Proposed Grizzly Bear Management Units on the Lolo, Bitterroot and Select Portions of the Beaverhead-Deerlodge National Forests, Montana, USA

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Photo: Sam Parks

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BMU concept and initial identification, project supervision, report preparation and layout: MB;
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Introduction

The long-term survival of grizzly bears (*Ursus arctos*) in the northern Rockies is dependent on connecting isolated populations with areas of protected habitats between the designated Grizzly Bear Recovery Areas (Allendorf et al. 2019). As grizzly bears reoccupy native habitat in the Northern Rockies there is a need to update National Forest management plans and consultations with the U.S. Fish and Wildlife Service. For example, the Lolo and Bitterroot National Forests in Montana intend to begin long-term Forest Plan Revisions within the next two years and the Lolo has re-initiated formal Endangered Species Act Section 7 consultation on its existing Forest Plan. The Nez Perce-Clearwater National Forests in Idaho have a draft Plan revision.

In order to assess the existing baseline situation, proposed Bear Management Units (BMUs) were identified on the Lolo and Bitterroot National Forests in areas outside the Recovery Areas which have high value for connectivity and facilitating natural immigration into the Bitterroot ecosystem. Areas of the Beaverhead-Deerlodge National Forest that are part of the Sapphire-Pintlar connectivity area and contiguous with the Lolo and Bitterroot National Forests were also mapped. This information will have future use for calculating baselines for roads, secure core, habitat productivity, denning habitat and other resources.

Methods

BMU Size— The bounds of Bear Management Units within the project area were delineated based on several factors. Within Grizzly Bear Recovery Areas in the northern Rockies, female grizzly bear life ranges are from 300-600km^2 in the Selkirk Mountains (Wakkinen and Kasworm 1997; Almack 1986), approximately 600km^2 in the Cabinet-Yaak (Kasworm and Servheen 1995; Kasworm et al. 2021) and nearly 900km^2 in the Yellowstone Recovery Area (Blanchard and Knight 1991). As a general rule of thumb, bear density and life ranges are inversely related to precipitation with xeric habitats having the largest ranges with lower density. Bear densities are also lower in areas with less secure core habitat due to higher mortality risk.

Simply dividing the landscape into 600km^2 polygons would be arbitrary and not make biological sense as watersheds vary in size and current delineations of BMUs in the NCDE, Cabinet-Yaak and Selkirk Recovery Areas are of variable size. Therefore, the range of 300-900km^2 was used as a guide. In connectivity areas between Grizzly Bear Recovery Areas we anticipate that grizzly bears will at least initially have larger life ranges as they disperse into and explore new habitats before settling into a long-term home range. Movements of a male grizzly bear marked in the NCDE were detected in the East Fork of the Bitterroot 120 miles from the NCDE Recovery Area (USFWS 2021). We also used the presence of suitable denning habitats (Bader and Sieracki 2022) to guide design of BMUs.

BMU Bounds— The proposed BMUs consist of federal, state, and private lands with conservation easements. Larger parcels of private land, cities, towns and isolated parcels of public land were excluded. The management plan for the latter is focused on bear aware programs and co-existence strategies including securing of attractants such as garbage, chickens and bird-feeders.

BMUs were identified for two habitat types. One is for large core secure areas within and adjacent to the designated Recovery Areas. The other is for connective habitats straddling the hydrologic divides of mountain ranges which have smaller, spatially disjunct secure core habitats defined as areas at least 500m from open roads and at least 10km^2 (2500ac) in size (USFWS 2018).

BMUs have been identified and mapped for the Nez Perce-Clearwater National Forests (Mattson 2021). To prevent overlap, in areas of the Bitterroot and Lolo National Forests adjacent to the Nez Perce-Clearwater National Forests, BMU boundaries are defined by the boundary between the Lolo, Bitterroot and Nez Perce-Clearwater National Forests.

