

Oil Spill Flow~Diverter™

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An aerial photograph showing a yellow oil spill diverter system deployed in the ocean. The system consists of several yellow cylindrical buoys connected by a network of red and white ropes. The buoys are arranged in a line, and the ropes form a grid pattern on the water's surface. The water is a deep blue-green color, and the diverter system is designed to intercept and divert oil spills. The text "US Patent Pending" is visible in the upper right corner, and "Oil Spill Flow~Diverters™" is written across the center in a stylized font.

US Patent Pending

Oil Spill Flow~Diverters™

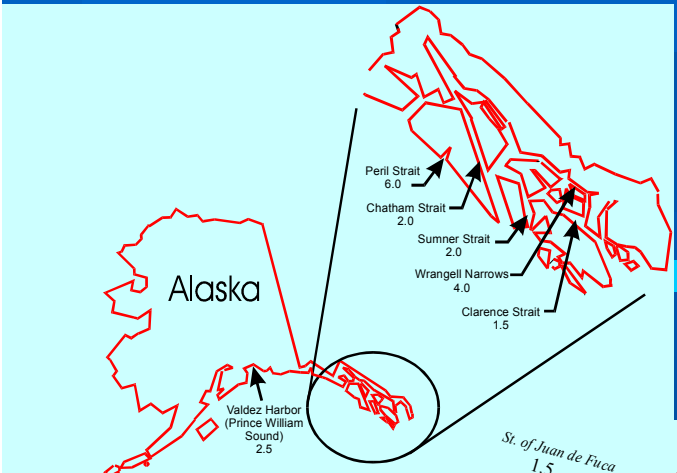


The Problem

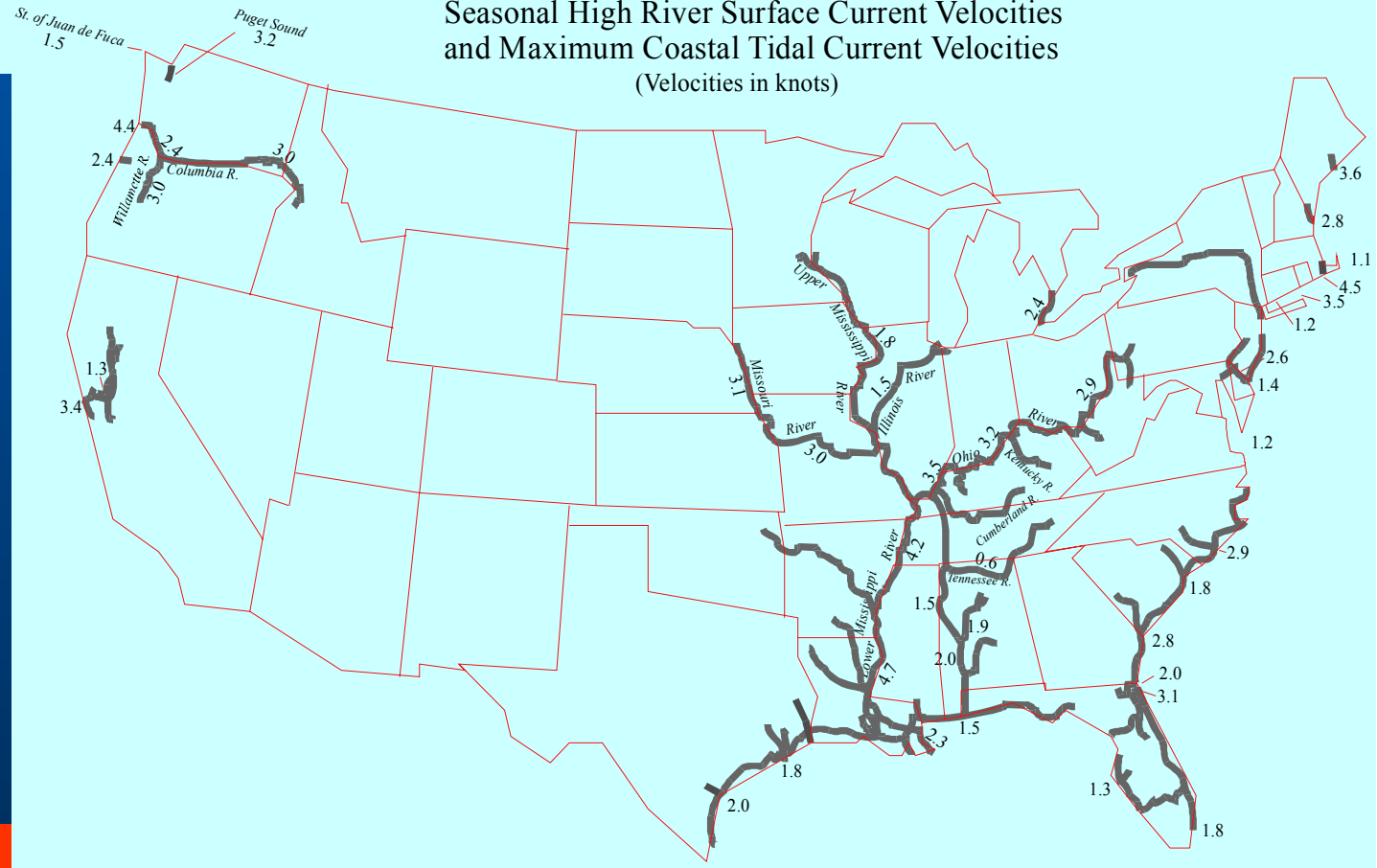
- **59% of all oil spilled in the US occurs in fast currents.**
- **Oil entrains under conventional boom and skimmers in currents above one knot.**
- **Advanced deflection boom techniques and skimmers are not very effective above 2 knots and are slow to deploy.**



Fast-Water Currents



Seasonal High River Surface Current Velocities and Maximum Coastal Tidal Current Velocities (Velocities in knots)





Background

- A Fast-Water Oil Spill study sponsored by the Coast Guard identified a short fall of available technologies to effectively respond to spills in currents above one knot
- Oil Spill Flow~Diverters were developed by CSC Advanced Marine under a US Coast Guard R&D Center contract initiated to improve fast-water response technology



