

Frank Church-River of No Return Wilderness Campsite Impact Monitoring, 1978-2019

Final Project Report
2022

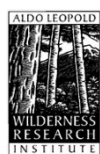


Photo courtesy Wilderness Connect (Cavan Fitzsimmons)

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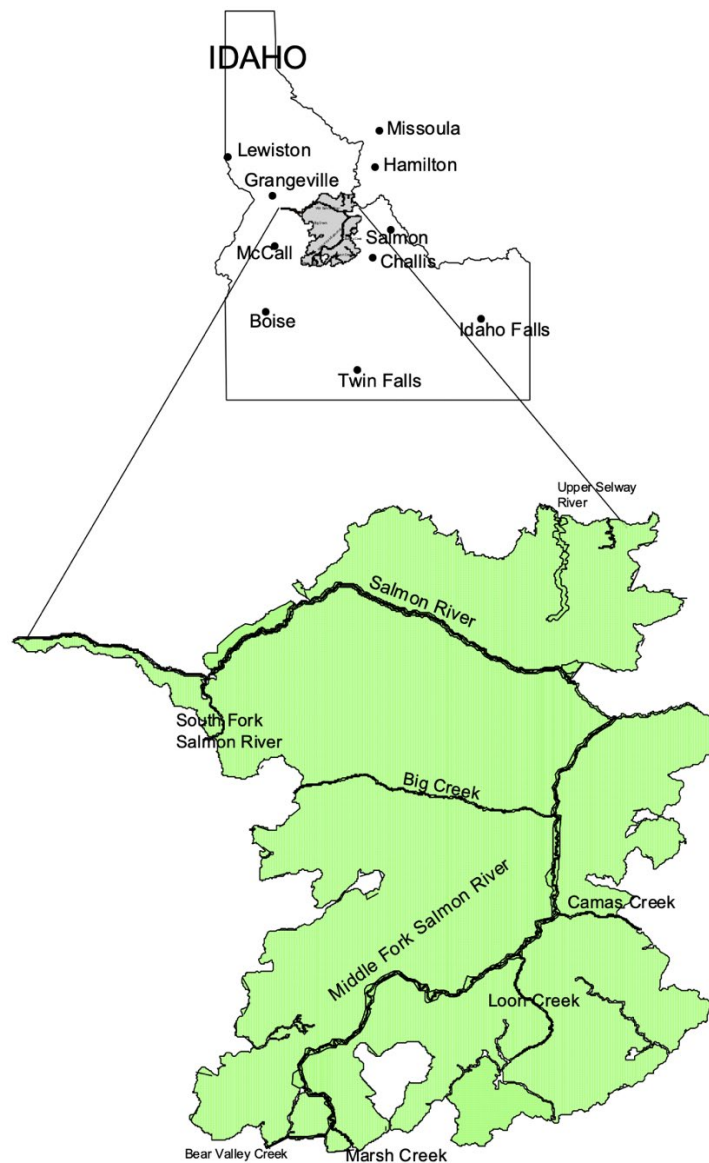
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Background

The Frank Church-River of No Return Wilderness (FC-RONRW) covers 2.4 million acres in central Idaho. Designated by Congress in 1980, the FC-RONRW is administered by four National Forests (Salmon-Challis NF, Payette NF, Nez Perce-Clearwater NF, Bitterroot NF). As in all designated Wilderness, recreation is a fundamental part of the landscape. “The Frank” offers vast opportunities for hiking, camping, hunting, fishing and swimming among its trails, rivers, and lakes. Jagged mountains spread out in all directions, topping out over 10,000 feet in the Bighorn Crag area. This arid land is covered by forests of fir, pine, and spruce. Below, the Middle Fork and the Main Salmon River carve canyons thousands of feet deep.



Map courtesy “A User’s Guide Frank Church–River of No Return Wilderness” USFS (2001)

Over the past forty years, formal and informal campsites (whether by the Forest Service or by users themselves) have been established, and sometimes, left to fade away. Systematic monitoring of these campsites – among other Wilderness resources—is mandated by the Wilderness Act of 1964, the National Environmental Policy Act of 1969, Central Idaho Wilderness Act and the FC-RONR Wilderness Plan.

In the FC-RONRW, campsite conditions have been monitored for over forty years; however, these data have never been compiled in a single database, making it challenging to analyze long-term trends across the entire area. Further, two tools have been used to assess campsite condition – the Frissell Condition Class and Modified-Cole Campsite Index. In general, campsite assessment is an evaluative process performed by technicians on the ground. Campsites are judged by the amount of human-caused degradation, such as tree scars, social trails, fire rings, and barren ground. While both result in a score from 1-5, the Frissell approach requires technicians to make subjective evaluations of variables in concert (which can often be done quickly), while the Cole method requires quantitative measurements of individual variables, summed at the end to arrive at a final score.

The purpose of this project was to compile all known sources of FC-RONRW campsite inventory data into one dataset, clean the data to address inconsistencies (i.e., in naming conventions, variables recorded), and perform initial trend analysis. In this report, we present the analysis performed to date. Further, the compiled and cleaned dataset provides a foundation for the addition of future data and analyses.

Methods

The researchers requested campsite inventory data from each of the FC-RONRW forests, and obtained records (paper and/or digitized) from the following ranger districts:

- Krassel RD of the Payette NF
- Middle Fork RD and North Fork RD of the Salmon-Challis NF
- West Fork RD of the Bitterroot NF

A representative subset of the data was then used to establish a standard set of variables to be captured in the master datasheet and an associated codebook (see Armatas et al. (2025) for the data archive and full details). This process accounted for the variations in what data (i.e., different variables) were collected through the years and in different districts; we retained those variables that were both common throughout the years and across districts, and considered most important to managers for future monitoring and campsite analysis.

Next, data were manually entered. The first batch entered were digital files existing on collected hard drives. After copying over data to the master sheet, several of the variables had to be coded according to the codebook. For instance, an entry that reported that 75% of a campsite was vegetated would receive a “3” in the column “M_vegprop.” Over the course of

several months, all the data were entered and coded. Further, river sites were identified and segregated from upland sites, with support from USFS managers. In conversations with USFS managers, it was clear that campsites along the river corridors must be treated as a distinct subset of data – this is due to the unique user groups on the rivers and the management of these Wild and Scenic Rivers (i.e., permit systems).

The newly established dataset had two clear limitations: 1) Inconsistent campsite naming conventions (i.e., different ID systems used across districts and years); and 2) Lack of GPS coordinates for many campsite entries. To address these limitations, we used both simple excel sorting features, and statistical analysis software. Specifically, *R* statistical program was used to identify mismatch naming conventions, locate missing data and possible data entry errors, as well as leverage location data to correct for errors where possible. Annex 1 provides a list of steps used to further clean the data in *R*.

Results

After data cleaning, a total of 3481 data points were retained in the master datasheet. Of these, 87% (n=3041) represented assessments of upland sites and 13% (n=440) river sites. To evaluate trends, a subset of 2177 points was defined, including only campsites which had been monitored more than once. Of these, 83% (n=1808) were upland sites and 17% (n=369) river sites. Monitoring effort in each ranger district has varied over the years, as represented in Figure 1. Based on the data made available for this study, monitoring effort appears to have been strongest in the Middle Fork RD, especially in the early 1990s. The Krassell RD had four distinct monitoring campaigns, most recently in the mid 2010s. The North Fork and West Fork RDs contributed less to the dataset overall, but data from these districts is relatively new.

