

Sebasticook Lake Watershed-Based Management Plan

Public Forum
August 15, 2024



Penobscot County
Soil & Water
Conservation District



The Sebasticook Lake Watershed-Based Management Plan project is funded in-part by the US Environmental Protection Agency under Section 604(b) of the Clean Water Act.

Water Quality Impairment

Sebasticook Lake is listed as

IMPAIRED

on Maine DEP's

Nonpoint Source

Priority Watersheds List

AND the list of

Lakes Most at Risk from

Development

under the Maine

Stormwater Law



Every Lake is Unique



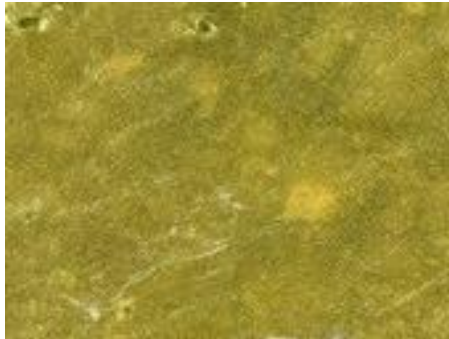
Lake Winnecook, Unity



Georges Pond, Franklin



North Pond, Smithfield



Sebasticook Lake, Newport (June 2023)

The Lake & Watershed

SEBASTICOOK LAKE

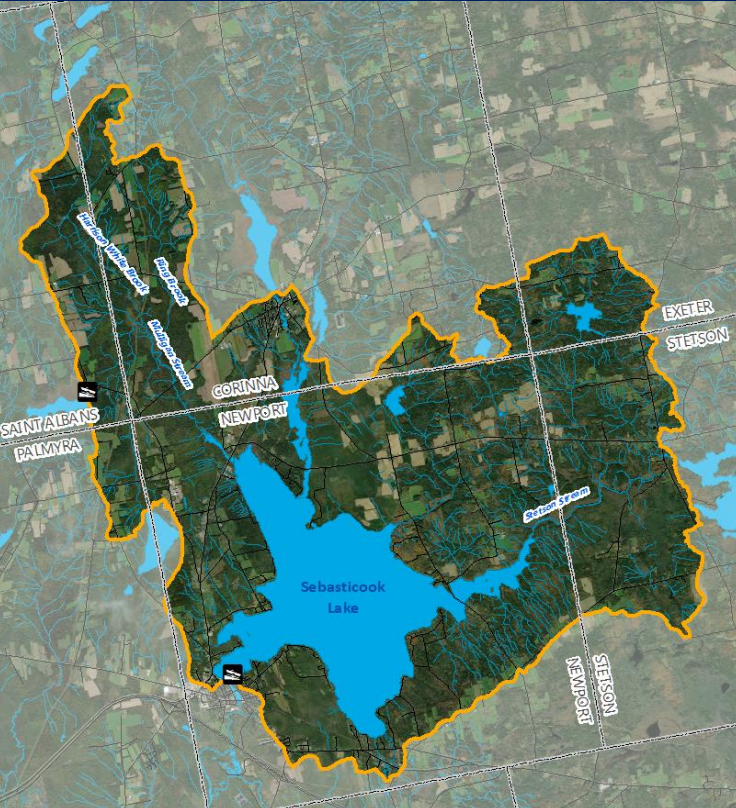
Watershed Area: 46 sq mi

Surface Area: 4,537 acres

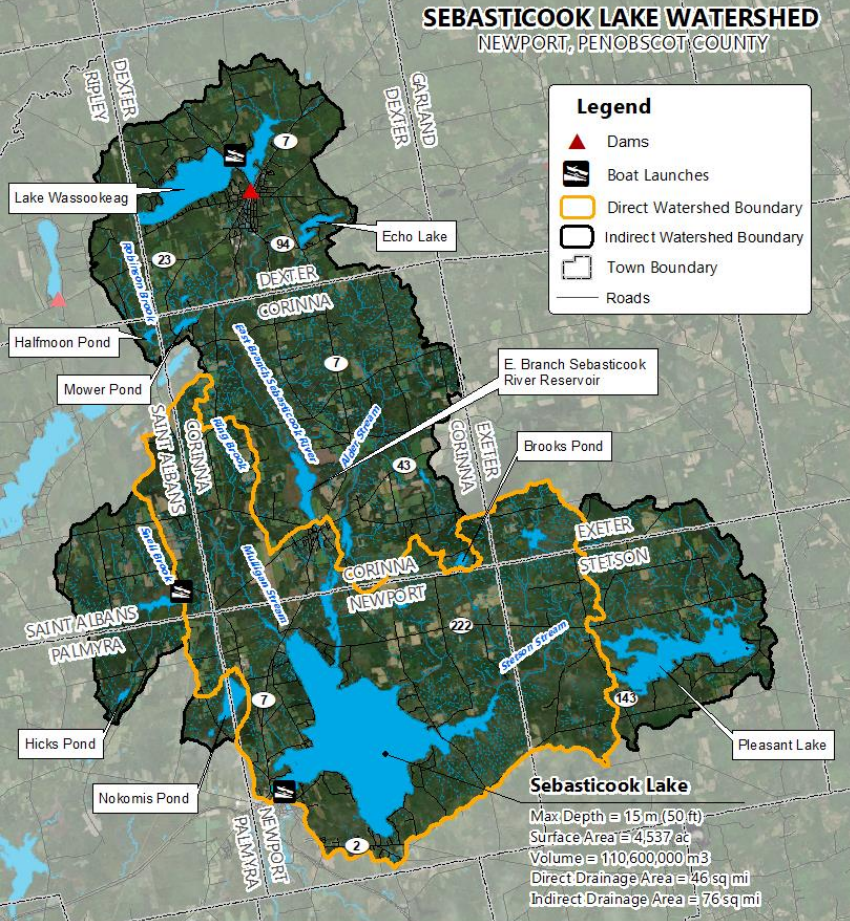
Maximum Depth: 50 ft

Average Depth: 20 ft

Flushing Rate: 1.5 flushes/yr



SEBASTICOOK LAKE WATERSHED
NEWPORT, PENOBSCOT COUNTY



DIRECT WATERSHED

Newport (49%)

Corinna (20%)

Stetson (17%)

Saint Albans (7%)

Exeter (5%)

Palmyra (2%)

**Total Area Excludes Lake Area*

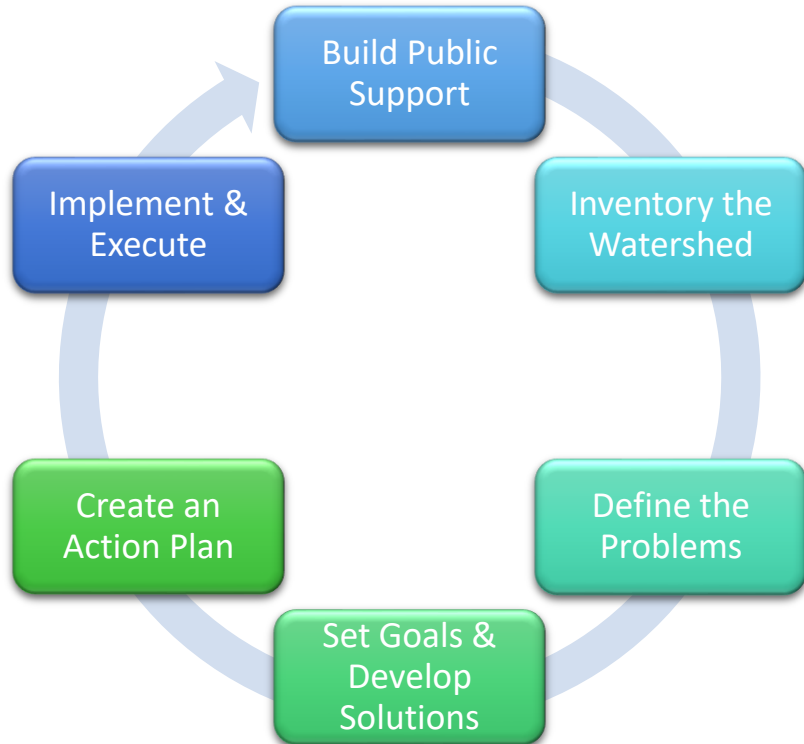
Water Quality Concerns

1. Legacy pollutants in the lake
2. Phosphorus inputs from the watershed
3. Loss of dissolved oxygen
4. Phosphorus release from the sediment

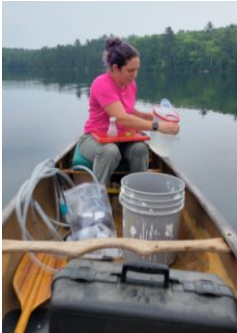


How is a Management Plan Developed?

