On-Water Mechanical Recovery

The Basics of Booming and Skimming

Window of Opportunity

- Refers to the period of time during which conditions are appropriate for a particular response technology
- Mostly a consideration for on-water response
- It is a function of the type of oil, release rate, spreading, physical and chemical changes in the oil and environmental conditions

Encounter Rate

- Amount of oil that can be concentrated and collected over time by an individual piece of equipment or system
- Key factor in determining anticipated recovery
- Applies to all on-water activities (not relevant to on-shore activities)
- Function of oil thickness, application swath width and speed of advance
- Encounter rate is low for containment (skimming or in-situ burning) and high for aerial dispersant operations
- Decreases over time as oil spreads

Areal Coverage of Response Platforms

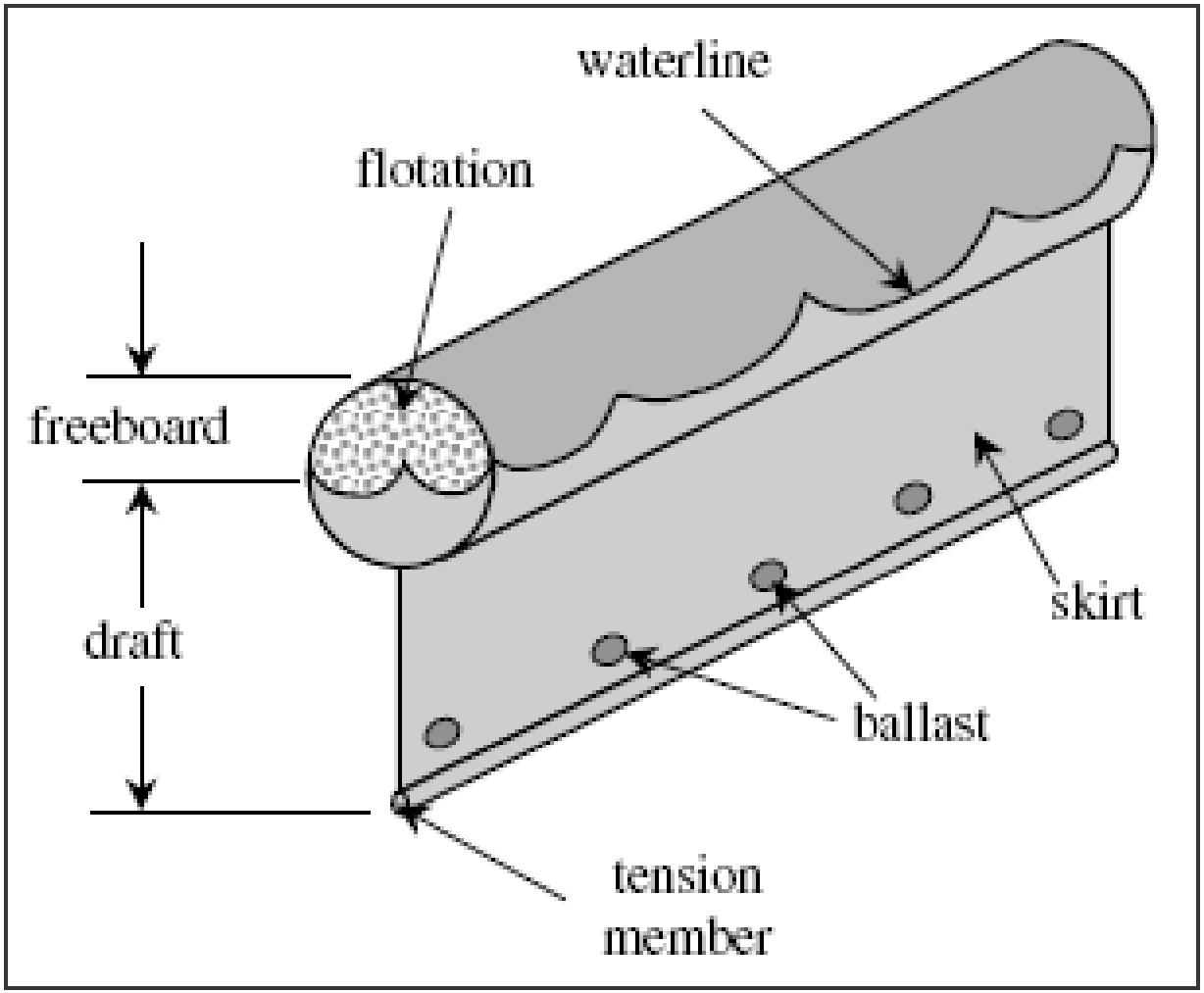
Platform	Acres per Hour
Mechanical	
Small Skimmers	0.2 - 2.6
Medium Skimmers	3.5 - 14
Large Skimmers	21 - 70
In-Situ Burning	5 - 31
Dispersants	
Vessels	28 - 140
Small Aircraft and Helicopters	193 - 893
Large Aircraft	1750 - 5000

