YUKON-CHARLEY RIVERS NATIONAL PRESERVE

CENTRAL ALASKA NETWORK

White Sweet Clover Reconnaissance

Summary Trip Report

July 27-30, 2020



Author: Danielle Knapp

August 2020

PURPOSE

The purpose of this work was to conduct a preliminary survey for white sweet clover extent in Yukon-Charley Rivers National Preserve after its initial discovery during the summer of 2019 by a state biologist.

PERSONNEL

Danielle Knapp: Project lead, identification of and navigation to sites with high risk for colonization, riverbank and gravel bar scouting, spatial data collection and processing, reporting

Sarah Swanson: Piloting the river, riverbank and gravel bar scouting, data collection

Randy Smith: Local knowledge and identification of high foot-traffic areas along the river

Amy Larsen: Support and oversight

ACCESS

A river boat was taken from the Eagle NPS fleet, with assistance from Randy Smith, downriver to Slavens Roadhouse and back up over the course of four days.

CAMPING AND LODGING

The Kandik public use cabin was used as a base camp the first and second nights on the river, as the cold, rainy summer and Covid 19 pandemic have greatly reduced public use of the Yukon River and the cabins within the preserve. The third night, camp was made on a sand bar across the river from Calico Bluff. The river was high due to rain throughout the summer, and many normally accessible sand bars often used for camping were submerged.

SAFETY CONSIDERATIONS

During this trip, water levels were high, which is more forgiving with navigating around submerged gravel bars, but presents other hazards such as floating trees and logs that require attention and navigation. Having relatively recent tracks for navigation from a boat driver experienced with the river is important, as is being able to read the river. Boat driver fatigue, especially in poor weather conditions, was and should be managed by having multiple personnel capable of driving the boat, switching off duties. Life jackets should be worn at all times when on the boat, as any accident involving someone in the river can result in cold shock and disorientation, even if they are a capable swimmer. Emergency gear, water filters, extra oil and gas, and tools should be carried on the boat for on-the-fly maintenance and troubleshooting.

WEATHER PATTERNS

The first two days on the river were rainy and cold (50s), and the third and fourth day cleared up and warmed (60s).

PHENOLOGY

Mid-late July was an excellent time to search for white sweet clover, as it was in full bloom as were the wildflowers it was cohabiting with (goldenrod, grass of Parnassus, alpine sweet-vetch). Patches of white

sweet clover were relatively easy to spot from the boat even without binoculars once our eyes were trained for it.

ANIMAL OBSERVATIONS

Peregrine falcons were active on the bluffs, as were gulls. Many of the gravel bars we visited had extensive moose tracks, and we did see one adult female. Kandik public use cabin had an active beaver lodge. Two of the islands we visited also had relatively fresh, small bear tracks. Frogs were active at several sites and public use cabin lawns visited. Many pollinators were observed on wildflowers including white sweet clover.



Bumble bee visiting white sweet clover. Photo credit: S. Swanson

PROJECT SUMMARY AND OBSERVATIONS

In July 2020, aquatic ecologist Danielle Knapp and biological technician Sarah Swanson surveyed Yukon-Charley Rivers National Preserve for white sweet clover (*Melilotus albus*). A terrestrial invasive plant, it was discovered by a state biologist in the preserve in 2019 (65.14304, -141.67322°; Site # YUCH2020-016 in photos and map below). Prior to this discovery, white sweet clover had only been observed upstream of the preserve, on gravel bars between Dawson and Eagle. The tall, flowering plant is commonly found along Alaska's road system, river corridors, and publicly trafficked areas. It colonizes sunny, well drained areas where the soil has been disturbed. Roadways, boat launches, and riverbanks are ideal habitat for its establishment due to continuous disturbance to the soil via human activity and water movement. In Alaska, white sweet clover has been observed to colonize gravel bars in braided rivers and small areas of

erosion along shorelines (Conn et al. 2008). The purpose of conducting this survey was to verify the 2019 discovery, determine how prevalent the plant is within the preserve, and document the location and size of any found populations. This information can be used to develop a management plan and help park staff understand how it is transported, how aggressively the plant is spreading, and whether it is causing harm to the ecosystem.

In the Lower 48, white sweet clover can take over previously disturbed sites, and is a concern for prairie restoration efforts as dense stands of the plant can outcompete native vegetation in that environment (Nooker 2020). Tallgrass prairies can be particularly susceptible to white sweet clover invasion because of the plant's capability to fix nitrogen in an otherwise nutrient-poor ecosystem. However, in Alaska, soil chemistry data comparing areas with white sweet clover to areas without white sweet clover were not significantly different (Conn et al. 2008). In Alaska, white sweet clover has spread via the road system and has been observed on gravel bars along the Tanana, Matanuska and other braided rivers in Alaska. It appears to thrive in gravel where nitrogen and other nutrients are in short supply and other plants are unable to survive. Scientists do not know how the movement of the plant into Yukon-Charley, a pristine preserve that boasts dense native vegetation (including alder, which natively exists as a nitrogen fixer), will affect the ecosystem.

During the survey Knapp and Swanson documented populations of white sweet clover just upriver of the preserve at the boat ramp in Eagle (Figure 1), the boat launch at Eagle village (Figure 2), and along the road connecting the two communities.





Figure 1 (Left): Knapp with white sweet clover at the Eagle boat ramp. Photo credit: S. Swanson
Figure 2 (Right): Eagle village boat launch area with white sweet clover. Photo credit: D. Knapp

White sweet clover was also observed along the road between Tok and Eagle, which is likely a route of transit from the Alaska and Richardson Highways. Seeds from adult plants (Figure 3) may have spread via the movement of the river, wildlife, or preserve visitors launching from the Eagle area.



Figure 3. White sweet clover going to seed. Photo credit: S. Swanson

With guidance from interpretive ranger Randy Smith of Eagle, Knapp and Swanson focused their search for the plant around heavily camped gravel bars and public use cabins, as well as sunny, well drained riverbanks within the preserve. In addition to these sites they used binoculars to search the river shorelines and gravel bars as the team boated between Eagle and Slavens Roadhouse. In total, 15 high-risk sites (including the sites found using binoculars) were examined by thoroughly hiking the area (Figure 4). White sweet clover populations were found in seven locations, including the known location originally documented in 2019. The furthest downstream population they could find was approximately 55 river miles downstream from Eagle, on an island in the vicinity of Rock of Ages.



Figure 4. Swanson collecting data on a population of white sweet clover found at a heavily camped gravel bar. Photo credit: D. Knapp

The most commonly populated settings were open gravel bars and sunny shorelines; no colonizations were found at any of the public use cabins. White sweet clover was found co-habiting with other sun-loving wildflowers such as northern goldenrod (*Solidago multiradiata*), alpine sweet-vetch (*Hedysarum alpinum*), and grass of Parnassus (*Parnassia palustris*) (Figure 5). It tended to persist in open areas, and substantially thinned and/or disappeared completely as the shoreline transitioned inland to alder and willow. No white sweet clover was found at the bases of bluffs, landslides and steep slopes commonly encountered along the Yukon River within the preserve.



Figure 5. A typical shoreline colonized by white sweet clover. Photo credit: D. Knapp

The population found at the original discovery site, a gravel bar just downstream of Trout Creek, was small enough to be manually removed by Knapp and Swanson (Figure 6).



Figure 6. Knapp manually pulling white sweet clover at the original discovery site. Photo credit: S. Swanson

INFORMATION & LOCATION OF FOUND WHITE SWEET CLOVER POPULATIONS

Site	Latitude	Longitude	Acres	% Cover	Removed?	Comments
YUCH2020-001	64.93449	-141.30662	0.25	15	No	Rocky shoreline with pioneer species
YUCH2020-002	65.055349	-141.36609	0.70	5	No	Wood Island-willows and mud; southern part of the island is frequently camped
YUCH2020-009	65.243514	-141.9045	0.86	5	No	Island with some flowers and willow/alder, mostly mud
YUCH2020-010	65.244849	-141.90349	0.83	40	No	Inside area of small island, large patch present
YUCH2020-011	65.245492	-141.90236	0.54	25	No	Other side of island (010), more rocky terrain
YUCH2020-013	65.244959	-141.90109	1.34	2	No	Upriver tip and river right side of island (010); sporadically in understory of willows
YUCH2020-016	65.143086	-141.67322	0.26	10	Yes	Site of original discovery
YUCH2020-017	65.107919	-141.52987	3.34	1	No	Heavily tented sand bar
YUCH2020-018	65.06722	-141.38355	0.09	2	No	Island below larger Wood Island patch, muddy bank with other flowers
YUCH2020-019	64.93361	-141.29942	0.01	20	No	Bar across from 40 mile river convergence

