

# FAWN LAKE

A scenic view of Fawn Lake at sunset. The sky is a mix of blue and orange, with the sun low on the horizon. The water is calm, reflecting the sky and the surrounding forest. Tall pine trees are prominent on the left side, and a dense forest of green trees lines the far shore. The overall atmosphere is peaceful and natural.

Bedford's largest and most  
aesthetic body of water.

# FAWN LAKE'S VALUE TO BEDFORD

- MAJOR CONSERVATION ASSET
- UNIQUE AND DIVERSE ECOSYSTEM
- MULTI-GENERATIONAL AND MULTI-SEASONAL RECREATION USE
- HISTORICAL AUTHENTICITY
- EDUCATIONAL OPPORTUNITIES

# CONSERVATION



# RECREATION



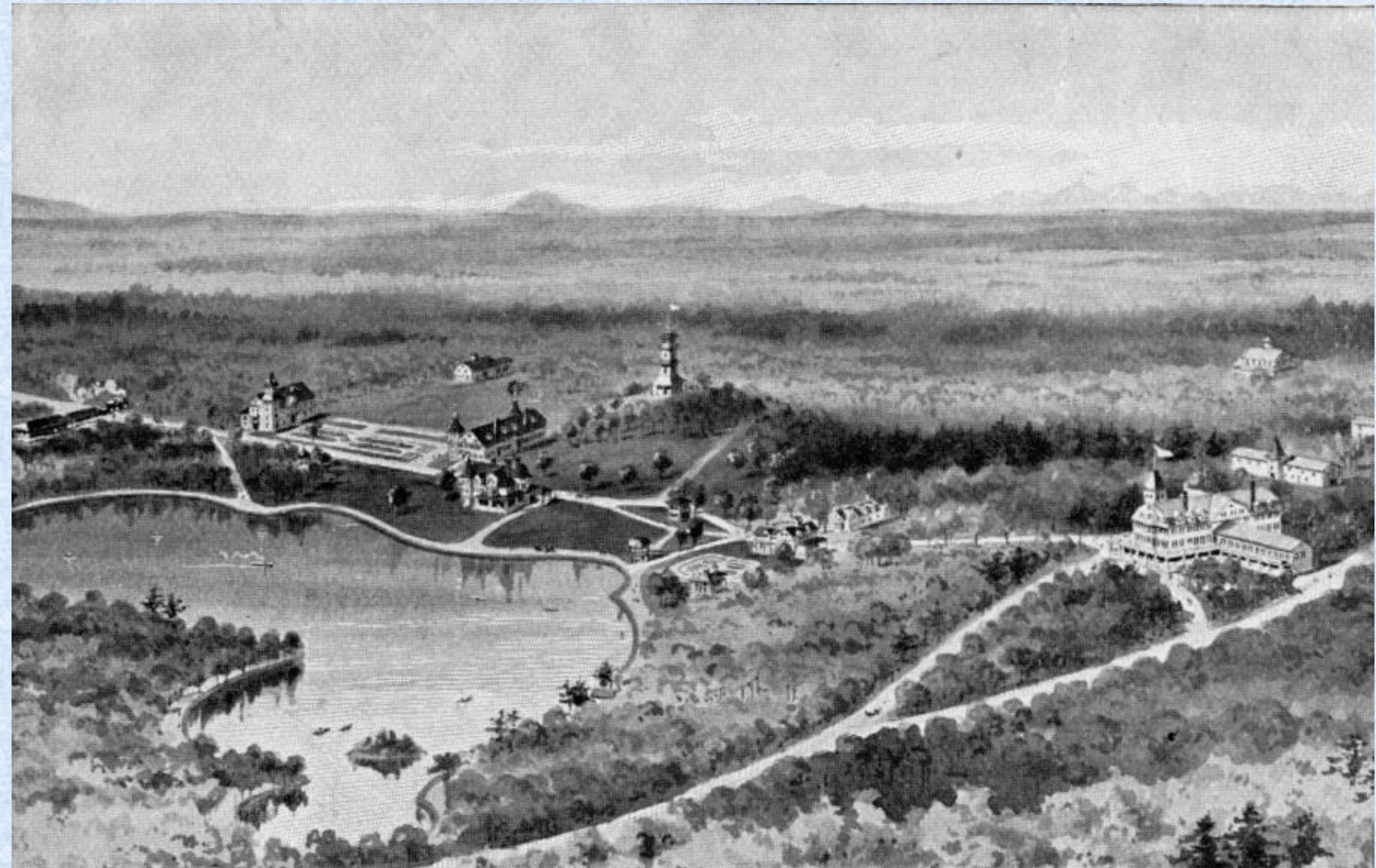
# ANIMAL DIVERSITY



# PLANT DIVERSITY



# HISTORY



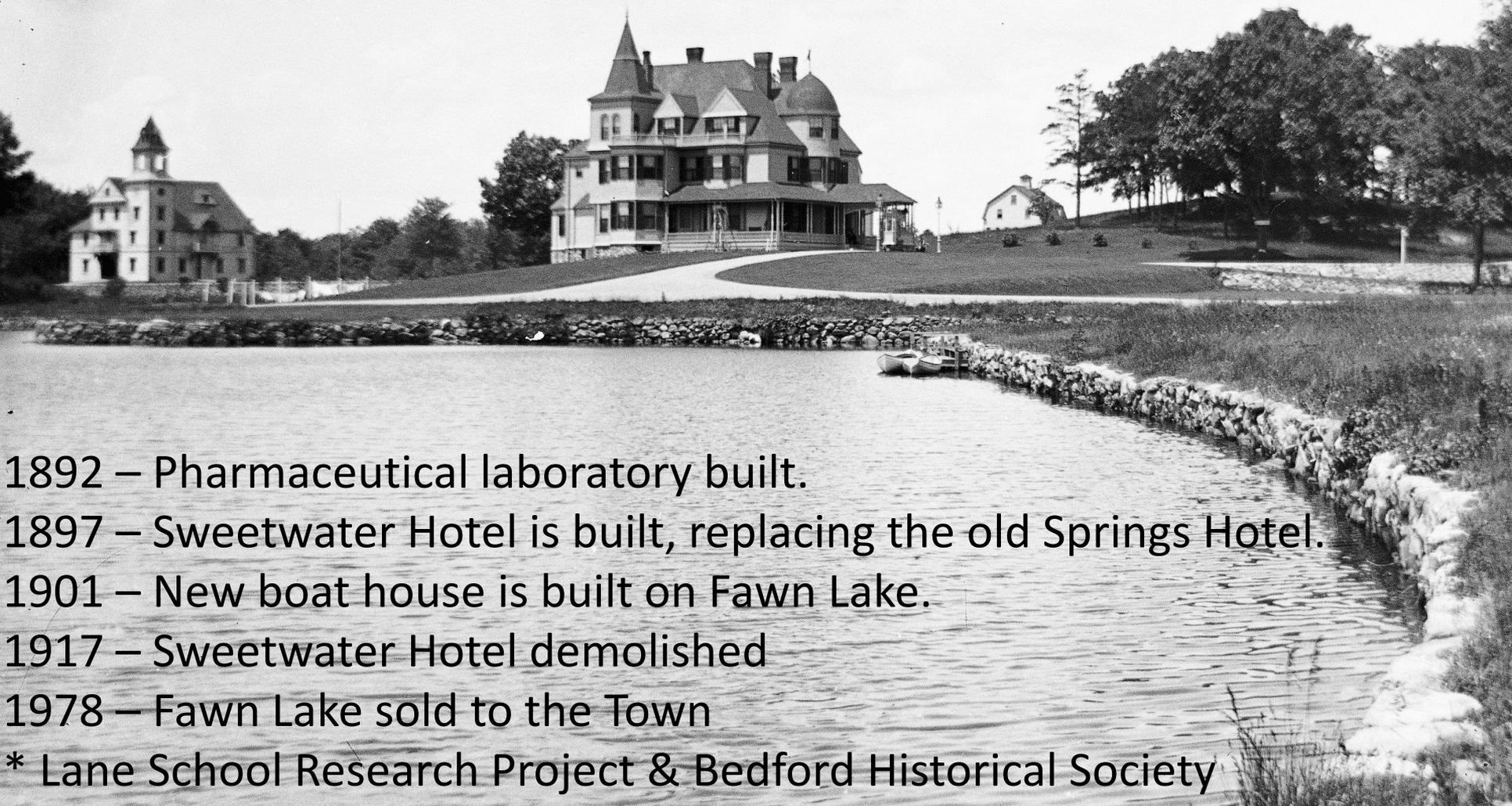
