

Casco Bay Watershed

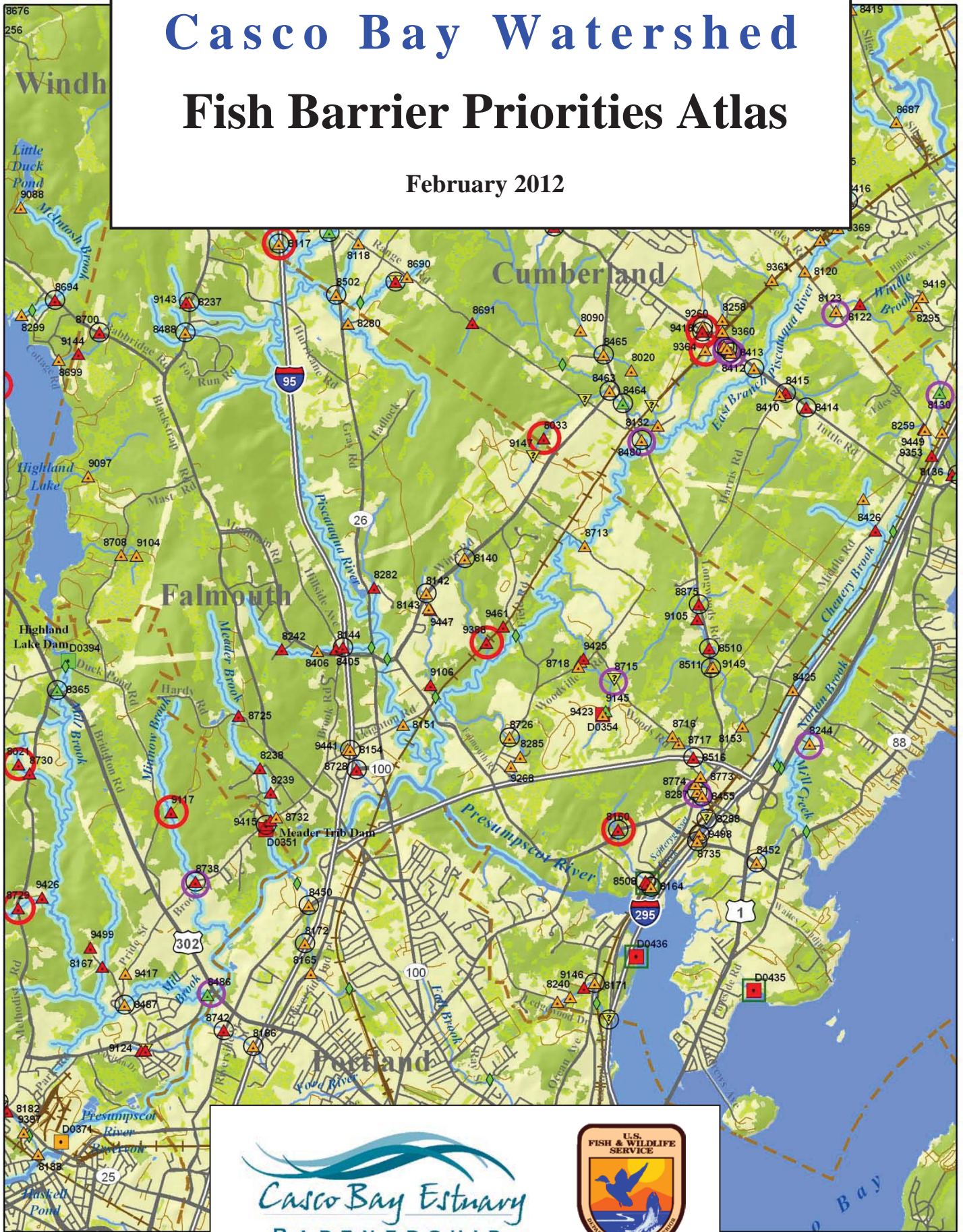
