

2010

## Casco Bay Stream Barrier Surveys (2010 State of the Bay Presentation)

Alex Abbott  
*U.S. Fish and Wildlife Service*

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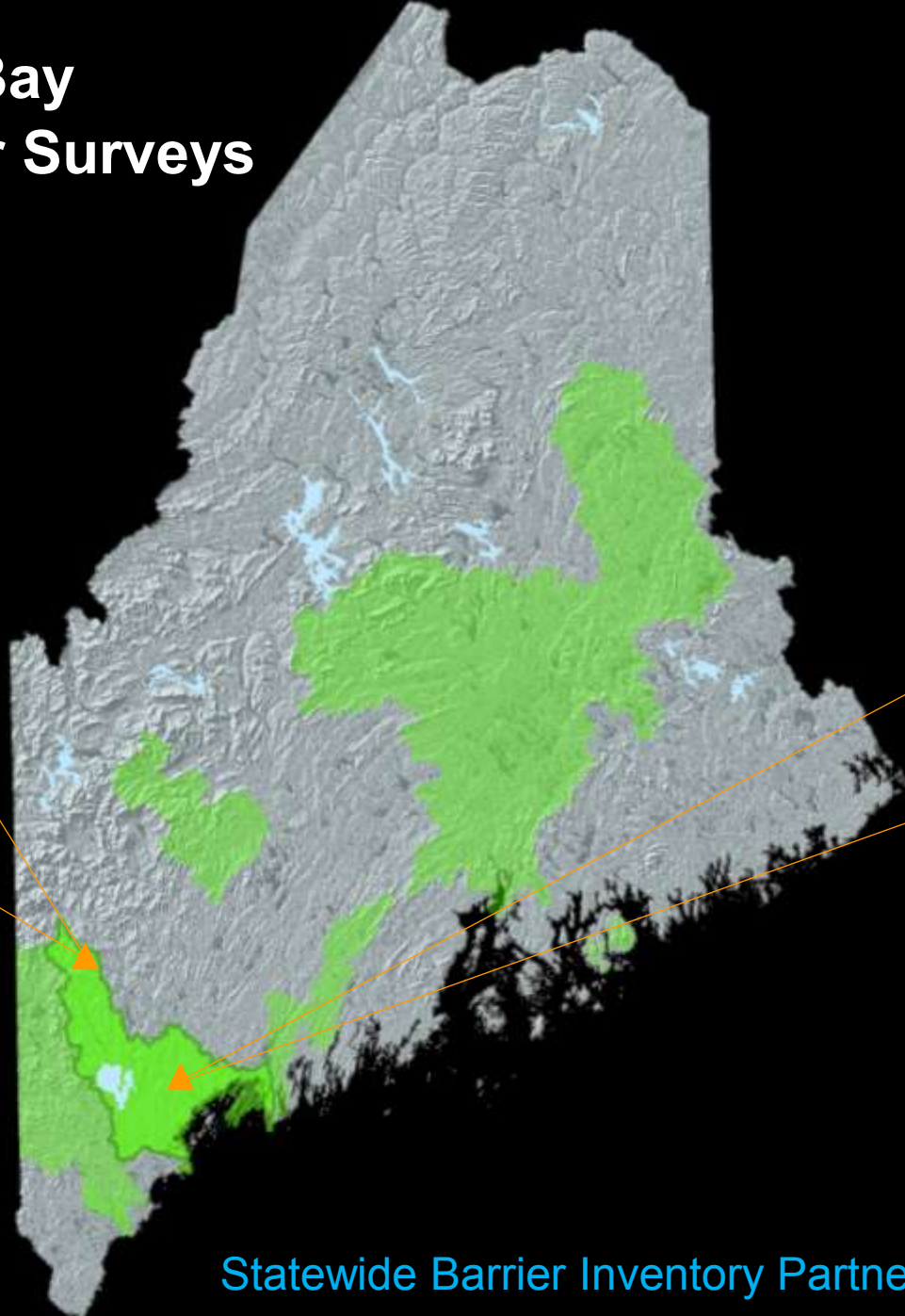
### Recommended Citation

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# Casco Bay Stream Barrier Surveys