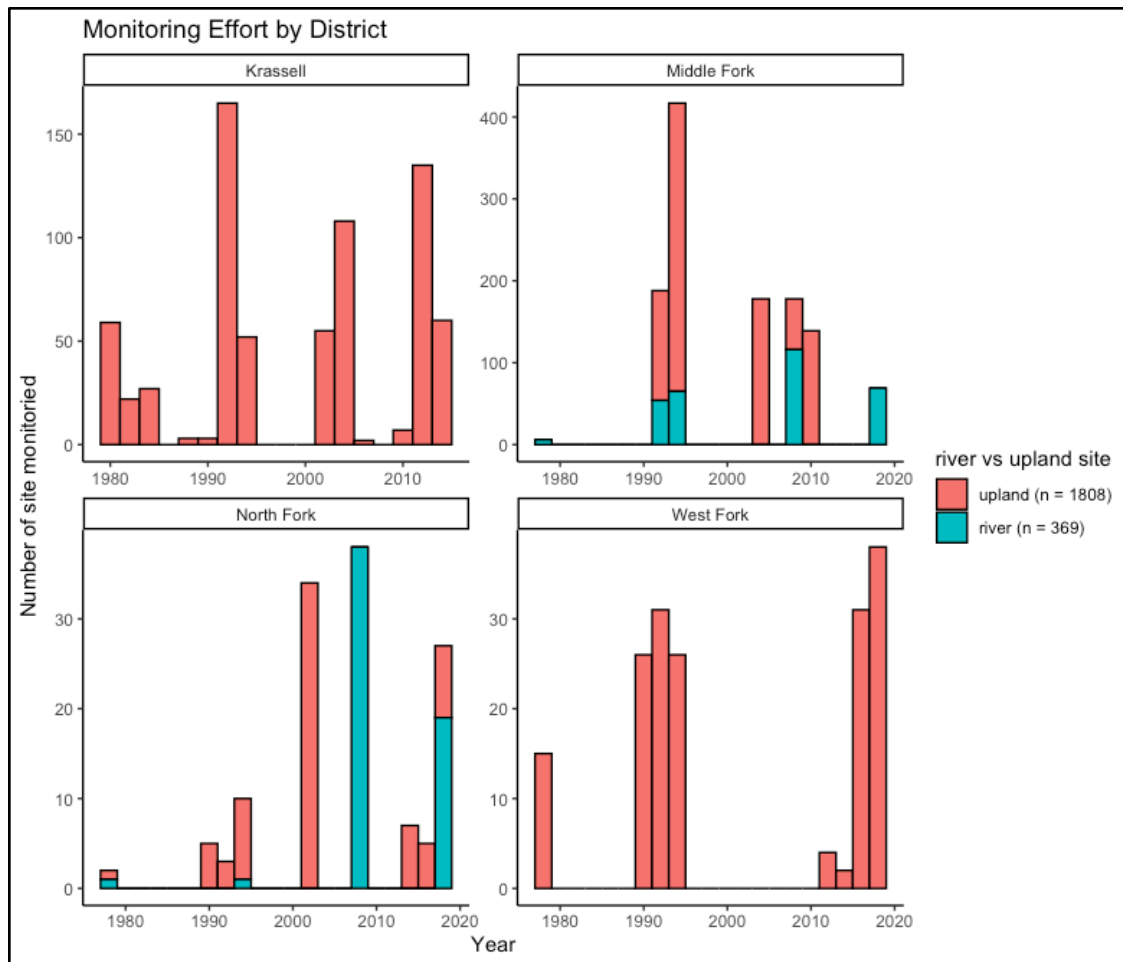


Figure 1. Monitoring effort in each district, over time (note scale differences across subplots).

Frissell-Cole Correlation

In part, this study aimed to understand the potential to ‘crosswalk’ Frissell campsite condition scores with Cole campsite condition scores. There were 190 entries with both Frissell and Cole scores reported (121 river sites and 69 upland sites). The overall correlation coefficient for these sites was 0.76. For river sites only, the correlation coefficient was equal to 0.80 and for upland sites 0.66. Evidently, the Frissell and Cole methods yield relatively similar scores, especially for river sites. Given this close correlation, managers can cautiously ‘crosswalk’ Frissell and Cole scores when considering long-term trends and comparing sites.

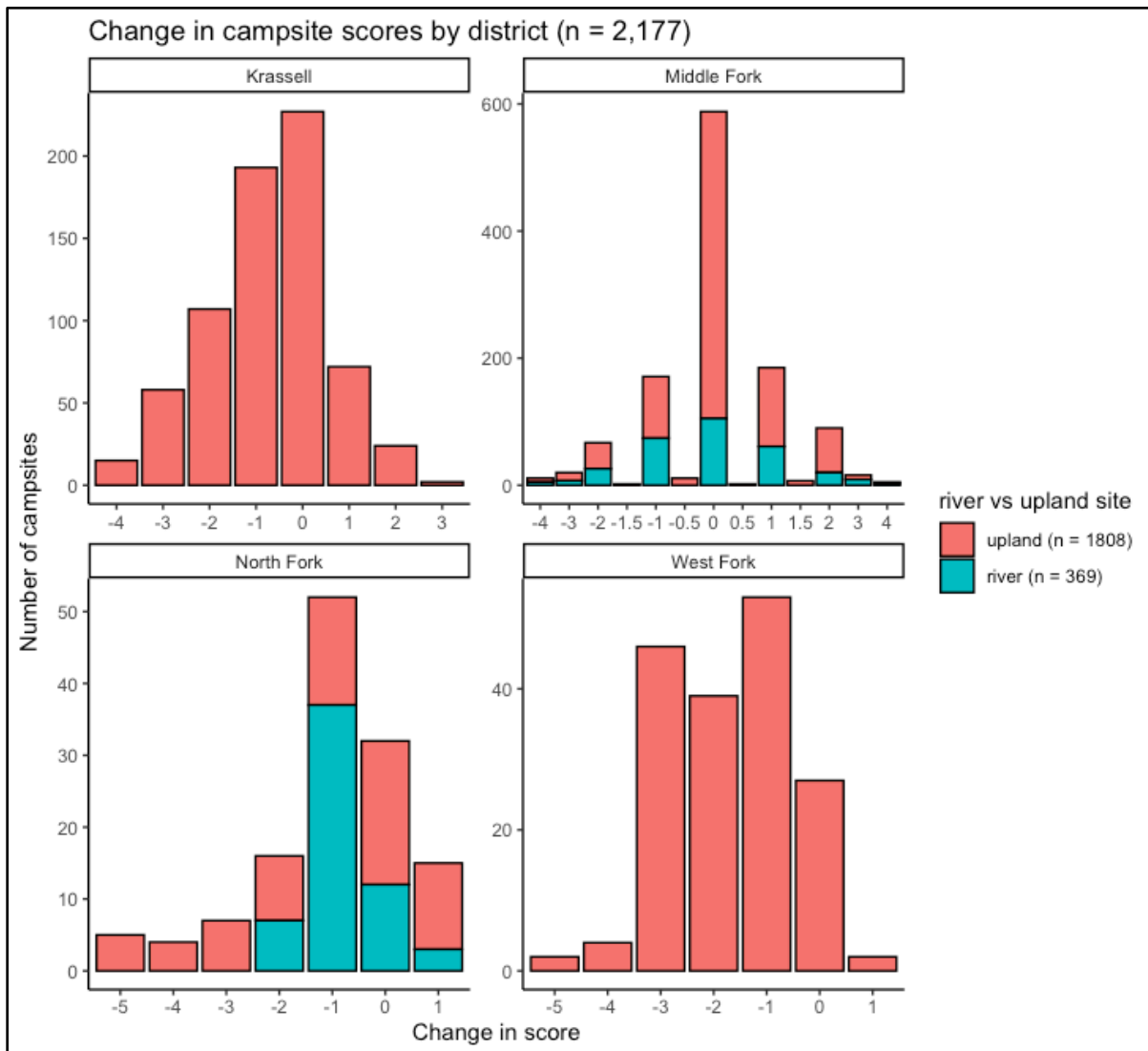


Figure 2. Change in campsite score by district.

Figure 2 summarizes the change in campsite score, or the difference between a site's first score (regardless of year) and its most recent score. Positive changes indicate an increase in Frissell or Cole scores (that is, more degraded). Negative change values indicate a decrease in score (condition improvements). This figure shows change in campsite score for each district with more than one assessment (2177 campsites). In the Middle Fork and North Fork RDs, river sites are identified in blue and upland sites in red. The data demonstrates that campsite condition has significantly improved in the Krassell, North Fork, and West Fork RDs. Conditions in the Middle Fork have generally stayed constant over time. At this scale of analysis, there is no indication that campsites are more degraded now than in earlier years. However, there are, of course, individual sites where this is not the case (e.g., popular Middle Fork rivers sites such as Pungo Creek, Grassy II, and Upper Jackass). Figure 3 illustrates this general decline in campsite scores across years, broadly suggesting that campsites in the FC-RONRW have experienced lesser impacts recently. Each point represents the mean score for all sites for the year. If a score

using the Cole method was available, that value was used; otherwise, Frissell scores were included in the calculation. Substituting Frissell scores for Cole scores was justified by the two methods' relatively high correlation coefficient. At the general level of the entire FC-RONRW, upland sites appear to be recovering from impacts more dramatically (by an average of approximately 1.5 points on the 5-point scale) than river sites (approximately 0.5 points).

