BOOOOOOM

Booming

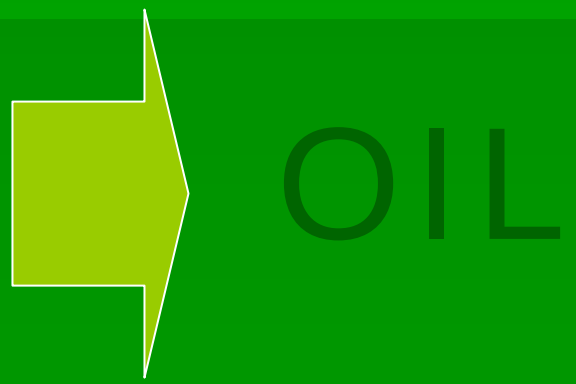
Objective:

1. To prevent oil from contacting resources at risk
2. To facilitate oil removal.

Description:

A boom is a floating, physical barrier, placed on the water to:

1. Contain
2. Exclude
3. Deflect
4. Divert



Containment Strategies Overview

Before spilled oil can be recovered,
the spreading of the oil must be
controlled and contained
in an area accessible to oil recovery devices.

Generally accomplished using oil containment boom as a…

TOOL

1. **A Containment Tool** (Keep In)

2. **A Protective Tool**

    a.) Exclusionary Configurations (Keep Out)
    b.) Deflection Configurations (Re-Direct Away)
    c.) Diversionary Configurations (Re-Direct To)

Limitations

There are limitations on the effectiveness of any boom:

Splash-Over from wind & breaking waves.

Changing tides & shifting currents.

In ***all cases*** of boom deployment…

consideration must be given to conditions on-scene AND protecting the **safety** of personnel.

Open Water Containment

- Oil spilled on open water is normally contained using boom.
- Boom deployed using vessels to tow the boom around the perimeter of the oil spill.
- Type of boom to be deployed will depend on local conditions:
  - Sea State
  - Tides
  - Currents
  - Wind
- To be most effective:
  - Booming on open water should be done as soon as possible after a spill.

Protective Booming

((Exclusionary or Deflection Configurations))

Goal of most containment and recovery strategies is to
collect the spilled oil from the water
and
prevent it from reaching sensitive resources.

This is not always possible & the goal will shift to:

Minimizing environmental injury using a variety of booming techniques **to keep the oil out or direct the oil away** from sensitive natural resources or cultural artifacts.

What are some of those areas to be protected ????

Exclusionary & Deflection Booming

- Performed prior to the advance of the oil - Used to prevent or exclude oil from entering:
  - Harbor Inlets
  - Sloughs
  - Marshes
  - Estuaries
  - Water Intakes
- Hard boom alone, or in combo with sorbent boom, can be used for these configuration.
  Factors for consideration:
  - Type
  - Size of Boom
  - Natural Forces of Water Body
  - Wind
  - Tide
  - Currents
- These factors can be pre-determined by:
  - A Priority System (GRP)
  - Regularly Training, and
  - Local Knowledge of the Waters

Diversionary Booming

- **Purpose:** To divert the direction of the oil to a recover site.
- **Oil velocity** for this booming strategy should be reduced to under **0.7 knots**.
- Accomplished by:
  Angling the boom in relation to the current's direction,
  reducing the velocity of the floating oil in relation to the boom.
- Diversionary booms can be set up in series along a waterway
  to increase their effectiveness.
- **Reminder:** The boom needs to be tended and monitored as weather and
  tidal conditions change.

