





# 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 surveys<sup>1</sup> 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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<sup>1</sup> 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](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

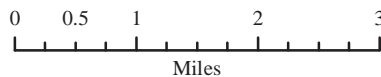
- Private
- Public
- Highway
- Interstate

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

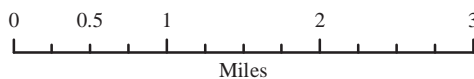
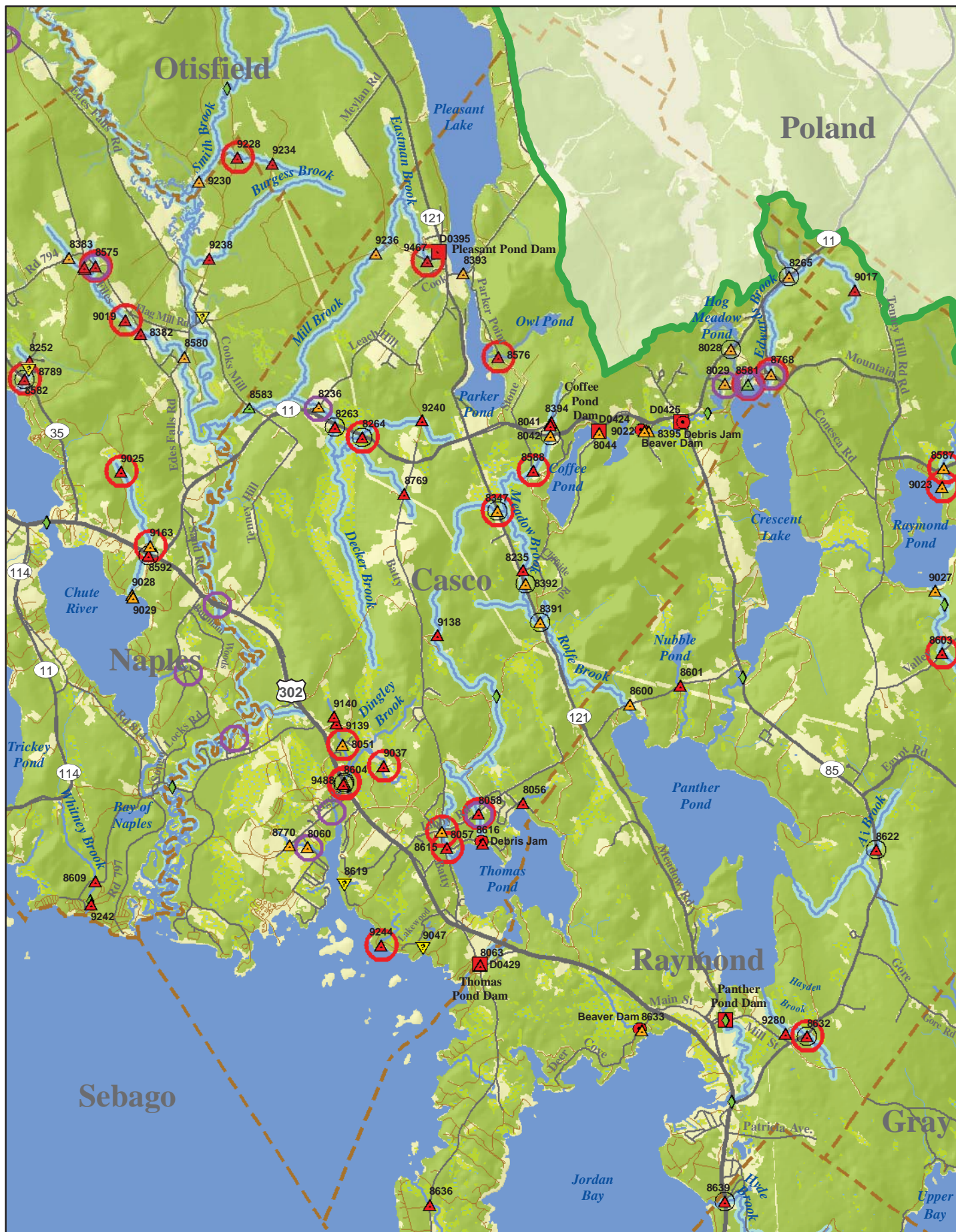
These maps are created primarily with 1:24,000 scale basemap data, with landcover data added to provide general distinctions between open and forested lands. Areas outside of the Casco Bay watershed are masked to obscure them.