Alex Abbott  
U.S. Fish and Wildlife Service  
Gulf of Maine Coastal Program



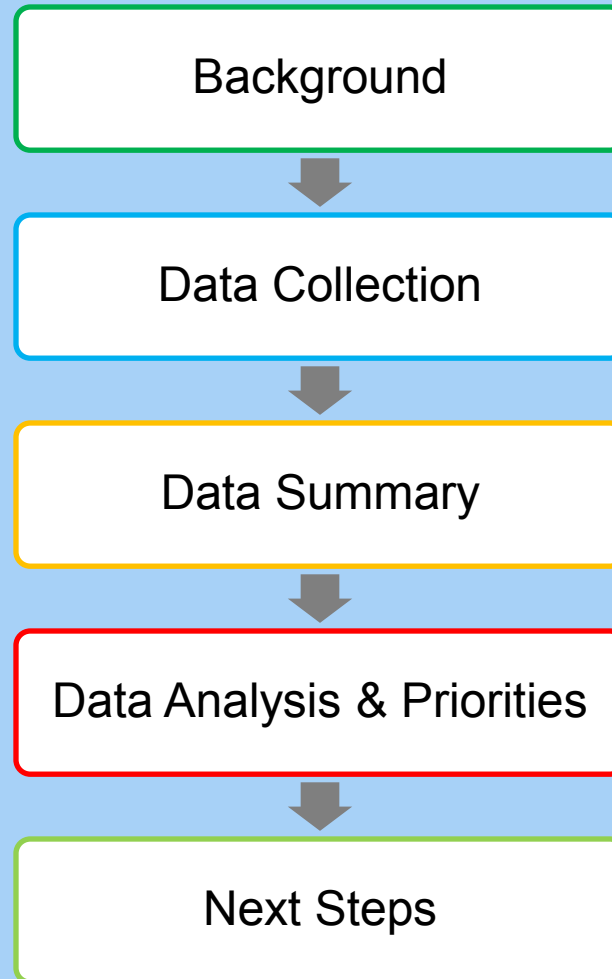
Statewide Barrier Inventory Partnership

# Maine Barrier Survey Status Map



More than  
25 % of Maine  
Road Crossings  
Surveyed

# Casco Bay Stream Barrier Surveys



# Thanks to Maine's Barrier Inventory Partners



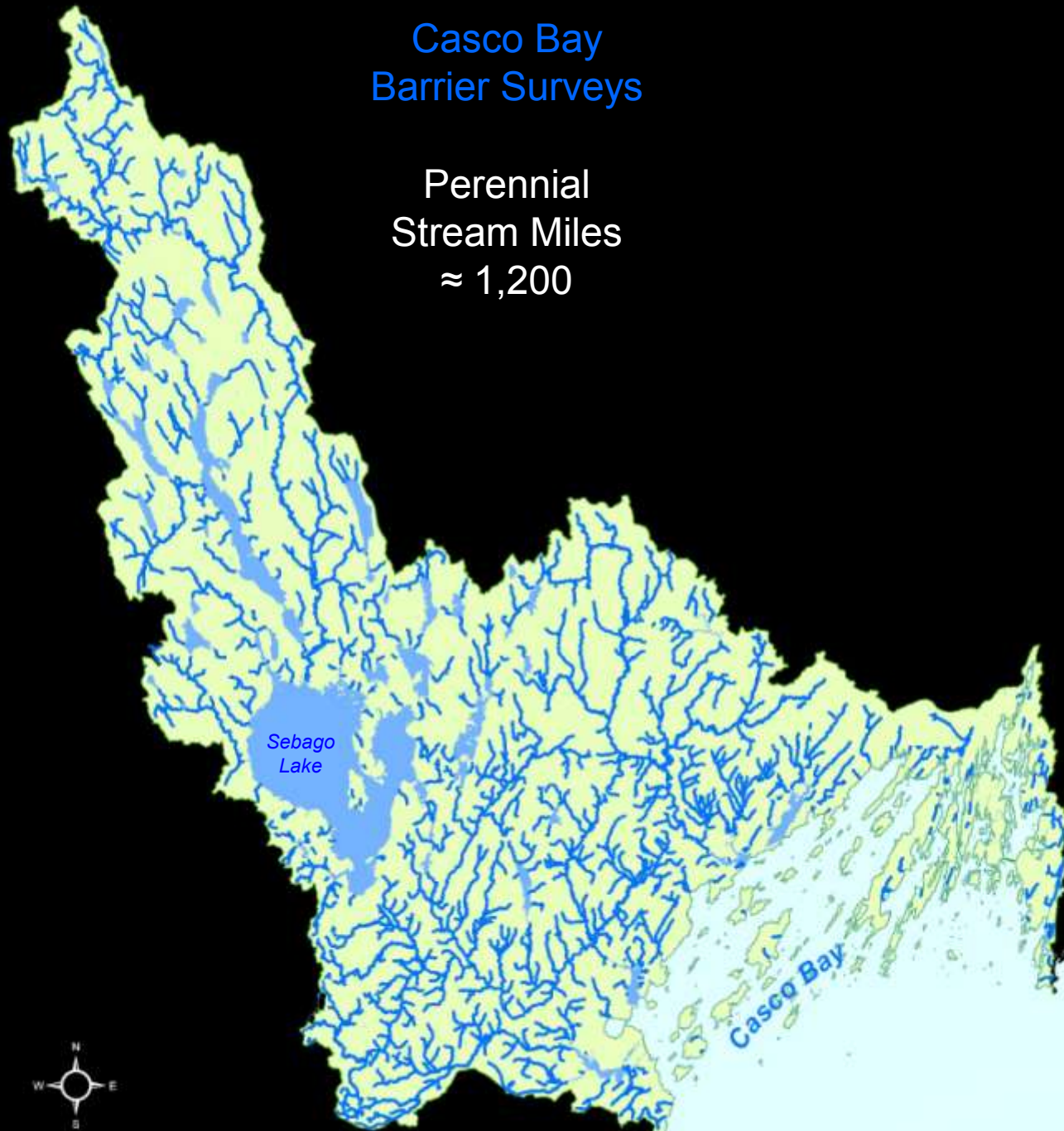






# Casco Bay Barrier Surveys

Perennial  
Stream Miles  
 $\approx 1,200$



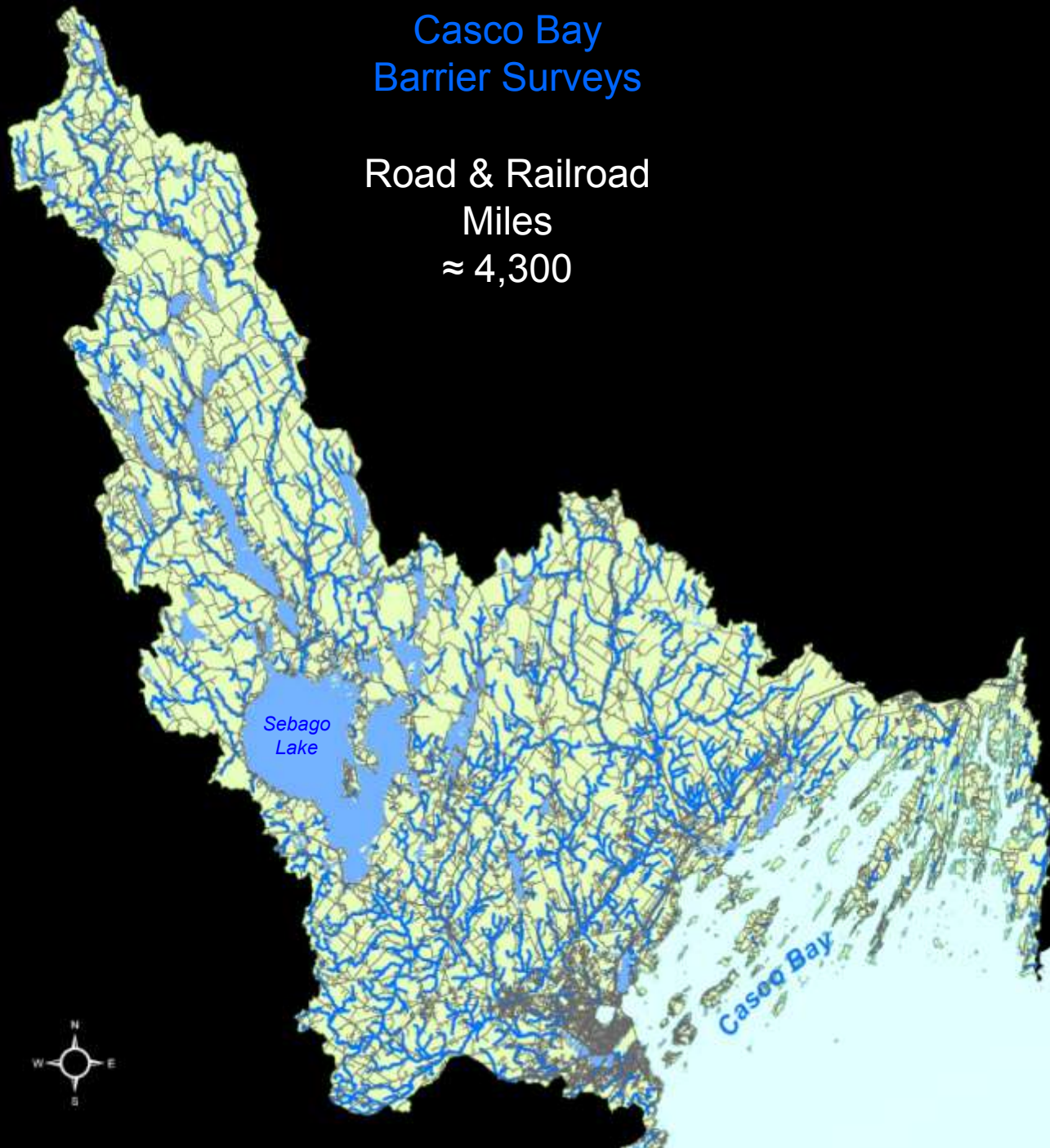
0 1 2 3 4 5  
Miles





# Casco Bay Barrier Surveys

Road & Railroad  
Miles  
 $\approx 4,300$

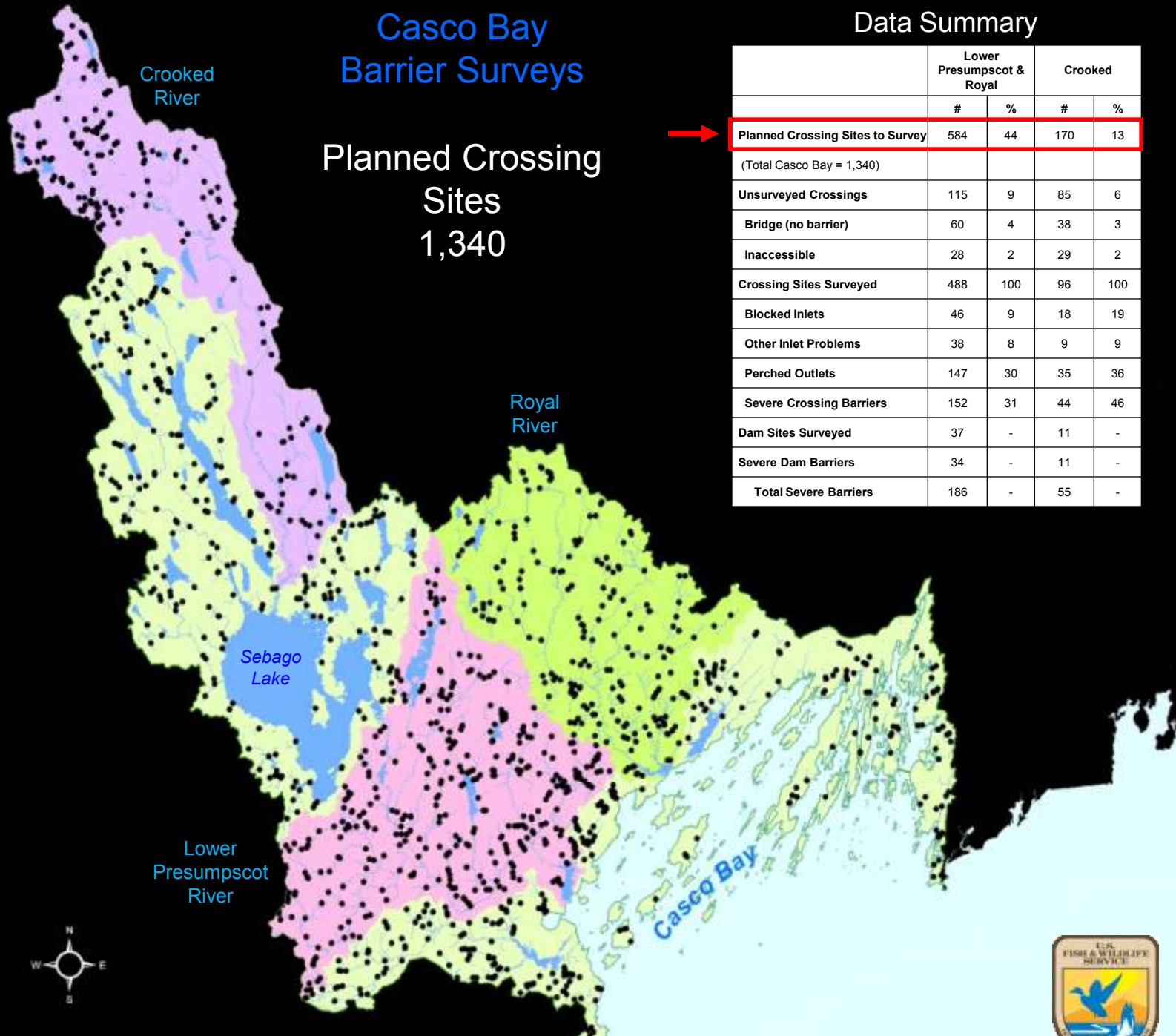


# Casco Bay Barrier Surveys

Planned Crossing  
Sites  
1,340

## Data Summary

	Lower Presumpscot & Royal		Crooked	
	#	%	#	%
<b>Planned Crossing Sites to Survey</b>	<b>584</b>	<b>44</b>	<b>170</b>	<b>13</b>
(Total Casco Bay = 1,340)				
Unsurveyed Crossings	115	9	85	6
Bridge (no barrier)	60	4	38	3
Inaccessible	28	2	29	2
Crossing Sites Surveyed	488	100	96	100
Blocked Inlets	46	9	18	19
Other Inlet Problems	38	8	9	9
Perched Outlets	147	30	35	36
Severe Crossing Barriers	152	31	44	46
Dam Sites Surveyed	37	-	11	-
Severe Dam Barriers	34	-	11	-
Total Severe Barriers	186	-	55	-