- Part of a long-term effort involving towns, agencies, organizations, and individuals
- Public Participation: public meetings, steering committee meetings, stakeholder input



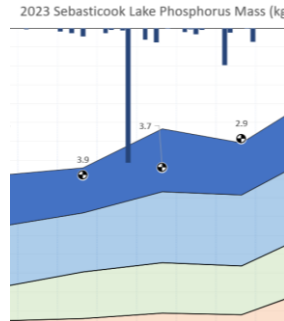
Major Components of the Plan



Water Quality Monitoring & Analysis



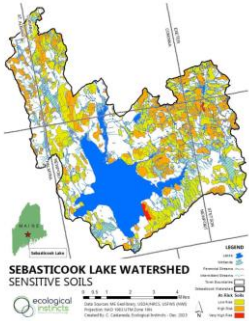
Sediment Sampling & Analysis



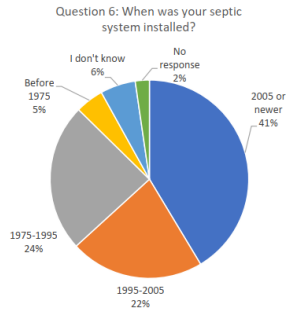
Watershed Modeling & Internal Loading Analysis



Watershed Survey



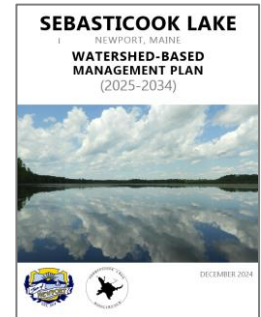
Septic Vulnerability Analysis



Septic System Survey

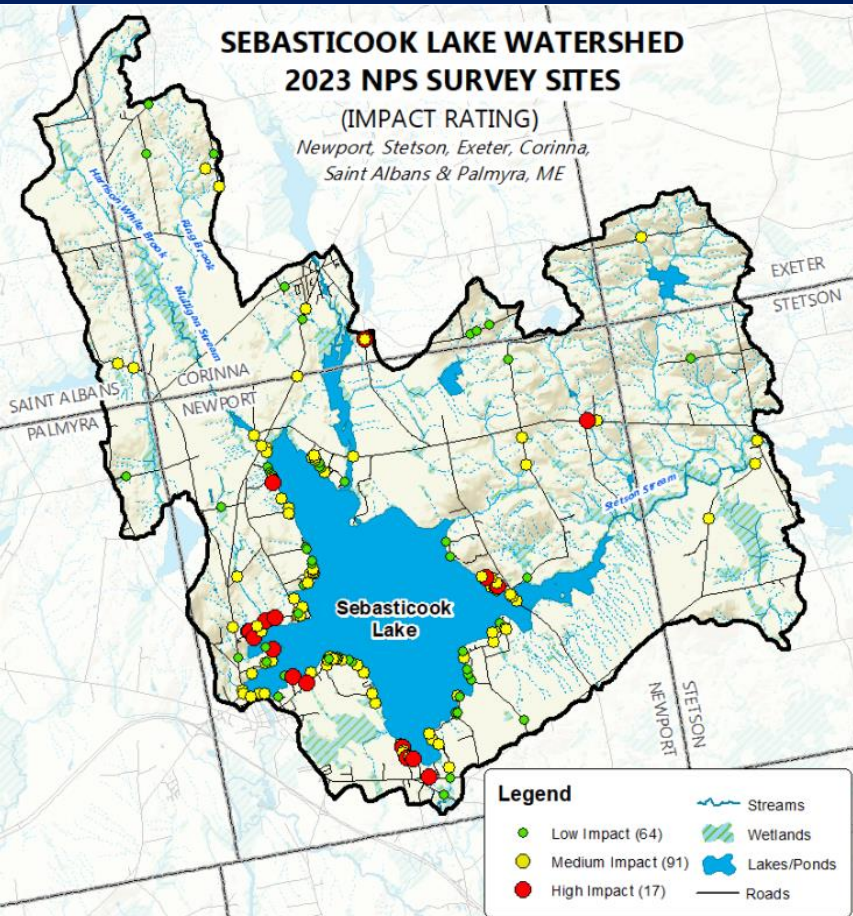


Public Outreach/Meeting



Watershed Plan Development

WATERSHED SURVEY



Land Use	Total	% Total
Residential	54	31%
Town Road	48	28%
Private Road	24	14%
Driveway	11	6%
State Road	12	7%
Trail or Path	7	4%
Boat Access	5	3%
Municipal / Public	5	3%
Commercial	3	2%
Beach Access	2	1%
Construction Site	1	1%
Total	172	100%

* Collectively, town, state & private roads account for 50% of sites.

Photos- Watershed Survey



Examples of residential sites ranked high (left), medium (middle), and low (right) impact.



Examples of road sites ranked high (left), medium (middle), and low (right) impact.

Next Steps- Watershed Survey

- Finalize Prioritization Process
- Send a letters to landowners with a documented site
- Notify state & town officials
- Initiate a LakeSmart Program



Example of a medium impact boat access site in Sector 6.

Agriculture Survey

- Field survey of active ag land (current use & NPS concerns)
- Review of existing field & nutrient management practices
- Summary Report
 - Types and # of farms
 - Types and # of conservation practices
 - Summary of field visits with farmers



Photo Source: All in Thyme Farm, Newport, ME

AGRICULTURE SURVEY

- **Total of 181 farms** in the watershed (167 Penobscot/4 Somerset)
- **Diverse mix of farming operations.**
Hay, Corn, Pasture & Potatoes
- **Largest areas on north side of the lake**
in Newport, Corinna & St. Albans
- Site visits w/ **4 largest operators-** all have made efforts to reduce impacts to water quality
- **41 NRCS contracts** between 2012-2023 covering **6,605 acres** (ag & forestry)
- **Confined Animal Feeding Operations** (CAFO's) of concern to water quality

Crop Type	Acres
<i>Hay/Non-Alfalfa</i>	2,358
<i>Corn</i>	1,412
<i>Grass/Pastureland</i>	580
<i>Potatoes</i>	429
<i>Rye</i>	123
<i>Apple</i>	77
<i>Alfalfa</i>	58
<i>Oats</i>	20
<i>Blueberries</i>	5
<i>Christmas Trees</i>	5
<i>Fallow</i>	1
Total	5,068

SEPTIC SYSTEMS

Septic System Assessment Tasks

- Septic Database
- Septic System Survey
- Vulnerability Analysis

2023 SLA Septic System Survey

Respond by July 1st and enter to win a \$100 gift card!

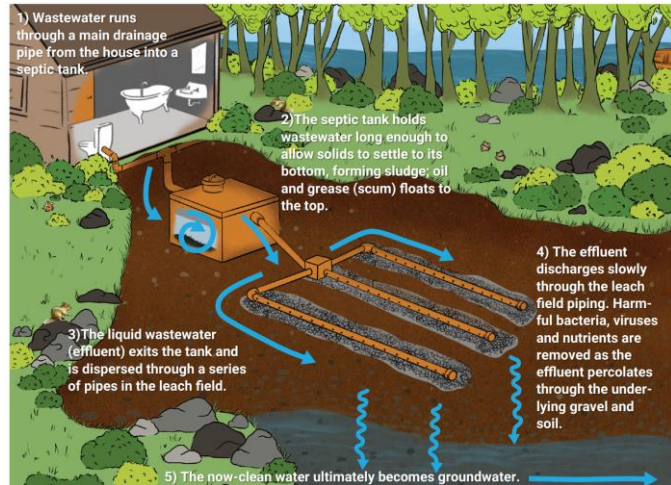
- All shorefront property owners will receive a paper survey by mail in June
- Or fill out the online survey at <https://forms.gle/jeZqEvAU7QthjvFo6>
- Everyone that responds will be entered into a drawing to win a \$100 gift card to Pratt Family Greenhouse



Responses will be used for the 2024 Watershed Plan to:

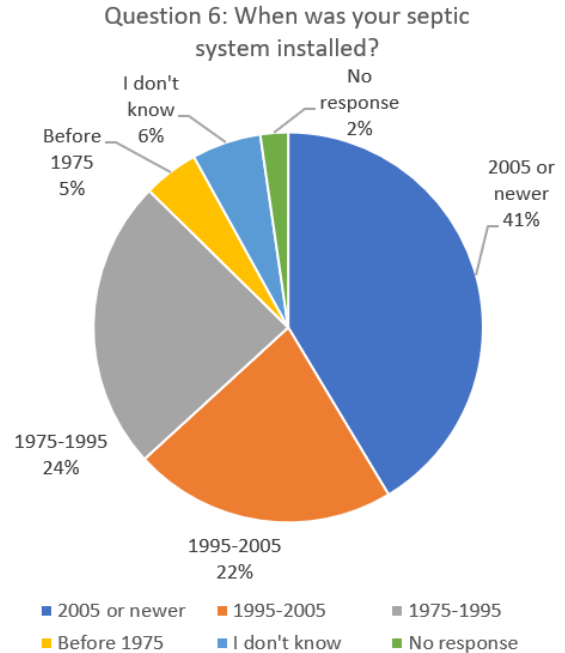
- ✓ Build upon current knowledge of septic systems in the watershed
- ✓ Estimate phosphorus inputs to the lake from septic systems
- ✓ Develop strategies to fund septic system upgrades
- ✓ Raise awareness about septic systems and water quality
- ✓ The survey will not be used for regulatory purposes

The SLA Septic System Survey is part of a larger effort to develop a 10-year Watershed-Based Management Plan for Sebasticook Lake in 2023-2024. Funding for the survey was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. The funding is administered to the Town of Newport by the Maine Department of Environmental Protection in partnership with EPA.

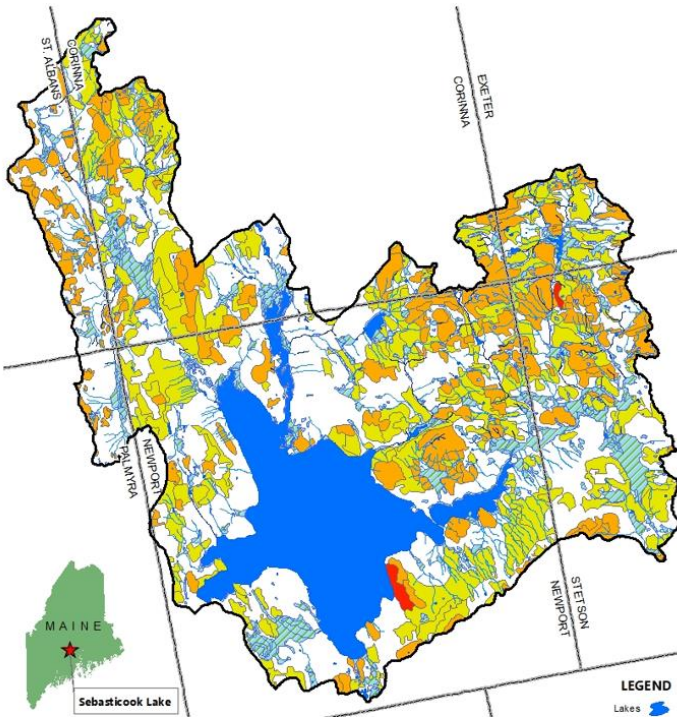


SEPTIC SURVEY

- **USE-** 60% Seasonal Use
- **PROXIMITY-** 50% of systems w/in 100' of the lake
- **AGE-** 30% installed before current plumbing code



