

Casco Bay Watershed

Fish Barrier Priorities Atlas

February 2012

The map displays the Casco Bay Watershed, highlighting fish barrier priorities. Key features include:

- Geographic Labels:** Cumberland, Falmouth, Portland, Casco Bay, Presumpscot River, and various brooks (e.g., Middlebrook, Mill Brook, Mallow Brook).
- Infrastructure:** Major roads (I-95, I-295, US-1, US-302) and local streets.
- Barrier Markers:** Numbered triangles and circles indicating barrier locations and priorities. Some markers are circled in red, others in purple.
- Water Bodies:** Casco Bay, Presumpscot River, and various brooks.
- Legend:** A legend at the bottom left identifies the symbols used for barrier priorities.
- Logos:** Logos for the Casco Bay Estuary and the U.S. Fish & Wildlife Service are located at the bottom.

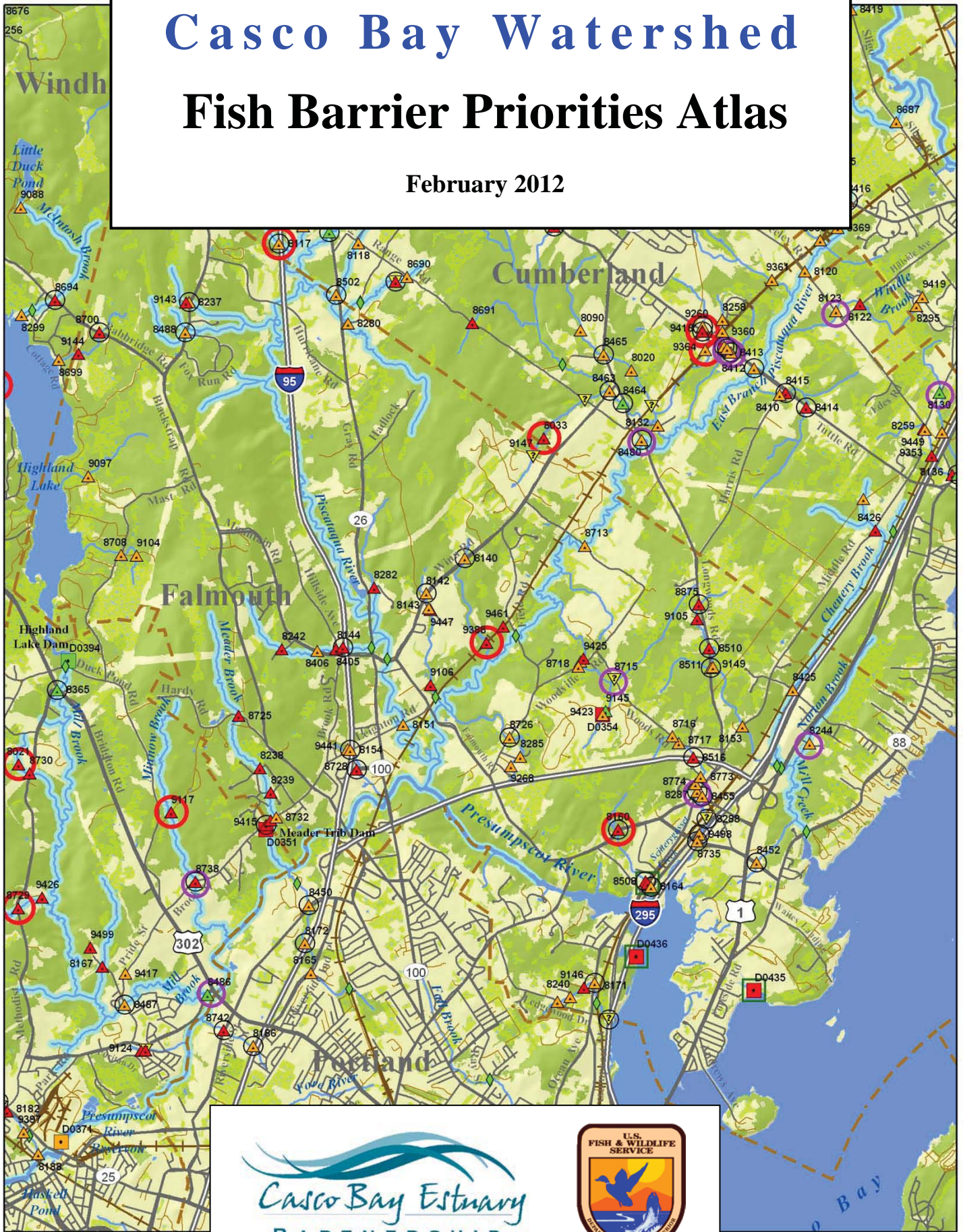
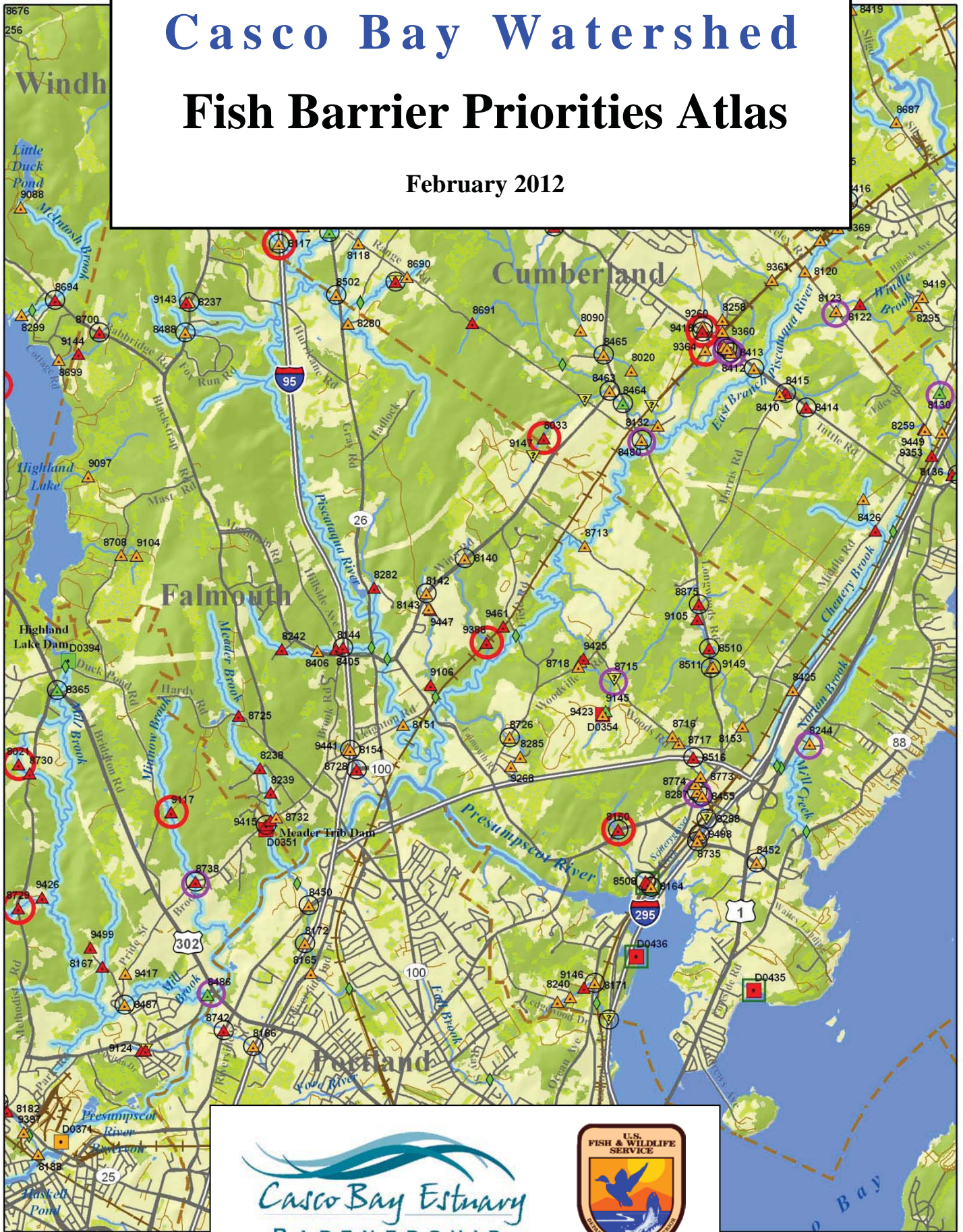
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March 2012

Background

This atlas was created to help guide restoration of streams affected by road-stream crossings and dams acting as barriers to fish passage in the Casco Bay watershed as part of a project coordinated by the Casco Bay Estuary Partnership (CBEP) and U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (USFWS-GOMCP). The 42 individual town maps of the atlas contain crossings, dams and a small number of natural barriers identified during field surveys¹ of perennial streams in 2009 and 2010, and mapped using a geographic information system (GIS). Sites have been classified by the degree of restriction they represent for fish passage, and additional related data such as high priority stream habitat and flood hazards are shown in the maps to help identify priority sites. Data have been compiled into a database for use in analysis and mapping.

