Chirikof Island Range Survey
July 2014
Karin L Sonnen
USDA-NRCS

Natural Resources Conservation Service (NRCS) Alaska's State Conservationist Bob Jones was contacted with a request from two Alaska Soil and Water Conservation Districts (Homer and Kodiak) and the US Fish and Wildlife Service Alaska Maritime National Wildlife Refuge Manager (FWS) Steve Delehanty, for a Range Survey to be completed on two federally owned and managed Islands; Chirikof and Wosnesenski. The data will be used as part of an Environmental Impact Study being conducted by the Alaska Maritime National Wildlife Refuge concerning unmanaged cattle on the islands.

This assessment includes the development of several range condition maps that will address all aspects of the island's range condition, and include current year's utilization, apparent trend, and similarity index. These assessments are all standard range measurements throughout the United States, used by Federal Agencies including the UDSA - Forest Service, the USDI - Bureau

of Land Management as well as the USDA - NRCS. The assessments were ocular due to time constraints, and the methodologies are all documented in the NRCS's Range and Pasture Handbook (GLTI, 1997).

During July 15 through 25, NRCS Rangeland Management Specialist Karin Sonnen and Range Technician Katie Schmidt traveled to both islands via the USFWS Research Vessel Tiglax, to conduct the surveys at each island. This report will focus on Chirikof Island.

The crew had two days (July 17 and 18) to assess as much of the island as possible. Weather, including wind direction, speed, and ocean conditions (as well as the terrain around the island and just under the water's surface) dictated where crews could be dropped off. It was hoped that ATV Quads could be brought ashore to have better access to more areas on the island, but ocean conditions did not allow for the unloading of the ATV's from the Tiglax into the skiffs. Therefore the crew traveled around on foot for the two day assessment.

Chirikof Island General Description:

Chirikof Island is an approximately 29,000 acre, tree-less island located about 95 miles from the southern tip of Kodiak Island and eighty five miles south-east of the Alaska Peninsula. The nearest island is Chowiet Island, located approximately thirty seven miles to the north-west. Chirikof is unprotected by any land mass.

The terrain on Chirikof varies from wide, low ridges which dominate the northern part of the island, to steep slopes leading to higher elevations and alpine communities in the south and

eastern part of the island. The shores of the island are predominantly sandy beaches and dunes with low to mid elevation rises above, which are steep, but not so steep that human or cattle access is restricted. The southeastern coast of the island is much steeper with cliffs and rocky beaches, and access to the island from the shore would be extremely difficult if not impossible.

Narrow Valley in southern Chirikof

The vegetation on the island varies with the terrain, but is almost entirely herbaceous with the exception of dwarf shrubs in the highest elevations with occasional patches of two foot tall willows and salmonberry at mid and low elevations.

The steep slopes of the south eastern part of the island are covered with a diverse forb plant community, occasional dwarf crowberry shrub community and alpine plant community on the tops of tall peaks and ridges. These high mountainous areas are intersected with valleys of varying widths, many of which hold small streams that occasionally travel through sedge meadows intersecting the valleys.

The lower elevation, northern and western parts of the island currently support diverse grassy meadows on the upland rolling hills, with broad sedge meadow valleys between. These lower elevation areas also have very sandy soils beneath them. The terrain, elevation, and soils all influence the plants that grow on Chirikof and the impacts and intensity of cattle use these areas receive.

RANGE CONDITIONS:

Higher elevation southern and south-eastern Chirikof

The steep hillsides that lead to high elevation ridges and alpine areas are used by the cattle on the island, but to a lesser extent than the rest of the island. Cattle were seen on these areas, but their impacts were not heavy or concerning. The ground is well covered with diverse vegetation, and the soil is not commonly exposed, with the exception of some trailing and congregating areas on steep slopes where the animals trail up and down the hills. Grazing was light, with lush forbs and grasses dominating the slopes. These areas resemble Sitkinak Island

to the north (with lesser amounts of salmonberry shrubs) and also the southern tip of Kodiak Island (again, this island has lesser amounts of alder and salmonberry thickets).

Chirikof stream with well undercut, vegetated banks

The plant communities on the more gentle slopes of this area are likely a bit different, in both species composition and production, from what would be here if cattle had never been on the island. The more rolling hills have a high component of grasses that are probably more grazing tolerant than the communities that would be here if cattle were not on this island.

The narrow valleys in this area of the island show more cattle use closer to the mouths of the valleys. It is expected that the cattle may use these steep valleys for protection from the weather during severe storm events, and some trailing can be found occasionally in these narrow valleys. The streams in this area of the island, which are upstream of the mouths and beach areas, looked to be in excellent condition with well-developed cut banks and overhanging vegetation. A common misperception about cattle in Alaska is that they congregate and loaf in the riparian areas. Although this is true in the western United States it does not hold true in Alaska, where the vegetation tends to be equally lush and nutritious on the hills as in the riparian areas.

This broad area of the island does have one wide valley dissecting it, and although the crew did not get feet on the ground in this valley, the data collected at similar areas of the island were extrapolated and applied to this area.

The very tops of the highest ridges showed interesting lichen dynamics. The tops of the hills all had an orange hue, and when we hiked up to one, we saw that the dominant lichen was Sphaerophorus globosus. This lichen was in a nearly continuous monoculture mat, and this is something I have never seen before to this extent. Sphaerophorus globosus is an increaser, and indicative of past heavy reindeer grazing. Of course we have not had reindeer on this island, but the presence of this particular lichen with such a dominance in the community points to significant disturbance on these knobs in the distant past, with a time of rest (more than a decade) from the disturbance since then. Population records are sporadic and only estimations at best, on Chirikof. This was just an interesting distraction. The tops of the hills and ridges in this area are now well covered with vegetation and lichens, and have healed up from whatever the past disturbance might have been. These small areas were too small to map out, but if they had been mapped, the similarity index map would have shown them as a 0-25% similarity.

Alpine knobs of the ridges on Southern Chirikof show an orange tinge from the lichen Sphaerophorus globosus (above) and a closer look (at right).

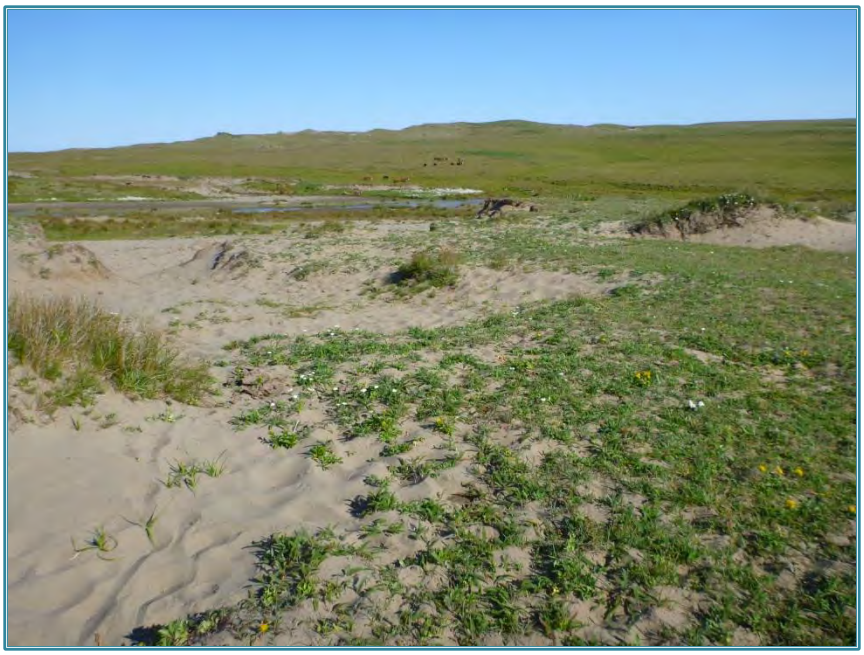
It is suspected that the steepness and the elevation of this area of the island have allowed it to remain in good condition with light impacts seen from cattle grazing. Trails do dissect through these areas, and occasional rutting pits can be found, but overall these areas are in good condition with the soil well covered with vigorous vegetation growing in the modified plant communities. These areas are probably not accessed much in the wintertime, and with green-up occurring sooner at lower elevations it is likely the cattle congregate in other areas while these higher elevation areas have a chance to grow in the spring. By early-summer, plenty of forage is present for grazing on, all over the island, and the higher elevation areas are used but not over-used by the cattle.

