Using iNaturalist to support high school environmental science curriculum

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Photo credit: Nicholas Caruso

Introduction

- The goal of this module is to provide an outline for initiating an iNaturalist project in a high school classroom. Within this document is an outline for initiating the project, collecting data regarding effect on students, and reflections on the experience of implementing a similar project in a high school in North Carolina.

- The module was created as part of a National Science Foundation Research Experience for Teachers grant extension.

Rationale

- The school day is limited in time, and resources. Class periods are often, out of necessity, limited to covering curriculum objectives. Informal and self guided learning are often sacrificed in the name of saving time, and or resources.
- The INaturalist.org platform can automate and collate natural history data points collected independently by students.
- Using this platform teachers and students can communicate and share data with the larger scientific community.
- Here we show how this website can be utilized to help students explore their surroundings with minimal time or resources.

Objectives

- The project was driven by three main objectives.

  - Foster a connection with the natural world
  - Increase student awareness of surroundings
  - Use technology to guide students in exploring their environment and expand their knowledge of native species.

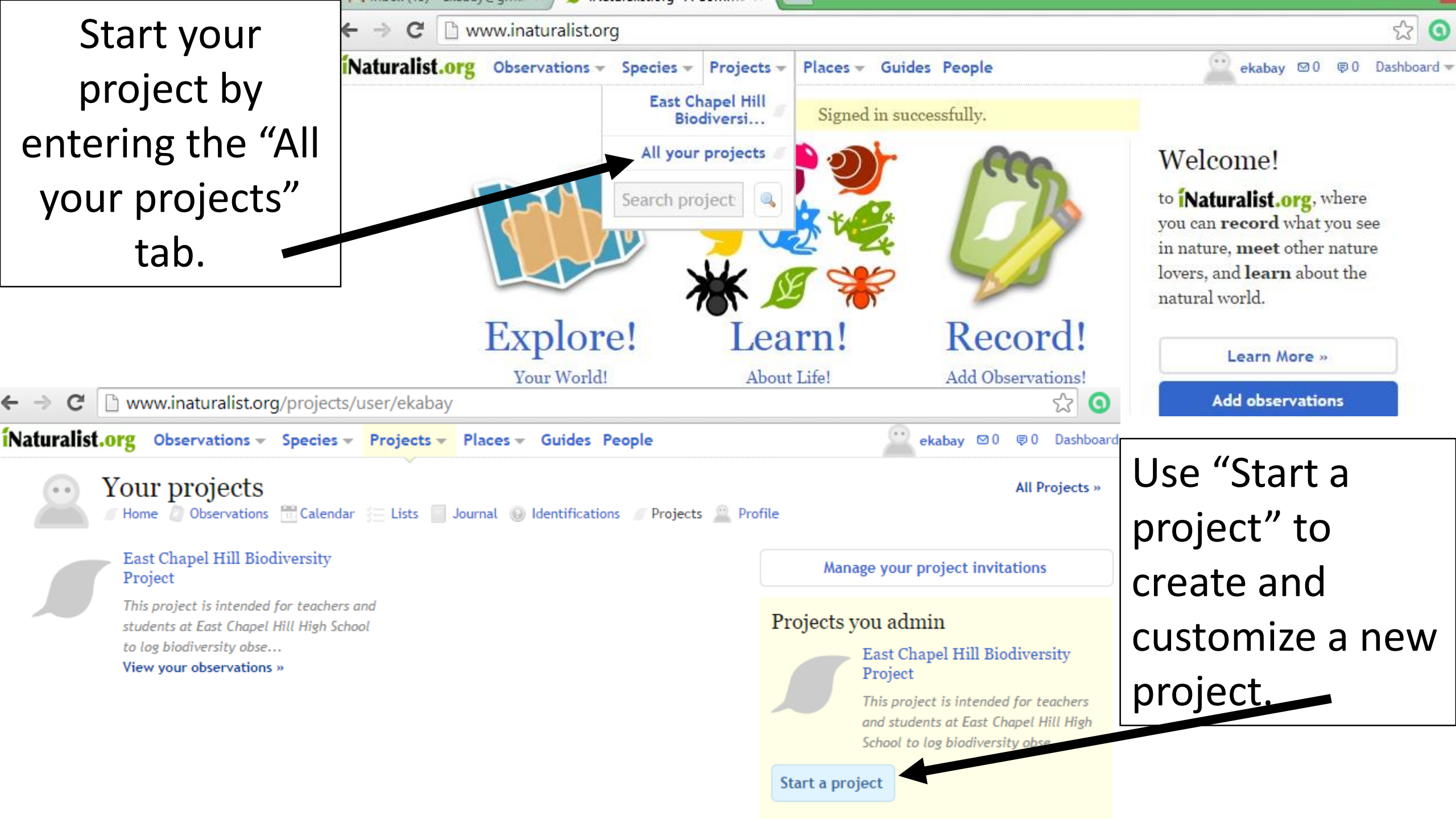
Methods: INaturalist.org Project Creation

- Create username on INaturalist.org
- Initiate new project.
- Project settings permit public or private projects.