SEPTIC VULNERABILITY ANALYSIS



SEBASTICOOK LAKE WATERSHED SENSITIVE SOILS



Data Sources: ME Geolibary, USDA/NRCS, USFWS (NWI)
 Projection: NAD 1983 UTM Zone 19N
 Created By: C. Castaneda, Ecological Instincts - Dec. 2023

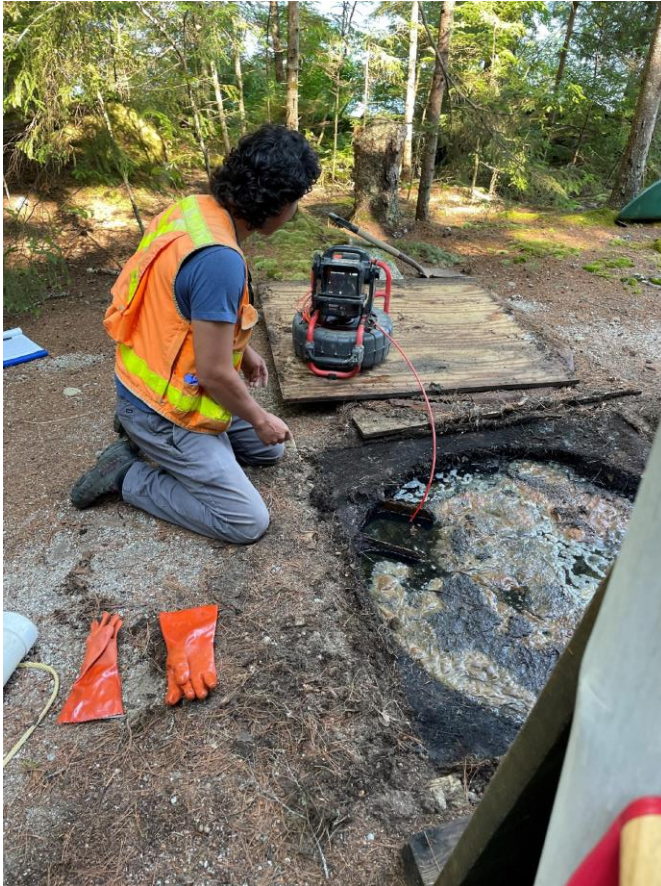
LEGEND

- Lakes
- Wetlands
- Perennial Streams
- Intermittent Streams
- Town Boundaries
- Sebasticook Watershed
- At-Risk Soils**
 - Low Risk
 - High Risk
 - Very High Risk

Town	Watershed Area (ac)	Sensitive Soil Area (ac)	% of area on sensitive soil
Exeter	1,625	1,040	64%
Corinna	5,906	3,167	54%
Stetson	5,025	2,471	49%
Newport	14,415	6,325	44%
Saint Albans	1,973	595	30%
Palmyra	675	86	13%
Total Watershed	29,619	13,684	46%

- 1,671 parcels in Newport-55% or 927 parcels on at-risk soils
- 92 parcels within 150 ft of Sebasticook Lake

REDUCING SEPTIC INPUTS



- ❖ Pump your septic system regularly
- ❖ Replace older systems in the shoreland zone (Installed before 1995)
- ❖ Avoid using garbage disposals or putting chemicals down your drains or toilets

WQ MONITORING & IN-LAKE ASSESSMENT

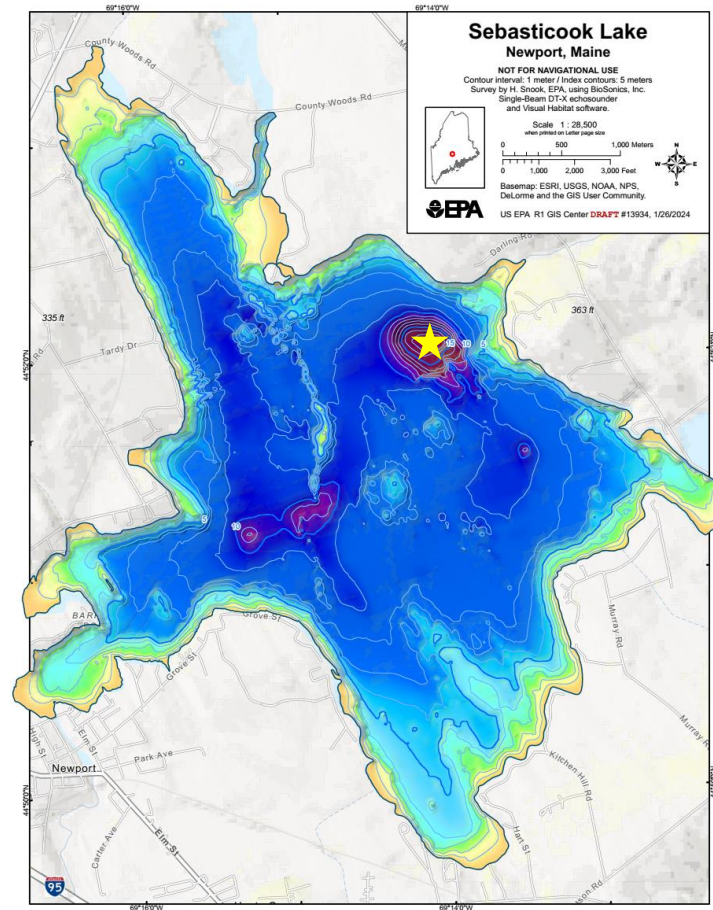
- ✓ Bathymetric Mapping
- ✓ Sediment Sampling & Analysis
- ✓ Water Quality Monitoring (June – Sept)
- ✓ Monthly Phytoplankton Analysis



BATHYMETRIC MAPPING

Bathymetric Mapping

- US EPA in 2022
- Updated lake depth map, volume & area
- Used for Internal Loading Analysis & In-Lake Management Recommendations

