





# 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.

For more information, please contact:

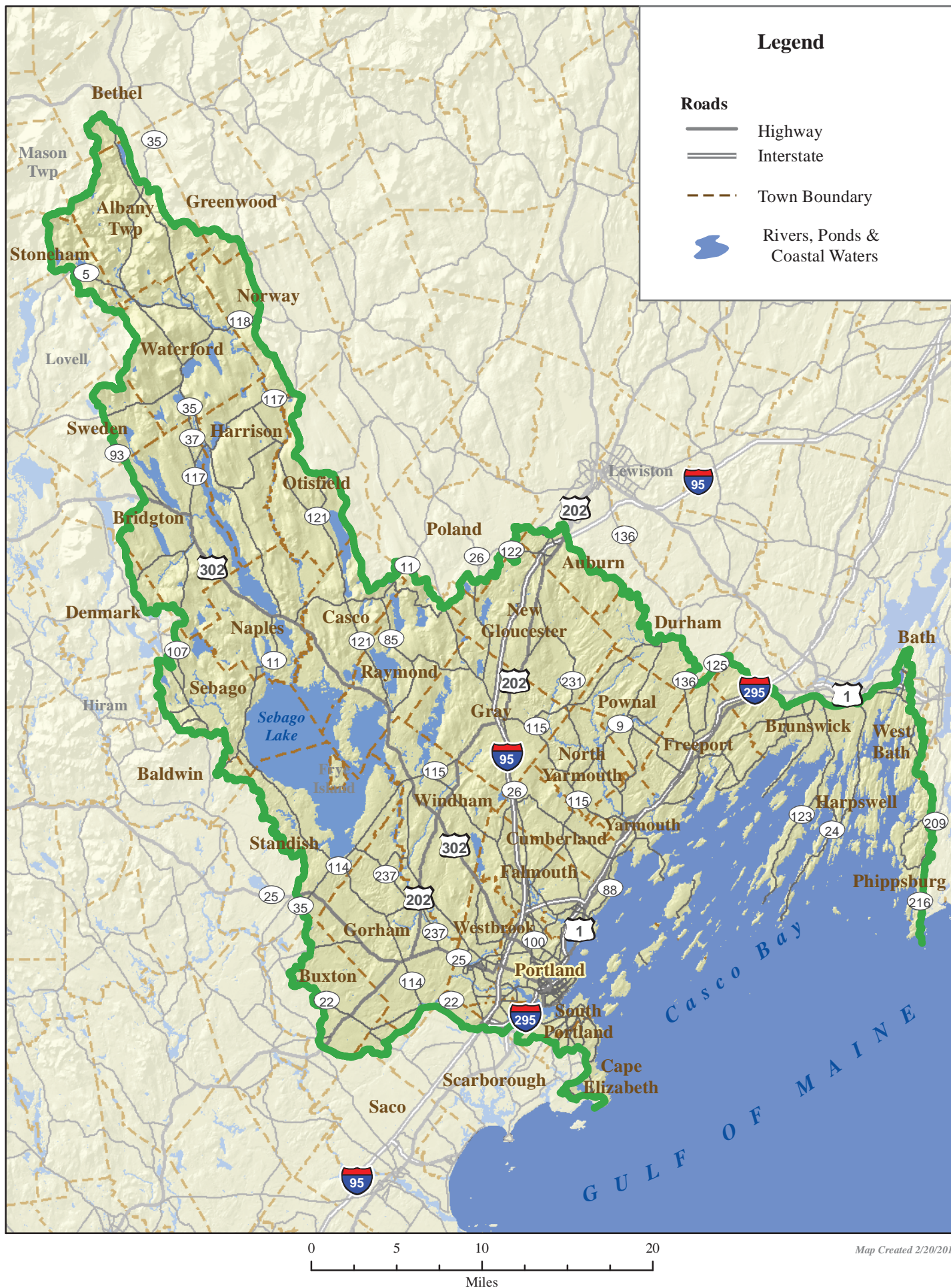
Alex Abbott c/o  
Gulf of Maine Coastal Program  
U.S. Fish and Wildlife Service  
4R Fundy Rd.  
Falmouth, ME 04105  
Telephone: 207-781-8364, ext. 21  
Electronic Mail: [alexoabbott@hotmail.com](mailto:alexoabbott@hotmail.com)

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](mailto:mcraig@usm.maine.edu)  
Website: [www.cascobayestuary.org](http://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