Source: ExxonMobil 2008a

Basic Elements

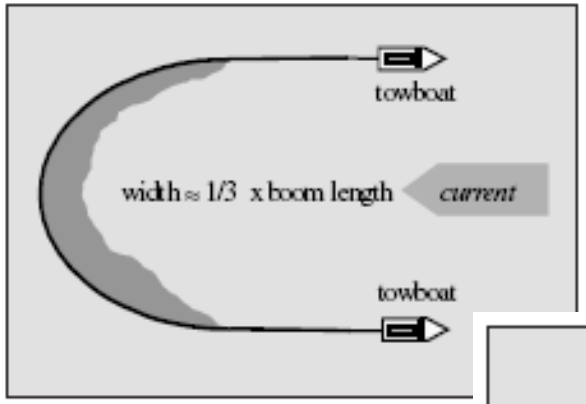
- Two steps
  - Containment
  - Recovery or removal
- Boom configuration and placement
  - U, V, J for two towing vessels
  - Sweep (single vessel)
  - Encirclement
  - Diversion, exclusion or cascade

Basic Boom Construction

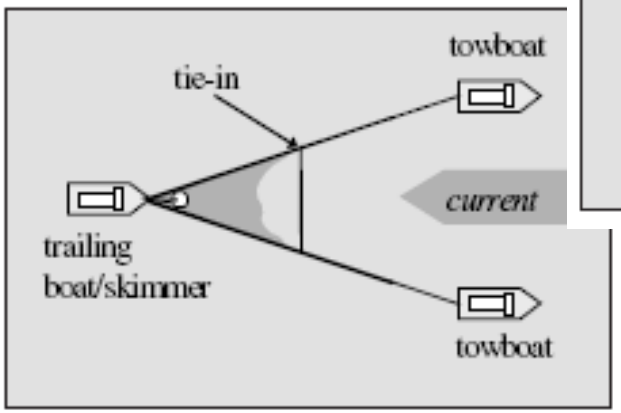


Source: ExxonMobil 2008

Towing Boom Configurations



"U"



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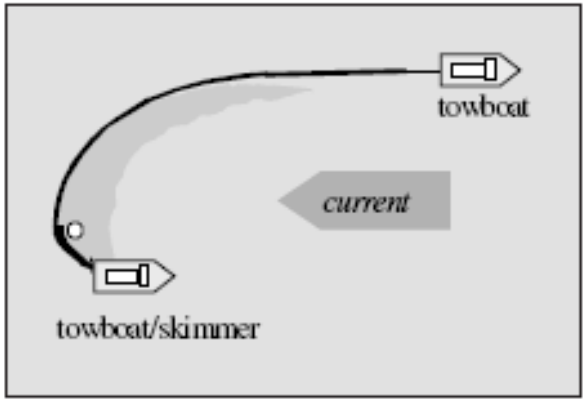


"J"

Source: ExxonMobil 2008

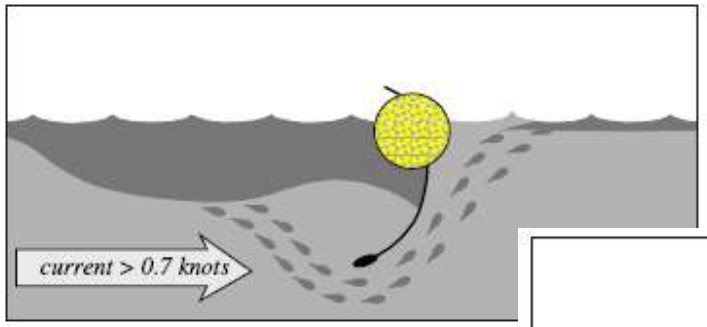
Boom Limitations

- Booms limited by sea state and current
  - Critical current for most booms approximately 1 knot (0.5 m/s)
  - Up to approximately 2 knots can be accommodated with cascading booming
- Sea State
  - Good conditions – 0 to 10 knots, calm or swells
  - Poor conditions – >20 knots, waves 3 to 4 foot
- Boom size must be appropriate for conditions

