MARE BROOK ASSESSMENT

Technical Advisory Meeting # 1

Town of Brunswick, Maine

January 22, 2016

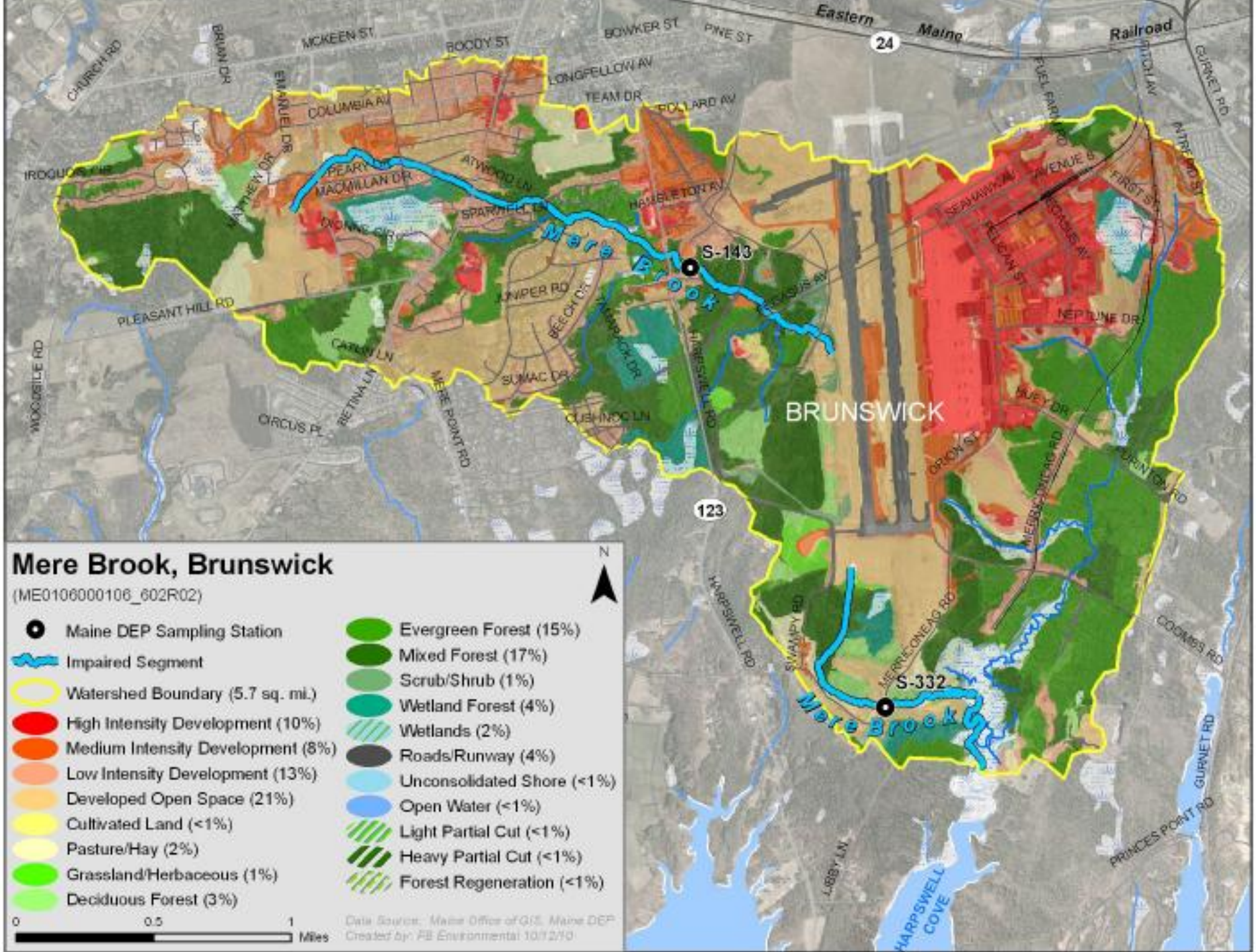
FB environmental

MEETING AGENDA| TAC

1. **Welcome and Introductions**
2. **Project Overview and Schedule**
3. **Work Completed to Date**
   - Initial Site Visit
   - Data Gap Analysis and Recommendations
   - Sampling and Analysis Plan and Implementation
   - Geomorphic Assessment
4. **TAC Feedback**
   - Stressor Analysis Activity
   - Approach for Spring Field Work
   - Landowner Contact Process
5. **Next Steps**

PROJECT SCHEDULE| TASKS

- **TASK 1**: Project Management and Administration
- **TASK 2**: Stakeholder Meetings and Landowner Participation
- **TASK 3**: Develop and Facilitate TAC Meetings and SAP
- **TASK 4**: Mare Brook Corridor Assessment
- **TASK 5**: Develop BMP Report

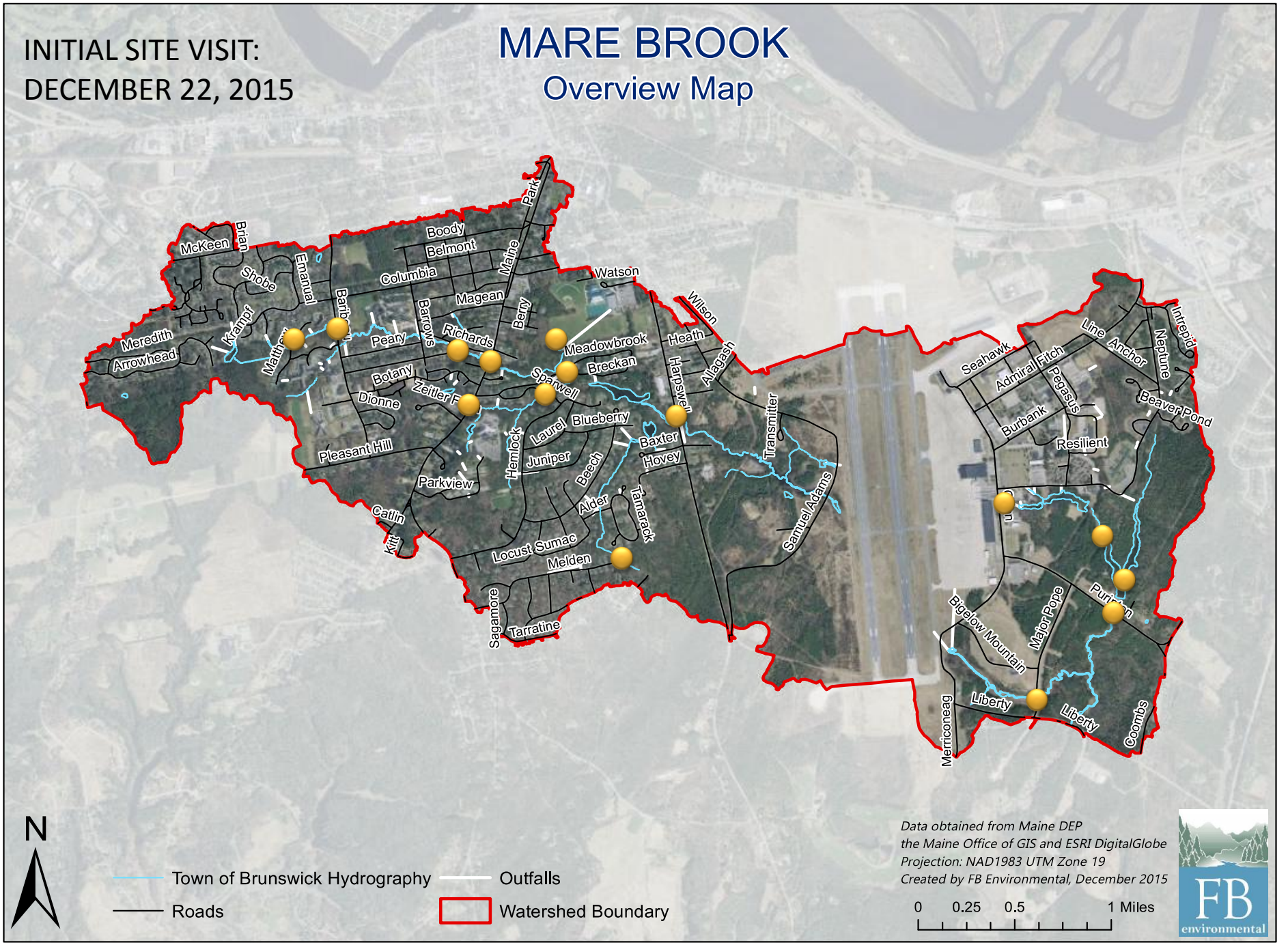

Mere Brook, Brunswick
(ME0106000106_602R02)
Maine DEP Sampling Station
Impaired Segment
Watershed Boundary (5.7 sq. mi.)
High Intensity Development (10%)
Medium Intensity Development (8%)
Low Intensity Development (13%)
Developed Open Space (21%)
Cultivated Land (<1%)
Pasture/Hay (2%)
Grassland/Herbaceous (1%)
Deciduous Forest (3%)
Evergreen Forest (15%)
Mixed Forest (17%)
Scrub/Shrub (1%)
Wetland Forest (4%)
Wetlands (2%)
Roads/Runway (4%)
Unconsolidated Shore (<1%)
Open Water (<1%)
Light Partial Cut (<1%)
Heavy Partial Cut (<1%)
Forest Regeneration (<1%)
0
0.5
1
Miles
Data Source: Maine Office of GIS, Maine DEP
Created by: FB Environmental 10/12/10
N
S-143
S-332
Mere Brook
BRUNSWICK
Eastern Maine Railroad
24
123
MCKEEN ST
BOODY ST
BOWKER ST
PINE ST
LONGFELLOW AV
TEAM DR
COLUMBIA AV
ATWOOD LN
HAMBLETON AV
SPARWELL LN
JUNIPER RD
PLEASANT HILL RD
CATLIN LN
SUMAC DR
CUSHNOC LN
CIRCUS PL
MERE POINT RD
HARPSWELL RD
SWAMPY RD
MERRICONEAG RD
ORION ST
NEPTUNE DR
HUEY DR
COOMBS RD
GURNET RD
PRINCES POINT RD
HARPSWELL COVE
LIBBY LN
WOODSIDE RD
CHURCH RD
BRIAN DR
EMANUEL DR
MATTHEW DR
PEARY DR
MACMILLAN DR
DIONNE CIR
BEECH DR
TAMARACK DR
HARPSWELL RD
FUEL FARM RD
AVENUE S
FIRST ST
PELICAN ST
PEGASUS AV
INTREPID ST
PITCH AV
GURNET RD