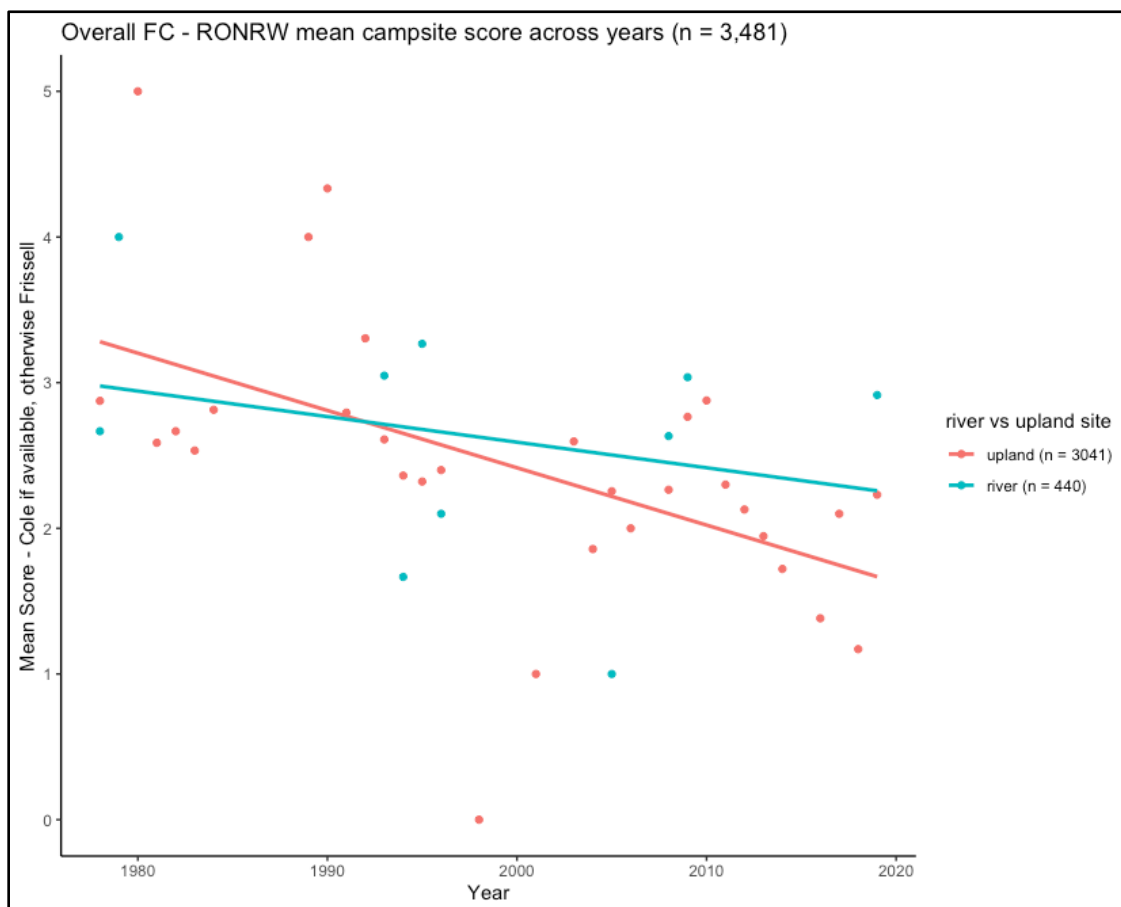


Figure 3. Overall mean campsite scores across years, with river and upland sites separated.

As Figure 4 illustrates, impact scores have decreased at the fastest rates in the West Fork and Krassell RDs, and in upland sites in the North Fork RD; but have decreased just moderately in the Middle Fork RD.

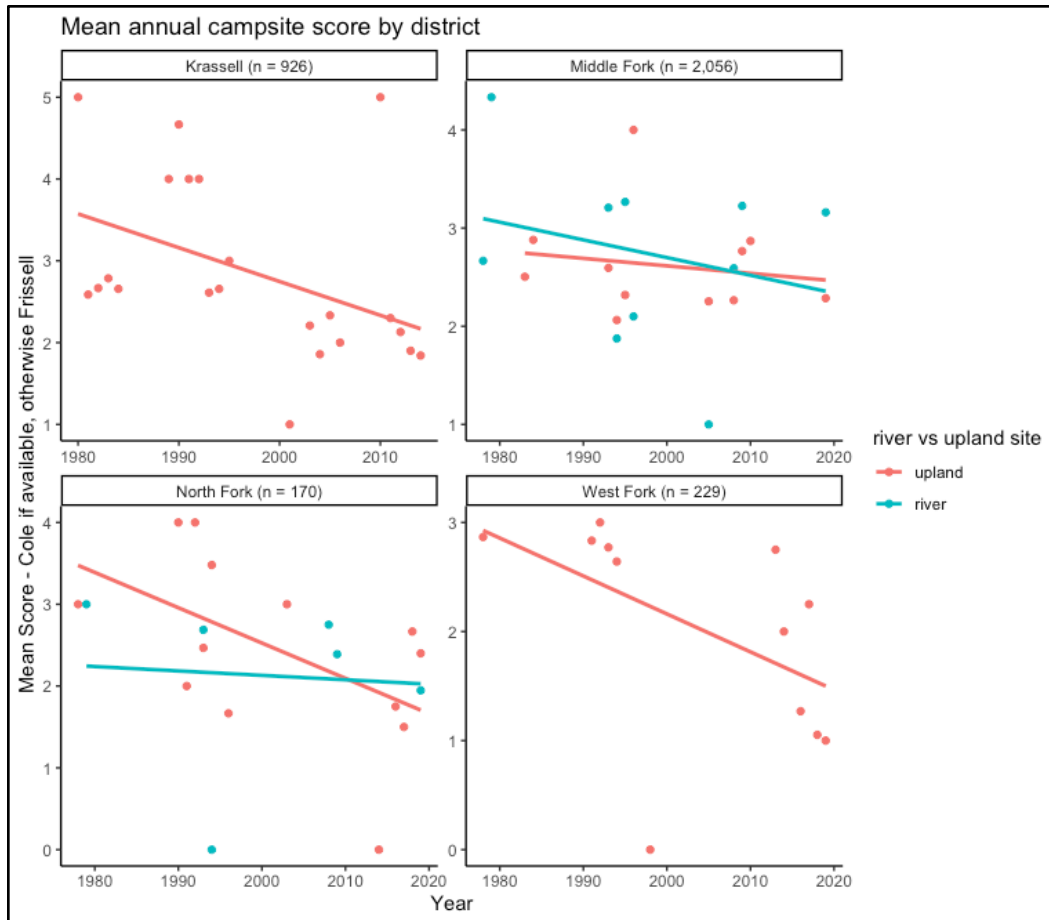


Figure 4. Mean campsite scores across years, by district, with river and upland sites separated.