Project Goals Accomplished

- **Develop method to control oil in fast-water conditions (1-7 knots) where booms fail**
- **Divert oil away from sensitive areas**
- **Divert oil to collection equipment/areas**
- **Deployable by two people from shore or from a boat**
- **Transportable by pickup truck or boat**



Description

- **Vertical foils are used to fly out into the current from shore or from a boat with the use of control lines.**
- **The foils divert the surface current and move the oil with it.**
- **The catamaran design adds stability and makes deployment easier.**



The Flow~Diverter Solution

- Fool the oil by changing the surface current direction in your favor.
- Control the oil spill flow in fast currents 1-7 knots where booms fail.
- Diversifiers are easily transportable and quick to deploy with only two people and no support boats.
- They can quickly move out of the way of debris or passing ships with control by one person.

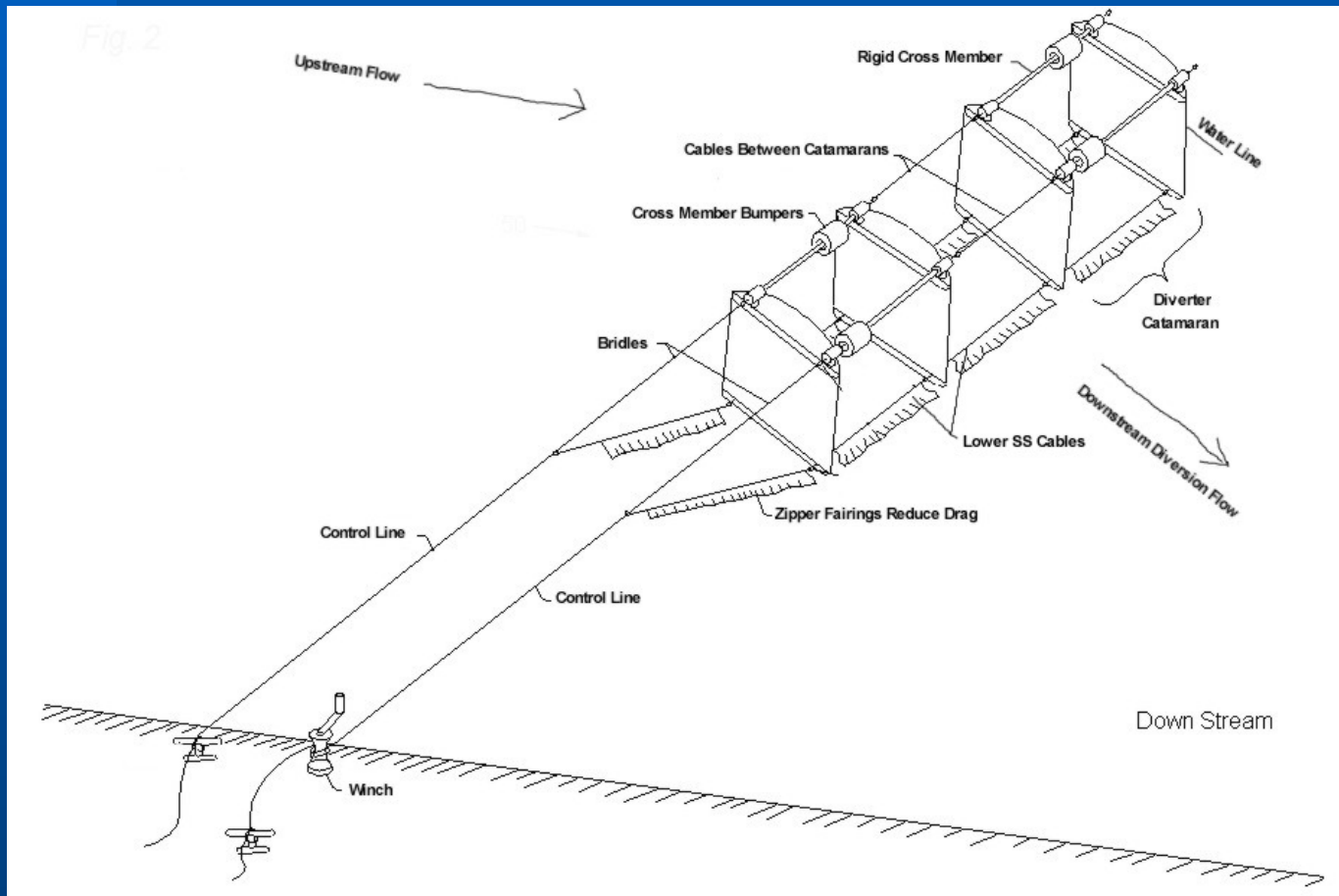


Development Testing

- **Successfully tested at US Navy NSWCCD Bethesda Circulating Water Channel in 1-7 Knots (May 2000)**
- **Demonstrated on Mississippi River in June from shore and from a vessel using simulated oil (1- 6 kts)**
- **Successfully tested at a Government tow tank (OHMSETT) at NWS Earle, NJ in Oil at 1 to 5 knots. Diverted and concentrated the oil slick 15+ feet from inboard diverter wing using two diverter catamarans. (June 2000)**



