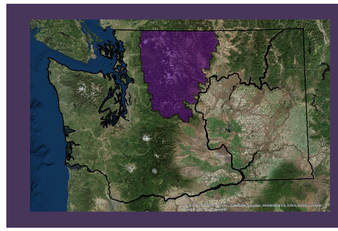


Identifying Camera Trap Locations to Monitor Grizzly Bear Populations in the North Cascades Ecosystem

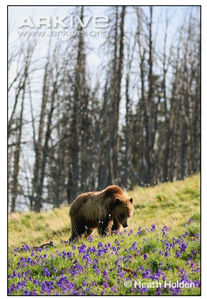
Whitney Emge

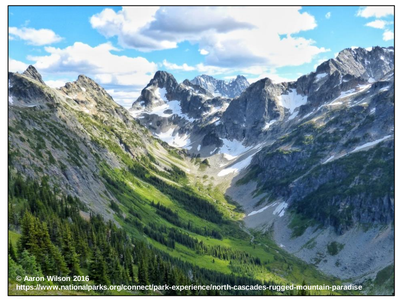
University of Washington, Tacoma

UNIVERSITY of WASHINGTON TACOMA

Introduction

Grizzly bears (*Ursus arctos horribilis*) historically occurred throughout the North Cascades Ecosystem (NCE), but due to pressures from human activity including hunting and habitat modification, the population has declined. It is estimated that less than 10 grizzly bears remain in the Washington portion of the NCE (DOI, 2017), despite sufficient habitat. In January 2017 the U.S. Department of the Interior (DOI), the National Park Service (NPS), and the U.S. Fish and Wildlife Service (FWS) released a draft grizzly bear restoration plan detailing a proposed course of action to recover the grizzly bear population in the NCE by relocating bears from other viable populations.





Fisher Creek Basin, potential grizzly bear habitat.

Given the grizzly bear restoration plan, the purpose of this project is to identify ideal locations for camera traps in the NCE. Camera traps are a relatively noninvasive data collection method in wildlife studies, requiring no capture or handling of animals (Ancrenaz et al, 2012). Locations will be determined by first identifying ideal grizzly bear habitat, and then determining which areas of that habitat would be reasonably accessible to researchers.

Methods

The habitat analysis for the 6.1 million acre Grizzly Bear Recovery Zone (GBRZ) involved human use variables and preferred grizzly bear landcover in the late season, July 15 – September 20, when more habitat would be accessible to researchers.

Bear Management Units (Cascadia Partnership Forum, 2014) were ranked by total road length, since more roads mean more habitat fragmentation. In Figure 1, red indicates units with more roads and green indicates units with fewer roads. A land cover raster (Kiilsgaard and Barrett, 1999) was clipped to the GBRZ and ranked by appropriateness of habitat, as shown in Table 1 with the classification range. Buffers for human use and non-habitat variables and classifications appear in Table 2. Raster calculator was used to identify grizzly bear habitat in the GBRZ, which appears in a red to green gradient in Figure 2. For the camera location analysis, raster cells with the top three scores were exported to polygons. Polygons within 800m of trails were selected to determine accessible habitat areas for researchers to hike to and identify locations for camera trap placement.

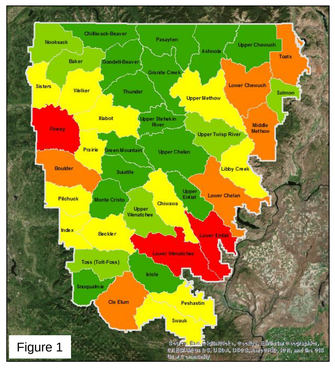


Figure 1

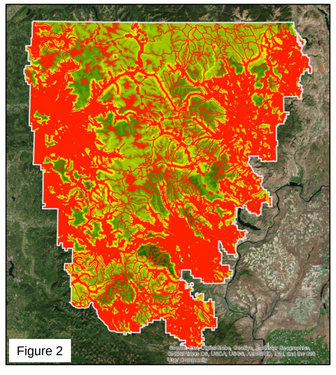


Figure 2

Table 1: Habitat Type and Index

Subalpine Parkland	4
Alpine Grasslands & Shrublands	4
Montane Coniferous Wetlands	4
Montane Mixed Conifer Forest	3
Lodgepole Pine Forest & Woodlands	3
Westside Riparian Wetlands	3
Eastside Riparian Wetlands	3
Ponderosa Pine, Eastside White Oak Forest & Woodlands	2
Eastside (Interior) Mixed Conifer Forest	2
Westside Lowlands Conifer-Hardwood Forest	2
Eastside (Interior) Grasslands	1
Upland Aspen Forest	1
Shrub-steppe	1
Herbaceous Wetlands	1
Agriculture, Pasture & Urban	0
Water, Ice, Barren Land	0

