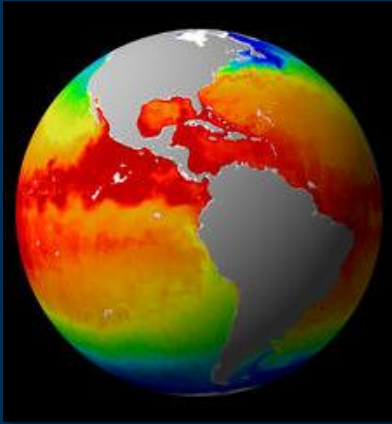


# iPlover

## first demo and Q&A



**Project Lead**

**Rob Thieler  
U.S. Geological Survey  
Woods Hole, MA**

# Project Team

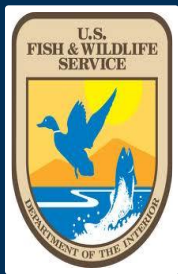


**App development: Luke Winslow, Megan Hines, Jordan Read, Rob Thieler**

**Science application: Nathaniel Plant, Ben Gutierrez, Sara Zeigler, Sawyer Stippa, Rob Thieler**



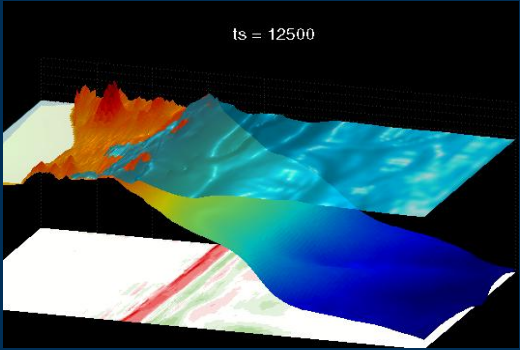
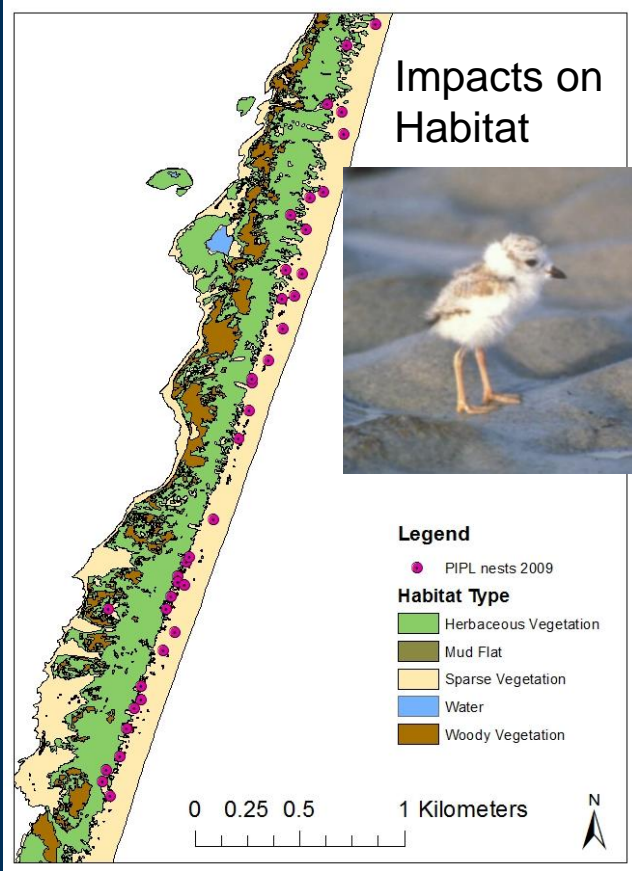
**Sarah Karpanty, Katy Gieder, Jim Fraser, Dan Catlin, Shannon Ritter**



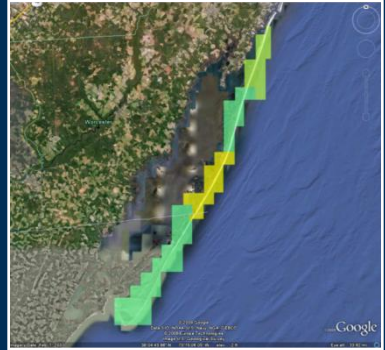
**Anne Hecht, Andrew Milliken**

**And all of you participating in this effort**

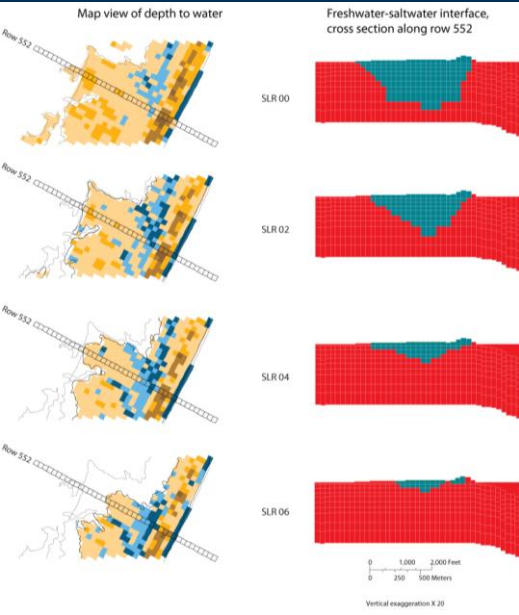
# Current Research Themes



Storms



Sea Level + Erosion

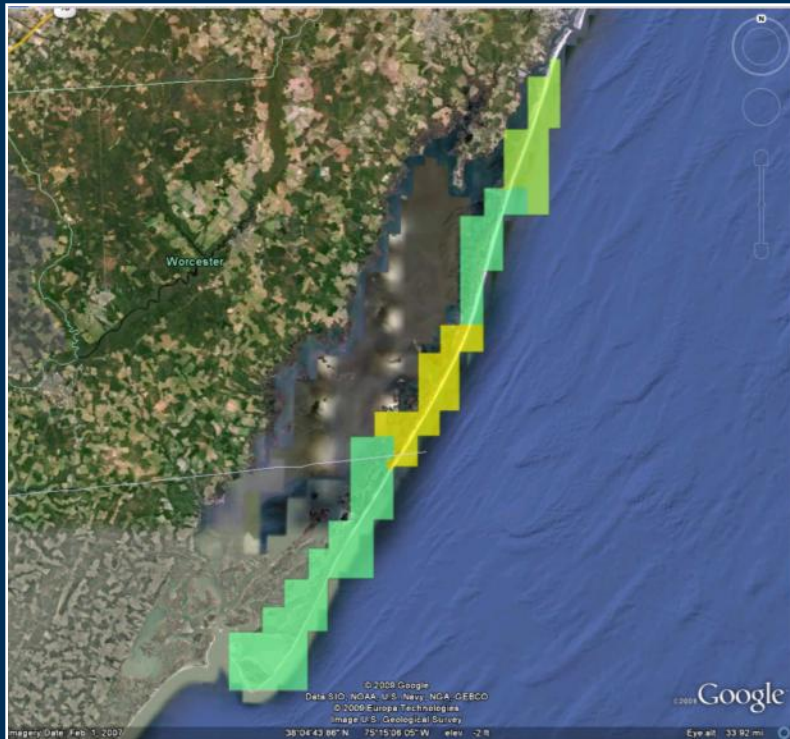


Impacts on GW Resources

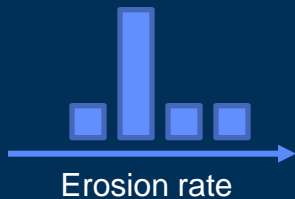
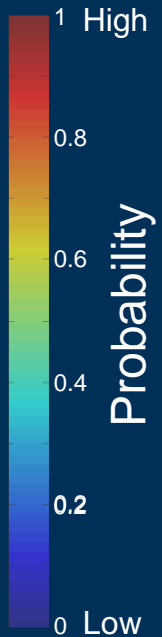
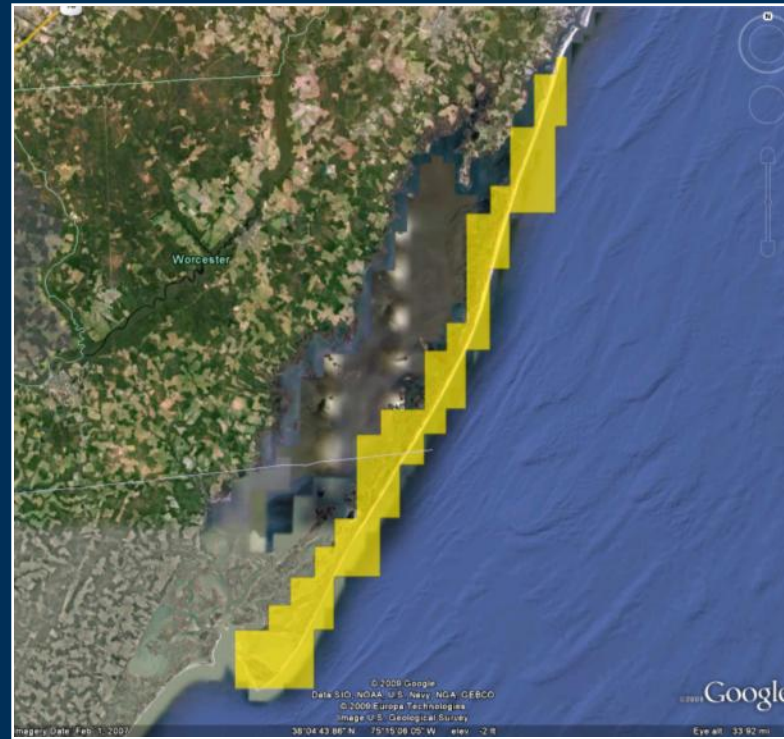
Integrate SL and storm history and processes with geology, biology, and hydrology to assess and forecast vulnerability and integrity over event and climate time-scales.

# Application of a Bayesian network to an uncertain future: Probability of shoreline erosion >1 m/yr at Assateague Island National Seashore

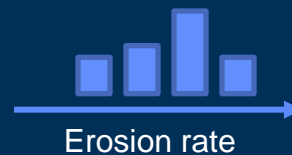
Current conditions



SLR +1 mm/yr, Wave ht. +10%



Narrow probability distributions  
Relatively low uncertainty

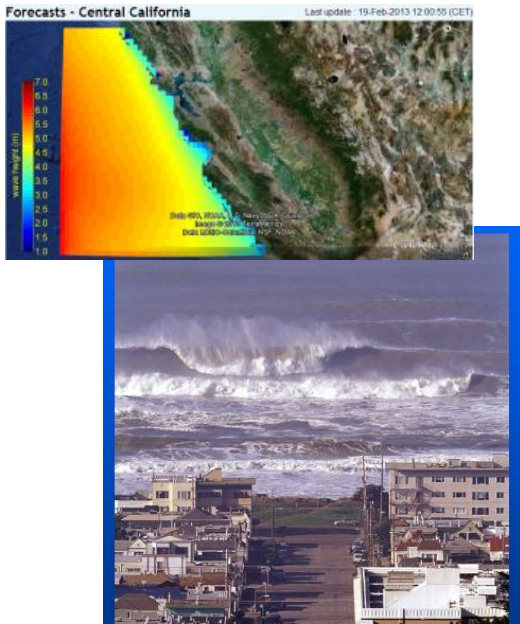


Higher likelihood of erosion  
Broader distributions  
Increased uncertainty

# Integration and prediction of coastal change

- Short- and long-term coastal hazard processes (i.e., storms, sea-level rise)
- Uses data and models

storm/wave models



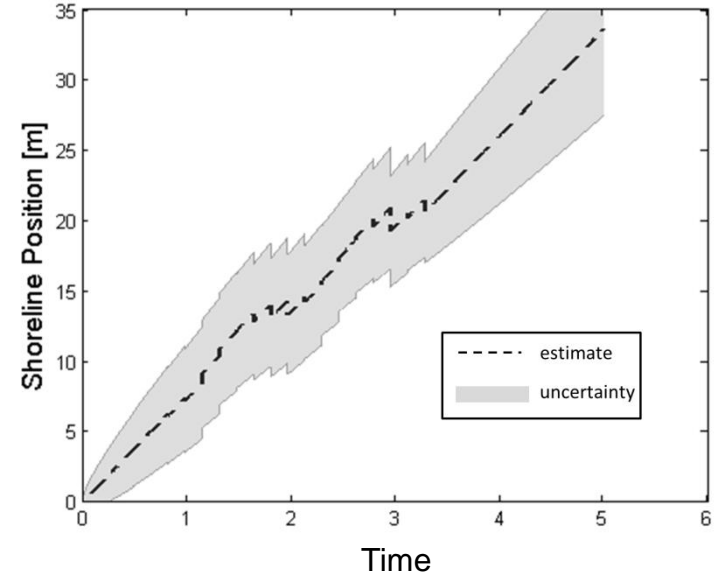
+

shoreline data



=

coastal change prediction and prediction uncertainty



Shoreline change near San Francisco using Kalman filter (data assimilation)

# Decision Support for DOI Agencies

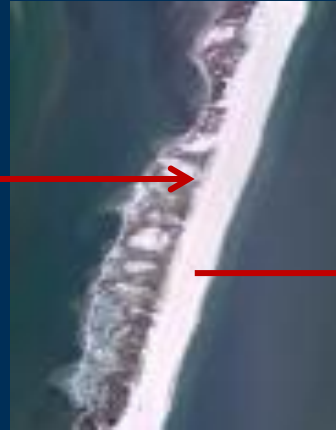
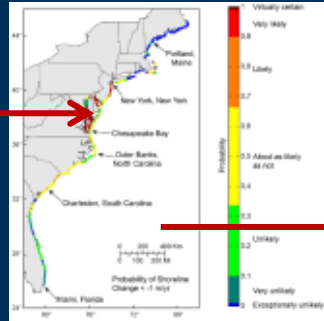
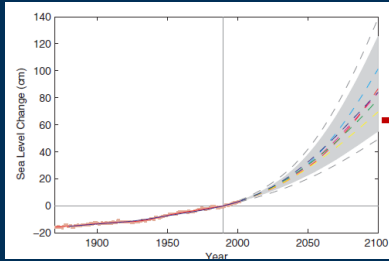
## Piping plover, *C. melodus*



