UNIQUE CHALLENGES of BOOMING FAST FLOWING RIVERS

BOOM DEPLOYMENT TECHNIQUES and STRATEGIES

by

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RIVER BOOMING:
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WHEN ATTEMPTING TO BOOM A FAST FLOWING RIVER

THERE ARE THREE (3) GIVEN:

- YOUR RADIOS GO DOWN,
- YOUR BOATS WON'T START &
- YOUR ANCHOR 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 INCORRET TYPE of EQUIPMENT (BOOM)
for RIVER APPLICATIONS.

RIVER BOOMING:
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OFTEN the RP and its OSRO STATE:

“ YOU CAN’T BOOM a FAST FLOWING RIVER ”

WELL !!!

OUR GOAL is to SHOW YOU THAT:

‘ YOU CAN BOOM A FAST FLOWING RIVERS ’

RIVER BOOMING:
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OUR OBJECTIVE IS TO PROVIDE A CISION PROCESS to AID, the FIRST RESPONDER in

PROPER SELECTION of APPROPRIATE SPILL RESPONSE STRATEGIES

for

BOOMING FAST FLOWING RIVERS

SPILL RESPONSE STRATEGIES

- MONITOR, WAIT & DO NOTHING
- CONDUCT IN-SITU BURNING
- USE of CHEMICAL TREATMENTS
- PHYSICAL CONTAINMENT of OIL
- PHYSICAL REMOVAL OF OIL
- SHORELINE/BANK CLEANUP
- WASTE DISPOSAL Disposal
- REMEDIATION & RESTORATION

RIVER BOOMING:
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AN EFFECTIVE BOOM CONTAINMENT SYSTEM

- **DIVERTS** *&/or* **DEFLECTS** *the OIL Away from Economic & Environmentally Sensitive Areas to Predesignated Containment & Recovery Sites.*

- **COLLECTS** *Spilled OIL to Aid* **RECOVERY OPERTIONS.**

- **CONCENTRATES** *Spilled OIL to Aid in* **RECOVERY OPERATIONS.**

- **PREVENTS** *the Spreading of the OIL Over* **WIDER AREAS.**

- **PROTECTS** *Specific Areas, i.e.,*

Lakes, Rivers, Streams/Creeks,Wetlands, Water Intake Systems and Environmentally & Economically Sensitive Areas.

BOOMING CONSIDERATIONS:

**** What is Practical?***

**** How Efficient?***

(Effort vs Effectiveness)

**** What are Response Options?***

("Environmental Damaging")

**** What are the Implications of Monitoring?***

(Self Cleaning Response)

**** Are their Political or Social Sensitivities?***

**** 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*
* *Weather*
* *Time of Year*

RIVER BOOMING:
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3 CONTAINMENT BOOM DEPLOYMENT STRATEGIES

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*EXCLUSION BOOMING

Deflection

* CONTAINMENT BOOMING

Lakes/Bays/Ocean

Rivers

* DIVERSION BOOMING

Single

Cascade

Chevron

* EXCLUSIONARY BOOMING:

Boom Deployment Across or Around Sensitive Areas & 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.

RIVER BOOMING:
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Exclusionary Booming of Confluence of Rivers

Nonconnah Creek, Tennessee

RIVER BOOMING:
==========

Exclusionary Boom Deployment - Water Intake with ***"Kim-Spacers"***
Red River of the North

RIVER BOOMING:
==========

* 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

The Pollutant is "Deflected and/or Pushed Away" from a Sensitive Area and/or Prevented from Impacting the Area in question.

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

Used on ***Rivers,***

Streams & Creeks,

Harbor Entrances,

Inlets,

Bays.

RIVER BOOMING:
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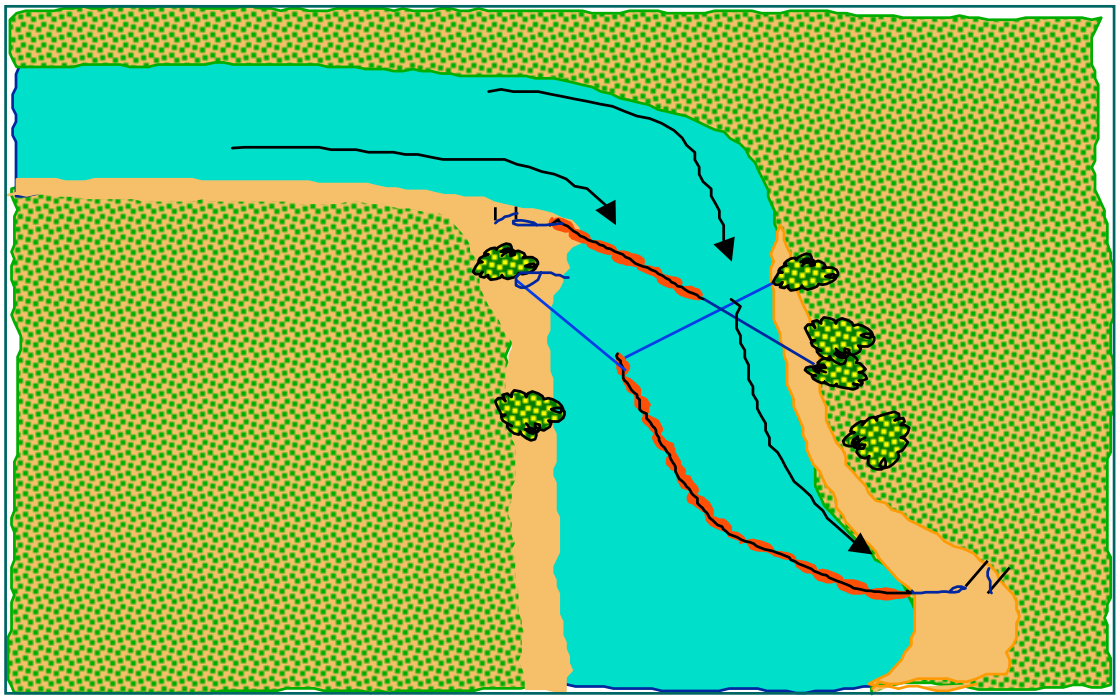

Deflection Boom Deployment

RIVER BOOMING:
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Deflection Booming - River Deployment

Yellowstone River

RIVER BOOMING:
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Deflection Booming - River Deployment

Weber River - Utah

RIVER BOOMING:
==========

Deflection Booming - River Deployment

Popo Agie River - Wyoming

* CONTAINMENT BOOMING:

In Lake, Bay, 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. of Tow Lines or Directly to the Shoreline/Bank.

On Rivers, the Oil is diverted to the Shoreline/River Bank for Containment and Recovery.

RIVER BOOMING:
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Lake Catenary Towing Operations

RIVER BOOMING:
==========

Containment Booming - River Bank

Maris River - Montana

RIVER BOOMING:
==========

Containment Booming – Cascade System

Shoshone River - Wyoming

RIVER BOOMING:
==========

Single Diversionary/Containment Boom Deployment

Channel Off of Colorado River - Arizona

TYPES of DIVERSION BOOMING

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* SINGLE DIVERSIONARY,

* CASCADE DIVERSIONARY,

  Bank to Bank System

  Bridge Anchor System

  Buoy Anchor System

* CHEVRON DIVERSIONARY

  Closed Chevron System

  Open Chevron System

* DIVERSION BOOMING:

Boom 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 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 1knot &/or 1.15 mile per hr.

DIVERSION BOOMING

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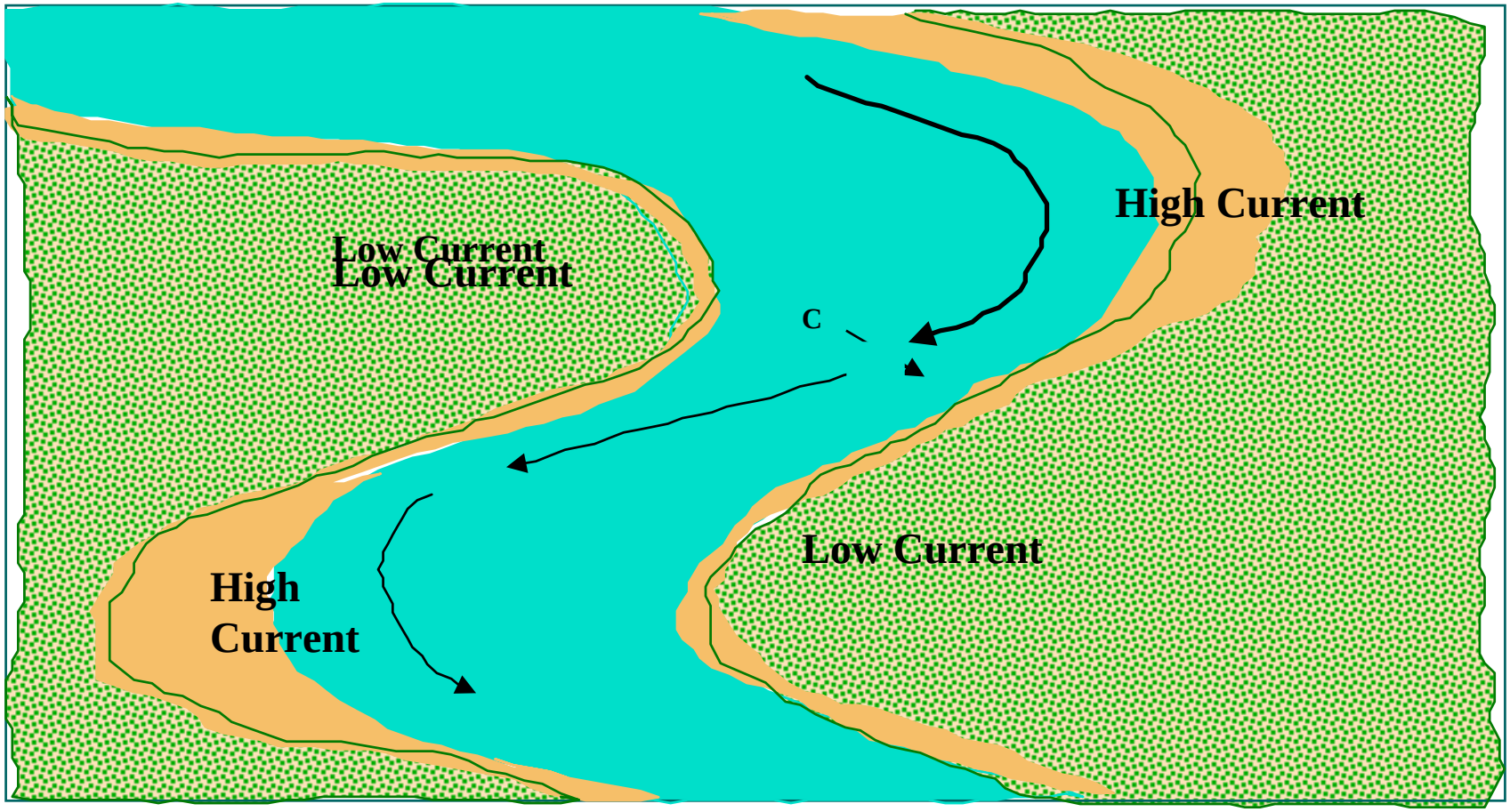
High and Low Current Areas



