

North Slope Borough GIS 40 Years in the Making

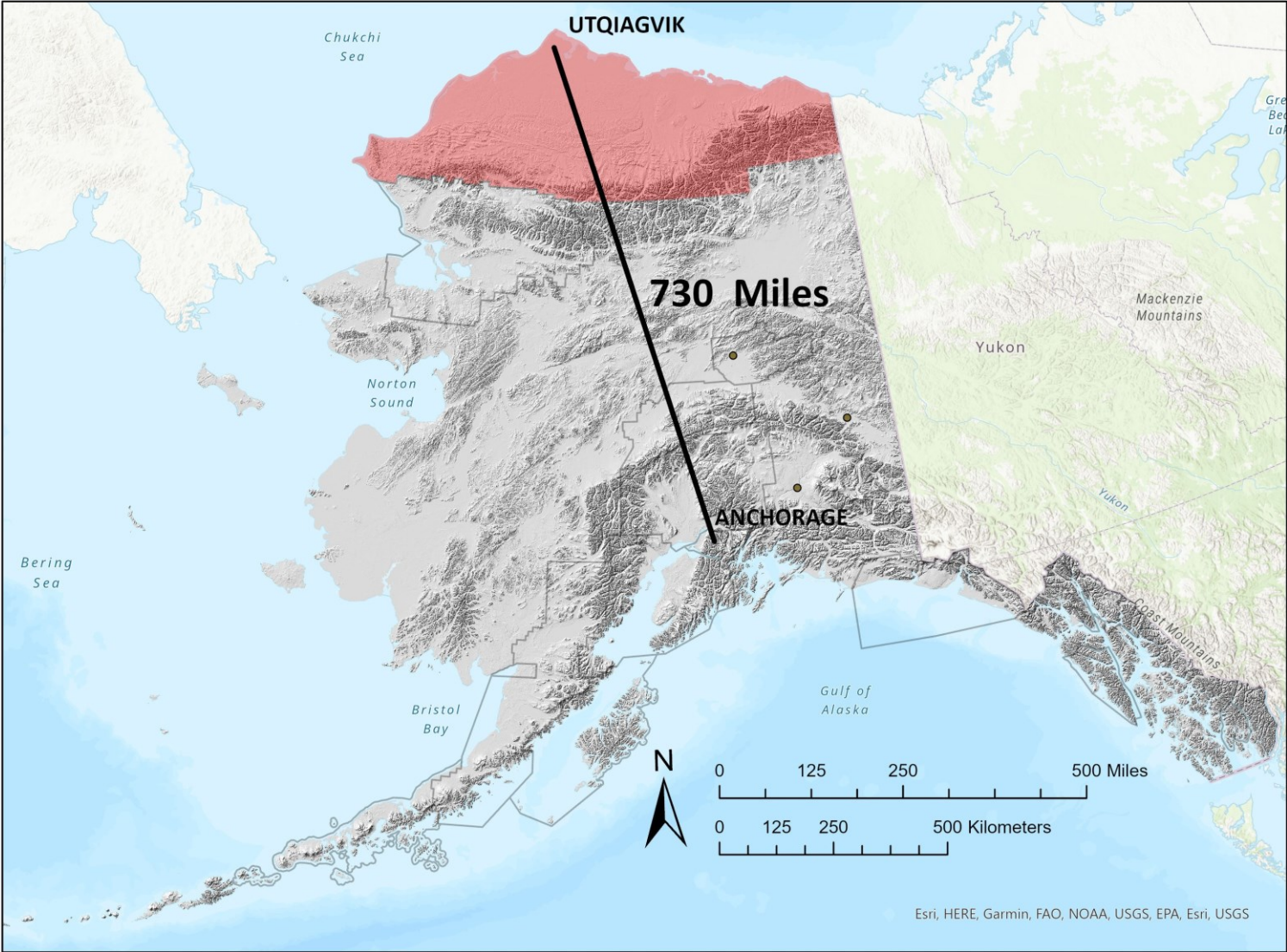
Outline

- ▶ Introduction
- ▶ NSB GIS History timeline
- ▶ 2016-2023 NSB GIS: how the NSB GIS evolved and current status
- ▶ Some examples of current work we're doing