# BRIEF HISTORY OF BEDFORD SPRINGS\*

1843 – Springs Hotel built.

1866 – New York Pharmaceutical purchases the Bedford Springs property.

1877 – The narrow-gauge railroad between Bedford and Billerica opens.

1888 – Post office is established at Bedford Springs.



1892 – Pharmaceutical laboratory built.

1897 – Sweetwater Hotel is built, replacing the old Springs Hotel.

1901 – New boat house is built on Fawn Lake.

1917 – Sweetwater Hotel demolished

1978 – Fawn Lake sold to the Town

\* Lane School Research Project & Bedford Historical Society

# WHAT IS THE ISSUE?

## ***SOFT SEDIMENT ACCUMULATION***

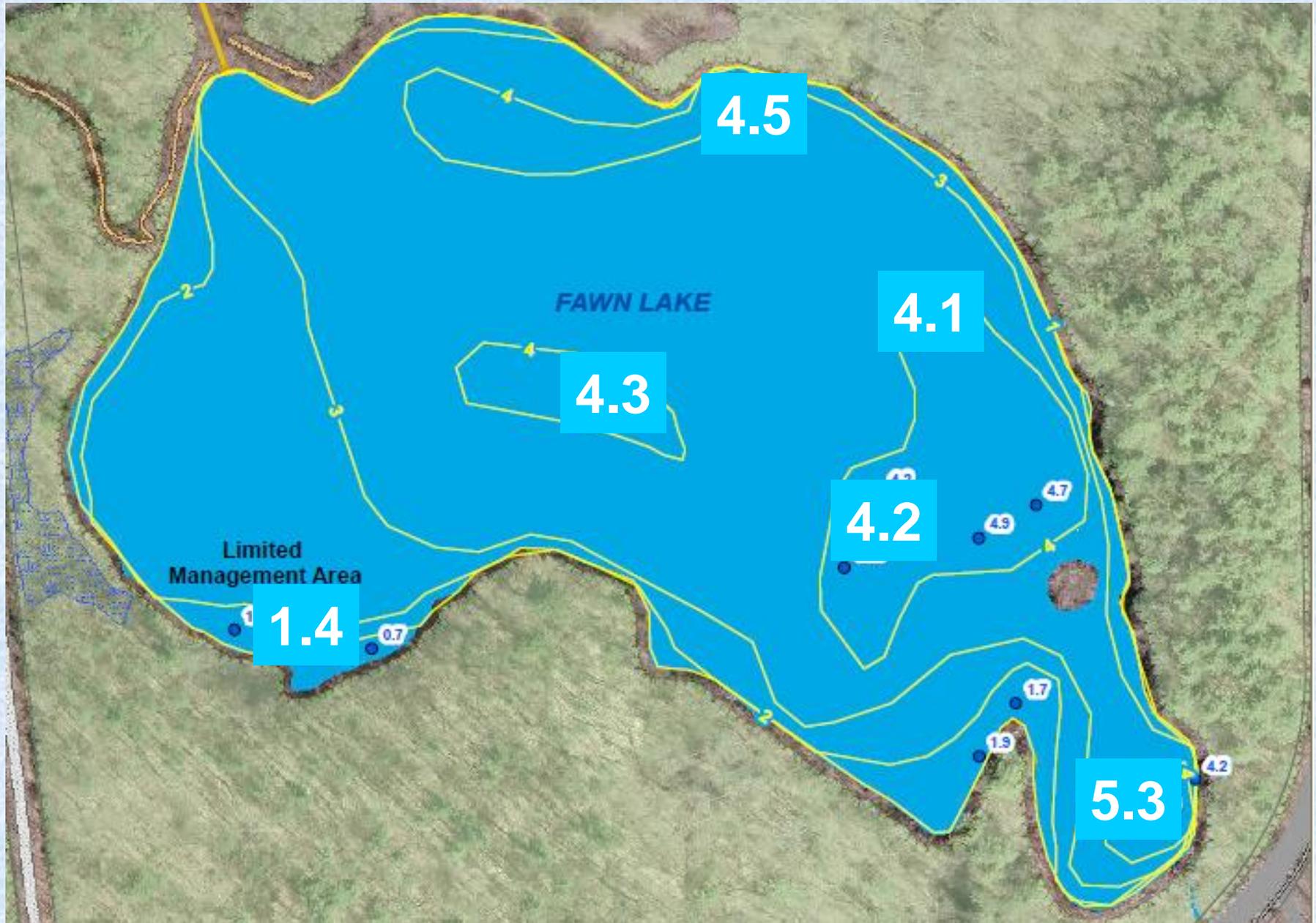
- REDUCES LAKE DEPTH
- CAUSES FISH KILLS
- INCREASES AMOUNT OF FLOATING AND SUBMERGED VEGETATION
- IMPEDES RECREATIONAL USE