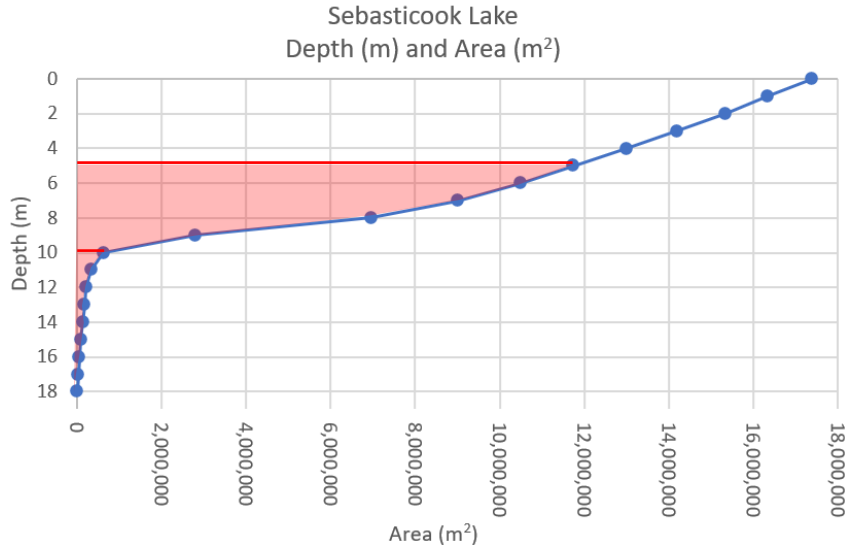


BATHYMETRIC MAPPING

- 4% area below 10 m
- 68% area below 5 m

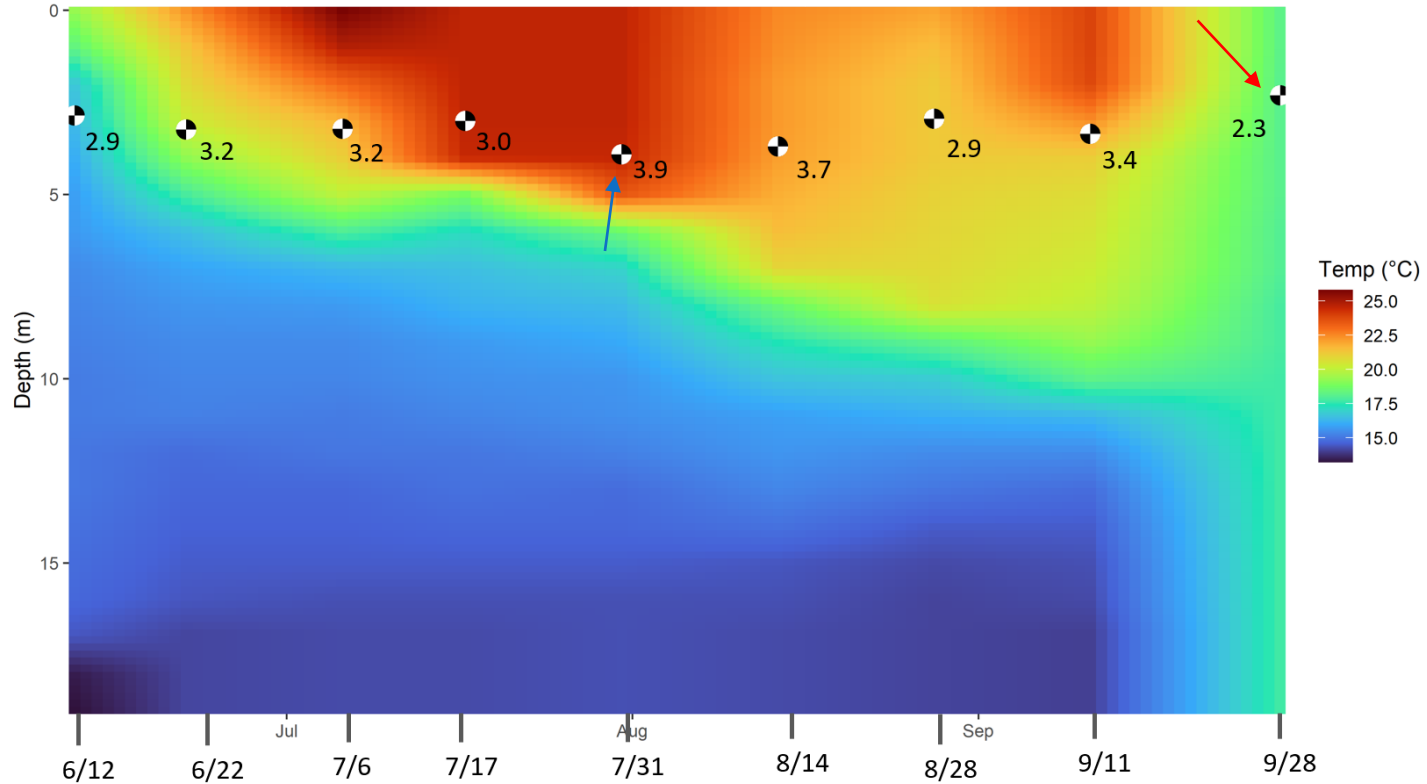


What happens
between 5 - 10m
greatly affects water
quality conditions



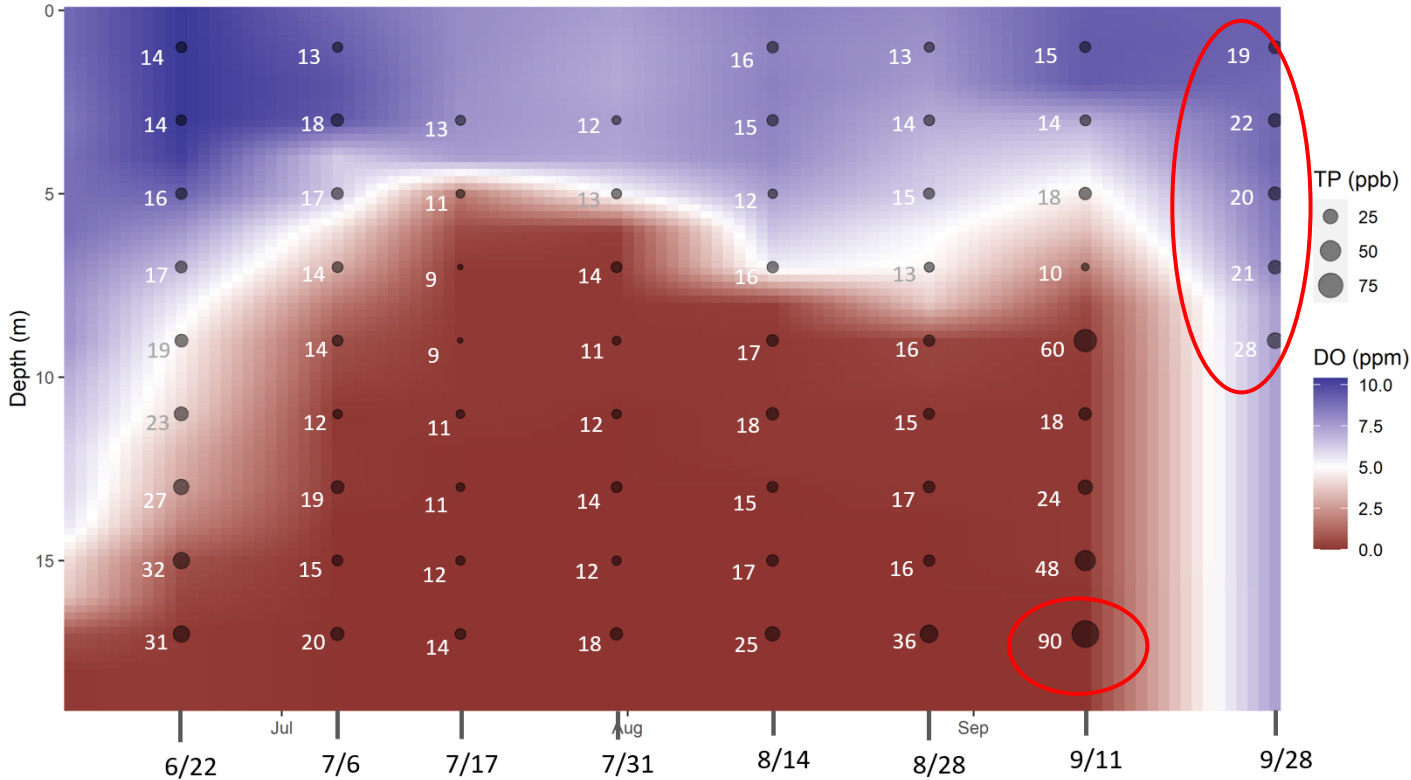
TEMPERATURE & WATER CLARITY

Sebasticook Lake - Station 1 - 2023



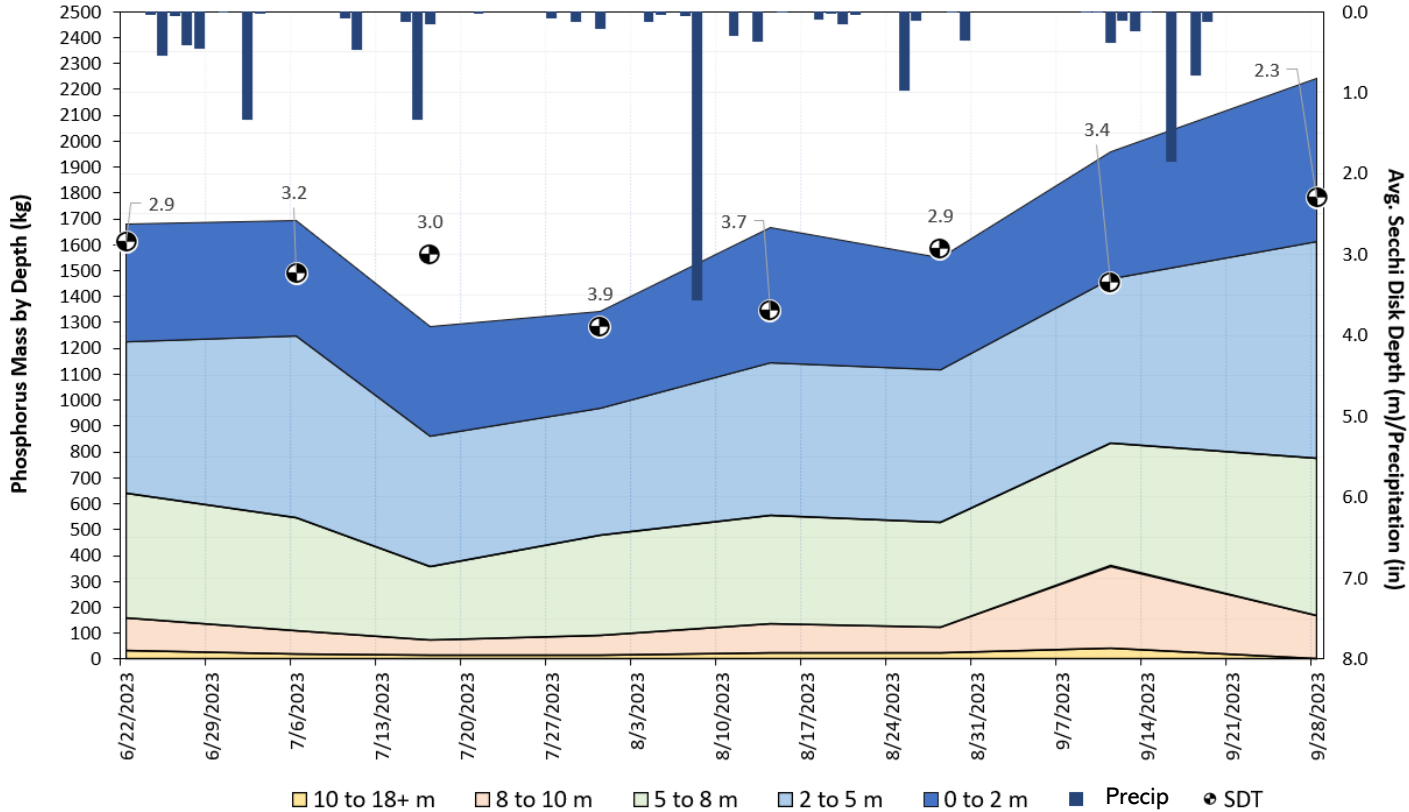
DISSOLVED OXYGEN & PHOSPHORUS

Sebasticook Lake - Station 1 - 2023

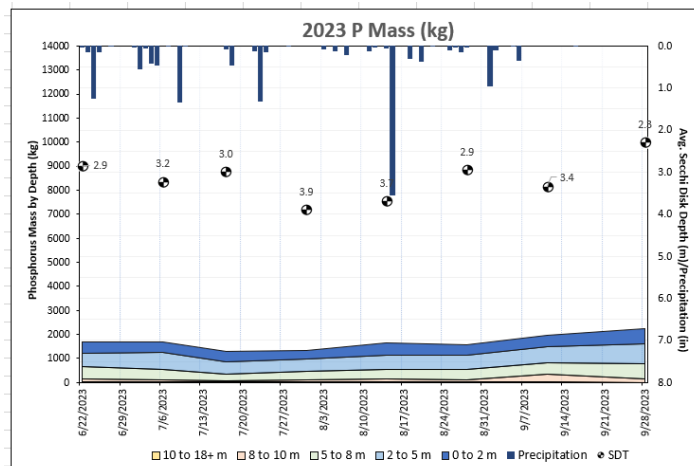
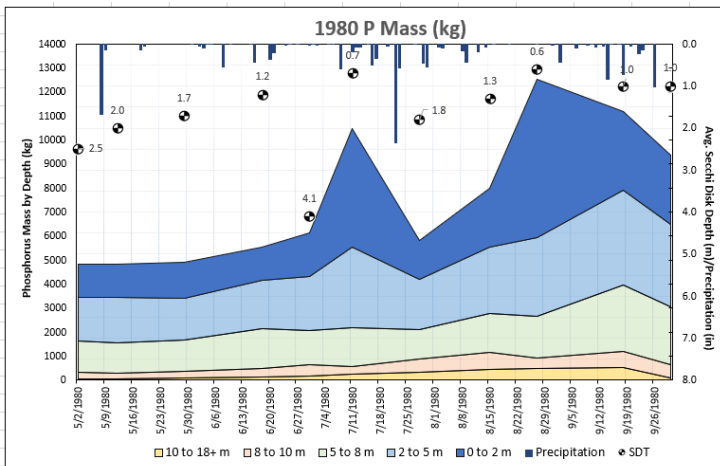


