Restoration, Replacement or Acquisition of Equivalent Resources and the Mitigation Environmental Impacts

Service Flow Use for the Deepwater Horizon oil spill and beyond

Presented by:

Tom Campbell

Robert Haddad

Pillsbury Winthrop Shaw Pittman LLP

Successful Impact Mitigation is Critical

- Mitigation arises in different contexts
  - Gulf oil spill
  - Pipeline construction permits
  - Project Development
- Objective criteria for any mitigation project
  - Impacted Service flows
  - Practicable Mitigation Project
  - Nexus between Impact and Project

pillsbury

Deepwater Horizon Oil Spill

- MOEX Settled Natural Resource Damage and other liabilities by settling with BP
  - Paid $1.06 billion to BP
  - MOEX received an indemnity from BP

pillsbury

Deepwater Horizon Oil Spill

- MOEX Offshore settled Clean Water Act liability for $85MM
- $20MM in Supplemental Environmental Projects in Four States
  - Texas
  - Louisiana
  - Mississippi
  - Florida
- Oyster reefs restoration and acquisition of ecologically significant land was considered
- EPA and DOJ were comfortable with both
- Land acquisition was chosen

pillsbury

Mitigation by Land Acquisition

- MOEX Offshore spent $20MM acquiring six ecologically significant properties in four states

Gulf of Mexico Oyster Reefs

- An oyster reef is a marine ecosystem made of densely packed oysters
- Found in every Gulf state
- Support a vast oyster industry

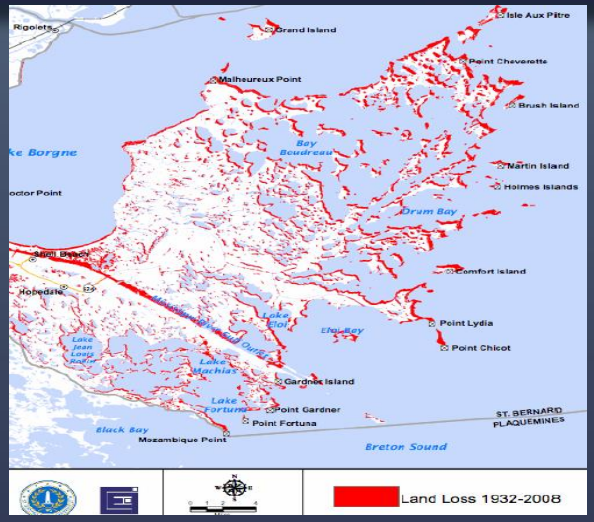
Oyster Reef Service Flows are Extraordinarily High

- Creates habitat for fish, shrimp and other sea life (high levels of secondary productivity)
- Reduces erosion of the shoreline (coastal resiliency)
- Creates buffer from storm surge (coastal resiliency)
- Filters and purifies thousands of gallons of sea water per day (water quality)

pillsbury

Loss of Oyster Reefs and Restoration

- Vanishing coastline due to channeling of the Mississippi river
- Oyster reefs throughout the Gulf of Mexico suffer from
  - over-harvesting
  - erosion
  - water quality issues
  - storms
- In many areas, oyster reefs no longer grow because they lack suitable substrate to which they can attach
- Strain on the oyster industry



pillsbury

Types of Artificial Reef Structures

- Traditionally rock and concrete were dumped where reefs were needed
- Lighter and stronger alternatives have recently emerged.
  - Steel ReefBlk
  - Concrete reef balls
- Determined by prevailing environmental conditions

