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Comparative Nutrient Data for Two Locations on the Marstons Mills River

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Barnstable High School, Hyannis, Massachusetts (2008). *Comparative Nutrient Data for Two Locations on the Marstons Mills River*. In Watershed Access Lab Projects. Project 81.
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Comparative Nutrient Data for Two Locations on the Marstons Mills River

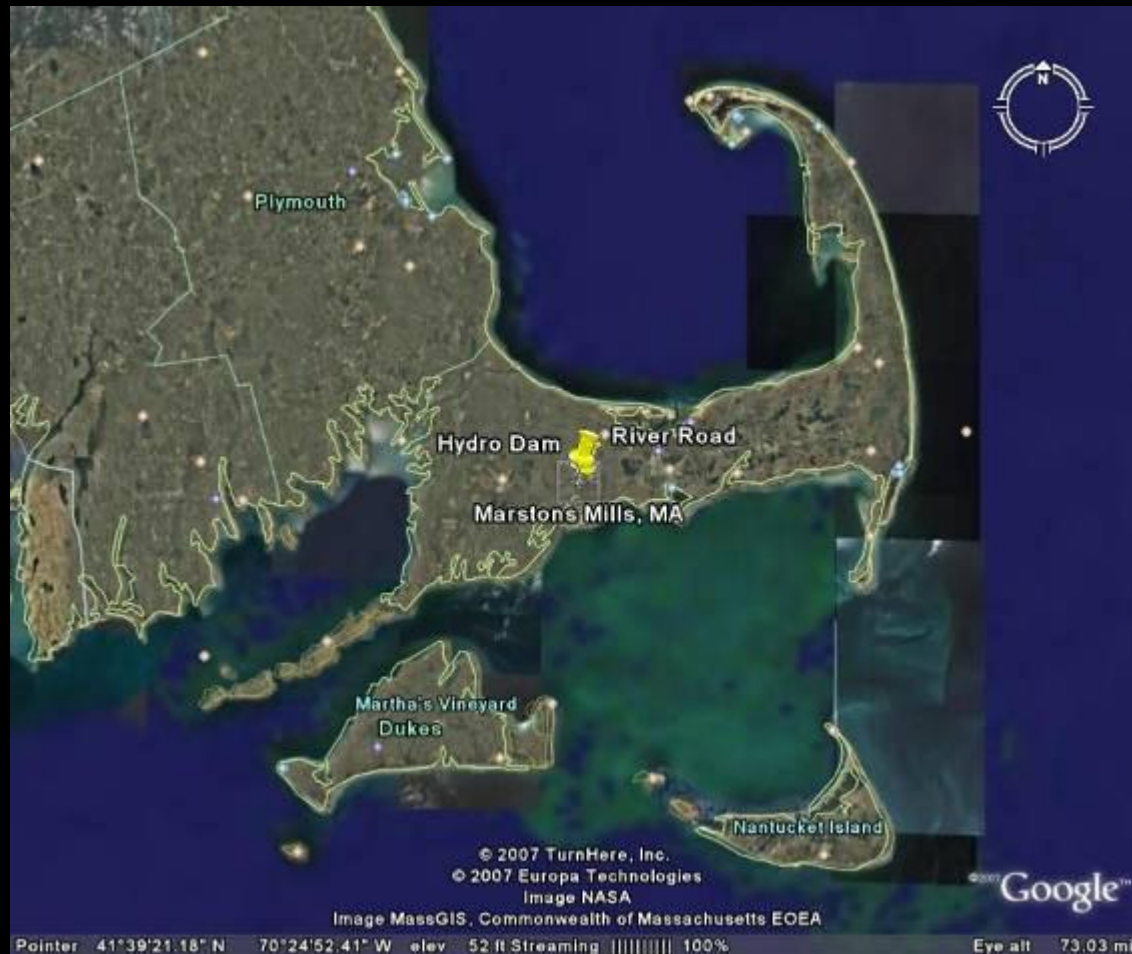
By Mark Brito, Jared Broberg, Tim McGrath,
Samantha Sylvester, and Christina Tyndall

Advising Teacher: Ms. Jessica L. Jackson

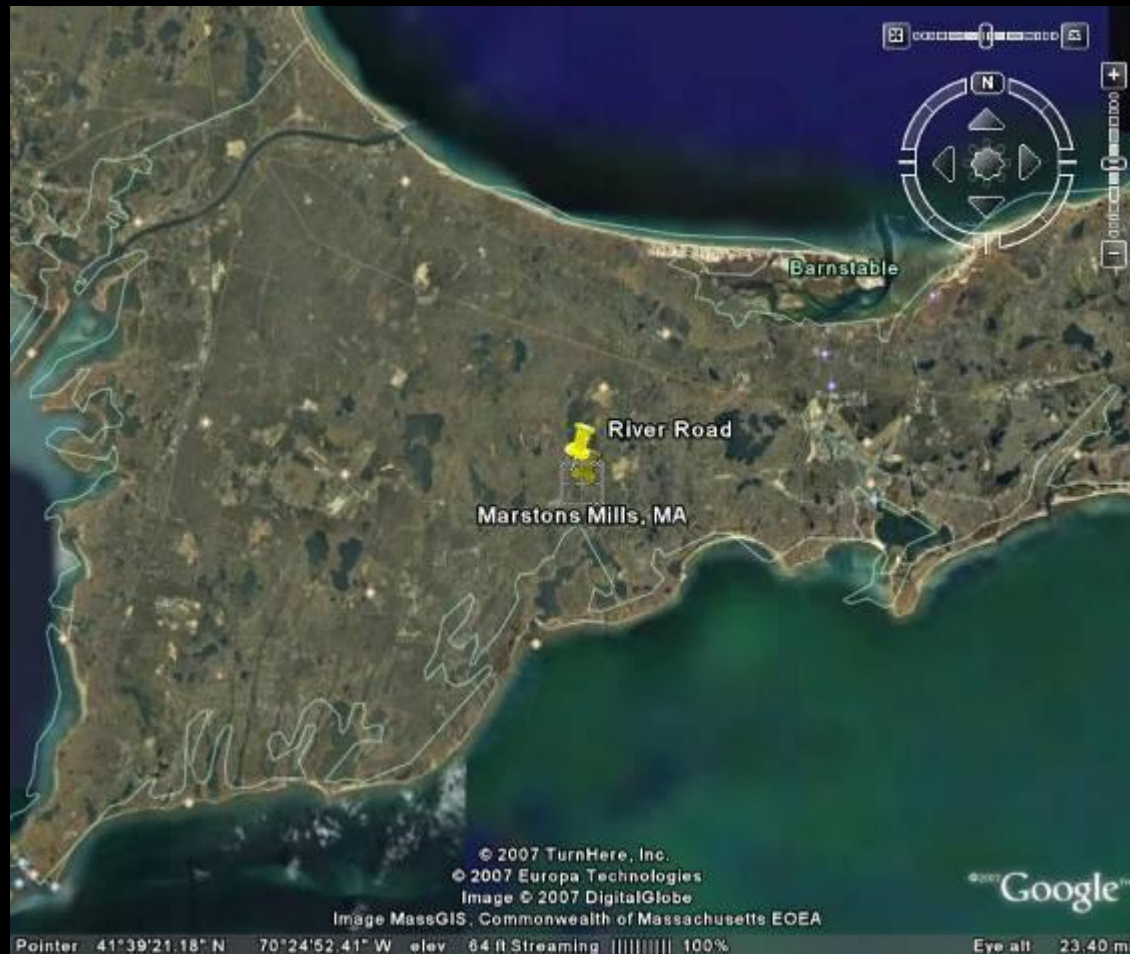
Research Objectives

- Measure and compare nutrient levels of two sites along local waterway
- Infer health of watershed
- Increase visibility of watershed issues