Bill Byrne, MA F&W

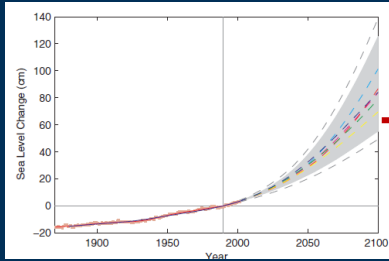
- Listed species
- DOI management responsibility
- Lifecycle includes substantial time on NPS lands for breeding, migrating, wintering
- Have interesting and specific habitat requirements that we can predict
  - Rangelwide habitat availability
  - Attributes and distribution of breeding, foraging areas
  - Wave run-up and inundation sensitivity (morphologic and hydrodynamic detail)
- Can feed predictions into models used to make land and species management decisions

# Objective: predict influence of sea-level rise $\Rightarrow$ coastal morphology $\Rightarrow$ plover\*

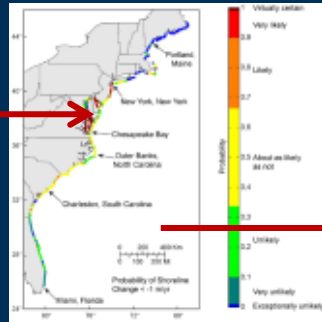


- Sea-level change (and other factors) drives coastal erosion
- Erosion and sedimentation modify morphology
- Large-scale and local morphology predicts plover success (and vegetation, groundwater resources, wetland behavior, etc.)
- \*The people problem is the same, minus the feathers

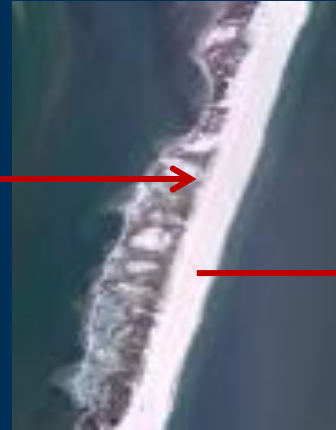
# Objectives supported by research output



IPCC, 2014  
Parris et al.,  
2013



Gutierrez et al., 2011  
NCA, 2014  
Gutierrez et al., 2014



Gutierrez et al., in  
revision

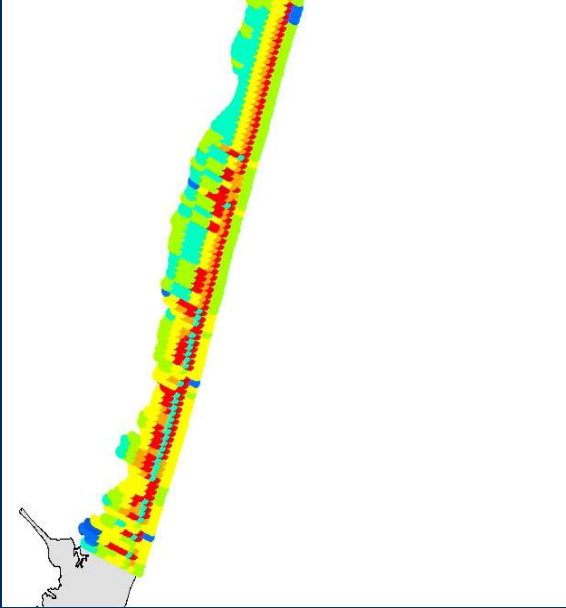


Gieder et al., 2014



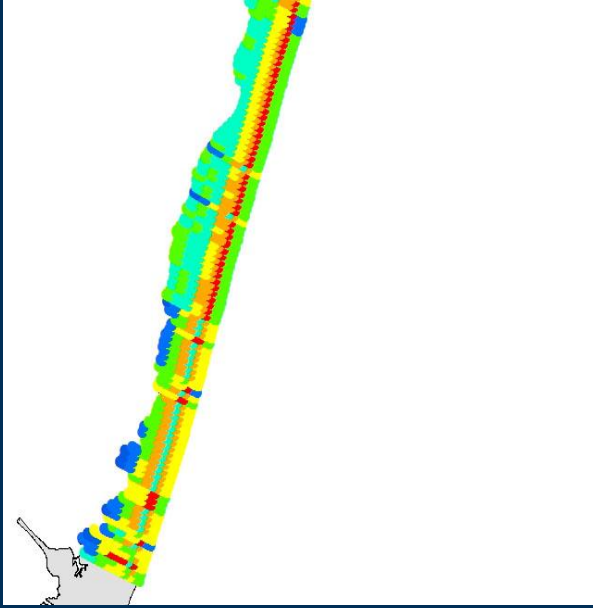
# Forecasting hypothetical future management scenarios and plover nesting probability

~2050, 4.1 mm/yr SLR



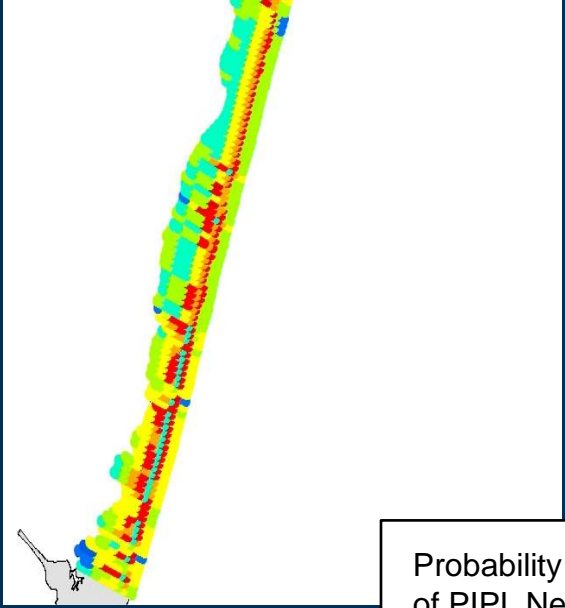
Good

~2050, 4.1 mm/yr SLR, with frequent sand placement

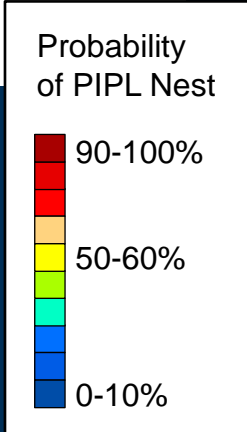


Not-as-good

~2050, 4.1 mm/yr SLR, with increased berm height

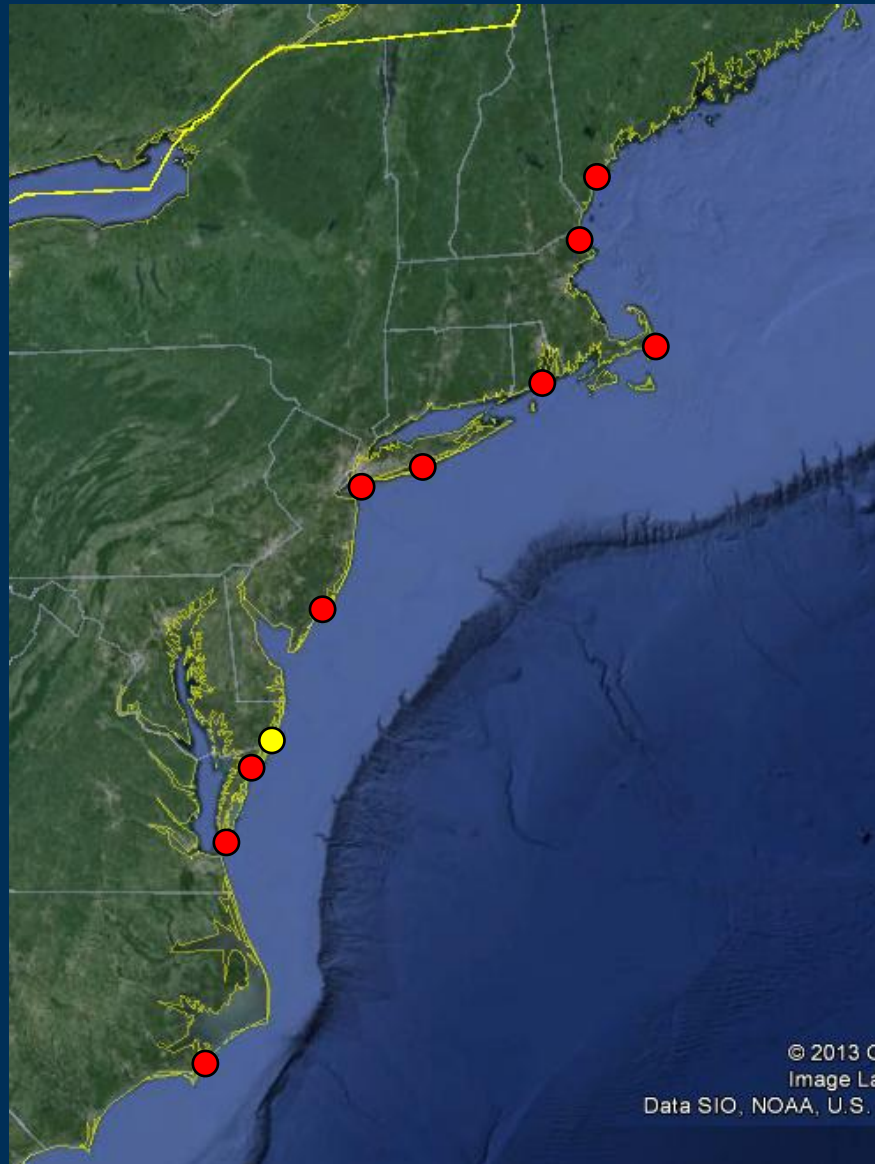


Good



(Gutierrez, Gieder et al., in prep)

# Sea-level rise: broadening scope and diving deep



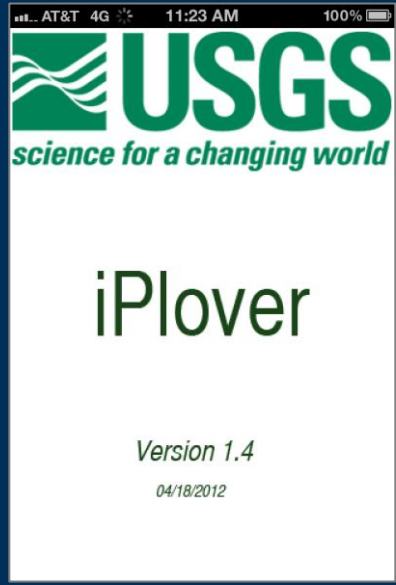
- Continued research
  - Assateague
  - Chincoteague
- Expansion to new locales
  - Cape Lookout
  - Eastern Shore of VA
  - Forsythe
  - Gateway (JBU)
  - Fire Island
  - Rhode Island
  - Monomoy
  - Parker River
  - Rachel Carson
- Diving Deep
  - Forsythe
  - Gateway (JBU)
  - Fire Island

# iPlover: feeding SLR, plover (and other) models with standardized observations

- Deploy to select DOI partners; provide protocols
- Vastly increase spatial domain
- Can deal with fuzzy observations
- Collection requirements based on what we've learned to date



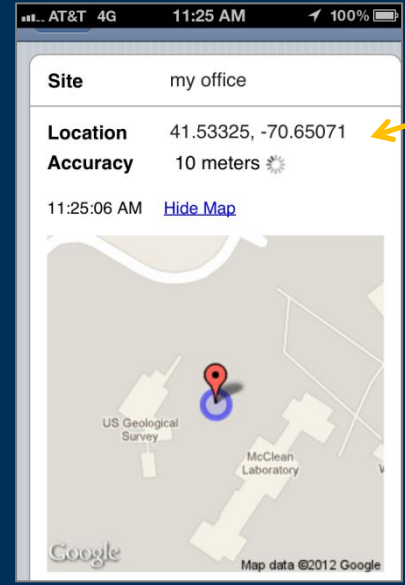
There's an app for that



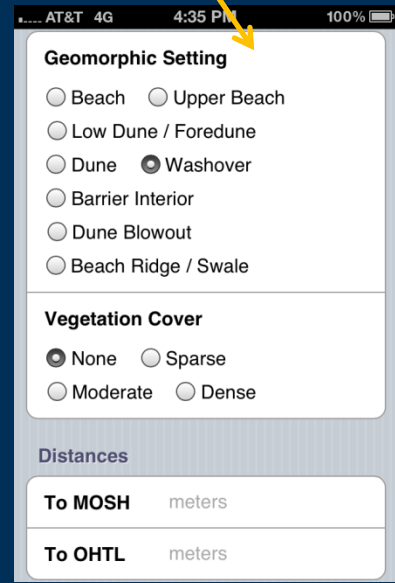
Unofficial splash screen



Unofficial icon



DATA!