Although habitat needs for fish are best understood at the scale of whole streams, which bear little relationship to town boundaries, this atlas was created primarily for use by municipal public works employees and other staff and representatives focusing on local road systems. Therefore, each map page represents a town or city, and is shown at a scale suitable to include the entire community on one page. An index map shows the location of each town within the watershed, and a legend page provides explanation of symbols used on individual maps. Barriers from outside the Casco Bay watershed are shown where data are available, but masked to focus on the towns and portion of towns which are within the watershed.

Fish Barriers

Road-stream crossings are shown with SiteID numbers to help identify them in the barrier database. Dams, in most cases, have labels both of SiteID and the dam's common name, if one is known. *Severe* barriers are defined as those road/stream crossings where fundamental physical barriers exist at either the inlet or outlet of the crossing, including inlets or outlets "perched" above the stream channel, and inlets blocked at least 50%, usually by debris. *Potential* barriers cover a wide spectrum of road-stream crossing situations where fish passage problems are likely to exist at some flows for some species or age groups of fish, and passage of other aquatic organisms such as amphibians and macroinvertebrates is likely also limited. Sites that were inaccessible to survey crews, and therefore not surveyed, are shown as unsurveyed, but are included in our analysis as *Potential* barriers. Dams are classified by whether or not they have effective facilities in place to provide upstream fish passage. Natural barriers, including waterfalls, debris jams (including woody debris or rock and fine sediments), and beaver dams were assessed when in close proximity to surveyed crossings and dams, and are mapped as well.

Priority Streams

USFWS-GOMCP and CBEP staff consulted with state fisheries biologists to identify streams with important fish habitat, primarily for brook trout or Atlantic salmon, or both. These *priority streams* are highlighted on the maps. The scope of the road/stream crossing barrier assessment was limited to perennial streams, those with continuous flow year round. Although intermittent streams were not surveyed, fish using priority streams also rely on connectivity with intermittent tributaries at various times of year. There are likely to be additional barriers on important intermittent streams that have not been assessed.

Flood Hazards

The maps present data from Cumberland County Emergency Management Agency (CCEMA) and CBEP to show where flood hazards are likely to overlap with fish barriers. CCEMA, in cooperation with towns, has identified many road crossings as flood hazards based on past flood events. CCEMA sites are marked by purple circles, and do not always coincide with barrier survey sites because they may be located on intermittent streams or larger rivers crossed by bridges, which are generally passable for fish but may still entail flood hazards.

¹ Field surveys were conducted based on protocols from the *Maine Road-Stream Crossing Survey Manual* (http://www.maine.gov/doc/mfs/fpm/water/docs/stream_crossing_2008/MaineRoad-StreamCrossingSurveyManual2008.pdf).

Where these sites do coincide with barriers, the combination of flood hazard with fish passage problems should place them high on any town's priority list for replacement.

A second set of flood hazard sites was derived from the barrier survey data by CBEP Director Curtis Bohlen. In CBEP's analysis, the capacity of each crossing was compared to the expected flows for that specific crossing during a 25-year flood event. Where sufficient crossing data exists, flows were calculated based on the relationship between drainage area above the crossing, and the proportion of the drainage area occupied by National Wetland Inventory-defined wetlands. CBEP flood hazard sites are shown as red circles, and represent all crossing sites where the capacity of the crossing was less than 50% of the expected 25-year flood value. This is meant as a general indication of flood risk, but may be incorrect in some locations based on site-specific factors. As with CCEMA sites above, where these sites coincide with barrier sites, the combination of flood hazard with fish passage problems should place them high on any town's priority list for review and possible replacement.

