Choosing Sites

*Making a Geodatabase*

* When receiving data (shapefiles, rasters, etc.) from collaborators or online resources put them in a folder called “Incoming Data” that is a subfolder of your project folder on File Explorer
  + Project (i.e., “Seasonally Disconnected Habitats”) > “GIS” > “Incoming Data”
* Open ArcGIS Pro and add data to your map for the project (.mxd project file)
  + You may need to create a folder connection to the “Incoming Data” folder
* They will show up in your contents panel on the left side of ArcGIS Pro
* Open the Catalog by going to the View tab and clicking “Catalog Pane”
* Go to your “GIS” subfolder within your project folder and right click then select New > New File Geodatabase
* Name the geodatabase something like “Seasonal\_Habitats\_Sites.gdb” or “REM\_Sites.gdb”
  + Think of the geodatabase as a filing cabinet and feature datasets as drawers
* If you want to organize the data in your dataset even more you can right click on your geodatabase > New > Feature Dataset
* Name your feature dataset something appropriate for the type of data that you will put in it (e.g., Seasonal\_Habitat\_Water for hydroline data or watershed boundaries)
  + You don’t need to make feature datasets but it may be helpful if you can organize data by categories
* Right click on each item in your catalog (other than basemaps) and select Data > Export Features
* Name the feature class something appropriate and select the geodatabase or feature dataset within that geodatabase as the Output Feature Class location and click “Run”
* It will me added to your map so you can delete the old duplicate which is sourced to the “Incoming Data” folder
  + This way everything in your map is sourced from the same geodatabase
  + Data is converted from a shapefile to a feature class within a geodatabase
    - Better for storage space and organization
* If someone wants a specific feature class from your map you can export it as a shapefile, zip the folder, and send it to them

*Classifying REM*

* Use the raster file “Middle\_Skagit\_REM\_2016.tif” created by Kate Ramsden who is the GIS Analyst at SRSC
  + Any GIS files that are being used for a specific project should go in a database made just for the project (i.e., “REM\_Sites.gdb”)
    - See “*Making a Geodatabase*”
  + The ArcGIS Pro file (i.e., “REM\_Site\_Personal.mxd”) cannot go in the geodatabase but should go in a subfolder with the geodatabase so if you want to send it to someone else you can zip the whole subfolder containing the geodatabase and .mxd
    - The .mxd contains symbology so if you want the symbology to stay the way that it is in your map you have to include the .mxd in the zipped folder
* Import into ArcGIS Pro

Text

Description automatically generated with medium confidence

* It will look like a gradient of gray when you import it
* Right click on the file and click on “Symbology” > “Classify” (drop down menu)
* Click on the drop down menu “Method” and click “Manual Interval” then go into the table and manually change the values for the color breaks
  + You can also change the “Color Scheme” to whatever you want
    - If you wanted to change the actual values of the raster (i.e., 1, 2, 3 instead of -5.215011 – 0, 0.000001 – 0.5, 0.500001 – 1 then you would use the “Reclassify” tool in the Spatial Analyst Toolbox
* The resulting change in symbology will allow you to see potential pinch points at site outlets
  + Use this raster file in conjunction with aerial imagery and hydroline shapefile

A picture containing bar chart

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*Selecting Outlets*

* Using the REM, aerial imagery, and hydroline shapefile find potential outlets of seasonally disconnected sites
* Create a new point feature class in your .mxd by opening the Catalog > Right click on the geodatabase that you made for the project (i.e., “REM\_Site.gdb”) > Create Feature Class
* Name the new feature class (i.e., “Placemarks\_Final\_WGS”) and then go through the six pages making sure that you select the feature type (point) and appropriate projection (WGS 1984)
  + If you want to calculate the latitude and longitude in decimal degrees the projection must be in WGS 1984
* Click on Edit > the feature class that you created (i.e., “Placemarks\_Final\_WGS”)
* Place points at site outlets and select the box with the green check mark when you’re done so that it is saved