# iPlover

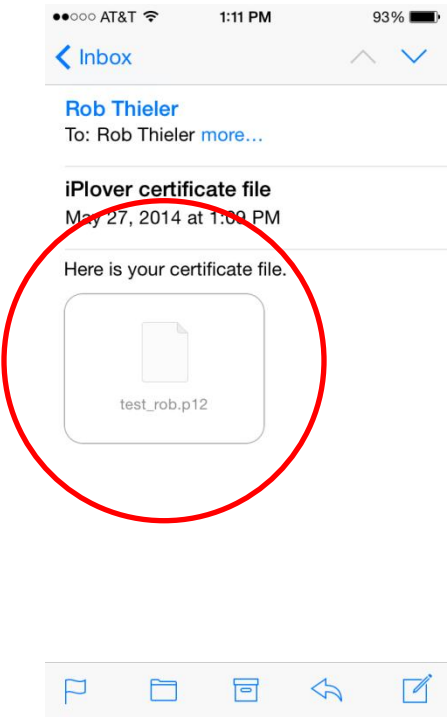
- A mobile web app to collect location and environmental attribute information about PIPL nests
- Observations can be fuzzy or uncertain
  - Our models account for that
  - There are alternative methods to help estimate some parameters
- Used to drive research models of habitat evolution and utilization
- Data and models used to inform land- and species-management decision making at local to regional scales

# Today's How-to's

- Set up the iPhone with the iPlover security certificate
- Access the iPlover URL
- Use the application
  - Collect data using draft field protocols
  - Upload data to USGS
- Get help
- Provide feedback
- Troubleshoot
  
- Q&A

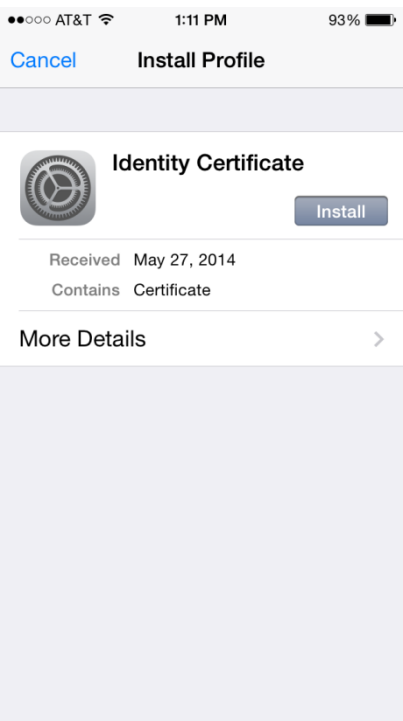
# Install and activate security certificate (1/2)

1



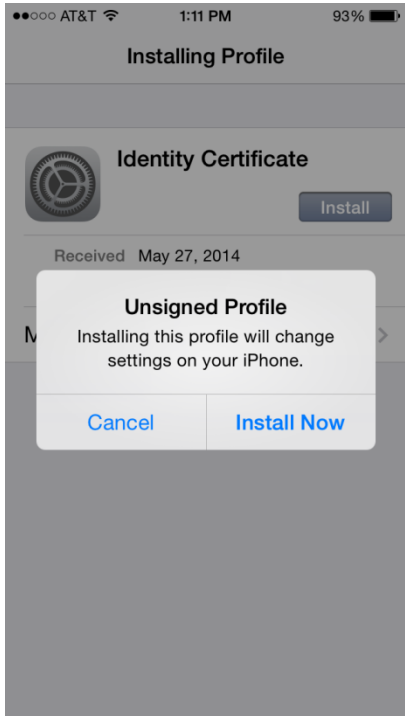
Open email with certificate file; tap file icon (can use the built-in mail app or the browser, e.g., to access mail.doi.gov)

2



Tap **Install**

3



Tap **Install Now** ("unsigned" means it is not signed by a recognized entity like Verisign or TRUSTe; it's locally generated and signed by USGS)

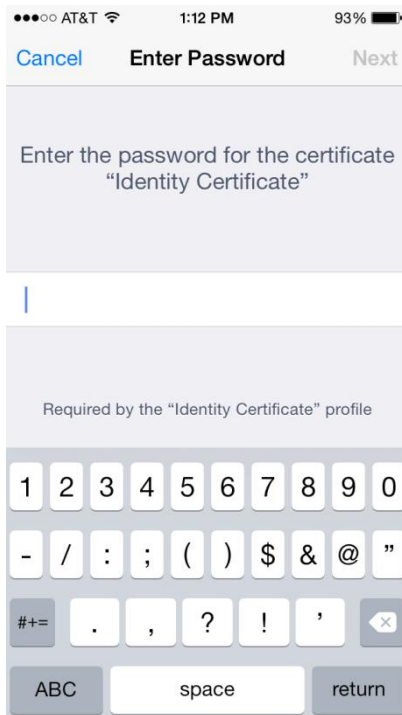
# Install and activate security certificate (2/2)

4



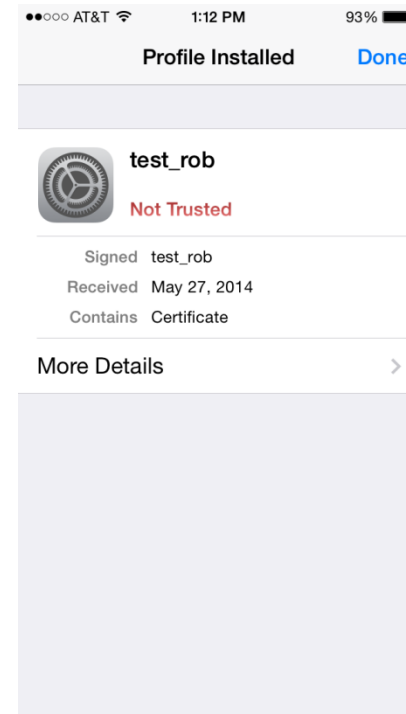
If your iPhone has a Passcode, enter it

5



Enter the certificate password (supplied verbally by iPlover dev team)

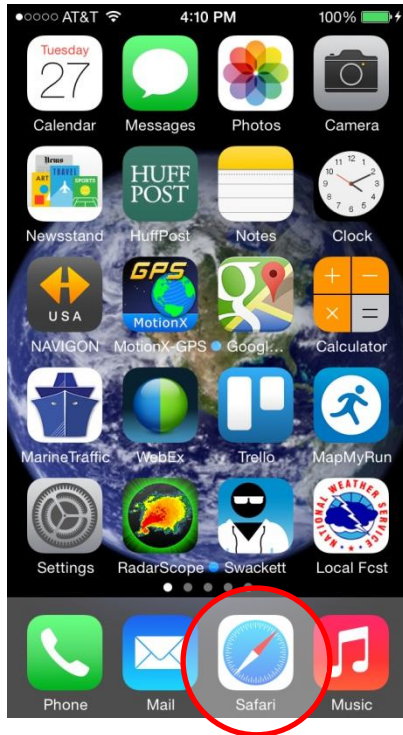
6



Tap **Done** ("Not Trusted" means it is not signed by a recognized entity like Verisign or TRUSTe; it's locally generated and signed by USGS)

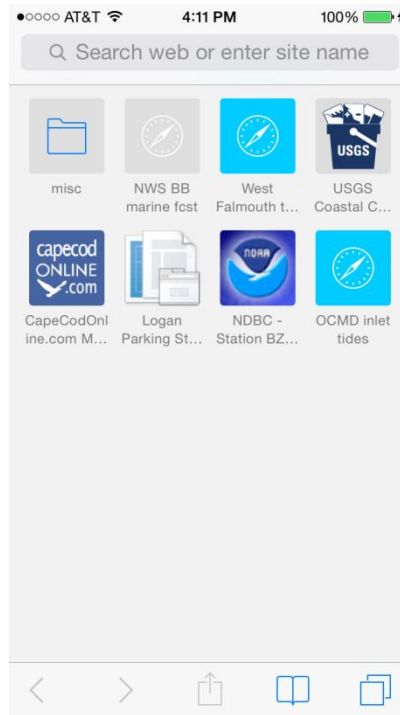
# Access the iPlover web app (1/3)

1



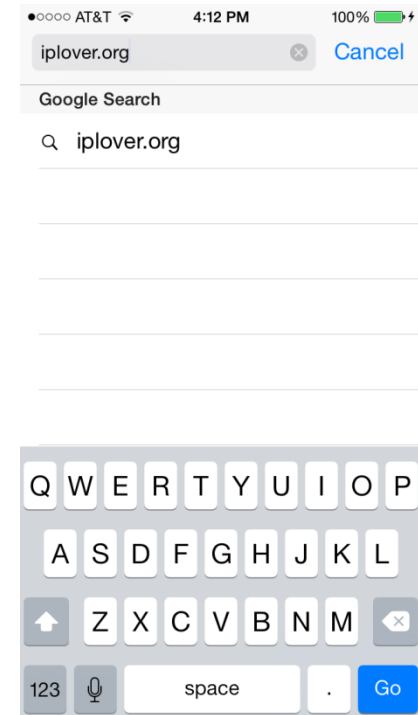
Tap **Safari** icon to start the browser

2



Get browser page (you may not have any bookmarks yet, as shown here)

3



Enter the URL, iplover.org; tap **Go**



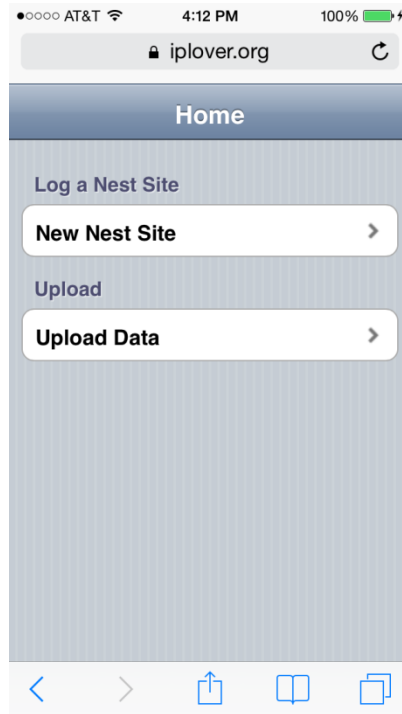
# Access the iPlover web app (2/3)

4



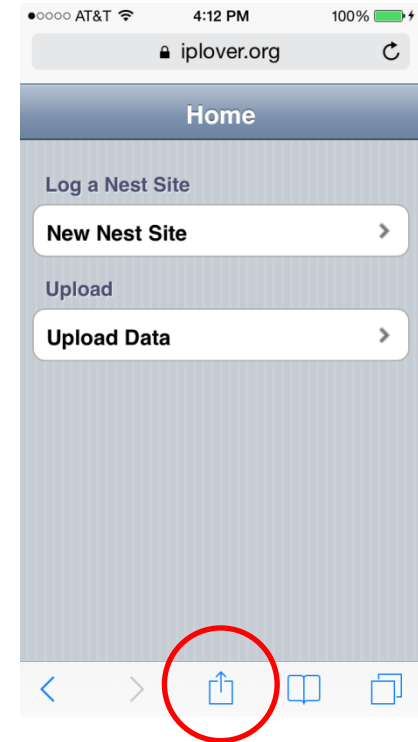
Splash screen shows USGS identifier, app name, and version

5



App Home page loads

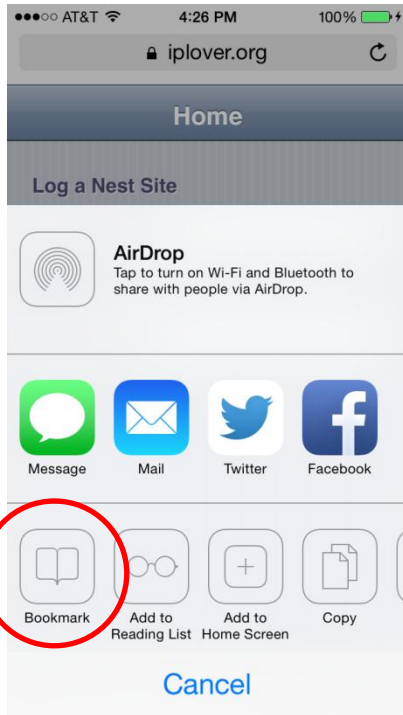
6



Tap the **Share** icon (this will allow saving as a bookmark for later easy-to-find use)

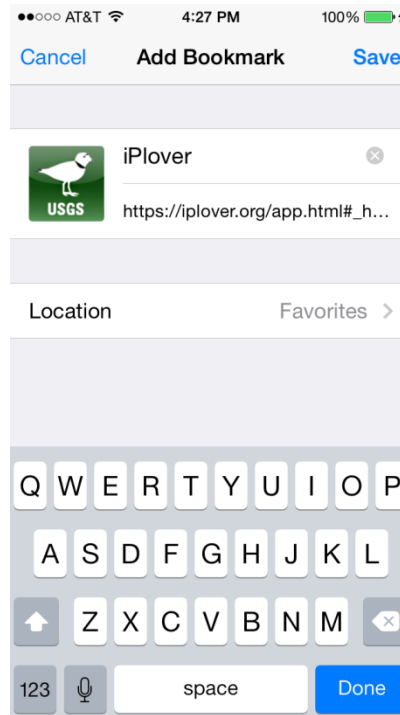
# Access the iPlover web app (3/3)

7



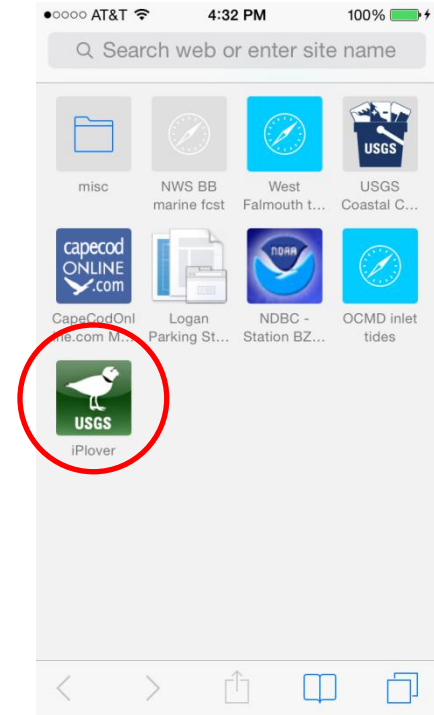
Tap **Bookmark**

8



Tap **Save**

9



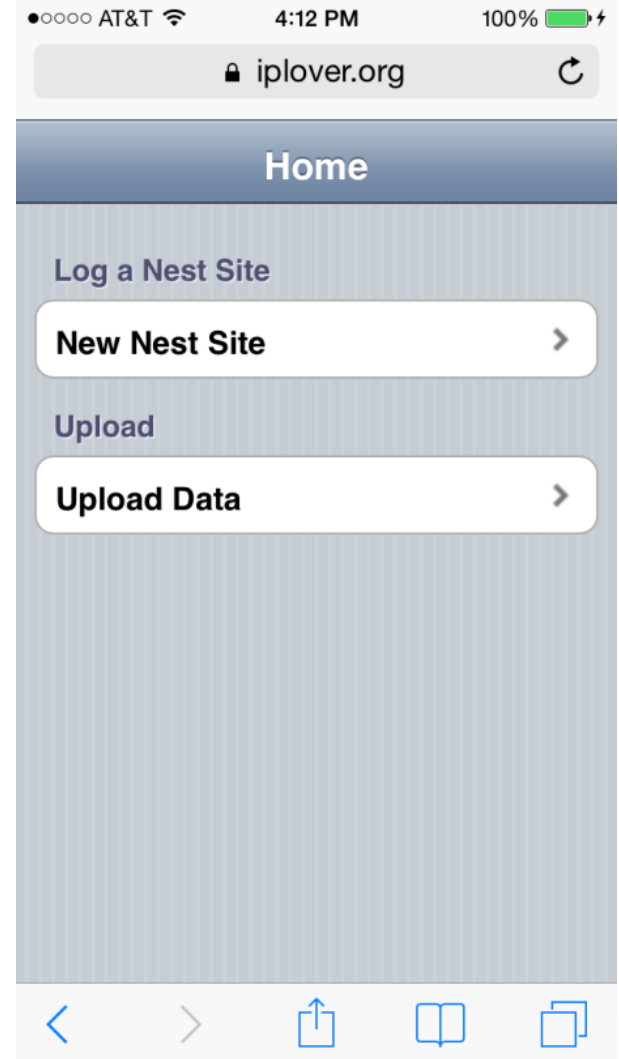
Bookmark now available whenever you access the browser

