WHEN ATTEMPTING to BOOM a FAST FLOWING RIVER

THERE are THREE (3) GIVENS:

• YOUR RADIOS GO DOWN,
• YOUR BOATS WON’T START &
• YOUR ANCHORS WON’T HOLD.
ADDITIONALLY, MOST SPILL RESPONSE TEAMS INITIALLY CONSIST OF

- ME,
- YOU,
- BUBBA

A PICKUP TRUCK with LITTLE or NO EQUIPMENT and/or the INCORRECT TYPE of EQUIPMENT (BOOM) for RIVER APPLICATIONS.
OUR **OBJECTIVE** is to PROVIDE a **DECISION PROCESS** to AID the FIRST RESPONDER in the **PROPER SELECTION of APPROPRIATE SPILL RESPONSE STRATEGIES for** **BOOMING FAST FLOWING RIVERS**
SPILL RESPONSE STRATEGIES

• MONITOR, WAIT & DO NOTHING
• IN-SITU BURNING
• CHEMICAL TREATMENTS
• PHYSICAL CONTAINMENT of OIL
• PHYSICAL REMOVAL OF OIL
• SHORELINE/BANK CLEANUP
• WASTE DISPOSAL
• REMEDIATION & RESTORATION
BOOM CONSIDERATIONS:

- **WHAT is PRACTICAL?**
- **HOW EFFICIENT?**
  (Effort vs Effectiveness)
- **WHAT are the RESPONSE OPTIONS?**
  (“Environmental Damaging”)
- **WHAT are the IMPLICATIONS of MONITORING?**
  (Self Cleaning Response)
- **ARE THERE POLITICAL or SOCIAL SENSITIVITY ISSUES?**
- **HOW MUCH WASTE will be GENERATED or COLLECTED?**
  (i.e. Disposal)
SELECTION FACTORS

- TYPE of WATER BODY
- CURRENT SPEED
- SHORELINE CONFIGURATION
- NATURAL COLLECTION POINTS
- WATER DEPTH
- AVAILABLE EQUIPMENT
- AVAILABLE MANPOWER
- AMOUNT of OIL SPILLED
- WEATHER CONDITIONS
- TIME of YEAR
“3” BOOM DEPLOYMENT STRATEGIES

• EXCLUSION BOOMING
  Deflection

• CONTAINMENT BOOMING
  Lakes/Bays/Ocean/Rivers

• DIVERSION BOOMING
  Single
  Cascade
  Chevron
• **EXCLUSION BOOMING:**

  Boom Deployment **ACROSS** or **AROUND** Sensitive Areas and Anchored in Place to "**EXCLUDE**" a Pollutant from Contaminating the Area.

  **Used Across:**

  - SMALL BAYS,
  - HARBOR ENTRANCES,
  - INLETS,
  - RIVERS,
  - CREEK/STREAM MOUTHS,
  - WATER INTAKE SYSTEMS, ETC.

  to **PROTECT an AREA** and/or **PREVENT BEING OILED**.

**UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS**
Exclusion Booming of Confluence of Rivers
Nonconnah Creek - Memphis, Tennessee Area
DEFLECTION BOOMING:

Boom is **Deployed from the shoreline away from** the Approaching Pollutant and Anchored in Place.

The Pollutant is Deflected away from the River Bank &/or Shoreline and/or Prevented from Impacting the Area in Question.

The Approaching Slick is Forced into a Taking a New Direction.

**Used on:** **RIVERS,** **STREAMS & CREEKS,** **HARBOR ENTRANCES,** **INLETS,** **BAYS.**
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Deflection Boom Deployment
Deflection Booming - River Deployment
Weber River - Coalville, Utah Area
CONTAINMENT BOOMING:

In Lake, Bay, or Ocean Response, Boom is Deployed in a “U” or “V” Shape in Front of the Approaching Oil Slick.

Boom Towing Bridles are Anchored &/or Secured to the Work Boat with 100 Ft. Tow Lines or Directly to the Shoreline/Bank.

On Rivers, the Oil is diverted to the Shoreline/River Bank for Containment and Recovery.
Containment Booming - River Bank
Marias River - Shelby, Montana Area
TYPES of DIVERSION BOOMING

• **SINGLE DIVERSION**, BANK to BANK ROPE SYSTEM, BRIDGE to BANK ROPE SYSTEM, BUOY to BANK ROPE SYSTEM

• **CASCADE DIVERSION**, CLOSED CHEVRON SYSTEM, OPEN CHEVRON SYSTEM, CASCADE CHEVRON SYSTEM

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS
DIVERSION BOOMING:

Boo is **DEPLOYED at an ANGLE** to the Approaching Pollutant.

The **FASTER** the Current, the **SMALLER** the BOOM ANGLE of DEPLOYMENT into the **FLOWING WATER**.

The Pollutant is Either "**DEFLECTED**" away from a Sensitive Area or "**DIVERTED**" to a Central Collection Point on the River Bank to Ease Recovery.