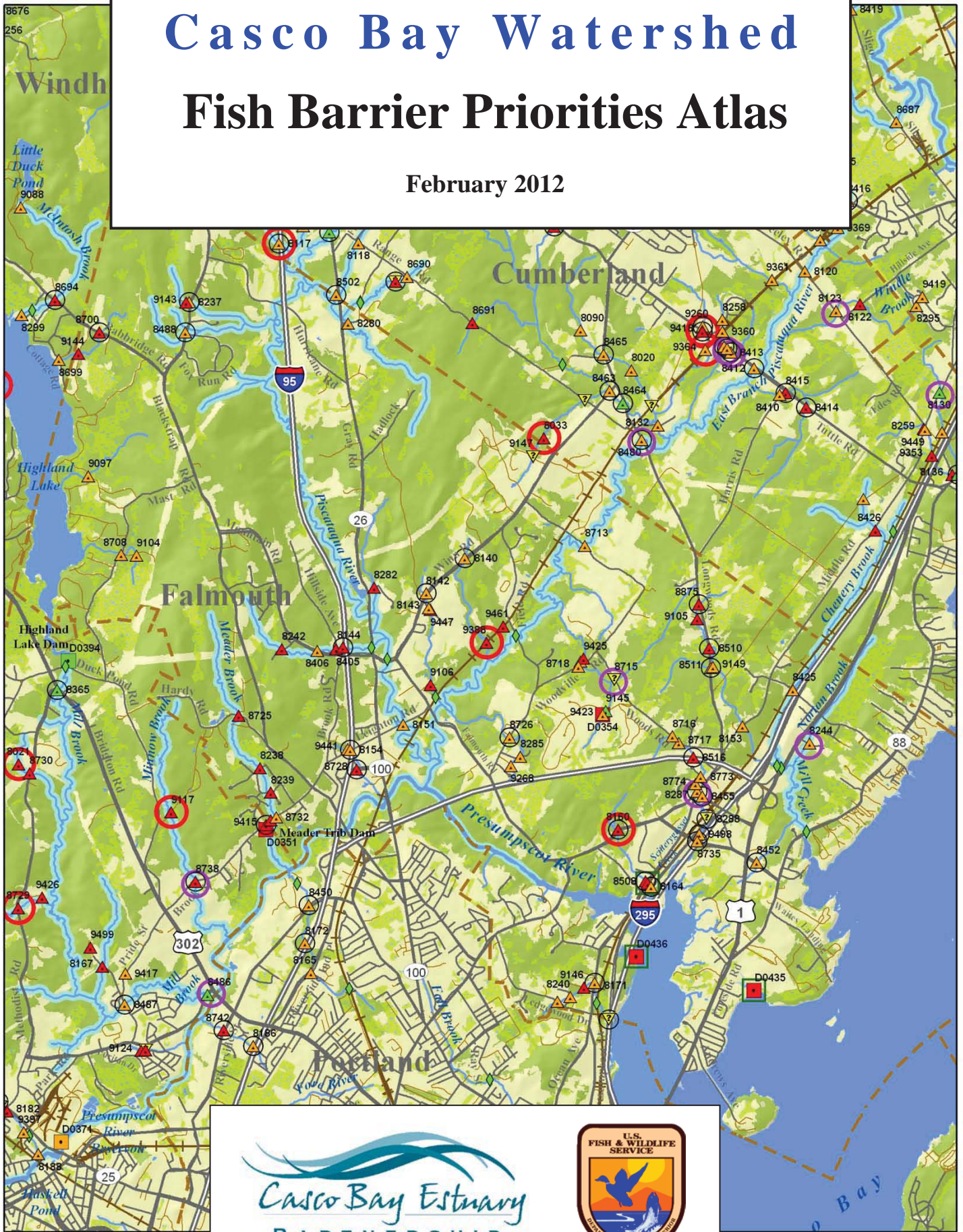
Fish Barrier Priorities Atlas