pillsbury

Living Shorelines

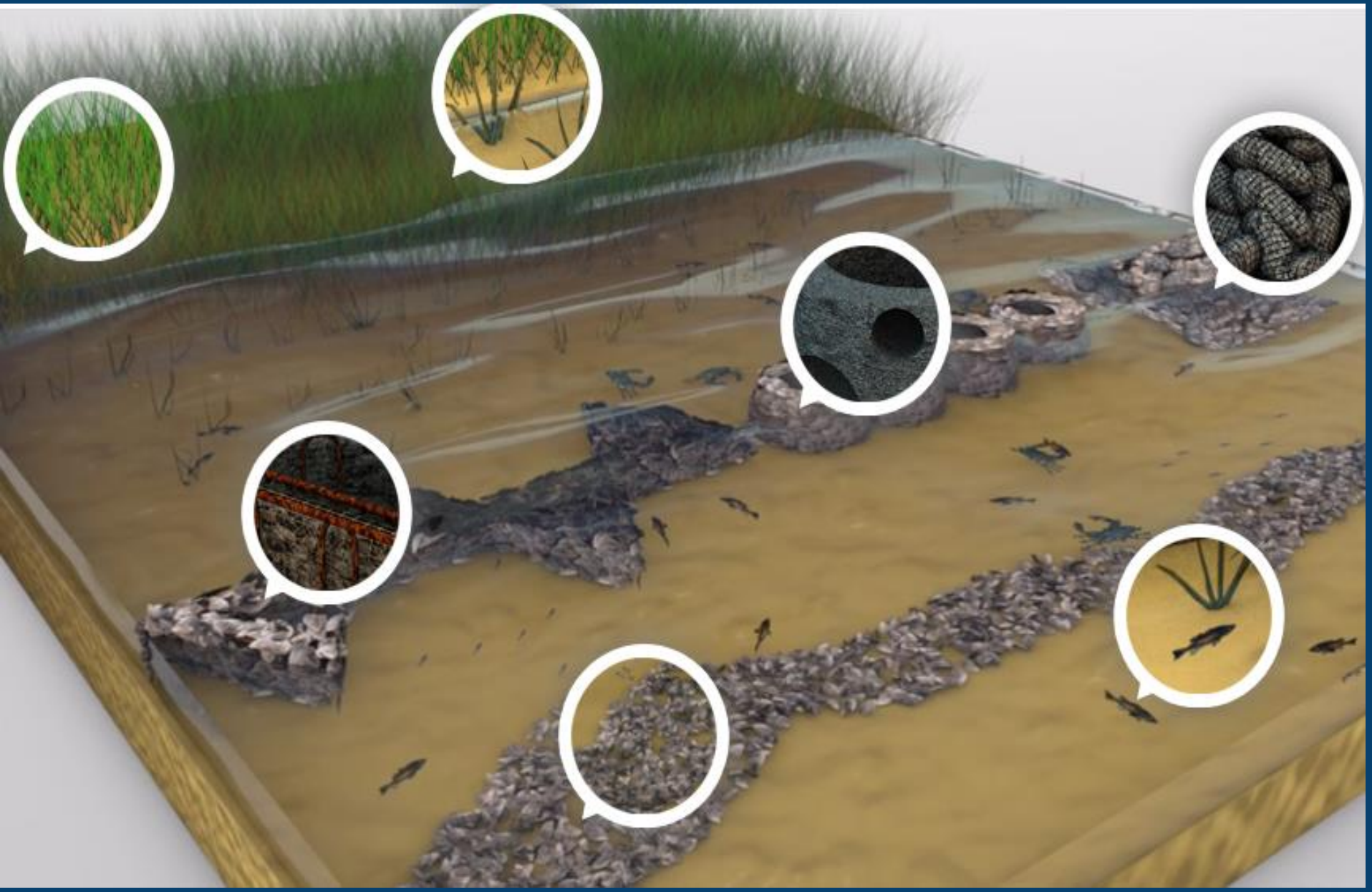
The St. John's College living shorelines site before the living shorelines were installed.

The St. John's College living shorelines site after the living shorelines were installed.

