Integrated Pest Management For A Greener Campus

Arts & Sciences | Dental Medicine | Graduate Studies
Osteopathic Medicine | Pharmacy | Health Professions

UNE UNIVERSITY OF NEW ENGLAND
Biddeford & Portland, Maine

EHS ENVIRONMENTAL HEALTH AND SAFETY

University of New England

The University of New England (UNE) is an innovative health sciences university grounded in the liberal arts.

UNE offers more than 40 undergraduate, graduate and professional degree programs and is home to Maine's only medical school.

Total enrollments for 2013-2014 Academic year: 9,681

UNE University of New England
Biddeford & Portland, Maine

EHS Environmental Health and Safety

University Campus

Our coastal Maine campus is located on a beautiful 560 acre site in Biddeford, Maine, where the Saco River flows into the Atlantic Ocean.

The University Campus is home to:

- **The College of Arts and Sciences**
- **The College of Osteopathic Medicine**
- **The Marine Sciences Center**

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Portland Campus

The Portland Campus is designated a national historic district and is quintessential New England, with a central green surrounded by classic brick buildings.

The Portland Campus is home to:

- **College of Pharmacy**
- **College of Dental Medicine**
- **Westbrook College of Health Professions**
  - **Dental hygiene and nursing (undergraduate)**
  - **Nurse anesthesia, occupational therapy, physical therapy, physician assistant, and social work (graduate)**

UNE Tangier, Morocco

The UNE Campus in Tangier, Morocco offers a suite of lab sciences and humanities courses that meet the needs of a broad range of undergraduate students.

All courses are taught by UNE faculty and count toward the core or the major.

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UNE Commemorates the 50th Anniversary of Dr. Martin Luther King's Speech on Campus (May 7, 1964)

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The George & Barbara Bush Center

The Bush Legacy Collection within UNE's Bush Center houses material anchoring the Bush legacy in Maine.

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Maine CDC Issues Warning

- **August 2012**
  - **Maine CDC had tested 663 Mosquitoes for WNV.**
  - **Two mosquitoes tested positive for WNV.**
  - **Maine CDC had tested 26 humans for WNV. All test results were negative.**
- **Prompted discussions at Administrative level over health concerns with public and campus community.**
  - **Student Athletes already on campus**
  - **Research conferences in progress**
  - **Faculty and staff on campus**
- **University Campus is surrounded by water.**
  - **Atlantic Ocean**
  - **Saco River**
  - **Forested Vernal Pools**
  - **Wetlands**
  - **Salt Marshes**

Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services

UNE Response

- **Reviewed current chemical spray program**
  - **A limited pest control chemical spray program in place at UNE.**
- **Director of EH&S makes recommendation not to increase the number of spray applications.**
  - **Increased chemical spraying would have the potential negative impact on the health of the campus and ecological communities.**
- **Director of EH&S recommends responding with personal protection.**
- **EH&S Department purchases & distributes insect repellent (EPA-registered) to:**
  - **Athletics Department**
  - **Student Affairs**
  - **Residential Life**
  - **Conference Services**
- **Director of EH&S makes recommendation for an environmentally safe and sustainable mosquito management program, i.e. Integrated Pest Management.**

UNE Response

- **Vice President for Clinical Affairs, Director of Public Health Programs, issues guidance document to UNE community.**
  - **Outlining best personal protection measures to reduce the likelihood of being bitten by infected mosquitoes.**
- **Vice President for Campus Services evaluates and takes measures to reduce vector populations.**
  - **Eliminate mosquito breeding sites, i.e. emptying standing water from flower pots, buckets and barrels, etc.**
  - **Discussions with pest control contractor to ensure best practices are in place for the remainder 2012 mosquito season.**
  - **Facilities will ensure window screens in dormitories are in place and in good condition.**
- **UNE Administrators approve biological control approach, contact UNE faculty for assistance.**
  - **Noah Perlut, Ph.D., Assistant Professor, Environmental Studies and Chair of UNE's Environmental Council.**