# When to Collect iPlover Data

## Preferences

Describe nest site in sync with vegetation phenology and geomorphology (i.e., near the time of nest initiation or full clutch)

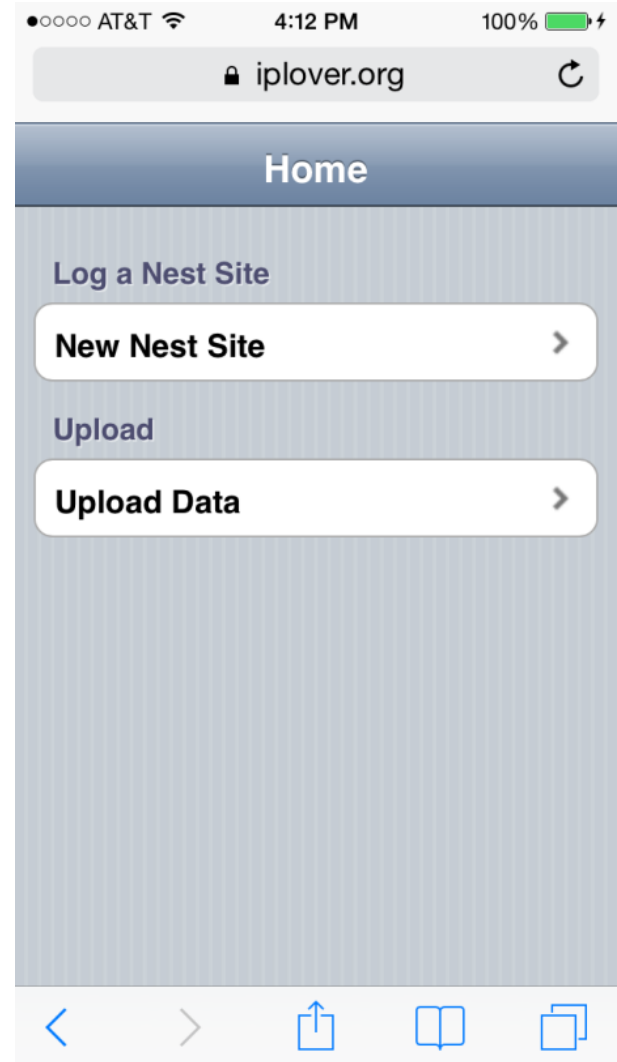
Collect at the same time you are doing a close nest-approach for other reasons. (Biggest concern is unexclosed nests at locations with plover-focused avian predators. Lower priority concerns are weather and direct effects of disturbance.)



# Using iPlover

Two basic functions:

- 1) Collect
- 2) Submit



# Using iPlover – Collect Data

**Site ID** site name

---

**Picture**  no fil...lected

---

**Location** 41.53338, -70.65083  
Accuracy: 65 meters

at 12:48:52 PM [Show Map](#) [Lock Location](#)

## Site info

- 1) Site ID
- 2) Photo
- 3) Location

## Geomorphic Setting

- Beach
- Upper Beach
- Low Dune/Foredune
- Dune
- Washover
- Barrier Interior
- Dune Blowout
- Beach Ridge/Swale

## Substrate Type

- Wetland
- Forest/Shrub
- Sandy
- Unknown

## Geologic info

- 1) Setting
- 2) Substrate

## Vegetation Type

- Herbaceous
- Woody/Shrub
- Water
- Shell Bed

## Vegetation Density

- None
- Sparse <20%
- Moderate 20-90%
- Dense >90%

## Biologic info

- 1) Veg. type
- 2) Veg. density

Notes

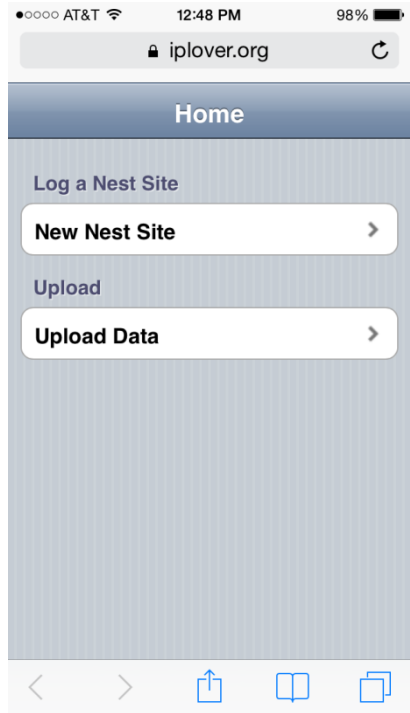
Space for notes

Save Nest Data

**SAVE!**

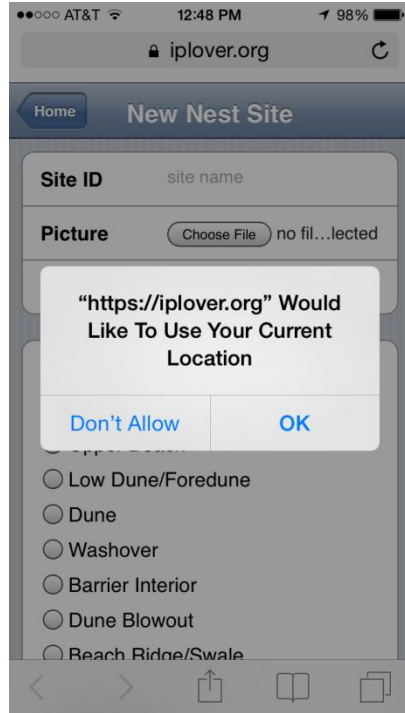
# Site info (ID, Photo, Location)

1



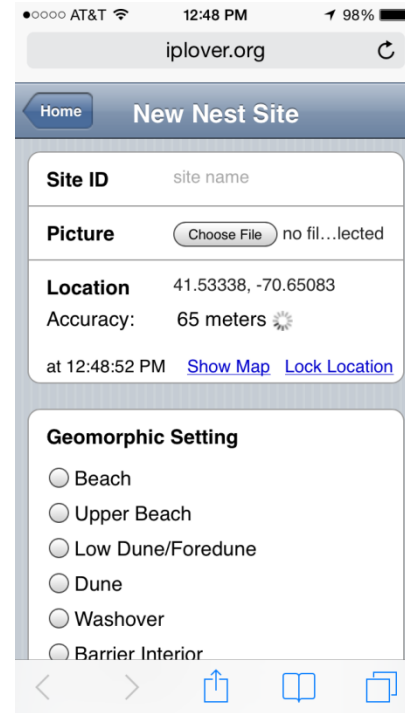
Tap **New Nest Site** to start data collection

2



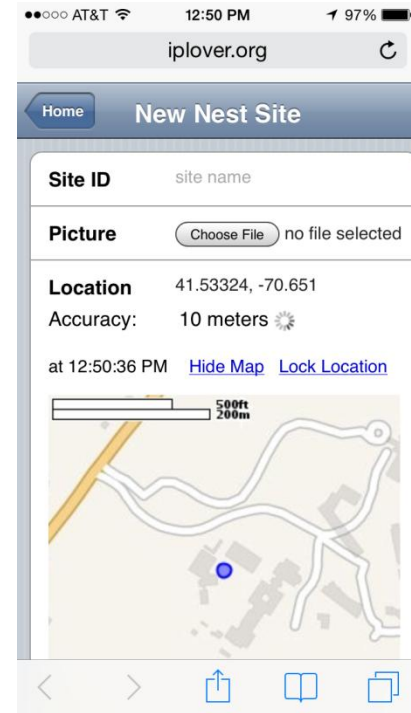
Apps must ask to use the GPS (only the first time); Tap **OK**

3



GPS starts computing location for 60 seconds; accuracy should improve with time

4



Tap **Show Map** to see map with Accuracy Ring (ring will get smaller as accuracy improves)

# Nest location

No

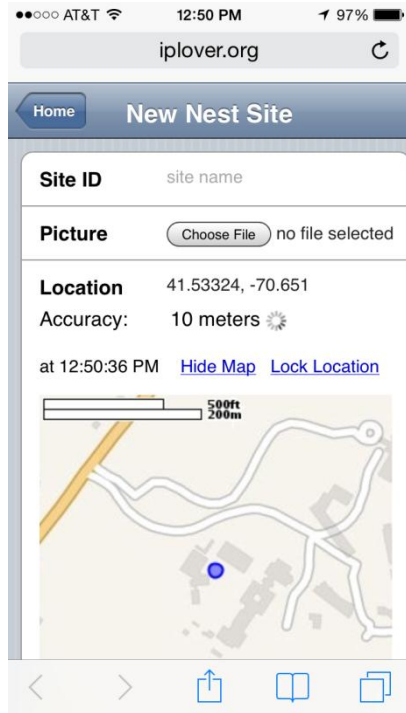


Yes



# Site info (ID, Photo, Location)

5



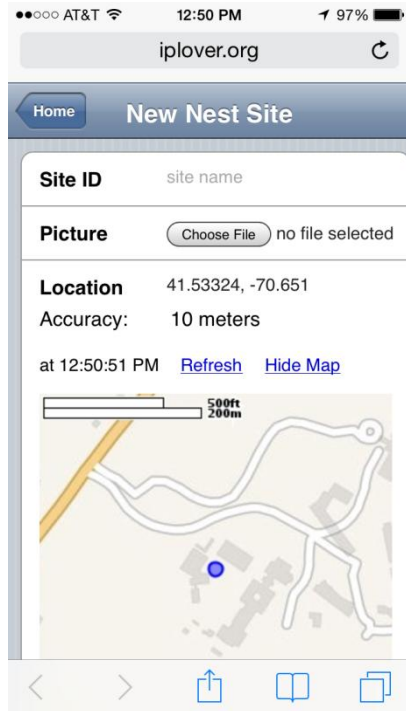
What if I get great accuracy (2-5 m) almost instantly?

Tap **Lock Location** to save the current GPS fix, and move on.



# Site info (ID, Photo, Location)

5

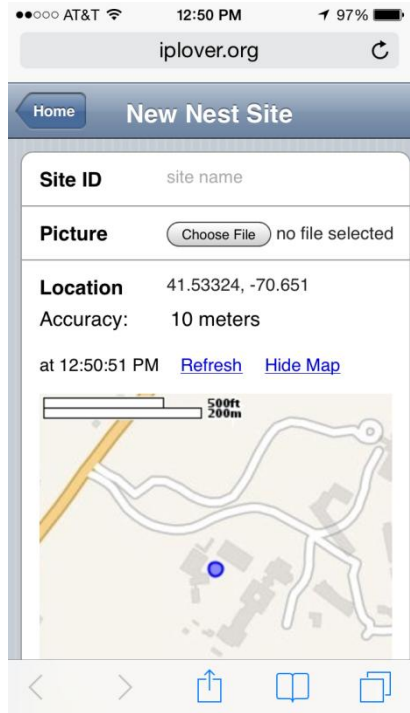


If my accuracy is poor (>-15-20 m), what should I do? When should I stop trying to get better data?

The GPS will stop automatically after 60 seconds. If accuracy is poor, tap **Refresh** to start another 60 second attempt. If accuracy improves, great. If not, move on.

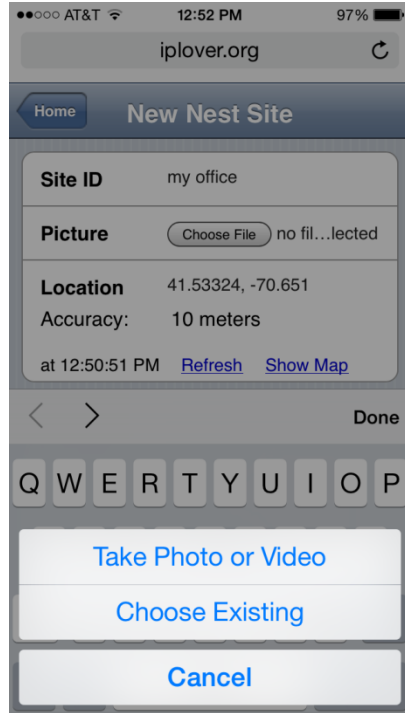
# Nest photo

1



Tap **Choose File** attach a photo to the site

2



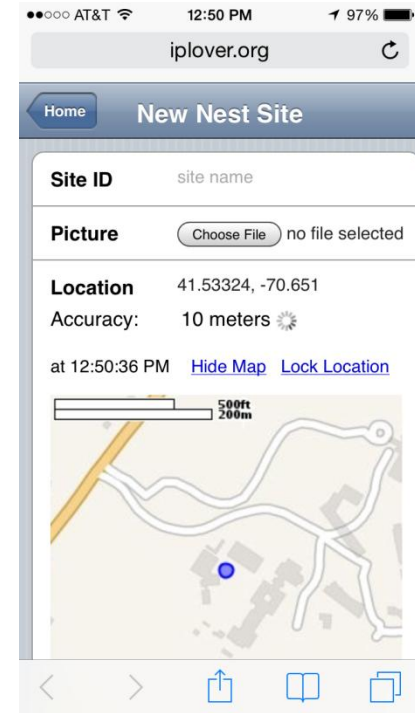
Choose from the options (**Take Photo** used here)

