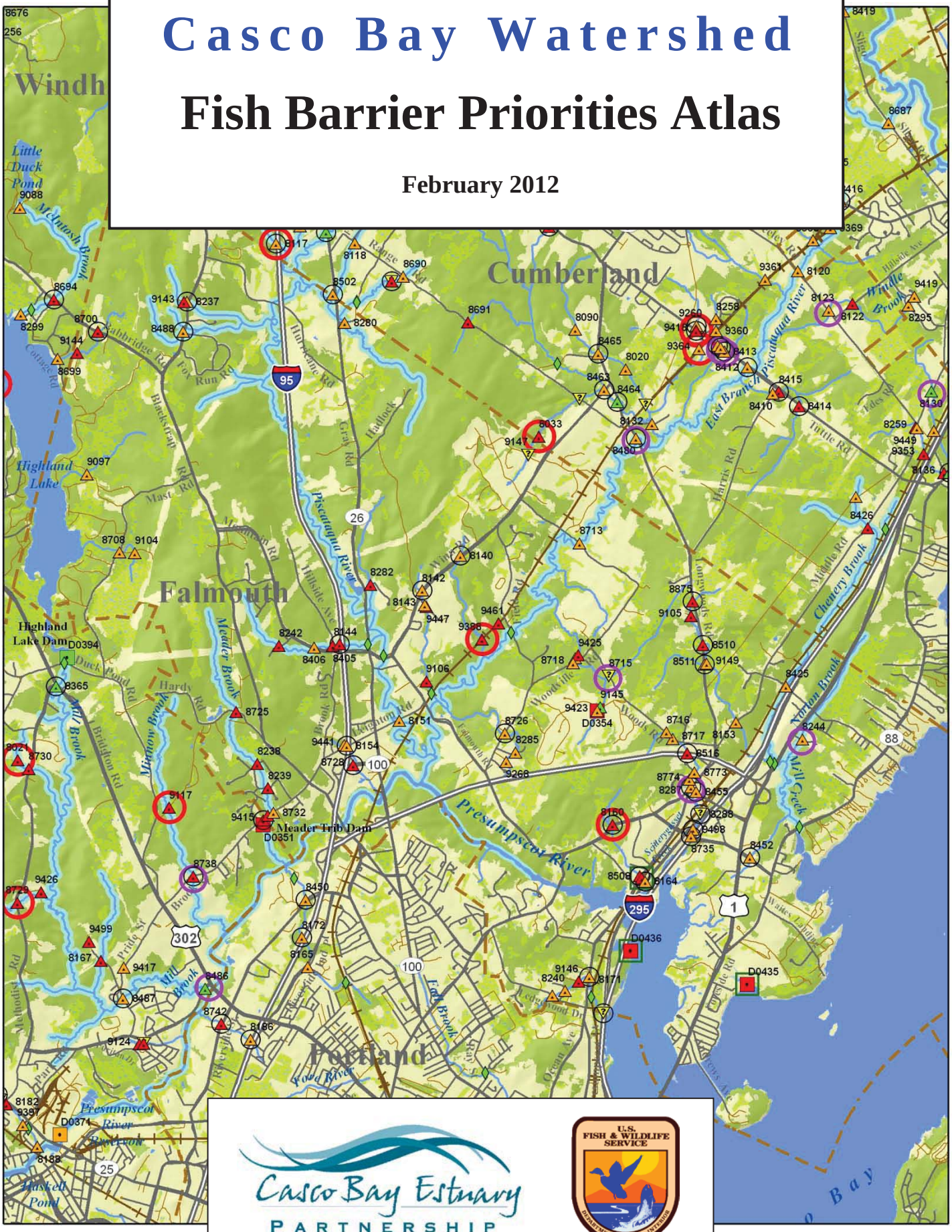
Casco Bay Watershed

Fish Barrier Priorities Atlas

February 2012



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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 surveys[1] 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.

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[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.

Casco Bay Estuary Partnership

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

0 0.5 1 2 3
Miles

Map Created 2/20/2012

Casco Bay Barriers by Town

Otisfield

Map Created 2/20/2012

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
8829	Otisfield	High	Unknown	Potential	6/15/2010	Holden Trail	Private / Driveway	Deadhole Brook	372112	4879224	Perennial			
8930	Otisfield	High	Culvert	Potential	6/15/2010	Oak Hill Rd	Town / Paved	College Swamp Bk	374968	4878893	Perennial	1	Metal	
8929	Otisfield	High	Culvert	Potential	6/15/2010	Oak Hill Rd	Town / Paved	Middle Brook	374309	4878519	Perennial	1	Metal	
8928	Otisfield	High	Culvert	Severe	6/15/2010	Oak Hill Rd	Town / Paved	Unnamed	374131	4878402	Perennial	1	Metal	
8828	Otisfield		Culvert	Severe	6/28/2010	Powhatan Rd	Private / Paved	Dolly Brook	377406	4879792	Perennial	1	Metal	
8927	Otisfield	High	Culvert	Severe	6/16/2010	Rt. 121	State / Paved	Greeley Brook	375982	4880099	Perennial	1	Metal	
8926	Otisfield	High	Culvert	Severe	6/15/2010	Rt. 121	State / Paved	Middle Brook	376351	4880542	Perennial	1	Metal	Rust
9234	Otisfield	High	Culvert	Severe	6/25/2010		Private / Trail	Cold Brook	375202	4875428	Perennial	1	Metal	
9230	Otisfield	High	Culvert	Potential	6/25/2010		Private / Trail	Smith Brook	374046	4875146	Perennial	1	Metal	

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
8829			No							28.2	0.180	0	0.180	0		
8930	Round Culvert	At Grade	No	6.9	31.2	At Grade		None	2.6		4.189	0	4.189	1		
8929	Round Culvert	At Grade	No	2.6	40.7	At Grade		None	3.9		0.831	0	0.831	1		
8928	Round Culvert	At Grade	75%	2.3	38.7	At Grade		Comparable	4.9	2.1	0.920	0	0.920	1		
8828	Round Culvert	At Grade	No	4.9	67.3	Perched	0.5	None	3.3		0.821	0	0.821	3		
8927	Pipe Arch Culvert	At Grade	No	5.0	50.9	Perched	0.5	None	2.6		1.516	0	1.516	3		
8926	Round Culvert	At Grade	No	3.0	49.9	Perched/Cascade	0.1	None	1.0		0.488	0	0.488	3		
9234		Inlet Drop	75%		21.3	At Grade		Unknown	1.0		0.373	0	0.373	2		
9230	Round Culvert	At Grade	No		21.3	At Grade		Unknown		9.3	6.306	5	13.006	0		