In large secure core within and adjacent to Grizzly Bear Recovery Areas, BMUs go to the top of watershed divides. In connectivity habitats, with a few exceptions, BMU boundaries go over the top of watershed divides because most secure core habitats overlap these features and are the best routes for grizzly bears based on least-cost path analysis (Peck et al. 2017; Walker and Craighead 1997) and coincide with the upper elevations in the center of mountain ranges. Thus, BMUs in connectivity areas have spring riparian ranges on two sides while having suitable fall, denning and secure core habitats at higher elevations. Figure 1 illustrates this concept, showing the proposed Three Lakes BMU within the Ninemile Demographic Connectivity Area which contains spring habitats on the North and South edges of the BMU.

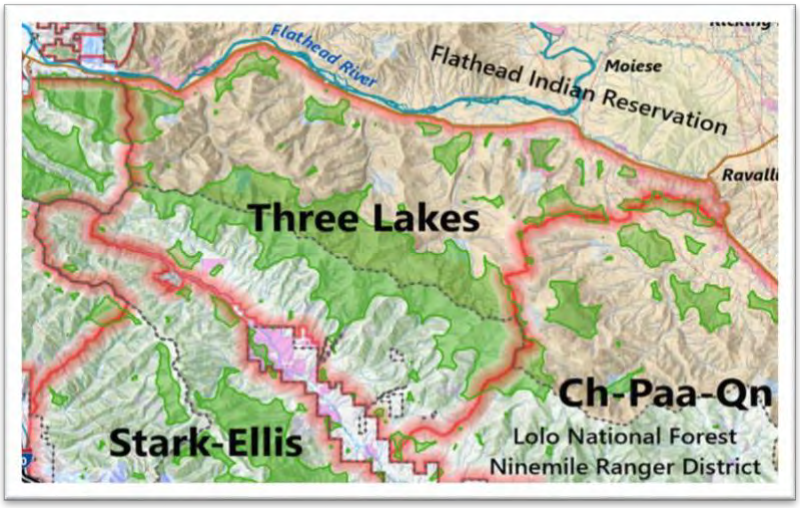

Figure 1. Three Lakes BMU with secure core (green) and lower elevation spring range along the Flathead River and Ninemile Creek.

Draft BMU boundaries were drawn by hand onto 3’ x 4’ U.S. Forest Service National Forest Maps. These were then digitized into electronic form using ArcGIS (ESRI 2021), and polygons were constructed from the maps. Constructing the GIS-based BMU boundary polygons involved tracing polygon edges of base layers. A general priority scheme was followed first tracing Hydrologic Unit boundaries from the USGS Watershed Database (in some cases we followed a ridge between Hydrologic Unit boundaries), then the Public Lands System (PLSS), and where practicable, administrative boundaries such as National Forest and Ranger District boundaries and conservation easements. In a few instances streams were followed in order to properly size the BMUs. Areas were then calculated for each BMU polygon.

BMU Naming— Provisional names were assigned to each BMU following the practice used in the NCDE, Cabinet-Yaak and Selkirk Grizzly Bear Recovery Areas where BMUs are named after well-known topographical features such as mountain peaks, rivers and streams.

Results

The map results are shown in Figures 3 and 4, and the spatial results are shown in Table 1. The mean size of the BMUs (n = 32) is 586km^2, which is approximate to the mid-point in the range of 300-900km^2 for female life ranges in Grizzly Bear Recovery Areas in the northern Rockies.

Figure 2. Sam Parks photo.