RIVER BOOMING:
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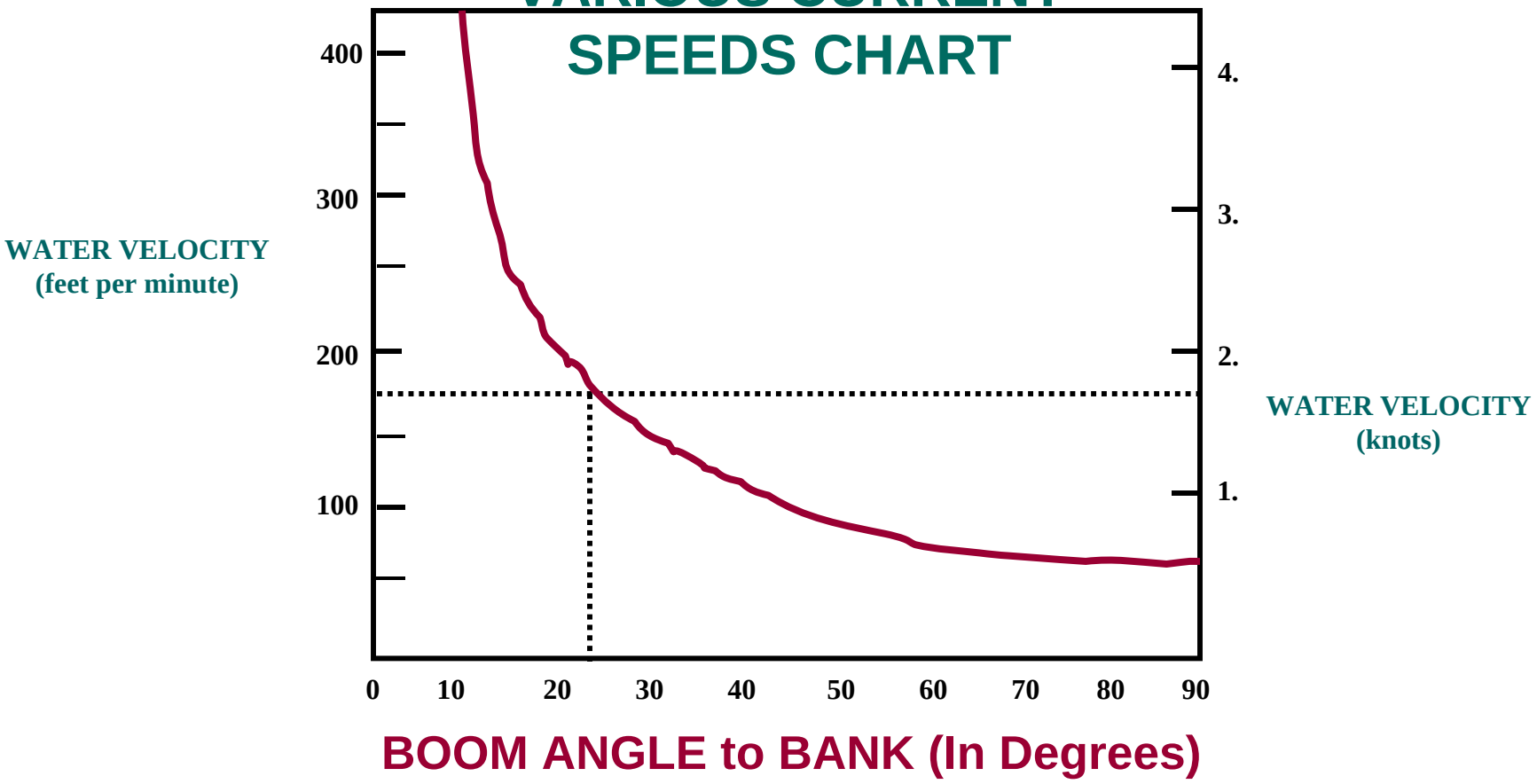
BOOM ANGLES for VARIOUS CURRENT SPEEDS CHART



Plot of the Maximum Angle for Boom Deployment at Increasing Current Velocities.

RIVER BOOMING:
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OW to DETERMINE ANGLE to DEPLOY BOOM in FAST FLOWING RIVE

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•ESTABLISH CONTAINMENT POINT on NEAR SHORE

•LOOK UP RIVER AND LOCATE RIVER CURRENT COMING to YOU

•DETERMINE RIVER CURRENT SPEED
(APPROXIMATE)

•ESTABLISH 360 DEGREE COUNTER CLOCKWISE CIRCUMFERENCE.

•FIND 90 DEGREE POINT on FAR SHORE of RIVER.

•FIND 45 DEGREE POINT on FAR SHORE of RIVER.

•FIND 20-25 DEGREE POINT on FAR SHORE of RIVER.
(USE BOOM ANGLE DEPLOYMENT CHART)

•LOCATED POINT from NEAR SHORE to FAR SHORE at 20-25 DEGREES is LOCATION of FIRST ANCHOR POINT.
(REPEAT PROCESS of EACH BOOM DEPLOYED)

RIVER BOOMING:
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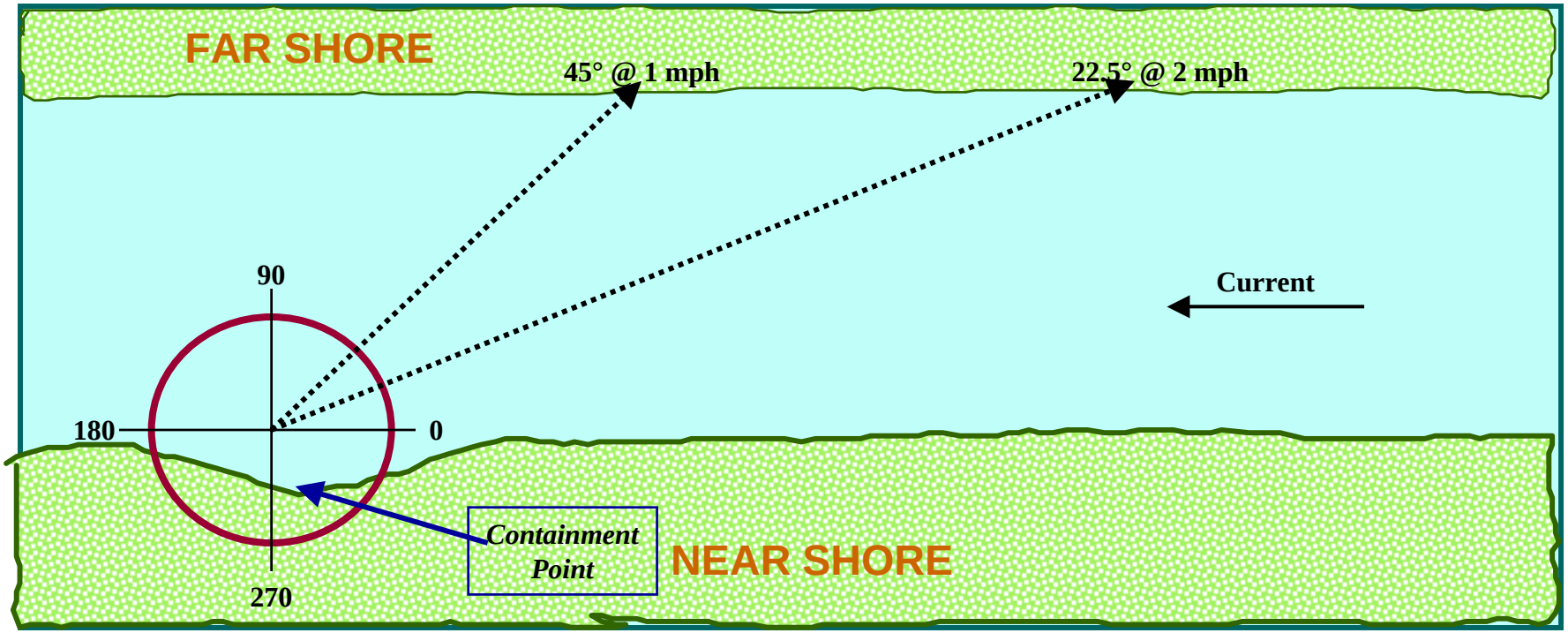
ERMINING ANGLE TO DEPLOY BOOM IN FAST FLOWING R



RIVER BOOMING:
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Single Diversionary Boom Deployment with Secondary
Teton River - Montana

RIVER BOOMING:
==========

Single Diversionary Boom Deployment with Shoreline Protection
Red River of the North

RIVER BOOMING:
==========

Single Diversionary Boom Deployment with Anchor System

Missouri River - Montana

FAST RIVER BOOMING TECHNIQUES

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" ROPE " CASCADE DIVERSIONARY BOOM DEPLOYMENT SYSTEMS

- BANK to BANK ROPE SYSTEM
- BRIDGE to BANK ROPE SYSTEM
- BUOY to BANK ROPE SYSTEM

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

South Platt River – Colorado

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Shoshone River - Wyoming

RIVER BOOMING:
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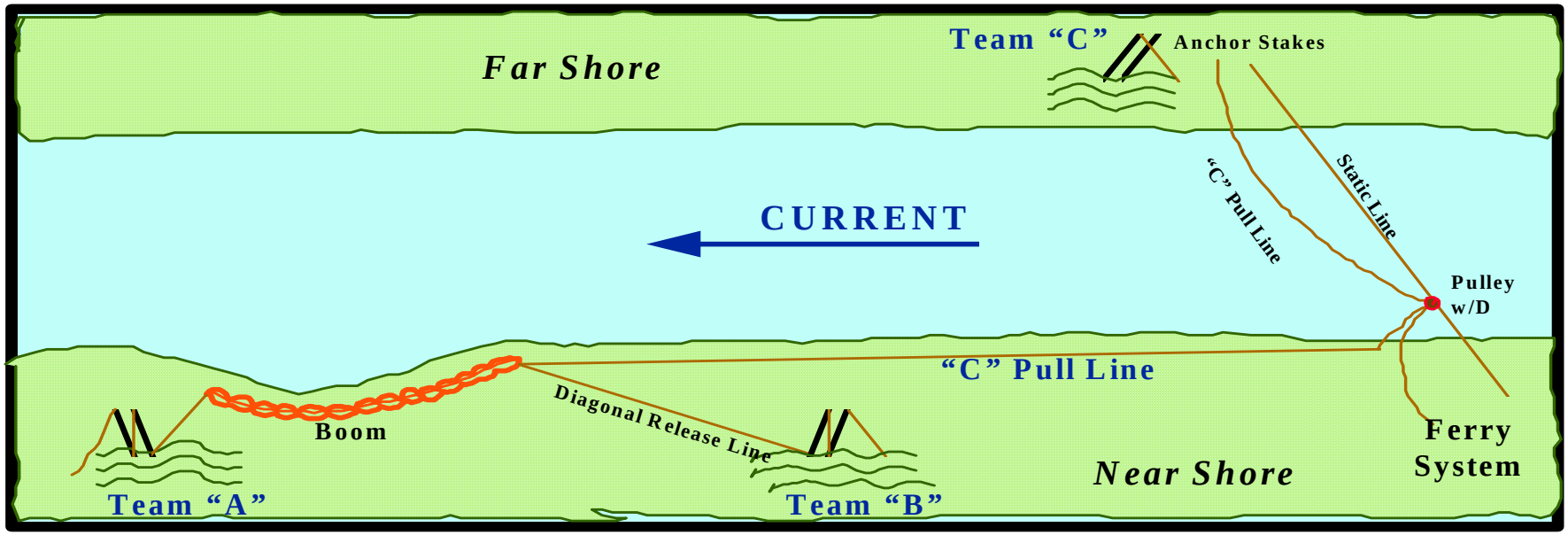
Bank to Bank Rope Anchor System