REFERENCES

J. S. Conn, K. L. Beattie, M. A. Shephard, M. L. Carlson, I. Lapina, M. Hebert, R. Gronquist, R. Densmore & M. Rasy (2008) Alaska Melilotus Invasions: Distribution, Origin, and Susceptibility of Plant Communities, Arctic, Antarctic, and Alpine Research, 40:2, 298-308, DOI: 10.1657/1523-0430(06-007)[CONN]2.0.CO;2

J. Nooker (2020). Personal Communication. Conservation Biologist and Research Scientist, Wisconsin Department of Natural Resources

DATA ACCESS

Geospatial data and photos accessible in the IRMA Data Portal, Code #2283865. Maps, photos, write-ups, and a geodatabase including points and areas of white sweet clover colonization are also available on the YUGA network drive K:\White Sweet Clover in YUCH

SITE PHOTOS



Eagle Boat Ramp



Eagle Village Boat launch



YUCH2020-001: Present



YUCH2020-002: Present



YUCH2020-003: Absent, Kandik public use cabin



YUCH2020-004: Absent, Biederman’s cabin



YUCH2020-005: Absent, Slavens Roadhouse



YUCH2020-006: Absent



YUCH2020-007: Absent



YUCH2020-008: Absent, Glenn Creek Cabin



YUCH2020-009: Present



YUCH2020-010: Present



YUCH2020-011: Present



YUCH2020-012: Present



YUCH2020-013: Present



YUCH2020-014: Absent



YUCH2020-015: Absent, Nation Bluff Cabin



YUCH2020-016: Present, original discovery site



YUCH2020-017: Present



YUCH2020-018: Present



YUCH2020-019: Present



BoatScan001: Absent. We did not land on shore for boat scans; shorelines that looked favorable for colonization of white sweet clover were scanned with binoculars from the boat as the boat moved closely along the shore at a very slow pace.



BoatScan002: Absent. We did not land on shore for boat scans; shorelines that looked favorable for colonization of white sweet clover were scanned with binoculars from the boat as the boat moved closely along the shore at a very slow pace.



BoatScan003: Absent. We did not land on shore for boat scans; shorelines that looked favorable for colonization of white sweet clover were scanned with binoculars from the boat as the boat moved closely along the shore at a very slow pace.

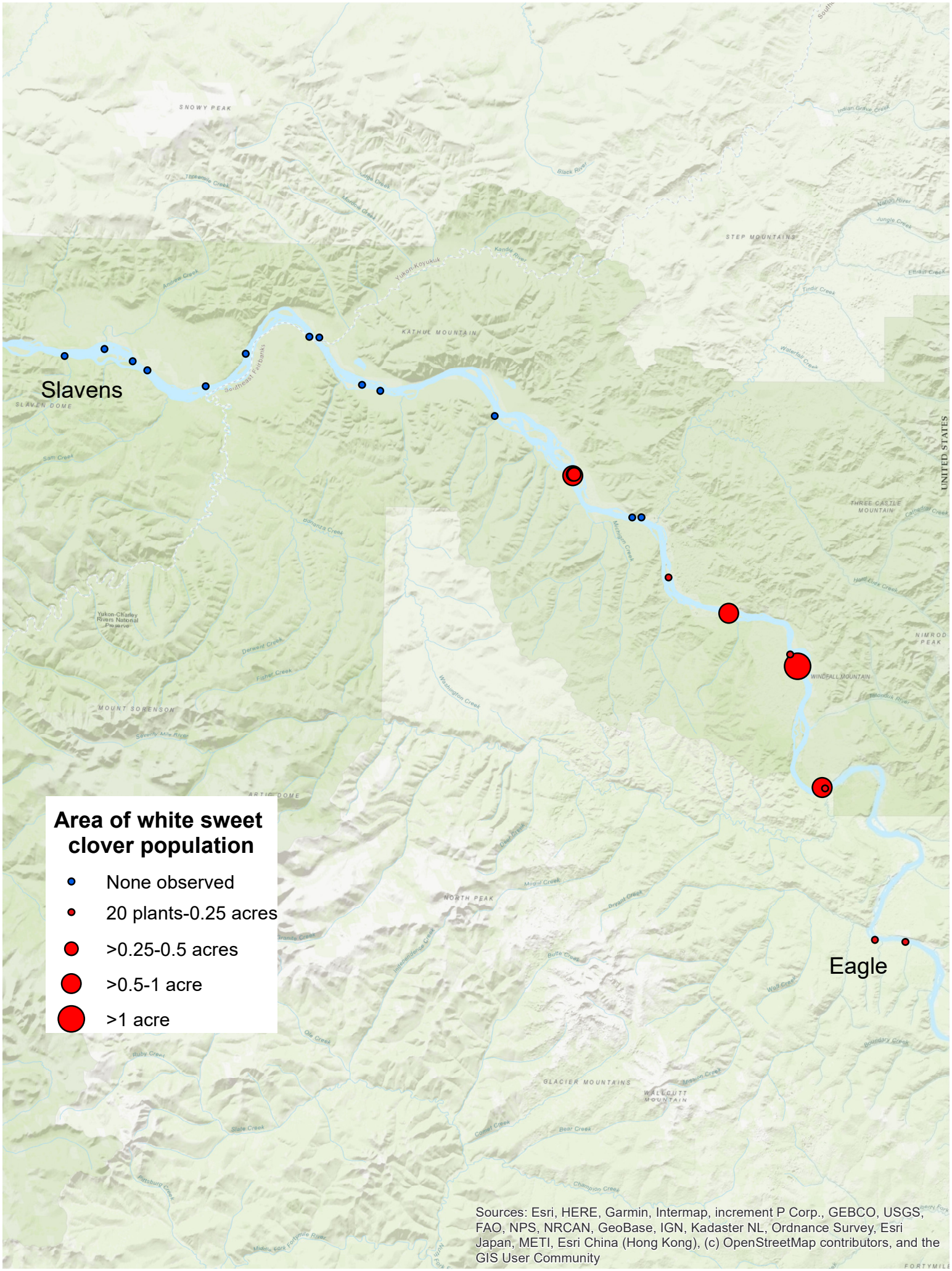


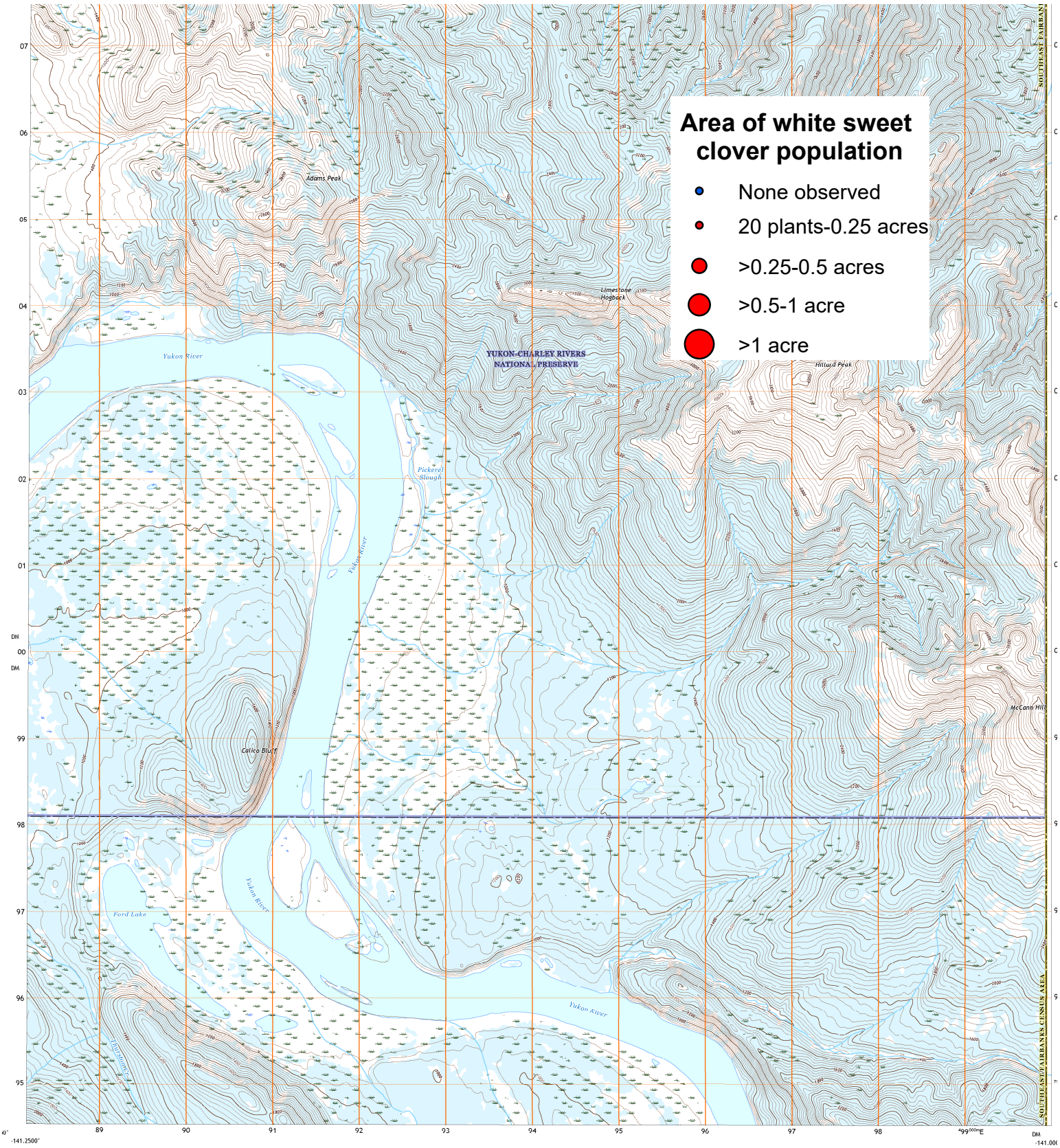
BoatScan004: Absent. We did not land on shore for boat scans; shorelines that looked favorable for colonization of white sweet clover were scanned with binoculars from the boat as the boat moved closely along the shore at a very slow pace.