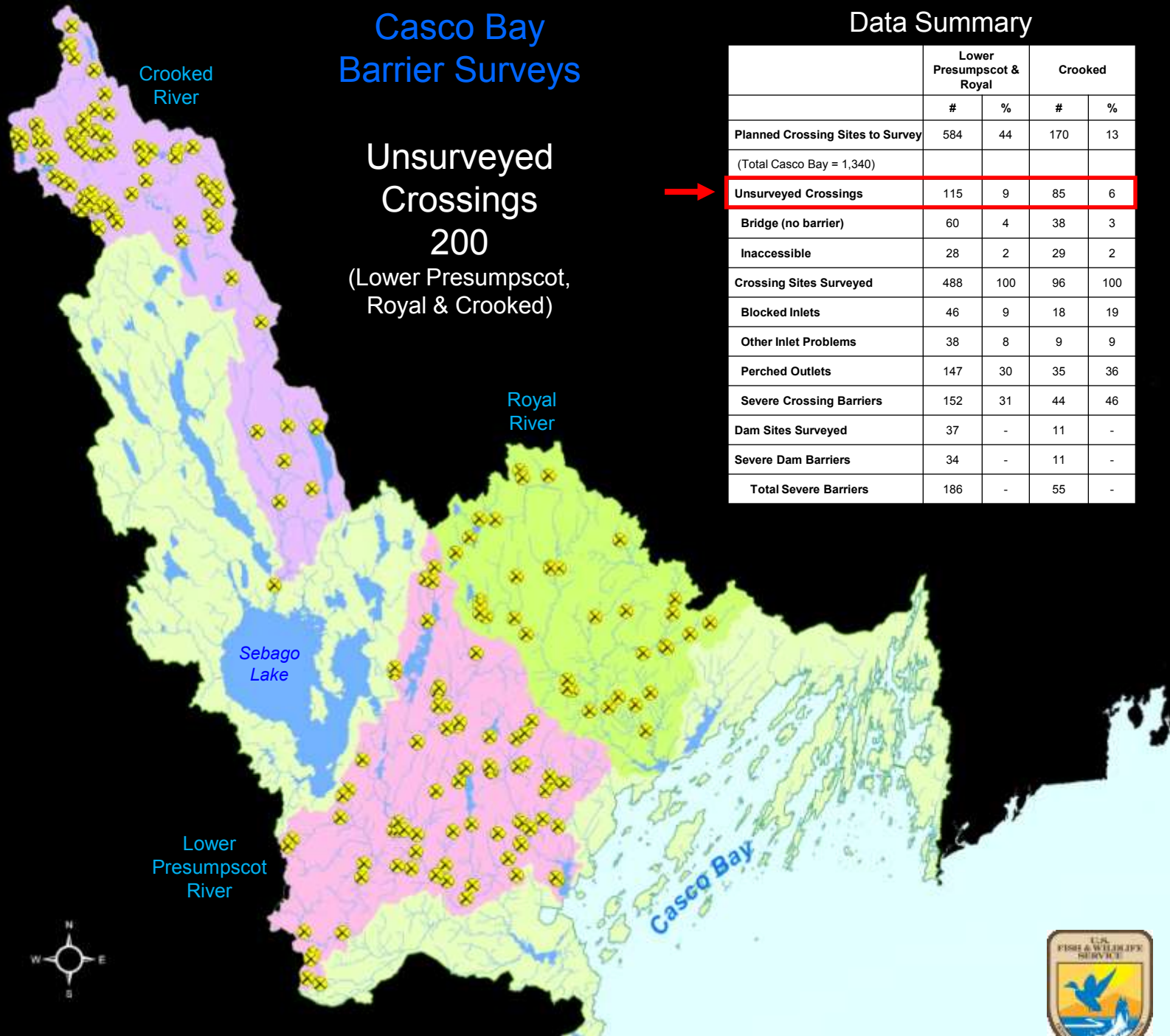
# Casco Bay Barrier Surveys

Unsurveyed  
Crossings  
200

(Lower Presumpscot,  
Royal & Crooked)

## Data Summary

	Lower Presumpscot & Royal		Crooked	
	#	%	#	%
Planned Crossing Sites to Survey	584	44	170	13
(Total Casco Bay = 1,340)				
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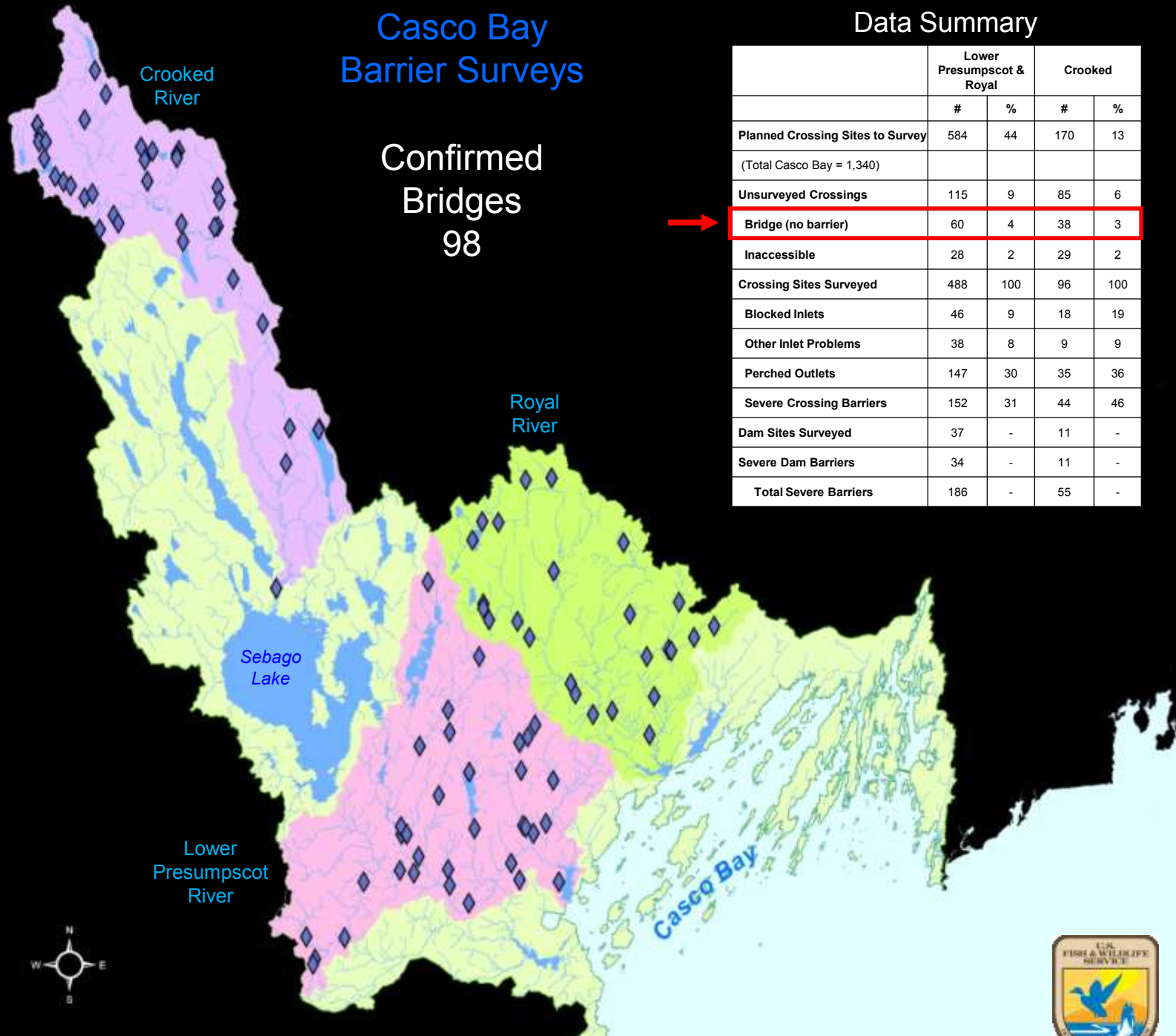


# Casco Bay Barrier Surveys

Confirmed  
Bridges  
98

## Data Summary

	Lower Presumpscot & Royal		Crooked	
	#	%	#	%
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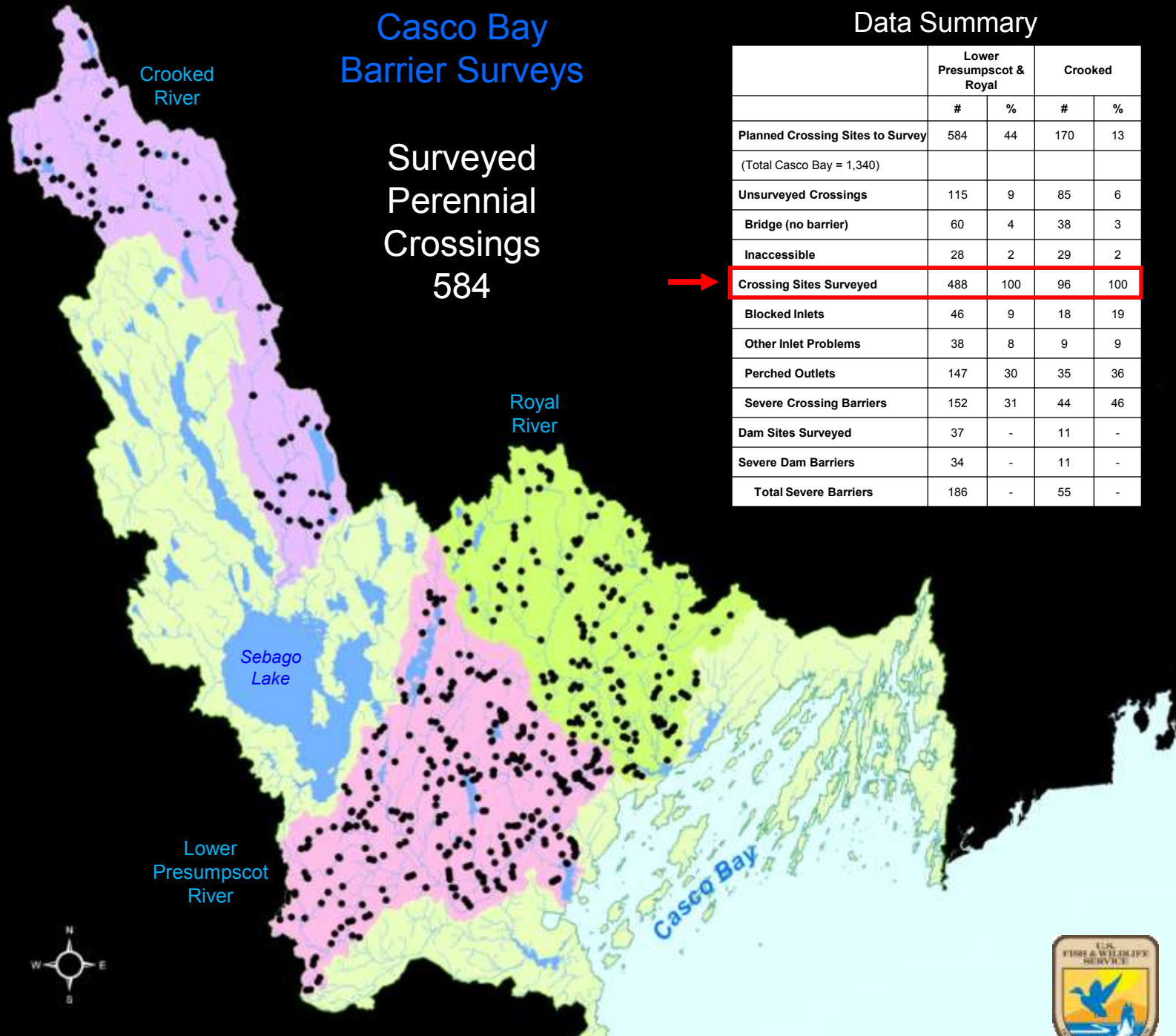


