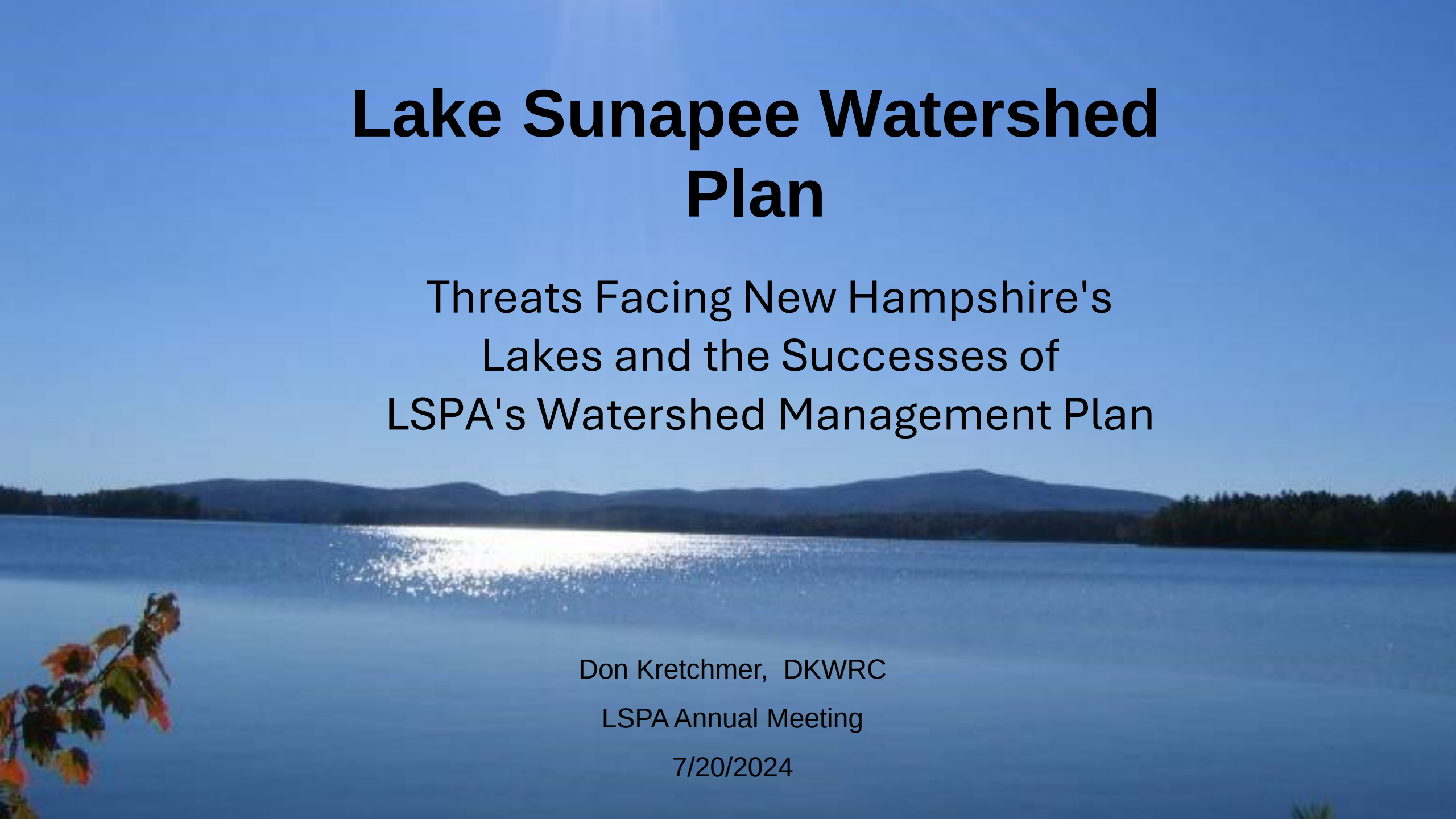
Lake Sunapee Watershed Plan

Threats Facing New Hampshire's Lakes and the Successes of LSPA's Watershed Management Plan



Don Kretchmer, DKWRC

LSPA Annual Meeting

7/20/2024

This morning's talk

- Issues introduced in watershed plan
- Progress on implementing the plan
- Potential paths forward
- Lake issues from around NH
- Ways to help

Fertilizer phosphorus

PHOSPHORUS

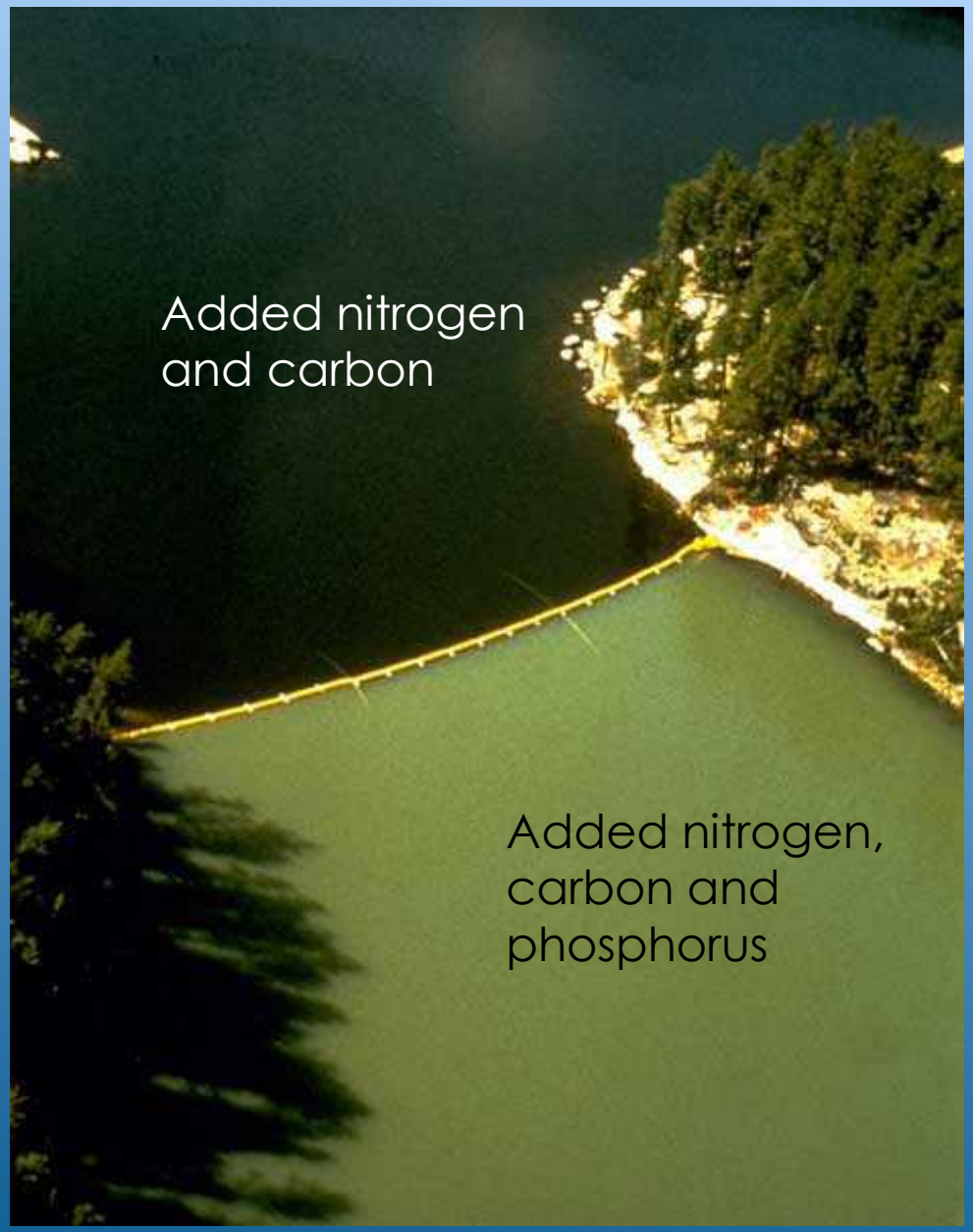
The most important nutrient in lakes

Also the middle number on a fertilizer bag (should be 0)