Spokane River - Washington

Fast River Boom Deployment

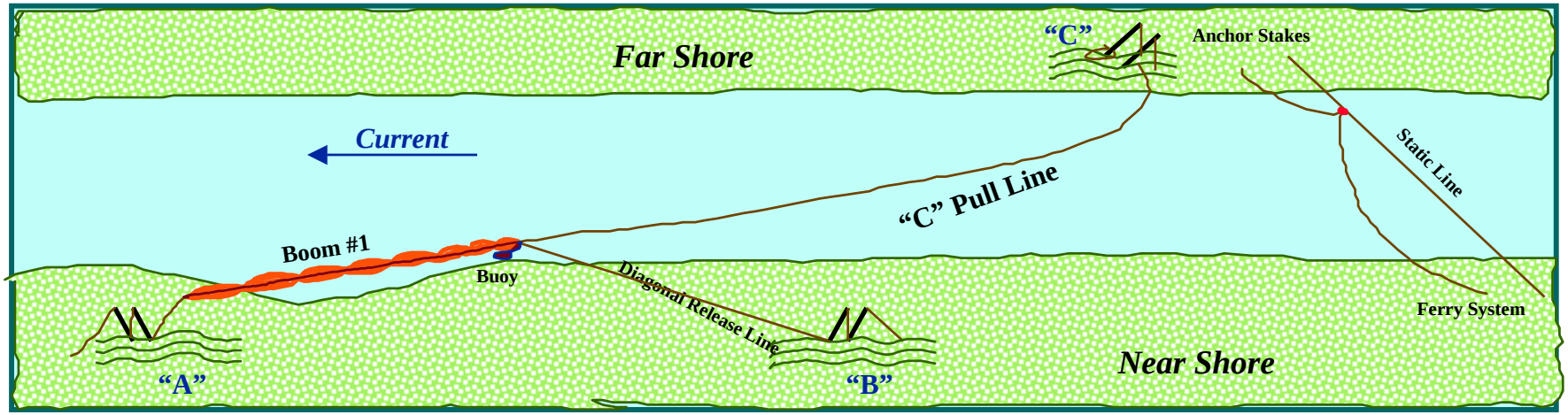
Step 1.



Bank to Bank Rope Anchor System

Fast River Boom Deployment

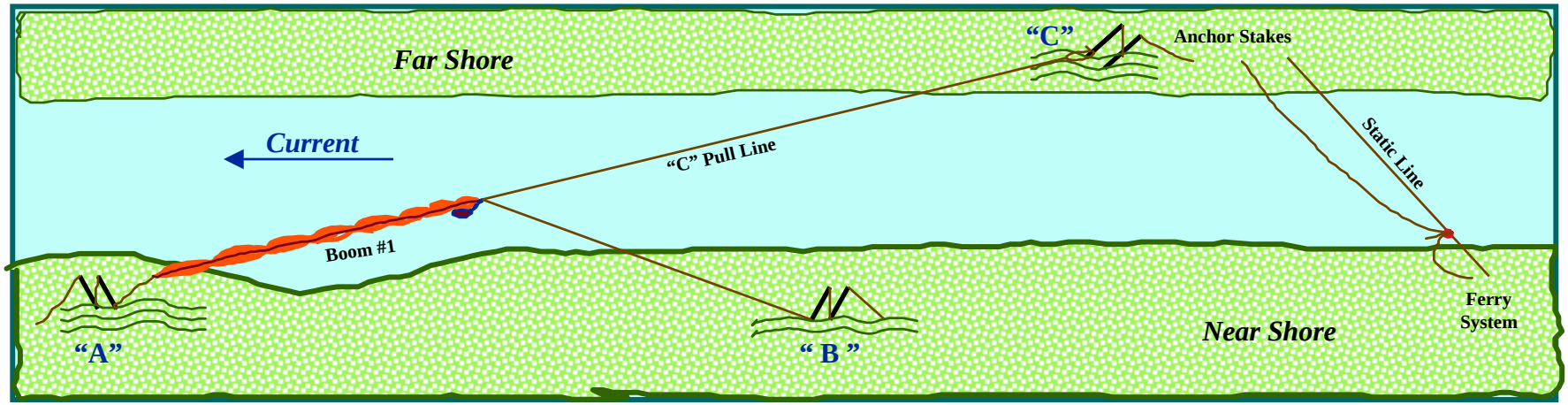
Step 2.



Bank to Bank Rope Anchor System

Fast River Boom Deployment

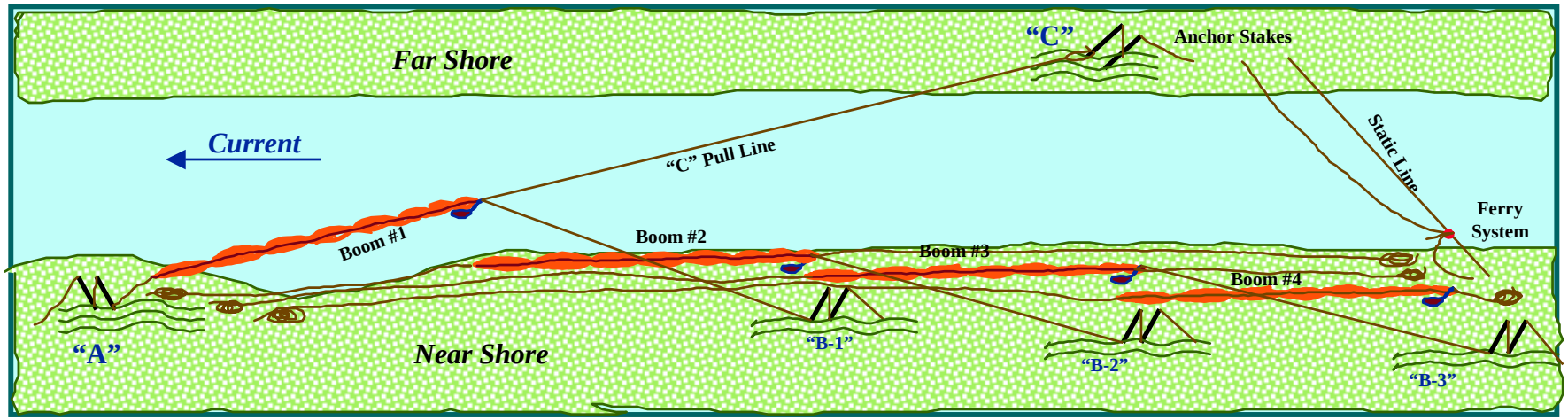
Step 3.



Bank to Bank Rope Anchor System

Fast River Boom Deployment

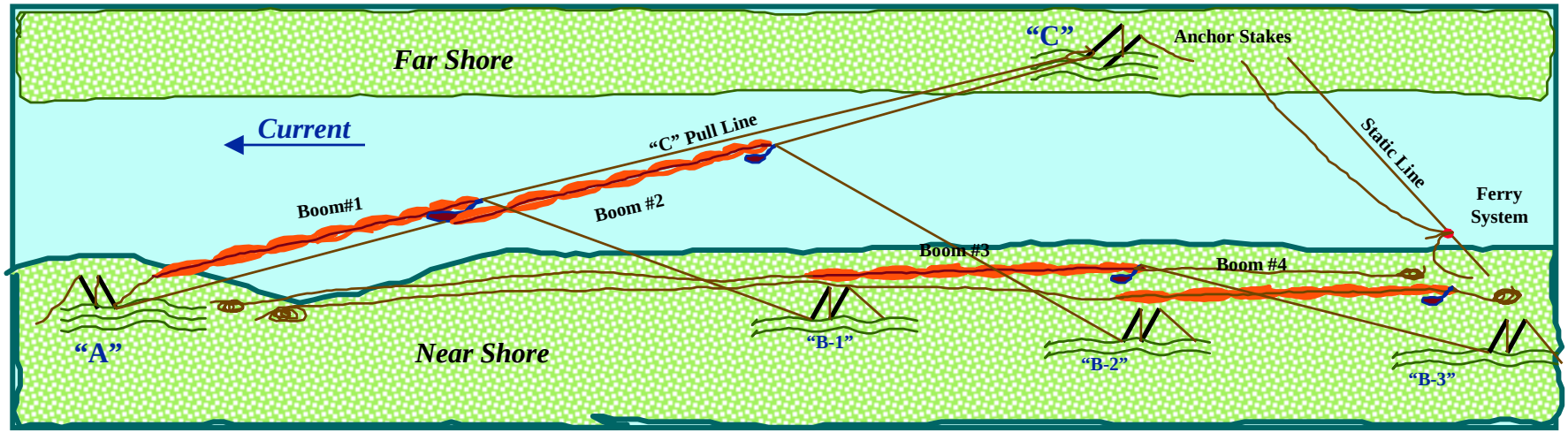
Step 4.



Bank to Bank Rope Anchor System

Fast River Boom Deployment

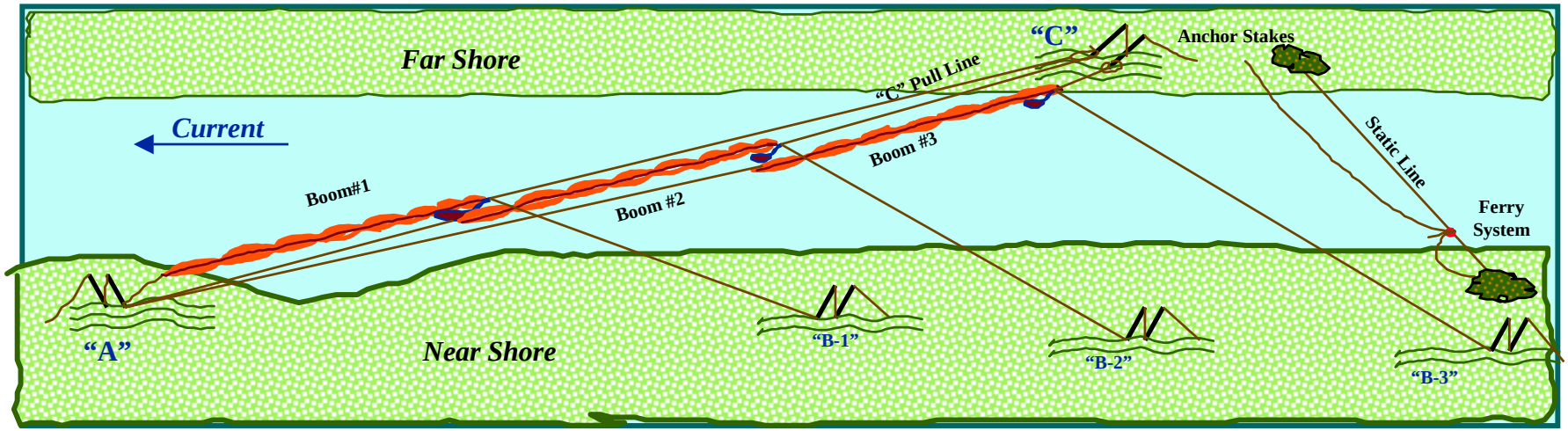
Step 5.