Lower elevation (Below 300 ‘) northern and western Chirikof:

The underlying soil material in the majority of the northern and western areas of the island was sand. This is significant, and unlike other islands I have assessed, which tend to have a stretch of sand dunes in coastal areas, but rarely make up over half of the island, like on Chirikof. Sedge wetlands and drainages, which have more of an organic soil, are scattered throughout these areas

of the island, but the majority of the areas in the northern upland areas, are underlain by sand.

The vegetation communities in the interior of the island at these lower elevations (Below 300 feet) have remnants of beach wild rye in them. This is a good indicator that with no cattle grazing, these areas would probably be dominated by beach wild rye, along with tall herbaceous forbs growing amongst the wild rye. Where Beach wild rye can establish, it will outcompete many other low-growing plants, shading them out with its tall growth form. Beach wild rye is a favored species by cattle, and can quickly be removed from a plant community with unmanaged grazing. These areas of the island would likely shift back to a beach wild rye-dominated community if left ungrazed for a decade or so. Beach Wild Rye is a tall grass that spreads not only through seed, but more successfully through rhizomes below the sand's surface. It does have a high growing point and so is susceptible to grazing pressure. Much of the island is now supporting a plant community that is much more tolerant of grazing, which is why we now see a higher amount of production from species including Hairgrass (*Deschampsia),* Alpine Timothy *(Phleum alpinum),* Red Fescue *(Festuca rubra),* Spike Trisetum *(Trisetum spicatum),* Yarrow *(Achillea),* Bluegrass (*Poa sp.*), lupine (*Lupinus nootkatensis*), and Sedge (*Carex sp.)*. Deschampsia and Poa are increasers, meaning they will increase in density with unmanaged grazing on ecological sites like these.



The vegetation along the coastal areas of the island shows a shift as well, to a community of short sedges (*Carex macrocephala*), Beach arnica (*Senecio pseudo-arnica*), and yarrow (*Achillea millefolium*), with a bit of remnant beach wild rye and beach pea. The expected plant community (which would be present with no cattle grazing, or even could be present with managed

cattle grazing) is one made up of beach wild rye (*Elymus mollis*), Beach Pea (*Lathyrus maritimus*), and a few other tall forbs. In this community the sand is well covered with organics added to the soil each year from both roots and the plant's above ground, yearly production. Additionally the tall vegetation slows winds carrying sand, allowing the blowing sand to be trapped and settle amongst the vegetation. The existing community does not fully cover the sand, and is very short with a much lower biomass production each year. Based on the vegetation's sparse distribution, it appears the vegetation is barely holding on to its existence, and is slowly being replaced by bare sand.

The actual grazing pressure seen on the plants in the middle of July was within prescribed grazing standards for current year's use, and just looking at the plants and amount of grazing they were measured as having, makes range condition on the island appear to be acceptable. It is important to note, however, that the cattle have to graze on the island all year long, and we were assessing the island in the middle of July (which is close to peak production for Alaska rangeland). The cattle will be surviving off this range and its production for at least another 9 months. The vegetation growth and grazing that was present looks pretty good, as a utilization

Pedestalled plants showing active erosion.

percent, however the soil and erosion evidence points to an unhealthy range ecosystem. A significant amount of exposed bare ground was commonly found between plants, with pedestalling and large exposed areas common as well.

Continuous, unmanaged grazing has altered the inland plant communities to a composition that is more grazing tolerant, with shorter grasses and lower growing points dominating over tall grasses and forbs. The very close grazing that eventually must occur on the low elevation range of the island, and the continuous hoof action are affecting the amount of exposed sand present in these areas of Chirikof. The accelerated erosion is exacerbated along the island's coast. Cattle use may be a bit heavier along the coast as they travel along the edges of the island, and the coastal areas take the full brunt of the winds. Any exposed areas will experience erosion.

Stable soils allow plants to establish and grow, providing habitat and forage. Growing plants provide detritus (above and below ground) for organic matter in the soil, providing food for microbes in the soil which in turn transform the organic matter into usable nutrients for plants. When topsoil is eroded away, the types of plants that can inhabit an area shift to those that are pioneering species. Getting plants to establish on eroded areas becomes more difficult, as the erosion can continue and desiccate seeds, seedlings, and rhizomes.

Western shore of Chirikof shows excessive trailing and exposed sand in the modified plant community.

Erosion is active on much of Chirikof Island; especially on those areas underlain with sand. This is evident in exposed, spider webbed cattle trailing on hillsides, and in plant pedestaling in

susceptible areas. The sparsely vegetated beach dune areas show a significant amount of exposed sand between plants, and a few areas have large blowouts.

Once a blowout occurs, it is difficult for vegetation to establish, and takes time and undisturbed conditions for revegetation to occur. Additionally, the blowout can become active to the point that the sand is moving farther and farther inland and smothering areas that are vegetated. In a case like that, even if cattle are removed from grazing an area, the exposed sandy dune area can continue to advance and increase in size. Examples like these benefit from human intervention, by way of sprigging beach wild rye, for the area to become revegetated and stable. Given several decades, the native vegetation may establish and recover the bare area with a vegetative cover. This erosion and deposition cycle has been documented on grazed islands in Alaska (Akun and Sitkinak). The areas visited on Chirikof are not affected to that extent, but with the extensive sandy soils on much of the island, some areas do have that potential. In aerial photos it appears that the tip of the island may have some of this dune erosion occurring.

The condition of the stream corridors in this area of the island is variable, but generally the broader valleys have more use than the more narrow ones. We crossed one narrow valley in the northern part of the island that was floating, and thus had very little cattle use on it. We also crossed one broader valley that had significant long term use and damage in the form of pedestalled plants, significant patches of exposed soil, and active erosion.

Cattle of Chirikof Island.

Cattle

The cattle seen on the island appeared to have several breed's phenotypes. A genetic study was done on the Chirikof Cattle in 2006 with the results finding that the cattle appear to be genetically unique from the 11 major breeds in North America (MacNeil, M.D., 2007). Many small groups of cattle were seen wherever we went. They were sometimes curious, but did run from us, with the exception of a few bulls that would occasionally follow along behind us. We did our best to avoid them, but inevitably did stir them up by making them move around as we walked across the island.

Groups of cattle were counted with bull to cow ratios noted, and based on what we saw it appeared the bull to cow ratio was between 1:2 and 1:3. This is too many bulls for a healthy and productive herd. The few carcasses we did find appeared to be young animals a year or two old. It is a possibility that they were killed by being over bred by big bulls. Although that is speculation it has been known to happen with unmanaged cattle herds in Alaska. Having that many bulls in a population will most certainly negatively affect the cows, their health, and their reproductive success.

Since the field work was completed on the island, a population count was completed on Chirikof via fixed wing plane. The count resulted in 2,024 head of cattle.

Option for including cattle in the future of Chirikof Island:
Having 2,000 unmanaged cattle on a 29,000 acre island is cause for concern about both the health of the cattle and the health of the island's ecosystem. A large part of Chirikof is in a degraded condition right now. It is likely that harsh winters have put some controls on the population in the past, and the population has probably fluxuated up and down depending on winter conditions. In spite of this population fluxuation over many years, the range is in a downward trend over much of the island.

Chirikof Island is a productive island and generally well suited to raising cattle. The slight majority of the island is below 300' in elevation, making for accessible winter range. The island is mostly well drained with dry soils and grass-dominated range. The limiting factor for the cattle is winter range. Estimates in production for the areas below 300 feet in elevation that are accessible to cattle, range from 650 to 3,000 pounds per acre. About two thirds of the winter range has an annual production estimated at 700 pounds per acre and the rest is estimated at an average of 2,000 pounds per acre. Using the calculations detailed in Appendix 2, a more reasonable number of cattle for Chirikof, based on the present condition of the range, is about 500 animals. This number is a conservative estimate, and assumes a bull to cow ratio of 1 to 20. This number also allows for only 30% of the forage to be allocated to cattle grazing, which will allow the range to recover.

Concluding Comments

Close to half of Chirikof Island is in a degraded condition that includes the loss of soil. This degraded area is primarily the winter range of the island that supports the forage the cattle have access to during the winter months. The island's population of cattle is currently at about 2,000, and the bull to cow ratio is out of balance.

Chirikof is also a productive island for raising cattle, and supports a well-adapted, disease-free herd whose ancestors were introduced to the island in the late 1800's. During initial research done by Range Technician Katie Schmidt, photographs were found from Chirikof, taken by William Workman, a young college student who was doing his master's degree work on archaeology at Chirikof in 1963. He went on to become a world-renown specialist and expert in Alaskan archaeology, as well as a professor at UAA's Archaeology Department. After talking

with now-retired Professor Workman, those photo locations were revisited and retaken for comparison in July of 2014 while we were on Chirikof. The 1963 photographs appear to have more bare ground than seen in 2014. Some of the photos taken on the beach areas show dunes in 1963 that are no longer present in 2014; they have eroded away.

