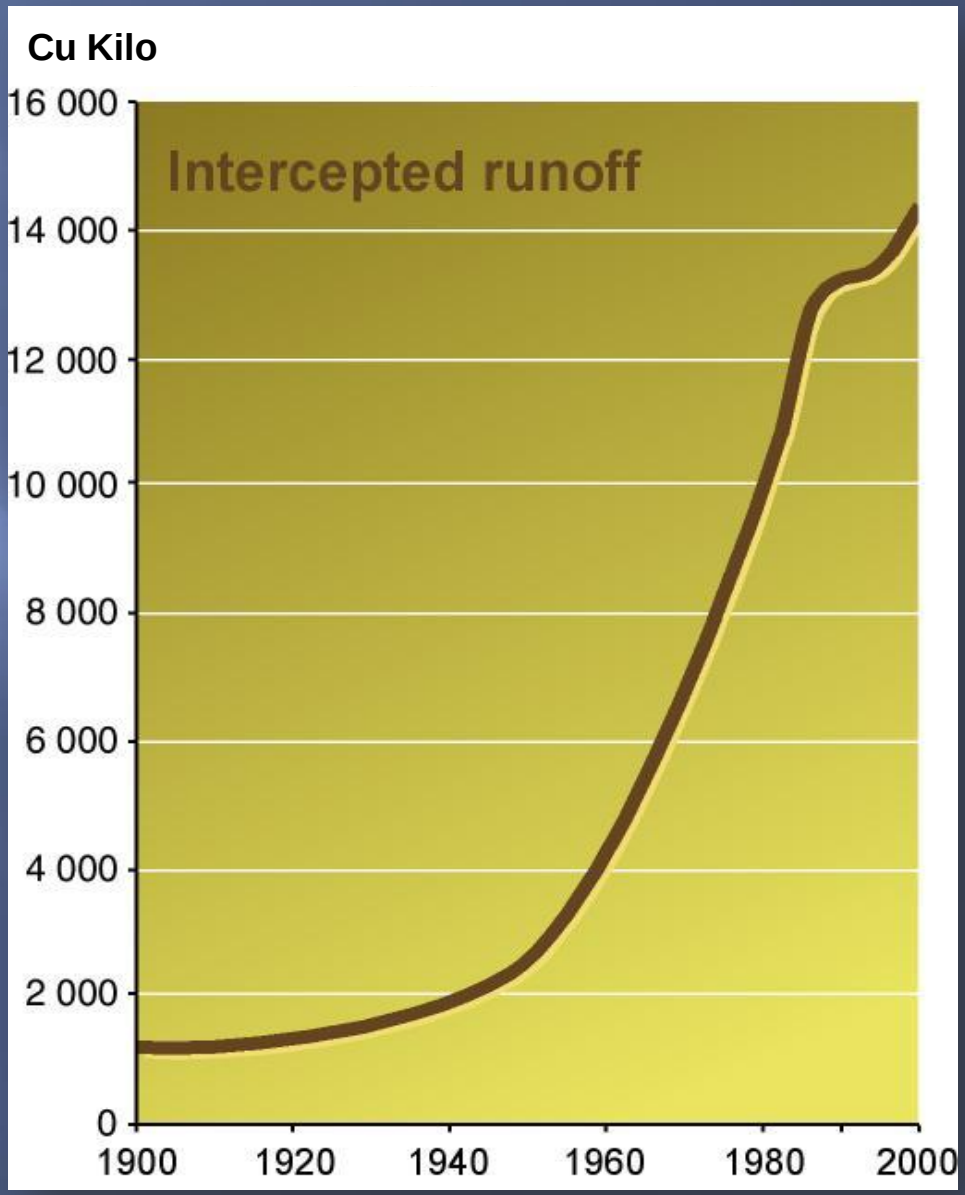
Nutrients

Wetlands

…By Definition Create and Sustain Estuaries

Competition For Water

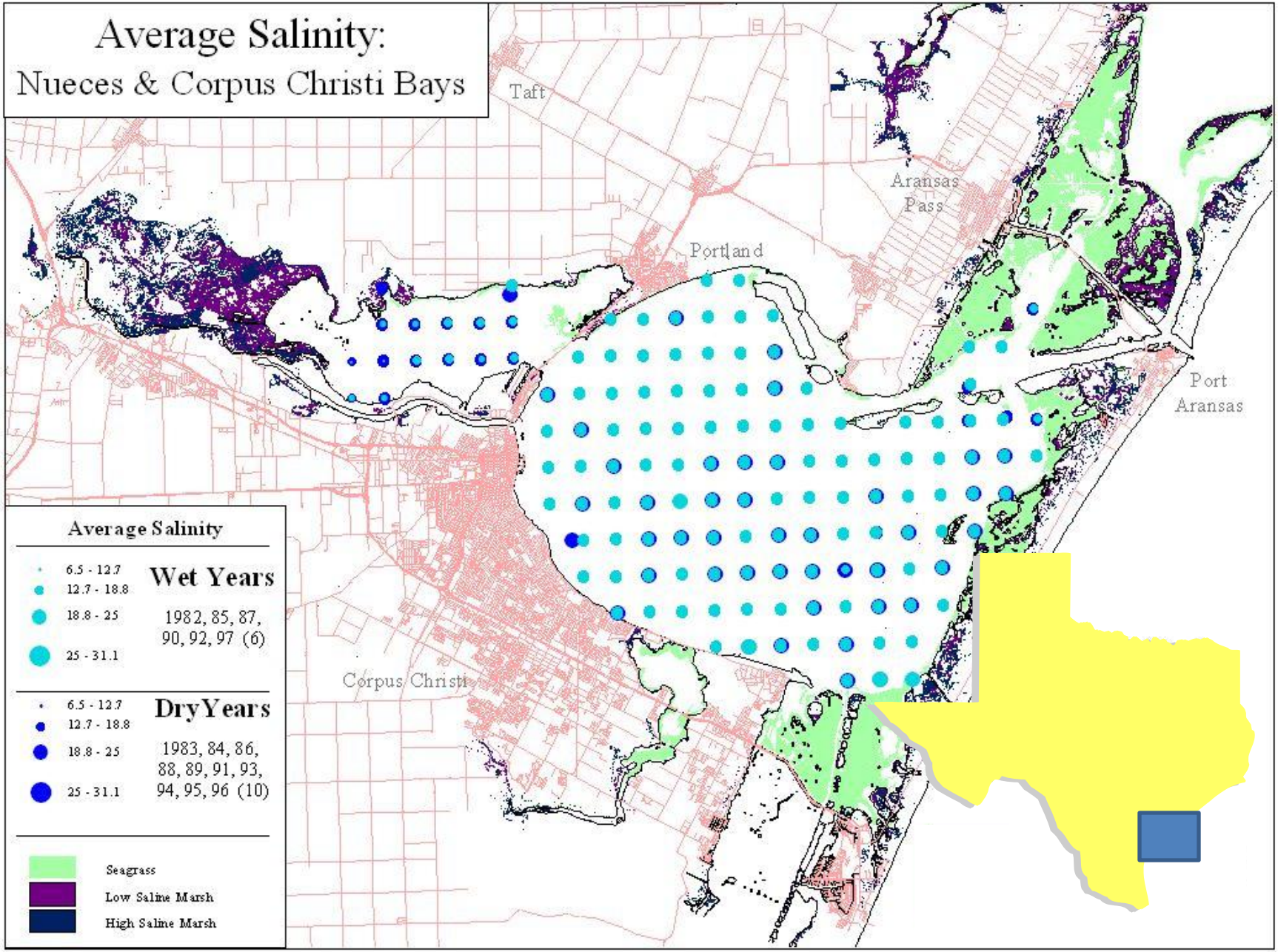
- Amount of water in reservoirs quadrupled since 1960
- There is now 3-6 times as much water in reservoirs as in natural rivers
- Withdrawals from rivers and lakes doubled since 1960



Source: http://www.millenniumassessment.org/

Texas Senate Bill 3 Basically put into Place an Adaptive Management Process to Secure Instream Flows and Freshwater Inflows to Protect Health and Productivity of Texas Rivers and Estuaries

- Passed in 2007 by the 80th Regular Session of the Texas Legislature
- Created a basin-by-basin process for developing
  - Recommendations to meet instream flow needs for rivers
  - Recommendations to meet inflow needs for bays and estuaries
  - Environmental Flow Standards to be adopted by rule by the Texas Commission on Environmental Quality (TCEQ)


Average Salinity:
Nueces & Corpus Christi Bays
Taft
Aransas Pass
Portland
Port Aransas
Corpus Christi
Average Salinity
6.5 - 12.7
12.7 - 18.8
18.8 - 25
25 - 31.1
Wet Years
1982, 85, 87, 90, 92, 97 (6)
6.5 - 12.7
12.7 - 18.8
18.8 - 25
25 - 31.1
DryYears
1983, 84, 86, 88, 89, 91, 93, 94, 95, 96 (10)
Seagrass
Low Saline Marsh
High Saline Marsh

Adaptive management should be science driven but not science dominated. It is not possible to proceed with the certainty that many may demand. Such requests (for more certainty or more study) are often nothing more than delaying tactics. The primary purpose of adaptive management is to allow action in the face of a lack of certainty or scientific consensus, which is almost always the case in resource related issues. Once free of the illusion that science or technology can solve resource or conservation problems, a broad range of solutions become possible.

