



MARE BROOK ASSESSMENT

Technical Advisory Meeting # 2
Town of Brunswick, Maine
April 27, 2016



MEETING AGENDA

1. Welcome & Introductions

2. Project Update

- a) Status of Project Tasks
- b) Review Schedule

3. Presentations

- a) Data Collection History
- b) Stressor Analysis
- c) Gap Analysis & Recommendations

4. Discussion

5. Next Meetings/Other Business



PROJECT 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

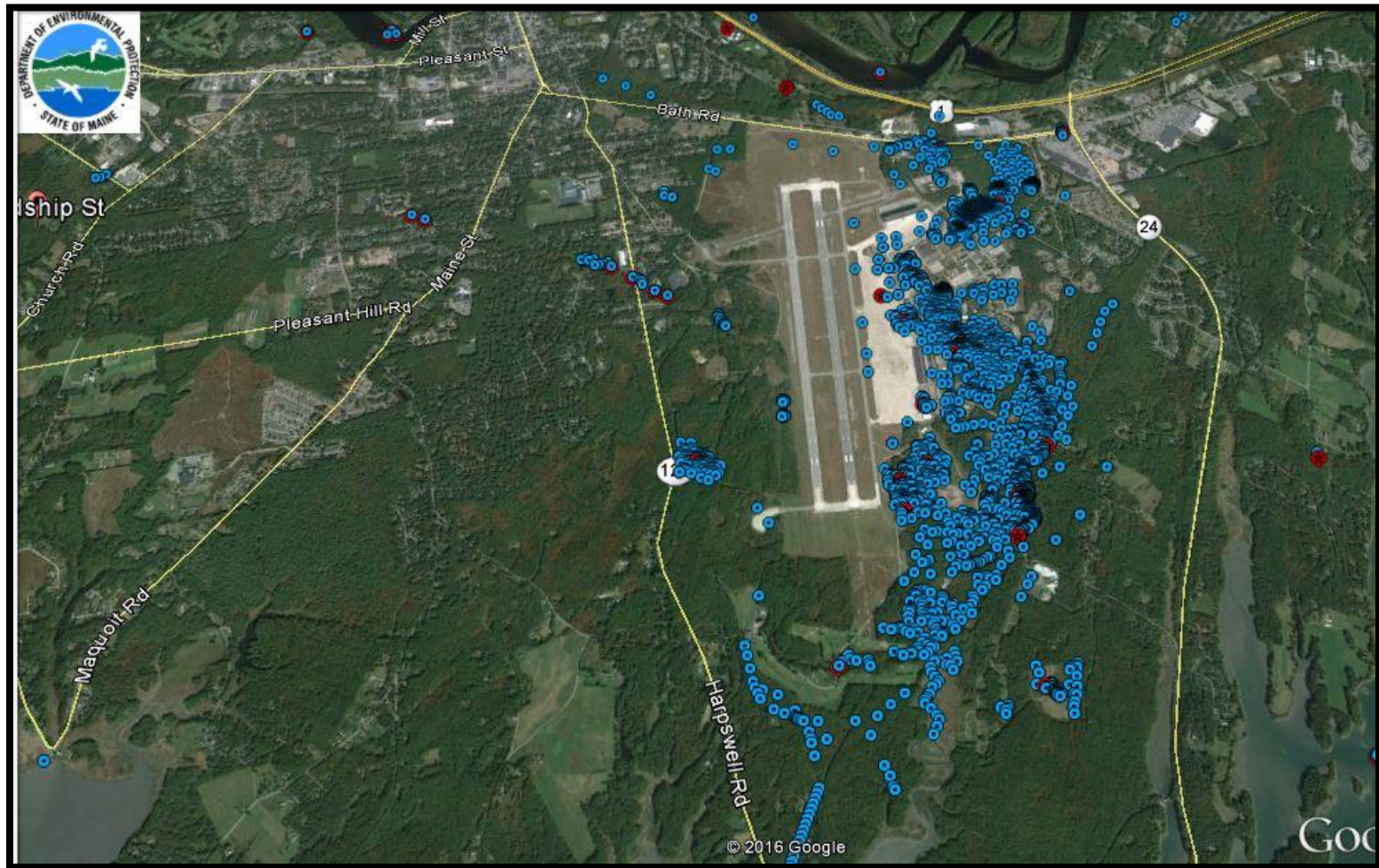


DATA DIRECTORY

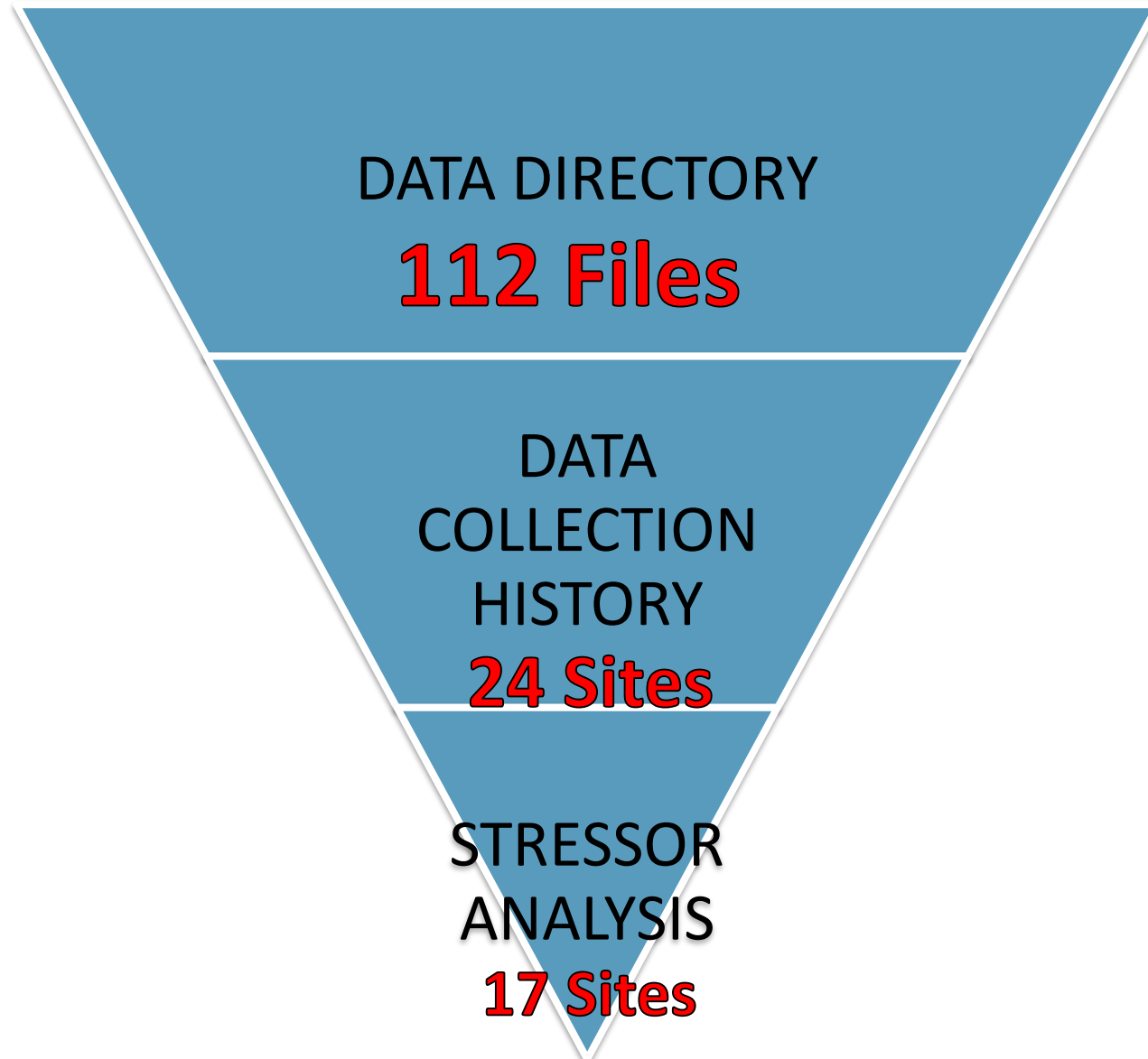


- ❖ 2015 DEP Macroinvertebrate Data
- ❖ 2015 DEP Continuous Monitoring Data
- ❖ Historical Data from BRWM
- ❖ USFWS 2007 Fish Tissue Study
- ❖ Navy Report "Groundwater-Surface Water Connectivity in the Eastern Plume"