# Casco Bay Barrier Surveys

Surveyed  
Perennial  
Crossings  
584

## Data Summary

	Lower Presumpscot & Royal		Crooked	
	#	%	#	%
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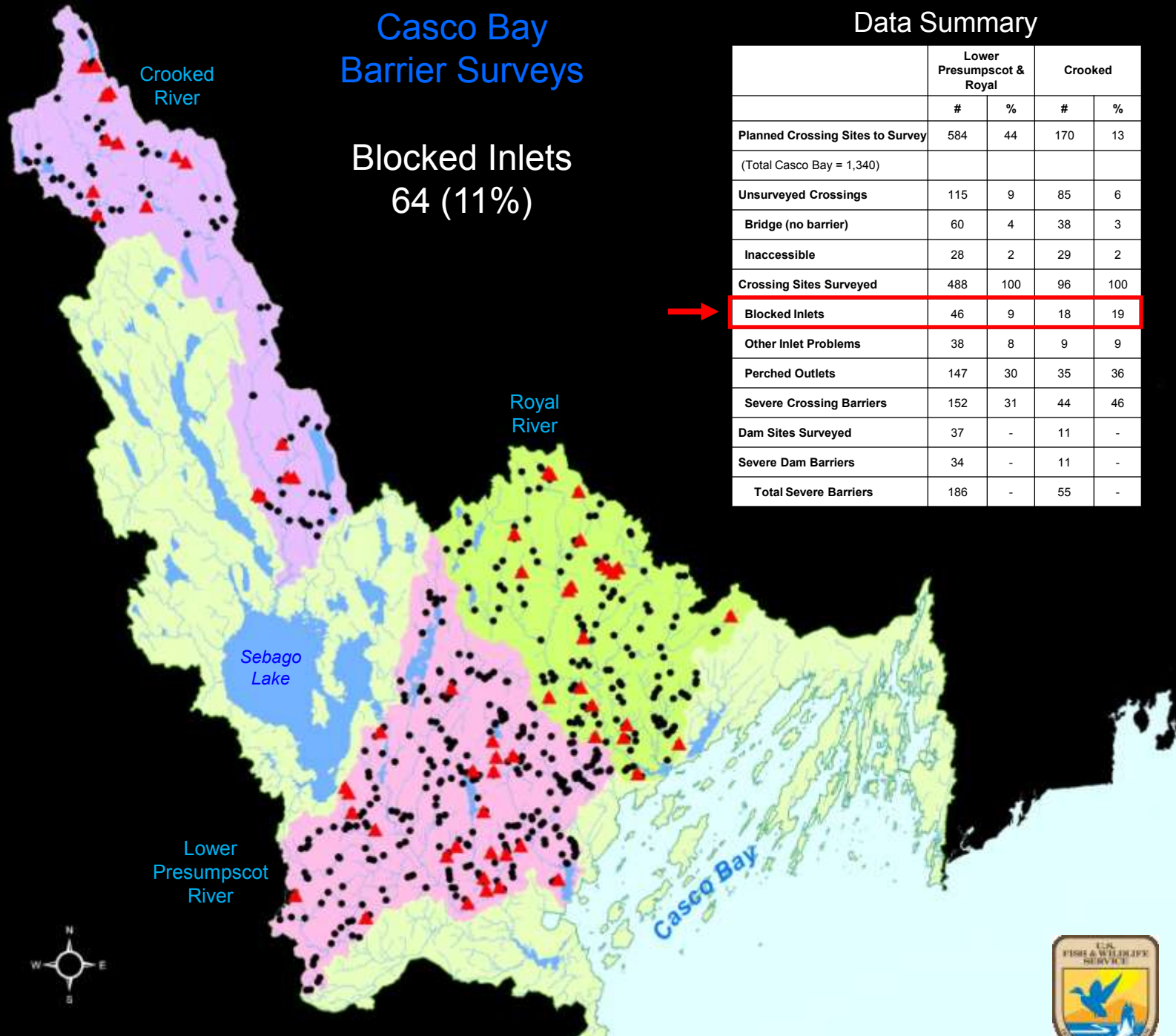


# Casco Bay Barrier Surveys

Blocked Inlets  
64 (11%)

## Data Summary

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# 64 Blocked Inlets

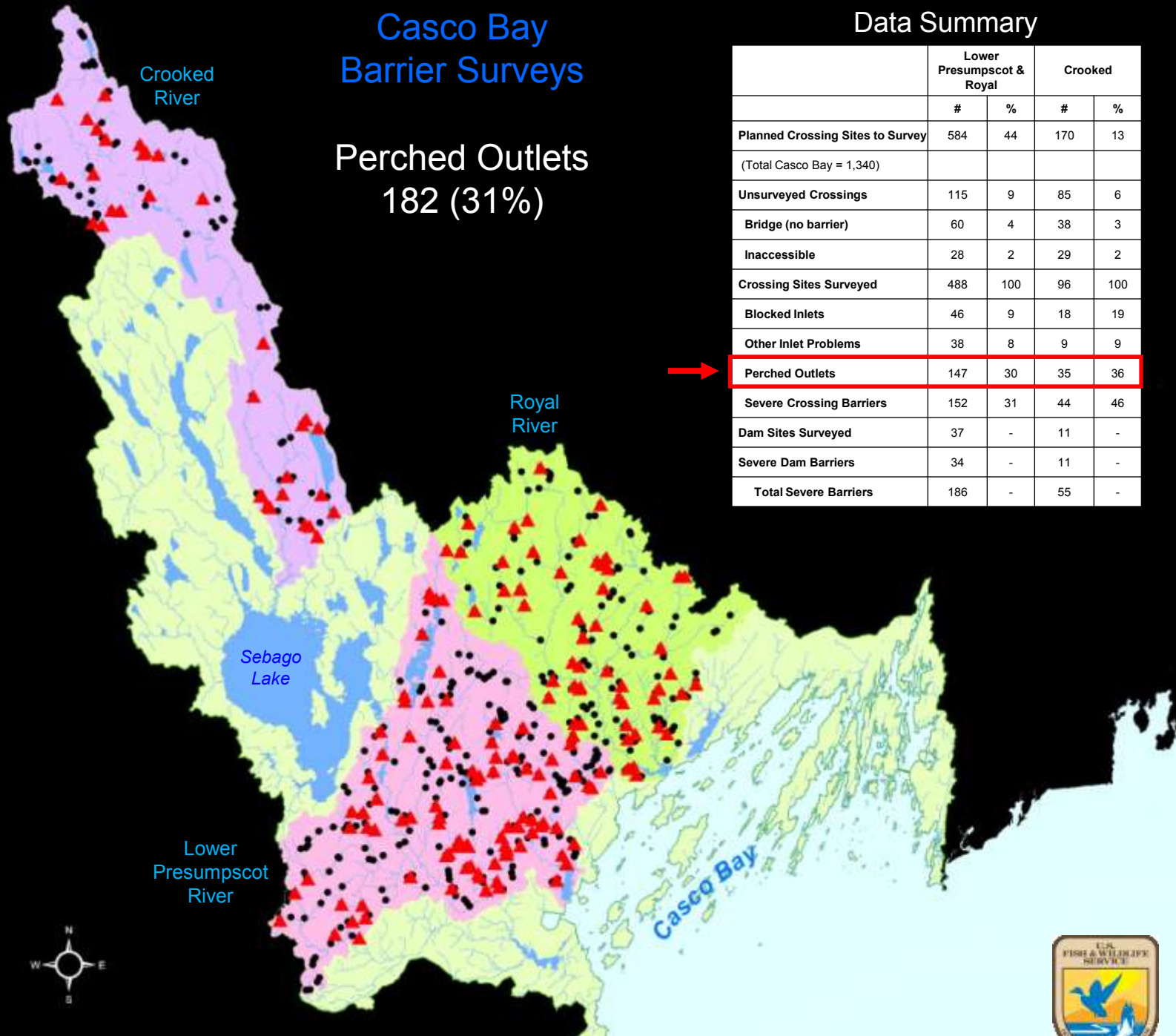


# Casco Bay Barrier Surveys

Perched Outlets  
182 (31%)

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# 182 Perched Outlets



# Casco Bay Barrier Surveys

Severe Crossing  
Barriers  
196 (34%)