UNE Response

- **Dr. Noah Perlut recruits students (Environmental Science Majors).**
  - **Caitlyn Spaeth ('13)**
  - **Samantha Fields ('14)**
  - **Brendan Emanuel ('14)**
- **Fall Semester 2012, Professor Richard Peterson's "Environmental Movement Class".**
  - **Course required students to develop a community action project**
  - **Students spent the semester researching and writing a Integrated Pest Management program.**
- **December 2012, Students present findings (60 page document) to:**
  - **UNE Administration**
  - **UNE Environmental Council**
  - **Professor Peterson for final semester grade**
- **Spring/Summer 2013, UNE students implementation and management of mosquito project.**
  - **Paid internship that fulfills Major requirement**
  - **Earn 3 credits as part of Advanced Environmental Internship ENV 495**

Student Recommendations

Integrated Pest Management

Integrated Pest Management incorporates:

- Manages the timing chemical applications
- Manages the types of chemicals applied
- Utilizes a variety of biological control methods

These methods include:

- Reduction of traditional pesticides
- Introduction of organic pesticides and larvicides
- Introduction of native mosquito predatory species
  - Construction of little brown bat boxes
  - Construction of Tree Swallow/Blue Bird houses
- Optimization of existing garden landscapes
  - Replace some existing landscape vegetation with native flora and fauna
  - Strategically locate potted planters throughout campus
- Trapping and identification of mosquito species

Student Recommendations

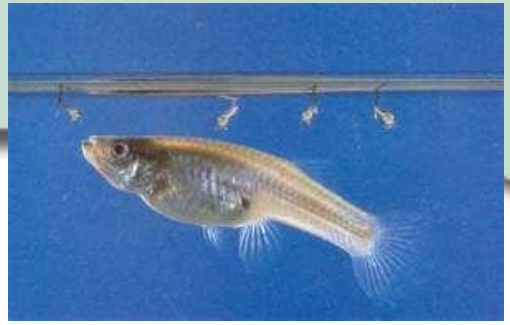
Insectivores: Dragonflies, Damsel flies

- There exists the possibility that local populations of native dragonflies and damselflies could be harmed by introducing more aggressive species from other places.
- There exists the HIGH possibility that non-native "exotic" species could be introduced.
- Dragonflies eat more than mosquitoes and mosquito larvae.
  - An overpopulation of dragonflies could increase competition and harm populations of other local rare or endangered insects.
- Maine DEP requires a permit to persons importing Dragonflies into the state.
- In this alternative, Dragonflies would not be used as a supplemental control measure

Student Recommendations

Fish:

- ***Fish family Gambusia*, a species of fish found globally, that can persist in stagnant and low water quality.**
- **Native to southeastern North America (Atlantic and Gulf Slope drainages).**
  - **In this alternative, fish would have to be stocked in the freshwater environments through campus.**
  - **This was not be feasible due to limitations on access to most of the wetlands.**
- **Not a native Maine**
  - **introducing them into natural aquatic habitats could have potentially significant adverse impacts on local habitats.**
  - **Species is indiscriminate feeder that may eat tadpoles, zooplankton, aquatic insects, and other fish eggs and fry.**
- **There are mosquito breeding sites which are too small to maintain fish populations (e.g., vernal pools).**
- **In this alternative, fish would not be used as a supplemental control measure.**



Biddeford Campus

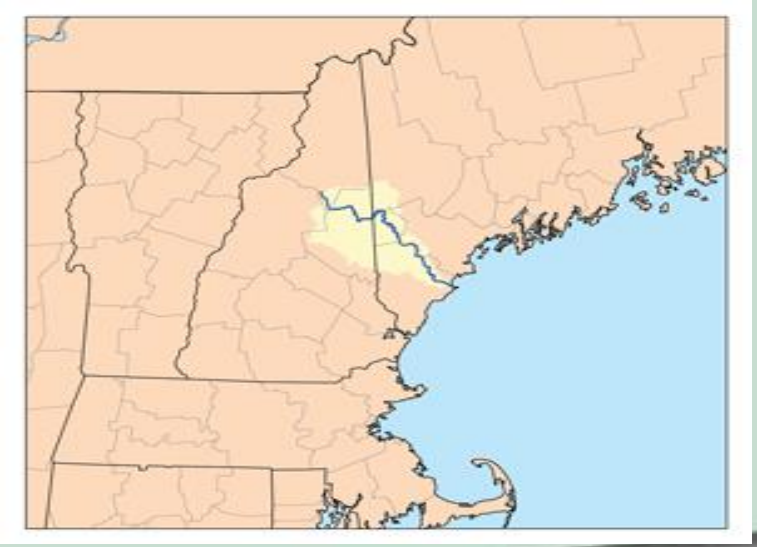
The beauty of UNE's Biddeford campus is defined by water.