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







## 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
8588	Casco	High	Culvert	Severe	10/6/2010	Camp Cedar Rd	Town / Unpaved	Unknown	379306	4870593	Perennial	1	Metal	Rust
8768	Casco	High	Multiple Culverts	Potential	10/8/2010	Conesca Rd	Town / Paved	Edwards Brook	383046	4872129	Perennial	2	Plastic	
8576	Casco		Culvert	Severe	6/3/2010	Country Ln	Town / Unpaved	Unknown	378755	4872399	Perennial	1	Metal	Rust
9236	Casco	High	Multiple Culverts	Potential	6/3/2010	Edes Falls Rd	Private / Trail	Mill Brook	376825	4874020	Perennial	2	Concrete	
9467	Casco	High	Culvert	Severe	6/3/2010	Edes Falls Rd	Town / Unpaved	Unknown	377641	4873896	Perennial	1	Metal	
8041	Casco	High	Culvert	Severe	10/6/2010	Jim Small Rd	Town / Paved	Meadow Brook	379575	4871305	Perennial	1	Plastic	
8394	Casco	High	Culvert	Severe	10/6/2010	Jim Small Rd	Town / Paved	Meadow Brook	379591	4871362	Perennial	1	Metal	Rust
8235	Casco	High	Culvert	Severe	9/7/2010	L. Coffee Pond Rd	Town / Unpaved	Meadow Brook	379149	4869026	Perennial	1	Metal	
9244	Casco		Culvert	Severe	9/10/2010	Lakewood	Private / Unpaved	Unknown	376916	4863131	Perennial	1	Metal	
8236	Casco	High	Culvert	Potential	6/3/2010	Leech Hill Rd.	Town / Paved	Unknown	375926	4871596	Perennial	1	Metal	
8057	Casco	High	Culvert	Potential	9/10/2010	Libby Rd	Town / Paved	Unknown	377866	4864912	Perennial	1	Metal	
8058	Casco	High	Multiple Culverts	Severe	9/10/2010	Libby Rd	Town / Paved	Unknown	378447	4865198	Perennial	4	Plastic	
8392	Casco	High	Culvert	Potential	9/7/2010	Meadow Rd	State / Paved	Meadow Brook	379186	4868814	Perennial	1	Metal	
9140	Casco	High	Culvert	Severe	7/23/2010	Moose Run	Private / Paved	Unnamed	376167	4866724	Perennial	1	Metal	Rust
8265	Casco	High	Culvert	Potential	10/12/2010	Poland Spring R	State / Paved	Unknown	383332	4873662	Perennial	1	Concrete	
8769	Casco	High	Culvert	Severe	6/3/2010	Quaker Hill Rd	Town / Paved	Unknown	377281	4870233	Perennial	1	Plastic	
8264	Casco	High	Multiple Culverts	Severe	6/3/2010	Route 11	State / Paved	Unknown	376616	4871117	Perennial	2	Metal	Rust
8042	Casco	High	Culvert	Potential	10/6/2010	Rt 11-Poland Spring Rd	State / Paved	Meadow Brook	379573	4871135	Perennial	1	Concrete	
8263	Casco	High	Culvert	Severe	6/3/2010	Rt 11-Poland Spring Rd	State / Paved	Meadow Brook	376191	4871281	Perennial	1	Metal	
8391	Casco	High	Multiple Culverts	Potential	9/14/2010	Rt 11-Poland Spring Rd	State / Paved	Rolfe Brook	379411	4868212	Perennial	2	Metal	
9138	Casco	High	Culvert	Severe	9/14/2010	Rt 11-Poland Spring Rd	Private / Unpaved	Rolfe Brook	377799	4868010	Perennial	1	Stone	
8056	Casco	High	Culvert	Severe	9/14/2010	Rt 11-Poland Spring Rd	Town / Unpaved	Unknown	379146	4865367	Perennial	1	Plastic	
8347	Casco	High	Culvert	Potential	10/6/2010	Rt 11-Poland Spring Rd	State / Paved	Unknown	378740	4869954	Perennial	1	Metal	
8615	Casco	High	Culvert	Severe	9/10/2010	Rt 11-Poland Spring Rd	Town / Paved	Unknown	377950	4864664	Perennial	1	Plastic	
8616	Casco	High	Multiple Culverts	Severe	9/10/2010	Rt 11-Poland Spring Rd	Town / Unpaved	Unknown	378507	4864733	Perennial	3	Metal	
9037	Casco	High	Multiple Culverts	Severe	9/10/2010	Rt 11-Poland Spring Rd	Private / Unpaved	Unknown	376956	4865949	Perennial	2	Plastic	
9139	Casco	High	Culvert	Severe	7/23/2010	Rt 11-Poland Spring Rd	Private / Paved	Unnamed	376215	4866623	Perennial	1	Metal	
NBCasco9241	Casco	High	Debris Jam	Potential	9/14/2010		NA	Decker Brk	376680	4868316	Perennial			
