

VIMS Clams

Process Document

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Summary

See [Project Documentation](#) – Project Summary.

File Organization

Google Drive

Christina → VIMS Clams

- [Clam resource distribution: A GIS summary \(Report Format\)](#) = report format of the final StoryMap product for the project
- [Process Document: VIMS Clams](#) = this document
- [Project Documentation: VIMS Clams](#) = summary of project and meeting notes
- [VIMS Clam Documentation](#) = hour log and data dictionary
- [Resources folder](#) = contains original project proposal presentation, budget, and description
- [vims_clams_06282023](#) = backup of the G Drive files as of 6/28/2023 (not available for public access because the data was provided by non-VIMS / W&M people)

G: Drive

casabochick → vims_clams

- data
 - OQtows = original ocean quahog tow data in CSV format
 - SCtows = original surfclam tow data in CSV format
 - roms_glorys_psy_monthly_1959_2021 = GLORYS temperature data in NetCDF format
- images = folder containing images used in the StoryMap presentation
- temp_layouts = folder containing static images and PowerPoint presentations used to create the temperature time series for the StoryMap
- vims_clams = ArcGIS project file that contains all work on the clam data
 - OQtows_All_Neg = point layer with negative values for longitude; all tow years
 - SCtows_All_Neg = point layer with negative values for longitude; all tow years
 - OQtows_Density = point layer with species density displayed proportionally (size)

- SCtows_Density = point layer with species density displayed proportionally (size)
- Ocean Bottom Temperature = NetCDF raster layer with all years of data
- Decades = group layer containing layers for each decade of tow data
- FiveYrs = group layer containing layers for each five year increment of tow data
- Temp = group layer containing layers for each year of temperature data

ArcGIS Online

All data published from the ArcGIS Pro project or maps / apps created for this project are stored in Christina's Contents → VIMS Clams

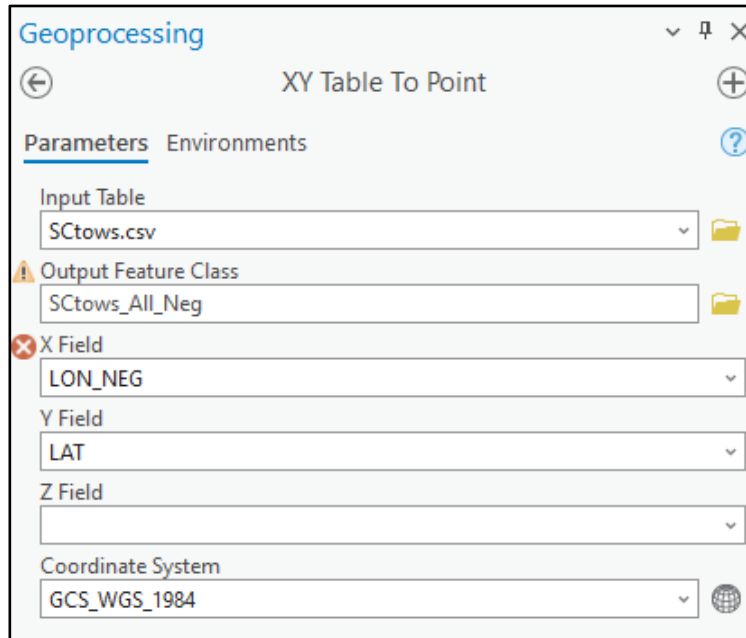
Methods

Step 1: Add the CSV data to an ArcGIS Pro Project

1. A note that all the tow data I used in this process was provided by Daniel Hennen, Ph.D., Operations Research Analyst at NOAA's Northeast Fisheries Science Center. In the CSV file, check one of the latitude and longitude coordinates in Google Maps to see whether it shows up in the correct location. Points should appear somewhere in the mid-Atlantic off the east coast of the United States. If they show up somewhere in Asia, you likely need to add negatives to the longitude coordinates in the CSV file. You can do so by setting up the following equation:

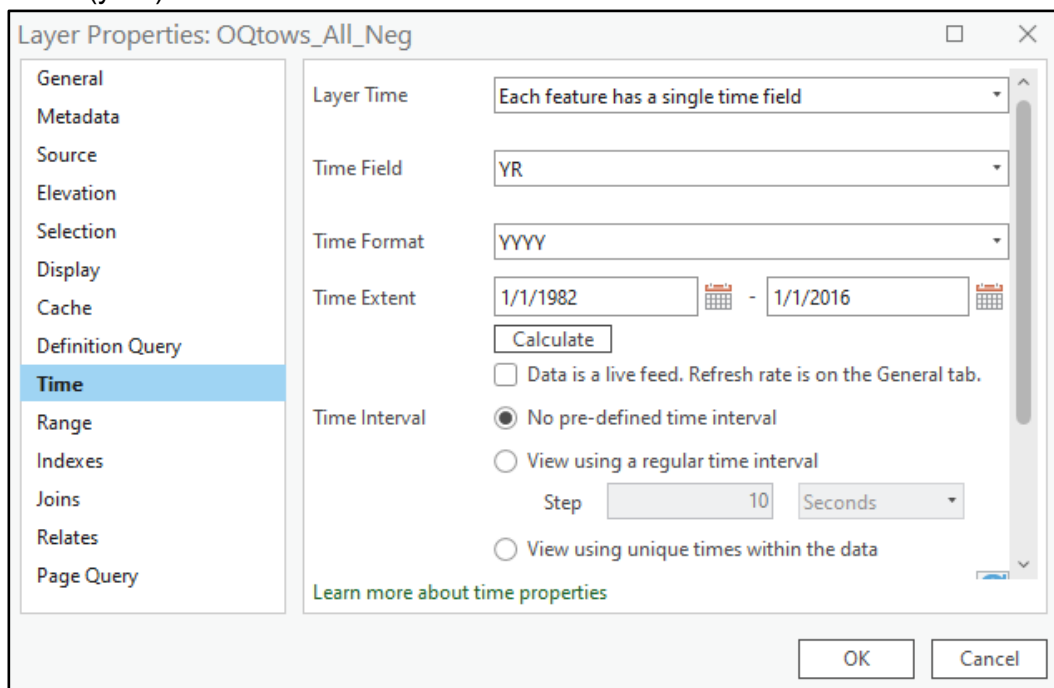
	A	B	C	D	E	F	G
1		YR	NperMsq	LAT	LON	DEPTH	LON NEG
2	1	1982	0.534675	41.9	67.8667	53	=E2*-1
3	2	1982	0	41.8333	68	56	-68
4	3	1982	0.015501	41.6	67.5833	33	-67.5833

2. Once you have ensured your coordinates have the correct negatives, open your ArcGIS Pro Project.
3. Use the XY Table to Point tool to add in each CSV file with the default coordinate system, WGS 1984.



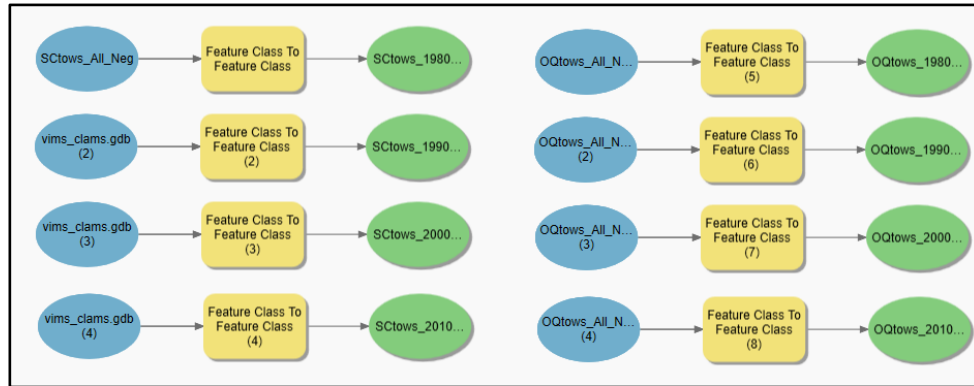
Step 2: Enable time for each layer

1. For each layer that needs to be viewed over time (e.g., by year), right click on the layer and open the Layer Properties.
2. Click on the Time tab.
3. Set up the Time properties so that *Each feature has a single time field* and that time field is YR (year).