BoatScan005: Absent. We did not land on shore for boat scans; shorelines that looked favorable for colonization of white sweet clover were scanned with binoculars from the boat as the boat moved closely along the shore at a very slow pace.

MAP OF SITES


Slavens
Eagle
Area of white sweet clover population
None observed
20 plants-0.25 acres
>0.25-0.5 acres
>0.5-1 acre
>1 acre
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



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North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 7W

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Imagery	SPOT, ©	September 2009
Roads	Alaska Dept. of Transportation,	Not Available
Names	GNIS,	1981 - 2010
Hydrography	National Hydrography Dataset,	2002 - 2018
Contours	National Elevation Dataset,	2018
Boundaries	Multiple sources; see metadata file	2016 - 2017
Public Land Survey System	BLM,	2008
Wetlands	FWS National Wetlands Inventory	1984

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
DN
DM
Grid Zone Designation 7W

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1 0.5 0 1
MILES
1000 500 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011. A metadata file associated with this product is draft version 0.6.17

ALASKA
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

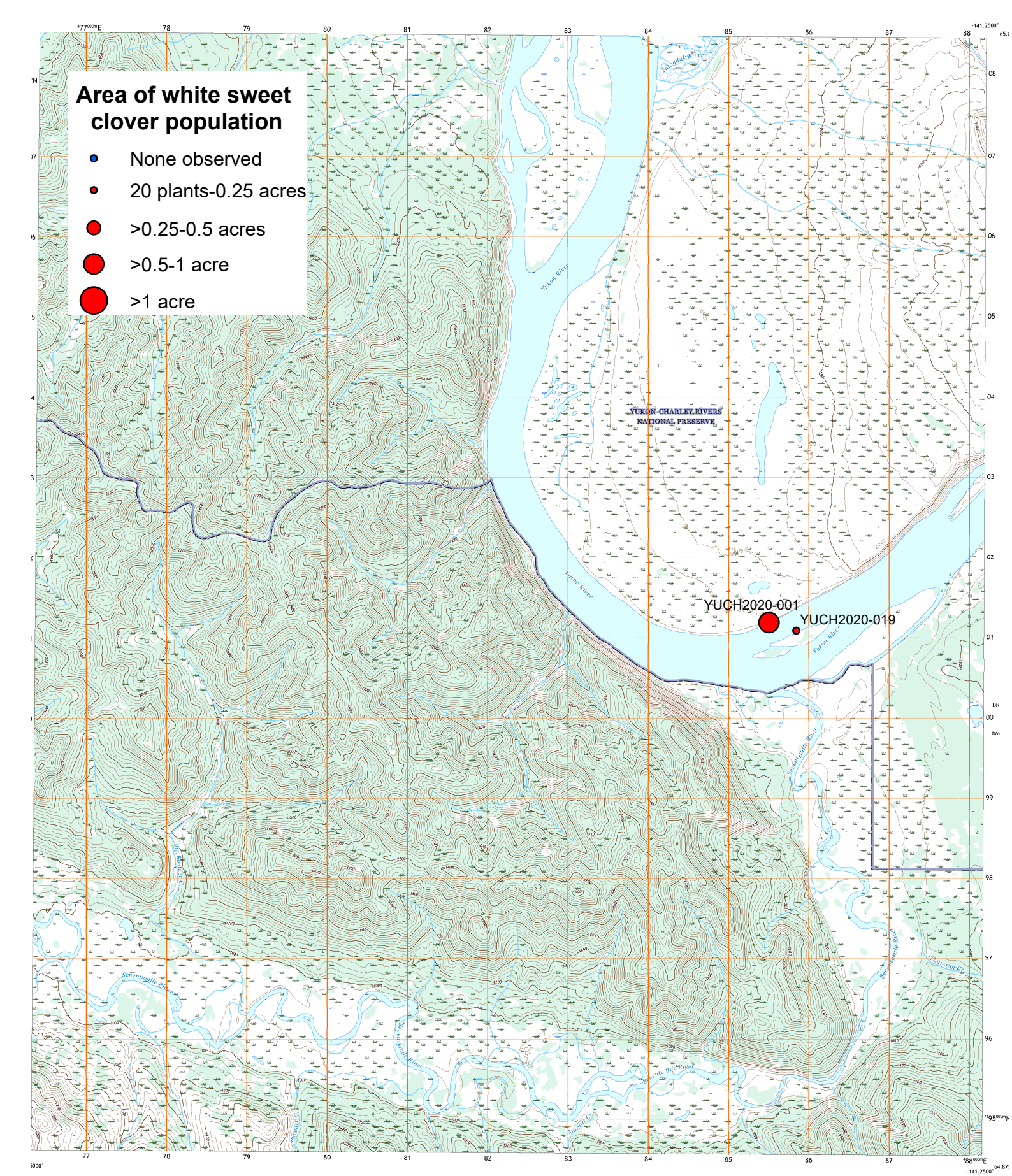
ADJOINING QUADRANGLES

1 Charley River A-1 SW
2 Charley River A-1 SE
3 Charley River A-1 OE E SW
4 Eagle D-1 NW
5 Eagle D-1 OE E NW
6 Eagle D-1 SW
7 Eagle D-1 SE
8 Eagle D-1 OE E SW

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

EAGLE D-1 NE, AK, YT
2018



Page 2

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UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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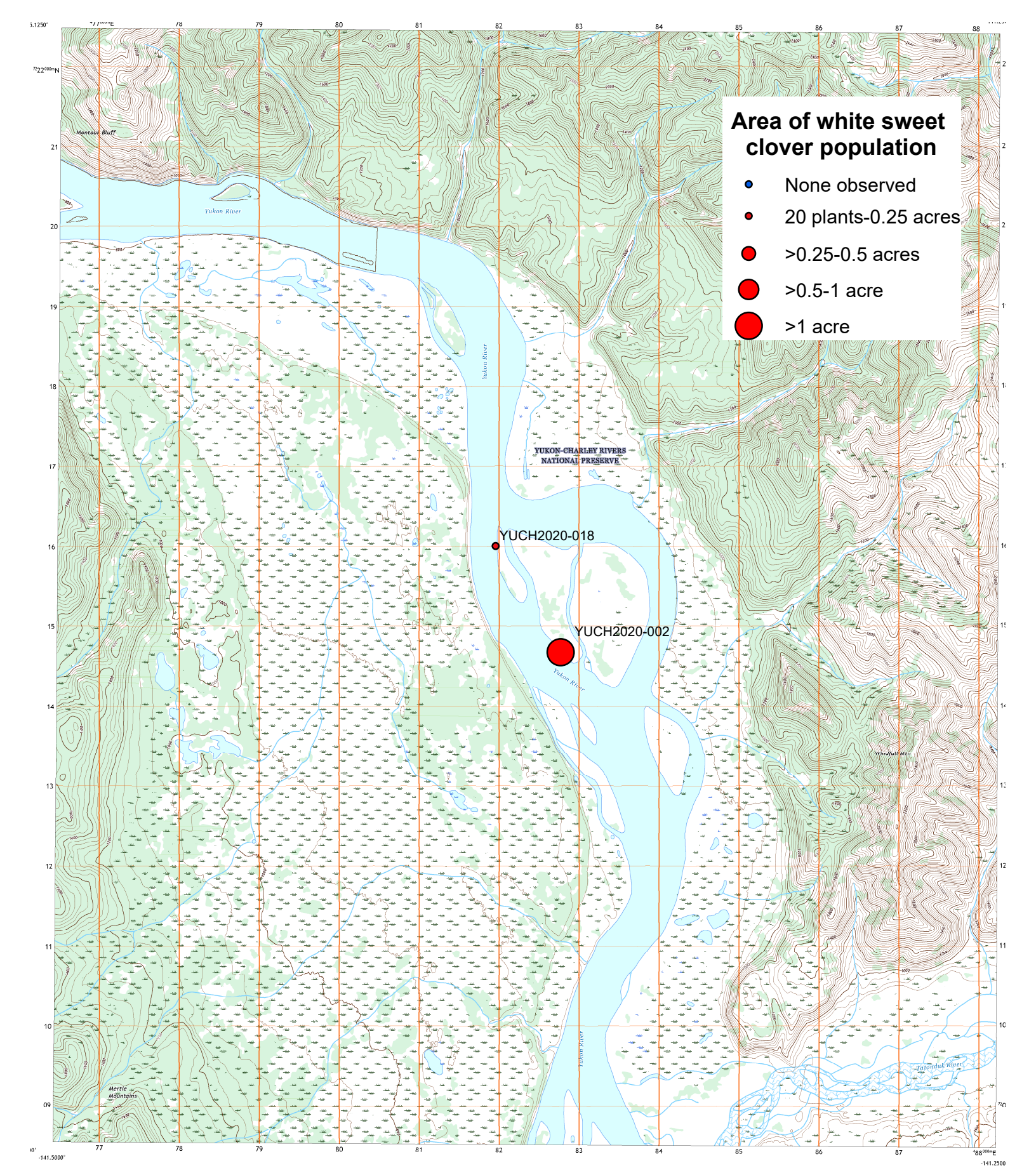
CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