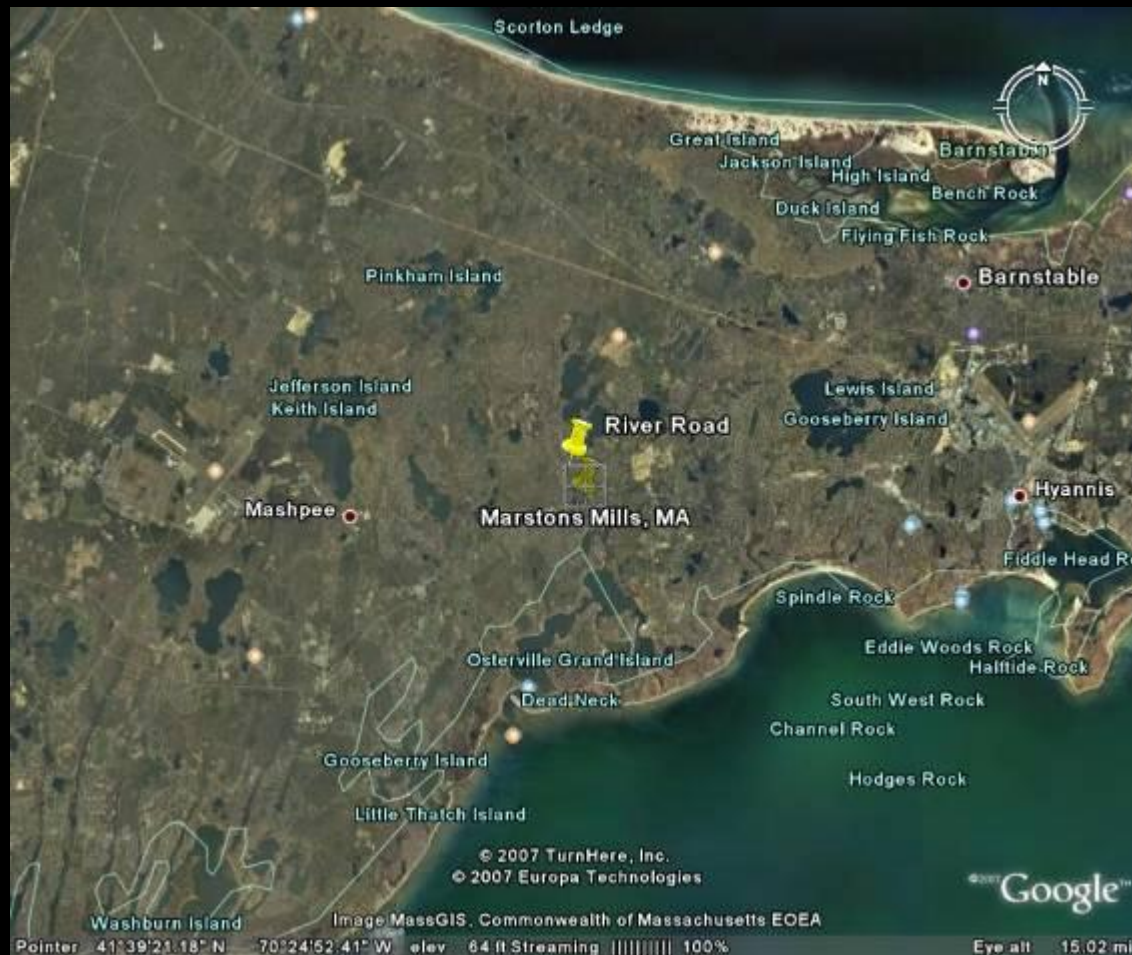
Our Watershed: Cape Cod



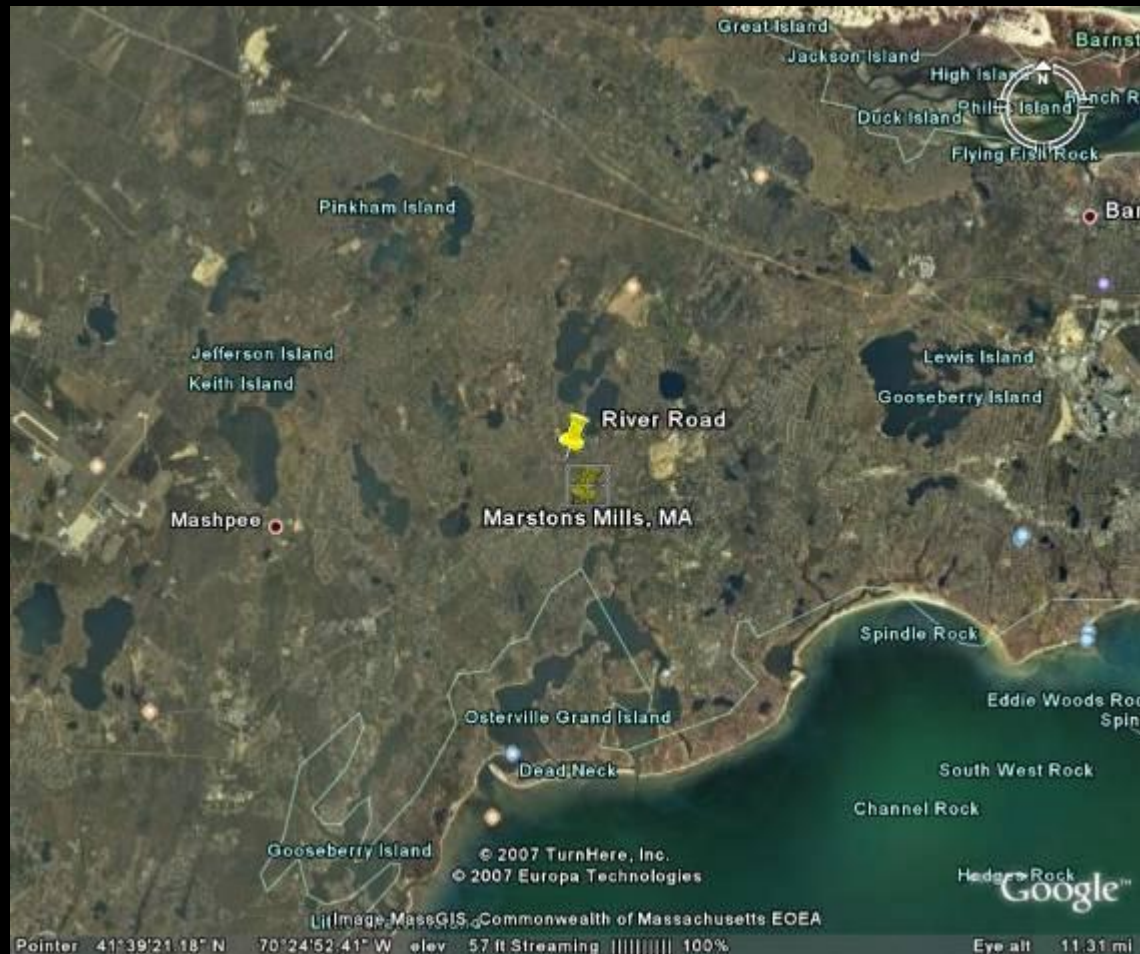
Zooming In



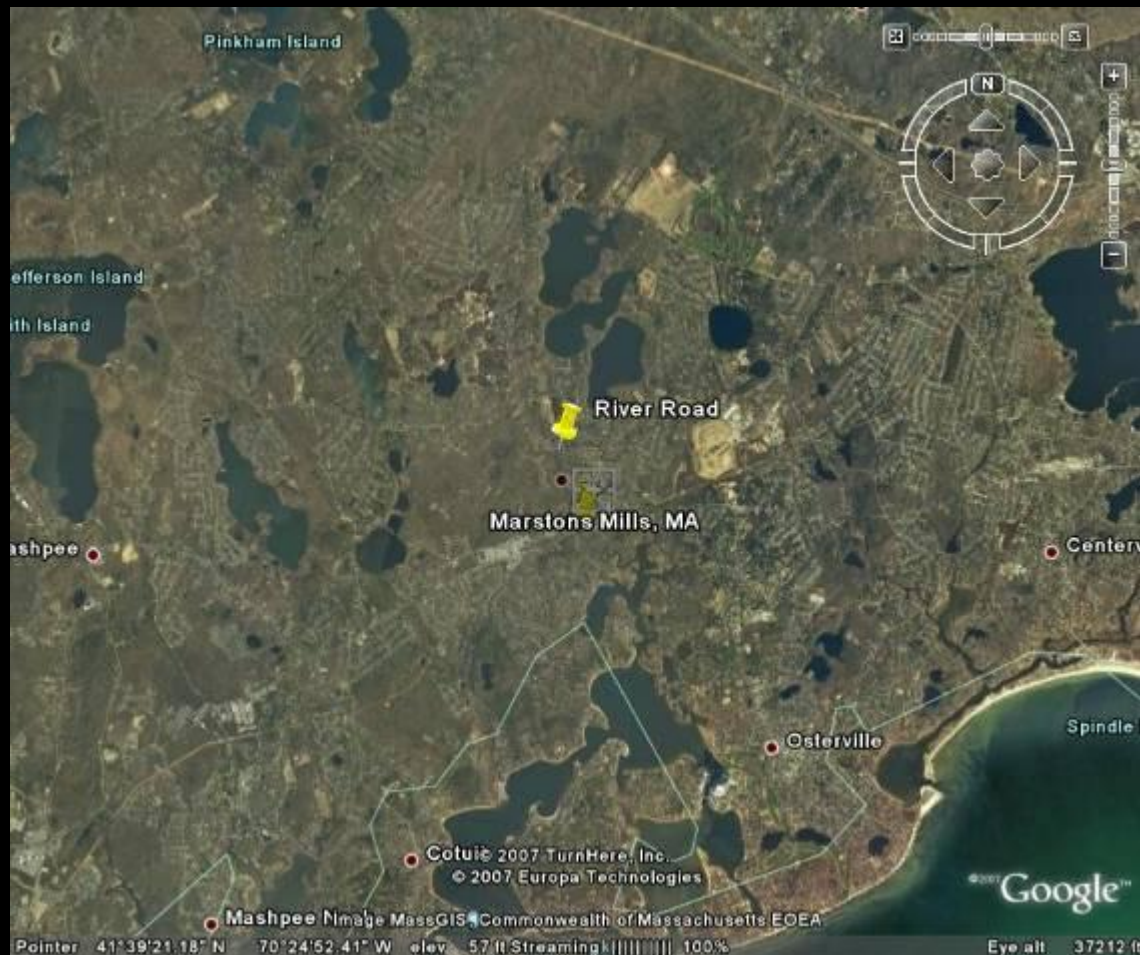
Town of Barnstable



Melting Glacier Left Many Kettle Ponds on Cape Cod



The Village of Marstons Mills



Leadership by Example



