YUKON NORTH SLOPE
BASELINE ECOLOGICAL AND CULTURAL
CONSERVATION ASSESSMENT

MAP ATLAS

USER GUIDE & DOCUMENTATION

Version 1

PREPARED BY
ROUND RIVER CONSERVATION STUDIES

PREPARED FOR
WILDLIFE MANAGEMENT ADVISORY COUNCIL (NORTH SLOPE)

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Contents

Introduction

The Yukon North Slope Map Atlas is a series of maps presented in GeoPDF format. This format allows users to explore data by turning on and off layers, zoom into areas of interest, navigate the map using geographic coordinates, draw and export georeferenced spatial data, measure distances, and explore feature attributes, all without GIS capabilities or software.

The Wildlife Management Advisory Council (North Slope; WMAC(NS)) is updating the Yukon North Slope Wildlife Conservation and Management Plan, including the incorporation of more explicit consideration of the spatial distribution and extent of ecological and cultural values for the region. This has resulted in significant investment in both compiling the existing spatial data on these values as well as generating new spatial information in the form of research, modeling and analyses efforts.

This Yukon North Slope Map Atlas is a map library highlighting and presenting a number of the key spatial data that have been considered by WMAC in developing the Yukon North Slope Wildlife Conservation and Management Plan. The Map Atlas, Version 1 contains ten thematic maps for the YNS highlighting available spatial data on cultural and ecological values. These maps are organized into themes, and each map provides additional visualization of helpful base data to place the values displayed within their ecological, cultural and management contexts. The ten thematic maps are:

- Aquatic and Marine
- Avian
- Caribou
- Climate
- Grizzly Bear
- Moose
- Sheep and Muskox
- Traditional Use
- Wildlife Key Area

This document contains two chapters:

Chapter 1 is a User Guide to exploring the Yukon North Slope Map Atlas through the GeoPDF formatted map library, and

Chapter 2 provides basic spatial data documentation including data source, resolution, and brief processing notes for the data displayed in the Map Atlas.

Chapter 1: User Guide to the YNS Map Atlas GeoPDF Map Library

Maps can be opened in free Adobe Reader software (https://get.adobe.com/reader/), which allows users to turn layers on and off and zoom/pan around to explore the map. More advanced capabilities – drawing and exporting spatial data, measuring distance, exploring feature attributes, locating geographic coordinates – are available through the TerraGo Toolbar, a free plug-in for Adobe that can be downloaded and installed here:

https://info.terragotech.com/download/terrago-toolbar

The TerraGo Toolbar is only compatible with Windows operating systems. Mac users can still open maps in Adobe Reader and turn layers on and off, but the more advanced features of the Map Atlas will not be available.

Basic Function

Each map opens with the same base data displayed by default. Additional layers can be turned on and off through the Layers panel on the left of the screen. Figure 1 identifies some key features of the map that are discussed below.

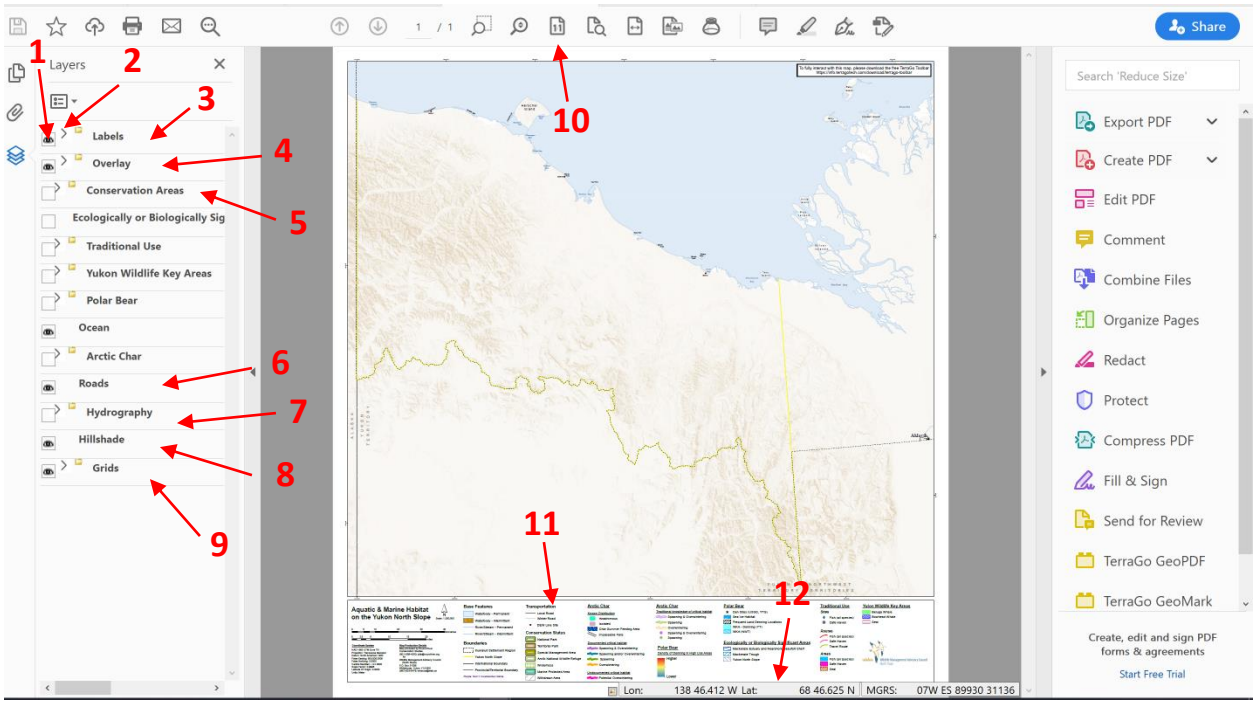

Figure 1. Basic features of Map Atlas GeoPDFs

1) The boxes next to each layer indicate whether the visibility of that layer is on (eyeball) or off (empty). Layers can be turned on or off by clicking the box

2) The sideways caret symbol next to the boxes of some layers indicate that the layer contains multiple sub-layers within it, all of which can be turned on and off independently. Click the caret symbol to expand the layers list and see what is contained within. Some of the sublayers

may have sublayers of their own – if the caret symbol is present it means there is more information contained in that layer - explore them all to ensure that the ones that are visible are the ones intended. Only some sublayers may be turned on by default

3) Labels – this layer contains annotation for base data layers on the map (Figure 2). Features that are labelled in this layer include communities, DEW line sites, points, bays, spits, islands, lakes, rivers, mountains, canyons, and Inuvialuit place names. When a map initially opens, only the communities, DEW line sites, points, bays, spits, and islands are labelled by default. The other labels can be turned on manually. The Lakes & Large Rivers and Rivers & Streams labels correspond to the Hydrography layer (#7 on Figure 1) and as such will be much more informative when turned on along with that layer.

