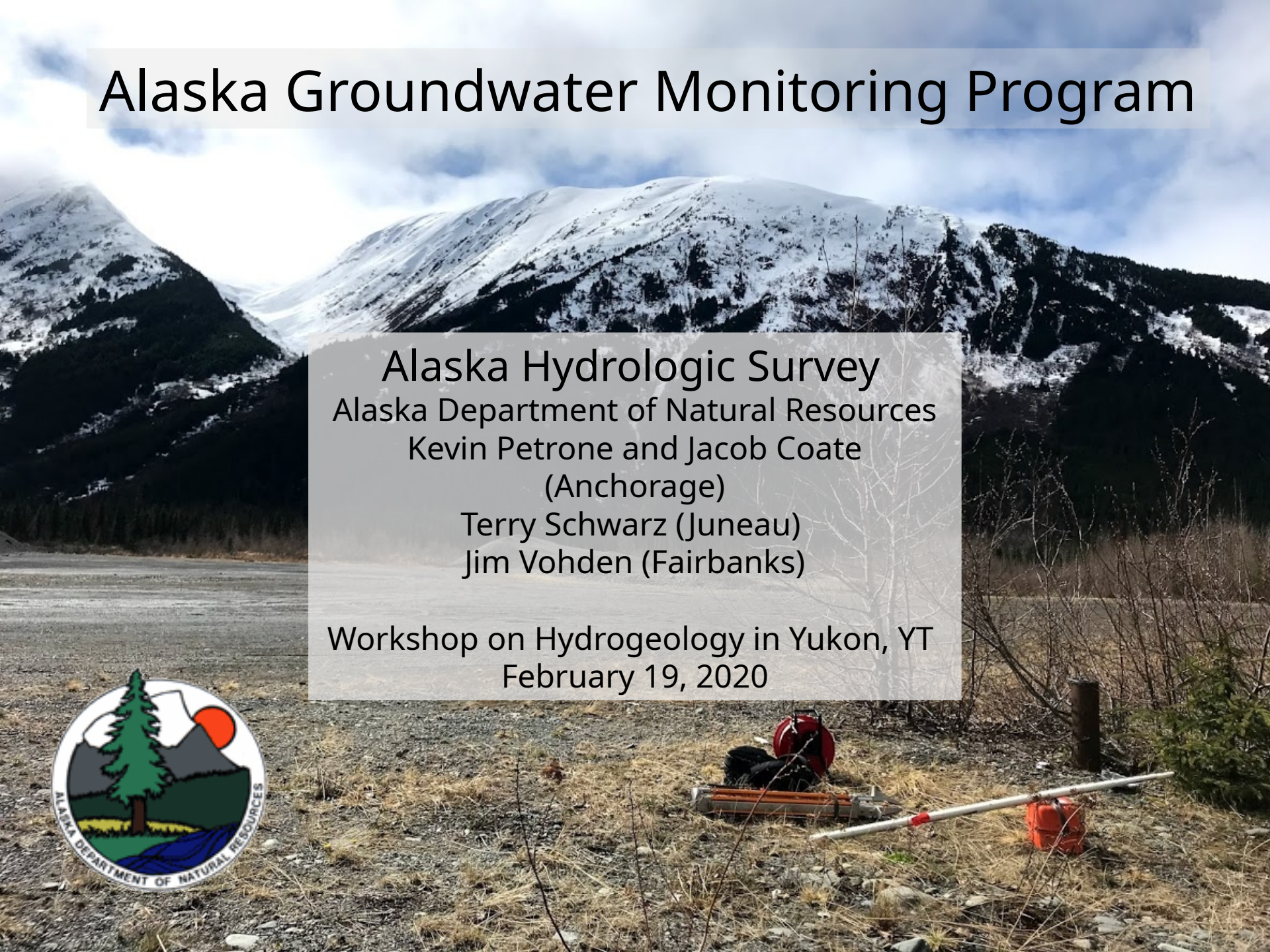
Alaska Groundwater Monitoring Program



Alaska Hydrologic Survey

Alaska Department of Natural Resources
Kevin Petrone and Jacob Coate (Anchorage)
Terry Schwarz (Juneau)
Jim Vohden (Fairbanks)

Workshop on Hydrogeology in Yukon, YT
February 19, 2020

Alaska Groundwater Monitoring Program

Why Are Groundwater Level Data Needed?

Water availability for Muni/Borough/Village Potable Supply

- groundwater storage and recharge dynamics
- the response of groundwater aquifers to climate variability and drought

Water availability for surface water bodies

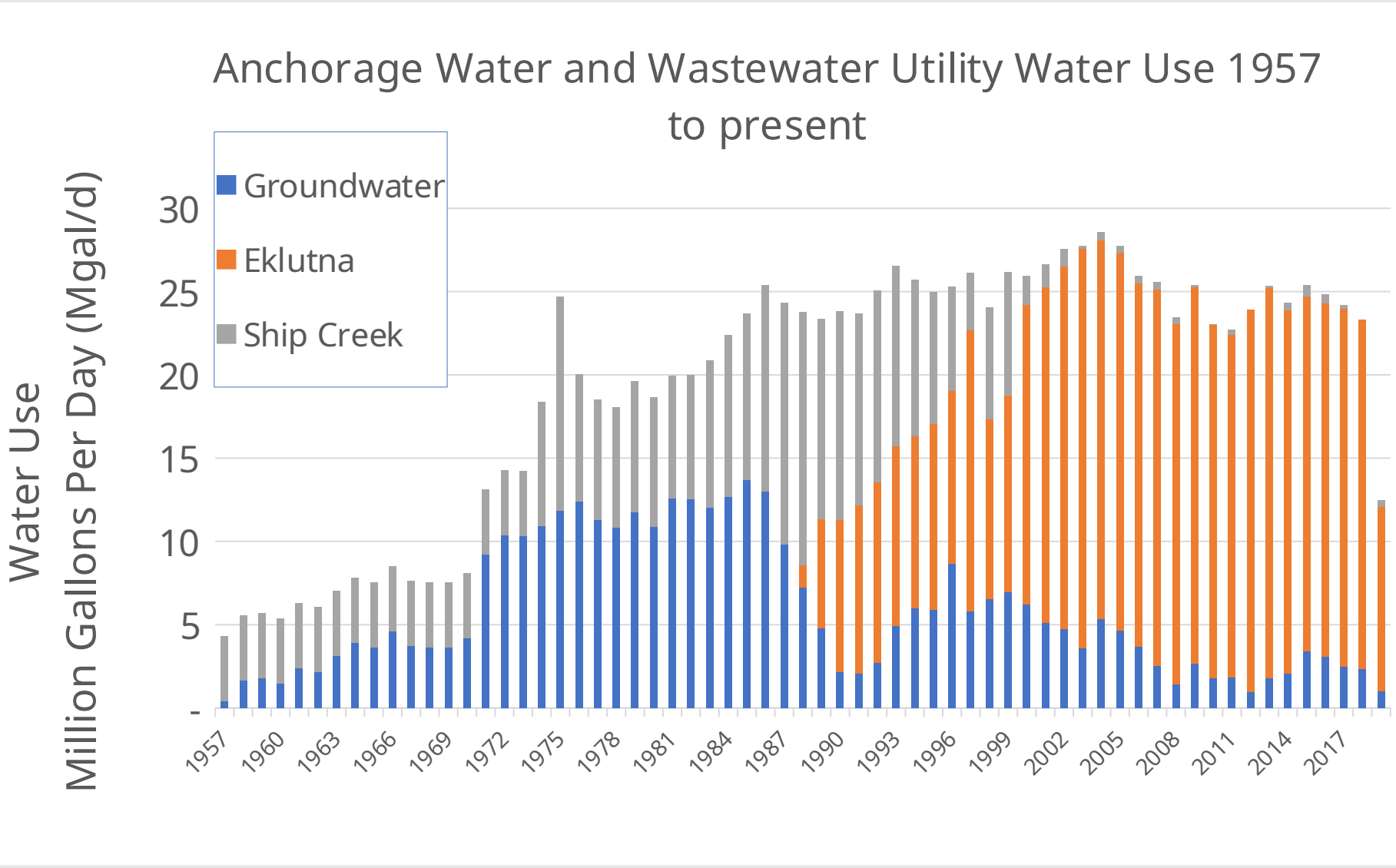
- the interaction between groundwater and surface-water