1 Charley River A-2 SE
2 Charley River A-1 SW
3 Charley River A-1 SE
4 Eagle D-2 NE
5 Eagle D-1 NE



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North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 7W

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UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

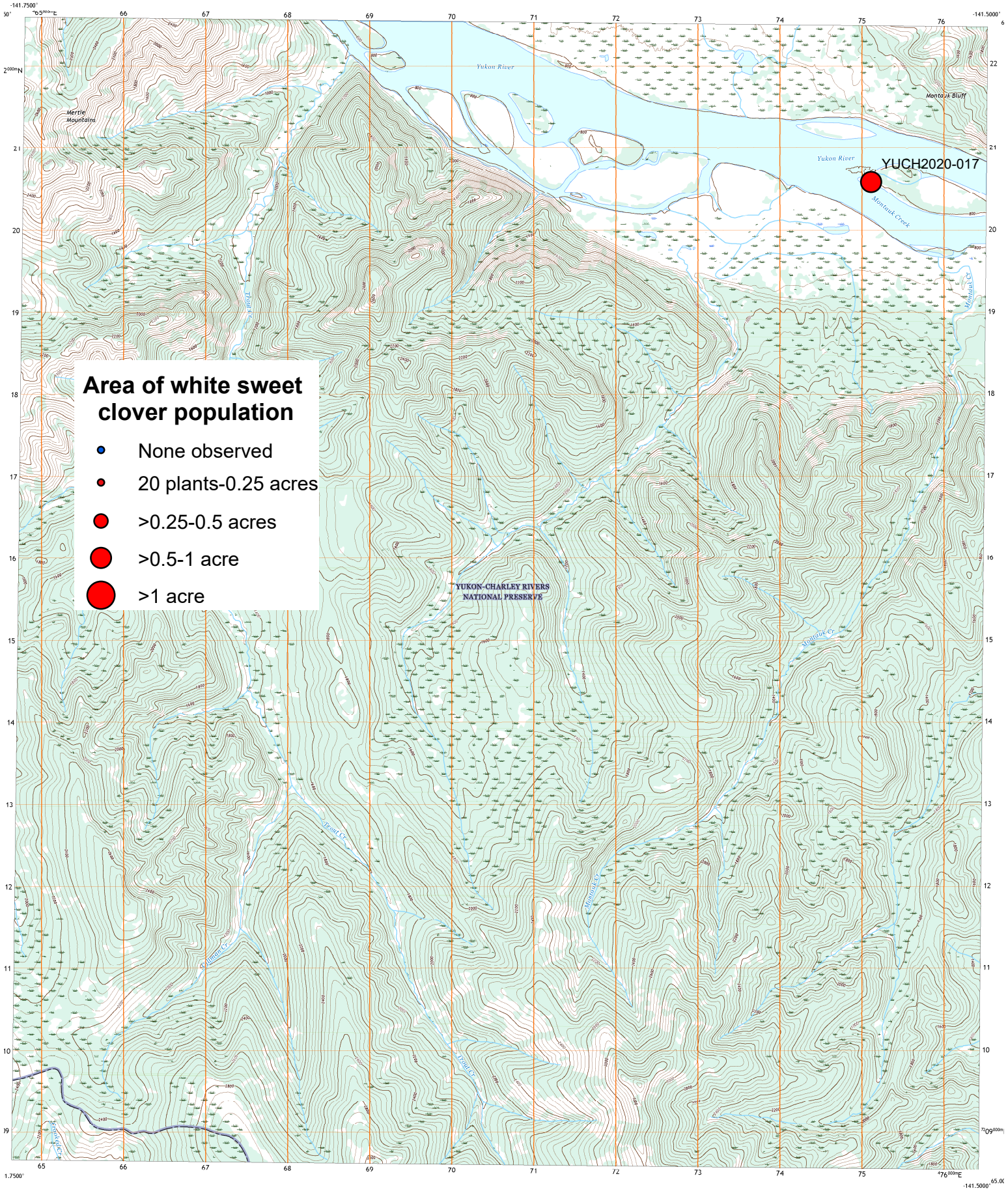
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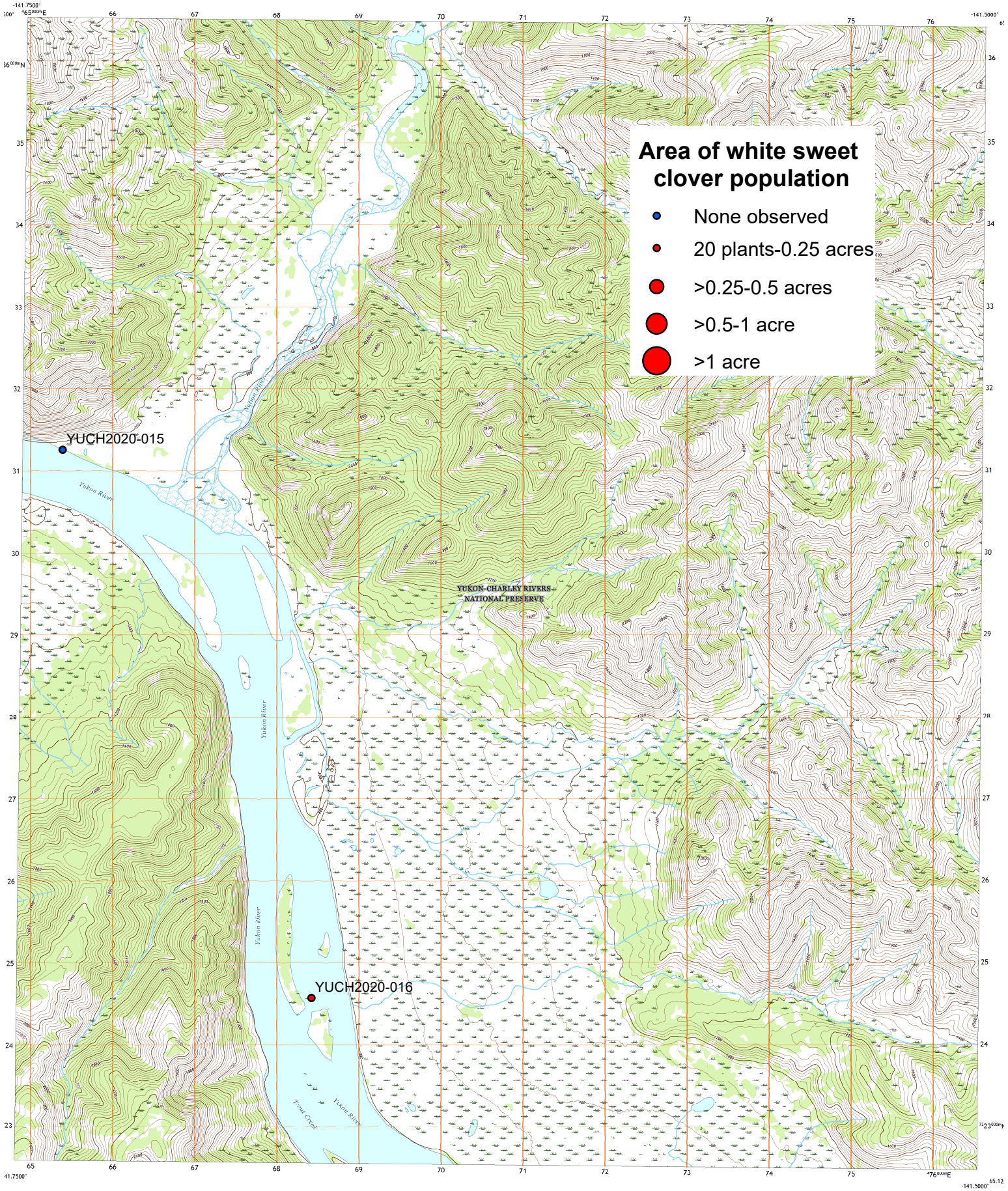
CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011