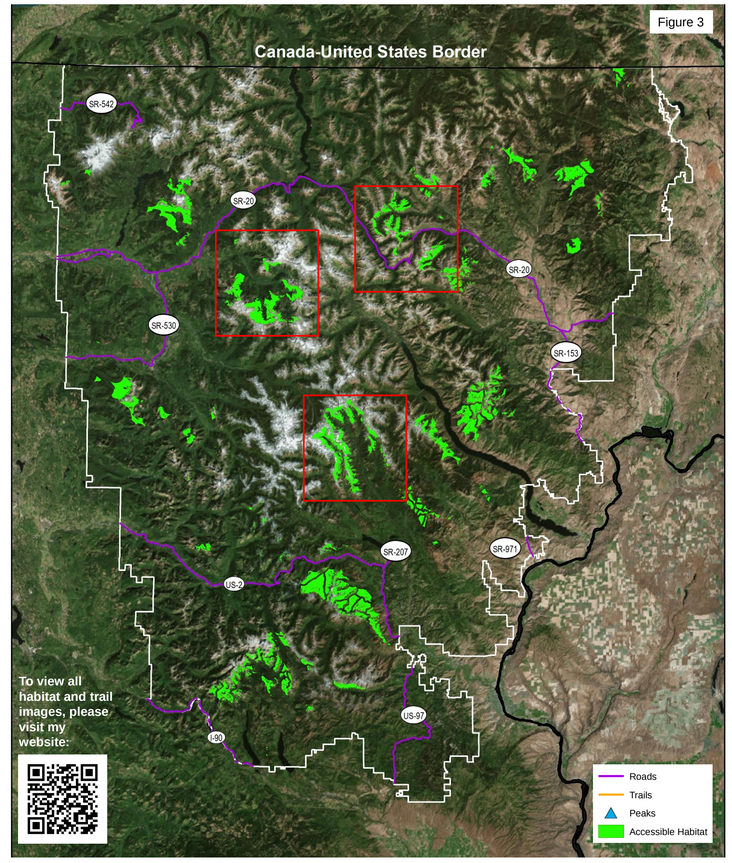
Table 2: Datasets, Abbreviations, and Index Score

Dataset	Abbreviation	Index
Landcover Habitat	Habitat	0-4
Density of Roads per BMU	RoadDensity	0-4
Developed Land Multiple Ring Buffer (1,000, 1,500, 2,000, 2,500m)	DevMulti	0-4
Roads Multiple Ring Buffer (1,000, 1,500, 2,000, 2,500m)	RoadMulti	0-4
Ice and Barren Land	IceBarren	0/1
Campsite Buffer (1km)	CampsiteBuff	0/1
Trail Buffer (250m)	TrailBuff	0/1
Railroad Buffer (500m)	RailBuff	0/1
Road Buffer (500m)	RoadBuff	0/1
Developed Land Buffer (500m)	DevBuff	0/1

Raster Calculator equation:

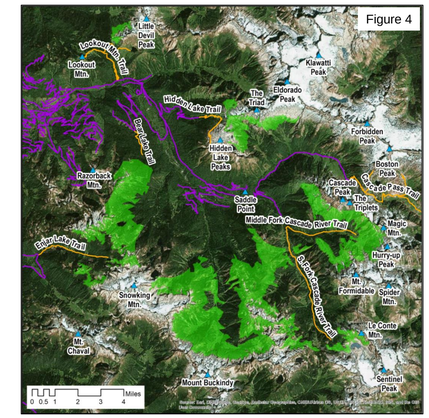
(("Habitat")+("RoadDensity")+(("DevMulti")*(-1))+(("RoadMulti")*(-1)))*("IceBarren")*("CampsiteBuff")*("TrailBuff")*("RailBuff")*("RoadBuff")*("DevBuff")

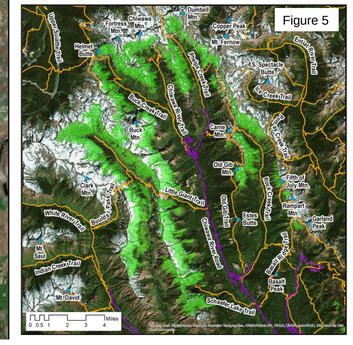
Results

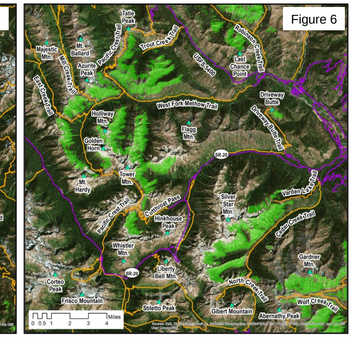


The top ranking habitat areas within 800m of a trail appear in Figure 3. Detailed images of select habitat areas with trails (orange) and their corresponding names, as well as roads (blue) appear in Figures 4-6.

Figure 4 shows accessible habitat near the Upper Cascade River watershed, where the last confirmed grizzly bear sighting occurred in Washington State in 2010 (Zimmer, 2011). Figure 5 shows accessible habitat near the Glacier Peak Wilderness, where a grizzly bear was sighted in 1996 (DOI, 2017). Figure 6 shows accessible habitat just east of Thunder Creek, where a grizzly bear track was confirmed in 1991 (WWO, 2017) and north of upper Lake Chelan where a female and cub were seen in 1991 (DOI, 2017).







Discussion

The results of this analysis indicate that there are several core areas of ideal grizzly bear habitat throughout the GBRZ that are appropriate and accessible for camera trap placement. Future analyses may incorporate canopy cover or avalanche chute data, and may also consider options for early season camera placement to gather data on grizzly bear behavior and spatial use at the end of hibernation.

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Author: Whitney Emge

Date: May 25, 2017

Contact: emge.whitney@gmail.com

ArcMap 10.4.1

NAD 1983 HARN State Plane South WA FIPS 4602 Feet