3



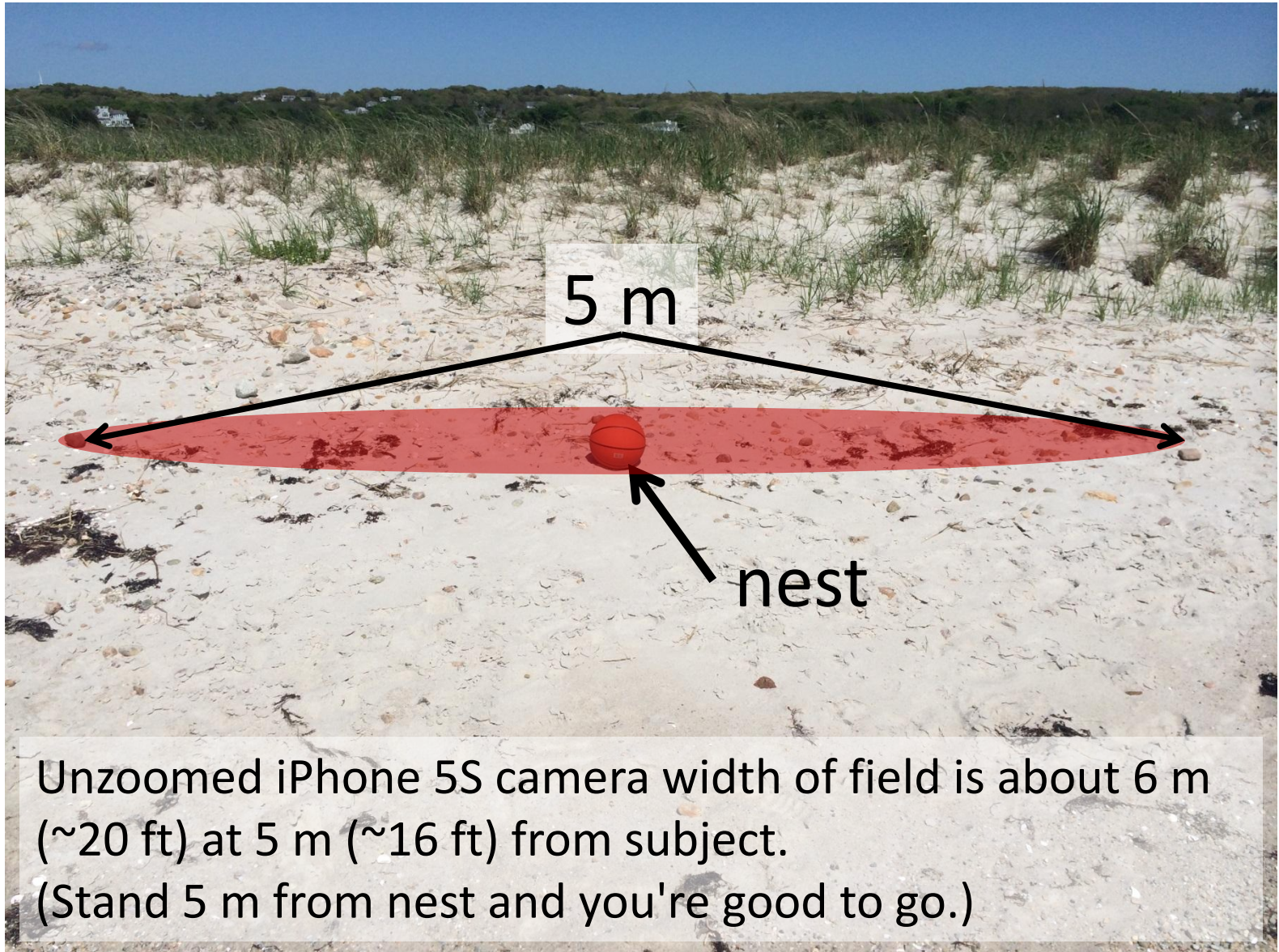
Take picture, tap **Use Photo** (or **Retake** if you want a do-over)

4



Tap **Show Map** to see map with Accuracy Ring (ring will get smaller as accuracy improves)

# Nest photo width of field



# Nest photo considerations



Stand about 5 m from nest.

Place nest in center of field of view.

Don't use zoom.

What direction you are facing doesn't matter. (But don't shoot into the sun.)

Avoid shadows if possible (yours, other people, trees, shrubs, etc.).

# Site ID considerations

**Site ID**

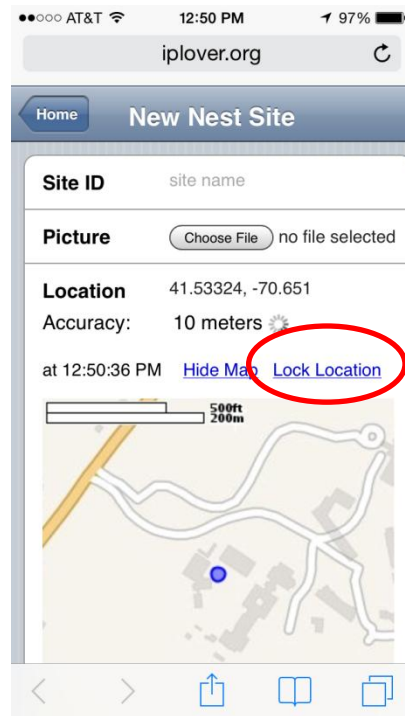
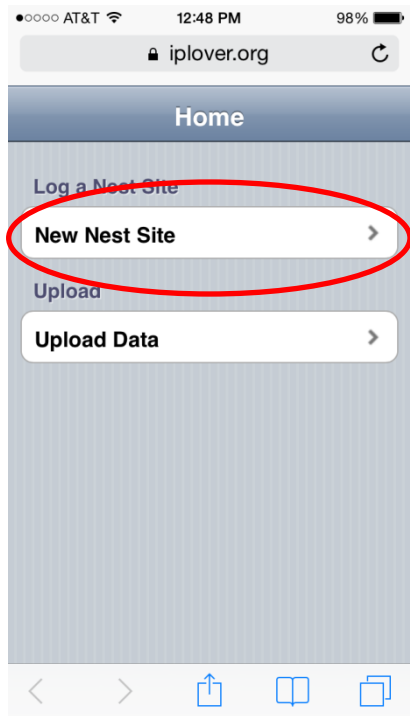
site name

Use the same system that your Refuge or Park uses.

Be consistent.




# A suggested workflow...



- 1) Go to app Home page.
- 2) Approach nest and establish your position.
- 3) Tap **New Nest Site** to start the GPS.
- 4) Get good GPS fix. (If good accuracy is quick, tap **Lock Location**; otherwise wait and try **Refresh**.)
- 5) Move to 5 m from nest and take picture.
- 6) Move away from nest to complete Site ID and other data fields.



# Using iPlover – Collect Data

<b>Site ID</b>	site name
<b>Picture</b>	<input type="button" value="Choose File"/> no fil...lected
<b>Location</b>	41.53338, -70.65083
Accuracy:	65 meters 
at 12:48:52 PM <a href="#">Show Map</a> <a href="#">Lock Location</a>	

## Site info

- 1) Site ID
- 2) Photo
- 3) Location

### Geomorphic Setting

- Beach
- Upper Beach
- Low Dune/Foredune
- Dune
- Washover
- Barrier Interior
- Dune Blowout
- Beach Ridge/Swale

### Substrate Type

- Wetland
- Forest/Shrub
- Sandy
- Unknown

## Geologic info

- 1) Setting
- 2) Substrate

### Vegetation Type

- Herbaceous
- Woody/Shrub
- Water
- Shell Bed

### Vegetation Density

- None
- Sparse <20%
- Moderate 20-90%
- Dense >90%

## Biologic info

- 1) Veg. type
- 2) Veg. density

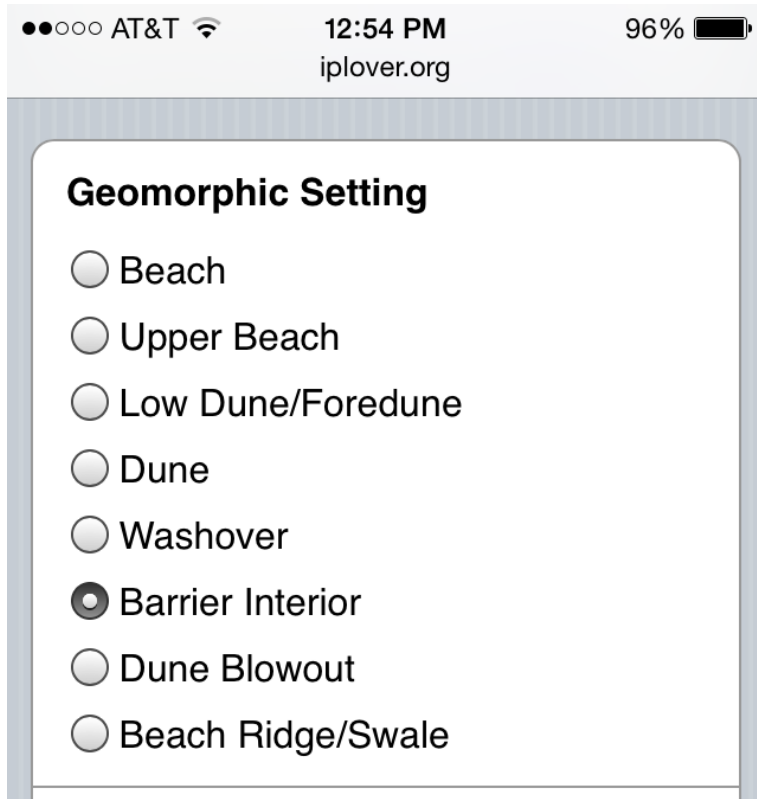
Notes

Space for notes

Save Nest Data

**SAVE!**

# Geomorphic Setting



These are "radio buttons".

You can only pick one.

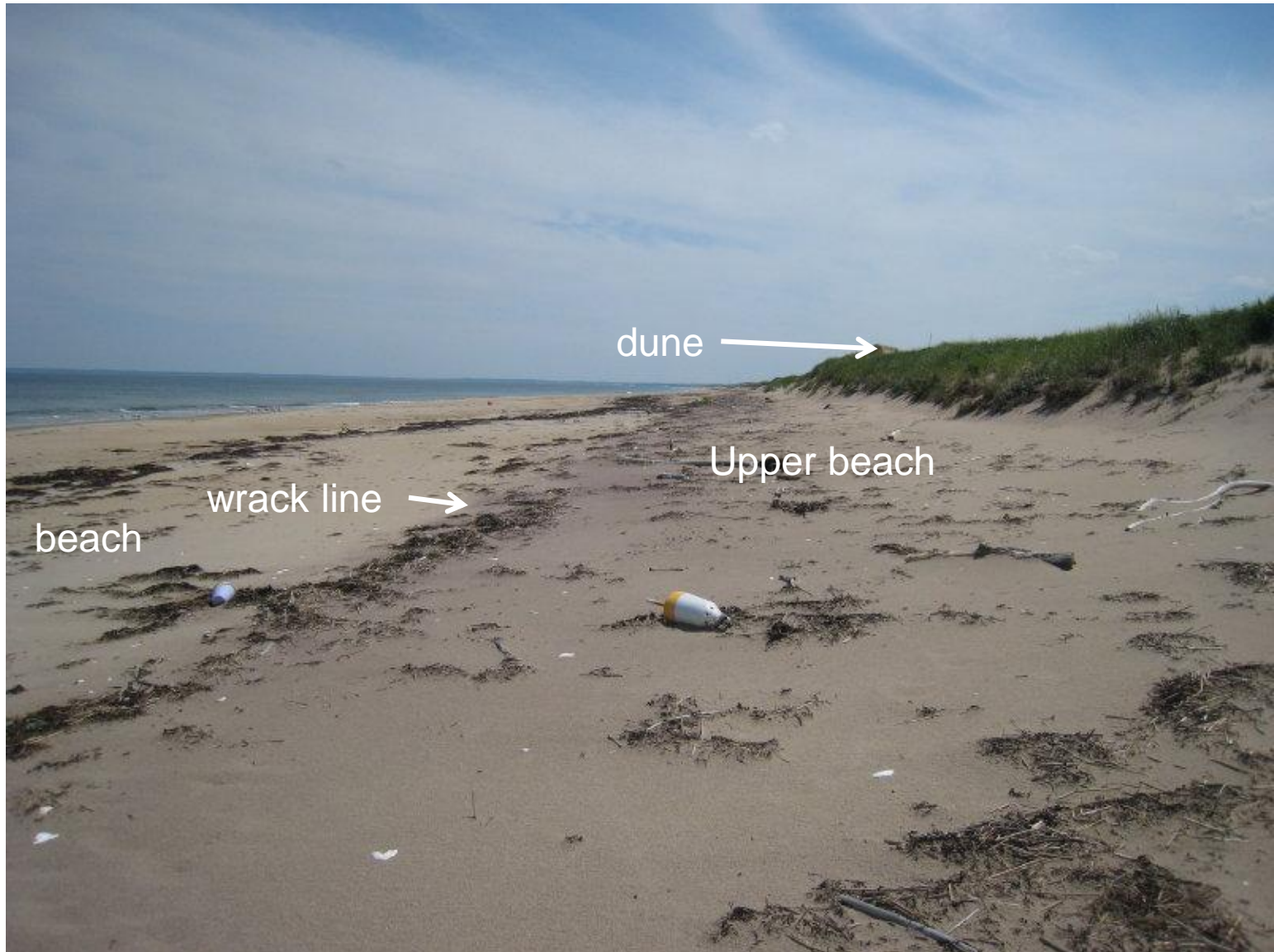
Tap on the button or the text to select.

The selected button will darken.



