iPlover Data Collection Protocol

Project Lead

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Project Team

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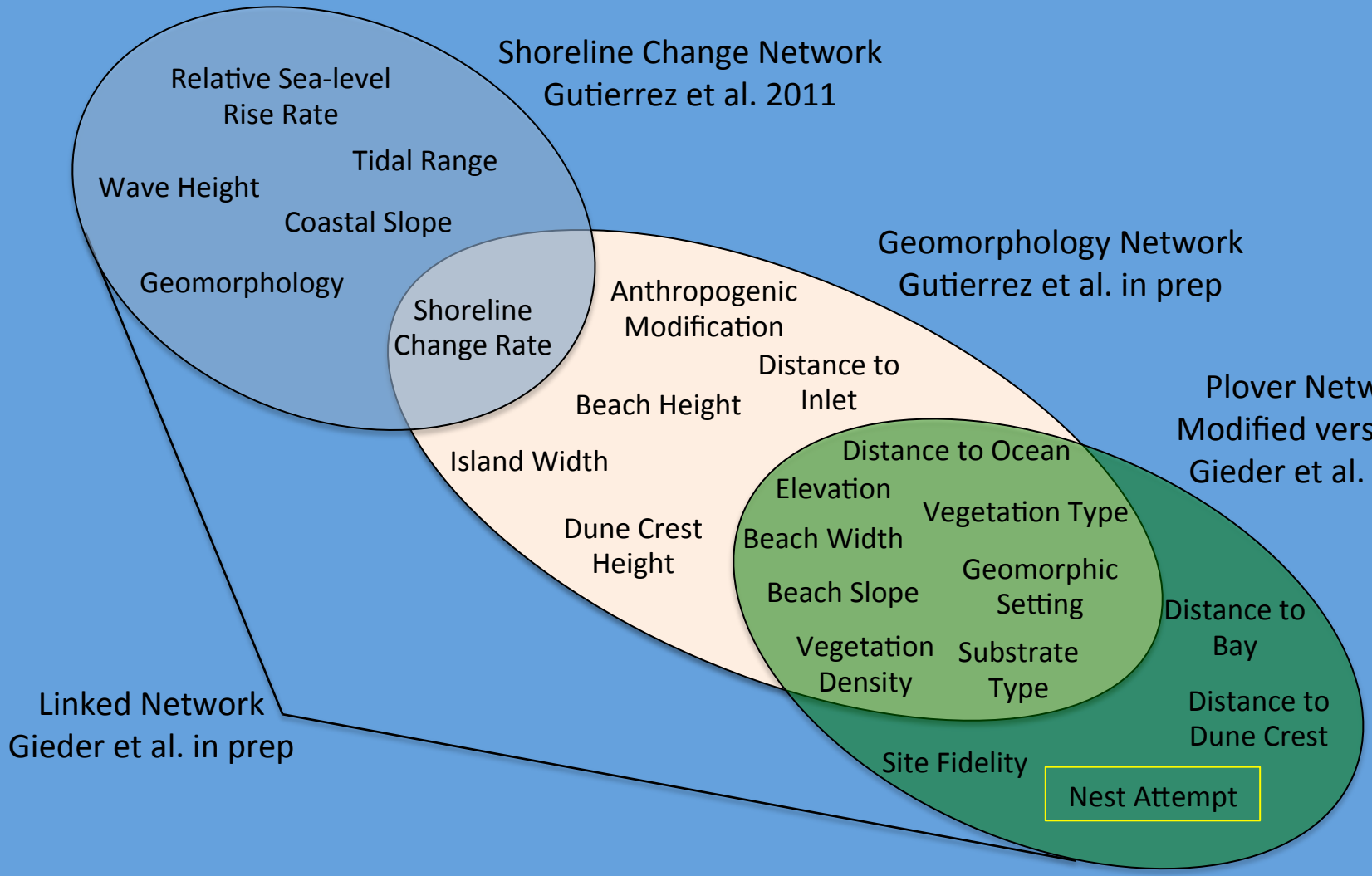
Anne Hecht, Andrew Milliken

And all of you participating in this effort!

Forecasting the Effects of Sea-Level Rise on Piping Plovers



Purpose of iPlover

- A mobile app to collect location and environmental attribute information about PIPL nests and other areas on barrier islands
- 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

Purpose of iPlover

- Use to collect data at:
  1. Plover nest locations – characterizes biogeomorphic conditions at locations plovers choose for nesting
     - iPlover users collect info at these points as nests are found during the breeding season
  2. Random points – characterizes same biogeomorphic conditions at locations where plovers are not nesting
     - iPlover users collect info at points predetermined by USGS personnel during the breeding season
     - Number of points equal to previous year's number of plover nests

**This combination of data teaches models to differentiate low suitability from high suitability plover habitat

Protocol At A Glance

1. Set up the project iPhone

2. Receive and upload random points onto project iPhone

3. Use the application to collect data
   - Collect nest point data as nests (and re-nests) are found during normal monitoring efforts
   - Go to random point locations on the ground
     - Visit random points during active breeding season to ensure consistency in vegetation cover

4. Upload all data to USGS

iPlover Installation

On the iPhone itself….

- Open the App Store, search for and select the iPlover app
- Tap **Get** and then tap **Get It Free**
- When asked to sign in to get the app, do so using your existing Apple ID or create a new Apple ID
  - If you create an Apple ID, you will need to go to email to verify ID before proceeding
- Follow on-screen instructions
  - When asked for payment information, tap **None**
  - If this is not an option (because you are using an existing Apple ID), add payment info (but it will not be charged for this app)

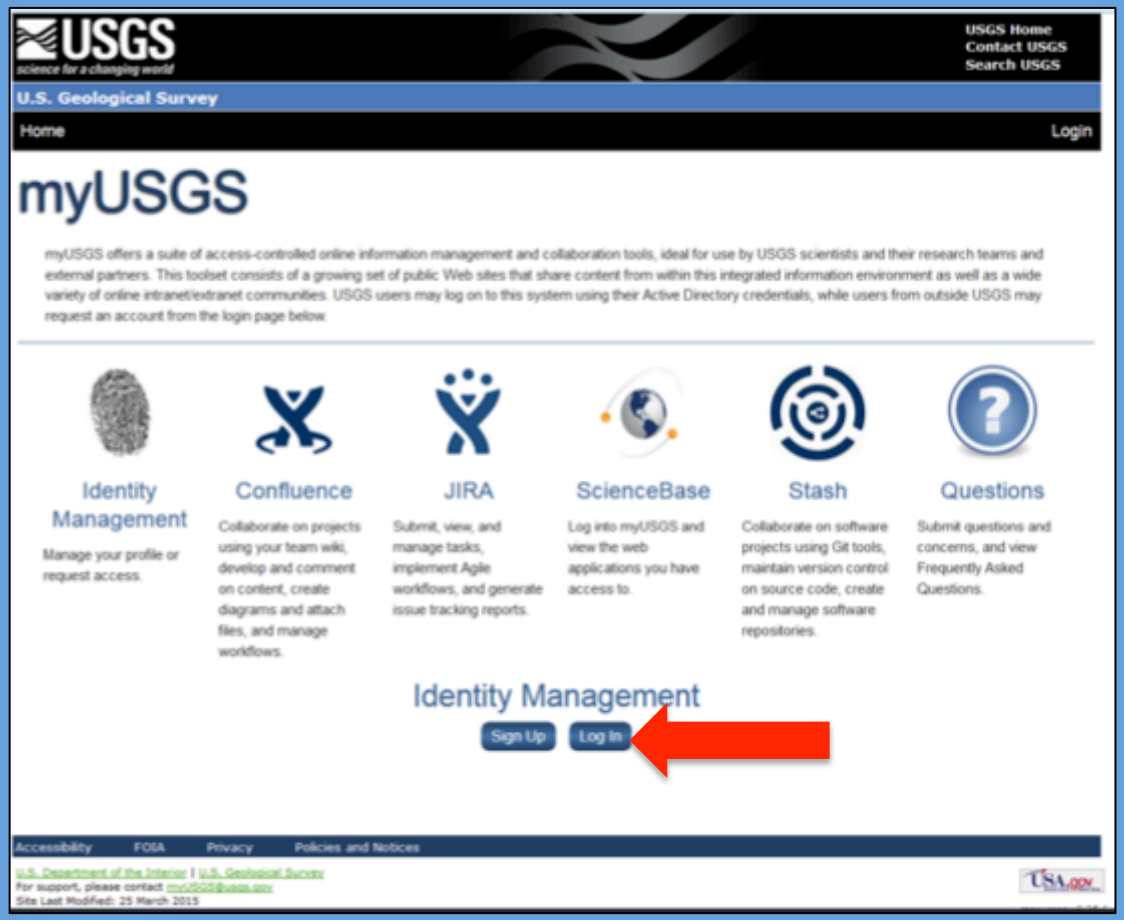
For additional information, see document at:
https://support.apple.com/en-us/HT204034

iPlover Account Set-Up

- iPlover users must set up account on myUSGS:
  https://my.usgs.gov/resources/

Click Log In button here if you have a Department of Interior email address (@usgs.gov, @fws.gov, @blm.gov, @bia.gov, @boem.gov, @bsee.gov, @nps.gov, @osmre.gov, or @doi.gov)

Use this **email address** and your **Active Directory password** to log in to iPlover App



iPlover Account Set-Up

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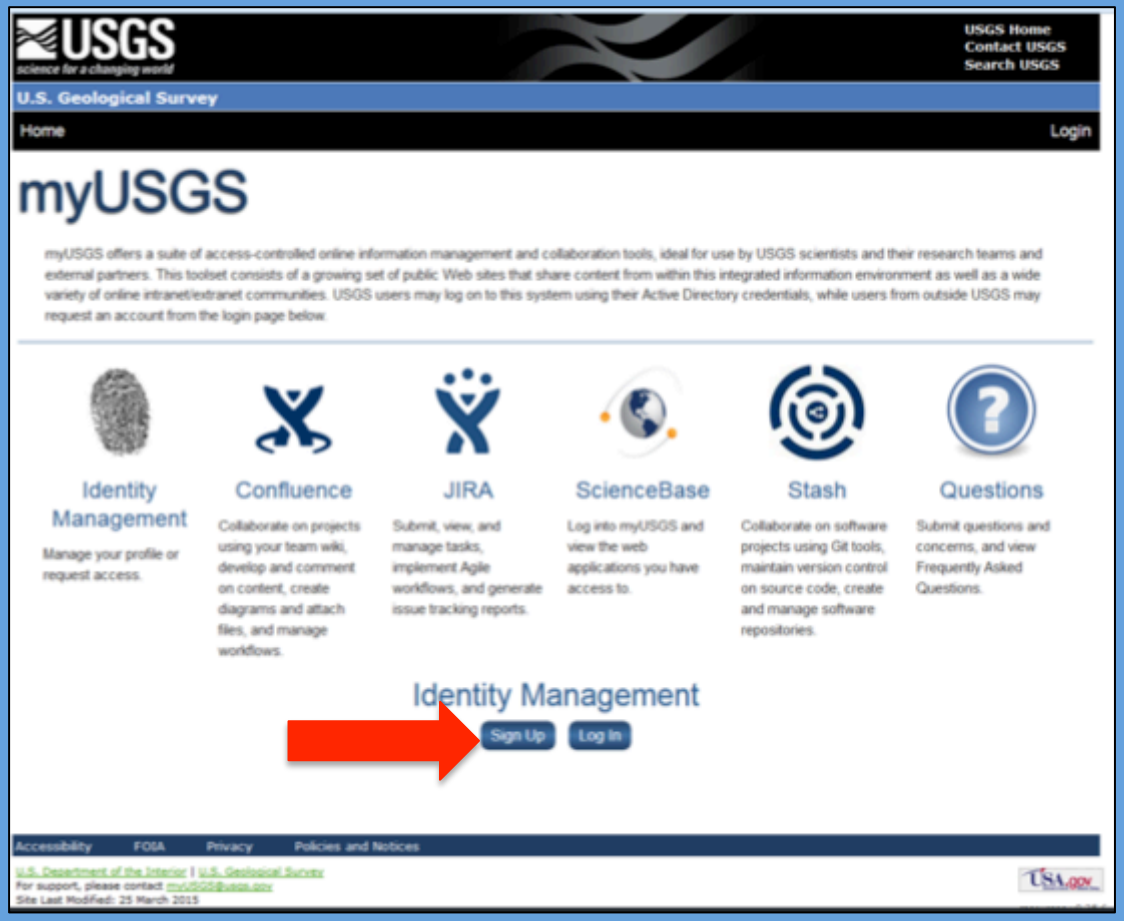


Click Sign Up button here if you do not have a Department of Interior email address

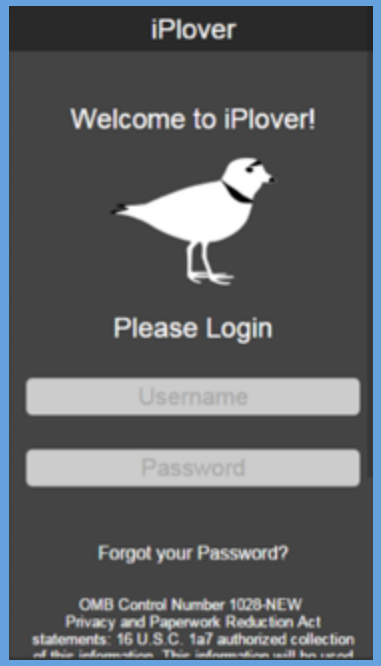
Enter requested information, and use mhines@usgs.gov as notifier so that Megan can approve your account.

You will receive an email with temporary password.

Once you are registered and approved, Megan will add you to a group and email you to confirm.

iPlover Account Set-Up

- Once you have submitted this information, you will log-in to iPlover using:
  1. DOI staff: your DOI email address and Active Directory Password
  2. Non-DOI Staff: the email address and password you provided when setting up your account



During account set up process, Megan Hines (mhines@usgs.gov) will associate you with a group (i.e., by site or region) so that your data are properly affiliated and will synchronize with other users in your group

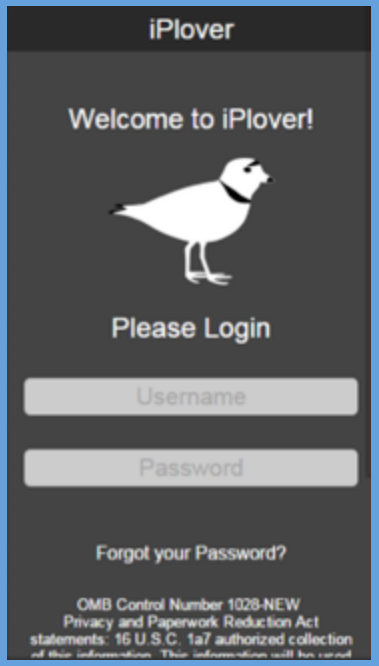
Log in to iPlover to cache credentials

- Before you head out into the field, it is critical to log in to iPlover which will cache your credentials on the device.

- This is critical in case you do not have a satisfactory internet connection in the field.

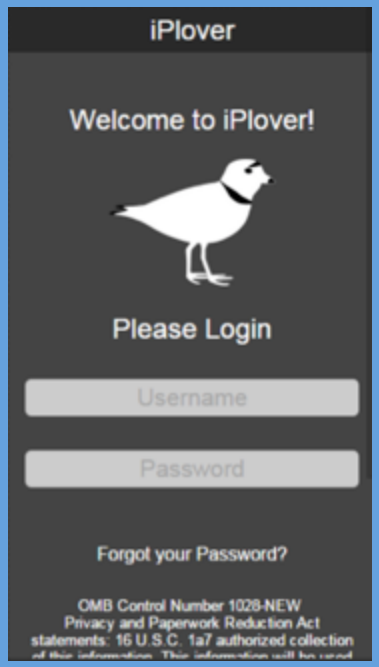
- For both DOI and non-DOI accounts, your password is required to be reset after 90 days.
- Each time you synchronize your credentials will be checked, if your cached credentials have expired, it will force you to log in again.

- If you experience any problems, contact iplover_help@usgs.gov any time throughout the season.

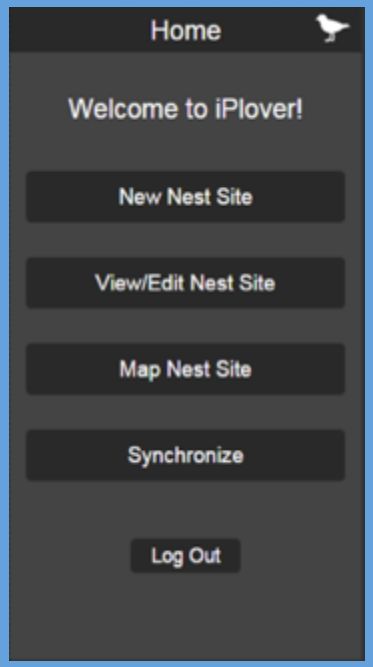


Using iPlover

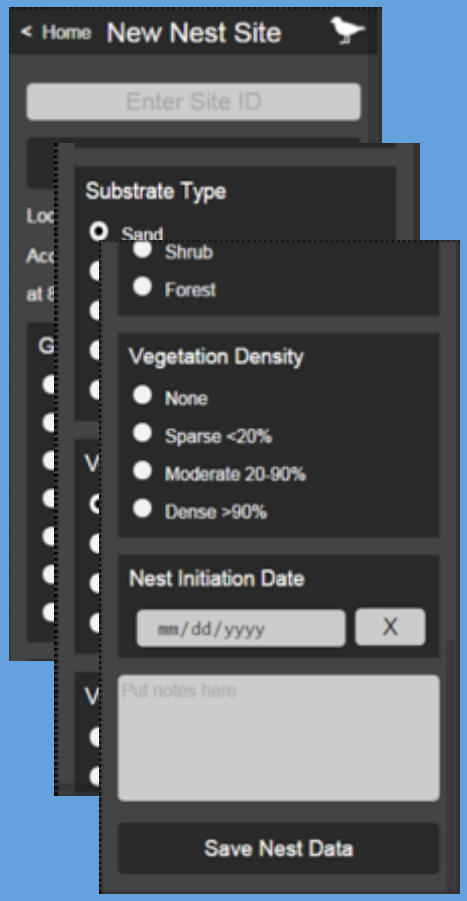
The core of iPlover consists of a few simple screens:



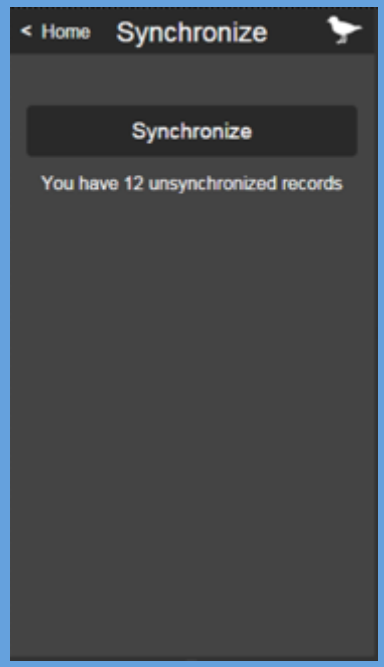
Log-in screen



Main menu



Scrolling data input screen



Data synchronize screen

When to Collect iPlover Data

Preferences:

1. Nest Points
   - Describe nest site in sync with vegetation phenology and geomorphology (i.e., as close as possible to nest initiation or full clutch)
   - Collect at the same time you are doing close nest approaches for other reasons
     - Need to minimize disturbance, predation, etc.