TOO MUCH PHOSPHORUS GROWS ALGAE, CYANOBACTERIA AND PLANTS IN LAKES

TOO MUCH GROWTH CAN REDUCE WATER CLARITY, DEPLETE DISSOLVED OXYGEN AND MAY RESULT IN WORSE BLOOMS

1973 EXPERIMENT BY SCHINDLER

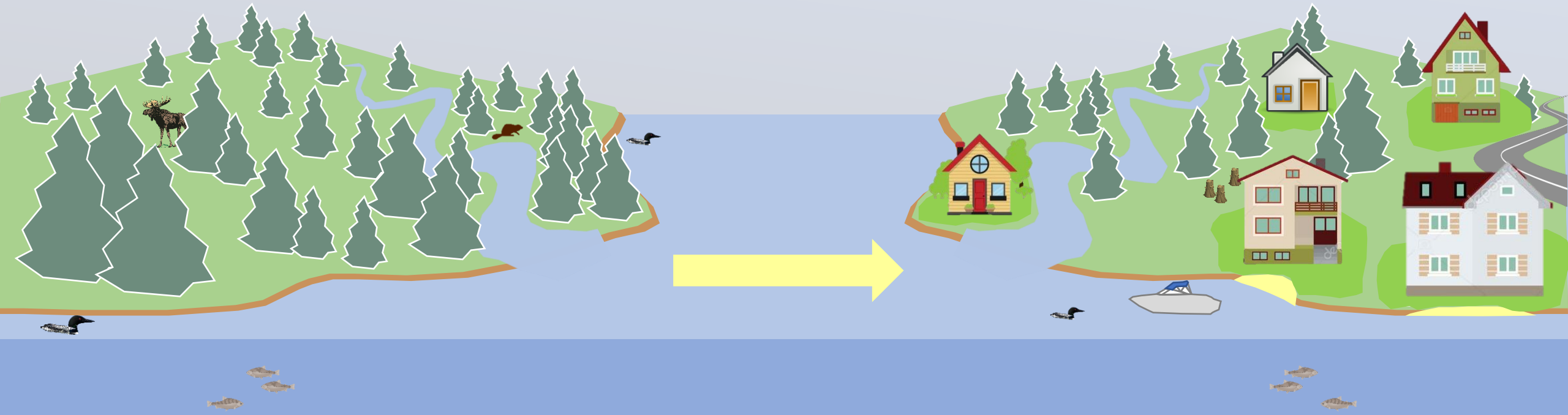


Wentworth Water

Wentworth Water With Phosphorus Lawn Fertilizer

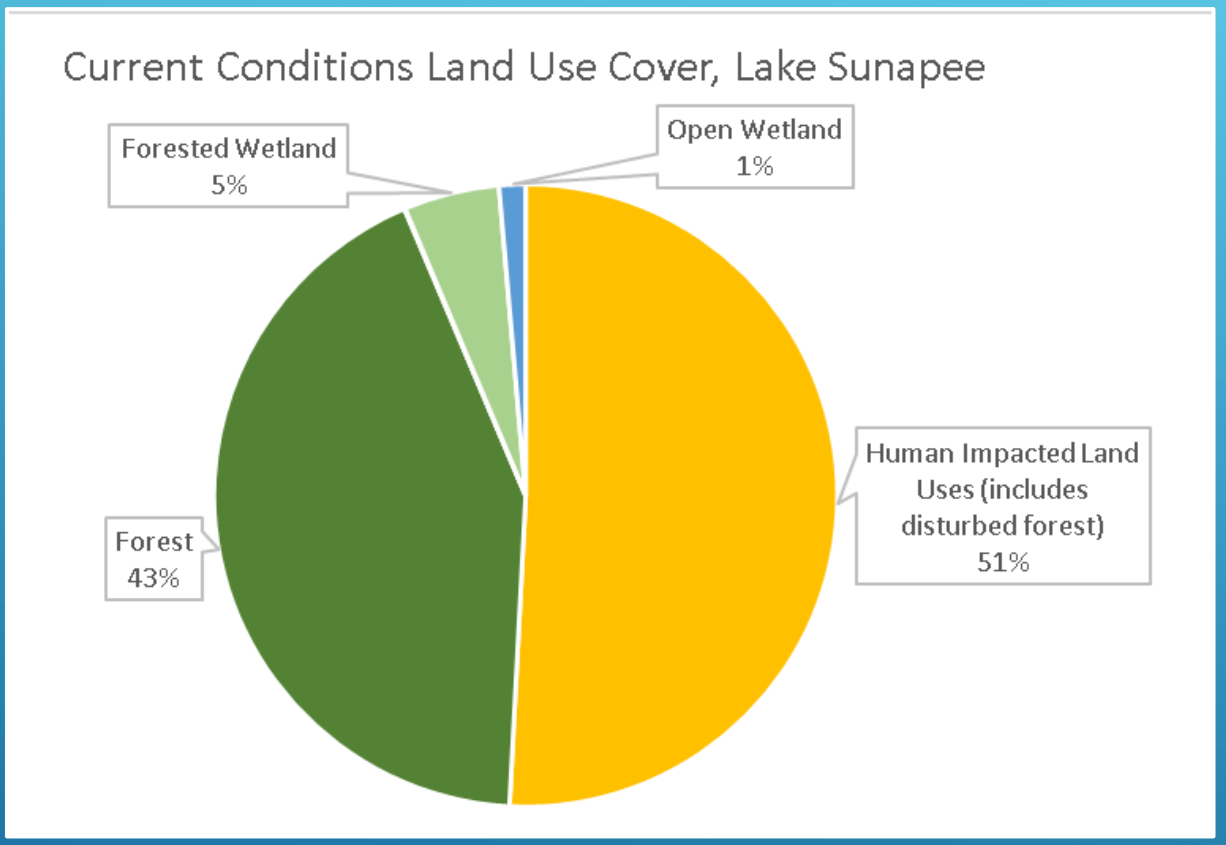
2007 EXPERIMENT BY KRETCHMER

Changes in land use changes the water quality downstream and the amount of phosphorus that gets to the lake

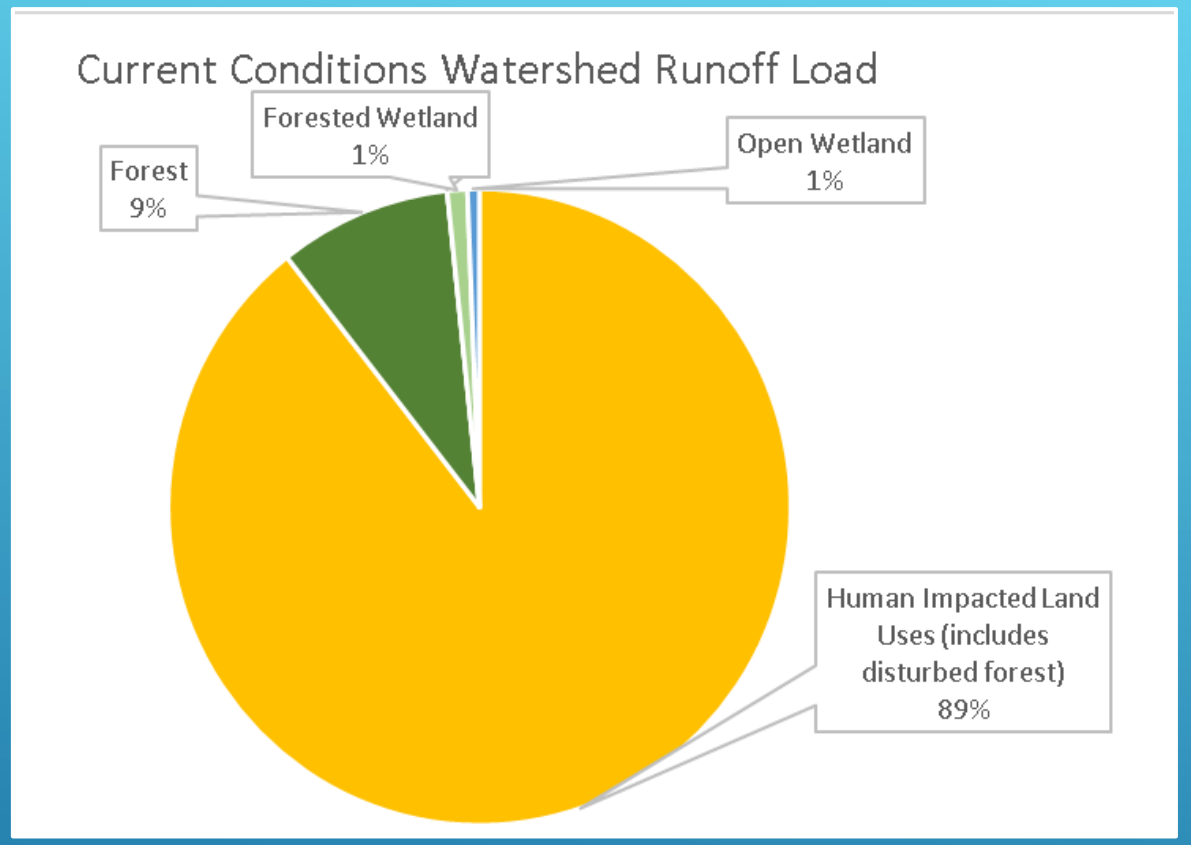


The watershed plan is based primarily on the identification of sources of phosphorus to the lake and control of those sources.

Land with human uses generates most of the phosphorus load. Human uses include disturbed forest (evidence of recent harvest)