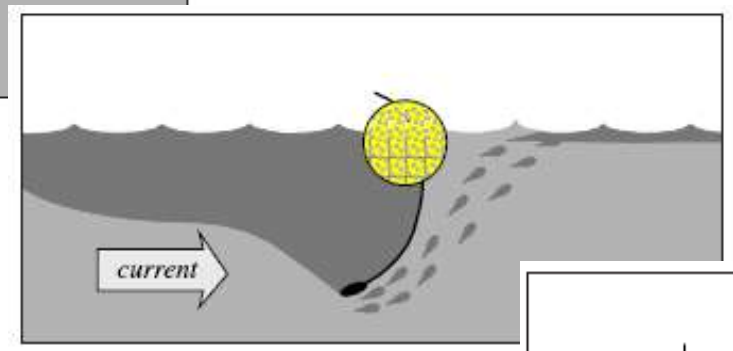
Boom Failures Result in:

- Entrainment or drainage
- Critical accumulation
- Splash over
- Submergence
- Planing
- Structural failure

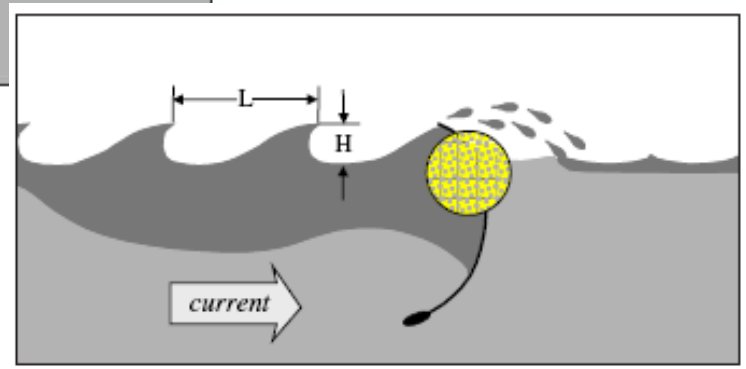
Examples of Boom Failure



Entrainment



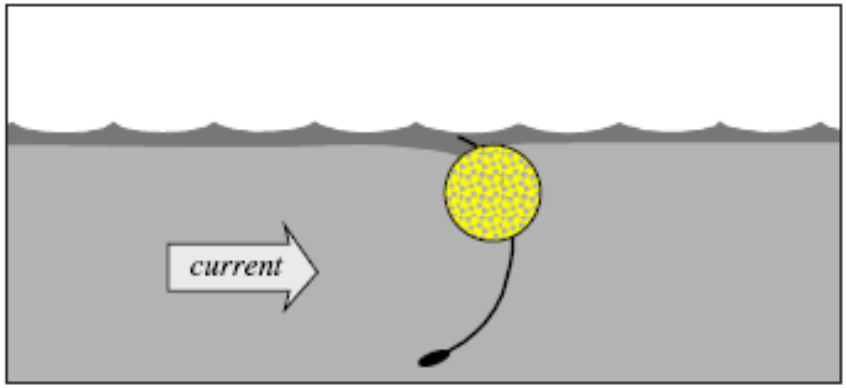
Drainage



Splashover

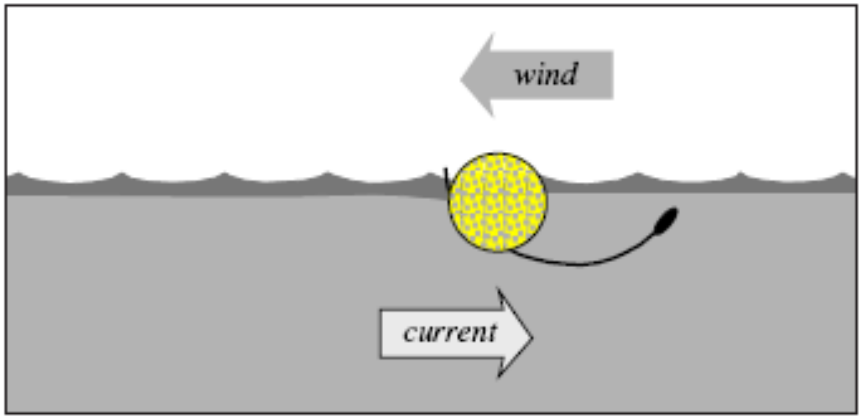
Source: ExxonMobil 2008

Examples of Boom Failure (cont.)