Boom Types

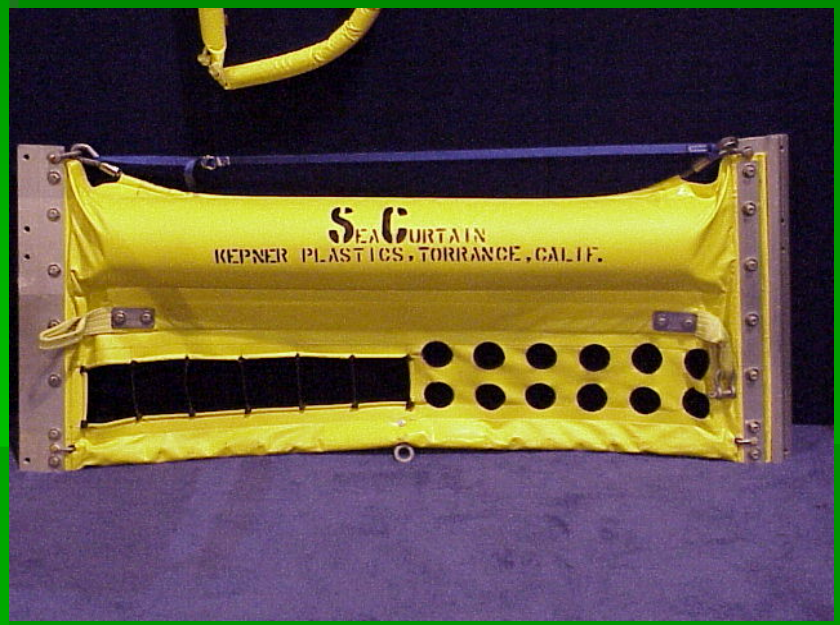
TYPES

- Fence
  - No chain for ballast tension
  - Rigid
  - Poor response to waves
  - Flexi usually used in sheltered areas
  - Foam floatation chamber w/ ballast skirt

TYPES

- Fence
- Curtain
  - Flexible material
  - Ballast skirt
  - Good response to waves
  - Air or foam in top chamber

TYPES



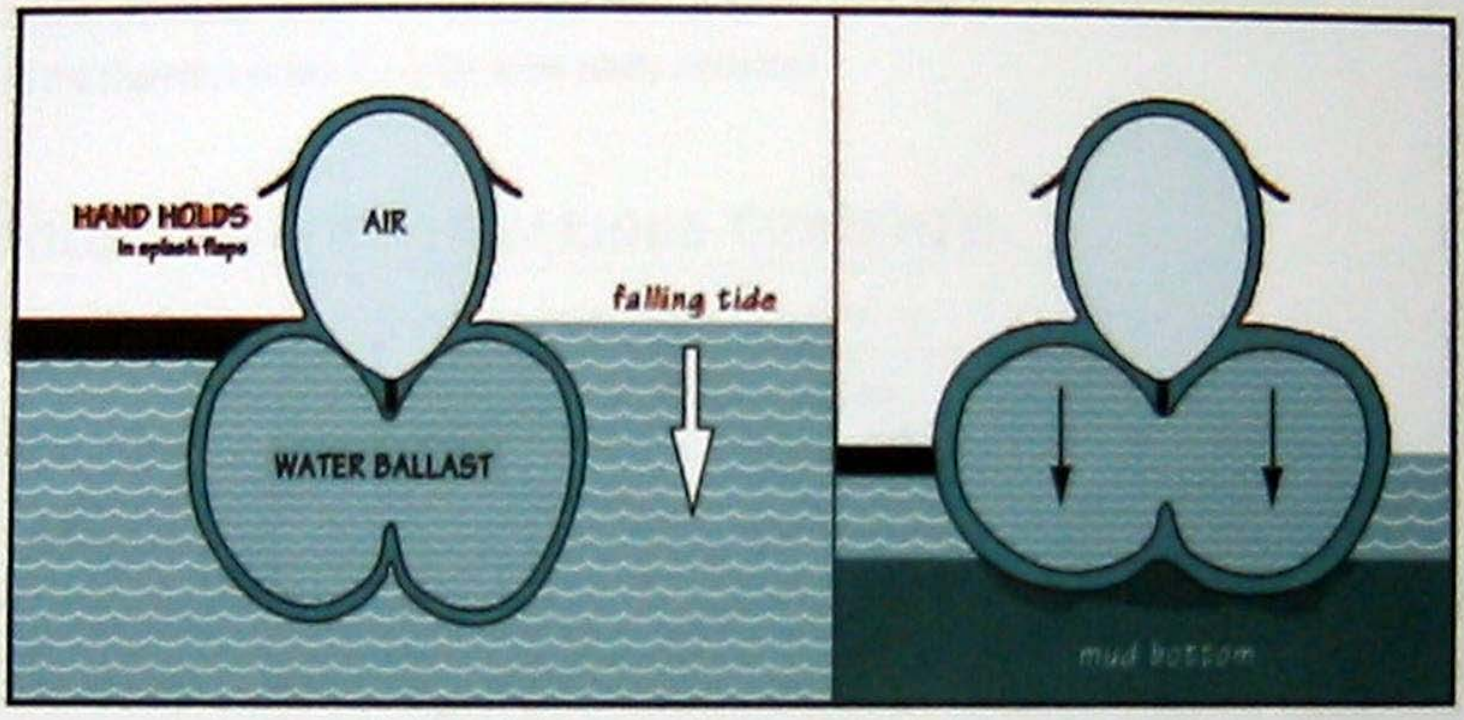
- Fence
- Curtain
  - Fast water
  - Holes in skirt reduce force on boom
  - Reduces entrainment

TYPES

- Fence
- Curtain
- Inflatable
  - Chained tension member
  - Heavy duty fabric
  - Good for cascade booming