- **The Saco River, Atlantic Ocean, Biddeford Pool, brooks and streams, forested wetlands, vernal pools, and salt marshes.**
- **Inherently, these waters are a host habitat for some of the 40 species of mosquitoes found in Maine.**
- **About 20 are pests to humans, and 12 can be vectors of diseases that are harmful, such as West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE);**
  - **Mosquitoes rely on wetland areas for larval stages**
  - **Species that rely on both salt and fresh water can be vectors of these diseases**
- **WNV and EEE mosquitoes have been found in Biddeford, Maine**

Saco River Basin

The largest watershed in southern Maine.

- Headwaters in New Hampshire's White Mountains
- Drains 1,700 square miles
- Encompassing all or part of 20 cities and towns in Maine.
- Maine's fourth-largest river
  - The Saco flows roughly 120 miles emptying into the Gulf of Maine



Saco River Estuary

- **The estuarine portion of the river lies below the first dam on the river.**
- **Includes a variety of coastal habitats**
  - **Mudflats**
  - **Salt Marshes**
  - **Rocky Intertidal**
  - **Sandy Beaches**

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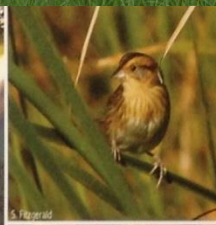
Scientists and students from the University of New England and the Wells National Estuarine Research Reserve are studying the Saco River estuary's value to people and nature. In collaboration with citizens and organizations in Biddeford and Saco, they have identified key actions that local people can take to protect and enhance the estuary's value.

Estuaries are places where rivers meet the sea. Estuaries are economic engines and cultural keystones, renowned as nurseries for young fish, breadbaskets of the sea, and feeding grounds for fish, birds, and wildlife. The Saco River estuary is the tidal section of the river, extending from the dams in downtown Biddeford and Saco to the bay.



SUSTAINING THE SACO RIVER ESTUARY

for today and the future

THOUSANDS of PEOPLE

Residents and visitors live, work, and play along the Saco River estuary. They benefit financially, recreationally, culturally, and spiritually.

DOZENS of BUSINESSES

Marinas, fishermen, tour operators, tackle shops, and other businesses derive income directly from the Saco River estuary. Many additional businesses benefit indirectly.

133 BIRD SPECIES

Nearly half of all bird species in Maine have been observed using the Saco River estuary. Many of the species are not commonly associated with estuaries.

60 FISH SPECIES

The Saco River estuary has the highest number of fish species — including adult and larval fish caught in the river and bay — recorded in any Maine estuary.

10 RARE PLANTS

A surprising diversity of plants live in the marshes of the Saco River estuary, including ten species that are rare in Maine and/or nationally.

360 ACRES of TIDAL MARSHES

Three types of tidal marshes — salt, brackish, and freshwater — occur in the Saco River estuary. The marshes improve water quality and provide habitat for many kinds of wildlife.

KEY ACTIONS TO PROTECT THE ESTUARY'S VALUE

Through landowner stewardship and zoning enforcement retain trees and shrubs to sustain water quality and wildlife.

Reduce the flow of polluted stormwater from roads, parking areas, lawns, and other developed land into the estuary.