# Geomorphic Setting description

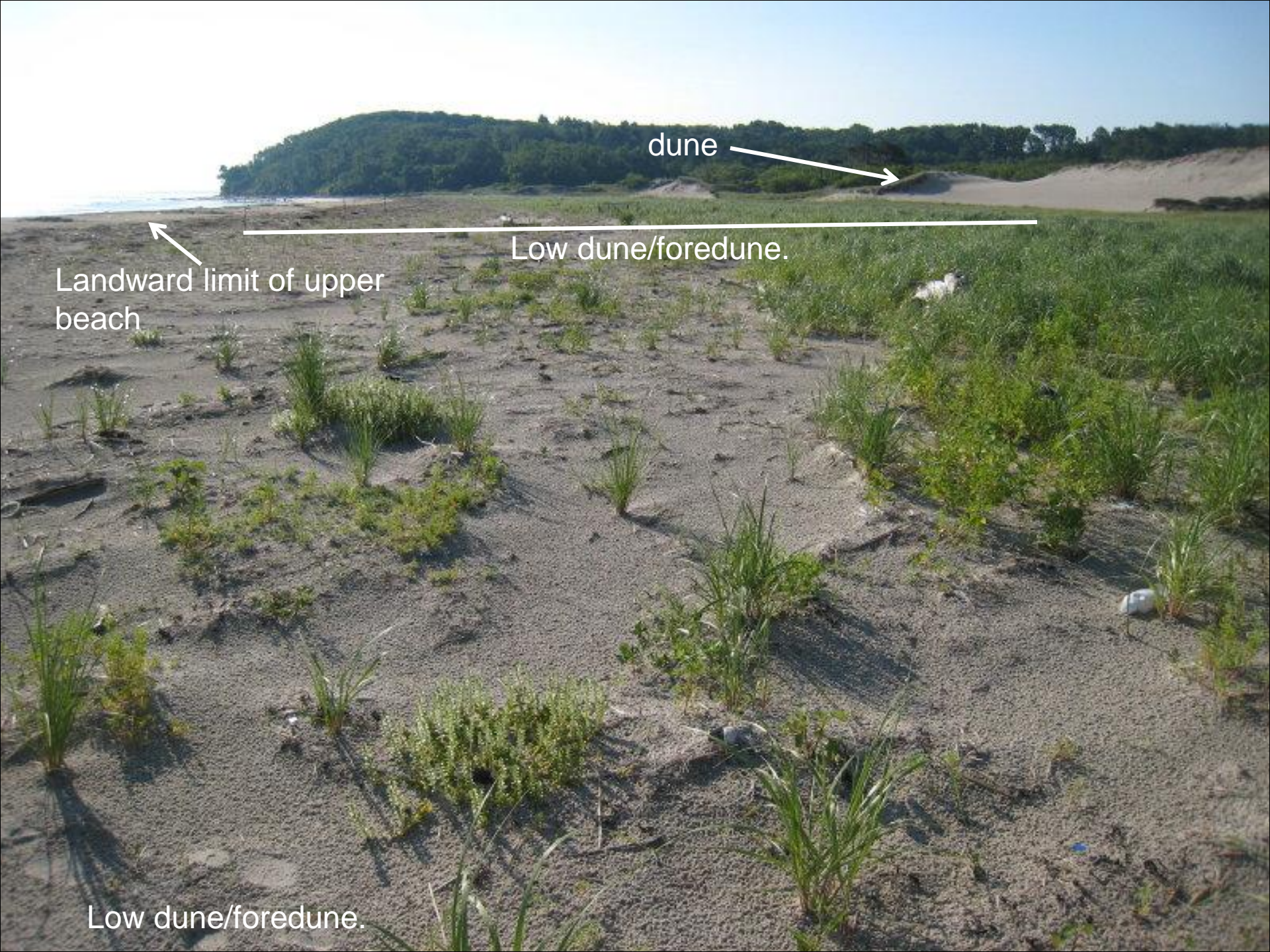
Next slides



A wrack line as well as slight scarp separates upper beach from beach



Low dune/foredune.



dune



Low dune/foredune.



Landward limit of upper beach



Low dune/foredune.



Low dune/foredune.



Low dune/foredune.



Low dune/foredune.

Blow out







Dune.



Dune.

Washover/overwash

Break in dune crest and vegetation line

Subtle dune crest here

Edge of overwash fan





Barrier interior.



Chincoteague "Hook"

Google Earth

Images taken 1/18/2007 © 2007  
© 2007 Google  
All rights reserved. No part of this image may be reproduced without the prior written permission of Google.



Beach ridge-swale.

# Substrate Type

## Substrate Type

- Wetland
- Forest/Shrub
- Sandy
- Unknown

These are "radio buttons".

You can only pick one.

Tap on the button or the text to select.

The selected button will darken.

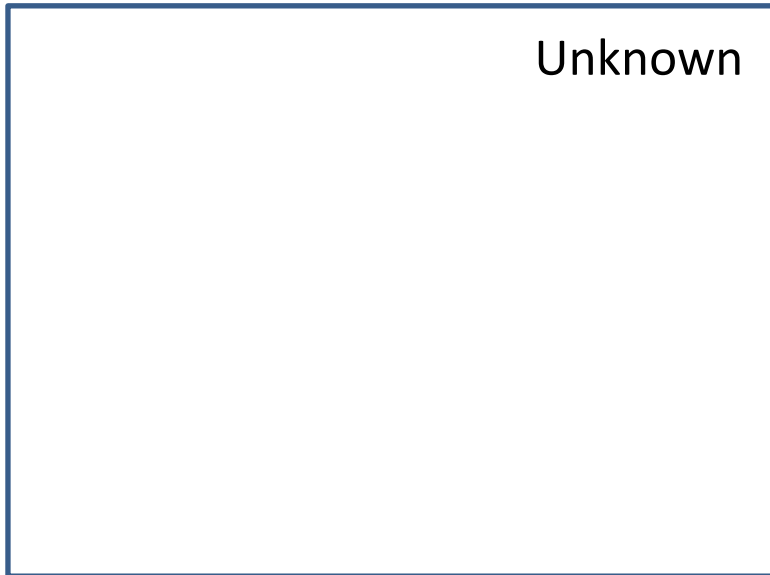
# Substrate Type description



Forest/Shrub



Wetland




Unknown



Sandy

# Using iPlover – Collect Data

<b>Site ID</b>	site name
<b>Picture</b>	<input type="button" value="Choose File"/> no fil...lected
<b>Location</b>	41.53338, -70.65083
Accuracy:	65 meters 
at 12:48:52 PM <a href="#">Show Map</a> <a href="#">Lock Location</a>	

## Site info

- 1) Site ID
- 2) Photo
- 3) Location

<b>Geomorphic Setting</b>
<input type="radio"/> Beach
<input type="radio"/> Upper Beach
<input type="radio"/> Low Dune/Foredune
<input type="radio"/> Dune
<input type="radio"/> Washover
<input type="radio"/> Barrier Interior
<input type="radio"/> Dune Blowout
<input type="radio"/> Beach Ridge/Swale
<b>Substrate Type</b>
<input type="radio"/> Wetland
<input type="radio"/> Forest/Shrub
<input type="radio"/> Sandy
<input type="radio"/> Unknown

## Geologic info

- 1) Setting
- 2) Substrate

<b>Vegetation Type</b>
<input type="radio"/> Herbaceous
<input type="radio"/> Woody/Shrub
<input type="radio"/> Water
<input type="radio"/> Shell Bed
<b>Vegetation Density</b>
<input type="radio"/> None
<input type="radio"/> Sparse <20%
<input type="radio"/> Moderate 20-90%
<input type="radio"/> Dense >90%

## Biologic info

- 1) Veg. type
- 2) Veg. density

<b>Notes</b>
--------------

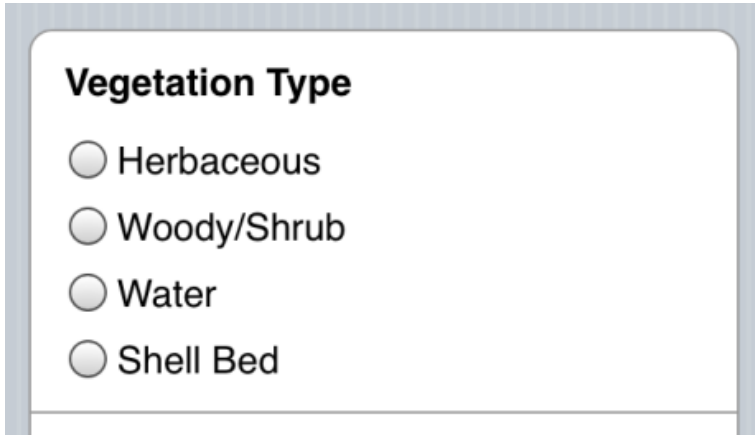
Space for notes

<input type="button" value="Save Nest Data"/>
-----------------------------------------------

**SAVE!**



# Vegetation Type



**Vegetation Type**

Herbaceous

Woody/Shrub

Water

Shell Bed

These are "radio buttons".

You can only pick one.

Tap on the button or the text to select.

The selected button will darken.

# Vegetation Type description



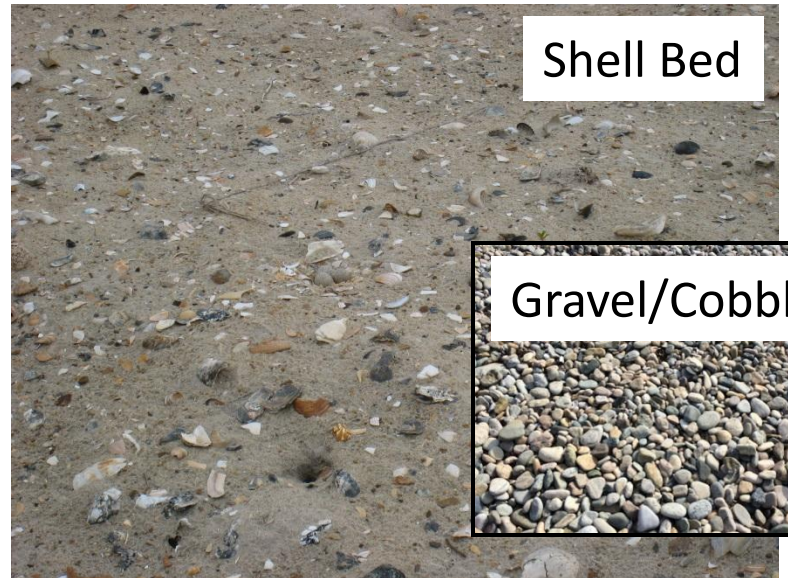
Woody



Herbaceous



Water



Shell Bed

Gravel/Cobble

# Vegetation Density

## Vegetation Density

- None
- Sparse <20%
- Moderate 20-90%
- Dense >90%

These are "radio buttons".

You can only pick one.

Tap on the button or the text to select.

The selected button will darken.

# Vegetation Density description

Next slides

# No vegetation (bare surface)



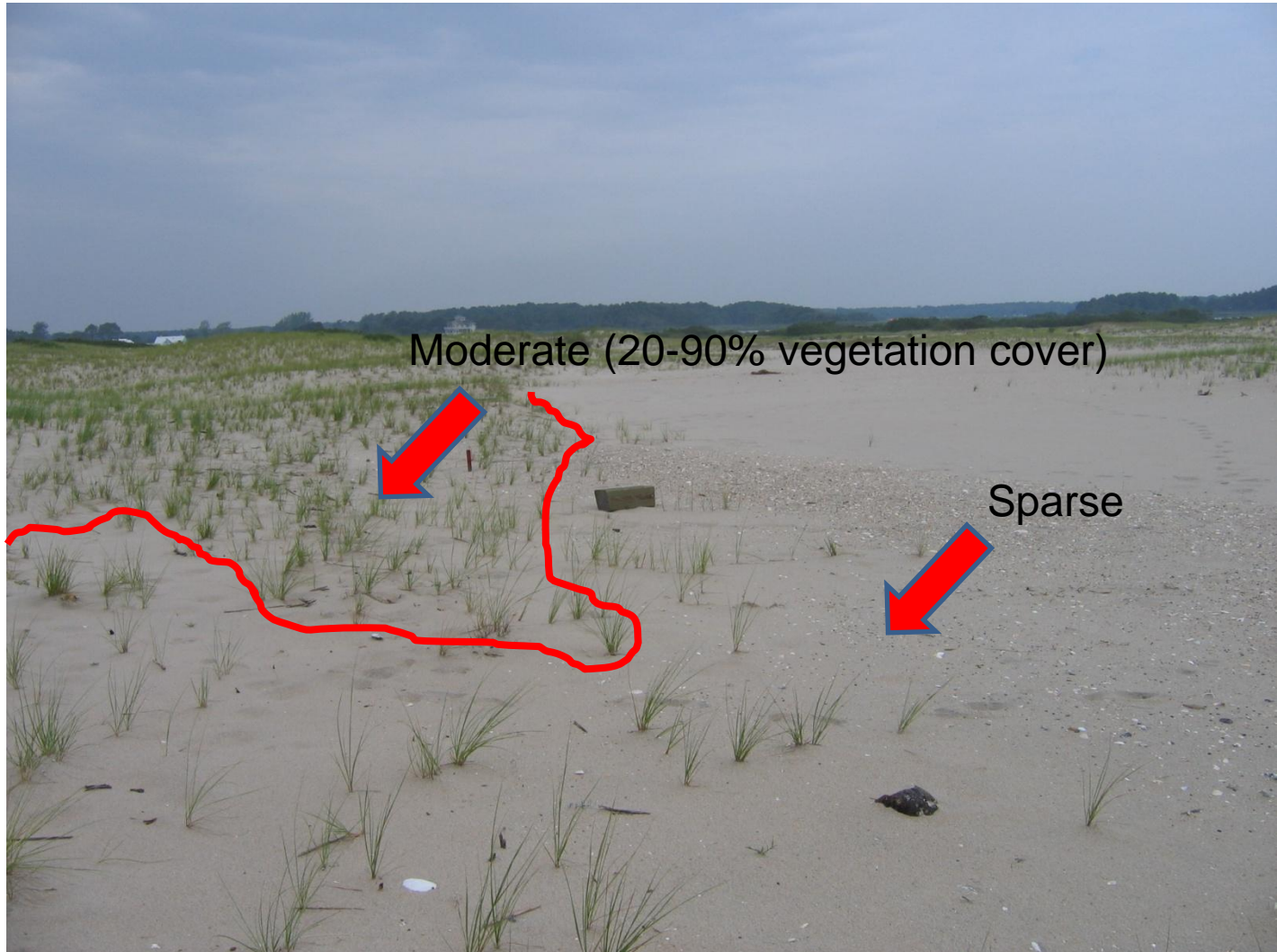
**Sparse <20%**



Sparse <20%



# Sparse <20%







x



sparse <20%



Sparse veg.

moderate veg.