It is our recommendation that projects remain open to the public as students benefited from ID's made by the INaturalist.org community. This rewarded students that logged species observations ahead of class deadlines, and engaged them with the technology interface.*

- Use the project requirement form to set required data for student to collect. The website will automatically require the information from students, CUTTING DOWN ON TEACHER GRADING.

Start your project by entering the “All your projects” tab.



Use “Start a project” to create and customize a new project.

INaturalist.org project set up

- After initiating a project your will be taken to this screen →
- We chose to leave our project public so students could benefit from interaction with the community.
- Descriptions and terms are defined on this page, customized to the needs of the project.

- Farther down on the same screen INaturalist.org allows for the definition of data the students need to collect.

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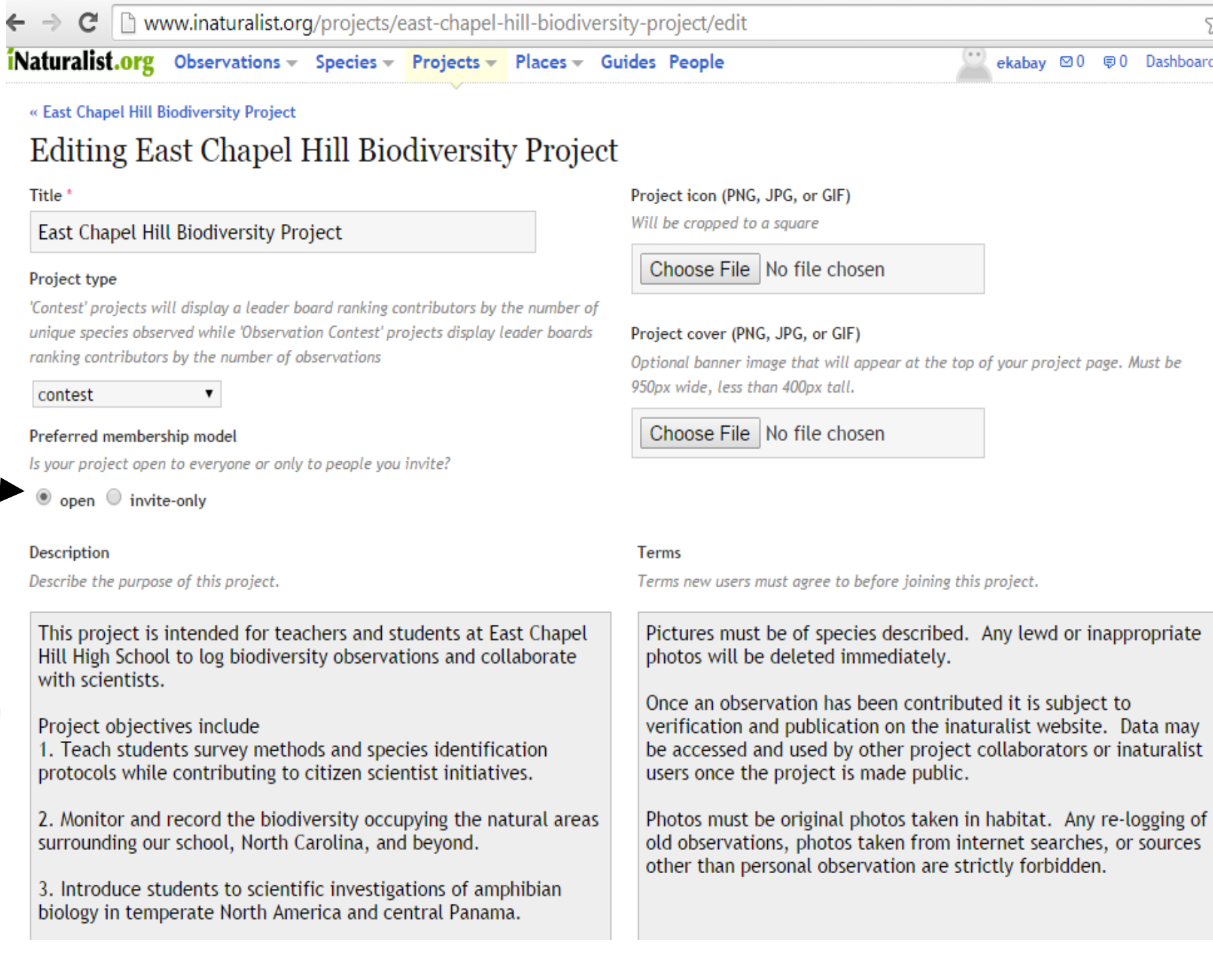
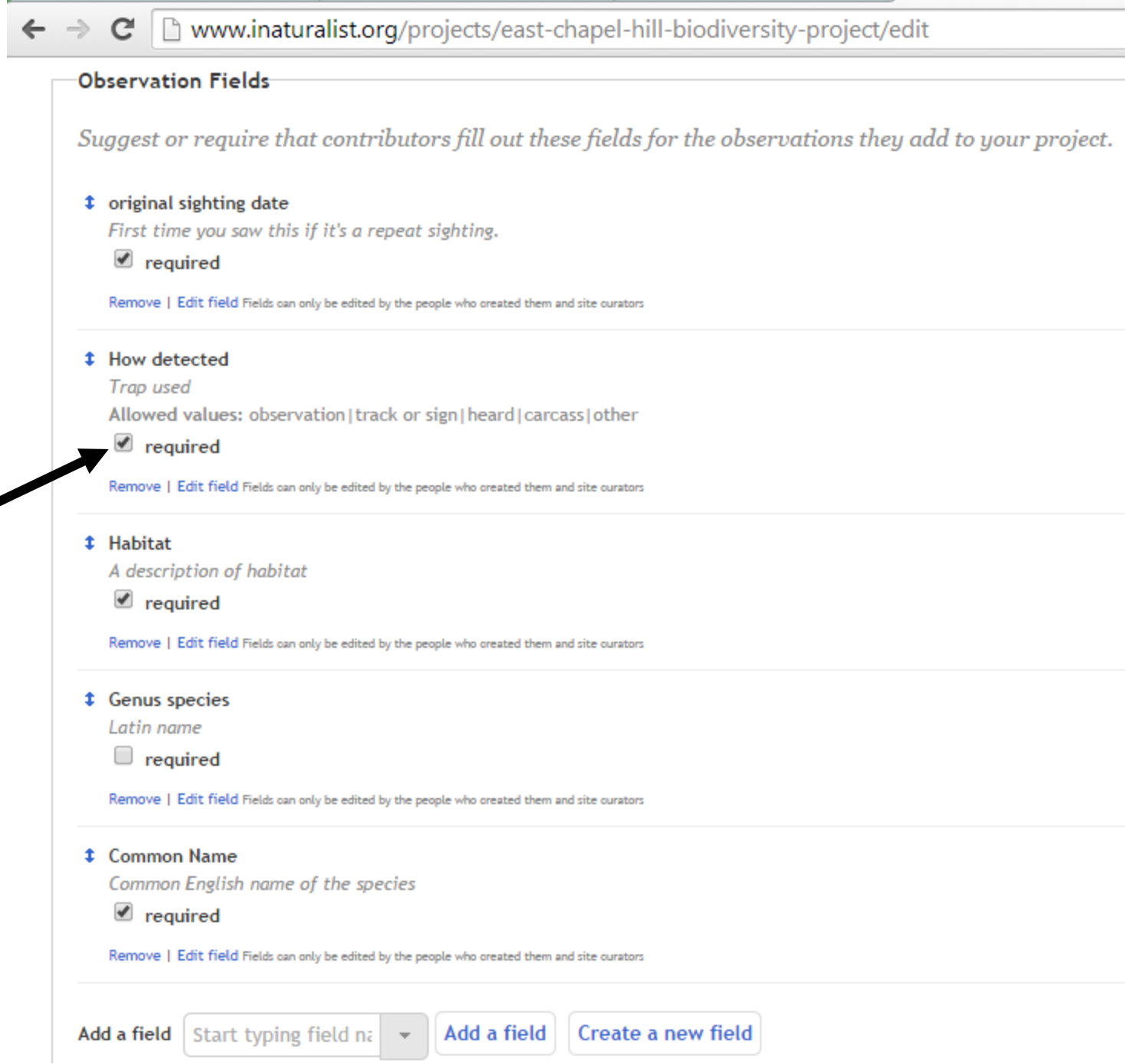