WORK COMPLETED|
INITIAL SITE VISIT

INITIAL SITE VISIT:
DECEMBER 22, 2015

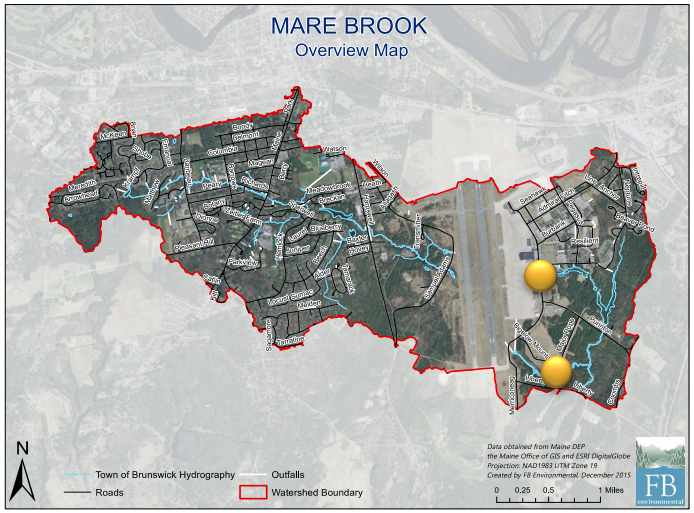
MARE BROOK

Overview Map



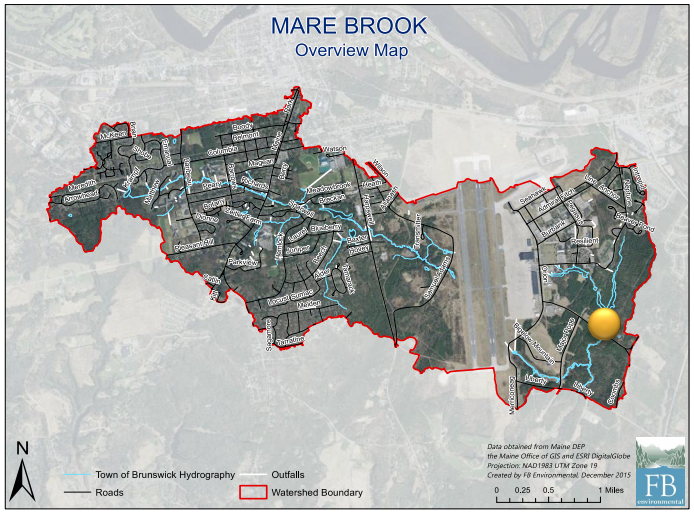
MARE BROOK SITES 1 & 2

Site 1: Major Pope Rd

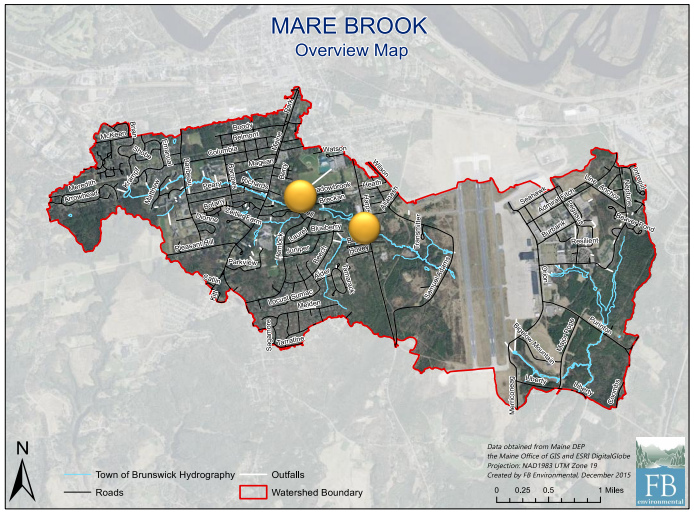


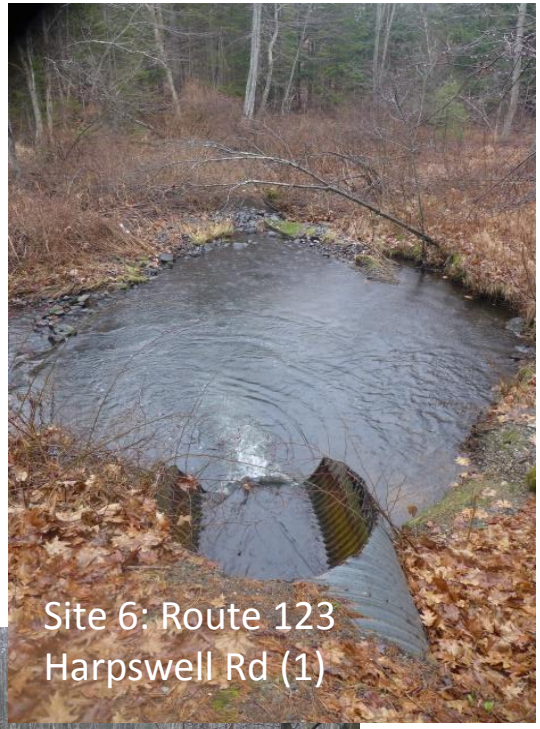
Site 2: Orion Rd Culvert Outlet

MARE BROOK SITE 3



MARE BROOK SITES 6 & 7

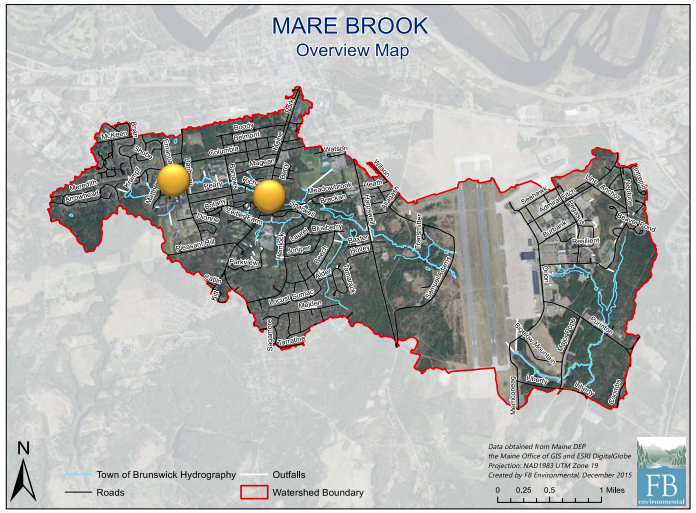



Site 6: Route 123
Harpswell Rd (1)

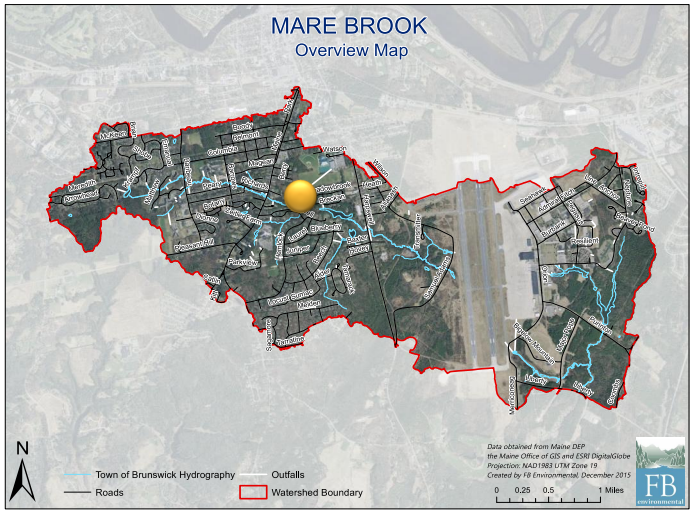
Site 7: Meadowbrook Rd (1)

Site 6: Route 123, Harpswell Rd (2)

MARE BROOK SITES 11 & 14



MARE BROOK SITE 15



Site 15: Off Watson Ave, behind Bowdoin College (1)

Site 15: Off Watson Ave, behind Bowdoin College (2)

INITIAL SITE VISIT: SUMMARY

WORK COMPLETED|
GAP ANALYSIS

GAP ANALYSIS| GOALS

- Collect & Assemble Historical Documents
- Create a Data Directory
- Identify Gaps in Data for Future Monitoring & Assessment
- Use for Water Quality Review