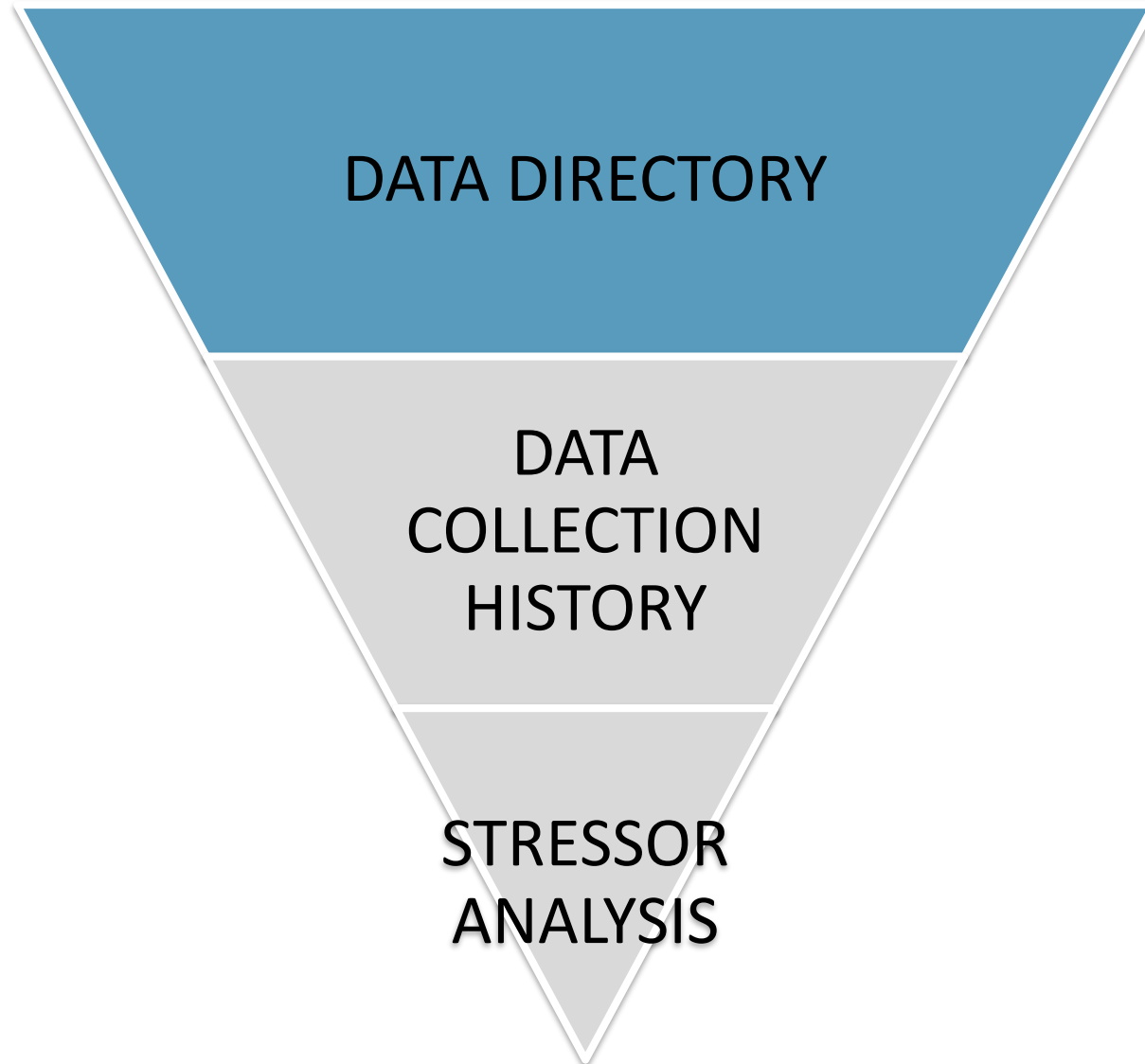
WHAT DATA IS AVAILABLE?



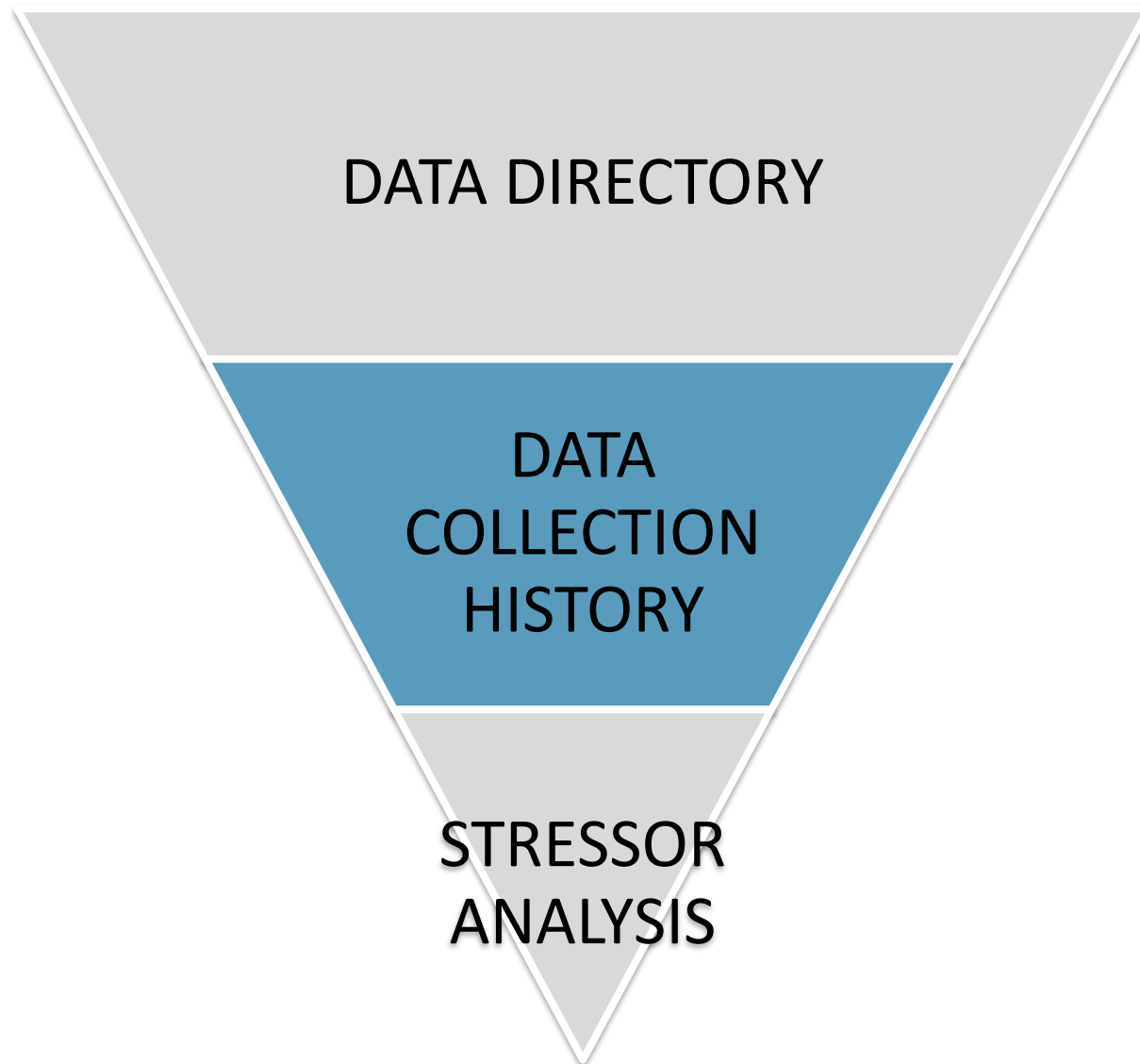
HOW DO WE DIGEST THIS INFORMATION?