Data collected by students

- Careful planning of the observation fields can save time when the student data is exported for grading or analyses.
- Checking the “required” box denotes fields students must complete before the observation is accepted by the project.

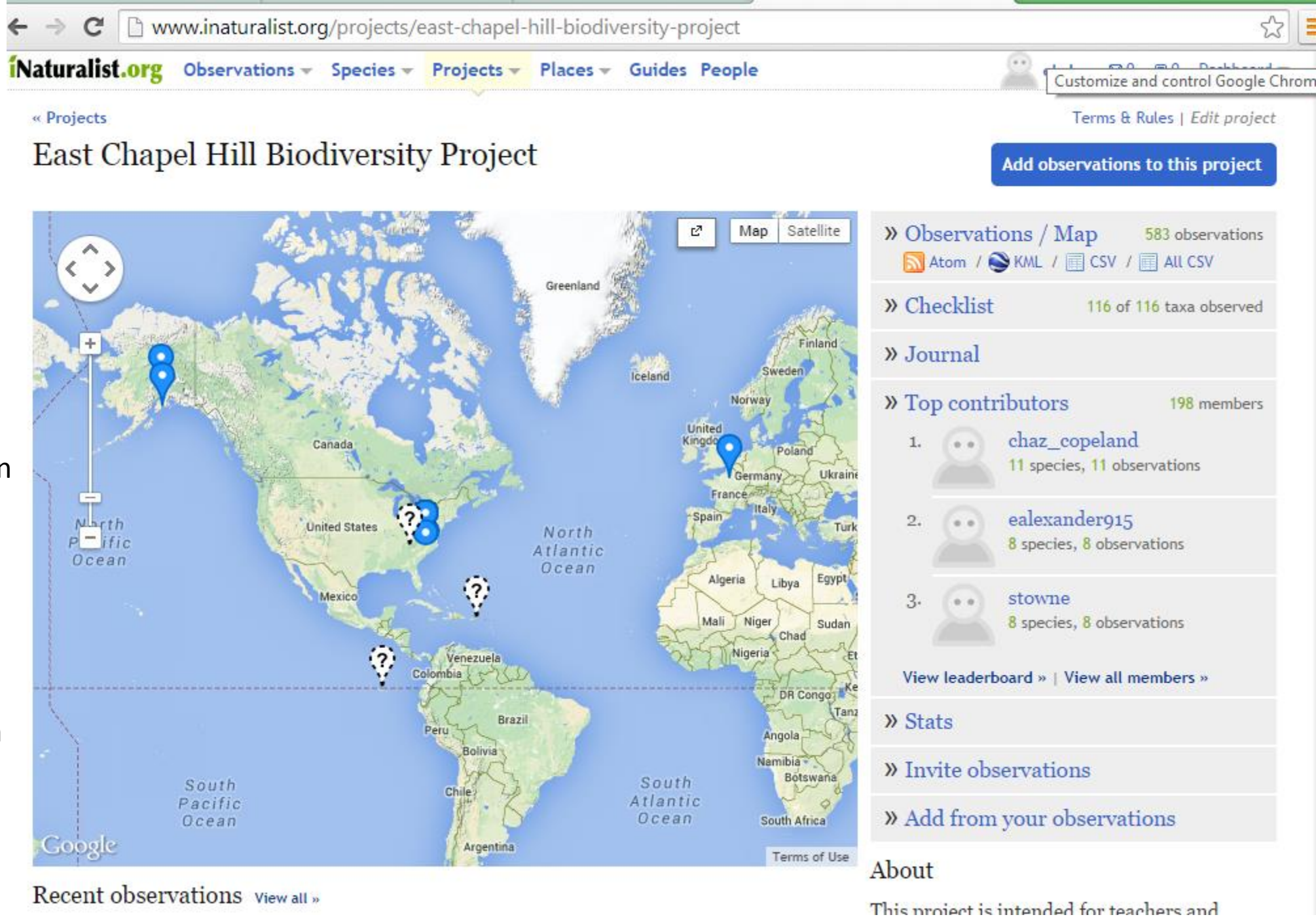
- It helps to be really clear that leaving out required data will cause an observation to be rejected and not seen by the teacher. We experienced a lot of confusion on this principle.

- We did not require Latin names for observations but many students found and used Latin names.



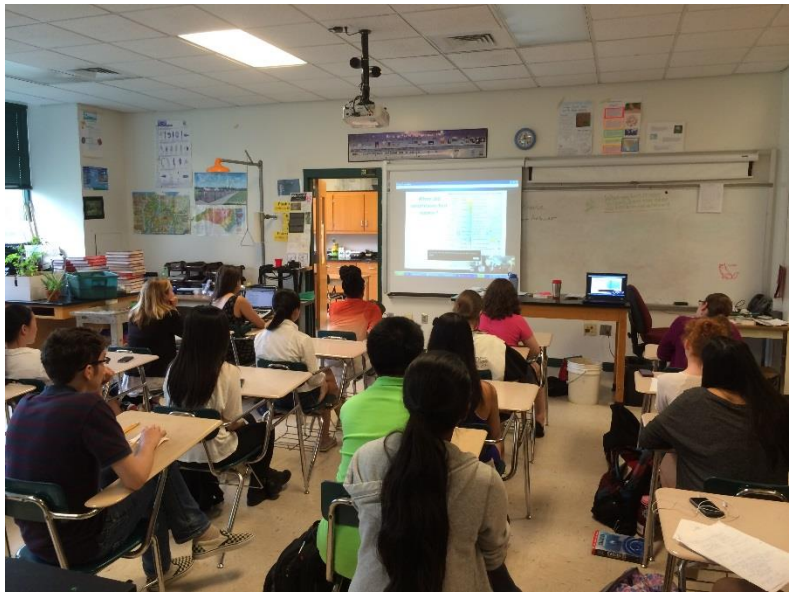
Project homepage

- When the project is finished INaturalist.org gives it a homepage.
- The map is interactive and students can click on observation bubbles to see where their classmates have logged observations.
- We did not put a geographic limitation on the project but that is possible.



Student accounts on INaturalist.org

- Students need to create INaturalist.org accounts to participate in the project.
- If a computer lab or mobile laptop cart is available in your school, it can be useful to have students create their accounts in class.
- The entire process takes a class of 30 students just under 40 minutes to complete.



Methods: Initial data collection

- Prior to opening the project to students, we collected entry data using an internet survey.
- We administered the survey using google surveys accessible and **FREE** via a gmail.com account.
- If students are allowed to create their own INaturalist.org usernames then ensure they must enter their username in the survey.
- Survey responses are not restricted to gmail accounts so there is no need for students to create a new email address.
- If time permits, completing the survey and signing up for INaturalist.org can be completed in class to reduce confusion and alleviate internet access issues in student homes.