Bank to Bank Rope Anchor System

Fast River Boom Deployment

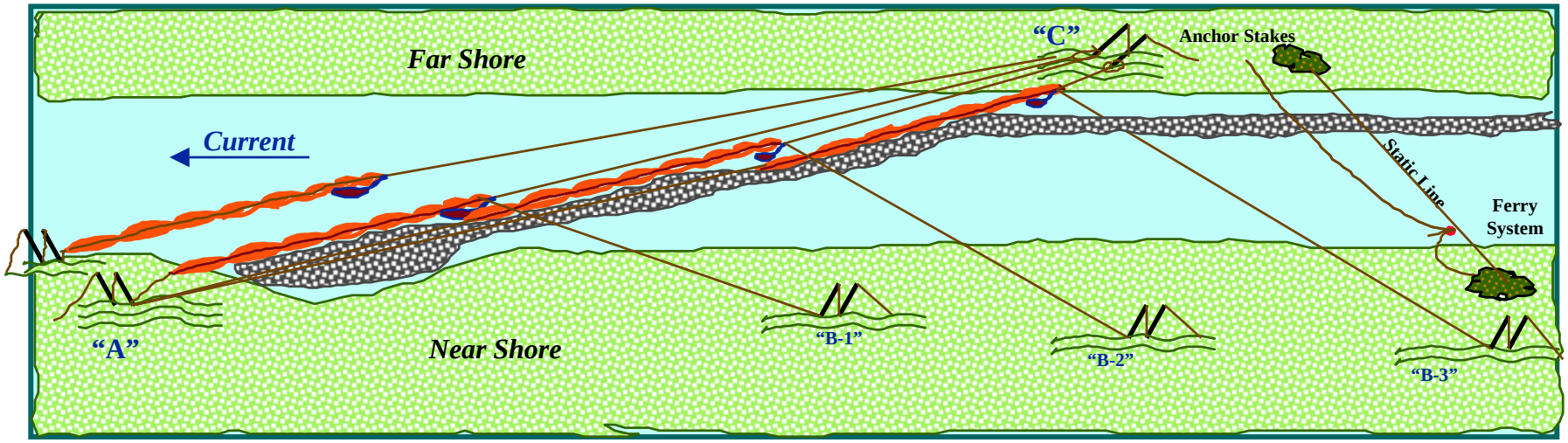
Step 6.



Bank to Bank Rope Anchor System

Fast River Boom Deployment

Step 7.



Bank to Bank Rope Anchor System

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System* - *Bank Layout
American River - California

RIVER BOOMING:
==========

No. 1 - Boom Being Deployed - Bank to Bank Rope Anchor System
American River - California

RIVER BOOMING:
==========

No. 2 - Boom Deployed - Bank to Bank Rope Anchor System
American River - California

RIVER BOOMING:
==========

No. 3 - Boom Deployed - Bank to Bank Rope Anchor System

American River - California

RIVER BOOMING:
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No. 4 - Boom Being Deployed - Bank to Bank Rope Anchor System
American River - California

RIVER BOOMING:
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No. 4 - Boom Deployed - Bank to Bank Rope Anchor System
American River - California

RIVER BOOMING:
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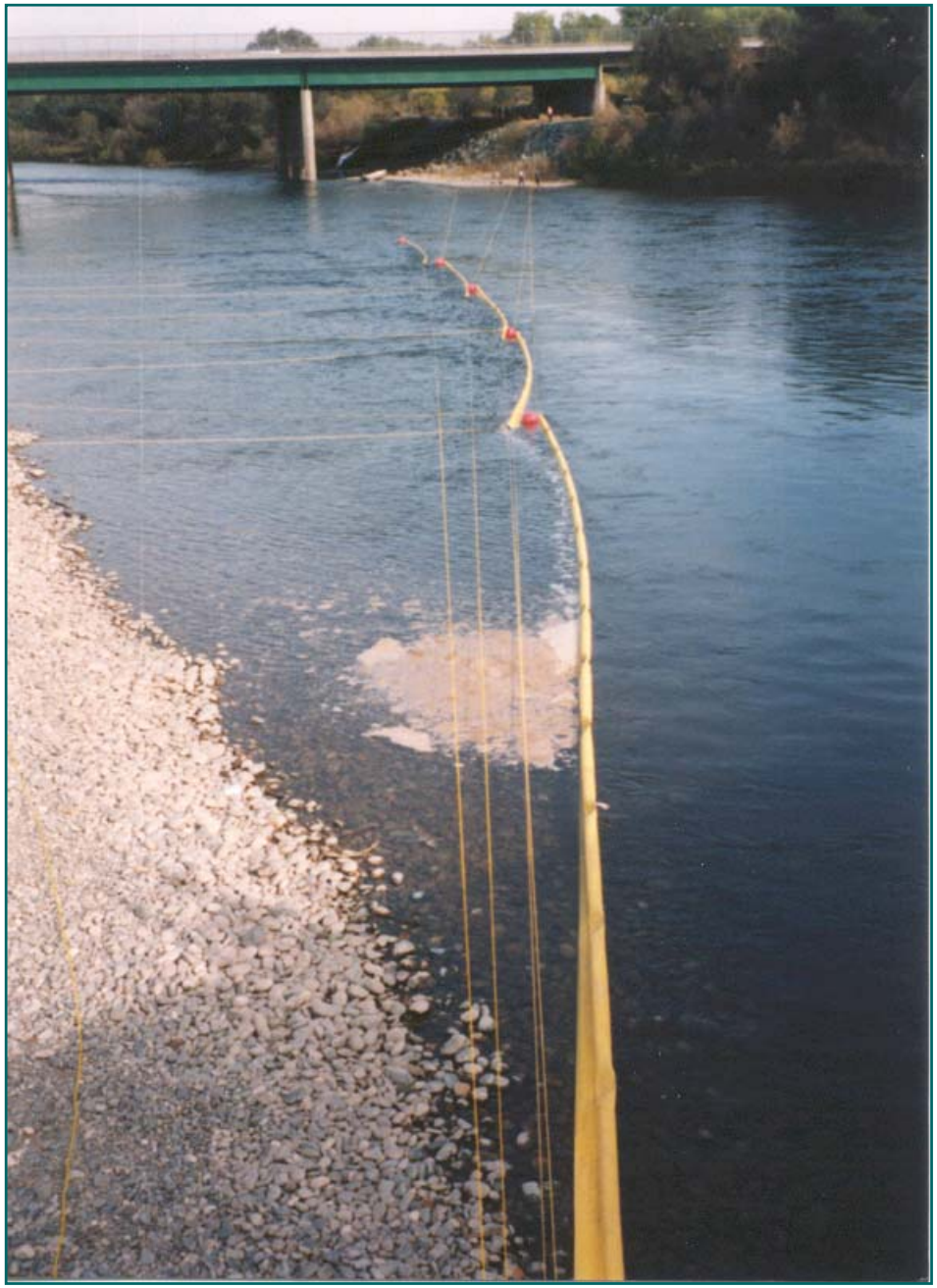

No. 4 - Boom Deployed - Bank to Bank Rope Anchor System

RIVER BOOMING:
==========

No. 6 - Boom Deployed - Bank to Bank Rope Anchor System
American River - California

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Arkansas River - Colorado

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

North Platt River - Wyoming

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Rio Grande River - New Mexico

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Missouri River - Montana

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System Deployed

Colorado River - Nevada

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Lower Colorado River – Texas

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Maris River - Montana

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Delaware River - Pennsylvania

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Rio Grande River – New Mexico

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Arkansas River - Colorado

RIVER BOOMING:
==========

Bank to Bank Rope Anchor System

Yellow Stone River - Montana

RIVER BOOMING:
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Bank to Bank Rope Anchor System

Platt River - Wyoming

RIVER BOOMING:
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Bank to Bank Rope Anchor System

Clark Fork - Montana

RIVER BOOMING:
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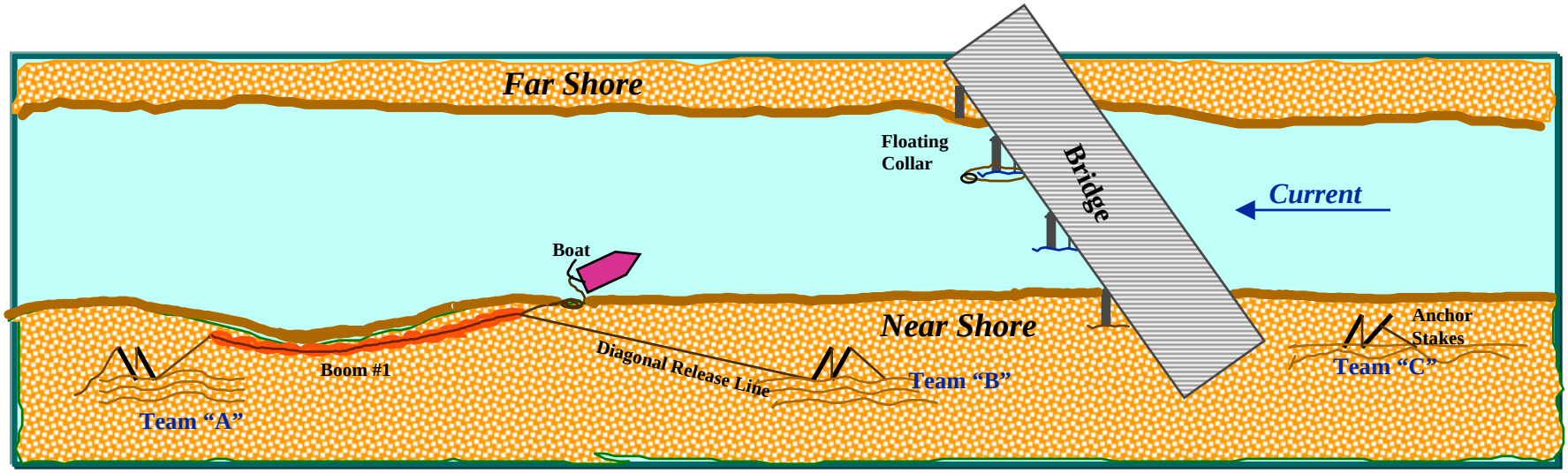
Bank to Bank Rope Anchor System

Truckee River - Nevada

Fast River Boom Deployment

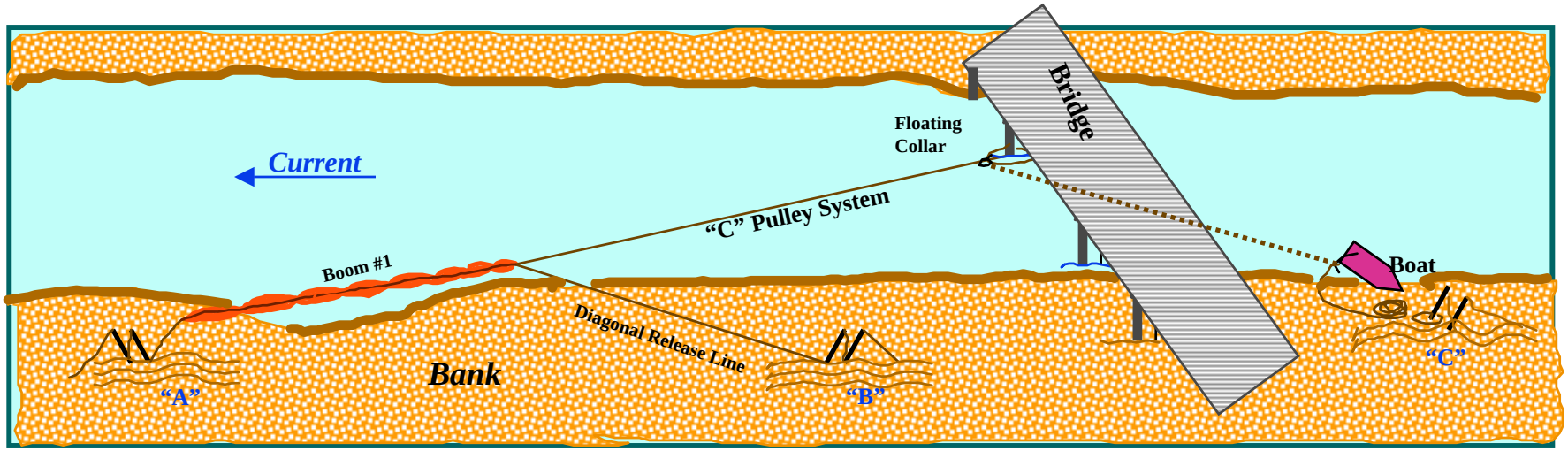
Step 1.