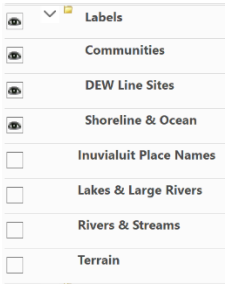

Figure 2. Labels on Map Atlas GeoDFs

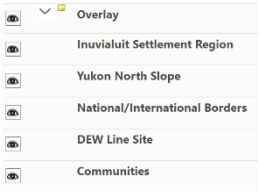

Figure 3. Overlay features on Map Atlas GeoPDFs

4) Overlay – this layer contains political and geographic boundaries, as well as communities and DEW Line Sites used for navigation and reference (Figure 3). All layers within the Overlay are displayed by default when the map opens

5) Conservation Areas – this layer contains all the various protection designations on the Yukon North Slope and neighboring areas (Figure 4). "Conservation Areas" include national and territorial parks, special management areas, withdrawn areas, wildlife refuges, wilderness, and marine protected areas. The name of the individual area is shown in the Layers panel when you expand the Conservation Areas layer.

Figure 4. Conservation areas on Map Atlas GeoPDFs

6) Roads – this layer contains the year-round and seasonal roads around the town of Aklavik (Figure 5). There are no roads, seasonal or otherwise, on the Yukon North Slope or anywhere outside of Aklavik in the map extent.

Figure 5. The only roads in the Map Atlas extent

7) Hydrography – this layer contains all water features in the map extent (Figure 6). This includes streams, large rivers, lakes, tidal areas, and intermittent watercourses and waterbodies. Due to the graphic complexity of this layer and subsequent slow draw time, it is turned off by default when the map opens. The hydrography layer is best viewed when zoomed into 1:1 (#10 on Figure 1, also see Figure 8), as this is the intended scale of the map and underlying data. To aid in interpretation of this layer, there are labels available for individual features which can be turned on in the Labels layer (Figure 2).

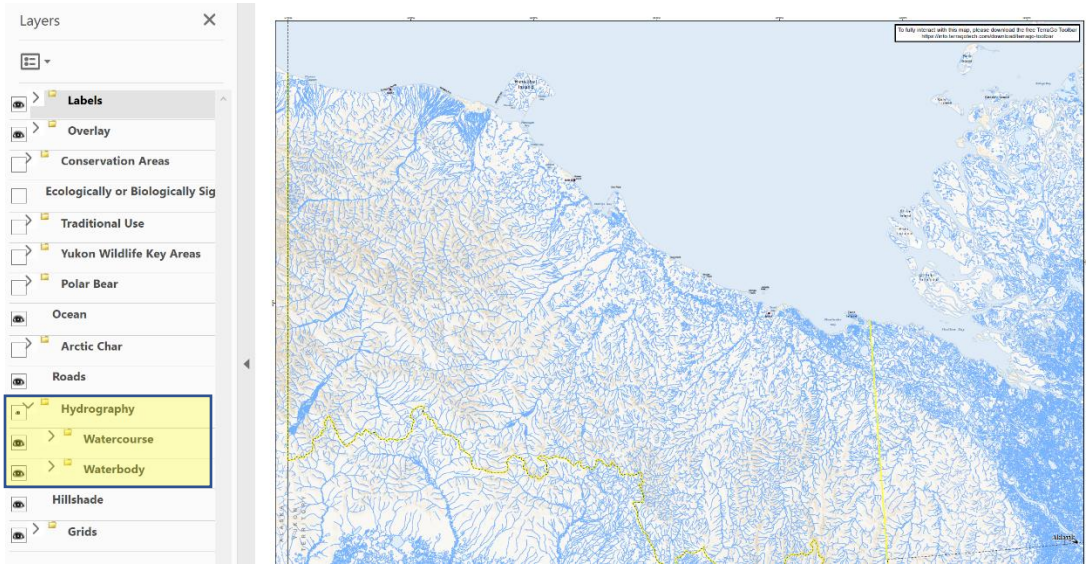

Figure 6. Water features in Map Atlas GeoPDFs

8) Hillshade – this is a raster base layer depicting the underlying terrain. It is tuned on by default on all maps but can be turned off to simplify the display.

9) Grids – this layer contains spatial reference grids (Figure 7). The lat/long reference grid, found along the borders of the map, is turned on by default. A second reference grid – Reference Tics – can be turned on under the Grids layer. This grid is based on UTM Zone 7N projection and in addition to labels along the edges of the map, it displays a grid of tic marks on the map, each 25 km apart.

Figure 7. Reference grids available on Map Atlas GeoPDFs

10) 1:1 – this button allows the user to quickly zoom into the map at a 1:1 scale, which corresponds to a 1:250,000 map scale and is the intended scale for mapping and interacting with the data (Figure 8). Many datasets contained in the map are quite detailed and best explored at this scale.

Figure 8. Zoom capability in Map Atlas GeoPDFs

11) Legend – a static legend is present at the bottom of every GeoPDF map. The legend displays all of the data contained in the GeoPDF simultaneously. As such, it is helpful to review the legend when familiarizing oneself with any of the maps as it will give context to the way the data is displayed when you click layers on and off in the legend. It will also give a snapshot of what data is, and is not, contained in the map.