Water availability in response to natural disturbances

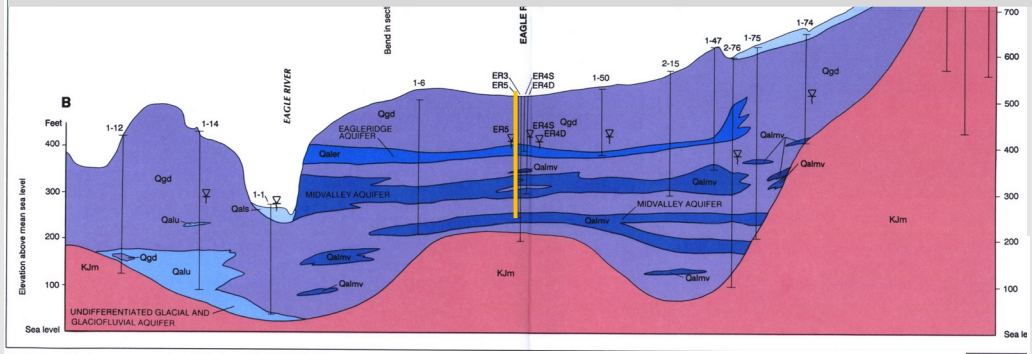
- the effect of earthquakes on groundwater levels and water supply wells

History of Groundwater Monitoring in Alaska (statehood-present)

- In 1950s – much interest in water resources in Alaska – 100 wells inventoried after the Good Friday Earthquake with continuous pre- and post-response in >30 wells*
- 1972 USGS maintained 80 observation wells and 1 spring in Alaska
- 2013 the state began an ad-hoc groundwater monitoring program
- 2019 USGS maintains four observation well in Alaska
- 2020 TOTAL*: with combined efforts among local, state, and federal agencies with cooperation from private landowners increased the # of observation wells in Alaska to ~15 (~10 state, 4 USGS)

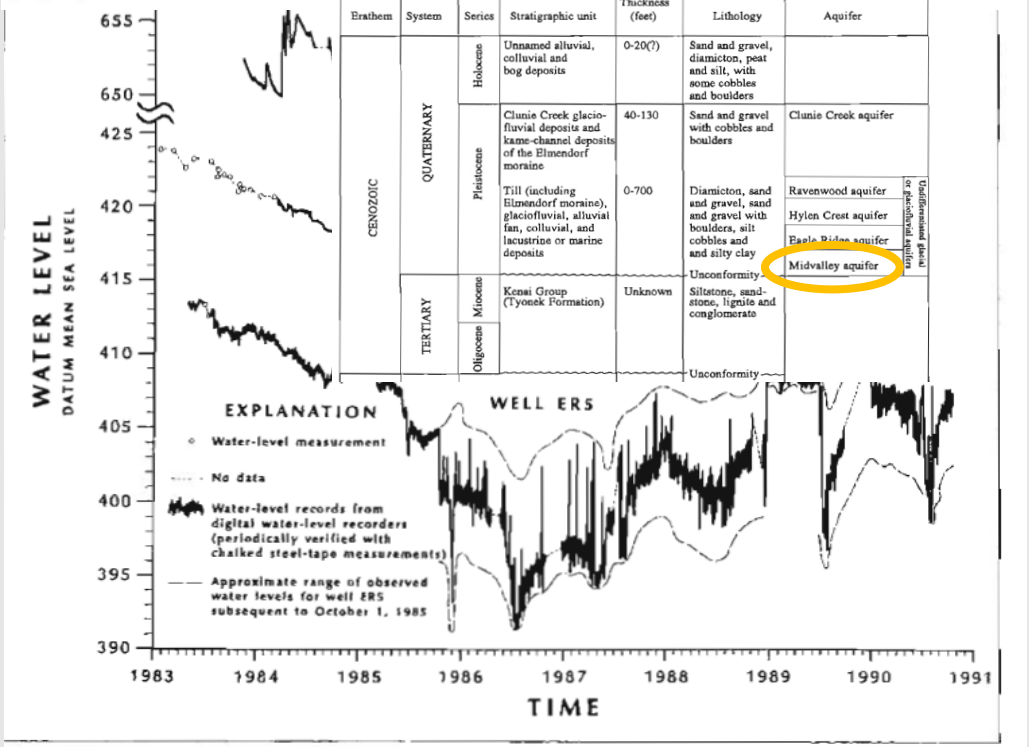

Anchorage Water and Wastewater Utility Water Use 1957 to present
Water Use
Million Gallons Per Day (Mgal/d)
Groundwater
Eklutna
Ship Creek
30
25
20
15
10
5
-
1957
1960
1963
1966
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017

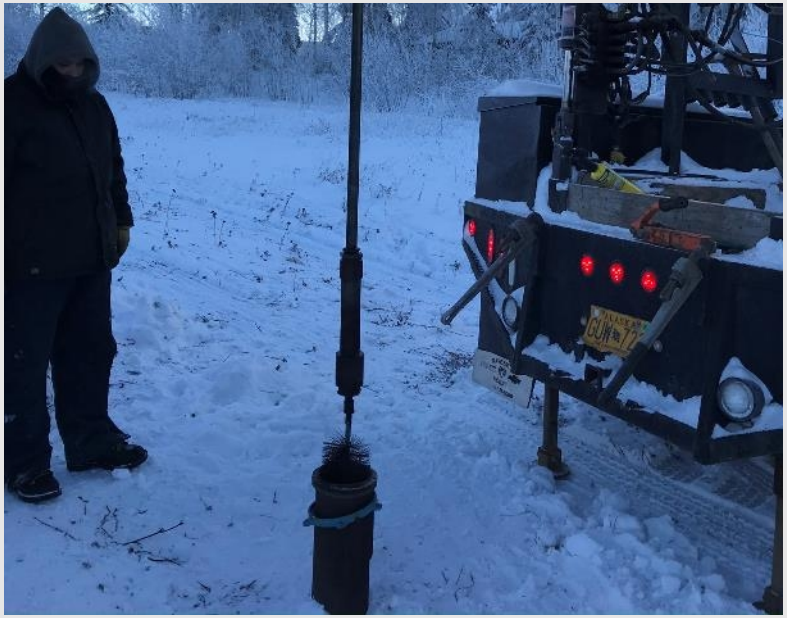
Monitoring Well Rehabilitation and Re-Establishment, Eagle River, AK
Well ER-5 confined, mid-valley aqu



Hydrogeologic cross section B-B'