Other Data

Land use and wetland data are mapped to provide helpful landscape information, with upland forested areas distinguished from wetland, open, or developed areas. Public and private roads and railroads are included, as are all streams in the watershed, both perennial and intermittent. Relief shading is provided to help make reading the topography of the maps somewhat more intuitive. Tidal crossings, due to the increased complexity involved with crossing designs for two-way flow and maintenance of coastal wetlands, are denoted separately on the maps. Any town or other entity with plans to replace culverts at tidal crossings is invited to contact CBEP to explore partnership and grant funding opportunities. Town-based data summary tables for all barrier sites classified as *Severe* or *Potential* on high priority streams are provided following the maps. Each town has a two-page summary of key attributes from the database to provide information on location, dimensions and site conditions.

Data Sources

The data used to create this atlas came from a variety of sources. CBEP and USFWS-GOMC funded field surveys, with significant volunteer assistance from Trout Unlimited. Many resources were supplied by USFWS-GOMCP, including software, hardware, and data. Most barrier data was developed by USFWS-GOMCP from field survey data, though some was provided by the Kennebec Estuary Land Trust, which conducted surveys in the easternmost portion of the watershed. Flood hazard data is from either CCEMA, or from Curtis Bohlen's CBEP flood hazard analysis. Priority streams data was developed by USFWS-GOMCP, MDIFW, and the Maine Department of Marine Resources based on survey data of fish occurrences and habitat surveys. Basemap data, including relief shading, roads, town boundaries and most watershed polygons were supplied by the Maine Office of Geographic Information Systems. The roads data mapped is primarily from the Maine Department of Transportation dataset. Dam data is modified from original data from the Maine Department of Environmental Protection. Hydrography data came from high resolution National Hydrography Dataset (NHD).

Disclaimer

Please be aware that the data contained in the maps and tables of this atlas may contain errors, and represents the best information available at the time of publication. Note that crossing surveys were conducted in 2009 and 2010, and some sites surveyed may have undergone important changes based on flood events, maintenance or even entire replacement of a crossing. Likewise, flood hazard sites identified by CCEMA may have been modified based on previously planned work to lessen flooding problems.

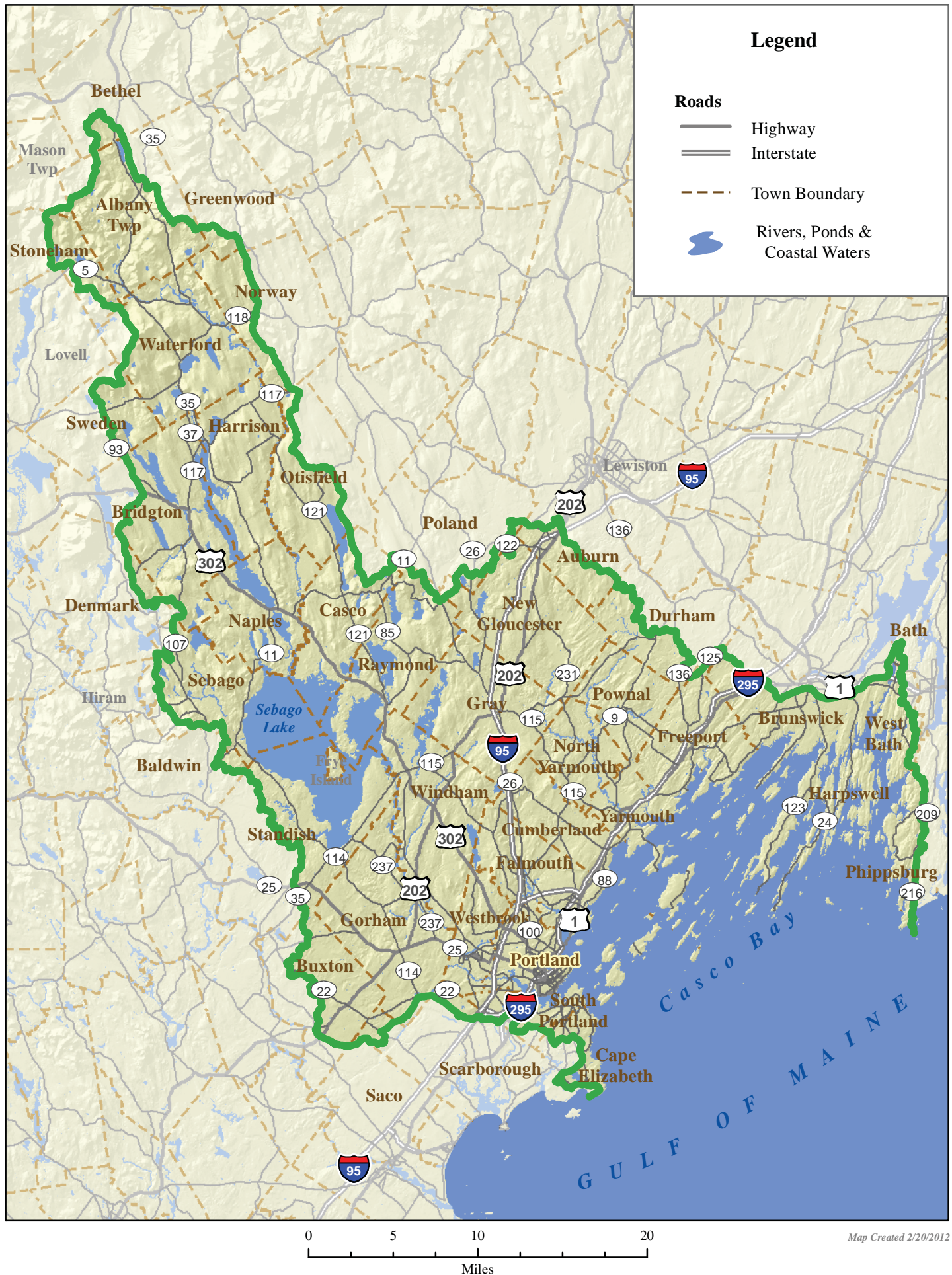
For more information, please contact:

Alex Abbott c/o
Gulf of Maine Coastal Program
U.S. Fish and Wildlife Service
4R Fundy Rd.
Falmouth, ME 04105
Telephone: 207-781-8364, ext. 21
Electronic Mail: alexoabbott@hotmail.com

Matt Craig
Casco Bay Estuary Partnership
PO Box 9300, 34 Bedford Street
Portland, ME 04104-9300
Telephone: 207.228.8359
Electronic Mail: mcraig@usm.maine.edu
Website: www.cascobayestuary.org

Casco Bay Barriers by Town

Index Map



Casco Bay Barriers by Town

Legend

Crossing Barrier Type with SiteID

- 8235 ▲ Severe
- 8049 ▲ Potential
- 8731 ▲ Passable
- 9112 ▼ Unknown

Dams

- No Upstream Fish Passage
- Planned Upstream Fish Passage
- Upstream Fish Passage

- ◆ Bridge (Passable)
- Debris/Beaver Dam (Impassable)
- ⚡ Waterfall (Impassable)
- MDOT Crossing
- Tidal Site
- Flood Hazard - Cumberland County EMA
- Flood Hazard - CBEP Analysis
- ~ Priority Stream

Roads

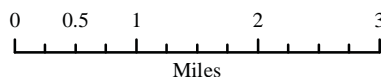
- Private
- Public
- Highway
- Interstate

- Railroad
- Town Boundary
- Wetland
- Perennial Stream
- Intermittent Stream
- Rivers, Ponds & Coastal Waters
- Watershed Boundary
- Forested Lands
- Open or Developed Lands

These maps are created primarily with 1:24,000 scale basemap data, with landcover data added to provide general distinctions between open and forested lands. Areas outside of the Casco Bay watershed are masked to obscure them.