HOW DO WE DIGEST THIS INFORMATION?



HOW DO WE DIGEST THIS INFORMATION?



DATA COLLECTION HISTORY

GEO-BASED UNIQUE ID	Descriptors	SITE ID	LATITUDE (IF AVAILABLE)	LONGITUDE (IF AVAILABLE)	YEARS COLLECTED	COLLECTED BY
(UPSTREAM to DOWNSTREAM)						
MB1	-	Mare Brook - CBMBBH	-69.9391	43.8433	9/29/14	Maine DEP
	-	Mare Brook - CBMBBH	-69.9334	43.8617	10/11/12	Maine DEP
MB2	-	Tributary to Mare on Golf Course	NA	NA	NA	Maine DEP
MB3	-	Station 332	43.87227493	-69.9375262	NA	Maine DEP
	-	S-332	43.87227493	-69.9375262	1997, 1998, 1999	Maine DEP
	-	NASB-SITE 11 FTA AND EASTERN PLUME	43.8884438	-69.92659245	1999, 2002-2005, 2007-2013	Maine DEP
	-		43.8884438			
	-	NASB-SITE 11 FTA AND EASTERN PLUME				
	-	NASB-SITE 11 FTA AND EASTERN PLUME	43.8884438	-69.92659245	2009-2014	Maine DEP

↑
ALIAS

↑
LOCATION

↑
DATA
INFORMATION

DATA COLLECTION HISTORY

SITE ALIAS	SITE DESCRIPTION
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MB1	CBMBBH
MB2	Brunswick Golf Course
MB3	Station 332
MB4	NASB Site 11 FTA & Eastern Plume
MB5	Picnic Pond – Representative Stream Site
MB6	Picnic Pond – Representative Pond Site
MB7	Purinton Road (Merriconeag Stream, Station 330)
MB8	Station 457
MB9	Station 144
MB10	Major Pope Road (Mare Brook)
MB11	NASB Site 2 Orion Street LF South
MB12	NASB Site 1 & 3 Orion Street LF North & Hazwst LF

CONTINUED...

SITE ALIAS	SITE DESCRIPTION
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MB13	Station 331
MB14	Jonathan Street
MB15	RMR30
MB16	Station 143
MB17	Route 123
MB18	RBEMR23
MB19	RBEMR24
MB20	Maine Street
MB21	Richards Drive
MB22	Station 1064
MB23	RBEMR33
MB24	Baribeau Drive