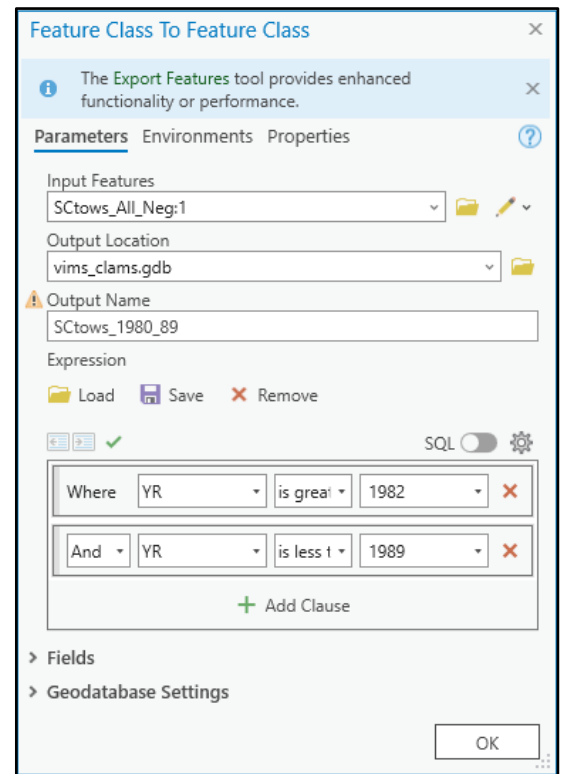
Step 3: Create separate layers for 5 and 10 year increments

1. Use Feature Class to Feature class to Create queries that produce new layers with only data per decade. I.e., For the time span of 1980 to 1989, I created a query where the year was greater than or equal to 1982 and less than or equal to 1989 (there was no 1980 or 1981 in the data).



Model saved as Step3 in project toolbox

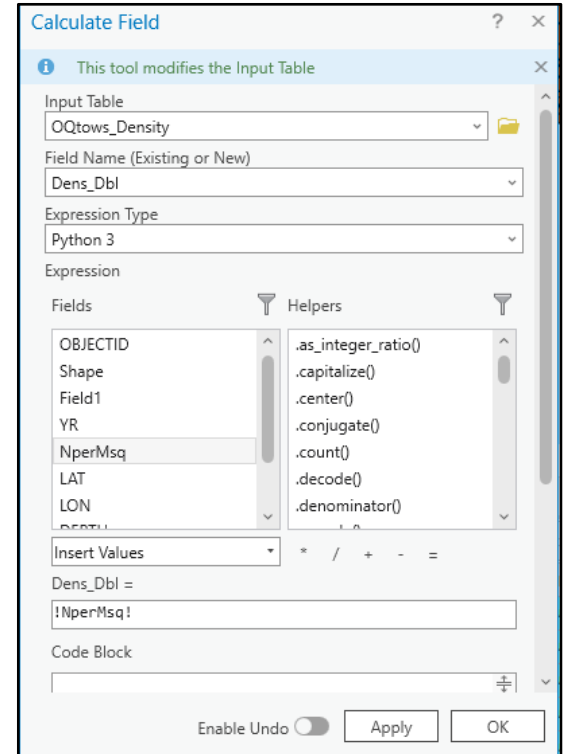
2. Use Feature Class to Feature Class again, this time producing layers with only data per 5 year increments starting in 1980. If there is data for a year ending in 0 or 5, it is included as the start of a range but not the end (i.e., for the ranges 1990 - 1995 and 1995 - 2000, data for 1990 would be included in the first range but NOT data for 1995, data for 1995 would be in the second range).