P MASS

2023 Sebasticook Lake Phosphorus Mass (kg)



P MASS 1980 VS. 2023



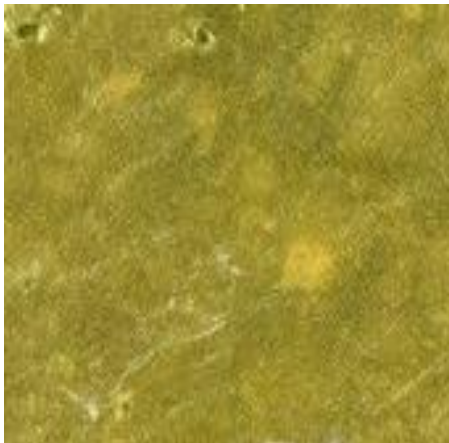
■ P Mass was 6X higher in the 1980s

■ Substantially lower in 2023



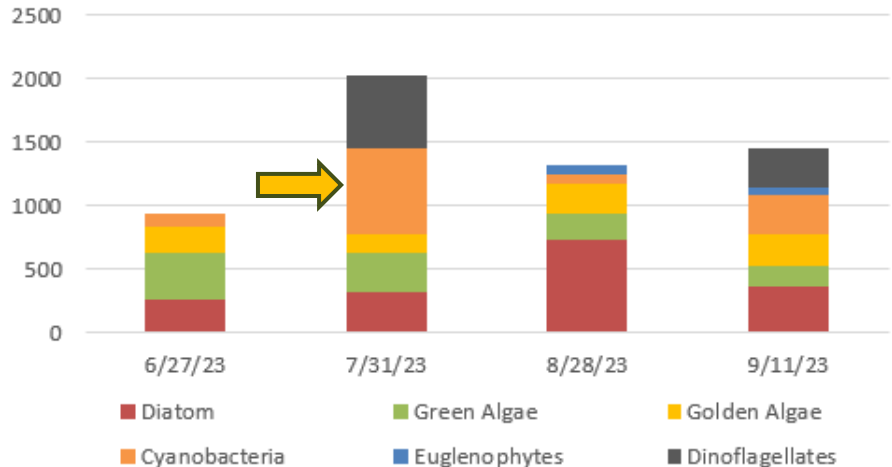
PHYTOPLANKTON ANALYSIS

- a) Monthly samples collected June - September
- b) No signs of major issues (wet year and unusually high SDT)



Seabasticook Lake, Newport (June 2023)

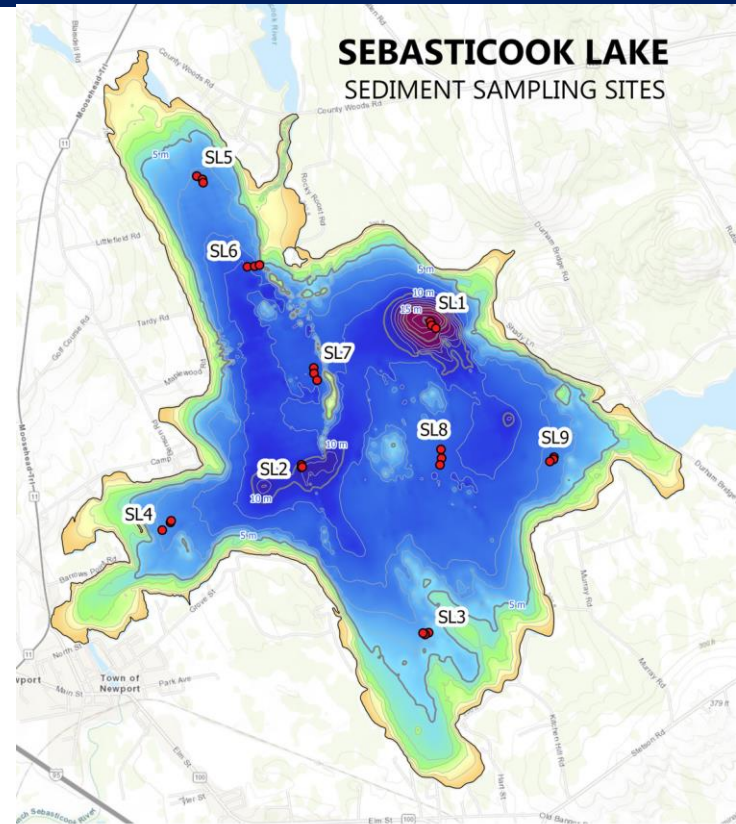
Seabasticook Lake - Station 1
2023 Phytoplankton Density ($\mu\text{g/L}$)



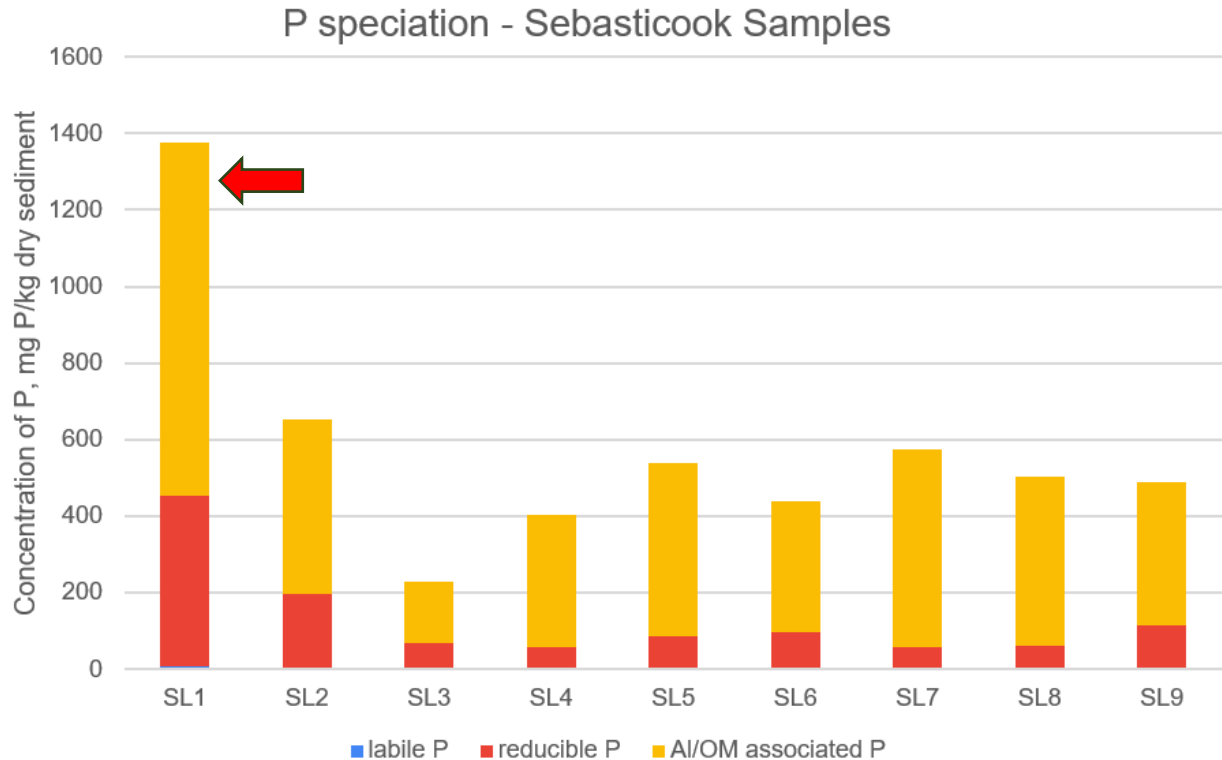
SEDIMENT SAMPLING & ANALYSIS

Sediment Sampling

- 9 Sampling Locations
- Collected by Maine DEP
May 2023
- Analyzed by St. Joseph's
College



SEDIMENT SAMPLING & ANALYSIS



SEDIMENT SAMPLING & ANALYSIS

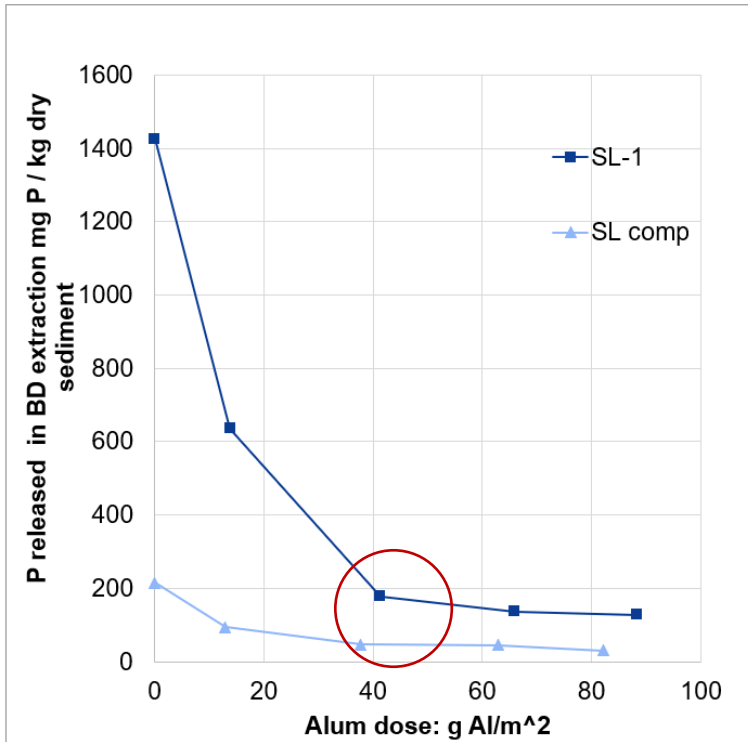


FIGURE 1: P RELEASE IN UNITS OF mg P / kg dry sediment. AL DOSE UNITS IN g Al / m² lake bottom