Erathem	System	Series	Stratigraphic unit	Thickness (feet)	Lithology	Aquifer
CENOZOIC	QUATERNARY	Holocene	Unnamed alluvial, colluvial and bog deposits	0-20(?)	Sand and gravel, diamicton, peat and silt, with some cobbles and boulders	
		Pleistocene	Clunie Creek glacio-fluvial deposits and kame-channel deposits of the Elmendorf moraine	40-130	Sand and gravel with cobbles and boulders	Clunie Creek aquifer
			Till (including Elmendorf moraine), glaciofluvial, alluvial fan, colluvial, and lacustrine or marine deposits	0-700	Diamicton, sand and gravel, sand and gravel with boulders, silt cobbles and and silty clay	Ravenwood aquifer; Hylen Crest aquifer; Eagle Ridge aquifer; Midvalley aquifer; Undifferentiated glacial or glaciofluvial aquifers
					Unconformity	
	TERTIARY	Miocene	Kenai Group (Tyonek Formation)	Unknown	Siltstone, sandstone, lignite and conglomerate	
		Oligocene				
					Unconformity	

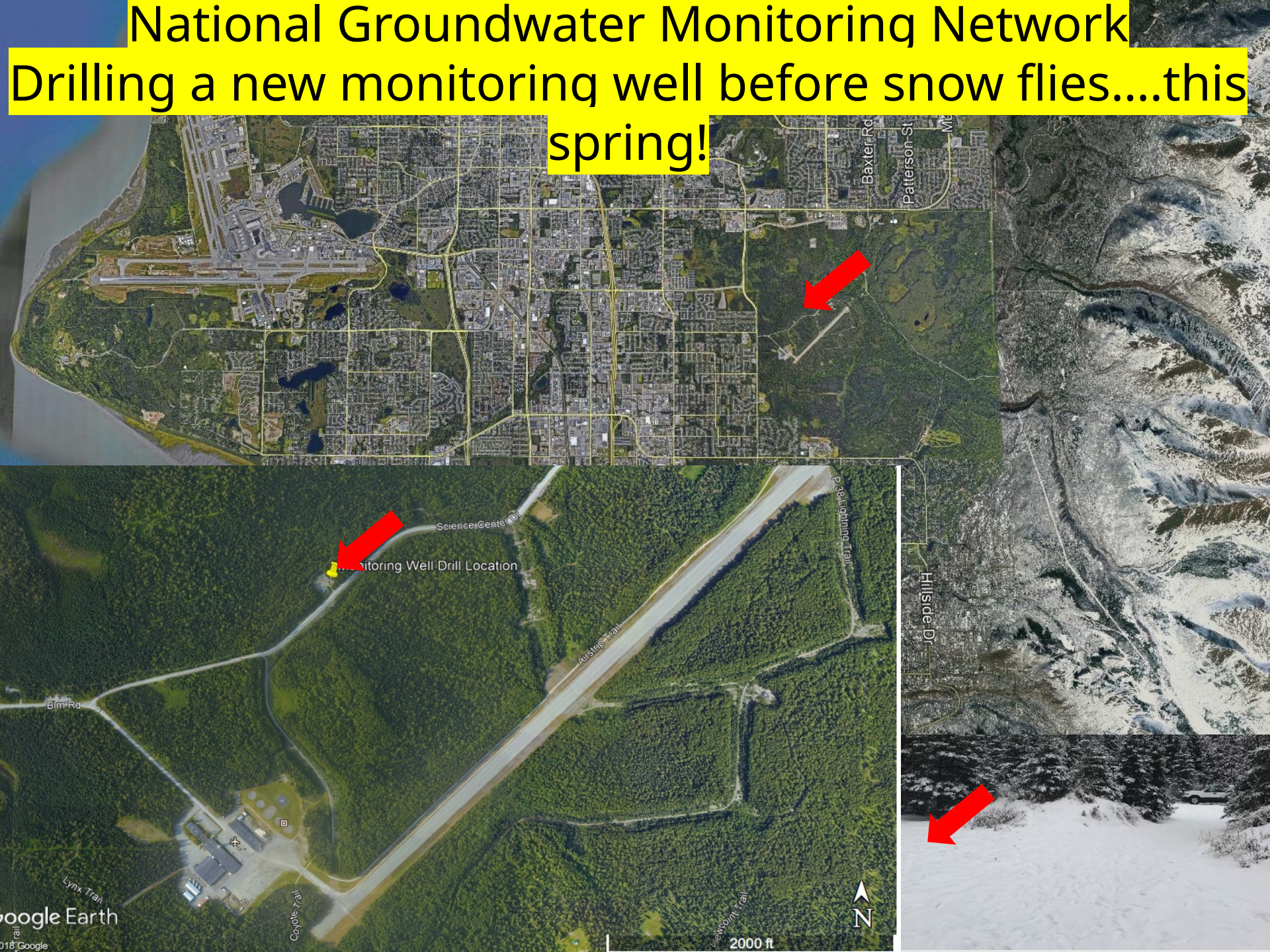




http://dggs.alaska.gov/webpubs/dggs/pr/text/pr108.pdf

National Groundwater Monitoring Network

Drilling a new monitoring well before snow flies....this spring!



Alaska Groundwater Database
data harvested from AK state servers to the National Groundwater Monitoring Netwo

National Groundwater Monitoring Network

USGS Grant awarded to DNR in 2016

ACWI
Advisory Committee on Water Information

National Ground-Water Monitoring Network

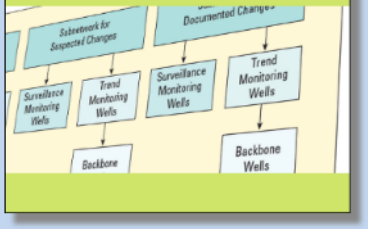
The National Ground-Water Monitoring Network (NGWMN) is a product of the Subcommittee on Ground Water of the Federal Advisory Committee on Water Information (ACWI). The NGWMN is a compilation of selected groundwater monitoring wells from Federal, State, and local groundwater monitoring networks across the nation.

The NGWMN Data Portal provides access to groundwater data from multiple, dispersed databases in a web-based mapping application. The portal contains current and historical data including water levels, water quality, lithology, and well construction. The NGWMN is currently in the process of adding new data providers to the Network. Agencies or organizations collecting groundwater data can find out more about becoming a data provider for the Network.

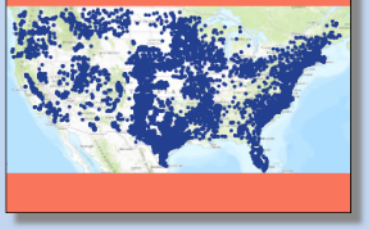
Funding to support data providers to the National Ground-Water Monitoring Network is provided through USGS Cooperative Agreements. Agencies can also find information about the status of the USGS cooperative agreements.