REFER TO YOUR HANDOUT

MONITORING SITE MAP Mare Brook Watershed



- Sampling Sites
- Roads
- Drainage
- Waterbodies
- Watershed Boundary

0 0.25 0.5 1 Miles

Coffin Pond

Mare Brook

Unnamed Tributary

Picnic Pond

Merriconeag Stream

Approx. Head of Tide

***to Harpswell Cove**

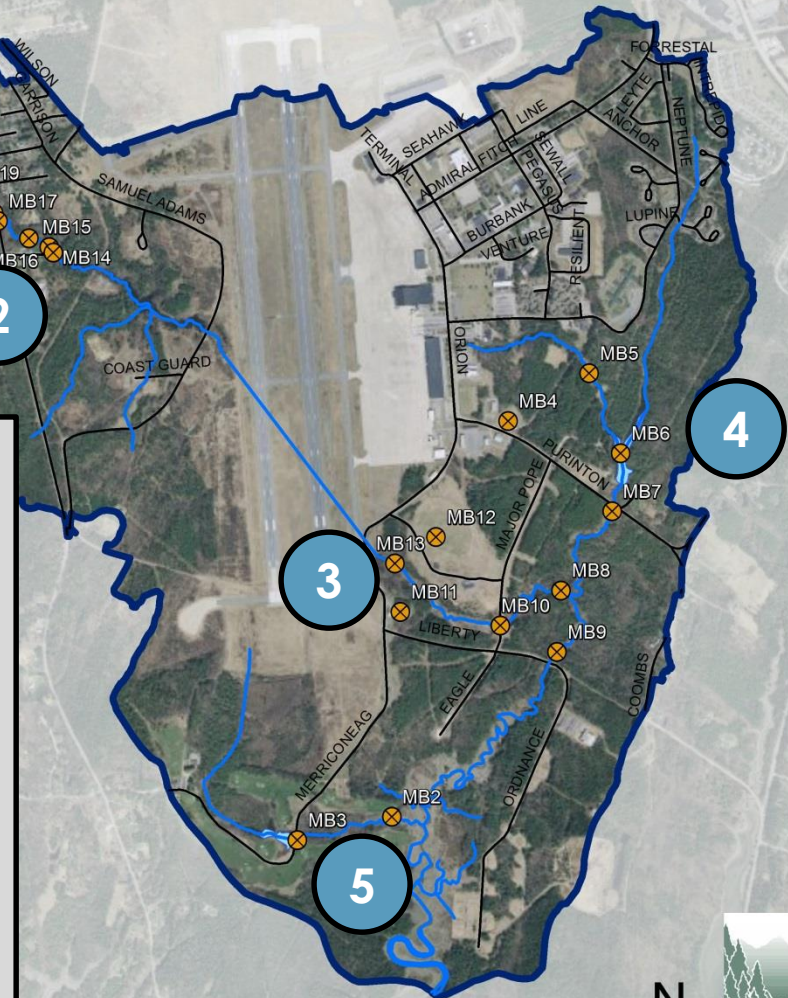
Data obtained from the Town of Brunswick,
the Maine Office of GIS and ESRI DigitalGlobe
Projection: UTM Zone 19N
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MONITORING SITE MAP

Mare Brook Watershed

- 1 Mare Brook Upstream of Maine Street
- 2 Mare Brook and Harpswell Rd Crossing
- 3 Mare Brook Below Airport and Above Confluence with Merriconeag Stream
- 4 Picnic Pond and Merriconeag Stream
- 5 Mare Brook below Confluence and Unnamed Tributary
- 6 Harpswell Cove



***to Harpswell Cove**

Data obtained from Town of Brunswick,
the Maine Office of GIS DigitalGlobe
UTM Zone 19N
Created by FB Environmental, April 2016



DATA HIGHLIGHTS

1

SITES MB24 – 20

(Maine Street and Above)

- 2009 Grab Samples (DO, Temp, SpC)
- 2015 Macroinvertebrates, Bacteria, and Continuous Monitoring

Harpswell Cove



- Sampling Sites
- Roads
- ~ Drainage
- Waterbodies
- Watershed Boundary

0 0.25 0.5 1 Miles

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Projection: UTM Zone 19N
Created by FB Environmental, April 2016



DATA HIGHLIGHTS

2

SITE MB19 – 14

- 1991, 1995, 1997 - 2003
Temp, DO, SpC, pH, Flow,
Nutrients
 - Limited dataset (few days per season)
- 1991, 95, 98 – 03, 15:
Macroinvertebrates
- 2015: Bacteria, Continuous
Monitoring

Harpswell Cove



- Sampling Site
- Roads
- ~ Drainage
- Waterbodies
- Watershed Boundary

0 0.25 0.5 1 Miles

Data obtained from the Town of Brunswick,
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Projection: UTM Zone 19N
Created by FB Environmental, April 2016



DATA HIGHLIGHTS

3

SITE MB13 – 10, 8

- 1988, 89, 95: Metals, Cations, Inorganics, VOCs
- 1995 - 1999, 01, 04, 05, 07: DO, pH, SpC, Temp, Turbidity
- 2000, 03, 08, 09, 14: Include Pesticide and sVOCs
- 2009 – 2013: Above plus Water Level
- 1997 – 03, 2015: Macroinvertebrates
- 2015 bacteria

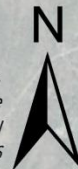
Harpswell Cove



- Sampling Site
- Roads
- ~ Drainage
- Waterbodies
- Watershed Boundary

0 0.25 0.5 1 Miles

Data obtained from the Town of Brunswick,
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Projection: UTM Zone 19N
Created by FB Environmental, April 2016



DATA HIGHLIGHTS

4

SITE MB4 – 7

(Merriconeag Stream)

- 1997, 98, 00, 01: Temp, Velocity
- 1999, 02: Plus DO, SpC
- 2003: Plus Nutrients
- 2015: Above plus PFCs, Cations, Metals, VOCs, sVOCs, Bacteria
- 1997 – 03, 15: Macroinvertebrates

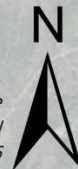
Harpswell Cove



- Sampling Sites
- Roads
- ~ Drainage
- Waterbodies
- Watershed Boundary

0 0.25 0.5 1 Miles

Data obtained from the Town of Brunswick,
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Projection: UTM Zone 19N
Created by FB Environmental, April 2016



DATA HIGHLIGHTS

5

SITE MB9, 3, 2

(Below Confluence)

1991, 95, 97: Temp, DO,
Velocity

1998 – 01, 13: Above plus
VOCs, sVOCs

2002 - 05, 07: VOCs, sVOCs

2008, 14 : Plus pesticides

2009 - 12: Plus water level

2015: Plus PFDs, cations,
metals, continuous Temp,
DO, SpC

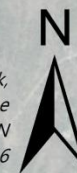
1991, 95, 97 – 03:

Macroinvertebrates

Harpswell Cove



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Projection: UTM Zone 19N
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DATA HIGHLIGHTS

6

SITE MB1

(Estuary Site)

Tissue Samples (Metals,
Organics) (2013 - 2014)

Harpswell Cove



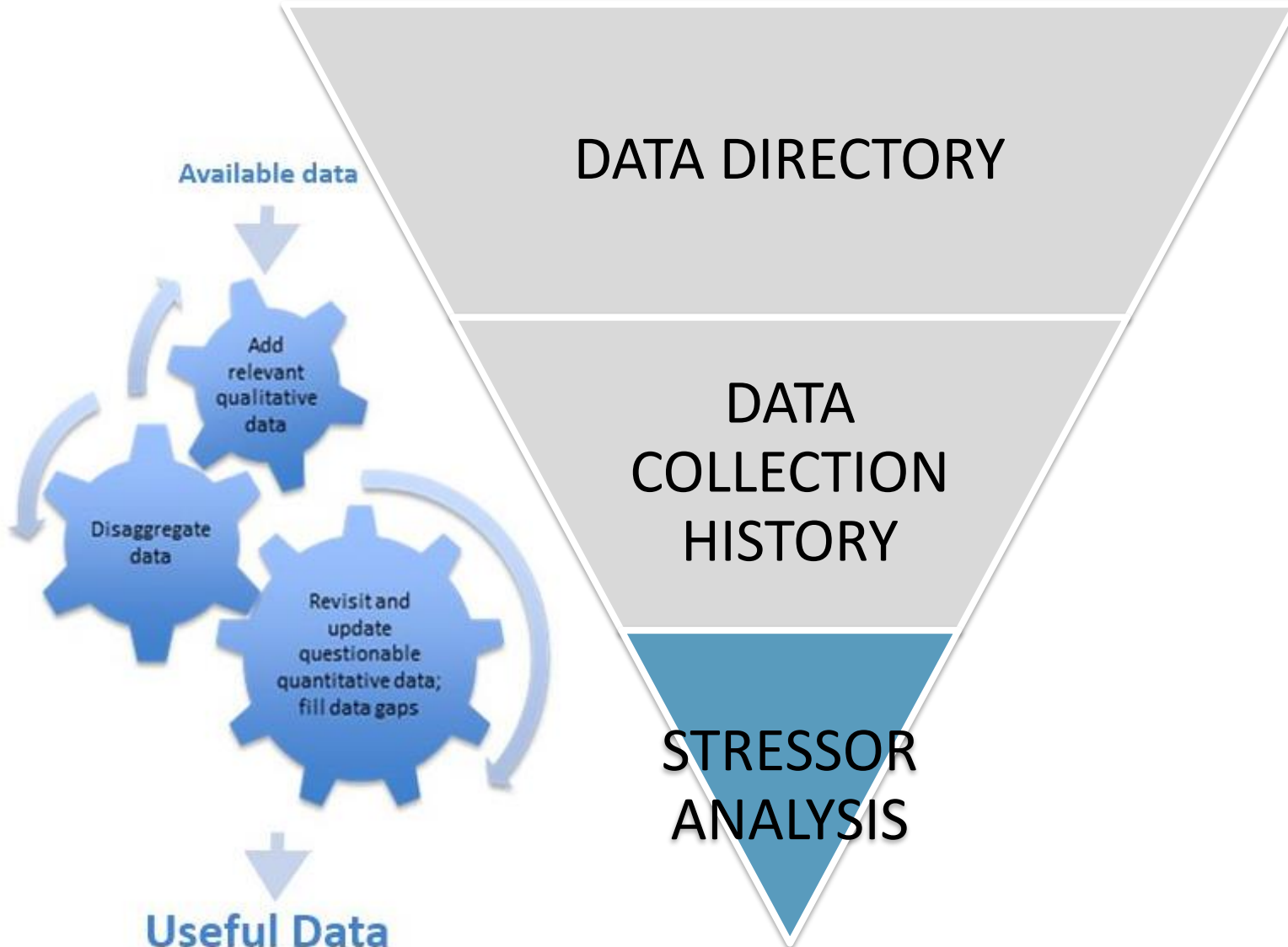
- Sampling Sites
- Roads
- Drainage
- Waterbodies
- Watershed Boundary

0 0.25 0.5 1 Miles

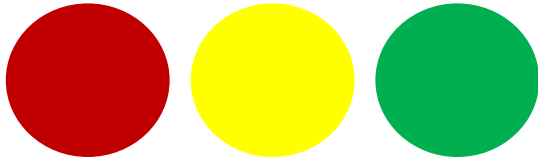
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HOW DO WE DIGEST THIS INFORMATION?