Maps

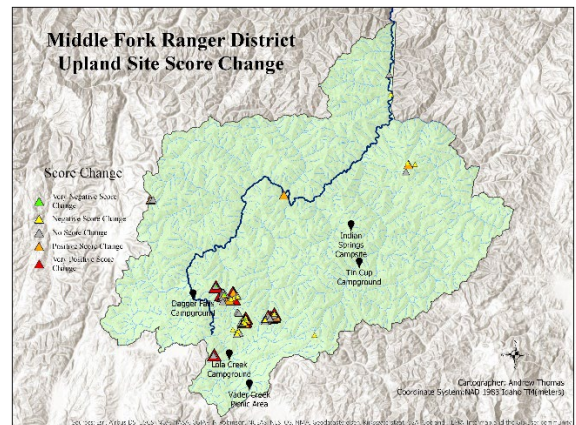
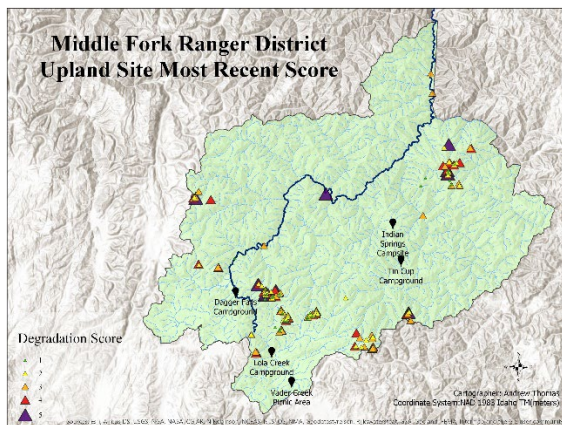
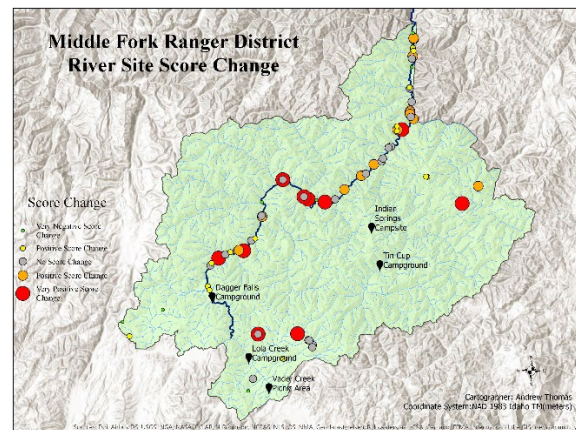
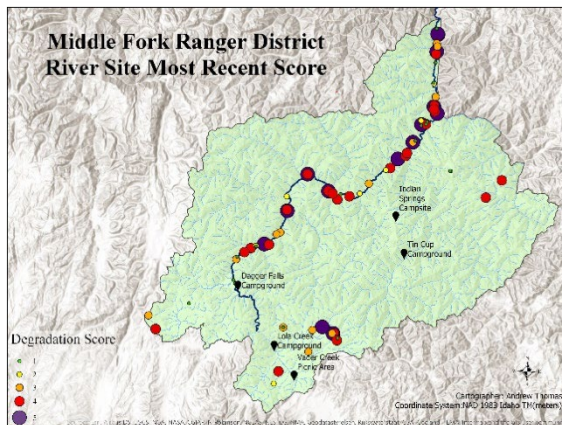
The following maps were produced to illustrate two important metrics: (1) the score change for upland and river sites in each district; and (2) the most recent score recorded for each of these sites. The 'Score Change' metric mirrors the data plotted above, now applied to the geographic context. Note that score change maps only include sites with more than one data point. The 'Most Recent Score' metric adds a visual indication of where management interventions may be most needed (i.e., campsite rehabilitation), based on the latest available inventories. Again, these data are plotted separately for upland and river sites, recognizing the different management objectives and visitation patterns for each. In all cases, upland sites are represented by triangles and river sites by circles. The most recent condition class ("degradation scores") from 1-5 are scaled by icon size and color-coded. Similarly, score change direction and magnitude are scaled by size and color-coded:

- Small green circles (very negative score change) indicate conditions improving by 2 or more points from the site's first score to its most recent score.
- Small yellow circles (negative score change) indicate improvements by up to 2 points.

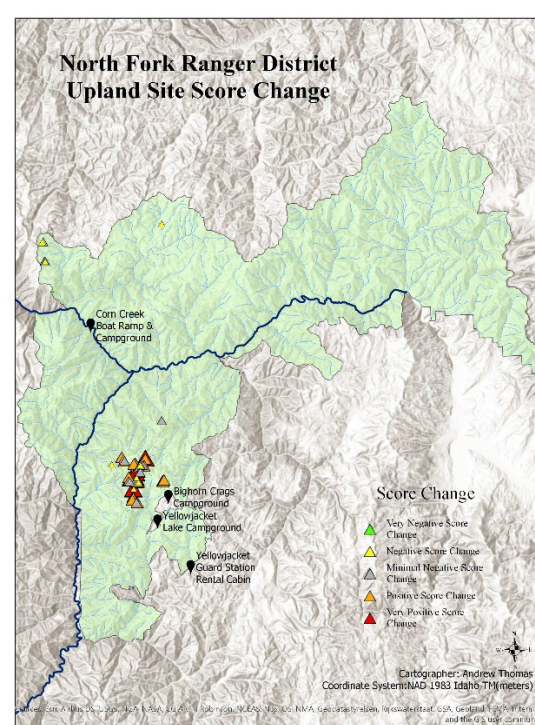
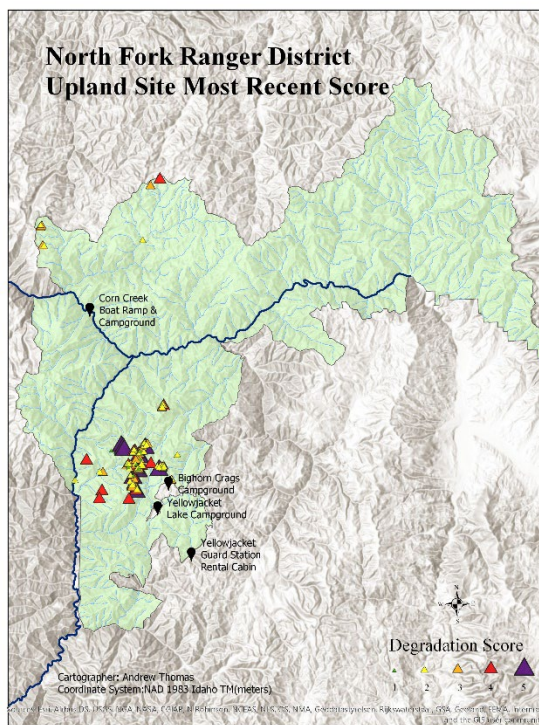
- Grey circles (no score change) indicate a value of zero.
- Medium orange circles (positive score change) indicate a campsite degradation by up to 2 points.
- Large red circles (very positive score change) indicate campsite degradation by 2 or more points.

Full size maps are included in Annex 2. Maps are not available for the Krassell RD as insufficient data included geographic coordinates.

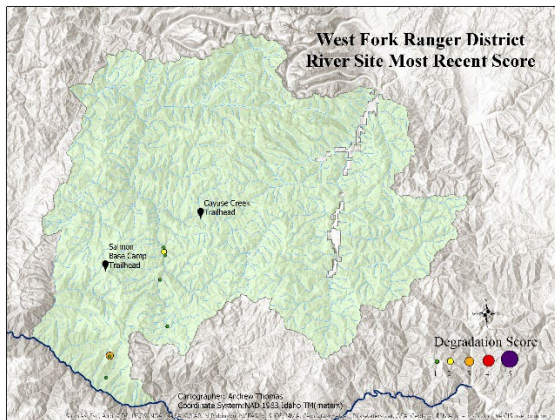
Middle Fork Ranger District



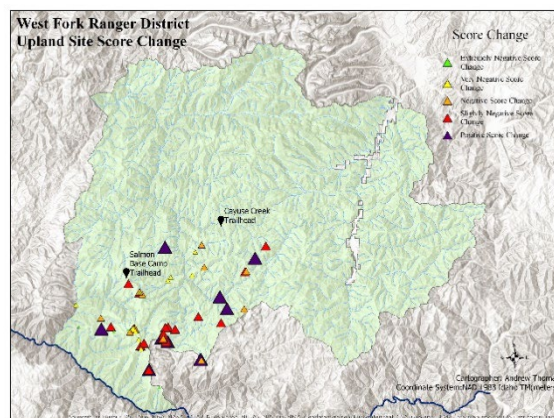
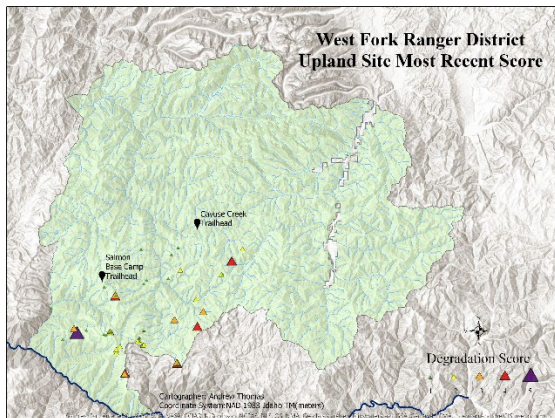
North Fork Ranger District



West Fork Ranger District



Note: Insufficient data was available to map river site score changes



Discussion and Conclusions

This project lends new insights into the change of campsite conditions over time in the FC-RONRW and best practices for campsite monitoring and data management in the Wilderness. Based on preliminary analyses of over 3000 campsite assessments, this study found that campsites in The Frank are generally in better condition than a few decades ago. In all districts with available data, upland and river sites are, on average, becoming less degraded. Importantly, upland sites have improved more swiftly than river sites.