Submergence

Planing



Source: ExxonMobil 2008

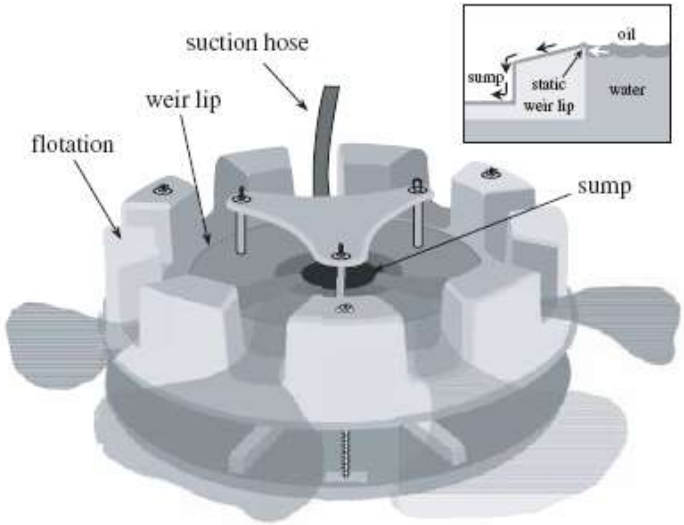
Skimmers

- Mechanical devices to remove oil from water surface
  - Independent
  - Built into vessel or containment device
- Function best on thick slicks
- Rated based on recovery capacity as well as amount of water recovered with the oil

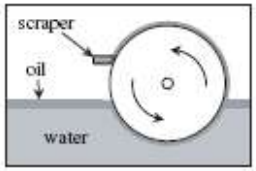
Skimmers (cont.)

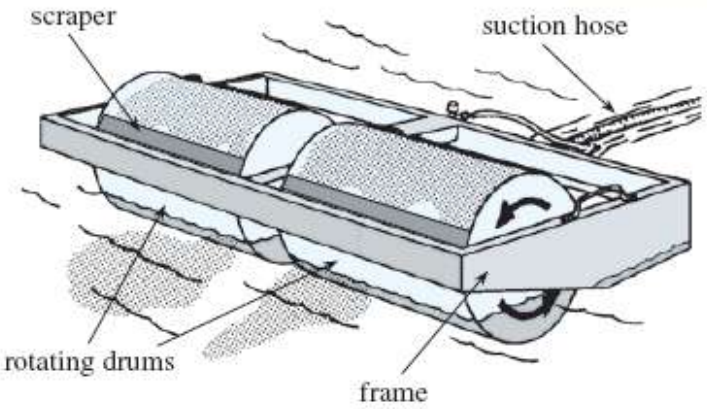
- Major types of skimmers
  - Oleophilic surface skimmers
  - Weir skimmers
  - Suction skimmers (vacuum devices)
  - Elevating skimmers
  - Submersion skimmers
  - Vortex (centrifugal) skimmers
- Special purpose ships

Examples of Skimmers



Simple Weir Skimmer

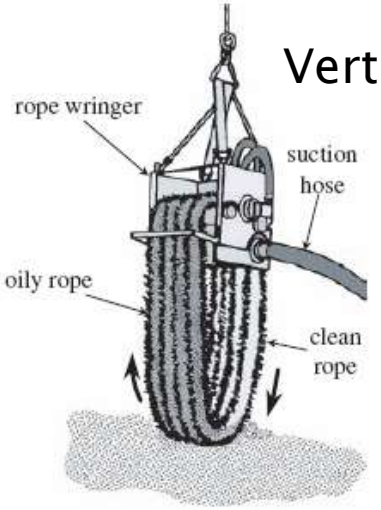




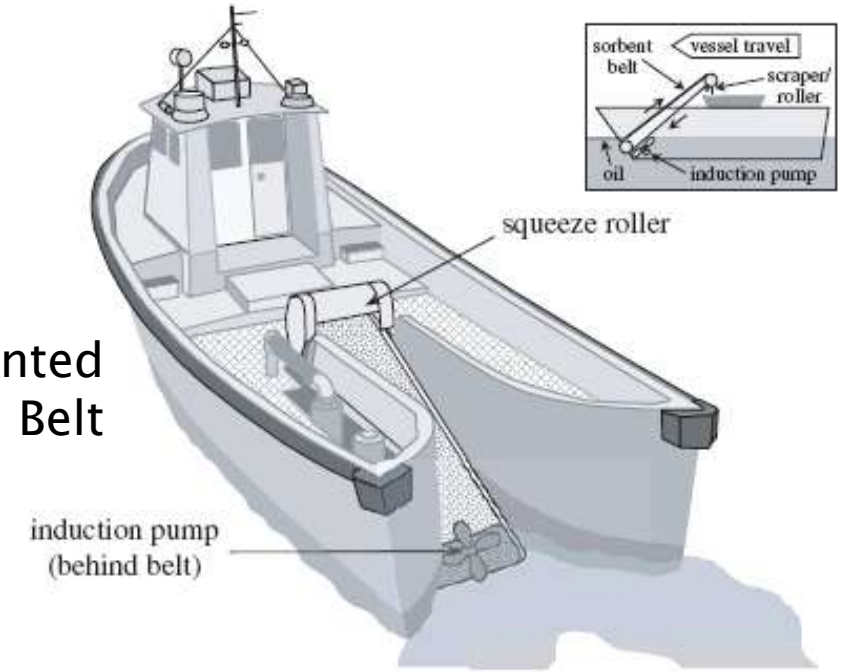
Drum Skimmer

Source: ExxonMobil 2008

Examples of Skimmers (cont.)