ROAD CLASSIFICATION
Expressway, Secondary Hwy, Ramp, Local Connector, Local Road, 4WD, Interstate Route, US Route, State Route

QUADRANGLE LOCATION
1 Charley River A-2 NE
2 Charley River A-1 NW
3 Charley River A-1 NE
4 Charley River A-2 SE
5 Charley River A-1 SE
6 Eagle D-2 NE


Area of white sweet clover population
None observed
20 plants-0.25 acres
>0.25-0.5 acres
>0.5-1 acre
>1 acre
YUCH2020-017
Yukon River
Montauk Bluff
Montauk Creek
Mertie Mountains
YUKON-CHARLEY RIVERS NATIONAL PRESERVE
Trout Cr
Mammoth Cr
Quartz Cr
Boulder Cr
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Names.....GNIS, Not Available
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Contours.....National Elevation Dataset, 2018
UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
SCALE 1:25 000
KILOMETERS
METERS
MILES
FEET
CONTOUR INTERVAL 40 FEET
ALASKA
QUADRANGLE LOCATION
1 Charley River A-2 NW
2 Charley River A-2 NE
ROAD CLASSIFICATION
Expressway
Local Connector
Secondary Hwy
Local Road
Ramp
4WD
Interstate Route
US Route
State Route



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North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 7W

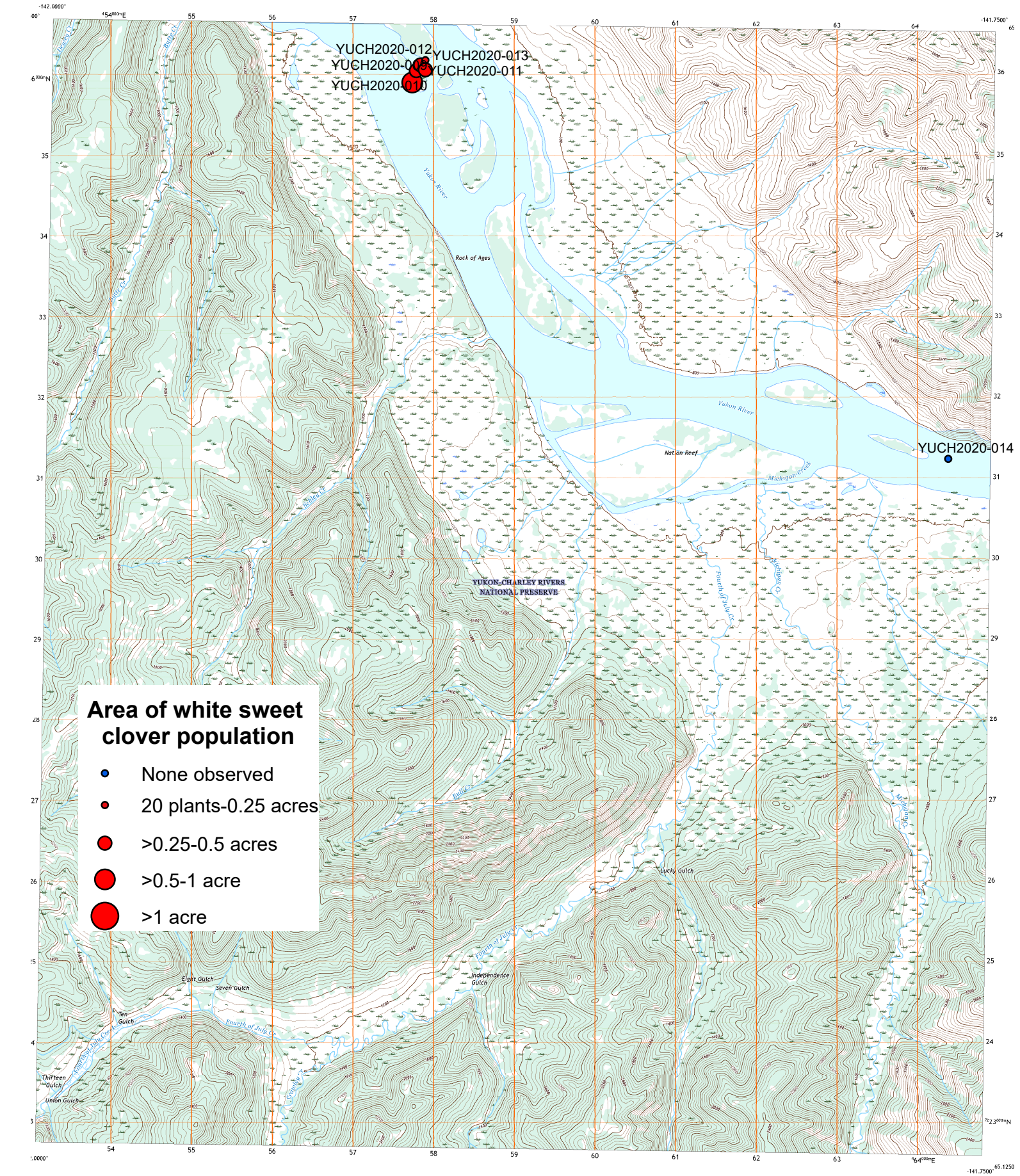
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Imagery.....SPOT, © July 2012

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MILES 0.5 0 1
1000 500 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

ROAD CLASSIFICATION
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Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

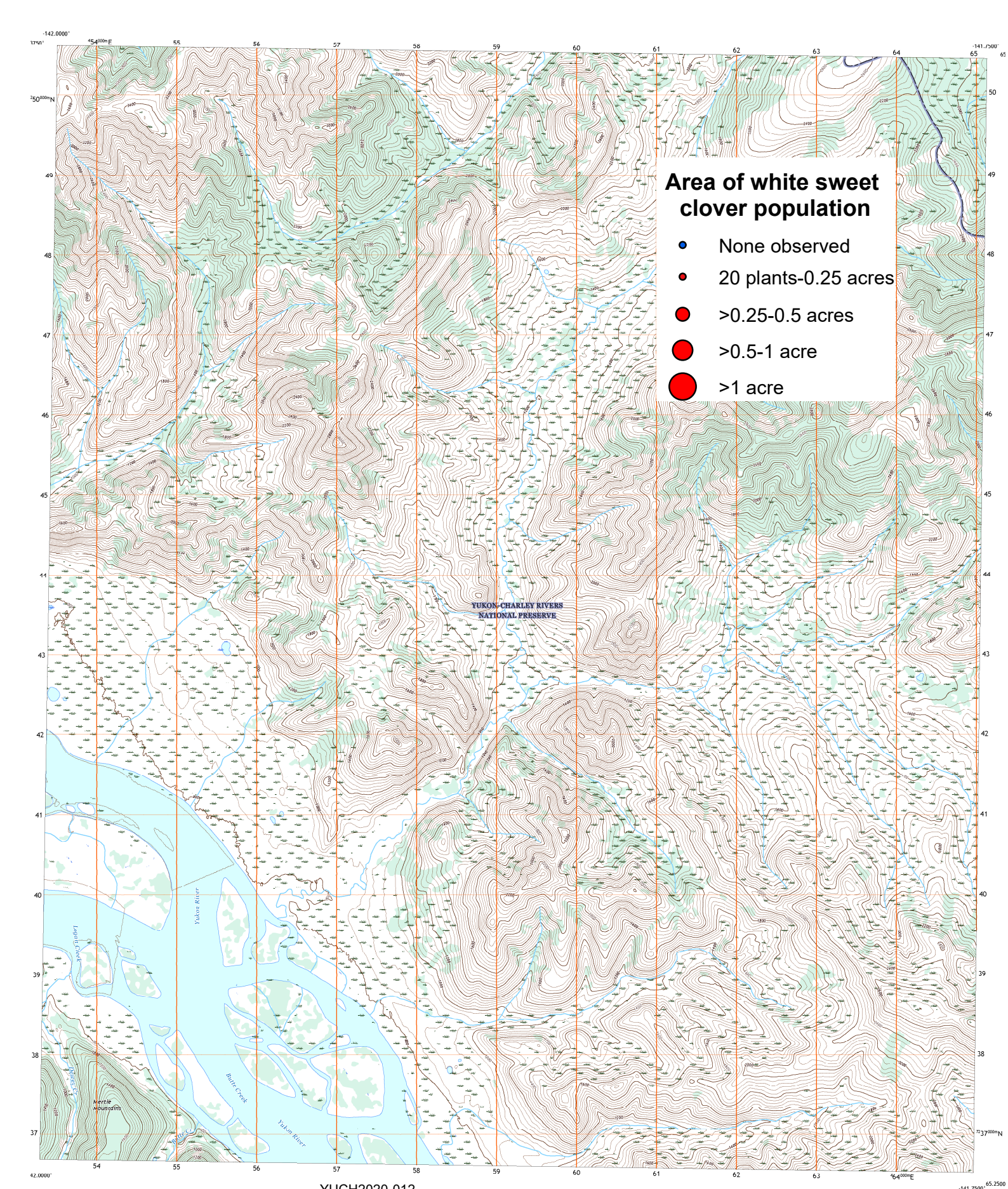


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Roads.....Alaska Dept. of Transportation, Not Available
Names.....GNIS, 1981 - 2016