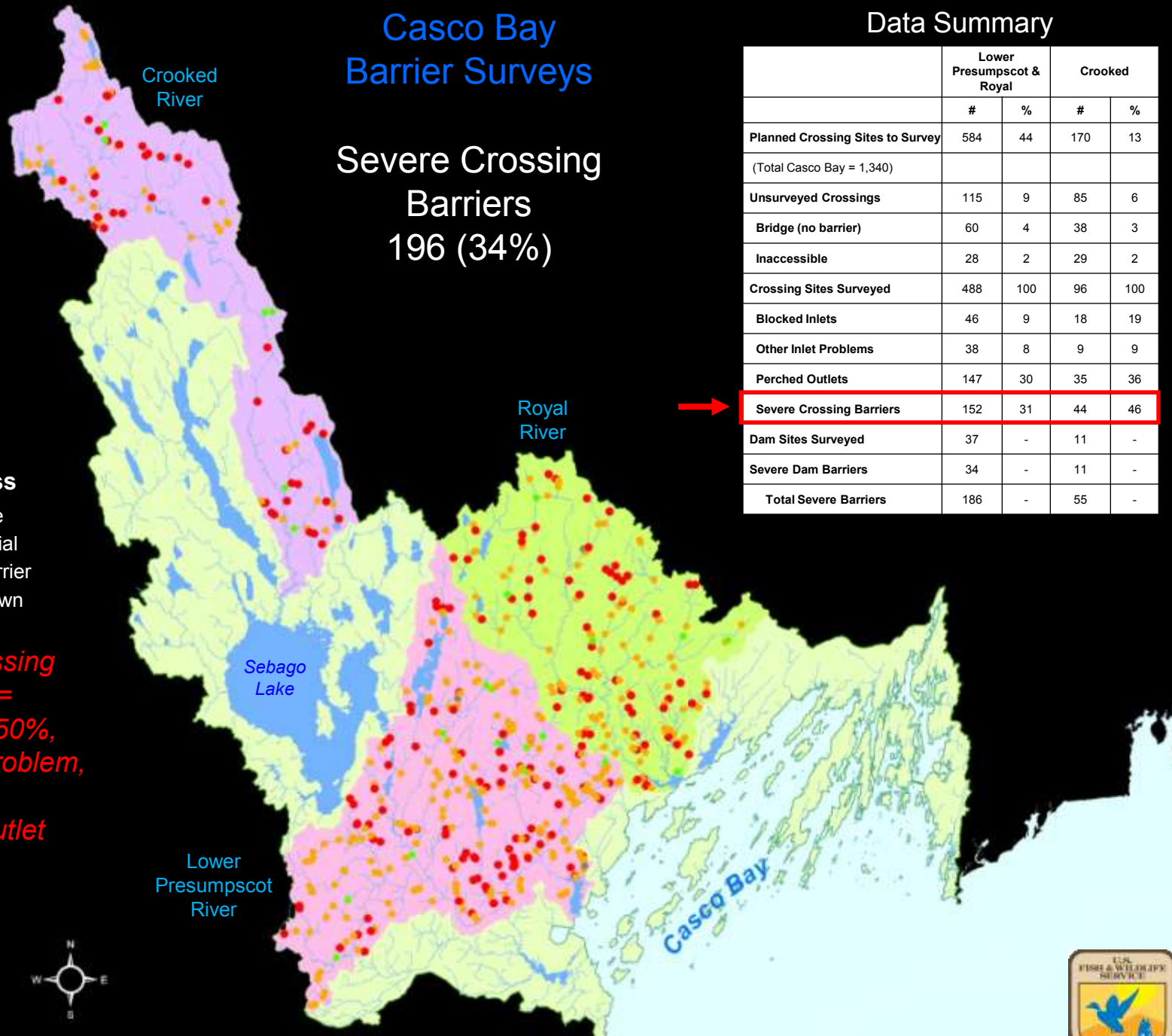
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Severe Dam Barriers	34	-	11	-
<b>Total Severe Barriers</b>	186	-	55	-

### BarrierClass

- Severe
- Potential
- No Barrier
- Unknown

*Severe Crossing  
Barriers =  
Blocked >= 50%,  
Severe Inlet Problem,  
or  
Perched Outlet*





# Casco Bay Barrier Surveys

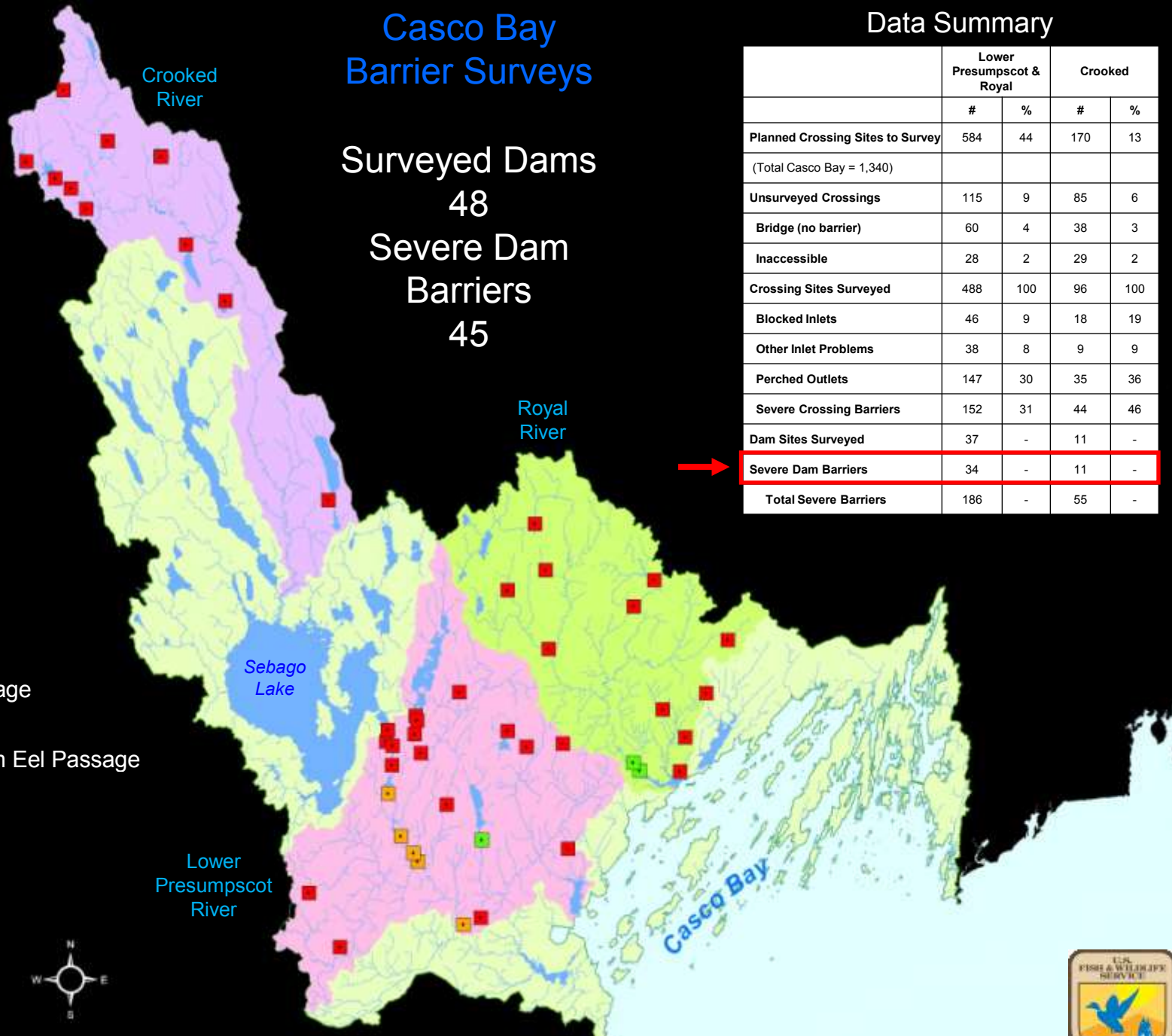
Surveyed Dams  
48  
Severe Dam  
Barriers  
45

## Data Summary

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<b>Severe Dam Barriers</b>	<b>34</b>	<b>-</b>	<b>11</b>	<b>-</b>
Total Severe Barriers	186	-	55	-

### Dams

- No Passage
- Passage
- Upstream Eel Passage



# 45 Severe Dam Barriers



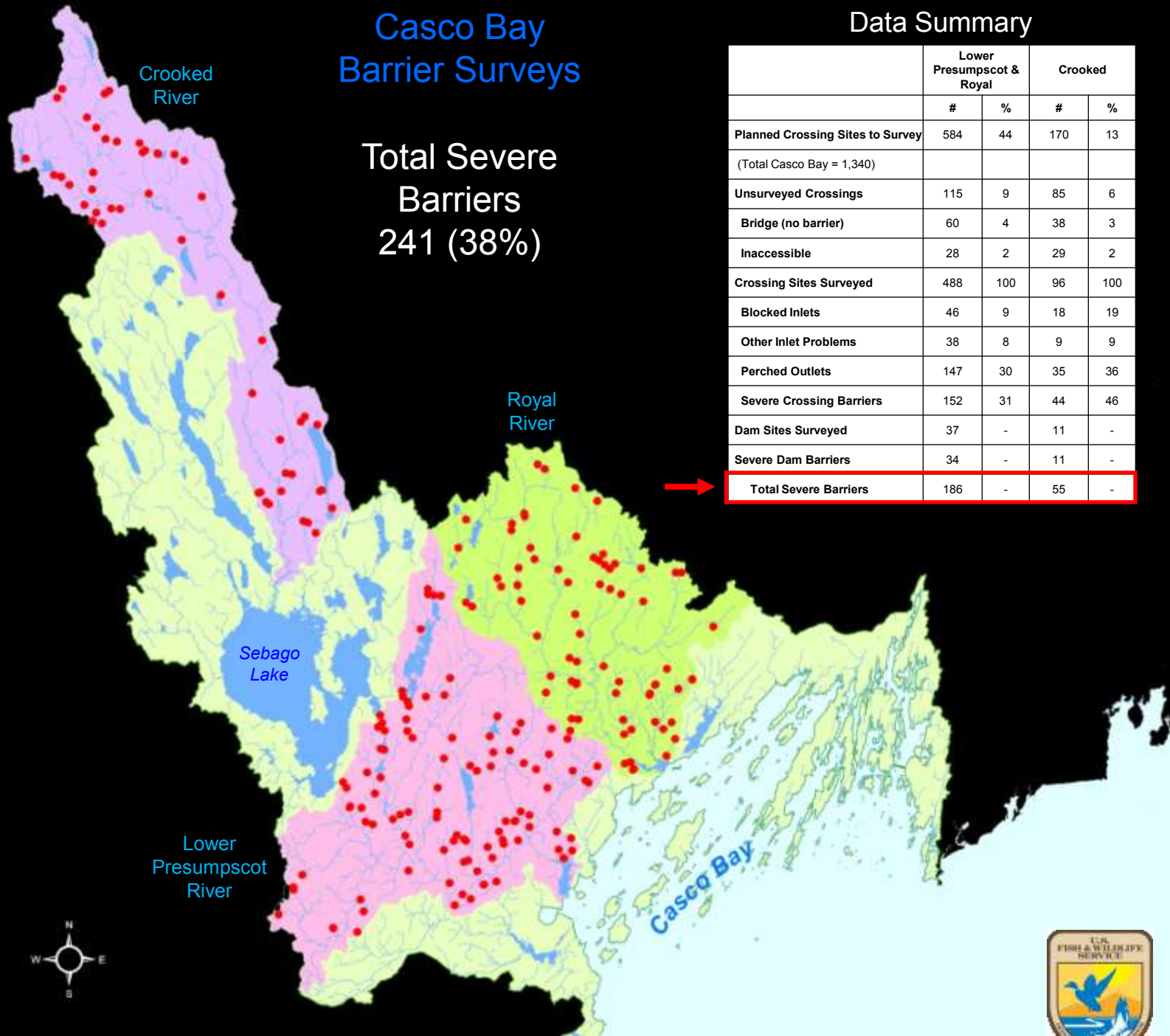


# Casco Bay Barrier Surveys

Total Severe  
Barriers  
241 (38%)