# Moderate 20-90%



# Moderate 20-90%



# Moderate 20-90%





Moderate 20-90%

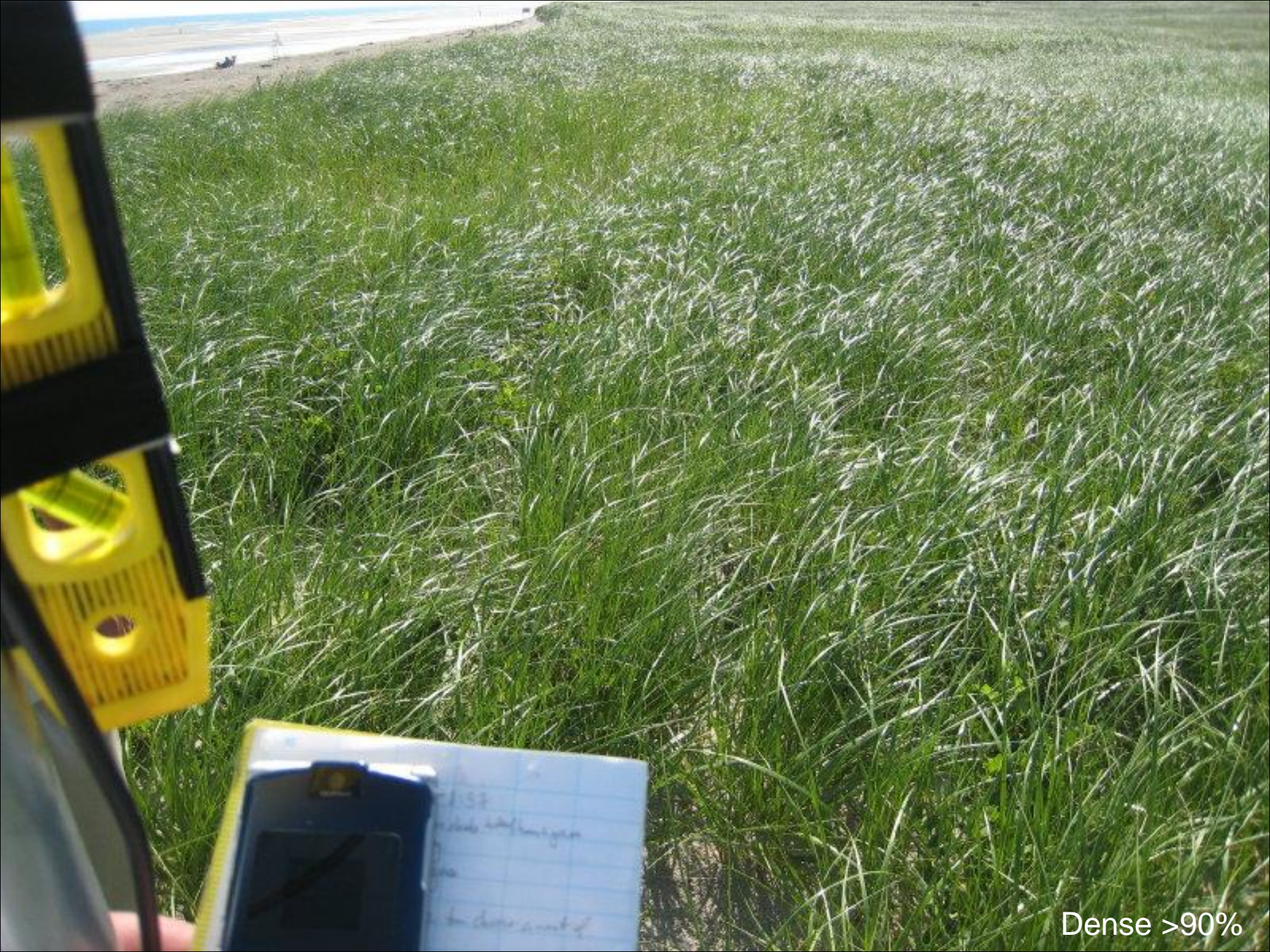


Moderate 20-90% (could also be Dense >90%)

Dense >90%







1.57  
Dense vegetation  
In dense area of

Dense >90%

# Using iPlover – Collect Data

<b>Site ID</b>	site name
<b>Picture</b>	<input type="button" value="Choose File"/> no fil...lected
<b>Location</b>	41.53338, -70.65083
Accuracy:	65 meters
at 12:48:52 PM <a href="#">Show Map</a> <a href="#">Lock Location</a>	

## Site info

- 1) Site ID
- 2) Photo
- 3) Location

<b>Geomorphic Setting</b>
<input type="radio"/> Beach
<input type="radio"/> Upper Beach
<input type="radio"/> Low Dune/Foredune
<input type="radio"/> Dune
<input type="radio"/> Washover
<input type="radio"/> Barrier Interior
<input type="radio"/> Dune Blowout
<input type="radio"/> Beach Ridge/Swale
<b>Substrate Type</b>
<input type="radio"/> Wetland
<input type="radio"/> Forest/Shrub
<input type="radio"/> Sandy
<input type="radio"/> Unknown

## Geologic info

- 1) Setting
- 2) Substrate

<b>Vegetation Type</b>
<input type="radio"/> Herbaceous
<input type="radio"/> Woody/Shrub
<input type="radio"/> Water
<input type="radio"/> Shell Bed
<b>Vegetation Density</b>
<input type="radio"/> None
<input type="radio"/> Sparse <20%
<input type="radio"/> Moderate 20-90%
<input type="radio"/> Dense >90%

## Biologic info

- 1) Veg. type
- 2) Veg. density

<b>Notes</b>
Space for notes

<input type="button" value="Save Nest Data"/>
-----------------------------------------------

**SAVE!**

# Notes



Notes


This is a free text entry field. It can handle up to XXXX characters.

Tap in the white area to bring up the keyboard.

Add any supplemental information you think is important, such as:

- ) nest status (active, failed, fledged)
- ) exclosed
- ) uncertainty of any observations

# Using iPlover – Collect Data

<b>Site ID</b>	site name
<b>Picture</b>	<input type="button" value="Choose File"/> no fil...lected
<b>Location</b>	41.53338, -70.65083
Accuracy:	65 meters 
at 12:48:52 PM <a href="#">Show Map</a> <a href="#">Lock Location</a>	

## Site info

- 1) Site ID
- 2) Photo
- 3) Location

<b>Geomorphic Setting</b>
<input type="radio"/> Beach
<input type="radio"/> Upper Beach
<input type="radio"/> Low Dune/Foredune
<input type="radio"/> Dune
<input type="radio"/> Washover
<input type="radio"/> Barrier Interior
<input type="radio"/> Dune Blowout
<input type="radio"/> Beach Ridge/Swale
<b>Substrate Type</b>
<input type="radio"/> Wetland
<input type="radio"/> Forest/Shrub
<input type="radio"/> Sandy
<input type="radio"/> Unknown

## Geologic info

- 1) Setting
- 2) Substrate

<b>Vegetation Type</b>
<input type="radio"/> Herbaceous
<input type="radio"/> Woody/Shrub
<input type="radio"/> Water
<input type="radio"/> Shell Bed
<b>Vegetation Density</b>
<input type="radio"/> None
<input type="radio"/> Sparse <20%
<input type="radio"/> Moderate 20-90%
<input type="radio"/> Dense >90%

## Biologic info

- 1) Veg. type
- 2) Veg. density

<b>Notes</b>
--------------

Space for notes

<input type="button" value="Save Nest Data"/>
<b>SAVE!</b>

# Saving Data

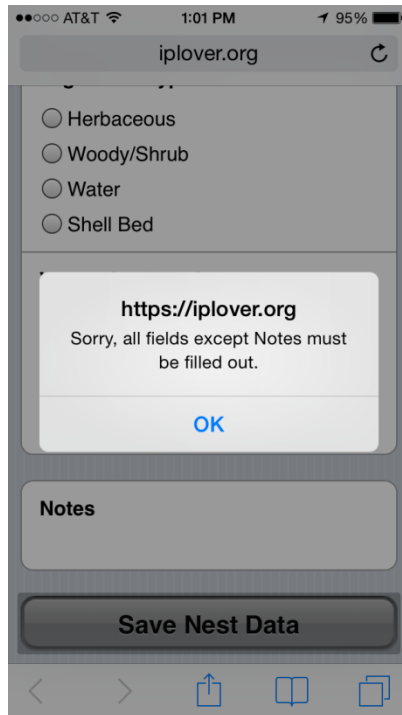


**Save Nest Data**

When you are finished entering data, tap the **Save Nest Data** button.

All data are saved locally on the iPhone.

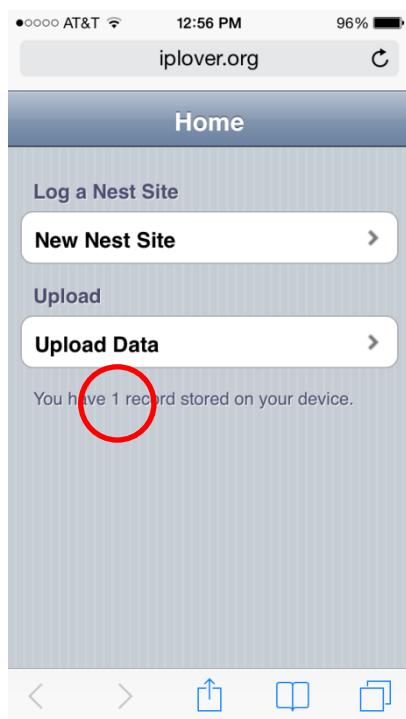
The app checks to make sure you entered all the required data.



After saving, the app returns to the Home page.

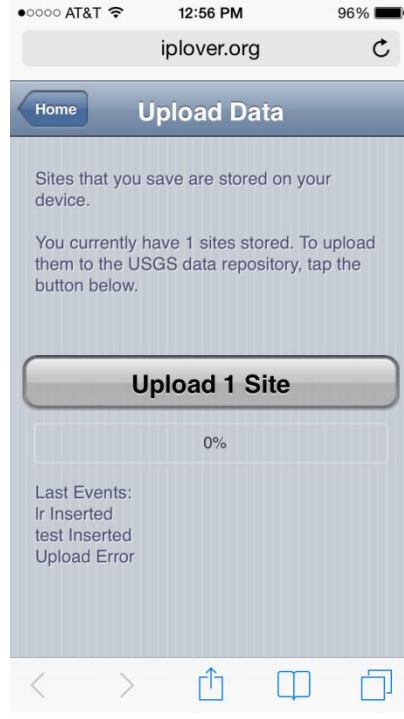
# Using iPlover – Submit Data (1/2)

1



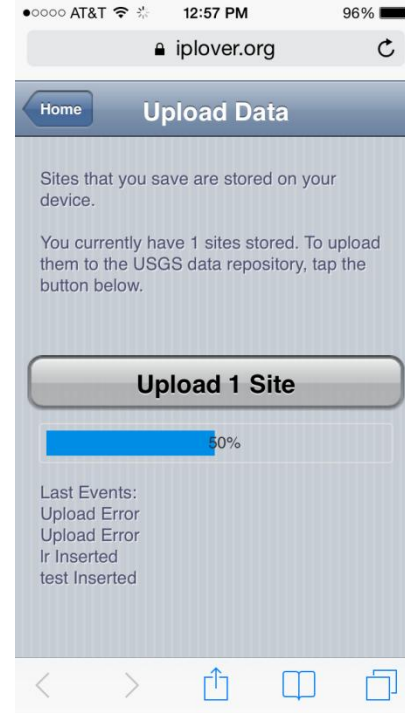
Tap **Upload Data**  
(a counter shows how many sites [records] you have stored on the phone)

2



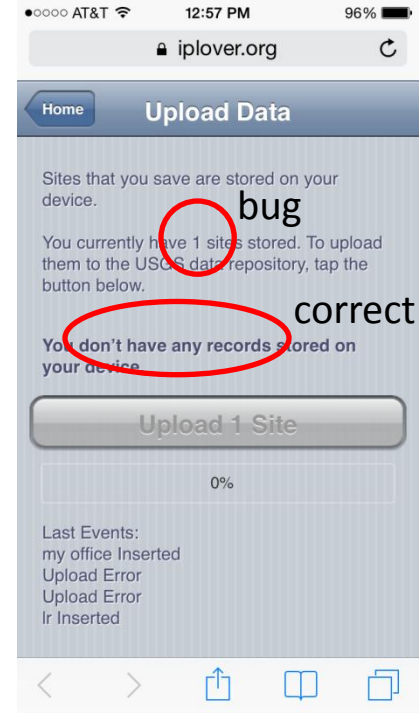
Tap **Upload *n* Site(s)** to begin data submission to USGS database

3



Progress bar will move from 0-100% for each site (record) as it is uploaded

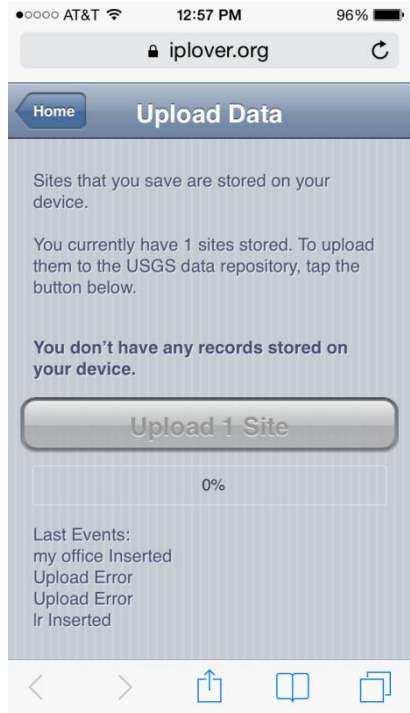
4



When complete, record count will update, button grays out (lower left shows success or error for each record)

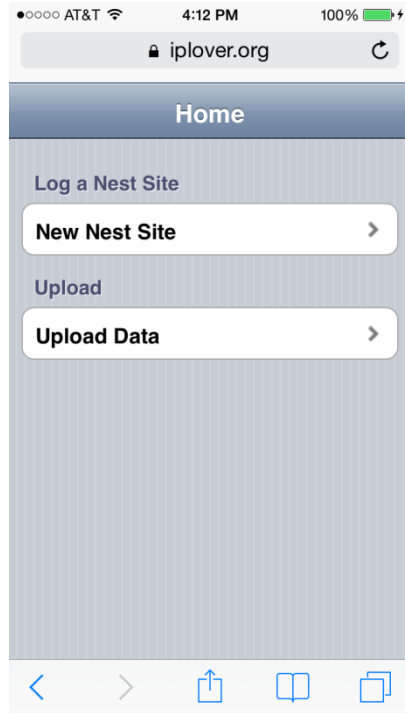
# Using iPlover – Submit Data (2/2)

5



Tap **Home** to return to Home page

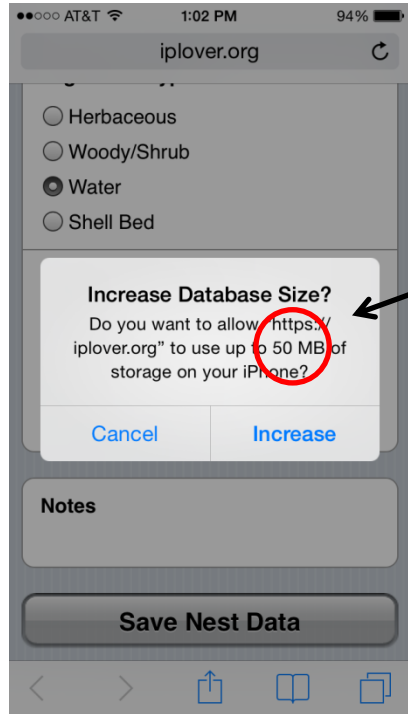
6



The app is ready to go again

# Some Quirks and Tips

## Photos



This will initially be 10. Then 25. Then 50.