12) Lat/Long indicator – this is a dynamic box that appears in the lower right corner of every map. Because the PDFs are spatially referenced, any point on the map can be linked to geographic coordinates. As you moved your cursor over the map, you will notice the lat/long change. If you have the TerraGo toolbar plug-in installed, clicking on the box will bring up a Locate dialogue box (Figure 9). This box will display the coordinates of

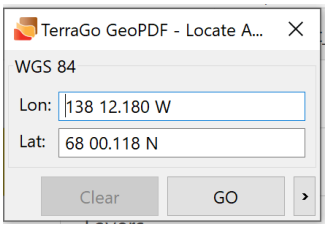

Figure 9. Locate functionality of Map Atlas GeoPDFs

the cursor as it moves around the map, but you can also enter a known lat/long coordinate into the box and click GO, and it will zoom to that location on the map.

Beyond these basic features, each GeoPDF in the Map Atlas comes with its own unique set of layers. These layers are described individually in the Appendix of this document. When exploring the different layers in different maps, there are a couple of important things to keep in mind:

- In maps with inset maps (i.e. Caribou or Climate Change), each map frame is listed in the Layers panel with no layers expanded upon first opening the GeoPDF. In order to see the layers in each map, simply click the caret to expand the list (Figure 10)

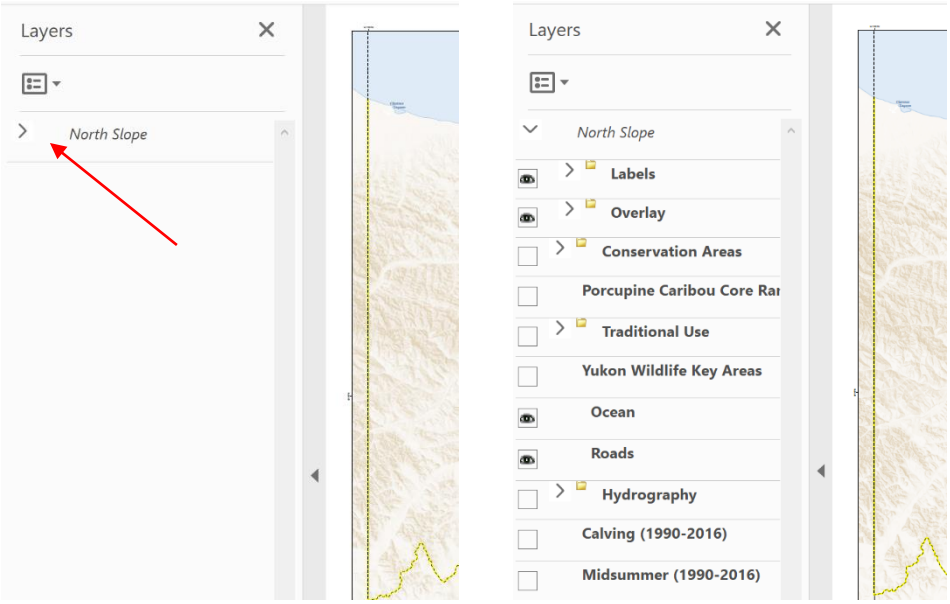

Figure 10. Expanding map layers in Map Atlas GeoPDFs

- If a map layer is contained within a higher-order map layer, the parent layer must be visible in order to turn on any of the layers within it.
- If multiple overlapping raster layers are turned on (for example, multiple grizzly bear models), only the top layer will be visible. To view these layers individually, make sure you turn off any other layers that may be obscuring them.
- Some layers are turned on by default and others will only turn on manually. If you turn on a layer that is indicated to contain sublayers, always expand all possible layer lists to see what is turned on by default and what else may be available within that layer.
- Many layers in these maps are best interacted with at 1:1 scale (Figure 8).
- Labels are available for most base layer features including rivers, streams, lakes and topography (all designed for viewing at 1:1) – many of these are not on by default and need to be turned on in the Labels Layer (Figure 2)

Advanced Function

The full functionality of these GeoPDFs can be explored by downloading and installing the TerroGo Toolbar plugin for Adobe Reader. Once installed, the plug in will provide two additional toolbars for interacting with the maps (Figure 11). In addition to the information provided in this document, there is an online forum dedicated to the toolbars that may be able to answer additional questions: https://knowledge.terragotech.com/hc/en-us/categories/203009427-TerraGo-Toolbar