Amount of Land

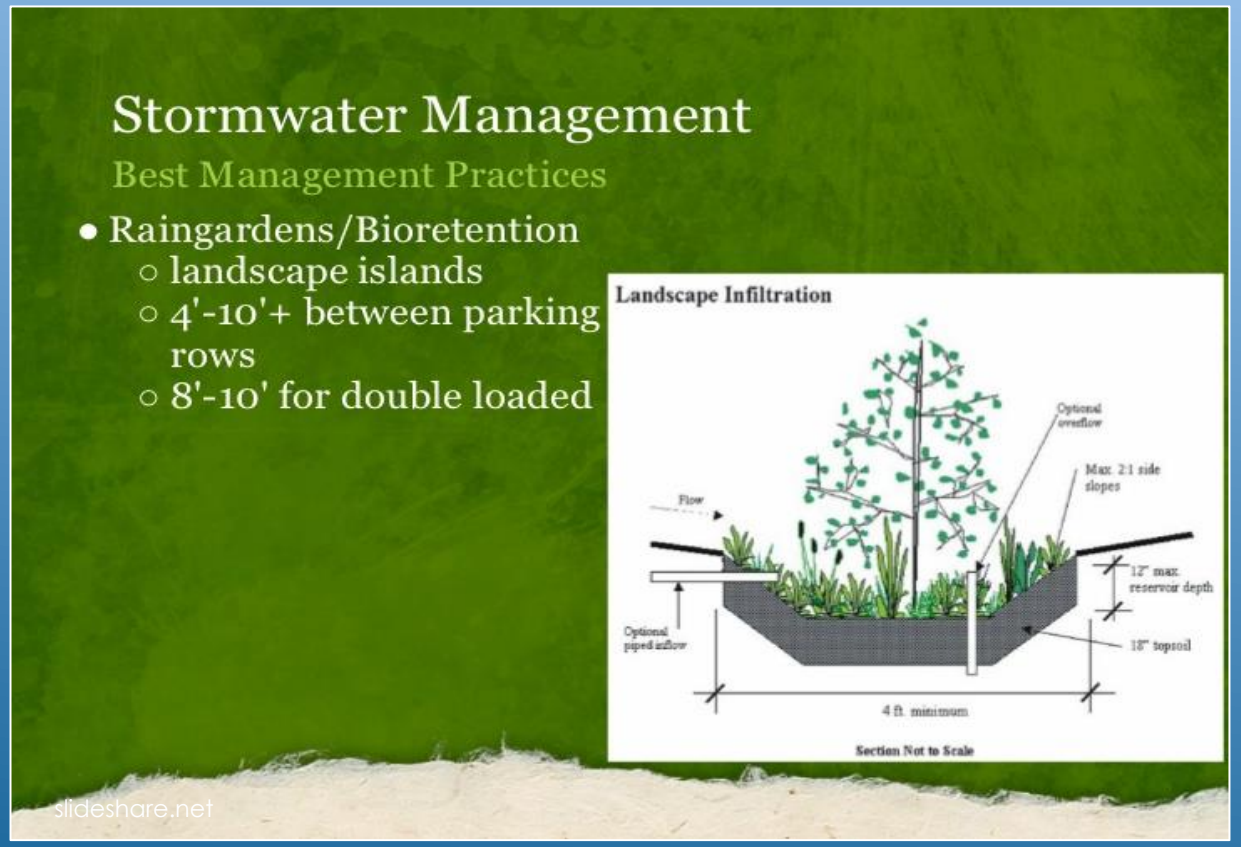


Amount of Phosphorus from Land

10 YEAR ACTION PLAN

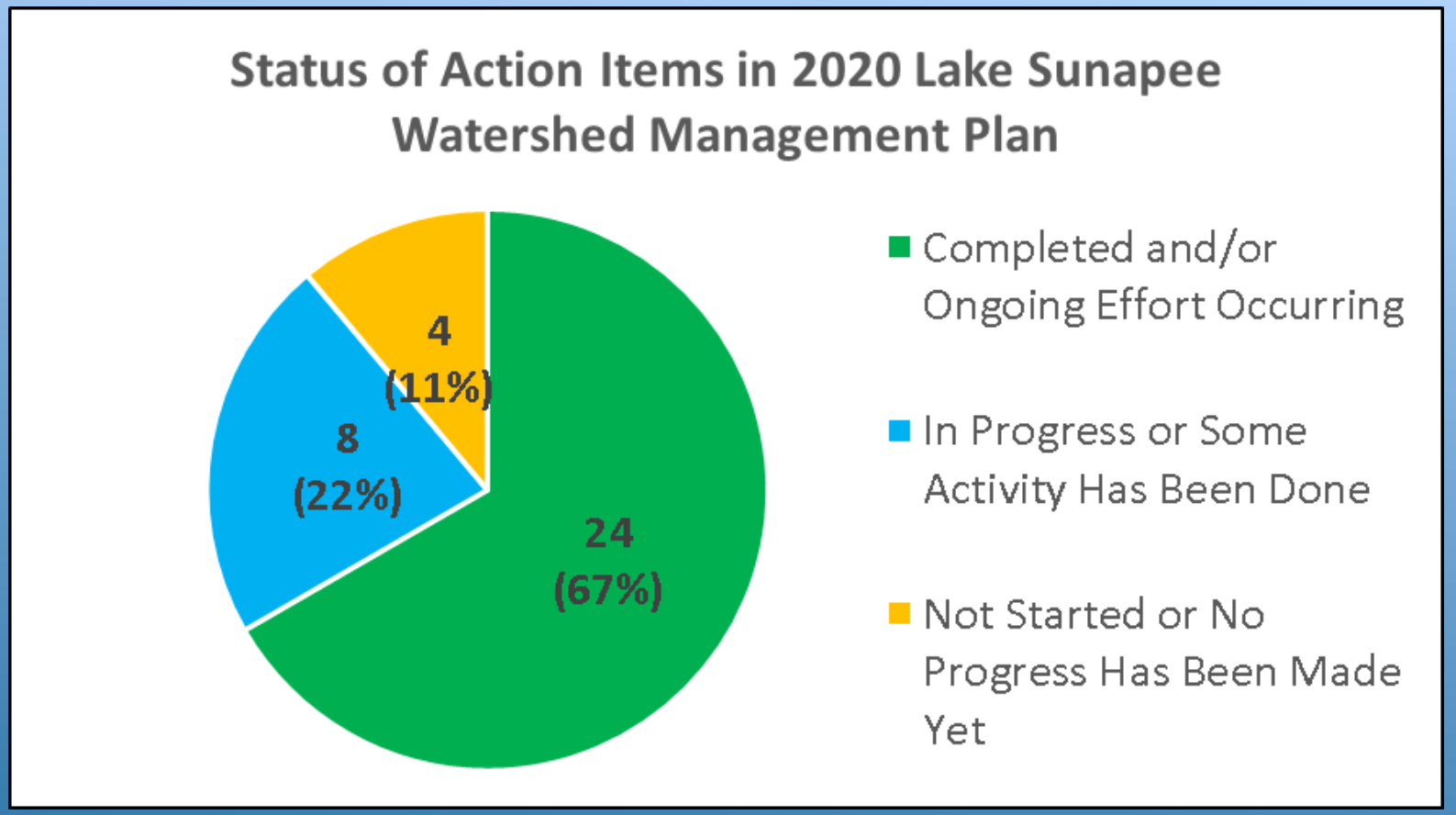
- Watershed Actions to reduce phosphorus
  - Education & Outreach
  - Land Use Regulation, Zoning & Ordinances
  - Best Management Practices
  - Land Conservation
- Supporting Activities
  - Research
  - Monitoring and Assessment
  - Further assessment

Dynamic plan requires participation and resources from many stakeholders besides LSPA



Category		Estimated Annual P Load Reduction/Offset (kg)	Estimated 10-year Phosphorus Reduction/Offset (kg)	Notes
Education and Outreach		1	10	Estimate includes voluntary action, septic upgrades and homeowner projects. Could be substantially higher.
Land Conservation		2	20	Offset of P loading is 0.26 kg/yr (keeping land in forest rather than residential) for full buildout period. This equates to an offset of 0.08 kg/ha/yr for the next 10 years. Estimate based on 25ha/yr protected or 250 ha over 10 years.
Land Use Regulation, Zoning and Ordinances		1	10	Estimate
Best Management Practices	Identified	4	40	See Appendix H - BMP Tables
	To be identified	2	20	Sites identified through further evaluation task.
Total Reductions/offsets:		**10**	**100**	

Summary of reduction goals from watershed plan.



Progress on Action Items from watershed plan.

Education Outreach

- Classroom Programs
- Public Programs
- Field Trips
- Web and Printed Material
- Signage
- Guidance documents

Progress is Good

Land Use Regulation, Zoning & Ordinances

- Meet with watershed town officials
- Work on local ordinances and regulations (septic, stormwater)
- Attend local meetings concerning specific projects

Progress is Good

Progress in the Town of Sunapee

- Added Otter Pond Brook to the list of protected waterways in the Water Resources Shorelines Overlay District
- Added Steep Slope District Provisions to the Zoning Ordinance to create an overlay district that will regulate construction on slopes exceeding 15%
- Added Specific Provisions to the Zoning Ordinance for Erosion Control to limit what land disturbance is allowable within the 50' shoreline buffer
- Allocated $8,000 to fund efforts to prevent invasive plants from being introduced into Lake Sunapee
- New septic rules to protect lake

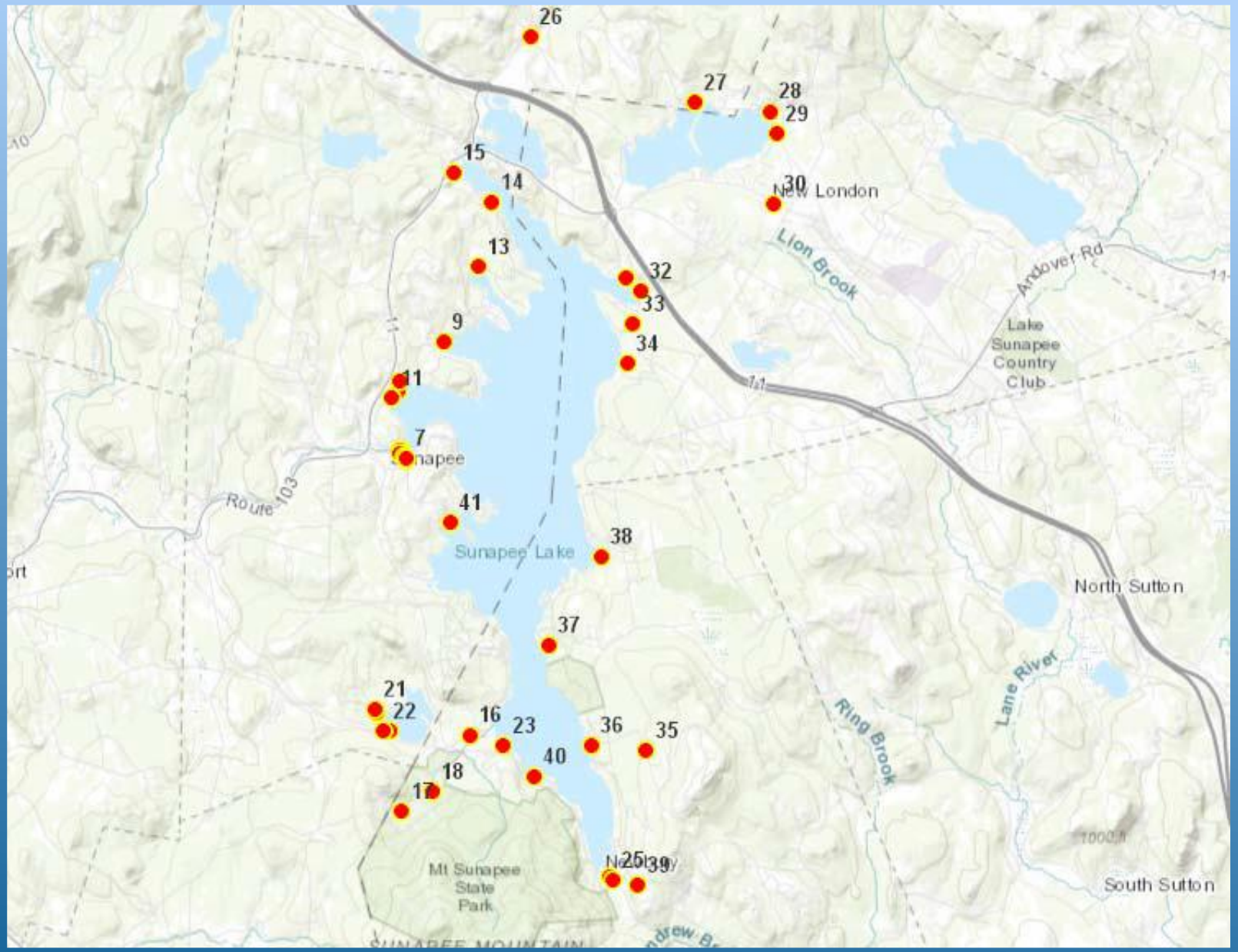
Discussions continue with other towns on septic and zoning issues

Best Management Practices (BMPs) structural solutions.