Google documents used to collect survey data

Advantages

- Google will export survey responses to excel files to aid in analyses.
- Free for administrator and students
- Reduces need for paper printouts

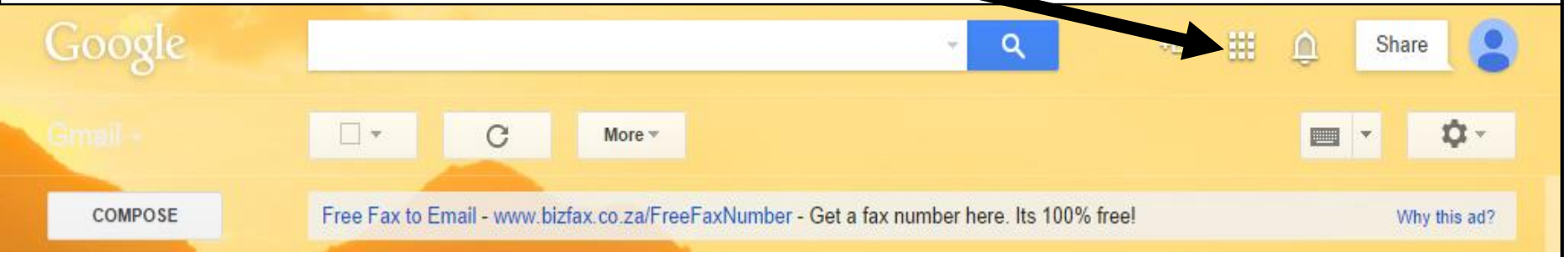
Disadvantages

- Requires computer and internet access
- Access issues in students homes and can be difficult given computer resources in the school building

Pre-project survey questions

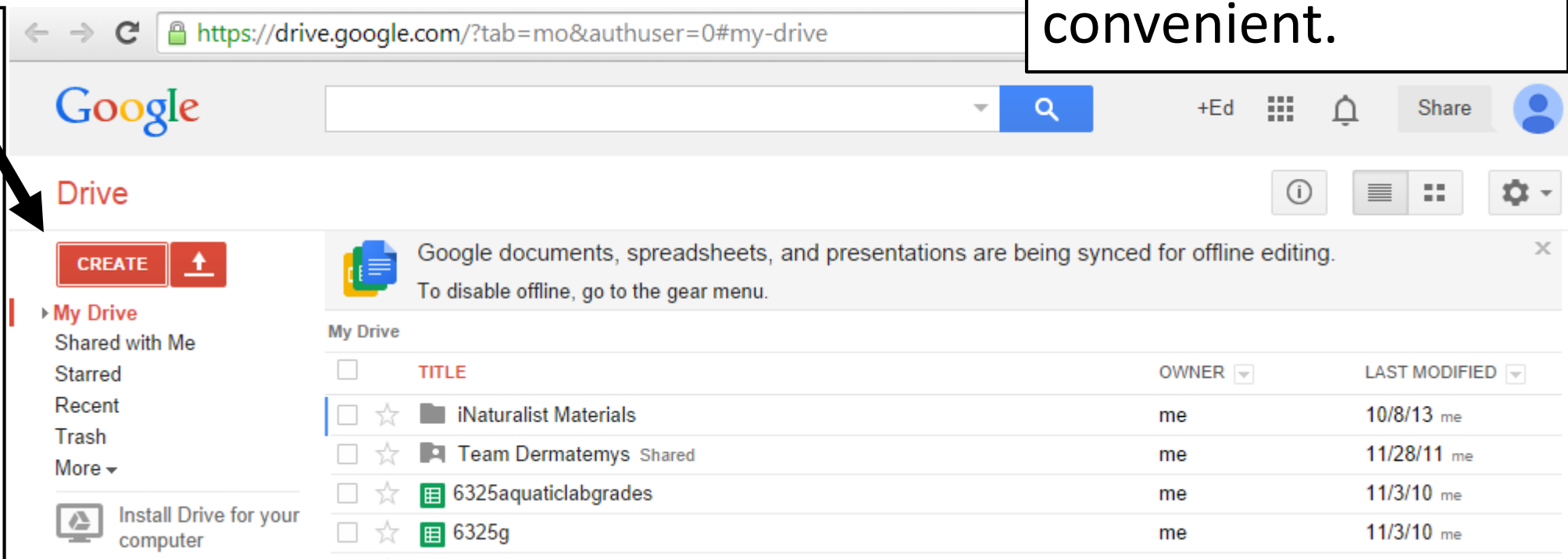
- **What email address did you link to the inaturalist project?**
- **What is your inaturalist.org username?**
- **What is your environmental science teacher's last name?**
- Do you have an iphone or android cellphone?
- Do you own a cellphone with a camera?
- Do you own or have access to a digital camera?
- Are you familiar with GPS (Global Positioning System) devices?
- How many types of amphibians can you identify?
- How many types of plants other than trees can you identify?
- How many species of amphibians live in North Carolina?
- What is your first name?
- What is your last name?
- Do you have experience with Facebook?
- How many types of trees can you identify?
- How many types of birds can you identify?
- Do you have experience with google maps?
- Do you have experience with managing digital photographs?