Part of the Gang

(Jared Broberg, Mark Brito, Tim McGrath, Chris Hidy)



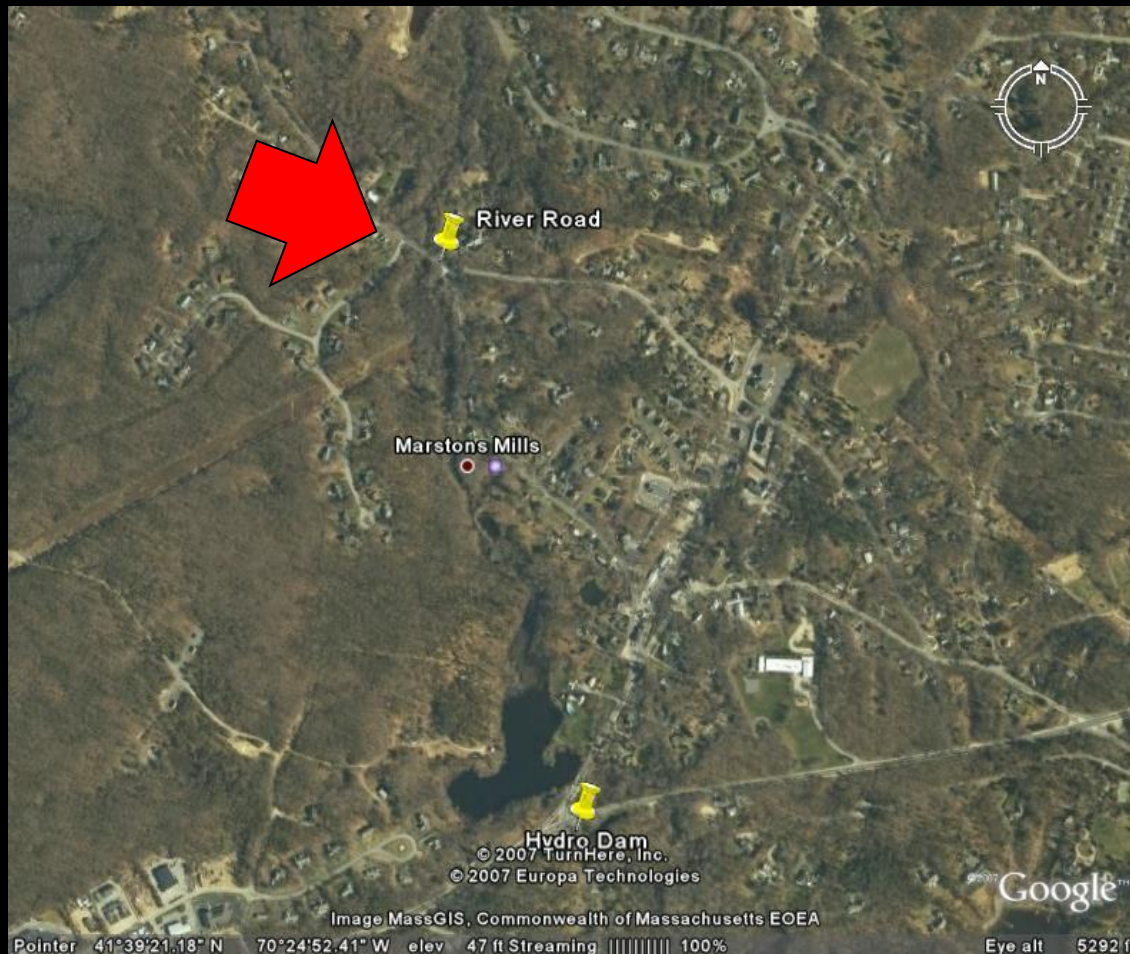
More of the Gang



Christina Tyndall, sketching
the Hydro Dam site

Mark Brito, Ms. Jackson, Samantha Sylvester, Tim McGrath, and Jared Broberg learning how to use the wading rod and flow meter