CURRENT NETWORK:
7226 water-level wells
1943 water-quality wells
10 subnetworks
29 contributing agencies
54 administrative units
63 principal aquifers

LEARN about the Network



EXPLORE the Network



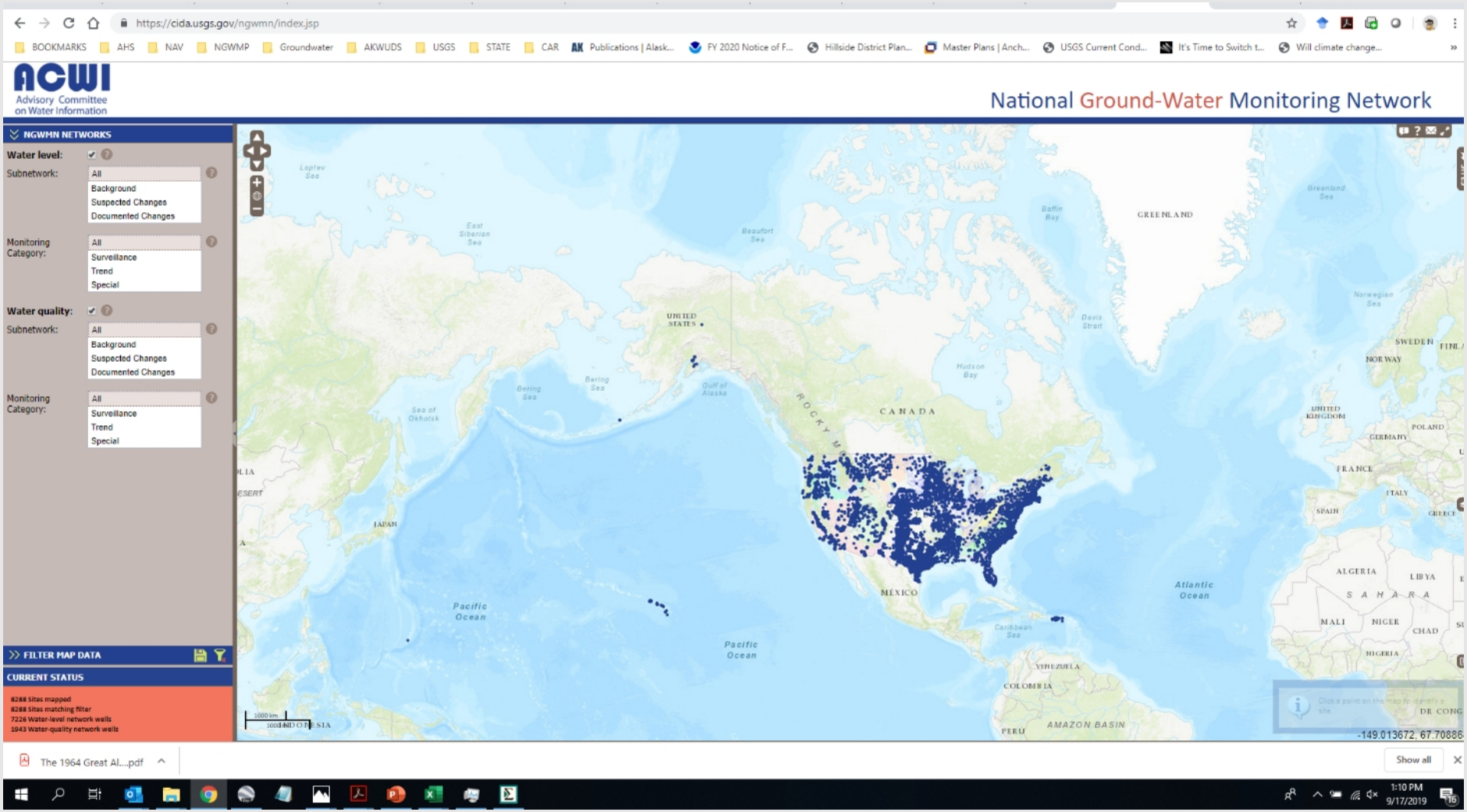
The 1964 Great Al....pdf