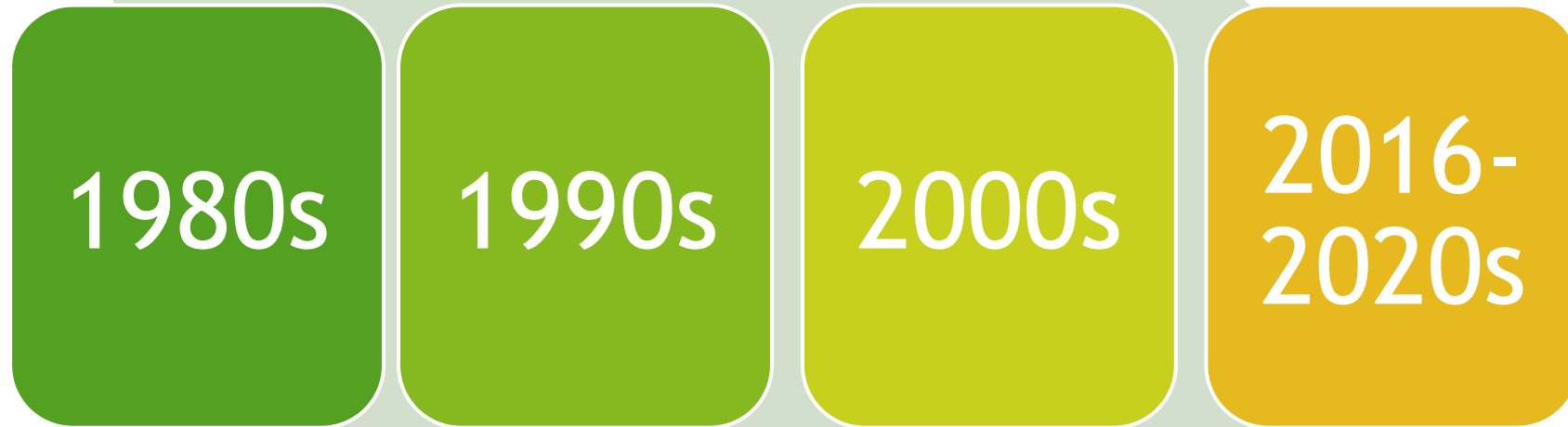
Introduction

- ▶ GIS began in late 1970s, but it was really the introduction of Esri's ArcInfo software in 1982, where GIS began to take off. Alaska had the first 3 of 5 ArcInfo licenses!
- ▶ NSB GIS was a pioneer, starting with GIS project work in 1983, and a full working ArcInfo license and lab established in 1984. Headed by Earl Nordstrand, who later worked for Esri as a prominent leader on the technical side.
- ▶ Key people such as Jack Dangermond and Roger Tomlinson were involved in early NSB GIS development.
- ▶ Now, the NSB faces challenges of all kinds. Economic, environmental. *Climate change* is perhaps the most important.