Scale Varies by Town
See scale bar at bottom of each map



Casco Bay Barriers by Town

Cumberland



Severe and High Priority Potential Barriers by Town

Site ID	Town	Habitat Priority	Basic Structure Type	Barrier Class	Survey Date	Road Name	Road Type & Class	Stream	UTM East	UTM North	Stream Type	Number Of Culverts	Material	Condition
8034	Cumberland	High	Unknown	Potential	6/17/2009	Alder Way	Unknown - e911	Hobbs Brook	395771	4849786	Perennial			
9456	Cumberland	High	Culvert	Severe	7/6/2007	Alder Way	State / Paved	Unknown	395777	4849789	Perennial	1	Plastic	
8408	Cumberland	High	Culvert	Potential	7/20/2009	Blanchard	State / Paved	Unnamed	396156	4852406	Perennial	1	Metal	
8105	Cumberland	High	Culvert	Potential	7/15/2009	Blanchard Rd	Town / Paved	Unknown	395440	4853092	Perennial	1	Metal	
8872	Cumberland		Culvert	Severe	7/20/2009	Blanchard Rd	State / Paved	Unnamed	398004	4850567	Perennial	1	Metal	
8033	Cumberland		Culvert	Severe	7/9/2009	Hazeltine Dr	Unknown / Paved	Unknown	397858	4847592	Perennial	1	Concrete	
8122	Cumberland	High	Culvert	Severe	6/29/2009	Hillside Rd	Town / Paved	Windle Brook	402294	4849472	Perennial	1	Metal	
8117	Cumberland	High	Culvert	Potential	9/10/2009	I-95	State / Paved	Unnamed	394125	4850268	Perennial	1	Concrete	
8480	Cumberland	High	Culvert	Potential	7/9/2009	Longwoods Rd	State / Paved	E Br. Piscataqua R	399233	4847569	Perennial	1	Concrete	
9405	Cumberland	High	Culvert	Severe	6/15/2007	Lower Methodist	Town / Paved	Unnamed	394515	4850862	Perennial	1	Concrete	
8426	Cumberland	High	Culvert	Severe	8/3/2010	Middle Rd	Town / Paved	Cherry Brook	402511	4846296	Perennial	1	Plastic	
8259	Cumberland	High	Culvert	Severe	8/3/2010	Middle Rd	Town / Paved	Unknown	403190	4847725	Perennial	1	Plastic	
8018	Cumberland	High	Multiple Culverts	Potential	7/15/2009	Old Farm Rd	Unknown / Paved	Unnamed	394481	4850574	Perennial	2	Metal	
8671	Cumberland	High	Culvert	Severe	7/15/2009	Orchard Rd	Town / Paved	Unnamed	395450	4853318	Perennial	1	Metal	
9446	Cumberland	High	Culvert	Potential	7/20/2009	Orchard Rd	Town / Paved	Unnamed	396101	4855345	Perennial	1	Metal	Rust
8136	Cumberland	High	Culvert	Severe	9/1/2009	Powell Rd	Town / Paved	Unnamed	403595	4847077	Perennial	1	Plastic	
9422	Cumberland	High	Multiple Culverts	Potential	7/15/2009	Private Drive Way	Private / Driveway	Unnamed	395443	4853357	Perennial	2	Metal	
9353	Cumberland	High	Culvert	Severe	8/3/2010	Railroad	Railroad	Unknown	403307	4847346	Perennial	1	Concrete	
8691	Cumberland		Culvert	Severe	6/17/2009	Range Rd	Town / Paved	Unknown	396855	4849211	Perennial	1	Plastic	
8118	Cumberland	High	Multiple Culverts	Potential	6/17/2009	Range Rd	Town / Paved	Unnamed	395258	4850332	Perennial	2	Plastic	
8690	Cumberland	High	Culvert	Potential	6/17/2009	Range Rd	Town / Paved	Unnamed	395938	4849857	Perennial	1	Plastic	
8502	Cumberland	High	Culvert	Potential	6/17/2009	Rte 100	State / Paved	Unnamed	394942	4849607	Perennial	1	Concrete	
8017	Cumberland	High	Multiple Culverts	Potential	7/20/2009	Serenity Way	Unknown / Unpaved	Unnamed	396396	4855042	Perennial	2	Plastic	
8107	Cumberland	High	Culvert	Potential	7/15/2009	Skillins Rd	State / Paved	Unknown	395452	4852859	Perennial	1	Plastic	
8412	Cumberland	High	Culvert	Potential	6/22/2009	Tuttle Rd	State / Paved	Piscataqua River	400809	4848572	Perennial	1	Metal	
8873	Cumberland	High	Multiple Culverts	Severe	6/22/2009	Tuttle Rd	State / Paved	Unknown	400086	4849088	Perennial	2	Metal	
8414	Cumberland	High	Culvert	Severe	6/22/2009	Tuttle Rd	State / Paved	Unnamed	401541	4848024	Perennial	1	Metal	
8415	Cumberland	High	Culvert	Severe	6/22/2009	Tuttle Rd	State / Paved	Unnamed	401254	4848223	Perennial	1	Metal	Rust
9103	Cumberland	High	Bridge	Potential	8/4/2010	Unknown	Private / Trail	Cherry Brook	402343	4846739	Perennial		Wood	
D0379	Cumberland		Dam	Severe			NA	mill brook	398207	4852830	Perennial			
D0384	Cumberland	High	Dam	Severe			NA	Piscataqua River	395087	4852537	Perennial			