Show all

1:12 PM
9/17/2019

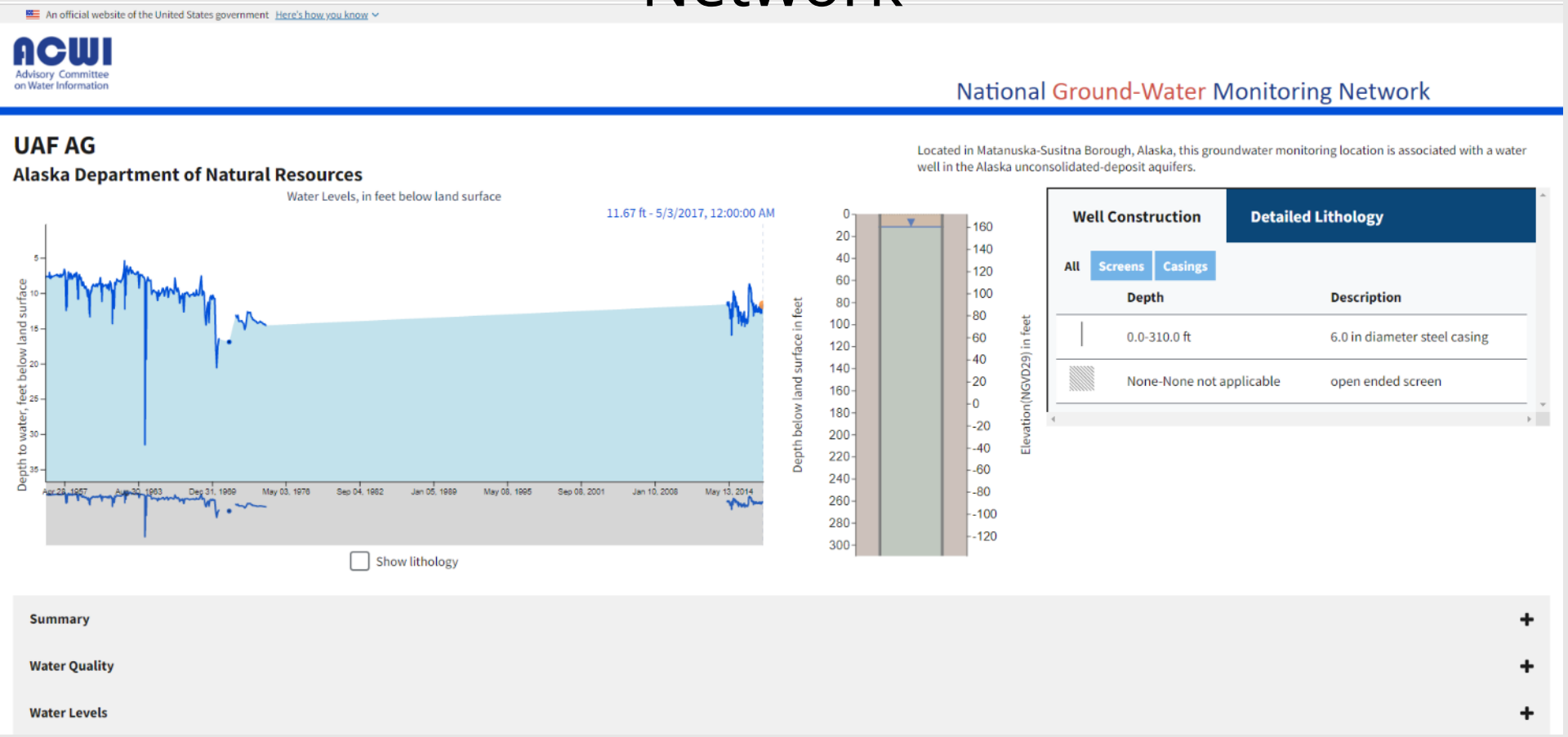
https://cida.usgs.gov/ngwmn/

National Groundwater Monitoring Network



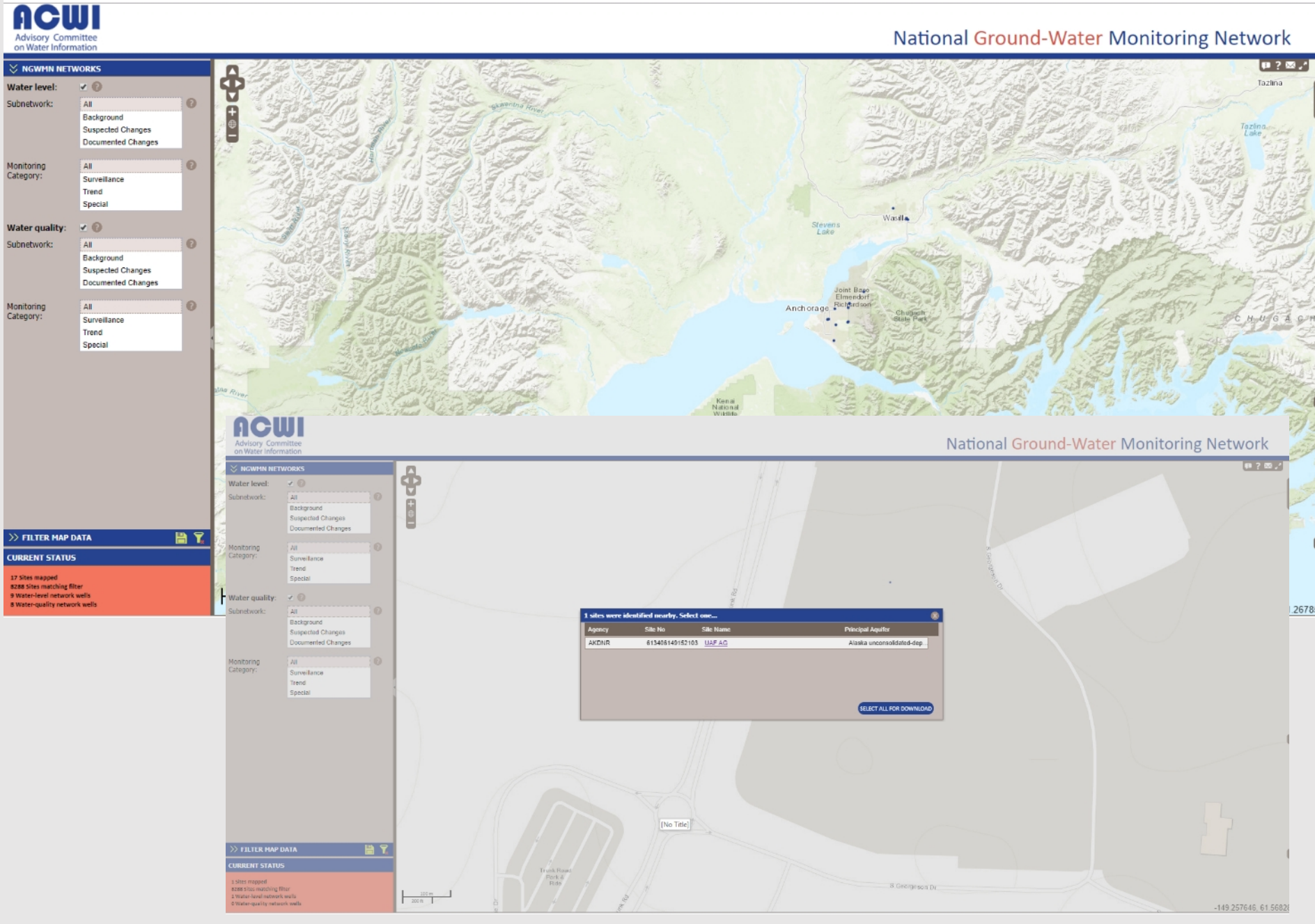
https://cida.usgs.gov/ngwmn/index.jsp

National Groundwater Monitoring Network