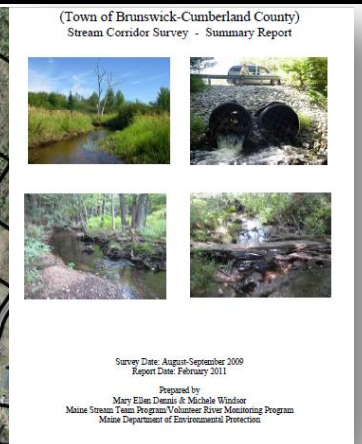
Photos: Maine DEP 2011 SGS

GAP ANALYSIS| DATA CATALOG

Title	Filename	Author	File Type	Document type	Date	Brief Description	Parameters Measured/Presented	Source	Data/Report location
Town of Brunswick									
Town of Topsham information for Urban Impaired Watershed	Town of Topsham information for Urban Impaired Watershed	?	Excel	Spreadsheet	Presumably 2009	List of names and addresses	Address, owner, owner's address	Town	2009 Volunteer Monitoring (Brunswick)
Town of Brunswick information for Urban Impaired Watershed	Town of Brunswick information for Urban Impaired Watershed	?	Excel	Spreadsheet	Presumably 2009	List of names and addresses	Address, owner, owner's address	Town	2009 Volunteer Monitoring (Brunswick)
Mere Brook direct stream landowners	Mere Brook direct stream landowners	?	Excel	Spreadsheet	Presumably 2009	Parcel numbers	Map, lot, sub	Town	2009 Volunteer Monitoring (Brunswick)
Mere Brook Monitoring Flyer	MBvolunteerlist	?	Excel	Spreadsheet	Presumably 2009	List of volunteers	Name, email, phone	Town	2009 Volunteer Monitoring (Brunswick)
MereBrook_Base Access Request Letter	Mere Brook Monitoring Flyer	Vanessa Levesque (Town of Brunswick)	pdf	Flyer	Presumably 2009	Flyer to recruit volunteers	n/a	Town	2009 Volunteer Monitoring (Brunswick)
Mere Brook walk abutter letter_VL_aug13	merebrook sampling south3(small)	?	pdf	Map	Presumably 2009	Map depicting one potential monitoring station	Monitoring station	Town	2009 Volunteer Monitoring (Brunswick)\Maps
MBvolunteerlist	merebrooksurvey_BNAS	?	pdf	Map	Presumably 2009	Map depicting monitoring sections on BNAS property	Monitoring stations	Town	2009 Volunteer Monitoring (Brunswick)\Maps
Mere Brook: Potential Southern Monitoring Station	MereBrook_allsites	?	pdf	Map	Presumably 2009	Map depicting potential stream monitoring locations	Monitoring stations	Town	2009 Volunteer Monitoring (Brunswick)\Maps
Mere Brook Survey on BNAS	merebrook sampling north3(small)	?	pdf	Map	Presumably 2009	Map depicting three monitoring stations	Monitoring stations	Town	2009 Volunteer Monitoring (Brunswick)\Maps
Mere Brook Watershed: Possible Stream Monitoring	merebrook sampling south2	?	pdf	Map	Presumably 2009	Map depicting two potential monitoring stations	Monitoring stations	Town	2009 Volunteer Monitoring (Brunswick)\Maps
Maine Department of Environmental Protection									
Method for Delineating Impervious Area	Method for Delineating Impervious Area	DEP	Word	Document	?	Paragraph describing method for delineating impervious area	-	DEP	Maine DEP Files\Impervious_Surface_Maps\Methods-watershed and impervious surface delineations
Watershed Delineation Methodology	Watershed Delineation Methodology	DEP	Word	Document	?	Paragraph describing method of watershed delineation	-	DEP	Maine DEP Files\Impervious_Surface_Maps\Methods-watershed and impervious surface delineations
-	WatershedBoundary_DEP	DEP	kmz	kmz	?	Mere Brook Watershed Boundary	Watershed boundary	DEP	Maine DEP Files
Mere Brook Watershed Impervious Analysis Catchments of Outfalls from Developed Areas	Mere_Brook_Final (Catchments)	DEP	pdf	Map	?	Map of catchment boundaries for each stormwater outfall including a table summarizing impervious surface information	Catchment boundaries, impervious surface	DEP	Maine DEP Files\Impervious_Surface_Maps
Mere Brook Watershed Impervious Analysis Tributary Area	Mere_Brook_Final (Tributaries)	DEP	pdf	Map	?	Map of tributary areas including a table summarizing impervious surface information	Tributary areas, impervious surface	DEP	Maine DEP Files\Impervious_Surface_Maps
Mere Brook a.k.a. Mare Brook TMDL Assessment Summary	Appendix_17_MereBrook	DEP	pdf	Document	2012	From the Statewide IC TMDL. Lists Mare Brook as 21% impervious, and calls for a 62% reduction in IC.			
Mere Brook Watershed Tributary and Main Stem Analysis (Acres)	Trib Final(Acres)	DEP	Excel	Spreadsheet	?	Impervious area per tributary	Various aspects of impervious surfaces	DEP	Maine DEP Files\Impervious_Analysis_Tables
Mere Brook Watershed Catchment Impervious Analysis (Acres)	Catchments Final(Acres)	DEP	Excel	Spreadsheet	?	Impervious surface per outfall (lists outfall codes)	Various aspects of impervious surfaces	DEP	Maine DEP Files\Impervious_Analysis_Tables

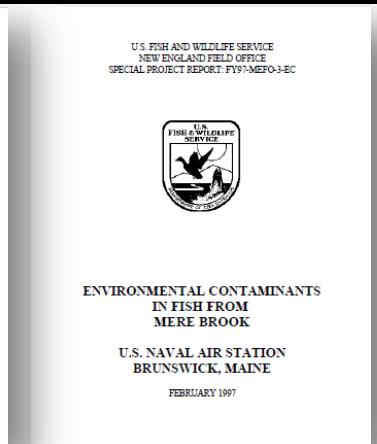
GAP ANALYSIS|RESULTS

- ✓ **Planning Documents**
- ✓ **Field Surveys**
- ✓ **Maps & GIS Data**
- ✓ **Water Quality Data & Studies**


(Town of Brunswick-Cumberland County)
Stream Corridor Survey - Summary Report

Survey Date: August-September 2009
Report Date: February 2011

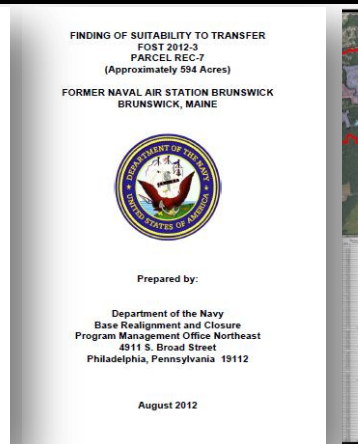
Prepared by
Mary Ellen Dennis & Michele Windsor
Maine Stream Team Program/Volunteer River Monitoring Program
Maine Department of Environmental Protection


U.S. FISH AND WILDLIFE SERVICE
NEW ENGLAND FIELD OFFICE
SPECIAL PROJECT REPORT: FY97-MEFO-3-EC

ENVIRONMENTAL CONTAMINANTS
IN FISH FROM
MERE BROOK

U.S. NAVAL AIR STATION
BRUNSWICK, MAINE

FEBRUARY 1997

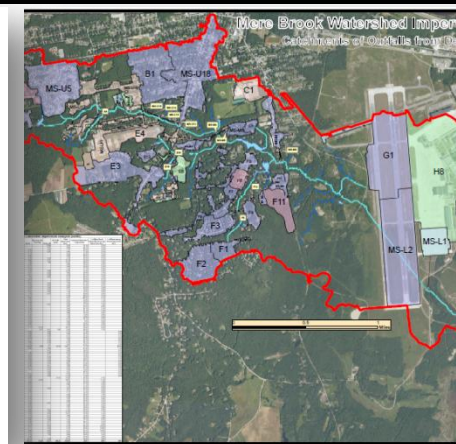

FINDING OF SUITABILITY TO TRANSFER
FOST 2012-3
PARCEL REC-7
(Approximately 594 Acres)

FORMER NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

Prepared by:

Department of the Navy
Base Realignment and Closure
Program Management Office Northeast
4911 S. Broad Street
Philadelphia, Pennsylvania 19112

August 2012



GAP ANALYSIS| KEY DOCUMENTS

Maine DEP

- 2009 SCS Survey
- 2012 TMDL Summary
- IC Analysis
- WQ Data
- SWAT Reports

Town of Brunswick

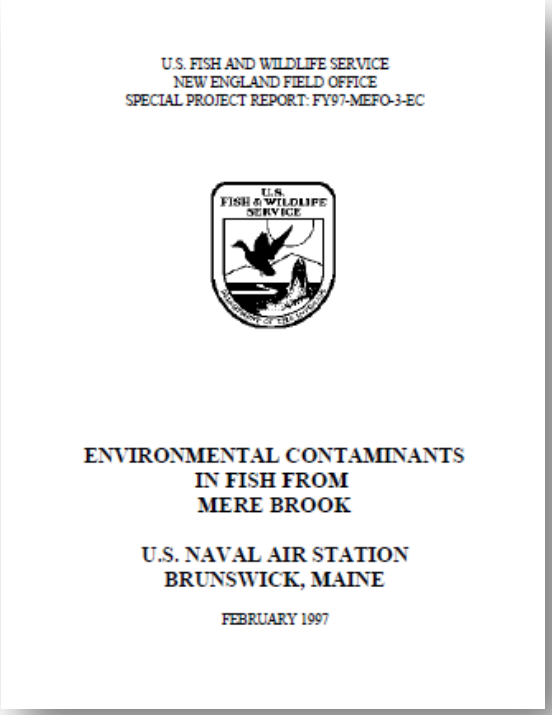
- GIS Data
- 2009 Survey Info

Dept. of the Navy (BNAS)