9488	Casco		Culvert	Severe	7/23/2010		State	Dingley Brook	376326	4865669	Perennial	1	Metal	
NBCasco9	Casco		Beaver Dam	Severe	10/8/2010		NA	Dumpling Pond	381009	4871218	Perennial			
D0395	Casco	High	Dam	Severe	6/3/2010		NA	Mill Brook	377829	4874029	Perennial			
D0425	Casco		Dam	Severe	10/8/2010		NA	Robinson Brk	381635	4871347	Perennial		Concrete	
NBCasco10	Casco		Debris Jam	Severe	10/8/2010		NA	Robinson Brk	381672	4871349	Perennial			
9240	Casco	High	Culvert	Severe	6/3/2010		Private / Trail	Unknown	377557	4871380	Perennial	1	Metal	Rust
D0424	Casco	High	Dam	Severe	10/8/2010		NA	Unknown	380340	4871192	Perennial		Concrete	
NBCasco4	Casco	High	Debris Jam	Severe	9/10/2010		NA	Unknown	378496	4864755	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
8588	Round Culvert	At Grade	No	1.7	38.4	Perched	2.0	Unknown		19.5	0.401	3	0.943	6		
8768	Round Culvert	At Grade	No	3.9	49.2	At Grade		None		5.3	2.131	2	2.748	2		
8576	Round Culvert	Inlet Drop	No	3.1	32.5	Perched	0.7	None		15.0	0.749	0	0.749	3		
9236	Round Culvert	At Grade	No	4.0	24.9	At Grade		None	3.3		2.209	6	13.361	0		
9467	Round Culvert	Inlet Drop	No	2.5	41.0	Perched	1.0	None	0.7		0.143	5	11.152	1		
8041	Round Culvert	At Grade	No	2.9	44.0	Perched/Cascade	0.1	None		4.7	0.039	1	0.439	8		
8394	Round Culvert	At Grade	No	3.1	37.7	Perched	0.6	Contrasting		8.9	0.399	0	0.399	9		
8235	Round Culvert	At Grade	No	3.8	31.5	Perched	0.8	None		35.3	1.630	5	3.393	5		
9244	Round Culvert	Perched	No	2.1	23.0	Perched	0.3	None		29.4	0.459	0	0.459	1		
8236	Pipe Arch Culvert	At Grade	No	5.9	52.5	At Grade		None	3.3		0.296	5	5.729	0		
8057	Round Culvert	At Grade	No	2.0	45.9	At Grade		Comparable		4.5	0.421	0	0.421	3		
8058	Round Culvert	At Grade	No	2.6	43.6	Perched	1.0	None		3.9	2.911	1	3.386	4		
8392	Round Culvert	At Grade	No	4.6	54.5	At Grade		None		21.2	0.143	6	3.536	4		
9140	Round Culvert	At Grade	No	3.0	48.9	Perched	1.1	None	1.6	3.9	0.190	0	0.190	3		
8265	Box Culvert	At Grade	No	4.1	39.4	At Grade		Comparable		1.8	0.257	0	0.257	3		
8769	Round Culvert	At Grade	No	2.3	38.7	Perched/Cascade	1.0	None	2.0		0.292	0	0.292	2		
8264	Round Culvert	At Grade	No	2.5	49.2	Perched	0.6	None		4.9	0.657	1	1.073	2		
8042	Box Culvert	Inlet Drop	No	5.2	57.4	At Grade		Comparable		13.5	0.103	2	0.542	7		
8263	Round Culvert	At Grade	No	5.9	67.3	Perched	0.1	None	11.5	10.6	3.535	4	5.434	1		
8391	Pipe Arch Culvert	At Grade	No	4.5	48.2	At Grade		Unknown		2.9	0.999	7	4.535	3		
9138		At Grade	No	1.3	19.7	Perched/Cascade	0.7	Contrasting		35.5	0.475	0	0.475	5		
8056	Round Culvert	At Grade	No	15.7	33.5	Perched/Cascade	0.2	None		4.5	0.315	0	0.315	2		
8347	Round Culvert	At Grade	No	1.5	49.2	At Grade		Unknown		4.6	0.820	0	0.820	6		
8615	Round Culvert	At Grade	No	2.0	40.0	Perched	0.9	None		2.7	0.165	1	0.586	2		
8616	Round Culvert	At Grade	No	3.9	41.0	Perched	0.7	None		6.6	0.010	3	3.681	2		
9037	Round Culvert	At Grade	No	1.0	15.7	Perched	0.3	None		6.0	0.394	0	0.394	2		
9139	Round Culvert	At Grade	No	2.9	59.1	Perched/Cascade	0.3	None	2.6		0.069	1	0.259	2		
NBCasco9241										6.3	0.534	0	0.534	2		
9488	Round Culvert	Inlet Drop	No	3.0	16.4	Perched/Cascade	0.9	None		11.8	1.995	3	2.648	1		
NBCasco9										11.6	0.598	1	0.828	4		
D0395										7.0	7.436	4	11.009	2	Pleasant Pond Dam	4.9
D0425										5.5	0.559	2	1.386	3	Unnamed	3.0
NBCasco10										6.0	0.023	3	1.409	2		
9240	Round Culvert	At Grade	No		18.4	Perched	0.1	None		6.2	0.416	0	0.416	3		
D0424										6.9	0.229	0	0.229	5	Coffee Pond Dam	1.3
NBCasco4										13.2	0.285	2	3.671	3		