# EXISTING CONDITIONS - SUMMER

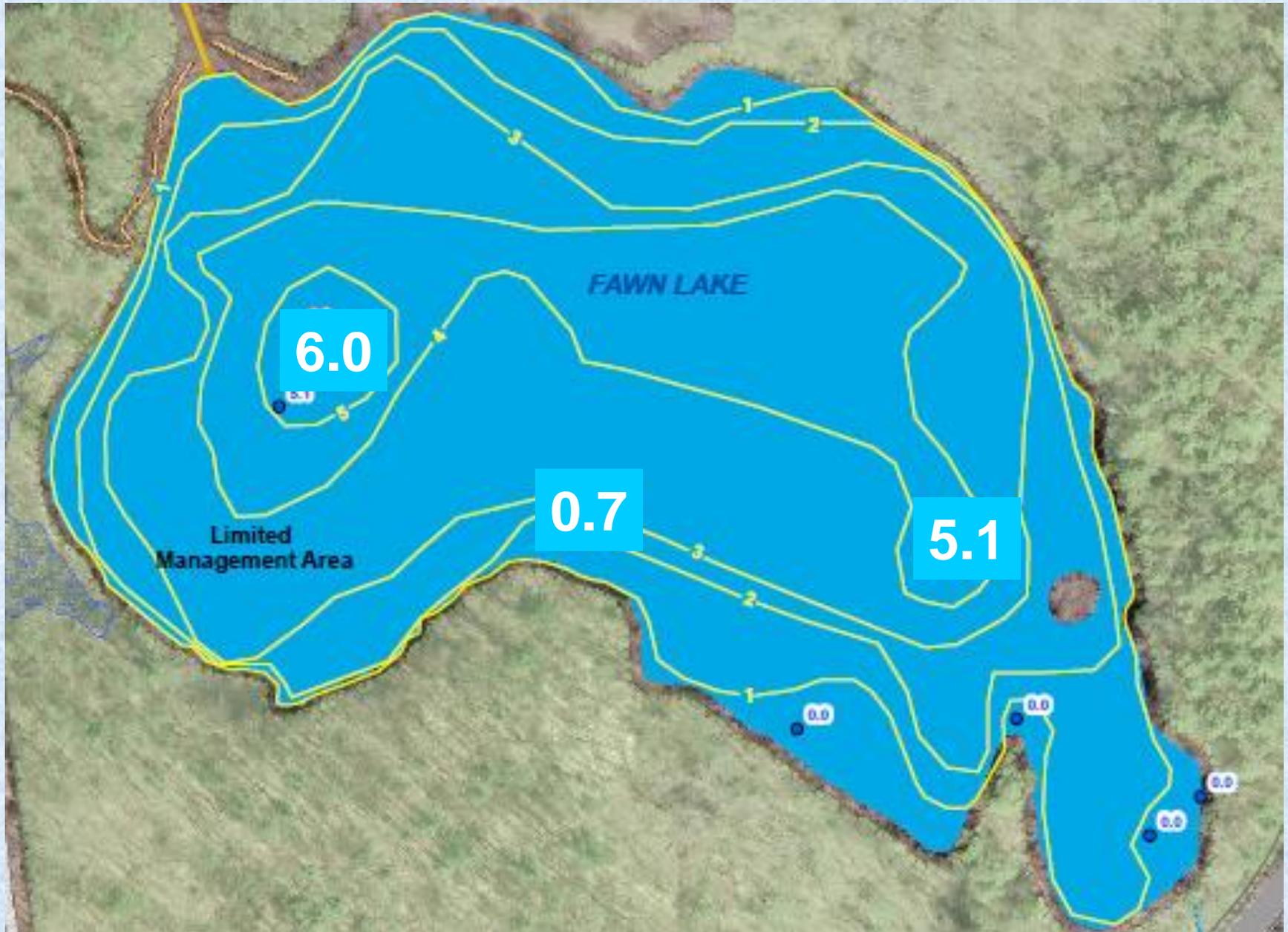


\*\* Summer 2014

# BATHYMETRY (depth, ft.)



# SOFT SEDIMENT DEPTH (ft.)

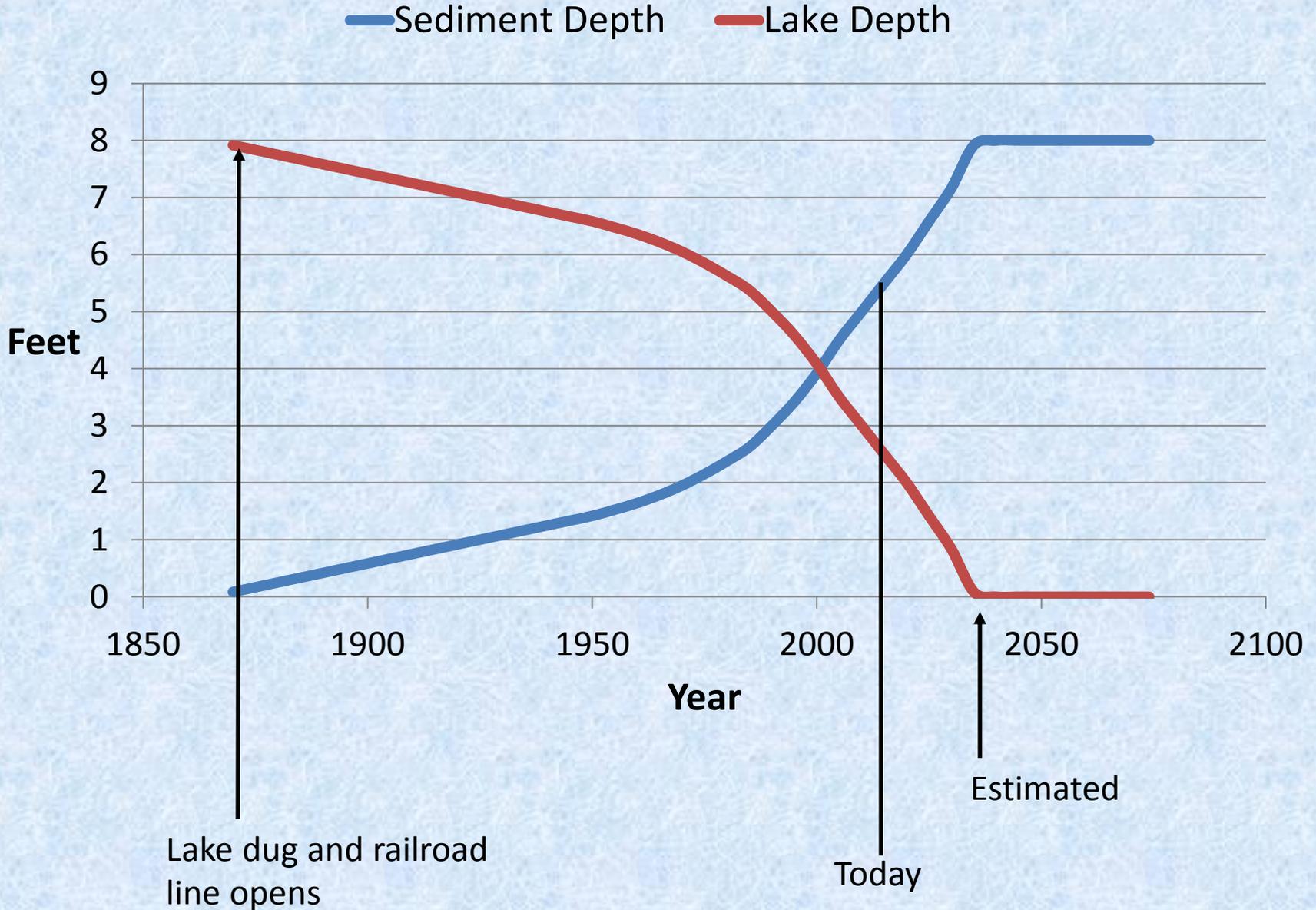


# WHAT HAPPENDS IF THE TOWN DOES NOTHING?

***SEDIMENT DEPTH INCREASES TO THE  
POINT WHERE THERE IS LITTLE OR NO  
OPEN WATER REMAINING***

- LOSS OF ENVIRONMENTAL HABITATS
- LOSS OF MOST RECREATIONAL USES, VISUAL BEAUTY, AND OPEN WATER ECOSYSTEM
- EVENTUALLY BECOMES SWAMP
- HARBORS ODOR AND MOSQUITOS

# ACCELERATING LOSS OF LAKE DEPTH



# EUTROPHICATION



# FAWN LAKE "AS IS"



# FAWN LAKE RESTORED



# RESTORATION METHODS

- MECHANICAL DRY DREDGING
- MECHANICAL WET DREDGING
- HYDRO-RAKING
- HYDRAULIC DREDGING
- HERBICIDES
- WATER LEVEL DRAWDOWN
- VEGETATION BARRIERS
- AERATION/CIRCULATION

As identified by Comprehensive Environmental Inc., and summarized in their report "Pond Management Strategies Matrix" prepared in March 2015.

# EVALUATION CRITERIA

- Longevity of Treatment
- Environmental Impacts
- Effectiveness removing/reducing unwanted vegetation
- Recreational Use and Enjoyment
- Future Operations and Maintenance Requirements
- Overall Project Cost
- Neighborhood Impacts
- Logistics (dewatering, staging, sediment disposal)
- Time to Permit

