Design, construction and monitoring of a successful snapping turtle *(Chelydra serpentine)* nesting habitat site in Niagara College's on-campus wetland, Niagara-On-The-Lake, Ontario

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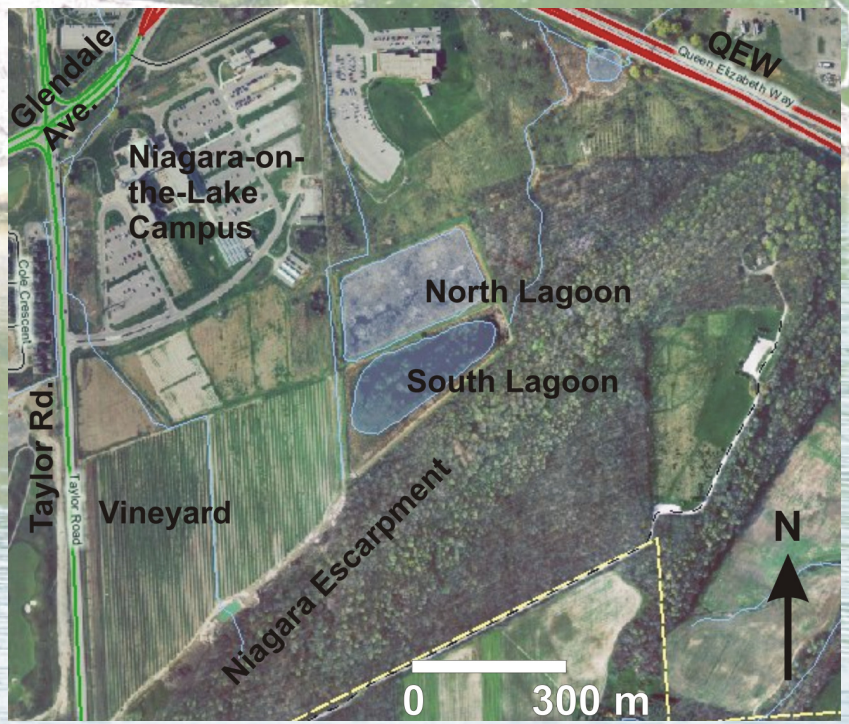
Presented at the Toronto Zoo Turtle Stewardship and Management Workshop, March 17-19 2008