2. Random Points
   - More flexibility, but collect at same time as nest points to maintain consistency in vegetation and geomorphology

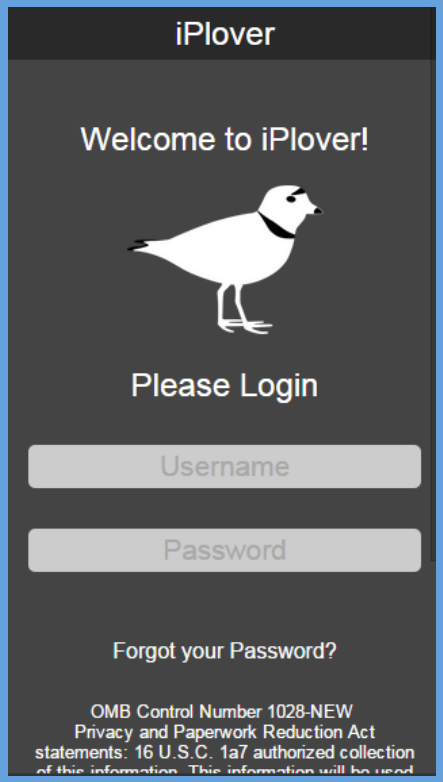
Suggested Workflow (especially for nests)

1. Open iPlover application and log-in
2. Approach nest and establish your position
3. Tap **New Nest Site**
4. Get a good GPS fix – tap **Lock Location** if good accuracy
5. Move to 5 m from nest and take picture
6. Move away from nest to complete Site ID and other data fields

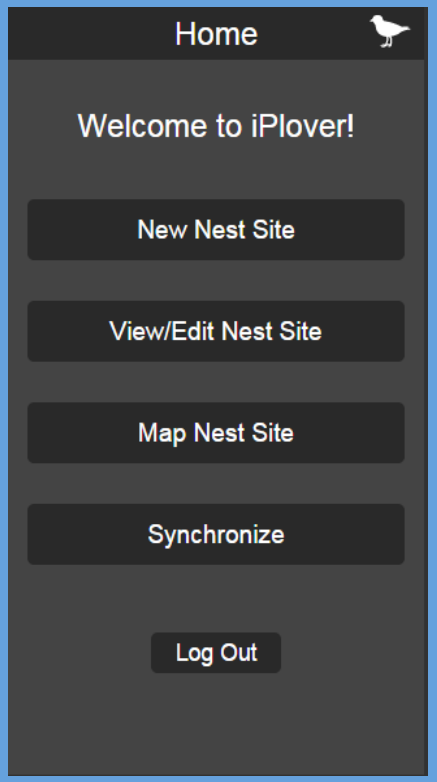
Collecting Data at Nest Sites….

Using iPlover

After finding a nest….

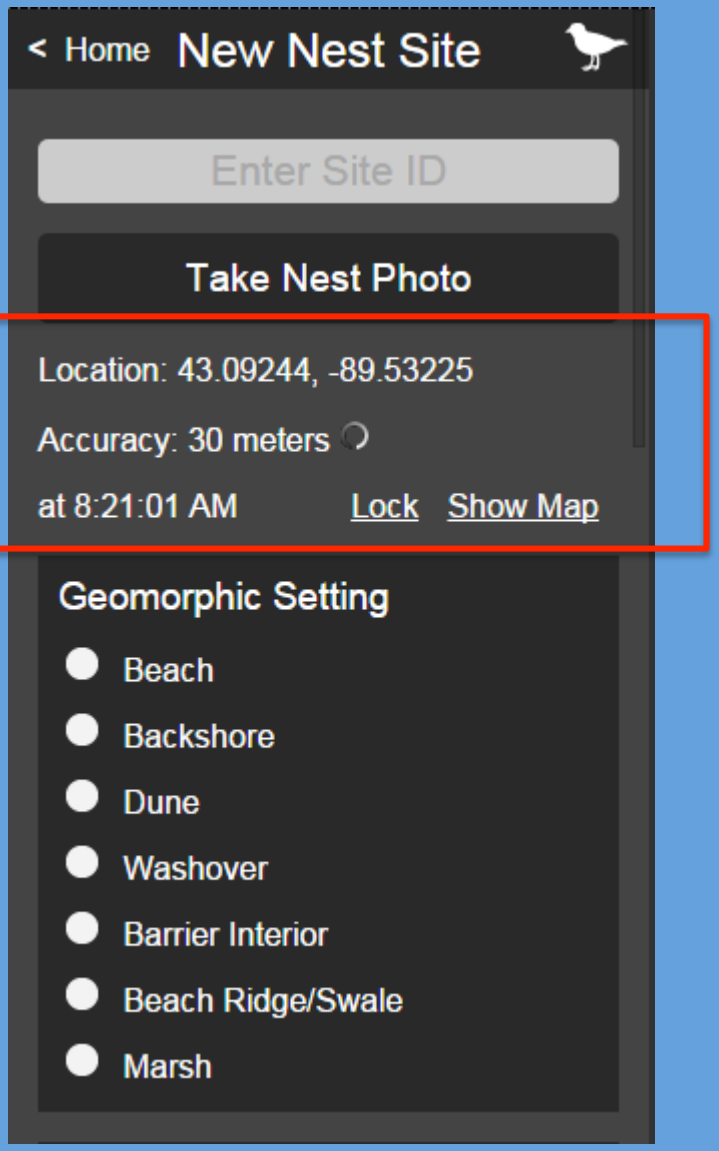


Log-in to iPlover using your personal credentials



Tap **New Nest Site** to add data specific to this nest

Site Information – Location



- Stand 1-2 m from nest
- iPlover will automatically start computing location using phone's internal GPS for 60 second
  - Accuracy should improve with time
- Tap Show Map to see map with accuracy ring
  - Ring will shrink as accuracy improves

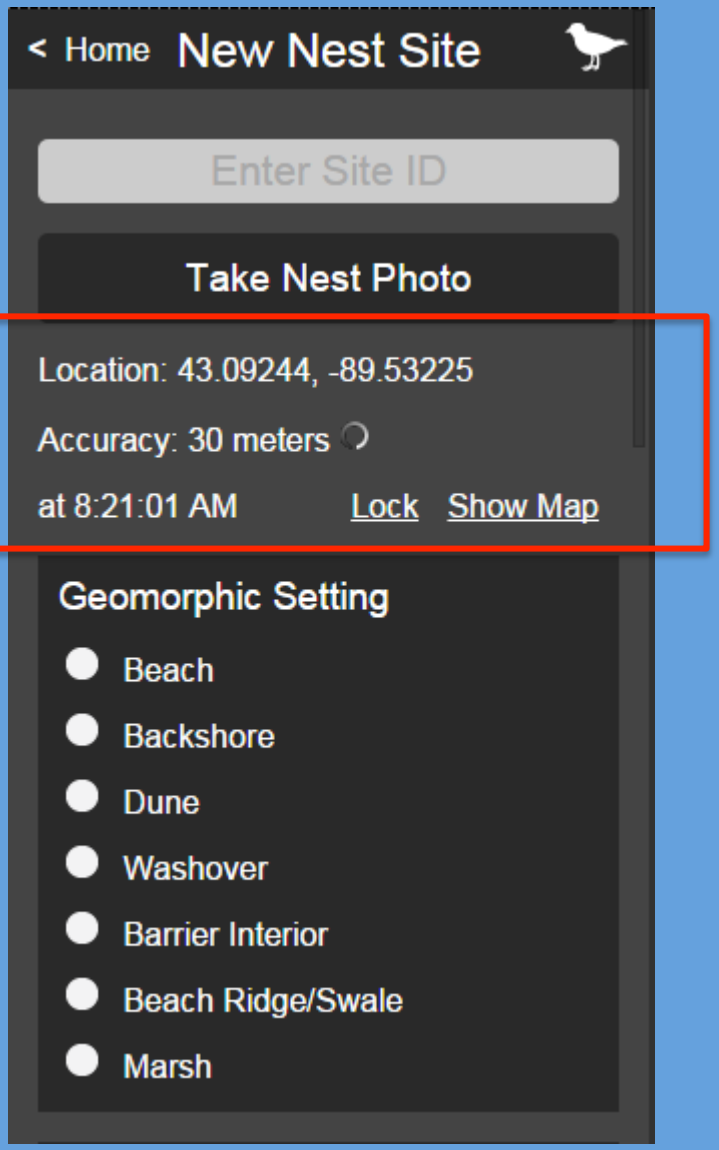
Site Information - Location

- When obtaining point location, stand 1-2 m away from the point
  - For nests - minimizes disturbance
  - For random points – for consistency

No

Yes

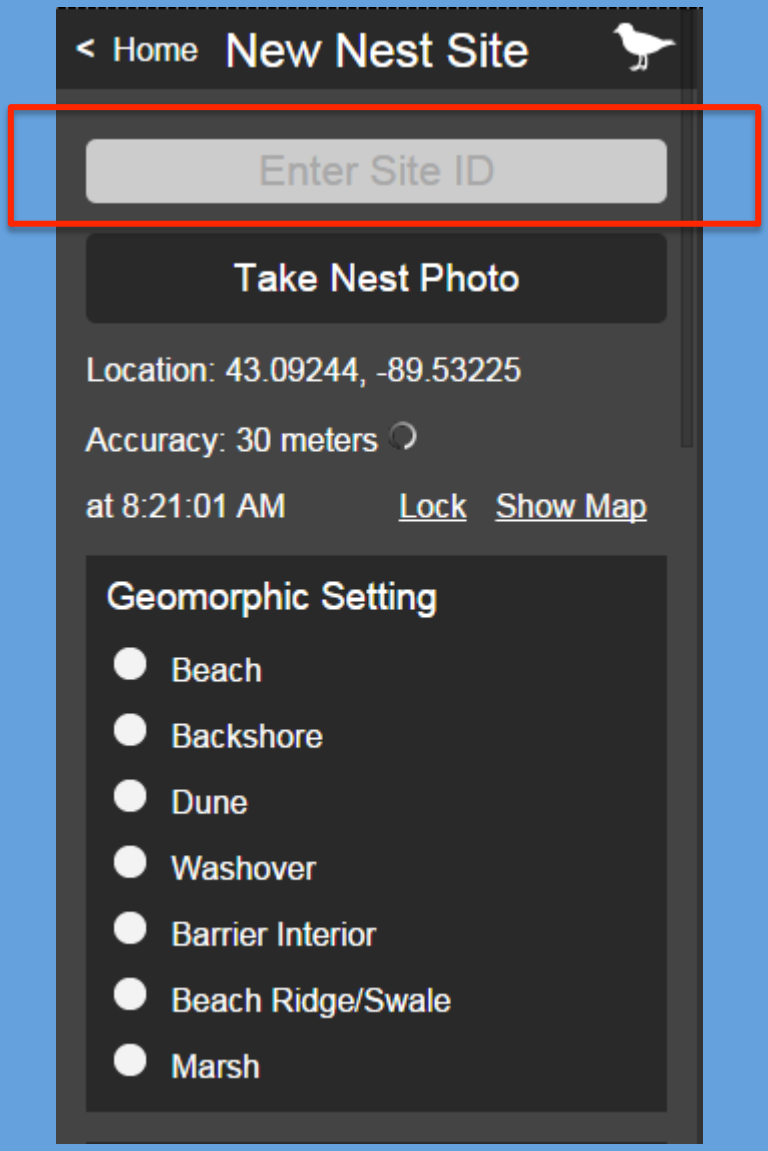
Site Information – Location



- If accuracy immediately < 5m, tap **Lock Location** to save current GPS fix
- If accuracy poor (> 15-20 m), the GPS will stop automatically after 60 seconds. If accuracy still poor, tap **Refresh** to start another 60 second attempt.
- If accuracy improves, tap **Lock Location**
- If it does not improve, move on

** After location is locked, move away from the nest to complete rest of data entry

Site Information – Site ID

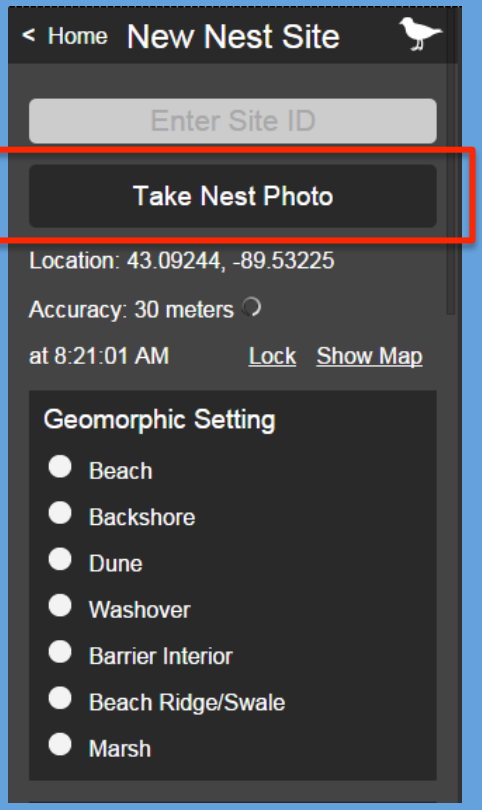


Enter a site ID:

- For nests: enter name that is based on your site's typical nest naming conventions – be consistent

Site Information – Photo

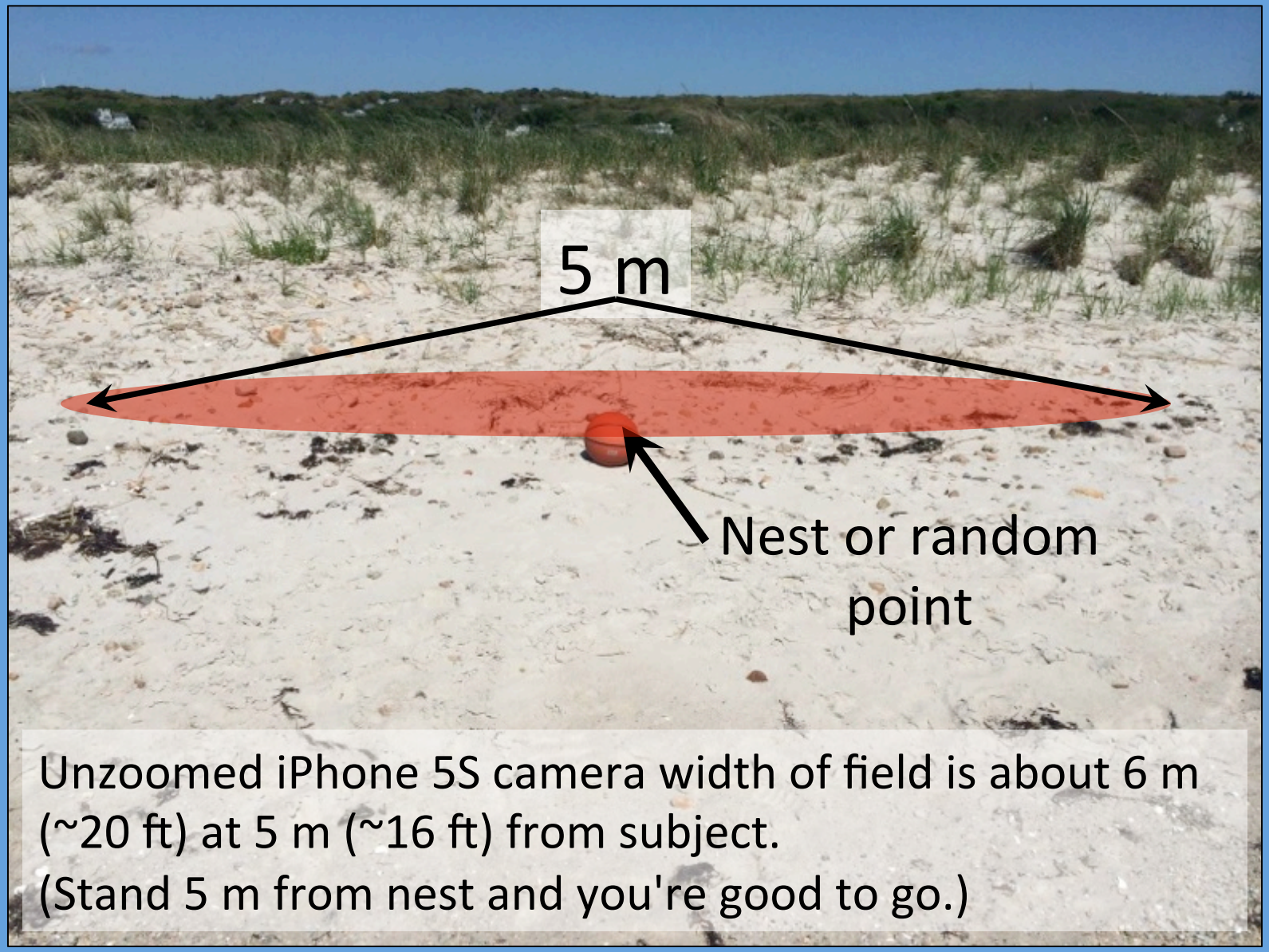
To take photo of nest or random point, first stand 5 m from the point and do not zoom the lens, then:



Tap **Take Nest Photo** to attach a photo to the site

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

Site Information – Photo



Unzoomed iPhone 5S camera width of field is about 6 m (~20 ft) at 5 m (~16 ft) from subject.
(Stand 5 m from nest and you're good to go.)