UTM GRID AND 2017 MAGNETIC NORTH

SCALE 1:25 000

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route



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Contours	National Elevation Dataset,	2018
Boundaries	Multiple sources; see metadata file	2012

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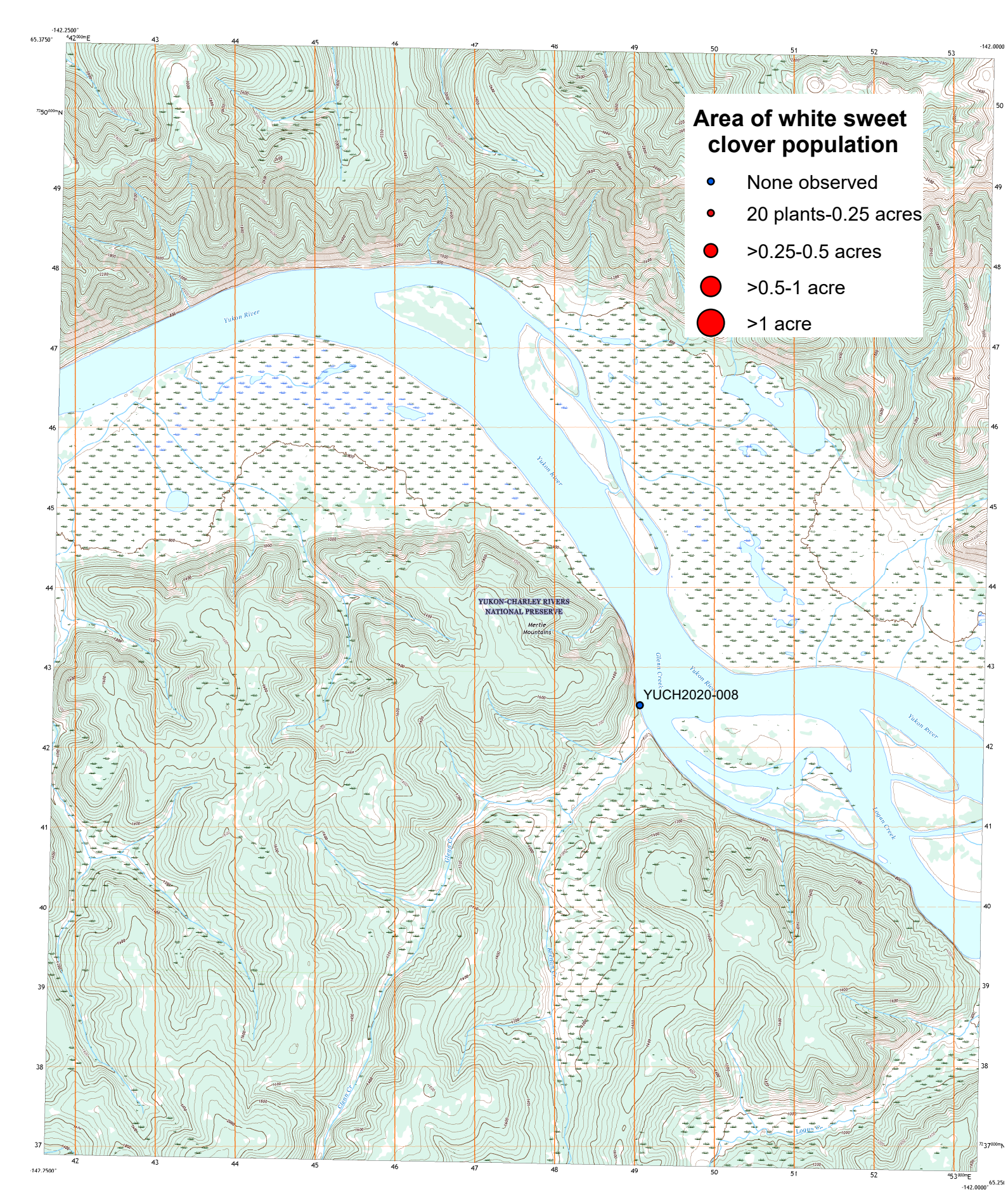
CONTOUR INTERVAL 40 FEET

ROAD CLASSIFICATION

Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

ALASKA — QUADRANGLE LOCATION

1 Charley River B-3 NE
2 Charley River B-2 NW



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North American Datum of 1983 (NAD83)
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Contours.....National Elevation Dataset, 2018
Boundaries.....Multiple sources; see metadata file 2016 - 2017

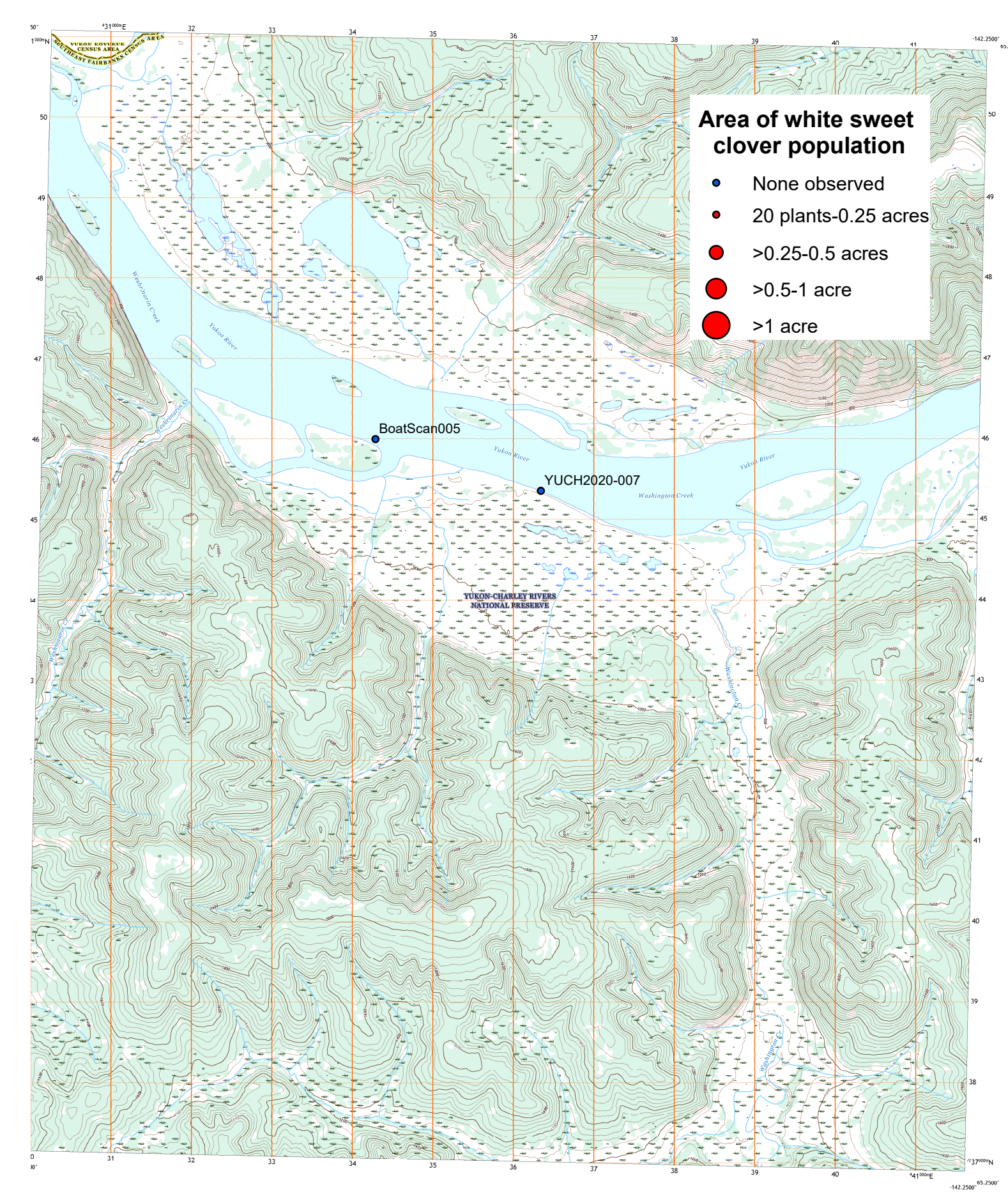
UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:25 000