Photo points were set up in not only the southern part of the island where the 1963 photos were taken, but also along the north western shore to monitor changes over time to that type of ecosystem. These photo points are described in detail and attached to the end of this report, so they can be revisited when other trips are planned to Chirikof in future years.

References:

National Range and Pasture Handbook. 1997 Natural Resources Conservation Service Grazing Lands Technology Institute (GLTI), Fort Worth, Texas.

MacNeil, M.D., Cronin, M.A., Blackburn, H.D., Richards, C.M., Lockwood, D.R., and Alexander, L.J. (2007) Genetic Relationships between feral cattle from Chirikof Island, Alaska and other breeds., *Animal Genetics*, 38, pp 193-197. 2007

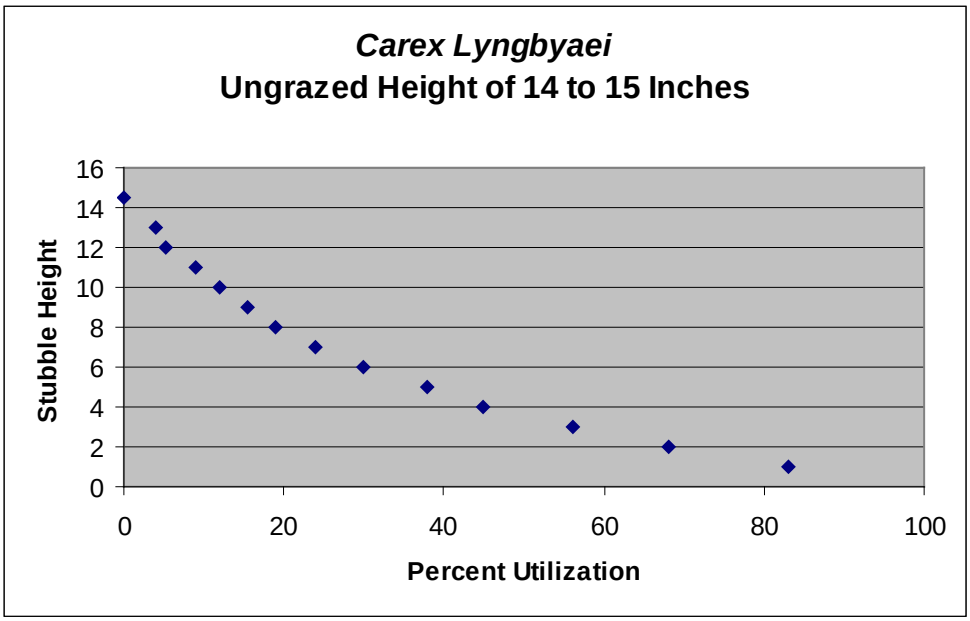
Rangeland Monitoring Explanations

Appendix 1

Utilization:

Utilization is a measure of how much of the plant's current year's growth has been removed by the grazing animal. This includes not only the amount consumed, but also damage to plants from trampling and hoof action as well. This is an ocular estimation made by an experienced range conservationist.

The following graph shows the utilization curve of Carex lyngbyaei, as sampled at the head of Kachemak Bay in Homer, Alaska. This example shows that the utilization percentage is not a direct reflectance of the stubble height of the remaining grass. Grasses have more of their biomass at the base of the plant than at the tips. Therefore, when a plant is grazed to 50% of its height, it does not equal 50% of the plant's biomass removed.



Apparent Trend:

The apparent trend determination looks at the entire site as a whole and compares it to the ungrazed site, or the desired plant community. Plant decadence, soil condition, species composition of the plant community, and vigor of the plants are all considered. A rating is assigned of "positive" for moving in a direction toward the desired plant community, "negative" for moving away from the desired plant community, or "not apparent" for a trend which is not discernable.

Similarity Index:

This is a rating of how similar the existing site is to what would be present without grazing (or the desired plant community, which may be different from the climax plant community). This takes into account not only the species present that would also be in the desired plant community, but also the production of these species. For example, if the site without grazing would be expected to have the following:

Beach Wild Rye	4,000 #/ac
Beach Pea	500#/ac

But the plant community on the site actually had the following:

Beach Wild Rye	1,000 #/ac
Beach Pea	100 #/ac
Yarrow	600 #/ac

The Similarity Index would be calculated as follows:

Species	#/Ac expected	#/ac actual
Wild Rye	4000	1000
Yarrow	0	600 (doesn't count toward total)
Beach Pea	500	100
Sum	4,500	1,100

1,100 actual / 4,500 expected = 0.24 or 24% Similarity Index

Initial Stocking Rate Calculation Details

Winter Range = 15,563 acres
10,025 acres have a production of approximately 700 #/ ac.
5,538 acres have a production of approximately 2,200 #/ac.

Allowing for just 30% of that production to be allotted to cattle grazing means
10,025 acres have 210#/ac available = 2,105,250 # of forage
5,538 acres have 660#/ac available = 3,655,080 # of forage

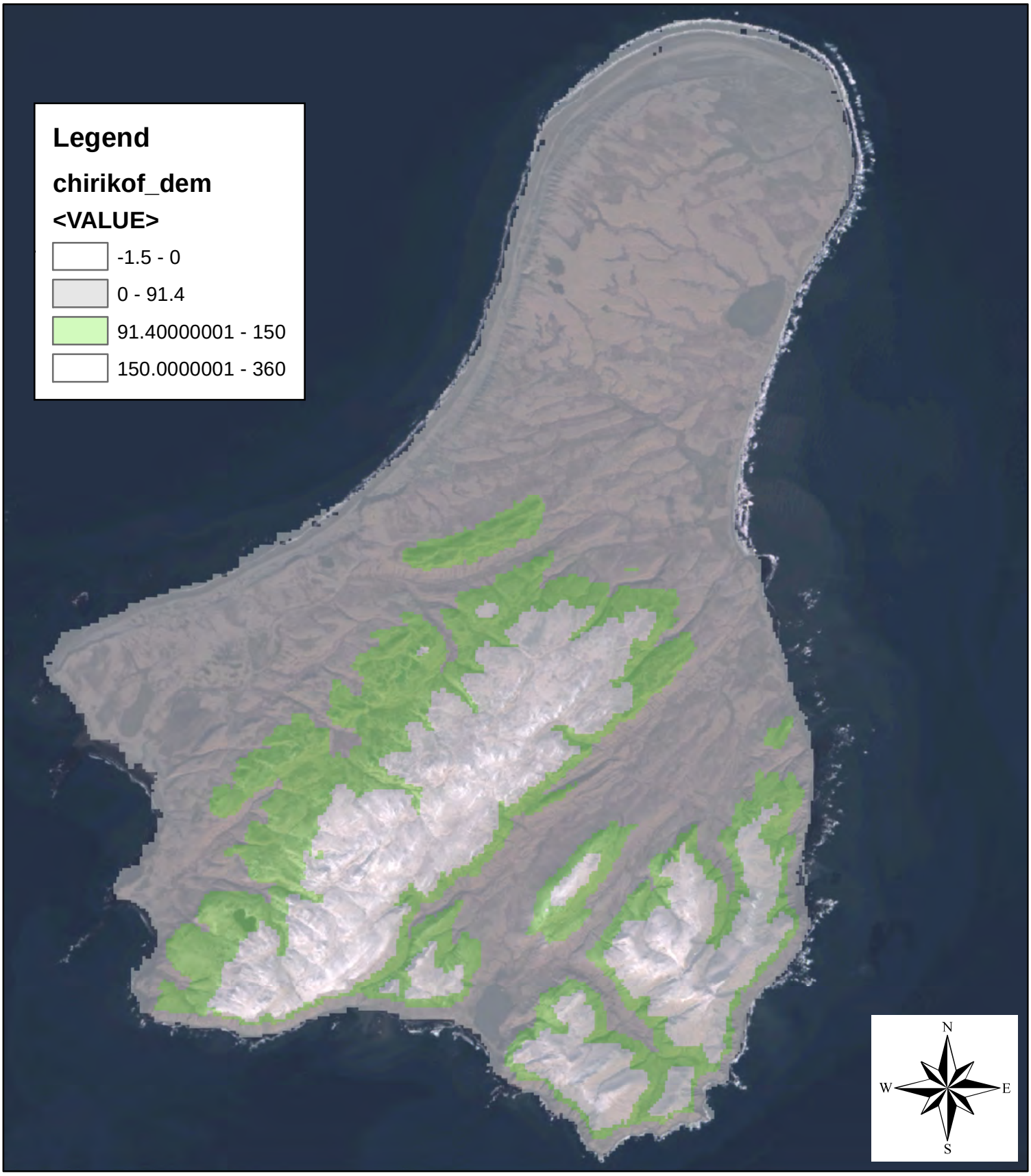
This gives a total of 5,760,330# of forage available for the year

A 1,000 # cow eats 3% of its body weight/day = 30 #/day
A cow eats about 930#/ month
A cow eats about 11,160# of forage/year

5,760,330# of forage divided by 11,160# needed per cow per year = 516 head.