STRESSOR ANALYSIS METHODOLOGY

STRESSOR CATEGORY	BACTERIA
	CONDUCTIVITY
	DISSOLVED OXYGEN
	MACROINVERTEBRATES
	METALS
	NUTRIENTS
	PH
	TOXICS
	TEMPERATURE
QUALITY	
POOR  HEALTHY	

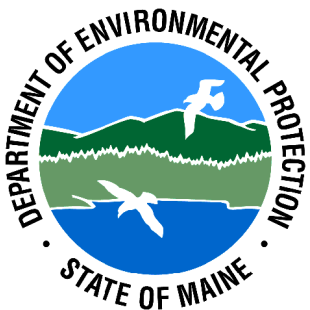
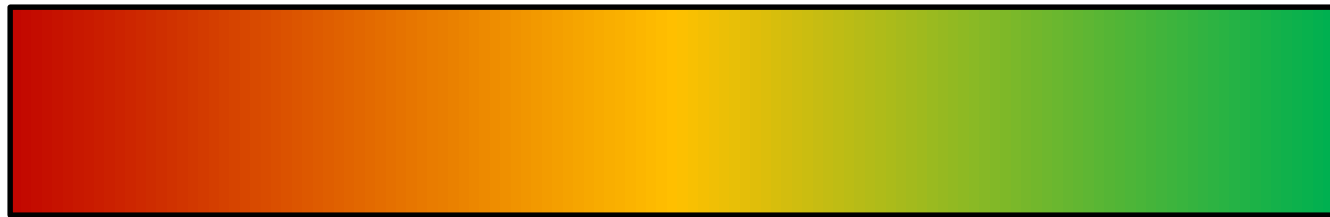
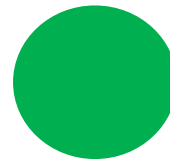
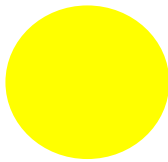
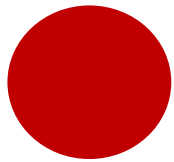
OBJECTIVE:

To provide a **visual** and **efficient** way to evaluate the available data from the Mare Brook watershed.

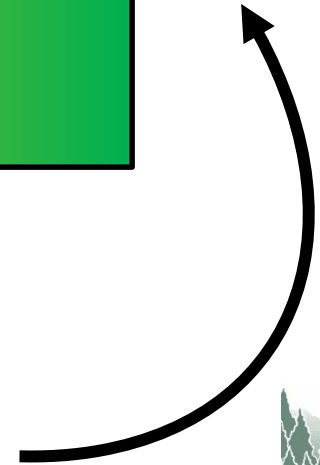
- ❖ Nine Identified Stressor Categories
- ❖ Rated from POOR to HEALTHY
- ❖ Based on Criteria

STRESSOR ANALYSIS METHODOLOGY

❖ Stoplight Criteria



TAC



STRESSOR ANALYSIS METHODOLOGY

1,1-DICHLOROETHANE
 1,1-DICHLOROETHYLENE
 1,1,1-TRICHLOROETHANE
 1,1,2-TRICHLOROETHANE
 1,1,2,2-TETRACHLOROETHANE
 1,2-DICHLOROBENZENE
 1,2-DICHLOROETHANE
 1,2-DICHLOROPROPANE
 1,2,4-TRICHLOROBENZENE
 1,3-DICHLOROBENZENE
 1,4-DICHLOROBENZENE
 4,4'-DDD
 4,4'-DDT
 ACENAPHTHENE
 ALUMINUM
 ANTHRACENE
 ANTIMONY
 ARSENIC
 BARIUM
 BENZENE
 BENZO(A)ANTHRACENE
 BENZO(A)PYRENE
 BENZO(B)FLUORANTHENE
 BENZO(G,H,I)PERYLENE
 BENZO(K)FLUORANTHENE
 BERYLLIUM
 BIS (2-ETHYLHEXYL) PHTHALATE
 VINYL CHLORIDE
 BROMOFORM
 CADMIUM
 CARBON TETRACHLORIDE
 CHLOROBENZENE
 CHLOROETHANE
 CHLOROFORM
 CHLOROMETHANE
 CHRYSENE

CHRYSENE
 COPPER
 DIBENZO(A,H)ANTHRACENE
 ETHYLBENZENE
 FLUORANTHENE
 FLUORENE
 FREON-113
 HEXACHLOROBUTADIENE
 IRON
 LEAD
 MANGANESE
 METHYLENE CHLORIDE
 NAPHTHALENE
 NICKEL
 NITRATE+NITRITE AS N
 PHENANTHRENE
 PHENOL
 PYRENE
 SELENIUM
 SILVER
 TERT-BUTYLBENZENE
 TETRACHLOROETHYLENE
 THALLIUM
 TOLUENE
 TOTAL CYANIDE
 TRICHLOROETHYLENE
 ZINC
 % DO
 1,1-DICHLOROPROPENE
 1,1,1,2-TETRACHLOROETHANE
 1,2-DIBROMO-3-
 CHLOROPROPANE
 1,2-DIBROMOETHANE
 1,2-DICHLOROETHYLENE
 1,2,3-TRICHLOROBENZENE

1,2,3-TRICHLOROPROPANE
 1,2,4-TRIMETHYLBENZENE
 1,3-DICHLOROPROPANE
 1,3,5-TRIMETHYLBENZENE
 1,4-DIOXANE D8
 2-BUTANONE (MEK)
 2-CHLOROTOLUENE
 2,2-DICHLOROPROPANE
 4-BROMOFLUOROBENZENE
 4-CHLOROTOLUENE

