**Methods, Kaniksu Winter Recreation EA Soundscape Analysis**

By Paul Sieracki, Geospatial Analyst
under contract with Wild Earth Guardians

## Purpose

This project was designed to show real world and hypothetical examples of sound produced by on-trail and dispersed OSV recreation from snowmobiles and snowbikes in controversial areas within the Kaniksu Winter Recreation Project Area, Idaho Panhandle Forest, USFS Region 1. Impacts to wildlife can reduce energy conservation in winter months from stress and cause displacement to undisturbed areas resulting in increased mortality rates. There are three general categories of sound in the environment.- Geophony, Biophony, and Anthrophony.

Geophony refers to sounds that are naturally occurring in the environment, such as winds, thunder, streams, waves, and infrasounds (sounds that are below the frequency range of human hearing). These sounds are produced by non-living things in the environment.

Biophony refers to sounds produced by living organisms, such as bird and animal vocalizations. These sounds are often used by animals for communication or territorial purposes.

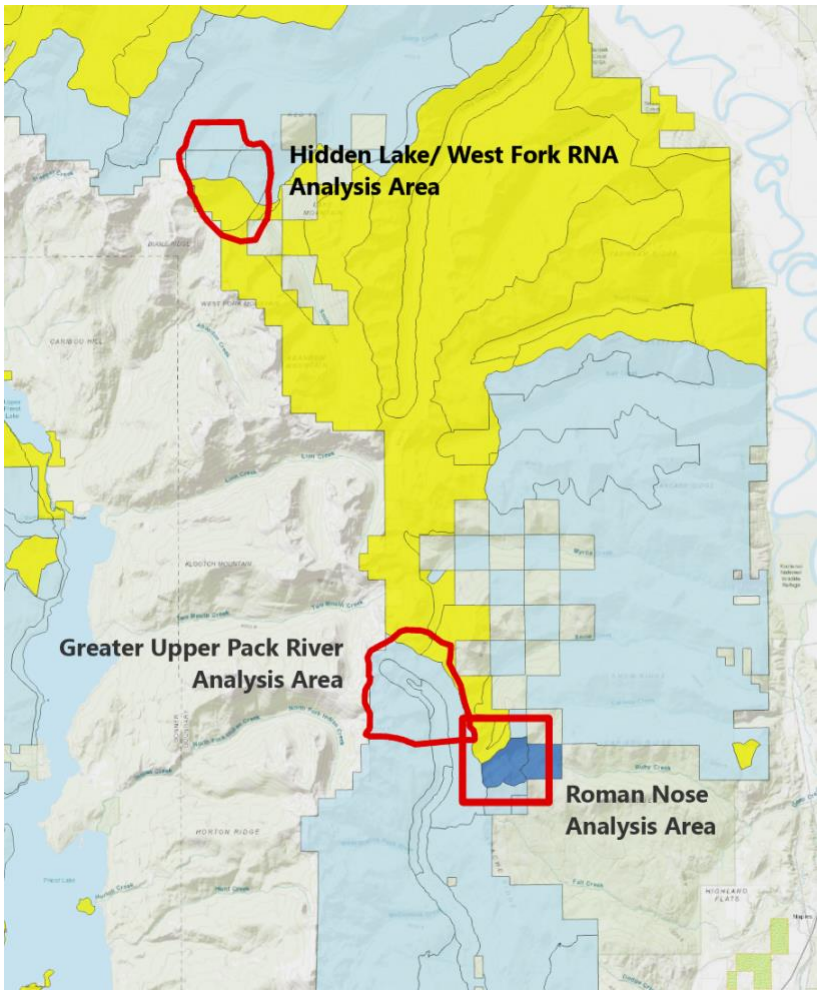
Anthrophony refers to sounds that are produced by human activities, such as cars, planes, music, and other human-made sounds. Animals can be affected by these sounds, and many animals have better hearing than humans. Sound disturbance caused by human activities can have negative effects on animals' behavior, communication, and survival.