February 2012

The map displays the Casco Bay Watershed with various fish barrier locations marked by numbered triangles. Some barriers are highlighted with red or purple circles. The map includes major roads (I-95, I-295, US-1, and various state routes) and water bodies (Casco Bay, Presumpscot River, and various brooks). The map is titled "Casco Bay Watershed Fish Barrier Priorities Atlas" and dated "February 2012".

Casco Bay Estuary

U.S. Fish & Wildlife Service

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Casco Bay Watershed

Fish Barrier Priorities Atlas

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.

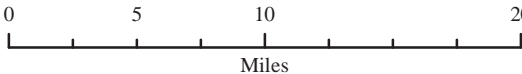
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Casco Bay Barriers by Town

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

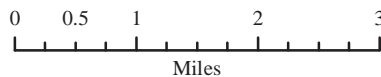
- Private
- Public
- Highway
- Interstate

- 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

Gorham



0 0.5 1 2 3 4
Miles

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
8141	Gorham	High	Culvert	Severe	7/31/2009	Barstow Rd	Town / Paved	Unnamed	381350	4845819	Perennial	1	Plastic	
8523	Gorham	High	Culvert	Potential	8/6/2009	Brookwood Dr	Town / Paved	Nason Brook	381836	4849375	Perennial	1	Metal	
8162	Gorham	High	Culvert	Potential	7/27/2009	Buck Rd	Town / Paved	Douglas Brook	379148	4841847	Perennial	1	Metal	
8161	Gorham	High	Multiple Culverts	Potential	7/27/2009	Buck Rd	Town / Paved	Unknown	379278	4841781	Perennial	3	Metal	
8360	Gorham	High	Culvert	Potential	8/11/2010	County Rd	State / Paved	S Br. Stroudwater R	384741	4832686	Perennial	1	Metal	
8209	Gorham	High	Culvert	Potential	8/11/2010	County Rd	State / Paved	Unknown	383343	4832035	Perennial	1	Metal	Rust
8367	Gorham	High	Multiple Culverts	Potential	7/27/2009	Dingley Spring Rd	Town / Paved	Unknown	376197	4840506	Perennial	4	Metal	
8720	Gorham	High	Culvert	Severe	7/28/2009	Dunlap Rd	Town / Paved	Cold Spings Brook	381744	4844549	Perennial	1	Metal	
8147	Gorham	High	Culvert	Severe	6/23/2009	Dunlap Rd	Town / Paved	No Data	382377	4844335	Perennial	1	Metal	Rust
8744	Gorham	High	Multiple Culverts	Potential	6/30/2009	Finn Parker Rd	Town / Paved	Files Brook	378263	4838750	Perennial	2	Metal	Rust
8197	Gorham	High	Culvert	Potential	6/16/2009	Flaggy Meadow	Town / Paved	Brandy Brook	381931	4836762	Perennial	1	Concrete	
8298	Gorham	High	Culvert	Potential	7/23/2009	Flaggy Meadow	Town / Paved	Little River	380052	4836171	Perennial	1	Metal	
8198	Gorham	High	Culvert	Severe	6/16/2009	Flaggy Meadow	Town / Paved	Unknown	381558	4836581	Perennial	1	Metal	
8163	Gorham	High	Culvert	Potential	7/23/2009	Fort Hill Rd	State / Paved	Johnson Brook	381903	4841698	Perennial	1	Concrete	