- 50+ Documents
- USFWS 1997 and 2008 Fish Tissue Study

GAP ANALYSIS|KEY DOCUMENTS

1997 & 2008



U.S. FISH AND WILDLIFE SERVICE
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SPECIAL PROJECT REPORT: FY97-MEFO-3-EC

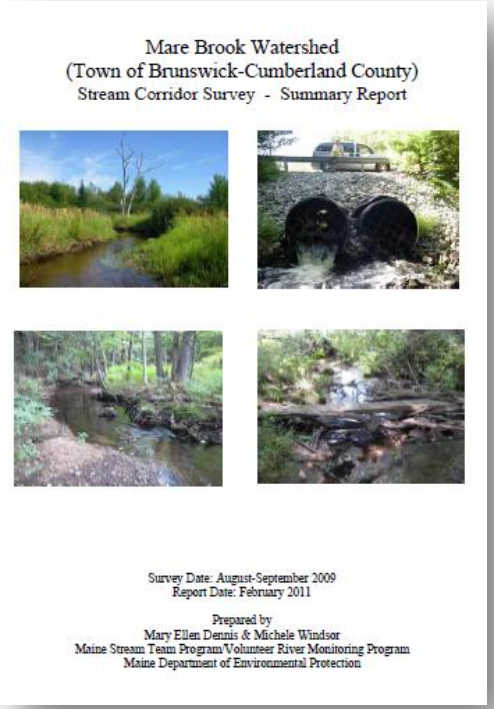
ENVIRONMENTAL CONTAMINANTS
IN FISH FROM
MERE BROOK

U.S. NAVAL AIR STATION
BRUNSWICK, MAINE

FEBRUARY 1997

USFWS Fish Tissue Studies
Brook Trout
Elevated Cu, Mg, DDT

2009



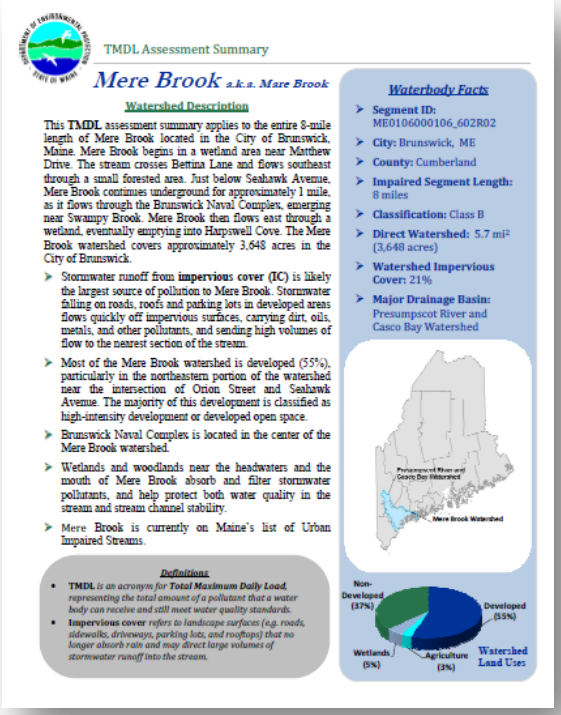
Mare Brook Watershed
(Town of Brunswick-Cumberland County)
Stream Corridor Survey - Summary Report

Survey Date: August-September 2009
Report Date: February 2011

Prepared by
Mary Ellen Dennis & Michele Windsor
Maine Stream Team Program/Volunteer River Monitoring Program
Maine Department of Environmental Protection

Town of Brunswick & DEP
17 Stream Reaches
Barriers to fish movement
Undercut banks
Algae "Plentiful"
Sediment & yard waste

2012



TMDL Assessment Summary

Mere Brook a.k.a. Mare Brook

Watershed Description

This TMDL assessment summary applies to the entire 8-mile length of Mere Brook located in the City of Brunswick, Maine. Mere Brook begins in a wetland area near Matthew Drive. The stream crosses Bettina Lane and flows southeast through a small forested area. Just below Seahawk Avenue, Mere Brook continues underground for approximately 1 mile, as it flows through the Brunswick Naval Complex, emerging near Swampy Brook. Mere Brook then flows east through a wetland, eventually emptying into Harpswell Cove. The Mere Brook watershed covers approximately 3,648 acres in the City of Brunswick.

- Stormwater runoff from **impervious cover (IC)** is likely the largest source of pollution to Mere Brook. Stormwater falling on roads, roofs and parking lots in developed areas flows quickly off impervious surfaces, carrying dirt, oils, metals, and other pollutants, and sending high volumes of flow to the nearest section of the stream.
- Most of the Mere Brook watershed is developed (55%), particularly in the northeastern portion of the watershed near the intersection of Orion Street and Seahawk Avenue. The majority of this development is classified as high-intensity development or developed open space.
- Brunswick Naval Complex is located in the center of the Mere Brook watershed.
- Wetlands and woodlands near the headwaters and the mouth of Mere Brook absorb and filter stormwater pollutants, and help protect both water quality in the stream and stream channel stability.
- Mere Brook is currently on Maine's list of Urban Impaired Streams.

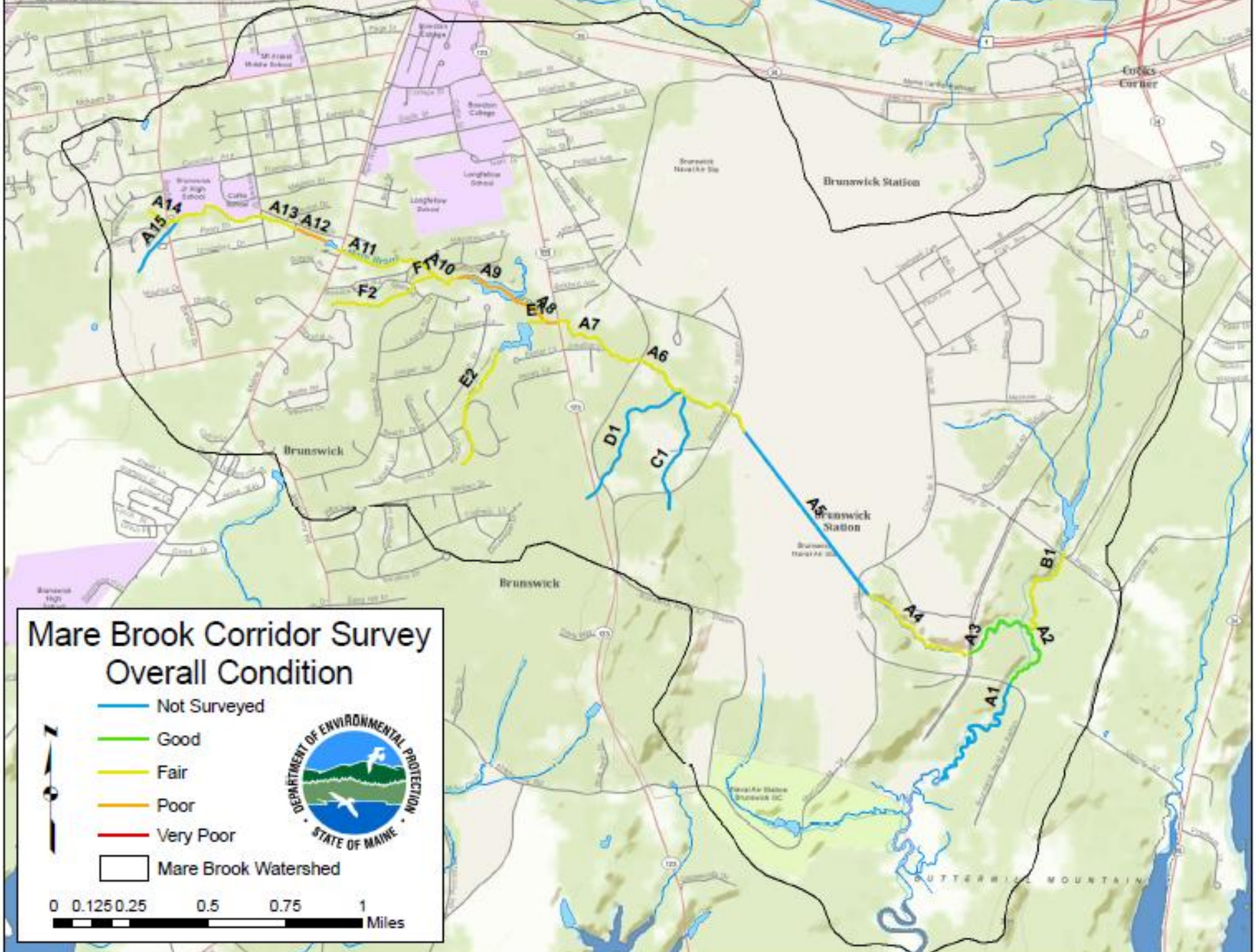
Definitions

- **TMDL** *is an acronym for* ***Total Maximum Daily Load****, representing the total amount of a pollutant that a water body can receive and still meet water quality standards.*
- **Impervious cover** *refers to landscape surfaces (e.g. roads, sidewalks, driveways, parking lots, and rooftops) that no longer absorb rain and may direct large volumes of stormwater runoff into the stream.*