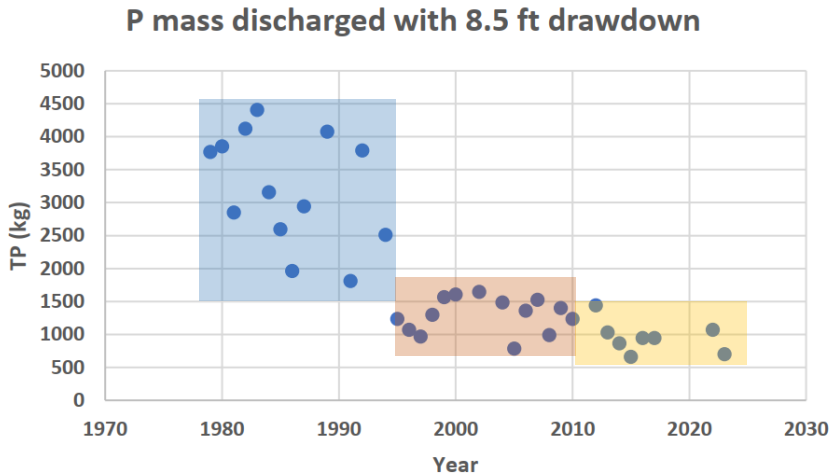
Maximum Probable P Inactivation

- Treatment Area: >5 m
- Dose: 40 g/m²
- Longevity: < 10 years
- Cost: \$5.2M
- Alternate: \$1.3M every couple years to 40 g/m²



ASSESSMENT OF DRAWDOWN

- **1980s-** Significant reductions in P (3,200 kg/yr)
- **1990s-** Reduced by > half 1980s (1,500 kg/yr)
- **2000s-** Slight reduction from 1990s (1,300 kg/yr)
- **2010- Present-** Leveling out (<900 kg/yr)



FUTURE OF THE DRAWDOWN

- Currently removing 1/3 – 1/5 of P from the original drawdown
- Balancing out what is coming in (maintenance)
- Won't help improve conditions in the lake over the long-term
- Necessary to prevent build-up of P in the lake again

Management Recommendations

- 1) Drawdown the lake during a summer algae bloom (~3 ft)
- 2) Drawdown the lake during fall mixing (8.5 ft)
 - Measure oxygen/temp weekly starting before Labor Day; timing will vary from year to year



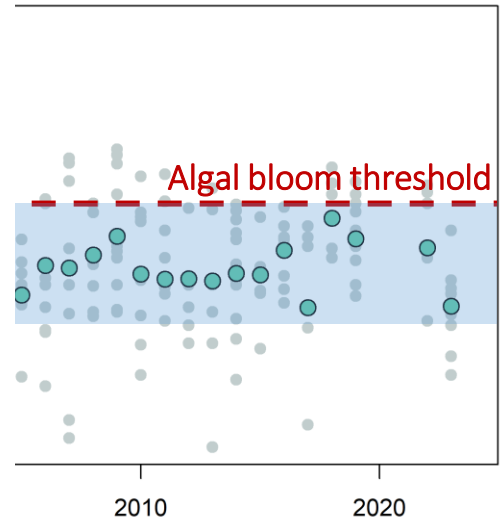
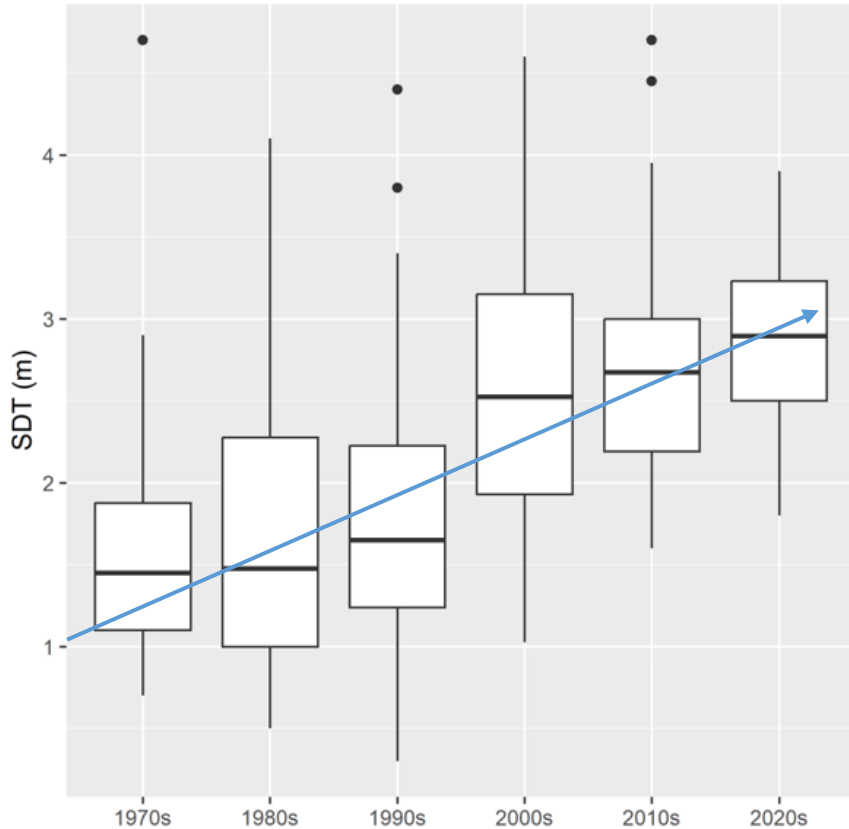
WATER QUALITY TRENDS

Parameter	Long-Term Trend (1972-2023)	10-Year Trend (2014-2023)
Water Clarity	Increasing (strong)	No Trend
Chlorophyll-a	Decreasing (strong)	No Trend
Total Phosphorus (Surface & Bottom)	Decreasing (strong)	No Trend
Alkalinity	Increasing (strong)	No Trend
Anoxic Factor	Increasing (n.s.)	n/a
Minimum Anoxic Depth	Decreasing	No Trend
Surface Temperature	Increasing (strong)	n/a

- Significant long-term improvement
- Leveling off since 1990s

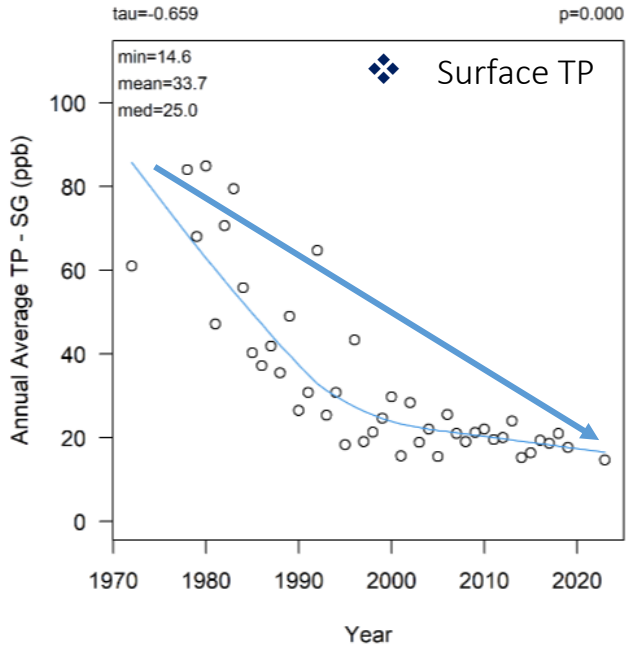
SECCHI DISK TRANSPARENCY (SDT)

Seabasticook Lake
(MIDAS 2264 - Station 1)

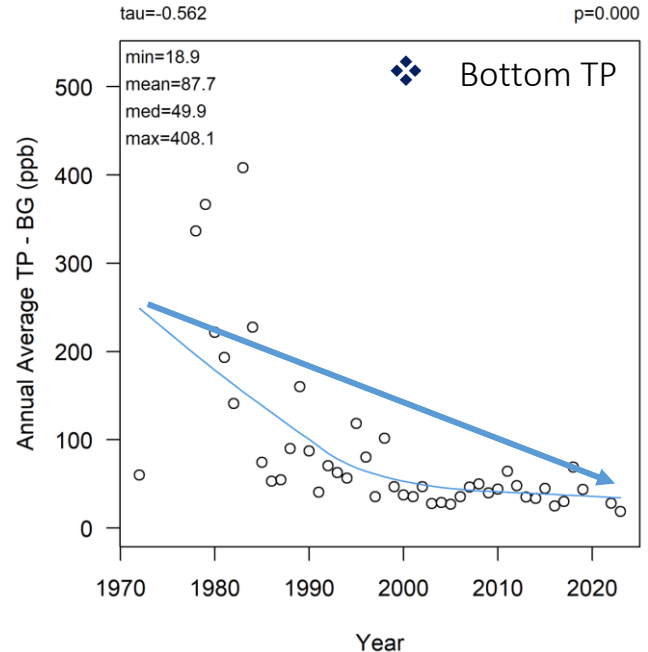


Total Phosphorus (SG & BG)

Sebasticook Lake
(MIDAS 2264 - Station 1)