https://cida.usgs.gov/ngwmn/provider/AKDNR/site/613406149152103/

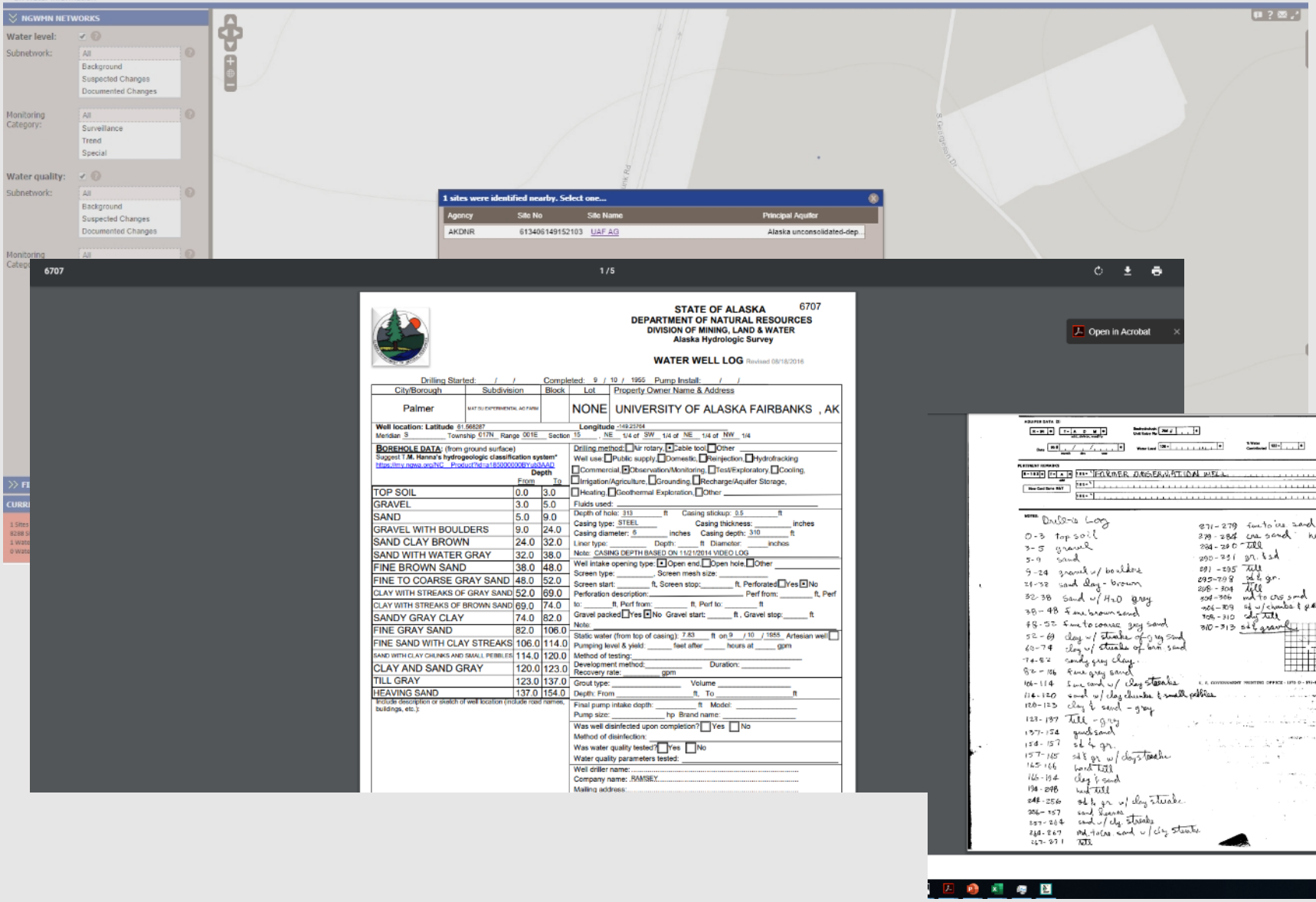
Matanuska Exp Farm Well – NGWMN



Matanuska Exp Farm Well – NGWMN

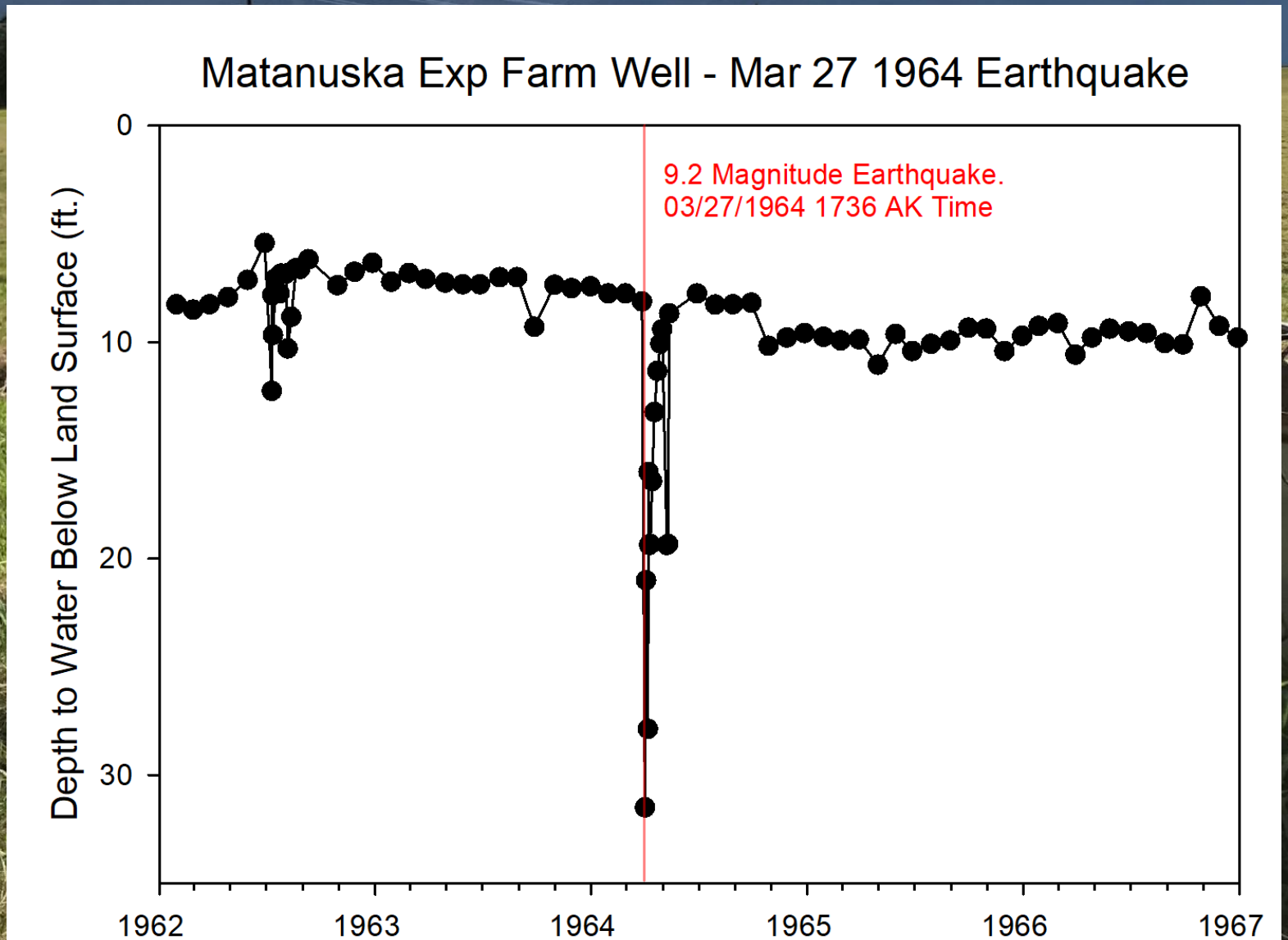
ACWI Advisory Committee on Water Information