Use the grid icon at the top left hand corner of the gmail home screen to go to google drive and create the survey. Here

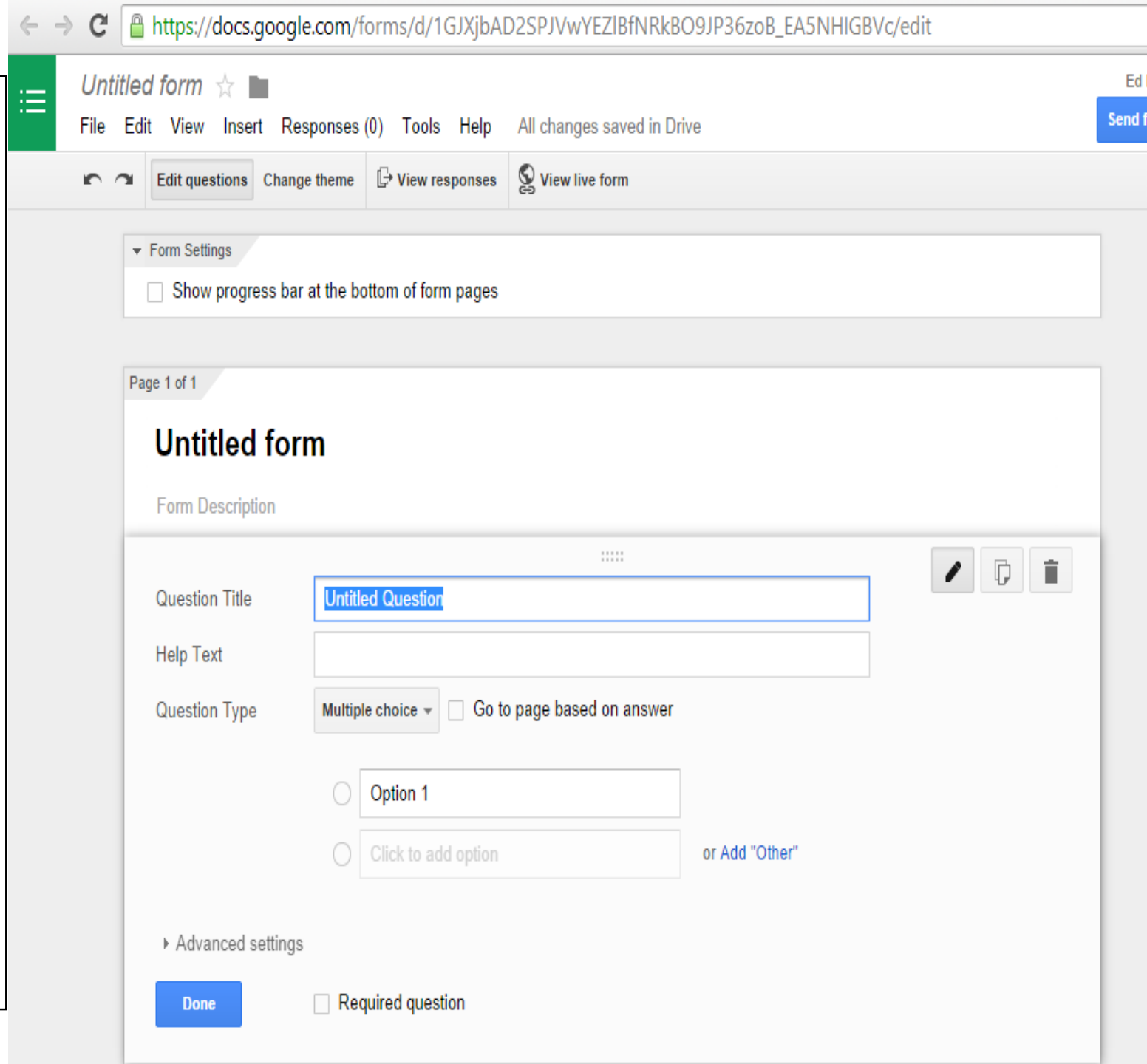


Other online survey services are available. Our school district uses google products making format convenient.

Use the Create tool to select "form" to customize a survey. Google exports results to excel or email.



- The google form can be fully customized and email to each individual student if possible.
- Students may also access the survey using a link provided on a class website.
- Surveys can be timed or untimed.



Results pre-project survey

- 241 students surveyed
- 186 have an iphone or android cell phone
- 215 have a cellphone with a camera
- 195 own or have access to a digital camera
- 4 students report not having access to any of the three methods for digital photography
- Work-arounds were found for the four students using school resources, and 1 student was found to have not filled out survey accurately.

Methods: Project Initiation

- Once the INaturalist.org project is set up and students have joined the project, data collection is flexible.
- We assigned between 2 and 4 unique observations per quarter throughout the year. We assigned more in the fall and spring when species are easier to locate and identify.
- Students were awarded modest amounts of extra credit for entering observations. (1 extra point per observation out of a possible 400 per quarter)
- Deadlines were assigned and project csv files were downloaded at predetermined times to avoid confusion over assignment submission.