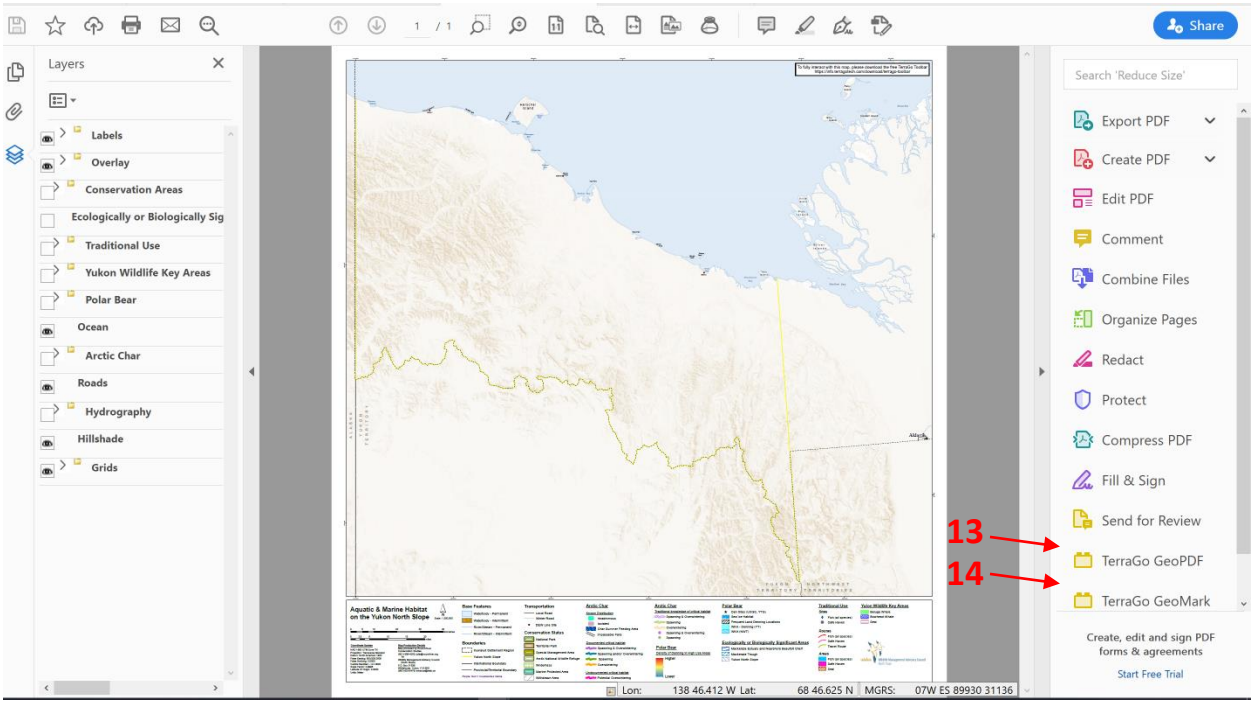

Figure 11. Location of the TerraGo GeoPDF and TerraGo GeoMark toolbars in Map Atlas GeoPDFs

13) TerraGo GeoPDF Toolbar

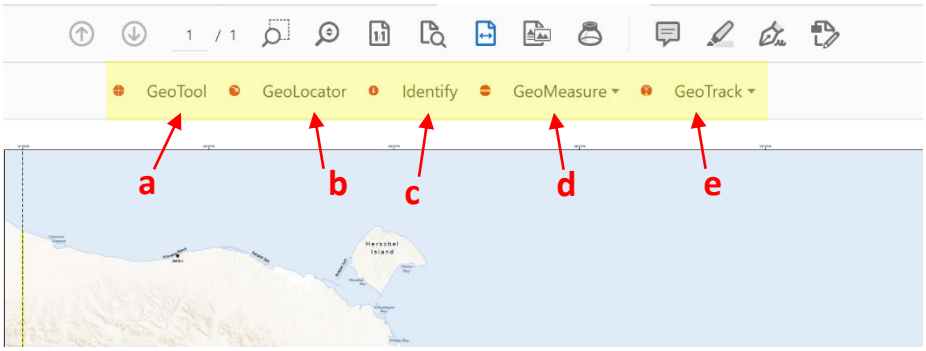

Figure 12. Tools available in the TerraGo GeoPDF toolbar

a) GeoTool function – this tool allows users to interact on a more in-depth level with the lat/long coordinate display. Once the tool is clicked:
   i. Single-clicking freezes and unfreezes the coordinate display
   ii. Double-clicking centers the location on screen and freezes the coordinate display
   iii. Right-clicking displays a shortcut menu from which you can control the visibility of the mini-coordinate display

b) GeoLocator – this tool brings up the same locator dialogue box as clicking on the lat/long box in the lower right of the map (#12 in Figure 1, also see Figure 9)

c) Identify – this tool allows users to interact with attributes of the spatial data on the maps (note: this functionality is not activated in version 1 of the Map Atlas). Once the tool is clicked, the user can then click a feature in the map to bring up attributes associated with that feature. It is also possible to perform a search for keywords within the attribute tables of map layers. Note: not all features, even on future maps, will have attributes available. This feature will primarily be used to enhance understanding of traditional knowledge spatial data and surveys.

d) GeoMeasure: this tool allows users to measure both distances and areas on the map. When the tool is clicked, a drop-down menu appears and the user can select distance or area. Click anywhere on the map to begin measuring, double-click to finish the line or area. Measurements are reported in meters (distance) or square meters (area) (Figure 13).

Figure 13. Measuring the shoreline distance between Stokes Point and Roland Bay

14) TerraGo GeoMark Toolbar

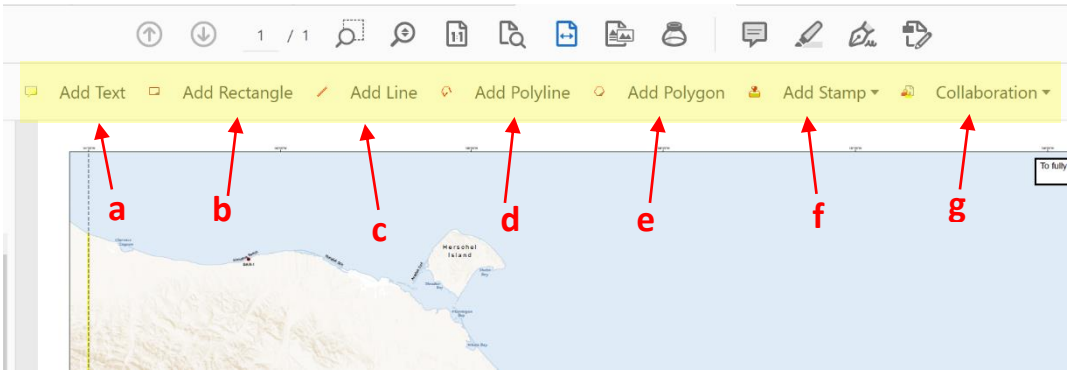

Figure 14. Tools available in the TerraGo GeoMark toolbar

Tools labelled "a" to "f" in Figure 14 all add components to the map that can be export in spatial data format and imported into either GIS or another GeoPDF. The Collaboration drop-down menu allows for export and other types of sharing.

a) Add Text – this allows users to make comments (shown as sticky notes) at certain points on the map (Figure 15). These will export as point data in shapefiles, and whatever text is entered in the text box will export in the attributes of the shapefile under "Comments".