Changes in recreation practices in the FC-RONRW may be responsible for some of these trends. Anecdotally, there are fewer recreationists in the interior now than in decades past; according to managers, worsening trail conditions due to fire, insects and disease, and a backlog of trail maintenance are among the drivers of decreased backcountry use in the Frank. In particular, these changes in conditions have led to challenges in access by people with stock, which may be a driving factor in improved campsite conditions (as stock impacts such as pawing and soil erosion have declined). Further, Leave No Trace backcountry ethics have become mainstream, with campers becoming more conscious of their impacts to the land and aware of strategies for mitigating them (i.e., packing out waste; scattering fire rings). Natural processes may also play a role in campsite condition. For instance, in the arid interior of the FC-RONRW, wildfires are prevalent. It's highly probable that a subset of campsites identified as 'Not a Site' on Cole and Frissell inventories (and therefore recorded as a zero), were wiped out by wildfires in the intervening years since their previous inventory. On the other hand, river sites in the Wilderness appear to be more consistent in their condition, hovering between 2 and 3 on the Cole and Frissell scales (moderate impacts). This stability may be due to the strict management of these sites through permit systems. Each season, a predictable number of users visits these campsites; their impacts are significant, but more closely monitored by USFS managers.

This project encountered significant challenges in the realm of data management. Over forty years of data provides the potential for a variety of analyses, but the compiled dataset has several limitations that, if addressed in the future, could lead to more analytic possibilities. First, the campsite inventory data is sporadic, with monitoring efforts varying by place and time, with particular ranger districts capitalizing on resources (i.e., funding and personnel) when they were available, and effort waning for years at a time when resources were less available. Sending rangers and other personnel to these remote locations is time and resource-intensive, which underscores the challenge of consistent monitoring. Even when data was available, inconsistent data collection and entry methods made analysis difficult, and in some cases led to observations being omitted from analysis. There is high value in standardizing naming conventions across all jurisdictions in the Wilderness, with inclusion of GPS coordinates.

There are challenges associated with recovering and processing older data, but this project and the associated data set highlight opportunities and lessons for future data collection:

- First, there may be potential to add to the current dataset with the discovery of more data; it is possible that other data exists, and hopefully this report can illuminate where gaps exist.

- Second, the existing dataset can be refined, with existing observations in the dataset being revised to include updated and consistent campsite names, with associated geographic coordinates; we were told a book of maps exists that helps to clarify campsite names and locations.
- Third, other opportunities include creation of interactive maps and other products to translate the tabular data into directly useful management tools. Campsite maps could also be combined with other datasets, including fire history and recreation use patterns to help support the findings herein. For example, if managers are using the campsite monitoring protocol laid out by Lang (2019), then additional data can be added to the data set developed during this project, as many of the variables in the developed data set align with those to be collected proposed by Lang (2019).

In summary, this project compiled all known campsite inventory data from the FC-RONRW and used a standardized codebook to create the most comprehensive dataset to date. Preliminary analyses confirmed that campsites are generally trending towards recovery after several decades of heavy use. Nonetheless, there are particular areas of the Wilderness where campsite impacts remain high (see maps throughout this report), especially along the river corridors. Data management was a challenge for monitoring efforts from 1978 to 2019, but there are tools to improve these processes, especially with the widespread use of modern technology. Further expansion of this dataset will allow managers to continue effectively monitoring campsites in the FC-RONRW, and ensure that desirable trends persist.

Reference:

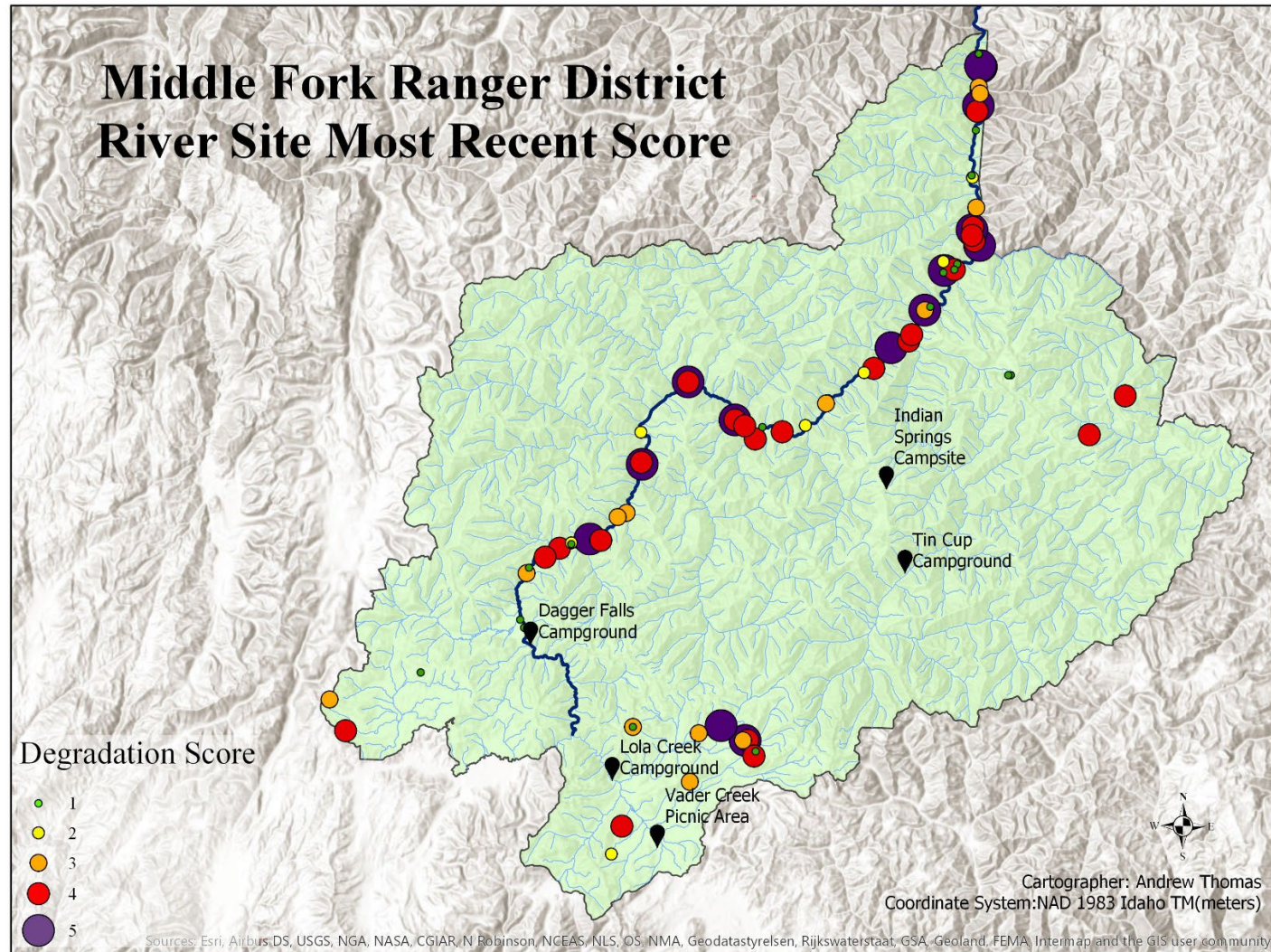
Lang, T. 2019. The Frank Church – River of No Return Wilderness Ranger Monitoring Guidebook. Prepared for the USFS by Tom Lang with the Selway-Bitterroot Frank Church Foundation.

Annex 1. Methods to address limitations of dataset, and potential for future improvements.