Start Upstream



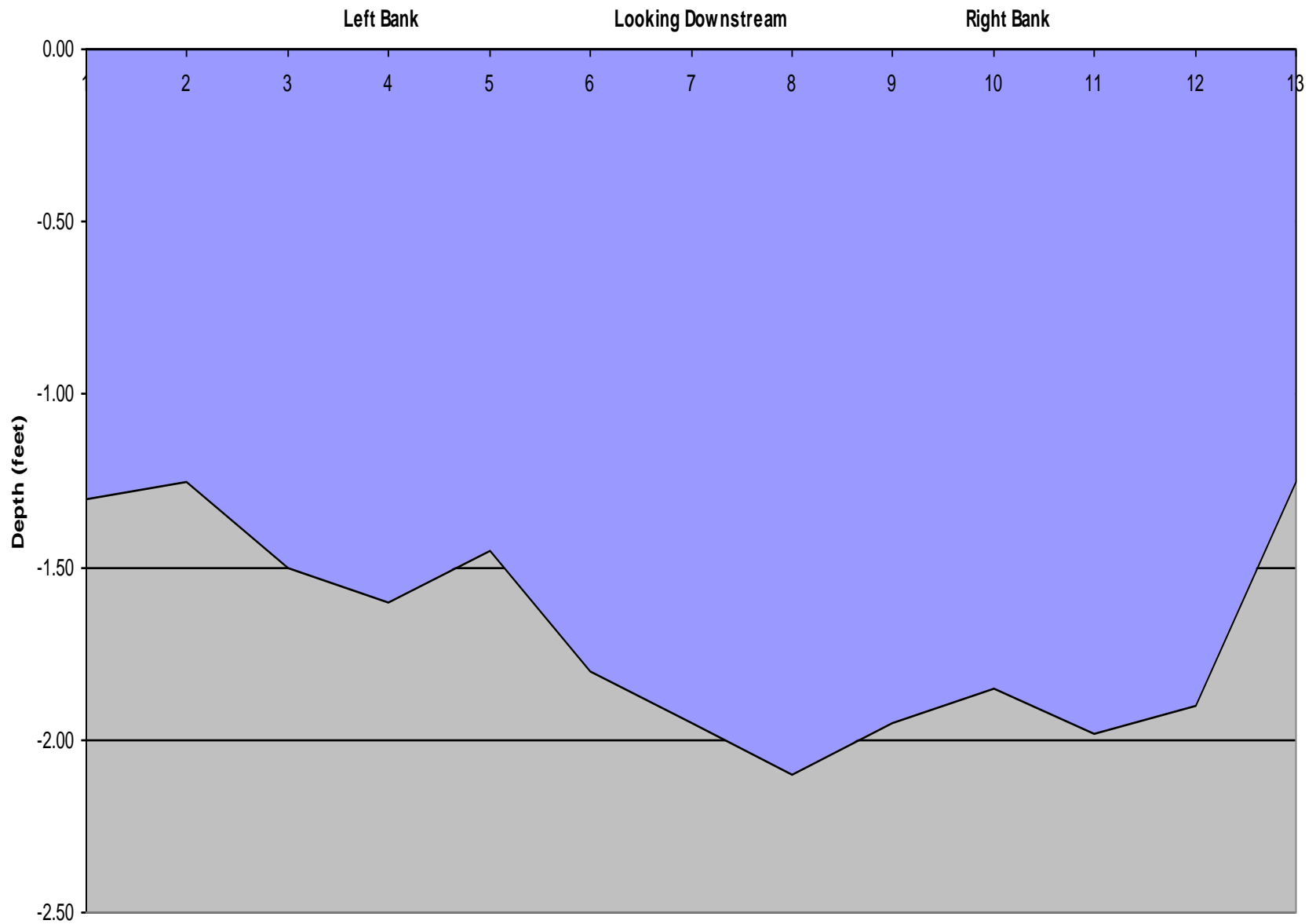
River Road Site



River Road Profile

- Suburban to rural residential area
- Heavy vegetation in riparian zone with a partial canopy
- Water barely visible from road
- Measurements made just upstream from pipe bottleneck under River Road itself
- Riverbank was flooded at time of experiment and measurements

Cross-Sectional Profile ~ October 30, 2007 ~ River Road



River Road Data

- Daily Discharge: 6,632,000 liters
 - Equivalent to approximately three full-size Olympic Swimming Pools
- Average Load per Day
 - Phosphorus: 500 grams
 - Nitrogen-Nitrate: 2,000 grams