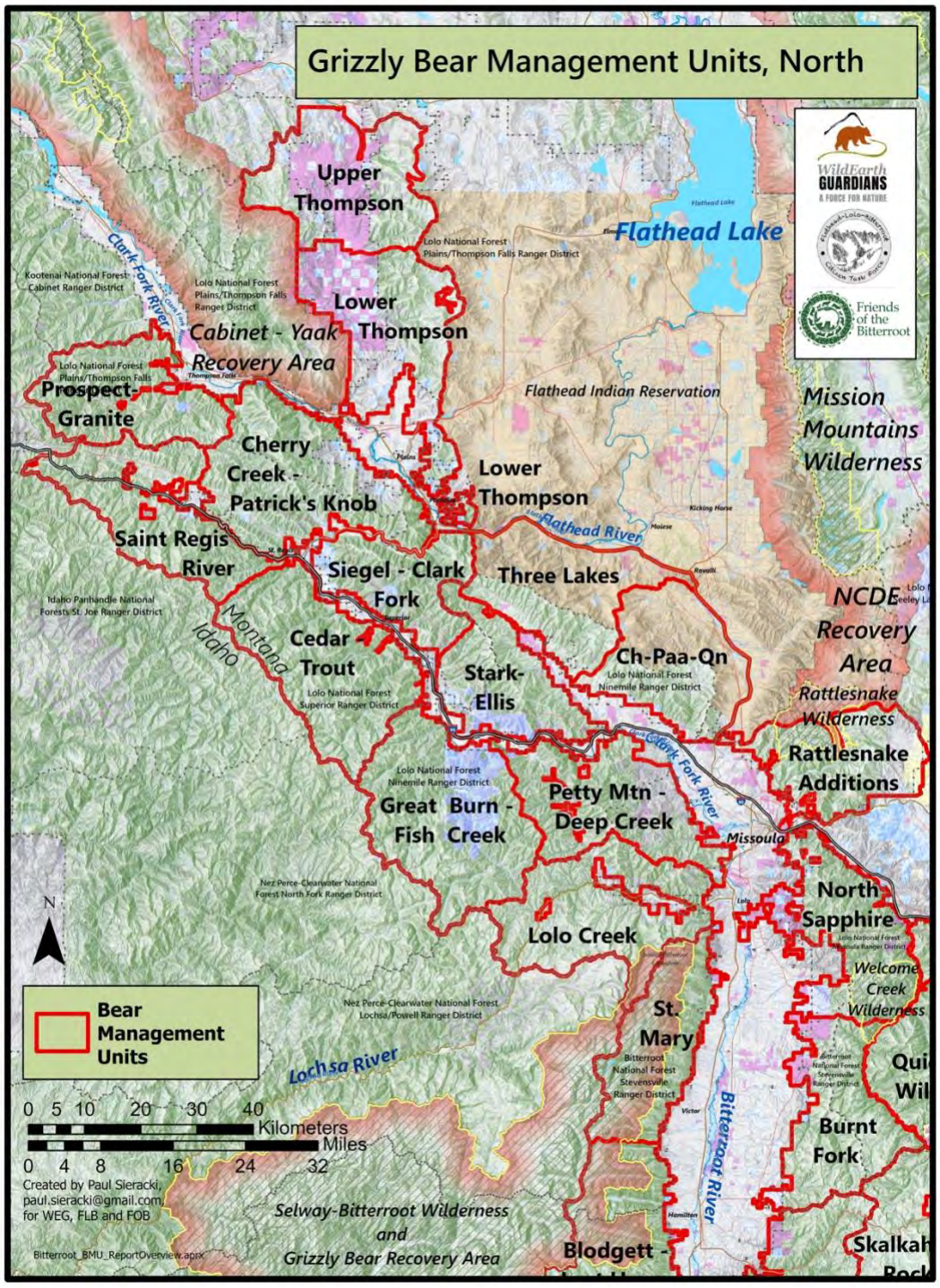

Figure 3. Proposed Bear Management Units, Lolo and Bitterroot National Forests.