- 1) We created a new column called 'score' to record a Cole if it was available, otherwise recording Frissell.
- 2) 50 campsites entries without an impact score were removed
- 3) 4 entries without campsite IDs were removed
- 4) 32 entries without a year were removed
- 5) After removing these missing data and before cleaning, there are 2,174 uniquely named campsites.
- 6) We explored sites that had the same locations but different names and renamed sites to have the same name if they had the same location.
 - a. This approach was conducted under the assumption that campsites with different names across different years, at the same location, were the same campsite.
 - b. Note there were 518 unique locations and 1,137 observations with recorded locations out of all observations.
- 7) Using locations to identify possible mismatched campsite names identified a second problem as there were correctly identified unique sites with the same locations that were, in fact different campsites.
- 8) To account for this problem, we manually reviewed sites that had the same location, but were clearly different sites
 - a. To determine different sites that had the same locations, we looked for similar naming conventions across years and corrected the names for these sites.
- 9) After correcting for naming and locations, we found that some sites were visited multiple times in a single year. For sites with differing scores in the same year, we took the average between the scores.
- 10) After accounting for all corrections, there are 2,114 unique sites that were visited between 1 and 6 times. This means that we corrected for 60 sites that had different names.
- 11) We then calculated a change in campsite score across years by subtracting the score recorded from the first year a site was visited from the score recorded from the most recent year a site was visited.

Note that after our preliminary analysis was complete, it came to our attention that many campsites missing GPS coordinates (especially earlier inventories in the Salmon-Challis NF) were located using markers on print-outs of the USGS quad maps. These printed maps were preserved in a large flip deck and digitized by the Forest's Wilderness & Rivers Program Manager.

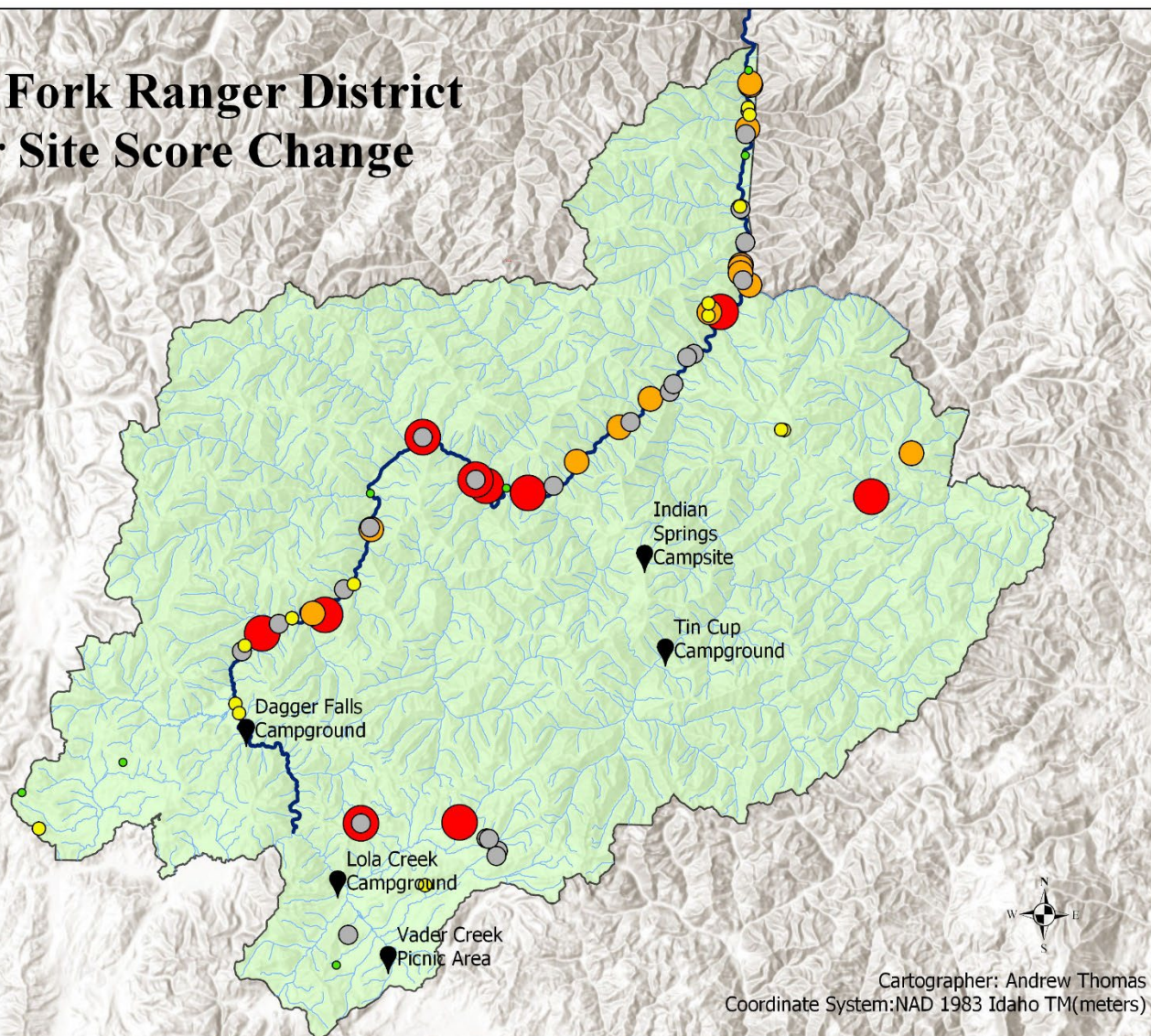
Annex 2. Full-size maps



Middle Fork Ranger District River Site Score Change

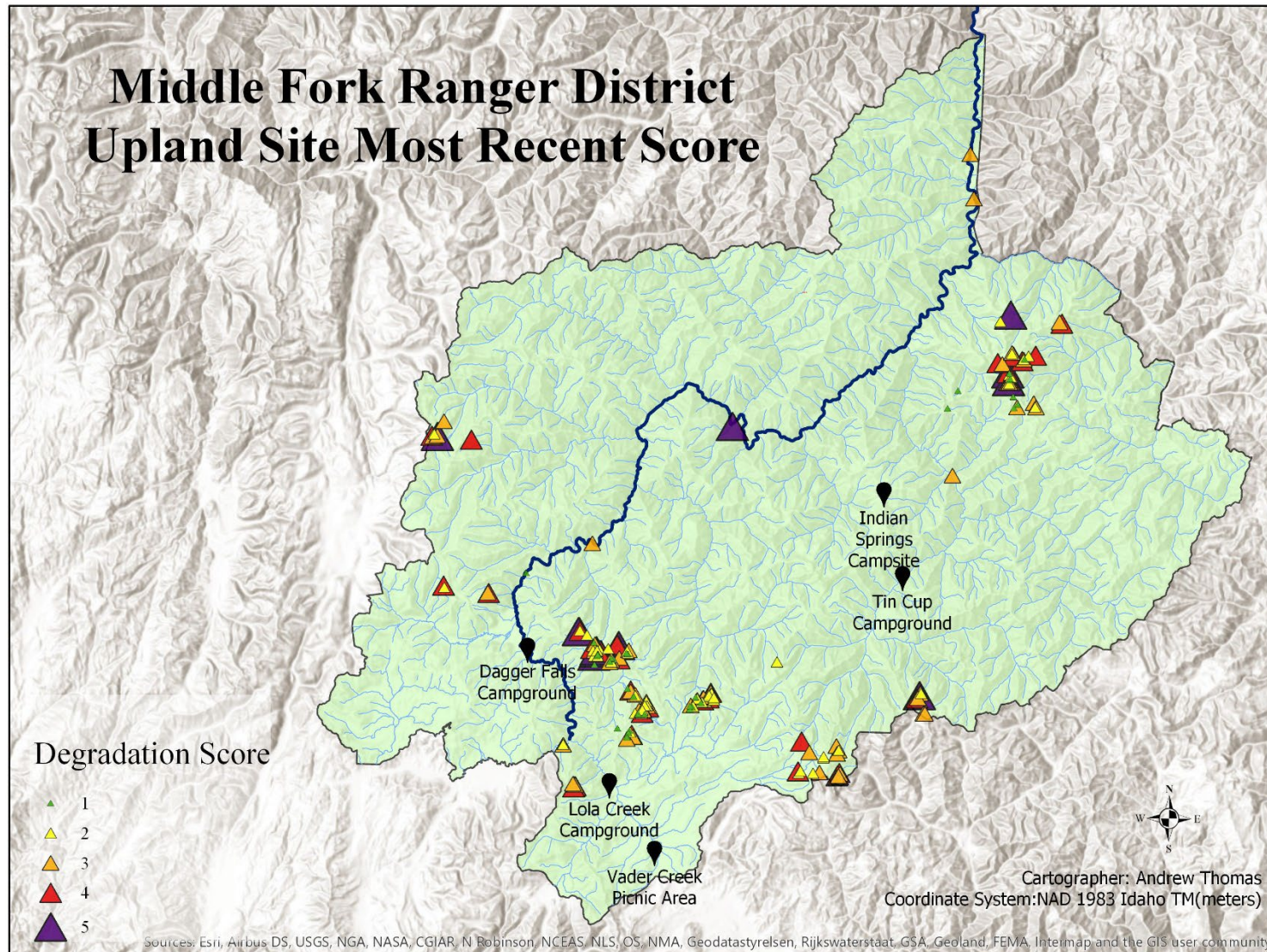
Score Change

- Very Negative Score Change
- Positive Score Change
- No Score Change
- Positive Score Change
- Very Positive Score Change



Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

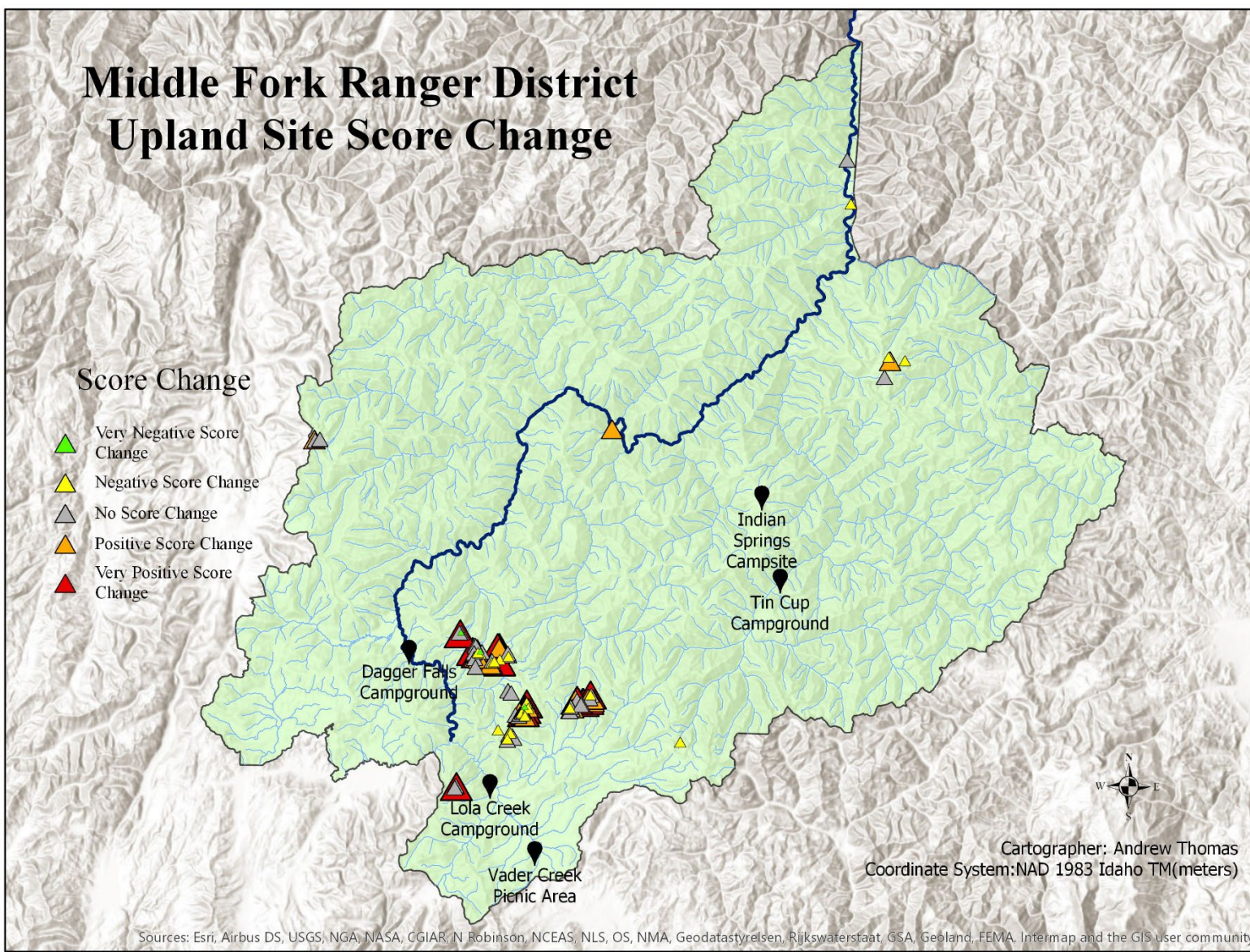
Middle Fork Ranger District Upland Site Most Recent Score