TYPES

- Fence
- Curtain
- Inflatable
- Fire
- Tidal Seal
  - 3 cells, 2 bottom filled w/ water, 1 top filled w/ air


HAND HOLDS
in splash flaps
AIR
falling tide
WATER BALLAST
mud bottom

BOOM CONSTRUCTION

5 Parts of a Boom

1. ASTM Connector

2. Main Tension Member

3. Ballast

4. Floatation

5. Skirt

Deployment

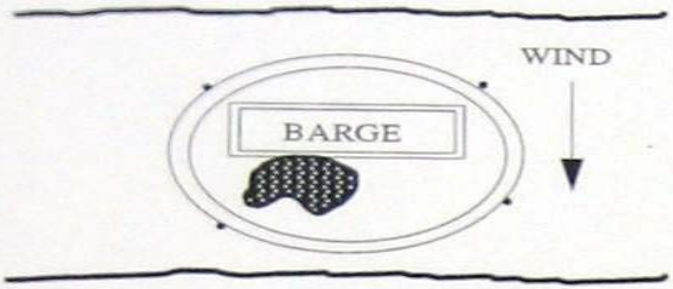
Boom Deployment

Boom is sometimes wound onto reels and stored for easy access and maneuverability. In lieu of reels, boom may be stowed methodically on response trailers for rapid deployment.

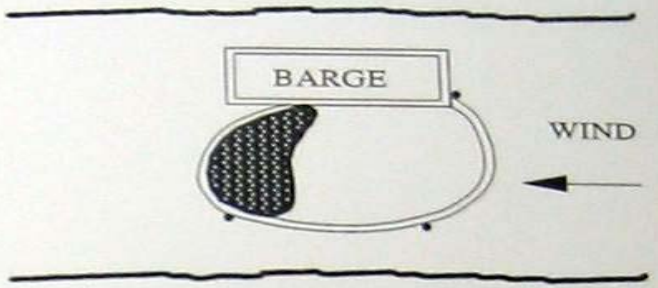
Containment

Overstressed due to high volume of oil. Gross oil loss or entrainment will follow.

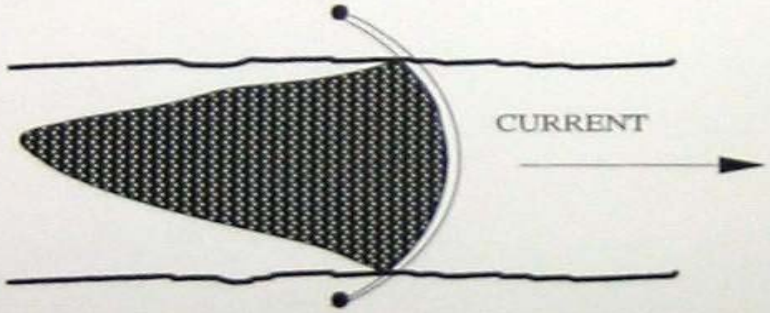
CONTAINMENT BOOM CONFIGURATIONS



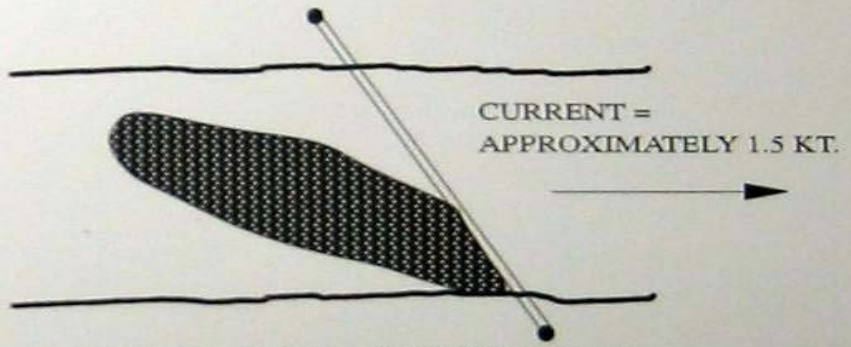
COMPLETE ENCIRCLEMENT
(NEGLIGIBLE CURRENT)