Site Information – Photo

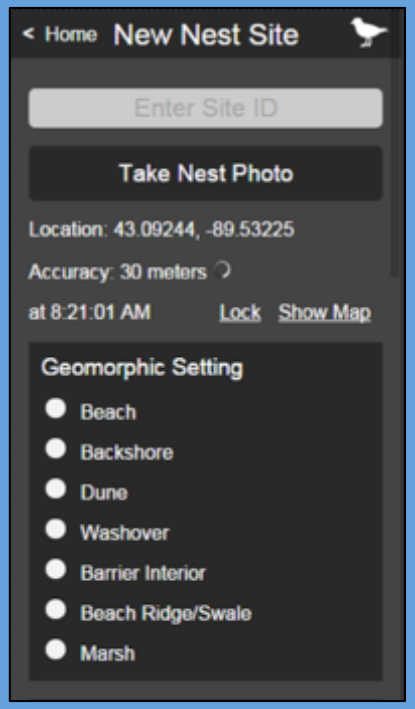
Photo Protocol:

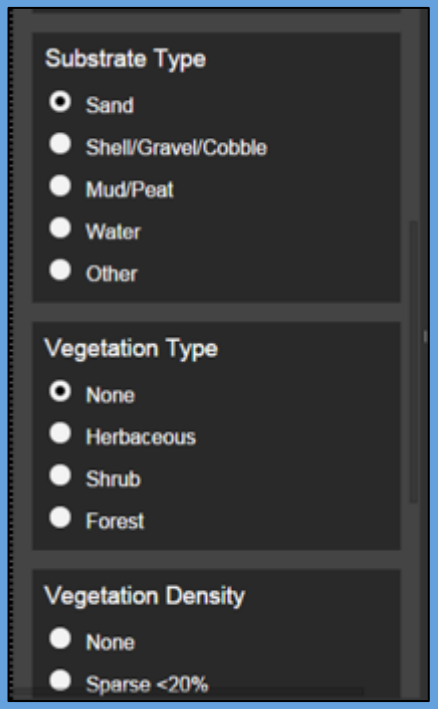
- Stand 5 m from nest or random point
- Place nest/point in center of view
- Do not use zoom
- The direction you are facing does not matter (but avoid sun)
- Avoid shadows if possible

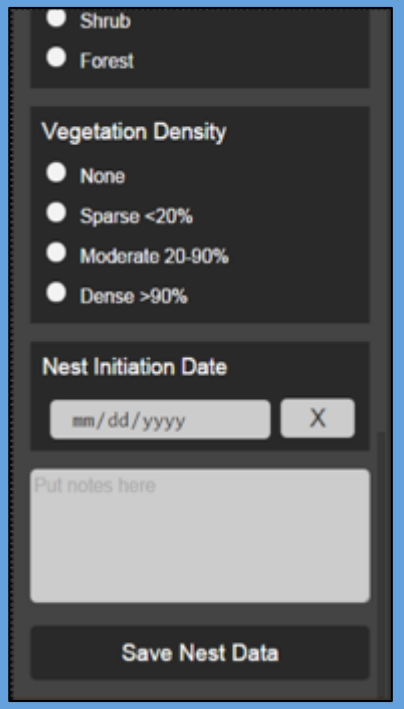
Site Information – Biogeomorphic Data Fields

For series of data fields:

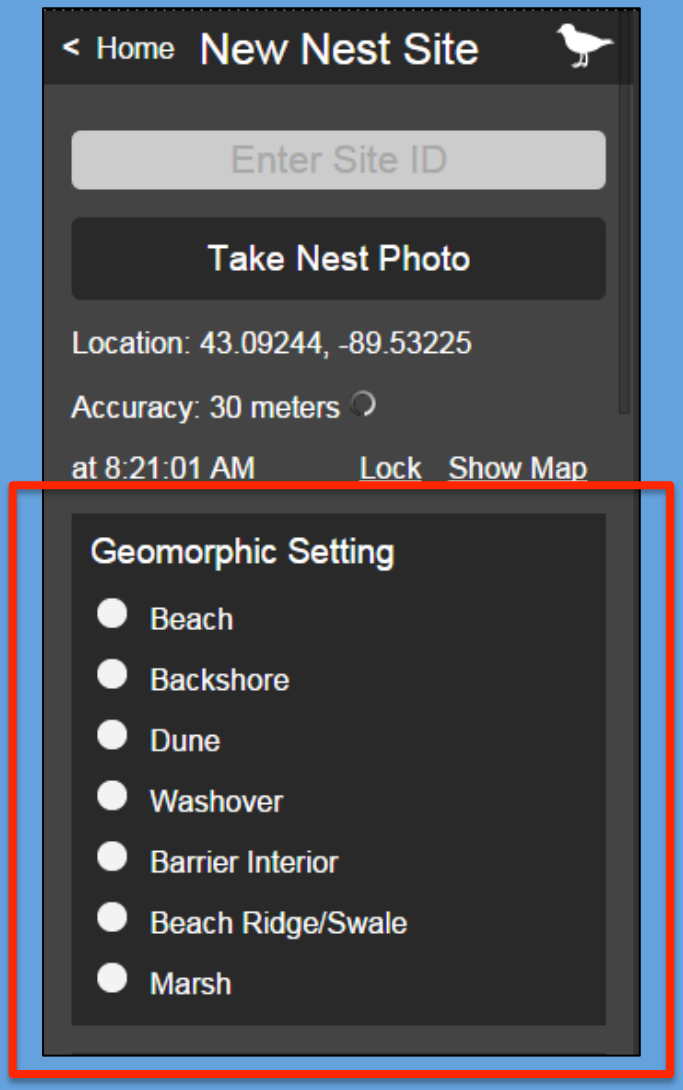
- Possible selections next to “radio buttons”
- Tap radio button to select option
- You can choose only 1
- The selected button will darken







Site Information – Geomorphic Setting



Site Information – Geomorphic Setting

Back-barrier may be mirror of ocean side

Or

May have pronounced marshes

(or some mixture of both)

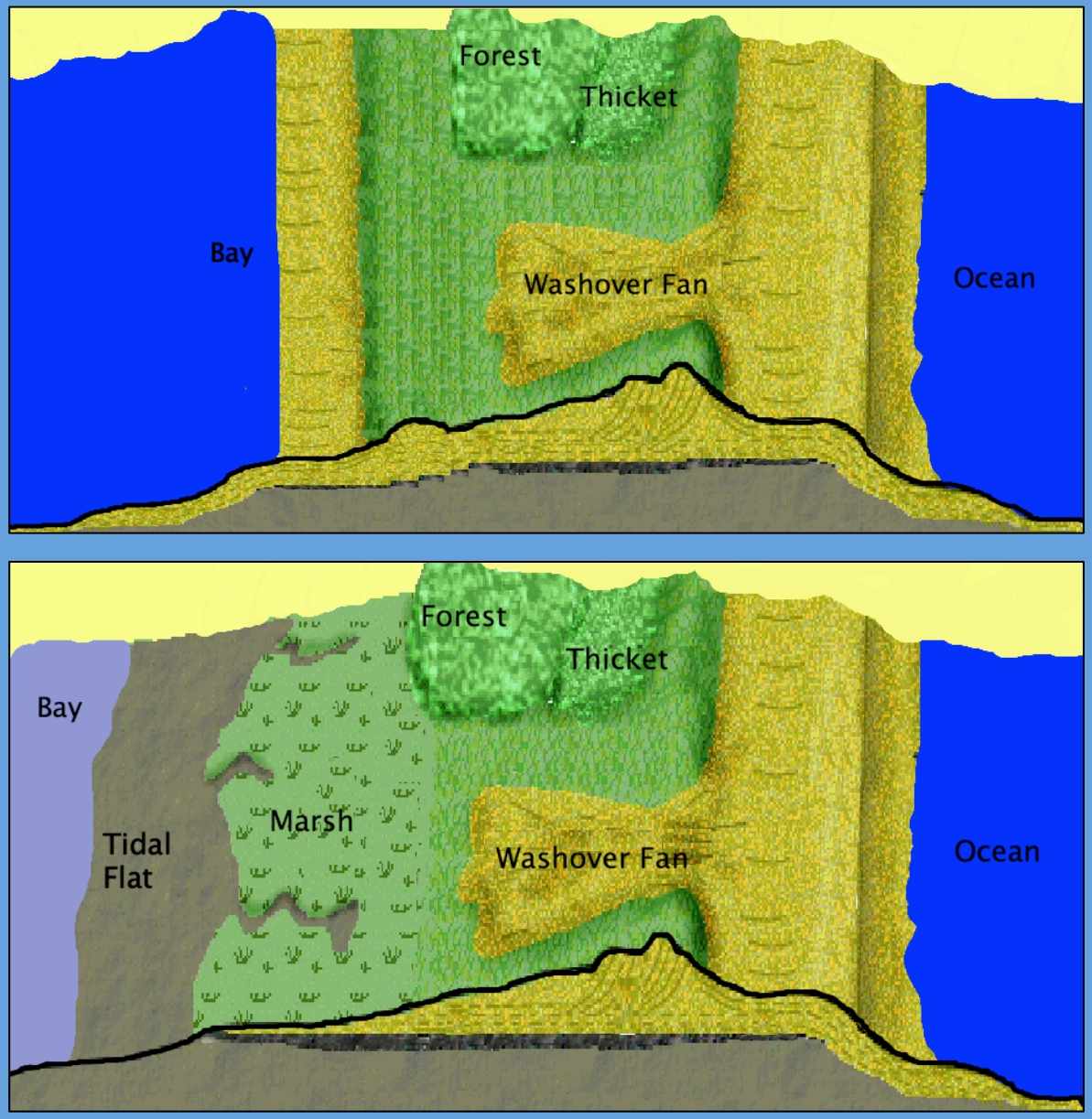


Image modified from science.kennesaw.edu

Site Information – Geomorphic Setting

Geomorphic settings for “mirror” back-barrier:

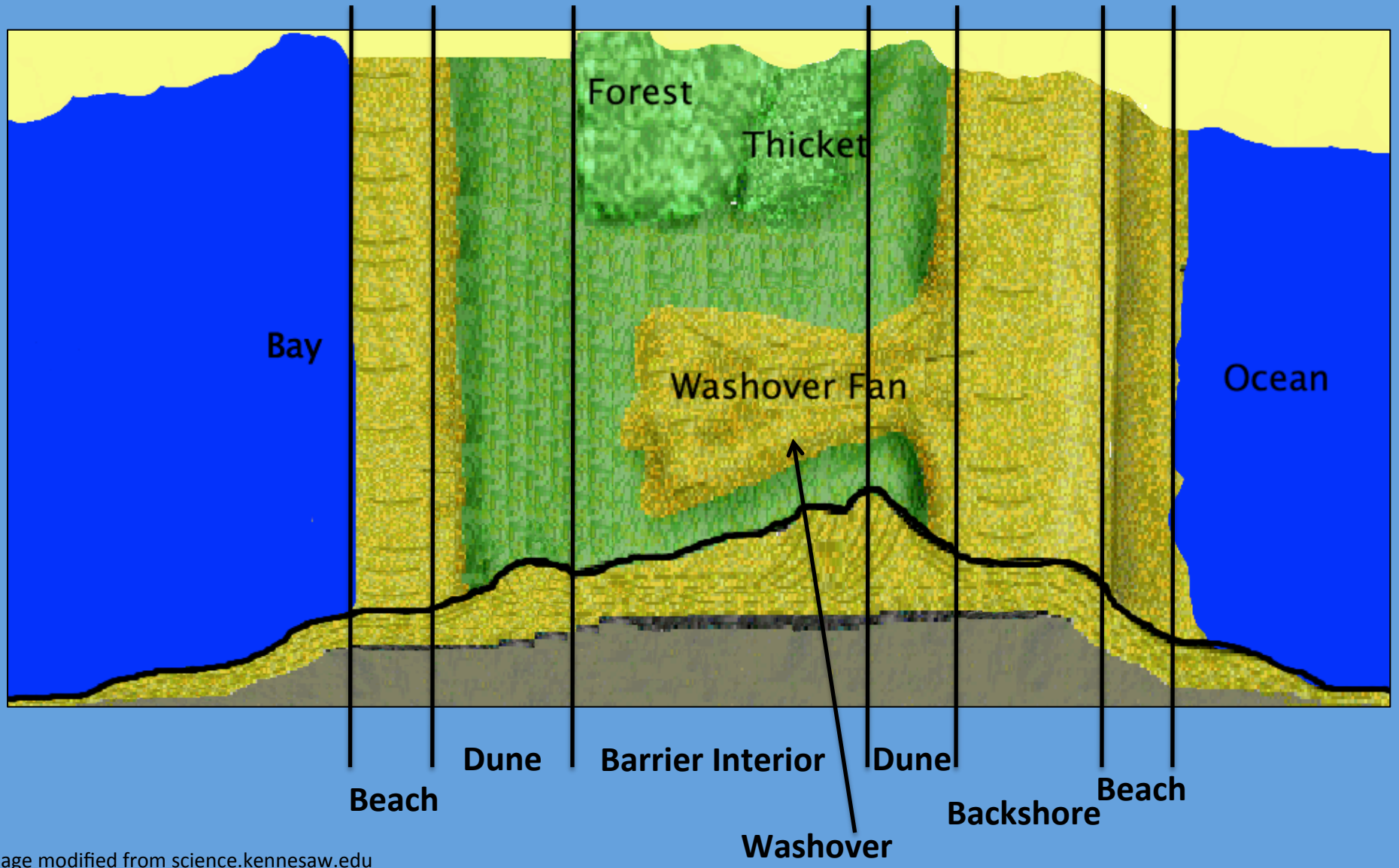


Image modified from science.kennesaw.edu

Site Information – Geomorphic Setting

Geomorphic settings for back-barrier with marsh:

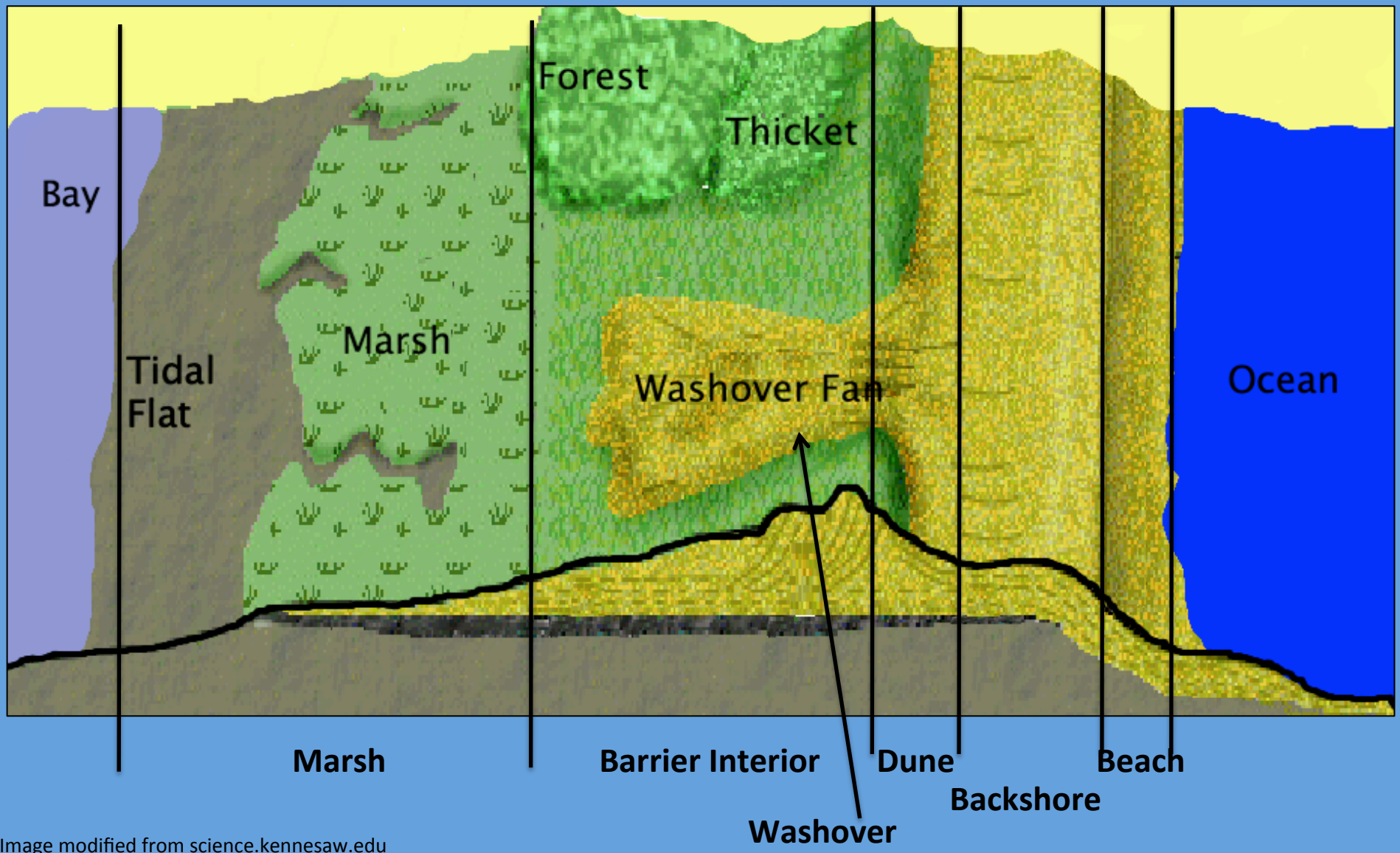


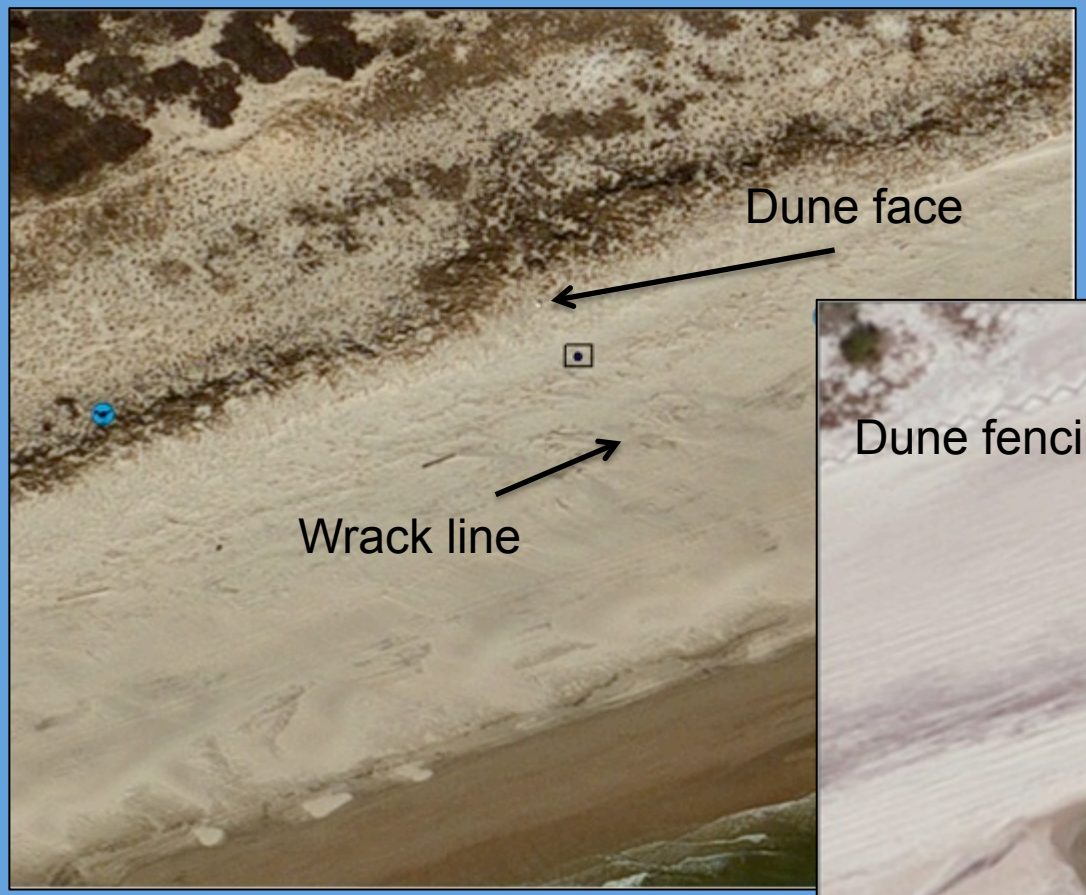
Image modified from science.kennesaw.edu

Site Information – Geomorphic Setting

- A wrack line and slight scarp separate Beach and Backshore
- Anything seaward of dune face = Backshore
- Anything landward of dune face = Dune

Site Information – Geomorphic Setting

Backshore



Beach

Site Information – Geomorphic Setting

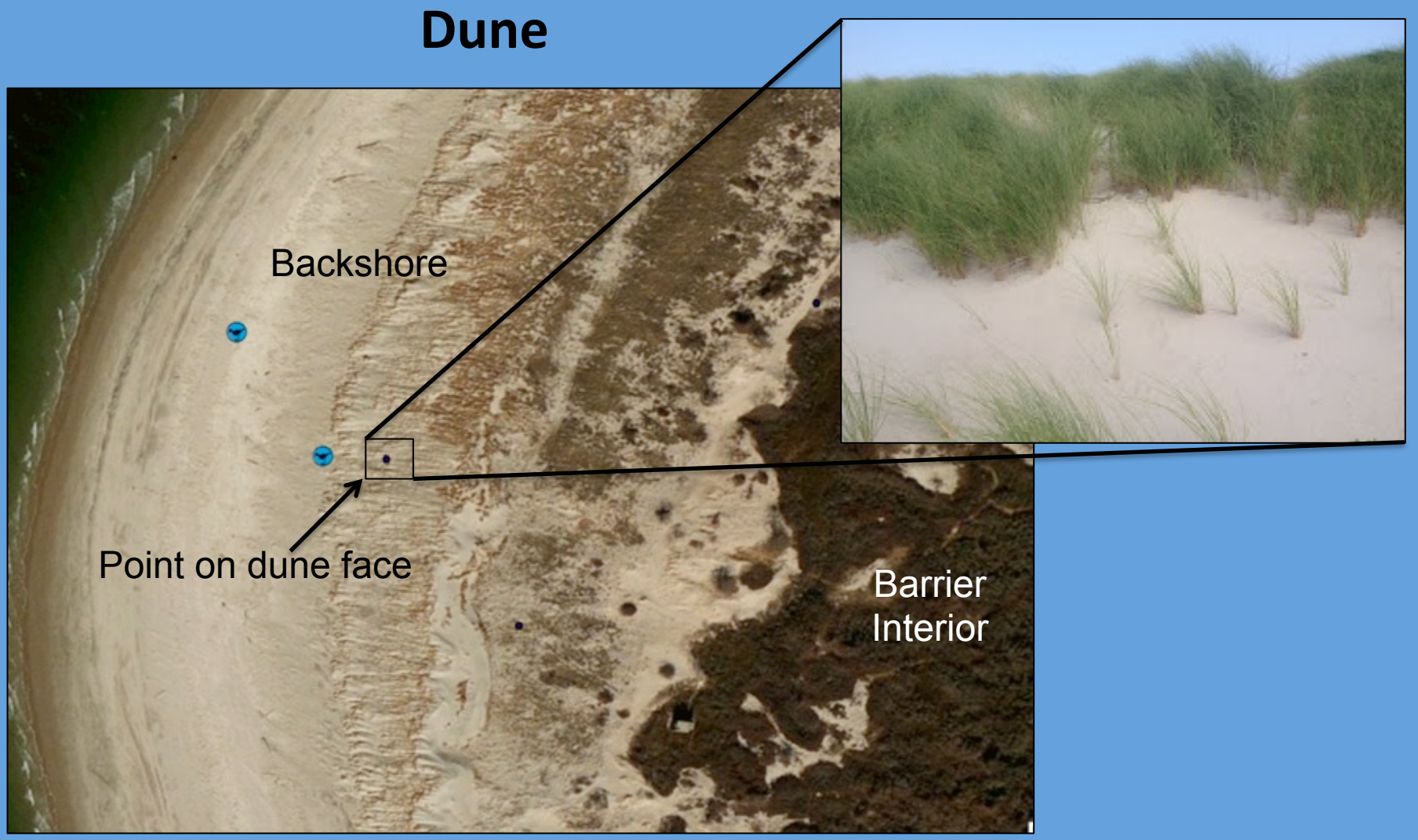
- The Beach (and sometimes Backshore and Dune) categories do not just apply to the ocean side of some barrier islands
- Use these classifications when the bay side of the barrier mirrors the ocean-side

Site Information – Geomorphic Setting

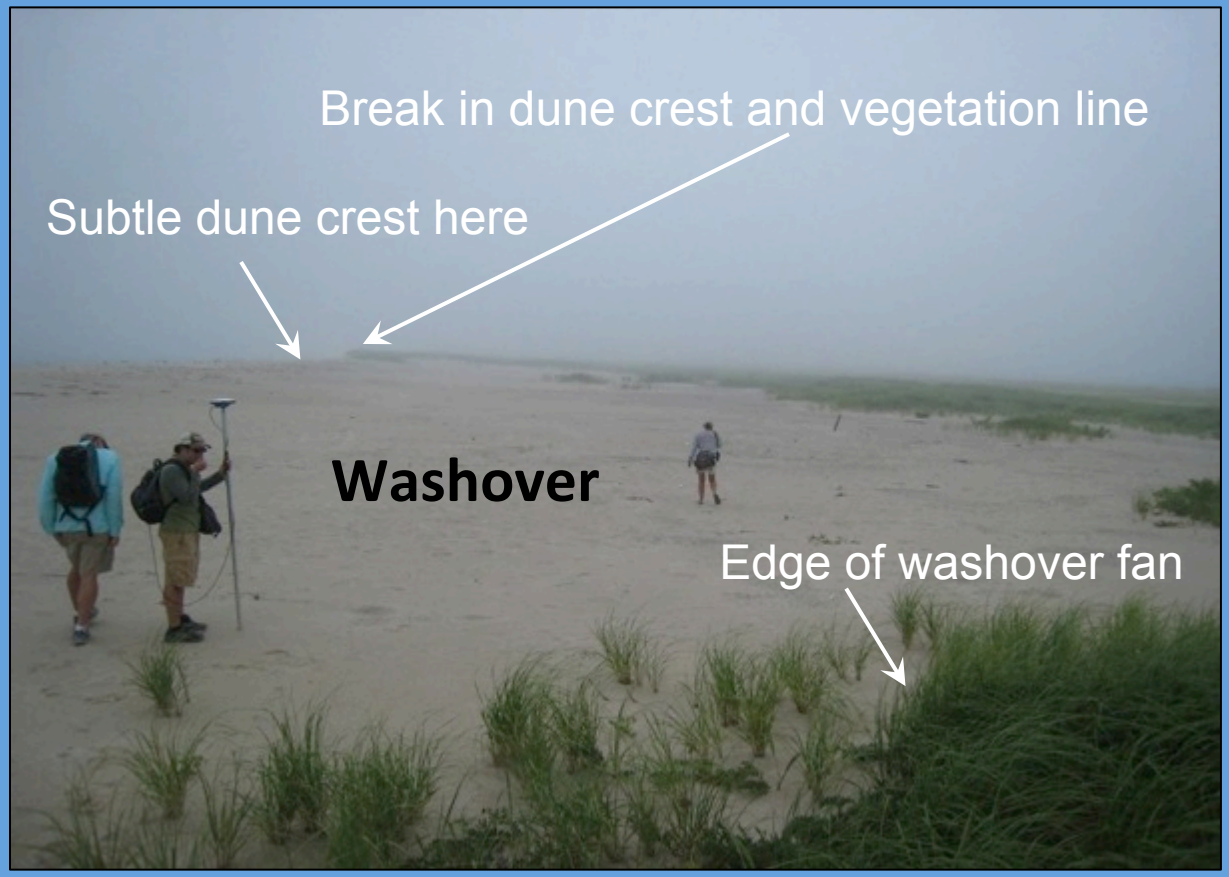
Dune

- Slight rise in elevation
- Clearly not inundated recently
- Persistent vegetation
- Evidence of wind-blown sand

Site Information – Geomorphic Setting

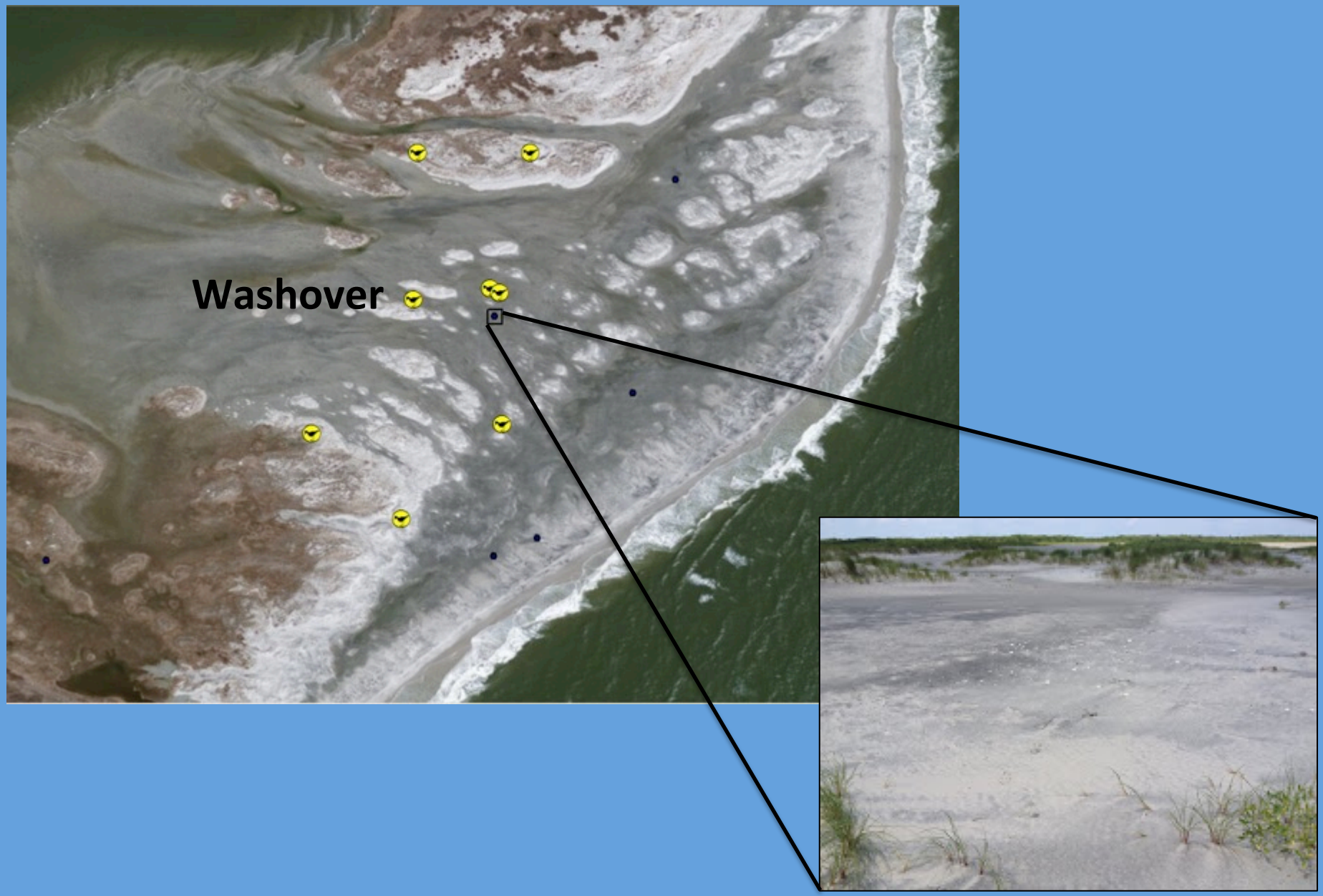


Site Information – Geomorphic Setting

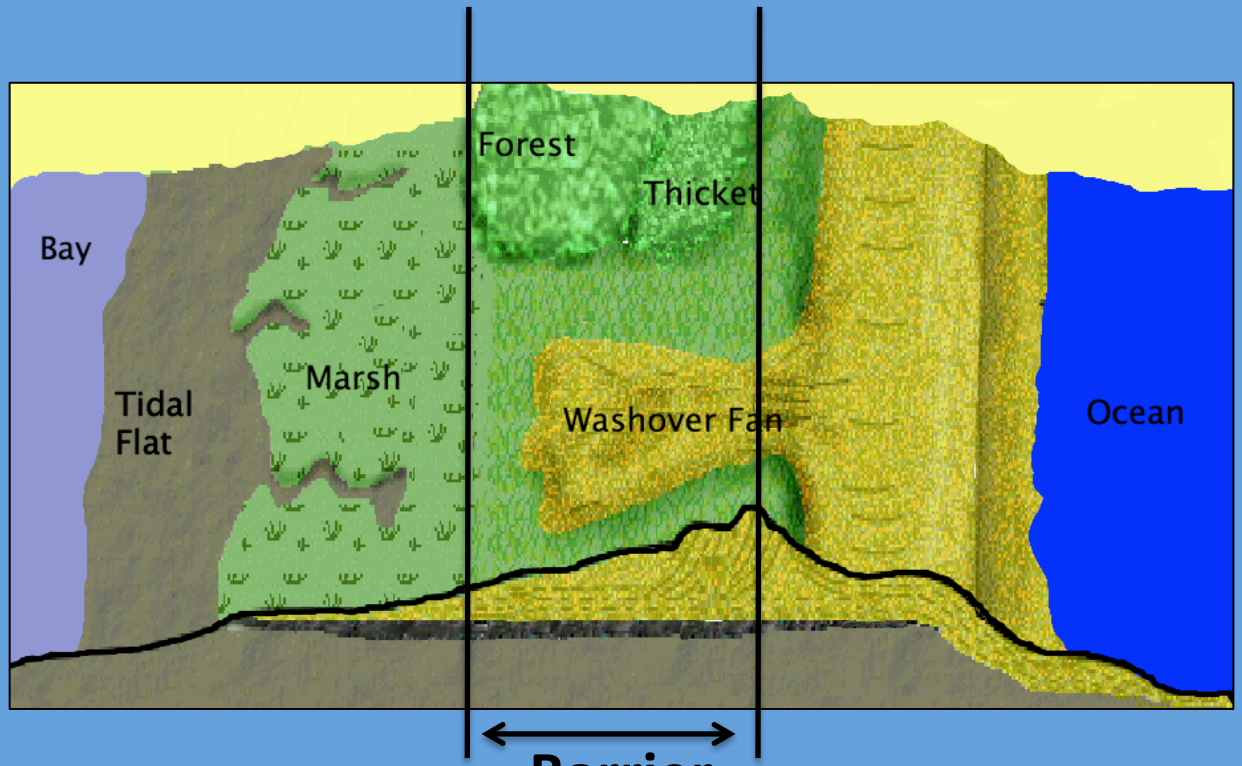


- Area where storm-induced waves carry sand and sediments from the ocean-side of the barrier through the dunes to a back-dune area
- Usually produces a fan-shape; vegetation, if any, less dense than surrounding areas
- **Washover takes priority over all other settings (e.g., if nest in washover that is also in barrier interior, select washover)**