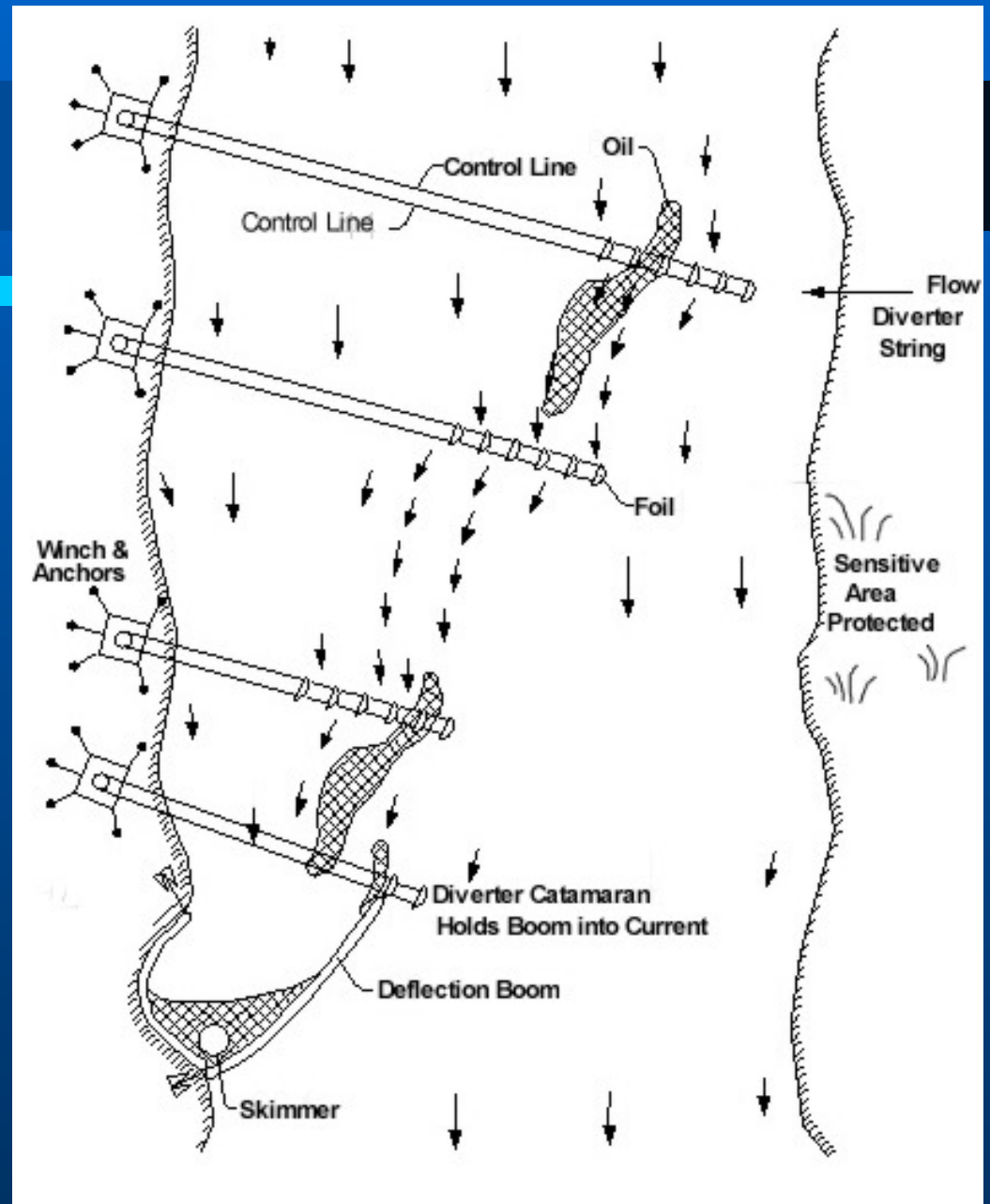
Catamaran Design - Array of Two





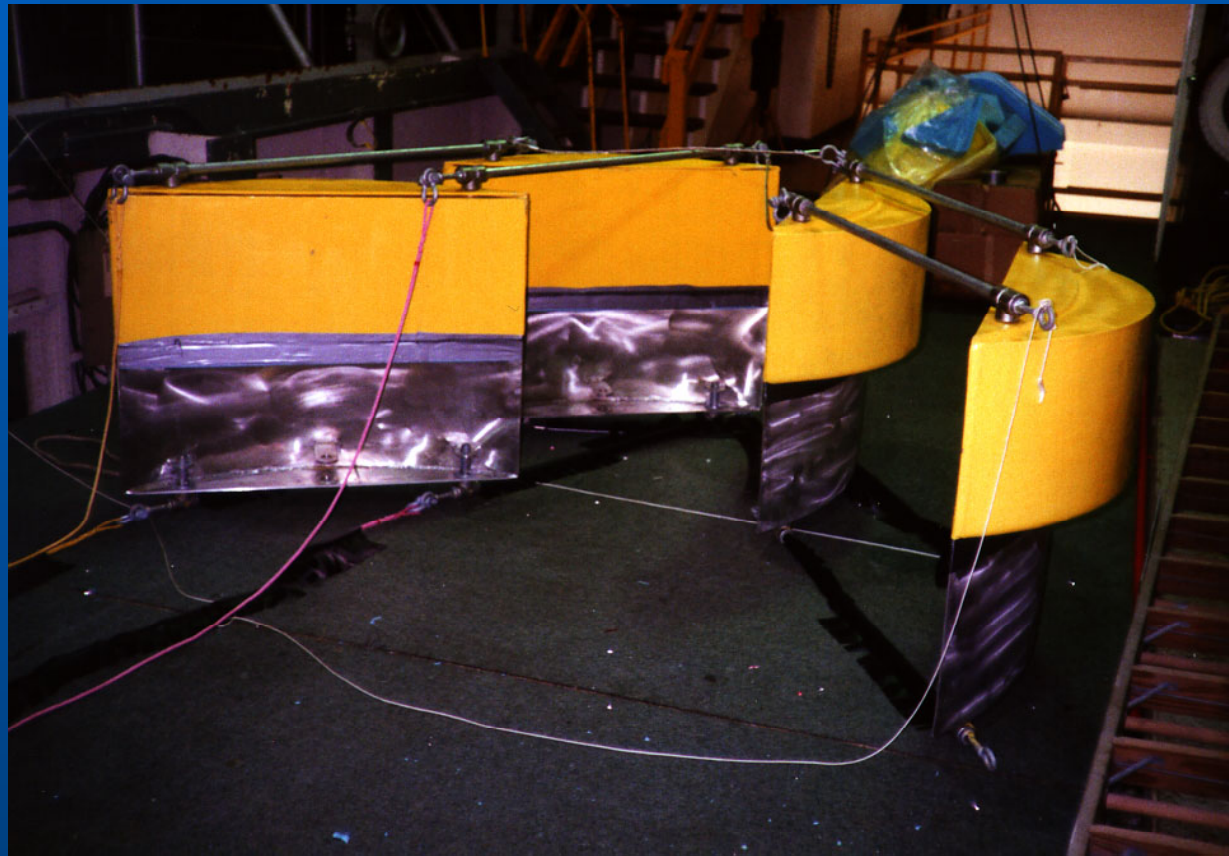
One Concept of Operations

- Cascade oil using an multiple arrays of Oil Spill Flow~Diverters.
- Divert oil from a sensitive area or to shore where the current slows down and conventional boom can be used for recovery.
- Deploy Deflection Boom