Vertical Rope Skimmer



Vessel Mounted Sorbent Lifting Belt

Source: ExxonMobil 2008

Sorbents

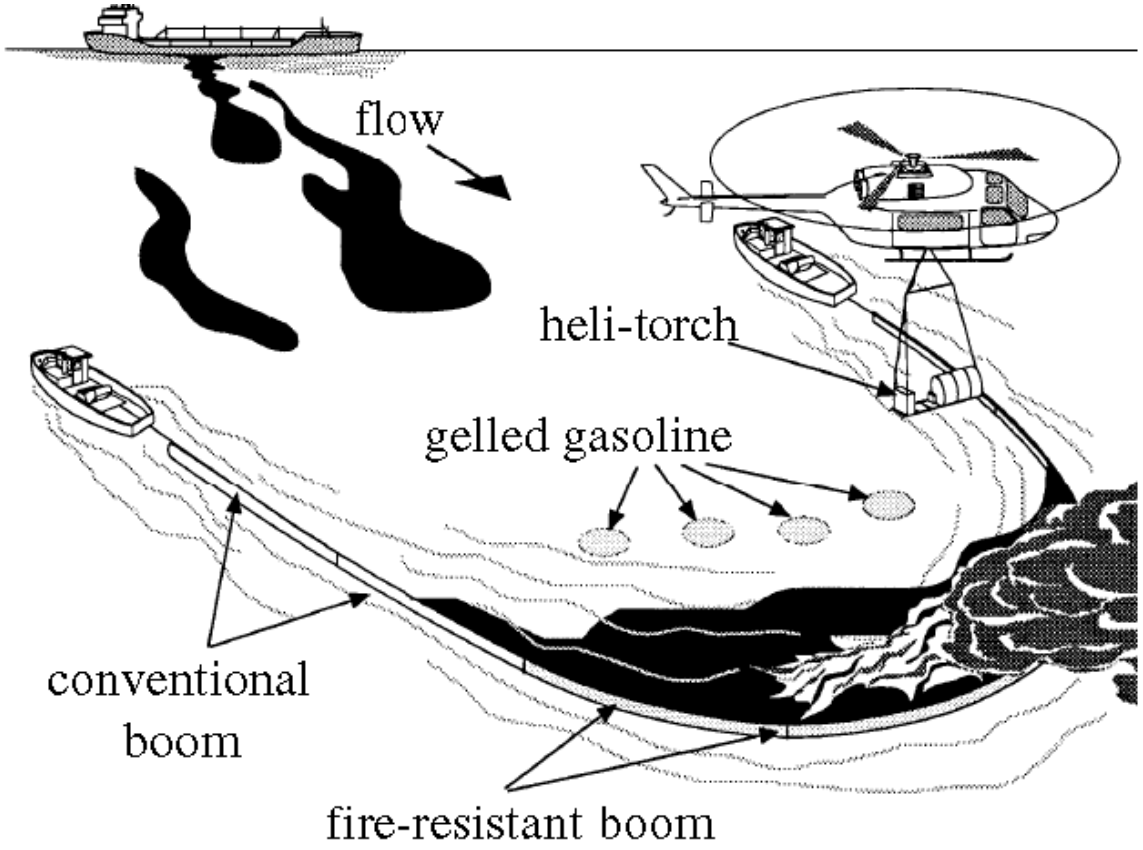
- Boom, pads, socks, pom-poms, etc.
- Used for final cleanup
- Synthetic
- Natural
  - Organic (peat moss, wood products)
  - Inorganic (clay)
- Can create secondary problems

On-Water In-Situ Burning

Basic Elements

- Usually requires containment
- Most oils will burn
  - 2 to 3 mm thick
  - Ignition is relatively easy
  - May be necessary to break emulsions
  - Usually very efficient (90% plus)
- Smoke plume usually below health level concerns within 500m downwind
- Rapid removal (eliminates need for storage)

In-Situ Burn Operation



Source: ExxonMobil 2008