Site Information – Geomorphic Setting



Site Information – Geomorphic Setting



- Area of barrier island that is between the dune line (ocean-side) and either the marsh or the dune line on the bay-side (but is not within a washover fan)
- Usually denser vegetation with shrubs or trees

Site Information – Geomorphic Setting

- Barrier Interior can also be open, like this low area that was recently flooded by the adjacent pond

Site Information – Geomorphic Setting

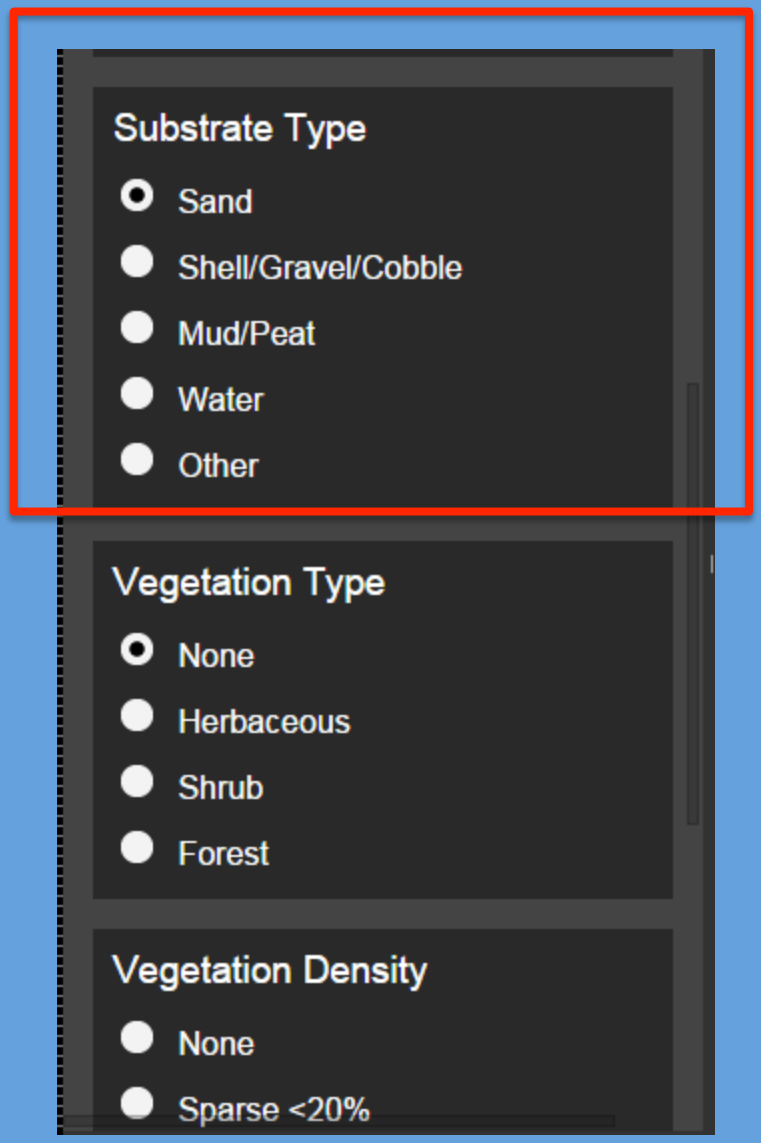
- A Ridge/Swale complex is a series of roughly parallel, sandy ridges (dunes) and low, wet “valleys” (swales) that are formed from irregular cycles of high and low water levels
- This setting is common around inlets (e.g., the Chincoteague hook) and other locations with recurved spits and dune ridges (e.g., Cedar Island or Hog Island VA)

Site Information – Geomorphic Setting

Marsh

- On back-side (bay-side) of barrier
- Usually mud/peat substrate and short, dense grasses

Site Information – Substrate



Site Information – Substrate

Sand

Shell/Gravel/Cobble

"Clean" sand, no sign of shells or cobble

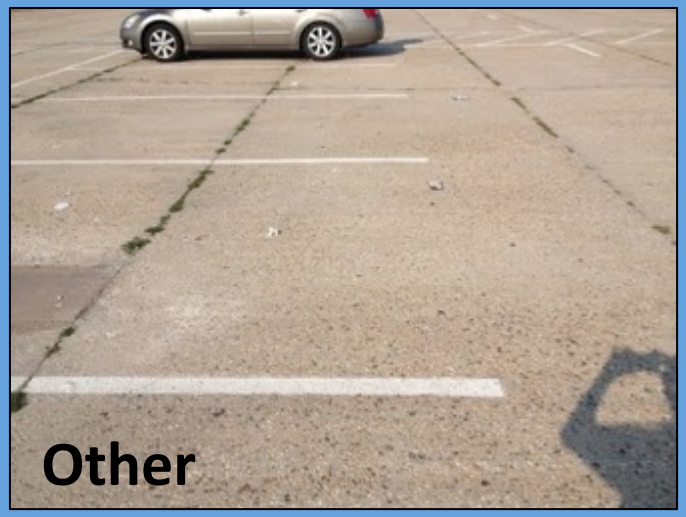
Obvious shells or rocks

Could be sandy substrate covered by grasses or pine needles

Could be sparse covering

Site Information – Substrate

* Usually substrate associated with marsh

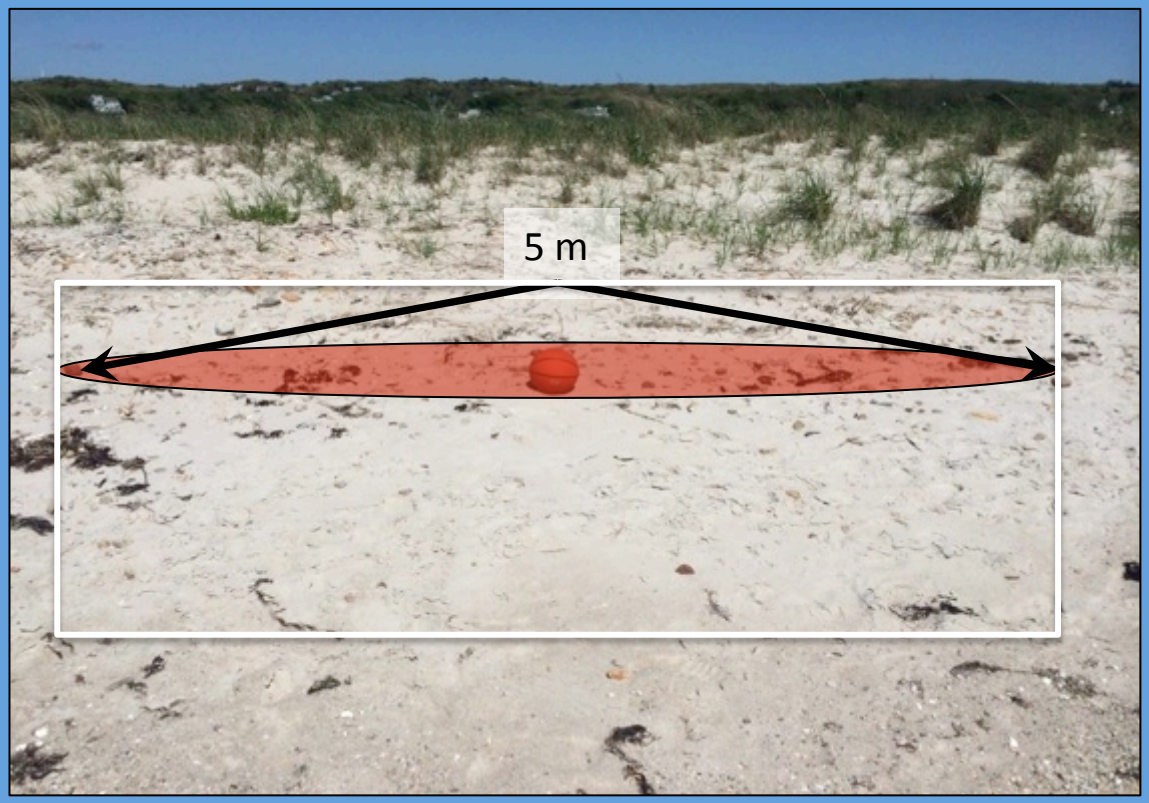


* Any other substrate type not listed
Example: asphalt

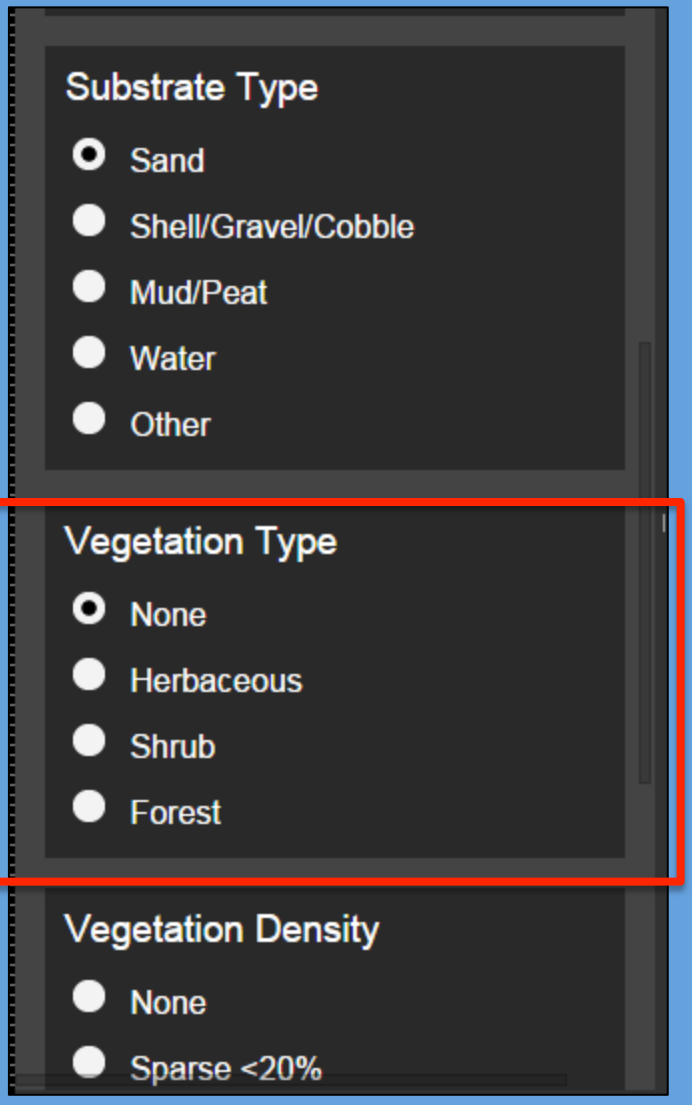
Site Information – Vegetation

- You will also need to define Vegetation Type and Density, which isn't always straight-forward

- Picture that you are looking down onto a 5 x 5 m box surrounding the nest
- Base your selections on characteristics/conditions within that box (not necessarily what is in the iPhone photo view)



Site Information – Vegetation Type



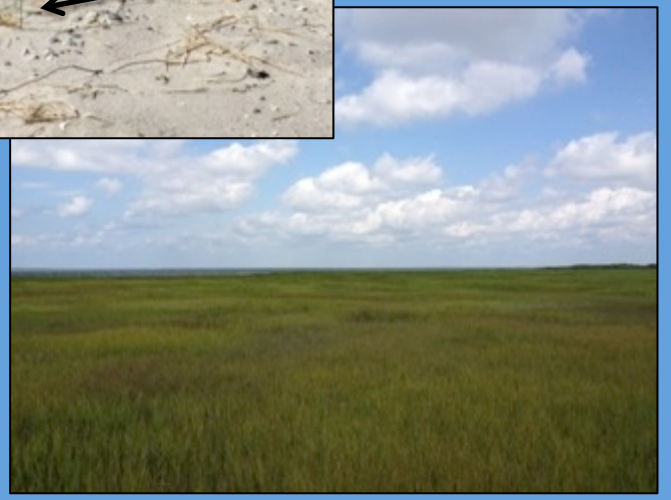
Site Information – Vegetation Type

None

* None if no vegetation within imaginary 5 x 5 m box around point

Herbaceous

* Could be very sparse vegetation



Site Information – Vegetation Type

Shrub

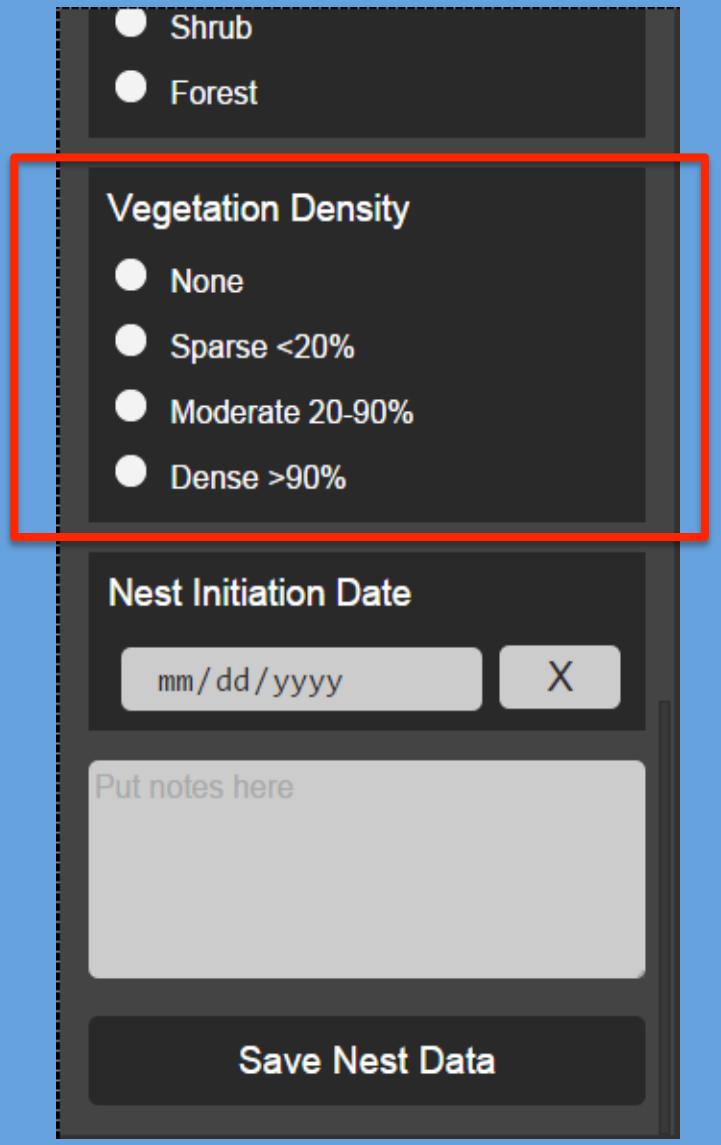
* Contains woody shrubs but not trees

Forest

* Contains trees

Site Information – Vegetation Density

Percentage associated with density refers to the percentage of the 5x5 m area surrounding the nest that is covered with vegetation