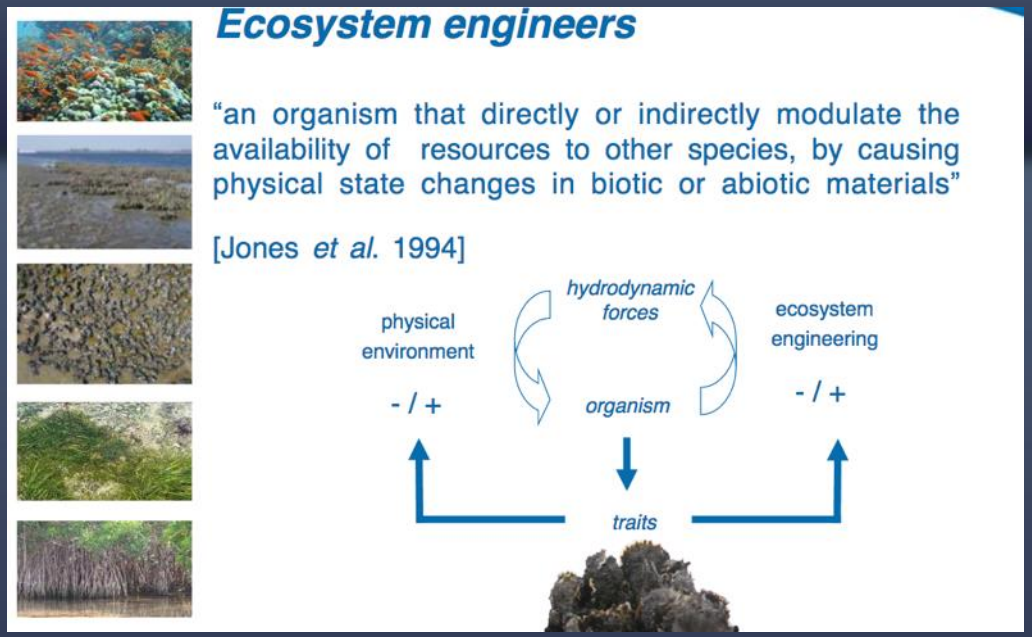
- Utilize a variety of structural and organic materials, such as wetland plants, submerged aquatic vegetation, oyster reefs, coir fiber logs, sand fill, and stone.
- The benefits of living shorelines include:
  - Stabilization of the shoreline.
  - Protection of surrounding riparian and intertidal environment.
  - Improvement of water quality via filtration of upland run-off.
  - Creation of habitat for aquatic and terrestrial species

http://www.habitat.noaa.gov/restoration/techniques/livingshorelines.html

pillsbury



Unique Benefits of Artificial Reefs



- Artificial reefs become living reefs
- Scalable
  - Cost is approximately $1MM per mile
  - Project scaled depending on mitigation requirements
    - Economies of scale for larger projects

pillsbury

Artificial Reefs are a Good Mitigation Tool

- Nexus
  - Water contamination
  - Oil and chemical spills
  - Specific ecological service loss
  - SEP
  - Direct and indirect economic benefits
- Protects surface and mineral property rights
  - Erosion and subsidence
- Self-executing: doesn't require direct company involvement
  - Contractors can assemble and install
  - A reef "bank" could be created
- Divisible and scalable: mitigation can expand, contract or divide
- Positive public relations value