Methods: Post project survey questions

- Did you add observations to the INaturalist.org project?
- Did you add extra observations on the INatrualist.org project? How many?
- Rate your enjoyment of the INaturalist.org project 1 to 5.
- How likely are you to add observations to the project during the summer?
- Did you learn to identify any new species by participating in the INaturalist.org project? How many?
- Did you use the INaturalist.org community to help you make identifications?
- Did the INaturalist.org project motivate you to observe nature more closely?

Methods: Post project survey questions contd.

- Are you more likely to observe nature after participating in INaturalist.org?
- Did your experience with the INaturalist.org project change your perception of any species of the outdoors?
- Was there a part of the project that you found most enjoyable?
- Is there something that you can suggest to make this kind of activity more successful in the future?
- Did you log any amphibian observations?
- Have you learned to identify any amphibian species since the project started?

Results

- At the end of the project post data was collected using INaturalist.org and Google forms
- Student data was exported and downloaded from INaturalist.org
- Students replied to a second google form to help gauge impact of the experience on students
- The following slides are a compilation of pictures and numbers from our pilot year using INaturalist.org to help connect students to nature

Quantitative Results: Google survey

- 179 students took post survey

Questions	Yes	No
Did you add observations to the INaturalist.org project?	114 (64%)	65(26%)
Did you add extra observations on the INatrualist.org project? How many?*	16 (9%)	163 (91%)
Did you use the INaturalist.org community to help you make identifications?	61 (34%)	118(66%)
Did the INaturalist.org project motivate you to observe nature more closely?	87(49%)	91(51%)**
Are you more likely to observe nature after participating in INaturalist.org?	55 (30%) (45 maybe)	79 (44%)
Did your experience with the INaturalist.org project change your perception of any species of the outdoors?	71 positive change (40%)	105 no change (59%)
Have you learned to identify any amphibian species since the project started?	53 (30%)	126 (70%)

**Not all students elected to answer this question and no option was given for “no change”.

*Not enough students added extra observations or reported how many

Qualitative Results: Student comments from google survey

Photo credit: Nicholas Caruso

Was there a part of the project that you found most enjoyable?	Is there something you can suggest to make the project more successful?
Going out into nature	more nature walks
Taking photos and looking for species	give more extra credit points for completing it
I liked taking nature walks	Try not to ask for specific animal types. Amphibians were very, very tough to find. It was a decent project though, I didn't hate it and it was semi-enjoyable. I got a few good walks and looks at nature out of it. Maybe spending a day out in the woods searching for certain animals would be a nice thing to do. That's the only suggestion I have.
taking pictures	it's already really fun
Being able to see other people's observations and comment	going on more nature walks during class or over the weekend in order to help us find species
nope	scoring system and prize for top scores to motivate people to participate more
looking at pictures that others took	include or mention it more in classes
I really liked walking in the woods to find living organisms	Pretty straight forward and seamless! Had a great time with it

Quantitative Results: INaturalist data

- 195 student participants
- 583 total observations
- 294 research grade observations
- 116 different taxons
- 77 amphibian observation across 29 species

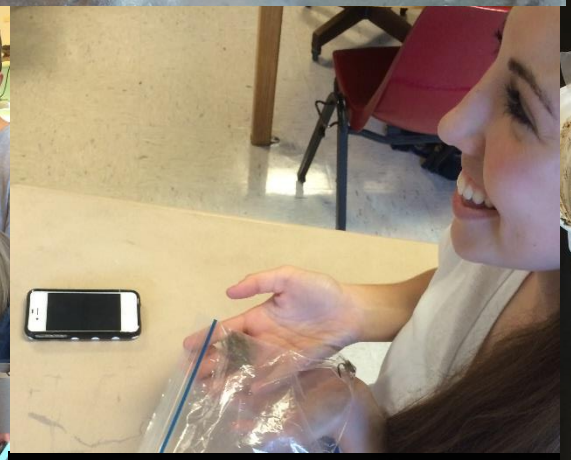
Field excursions support the INaturalist.org project.

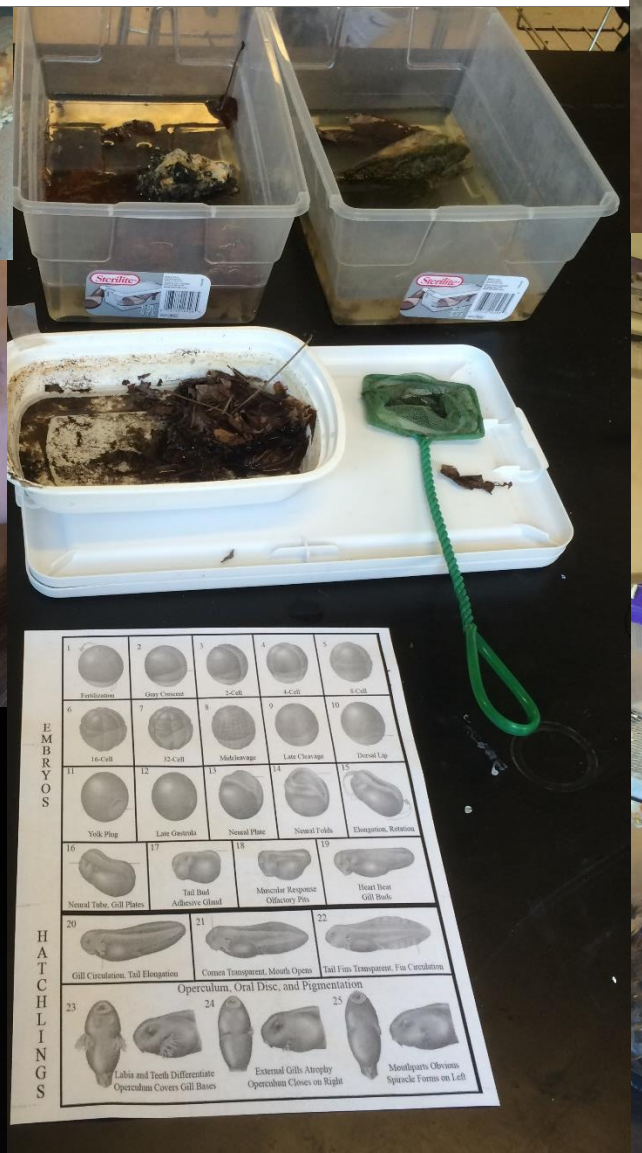
INaturalist.org, NSF, and Skype helped connect students to University of Maryland Scientists