CONTOUR INTERVAL 40 FEET

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

1 Charley River B-3 NW
2 Charley River B-3 NE



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Hydrography	National Hydrography Dataset,	2002 - 2018
Contours	National Elevation Dataset,	2016
Boundaries	Multiple sources; see metadata file	2016 - 2017
Public Land Survey System	BLM,	2008
Wetlands	FWS National Wetlands Inventory	1984 - 1986

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID

SCALE 1:25 000

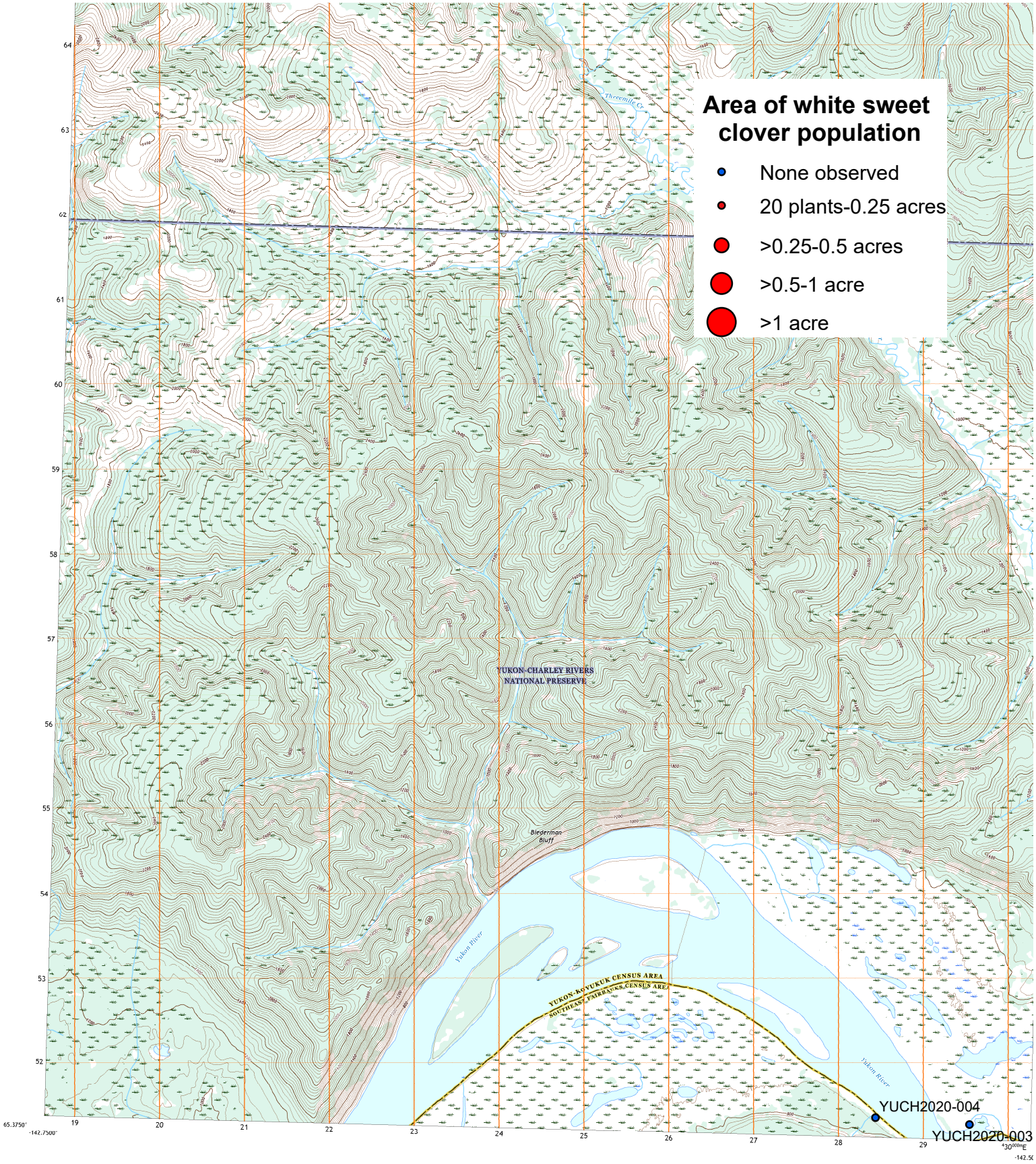
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METERS 0 500 1000 2000
MILES 0 0.5 1
FEET 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

ALASKA
QUADRANGLE LOCATION

1 Charley River B-1 NE
2 Charley River B-3 NW
3 Charley River B-3 NE
4 Charley River B-4 SE

ROAD CLASSIFICATION
Expressway
Secondary hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route



Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 7W

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Contours	National Elevation Dataset, 2018
Boundaries	Multiple sources; see metadata file 2016 - 2017
Public Land Survey System	BLM, 2008
Wetlands	FWS National Wetlands Inventory 1982 - 1986

GN 19°28' 346 MILS
1°30' 26 MILS
MN

U.S. National Grid
100,000-m Square ID
DN
Grid Zone Designation 7W

SCALE 1:25 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 MILES 1
1000 500 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011. A metadata file associated with this product is draft version 0.6.17

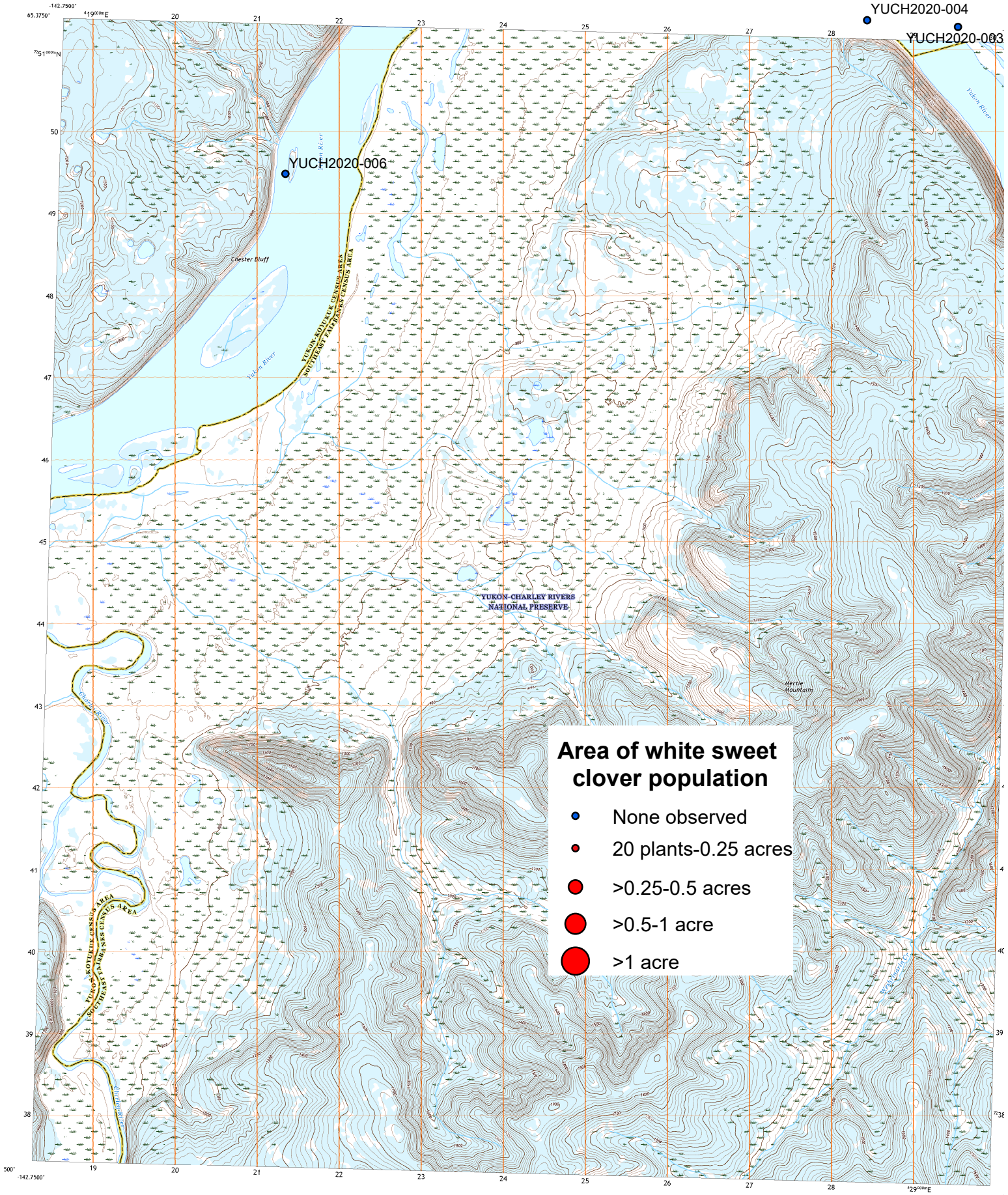
ALASKA
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 Charley River C-4 SW
2 Charley River C-4 SE
3 Charley River C-3 SW
4 Charley River B-4 NW
5 Charley River B-3 NW
6 Charley River B-4 SW
7 Charley River B-4 SE
8 Charley River B-3 SW