- Engineered designs to fix known erosion and nutrient sources
- May be as simple as regrading or revegetating or may be large reconstruction projects
- Require landowner cooperation and often permitting

Progress is Good

Photo	Location	Potential Problem	Potential Solution
	Boat Launch	Runoff from launch and parking area	Promote infiltration BMPs, education on value of buffers.
	Sediment plume during spring runoff	Sediment and nutrients entering lake via intermittant stream	Stabilize construction site upstream, trap sediment before lake.
	Fertilized lawn	Multiple locations in watershed showed evidence of fertilized lawn areas often in close proximity to lake.	Encourage natural landscape with native plant species, minimal to no fertilization.
	Poorly functioning BMP	Nutrient and sediment export from formerly forested, recently disturbed area new roadway lot. Sediment and phosphorus leaving site to lake.	Evaluate BMP design. Restore site to eliminate erosion and encourage infiltration.
	*Gloeotrichia* bloom	May be a sign of nutrient enrichment or transport of phosphorus from sediments by the organism	Phosphorus control throughout watershed and possible model simulation of phosphorus transport by *Gloeotricia* from sediments to water column.
	Erosion from Gravel Roads and ditches (multiple locations)	Improper road construction (no crown), removal of ditch vegetation leading to active erosion of ditch. Soil and associated nutrients transported to lake.	Rebuild roads with crowns, proper materials, stabilize ditches with turnouts, vegetation or stone in steep secions.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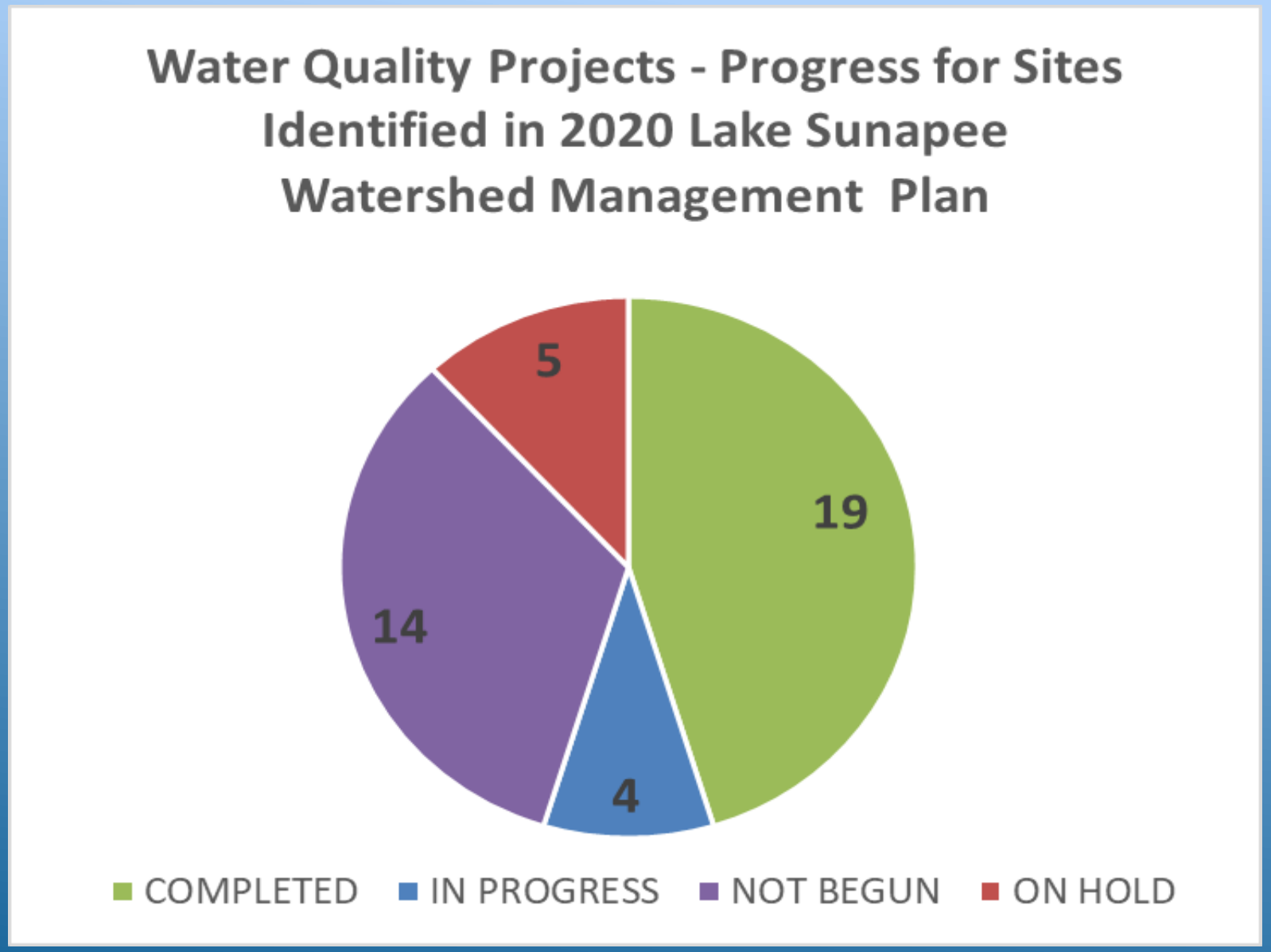
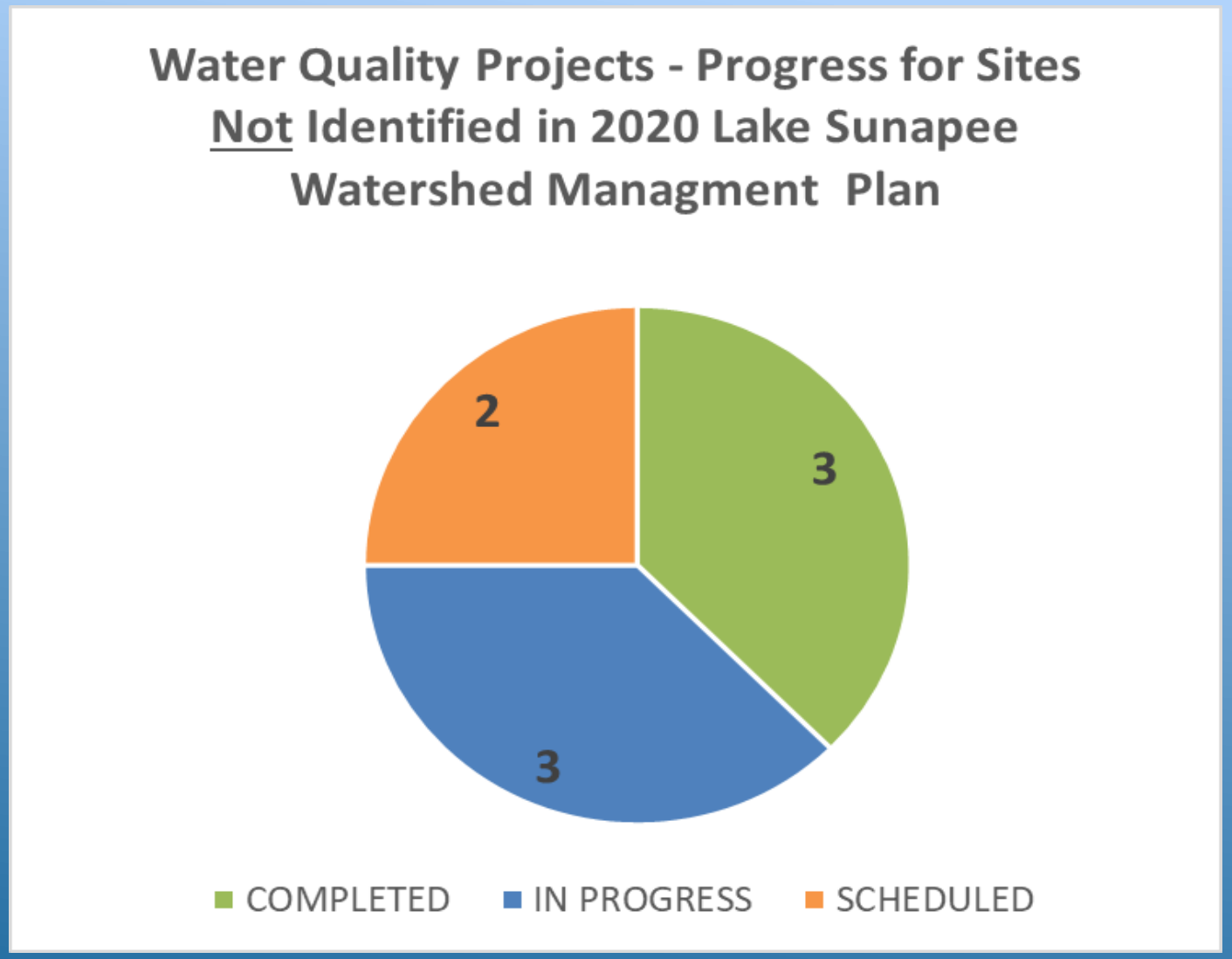
New London
Lion Brook
Andover Rd
Lake Sunapee Country Club
Route 103
Sunapee Lake
North Sutton
Lane River
Ring Brook
Mt Sunapee State Park
South Sutton


Water Quality Projects - Progress for Sites Identified in 2020 Lake Sunapee Watershed Management Plan
5
19
14
4
COMPLETED
IN PROGRESS
NOT BEGUN
ON HOLD


Water Quality Projects - Progress for Sites Not Identified in 2020 Lake Sunapee Watershed Managment Plan
2
3
3
COMPLETED
IN PROGRESS
SCHEDULED

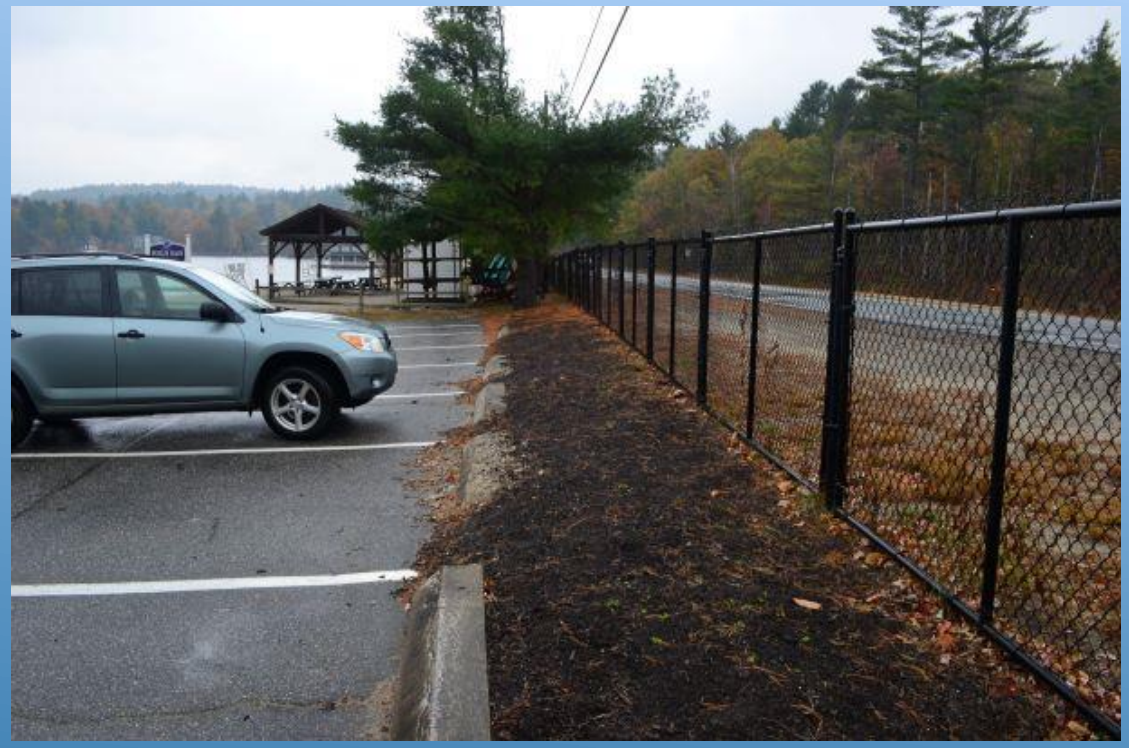
Highly Visible Sites with a High Chance of Success

Project ID	Project Name	Town	Landowner Type	Suggested Approach	2Estimated Phosphorus Reduction (pounds per year)	Estimated Cost
NW-02	Newbury Police Department Riperian Buffer Planting	Newbury	Public	Plant shrubs and groundcovers along edge of property bordering pond. Post educational sign.	0.82	$7,000 to $12,000
SUN-02	Sunapee Harbor Park Swale	Sunapee	Public	Constuct grass swale, tiered rain gardens and post educational sign.	3.44	$45,000 to $55,000
NL-01	Bucklin Beach Swale	New London	Public	Construct two rain gardens and erect educational sign.	0.7	$15,000 to $20,000
DOT-03	Route 114 Lake Front Plantings	New London	Private and Public ROW	Plant bushes and groundcovers along 150 feet of shoreline.	3.31	$6,000 to $12,000
DOT-04	Colby Point (Route 114) Shoulder Improvements	Springfield	Private and Public ROW	Construct sediment basin and add steps, boulders and plants along eroding shoreline.	7.93	$40,000 to $50,000
NL-02	Hastings Landing Sediment Basin	New London	Private and Public	Construct sediment basin and pave section of driveway.	0.07	$5,000 to $10,000

Table Notes:

Listed in same order found in *Table H3 - BMP Prioritization* of the 2020 Lake Sunapee WMP.