pillsbury

Example: Mad Island Preserve

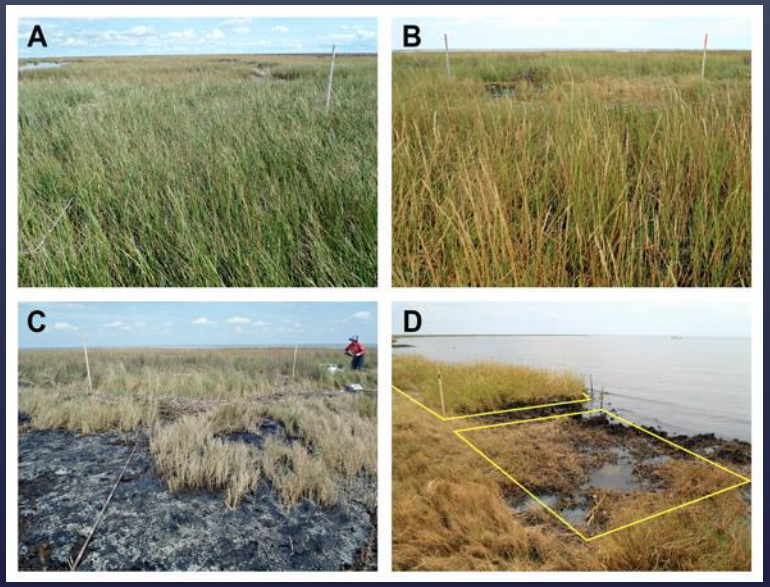
- Near Matagorda, Texas
- 1800 ft. of artificial reef
- Prior to reef installation severe erosion had occurred
- Within one year
  - erosion stopped
  - sediment accumulated
  - significant oyster growth

pillsbury

Technical Challenges

Measuring the Loss	Measuring the Gain
VS	
Basic Science	Applied Sciences

- In Kind Restoration
  - Exxon Valdez – Maitland
    - Coral – near shore,
    - Seagrass – salt water marshes
    - Oyster Reef - Multiple service flows
    - Spartina – salt water marshes
  - M/V Cape Flattery (Ohau)
    - Coral Nursery
    - Cementing Corals



pillsbury

Technical Challenges

Measuring the Loss	Measuring the Gain
VS	
Basic Science	Applied Sciences

Out of Kind Restoration

Deepwater Horizon

- Deepwater Corals

- Fish Biomass

- Mud Flats – not sexy

pillsbury

Technical Challenges

Measuring the Loss VS Measuring the Gain

Basic Science VS Applied Sciences

Out of Kind Restoration

Deepwater Horizon

- Deepwater Corals
- Fish Biomass
- Mud Flats – not sexy

pillsbury

Technical Challenges

Measuring the Loss	Measuring the Gain
VS	
Basic Science	Applied Sciences

Government

- DSAYs (Injured v. Restored)
  - habitats/services that are restored
- OPA factors require cost be considered

Company

- DSAYs (Injured v. Restored)
  - = $ for restoration (part of Damages)
- Doing the Right Thing

pillsbury

Groundwater Restoration Alternatives

pillsbury

Groundwater Laundry List

- Two Categories:
  - Water Quantity – increases quantity of available water
  - Water Quality – improves the quality of available water

The “Laundry List” of Restoration Options

- Vegetation Management
  - Removal of water thirsty species
- Acquisition of Riparian Corridor Conservation Easements:
  - Improves quality of riparian habitat
  - Reduces sediment and chemical loading
  - Improves water quality for aquatic species
  - Provides stream bank stabilization
  - Provides habitat for birds and wildlife corridor
- Agricultural Conservation Program
  - Wetlands restoration
  - Silt traps – large and small scale
  - Livestock, exclusion fencing
  - Conservation Tilling Method/Equipment

The “Laundry List” of Restoration Options

- Citizen Water Conservation Program
  - Grey water, lawn care & design
- Plugging open/abandoned wells
- Wellhead improvement
- Reducing groundwater use of the city by reducing leaks in city municipal water system
  - 30-50% of city well water is lost before it reaches the tap
- Cleanup of leaking abandoned sites
- Moving citizens from septic to municipal sewage system
- Hazardous Waste Amnesty Program
  - Agricultural waste
  - Household HW

pillsbury

Water Quantity Projects

- Cloud Seeding
- Retention Basins
- Purchase Surface and Ground water Rights
- Vegetation Management
- Acquisition of water rights from private sources or other states
- Citizen Water Conservation Program

Water Quality Projects

- Storm water Retention Ponds/ engineered wetlands
- Cleanup of Abandoned Waste Sites
- Plugging of Abandoned “Wells of Concern”
- Riparian Enhancement / Land Acquisition
- Cloud Seeding
- Improvements to Municipal Wastewater Discharges from local municipal areas
- Acquisition of Riparian Corridor Conservation Easements:
- Agricultural Conservation Program
- Ag and household Hazardous Waste Amnesty Program

pillsbury

Cloud Seeding

Cloud Seeding

Summary:

- Involves use of iron iodide to seed clouds, thereby creating additional rainfall
- Ex: In Texas, approximately 1/3 of the state is included in a water management program that includes cloud seeding
- Est. 10-22% rainfall increase
- New Mexico has passed legislation endorsing and establishing a program
  - NM Stat. Ann. § 75-3 – Weather Control and Cloud Modification
  - NM Weather Control and Cloud Modification Commission
- Could generate significant amounts of additional water

Cloud Seeding

Benefits:

- One of the only ways to generate “more” surface and groundwater
- The city already has an established weather modification program
- Could become the cornerstone to a long-term water management program for this area
- Reduces reliance on existing groundwater
- Produces increased crop yields
- Increases farming and ranching revenues

Agricultural Conservation

- Drip Irrigation (water quantity)
- Conservation Tilling
- Silt Traps
- Livestock management
- Wetlands preservation

Drip Irrigation Program

Summary:

- Agriculture reportedly consumes approx. 80% of the water withdrawn in some watersheds
- The majority of all irrigation is conducted using inefficient irrigation methods such as flooding, high-pressure spray or sprinkler irrigation methods
- It is estimated that 90-98% of the water used is actually lost to evaporation using these methods

pillsbury

Drip Irrigation Program

Benefits:

- Increased amount of water available to other users in the watershed as a result of increased efficiency of agricultural use
- This irrigation method could also improve crop yield, soil quality, and the quality of surface waters receiving agricultural runoff
- Could result in 150,000 acre-feet to 10,000,000 acre-feet additional water being available for other uses

Citizen's Water Conservation

Citizen's Water Conservation Program

Example:

- The City of Albuquerque has a well developed citizen conservation program to reduce the amount of water it must withdraw from the river.
- In 1995 the City of Albuquerque implemented a program to reduce domestic water consumption by providing free conservation audits and incentives to replace older landscapes, toilets, and clothes machines.
- Its targeted goal is a 33% reduction; however, it as been unable to achieve that goal.
- The City currently undergoing the regulatory process of obtain a permit to withdraw an increased amount of water.

Citizen's Water Conservation Program

Benefits to City and nearby communities:

- Could assist or enhance the city's ability to reduce water consumption and future water demands
- Could reduce the amount the average resident pays for water bills
- May make more water available for other users (agricultural and fisheries)
- Could allow for more effective growth
- Could be coupled with a water well replacement or construction project

pillsbury

Riparian Vegetation Management

Removal of Non Native Tree Species


Dozer removing tamarisk – July 2000

pillsbury

Vegetative Management

Summary:

- Removal of non-native species that use significant amounts of water and spread rapidly through roots and seed dispersal.
  - Often out competes native species (cottonwood and willow) and produces monoculture.
  - Often provides little to no habitat or food value to birds or wildlife.
- Target those that have high water demand
- Target riparian areas to improve riparian habitat

Vegetative Management

Benefits:

- Will result in net increase in available surface water and ground water by reducing vegetative uptake
- Could be implemented on federal or state owned lands or private land that volunteers
- New Mexico has already recognized this as a restoration priority with removal programs on some National Wildlife Refuges
- Native vegetative species will be restored and birds and wildlife will be provided with increased food and habitat
- Could result in the availability of significant amount of water over the life of the project