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

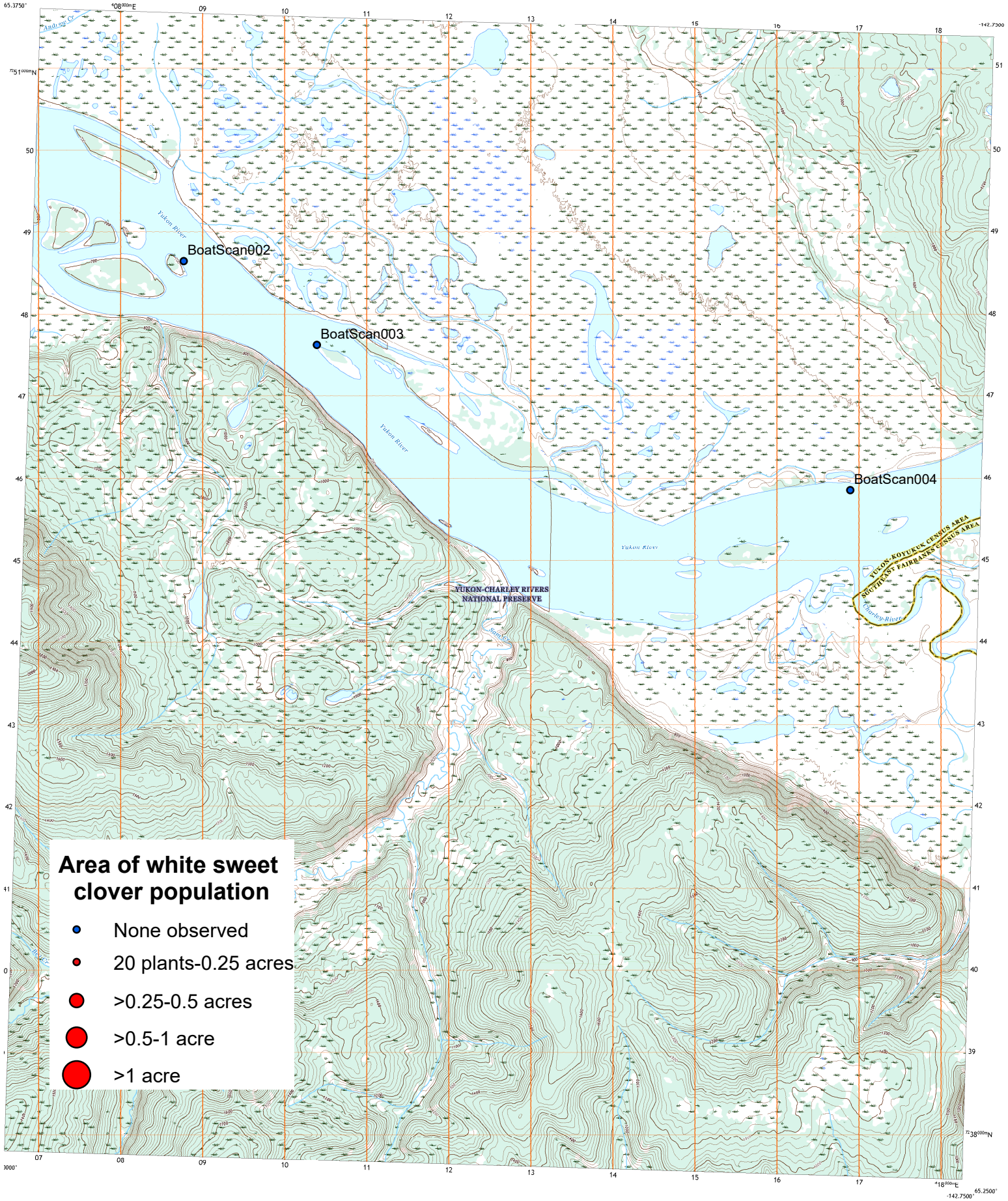
CHARLEY RIVER B-4 NE, AK
2018



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 7W
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

SCALE 1:25 000

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD



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Imagery.....SPOT, © September 2010 - July 2012
Roads.....Alaska Dept. of Transportation, Not Available
Names.....
Hydrography.....GNIS, Not Available
Contours.....National Hydrography Dataset, 2002 - 2018
Boundaries.....National Elevation Datasets, 2016
Public Land Survey System.....Multiple sources; see metadata file 2016 - 2017
Wetlands.....BLM, 2008
FWS National Wetlands Inventory 1984 - 1986

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

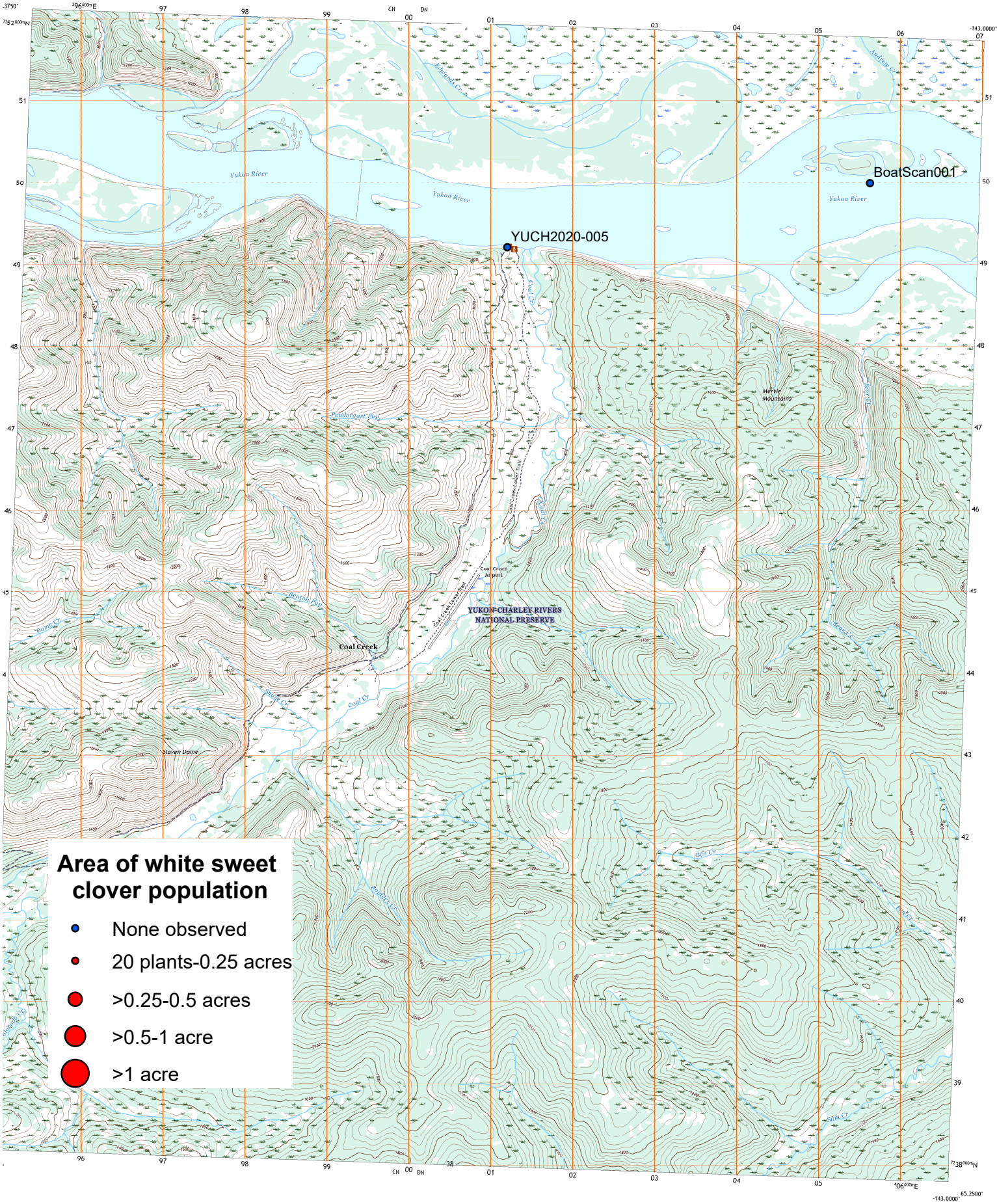
SCALE 1:25 000

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

1 Charley River B-5 NE
2 Charley River B-4 NW
3 Charley River B-4 NE



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orld Geodetic System of 1984 (WGS84). Projection and
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.....FWS National Wetlands Inventory 1984 - 198

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:25 000

CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

QUADRANGLE LOCATION

1 Charley River B-5 NW
2 Charley River B-5 NE

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Interstate Route
Local Connector
Local Road
4WD
US Route
State Route