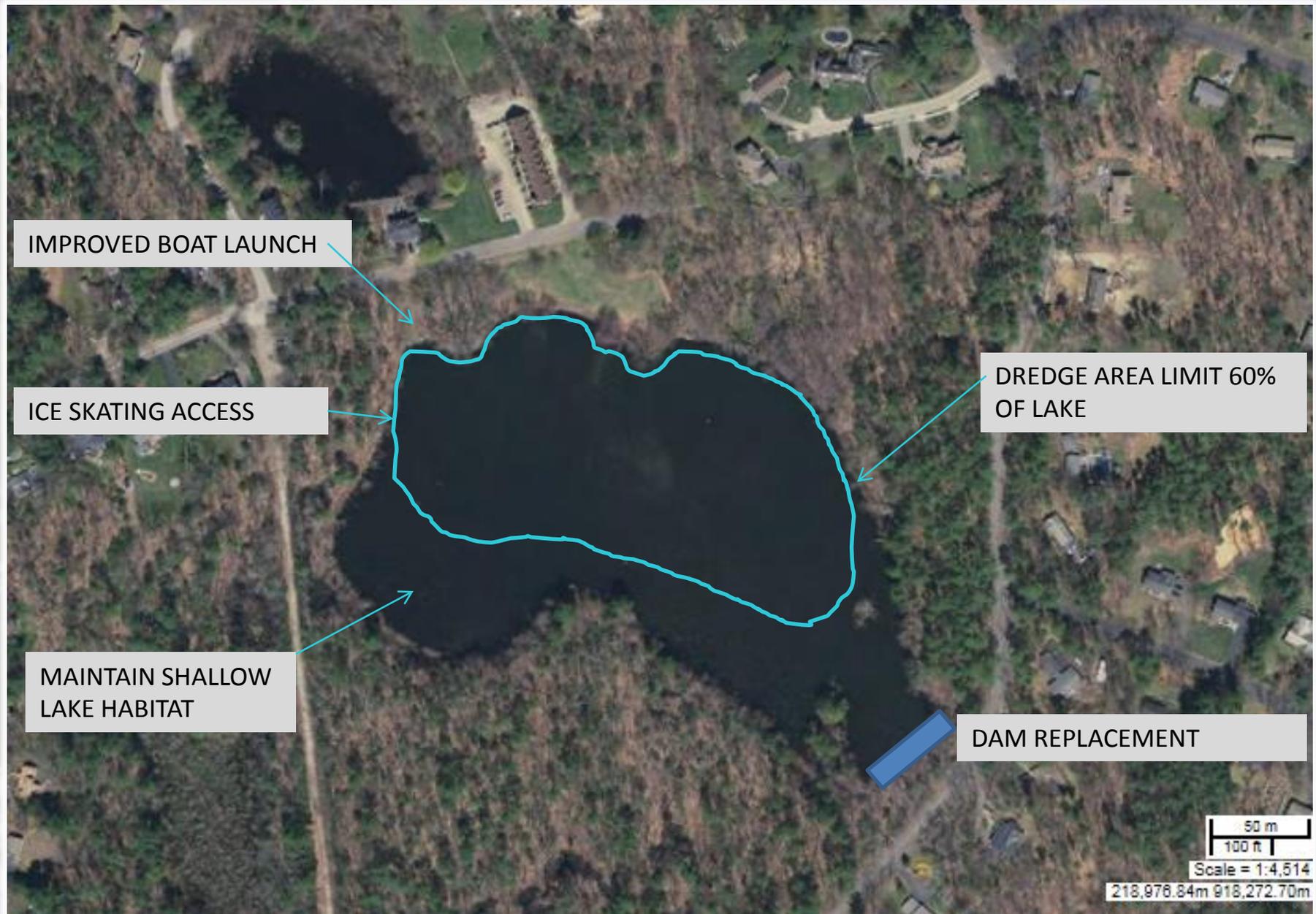
# EVALUATION OF METHODS

- The evaluation criteria were prioritized by the Committee by performing a Pair-Wise Analysis to arrive at a priority ranking. Highest priority = Longevity of Treatment
- The criteria were evaluated against each improvement method as identified by Comprehensive Environmental Inc., and summarized in their “Pond Management Strategies Matrix” prepared in March 2015.

# RECOMMENDED RESTORATION PLAN

- DREDGE 60% OF THE LAKE TO THE ORIGINAL 8 FOOT DEPTH
- PRESERVE 40% OF LAKE FOR ECOLOGICAL DIVERISTY
- IMPLEMENT RESTORATION WITHOUT DRAINING THE LAKE
- INCORPORATE DAM REPLACEMENT INTO PERMITTING

# RESTORATION PLAN DESIGN



# WHY DREDGE?

- EFFECTIVELY REMOVES ACCUMULATED SEDIMENT AND UNWANTED VEGETATION
- RETURNS THE LAKE TO ITS ORIGINAL STATE OF 150 YEARS AGO AND RESETS THE “EUTROPHICATION CLOCK”
- RESTORES / SUPPORTS RECREATIONAL USES
- PRESERVES HISTORICAL LANDSCAPE AND NATURAL BEAUTY