National Ground-Water Monitoring Network

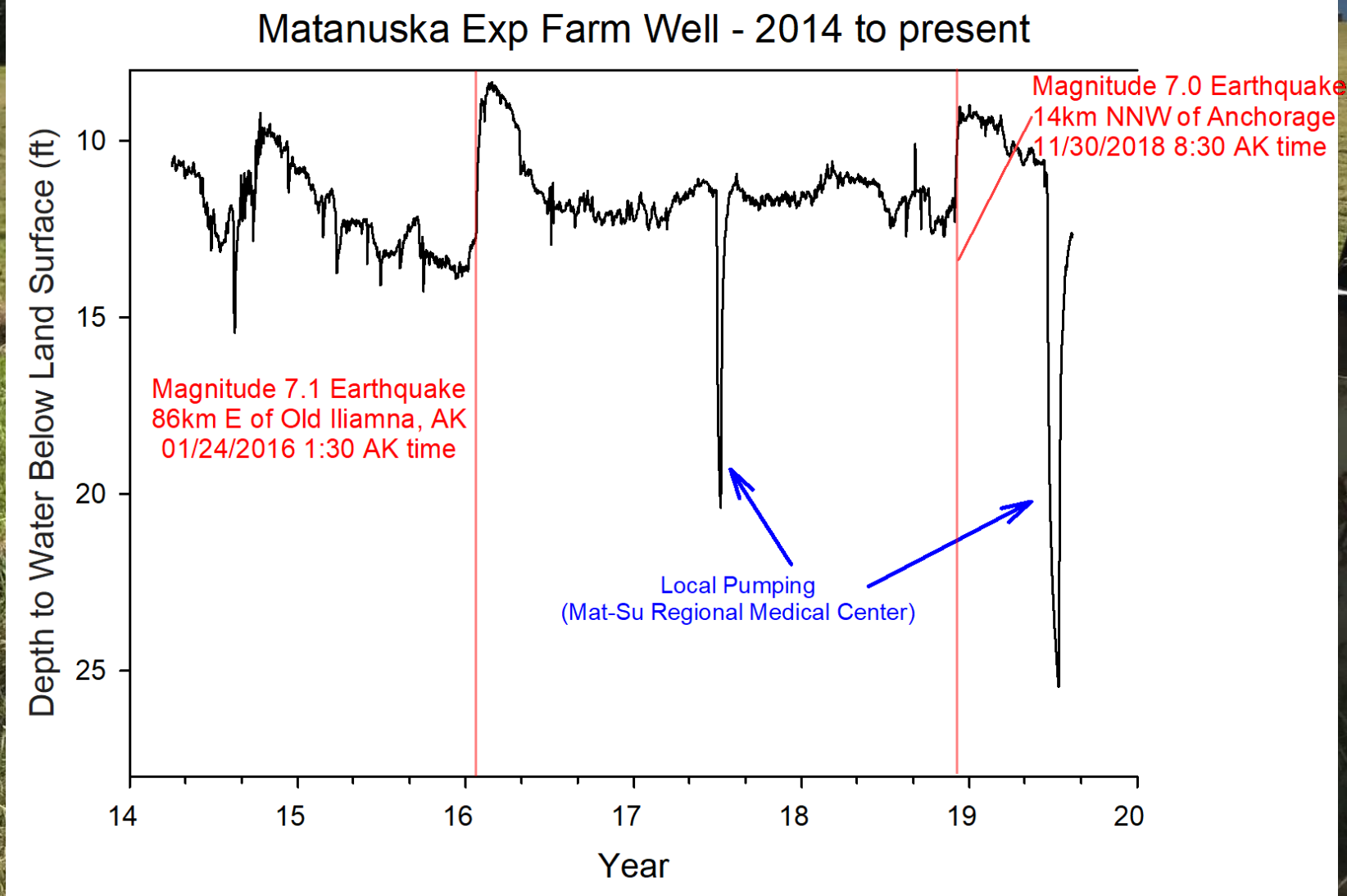


https://cida.usgs.gov/ngwmn/provider/AKDNR/site/613406149152103/

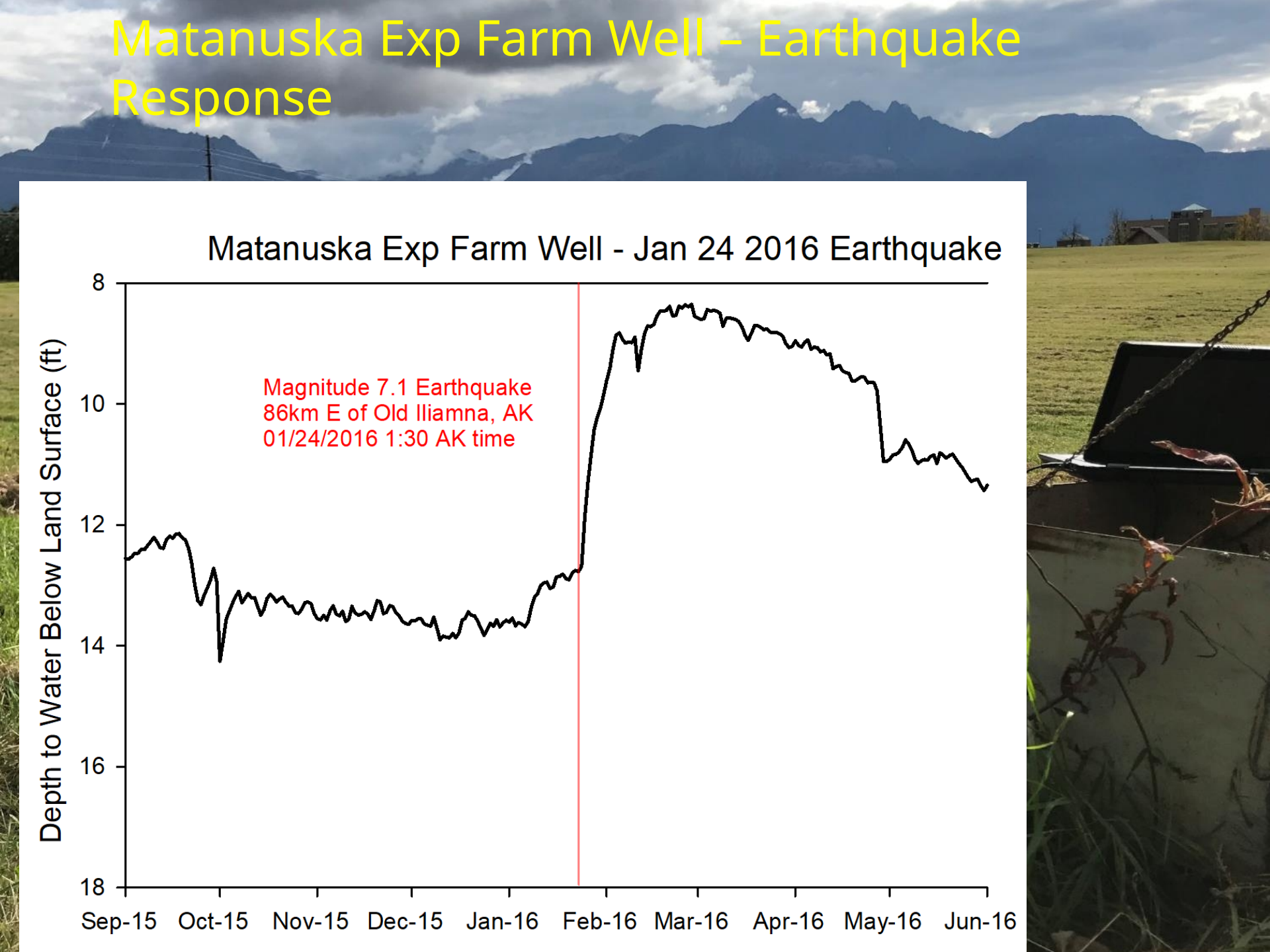
Matanuska Exp Farm Well – Earthquake Response



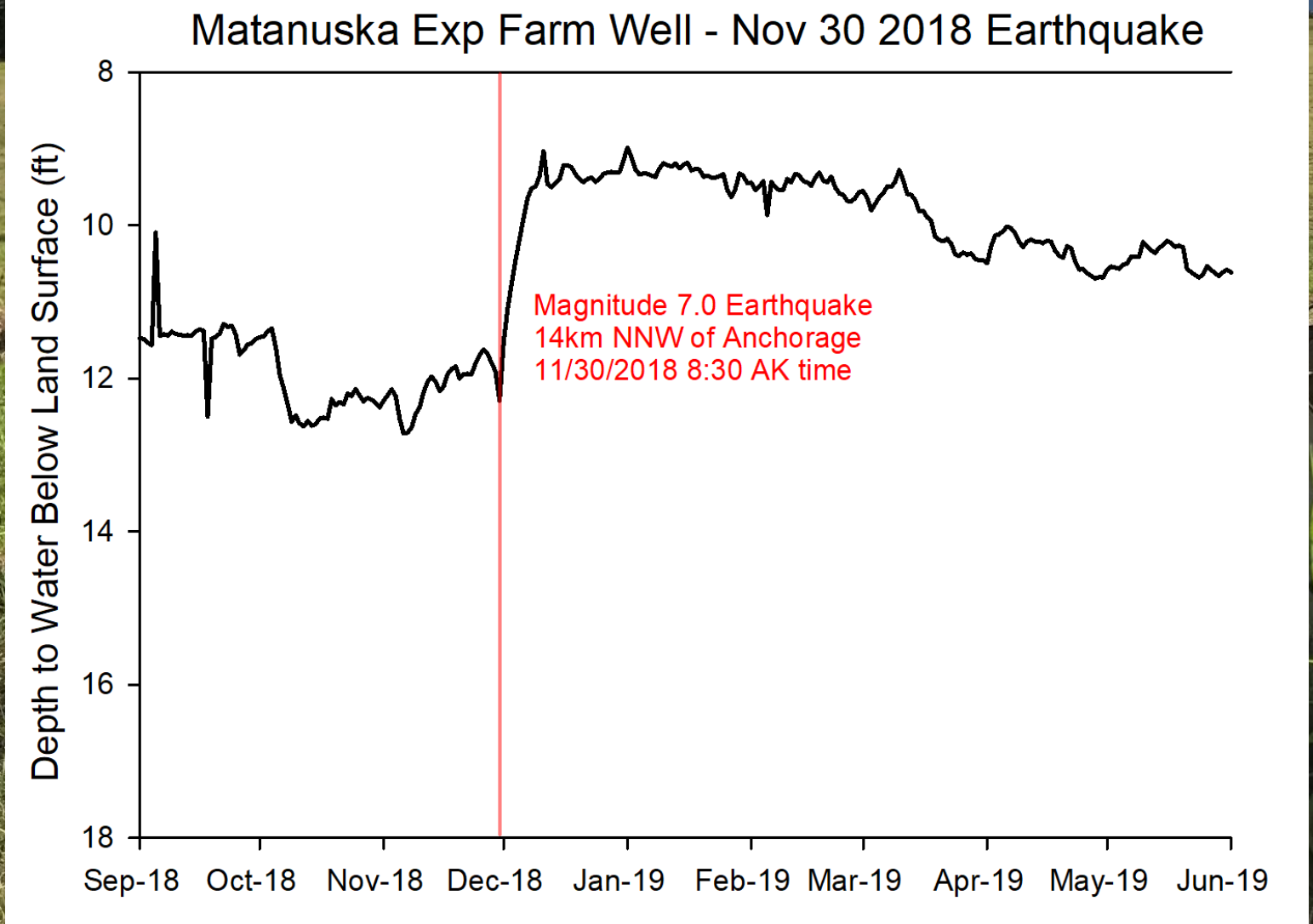
Matanuska Exp Farm Well – Earthquake Response