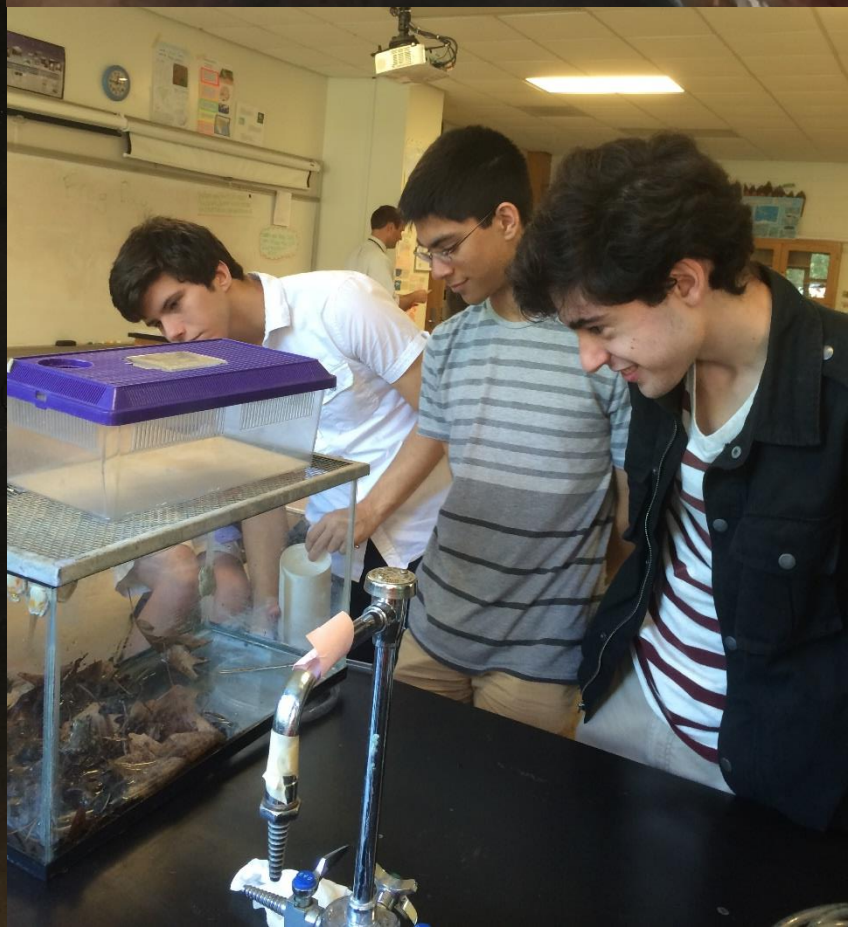
Student participants

University of Maryland Scientist Graziella Direnzo

Students having fun on frog day!







Lessons learned

- Careful design of introductory survey can help gauge growth of appreciation as well as measure feasibility of a digital project
  - Measuring growth was planned for the second year of the project, however after this year growth can be measured within a year as well as between years
- Budget mid year survey time to gauge student involvement and give opportunity for improvement suggestions
  - This can help bridge the gap between warm seasons in temperate regions
- Additional guided/targeted searches are necessary if a certain taxon is targeted
- Our project was optional for students, but it can be implemented as a project grade: see http://protecthabitat.wordpress.com/inaturalist-curriculum/ for an example

Reflections

- Digital media, social media, and other platforms helps to engage a variety of different learners
- Smartphones and other devices can be utilized to help students engage with environmental curriculum outside the classroom
- Most students enjoy time outside and the INaturalist.org project helps give purpose to time spent outdoors
  - Also motivates students to explore outdoor areas on their own
- Engaging students in citizen scientist initiatives can help collect valuable natural science data
- Optional format for project alleviates need to find time for teacher led guidance during class time

This work was made possible by the following organizations

- National Science Foundation
- Research Experience for Teachers Grant Extension

- University of Maryland

- East Chapel Hill High School

Sources

- http://protecthabitat.wordpress.com/inaturalist-curriculum/