A picture containing diagram

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*Calculating Latitude and Longitude of a New Point Feature*

* Once points have been placed in the new feature class you can name and calculate the latitude and longitude in decimal degrees of each point
* After making any edits make sure to press the “Save” button in the Edits tab
  + You will not be able to add a field (i.e., “Name”) unless all edits have been saved

A picture containing graphical user interface

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* Add two new fields called Latitude and Longitude with a Data Type of “Text” and a Length of 50
  + Make sure to save once the new field has been created
* Right click on the field Latitude and click “Calculate Field” then enter Python code into the “Latitude =” box
  + !shape.extent.YMax!
* Right click on the field Longitude and click “Calculate Field” then enter Python code into the “Latitude =” box
  + !shape.extent.XMax!
    - There is an easier way to do this in ArcMap but this is the most straightforward way to do it in ArcGIS Pro

Graphical user interface, application

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Fieldwork – Reconnaissance

*Uploading Coordinates Onto GPS*

* Choose the feature class that you want to upload to the GPS in ArcGIS Pro and right click > Data > Export Features
* Choose the folder location for your shapefile to be created
  + Make sure that it is in a normal folder (i.e., “Seasonally Disconnected Habitats” > “GIS” > “Exported Shapefiles”)
    - It won’t be saved as a shapefile if it’s in a geodatabase
* Click Run and the new copy which is now sourced to the “Exported Shapefiles” folder will show up on the map
  + Go ahead and delete it because you want to keep the feature class that is sourced to the geodatabase
* Open DNRGPS and click File > Load From > File
  + Make sure ESRI Shapefile (2D) is the file type and select the shapefile that you just exported form ArcGIS Pro
* Choose the column that you want to be IDENT
  + This will be what shows up on the GPS in the field so choose that “Site Name” column
  + You can also edit columns in DNRGPS
* Upload to the GPS

*Equipment*

* Dry suits with neoprene footies and boots (Ian and John both bring in case sites are deep)
* Charged dive light (John, that’s okay if you don’t have one), snorkel, hood
* Pontoon (keep it deflated on the boat and inflate if needed)
* Pontoon oars and cross-bar
* Pontoon pump
* GPS that we used yesterday (has sites pre-loaded)
  + Make sure it is the right GPS and there is enough battery life – if not replace batteries from battery/SD card box
  + Turn off the tracking for when you are boating but PLEASE make sure not to delete the tracks from yesterday
    - The track from yesterday is the “Current Track”
* Survey temperature logger (the one we duct tape to John)
* Field laptop
* Shuttle for HOBO loggers
* Rangefinder
* Stadia rod
* YSI
* Swoffer (rod with propeller and box reader)
* Red clipboard with datasheets and Rite-in-Rain with logger metadata
  + Use a datasheet with site name “Boat Recon” with the date and just use WPT column to put the outlet identifier (e.g. J1, J2, C1, etc.)
  + Start a new data sheet if you end up doing an actual snorkel survey
* HOBO temperature pendants with PVC housing, wire, wire cutters
* Water level logger (there are 6 in a box that are all launched and ready to go), PVC gauges with screw-on lids, string, metal clamp with screwdriver to tighten
* Time-lapse camera with 6 lithium batteries (there’s an EJECT button on the inside that you push to open the battery compartment) and an SD card (under the screen) installed
* Time-lapse camera t-post mount
* Post pounder
* T-posts
* Phone/camera (have the coordinates settings on if your phone has that feature – makes it easier for me to find out where the pictures were taken)