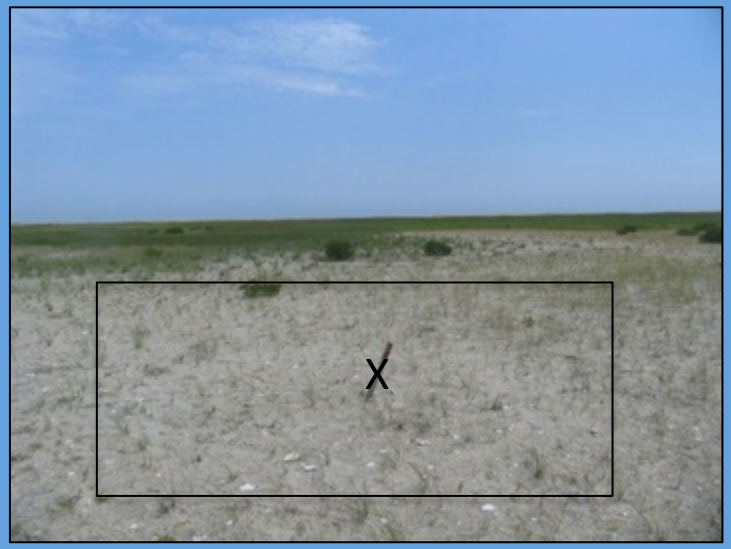
Site Information – Vegetation Density

None

Sparse

Site Information – Vegetation Density

Moderate

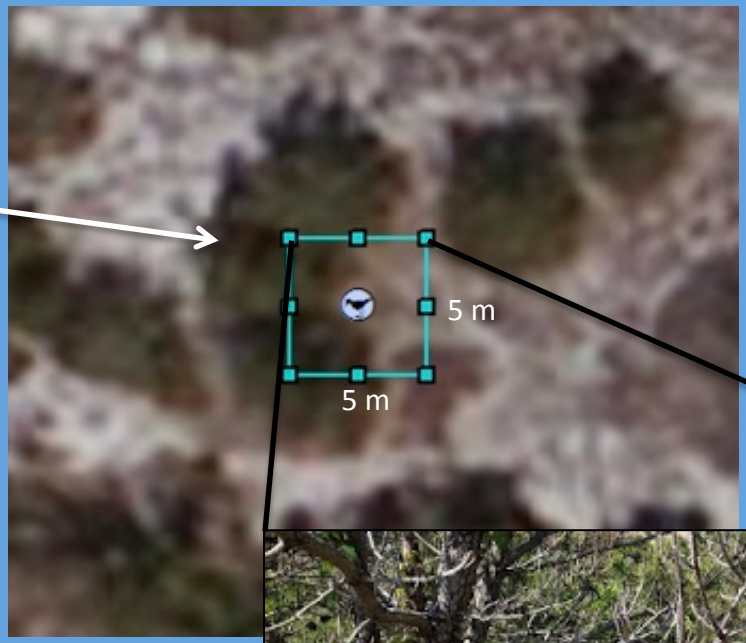


Dense

Example 1

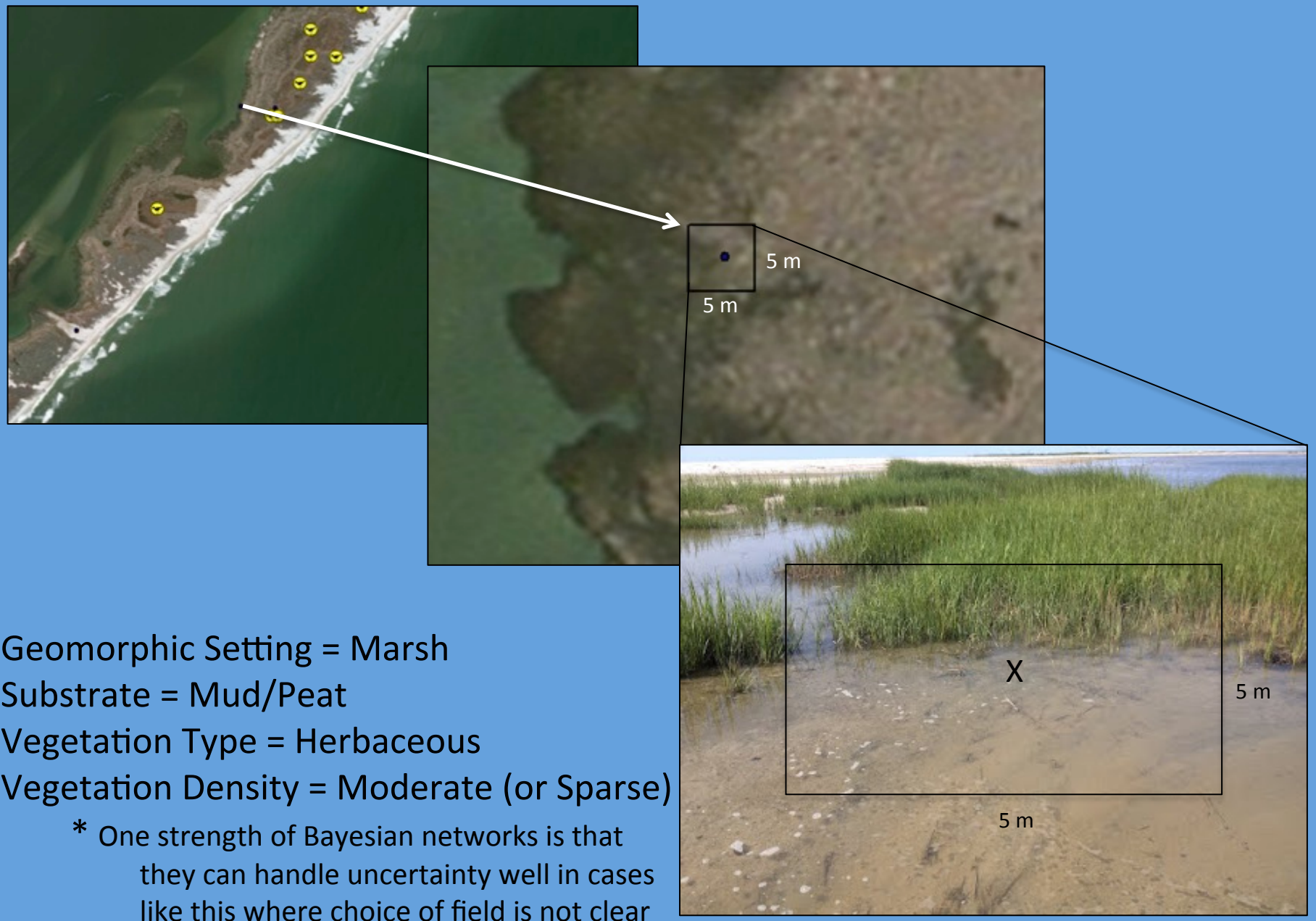
Geomorphic Setting = Dune
Substrate = Sand
Vegetation Type = None
Vegetation Density = None

Example 2



Geomorphic Setting = Barrier Interior
Substrate = Sand
Vegetation Type = Forest
Vegetation Density = Moderate

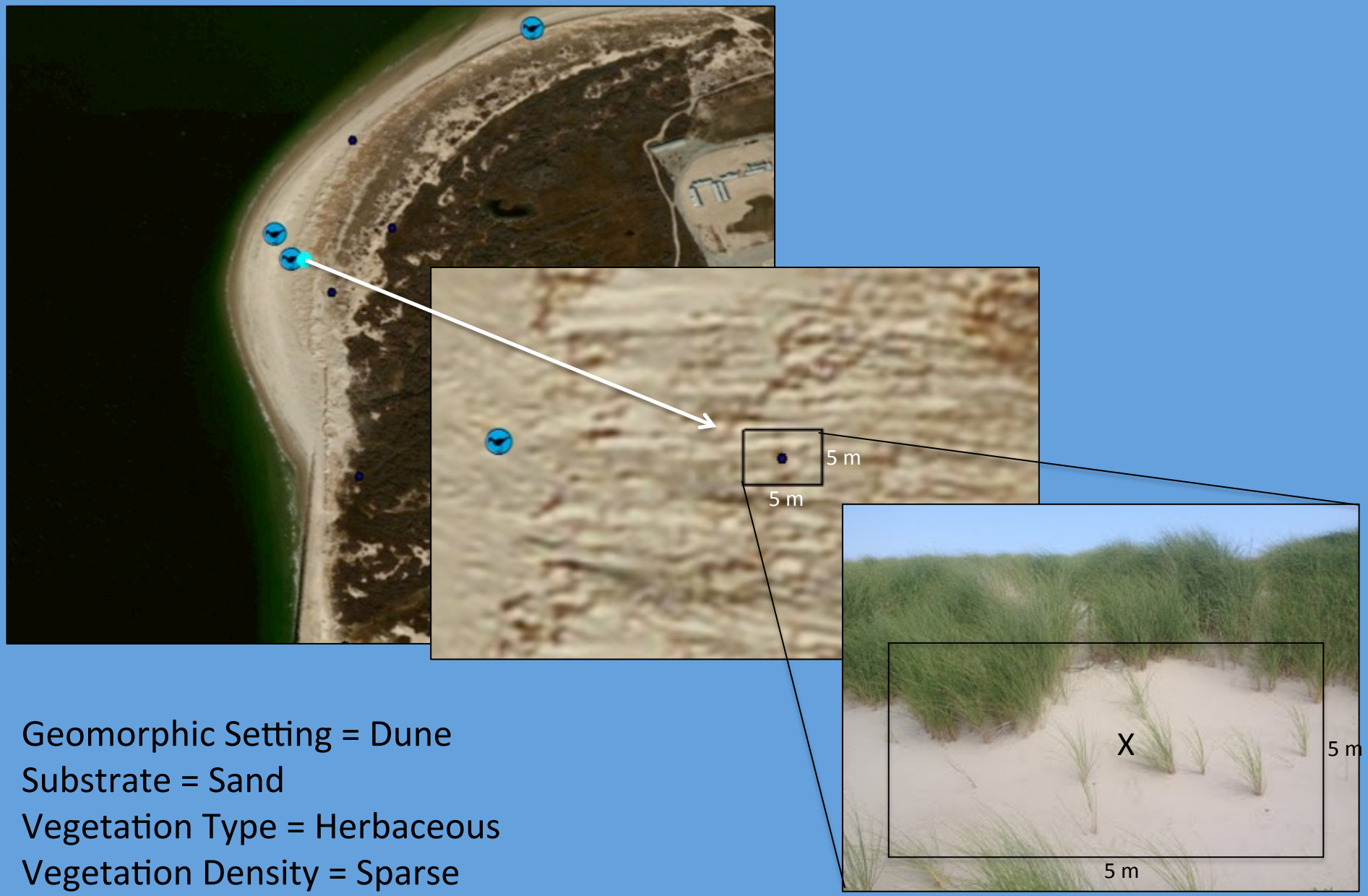
Example 3



Geomorphic Setting = Marsh
Substrate = Mud/Peat
Vegetation Type = Herbaceous
Vegetation Density = Moderate (or Sparse)

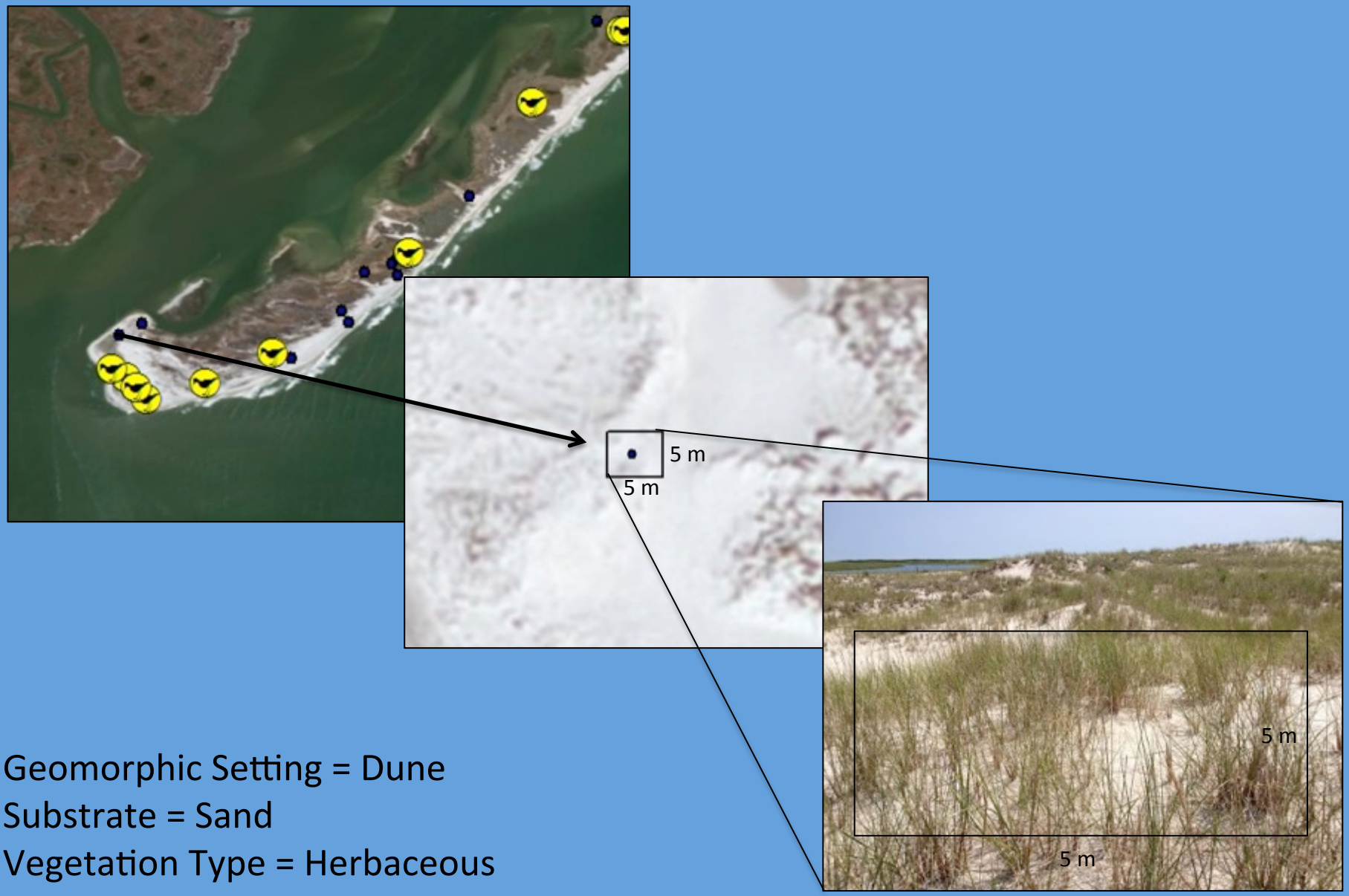
* One strength of Bayesian networks is that they can handle uncertainty well in cases like this where choice of field is not clear

Example 4



Geomorphic Setting = Dune
Substrate = Sand
Vegetation Type = Herbaceous
Vegetation Density = Sparse

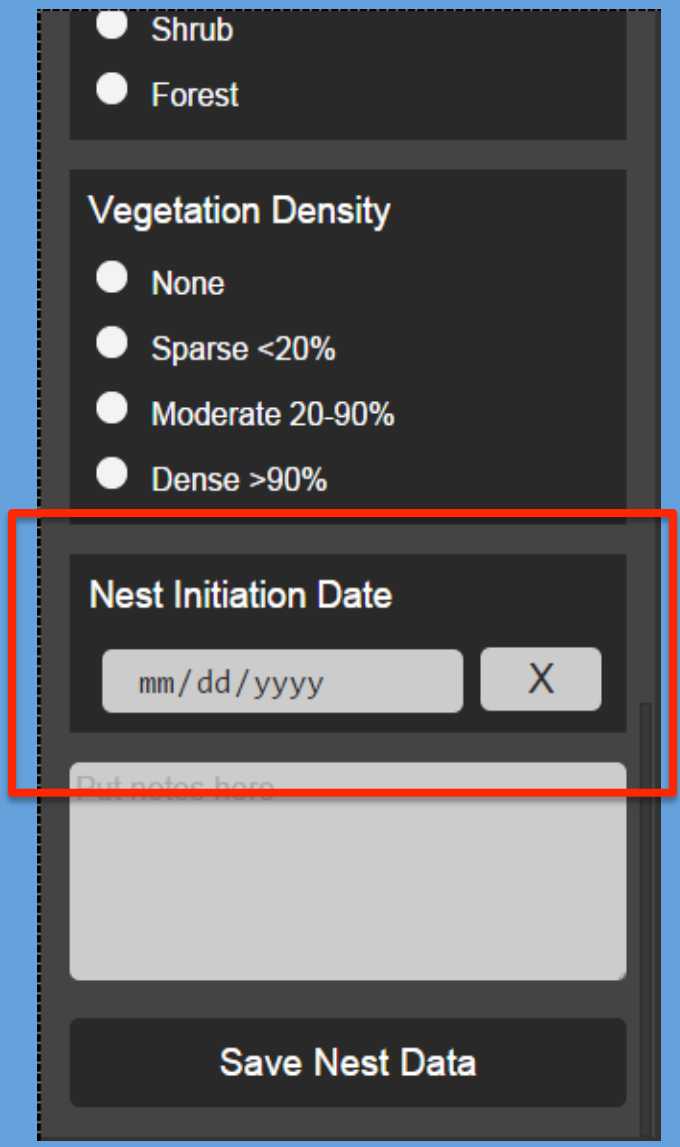
Example 5



Geomorphic Setting = Dune
Substrate = Sand
Vegetation Type = Herbaceous
Vegetation Density = Dense

Site Information – Nest Initiation

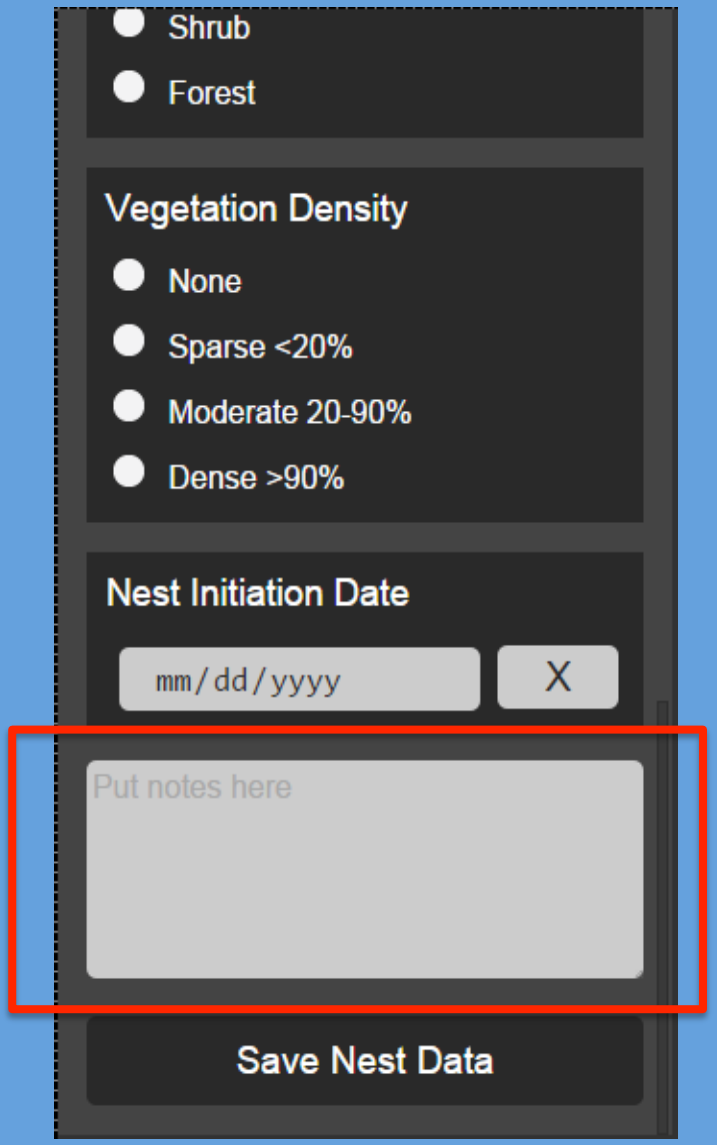
- In this field, enter estimated date for nest initiation
- If this date unknown or not applicable, leave this field blank
- If date is entered erroneously, tap the **X** to clear and re-enter date