**Used on:** RIVERS, STREAMS & CREEKS, HARBOR ENTRANCES, INLETS, BAYS

where Currents Exceed **1 KNOTS** &/or **1.15 MILES PER HOURS**.
UNEQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

**BOOM ANGLES for VARIOUS CURRENT SPEEDS**

Plot of the Maximum Angle for Boom Deployment at Increasing Current Velocities.
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Single Diversion Boom Deployment with Shoreline Protection
Red River of the North - Fargo, North Dakota
FAST RIVER BOOMING TECHNIQUES

“ROPE” CASCADE DIVERSION BOOM DEPLOYMENT SYSTEMS

• BANK to BANK ROPE SYSTEM

• BRIDGE to BANK ROPE SYSTEM

• BUOY to BANK ROPE SYSTEM
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bank to Bank Rope Anchor System
Blackstone River - Pawtucket, Rhode Island Area
Bank to Bank Rope Anchor System
Spokane River - Spokane, Washington Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

FAST RIVER BOOMING TECHNIQUES

BANK to BANK ROPE SYSTEM
HOW DO WE BEGIN PROCESS of BOOMING the RIVER?

**ANSWER:**

DIVIDE OIL SPILL RESPONSE GROUP into **3 SPILL RESPONSE TEAMS.**

- **TEAM “A”**
- **TEAM “B”**
- **TEAM “C”**
DETERMINING ANGLE to DEPLOY BOOM in FAST FLOWING RIVERS

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

FAR SHORE

Current

NEAR SHORE

90° at 1 mph
22.5° at 2 mph

Containment Point
Fast River Boom Deployment

Step 1.

Bank to Bank Rope Anchor System
Fast River Boom Deployment

Step 2.

Bank to Bank Rope Anchor System
Fast River Boom Deployment

Step 3.

Bank to Bank Rope Anchor System
Fast River Boom Deployment

Step 4.

Bank to Bank Rope Anchor System
**Fast River Boom Deployment**

**Step 5.**

**Bank to Bank Rope Anchor System**
Step 6.

Fast River Boom Deployment

Current

Bank to Bank Rope Anchor System

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bank to Bank Rope Anchor System - Bank Layout
American River - Sacramento, California
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

No. 1 - Boom Being Deployed - Bank to Bank Rope Anchor System
American River - Sacramento, California
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

No. 2 - Boom Deployed - Bank to Bank Rope Anchor System
American River - Sacramento, California
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

No. 3 - Boom Deployed - Bank to Bank Rope Anchor System
American River - Sacramento, California
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

**No. 4 - Boom Being Deployed - Bank to Bank Rope Anchor System**

*American River - Sacramento, California*
No. 4 - Boom Deployed - Bank to Bank Rope Anchor System
American River - Sacramento, California
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

No. 5 - Boom Deployed - Bank to Bank Rope Anchor System
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

No. 6 - Boom Deployed - Bank to Bank Rope Anchor System
American River - Sacramento, California
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bank to Bank Rope Anchor System
North Platte River - Guernsey, Wyoming
Bank to Bank Rope Anchor System
Rio Grande - Taos, New Mexico
Bank to Bank Rope Anchor System
Boise River - Boise, Idaho Area

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bank to Bank Rope Anchor System
San Juan River - Shiprock, New Mexico Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bank to Bank Rope Anchor System
Yellowstone River - Billings, Montana Area
Bank to Bank Rope Anchor System
Platte River - Casper, Wyoming Area
Bank to Bank Rope Anchor System
Stillwater River - Fitchburg, Massachusetts Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bank to Bank Rope Anchor System
Truckee River - Truckee, Nevada Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

FAST RIVER BOOMING TECHNIQUES

BRIDGE to BANK ROPE SYSTEM
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Fast River Boom Deployment

Step 1.

Bridge to Bank Rope Anchor System
Step 2.

**Fast River Boom Deployment**

Current

Boom #1

Diagonal Release Line

Floating Collar

Boat

“C” Pulley System

Bridge to Bank Rope Anchor System

**UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS**
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

**Fast Water Booming Technique**

**Step 3.**

Bridge to Bank Rope Anchor System
Fast River Boom Deployment

Step 4.

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bridge to Bank Rope Anchor System
Fast River Boom Deployment

Step 5.

**Bridge to Bank Anchor System**

**UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS**
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Fast River Boom Deployment

Step 6.