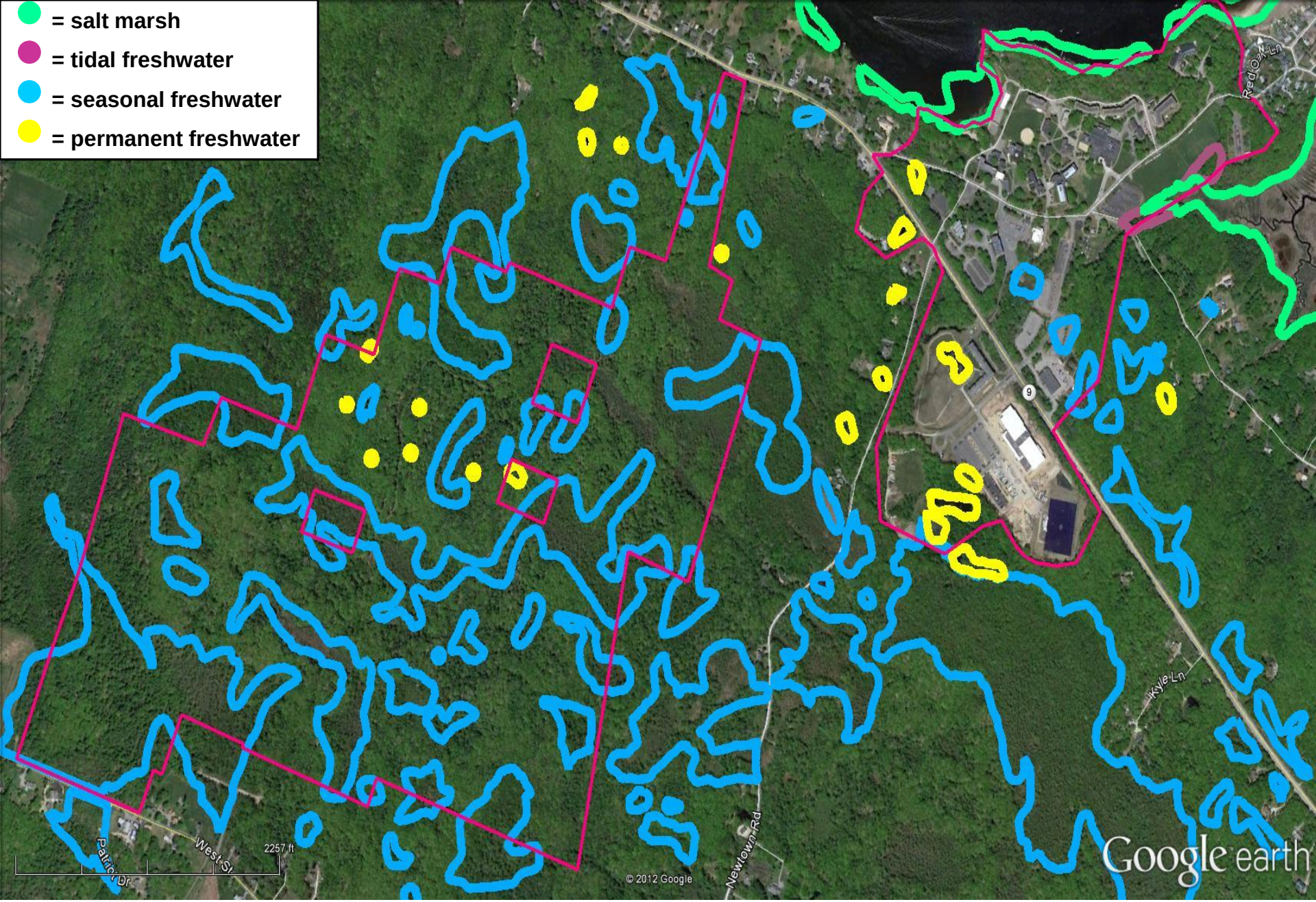
Support stewardship and education efforts to protect the estuary and to enable children and adults to learn about it.

Stop the invasive common reed, *Phragmites*, from taking over the marshes and reducing wildlife habitat value.

Conserve suitable land next to tidal marshes, where possible, so that as sea level rises the marshes can shift to higher ground.

Saco River Estuary

- **Environmental sustainability of the Saco River Estuary is a year round Commitment.**