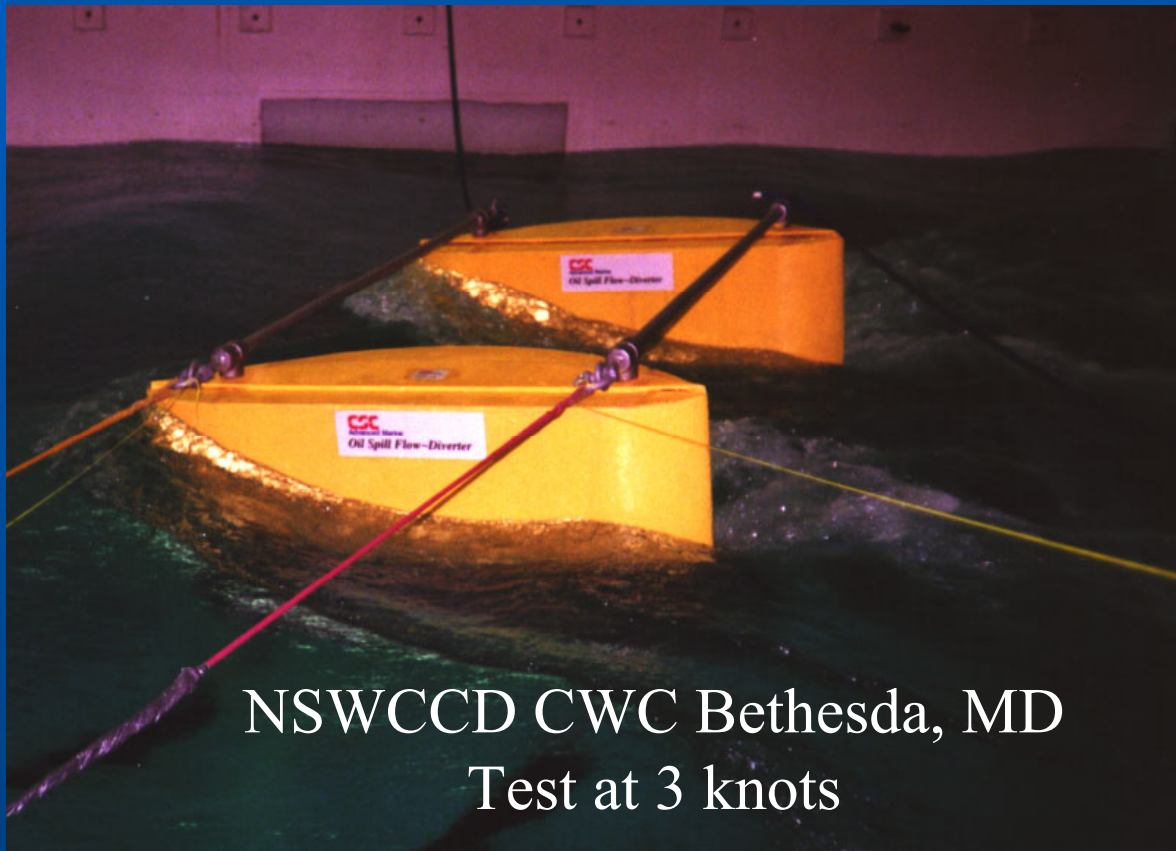


Prototype Diverter Catamarans





Circulating Water Channel Tests

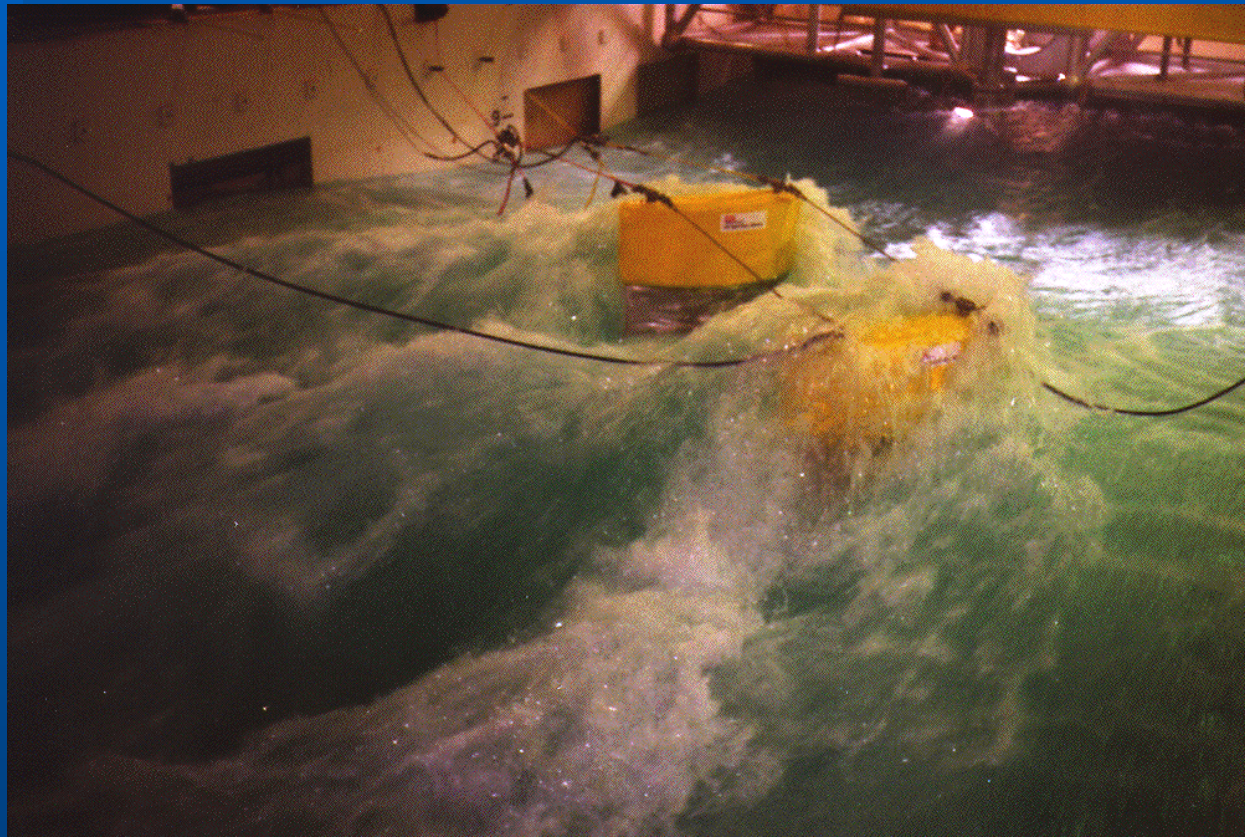


NSWCCD CWC Bethesda, MD
Test at 3 knots



Channel Tests at 7 Knots