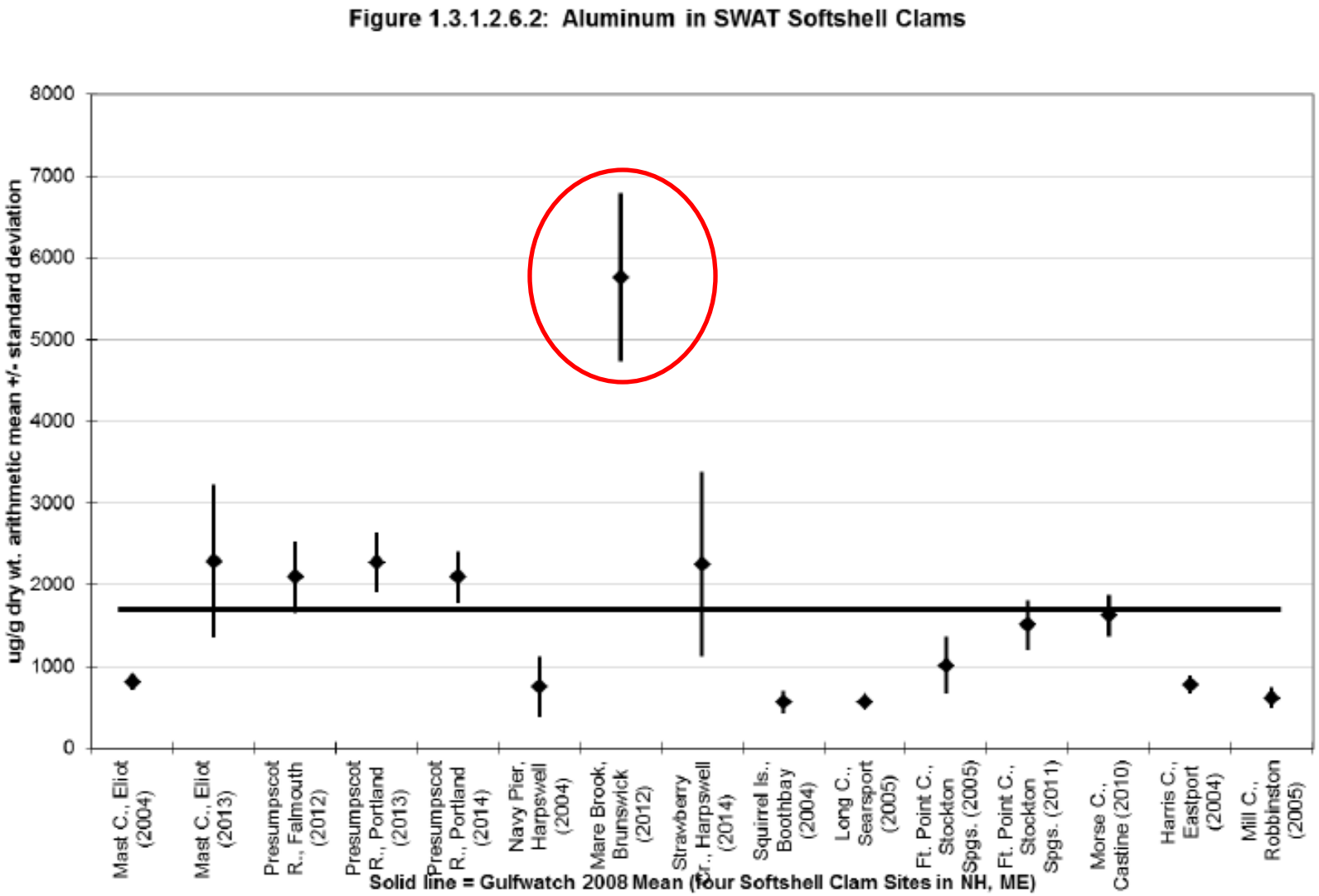
Waterbody Facts

- **Segment ID:** ME0106000106_602R02
- **City:** Brunswick, ME
- **County:** Cumberland
- **Impaired Segment Length:** 8 miles
- **Classification:** Class B
- **Direct Watershed:** 5.7 mi² (3,648 acres)
- **Watershed Impervious Cover:** 21%
- **Major Drainage Basin:** Presumpscot River and Casco Bay Watershed

Maine DEP IC TMDL
55% Watershed Developed
21% Impervious Cover (IC)
62% IC Reduction


Mare Brook Corridor Survey
Overall Condition
Not Surveyed
Good
Fair
Poor
Very Poor
Mare Brook Watershed
0 0.125 0.25 0.5 0.75 1
Miles
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF MAINE
A15
A14
A13
A12
A11
A10
A9
A8
A7
A6
A5
A4
A3
A2
A1
B1
C1
D1
E1
E2
F1
F2
Brunswick Station
Brunswick
Curtis Corner

GAP ANALYSIS| KEY DOCUMENTS



GAP ANALYSIS| KEY DOCUMENTS

50+ Navy Documents

FINDING OF SUITABILITY TO TRANSFER
FOST 2012-3
PARCEL REC-7
(Approximately 594 Acres)

FORMER NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

Prepared by:

Department of the Navy
Base Realignment and Closure
Program Management Office Northeast
4911 S. Broad Street
Philadelphia, Pennsylvania 19112

August 2012

FINDING OF SUITABILITY TO LEASE
BUILDING 250
(Approximately 2.93 Acres)

FORMER NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

Prepared by:

Department of the Navy
Base Realignment and Closure
Program Management Office East
4911 S. Broad Street
Philadelphia, Pennsylvania 19112

February 2013

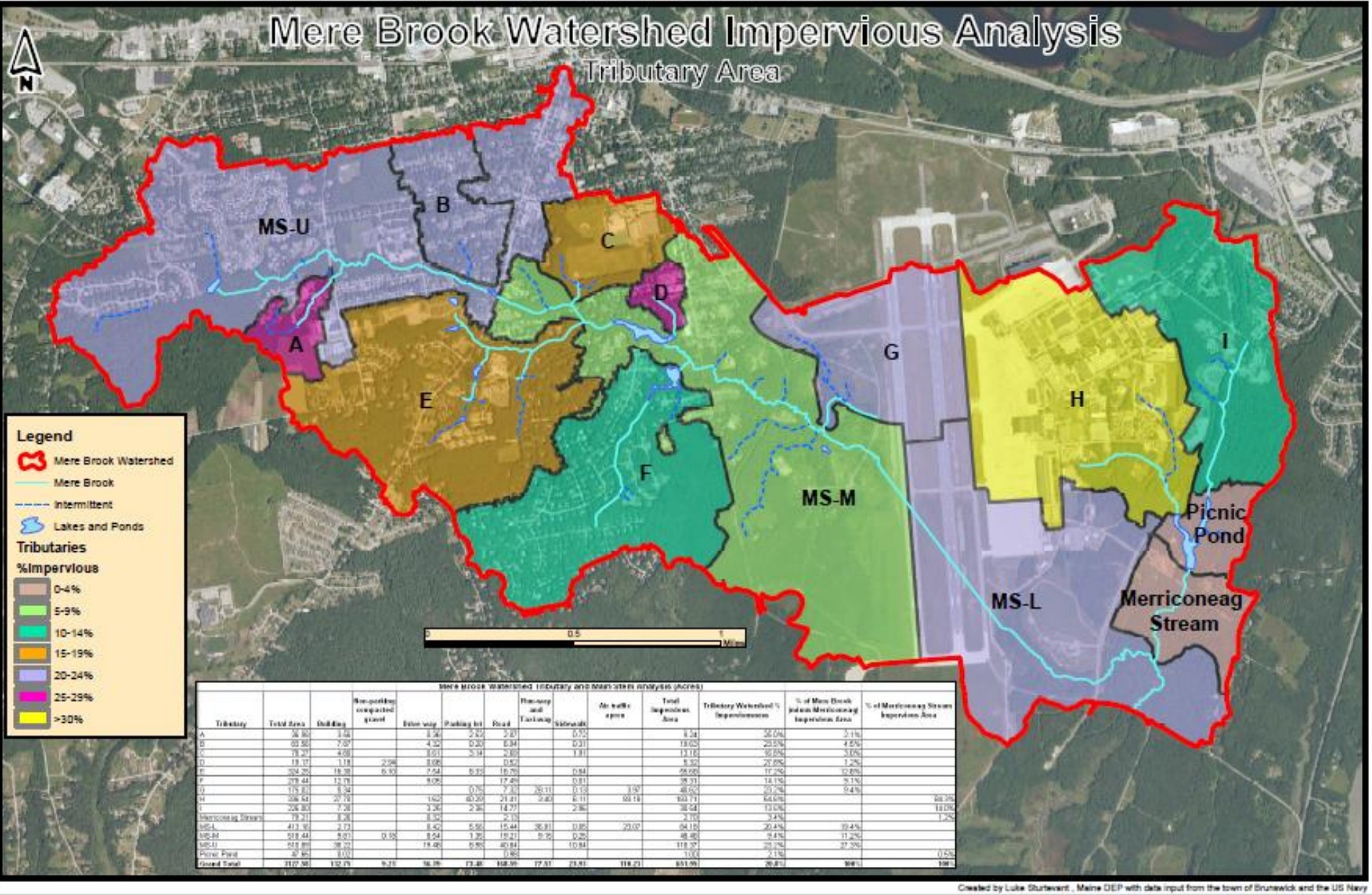
FINDING OF SUITABILITY TO LEASE
HANGAR 4
(Approximately 6.87 Acres)

FORMER NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

Prepared by:

Department of the Navy
Base Realignment and Closure
Program Management Office East
4911 S. Broad Street
Philadelphia, Pennsylvania 19112