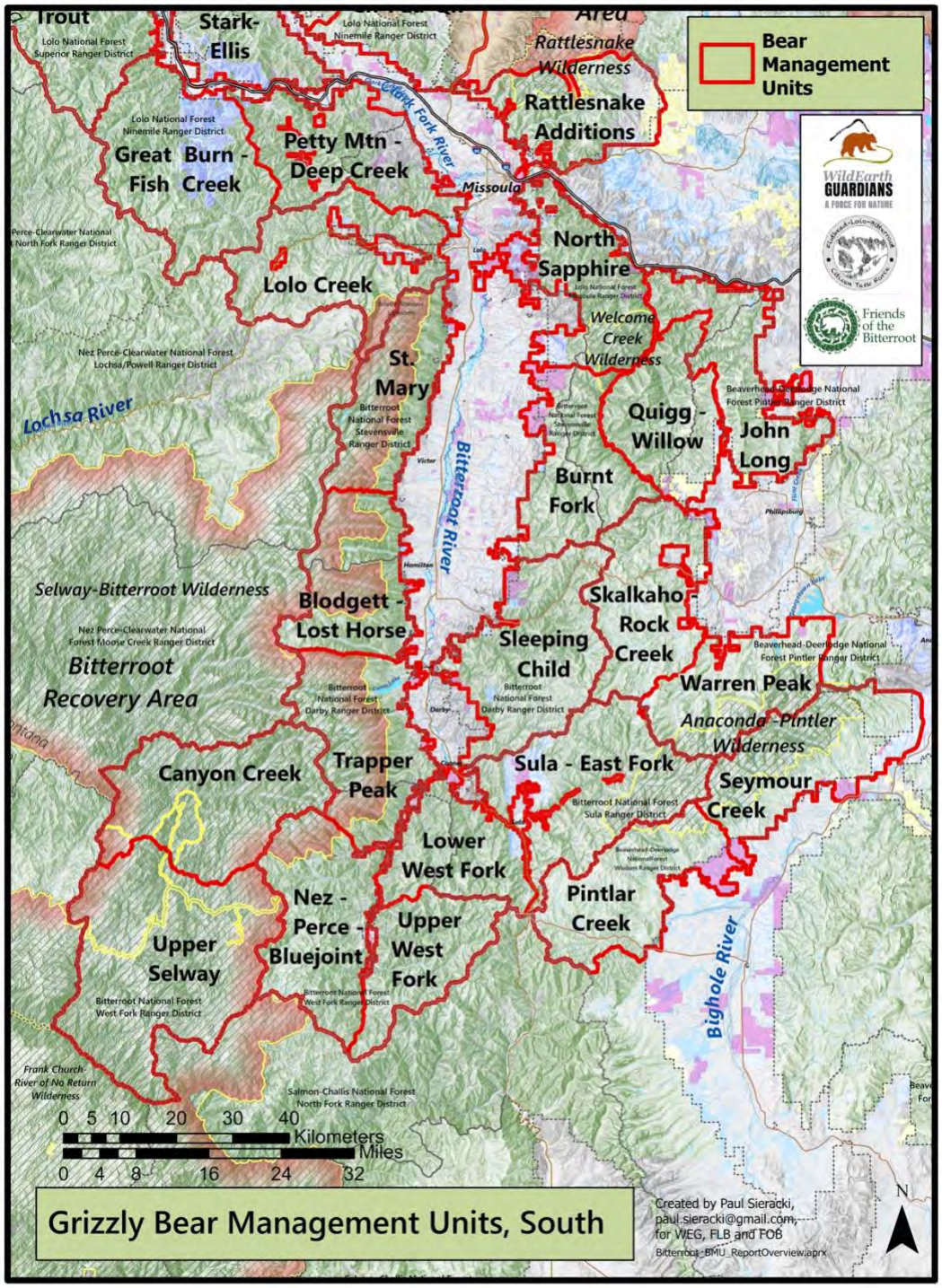

Figure 4. Proposed Grizzly Bear Management Units, Bitterroot, Beaverhead-Deerlodge and Lolo National Forests.

Table 1. Proposed Bear Management Units by Size and Management Agency.