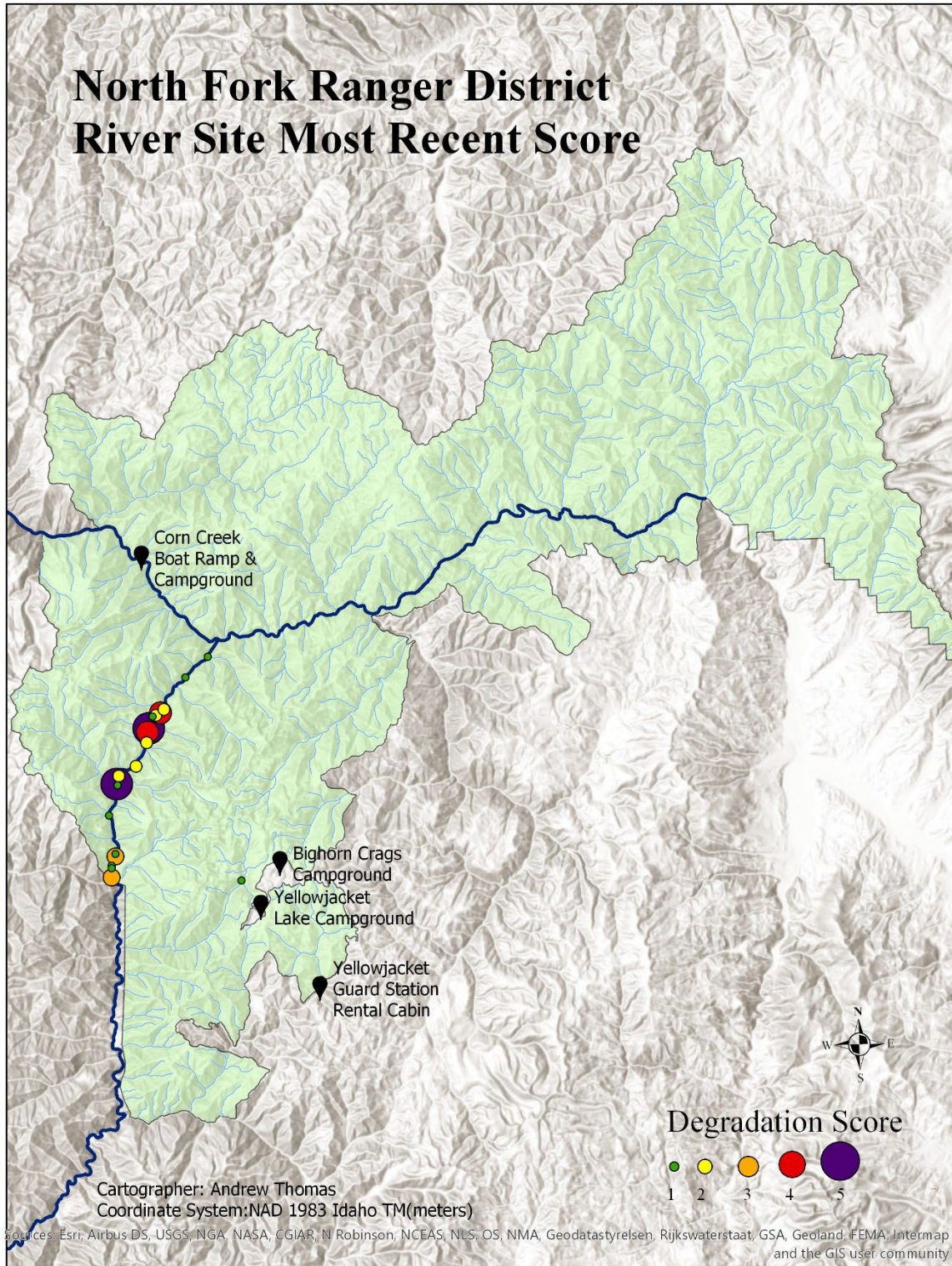


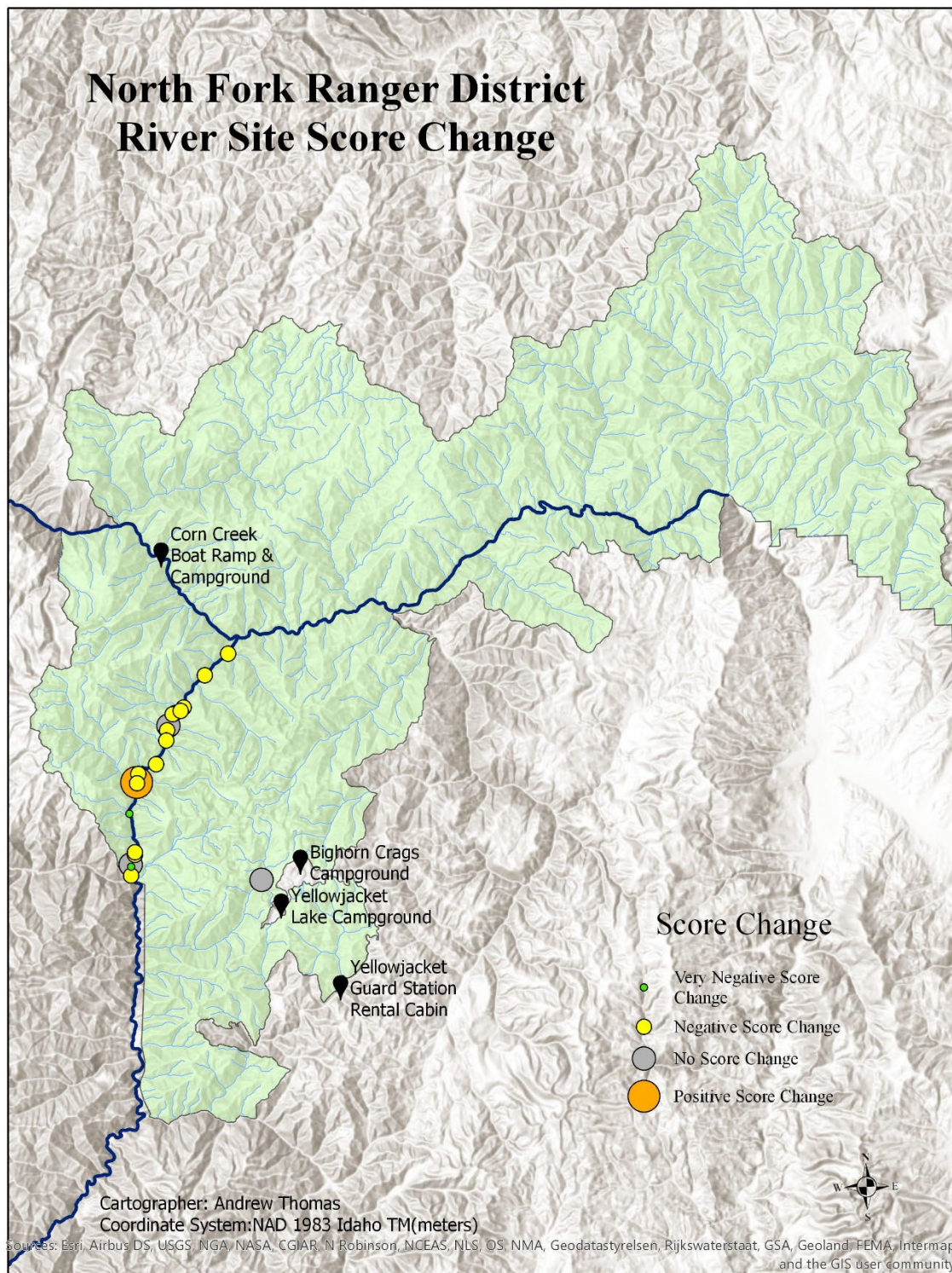
Middle Fork Ranger District Upland Site Score Change

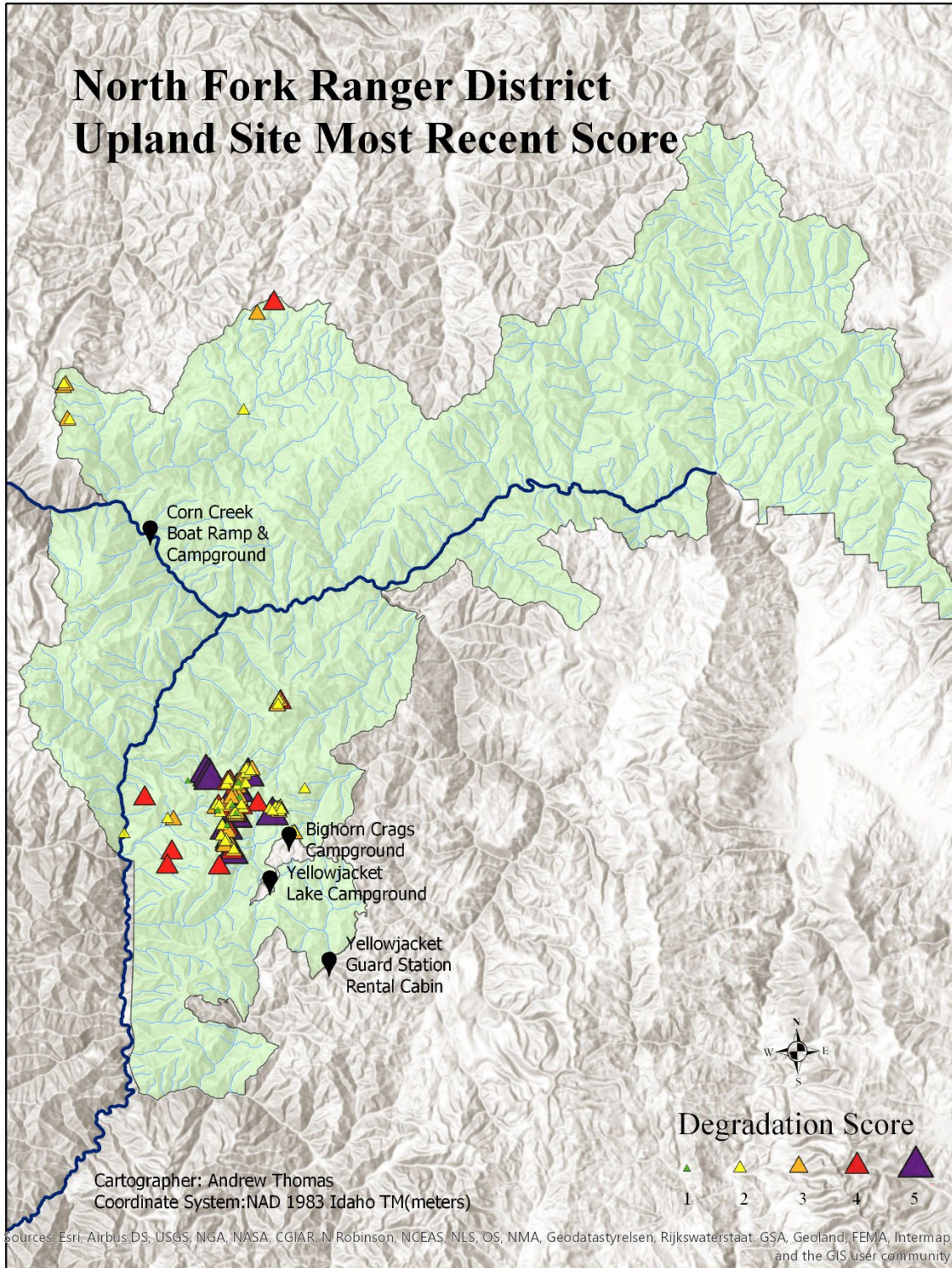
Score Change

- ▲ Very Negative Score Change
- ▲ Negative Score Change
- ▲ No Score Change
- ▲ Positive Score Change
- ▲ Very Positive Score Change









North Fork Ranger District Upland Site Score Change