NSB is a remote part of Alaska



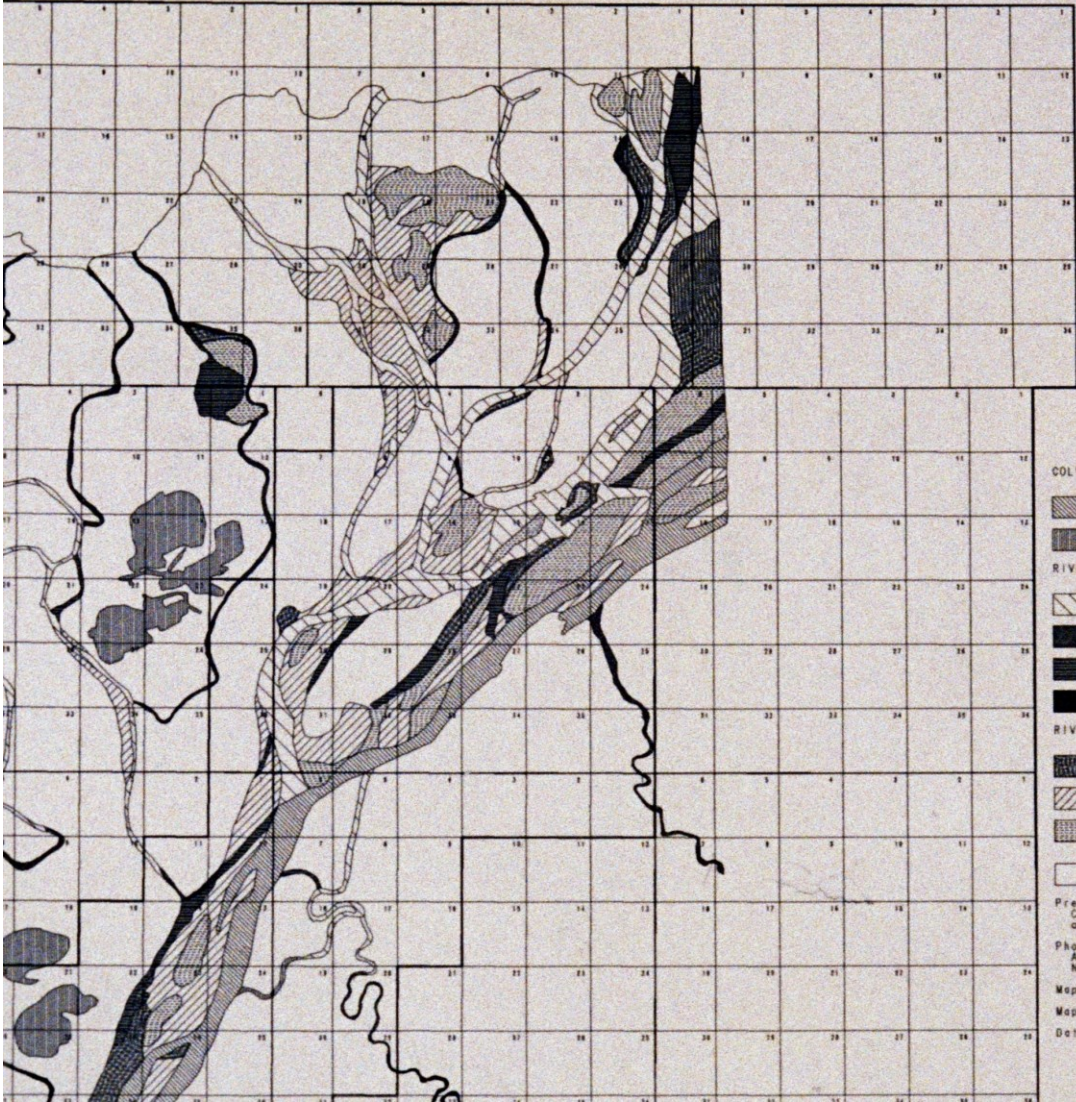
NSB GIS Timeline



NSB GIS: 1980s

- ▶ Pioneering Technical Projects. A time of great advances in GIS.
 - ▶ Coordinated project with Alaska DNR to map the North Slope and Alaska with GIS focused on resource and environmental data at 1:250,000 scale
 - ▶ Esri's first major GIS contract (\$3million 1983--\$9million in today's dollars)
 - ▶ NSB GIS office set up in Anchorage. Full ArcInfo installation: computers, scanner, software, and staff. 1984-1990. Driver was to assist oil and gas management by the NSB.
 - ▶ Use of GIS also used to assist in determining land ownership rights in the Colville Delta—GIS was used to prove ASRC's rights to lands on what is now the Alpine oil and gas field. Other key projects: land status mapping, mineral resource mapping.
 - ▶ Pioneering scientific studies using GIS:
 - ▶ Use of Geobotanical Maps and Automated Mapping Techniques to Examine Cumulative Impacts in the Prudhoe Bay Oilfield, Alaska

COLVILLE RIVER AND DELTA



COLVILLE RIVER AND DELTA

- Colville River
- Lakes

RIVER CHANNEL

- Submerged Greater Than 3 Chains
- Submerged Less Than 3 Chains
- Slough
- Intermittent

