# Predictor layers

Downloaded data required

Ready to Use

Calculated per Plot

* Temperature
* Precipitation
* Snow melt
* Surface water
* Distance to coast
* Elevation
* Substrate Chemistry
* Landcover
* Geese
* Migratory Flyway?
* Historical tundra distribution?
* NDVI?
* Soil moisture?

## Temperature and Precipitation

There seem to be so many options that it’s kind of overwhelming. Some that stood out:

1. Worldclim
   * 30 seconds of latitiude (~1km), 1970-2000
   * Advantages:
     1. commonly used so more comparable to other research.
     2. Used in the Person et al paper that made projections of habitat that I want to use
     3. Has associated future projections, making work easily transferable between chapters
     4. Easy to access and download
     5. Includes precipitation
   * Disadvantages:
     1. Metadata explicitly says it’s less reliable for arctic regions
     2. Would be better if the timeframe overlapped with when our data were collected (1996-2018)
2. ClimateNA

* <http://climatena.ca/>
* <https://adaptwest.databasin.org/pages/adaptwest-climatena>
* 1901-2014, 1km resolution
  + Advantages:
    1. Aside from the data layers you can download, it is also a software package that allows you to do custom downscaling for the are you are interested. “ClimateNA is a standalone MS Windows application that downscales gridded monthly climate normal data to scale-free point locations”
    2. Maybe a better timeframe? Documentation isn’t totally clear. One related website says 1971-2000, another says 1901-2014
    3. Does the same thing for future climate scenarios
    4. Includes precipitation
  + Disadvantages:
    1. Requires learning how to use their software. Unclear to me if this would be straightforward or not., looks fairly straightforward in their YouTube video How would I download on my computer while working remotely?
    2. I find their documentation kind of confusing, and it’s not clear to me what data their program uses and how reliable it would be for the arctic.

1. Arctic Reanalysis
   * <https://climatedataguide.ucar.edu/climate-data/arctic-system-reanalysis-asr>
   * <https://rda.ucar.edu/datasets/ds631.1/>
   * 2000-2016 (there should be a version up to 2016 released immanently), 15km resolution
   * Advantages:
     1. Arctic specific, should be more accurate. Created based on weather stations data and models
     2. Includes precipitation data
   * Disadvantages:
     1. Data is daily observations, I would need to aggregate it
     2. Much larger resolution. Realistically, the finer scale data is based on this type pf data and then is statistically downscaled. I’m not sure how much this changes the data – is it really that different?
     3. No associated future predictions. I would have to use different data for projections chapter
     4. Formatted for weather observing, might require effort to get into the format I want (i.e. some weather data is in GRID format – what is that? Temperature is in Kelvin. There are like 50 atmospheric layers so I would need to make sure I’m getting the ground temperature.
2. MODIS land surface temperature
   * 2000-2005, 1km resolution
   * LAND SURFACE temperature rather than AIR temperature
   * Tends to be higher that air temperature except in forests
   * Advantages:
     1. Could be more relevant to ground nesting birds and insect emergence?
   * Disadvantages:
     1. Some bias because only measured on cloud free days
     2. No future projections, would need to do something different for projection chapter
     3. Would be difficult to compare with other research that uses air temperature
     4. Would need a different source of precipitation data

RNCEP

NARR

Rdata

## Snow Melt

STILL LOOKING INTO IT

-kind of overwhelming. Is there someone at NWRC I could talk to about it?

* MODIS Terra Daily Snowcover (Global) – uses normalized difference snow index
  + 500m resolution
  + When I made a polygon around ~study area: 132,515 files selected (~600 GB), 2,000 displayed.
  + In google earth engine
* Northern Hemisphere EASE-Grid 2.0 Weekly Snow Cover (older)
  + <https://nsidc.org/data/nsidc-0046>
  + 25km resolution, weekly, 1966-present

National Snow and Ice Data Center

#### [MEaSUREs Northern Hemisphere State of Cryosphere Daily 25km EASE-Grid 2.0](https://nsidc.org/data/NSIDC-0534/versions/1) – has snow melt

#### [MODIS/Terra Snow Cover 8-Day L3 Global 500m SIN Grid](https://nsidc.org/data/MOD10A2/versions/6)

#### [Timing and Statistics of Autumn and Spring Annual Snow Cover for the Northern Hemisphere, 1972 to 2000](https://nsidc.org/data/G02168/versions/1)

#### [IMS Daily Northern Hemisphere Snow and Ice Analysis at 1 km, 4 km, and 24 km Resolutions](https://nsidc.org/data/G02156/versions/1)

* Canadian Meteorological Centre (CMC) Daily Snow Depth Analysis Data, Version 1
  + Daily, monthly, longer term – 24km

## Surface Water

STILL LOOKING INTO IT

https://global-surface-water.appspot.com/

## Distance to Coast

* Data: CAVM circumpolar coastline (and treeline?)
* http://www.arcticatlas.org/maps/themes/cp/cpcoast
* Need to calculate the distance to each plot

## Elevation

* Data: ArcticDEM, 100m resolution (There is a 30m version available if I need it, but require dealing with tiles instead of one file)
* https://www.pgc.umn.edu/data/arcticdem/
* Need to calculate mean elevation per plot

## Substrate Chemistry

* Data: CAVM substrate chemistry (polygons)
* <http://www.arcticatlas.org/maps/themes/cp/cpsc>
* Need to calculate per plot. Presumably virtually all plots would be in one category and proportion cover wouldn’t be needed

## Landcover

* Data: Northern Landcover 2000 (1997-2005), 30m resolution
* Have calculated the % cover of plot by landcover class. Still too complex, need to figure out what aspect to include as a predictor, if classes need to be aggregated

## Geese

* Data: PRISM observations
* Have calculated number of geese observed in each plot. This variable wouldn’t be useful if I wanted to create a predictive surface though

## Migratory Flyway?

* Categorical? Did I see this in Henningston and Alerstam papers?

## Historical Tundra Distribution?

* Henningston and Alerstam papers look at circumpolar richness patterns of shorebirds, I think this was one of the variables they found to be important. They created this data layer themselves by reconstructing it from a static image (I have the link somewhere…)

## NDVI?

## Soil Moisture?

* NDMI that Paul mentioned seems liken it might not be appropriate. Measures change in the water content of leaves
* ESA sentinel satellites measure soil moisture?
* <https://www.esa-soilmoisture-cci.org/node/145>

ALL CAVM data except for new raster

<http://www.arcticatlas.org/maps/catalog/index>