**Bridge to Bank Anchor System**

- **Near Shore**
- **Boat**
- **Current**
- **“A”**
- **“B-1”**
- **“B-2”**
- **Bridge**

w/ Pulley System or Power Wench
Bridge to Bank Rope Anchor System
Colorado River - Bullhead City, Arizona Area
Bridge to Bank Rope Anchor System
Rope Lead Anchor Collar Around Bridge Column
Colorado River - Bullhead City, Arizona Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Rope Being Pulled by Power Winch with Side Capstan Mounted on Stand
Colorado River - Bullhead City, Arizona Area
Bridge to Bank Rope Anchor System
Colorado River - Blythe, California Area

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS
Bridge to Bank Rope Anchor System - Boat & Rope Handling
Colorado River - Blythe, California Area
Bridge to Bank Rope Anchor System

Power Wench with Rope Lead thru “D” Ring located on Bridge Column

Colorado River - Blythe, California Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bridge to Bank Rope Anchor System
View of Boom Containment & Recovery Site
Colorado River - Blythe, California Area
Bridge to Bank Rope Anchor System
Nonconnah Creek - Memphis, Tennessee Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bridge to Bank Rope Anchor System - View of Bridge Rope Anchoring
Weber River - Coalville, Utah Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bridge to Bank Rope Anchor System
Open Chevron Cascade Boom Deployment with Deflection
Weber River - Coalville, Utah Area
Bridge to Bank Rope Anchor System
St. Johns River - Mayport, Florida Area
Bridge to Bank Rope Anchor System
St. Johns River - Mayport, Florida Area

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bridge to Bank Rope Anchor System
St. Johns River - Mayport, Florida Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bridge to Bank Rope Anchor System - Bridge Column
Missouri River - Fort Benton, Montana
Bridge to Bank Rope Anchor System - Bridge Column
Missouri River - Fort Benton, Montana
Bridge to Bank Rope Anchor System - Bridge Column to Bank Anchor
Missouri River - Fort Benton, Montana

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bridge to Bank Rope Anchor System - Bridge Column
Missouri River - Fort Benton, Montana
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Bridge to Bank Rope Anchor System - Bridge Column
Missouri River - Fort Benton, Montana
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

FAST RIVER BOOMING TECHNIQUES

BUOY to BANK ROPE SYSTEM
Fast River Boom Deployment

Step 1.

**Buoy to Bank Rope Anchor System**
Fast River Boom Deployment

Step 2.

Buoy to Bank Rope Anchor System

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS
Fast River Boom Deployment

Step 3.

Buoy to Bank Rope Anchor System

(Repeat Process for Each Boom Section)

UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Fast River Boom Deployment

Step 4.

Buoy to Bank Rope Anchor System

(Repeat Process for Each Boom Section)
**Fast River Boom Deployment**

**Step 5.**

**UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS**

**Buoy to Bank Rope Anchor System**
Fast River Boom Deployment

Step 6.

Buoy to Bank Rope Anchor System
**Fast River Boom Deployment**

*Step 7.*

*UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS*

**Buoy to Bank Rope Anchor System**
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Buoy to Bank Rope Anchor System - Boom Layout on Bank
Colorado River - Page, Arizona Area
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Buoy to Bank Rope Anchor System - Permanent Anchor Placement
Colorado River - Page, Arizona
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

Buoy to Bank Rope Anchor System - Permanent Anchor Placement
Colorado River - Page, Arizona
Buoy to Bank Anchor System
USCG Buoy Tender in Position to Drop 1600 lb. Sinker with Buoy
Missouri River - St. Louis, Missouri Area
Buoy to Bank Anchor System
USCG Buoy Tender in Position to Drop 1600 lb. Sinker with Buoy
Missouri River - St. Louis, Missouri Area
Buoy to Bank Rope Anchor System
Mississippi River - St. Louis, Missouri Area
BOOM CONSIDERATIONS:

• WHAT IS PRACTICAL?

• HOW EFFICIENT?
  (Effort vs Effectiveness)

• WHAT are the RESPONSE OPTIONS?
  (“Environmental Damaging”)

• WHAT are the IMPLICATIONS of MONITORING?
  (Self Cleaning Response)

• ARE THERE POLITICAL or SOCIAL SENSITIVITY ISSUES?

• HOW MUCH WASTE will be GENERATED or COLLECTED?
  (i.e. Disposal)
The RESPONSE STRATEGY that is SELECTED WILL DEPEND on the FOLLOWING FACTORS:

- **TYPE of WATER BODY**
- **CURRENT SPEED**
- **SHORELINE CONFIGURATION**
- **NATURAL COLLECTION POINTS**
- **WATER DEPTH**
- **AVAILABLE EQUIPMENT**
- **AVAILABLE MANPOWER**
- **AMOUNT of OIL SPILLED**
- **WEATHER CONDITIONS**
- **TIME of YEAR**
In SUMMARY -
HOW to DEPLOY BOOM in FAST FLOWING RIVERS

• If the RIVER LOOKS FAST - then CONSIDER IT’S FAST.

• USE BOOM ANGLE CHART -
If in DOUBT ESTABLISH a 20-25 DEGREE POINT into the RIVER CURRENT to ESTABLISH BOOM DEPLOYMENT & ANCHORING POINTS.

A GIVEN - “The FASTER the RIVER CURRENT”

▪ The SMALLER the BOOM SIZE that SHOULD be DEPLOYED
  ( 10” and/or 12” is the Maximum Size )

▪ & the SHORTER the BOOM LENGTH SECTION that SHOULD be DEPLOYED
  ( Generally 50’ to 100’ Sections )
UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

DON'T LET THIS BE YOUR BOOM DEPLOYMENT