Step 4: Visualize species density

1. For each layer that needs to be visualized by species density, ensure there is a numeric field for density in the table. If not (i.e., if the field is present but is a Text or other type):
 - a. Create a new field "Dens_Db1"

- b. Set the Data Type to Double
 - c. Right click on the new field name in the attribute table and click Calculate Field
 - d. Set Dens_Dbl equal to the existing species density field
 - e. Click OK
 - f. You may receive a warning that NA could not be written to the new field for some entries; that is okay, simply verify that those rows appear as Null
 - g. If you do not see all the decimal places that were present in the original field, return to the Fields view, click on Numeric under Number Format for the new density field, click the three dots ("...") and edit the Decimal places setting
2. Open the symbology pane for each layer and select Proportional Symbols under Primary symbology. Select your density field stored in the Double data type as the Field. Adjust the symbology settings as desired, for example:
 - a. Minimum symbol size 4, Maximum symbol size 50
 - b. Surfclams hex code #C500FF
 - c. Ocean quahogs hex code #31ADA1
 - d. All symbols:
 - i. Fill transparency 50%
 - ii. Outline size 0.5, value 40%



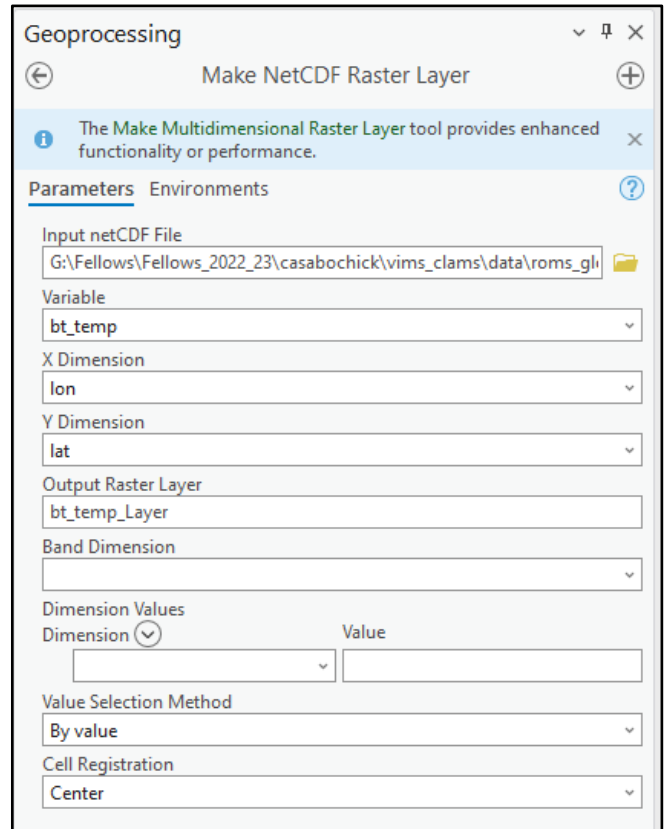
Step 5: Publish data to ArcGIS Online

1. For each layer you want to publish to ArcGIS Online, right click on the layer name in the Contents pane and click Sharing → Share As Web Layer.
2. Fill in the information for name, summary, etc. For example:
 - a. Name: Ocean Quahog Density
 - b. Summary: Point layer displaying locations of ocean quahog tows from 1982 - 2016, sized proportionally by species density (number of individual quahogs per square meter). Layer is part of a larger project led by Roger Mann, Ph.D., Professor at VIMS, and the William & Mary Center for Geospatial Analysis. Ocean quahog tow data provided by Daniel Hennen, Ph.D., Operations Research Analyst at NOAA's Northeast Fisheries Science Center.
 - c. Tags: Ocean Quahog, VIMS
 - d. Layer Type: Feature
 - e. Location: VIMS Clams
 - f. Share with: Everyone