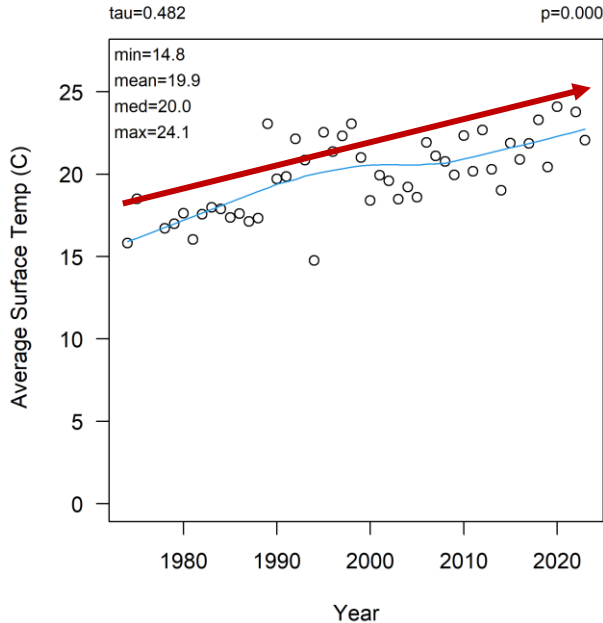
Sebasticook Lake
(MIDAS 2264 - Station 1)



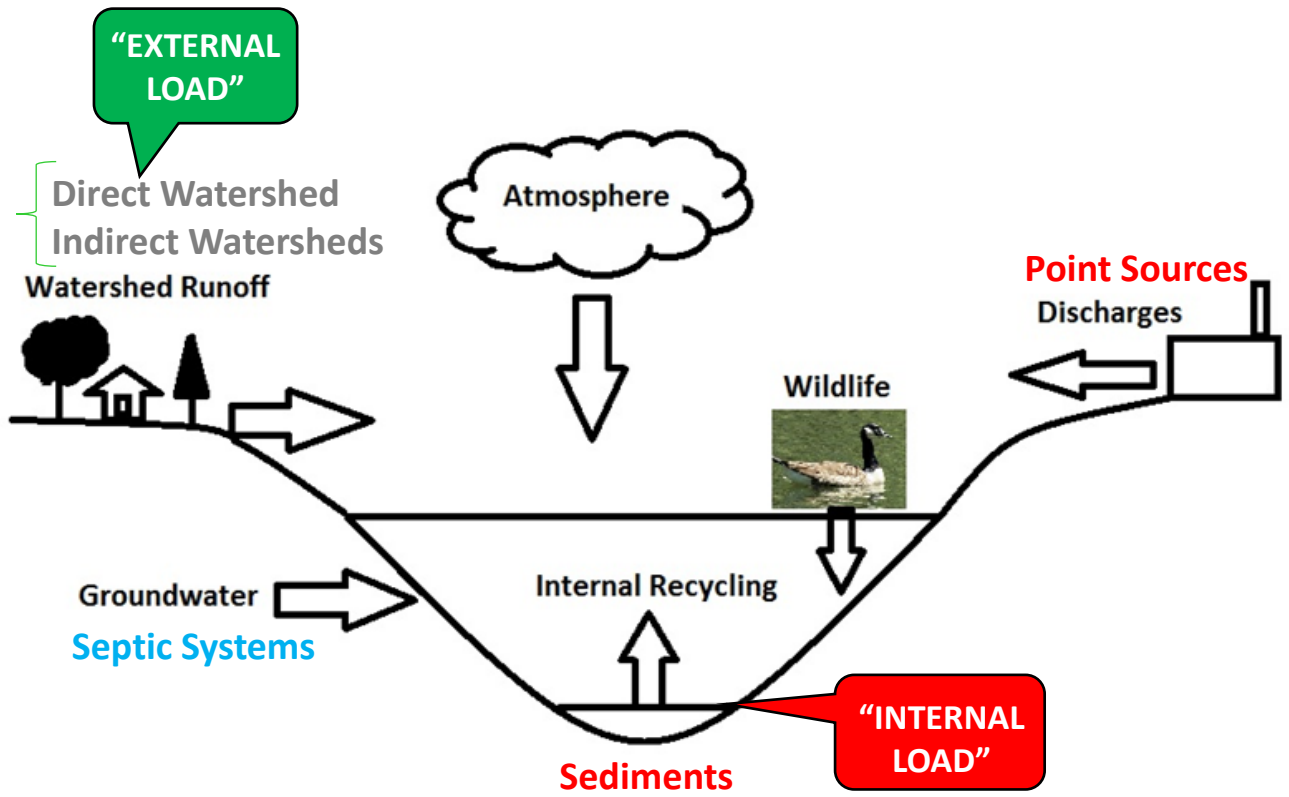
- Significant decreasing trend over the long term
- No trend over past 10 years

SURFACE TEMPERATURE

Sebasticook Lake
(MIDAS 2264 - Station 1)



- **Significant increasing trend over the long term** (except June)
- Strongest trends in July & September

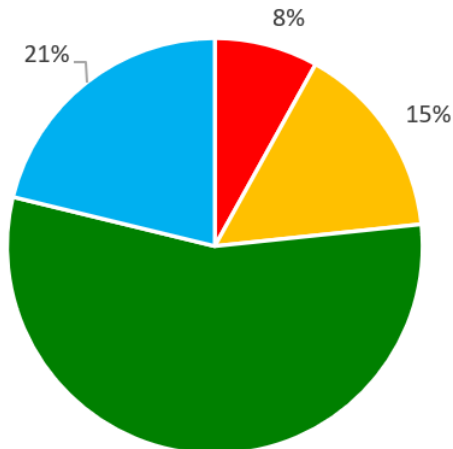


Where are the current sources of P in
Seabasticook Lake?

WATERSHED MODELING- LAND COVER

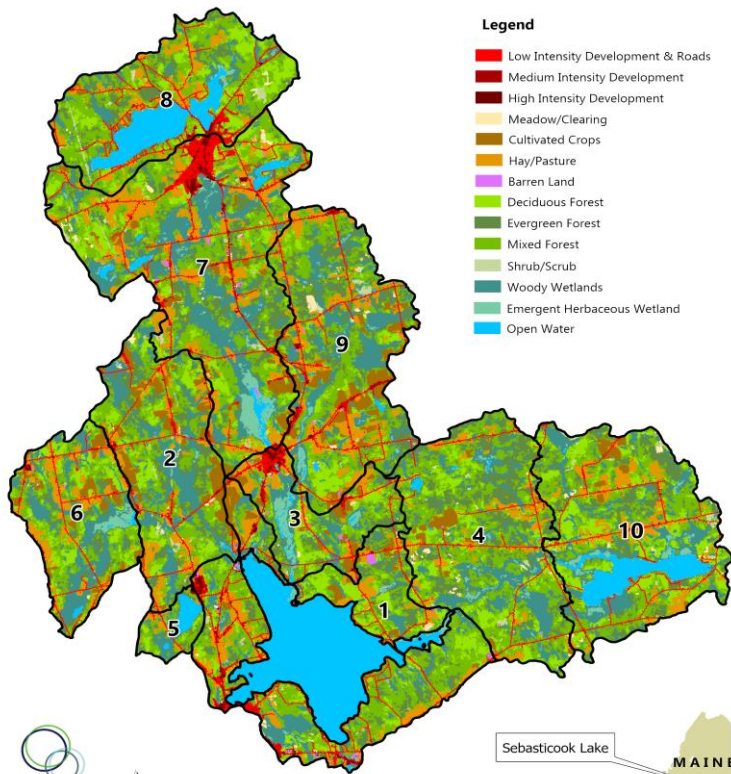
❖ Land-cover is a critical component of watershed modeling

% Land Cover
Sebasticook Lake Watershed



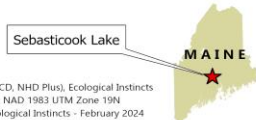
■ Development ■ Agriculture
■ Forest ■ Wetlands

SEBASTICOOK LAKE WATERSHED
LAND COVER BY BASIN



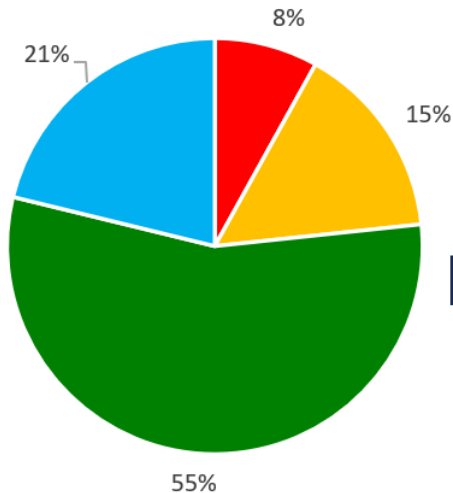
0 1 2 4 Miles

Source: USGS (NLCD, NHD Plus), Ecological Instincts
Projection: NAD 1983 UTM Zone 19N
K. Goodwin, Ecological Instincts - February 2024



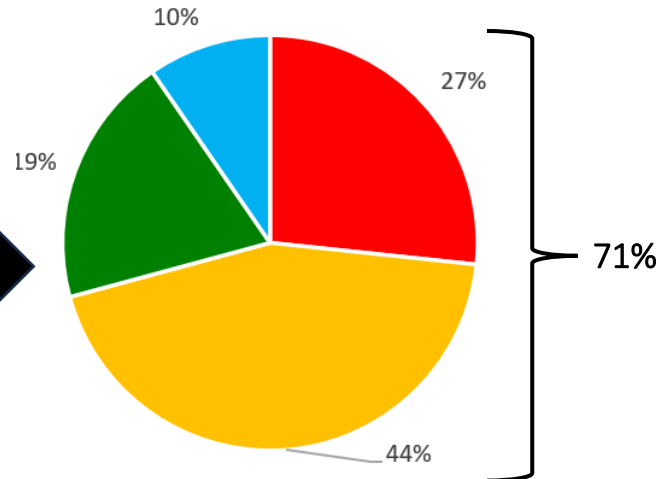
WATERSHED MODELING

% Land Cover
Sebasticook Lake Watershed



■ Development ■ Agriculture
■ Forest ■ Wetlands

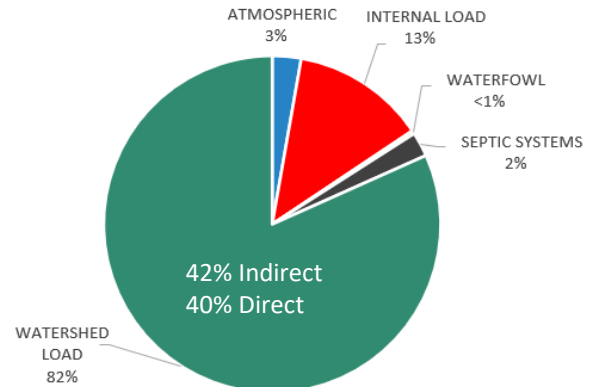
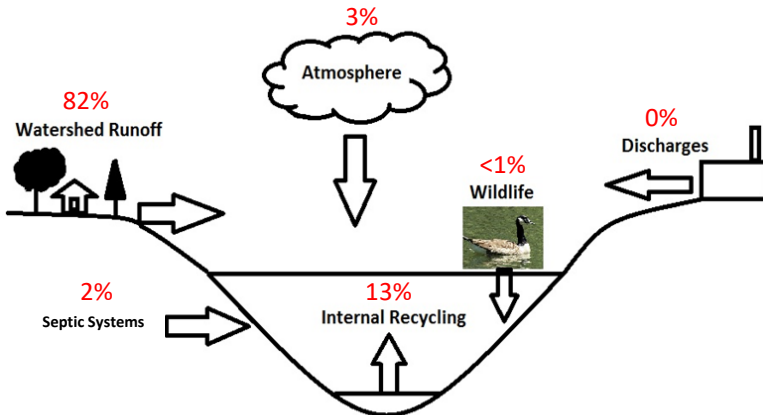
Load Generation (kg/yr) by Land Cover Category
(Baseflow + Runoff P)