Site Information – Notes

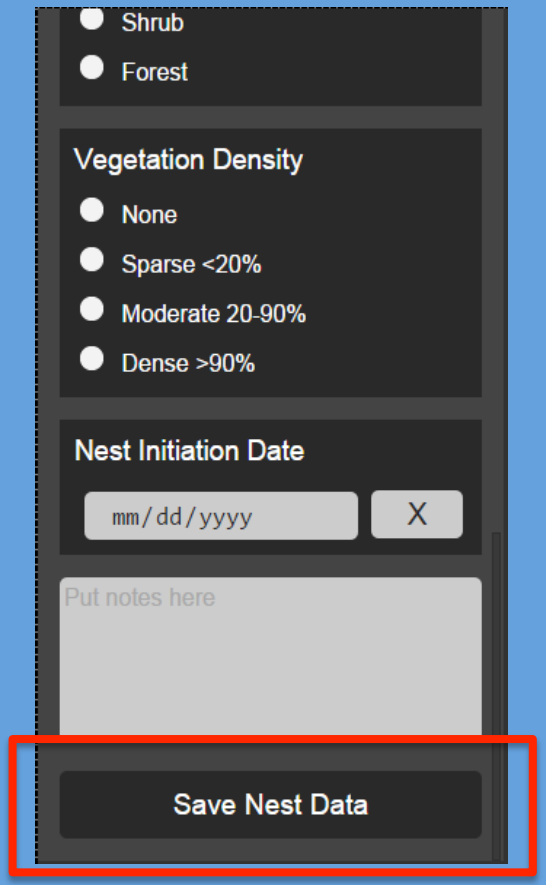
- This is a free text entry field
- Tap in the white area to bring up keyboard
- Add any supplemental information you think is important
  - Nest status (active, failed, fledged)
  - Exclosed
  - Uncertainty in observations (e.g., “This site has ~20% vegetation and could be sparse or moderate density")

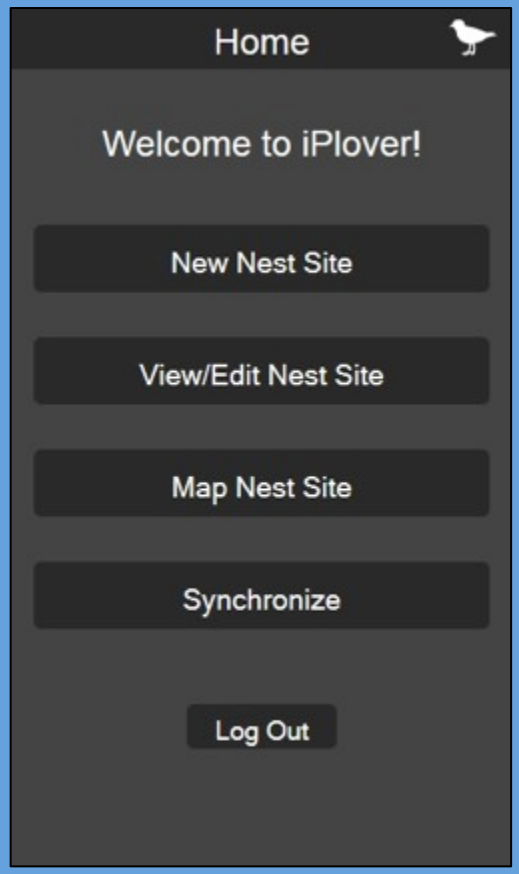
**Important: if you are collecting a re-nest, indicate “re-nest” in the notes field



Site Information – Save

- After all data fields have been added or selected, tap **Save Nest Data**
  - Saves data locally on the iPhone
- The app checks to make sure you entered all required data
- Returns you to home screen

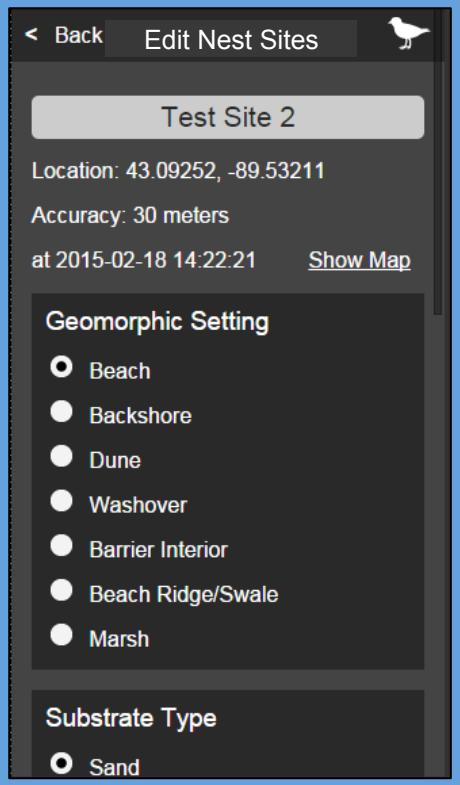


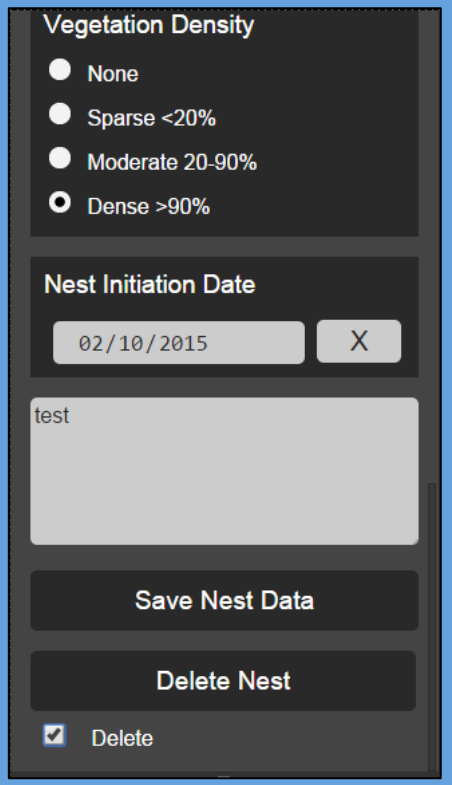


Additional iPlover Options - Editing

- After a random or nest point is “collected” (and even uploaded), it can be edited

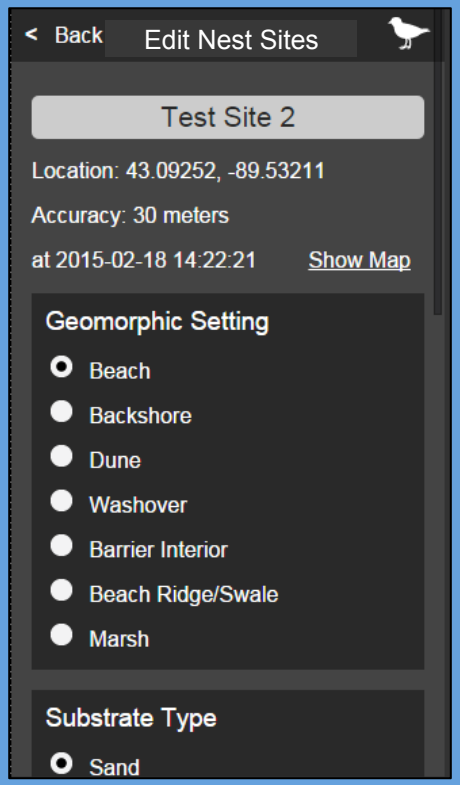
- Go to Main Menu and tap **View/Edit Nest Si**te
- In the next screen, select the point you would like to edit
- You will then be taken to that point’s data collection screen where you can edit your previous selections or delete the point

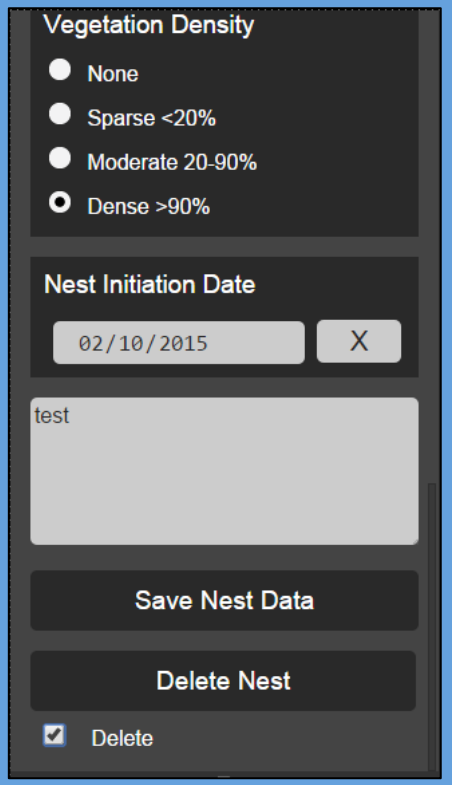




Additional iPlover Options - Editing

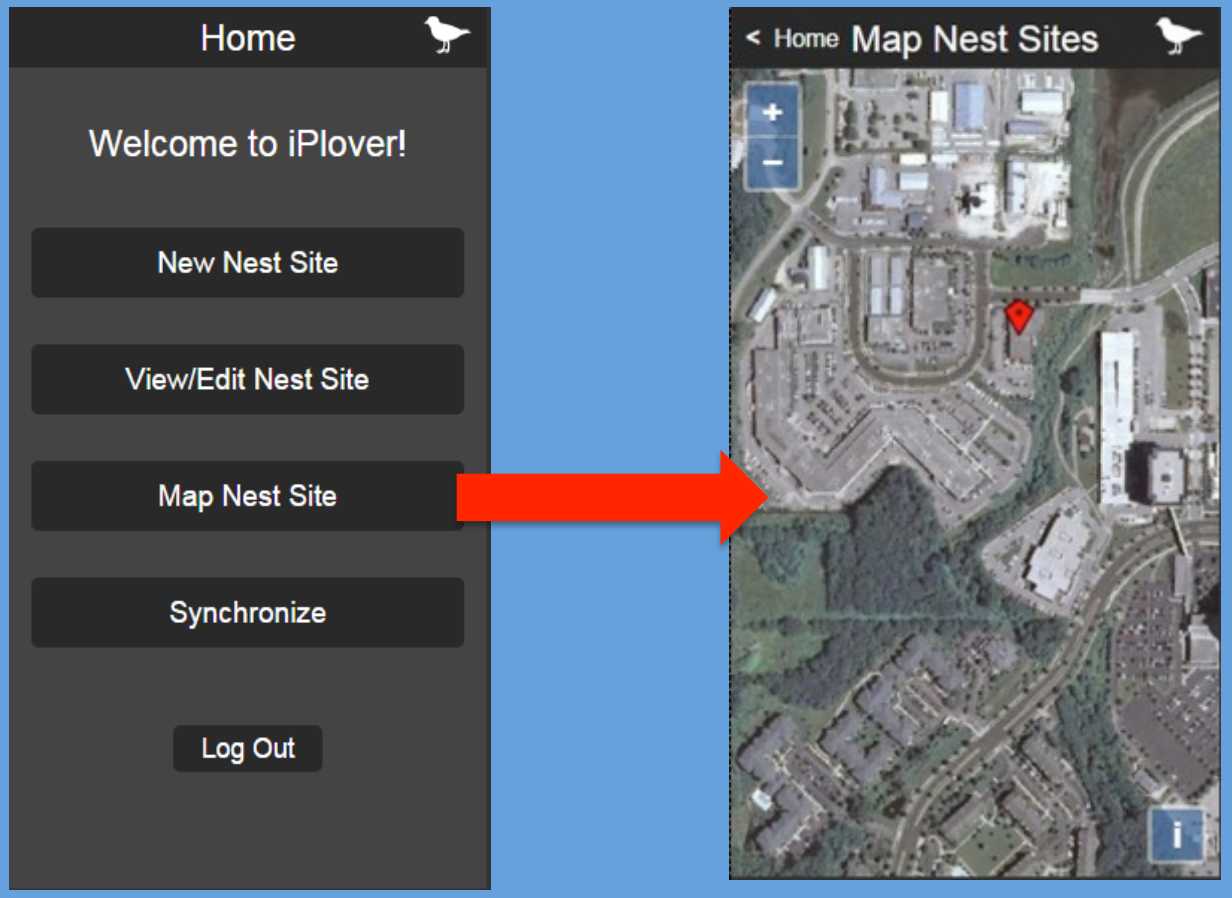
- Can be edited: Site IDs, site characteristics (anything with radio button), Nest Initiation Date, and Notes
- Cannot be edited: photos and GPS coordinates
  - If these things need to be edited, you must delete the record and start over





Additional iPlover Options

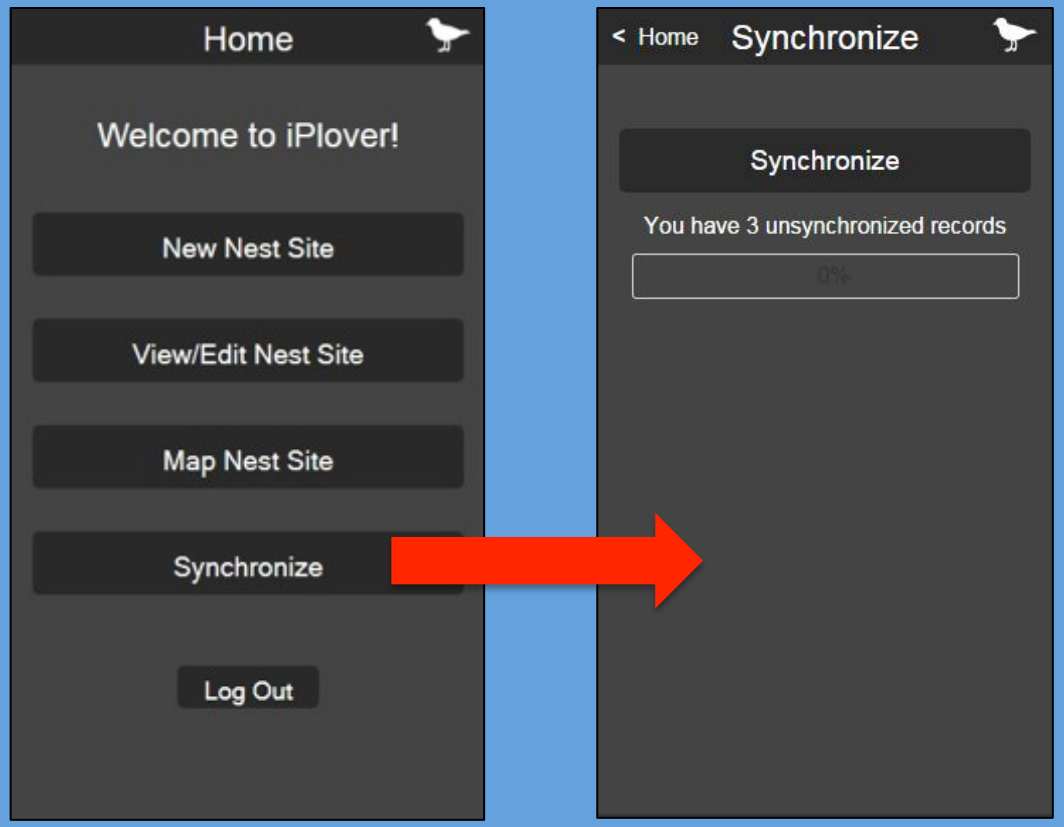
- On Main Menu, tap **Map Nest Site** to see a map of all previously collected nest and random points (both for your site and others)
- Can be used to prevent duplication of nest/random point collection



Upload Data to USGS

- When you have completed data collection for the day, go to the iPlover home screen and tap **Synchronize**
- In the next screen, tap **Synchronize** to upload all unsynchronized data onto the cloud, and download nest site data from other users in your group

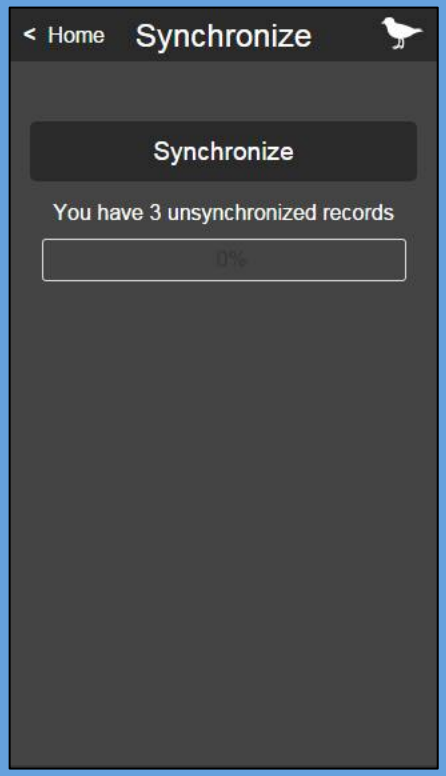
- As data synchronize, the progress bar will expand
- When all records have been synchronized, a message will appear to let you know the process is complete.



Upload Data to USGS

Important considerations about synchronizing:

- Protect your data by synchronizing at the end of the day (or when on lunch break, etc.)
  - Unsynchronized data will be lost if something happens to your phone
- Data will take longer to upload when number of unsynchronized records large
- Data can be synchronized in field, but we recommend waiting until on a wireless connection to reduce phone data usage
- Only synchronized data can be “seen” by other users on your team
  - Prevent data collection duplication by synchronizing and checking what others have done
- Synchronized data can still be edited




Collecting Random Points….