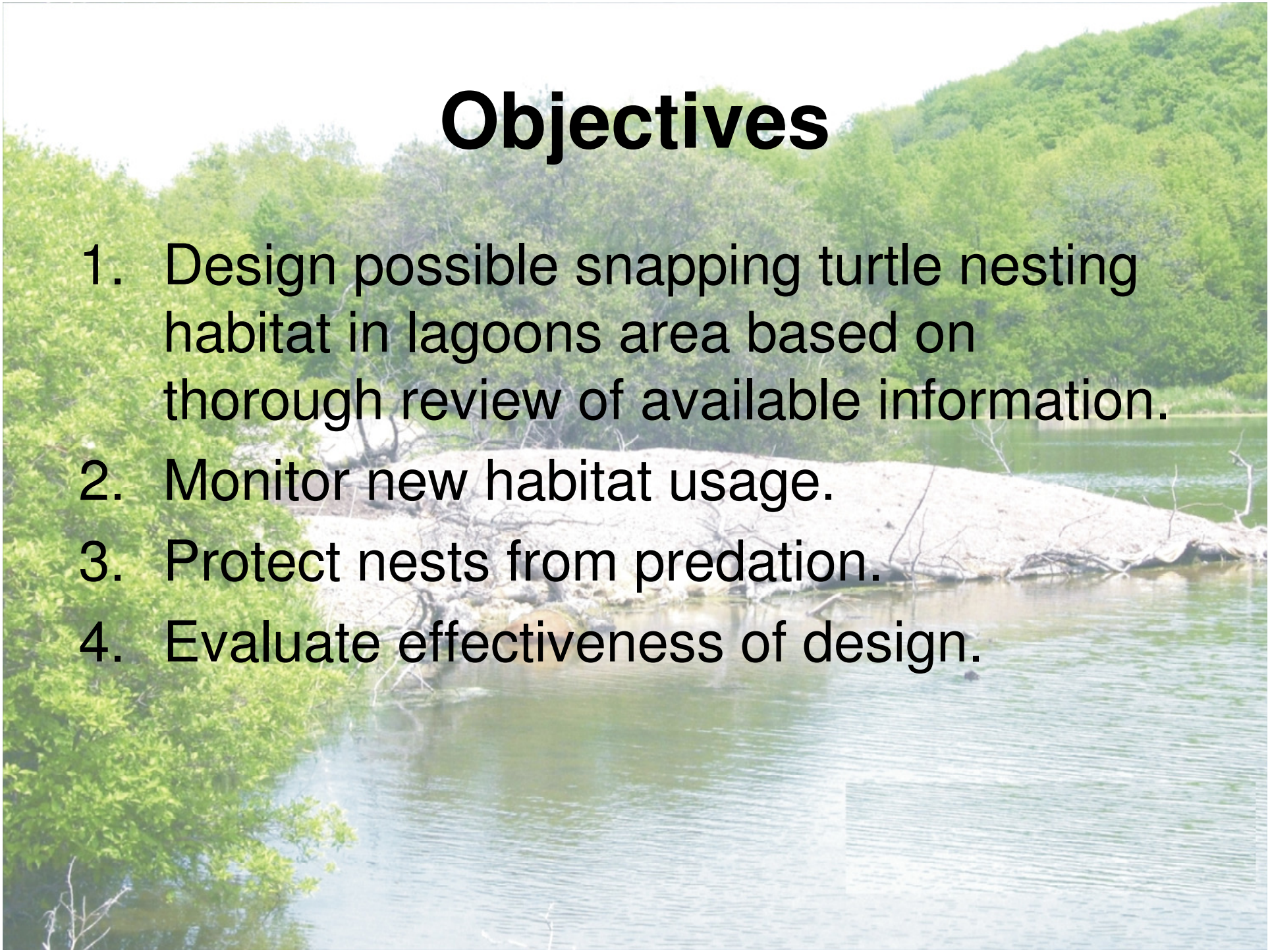
Thanks go to…

- **Bob Johnson** (Toronto Zoo), for inspiring and bringing us up to speed.
- **Paul Bechtel, Thomas Sciscione** and **Andrea Sinclair**, Niagara College Ecosystem Restoration post-grad students and staff who volunteered their time designing and building the site in winter 2007.
- **Vince Forbes**, Manager of the **LaFarge** Fonthill Quarry for donating 60 t of sand and gravel.
- **William Barnes**, **Jennifer Kertai**, **Kasia Zgurzynski** and **Marcel Quenneville**, the summer students who completed the construction and monitoring in 2007.
- niagararesearch and the support of **Natalee Tokar**
- and **Marti Jurmain**

Background

- Two wastewater treatment lagoons built in 1965 are part of Niagara College's Niagara-on-the-Lake campus (1997).
- Naturalization of the lagoons has been possible since 1996, the last year used for treatment.
- Many species, including snapping turtles, have colonized the lagoons for rearing young.
- Lagoon wetlands serve as excellent teaching tool for monitoring and ecological restoration research (snake hibernacula, wetland plant community regeneration, bird nesting habitat, amphibian spawning habitat).