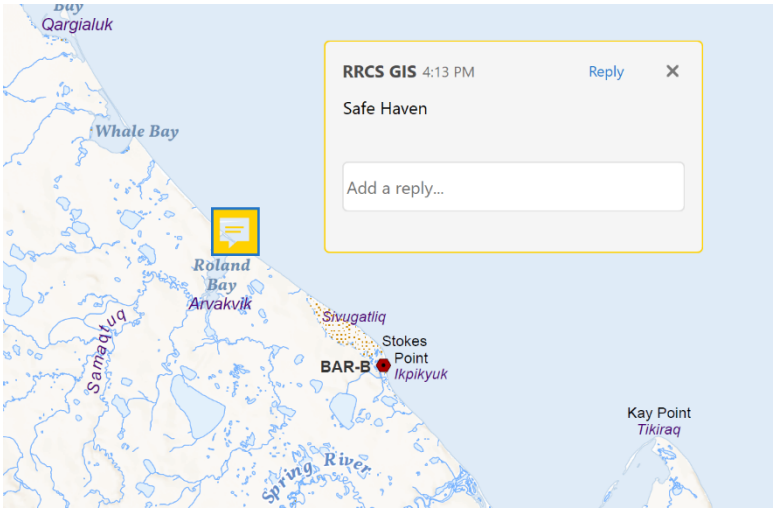

Figure 15 Text added to a Map Atlas GeoPDF

b) Add Rectangle – this allows users to add rectangles to the map (Figure 16). Once drawn on the map, users can right-click the rectangle and add a context note via the Open Pop-Up option. These features will export as polygons in shapefiles, and anything written in the po-up window will export in the attribute of the shapefile under "Comments".

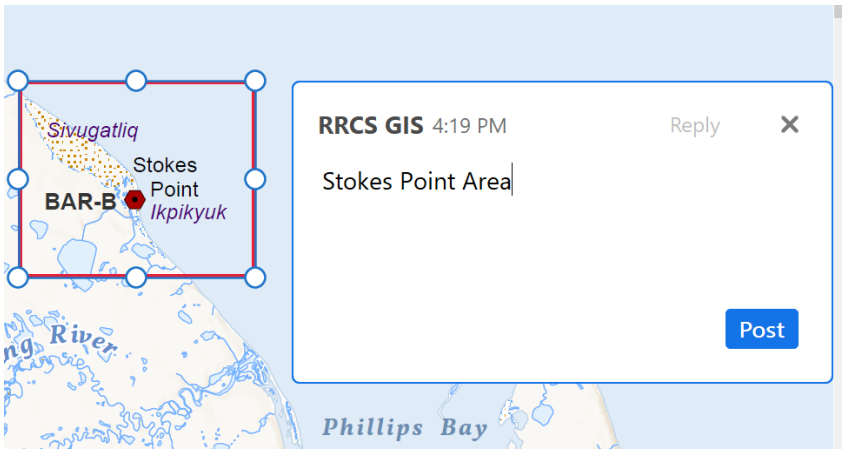

Figure 16. Rectangle added to Map Atlas GeoPDF

c) Add Line – this allows users to add straight lines to the map. Once drawn on the map, users can right-click the line and add a context note via the Open Pop-Up option. These features will export as polylines in shapefiles, and anything written in the po-up window will export in the attribute of the shapefile under "Comments".

d) Add Polyline– this allows users to add poylines (lines with multiple segments) to the map. Once drawn on the map, users can right-click the line and add a context note via the Open Pop-Up option. These features will export as polylines in shapefiles, and anything written in the po-up window will export in the attribute of the shapefile under "Comments".

e) Add Polygon – this allows users to add free-form polygons to the map. Once drawn on the map, users can right-click the polygon and add a context note via the Open Pop-Up option. These features will export as polygons in shapefiles, and anything written in the po-up window will export in the attribute of the shapefile under "Comments".

f) Add Stamp – this allows users to add point feature symbols to the map (Figure 17). Users can select from a predefined list of options. Once drawn on the map, users can right-click the point and add a context note via the Open Pop-Up option. These features will export as points in shapefiles, and anything written in the po-up window will export in the attribute of the shapefile under "Comments".

Figure 17. Stamp added to Map Atlas GeoPDF

g) Collaboration – this feature allows the user to both import and export GeoMarks, making it possible for groups to collaborate on the same map, GeoMarks made on one map to be exported and imported into another GeoPDF, and information collected in the GeoPDF to be exported to spatial data format for ingestion in GIS software. There are 4 important options in this menu:

i. GeoMarks View Filter – this option brings up a dialogue box that allows the user to filter visibility of GeoMarks either by user or date modified (Figure 18)

ii. Import as GeoMarks – this option allows users to import GeoMarks created in another map into the current map. In order for GeoMarks to be successfully imported, they must have been exported from another GeoPDF as a TerraGo Collaboration file (.twz) (see option iv, below)

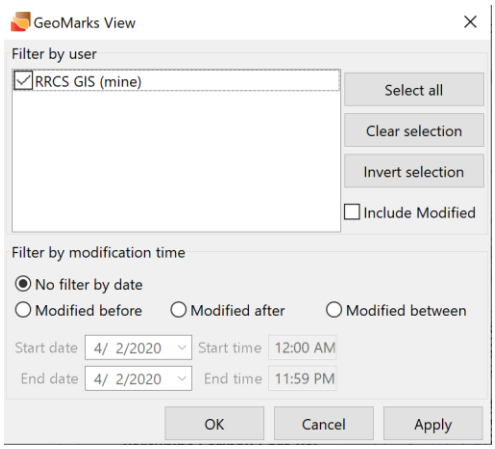

Figure 18. GeoMarks View Filter in Map Atlas GeoPDFs

iii. Delete GeoMarks – this option allows the user to delete GeoMarks from the GeoPDF. By clicking the "Modify Filter" button in the dialogue box that appears, the user can delete GeoMarks only from certain users, or from a certain time period, rather than deleting all GeoMarks at once.

iv. Export GeoMarks – this option allows users to export all GeoMarks on the map, along with context notes and text, into one of three spatial data formats: TerraGo Collaboration File (.twz), KML File (.kml), and Shape Files (.shm). If exporting GeoMarks for the purposes of loading into another GeoPDF, export in the ".tzw" format. If exporting to load in Google Earth, export in the ".kml" format. If exporting for ArcGIS or other GIS software, export as ".shm".