Creation of Random Points

- 2 sets of random points will be created for your use in the field
  - Primary random points dataset
  - A Backup random points dataset

- Primary random points dataset
  - Same number of random points as plover nest points observed in previous year
  - Points randomly located within the boundaries of a given site
  - Each random point given unique identification that differentiates it from other random points and plover nest points

- Backup random points dataset
  - ~10 extra random points created within site boundaries
  - For use when conditions prevent you from accessing a primary random point
    - The primary random point should be disregarded and a backup random point should be collected in its place
  - Each backup random point given unique identification that differentiates it from other random points, primary random points, and plover nest points

- Random points shapefiles can be exported as KML/KMZ files that can be uploaded in the GPS Kit application on your project iPhone

Upload Random Points

- Sara Zeigler will create random points files for you and send via email

- You can then load those coordinates onto a separate GPS unit or load them into a GPS app on your iPhone
  - Example, we used the iPhone app GPS Kit in 2014
  - However, beware - this app will cost $10 and reimbursement may be difficult if a gov cc not used

- See supplemental slides at the end of this file for instructions for using GPS Kit

Navigate to Random Points

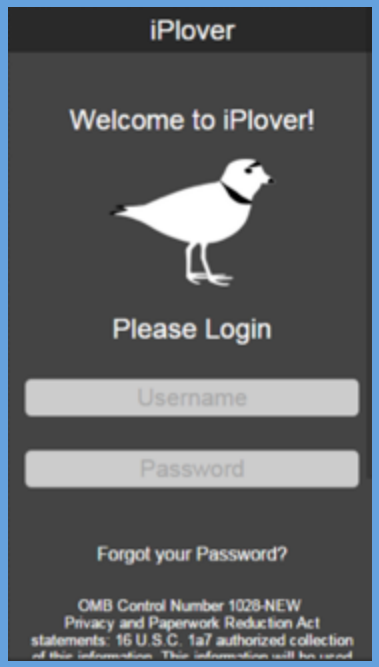
- Use GPS Kit or other GPS device to navigate to each primary random point

- HOWEVER, if it is not possible or safe for you to access a primary random point, discard that point and collect data for the nearest backup point instead
  - (but we do need points that characterize all settings on the island – so get into those barrier interiors if you can!

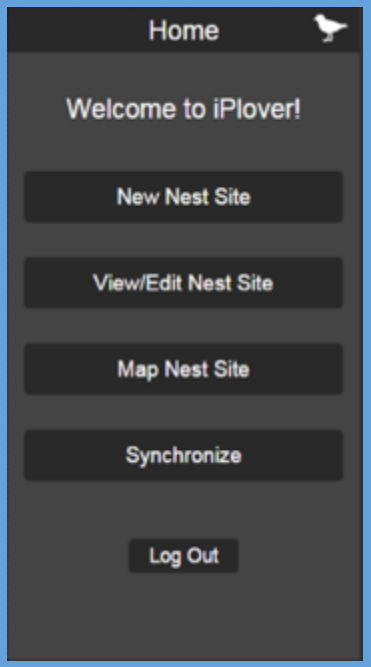
* An actual random point in 2014 was just beyond this sign. I used a backup point!

Collect iPlover Data

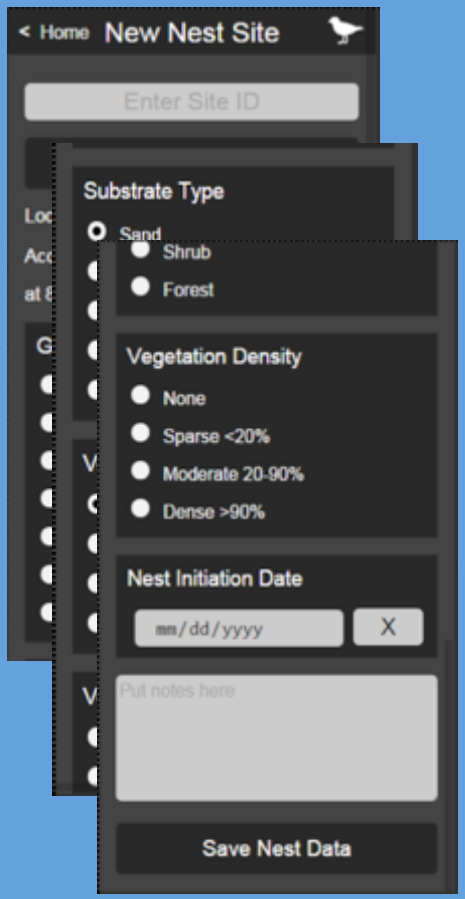
- Follow identical protocol for collecting nest data – treat the random point's coordinate as you would a nest



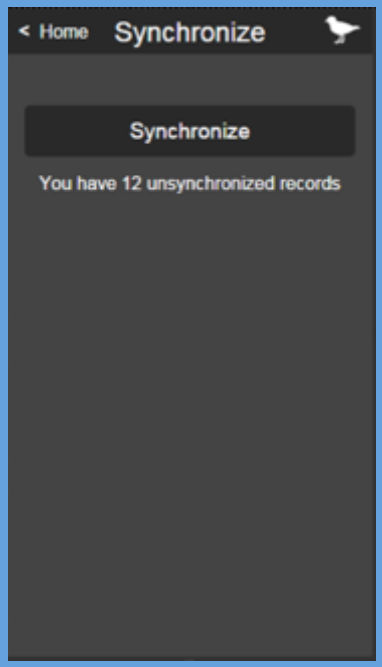
Log-in screen



Main menu



Scrolling data input screen



Data synchronize screen

Other Random Points Considerations

- For Site ID: use name associated with specific point in original GIS file (name should show up in GPS unit)
    - Need to differentiate random points from nest points
- Nest Initiation Date not applicable (tap **X** nest to this field)
- Random points data do not need to be collected at same time as nests
    - But collect as closely as possible for consistency in barrier island conditions

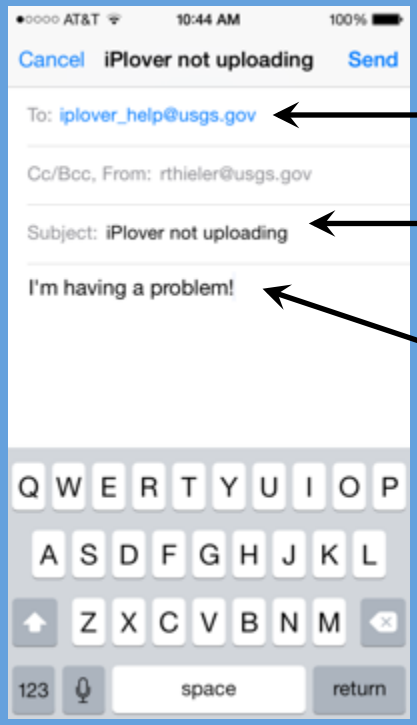
Practice Makes Perfect

You can practice with the app

- Any site that starts with the word “test” 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

Sara Zeigler (USGS), 540-750-3879 (cell)
- technical support questions, field description questions
- 9a-5p EST, M-F

Rob Thieler (USGS), 508-922-7108 (cell)
- Any question or complaint
- 9a-5p EST, M-F

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

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?

Thank you for your participation!

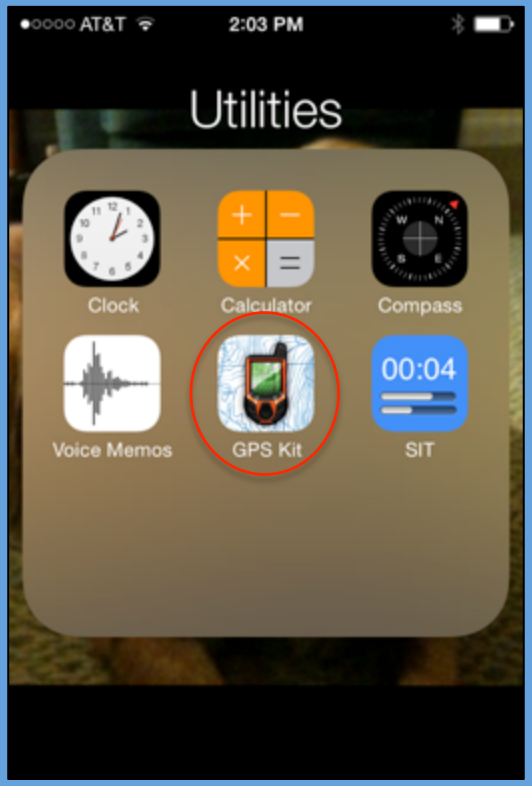
Supplemental Information

iPhone GPS Unit

- Download the GPS Kit application from the Apple App Store onto your project iPhone

- A user's guide for this app can be found
  http://gpskit.garafa.com/GPS_Kit/User_Guide.html

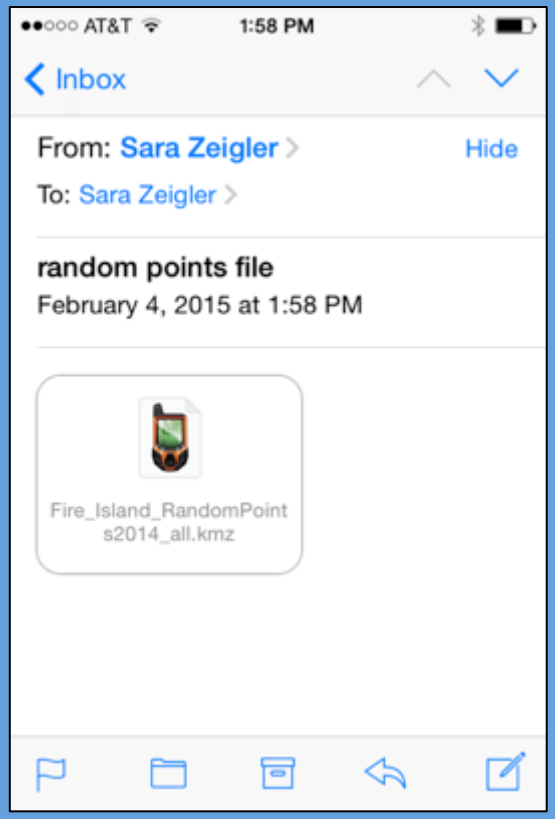
(Alternatively, a GPS unit of your choice can be used)

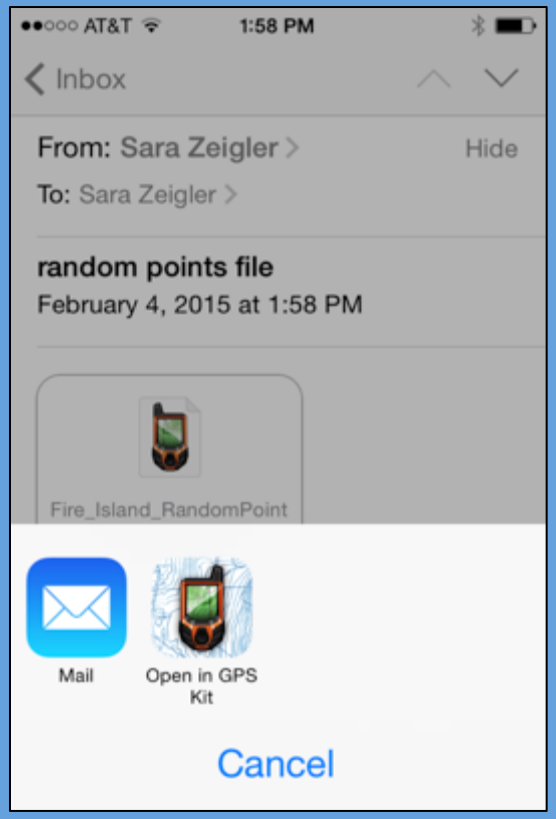


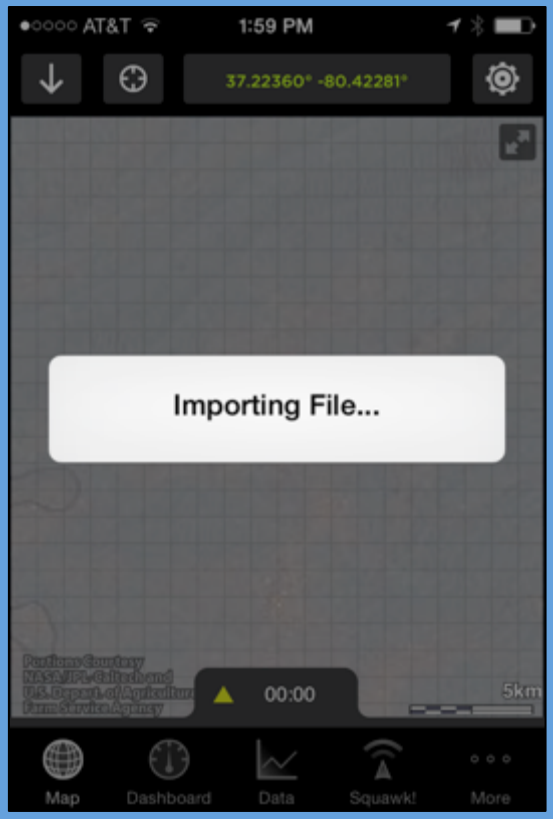
** Recommendation: using GPS Kit and iPlover will drain your iPhone's battery quickly. Make sure you go out into the field with a fully charged phone and recharge whenever possible (e.g., in truck, from an external battery, etc.)

Upload Points in GPS Kit

- Points can now be uploaded into the GPS Kit for use in the field
  - Open the random points email from Sara Zeigler containing the KML/KMZ files using your iPhone's email application
  - Click on the attachment and then click "Open in GPS Kit" in the window that appears
  - The points will automatically upload in GPS Kit



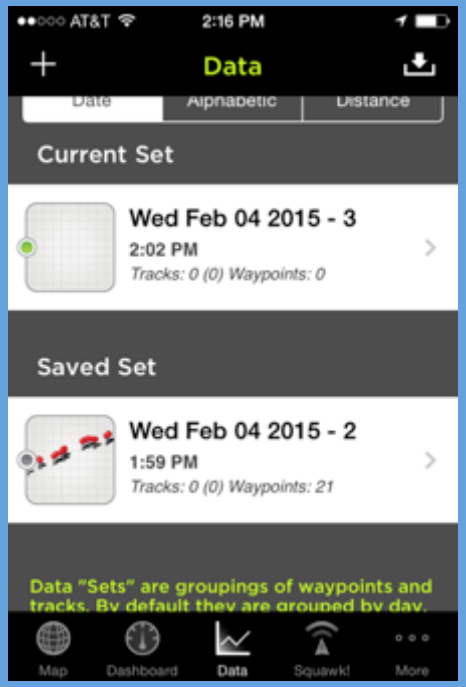




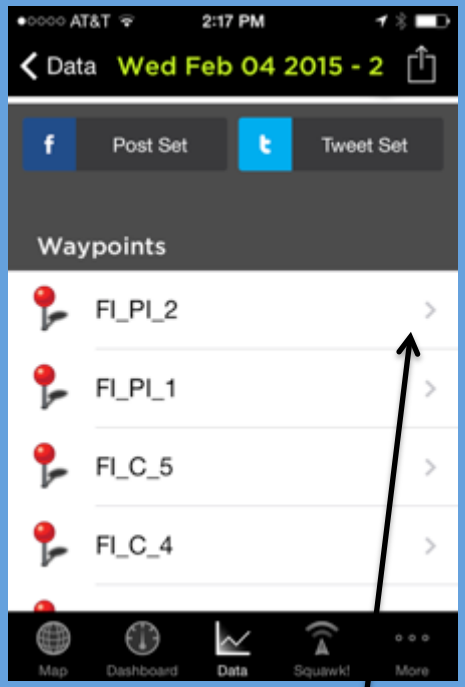
Navigate to Random Points with GPS Kit

- In GPS Kit, your current location is indicated by an arrow
- You can zoom in, zoom out, and pan across the map using your fingers in the application's map view to determine where you are in relation to a given point
- At the bottom of the map screen, click on the "Data" icon, then the random points dataset → here, you will see a list of individual points
- When you click on the name of a specific point, a screen showing that point's details appears

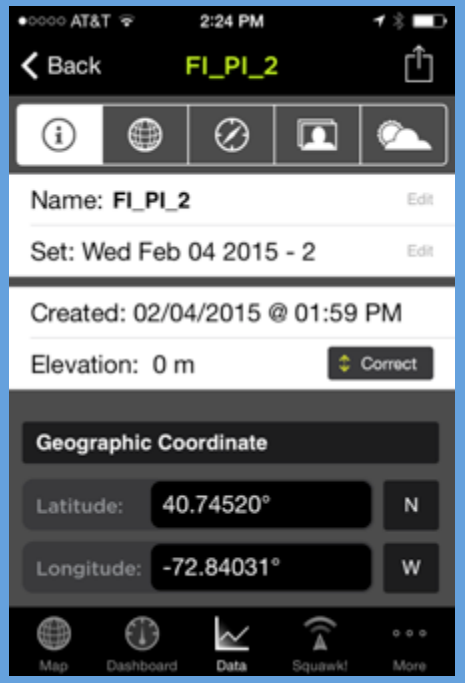
Connect to data screen



Access Random Points



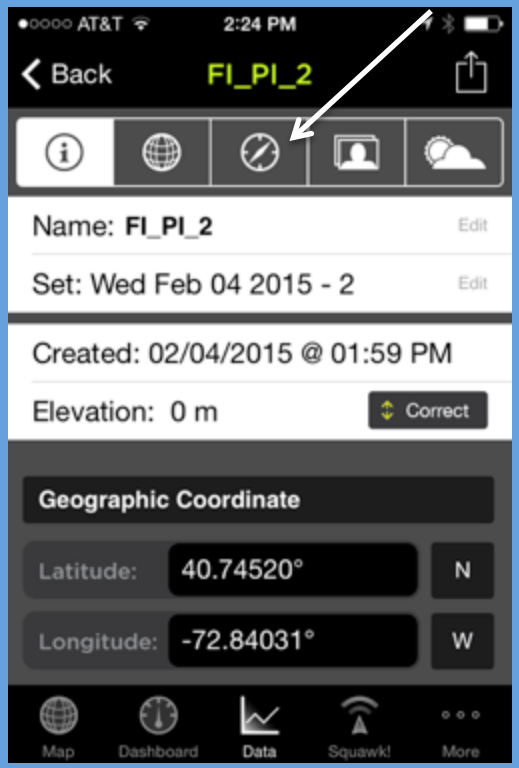
Tap to see point details



Navigate to Random Points

- Tap on the “Compass” icon to see how far and in what direction you need to travel to reach the point
- Alternatively, you can use the map view (by tapping the “Globe” icon) to see where you (as the purple arrow) are in relation to the point (the red pushpin)
  - When you get in the vicinity of the point, a distance meter at the top of the screen will tell you how far you are from the point’s coordinates
- Use these views to get to the random point location

Compass Icon



I would need to walk 736 km in a NE direction to reach this point from my current location in Blacksburg, VA!

Map Icon