8370	Gorham	High	Culvert	Potential	8/11/2010	Hogden Rd	Town / Paved	Stroudwater River	383170	4831637	Perennial	1	Metal	
8131	Gorham	High	Multiple Culverts	Potential	6/23/2009	Hurricane Rd	Town / Paved	Nason Brook	382415	4847929	Perennial	3	Metal	
8737	Gorham	High	Multiple Culverts	Potential	6/16/2009	Huston Ave	Town / Paved	N Branch Little River	382273	4841590	Perennial	2	Metal	
8248	Gorham	High	Culvert	Potential	6/16/2009	Huston Rd	Town / Paved	Farm Brook	383149	4842011	Perennial	1	Metal	Rust
8170	Gorham	High	Culvert	Potential	7/27/2009	Line Rd	Town / Paved	Unknown	376383	4840098	Perennial	1	Metal	Rust
8369	Gorham	High	Culvert	Severe	7/30/2009	Middle Jam Rd	Town / Paved	Unnamed	383041	4851025	Perennial	1	Metal	
8247	Gorham	High	Culvert	Potential	7/28/2009	Nina	Town / Unpaved	Sanborn Brook	380012	4844710	Perennial	1	Metal	
8283	Gorham	High	Culvert	Severe	8/6/2009	North Gorham Rd	Town / Paved	Nason Brook	381844	4848968	Perennial	1	Concrete	
8355	Gorham	High	Multiple Culverts	Severe	6/30/2009	Osipee Trail	State / Paved	Brandy Brook	381281	4837659	Perennial	2	Concrete	
8506	Gorham	High	Culvert	Potential	6/30/2009	Osipee Trail	State / Paved	Douglas Brook	378383	4840597	Perennial	1	Metal	
8146	Gorham	High	Culvert	Severe	7/28/2009	Plummer Rd	Town / Paved	Sanborn Brook	380154	4844547	Perennial	1	Metal	
8368	Gorham	High	Culvert	Potential	7/28/2009	Plummer Rd	Town / Paved	Unnamed	381550	4844866	Perennial	1	Plastic	
8145	Gorham	High	Culvert	Potential	7/28/2009	Plummer Rd	Town / Paved	Westcott Brook	380747	4844592	Perennial	1	Metal	
8741	Gorham	High	Culvert	Severe	10/1/2009	Queen St	Town / Paved	Hamblen Brook	385504	4840182	Perennial	1	Plastic	
9460	Gorham	High	Culvert	Potential	6/16/2009	Queen St	Town / Paved	Hamblen Brook	385314	4840099	Perennial	1	Plastic	
8740	Gorham	High	Culvert	Potential	6/16/2009	Queen St	Town / Paved	Hemblen Brook	385736	4840270	Perennial	1	Plastic	
8148	Gorham	High	Culvert	Potential	7/28/2009	Rt 114	State / Paved	N Branch Little River	378758	4844537	Perennial	1	Metal	
8155	Gorham	High	Multiple Culverts	Potential	7/28/2009	Rt 114	Town / Paved	Skunk Knoll Brook	381534	4842638	Perennial	2	Metal	
8478	Gorham	High	Culvert	Severe	11/18/2009	Rt 237	Private / Paved	Westcott Brook	380031	4847569	Perennial	1	No Data	
8491	Gorham	High	Multiple Culverts	Potential	6/16/2009	Rte 114	State / Paved	Tannery Brook	383372	4838071	Perennial	2	Concrete	
8207	Gorham	High	Culvert	Potential	8/11/2010	South St	State / Paved	Strout Brook	385013	4834037	Perennial	1	Concrete	
8359	Gorham	High	Culvert	Severe	8/13/2010	South St	State / Paved	Strout Brook	384732	4834707	Perennial	1	Concrete	
8208	Gorham	High	Culvert	Potential	8/11/2010	Straw Rd	Town / Paved	Strout Brook	384937	4833810	Perennial	1	Plastic	
8234	Gorham	High	Culvert	Potential	7/31/2009	Underhill Rd	Town / Paved	Unnamed	381950	4846550	Perennial	1	Plastic	