Chapter 2: Map Layer Documentation

This chapter provides brief documentation of the data presented in the YNS Map Atlas GeoPDF Map Library. This information is not complete documentation, which resides with the spatial data layers themselves (metadata) but provides basic information about the data. The following tables are organized parallel to the organization of the Map Atlas menu items, including: Base Data provided on all the Maps, Common Data that are also found on most of the Maps, then Map Theme specific data information (e.g., list of additional data found on the 'Aquatic and Marine' map).

Base Layers

Map Layer	Data Source	Description
Inuvialuit Settlement Region	NRCAN	The Inuvialuit Settlement Region (ISR) refers to the area covered under the Inuvialuit Final Agreement (IFA). The ISR was designated in 1984 in the IFA for the Inuvialuit people by the Government of Canada.
Yukon North Slope	WMAC	The Yukon Territory portion of the ISR
National/International Borders	Canvec	Territorial and international boundaries
DEW Line Sites	Stephen Kilbrun, 06 Jan 2015	Distant Early Warning Line (DEW Line) - a system of radar stations in the far northern Arctic region of Canada set up to detect incoming Soviet bombers during the Cold War. These stations are used today as reference points for navigation by the Inuvialuit.
Communities	Canvec (1:50,000)	Areas of permanent settlement. There are no permanent settlements on the Yukon North Slope, the closest is Aklavik in the Mackenzie Delta.
Conservation Areas	Geomatics Yukon (1:250,000), Parks Canada, USFWS, Brain Johnston at Yukon Parks (Dàadzàii Vàn boundary)	Areas under varying levels of environmental protection, including national parks, territorial parks, wildlife refuges, and withdrawn areas.
Roads	Canvec (1:50,000)	Year-round and seasonal roads. There are no year-round or seasonal roads on the Yukon North Slope – the closest roads are in the community of Aklavik
Hydrography	Canvec (1:50,000; YT & NWT); USGS (1:63,360; NDH - AK)	Permanent and intermittent water features (streams, rivers, lakes, tidal areas)

Common Datasets

Map Layer	Data Source	Description
Traditional Use	Stephen Kilburn, presented in: Wildlife Management Advisory Council (North Slope) and Aklavik Hunters and Trappers Committee. 2018. Yukon North Slope Inuvialuit Traditional Use Study. Wildlife Management Advisory Council (North Slope), Whitehorse, Yukon. 124 + xvi pp.	Inuvialuit hunting, fishing, trapping, plant collection, travel, and other forms of traditional use on the YNS. This includes places where people have stayed in cabins and tents, burial and birth sites, and other places of cultural, historical or personal importance. This dataset does not differentiate seasonal use.
Yukon Wildlife Key Areas	Environment Yukon (1:250,000)	Geographical locations used by wildlife for critical, seasonal life functions. Key areas are based on observed locations of wildlife at key times of the year, not on habitat assessment.
Traditional Knowledge (available in v2)	Will Tyson, presented in: Wildlife Management Advisory Council (North Slope) and Aklavik Hunters and Trappers Committee. 2018. Inuvialuit Traditional Knowledge of Wildlife Habitat, Yukon North Slope. Wildlife Management Advisory Council (North Slope), Whitehorse, Yukon. vi + 74 pp.	Habitat descriptions and requirements of important species on the Yukon North Slope, tied to predictive ecosystem mapping and other landscape features.

Aquatic and Marine Map

Map Layer	Data Source	Description
Ecologically or Biologically Significant Areas	Convention on Biological Diversity (https://www.cbd.int/ebsa/)	An EBSA is an area of the ocean that has special importance in terms of its ecological and biological characteristics: for example, by providing essential habitats, food sources or breeding grounds for particular species.
Polar Bear Den Sites	USGS, Yukon Government	USGS records of polar bear den locations span 1910 – 2010, with 392 locations (23 locations along YNS). YG surveys of Herschel Island from 2010 – 2017 recorded 12 dens. A 2018 YG survey of the western North Slope recorded an additional 8 den sites.
Sea Ice Habitat	WMAC, pers. comm	Represents the full extent of available sea ice habitat used by polar bears on the YNS
Frequent Land Denning Locations	Polar Bear Den Sites (see above), WMAC pers. comm	Digitized areas around known denning hot spots on the YNS
Density of Denning	Polar Bear Den Sites (see above)	Kernel density analysis (10 km) of den clusters, calculated within the Frequent Land Denning area
Char Summer Feeding Area	WMAC, pers. comm	Represents the full extent of summer feeding range utilized by YNS populations of Arctic Char
Arctic Char Distribution	Department of Fisheries and Oceans	"Developed by DFO GIS and Species at Risk…more of a 'broad-brush' approach for the distribution of Dolly Varden in the area" (Ellen V. Lea, DFO)
Impassable Falls	Sawatzky, C.D. and J.D. Reist. 2014. Life History Types and Stages of Northern Form Dolly Varden, *Salvelinus malma malma*. Canadian Manuscript Report of Fisheries and Aquatic Science 3029. Fisheries and Ocean Canada: Winnipeg, 46 pp.	Hydrologic features that block further movement upstream for anadromous populations – and fish upstream of these falls are considered isolated populations.
Documented Char Critical Habitat	Sawatzky & Reist, 2014 & Colin Gallagher (DFO), 16 April 2019	Areas of spawning and overwintering documented by survey observations
Potential Char Critical Habitat	Sawatzky & Reist, 2014	Suspected areas of spawning and overwintering based on local knowledge and environmental factors