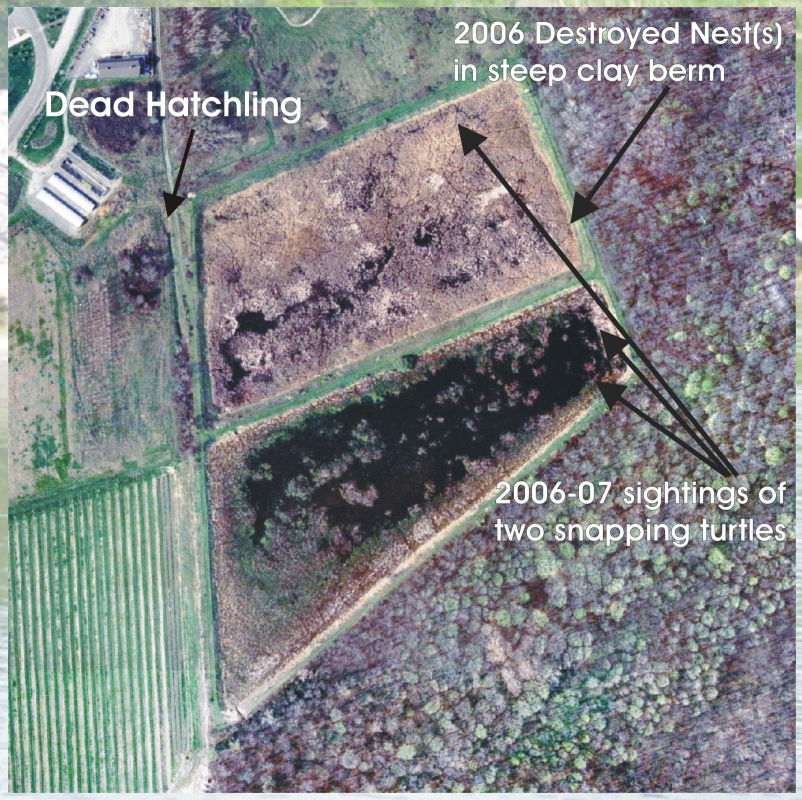


Objectives

1. Design possible snapping turtle nesting habitat in lagoons area based on thorough review of available information.
2. Monitor new habitat usage.
3. Protect nests from predation.
4. Evaluate effectiveness of design.

Our Snapping Turtles

- At least two individuals periodically sighted (size difference) between 2004-2007.
- Destroyed eggs (carnivory) and lone dead hatchling (distal) observed in 2006.
- Only clay/compacted clay over entire site (compost pile 150 m away only exception).
- Muskrat holes offer limited nesting habitat (backfilling problem).



Project History

- Spring 2006 Ecosystem Restoration class field trip to Toronto Zoo – Bob Johnson outlines concerns relating to populations of “common” species such as snapping turtles.
- Fall 2006: Conference call with B. Johnson followed by ER class competitive assignment (3 groups): literature review and proposed designs of nesting habitat for NC lagoons.
- Winter 2006-07: re-contouring of clay berm and placement of sand and gravel.
- Spring 2007: Shoreline stabilization and planting; monitoring site usage by turtles and nest protection.
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Outcome 1 of Student Competitive Assignments – Literature Review

- Snapping turtles require ~ 12 years to sexually mature.
- Egg and hatching predation by common mammalian carnivores (raccoon, opossum, fox, coyote) destroys 99 % of each year's new cohorts.
- Mature snapping turtles are commonly killed crossing roads.
- These factors, combined with habitat loss due to urbanization, are threatening the number of snapping turtles reaching reproductive age.

Outcome 1 of Student Competitive Assignments – Literature Review

- **Four major design parameters identified from literature:**

  a) close proximity to water (hatchling water stress, predation)

  b) substrate particle size: sand or gravel (excavation and egg burial)

  c) full sun exposure (heat)

  d) minimize vegetation (simplify detecting usage by turtles)

Outcome 2 of Student Competitive Assignments – Nesting Habitat Design

- Design nesting habitat such that it spans the berm separating the two lagoons.
- Orient habitat south to north, providing exposure from full sun to partial shade.
- Recontour berm, reduce slopes and expand available area into lagoons.
- Apply 30 cm deep flat/ sloped zones of construction sand or 3/4” crushed gravel.
- Remove vegetation and discourage plant growth.

Outcome 3 of Student Competitive Assignments – Monitoring and Protection

- Daily monitoring of habitat usage in May and early June (rake smooth, look for tracks, nests).
- Protect nest(s) immediately following discovery without disturbing moisture regime, light exposure, substrate compaction.
- Monitor nest condition, date of hatching, number of hatchlings and total number of eggs.

Summer 2007 Results

- On June 2 (Friday night!), the snapping turtle female(s) laid at least five clutches of eggs in the lagoon area.
- Two clutches laid in the constructed habitat.
- One nest in the constructed habitat was immediately destroyed by predators, as were three others built in muskrat holes in the clay berms.
- The remaining clutch, located on the central mound of construction sand, was immediately protected by a wire mesh fence and monitored for the next 79 days.
- On August 20, 34 hatchings were observed emerging from the nest.
- The nest was excavated, revealing that a total of 58 eggs were laid, of which only one did not hatch.