## 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
8598	New Gloucester		Multiple Culverts	Severe	8/17/2009	Bennet Road	Town / Paved	Brandy Brook	395323	4867111	Perennial	3	Concrete	
8597	New Gloucester	High	Multiple Culverts	Severe	8/17/2009	Bennett	Town / Paved	Eddy Brook	393682	4868001	Perennial	2	Plastic	
8045	New Gloucester	High	Culvert	Potential	8/21/2009	Brackett Road	Town / Unpaved	Westcott Brook	390495	4869514	Perennial	1	Metal	
8626	New Gloucester	High	Multiple Culverts	Severe	8/5/2009	Chadsey Rd	Town / Paved	Unknown	400321	4862986	Perennial	3	Metal	
8048	New Gloucester	High	Multiple Culverts	Severe	8/20/2009	Church Rd	Town / Paved	Stevens Brook	396370	4868899	Perennial	3	Concrete	
8593	New Gloucester		Multiple Culverts	Severe	8/18/2009	Durham Rd	Town / Unpaved	Runaround Brook	403402	4867025	Perennial	2	Metal	
8594	New Gloucester		Multiple Culverts	Severe	8/18/2009	Durham Rd	Town / Unpaved	Unnamed	401967	4868035	Perennial	2	Plastic	
8595	New Gloucester		Culvert	Severe	8/18/2009	Durham Rd	Town / Unpaved	Unnamed	402944	4867394	Perennial	1	Metal	
8596	New Gloucester		Culvert	Severe	8/18/2009	Durham Rd	Town / Unpaved	Unnamed	402412	4867748	Perennial	1	Plastic	
8606	New Gloucester		Multiple Culverts	Severe	8/18/2009	Fickett Rd	Town / Paved	Runaround Brook	402543	4865623	Perennial	2	Concrete	
8053	New Gloucester	High	Culvert	Severe	8/17/2009	Fish Hatchery Road	State / Unpaved	Eddy Brook	393781	4865473	Perennial	1	Metal	
8602	New Gloucester	High	Culvert	Potential	8/20/2009	Gloucester Hill Rd	Town / Paved	Stevens Brook	396735	4867910	Perennial	1	Concrete	
8027	New Gloucester	High	Multiple Culverts	Potential	9/10/2009	I-95	State / Paved	Foster Brook	395958	4874215	Perennial	3	Concrete	
8043	New Gloucester	High	Culvert	Severe	8/24/2009	I-95	State / Paved	Unnamed	394669	4870430	Perennial	1	Concrete	
8050	New Gloucester	High	Culvert	Potential	9/10/2009	I-95	State / Paved	Unnamed	393115	4867413	Perennial	1	Concrete	
8446	New Gloucester	High	Culvert	Severe	8/17/2009	Jackhill	Town / Paved	Brandy Brook	395199	4865585	Perennial	1	Metal	
8975	New Gloucester		Culvert	Severe	8/19/2009	Meadow Rd	Town / Unpaved	Unnamed	400028	4869810	Perennial	1	Metal	
8445	New Gloucester	High	Culvert	Severe	8/17/2009	Morse Rd	Town / Paved	Brandy Brook	395566	4864180	Perennial	1	Metal	
8014	New Gloucester	High	Unknown	Potential	8/19/2009	North Shore Dr	Unknown - e911	Westcott Brook	389717	4868456	Perennial			
8591	New Gloucester	High	Multiple Culverts	Potential	8/19/2009	Pond Rd	Town / Unpaved	Westcott Brook	390031	4868908	Perennial	2	Metal	
9435	New Gloucester	High	Multiple Culverts	Severe	8/19/2009	Pond Rd	Private / Driveway	Westcott Brook	389976	4868900	Perennial	2	Concrete	
8572	New Gloucester	High	Multiple Culverts	Potential	8/21/2009	Route 122	State / Paved	Foster Brook	395368	4875878	Perennial	2	Metal	
8605	New Gloucester		Culvert	Severe	8/20/2009	Route 231	State / Paved	Bear Brook	399714	4865803	Perennial	1	Metal	
8503	New Gloucester	High	Multiple Culverts	Potential	8/21/2009	Route 26	State / Paved	Westcott Brook	390641	4869628	Perennial	2	Metal	
8504	New Gloucester	High	Culvert	Severe	8/17/2009	Route 4	State / Paved	Brandy Brook	395206	4865557	Perennial	1	Concrete	
8505	New Gloucester	High	Culvert	Potential	8/21/2009	Route 4	State / Paved	Royal River	396926	4874429	Perennial	1	Metal	
8447	New Gloucester	High	Culvert	Severe	8/21/2009	Snow Hill Rd	Town / Paved	Unnamed	395837	4871686	Perennial	1	Concrete	
8586	New Gloucester	High	Culvert	Severe	8/21/2009	Snow Hill Rd	Town / Paved	Unnamed	394709	4871054	Perennial	1	Plastic	
8015	New Gloucester	High	Unknown	Potential	8/17/2009	Wing Ave	Unknown - e911	Brandy Brook	395114	4866381	Perennial			
8016	New Gloucester		Multiple Culverts	Severe	8/19/2009	Woodman Rd	Unknown / Unpaved	Unnamed	400463	4869927	Perennial	3	Metal	
D0367	New Gloucester	High	Dam	Severe	9/16/2009		NA	Eddy brook	393446	4866171	Perennial		Concrete	
D0378	New Gloucester	High	Dam	Severe			NA	royal river	395814	4871925	Perennial		Concrete	
D0406	New Gloucester	High	Dam	Severe	8/20/2009		NA	Stevens Brook	396735	4867910	Perennial		Concrete	
9324	New Gloucester	High	Culvert	Severe	8/19/2009		Railroad	Unnamed	398762	4867053	Perennial	1	Plastic	