Avian Map

Map Layer	Data Source	Description
Important Bird Areas	National Audubon Society	Areas identified using an internationally agreed set of criteria as being globally important for the conservation of bird populations
Shorebird Predicted Species Richness	Anderson, Christine & Dr. Paul Smith. 2018. Habitat selection by shorebirds breeding on the Yukon North Slope. Carleton University & Wildlife Research Division, ECCC.	Total predicted species richness calculated by summing the number of species for which a cell was categorized as suitable habitat, based on the species-specific thresholds, modelled with maximum entropy methods
TK Goose Models – Nesting, Foraging and Staging	RRCS, 2018. Traditional Knowledge-Based Goose Habitat Model. Report prepared for WMAC-NS.	Traditional knowledge of goose habitat on the Yukon North Slope was gathered through interviews with Inuvialuit knowledge holders in late 2016. This information was translated into spatial variables, mapped, and used to predict habitat for nesting, staging and foraging, (specifically for yellowlegs and snow geese). Habitat suitability was binned 1-10. See report for complete methodology.
All High Quality Goose Habitat	Calculated from the TK nesting, foraging, and staging models, above	The top 60% (bins 5-10) of habitat quality in the three individual models (nesting, foraging, staging), overlapped.
Goose Models Combined – Summary	Calculated from the TK nesting, foraging, and staging models, above	The result of a Marxan analysis, representing 75% of high quality (bins 5-10) nesting habitat, 50% of high quality foraging habitat, and 50% of high quality staging habitat

Caribou Map

Map Layer	Data Source	Description
Porcupine Caribou Core Range	Kyle Russell, Environment Yukon, 25 Feb 2020	Core range of the porcupine caribou herd, as defined by YG
Caribou Calving (1990-2016)	Mike Suitor, Environment Yukon, 2018; Burden. 2017. Movements and distribution of the PCH 1990 to 2016. Report prepared for YG	Annual calving range overlap analysis based on collar data 1990 - 2016, generalized at a scale of 20 km
Caribou Midsummer (1990-2016)	Mike Suitor, Environment Yukon, 2018; Burden. 2017. Movements and distribution of the PCH 1990 to 2016. Report prepared for YG	Annual mid-summer range overlap analysis based on collar data 1990 - 2016
Caribou Spring Migration (1998-2018)	Mike Suitor, Environment Yukon, 2018, pers. comm.	Migration corridor analysis based on collar data 1998 – 2018. Brownian Bridge Movement Models (BBMM) were used to estimate of the relative frequency-of-use of areas along the migration route for each collared individual at a resolution of 500m. Individual migration routes were modelled first, followed by population-level migration routes for each season. Overlap ("frequency of use") was calculated between different years based on the 95% and 50% isopleths of the population level BBMM.
Caribou Fall Migration (1999-2018)	Mike Suitor, Environment Yukon, 2018, pers. comm.	Migration corridor analysis based on collar data 1999 – 2018. Brownian Bridge Movement Models (BBMM) were used to estimate of the relative frequency-of-use of areas along the migration route for each collared individual at a resolution of 500m. Individual migration routes were modelled first, followed by population-level migration routes for each season. Overlap ("frequency of use") was calculated between different years based on the 95% and 50% isopleths of the population level BBMM.

Climate Map

Map Layer	Data Source	Description
Shoreline Erosion	Irrgang, A.M. Lantuit, H., Manson, G.K., Günther, F., Grosse, G. & Overduin, P.P. (2018). Variability in rates of coastal change along the Yukon Coast, 1951 to 2015. Journal of Geophysical Research: Earth Surface, 123(4), 617 - 850.	Shoreline positions were acquired from aerial and satellite images between 1951 and 2011. Shoreline change rates were calculated for multiple time periods along the entire coast up to Shingle Point.
Mean Annual Temperature Change	Climate WNA: www.climatewna.com	Difference in Mean Annual Temperature from baseline period (1960s – 1990s) to the 2080s. Mean Annual Temperature was calculated from an ensemble of 23 Coupled Model Intercomparison Project (CIMP) Atmosphere-Ocean General Circulation Models (AOGCMs), downscaled to 1 km. Low emissions scenario represented by B1, Moderate emissions by A1B, and High Emissions by A2.
Mean Annual Precipitation Change	Climate WNA: www.climatewna.com	Difference in Mean Annual Precipitation from baseline period (1960s – 1990s) to the 2080s. Mean Annual Precipitation was calculated from an ensemble of 23 Coupled Model Intercomparison Project (CIMP) Atmosphere-Ocean General Circulation Models (AOGCMs), downscaled to 1 km. Low emissions scenario represented by B1, Moderate emissions by A1B, and High Emissions by A2.
Change in Precipitation as Snow	Climate WNA: www.climatewna.com	Difference in Change in Precipitation as Snow from baseline period (1960s – 1990s) to the 2080s. Precipitation as Snow was calculated from an ensemble of 23 Coupled Model Intercomparison Project (CIMP) Atmosphere-Ocean General Circulation Models (AOGCMs), downscaled to 1 km. Low emissions scenario represented by B1, Moderate emissions by A1B, and High Emissions by A2.

Terrestrial Resilience	RRCS based on Buttrick, S., K. Popper, M. Schindel, B. McRae, B. Unnasch, A. Jones, and J. Platt. 2015. Conserving Nature's Stage: Identifying Resilient Terrestrial Landscapes in the Pacific Northwest. The Nature Conservancy, Portland Oregon. 104 pp.	Terrestrial resiliency was calculated through a combinations of heat load index, compound topographic index, and permeability. Results were stratified by ecoregion, ecotype, and land facet and binned 1-5. The density of the top 2 bins (40%) on the landscape was calculated at a scale of 5 km. Resulting layer identifies areas of highest terrestrial resilience - areas that may collectively and individually best sustain native biodiversity, even as the changing climate alters current distribution patterns.
Cliomes	Scenarios Network for Alaska + Arctic Planning; www.snap.uaf.edu/projects/alaska-canada-climate-biome-shift	"Cliomes" are broadly defined regions of temperature and precipitation patterns that reflect assemblies of species and vegetation communities (biomes) that occur or might be expected to occur based on links with climate conditions. They do not necessarily represent vegetation on the ground. Cliomes in the 2030s were modelled from baseline cliomes under three emissions scenarios: High (A2), Moderate (A1B), and Low (B1).