Phosporus reduction estimates from 2020 Lake Sunapee WMP.

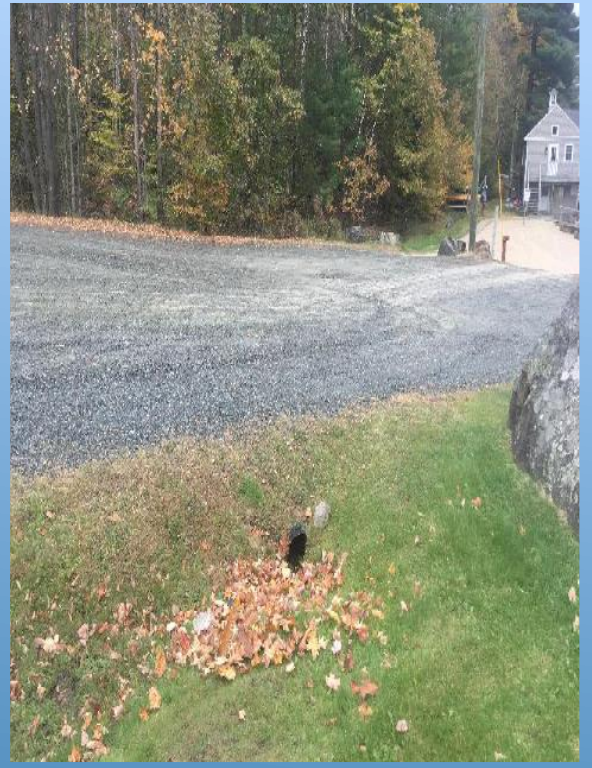


BUCKLIN BEACH ISSUES IDENTIFIED BY PLAN

(TOO MUCH RUNOFF AND NOT ENOUGH INFILTRATION)

BUCKLIN BEACH PROJECT

RAIN GARDEN SLOWS RUNOFF AND ALLOWS INFILTRATION OF RUNOFF AND PLANT UPTAKE OF NUTRIENTS



GRANLIDEN BEFORE

(WATER MOVED TO LAKE WITH MINIMAL INFILTRATION OR TREATMENT)

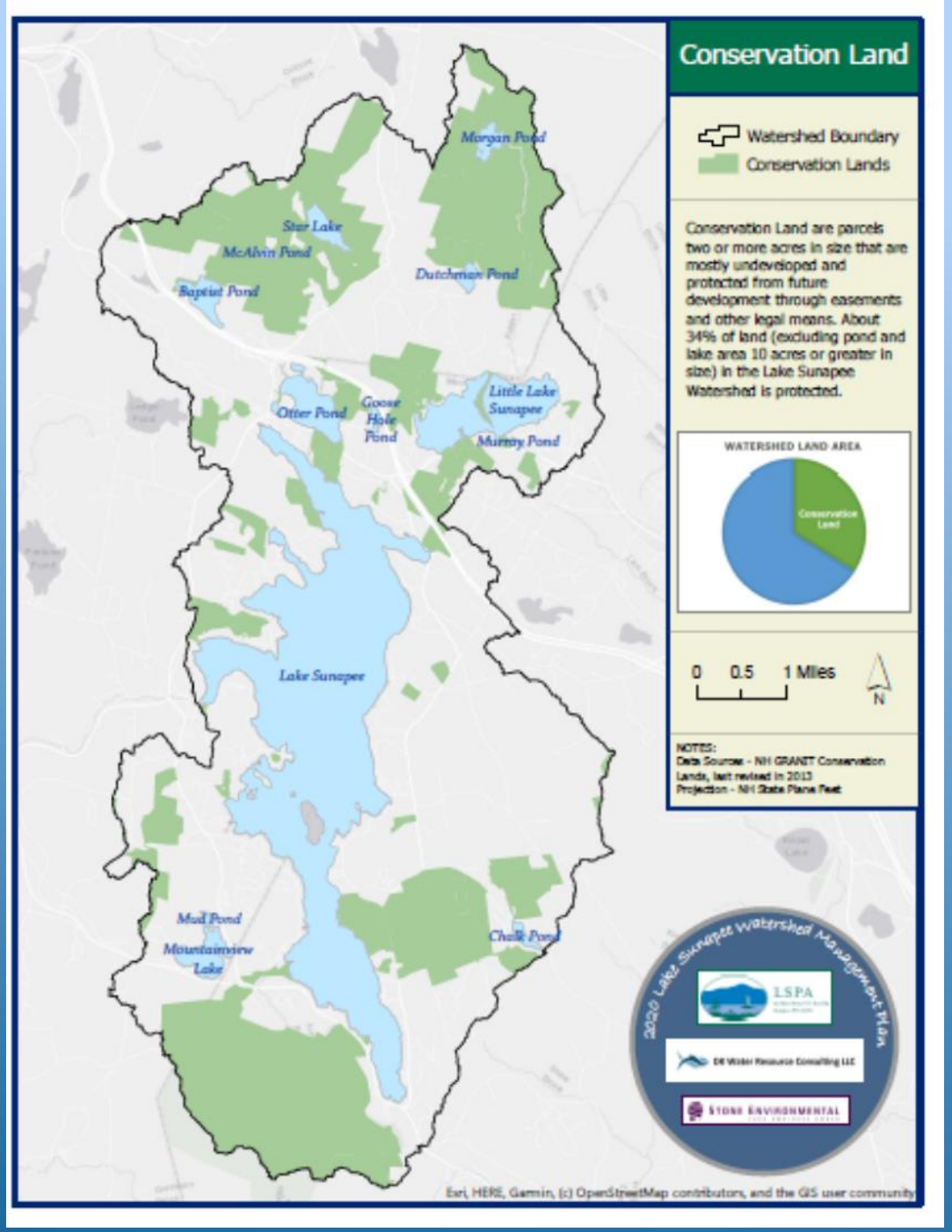
GRANLIDEN PROJECT

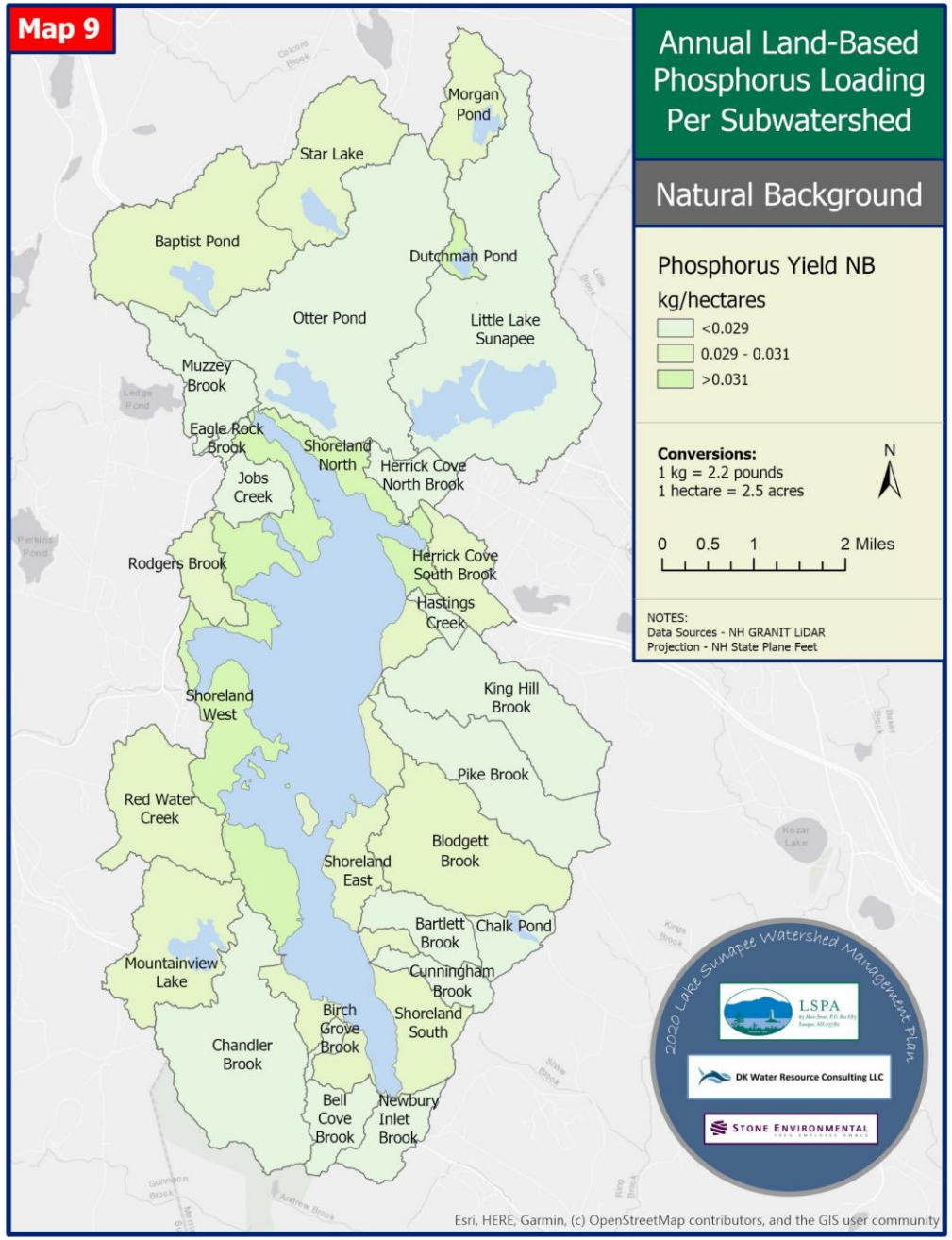
SLOWED WATER AND INCORPORATED SEVERAL ELEMENTS TO ALLOW MATERIAL TO SETTLE OR INFILTRATE.