This assumes the cows are 1,000 pounds in weight. A bull's intake will depend on its weight (3% per day) and bulls can be over 2,000 pounds.

Chirikof Island Elevation Class Map
(In Meters)



USDA-NRCS
10-03-2014

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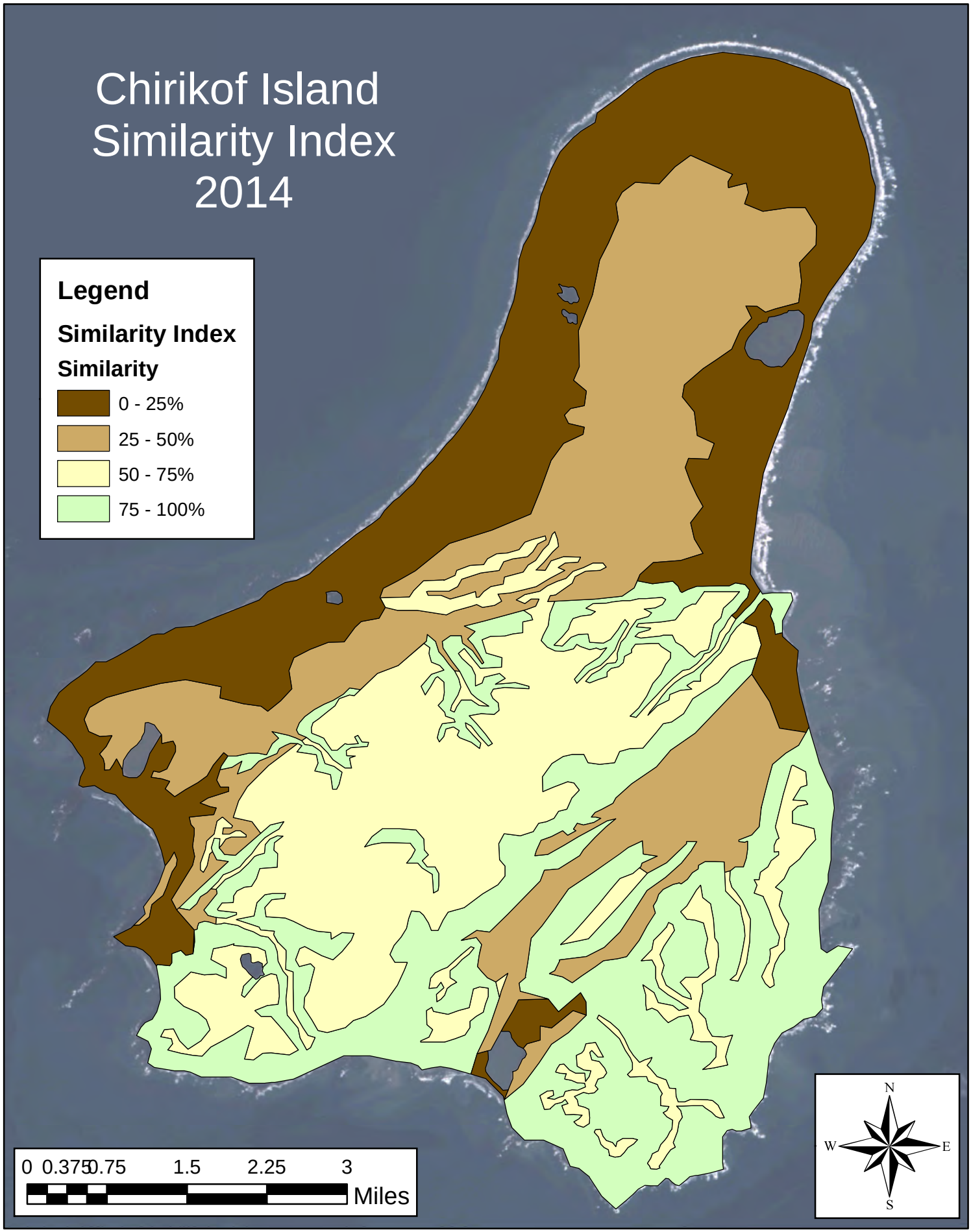
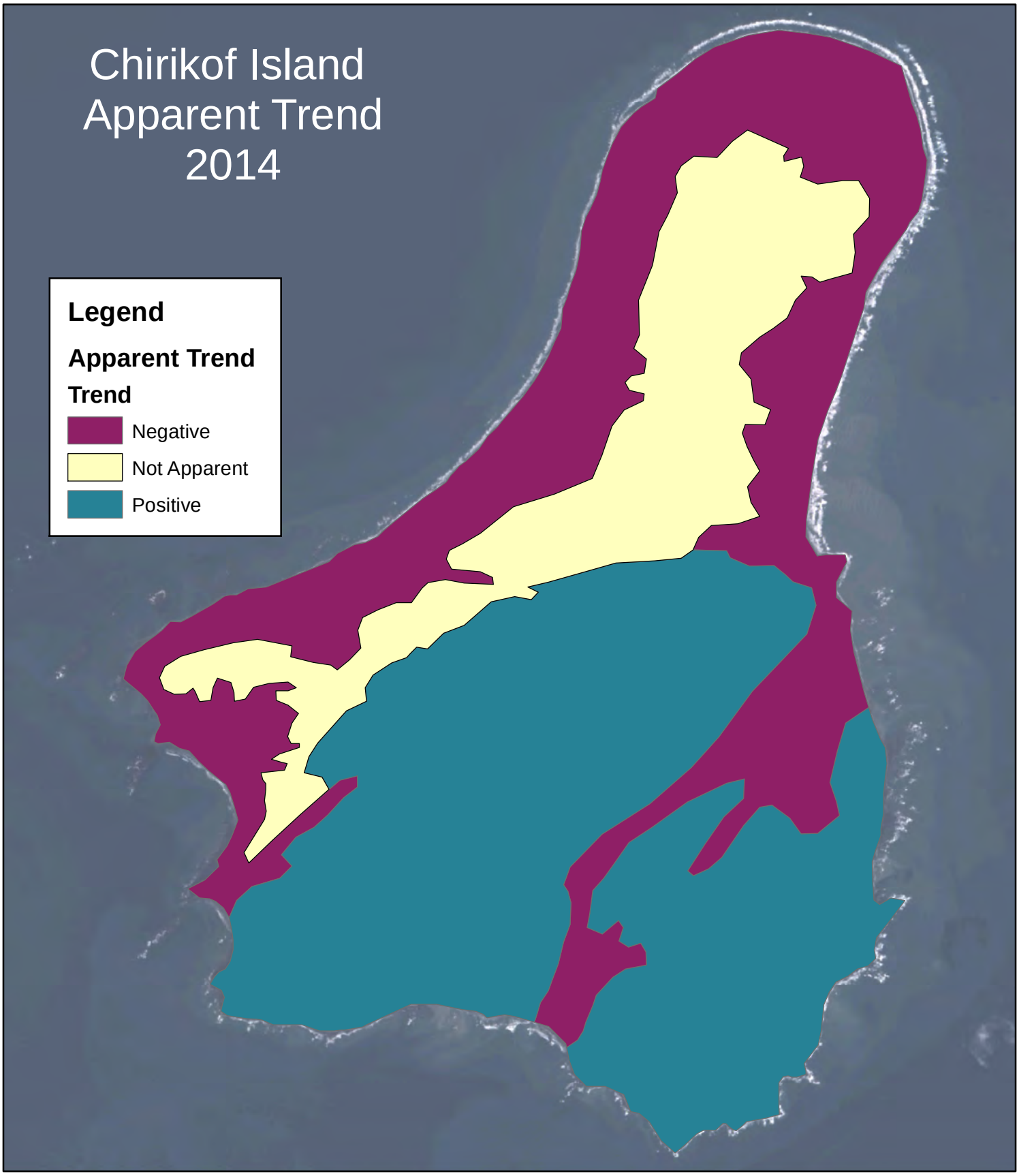