## Data Summary

	Lower Presumpscot & Royal		Crooked	
	#	%	#	%
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<b>Severe Dam Barriers</b>	34	-	11	-
<b>Total Severe Barriers</b>	186	-	55	-



# Prioritization

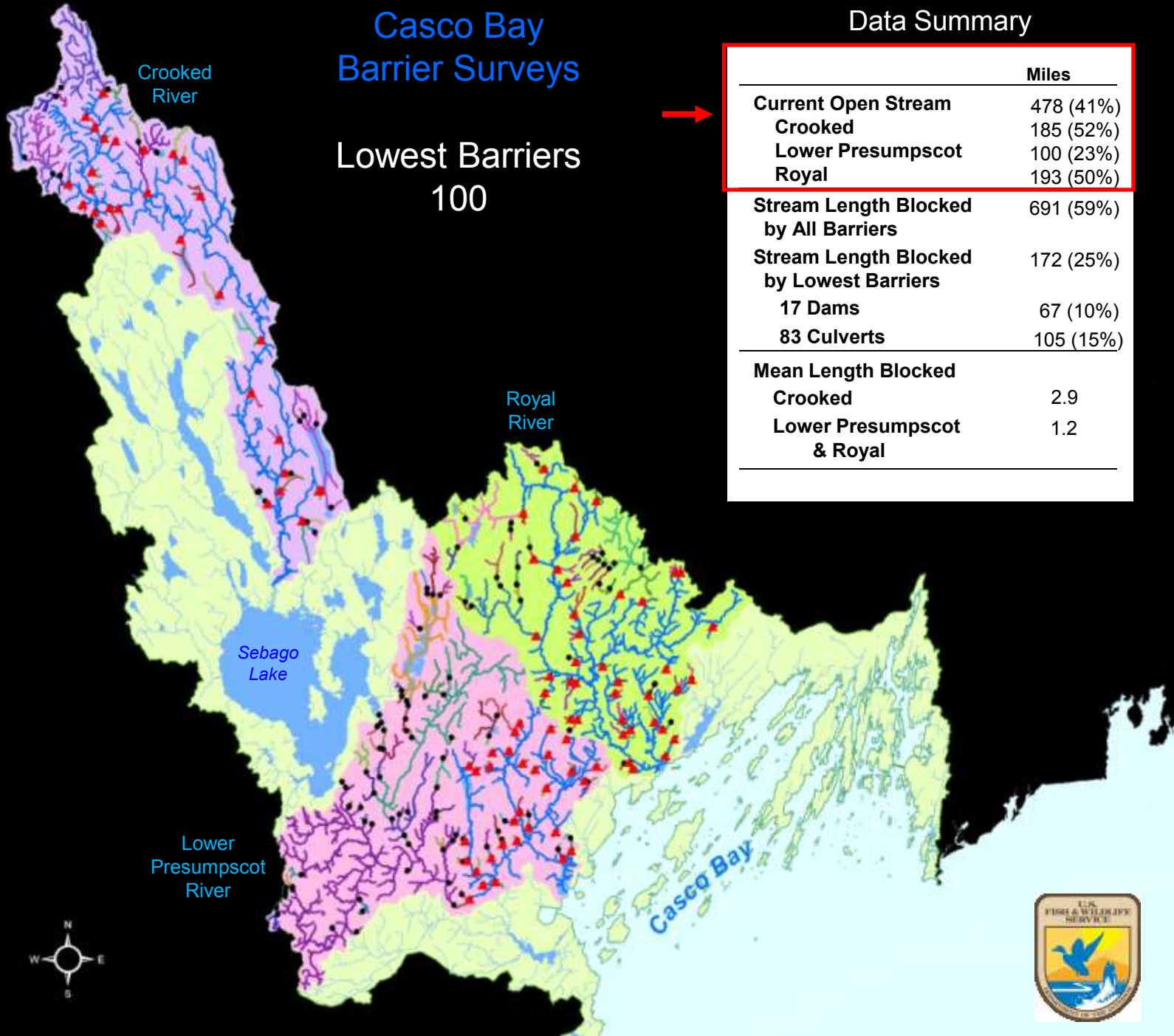


# Casco Bay Barrier Surveys

Lowest Barriers  
100

## Data Summary

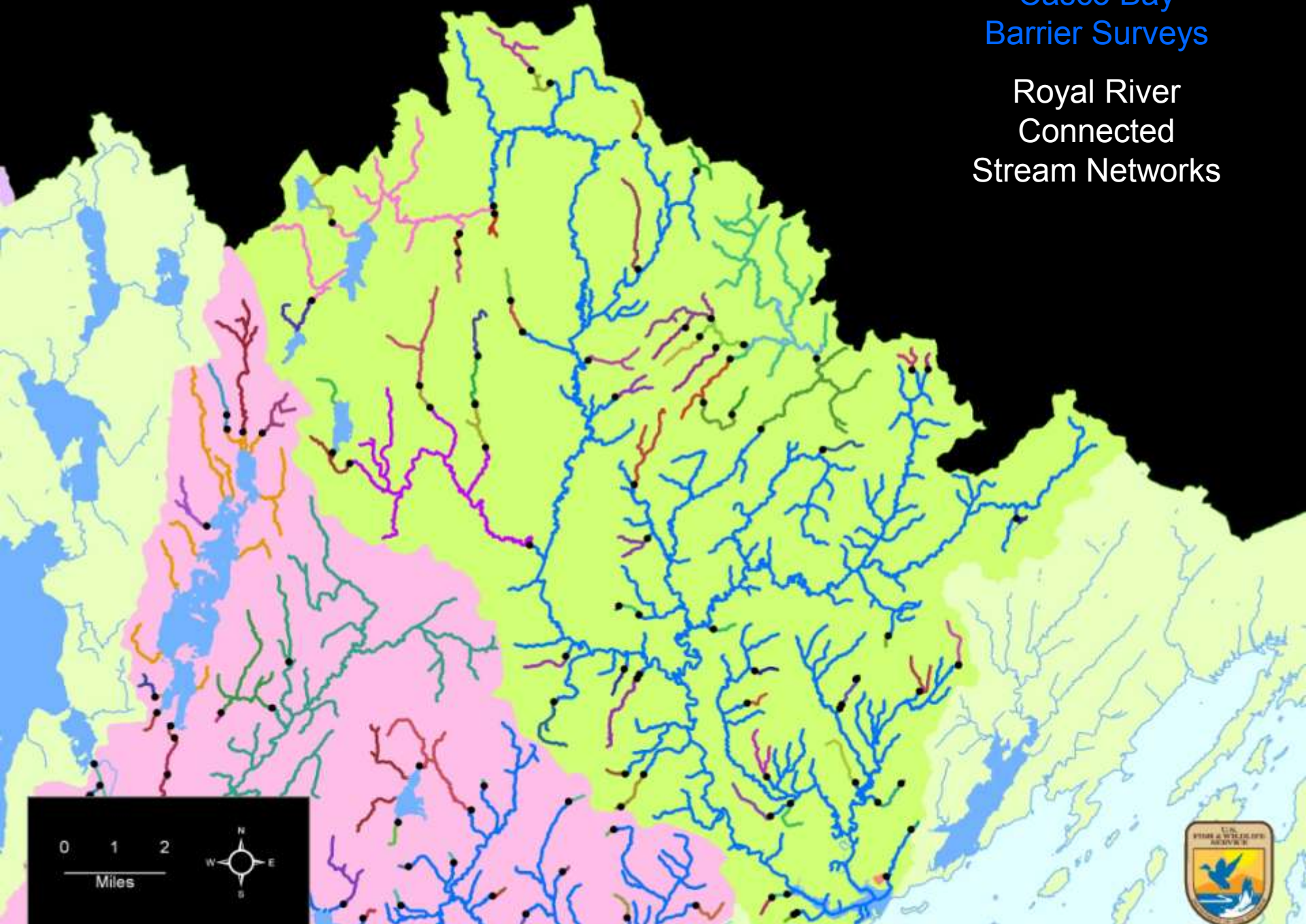
	Miles
<b>Current Open Stream</b>	478 (41%)
<b>Crooked</b>	185 (52%)
<b>Lower Presumpscot</b>	100 (23%)
<b>Royal</b>	193 (50%)
<b>Stream Length Blocked by All Barriers</b>	691 (59%)
<b>Stream Length Blocked by Lowest Barriers</b>	172 (25%)
<b>17 Dams</b>	67 (10%)
<b>83 Culverts</b>	105 (15%)
<b>Mean Length Blocked</b>	
<b>Crooked</b>	2.9
<b>Lower Presumpscot &amp; Royal</b>	1.2