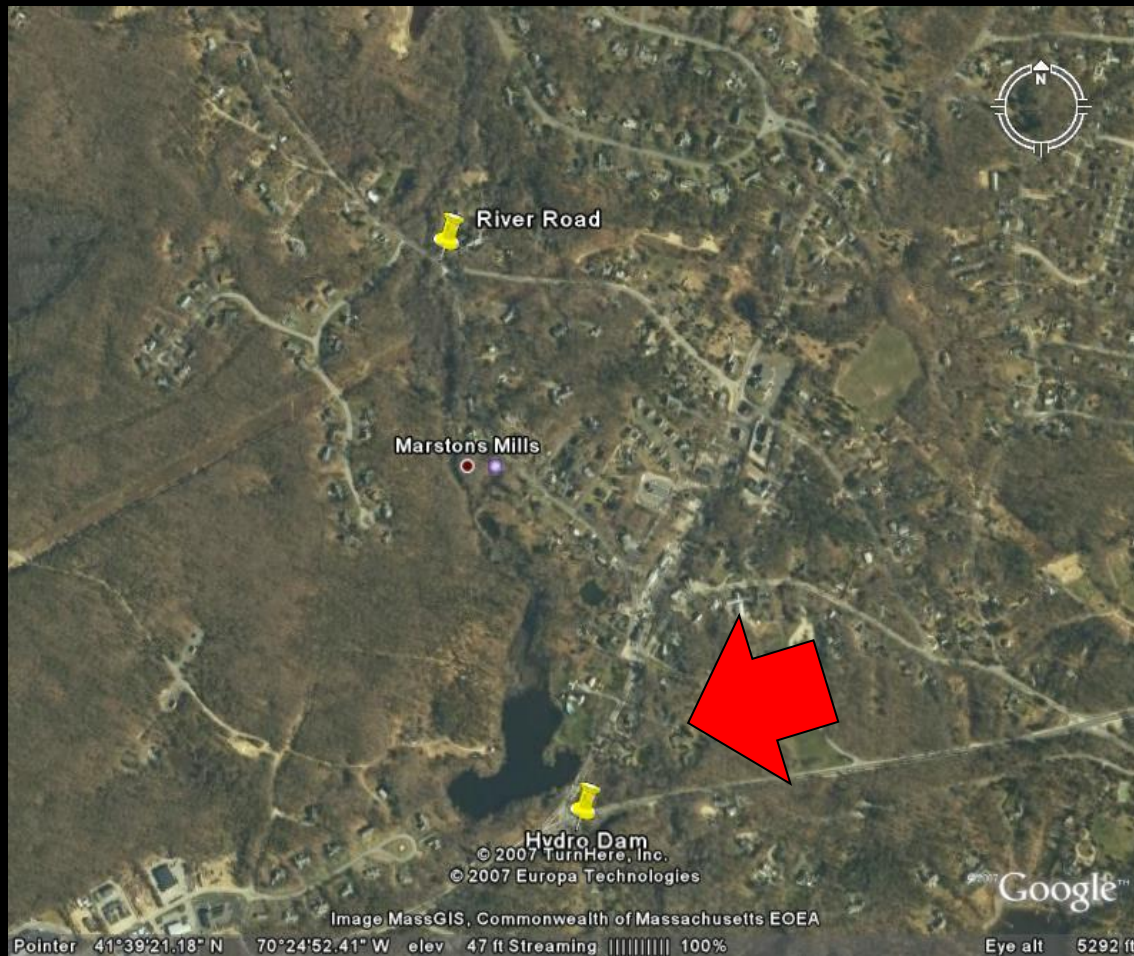
River Road Concerns

- Road bridge is narrow, road chips away
- Susceptible to runoff from salting and carbon emissions from vehicles
- Chemical pollutant runoff from private residences along the river
- Downstream from leeching fields, cranberry bogs and several ponds
- Nutrients change with season

Clean-Up Efforts

- Several bails of hay were present on both sides of bridge, likely to reduce pollution from road runoff
- Redirect residential sewage to town treatment plant in Hyannis
- Re-evaluate nutrient data on an annual or semiannual basis
- Run experiments further upstream
- Publish results in local newspaper

Flow Downstream to Hydro Dam



Busy Intersection and Roadways





Barnstable Land Trust



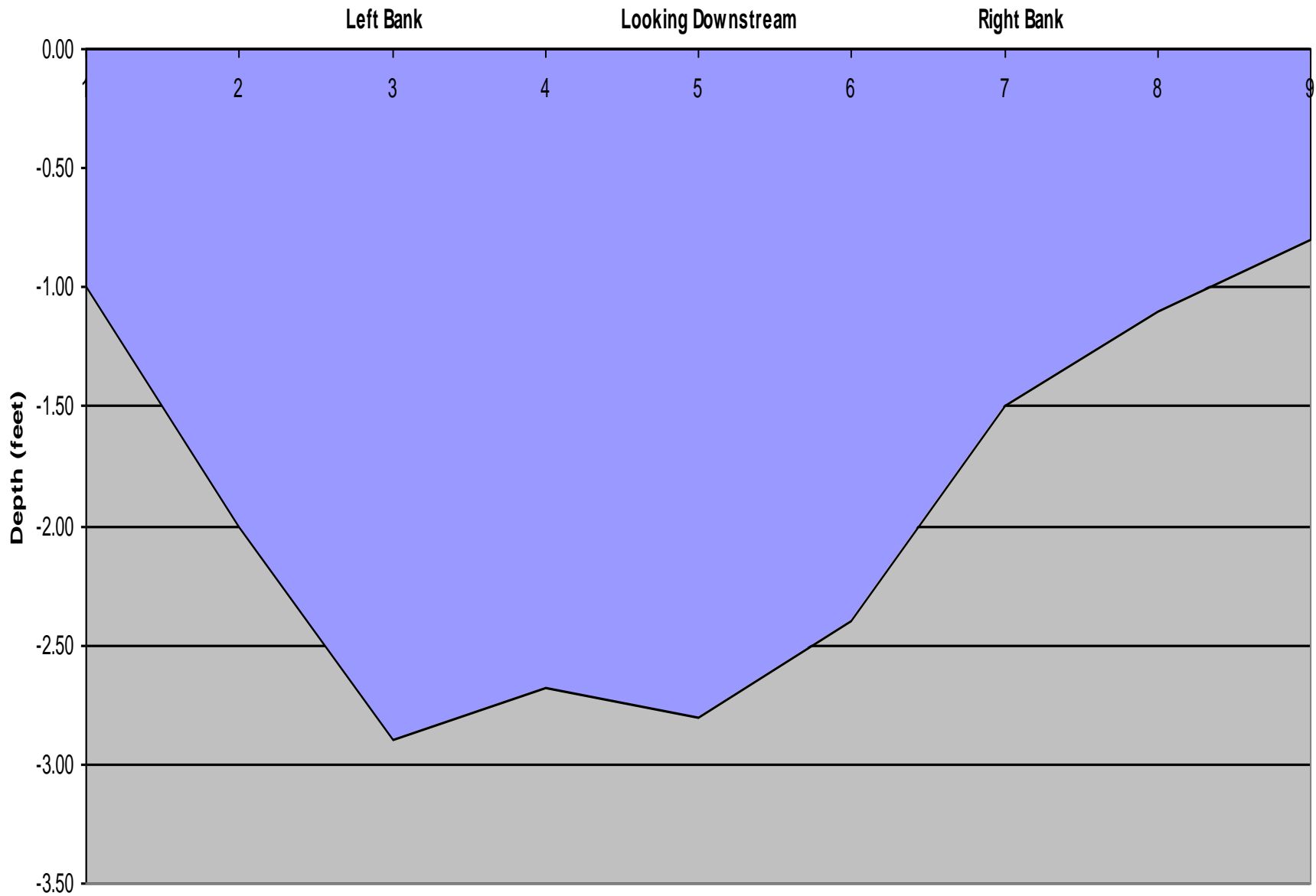
About the Herring Run

- Herring was a major food source for early settlers to Plymouth & Cape Cod
- Hydro dam was created to help upstream herring and alewife breeding practices
- Severe decline in herring and alewife populations have rendered the dam obsolete
- Decline in these fish populations not only cut-off the food source, but also affect the freshwater mussel population

Hydro Dam Profile

- Significant canopy and riparian vegetation
- At foot of major roadway – approximately 100 yards of roadway separates Duck Pond from hydro dam
- Water pools to the east once through outflow pipe, and continues south past hydro dam
- Steep bank with private residences from hydro dam to outwash at Prince Cove
- River was high and fast during experiment

Cross-Sectional Profile ~ October 30, 2007 ~ Hydro Dam



Hydro Dam Data

- Daily Discharge: 116,752,000 liters
 - Equivalent to approximately 47 full-size Olympic Swimming Pools!
- Average Load per Day
 - Phosphorus: 10,000 grams
 - Nitrogen-Nitrate: 25,000 grams