We selected three species deemed sensitive to dispersed OSV recreation - grizzly bear, mountain goat and wolverine. The grizzly bear responds to OSV impacts to early emerging bears, females with cubs out of den, to denning bears from mechanized anthrophony and OSV triggered avalanches. Mountain goats are impacted by stress from OSV encounters and noise. Wolverines are sensitive to OSV use in maternal and primary habitats. There are also direct impacts to the ESA threatened whitebark pine, young saplings of other tree species and to many subniveal species. Bader and Sieracki (2022) authored the grizzly bear

denning suitability habitat surface, Idaho Fish and Game created the mountain goat suitability surface. The wolverine primary and maternal habitat raster was created by Region 1 of the USFS.

**Areas Selected for OSV Produced Anthrophony Analysis**

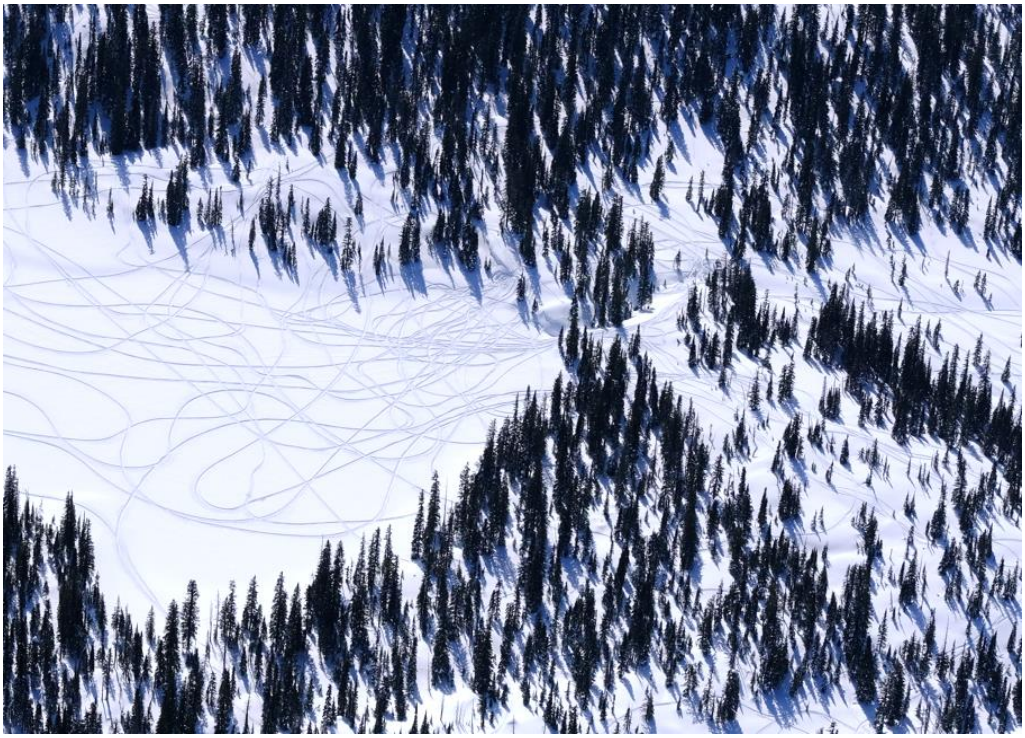
Three areas were selected for real world and hypothetical area analysis in the Selkirk Mountain portion of the Kaniksu Winter Recreation Project Area. These were selected based on the presence of high elevation wildlife, OSV trespass, controversial areas and the presence of OSV tracks documented in a March 19, 2023 flight of the project area by the Inland Empire Task Force and Wild Earth Guardians. The flight was sponsored by the nonprofit Lighthawk organization. These areas are called the  Greater Upper Pack River, Roman Nose and West Fork RNA/Hidden Lake Analysis Areas.  Analysis area boundaries are arbitrary, used for examples of soundscape analysis, and do not reflect quantitative habitat analysis of the selected species. The map to the right shows the location of the three analysis areas in relation to the Scoping Notice Map for the Winter Rec EA.




**Greater Upper Pack River**

This area has high wildlife value and there are OSV tracks documented up to Little Harrison Lake which formed the basis for a combination of documented and hypothetical OSV track sets. A short track was drawn into the Selkirk Recommended Wilderness to show the effects of mechanized anthrophony in

a closed area. This area was also favored and mapped by backcountry skiers for a Quiet Use area. Trespass OSV use was documented this past March from just north of Harrison Peak north to Two Mouth Lakes (see photo below).