8139	Gorham	High	Culvert	Severe	7/31/2009	Unnamed	Town / Paved	Unnamed	380358	4845927	Perennial	1	Metal	
8205	Gorham	High	Culvert	Severe	8/12/2010	Waterhouse Rd	Town / Paved	Unknown	383825	4834246	Perennial	1	Metal	
8722	Gorham	High	Culvert	Potential	7/28/2009	Wescott Rd	Town / Paved	N Branch Little River	379772	4844320	Perennial	1	Metal	
8137	Gorham	High	Culvert	Severe	6/23/2009	Wilson Rd	Town / Paved	Nason Brook	382544	4847090	Perennial	1	Metal	
8745	Gorham	High	Multiple Culverts	Severe	6/30/2009	Wood Rd	Town / Paved	Files Brook	379439	4837758	Perennial	2	Metal	
8479	Gorham	High	Unknown	Potential	8/3/2009		State	No Data	380226	4847436	Perennial			
9120	Gorham	High	Unknown	Potential	7/27/2009		Private	No Data	381586	4840837	Perennial			
D0372	Gorham	High	Dam	Severe			NA	Presumpscot	383067	4848466	Perennial			
D0377	Gorham	High	Dam	Severe			NA	Presumpscot	384168	4844791	Perennial			
9429	Gorham	High	Culvert	Potential	7/27/2009		Private / Driveway	Unknown	376487	4840005	Perennial	1	Metal	
NBCasco2	Gorham	High	Beaver Dam	Potential	8/11/2010		NA	Unknown	384729	4832685	Perennial			
9333	Gorham	High	Multiple Culverts	Potential	7/31/2009		Railroad	Unnamed	381031	4845474	Perennial	2	Concrete	
9335	Gorham	High	Culvert	Severe	7/31/2009		Railroad	Unnamed	380320	4845833	Perennial	1	Concrete	
9109	Gorham	High	Unknown	Potential	8/20/2009		Private	Ward Brook	384260	4843857	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
8141	Round Culvert	At Grade	No	2.2	39.7	Perched	1.0	None		7.2	0.309	0	0.309	5		
8523	Pipe Arch Culvert	At Grade	No	9.2	95.1	At Grade		None		2.3	2.481	2	3.022	8		
8162	Pipe Arch Culvert	At Grade	No	8.9	43.0	At Grade		None		4.7	1.248	6	6.389	4		
8161	Round Culvert	At Grade	No	2.5	40.0	At Grade		None		7.5	0.460	0	0.460	4		
8360	Round Culvert	At Grade	25%	9.1	85.3	At Grade		Contrasting		13.3	0.000	13	18.316	0		
8209	Round Culvert	At Grade	No	3.0	69.9	At Grade		Unknown		10.5	0.414	0	0.414	2		
8367	Round Culvert	At Grade	No	3.1	40.0	At Grade		None		24.6	1.646	0	1.646	6		
8720	Round Culvert	At Grade	No	4.1	40.4	Perched	0.6	None		14.6	0.672	1	0.782	3		
8147	Round Culvert	At Grade	100%	2.3	45.3	Perched	0.2	None		7.1	0.148	0	0.148	3		
8744	Round Culvert	At Grade	No	2.0	30.2	At Grade		None		5.8	0.268	0	0.268	3		
8197	Round Culvert	At Grade	No	4.9	72.2	At Grade		None		8.1	0.196	0	0.196	3		
8298	Pipe Arch Culvert	At Grade	No	20.3	41.3	At Grade		None		10.1	13.135	20	26.364	2		
8198	Round Culvert	At Grade	75%	2.0	65.6	Perched	0.9	None		4.0	0.363	0	0.363	3		
8163	Round Culvert	At Grade	No	6.0	113.5	At Grade		None		5.4	1.128	0	1.128	3		
8370	Round Culvert	Inlet Drop	No	10.5	86.0	At Grade		Comparable		16.2	3.170	10	15.501	2		