RIVER CHANNEL - PERIODICALLY FLOODED

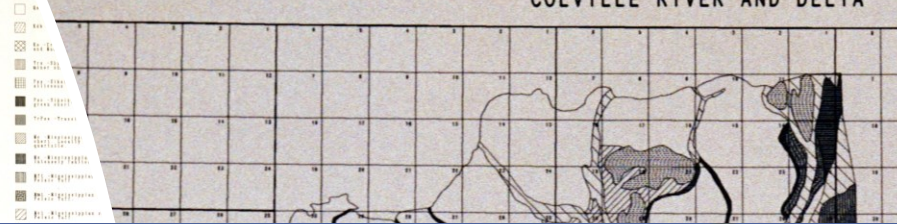
- Periodically Flooded
- Floodplain with Sparse Grass
- Floodplain with Denser Vegetation

OTHER LANDS

- Upland

Prepared for Arctic Slope Regional Corp
 C. Barnwell, J. Mortensen, Arctic Slope
 and E. Binnion, E. Nordstrand, North Slope
 Photography by:
 Air Photo Tech, Inc., July 5, 1983, Jul
 NASA 1:80,000 CIR, July 15, 1979
 Map Projection: Universal Transverse Mercator
 Map Scale: 1:83,360
 Date: March, 1987

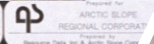
COLVILLE RIVER AND DELTA



Nutesut
 Image: IBCAO
 Image © 2023 CNES / Airbus
 Image © 2023 Maxar Technologies

Google

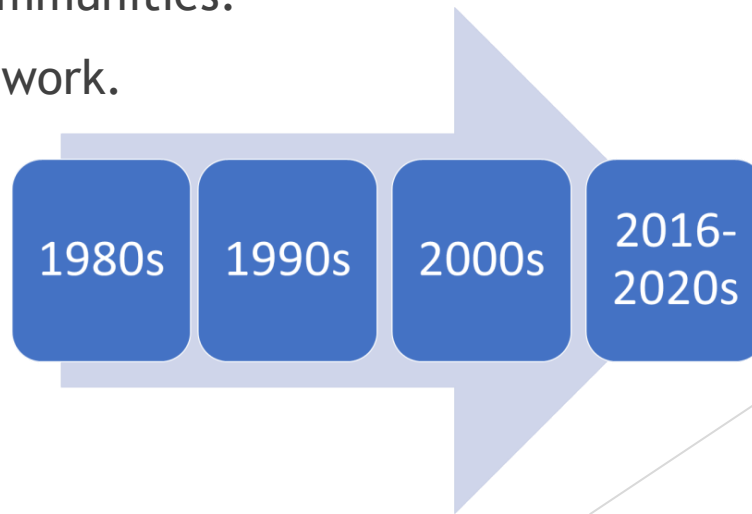
LAND STATUS MAP
 NUIQSUT
 Kuupik Corporation



ARCTIC SLOPE
 REGIONAL CORPORATION
 P.O. Box 1000, Barrow, Alaska 99705

NSB GIS: 1990s--2010

- ▶ Move of NSB GIS office to Barrow/Utqiagvik. Involved setup of office including a GIS lab with Unix workstations, staff, and manager.
- ▶ The GIS office served Barrow in this capacity until late 1990s.
- ▶ Key staff (one) maintained the NSB GIS until about 2005, then it continued with contractor support in limited fashion.
- ▶ Some key work was done such as the Barrow Area Information Database. DCRA Community Profiles of 6 of NSB communities.
- ▶ Supported NSB property appraisal work.