First design of barrier, June 4, 2007

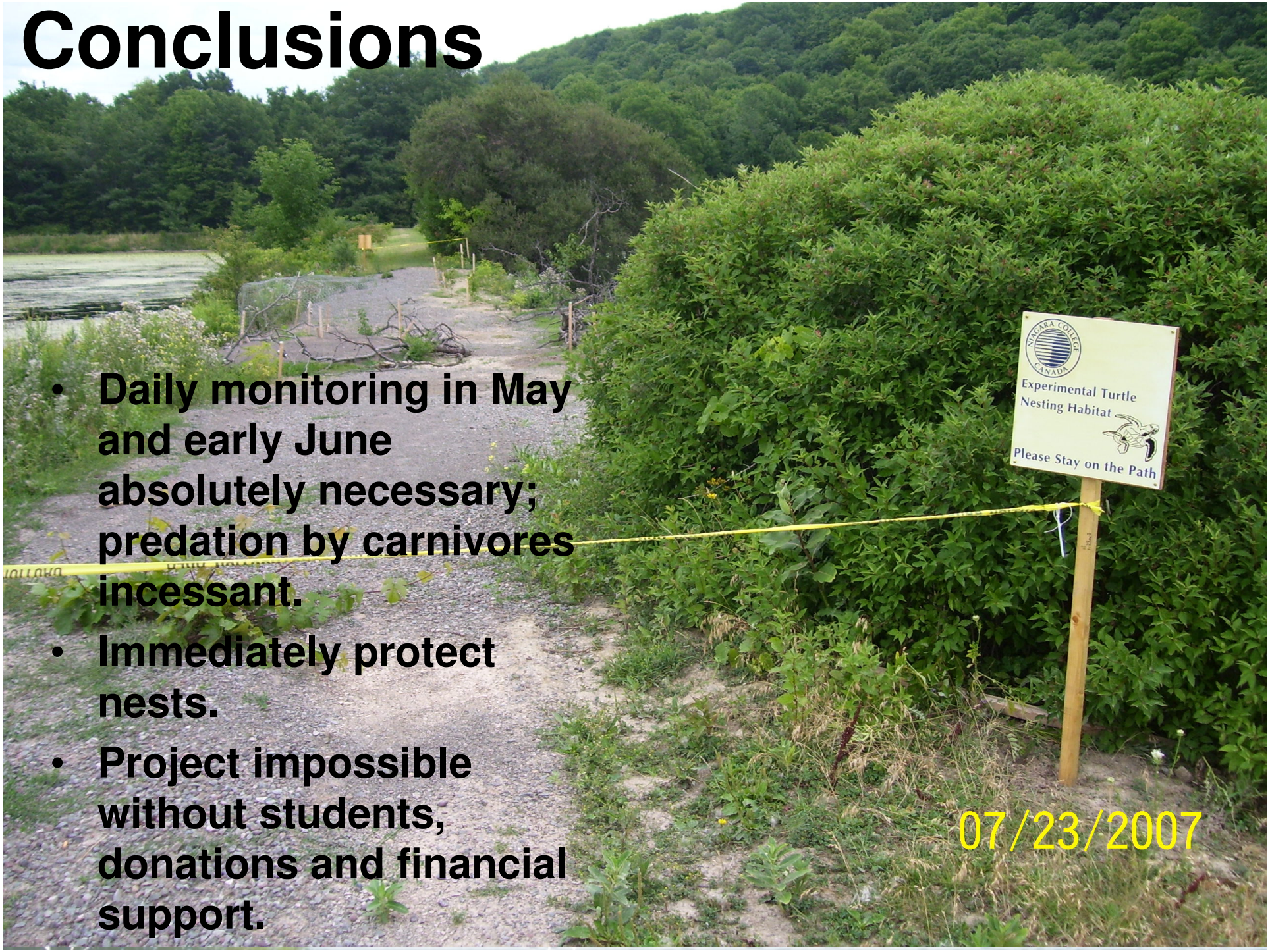
Final barrier, June 4, 2007

The Hatch, August 20, 2007

Substrate sampling (Toronto Zoo)

One of the 58 eggs did not hatch

Conclusions



- Daily monitoring in May and early June absolutely necessary; predation by carnivores incessant.
- Immediately protect nests.
- Project impossible without students, donations and financial support.

Questions for You…

- **Do we have five reproductive females? – only one clutch each?**
- **Monitoring hatchling survival – is it possible, worth it?**