## 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
8598	Round Culvert	At Grade	50%	2.5	41.0	At Grade		None		32.3	1.222	0	1.222	8		
8597	Round Culvert	At Grade	No	3.0	39.4	Cascade		None		10.0	0.941	0	0.941	6		
8045	Round Culvert	At Grade	No	5.4	24.3	At Grade		None		2.3	2.080	3	4.465	5		
8626	Round Culvert	At Grade	No	4.0	40.0	Perched	0.8	None		3.9	0.750	0	0.750	4		
8048	Round Culvert	At Grade	No	2.5	40.7	Perched	1.8	None		4.8	0.688	0	0.688	4		
8593	Round Culvert	At Grade	75%	5.0	40.4	At Grade		None		9.8	1.254	2	3.250	7		
8594	Round Culvert	At Grade	No	1.5	39.7	Perched	1.0	None		5.0	0.357	0	0.357	9		
8595	Round Culvert	At Grade	25%	2.6	32.5	Perched	0.7	None		3.6	0.552	0	0.552	8		
8596	Round Culvert	At Grade	25%	3.0	39.4	Perched	0.1	None		10.8	0.097	0	0.097	8		
8606	Round Culvert	At Grade	No	3.4	42.0	Perched	1.5	None		2.4	1.340	1	1.996	8		
8053	Round Culvert	At Grade	No	2.6	40.0	Perched	0.1	None		5.9	0.517	3	3.489	4		
8602	Box Culvert	At Grade	No	4.4	32.5	At Grade		None		6.6	0.721	1	1.409	2		
8027	Round Culvert	At Grade	No	5.2	275.6	At Grade		Comparable		7.8	1.463	1	2.302	3		
8043	Round Culvert	At Grade	75%	4.8	132.2	At Grade		None		4.8	0.501	0	0.501	5		
8050	Round Culvert	At Grade	No	6.0	108.3	At Grade		None		2.3	0.527	0	0.527	6		
8446	Round Culvert	At Grade	No	6.1	24.9	Perched/Cascade	0.4	None		8.8	0.595	2	2.342	6		
8975	Round Culvert	Unknown			41.3	At Grade		None		5.1	0.078	0	0.078	2		
8445	Round Culvert	At Grade	No	7.2	58.4	Perched/Cascade	0.2	None		19.0	0.993	4	3.352	4		
8014			No							4.1	1.922	0	1.922	8		
8591	Round Culvert	At Grade	No	3.7	34.8	At Grade		None		6.9	0.065	2	2.385	6		
9435	Round Culvert	At Grade	No	4.3	25.9	Perched	0.5	None		7.1	0.398	1	2.320	7		
8572	Round Culvert	At Grade	No	4.8	52.8	At Grade		None		6.1	0.839	0	0.839	4		
8605	Round Culvert	Inlet Drop	100%	3.3	70.5	At Grade		None		7.8	0.342	0	0.342	2		
8503	Pipe Arch Culvert	At Grade	No	5.7	128.6	At Grade		None		7.0	0.119	4	4.585	4		
8504	Box Culvert	Inlet Drop	No	7.0	76.4	Perched	0.5	None		8.2	0.017	3	2.359	5		
8505	Pipe Arch Culvert	At Grade	No	13.5	262.1	At Grade		Comparable		10.5	2.901	13	22.327	2		
8447	Round Culvert	Perched	No	4.4	58.4	Perched	1.5	None		4.8	0.694	0	0.694	4		
8586	Round Culvert	At Grade	No	3.1	69.2	Perched	0.3	None		4.6	0.475	1	0.976	4		
8015			No							4.1	0.525	1	1.747	7		
8016	Round Culvert	At Grade	25%	1.6	28.2	Perched	0.2	None		8.1	1.480	0	1.480	2		
D0367										11.0	1.505	2	2.972	5	Unnamed	6.6
D0378										7.4	9.648	10	17.124	3	Jordan Mill Dam	10.0
D0406										6.2	0.721	1	1.409	2	Unnamed	5.5
9324	Round Culvert	Perched	No	3.0	61.0	Perched	0.5	None		17.0	0.181	0	0.181	2		