NSB GIS: 2016

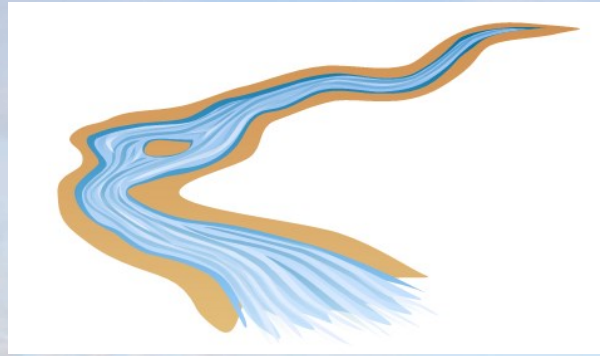
- ▶ Need for updated aerial imagery led to contracting this out
- ▶ Hire of Dan Heiner, NSB GIS manager, and rebuilding the NSB GIS office in Utqiagvik
- ▶ Aerial imagery need also led for realizing need for better elevation data.



Cayun, Charmaine, Dan, Andrew, Jonathan: NSB GIS Team in 2017, in Uitqiagvik, AK. 10



Business Needs



Environmental,
Wildlife
Management



Buildings and
Facilities

Tax and
Property
Appraisal

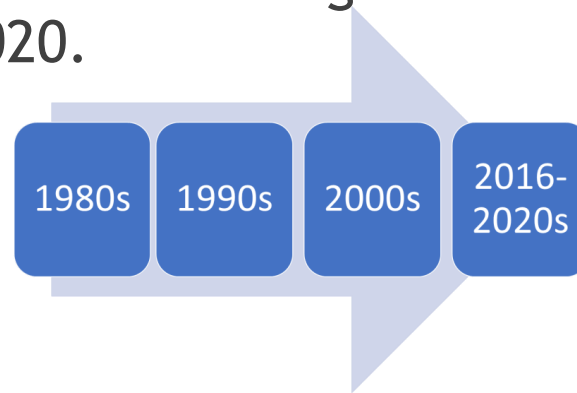


Infrastructure

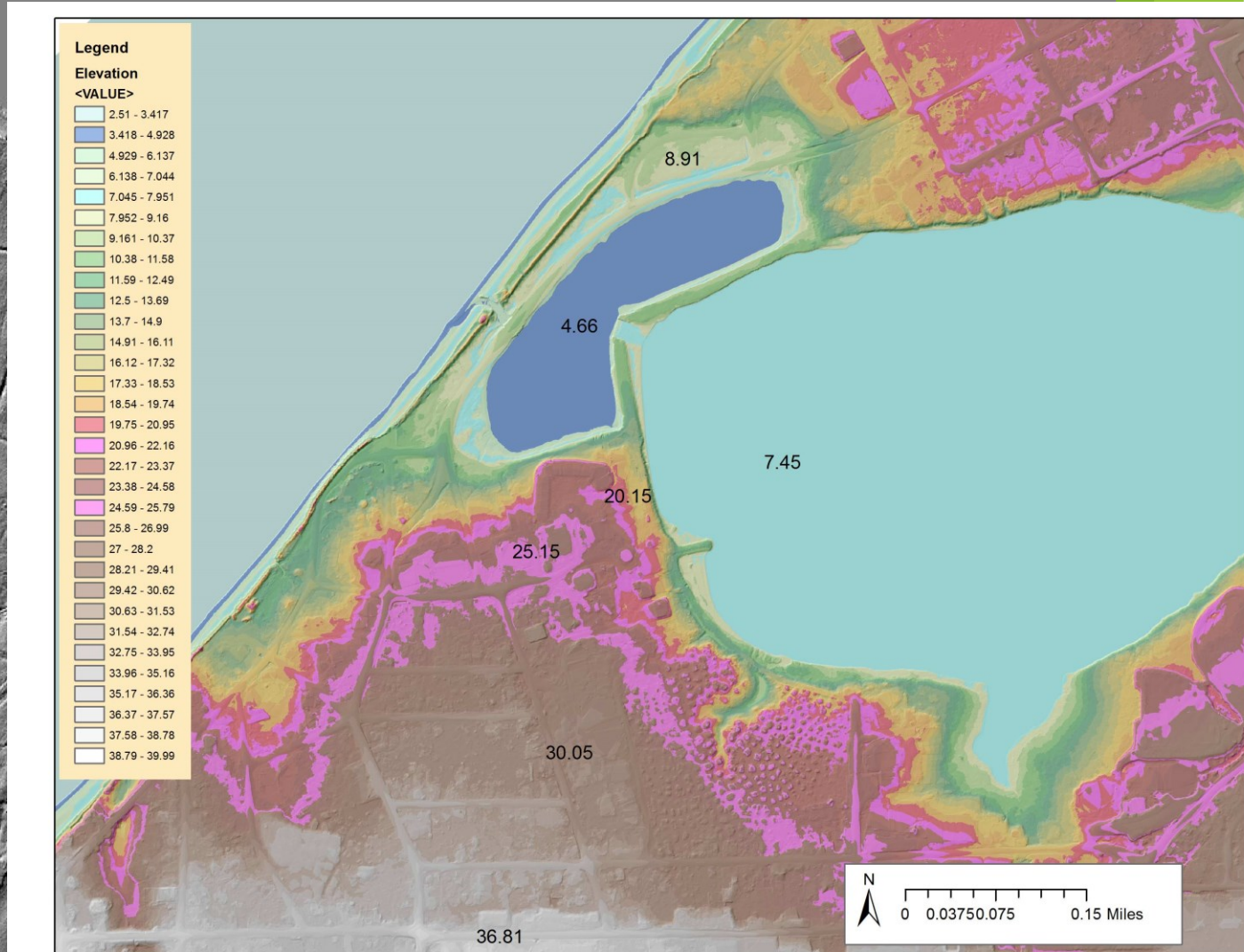
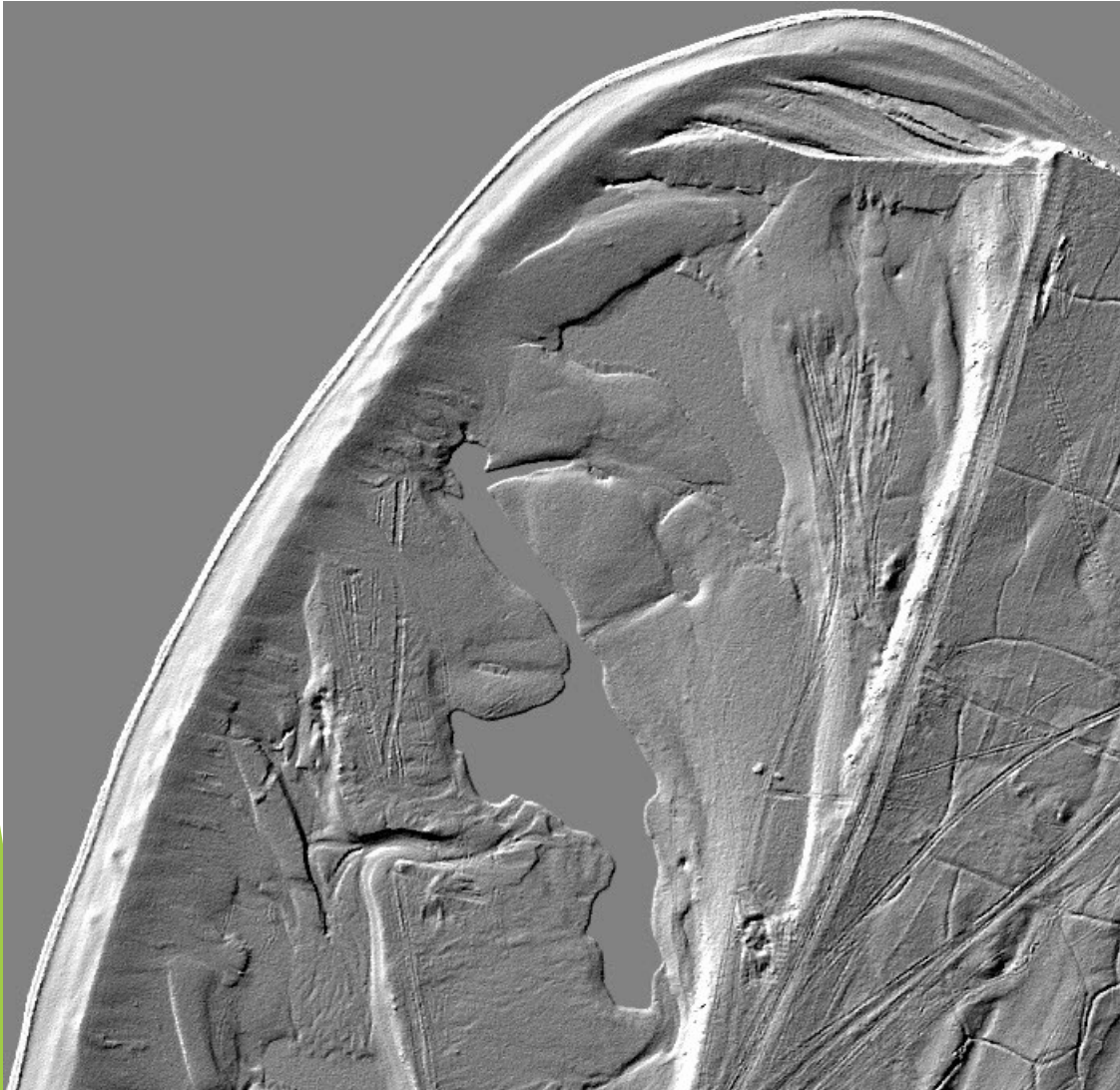