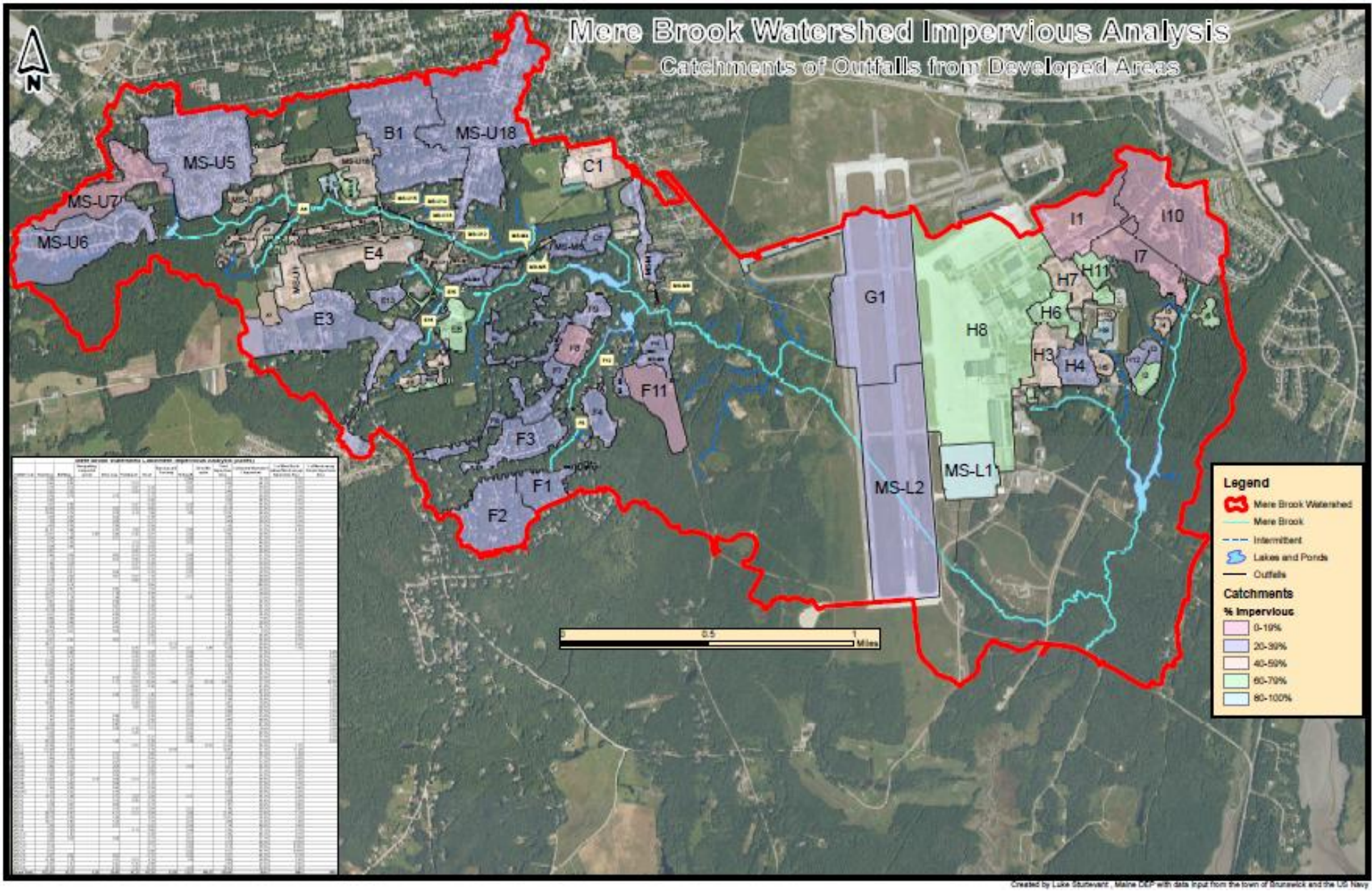
November 2013



Mere Brook Watershed Tributary and Main Stem Analysis (Acres)

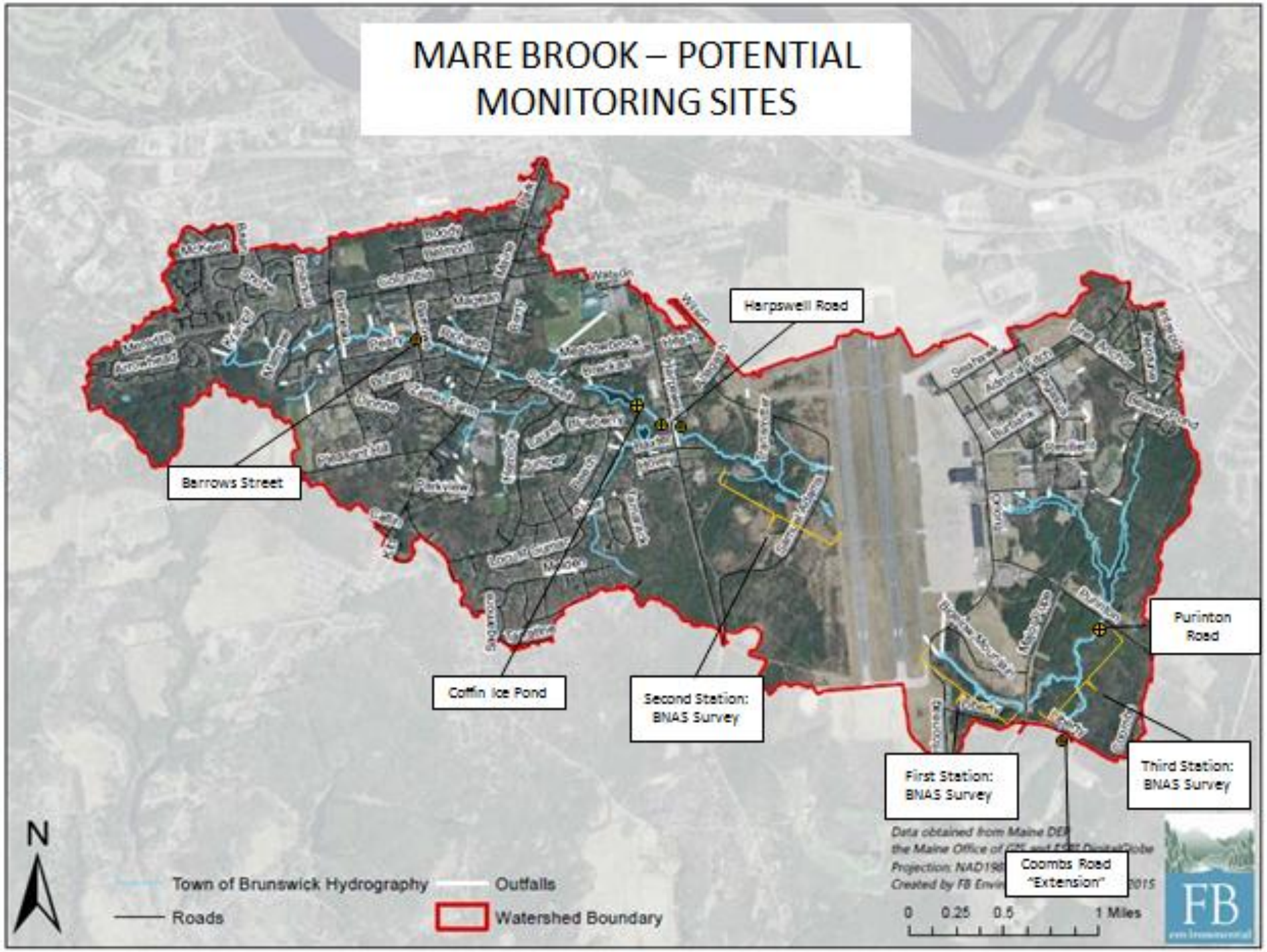
Tributary	Total Area	Building	Non-parking compacted gravel	Drive way	Parking lot	Road	Run-way and Taxiway	Sidewalk	Air traffic apron	Total Impervious Area	Tributary Watershed % Imperviousness	% of Mere Brook (minus Merriconeag) Impervious Area	% of Merriconeag Stream Impervious Area
A	36.86	3.68		0.36	2.62	2.87		0.72		9.24	25.0%	2.1%	
B	63.56	7.67		4.32	0.20	6.84		0.31		19.63	23.5%	4.5%	
C	78.27	4.68		0.61	3.14	2.83		1.81		13.16	16.8%	3.0%	
D	19.17	1.18	2.94	0.68		0.52				5.32	27.8%	1.2%	
E	324.25	18.38	6.10	7.54	6.13	16.76		0.84		55.68	17.2%	12.8%	
F	279.44	12.79		9.05		17.49		0.81		39.31	14.1%	9.1%	
G	175.82	8.34			0.75	7.32	28.11	0.13	3.97	48.62	23.2%	9.4%	
H	286.64	27.78		1.62	60.29	21.41	2.40	6.11	59.18	169.71	64.6%		68.3%
I	226.80	7.28		3.36	2.36	14.77		2.86		30.54	13.6%		18.0%
Merriconeag Stream	79.21	8.28		8.32		2.13				2.70	3.4%		1.2%
MS-L	413.16	2.73		8.42	5.56	15.44	36.81	0.85	23.07	84.18	20.4%	19.4%	
MS-M	518.44	9.61	0.18	8.54	1.35	19.21	9.15	0.25		48.48	9.4%	11.2%	
MS-U	618.89	38.22		19.48	6.98	40.84		10.84		118.37	25.1%	27.3%	
Picnic Pond	47.95	0.02				0.98				1.00	2.1%		0.5%
Grand Total	3127.58	132.75	9.21	56.39	23.48	168.59	77.51	23.91	118.21	651.99	20.8%	100%	100%

Created by Luke Sturtevant , Maine DEP with data input from the town of Brunswick and the US Navy