(cables only proved too hard to handle)





Field Demo on Mississippi River



Deployed from a moored
barge, 1.5 knots

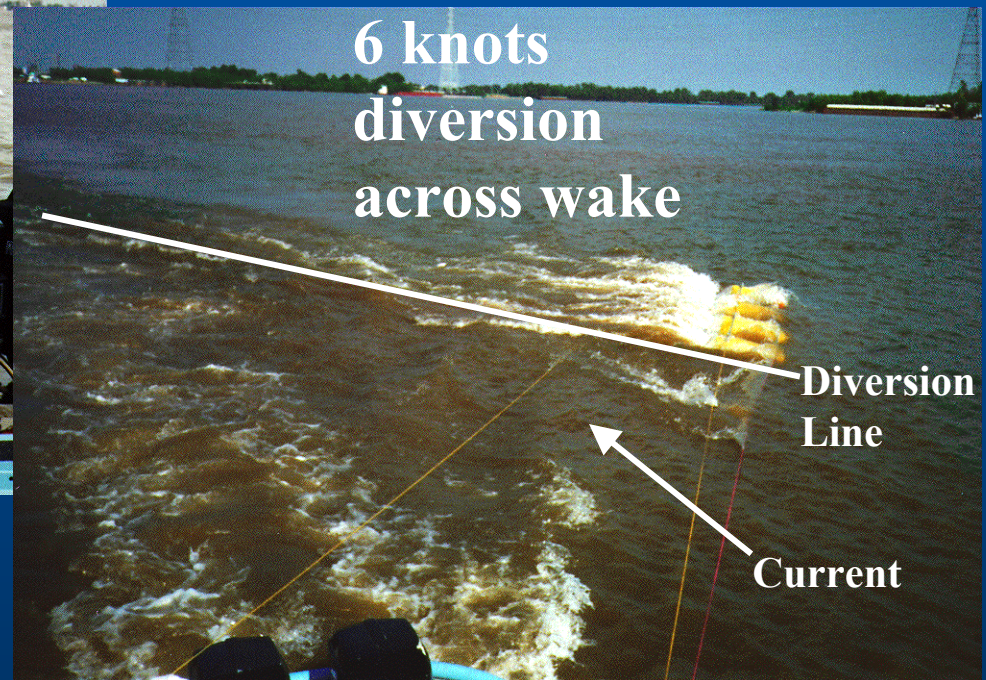
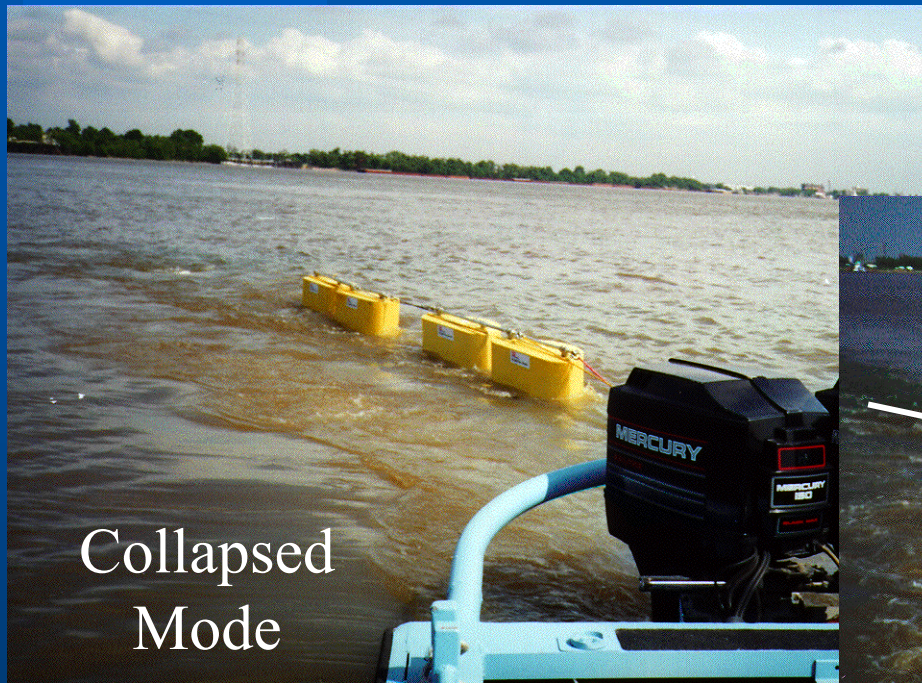