8131	Round Culvert	At Grade	No	3.5	42.7	At Grade		None		9.4	0.956	4	4.282	6		
8737	Pipe Arch Culvert	At Grade	No	13.1	88.6	At Grade		Contrasting		2.3	8.093	30	32.632	2		
8248	Round Culvert	At Grade	No	2.8	59.1	At Grade		None		52.9	0.297	0	0.297	2		
8170	Round Culvert	At Grade	No	5.0	30.5	At Grade		None		11.7	0.223	1	0.607	6		
8369	Round Culvert	At Grade	No	4.0	36.7	Perched	0.4	None		5.2	0.922	0	0.922	7		
8247	Round Culvert	At Grade	No	4.9	85.3	At Grade		None		4.9	1.581	0	1.581	4		
8283	Box Culvert	At Grade	No	8.0	24.6	Perched	0.9	Comparable		3.9	0.304	3	3.326	7		
8355	Round Culvert	At Grade	No	9.1	75.1	Perched/Cascade	1.5	Comparable		10.5	1.206	2	1.764	2		
8506	Pipe Arch Culvert	At Grade	No	13.8	79.7	At Grade		Contrasting		2.6	2.680	5	5.141	5		
8146	Pipe Arch Culvert	At Grade	No	6.9	76.1	Cascade		None		3.6	0.158	1	1.739	3		
8368	Round Culvert	At Grade	No	3.0	42.7	At Grade		None		10.8	0.110	0	0.110	4		
8145	Pipe Arch Culvert	At Grade	No	8.2	80.7	At Grade		None		5.7	3.575	7	5.568	3		
8741	Round Culvert	Perched	No	1.5	57.1	Perched	0.2	None		1.9	0.164	1	0.227	3		
9460	Round Culvert	At Grade	No	2.0	69.9	At Grade		None		9.4	0.063	0	0.063	4		
8740	Round Culvert	At Grade	No	3.0	47.2	At Grade		None		6.5	0.162	2	0.389	2		
8148	Pipe Arch Culvert	At Grade	No	11.5	62.7	At Grade		None		2.9	1.149	5	4.228	4		
8155	Round Culvert	At Grade	No	3.0	76.1	At Grade		None		8.9	3.011	8	9.860	3		
8478	Round Culvert	At Grade	100%			No Data		No Data		3.4	0.384	1	0.549	4		
8491	Round Culvert	At Grade	No	4.6	72.2	At Grade		None		13.0	0.561	0	0.561	2		
8207	Round Culvert	At Grade	No	8.0	114.8	At Grade		Comparable		2.4	0.640	1	0.873	1		
8359	Round Culvert	At Grade	No	2.0	45.9	Perched	0.7	None		8.0	0.234	0	0.234	2		
8208	Round Culvert	At Grade	No	3.0	39.0	At Grade		None		5.8	0.177	2	1.050	0		
8234	Round Culvert	At Grade	No	3.1	87.3	At Grade		None		4.3	0.434	0	0.434	6		
8139	Pipe Arch Culvert	At Grade	No	4.2	52.5	Perched	0.0	None		1.6	0.309	0	0.309	5		
8205	Round Culvert	At Grade	No	2.0	40.7	Perched	0.6	Comparable		6.1	0.280	0	0.280	0		
8722	Pipe Arch Culvert	At Grade	No	10.8	51.8	At Grade		None		5.9	1.085	6	5.313	3		
8137	Pipe Arch Culvert	At Grade	No	5.7	41.0	Perched	0.4	None		5.8	1.160	6	5.875	5		
8745	Round Culvert	At Grade	No	3.9	39.7	Cascade		None		6.0	1.639	1	1.906	2		
8479			No							8.9	0.439	0	0.439	4		
9120			No							3.2	0.636	0	0.636	2		
D0372										10.9	2.428	7	8.645	5	Dundee Pond Dam	52.0
D0377										3.0	9.614	62	99.165	4	Gambo Falls Dam	24.0
9429	Round Culvert	At Grade	No	3.3	26.9	At Grade		None		3.9	0.014	1	0.208	6		
NBCasco2										7.0	2.401	12	18.315	1		
9333	Box Culvert	At Grade	No	1.8	142.4	At Grade		None		16.7	0.321	1	0.630	4		
9335	Box Culvert	At Grade	75%	2.0	131.2	No Data		Unknown		16.2	0.066	1	0.375	4		
9109			No							3.5	0.531	0	0.531	4		