NSB GIS: 2019--2021

- ▶ **Data Acquisition Phase: Goal:** establish an authoritative, accurate, and USGS standard base dataset for the 8 NSB communities using the best available data. The purpose of this data is to support NSB departments, but also in general, as an authoritative base dataset for decision making, ecological studies, climate change studies.
- ▶ The NSB applied for USGS 3DEP funding as part of the 3DEP program.
- ▶ USGS accepted NSB as a partner, and began the LiDAR acquisition program using Quantum Spatial, who was instrumental in formulating the technical approach.
- ▶ Goal was high and moderate resolution LiDAR data and derivative products for all of the NSB communities including Deadhorse. Project was successful, and products received in 2020.



LiDAR Base Data for the NSB: many uses



Legend
Elevation
<VALUE>
2.51 - 3.417
3.418 - 4.928
4.929 - 6.137
6.138 - 7.044
7.045 - 7.951
7.952 - 9.16
9.161 - 10.37
10.38 - 11.58
11.59 - 12.49
12.5 - 13.69
13.7 - 14.9
14.91 - 16.11
16.12 - 17.32
17.33 - 18.53
18.54 - 19.74
19.75 - 20.95
20.96 - 22.16
22.17 - 23.37
23.38 - 24.58
24.59 - 25.79
25.8 - 26.99
27 - 28.2
28.21 - 29.41
29.42 - 30.62
30.63 - 31.53
31.54 - 32.74
32.75 - 33.95
33.96 - 35.16
35.17 - 36.36
36.37 - 37.57
37.58 - 38.78
38.79 - 39.99

NSB GIS—2022-2023

PATH FORWARD:

NSB-GIS, as a result of prior technical needs and options analysis, decided to move forward in a unmanned aerial system (UAS) program to acquire high-quality imagery and elevation data. This data would fulfill key needs of Public Works, Property Appraisal, and other departments.

▶ UAS equipment was purchased by NSB as follows.

- ▶ DJI Phantom 4 RTK
- ▶ DJI Matrice 300 RTK Drone
- ▶ D-RTK Mobile Base Station
- ▶ Zenmuse H20t sensor
- ▶ Zenmuse P1 sensor
- ▶ Agisoft Metashape License
- ▶ Esri Dron2Map license



▶ Training. Coordinated projects with DNR DGGS fostered training and experience was very helpful; Other: Esri Drone 2 Map, FAA, other.

▶ Testing: conducted project with contractor in 2022 using NSB drone equipment and contractor support at Deadhorse in late summer 2022. Successfully showed a UAS approach could work for the NSB.

▶ Implementation: 2023: Contracted with Corax. Conducted successful UAS data acquisition in Deadhorse area and Utqiagvik areas.

UAS 2023 Results—CORAX

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