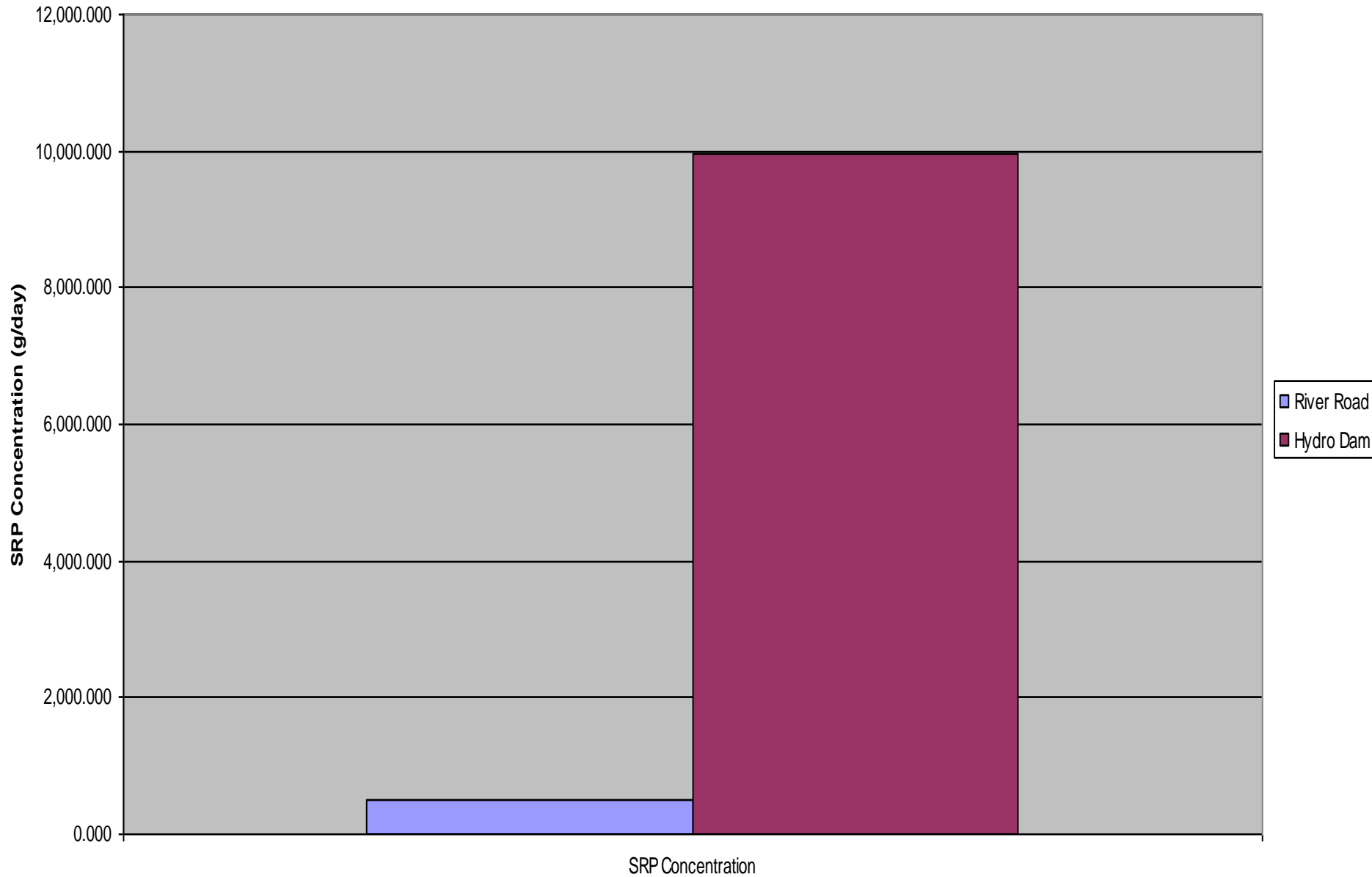
Hydro Dam Concerns

- Heavy carbon emissions from major roadway
- Several private residences sit atop bank, providing pollution from chemical runoff
- Steep bank from dam to outwash at Prince Cove where the river meets the sea
- Anything carried down river goes into the ocean for further distribution

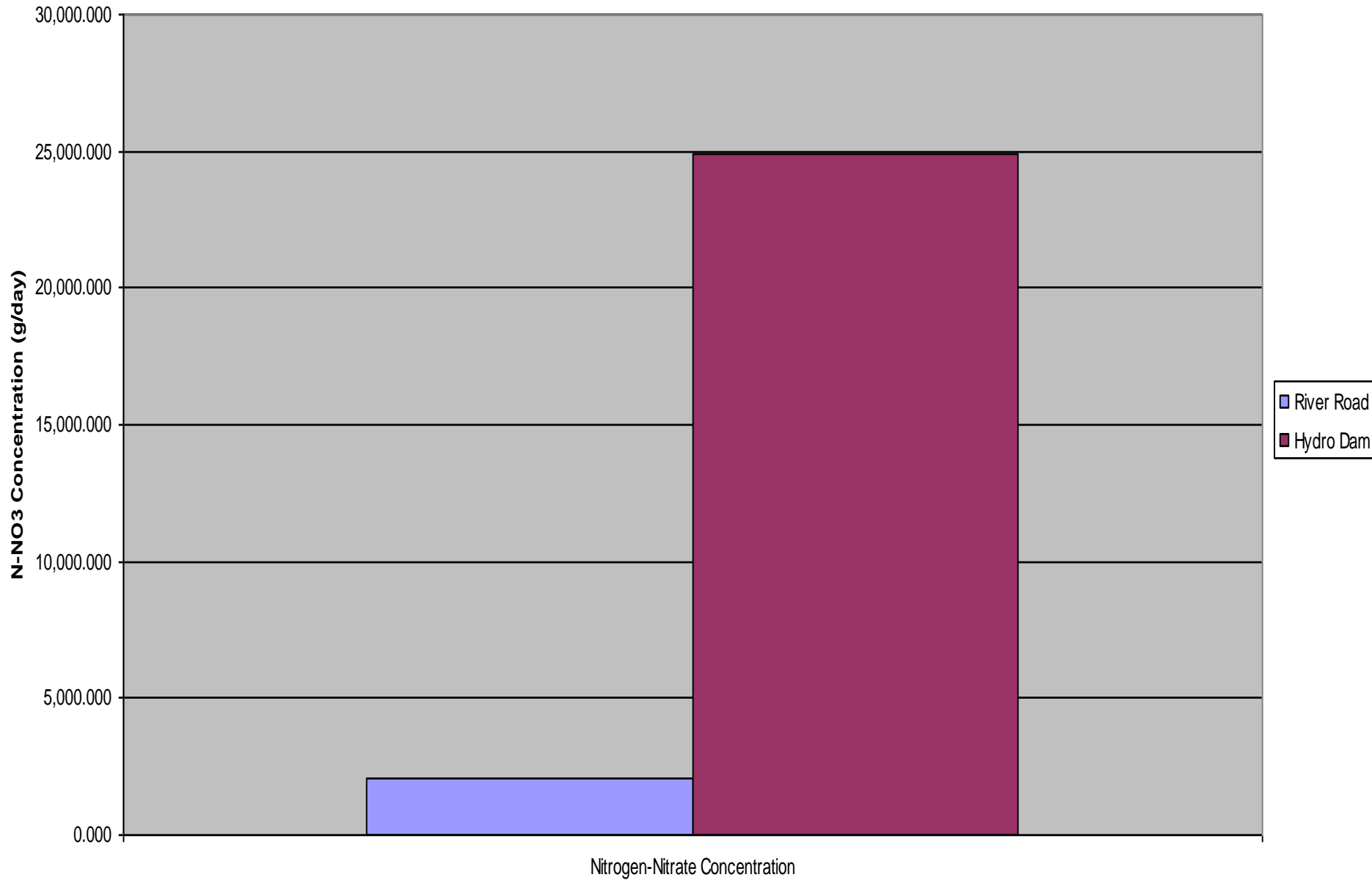
Site Data to Compare

- Significant differences found in levels of phosphorous and nitrogen-nitrate
- Virtually no difference in temperature, but significant differences in dissolved oxygen
- Differences in pH