USDA-NRCS
October 8, 2014



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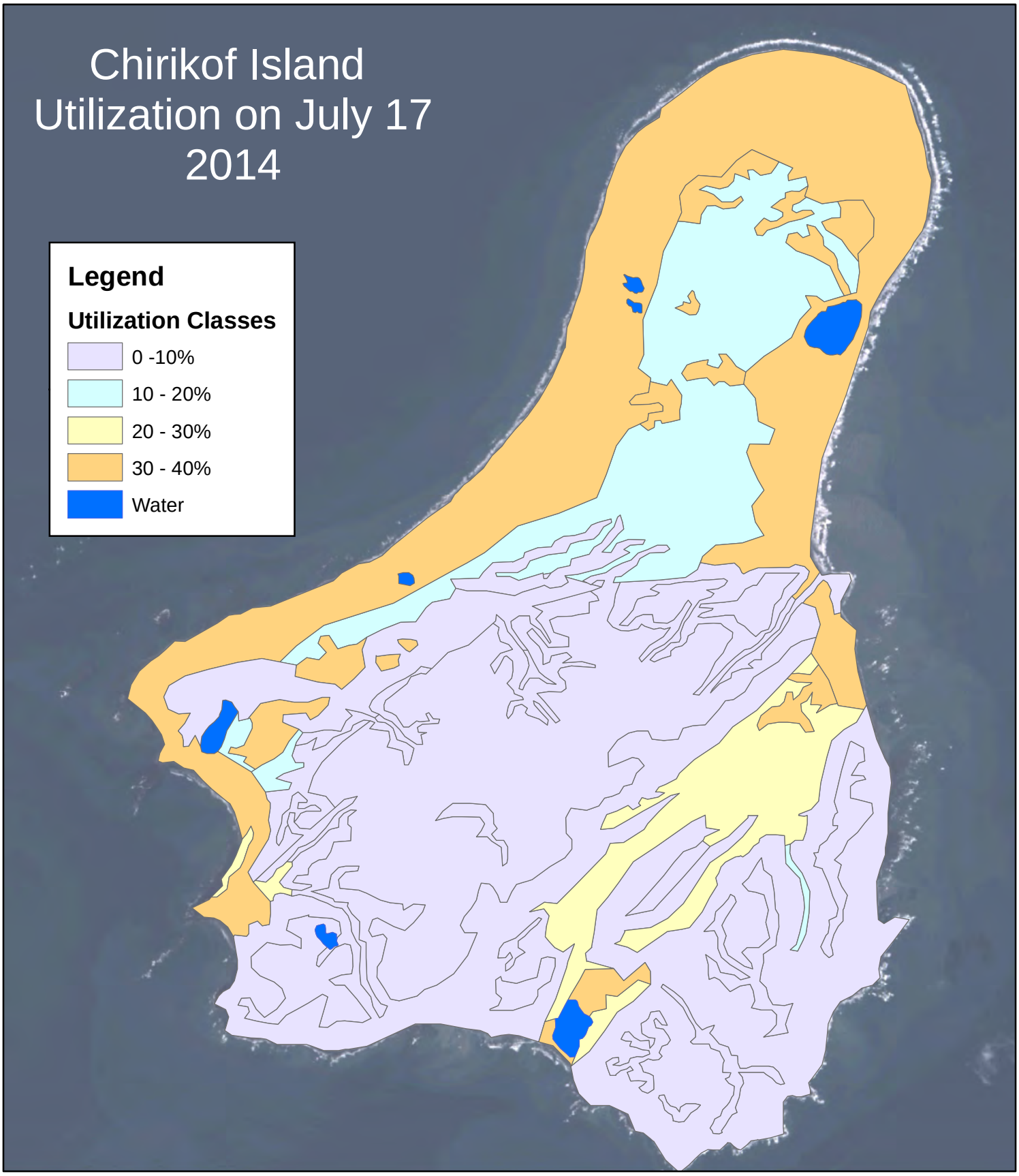

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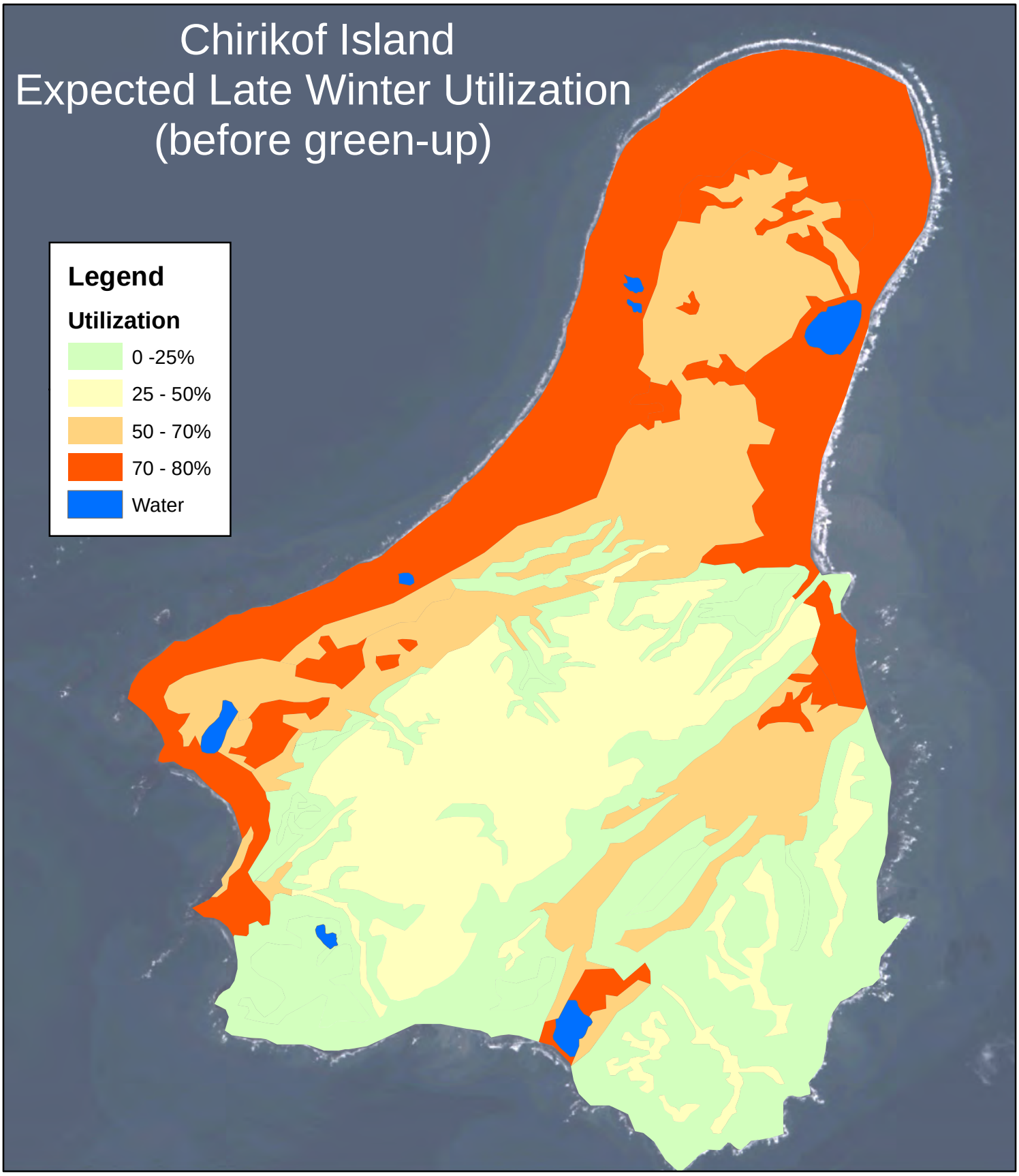