Bridge to Bank Rope Anchor System

Fast River Boom Deployment

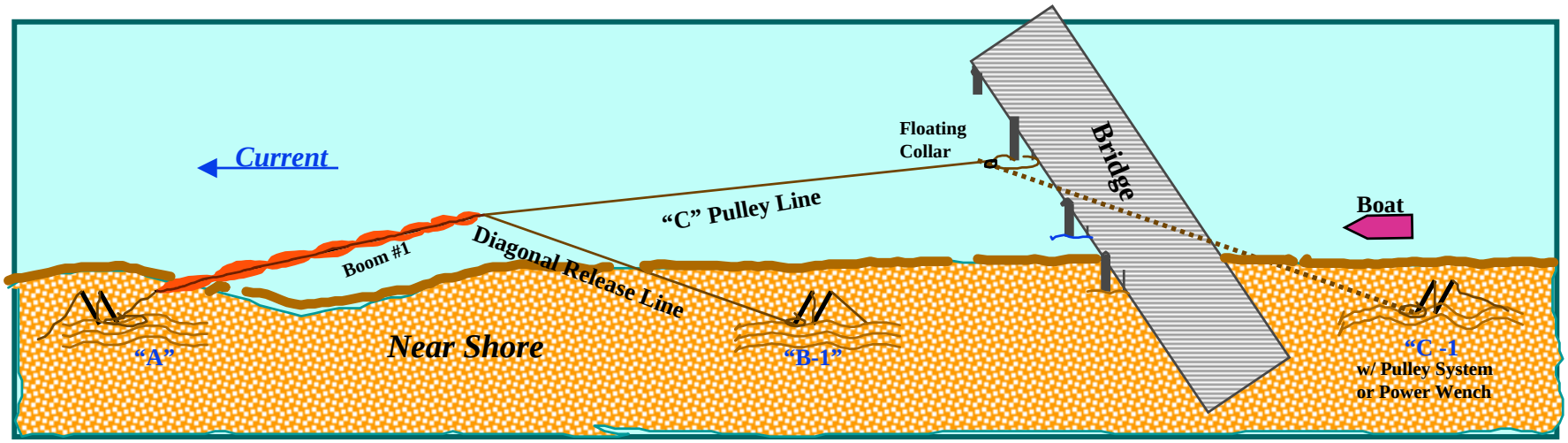
Step 2.



Bridge to Bank Rope Anchor System

Fast Water Booming Technique

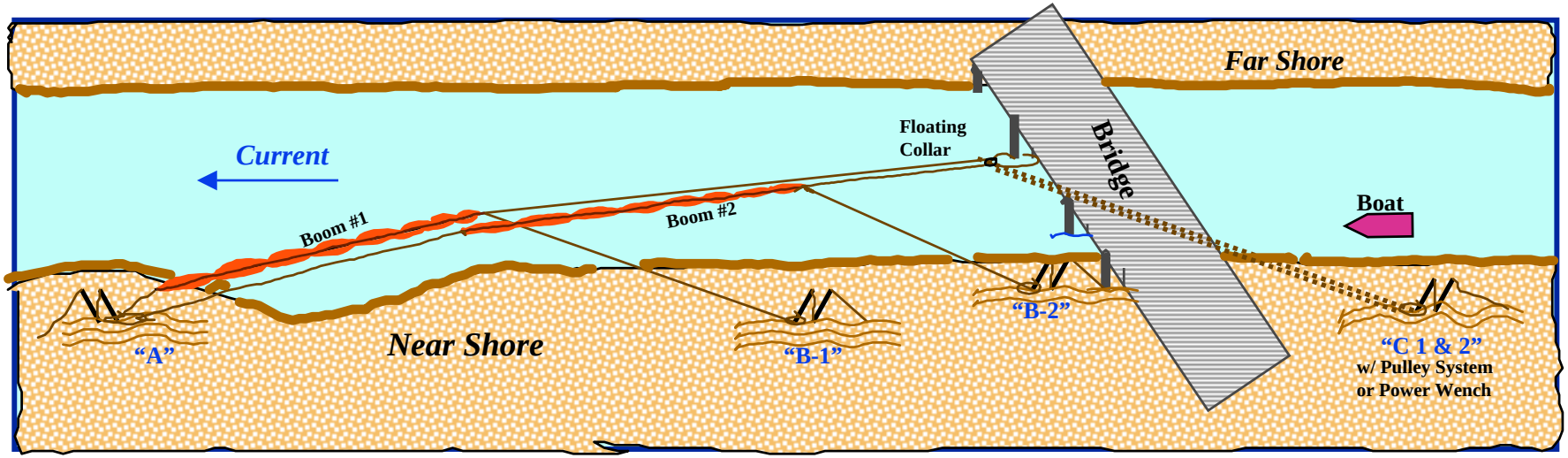
Step 3.



Bridge to Bank Rope Anchor System

Fast River Boom Deployment

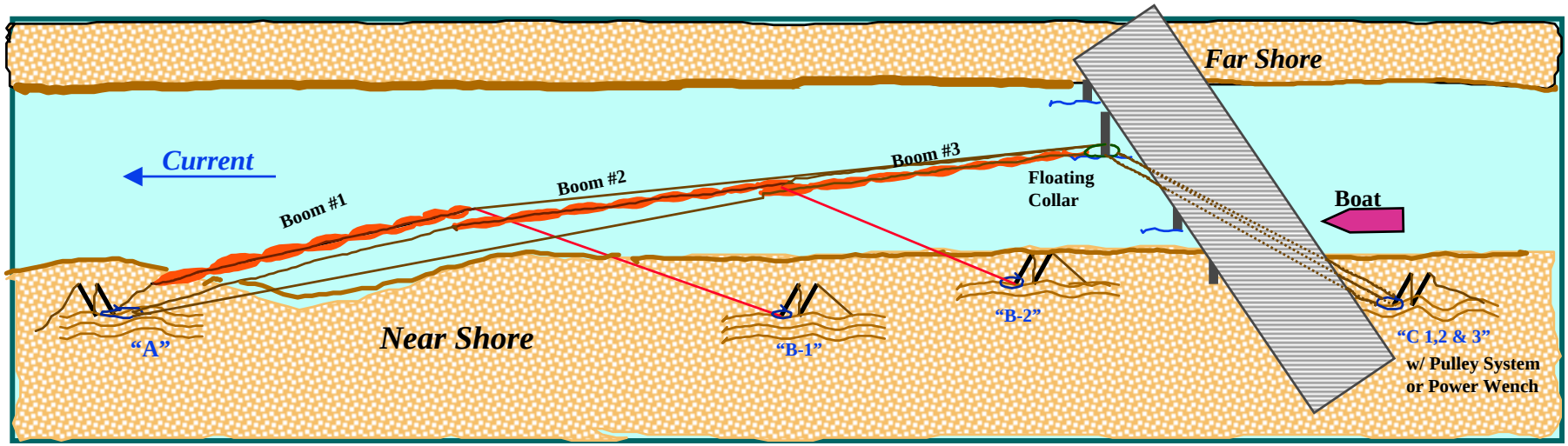
Step 4.



Bridge to Bank Rope Anchor System

Fast River Boom Deployment

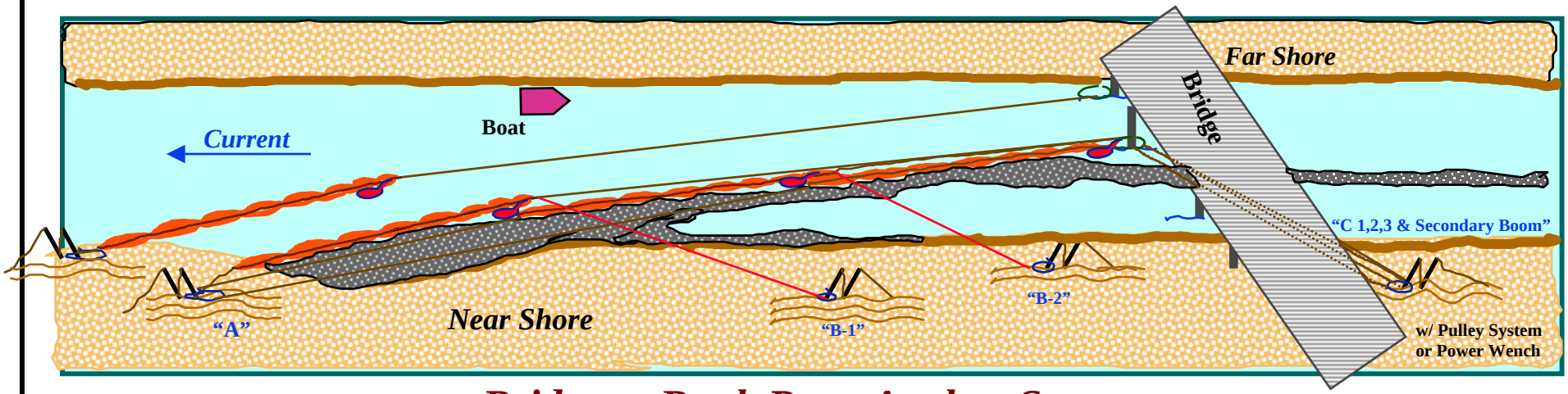
Step 5.



Bridge to Bank Rope Anchor System

Fast River Boom Deployment

Step 6.