SRP Concentration ~ October 30-31, 2007 ~ Marstons Mills River



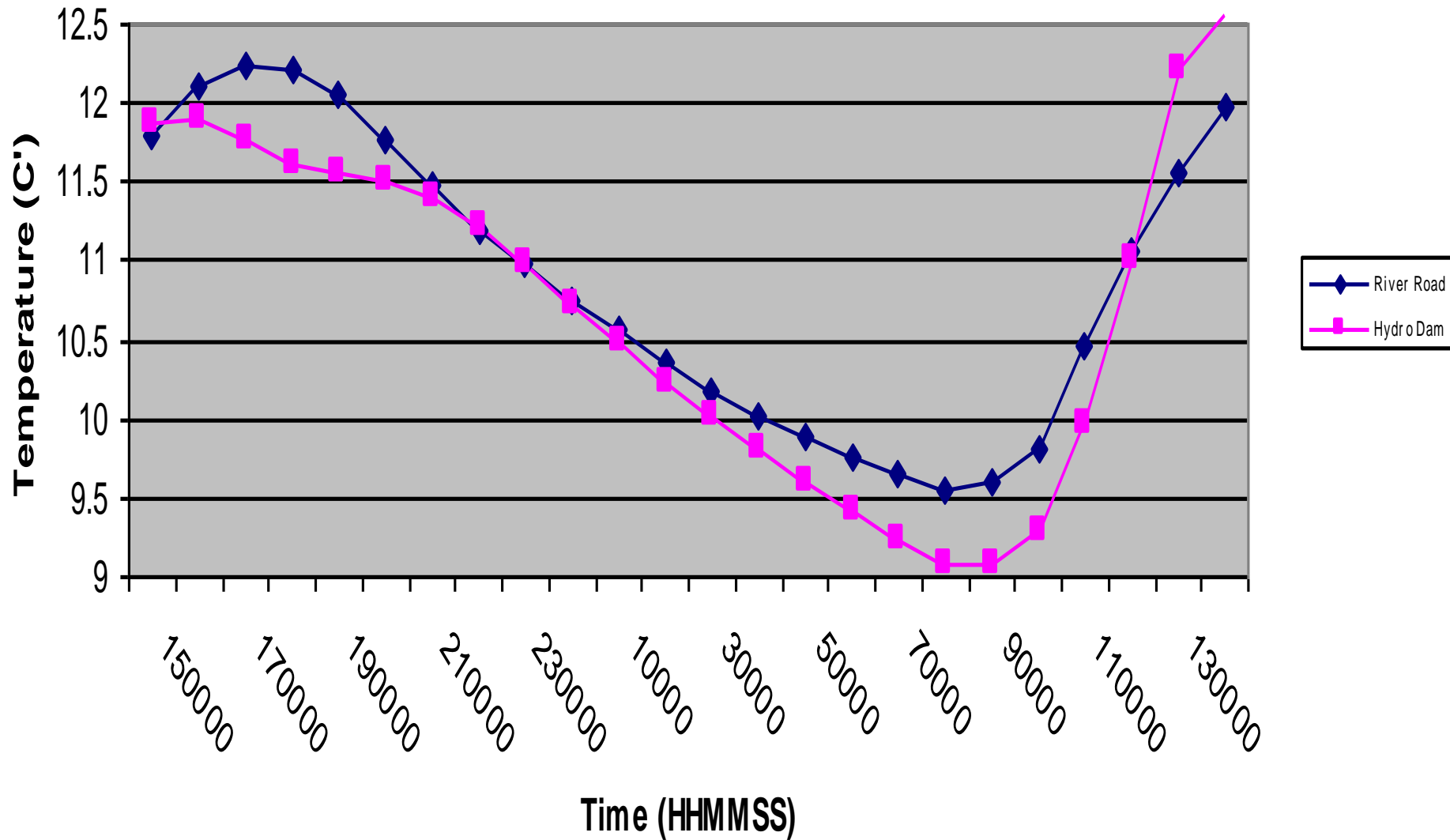
N-NO3 Concentrations ~ October 30-31, 2007 ~ Marstons Mills River



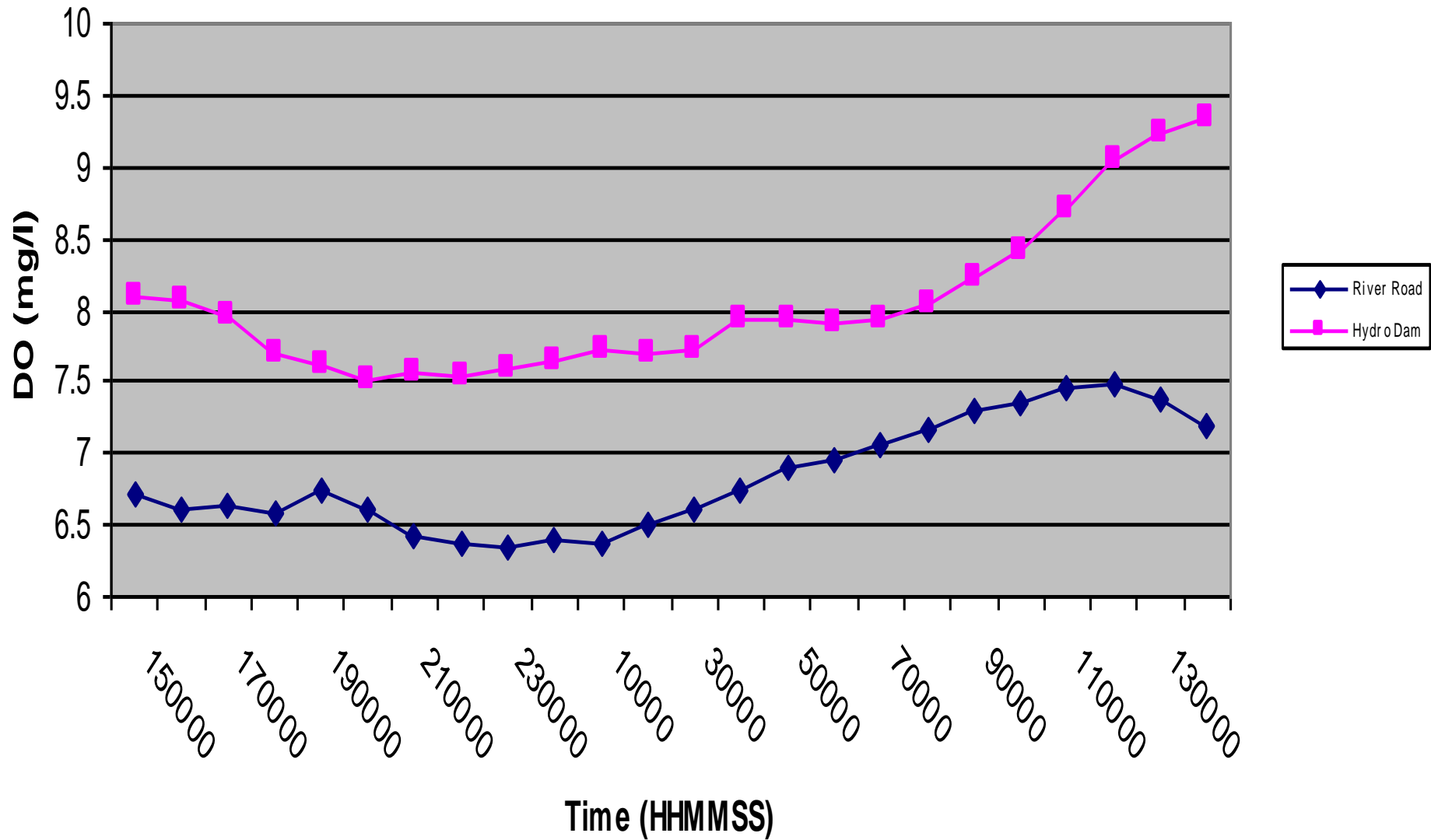
Why So High at the Hydro Dam?