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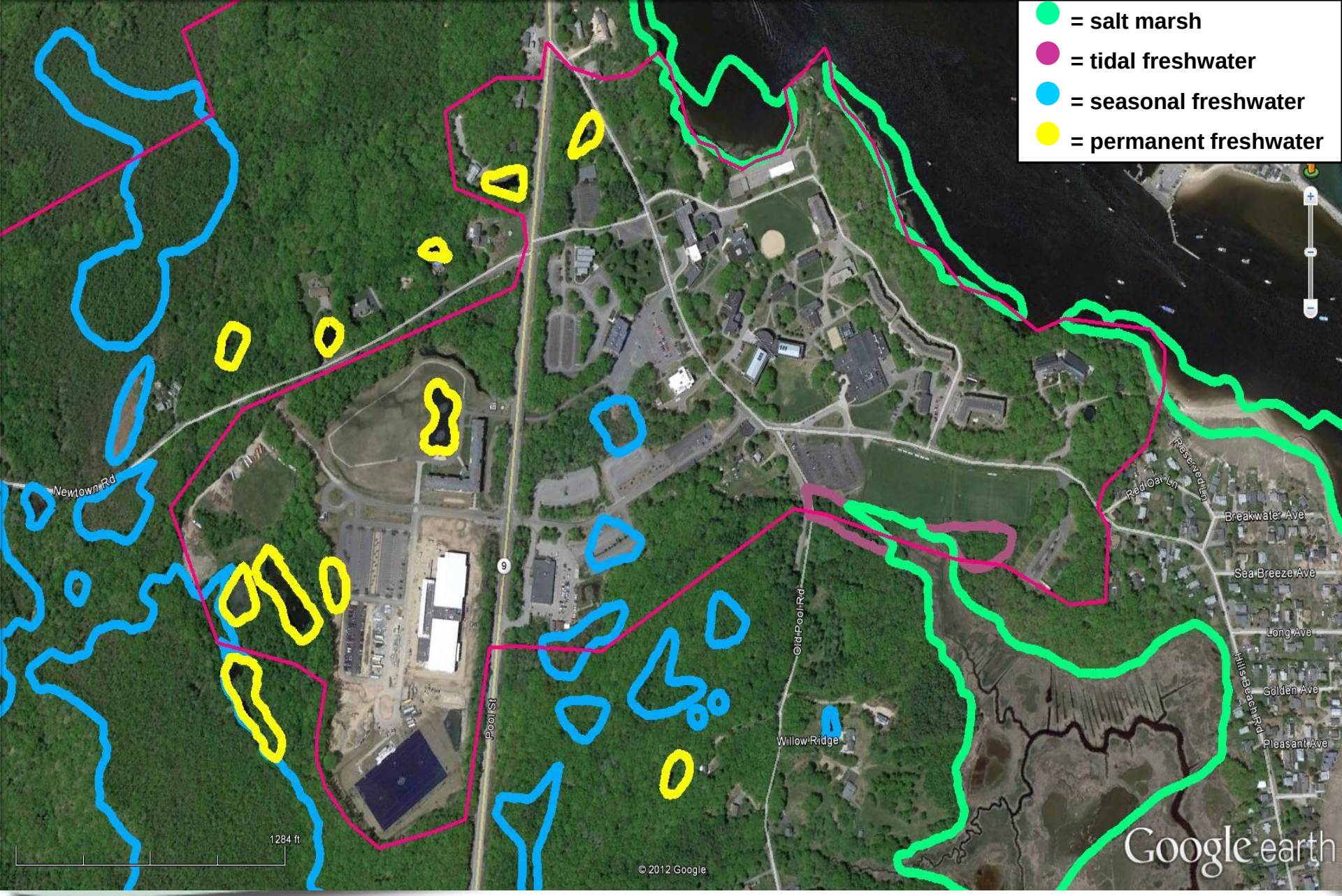

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Integrated Pest Management

- V.P. for Campus Services provides funds to implement IPM
- IPM Team is formed beginning of spring semester.
  - Caitlyn Spaeth (’13)
  - Samantha Fields (’14)
  - Brendan Emanuel (’14)
  - Noah Perlut (Faculty)
  - Richard Peterson (Faculty)
  - Robert Ferrin(Carpenter)
  - Josh Jacobs(Carpenter)
  - Phil Tashereau (Groundskeeper)
  - Richard Burgess (Groundskeeper)
  - Ron Souza, Director EH&S (Administration)
- IPM Team meets bi-month during the spring semester
  - Identify sites for bat boxes, bird houses, landscaping
  - Order materials & supplies
  - Construct houses, etc.

Integrated Pest Management

Working with Facilities Carpenters, Students sited 24 bird houses designed to attract mosquito-eating tree swallows and bluebirds and 24 bat boxes.

Working with the Facilities Grounds Crew, Students planted mosquito-repellent plants in high human-traffic locations around campus.

Students tested the efficacy of the plants to repel mosquitoes.

The students trapped mosquitoes to assess which species were on campus.

This project established the infrastructure to both increase the biodiversity on campus and make our time walking the grounds a bit more pleasant.