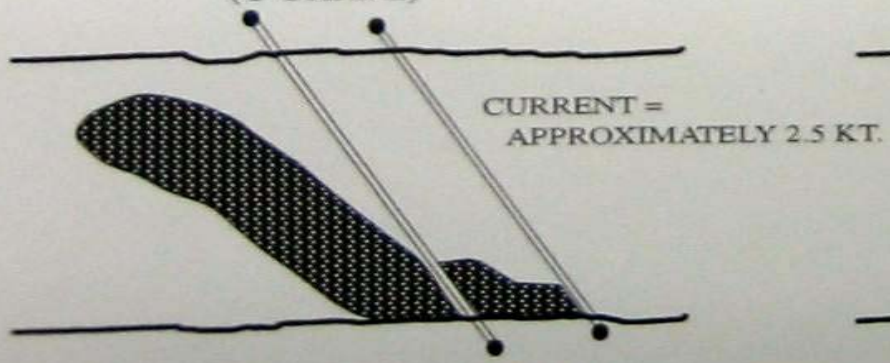
PARTIAL ENCIRCLEMENT
(NEGLIGIBLE CURRENT)



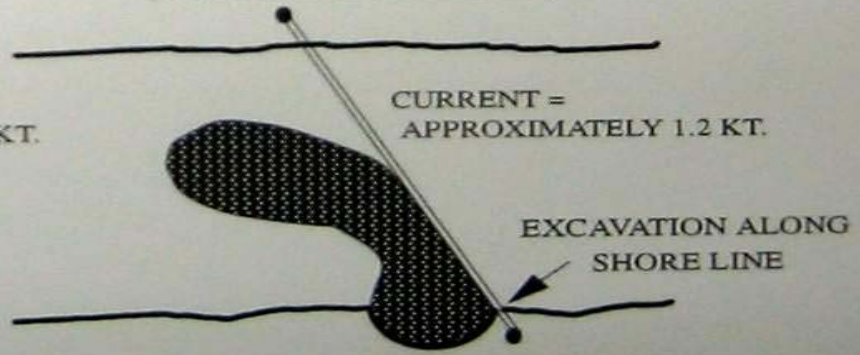
CATENARY
(U-SHAPE)



ANGLED CONTAINMENT BOOM
(MODERATE CURRENT)



DOUBLE CONTAINMENT BOOMING
(SWIFT CURRENT)

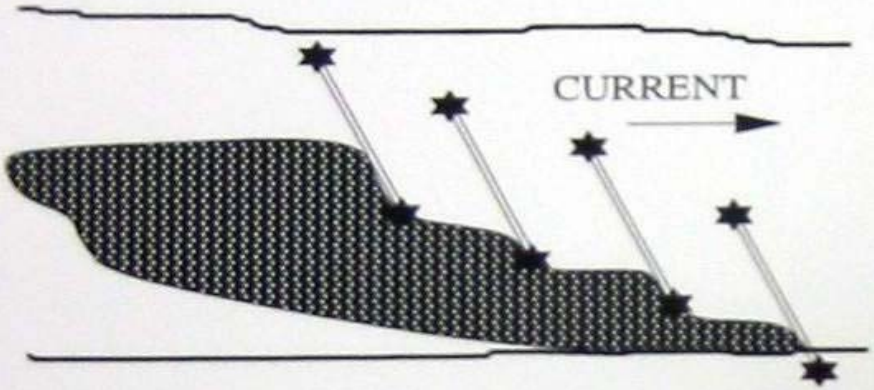


ANGLED CONTAINMENT BOOM
WITH RECOVERY PIT

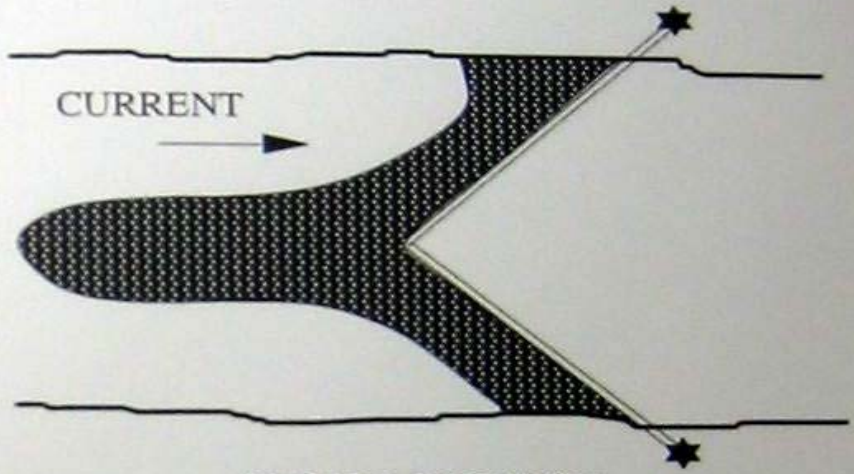
“Sacrificial” boom used to collect debris and trash.
Will probably be discarded after use due to damage.
Easy to deploy, labor intensive to decon & repack.