DICHLORODIFLUOROMETHANE
 DISSOLVED ORGANIC CARBON
 DISSOLVED OXYGEN
 E. COLI
 EH
 ENDOSULFAN I
 FLOW
 FLUOMETER
 INDENO(1,2,3-CD)PYRENE
 ISOPROPYL BENZENE

PERFLUOROOCTANE SULFONIC ACID
 PERFLUOROOCTANOIC ACID
 PERFLUOROPENTANOIC ACID
 PERFLUOROTETRADECANOIC ACID
 PERFLUOROUNDDECANOIC ACID
 PH
 POTASSIUM
 SEC-BUTYLBENZENE
 SODIUM
 SPECIFIC CONDUCTANCE
 STYRENE
 TEMPERATURE
 TOTAL DISSOLVED SOLIDS
 TOTAL KJELDAHL NITROGEN
 TOTAL PHOSPHORUS
 TOTAL SUSPENDED SOLIDS
 TOTAL VOCs
 TOTAL XYLENE
 TRANS-1,2-DICHLOROETHENE
 TRANS-1,3-DICHLOROPROPENE
 TRICHLOROFLUOROMETHANE
 TURBIDITY
 VANADIUM
 VELOCITY
 VINYL ACETATE
 WATER LEVEL DEPTH

168 AVAILABLE PARAMETERS



17 USED FOR STRESSOR ANALYSIS

CARBON DISULFIDE
 CHROMIUM
 CHROMIUM, HEXAVALENT
 CHROMIUM III
 CHROMIUM VI
 CIS 1,3-DICHLOROPROPENE
 CIS-1,2-DICHLOROETHENE
 COBALT
 CYCLOHEXANE
 D8 TOLUENE
 DIBROMOCHLOROMETHANE
 DIBROMOFLUOROMETHANE
 DIBROMOMETHANE

P-DIOXANE
 P-ISOPROPYLTOLUENE
 PERFLUOROBUTANE SULFONATE
 PERFLUOROBUTANOIC ACID
 PERFLUORODECANOIC ACID
 PERFLUOROHEPTANE SULFONIC ACID
 PERFLUOROHEPTANOIC ACID
 PERFLUOROHEXADECANOIC ACID
 PERFLUOROHEXANE SULFONATE
 PERFLUOROHEXANOIC ACID
 PERFLUORONONANOIC ACID
 PERFLUOROOCTANE SULFONAMIDE
 PERFLUOROOCTANE SULFONATE

BACTERIA EXAMPLE

BACTERIA CRITERIA

Red

>75% of instantaneous samples are >236 MPN or geometric mean > 64 MPN

Yellow

25 - 75% of instantaneous samples are >236 MPN

Green

< 25% of instantaneous samples are >236 MPN

SITE	SAMPLE COUNT	PERCENT >236 MPN/100ML	GEOMETRIC MEAN	STOPLIGHT
MB7	5	20%	106.3	RED
MB8	5	20%	108.0	RED
MB16	6	33.3%	196.6	RED
MB22	6	83.3%	584.1	RED
MB24	3	33.3%	236.6	RED

TAC FEEDBACK

- ❖ Do you think the nine identified stressors are suitable for identifying the water quality issues in the Mare Brook watershed?
- ❖ Are there additional stressors that you think would be better suited for assessing existing data and if so, is there sufficient data to support that stressor?
- ❖ Do you have any recommendations or changes to the criteria used to determine the “red”, “yellow”, and “green” stop lights proposed for the stressor analysis?
- ❖ Do you have any additional monitoring recommendations?

GAPS & RECOMMENDATIONS

- ❖ Evolving Process
- ❖ Continue to Add New Data



GAPS & RECOMMENDATIONS

DATA DIRECTORY



- ❖ Refine Watershed Area & Impaired Stream Segment
- ❖ Field Verification of Town Stream Layer
- ❖ Comprehensive Synthesis of Navy Data Needed
- ❖ Limited Data Available Below Head of Tide

GAPS & RECOMMENDATIONS

Data Collection History



- ❖ Large Gaps in Years Data is Collected in Upper Watershed (2003, 2015)
- ❖ Lack of Understanding of Stressors in Upper Watershed
- ❖ Influence of Merriconeag Stream – Prioritize Restoration Objective
- ❖ Limited Data in Estuary

GAPS & RECOMMENDATIONS

Parameter Specific



- ❖ 2015 is the only year bacteria data is available
- ❖ No chloride data
- ❖ DO data limited to lower watershed
- ❖ Large temporal gap in macro data

GAPS & RECOMMENDATIONS

Parameter Specific Cont.



- ❖ Flow Data Mostly Limited to US Navy Property
- ❖ More Information On Fisheries

DISCUSSION- TAC FEEDBACK

- ❖ OTHER DATA GAPS
- ❖ STRESSOR CRITERIA
- ❖ FUTURE MONITORING/ASSESSMENT



UPCOMING MEETINGS

- ❖ Public Meetings (June & October)
- ❖ Final TAC Meeting (October 2016)



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