Depending on how often you restart the app, you may not see this message.

Apple is protective of your browser and photos. iOS will ask if you want to increase database size after a few sites are collected. Tap **Increase**.

## Uploads



Use a wifi, LTE, or 4G connection.

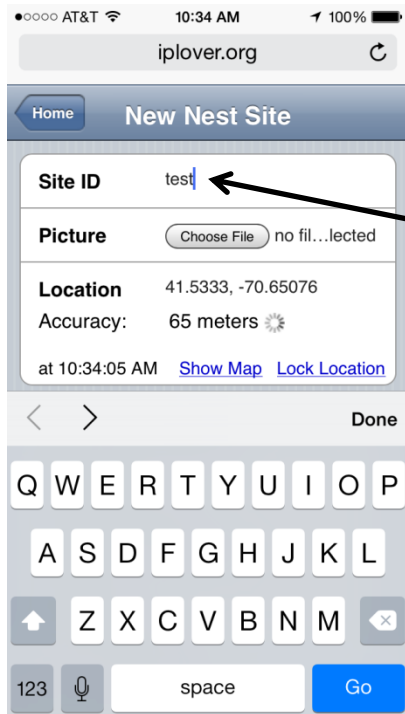
Don't even try to upload on an EDGE connection.

Data uploads will sometimes fail

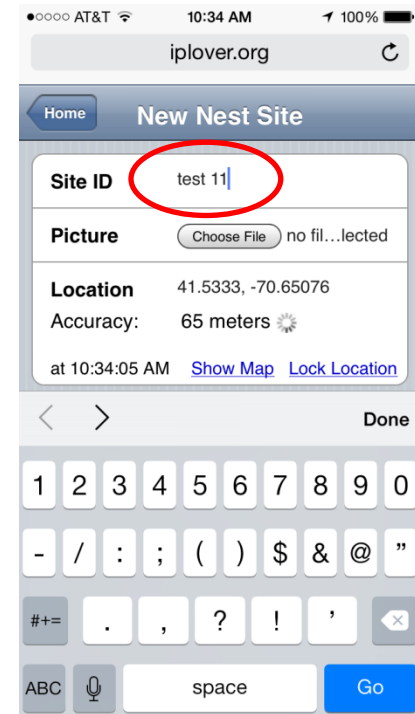
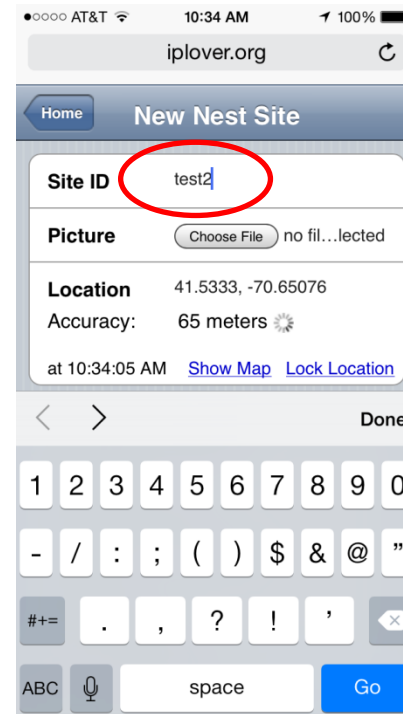


# Some Quirks and Tips

You can practice with the app!

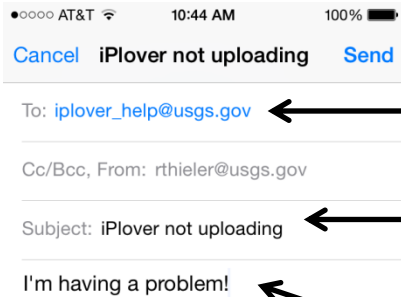


Any site that starts with the word "test" (and variants like those on the right) will not be used as real data.



# Getting Help

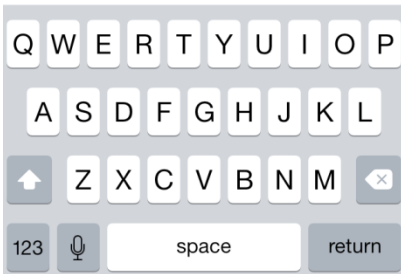
## email



iplover\_help@usgs.gov

put iPlover in subject

Describe problem, or  
ask for a phone call.  
Provide contact info.



Email to  
**iplover\_help** goes to  
9 people on the  
team. We'll get back  
to you!

## telephone

Rob Thieler (USGS), 508-922-7108 (cell)

- any question or complaint
- before 17 June, 7a-9p EDT
- 17 June – 25 July, problematic (at sea)

Megan Hines (USGS), 608-821-3917 (office, Wisconsin)

- technical support questions
- 10a-6p EDT, M-F

Jordan Read (USGS), 608-821-3922 (office, Wisconsin)

- technical support questions
- 10a-6p EDT, M-F

Sarah Karpanty (Va Tech), 540-557-7432 (cell)

- science, field description questions
- call "anytime"

Anne Hecht (FWS), anne\_hecht@fws.gov

- or call 978-443-4325 (office)
- leave call-back number
- how to maximize the value of iPlover data collection while minimizing adverse effects on plover breeding activity

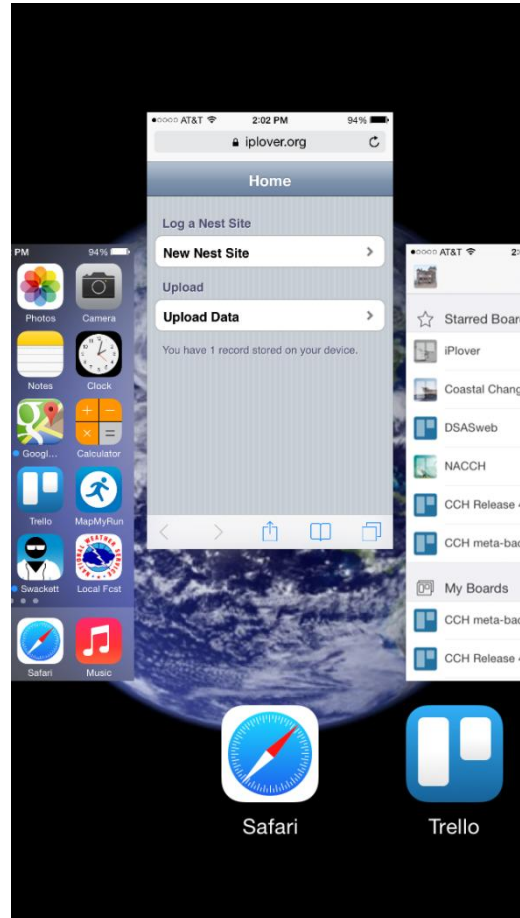
# If all else fails, try this... (method 1/2)

1



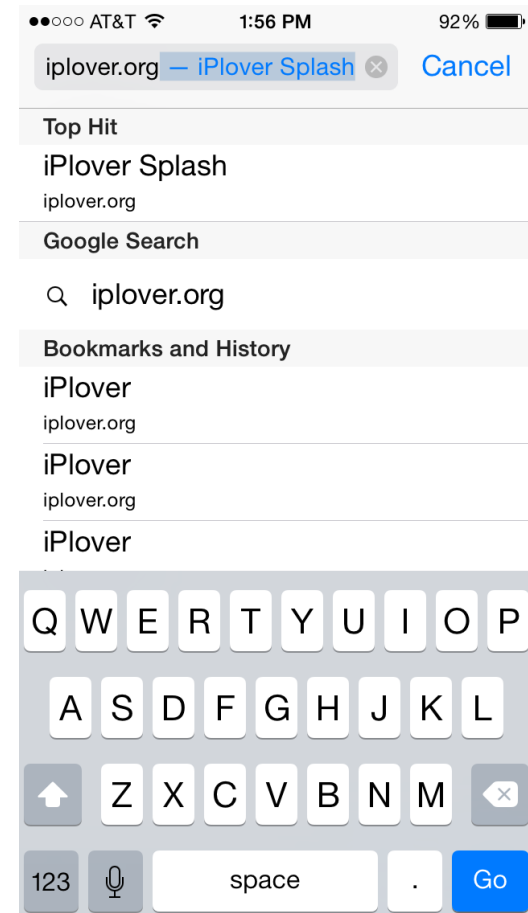
Press Home button twice; brings up running apps

2



Flick Safari up to make it quit

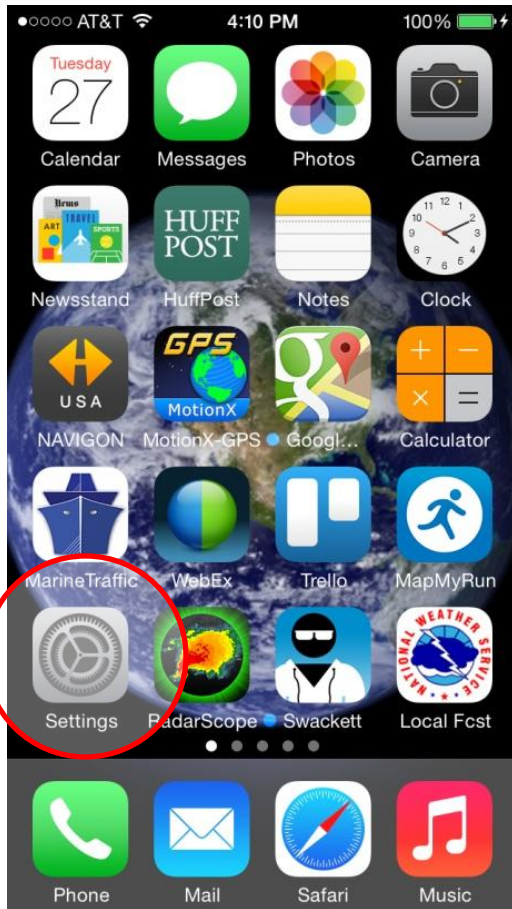
3



Enter iplayer.org URL manually, then tap Go

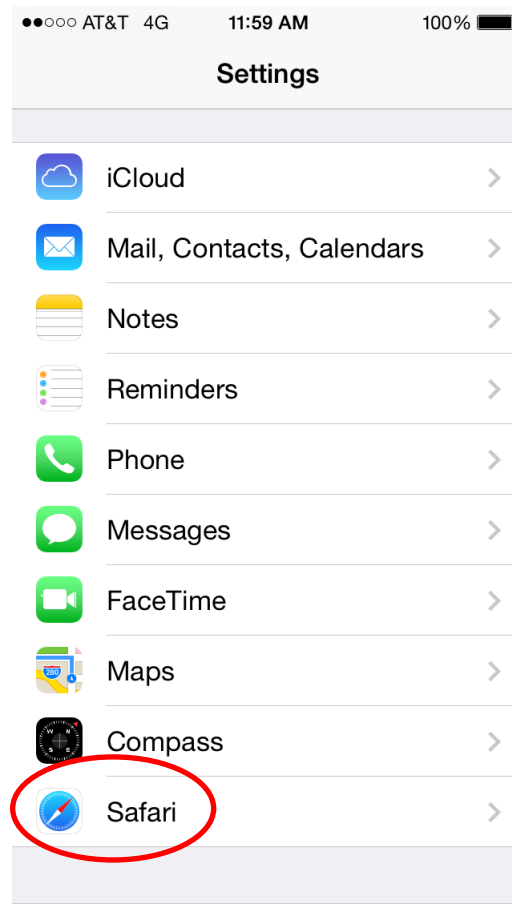
# If all else fails, try this... (method 2/2)

1



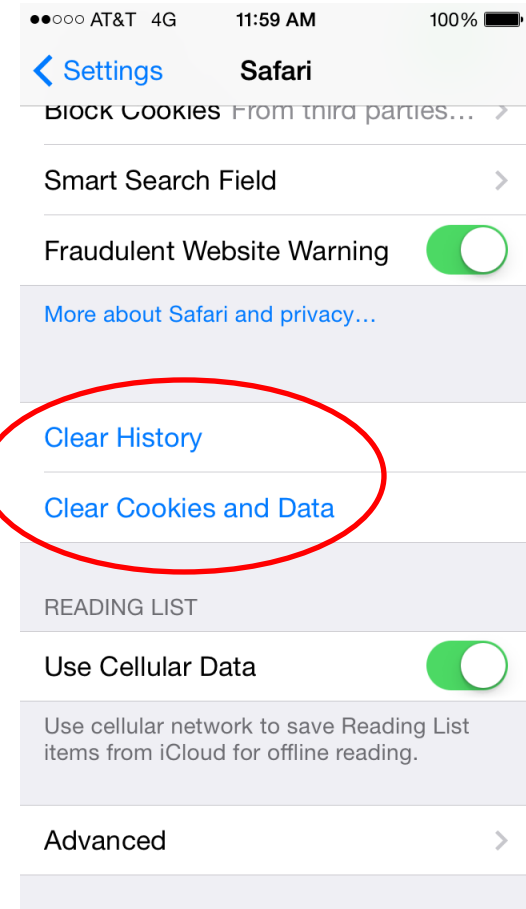
Tap **Settings**

2



Scroll down and tap **Safari**

3



Tap **Clear History**, then tap **Clear Cookies and Data** (an "Are you sure?" prompt will appear for each)

# Give Us Feedback!

**This is a science project.** It can only succeed (and inform plover management) with your participation and feedback.

Please tell us what you think. Send feedback to `iplover_help` (put "iPlover feedback" in the subject line).

Changes to workflow? Layout of the screen? Describing nest site attributes? Too burdensome? Not collecting enough information? Problems with the iPhone? Problems with data/calling plan? Other?

# Coming Soon(ish)

We'll send you the test data you entered.

We'll send you all the data from your Refuge or Park after the season.

**After the season, please send us known or estimated dates of nest initiation.**

Collection of "random points"; protocol and people TBD.

Updates and improvements (including your feedback) for 2015.

"Public" release to state agencies and NGOs planned for 2015.