Water-flushing to prevent residual oil from affecting shoreline's sensitive areas

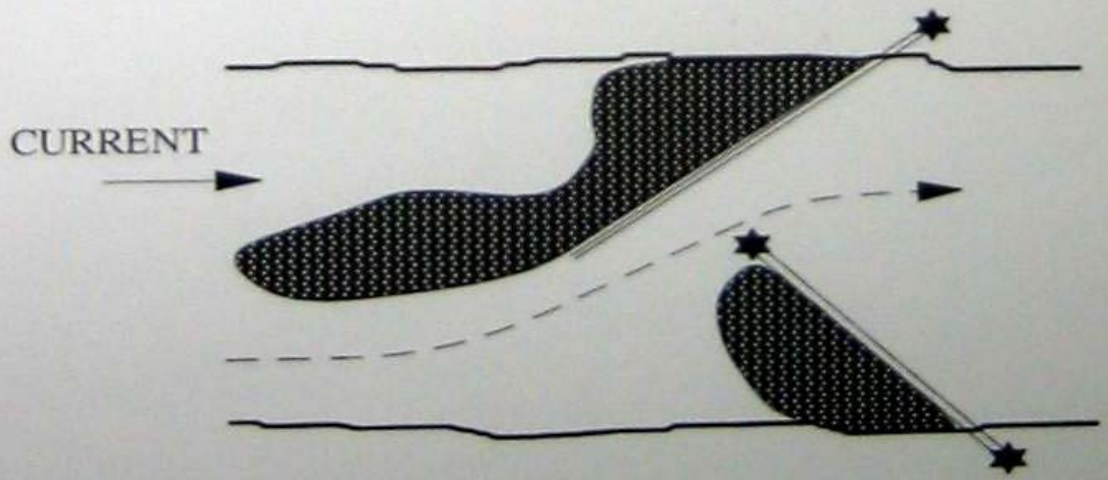
Natural collection areas for debris and trash are signs of where spilled oil will end up. These natural collection spots can be part of an ACP for this area.



CASCADE



CLOSED CHEVRON

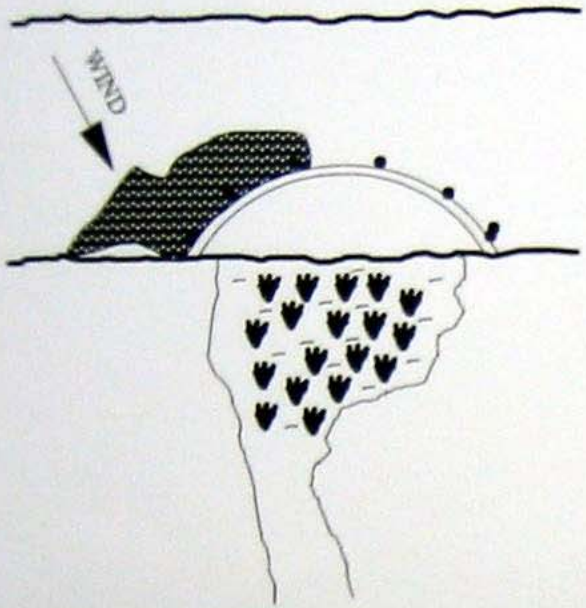


STAGGERED CHEVRON
(Allows Boat Movement)

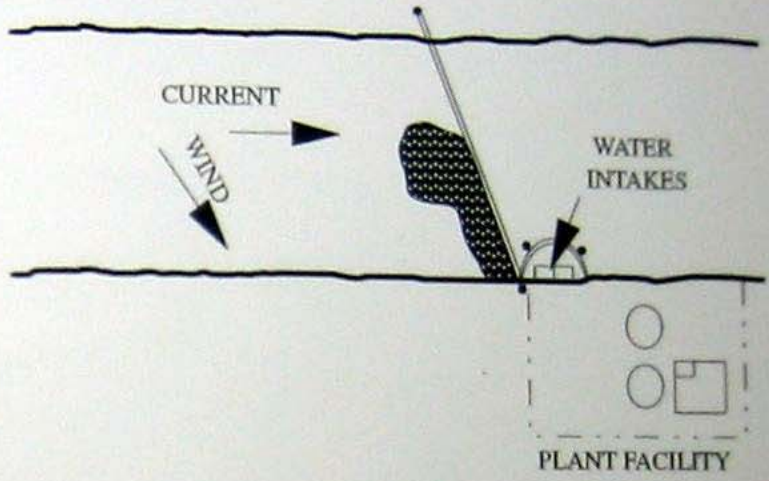
Product was diverted to this area for removal by Vac Truck.