Land Conservation

- Some options currently used by partners
  - Purchase land outright
  - Donations of land
  - Donation of conservation easements
  - Purchase of conservation easements
  - Goal is 25 acres/year (minimum)
- Groups/partners
  - Land trusts
  - Individual landowners
  - LSPA
  - Statewide organizations (SPNF)
  - National/international organizations (Nature Conservancy, Audubon)

More Progress Needed




Map 9
Annual Land-Based Phosphorus Loading Per Subwatershed
Natural Background
Phosphorus Yield NB
kg/hectares
<0.029
0.029 - 0.031
>0.031
Conversions:
1 kg = 2.2 pounds
1 hectare = 2.5 acres
N
0 0.5 1 2 Miles
NOTES:
Data Sources - NH GRANIT LiDAR
Projection - NH State Plane Feet
Morgan Pond
Star Lake
Baptist Pond
Dutchman Pond
Otter Pond
Little Lake Sunapee
Muzzey Brook
Eagle Rock Brook
Shoreland North
Herrick Cove North Brook
Jobs Creek
Rodgers Brook
Herrick Cove South Brook
Hastings Creek
Shoreland West
King Hill Brook
Pike Brook
Red Water Creek
Blodgett Brook
Shoreland East
Bartlett Brook
Chalk Pond
Mountainview Lake
Cunningham Brook
Birch Grove Brook
Shoreland South
Chandler Brook
Bell Cove Brook
Newbury Inlet Brook
2020 Lake Sunapee Watershed Management Plan
LSPA
DK Water Resource Consulting LLC
Stone Environmental
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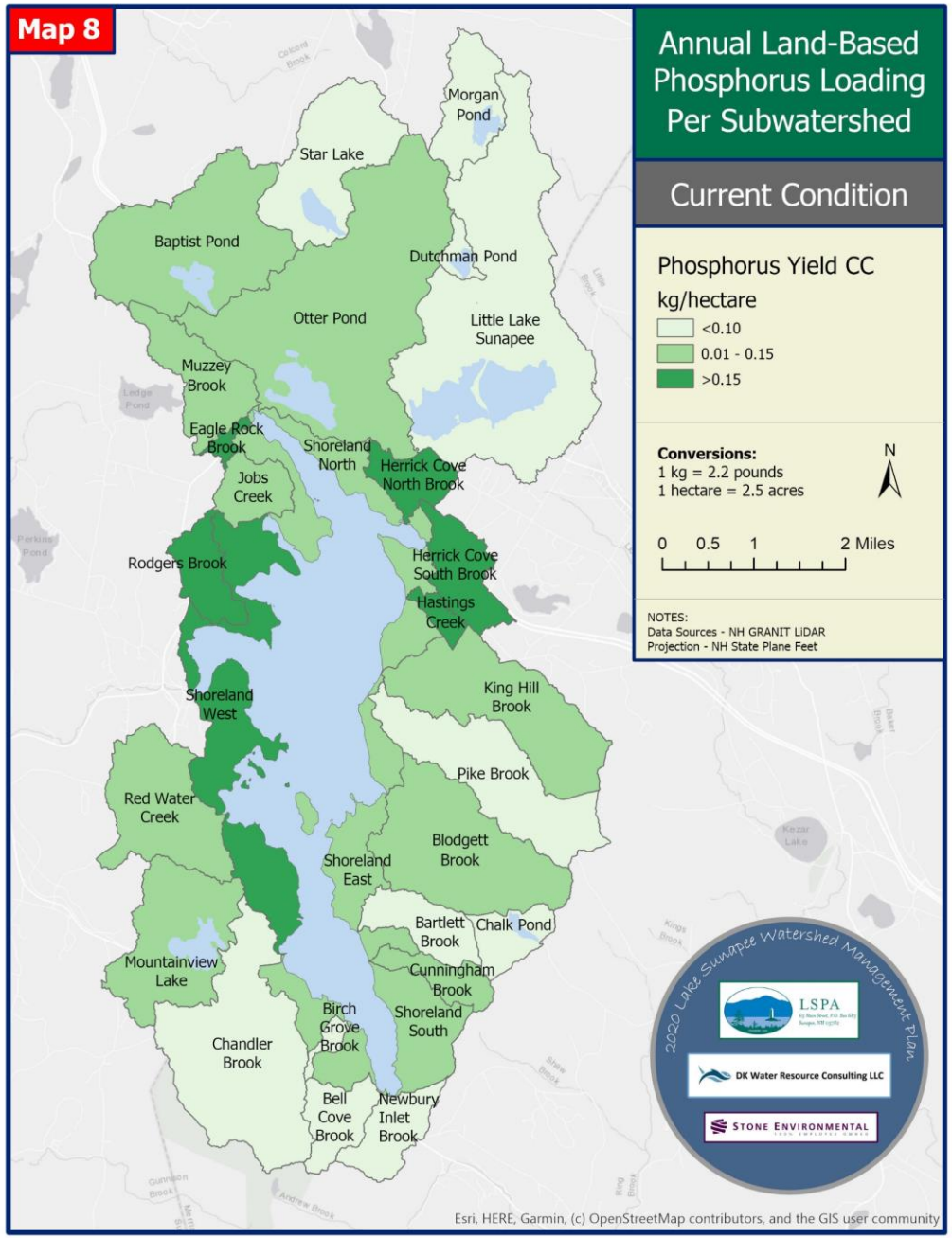
Map 8
Annual Land-Based Phosphorus Loading Per Subwatershed
Current Condition
Phosphorus Yield CC
kg/hectare
<0.10
0.01 - 0.15
>0.15
Conversions:
1 kg = 2.2 pounds
1 hectare = 2.5 acres
N
0 0.5 1 2 Miles
NOTES:
Data Sources - NH GRANIT LiDAR
Projection - NH State Plane Feet
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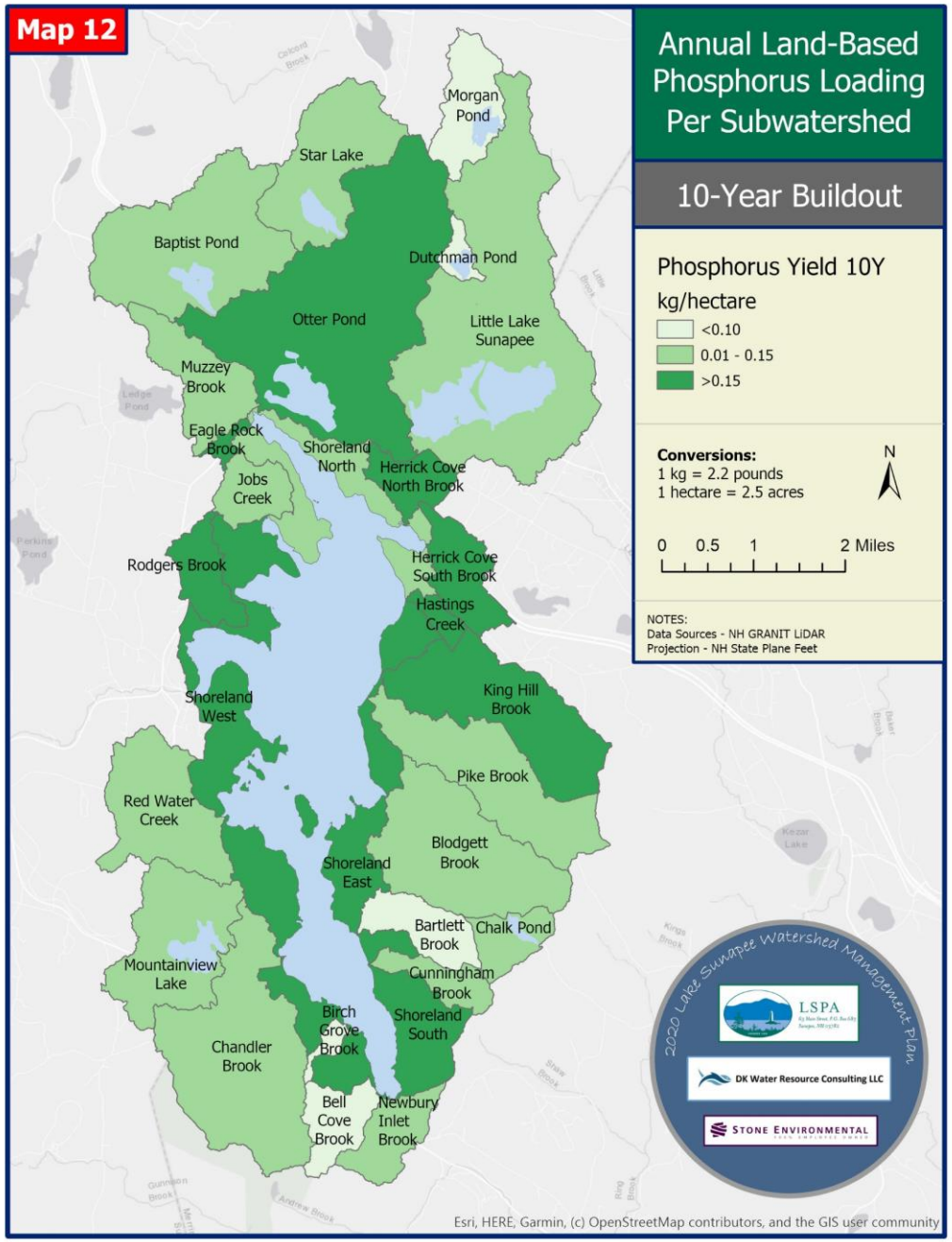
Map 12
Annual Land-Based Phosphorus Loading Per Subwatershed
10-Year Buildout
Phosphorus Yield 10Y
kg/hectare
<0.10
0.01 - 0.15
>0.15
Conversions:
1 kg = 2.2 pounds
1 hectare = 2.5 acres
N
0 0.5 1 2 Miles
NOTES:
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Projection - NH State Plane Feet
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Baptist Pond
Dutchman Pond
Otter Pond
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Eagle Rock Brook
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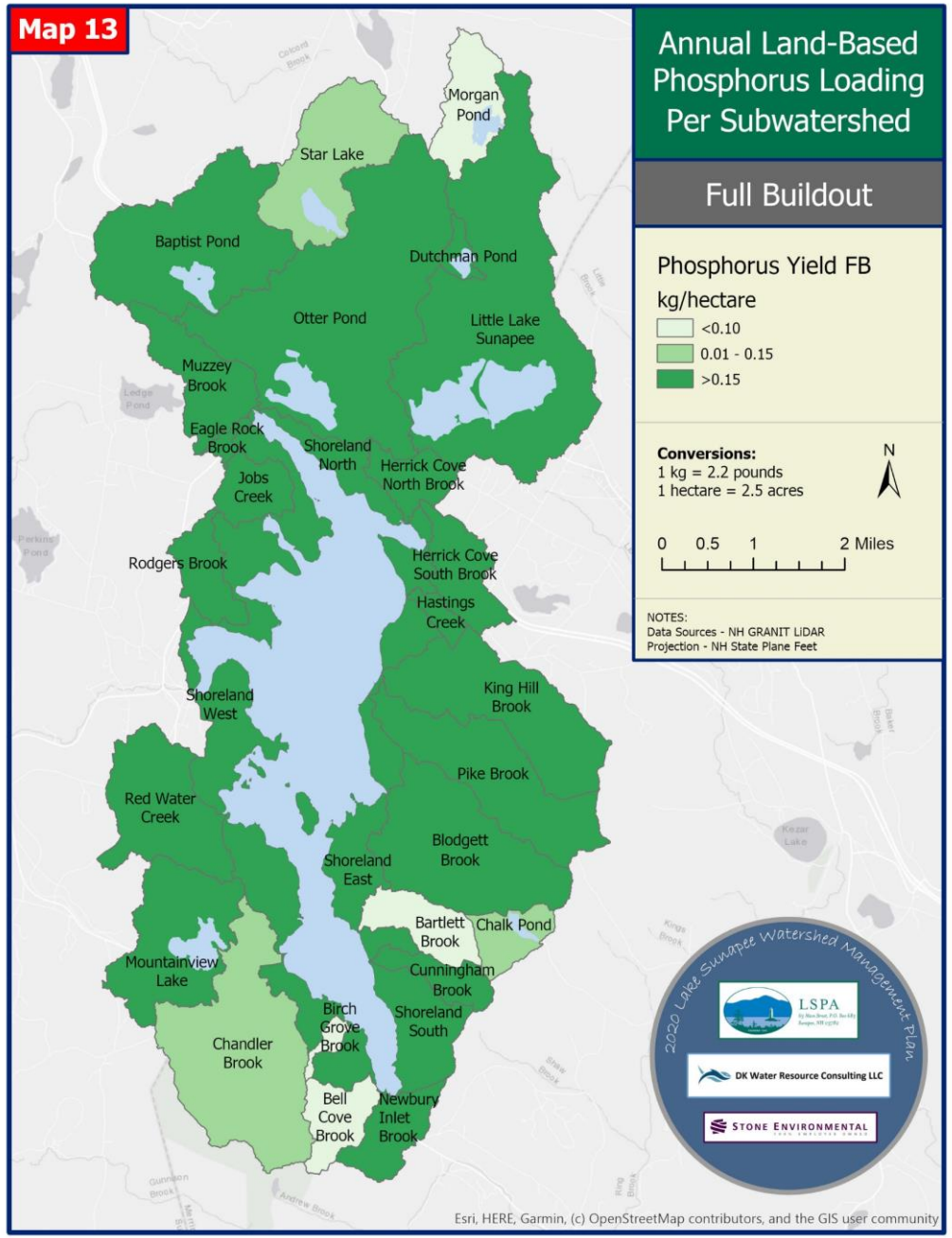
Map 13
Annual Land-Based Phosphorus Loading Per Subwatershed
Full Buildout
Phosphorus Yield FB
kg/hectare
<0.10
0.01 - 0.15
>0.15
Conversions:
1 kg = 2.2 pounds
1 hectare = 2.5 acres
N
0 0.5 1 2 Miles
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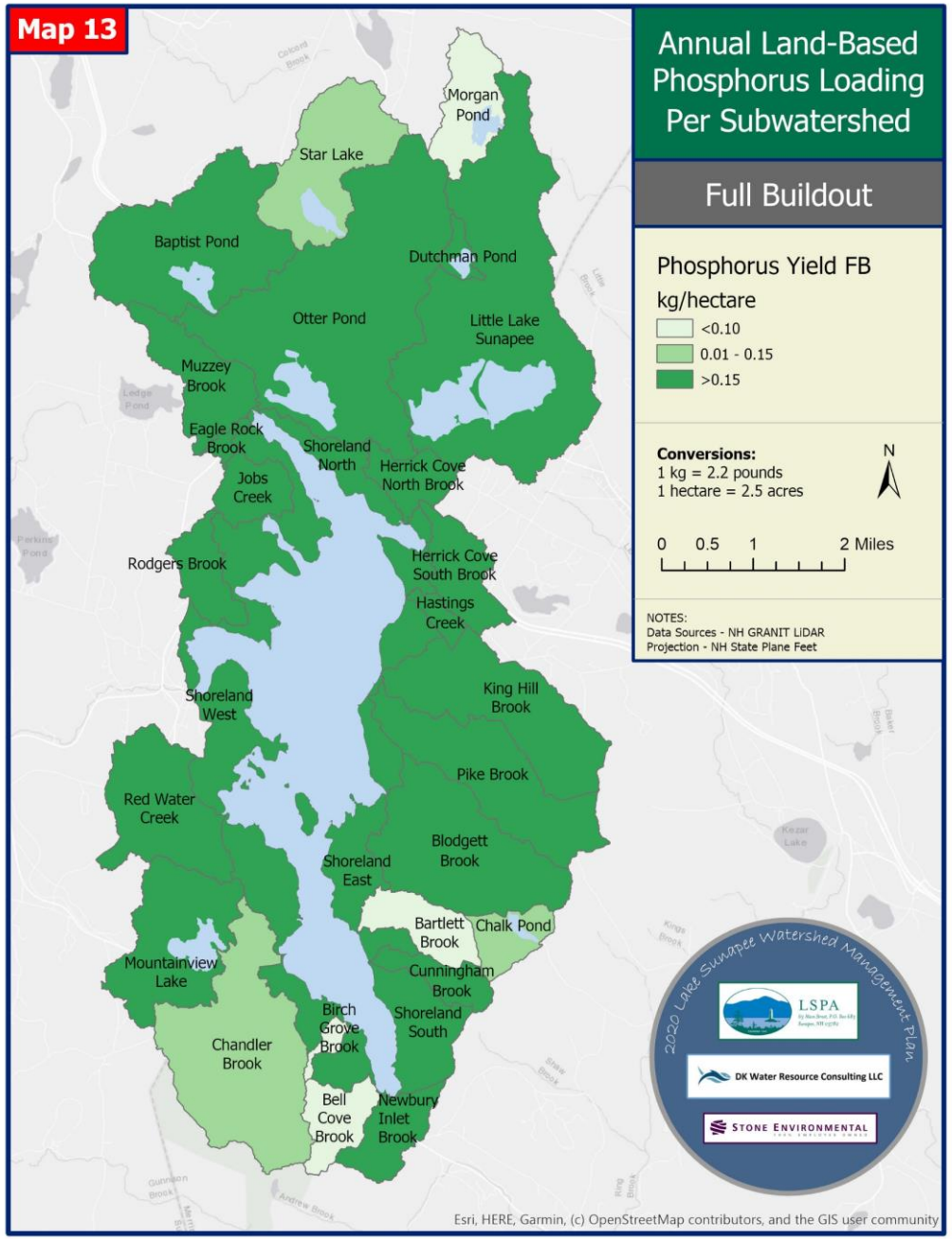
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Annual Land-Based Phosphorus Loading Per Subwatershed
Full Buildout
Phosphorus Yield FB
kg/hectare
<0.10
0.01 - 0.15
>0.15
Conversions:
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N
0 0.5 1 2 Miles
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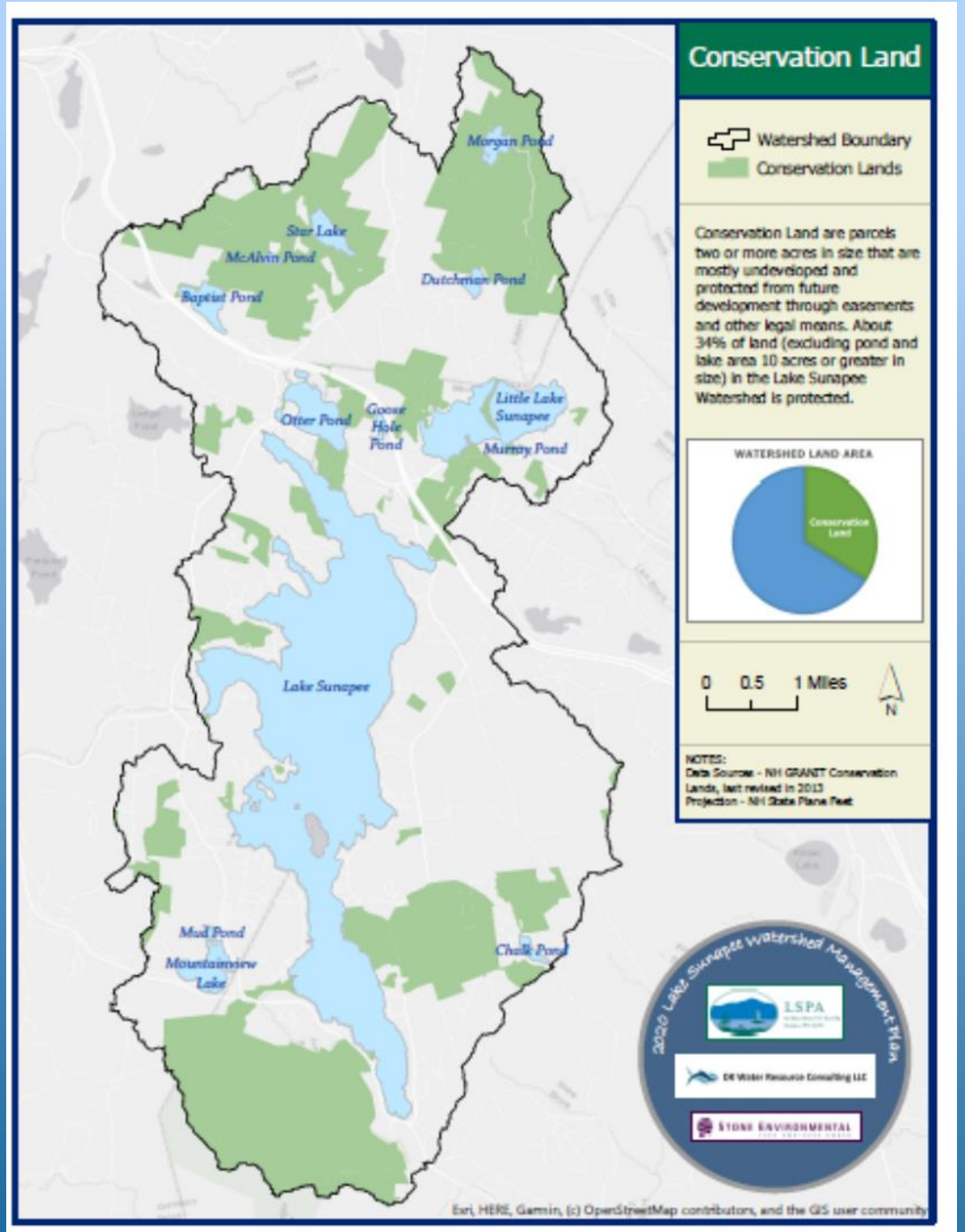
Conservation Land
Watershed Boundary
Conservation Lands
Conservation Land are parcels two or more acres in size that are mostly undeveloped and protected from future development through easements and other legal means. About 34% of land (excluding pond and lake area 10 acres or greater in size) in the Lake Sunapee Watershed is protected.
WATERSHED LAND AREA
Conservation Land
0 0.5 1 Miles
N
NOTES:
Data Sources - NH GRANIT Conservation Lands, last revised in 2013
Projection - NH State Plane Feet
Morgan Pond
Star Lake
McAlvin Pond
Baptist Pond
Dutchman Pond
Otter Pond
Goose Hole Pond
Little Lake Sunapee
Murray Pond
Lake Sunapee
Mud Pond
Mountainview Lake
Chalk Pond
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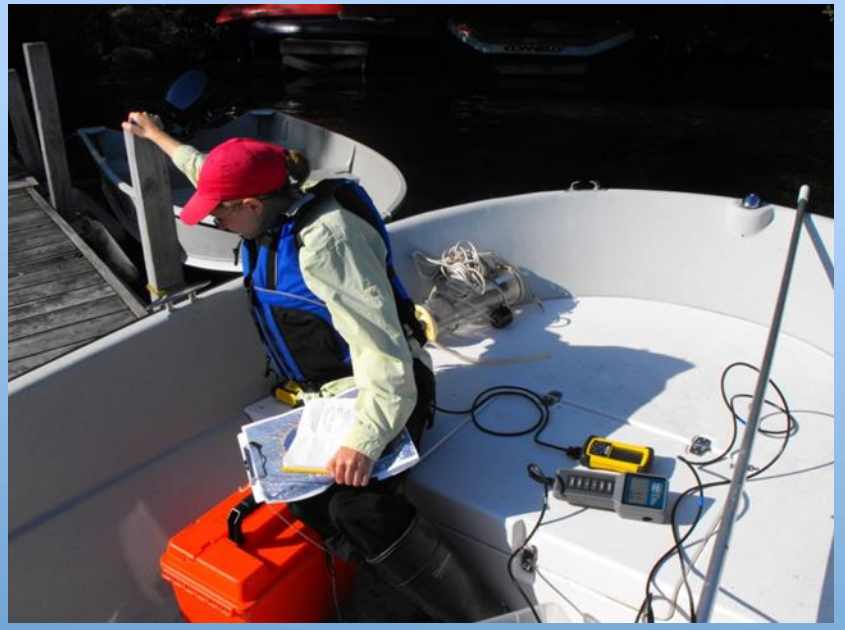
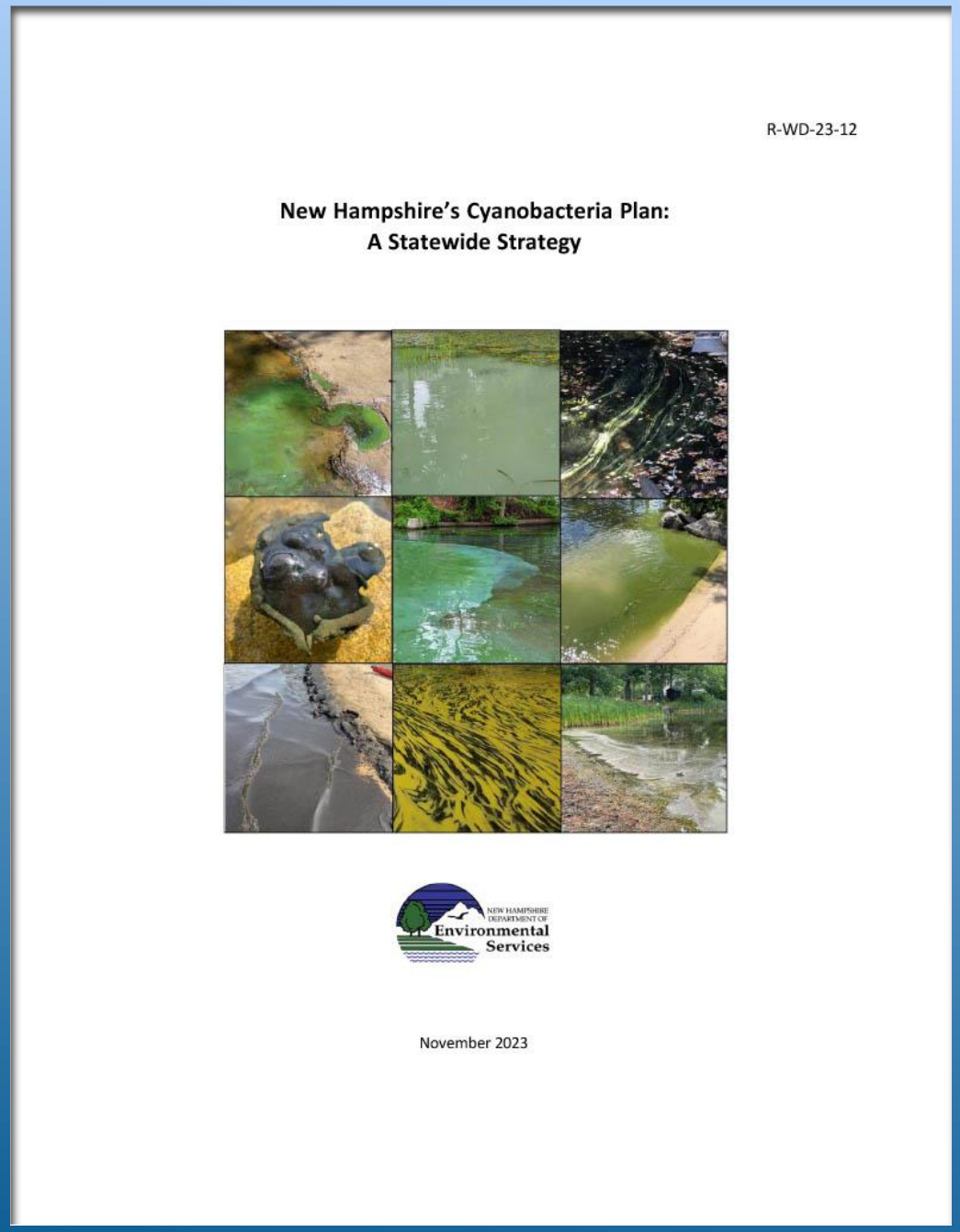
Other activities