*Protocols*

* Time-lapse camera installation
  + Set-up the camera
    - Switch to ON
    - Press the M button (this opens the setup window)
    - Enter date and time
    - Mode: Timelapse+
    - CaptureDelay: 60Min
    - PicSize: Low[4MP]
    - MultiShot: Off
    - CapStart: 12:00 AM
    - CapEnd: 12:00 AM
    - SmartIR: On
    - NightExp: PwrSave
    - TLFrequency: 60Min
    - TLPeriod: 1Hr
    - TempUnit: F
    - InfoStrip: On
    - SDManagement: Off
    - MotionDetect: Long
    - MotionTest: OK
    - Language: English
    - Name: SITE[e.g.AA]
      * Say you check out outlet C2 and place a time-lapse camera somewhere in that site you would name it SITEC
    - The rest of the settings just leave as is
    - If the screen falls asleep just push the M button to wake it up
  + Position time-lapse camera
    - Attach to the t-post mount
    - Find a spot so that facing the pinch point but tucked away if possible so tweakers won’t be enticed to steal it and pound in t-post
    - Get it positioned right using the screen to make sure the pinch point is in the frame (someone can stand in the pinch point to make sure it is framed well)
  + Document
    - Take a GPS point and note in the Rite-in-Rain (write down site and date) along with brief description
    - Take a picture or two
* Water level logger installation
  + Pound in a t-post that is in a deep spot close to the mouth (ideally where we have seen fish nearby)
    - The idea is to put it in a spot that will still hold water when the site is disconnected in the summer
  + Write down the Solinst logger ID, the length of the string, the height of the water on the gauge once you have it clamped to the t-post, the date, time, waypoint, and description of location in Rite-in-Rain
  + Take a picture or two
* Temperature logger installation
  + Put the temp logger in the PVC housing and feed wire through it, cut with wire cutters
  + Attach either to branch, stump, etc. or to the outside of the level logger
  + Write down pendant ID, the date, time, waypoint, and description of location in Rite-in-Rain
* Snorkel survey
  + Launch the white survey temperature logger with the field laptop
  + Make sure to turn on tracking on the GPS and make sure it is set to “Most Often”
  + When the tracklog is running and the temperature logger is in the water write survey start time on datasheet
  + Take measurements where see fish and maybe a couple where you don’t see fish
  + Take pictures if you can
  + Note when the temperature pendant is out of the water and turn off GPS when you’re done with the survey

Organizing Fieldwork Data

* After each week of fieldwork
* Make sure “DO\_Data” file and HOBO output files are saved as Excel Workbooks so able to highlight active time periods as green
* Once retrieve level logger and temperature logger from sites, add a new folder to each site for temporal data
  + Also use take each site from “DO\_Data” file and put in respective site folders with other temporal data

*Assigning Coordinates to Survey Waypoints*

* If using more than one GPS unit (e.g., “Estuary” and “Floodplain”) that have overlapping WPT numbers, create a new column with the GPS Unit and WPT combined in Excel so that each is a unique identifier (“GPSUnitWPT”) for both the snorkel and e-fishing dataset (“Seasonal\_Habitat\_Survey\_Data”) and the waypoint with coordinates dataset (“Seasonal\_Habitat\_Survey\_Data\_Waypoints”)
  + =[GPS Unit cell]&[WPT cell]
  + =A2&B2
    - “Estuary” and “184” 🡪 “Estuary184”
* Open both the snorkel and e-fishing dataset (“Seasonal\_Habitat\_Survey\_Data”) and the waypoint with coordinates dataset (“Seasonal\_Habitat\_Survey\_Data\_Waypoints”)
* In the empty “Latitude” cell that you want to fill with a coordinate in the snorkel and e-fishing dataset use VLOOKUP()
  + =VLOOKUP([GPSUnitWPT cell in snorkel and e-fishing dataset],[range of cells including GPSUnitWPT, Latitude, and Longitude in the waypoint with coordinates dataset], column number within that range that corresponds to Latitude (i.e., 2)], FALSE)
  + Repeat this step with Longitude changing the second to last variable to 3
* Once you have finished, copy and paste the Latitude and Longitude columns as plain text and delete the GPSUnitWPT column to clean up the data
* Save a “READ\_ONLY” version of your data after doing any manual cleanup and before starting any analysis