# DREDGING OPTIONS

## MECHANICAL WET DREDGING

### HYDRO-RAKING



### HYDRAULIC DREDGING



### MECHANICAL DRY DREDGING



# WHY HYDRAULIC DREDGING?

- LIMITS ENVIRONMENTAL IMPACT, MINIMIZING HARM TO FISH AND OTHER WILDLIFE
- ALLOWS MORE INCREMENTAL STAGING IF REQUIRED TO LOWER PROJECT COST VS MECHANICAL WET DREDGING

# WHY DREDGE 60% ?

- BALANCES COST AND BENEFITS
- PRESERVES A PORTION OF THE EXISTING ECOSYSTEM
- PROVIDES PARTIAL HISTORICAL RESTORATION
- RETAINS ALL RECREATIONAL ACCESS

# WHY 8 FEET?

- RESTORES LAKE TO ORIGINAL 1800'S DEPTH
- PROVIDES LONG TERM SOLUTION
- INCREMENTAL COST OF GOING DEEPER IS NOT JUSTIFIED

## FAWN LAKE RESTORATION COST ANALYSIS

Method		Average Cost	Permitting	Total	20 Year Cost	50 Year Cost
Dredging						
	Mechanical Dry Dredging	\$ 912,000	\$ 100,000	\$ 1,012,000	\$ 1,012,000	\$ 1,012,000
	Mechanical Wet Dredging	\$ 960,000	\$ 100,000	\$ 1,060,000	\$ 1,060,000	\$ 1,060,000
	Hydraulic Dredging	\$ 888,000	\$ 100,000	\$ 988,000	\$ 988,000	\$ 988,000
Chemical Treatments						
	Diquat (Reward)	\$ 6,500	\$ 5,000	\$ 11,500	\$ 115,000	\$ 287,500
	Glyphosate (Rodeo)	\$ 8,625	\$ 5,000	\$ 13,625	\$ 136,250	\$ 340,625
	Fluridone (Sonar)	\$ 14,625	\$ 5,000	\$ 19,625	\$ 196,250	\$ 490,625
Hydroraking						
		\$ 140,000	\$ 7,500	\$ 147,500	\$ 737,500	\$ 1,843,750
Combination of Hydroraking and Diquat						
					\$ 873,750	\$ 2,184,375
Weed/Mechanical harvesting						
		\$ 10,638	\$ 7,500	\$ 18,138	\$ 362,750	\$ 531,875
Aeration/Artificial Circulation - Set Up						
		\$ 18,400	\$ 50,000	\$ 68,400		
	Maintenance	\$ 4,888		\$ 4,888	\$ 166,150	\$ 312,775

# FAWN LAKE COMMITTEE

## RECOMMENDATION

- RESTORE OPEN WATER
- RETURN TO ORIGINAL LAKE DEPTH IN THE NORTHERN AREA
- IMPROVE RECREATIONAL ACCESS
- PRESERVE ECOLOGIC DIVERSITY
- RESPECT HISTORICAL AUTHENTICITY
- PROVIDE COST EFFECTIVE LONG-TERM SOLUTION

A serene landscape at sunset or sunrise over a lake, framed by bare trees. The sun is low on the horizon, casting a warm glow and reflecting on the water. The sky is a mix of blue and orange. The foreground shows a rocky shore.

QUESTIONS  
& DISCUSSION

# REJECTED OPTIONS

- HERBICIDES – environmental impacts, unknown health effects, changing science
- WATER LEVEL DRAWDOWN – destroys all existing aquatic habitats
- VEGETATION BARRIERS – not durable, require seasonal maintenance
- AERATION/CIRCULATION – not effective as stand alone, possible add-on
- HYDRORAKING – expensive and not effective
- DAM REMOVAL – inconsistent with preservation goals