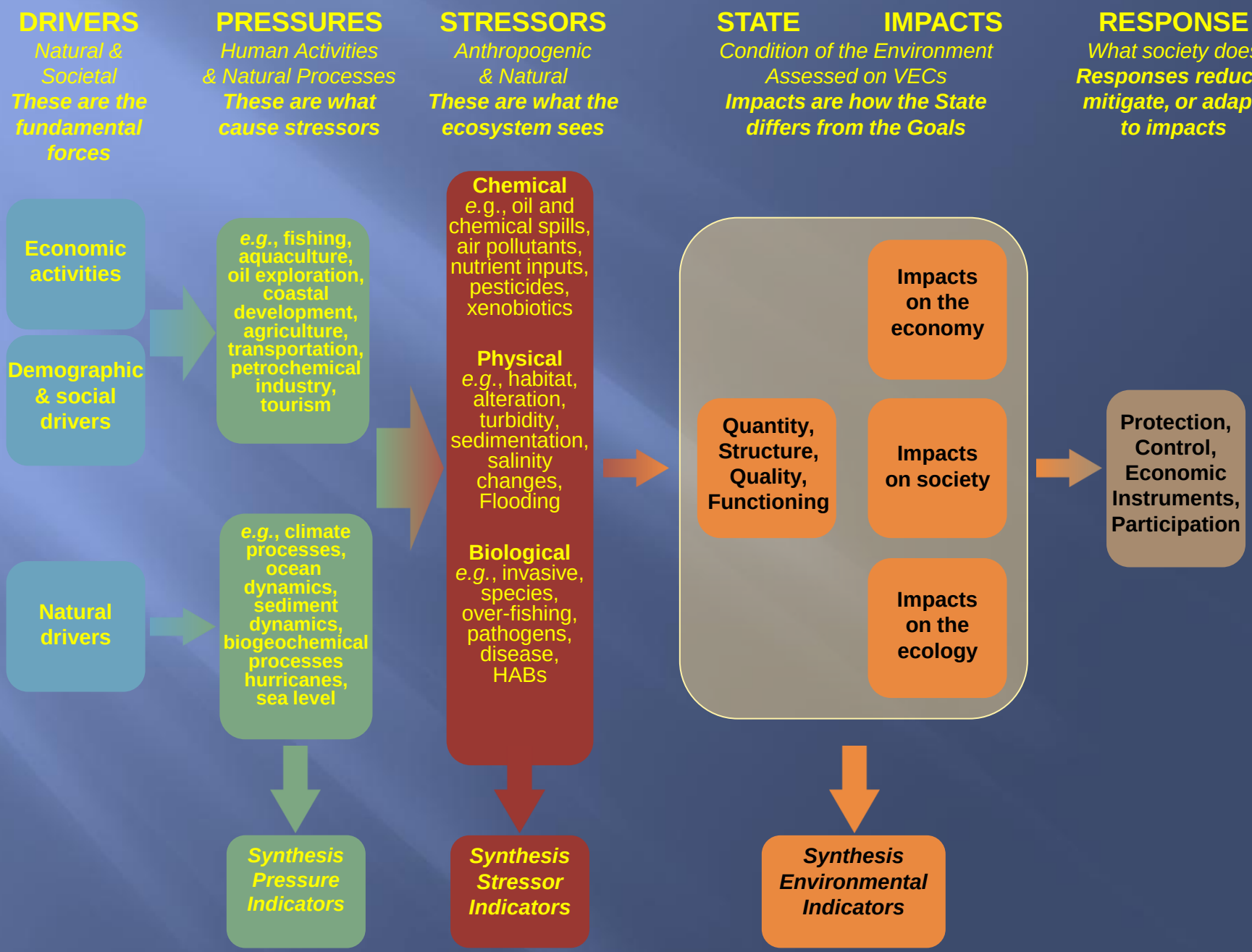
Rely on scientists to recognize problems but not to solve them. Resource issues are almost always multi-disciplinary in nature, science issues being relatively straightforward. It is the human element, socio-economic issues, that are at the root of the majority of problems impeding progress

Successful adaptive regulatory and adaptive management processes share several traits

Establish as specific a plan or process to be pursued, even in the face of uncertainties which will be raised, most likely by all stakeholders in the process. Never leave an open process that does not establish a *if not this, then what?*

A foundation to successful adaptive management is a means of monitoring the effects of actions taken under auspices of the process. You cannot know what management changes to propose unless you can objectively and accurately (to the degree possible) evaluate the effects of those actions taken.