Bridge to Bank Rope Anchor System

RIVER BOOMING:
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Bridge to Bank Rope Anchor System - Boom Layout on River Bank
Colorado River - Nevada

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Colorado River - Nevada

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Rope Lead Anchor Collar Around Bridge Column

Colorado River - Nevada

RIVER BOOMING:
==========

Rope Being Pulled by Power Winch with Side Capstan Mounted on Stand
Colorado River - Nevada

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System - View of Containment & Recovery Site

Colorado River - Nevada

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Colorado River - California

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Boat deploying Rope Lead to Column "D" Ring & Shore

Colorado River - California

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System - Boat & Rope Handling

Colorado River - California

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Rope Handling with Use of Webbing & "D" Rings

Colorado River - California

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System - Rope Leads to River Bank & Power Wench

Colorado River - California

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

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

Colorado River - California

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System - Containment Area

Colorado River - California

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

View of Boom Containment & Recovery Site

Colorado River - California

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Missouri River - Montana

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Nonconnah Creek - Tennessee

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System - Rope Leads Anchored to Bridge I-Beam

Weber River - Utah

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System - View of Bridge Rope Anchoring
Weber River - Utah

RIVER BOOMING:
==========

Pulley System from I-Beam

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Rope Leads with Pulleys Anchored to Bridge I–Beam

Weber River - Utah

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

Open Chevron Cascade Boom Deployment with Deflection

Weber River - Utah

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

St. Johns River - Florida

RIVER BOOMING:
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Cascade Diversionary Booming

Bridge to Bank Rope Anchor System

RIVER BOOMING:
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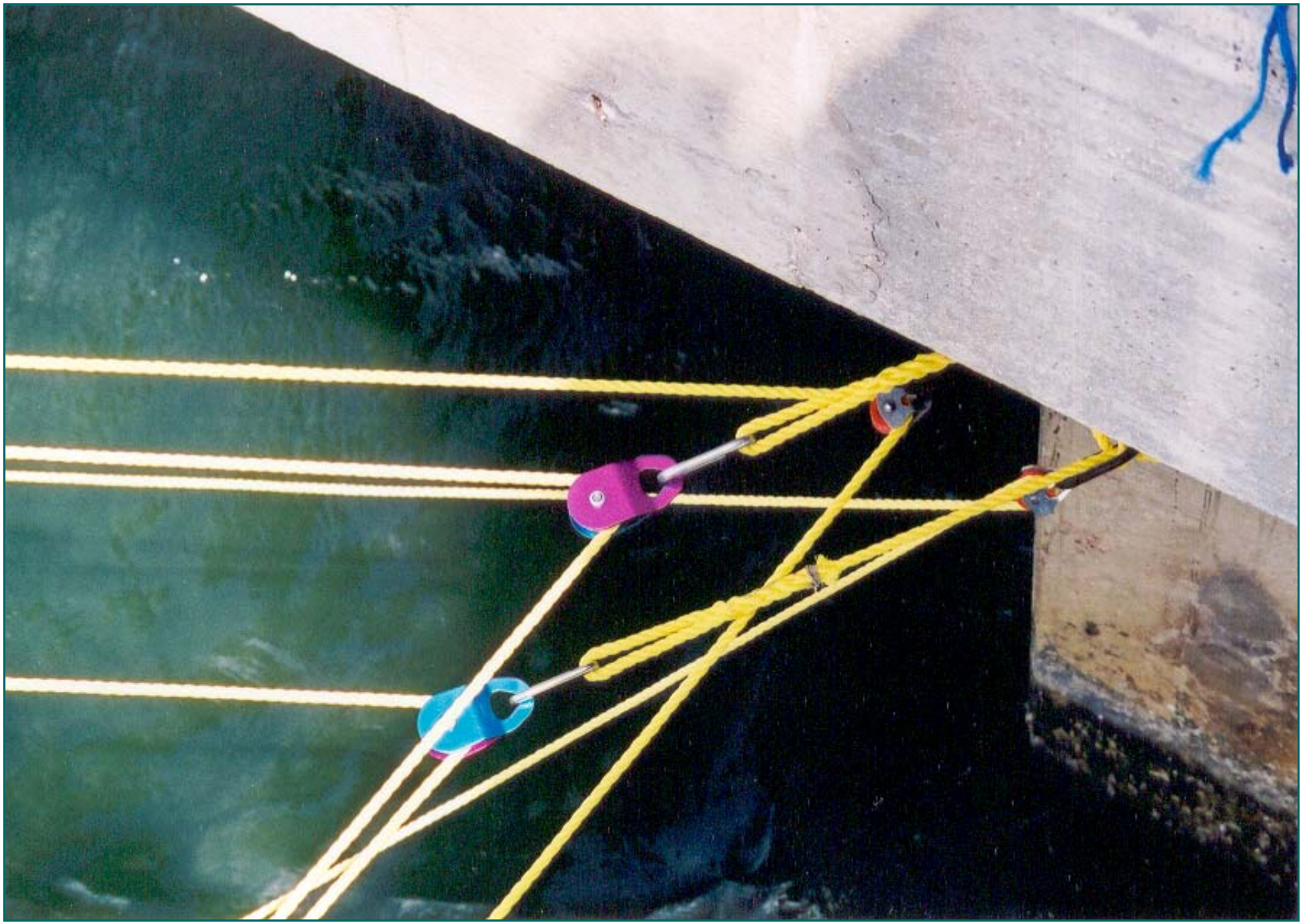

Cascade Diversionary Booming - Bridge to Bank Rope Anchor System
St. Johns River - Florida

RIVER BOOMING:
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Bridge to Bank Rope Anchor System

St. Johns River - Florida

RIVER BOOMING:
==========

Bridge to Bank Rope Anchor System

St. Johns River – Florida

RIVER BOOMING:
==========

Modified Bridge to Bank Rope Anchor System (Trees)
- Mississippi

RIVER BOOMING:
==========

Cascade Diversionary Booming

Modified Bridge to Bank Rope Anchor System (Trees)

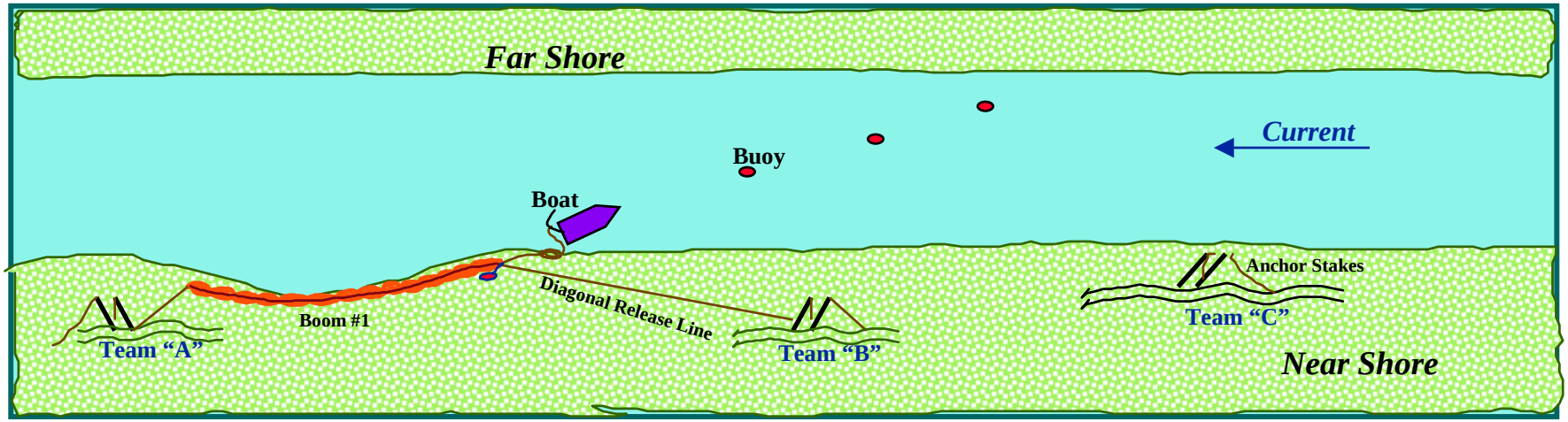
RIVER BOOMING:
==========

Cascade Diversionary Booming

Modified Bridge to Bank Rope Anchor System (Trees)

Fast River Boom Deployment

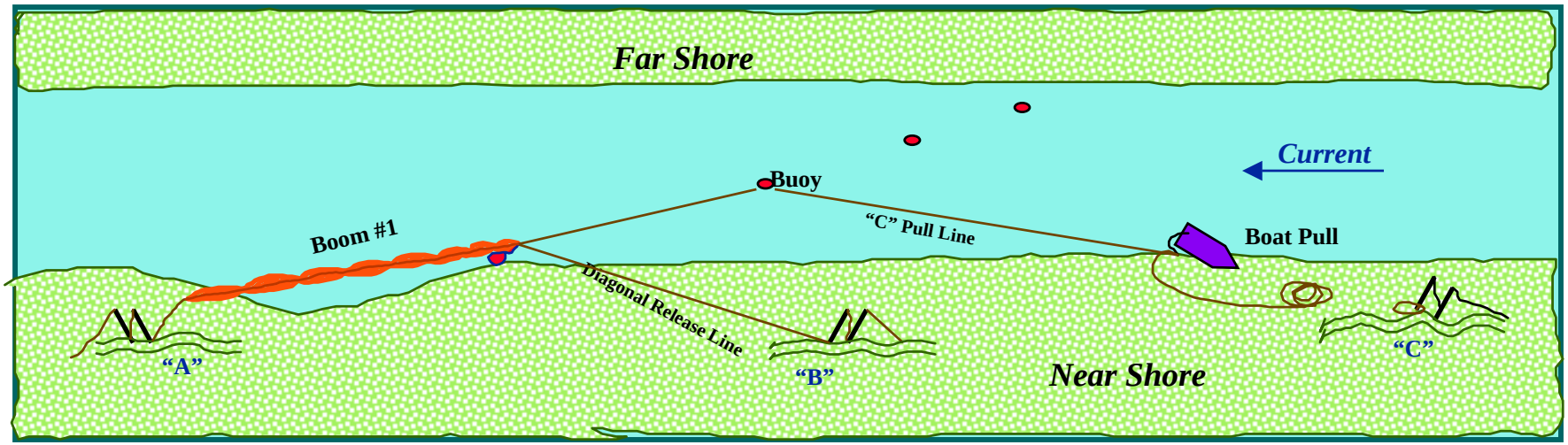
Step 1.



Buoy to Bank Rope Anchor System

Fast River Boom Deployment

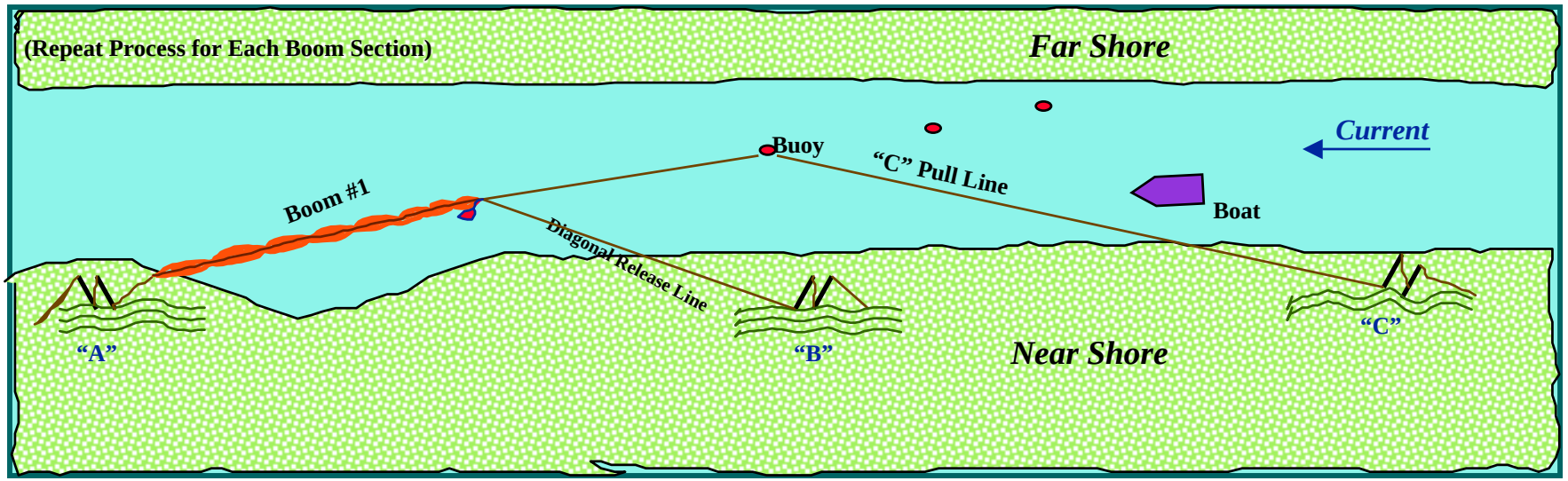
Step 2.