Casco Bay  
Barrier Surveys

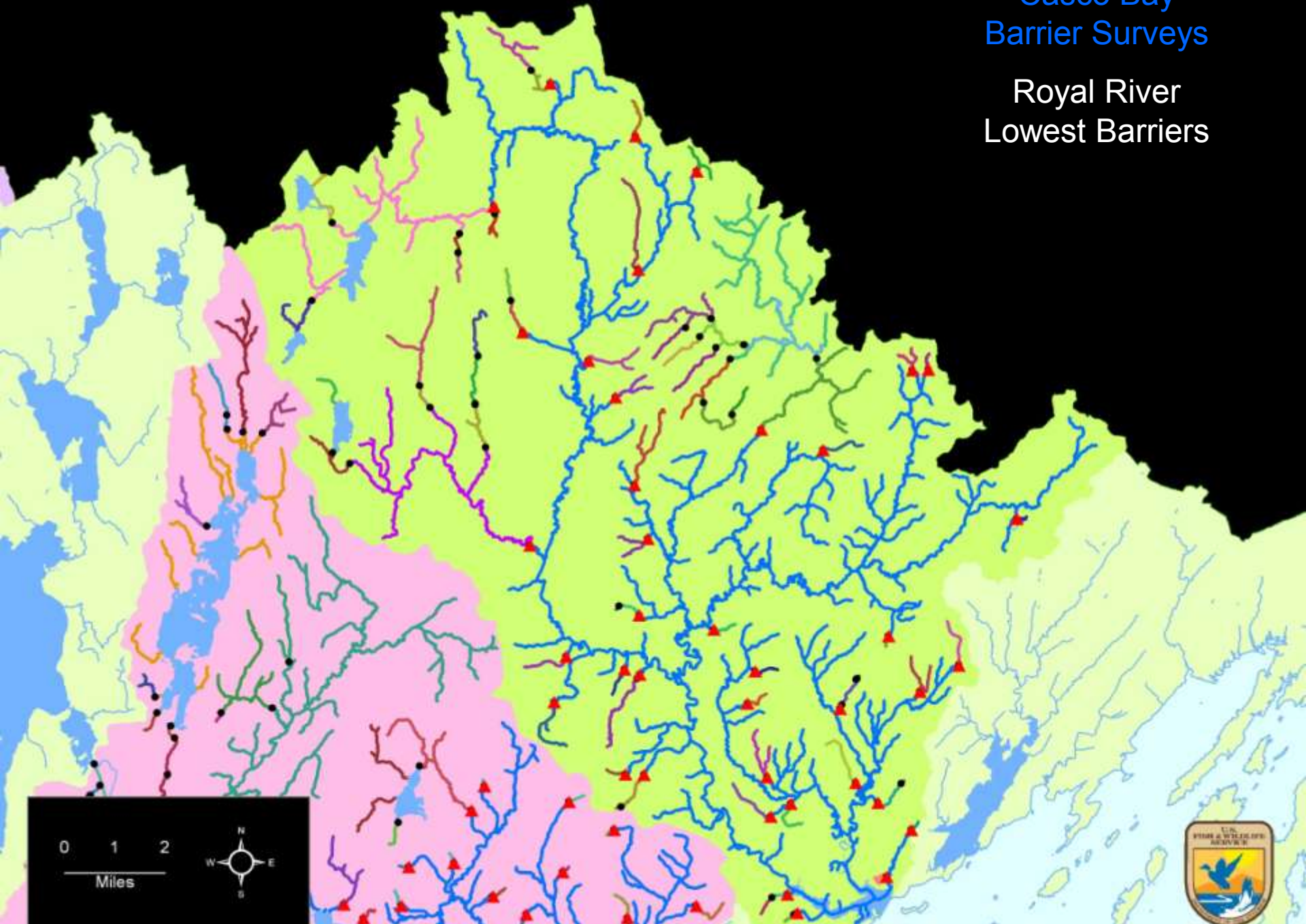
Royal River  
Connected  
Stream Networks





Casco Bay  
Barrier Surveys

Royal River  
Lowest Barriers

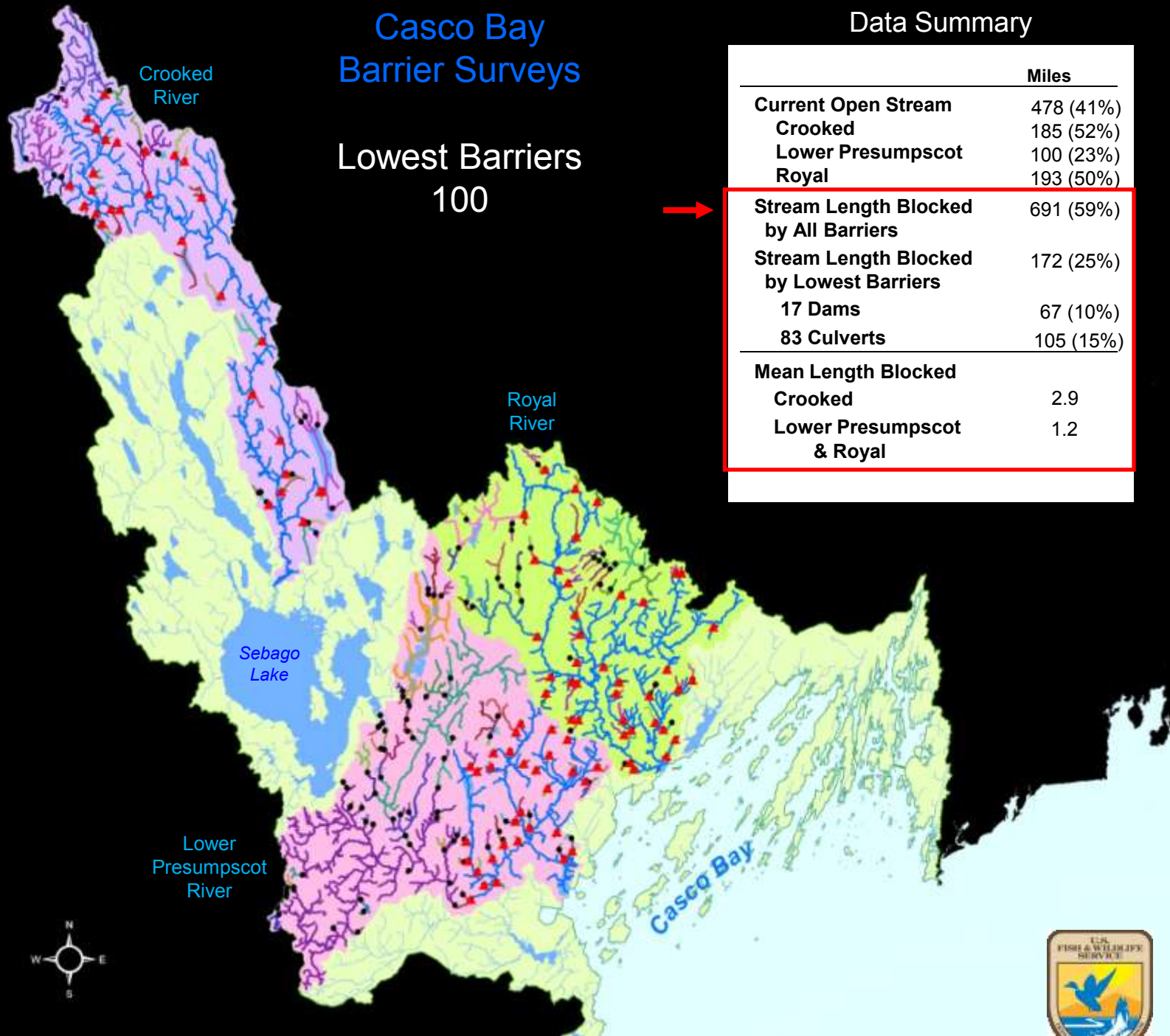


# Casco Bay Barrier Surveys

## Lowest Barriers 100

### Data Summary

	Miles
<b>Current Open Stream</b>	478 (41%)
<b>Crooked</b>	185 (52%)
<b>Lower Presumpscot</b>	100 (23%)
<b>Royal</b>	193 (50%)
<b>Stream Length Blocked by All Barriers</b>	691 (59%)
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<b>17 Dams</b>	67 (10%)
<b>83 Culverts</b>	105 (15%)
<b>Mean Length Blocked</b>	
<b>Crooked</b>	2.9
<b>Lower Presumpscot &amp; Royal</b>	1.2