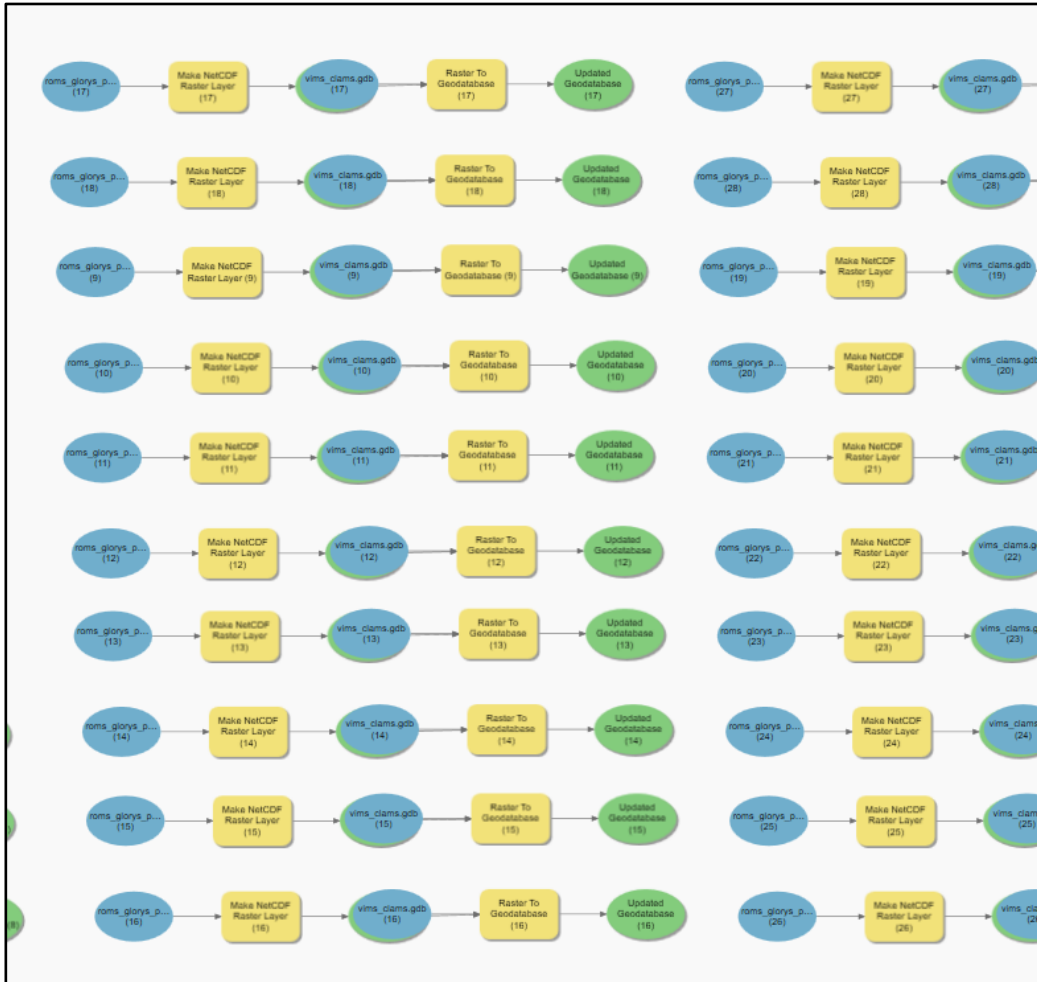
3. Click the Analyze button and resolve any errors or warnings that appear.
4. Click Publish.

Step 6: Overlay multidimensional temperature layer

1. I tried adding in the .nc provided by Hubert duPontavice (Ph.D., Postdoctoral Research Associate at Princeton University) using the Add Data → Multidimensional Raster Layer method outlined in [this tutorial video](#) but nothing was visualized in the output. I was able to successfully add the multidimensional layer with the Make NetCDF Raster Layer tool outlined in [this tutorial video](#), input examples provided:



2. To create individual layers for each year's slice of data, use the Make NetCDF Raster Layer again, but specify the year you would like to be visualized in the Dimension Values section.
3. To create individual layers for EVERY year's slice of data, I recommend setting up a model that will iterate through each year. Each year must include a tool with the proper parameters for Make NetCDF Raster Layer AND a Raster to Geodatabase conversion tool to add the resulting layer to your project geodatabase.
 - a. *Note:* There is probably a more efficient way to set this up with iterators or by having all layers feed into the same Raster to Geodatabase conversion tool (because it does allow for the input of multiple rasters), but I didn't have time to figure out how to do that. Also, when I first tried having all resulting layers feed into the same Raster to Geodatabase conversion tool, the model kept trying to run the conversion first, which would fail since none of the layers had been created yet. I think this can be solved with [preconditions](#); but again, I did not have time to figure out how those work.



Model saved as Step6 in project toolbox.

4. After running the model described in Step 3, you will need to add the raster layers from your project geodatabase to your map for them to show up. You should now have a raster layer for each year of temperature data!