- Monitoring
  - To tell us where we are
- Research
  - To better understand how the lake and watershed work
- Further Assessment
  - Detail on upper watershed lakes and ponds



- Earliest ice-out and shortest ice duration on many lakes this winter
- After a record number of bloom reports last year, earliest bloom recorded this year
- Cyanobacteria bloom in late June 2024 across virtually all of Lake Winnipesaukee
- Surface water in Lake Wentworth, highest I have observed in 28 years (84 degrees on July 14)
- Just finished longest heat wave on record in Concord, NH (12 days over 90)
- Extreme weather events continue (storms of record up north, drought elsewhere)
- New NH invasive species (spiny water flea) observed in Winnipesaukee last year
- NHDES Statewide Cyanobacteria Plan just finished

LAKE RELATED ISSUES FROM ACROSS THE STATE

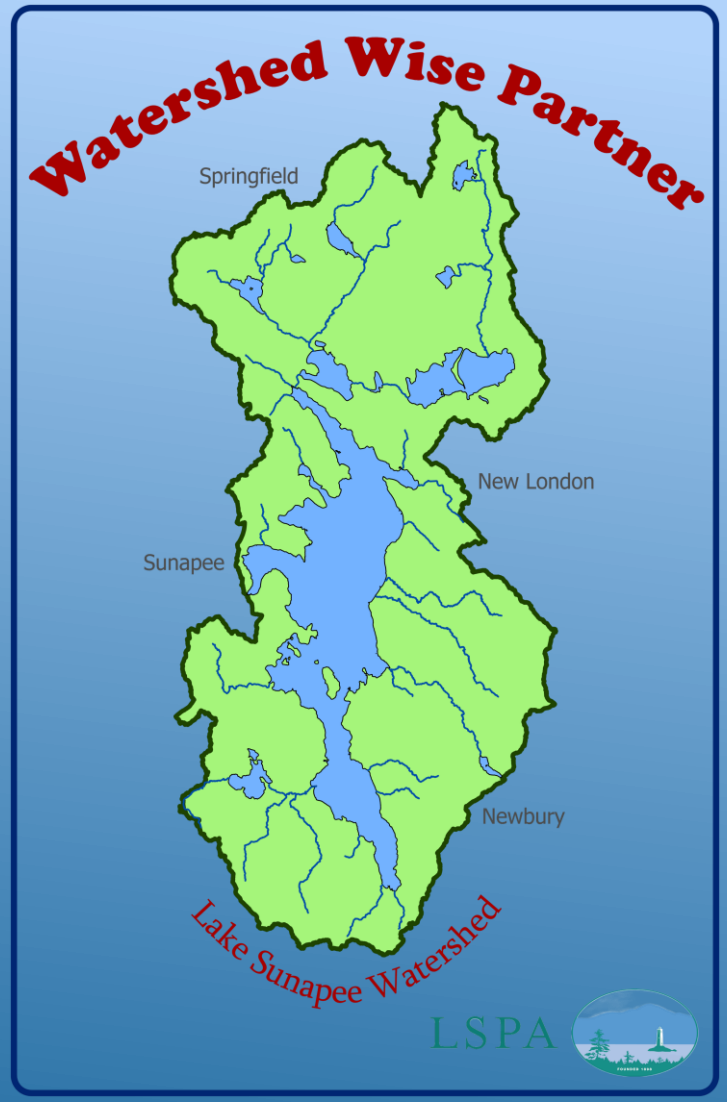


Four Areas of Focus

1. Nutrient Reduction
2. Education and Outreach
3. Monitoring
4. Addressing cyanobacteria in public water supplies

What can I do?

- Show up
- Volunteer
- Donate
- Take care of your own property
- Tell your neighbors
- Provide expertise if you have it.




Everybody can do something to help protect our lakes.
Questions?