Protection - Exclusionary

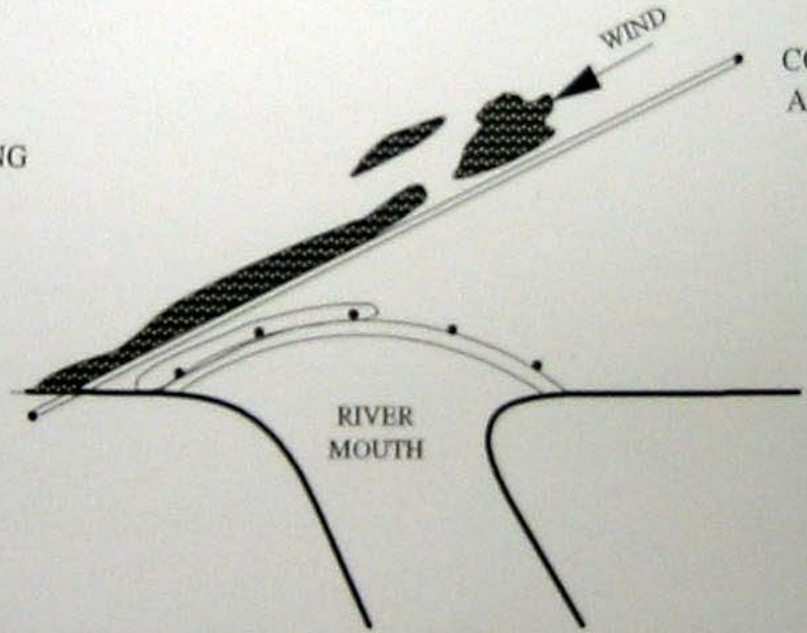
EXCLUSIONARY AND DEFENSIVE BOOMING CONFIGURATIONS



EXCLUSIONARY BOOMING
OF TIDAL FLAT



COMBINATION OF EXCLUSIONARY
AND CONTAINMENT BOOMING TO
PROTECT WATER INTAKES



COMBINATION OF DEFLECTION AND
EXCLUSIONARY BOOMING TO PROTECT
EXTRANCE TO RIVER

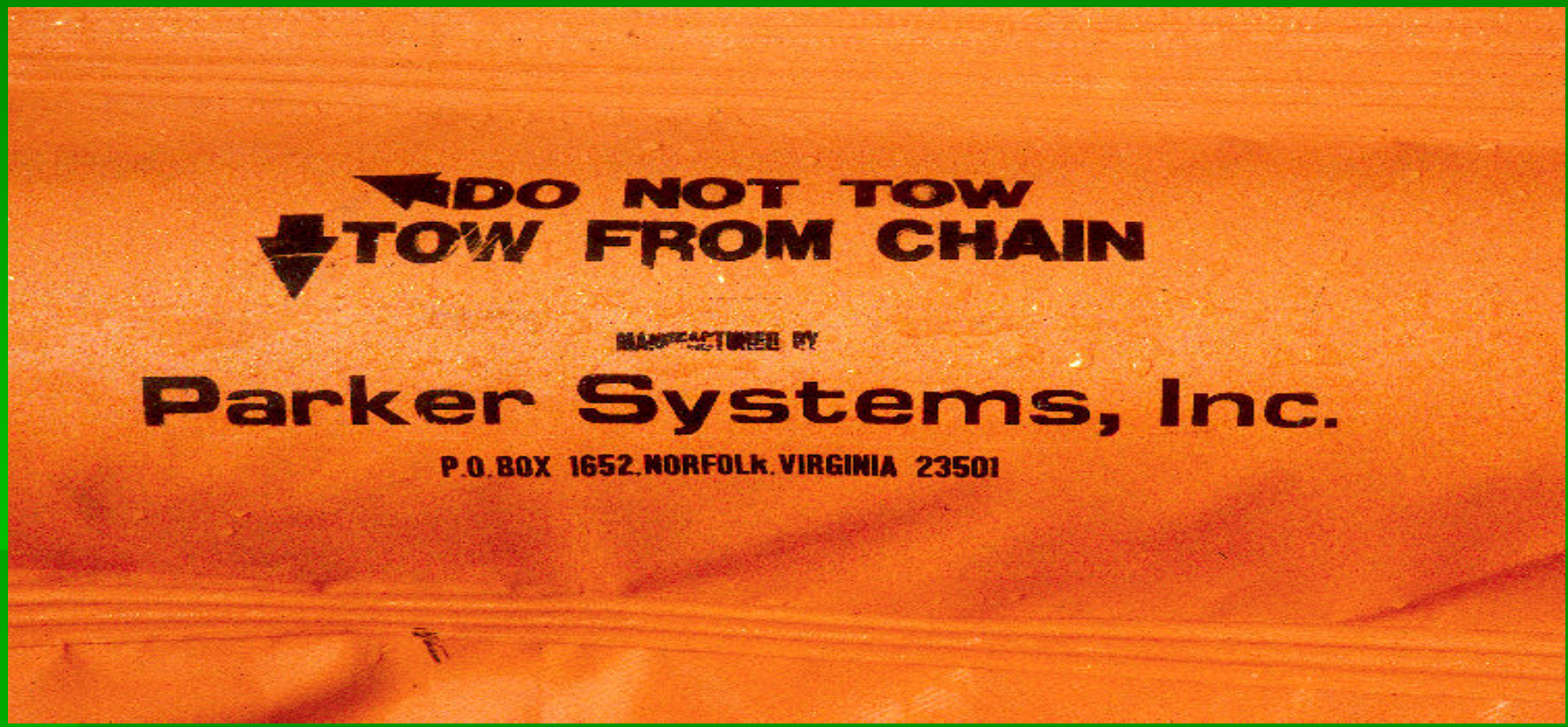
Long lengths of boom require anchoring every 400 ft or less