Buoy to Bank Rope Anchor System

Fast River Boom Deployment

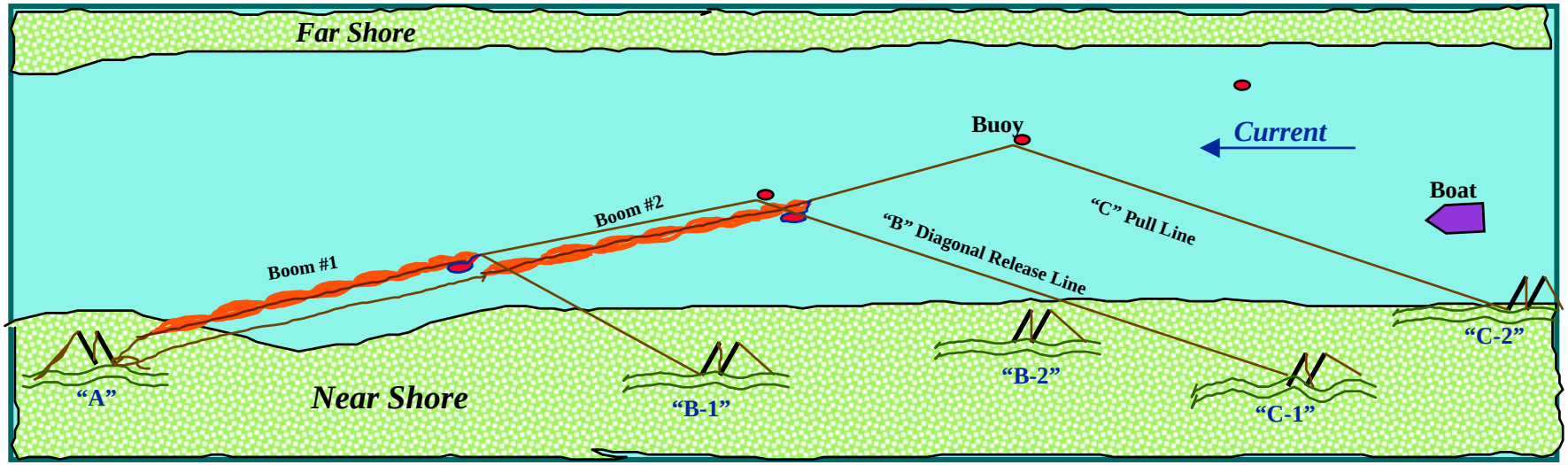
Step 3.



Buoy to Bank Rope Anchor System

Fast River Boom Deployment

Step 4.

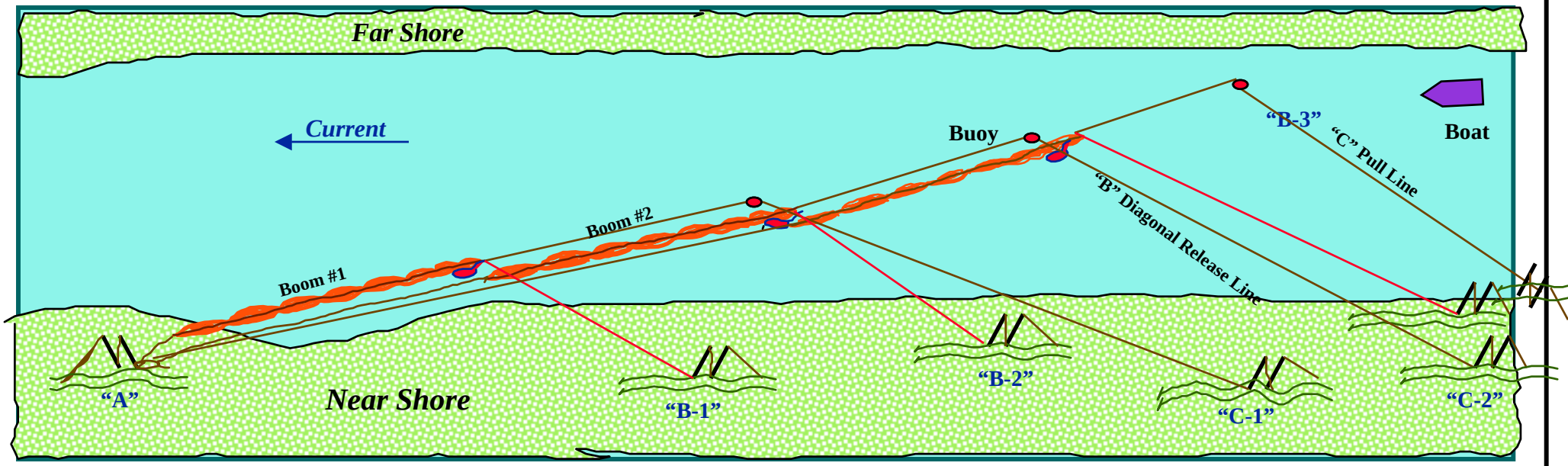


Buoy to Bank Rope Anchor System

(Repeat Process for Each Boom Section)

Fast River Boom Deployment

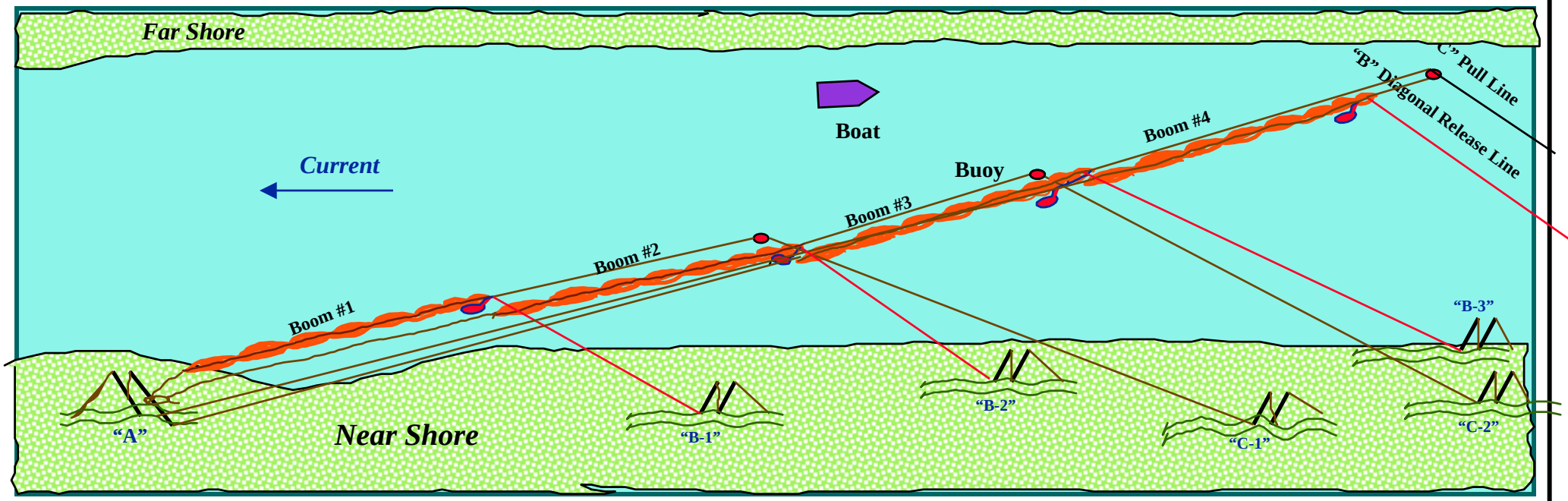
Step 5.



Buoy to Bank Rope Anchor System

Fast River Boom Deployment

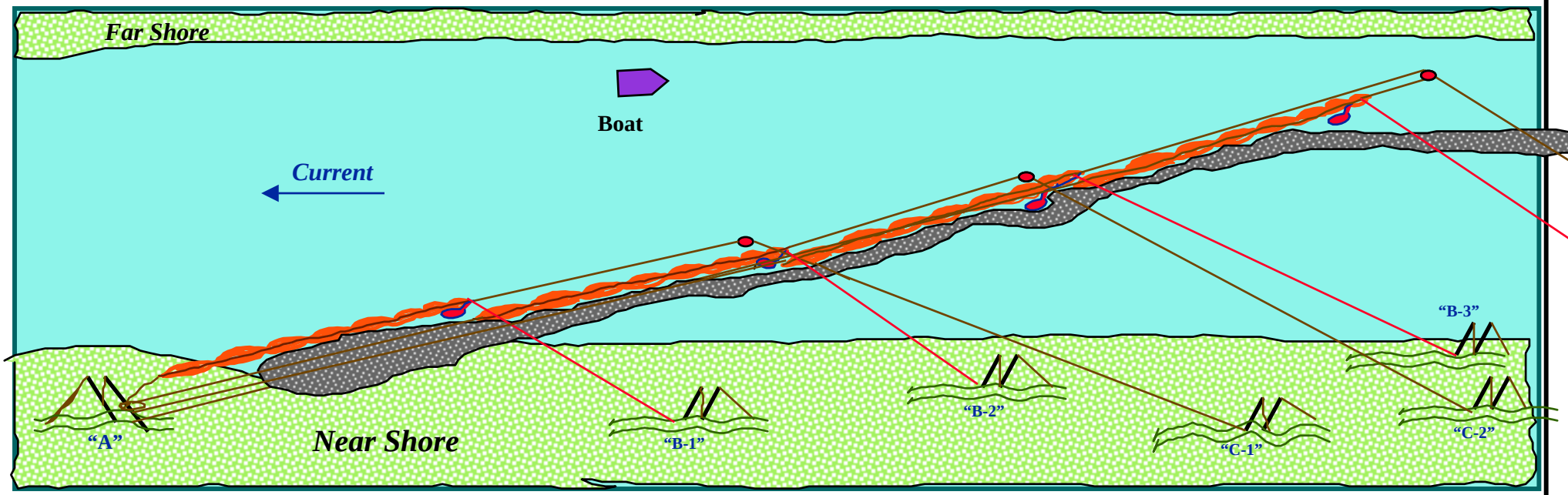
Step 6.



Buoy to Bank Rope Anchor System

Fast River Boom Deployment

Step 7.