# Casco Bay Barrier Surveys

## High Priority Barriers

### Data Summary

#### Site 1

26 stream miles

#### Site 2

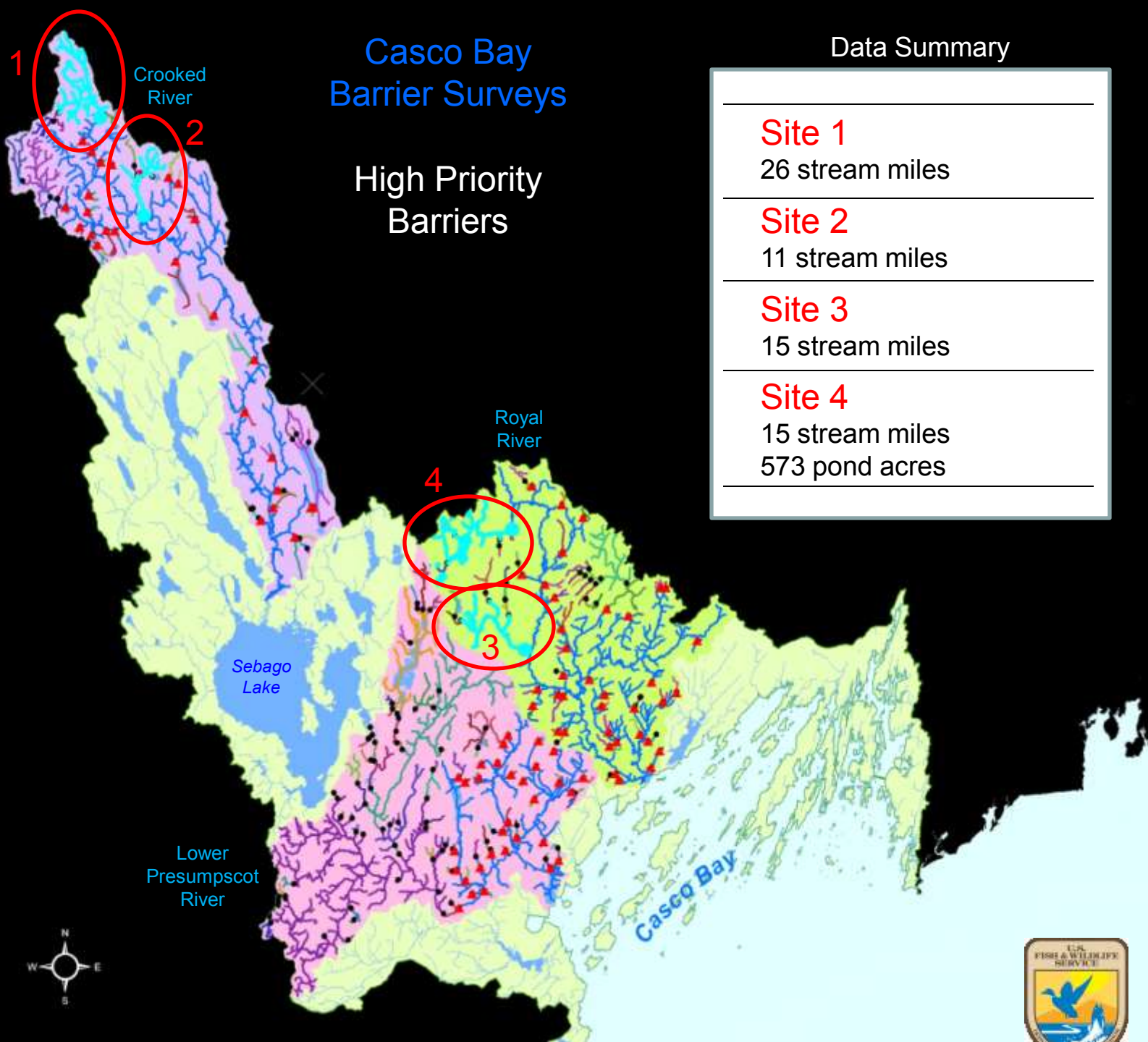
11 stream miles

#### Site 3

15 stream miles

#### Site 4

15 stream miles  
573 pond acres



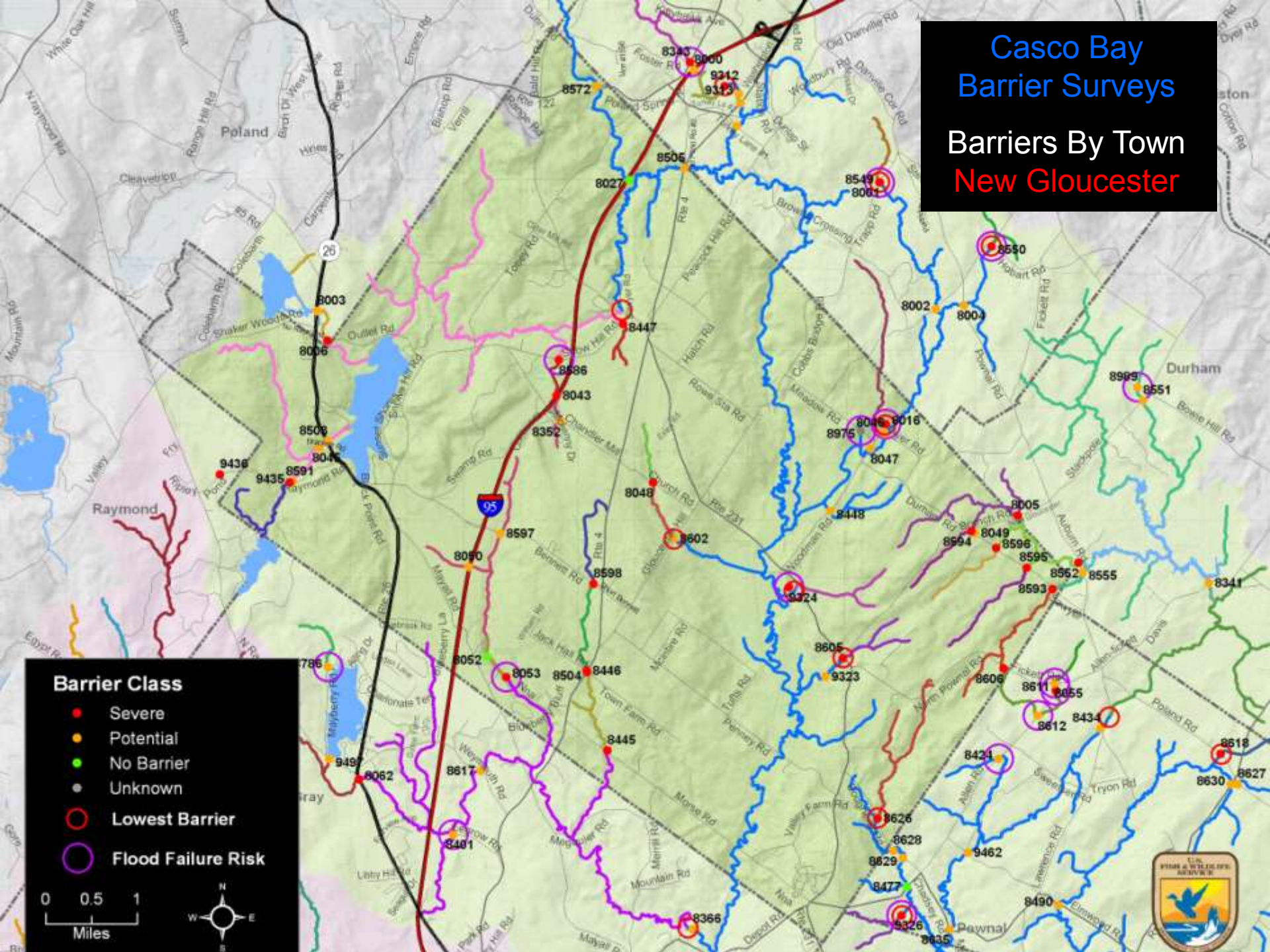


# Potential Priority Projects

Site	Structure	RoadType	Span/ Height	Issues	Stream Miles Opened	Cost
1	4 Culverts	Unpaved	6.4 ft	Perched Outlet, Blocked Inlet	26	??
2	Box Culvert/ Bridge	Paved	19.3 ft	Perched Outlet	11	??
3	Dam	NA	9.8 ft	No Passage	15	??
4	Dam	NA	10 ft	No Passage	15 miles & 573 pond acres	??



# Casco Bay Barrier Surveys Barriers By Town New Gloucester



**Barrier Class**

- Severe
- Potential
- No Barrier
- Unknown
- Lowest Barrier
- Flood Failure Risk

0 0.5 1  
Miles





# MAINE stream crossings

*new designs to restore stream continuity*

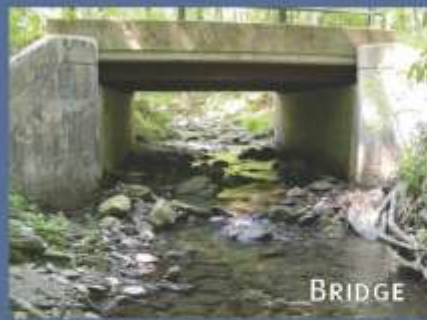
Stream continuity is critical to all creatures that depend on streams, including invertebrates, fish, amphibians, reptiles, and mammals. The design and condition of stream crossings determine whether a stream behaves naturally and whether wildlife can migrate freely. Through the effects of dams and poorly designed stream crossings, we have fragmented streams and hindered wildlife dispersal throughout our watersheds. In many cases, even crossings that were once effective are now barriers because of erosion or mechanical breakdown.

Safe and stable stream crossings can accommodate wildlife and protect stream health while reducing expensive erosion and structural damage. By adhering to the standards in the *Maine Department of Transportation Fish Passage Policy and Design Guide*, town officials, highway departments, and private landowners can help protect and restore stream continuity in Maine.



## KEY FEATURES OF WELL-DESIGNED CROSSINGS

*(fish friendly)*



BRIDGE



OPEN-ARCH

- Large sizes suitable to handling flood flows and debris
- Bridges and open-arch designs considered optimum under most conditions
- Crossings are wide and high relative to their length
- Greater than 1.2x stream width maintains dry banks for wildlife passage
- Water depth and velocity match conditions upstream and downstream
- Natural substrates create good conditions for stream wildlife
- Long life span with significant cost savings over time

## EFFECTIVE CROSSINGS INCLUDE...

- Bridges and open-bottom arches
- Culverts that span and are sunk into the streambed

## STREAM CROSSING PROBLEMS



**UNDERSIZED CROSSINGS** restrict natural stream flow, causing several problems, including scouring and erosion, high flow velocity, clogging, and ponding. Crossings should be large enough to retain natural substrates and to pass fish, wildlife, floods, and debris.



**SHALLOW CROSSINGS** have water depths too low for many organisms to move through them and may lack appropriate bed material. Crossings should have an open bottom or should be sunk into the streambed to allow for natural substrate and water depths.



**PERCHED CROSSINGS** are above the level of the stream bottom at the downstream end. Perching can result from either improper installation or from years of downstream bed erosion. Crossings should be open-bottomed or sunk in the bed to prevent perching.

## SLIPLINING is NOT the answer!

Sliplining, inserting a smooth plastic liner to an older culvert, may save money in the short run, but it nearly always decreases fish passage. Liners raise crossing elevations and increase flow velocities, removing crossing bed material and increasing downstream scour.

For more information on stream crossing surveys in Maine, visit the Maine Forest Service online at:

[www.maine.gov/dec/info/fish/water/stream\\_crossing.html](http://www.maine.gov/dec/info/fish/water/stream_crossing.html)

The *Maine Department of Transportation Fish Passage Policy and Design Guide* can be found online at:

[www.maine.gov/mdot/environmental/office-homepage/other\\_environmental.php](http://www.maine.gov/mdot/environmental/office-homepage/other_environmental.php)

Maine's stream barrier removal efforts are supported by a broad coalition of state and federal agencies and nongovernment organizations:

- Maine Forest Service
- Maine Department of Marine Resources
- Maine Department of Transportation
- Maine Department of Inland Fisheries and Wildlife
- Maine Department of Environmental Protection
- National Oceanic and Atmospheric Administration
- University of Southern Maine Aquatic Systems Group
- Penobscot Valley Council of Governments
- Natural Resources Conservation Service
- U.S. Fish and Wildlife Service
- Atlantic Salmon Federation
- The Nature Conservancy
- Project SHARE
- Trout Unlimited
- Maine Rivers

Design and Illustration: Kiley Steiner  
www.kileysteiner.com





# Next Steps

Complete Surveys & Analyze All Data



Identify Potential Restoration Sites



Assess Feasibility of Restoration Sites



Apply for Funding Restoration



Restoration!