Booming just far enough away from bulkheads, etc. can save clean up costs

Hatchery being protected using boom and anchor points . . .

Lots of them!

Directions, precautions . . . All on the surface of the boom



Towing section with a float attached

Use of bridle and amount of boom should not exceed 500 ft

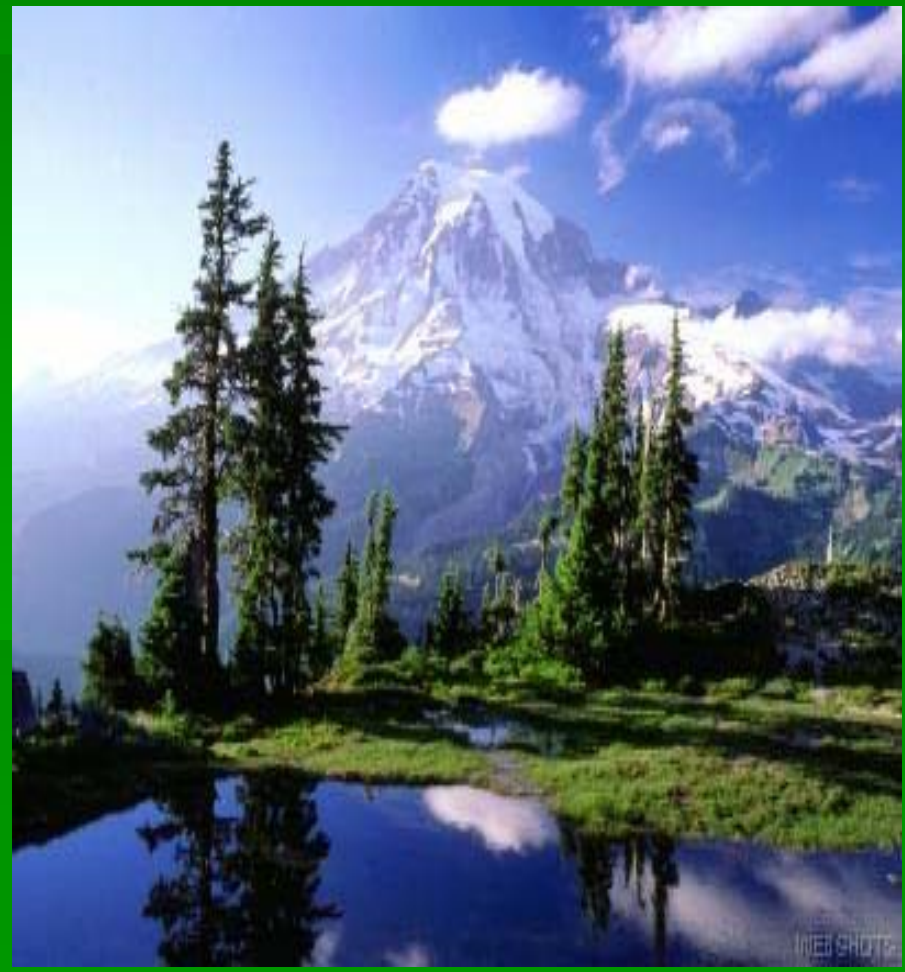
Damage

Boom selection and tow speed are some of many critical factors in mechanical recovery.

The wrong choice can lead to compounding problems during a response event.