**Roman Nose**

This area provides habitat for the three target species, grizzly bears, wolverine and mountain goats. The Forest Service proposes to allow cross-country OSV use from Nov. 1 - May 31 once it meets motorized access standards for grizzly bears. The Roman Nose analysis area overlaps slightly with the Upper Pack River area.

**Hidden Lake/West Fork RNA**

This area includes Hidden Lake, Joe Lake and West Fork RNA. A path was created through West Fork RNA, where OSV travel is prohibited to show impacts to a closed area. This area was also mapped for use by backcountry skiers as a Quiet area. This area has been traditionally violated by OSV users. The March Lighthawk flight documented tracks just south of the RNA at West Fork Lake and the surrounding forest.

## Software

The analysis was conducted in ArcMap  using Spread-GIS (Reed et al, 2009), final maps were created in Arcgis Pro.

## Process

Three analysis area polygons were created with boundaries on the far side of barrier ridges allowing for sound to potentially travel throughout the analysis area to a logical topological boundary. Trails were created imitating documented and possible off trail paths. Roads and hiking trails were followed where possible. Trail paths were drawn along with ridgelines as they are popular OSV travel routes.

Points were then created at a 125 m spacing. The Spread-GIS model was then run on these points as it does not work with polyline inputs. This is a very computational intensive model making closer spacing of points impractical on a PC. The image below shows the point spacing of a documented OSV path to Little Harrison Lake with conceptual paths imitating dispersed travel to the north of the lake. Sound modeling using 125m point spacing along the OSV paths somewhat underestimates sound dispersion because the points are not contiguous. To partially compensate for this, the trails were rasterized and assigned a decibel range between 65 to 75+ reflecting sound produced by OSV's. Rapidly accelerating OSV's produce up to 85 decibels. Figures 1 and 2 below show the point spacing with the rasterized OSV trail at Joe Lake.

Figure 1. 3D Point spacing with the rasterized OSV trail at Joe Lake

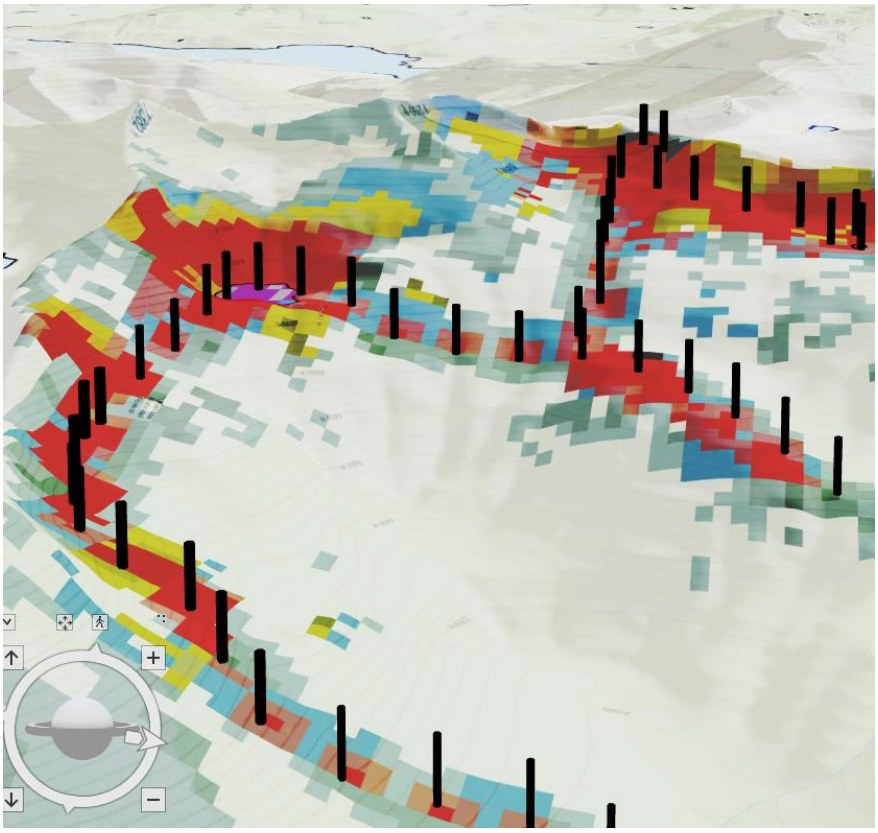
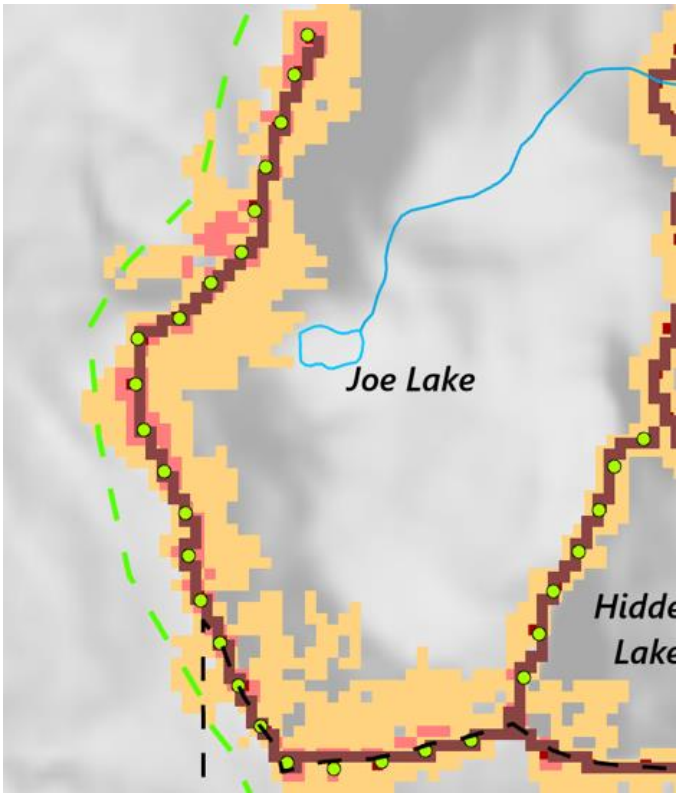