Simulated Oil - Diversion Testing Mississippi River, New Orleans





Deployed from a 24-foot Boat



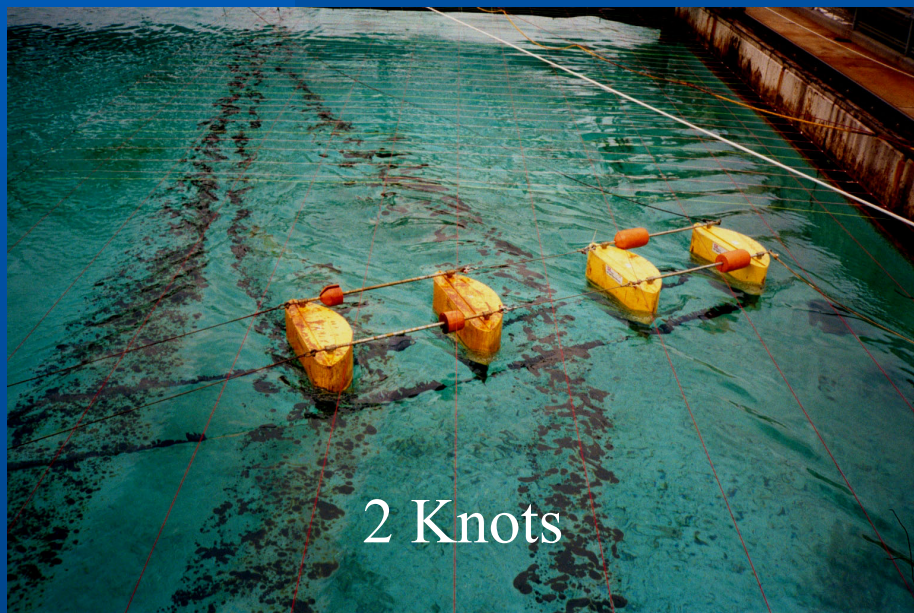


Tests in Oil at OHMSETT





Heavy Oil Tests; 20,000 cSt



2 Knots



3 Knots



Diesel Oil Tests at OHMSETT



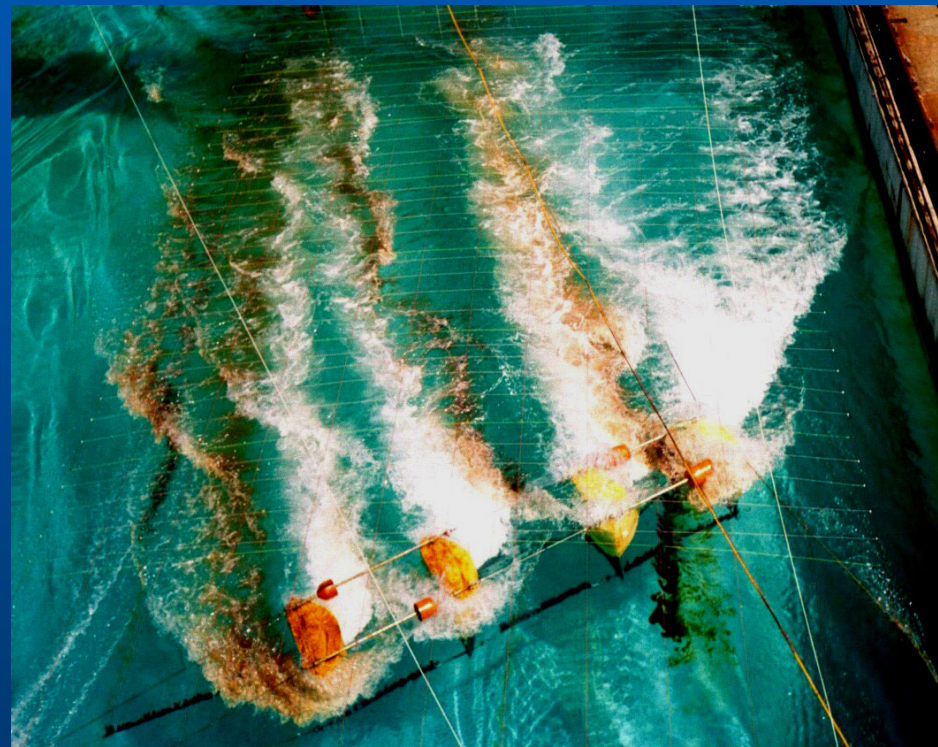
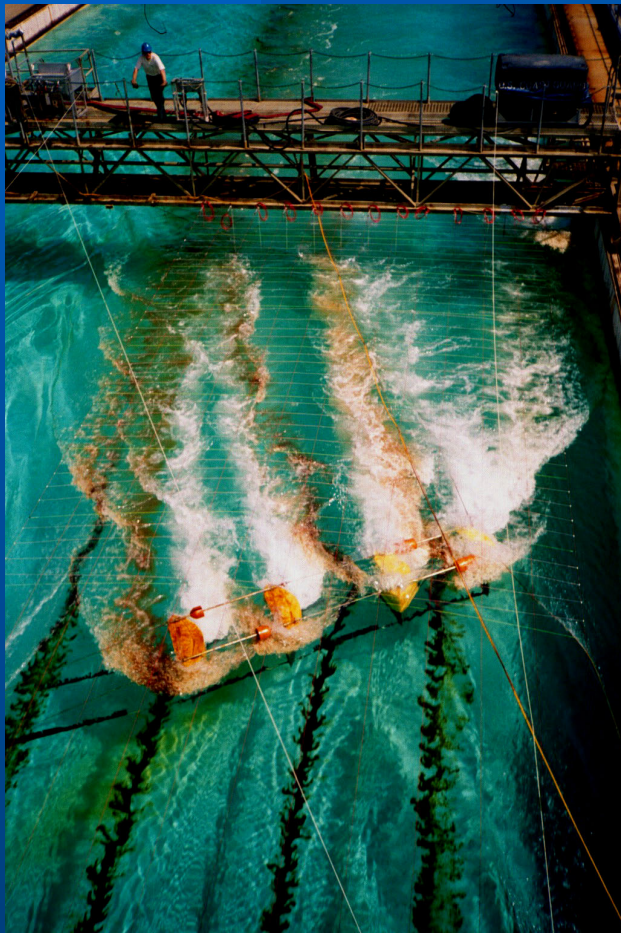
3 Knots