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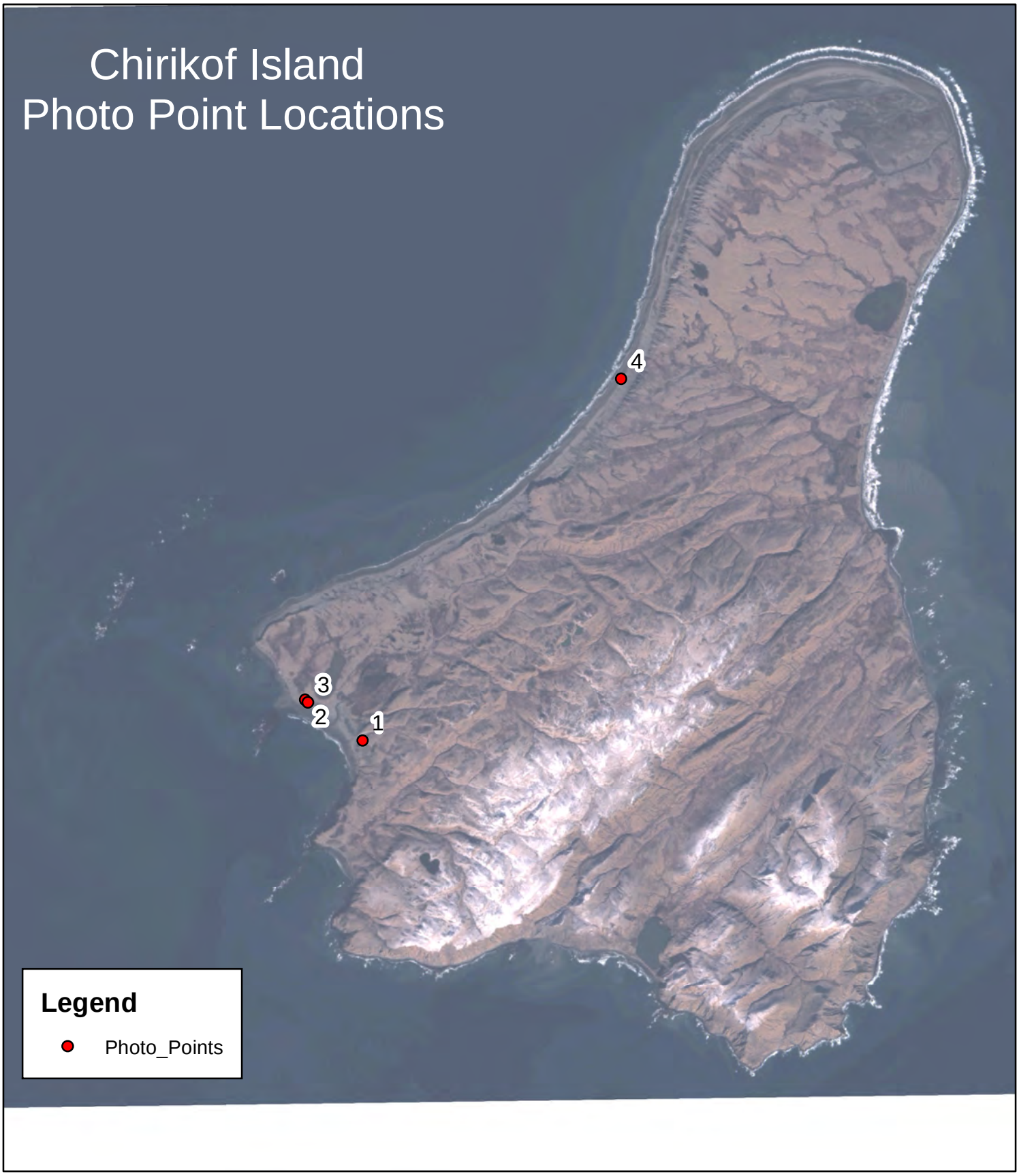

0 0.75 1.5 3 4.5 6 Miles

N
W E
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USDA-NRCS
October 8, 2014

Photo Point # 1_ Island: Chirikof_ Date: 17 July 2014
Datum WGS 84
N __ 55 degrees 48.386 minutes_____
W__155 degrees 43.323 minutes_____
Observers:__K. Sonnen / K. Schmidt_____

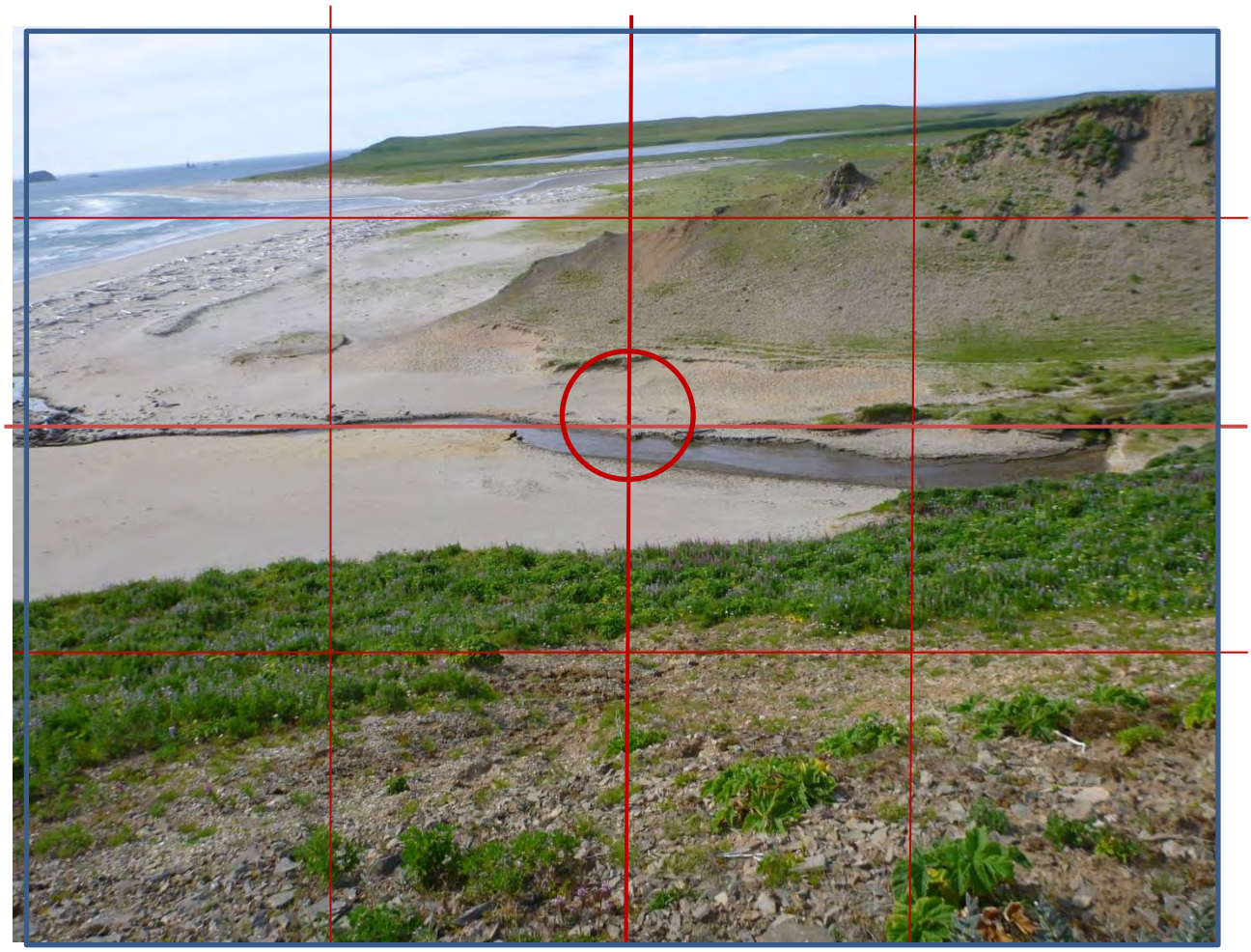
General Location Description: __On the NW facing side of a ridge about 2/3 of the way up, in an exposed area on the slope. Photo is taken pointing north-west.

Veg Description: __The photographed area is an area of shoreline that has sedges, yarrow, and other short vegetation species. Original photo was taken in 1962 by William Workman, and a second photo was taken in 2013 by Patrick Saltonstall. This photo point was formally established in 2014.

The Photo is taken looking : NW

Correlates with another photo point taken in an earlier year? Y year:_1962, 2013_____

Photo Aim



1963

2013

2014

Photo Point # 2_ Island: Chirikof_ Date: 17 July 2014
Datum WGS 84
N __ 55 degrees 48.747 minutes_____
W__155 degrees 44.284 minutes_____
Observers:__K. Sonnen / K. Schmidt_____

General Location Description: __On a low ridge above the vegetation and driftwood line.

Veg Description: __Grazed beach line. Vegetation is short Beach Wild Rye, Sedge, and yarrow. Original photo was taken in 1963 by William Workman, and a second photo was taken in 2013 by Patrick Saltonstall. This photo point was formally established in 2014.