Severe and High Priority Potential Barriers by Town

Site ID	Specific Structure Type	Inlet Condition	Inlet Blocked	Primary Inlet Span FT	Crossing Structure Length FT	Outlet Condition	Outlet Drop FT	Crossing Substrate	Fill Height FT	Estimated Stream Width FT	Upstream Miles to Next Barriers	Up-Stream Barriers	Total Upstream Miles	Down-stream Barriers	Dam Name	Hydraulic Height FT
8034			No							2.8	0.004	2	0.313	1		
9456	Round Culvert	At Grade	No	5.4	40.7	Perched	0.6	None		13.4	0.122	1	0.309	2		
8408	Pipe Arch Culvert	At Grade	No	9.2	103.0	At Grade		None		4.8	3.288	2	3.587	1		
8105	Round Culvert	At Grade	No	3.1	49.9	At Grade		None		4.0	0.159	2	0.292	2		
8872	Round Culvert	At Grade	No	3.0	105.6	Perched	1.4	None		10.4	0.168	0	0.168	2		
8033	Round Culvert	At Grade	No	1.9	131.2	Perched	1.2	None		3.2	0.525	0	0.525	2		
8122	Round Culvert	At Grade	No	3.9	40.7	Perched	0.1	None		4.4	0.842	0	0.842	3		
8117	Round Culvert	At Grade	No	4.0	180.4	At Grade		Comparable		6.6	0.999	1	1.192	1		
8480	Box Culvert	At Grade	No	20.0	78.7	At Grade		None		3.0	14.611	13	28.407	1		
9405	Round Culvert	At Grade	25%	3.9	62.3	Perched	0.0	None		14.7	0.236	0	0.236	2		
8426	Round Culvert	Inlet Drop	No	3.6	95.1	Perched	0.3	None		9.8	0.891	1	1.047	1		
8259	Round Culvert	At Grade	25%	2.5	53.1	Perched	0.2	None		8.3	0.493	0	0.493	2		
8018	Round Culvert	At Grade	No	3.2	50.9	At Grade		None		2.6	0.181	1	0.417	1		
8671	Round Culvert	At Grade	No	3.1	60.0	Perched	0.3	None		2.8	0.030	1	0.133	3		
9446	Round Culvert	At Grade	No	3.9	56.1	At Grade		None		8.2	0.011	0	0.011	3		
8136	Round Culvert	At Grade	No	3.0	40.0	Perched	0.1	None		10.6	0.277	2	1.026	0		
9422	Round Culvert	At Grade	No	2.0	21.0	At Grade		None		2.6	0.103	0	0.103	4		
9353	Round Culvert	At Grade	No	2.5	33.8	Perched	0.2	None		14.3	0.256	1	0.749	1		
8691	Round Culvert	At Grade	No	2.9	72.2	Perched	1.0	None		5.5	0.307	0	0.307	2		
8118	Round Culvert	At Grade	No	2.3	45.9	At Grade		Unknown		4.6	0.182	0	0.182	2		
8690	Round Culvert	At Grade	No	4.3	54.3	At Grade		Unknown		4.8	0.186	0	0.186	3		
8502	Round Culvert	At Grade	No	4.8	113.2	At Grade		None		6.4	0.534	1	0.716	1		
8017	Round Culvert	At Grade	No	2.5	40.4	At Grade		None		5.8	0.288	1	0.299	2		
8107	Round Culvert	At Grade	No	3.1	74.1	At Grade		None		21.5	0.131	3	0.422	1		
8412	Pipe Arch Culvert	At Grade	No	13.2	49.5	At Grade		None		3.8	5.130	5	9.660	2		
8873	Round Culvert	At Grade	No	2.5	49.2	Perched	1.3	None		4.9	0.622	0	0.622	2		
8414	Round Culvert	Inlet Drop	No	4.6	63.0	Perched	0.2	None		36.4	1.351	0	1.351	3		
8415	Pipe Arch Culvert	Inlet Drop	No	6.6	48.2	Perched	0.1	None		18.6	0.843	1	2.194	2		
9103	Bridge w/ Abutments	Inlet Drop	25%	2.3	23.0	At Grade		Unknown		3.4	0.156	0	0.156	2		
D0379										5.4	0.320	0	0.320	2	Knights Pond	8.0
D0384										7.0	1.539	14	9.496	1	Mill Pond (2) Dam	18.0