4 Knots



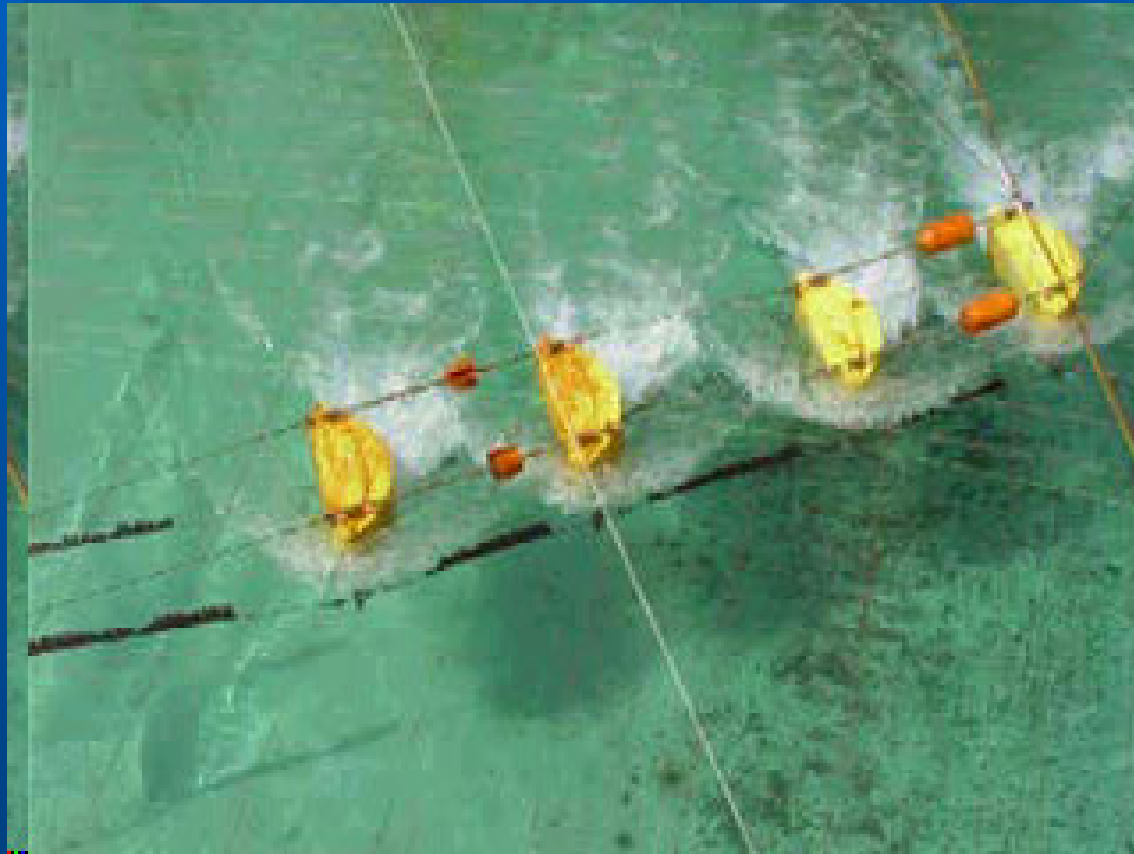
High Speed Tests at OHMSETT



**Some Diesel Mixing at 5 Kts
but Diversion was still Effective**



Diversion Run Video 4-knots



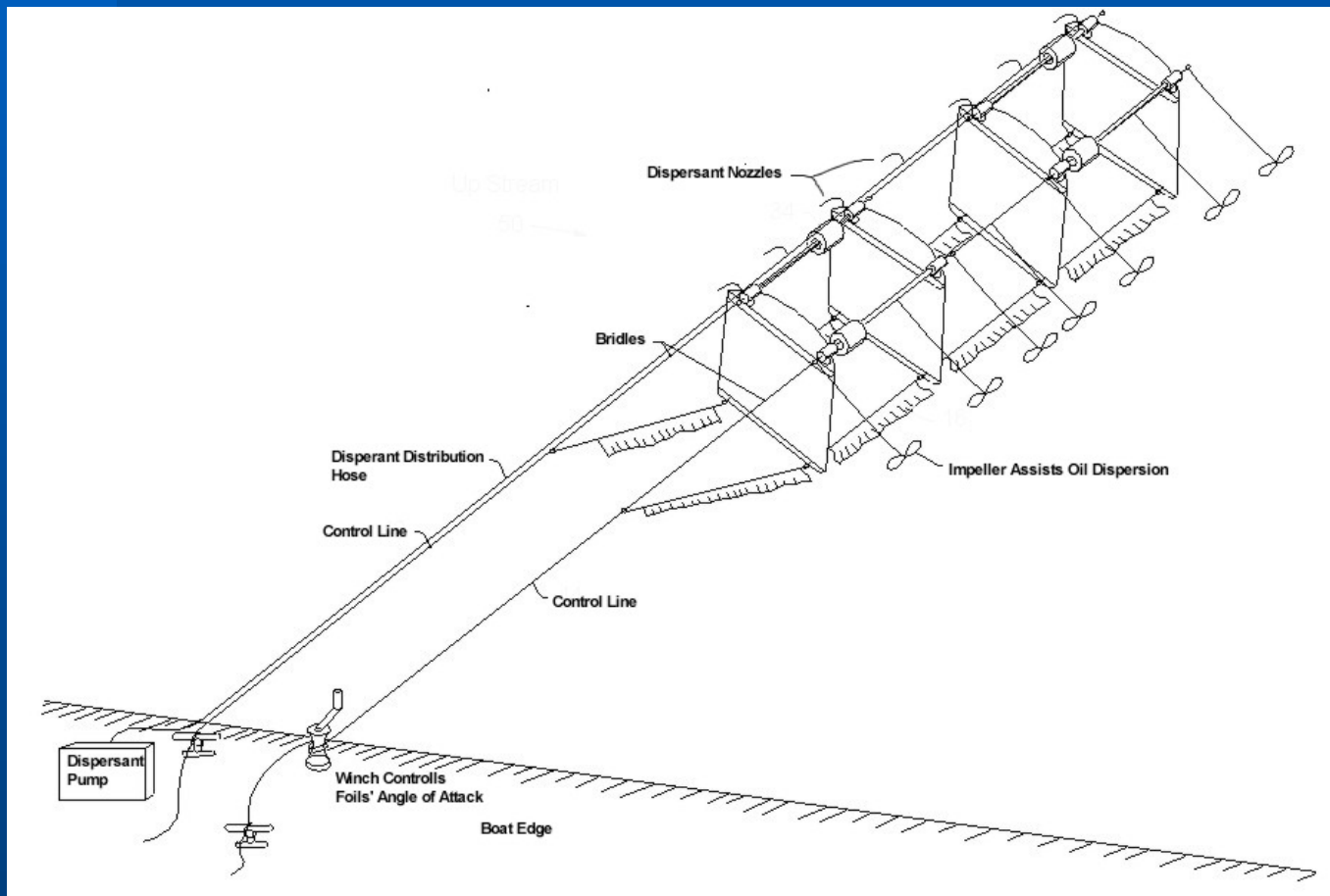


Additional Applications

- Deploy deflection boom or other equipment from shore out into the current without use of anchors/boats
- Deflect and concentrate oil with two diverter strings deployed from a vessel for skimmer pickup and recovery
- Dispersion of an oil spill in calm seas
 - Distribution of dispersants & mixing
- Insitu Burn support (diversion or water mist)



Oil Dispersion Mode





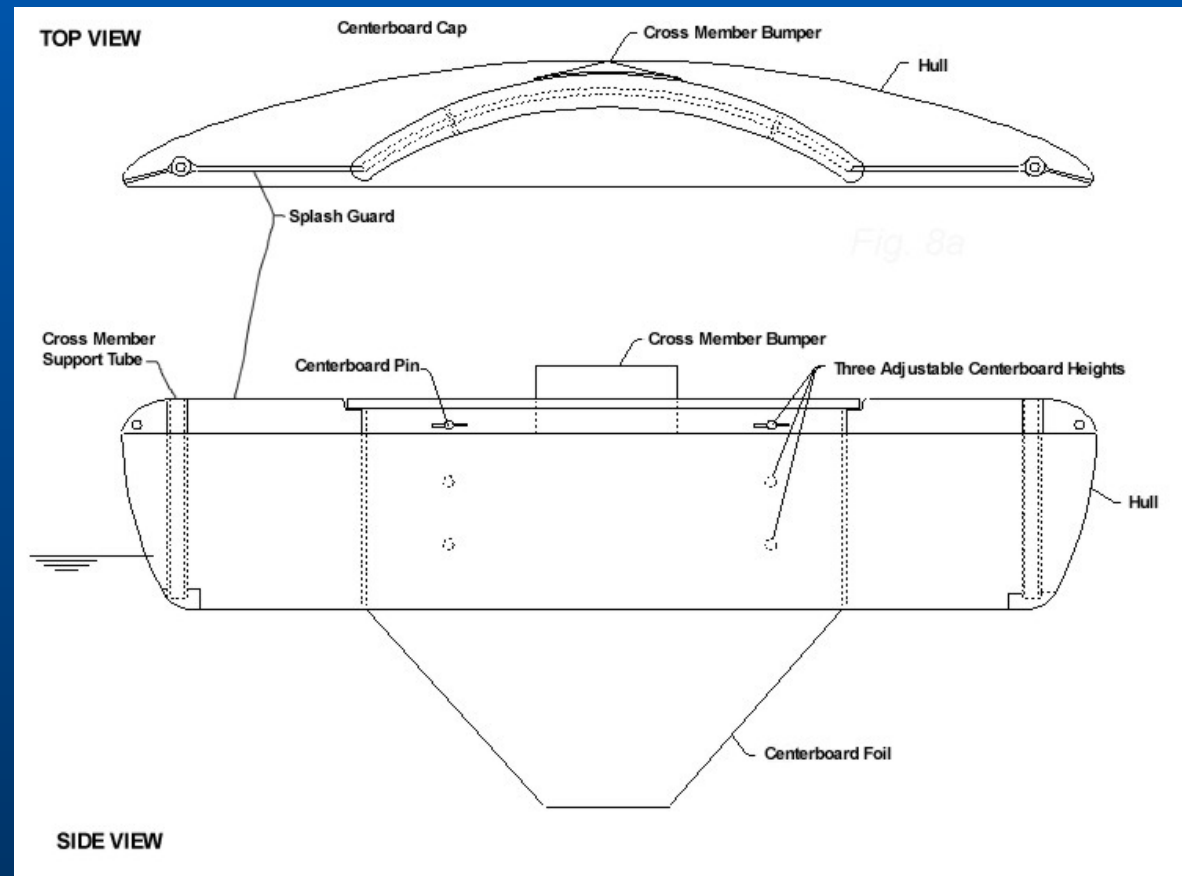
Product Improvements

- **Higher speed 7+ knots (less turbulence)**
 - Longer 8-foot hulls (lower wave making drag)
 - Lower beam to length ratio (more streamlined)
- **Shallow water capable**
 - Centerboard design (4" to 24" draft)
- **Twice the diversion sweep per catamaran (from 4 feet to 8 feet)**
- **Lighter weight**



Improved Hull/Foil Design

- Adjustable centerboard height
- Slanted foil - more debris tolerant
- Still fits into pickup truck - 4 abreast





Oil Spill Flow~Diverter™ Availability

- Production Model later in 2002
- Looking for demonstration opportunities
- Distributed by:

Hyde Marine Inc.,
28045 Ranney Parkway
Cleveland, Ohio 44145
www.hydeweb.com

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