The Photo is taken looking : S-SE

Correlates with another photo point taken in an earlier year? Y year:_1963, 2013_____

Photo Aim

1963

2013

2014

Photo Point # 3_ Island: Chirikof_ Date: 17 July 2014
Datum WGS 84
N ___55 degrees 48.726 minutes_____
W__155 degrees 44.243 minutes_____
Observers:__K. Sonnen / K. Schmidt_____

General Location Description: __in the driftwood line on the beach.

Veg Description: __Grazed beach line. Vegetation is short Beach Wild Rye and yarrow. Original photo was taken in 1963 by William Workman, and a second photo was taken in 2013 by Patrick Saltonstall. This photo point was formally established in 2014. The 1963 exact location is tough to determine as the beach ridges have changed a bit .

The Photo is taken looking : N-NW

Correlates with another photo point taken in an earlier year? Y year:_1963, 2013_____

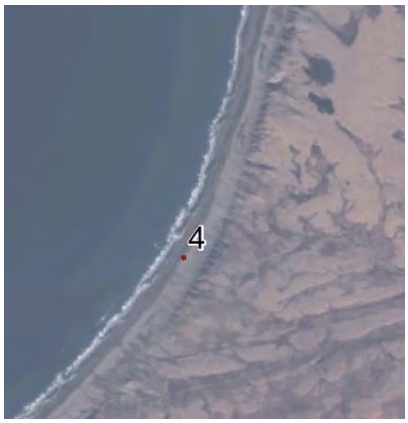
Photo Aim

1963

2013

2014

Photo Point # 4_ Island: Chirikof_ Date: 18 July 2014
Datum WGS 84
N __ 55 degrees 51.795 minutes_____
W__155 degrees 39.207 minutes_____
Observers:__K. Sonnen / K. Schmidt_____



General Location Description: __On the coast below the bench ridge but in the sedge vegetation. Three photos are taken at this one location – one looking north, one south, and one looking east at the bench, inland.

Veg Description: __Grazed beach line. Vegetation is Large-Headed Sedge, Beach Arnica, and Yarrow. This photo point was formally established in 2014.

The Photo is taken looking : N and S and E (three photos here)