Buoy to Bank Rope Anchor System

RIVER BOOMING:
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Buoy to Bank Rope Anchor System - Boom Layout on Bank
Colorado River - Arizona

RIVER BOOMING:
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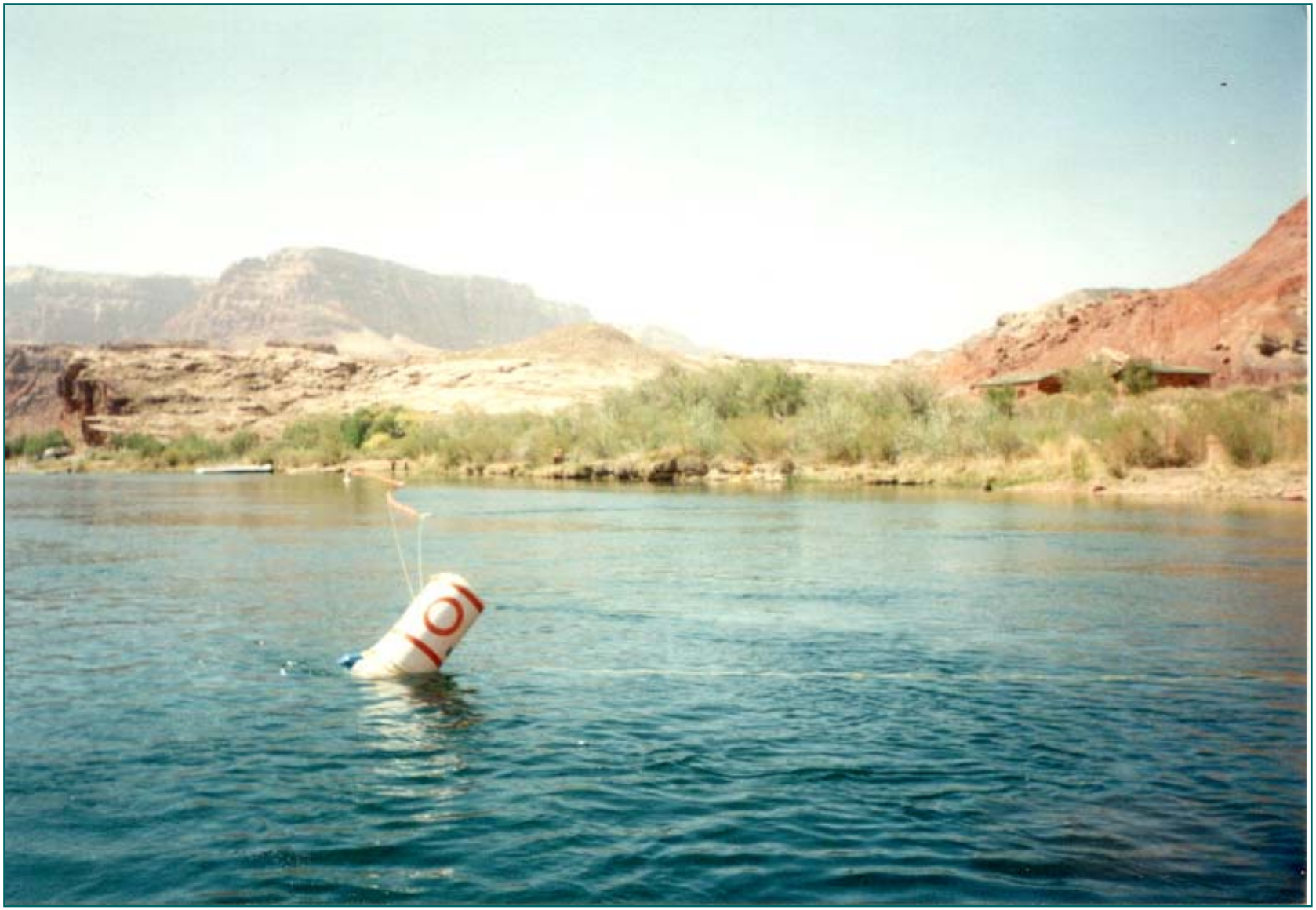


Buoy to Bank Rope Anchor System - Permanent Anchor Placement

Colorado River - Arizona

RIVER BOOMING:
==========

Buoy to Bank Rope Anchor System

Colorado River - Arizona

RIVER BOOMING:
==========

Buoy to Bank Rope Anchor System
Cascade Diversionary Booming

RIVER BOOMING:
==========

Buoy to Bank Anchor System

USCG Buoy Tender in Position to Drop 1600 lbs. Sinker with Buoy

Missouri River - Missouri

RIVER BOOMING:
==========

Buoy to Bank Rope Anchor System

USCG Buoy Tender Dropping 1600 lbs. Sinker with Buoy

Missouri River - Missouri

RIVER BOOMING:
==========

Buoy to Bank Rope Anchor System

USCG Buoy Tender Dropping 1600 lbs. Sinker with Buoy

Mississippi River - Missouri

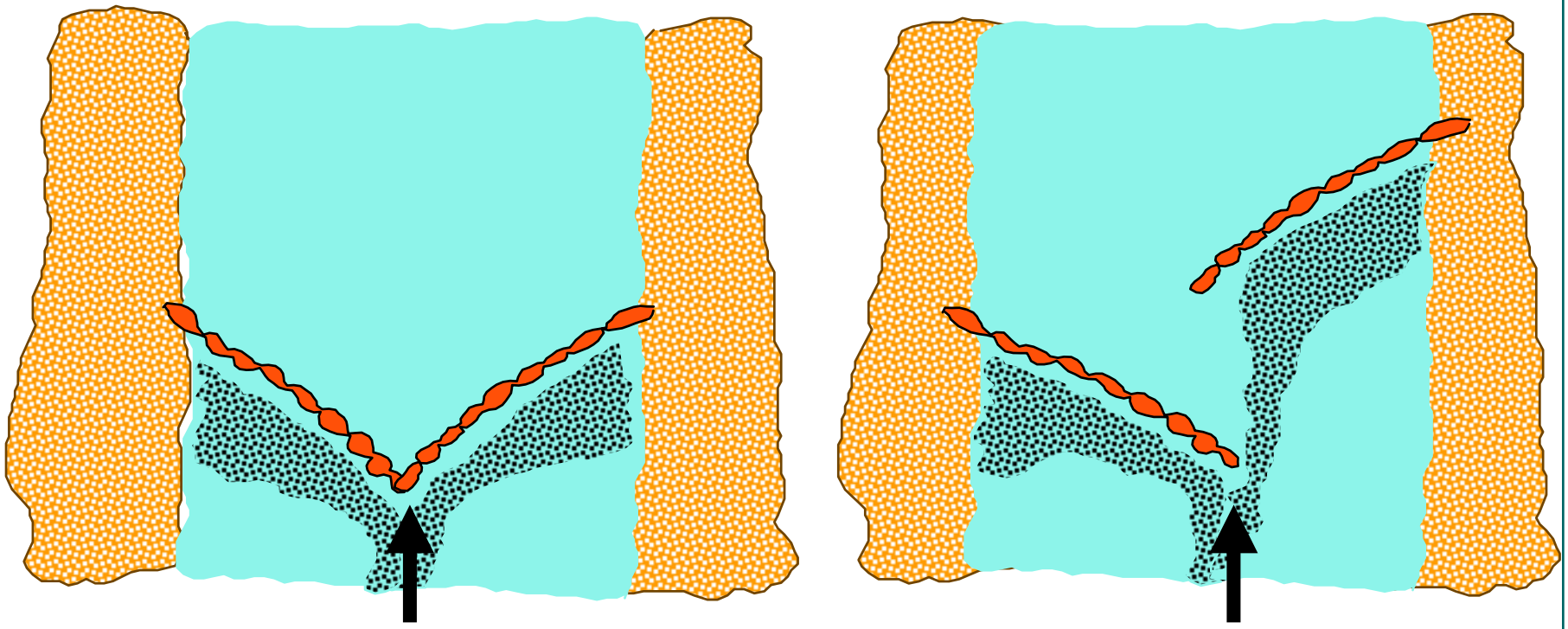
RIVER BOOMING:
==========

Buoy to Bank Rope Anchor System

Mississippi River - Missouri

RIVER BOOMING:
==========

Chevron Boom Deployment



Chevron

Open Chevron

RIVER BOOMING:
==========

Chevron Diversionary Booming

RIVER BOOMING:
==========

Open Cascade Chevron Diversion Booming
- with Permanent Anchors

RIVER BOOMING:
==========

Open Cascade Chevron Diversionary Booming

RIVER BOOMING:
==========

ESPONSE STRATEGY THAT IS SELECTED WILL DE ON THE FOLLOWING FACTORS:

* *Type of Water Body*
* *Current Speed*
* *Shoreline Configuration*
* *Natural Collection Points*
* *Water Depth*
* *Available Equipment*
* *Available Manpower*
* *Amount of Oil*
* *Weather*
* *Time of Year*

BOOM CONSIDERATIONS:

**** What is Practical?***

**** How Efficient?***
(Effort vs Effectiveness)

**** What are Response Options?***
("Environmental Damaging")

**** What are the Implications of Monitoring?***
(Self Cleaning Response)

**** Are their Political or Social Sensitivities?***

**** How much Waste will be Generated or Collected?***
(i.e. Disposal)

RIVER BOOMING:
==========

OW to DETERMINE ANGLE to DEPLOY BOOM in FAST FLOWING RIVE

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•ESTABLISH CONTAINMENT POINT on NEAR SHORE

•LOOK UP RIVER AND LOCATE RIVER CURRENT COMING to YOU

•DETERMINE RIVER CURRENT SPEED
(APPROXIMATE)

•ESTABLISH 360 DEGREE COUNTER CLOCKWISE CIRCUMFERENCE.

•FIND 90 DEGREE POINT on FAR SHORE of RIVER.

•FIND 45 DEGREE POINT on FAR SHORE of RIVER.

•FIND 20-25 DEGREE POINT on FAR SHORE of RIVER.
(USE BOOM ANGLE DEPLOYMENT CHART)

•LOCATED POINT from NEAR SHORE to FAR SHORE at 20-25 DEGREES is LOCATION of FIRST ANCHOR POINT.
(REPEAT PROCESS of EACH BOOM DEPLOYED)

RIVER BOOMING:
==========

IN SUMMARY -
HOW to DEPLOY BOOM in FAST FLOWING RIVERS

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•IF THE RIVER LOOKS FAST – THEN CONSIDER IT FAST.

•USE BOOM ANGLE CHART -

IF IN DOUBT ESTABLISH A 20-25 DEGREE POINT INTO THE RIVER
URRENT TO ESTABLISH BOOM DEPLOYMENT & ANCHORING POINT

A GIVEN - THE FASTER THE RIVER CURRENT:

HE SMALLER THE ANGLE INTO THE RIVER CURRENT TO DETERMIN
OOM DEPLOYMENT ANGLE and ANCHOR POINT ON THE FAR SHOR

•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 DEPI

(GENERALLY 50’ TO 100’ SECTIONS)

RIVERS BOOMED in the U.S.A.

by

DOWCAR ENVIRONMENTAL MANAGEMENT, INC.

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ALASKA:
Colville Sagavitock
Putt River Kuparuk River
Kaskovik River

ARIZONA:
Colorado Agua Fria
Gila Salt

CALIFORNIA:
American
Colorado

COLORADO:
Arkansas Colorado
Fountain South Platt

FLORIDA:
Choctawhatchee

GEORGIA:
Chattahoochee

ILLINOIS:
Des Plaines Mississippi
Chicago Sanitary & Ship Canal

INDIANA:
Wabash
Wildcat

KANSAS:
Kansas

LOUISIANA:
Calcaseiu

MAINE:
Androscoggin
Little Androscoggin

MINNESOTA:
Mississippi Diamond

MISSISSIPPI:
Coldwater

MISSOURI:
Mississippi Merrimack
Missouri

MONTANA:
Clark Fork Maris
Missouri Shoshone
Sun Teton
Yellowstone Bitteroot

NEW MEXICO:
Rio Grande

NEVADA:
Colorado Truckee

NORTH DAKOTA
Missouri
Red River of the North

OHIO:
Blanchard Ohio

OKLAHOMA:
Cimarron

PENNSYLIVANIA
Delaware Schuylkill

S. CAROLINA:
Ashley

TEXAS:
Brazos Lower Colorado
Sabine

TENNESSEE:
Nonconnah Mississippi

UTAH
Weber

WASHINGTON:
Spokane

WYOMING:
Wind Green
North Platt Shoshone
Popo Agie