- ? Bottleneck of outwash from the pond just upstream, across the road
- ? Ponds and lakes can be nutrient sinks, holding materials until they move along
- ? Excess pollution from vehicle emissions, given site is under Route 28
- ? Leaf litter from upstream locations has decomposed on its way downstream, showing an abundance of nutrients

Temperature vs. Time ~ October 30-31, 2007 ~ Marstons Mills River



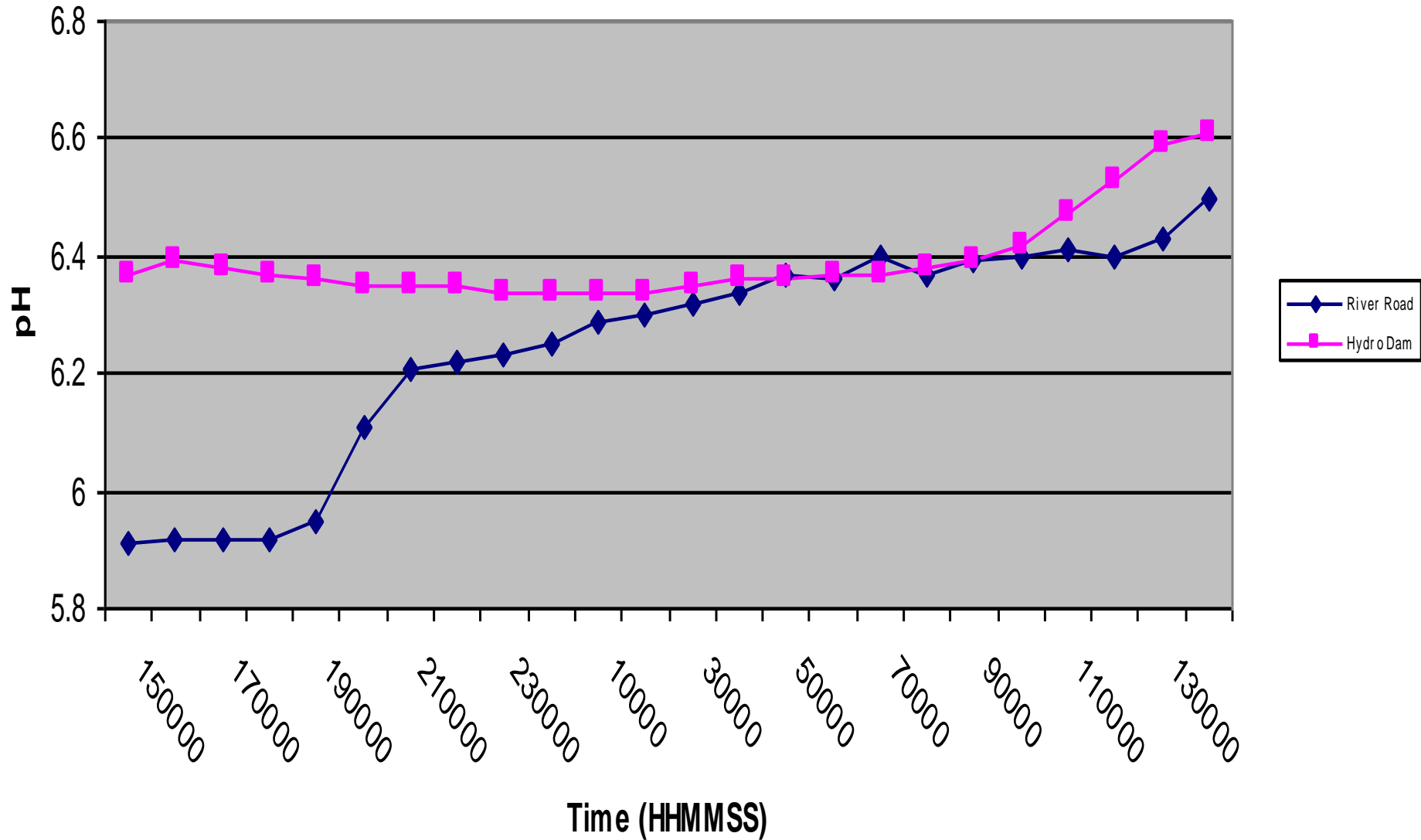
DO vs. Time ~ October 30-31, 2007 ~ Marstons Mills River



Why Is DO Higher at Hydro Dam?

- ? Pollutants generally raise the temperature of water, limiting levels of dissolved oxygen...but Hydro Dam is higher...why?
- ? There may be hidden pollutants upstream of River Road that bring its dissolved oxygen down
- ? Hydro Dam is close to large pond, and could be helping keep the DO up there

pH ~ October 30-31, 2007 ~ Marstons Mills River



Why Such a Difference in pH?

- ? Higher acidity upstream near cranberry bogs
- ? Effect of residential leaching fields
- ? Presence of hidden pollutants

What's Next?

- We will deliver our report to the Science Faculty of Barnstable High School
- We will re-run our experiments in the springtime and compare results
- We will maintain a log of our data through the years so others may continue to seek patterns and answers

Questions?

Enjoy the video!



Back to the Earth I screamed
and no one listened to me

Back to the Earth I lived and
they all followed

Well come on, see my world

I'm coming down to write my
way

THANK YOU for
RIGHTING OUR WAY! 😊

All Photos & Videos by Mrs. Carol Bernon
Barnstable Science Department Chair

Music Video by Jared Broberg
Featuring: “Back to the Earth” by Rusted Root (2002)