Bear Management Unit	Acres	Square Miles	Square Kilometers	Hectares	Primary Management
Ch-Paa-Qn*	129,850	203	526	52,548	Lolo NF/FIR
Stark-Ellis*	104,927	164	425	42,462	Lolo NF
Three Lakes*	136,912	214	554	55,407	Lolo NF/FIR
Siegel-Clark Fork*	93,842	147	380	37,976	Lolo NF
Upper Thompson	151,197	236	612	61,187	Lolo NF/ Conservation Easements
Lower Thompson	170,139	266	689	68,853	Lolo NF/ MT State Lands
Cherry Creek - Patrick's Knob	184,884	289	748	74,820	Lolo NF
Saint Regis River	137,125	214	555	55,492	Lolo NF
Prospect-Granite	119,902	187	485	48,523	Lolo NF
Great Burn - Fish Creek	196,823	308	797	79,652	Lolo NF/MT State Lands
Cedar - Trout	174,636	273	707	70,673	Lolo NF
Petty Mtn - Deep Creek	137,642	215	557	55,702	Lolo NF
Lolo Creek	159,153	249	644	64,407	Lolo NF

Rattlesnake Additions	112,771	176	456	45,637	Lolo NF
St. Mary	118,312	185	479	47,879	Bitterroot NF
Blodgett - Lost Horse	125,825	197	509	50,920	Bitterroot NF
Trapper Peak	146,948	230	595	59,468	Bitterroot NF
Nez Perce - Bluejoint	153,695	240	622	62,198	Bitterroot NF
Upper Selway	280,173	438	1,134	113,382	Bitterroot NF
Canyon Creek	187,608	293	759	75,922	Bitterroot NF
Upper West Fork	102,672	160	416	41,550	Bitterroot NF
Lower West Fork	100,133	157	405	40,522	Bitterroot NF
Sula - East Fork	184,603	288	747	74,706	Bitterroot NF
Sleeping Child	170,433	266	690	68,972	Bitterroot NF
North Sapphire	134,370	210	544	54,378	Bitterroot NF
Burnt Fork	128,665	201	521	52,069	Bitterroot NF
John Long	123,936	194	502	50,155	Beaverhead-Deerlodge NF
Skalkaho - Rock Creek	136,026	213	551	55,048	Beaverhead-Deerlodge NF
Quigg - Willow	115,355	180	467	46,682	Lolo-Beaverhead-Deerlodge NFs
Warren Peak	123,422	193	500	49,947	Beaverhead-Deerlodge NF

Pintlar Creek	136,628	214	553	55,292	Beaverhead-Deerlodge NF
Seymour Creek	154,025	241	623	62,332	Beaverhead-Deerlodge NF
Totals: (n = 32)	**4,632,632**	**7241**	**18,752**	**1,874,581**	-
Range and Mean (n = 32)	**93,842-280,173** $\bar{x}$ **= 144,770**	**147-438** $\bar{x}$ **= 226**	**380-1,134** $\bar{x}$ **= 586**	**37,976-113,382** $\bar{x}$ **= 58,581**	-

*Ninemile Demographic Connectivity Area (designated in the Conservation Strategy for Grizzly Bears, USFWS 2018)

Discussion

It is advantageous for government management agencies, non-governmental organizations and academic institutions to agree on specific boundaries for BMUs. Having the same measurement units will aid land management planning, site-specific analyses, consultations and scientific research with results that can be interactive.

Moreover, identification of BMUs is a starting point for multi-resource evaluation of grizzly bear habitat outside of the Recovery Areas, which sets the stage for improved least-cost path analyses for female grizzly bears similar to Proctor et al. (2015). In addition to geographic area, each BMU can be assessed for total road and motorized route miles and densities, percent secure core habitat per BMU measured against the U.S. Forest Service (1995) definition of 68% and its spatial distribution as in Sieracki and Bader (2020), denning habitats (Bader and Sieracki 2022), spring ranges and so forth. These data can inform proposals for habitat protection and connectivity based on reductions in the road network, additional seasonal restrictions on motorized access and re-creation of additional secure core areas. This information would be particularly useful for grizzly bear recovery planning and National Forest Plan revisions, amendments and project-level analyses.

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