Created by Luke Stutevant , Maine DEP with data input from the town of Brunswick and the US Navy

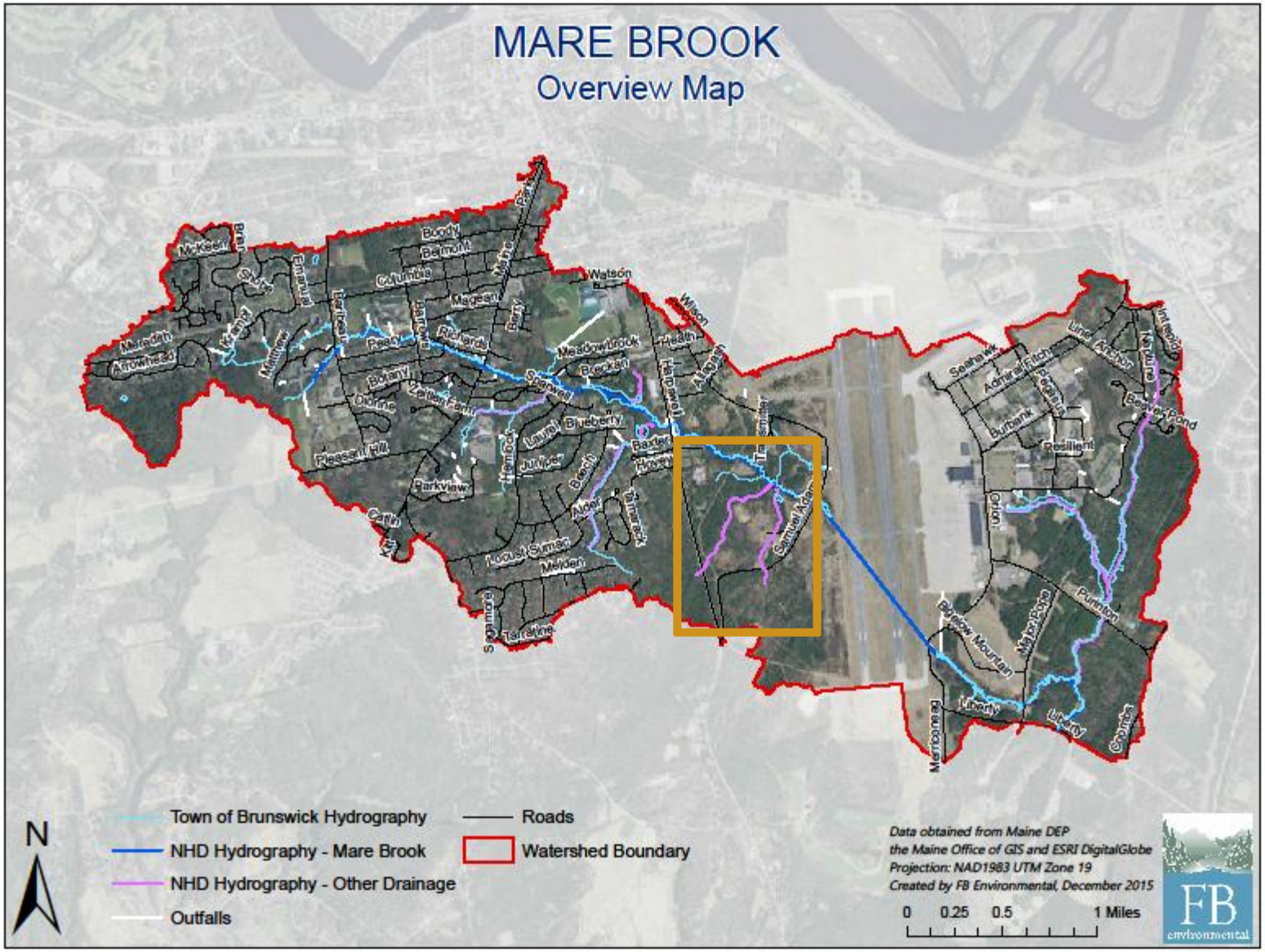
MARE BROOK – POTENTIAL MONITORING SITES



GAP ANALYSIS|RESULTS

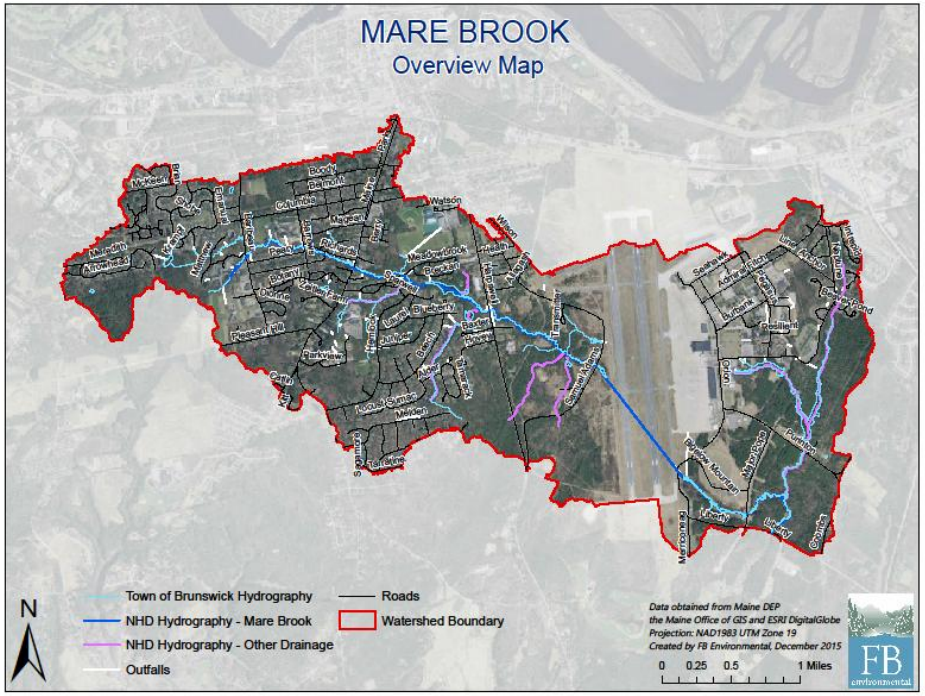
- **GIS DATA**
  - Streams Layer Differences- NHD vs. DEP
  - Watershed Areas (DEP Layer vs. Town)
  - Road Layers (E911)

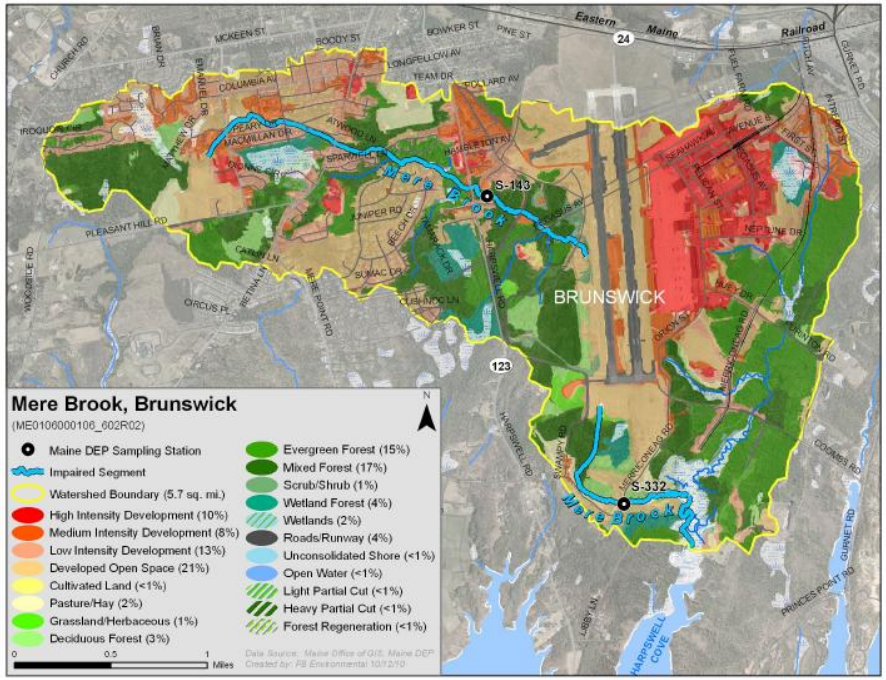
GAP ANALYSIS|RESULTS



GAP ANALYSIS|RESULTS

- **WATERSHED AREA**





GAP ANALYSIS|RESULTS

- **WATER QUALITY MONITORING DATA**
  - DEP Biomonitoring Data (post 2003?) & 2015 Continuous Monitoring Data
  - GIS Associated with VRMP & DEP Sites
  - Surface Water Monitoring Data from Navy (2012 and other years?)
  - 2007 Fish Tissue Report (Follow-up to 1997)
  - Sediment Sampling Data
  - CBEP monitoring data in Harpswell Cove
  - Culvert Survey (Maine Stream Habitat Viewer

GAP ANALYSIS|NEXT STEPS

- **Collect Missing Data & Assess Water Quality**
  - Maine DEP & Volunteer Data
  - US Navy
  - USFWS, CBEP, MDIFW

- **Finalize the Data Catalog**
  - Sampling Sites
  - Years Collected
  - GIS Coordinates/Location
  - Organize Monitoring Sites

- **WQ Review & Recommendations**
  - 2016 monitoring
  - Long-Term Monitoring

TAC FEEDBACK|
STRESSOR IDENTIFICATION

STRESSOR ID | PURPOSE

- **Identifies Stressors** causing biological impairment of aquatic ecosystems;
- **Provides Structure** for organizing scientific information;
- **Major Component** of watershed restoration;
- **Assess the Degree** to which the data supports probable causes.