Selection Factors

- Type of water body
- Environment
- Structures
- Available resources
- Accessibility
- Safety
- Debris



Selection Factors

- Type of water body
  - **Offshore**
  - **Rivers**
  - **Canals**
  - **Harbors**
  - **Inlets**
  - **Bays**
  - **Channels**
  - **Natural collection areas**

Selection Factors

- Type of water body
- Environment

Selection Factors

- Type of water body
- Environment
- Structures

Selection Factors

- Type of water body
- Environment
- Structures
- Resources

Selection Factors

- Type of water body
- Environment
- Structures
- Resources available

Selection Factors

- Type of water body
- Environment
- Structures
- Resources available
- Accessibility

Cascade booming in fast moving currents.
Staggered sections stepwise along the shoreline

Estimating Current & Deflection Angles

Forces on the boom

Estimating Current & Deflection Angles

- Forces on the boom and rigging
- Drag forces

BOOM ANGLES FOR VARIOUS CURRENTS

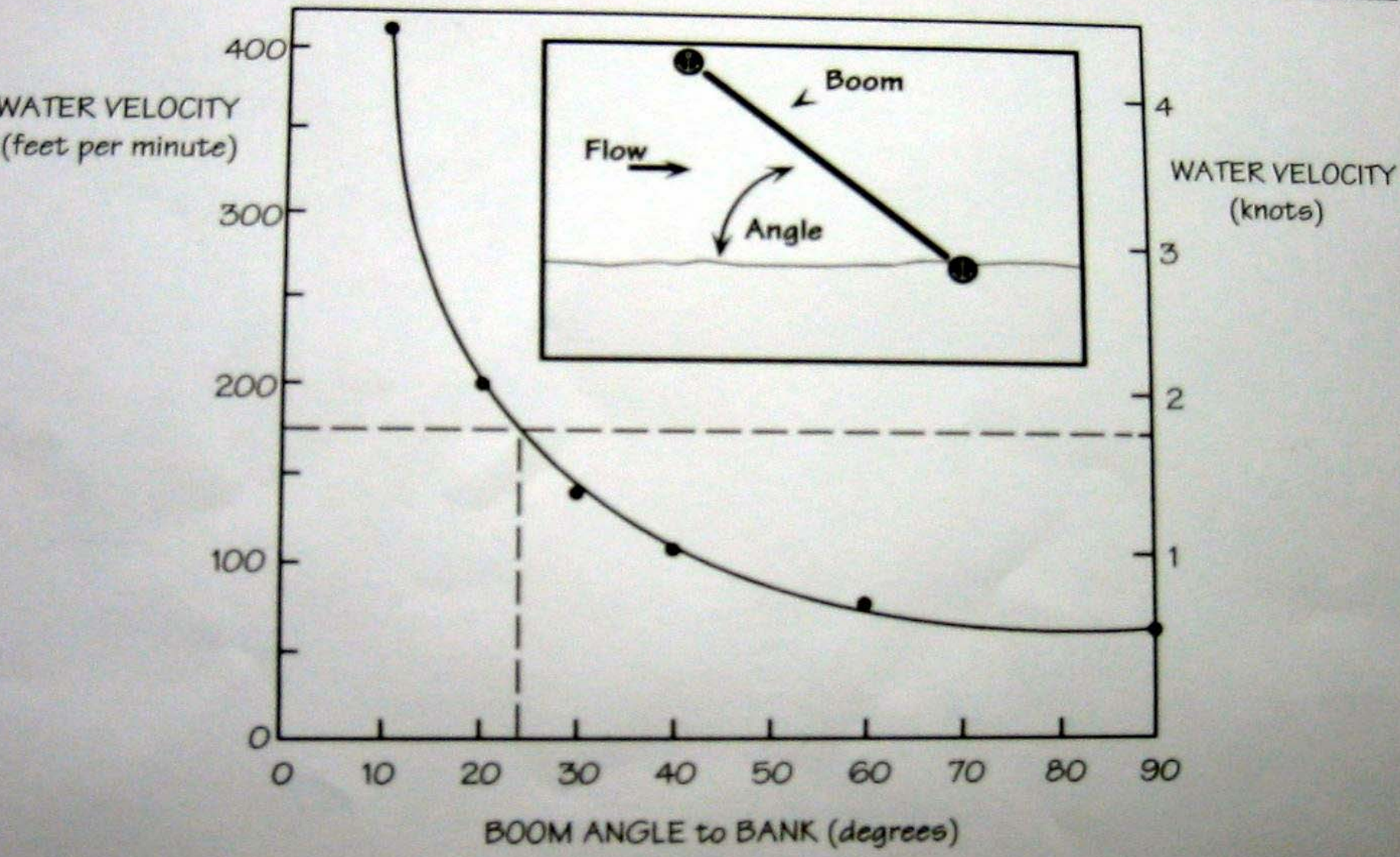


Figure 7. Plot of the maximum angle for boom deployment at increasing current velocities.

Boom Anchoring

CONVENTIONAL BOOM ANCHORING