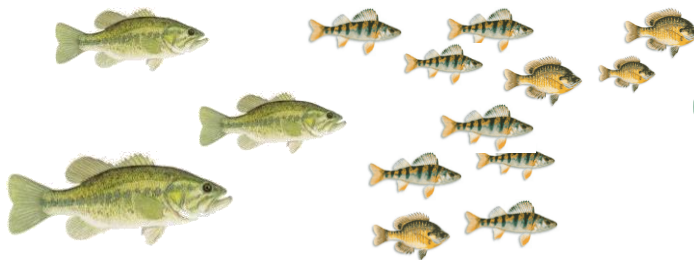
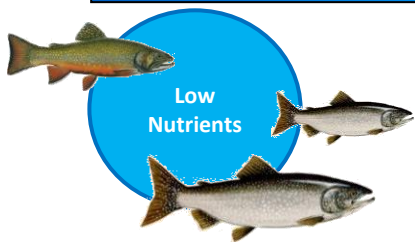
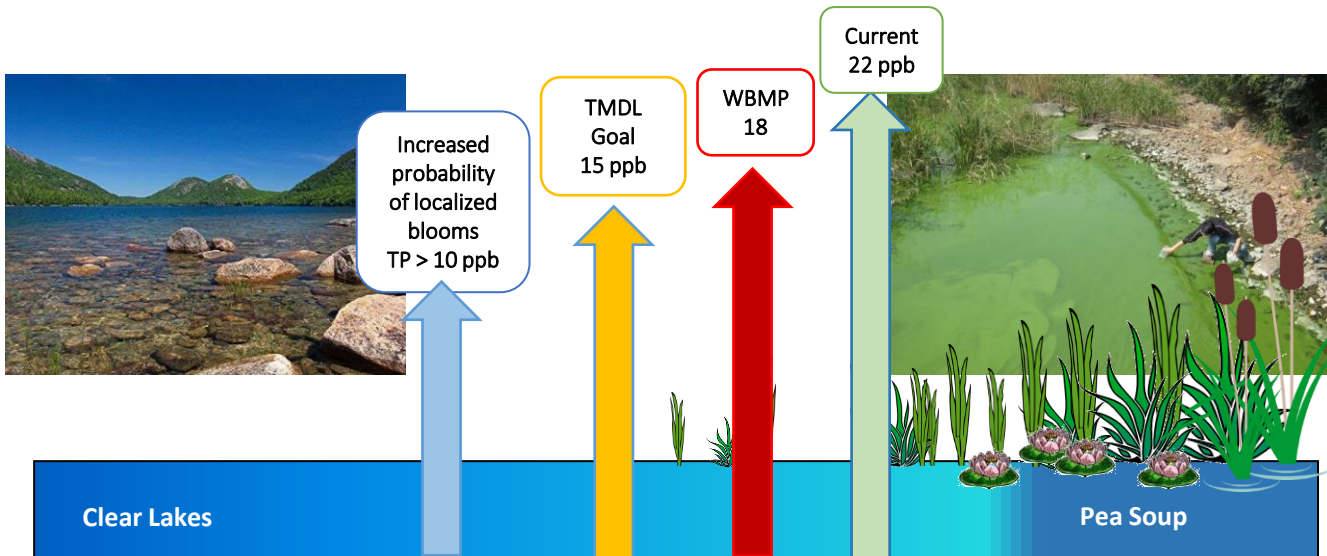
■ Development ■ Agriculture
■ Forest ■ Wetlands

PHOSPHORUS SUMMARY

SOURCE OF P	P (KG/YR)	% P LOAD
WATERSHED RUNOFF	5136	82%
INTERNAL RECYCLING	809	13%
ATMOSPHERIC	174	3%
WILDLIFE/WATERFOWL	20	<1%
SEPTIC SYSTEMS	148	2%
TOTAL LOAD	6286	100%



SET A REVISED WATER QUALITY GOAL (2025 – 2034)



WATER QUALITY GOAL (2025 – 2034)

❖ Reduce Overall P Load

By 1,133 kg/yr

❖ Increase Water Clarity

By a foot

❖ Decrease Bloom Probability

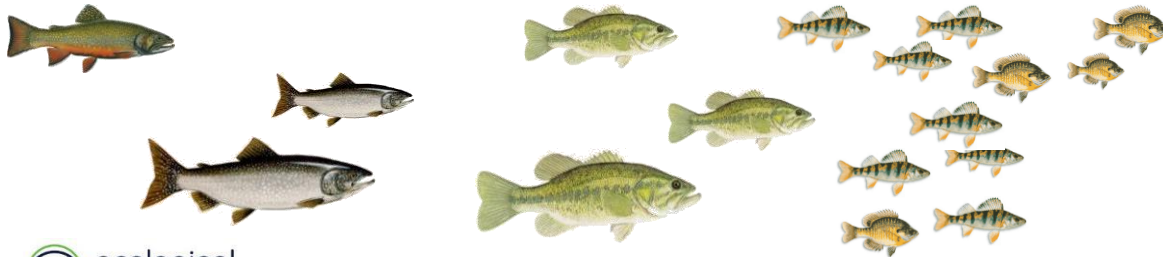
From 44% to 24%

Clear Lakes

WBMP
18

Current
22 ppb

Pea Soup



BIG PICTURE

- **Phosphorus is Too High** but is MUCH less than it used to be
- **Next Level P Control Efforts Are Needed** to improve current water quality conditions
- **Drawdown Has Helped with P Management** but has reached equilibrium and will not improve the lake further
- **P Inactivation (Alum)** could improve conditions but only temporarily (2-3 years/treatment) due to the large load of P from the watershed
- **Agriculture & Development** are the main watershed issues (2/3 agriculture, 1/3 development)

ACTIONS NEEDED



- **Reduce P from the Watershed-** Focus on agriculture, roads, buffers & septic systems
- **Reduce P from the Sediments-** Refine drawdown methods & criteria for low-dose alum treatment
- **Conserved Land-** Protect critical undeveloped land in the watershed
- **Ordinances-** Strengthen town ordinances and enforcement
- **Education-** Increase public awareness
- **Capacity Building-** Bolster community support for restoration through fundraising activities
- **Monitoring-** Expand monitoring efforts

ESTIMATED COST

A. Restoration - Reduce External Phosphorus Load	\$2,164,000
B. Restoration - Reduce Internal Phosphorus Load	\$2,703,000
C. Prevention - Reduce New Sources of NPS Pollution	\$284,000
D. Education, Outreach & Communications	\$49,000
E. Build Local Capacity	\$48,500
F. Science - Long-Term Monitoring & Assessment	\$156,000

Sebasticook Lake WBMP 10-Year Total \$5,404,500



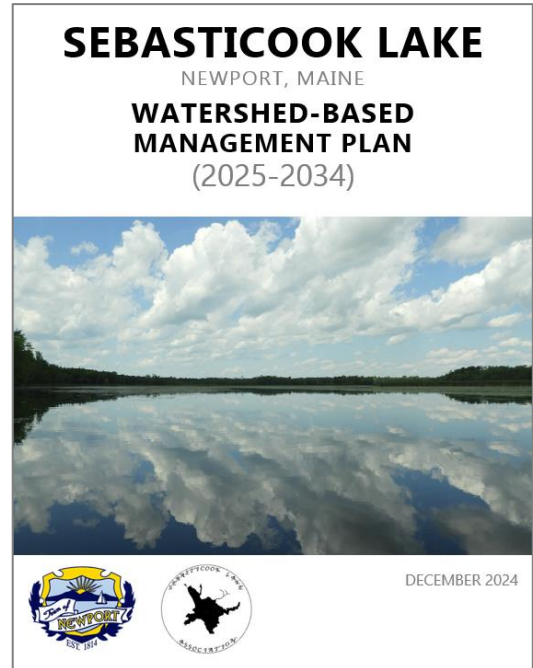
SMALL GROUP DISCUSSIONS

- A. **External Loading/NPS Actions** (Katie Goodwin)
- B. **Internal Loading/Drawdown** (Jen Jespersen)
- C. **Municipal Planning, Ordinances, Land Conservation** (Jim Ricker)
- D. **Education, Outreach & Communications** (Alex Wong)
- E. **Build Local Capacity** (Andre Cushing)
- F. **Monitoring & Assessment** (Linda Bacon)

30-minute Group Discussion
Assign Reporter- 5 minutes to share with large group
What are your top 3 objectives?

NEXT STEPS

- Update Watershed Action Plan
- Prepare draft & final WBMP
- Apply for state/federal grants to reduce P in the watershed



QUESTIONS?