Figure 2. 2D Point spacing with the rasterized OSV trail at Joe Lake




**Parameters input into Spread-GIS**

The following weather parameters were selected based on averaged March 2002 weather at Schweitzer Ski area. Winds averaged 16.6 km/hour from 318 degrees, with temperature of -6.6 deg C and an estimated 50% humidity. Eight frequency ranges were used based on default values in Spread_GIS and the lack of information about what frequencies these species are most sensitive to. Spread-GIS can weight frequencies intensities based on human hearing or flat, with no weighting (Z value). The Z value parameter was used because the emphasis was on effects to wildlife and species specific frequency weightings are not known with the assumption that the target species can hear and respond to the basic input frequencies much better than humans can. Ambient levels and sound absorption levels are based on the National Landcover Database (Dewitz, J., 2021) using the default cover type absorption values in Spread-GIS.

The final model runs used the following inputs.

**Calm, Clear Winter Day**

C:\TestWind10RN\SoundMapping\toolbox
C:\TestWind10RN\RomanNose100Calm

C:\TestWind10RN\RomanNose125mpts.shp ORIG_SEQ "528822.342936195 5385536.43579585 532759.35081022 5389346.44341587" C:\TestWind10RN\dem_30m1.tif C:\TestWind10RN\nlcd_2019_111.tif C:\TestWind10RN\SoundMapping\toolbox\Sources\HarrisonSources\ATV2.src -6.6 50 318 0 "clear, calm winter day"

**Windy, Clear Winter Day**

Executing: spreadgis C:\TestWind10RN\SoundMapping\toolbox C:\TestWind10RN\RomanNose100 C:\TestWind10RN\RomanNose125mpts.shp ORIG_SEQ "528822.342936195 5385536.43579585 532759.35081022 5389346.44341587" C:\TestWind10RN\dem_30m1.tif C:\TestWind10RN\nlcd_2019_111.tif C:\TestWind10RN\SoundMapping\toolbox\Sources\HarrisonSources\ATV2.src -6.6 50 318 16.6 "clear, windy winter day" "points & frequencies" C:\TestWind10RN\ambient\ambient02000 YES Z-flat