Matanuska Exp Farm Well – Earthquake Response



Matanuska Exp Farm Well – Earthquake Response



Questions

Contact information

Kevin Petrone phone: (907) 269-8646 email: kevin.petrone@alaska.gov

EFFECTS OF THE MARCH 1964 ALASKA EARTHQUAKE ON THE HYDROLOGY OF THE ANCHORAGE AREA, ALASKA

Generally, ground-water levels were residually lowered after the initial period of fluctuation. This lowering is attributed either to changes in the discharge zones offshore or to a change in the permeability of the aquifers by seismically induced strain.

Nearly all the pertinent data show that the artesian-pressure surface was lowered, locally as much as 24 feet, but that recovery started immediately and that within 6 months the water levels either had recovered to their former level or stabilized at a different level.

The Alaska Department of Natural Resources (ADNR) is a water-level data provider to the National Groundwater Monitoring Network (NGWMN; https://cida.usgs.gov/ngwmn/). Funding to support data providers to the National Ground-Water Monitoring Network is provided through USGS Cooperative Agreements. The ADNR collects groundwater data to evaluate changes in groundwater storage and recharge, the interaction between groundwater and surface-water, the response of groundwater systems to climate variability and drought, and the effects of earthquakes on groundwater levels. We will provide an update on current status of monitoring wells and highlights of results to date.

Alaska DNR and Statutory Responsibility

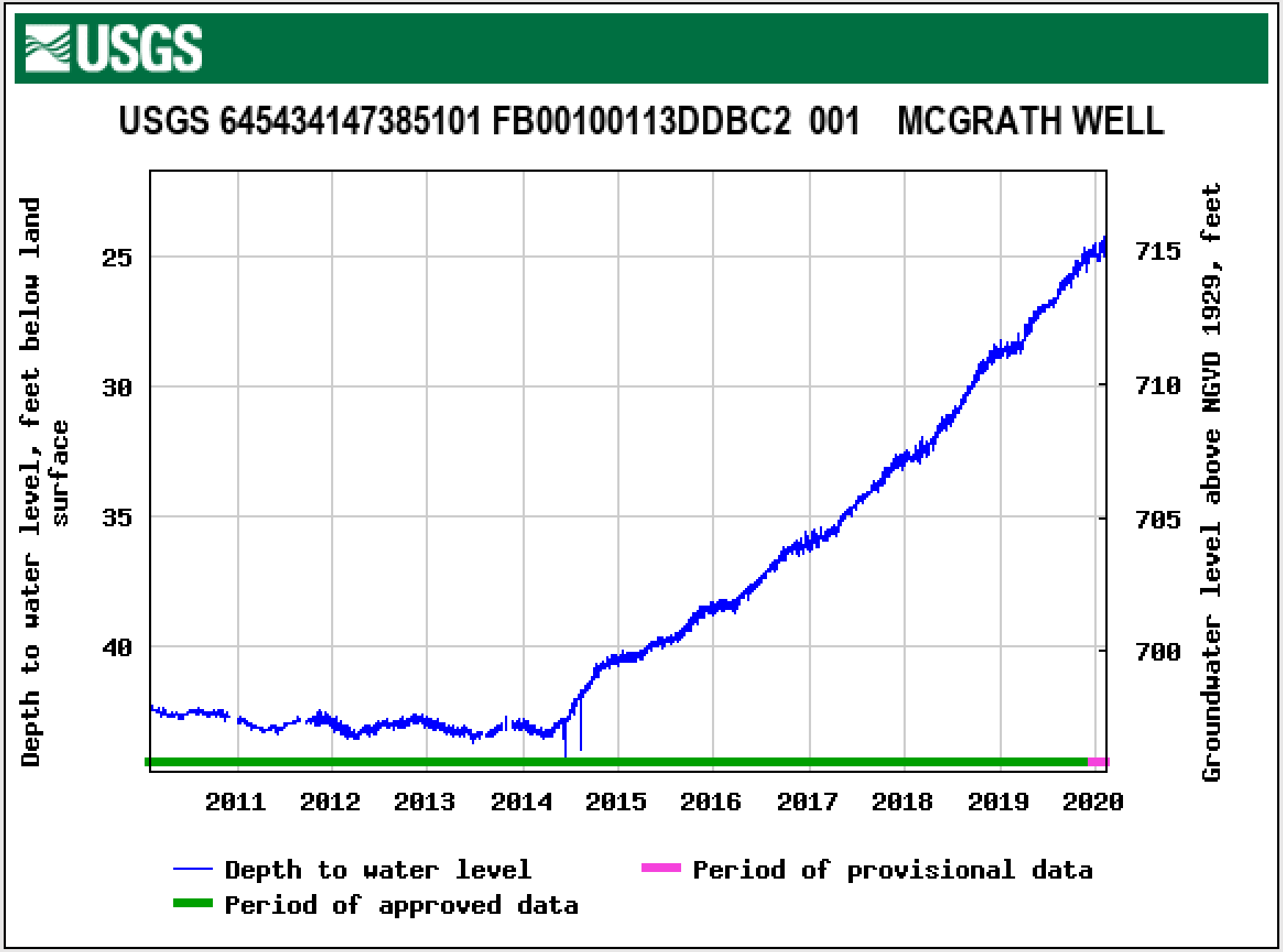
- The Alaska Hydrologic Survey within the Department
of Natural Resources is mandated by Alaska Statute (AS) 41.08.017, AS 41.08.020 and Department Order 115 *to collect, record, and require filing of data on the quantity, location and quality of water in the subsurface, surface, or along the coasts.*

- Unfunded mandates

- State's groundwater monitoring program is still in its infancy, only one *water level station* has 5 years or more of data

Methods & Procedures

http://pubs.usgs.gov/tm/


USGS
USGS 645434147385101 FB00100113DDBC2 001 MCGRATH WELL
Depth to water level, feet below land surface
Groundwater level above NGVD 1929, feet
25
30
35
40
715
710
705
700
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Depth to water level
Period of provisional data
Period of approved data