Correlates with another photo point taken in an earlier year? N year:_____

Photo Aim Looking South

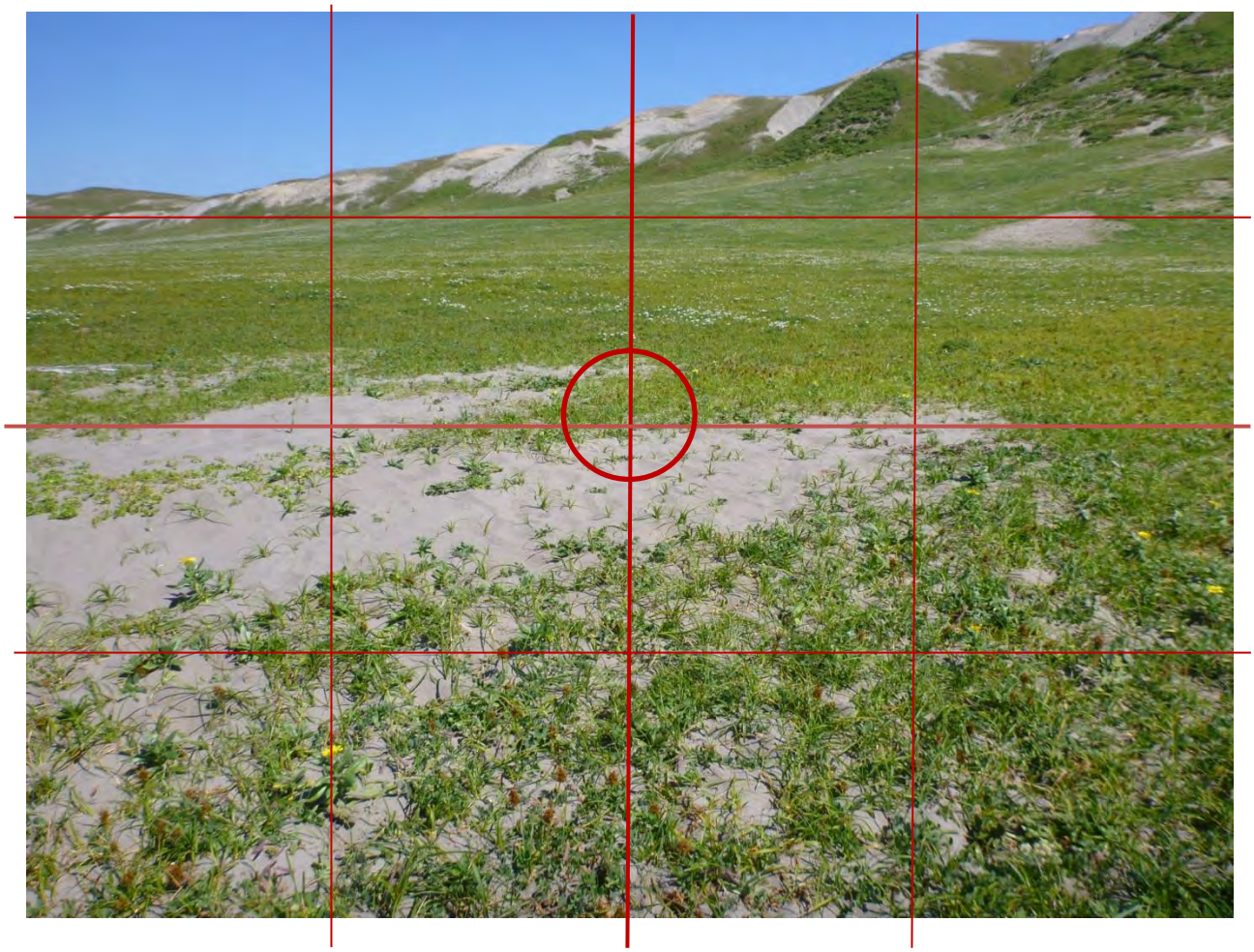


Photo Aim Looking East

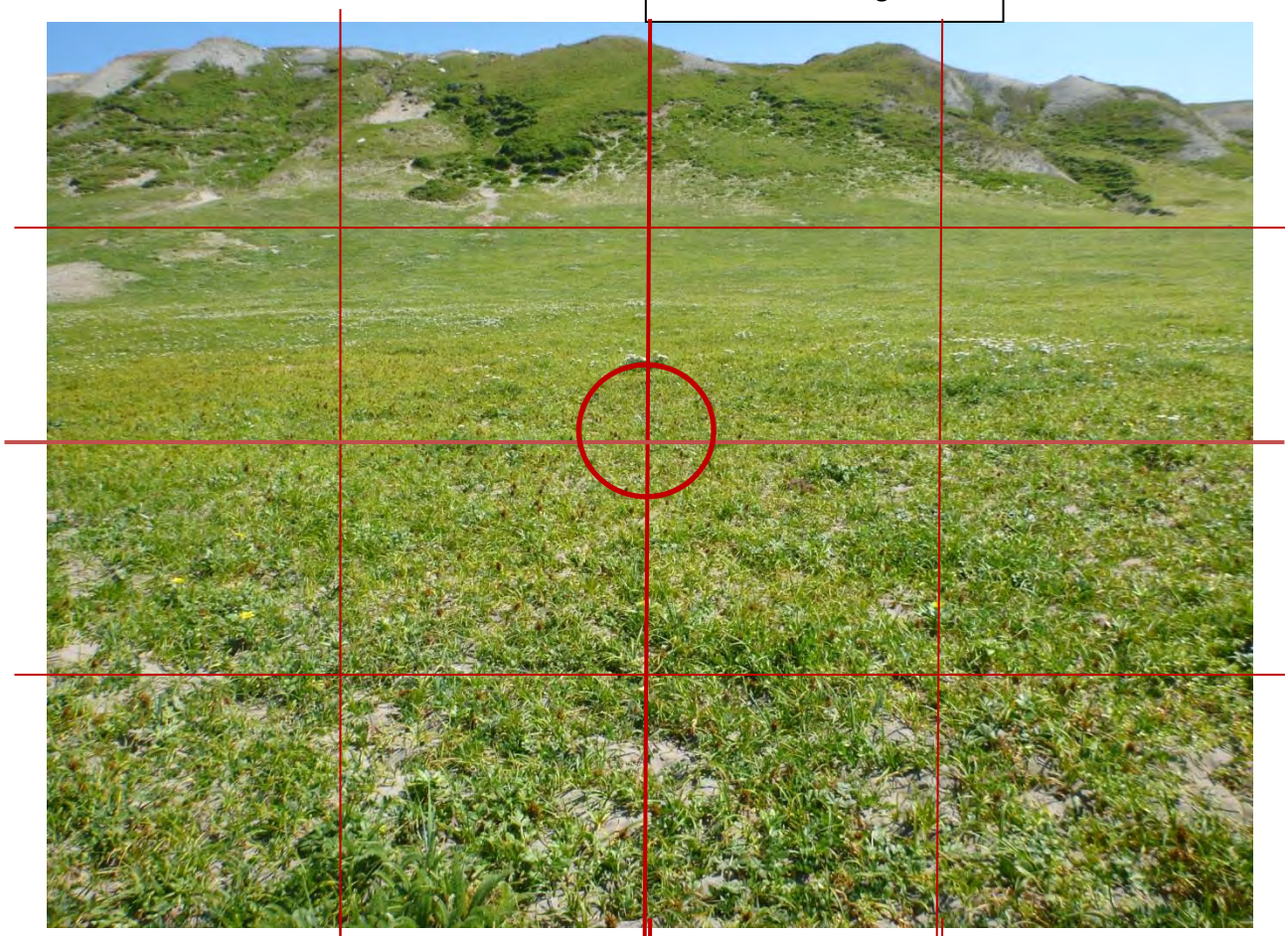
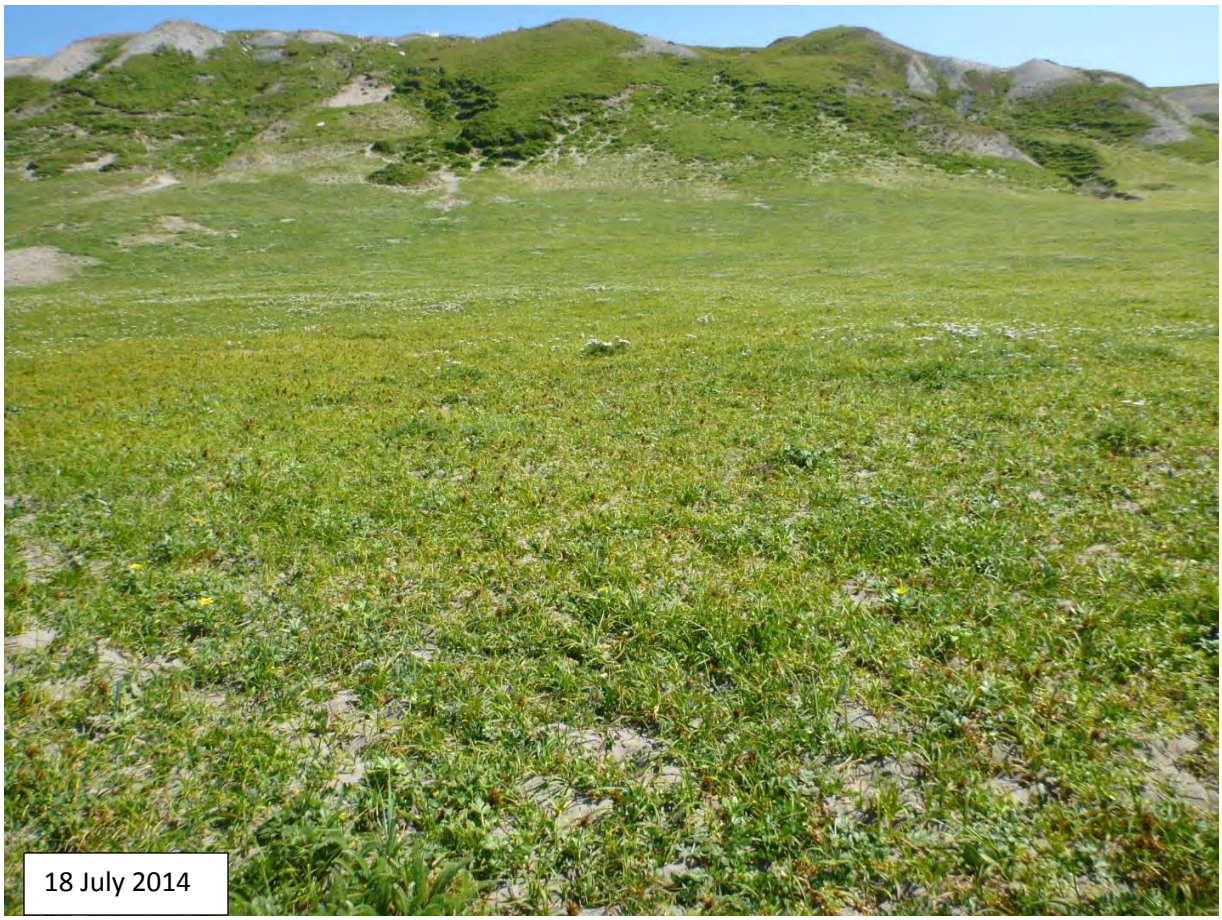
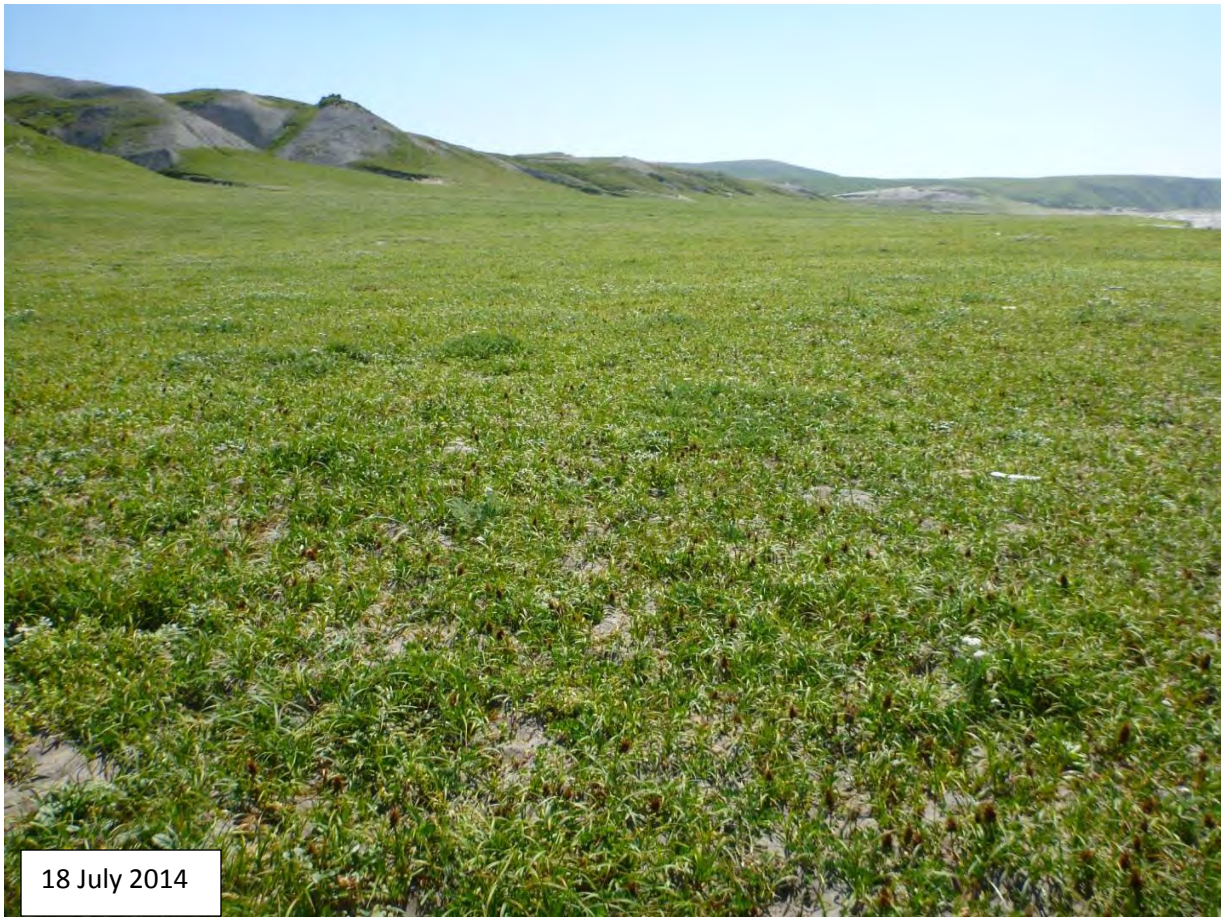


Photo Aim Looking North

18 July 2014


18 July 2014


18 July 2014