STREAM HEALTH & STRESSORS | LINK TO BIOLOGY

- <u>STREAM CONNECTIONS</u>

- Loss of Connectivity

  Dams & Culverts
  Lack of riparian cover
  Lack of naturally connected habitats causing fragmented habitats

- Fish & macroinvertebrates can't move through system.

STREAM HEALTH & STRESSORS | LINK TO BIOLOGY

- WATER CHEMISTRY

- Low Dissolved Oxygen, Elevated Specific Conductivity

  Increased nutrients/toxins from human influence
  Increased algal or periphyton growth

- Loss of Intolerant Species & Diversity of Species

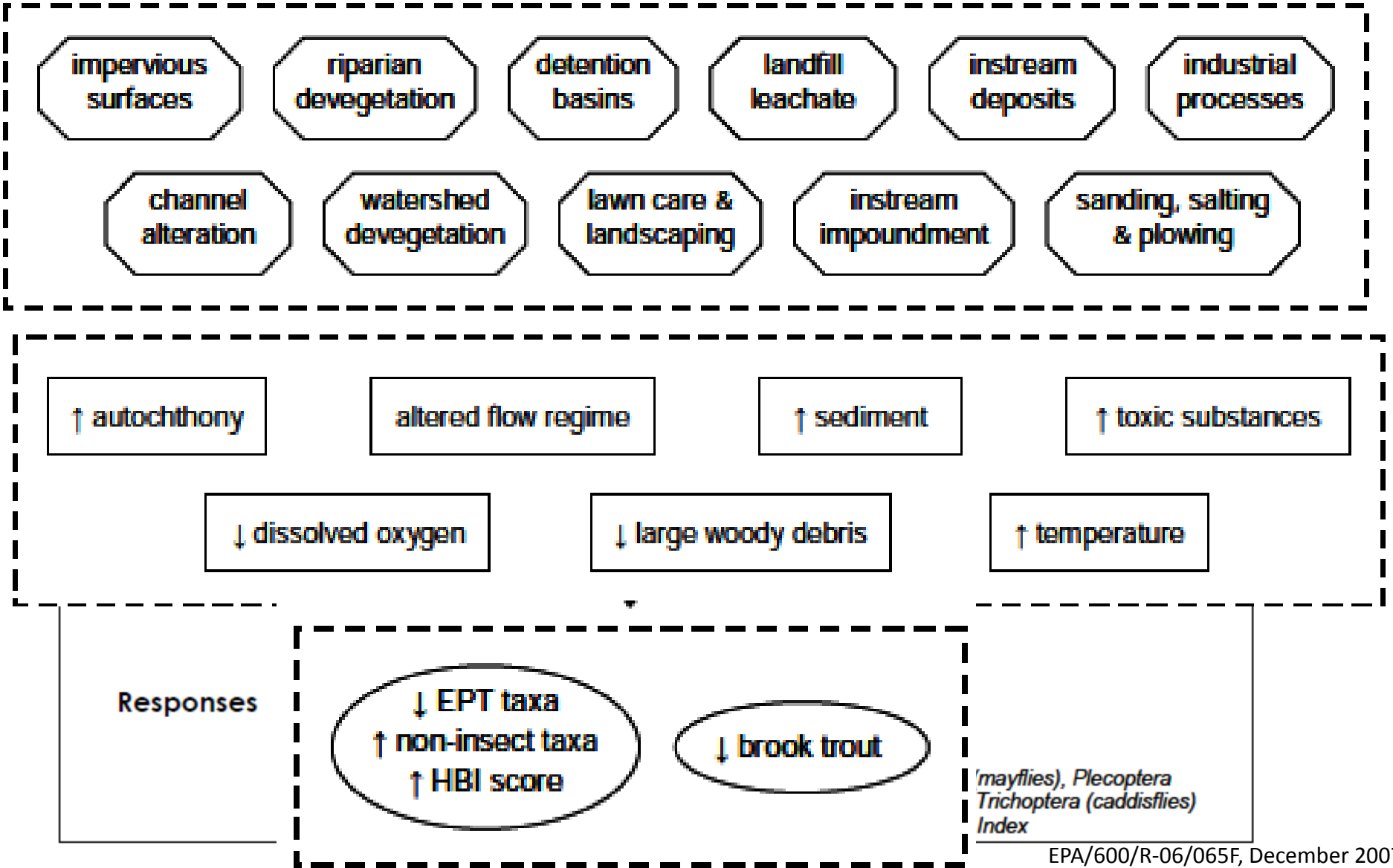
  Favors tolerant species
  Dominated by a few tolerant species

STRESSORS & SYMPTOMS| EXAMPLES

STRESSOR CATEGORY	SYMPTOM
Water / sediment quality	↑ nutrients ↑ toxics Δ suspended sediment
Temperature	↑ temperature

SOURCES, CAUSES & RESPONSES|

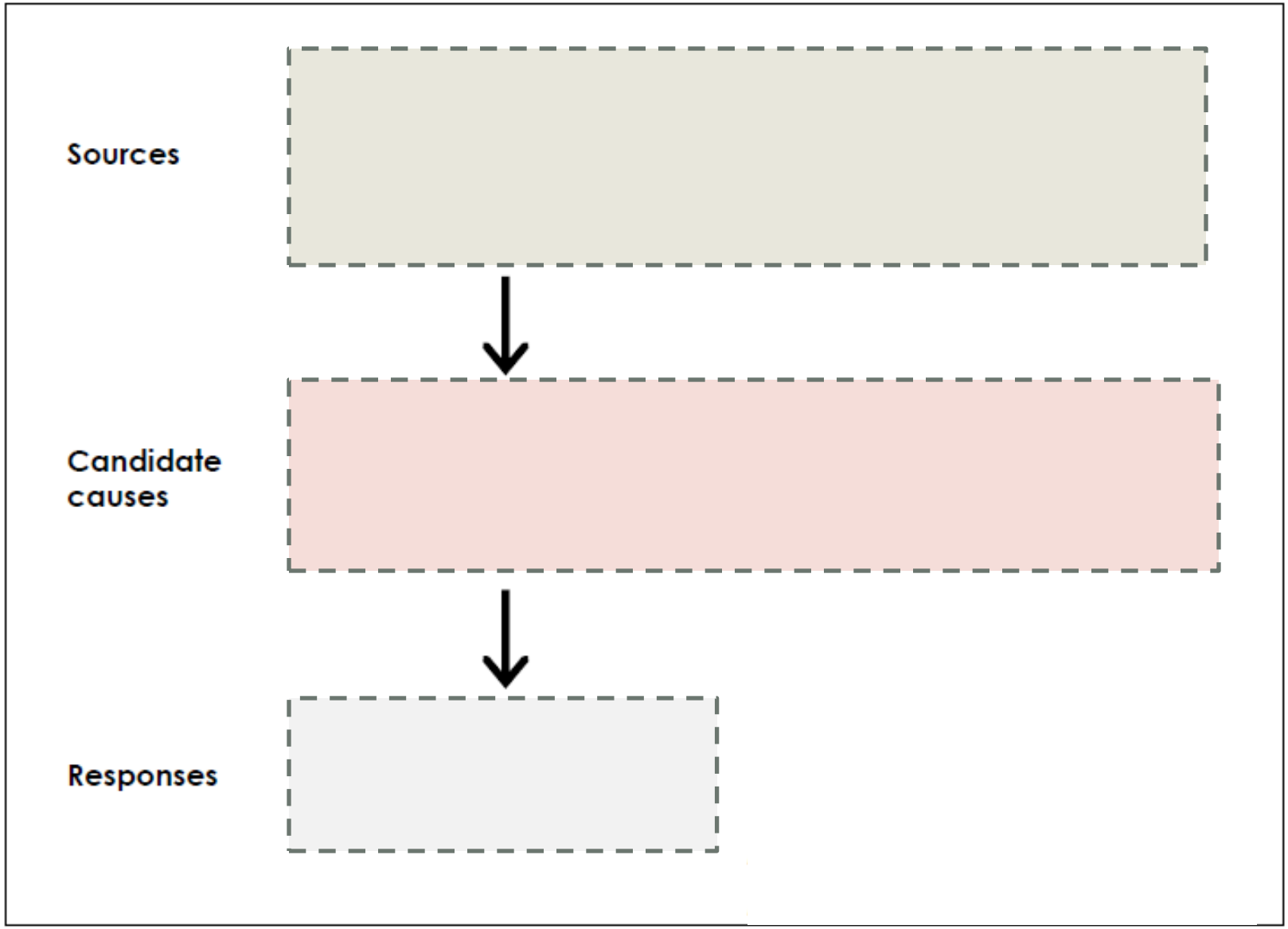
EXAMPLE: LONG CREEK



EPA/600/R-06/065F, December 2007

SOURCES, CAUSES & RESPONSES|

ARCTIC BROOK



TAC FEEDBACK|

APPROACH FOR SPRING FIELDWORK

STRESSOR ANALYSIS: NOTES FROM TAC FEEDBACK

- Off Base Above Runway vs. Below
- Algae in Stream
- Elevated Nutrients
- Possible DO depletion or Diurnal Fluxes?
- Geomorphic Issues- Concentrated Flow
- Poorly Maintained Stream Crossings
- Legacy Pollutants below base
- Historic Toxicity of Sediments in Merriconeag Stream
- Community Structure
- Flow
- Loss of floodplains- encroachment of dev.
- Groundwater influence (high water table)