Grizzly Bear Map

Map Layer	Data Source	Description
Den Locations	Mike Suitor, Environment Yukon	1993 - 2017
GPS Locations	Mike Suitor, Environment Yukon	2004 – 2010 GPS collar study
Grizzly Bear Habitat Models (Spring Male & Female, Summer Male & Female, Fall Male & Female)	RRCS. 2020. YNS grizzly bear seasonal habitat models. Report to WMAC(NS)	Spring, summer, fall and denning seasonal habitat models developed using a Bayesian Resource Selection Function approach to combine indigenous knowledge (as Bayesian priors) and GPS collar and den site data to predict relatively probability of selection for habitats across the YNS

Moose Map

Map Layer	Data Source	Description
Moose GPS Collar Locations	Mike Suitor, Environment Yukon, 201i8	Locations recorded through GPS collars. Dates of locations range from 30 Aug 2007 to 28 May 2009. Location data was gathered every 5 hours.
Moose Survey Locations	David Tavares, Parks Canada & Mike Suitor, Environment Yukon, 2019	This dataset represents late winter aerial survey observations. Surveys in the western portion of the study areas (Ivvavik) are from 2000, 2009, and 2019. Surveys in the eastern portion of the study area (Richardsons) are from 2000 and 2013. Each point represents between 1 and 10 moose, with the exception of 3 points outside the study area (Bell River) representing 12, 16, and 36 moose.
Moose Survey Areas	Hayleigh Conway, Parks Canada, 2019 & Yukon Wildlife Key Areas dataset	Areas consistently flown for late winter surveys of moose. On the eastern North Slope, drainages identified in the Yukon Wildlife Key Areas dataset are consistent with drainages flown for surveys.
Moose Survey Flight Lines	Hayleigh Conway, Parks Canada & Martin Kienzler, Environment Yukon, 2019	GPS tracks of aerial survey flights
Moose Seasonal Migration (WCMP)	WMAC, pers. comm	Generalized migration corridors drawn to show movement patterns on a regional scale. The migration on the eastern North Slope reflects movement from the coastal plain (summer) across the divide and into the Porcupine/Bell River drainage (winter). Migration on the western North Slope reflects movement from the British Mountains (winter) into the Old Crow Flats (summer).
Moose GPS Migration Pathways	Mike Suitor, Environment Yukon, 2019	Seasonal range overlap analysis based on GPS collar locations. Fall pathways represent 2007-2008, spring pathways represent 2008-2009. All season pathways are spring and fall combined into a single layer.
Moose GPS Migration Pathways - Generalized	RRCS	Areas of higher overlap in each season digitized into single linear pathways
TK Moose Model	RRCS, 2018. Traditional Knowledge-Based Goose Habitat Model. Report prepared for WMAC-NS.	Traditional knowledge of moose habitat on the Yukon North Slope was gathered through interviews with Inuvialuit knowledge holders in late 2016. This information was translated into spatial variables, mapped, and used to predict habitat suitability. Habitat suitability was binned 1-10. See report for complete methodology.

Predictive Ecosystem Mapping

Map Layer	Data Source	Description
Predictive Ecosystem Mapping	Product developed by Nadele Flynn as part of the Yukon Ecological Landscape Classification program: Ecological Landscape Classification Supervisory Committee. 2013. "Yukon Ecological and Landscape Classification (ELC) Program: Five-Year Strategic Plan." Whitehorse, YT, Canada.	Predictive Ecosystem Mapping (PEM) is the stratification of a landscape into map units (ecotypes), according to a combination of ecological features, primarily climate, physiography surficial material, bedrock geology, soil, and vegetation. PEM provides information on the distribution of ecosystems from which management interpretations (e.g., broad-scale landscape planning, site-specific interpretations) can be developed. Ecotype mapping of the eastern Yukon North Slope took place from 2015-2018 using SPOT imagery interpretation paired with ground vegetation plots. The final classification, provided in May 2018, was cross-walked with the existing ecotype mapping in Ivvavik National Park and on Herschel Island. The final predictive ecosystem map covers the entire Yukon North Slope, including Herschel Island, and follows the classification scheme originally developed in Ivvavik.
Traditional Knowledge Ecosystem Classification	Wildlife Management Advisory Council (North Slope) and Aklavik Hunters and Trappers Committee. 2018. Inuvialuit Traditional Knowledge of Wildlife Habitat, Yukon North Slope. Wildlife Management Advisory Council (North Slope), Whitehorse, Yukon. vi + 74 pp.	Classification of traditional knowledge-based habitat was undertaken through a two-day workshop in Aklavik in October 2016. Inuvialuit land users were asked to identify and describe the different types of habitats they encounter on the YNS. The TK-derived habitat classes were then linked by participants to PEM ecotypes based on photos and other descriptive information. This layer represents the final classification of Inuvialuit land users.

Sheep & Muskox Map

Map Layer	Data Source	Description
Sheep Survey Observations	Mike Suitor, Environment Yukon, 2018 & David Tavares, Parks Canada, 2019	Observations of sheep from aerial surveys conducted in 1984, 2001, 2002, 2006, 2010, 2014, 2017, and 2019. Dataset includes 632 observations, most locations represent anywhere between 1 – 20 sheep, with 9 locations representing more than 30 sheep each.
Sheep Survey Area	Hayleigh Conway, Parks Canada & Martin Kienzler, Environment Yukon, 2019	Mountain blocks included in aerial surveys for Dall's sheep
Muskox Use Contours	Mike Suitor, Environment Yukon, 2019	Use contours derived from the kernel surface
Muskox Use	Mike Suitor, Environment Yukon, 2019	Kernel surface estimated in GME for earlier data (2000's) and another for the most recent data (2015-June 2019)