Integrated Pest Management

- **Students designed a “Team” t-shirt**
- **Students created a Facebook page**
  - **https://www.facebook.com/UneMosquitoManagement**

Integrated Pest Management

Construction…….

Integrated Pest Management

Installation…….

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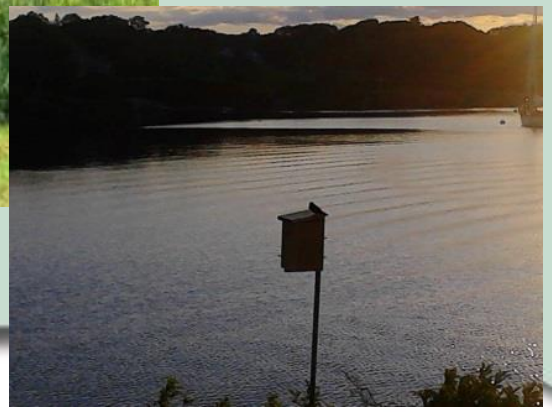
Integrated Pest Management

Location , location, location…….



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Location , location, location…….

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Integrated Pest Management

Location , location, location…….

Integrated Pest Management

Landscaping……

Integrated Pest Management

Bee balm (Monarda sp.)	**Perennial**	**2-4 ft.**	**Partial Shade**	**High**	**Similar smell to Citronella, but a heartier plant. Native to North America**
Marigold (Tagetes sp.)	Annual	6-14 inch	Full Sun	Medium	Fragrant with flowers for most of the growing season, can tolerate poor soil, Native to North America
Catnip (Nepeta cataria)	Perennial	1-3 ft.	Full Sun	Medium	Related to mint, catnip is a lush green plant
Lavender (Lavandula angustifolia)	Perennial	12-18 inch	Full Sun	Medium	Purple flowers and aromatic perfume
Rosemary	Perennial	Up to 3 ft.	Partial to full sun	Medium to high	May not do well in winter if it is too windy or unprotected, and would be best to be taken indoors.
Spotted Geranium (Geranium maculatum)	Perennial	1-2 ft.	Partial Shade	Medium	Native to eastern North America
Peppermint (Mentha piperita)	Perennial	12-18 inch	Mostly Shade	High	Native to North America
Basil	Annual	1-3 ft.	Full sun	Low	Very easy to grow by sowing seeds directly into the ground, very aromatic, green and leafy
Lemon Balm	Perennial	Up to 2 ft.	Partial Shade	Medium to high	Hearty, Can be weedy if left unkempt, will regenerate without effort
Sweet fern (Comptonia peregrina)	Perennial	2-4 ft.	Shade, partial shade	Medium	Native to North America, Hearty Shrub

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Inspection/maintenance…….

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Integrated Pest Management

2013 Results: Tree Swallow & Blue Birds

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2013- Tagging Tree Swallows & Blue Birds

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Trapping Mosquitoes for Speciation

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2014 Results: Tree Swallow & Blue Birds

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2014- Tagging Tree Swallows & Blue Birds

Integrated Pest Management

2014 – Spring Semester

- **Replaced all of the bat houses with new ones**
- **Recruited two new students to manage program.**
  - **Shane**
  - **Chris**

2014 – Summer Break Intern Opportunities

- **Shane & Chris hired to mange the program day-today**
  - **Monitor bird and bat house occupancy rate**
  - **Tagging adult and hatchlings**
  - **Remove invasive species**
  - **Planting and watering the IPM plants**
  - **Clean bird houses at end of season**

Integrated Pest Management

Results:

Number of bird house occupied

- 18 (2014)
- 5 (2013)

- **Number of Fledglings**
  - 108 (2014)
  - 25 (2013)
  - Potential of 48 adults and ~125 fledglings each year @ current housing level
- **Species of birds evenly distributed**
  - Blue birds
  - Tree Swallows
- **Number of birds that returned**
  - 3 (tree swallow, 1 adult, 2 fledglings)
- **Number of Bat houses occupied**
  - 0 (2013)
  - 5 (2014)

Integrated Pest Management

Future of the IPM Program

- **Administration continues to support this effort**
- **New students recruited each fall**
- **Current plans include expansion in area covered by bird and bat houses**

Integrated Pest Management

Questions ?