GULF (DPSSIR) REPORT CARD - FRAMEWORK



Example Gulf of Mexico Report Card
(using DPSSIR framework & TNC/NGO Report)

DRIVERS	PRESSURES	STRESSORS	STATE	IMPACTS	RESPONSE
Natural & Anthropogenic ***These are the fundamental forces***	Human Activities & Natural Processes ***These are what cause stressors***	Anthropogenic & Natural ***These are what the ecosystem sees***	Condition of the Environment Assessed on VECs ***Impacts are how the State differs from the Goals***		What society does ***Responses reduce, mitigate, or adapt to impacts***
Economic activities	***Physical:*** • Coastal Development • Dredging • Shoreline Structures • Oil/Gas Exploration • Transportation	***Physical:*** • Habitat Alteration • Changes in Hydrology • Harvesting • Changes in Salinity • Changes in Climate • Suspended Sediment • Noise	***Fish & Wildlife*** • Fisheries Populations • Avian Populations • Marine Mammals • Terrapins & Turtles	***Goal: Sustainable Fish / Wildlife*** • Species Diversity • Species Richness • Abundance • Productivity • Distribution	**Restoration Goals**: • Restore Water Quality • Ensure Freshwater Flows • Conserve Special Places • Incorporate Climate Change
Demographic & Social Drivers	***Resource Extraction:*** • Commercial Fishing • Recreational Fishing ***Chemical Releases:*** • Petroleum spills • Chemical spills	***Biological:*** • Introduced Species • Overfishing • Biological Competition • Disease • HAB	***Habitats:*** • Wetlands • Mangroves • Oyster Reefs • Seagrasses • Coral Reefs • Barrier Islands • Intertidal Communities	***Goal: Recover and Sustain Productive Habitats***	**Develop:** • Environmental Report Card • Long-term Monitoring • Market-based Solutions **Promote:** • Citizen Stewardship • Environmental Outreach • and Education
Natural Drivers	***Natural Processes:*** • Loop Current • Hurricanes • Tropical Storms	***Chemical:*** • Nutrients • Pesticides • Petroleum	***Physical Features:*** • Connectivity of Gulf with Coastal River Flows	***Goal: Restore Physical Features***	**Implement:** • Adaptive Management

Example Gulf of Mexico Report Card
(using DPSSIR framework & TNC/NGO Report)

DRIVERS	PRESSURES	STRESSORS
Natural & Anthropogenic *These are the fundamental forces*	Human Activities & Natural Processes *These are what cause stressors*	Anthropogenic & Natural *These are what the ecosystem sees*
Economic activities	*Physical:* • Coastal Development • Dredging • Shoreline Structures • Oil/Gas Exploration • Transportation	*Physical:* • Habitat Alteration • Changes in Hydrology • Harvesting • Changes in Salinity • Changes in Climate • Suspended Sediment • Noise

Example Gulf of Mexico Report Card
(using DPSSIR framework & TNC/NGO Report)

STATE	IMPACTS	RESPONSE
Condition of the Environment Assessed on Valued EOCSYSTEM Components (VECs)	*How the State differs from the Goals*	What society does *Responses reduce, mitigate, or adapt to impacts*
Fish & Wildlife • Fisheries Populations • Avian Populations • Marine Mammals • Terrapins & Turtles	*Goal: Sustainable Fish / Wildlife* • Species Diversity • Species Richness • Abundance • Productivity • Distribution	Restoration Goals: • Restore Water Quality • Ensure Freshwater Flows • Conserve Special Places • Incorporate Climate Change

Join us at…

SUMMIT2011

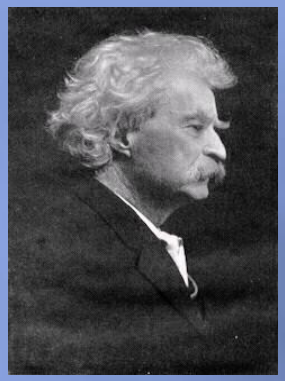
STATE OF THE GULF OF MEXICO

HOUSTON TEXAS

DEC 4 – 8 2011

Charting a Course for the Future of America's Sea

Do the Right Thing…



…It Will Gratify Some People and Astound the Rest