Other species will benefit from vegetative management programs …

…and replanting of native vegetative species

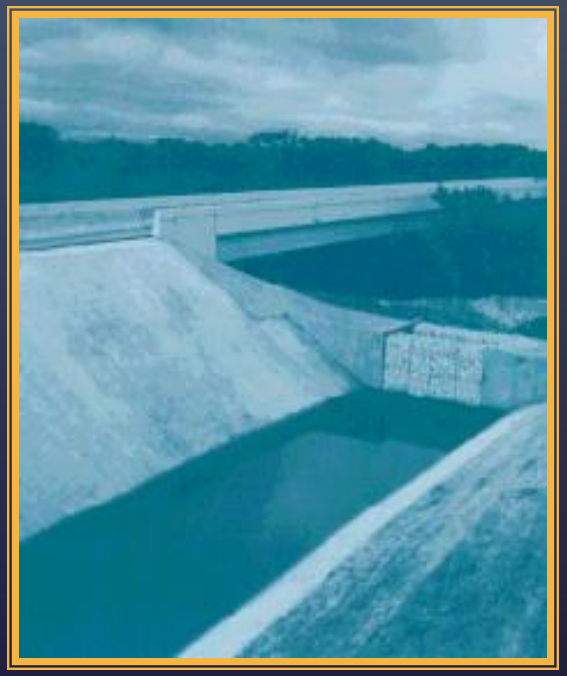
pillsbury

Restoration Projects at Nearby Parks and Wildlife Areas

This option requires direct dialogue with each Park Manager to determine on-going projects and those projects that would be consistent with current park management plans.

pillsbury

Storm water Retention Structures/ Engineered Wetlands



pillsbury

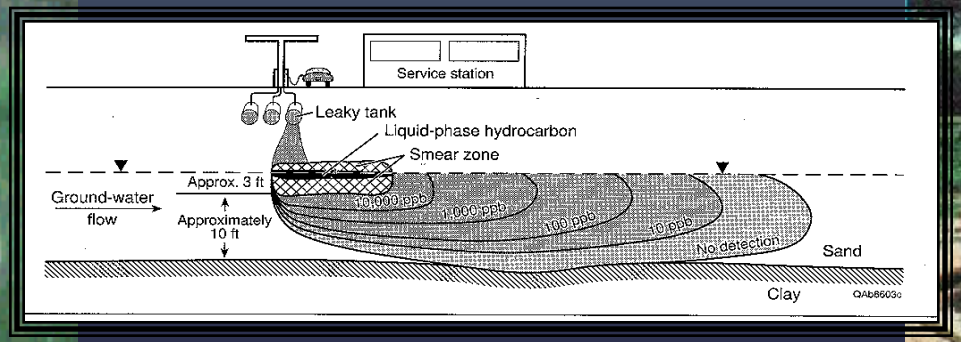
Stormwater Retention Structures/ Engineered Wetlands

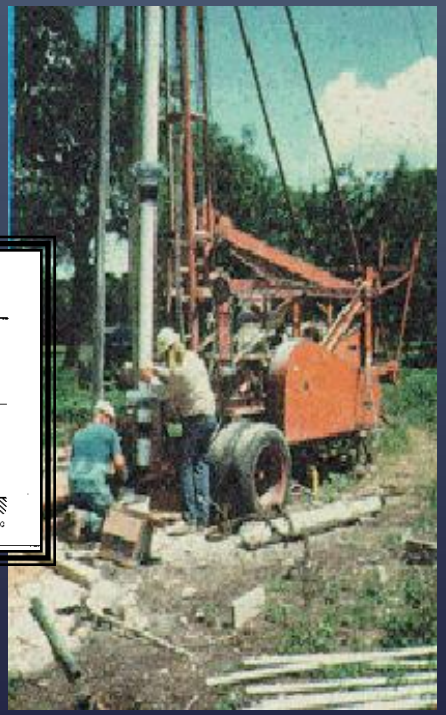
Summary

- **Retro fit existing developments with stormwater runoff retention/re-irrigation ponds**
- **Treatment types: settling, filtration, floatation, absorption, biological**
- **Costs: $42K - $1.8MM per structure (depending on type/location/size)**
- **Water quality benefit**
- **Recharge benefit in select areas**

pillsbury

Improperly Abandoned Water Wells/Cleanup of Abandoned Sites





pillsbury