USDA

United States Department of Agriculture

Citizen Science Project Plan

The Boise Forest Coalition

Emmett Ranger District, Boise National Forest

Photo of Citizen Science “train the trainer” session in High Valley, Idaho on September 10, 2019

Forest Service **Emmett R.D., Boise N.F.** **November, 2019**

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Reference: https://www.epa.gov/sites/production/files/2016-06/documents/quality_assurance_template_for_citizen_science.pdf

Introduction

Project Overview

The Boise Forest Coalition (BFC) has been collaborating with the Boise National Forest on project development since 2010. Projects are in various stages, from data collection to sale preparation and implementation with ongoing logging operations. The BFC has provided questions that could be addressed with relatively straight forward multi-party monitoring that requires little training. The Coalition's monitoring recommendations stipulated that costs should not take away from other restoration work or hamper the agency's ability to get work done on the ground. The BFC has committed to taking ownership in this monitoring process and recruit additional volunteers from the local community. Incorporating citizen science into monitoring would strengthen the BFC's credibility, increase awareness, potentially broaden public participation and diversify their active membership. While the Coalition is engaged in projects across the Forest, their initial monitoring would focus on one large landscape at a time, starting with the High Valley area on the Emmett Ranger District, covering over 7,000 acres of watershed restoration, logging, prescribed burning, hazardous fuels reduction in the wildland urban-interface, and wildlife habitat improvements. Monitoring would scale an extended period of time, ideally ≥15 years to capture long-term effects.

Photo of Citizen Science Large Tree Age Transect training day, August 07, 2019

The current proposal is to conduct 2-3 large volunteer events and numerous field days installing/collecting data from monitoring plots and transects. Operations will be based out of the High Valley field station, with work being completed in the surrounding High Valley project area, with volunteer events concentrated at the nearby beaver pond restoration site. Activities will include construction of a buck and pole livestock exclosure fence, installation of wildlife game cameras, monumenting and capturing pretreatment photo points, installing water meters to measure wetland hydrologic recovery, measuring stream shade with solar pathfinders, documenting stream bank characteristics with simple assessment forms, and documenting unauthorized routes proposed for decommissioning and system roads proposed for realigning outside of riparian conservation areas. The second part of the monitoring will take more time and cover a broader area. Volunteers will install a series of permanent photo points distributed across the landscape in a stratified random sample.

Data collection could include photo points, surface fuel and overstory forest conditions, wildlife surveys, economic analysis, and recreational use (see details below). The Boise NF has a commitment from numerous BFC members (see below) to assist with the project, as well as an international forestry student volunteer who will help with data collection,

analysis, and posting results to the BFC website, the Idaho Forest Restoration Partnership website, as well as potential other open-source locations. Data could also be incorporated into the Forest Plan monitoring report (posted on BNF website), FACTS, and used for project implementation and compliance inspection.

Coalition members will use this project an opportunity to engage participants who do not typically participate with coalition meetings, such as k-12 teachers, students, targeted recreational interest groups, and other members of the public. Citizen science is an ideal platform to help the Coalition broaden their exposure and follow through with project monitoring because the techniques are relatively simple and straightforward to measure and easy to replicate. This project is also well suited for citizen science because there is a lot of opportunity to engage volunteers in Science, Technology, Engineering and Math (STEM) learning, which not only will provide the BFC more exposure, it also provides a two-way learning process from a broader segment of society that might have valuable insight into public land management and allow the BFC to provide better informed recommendations for future management actions. In addition, because most of this data can be collected by a diverse group of volunteers and shared online, the project has the potential to reach a larger segment of society and could be useful for many years.

Community Input

The BFC, formed in September 2010, is a citizen-led, collaborative group comprised of stakeholders from a broad range of outside interests, including the environmental community, timber industry, recreational groups, and State and County government. The mission of the BFC is to provide the Forest with management recommendations developed through a consensus decision making process that address natural resource, economic, recreational, and societal needs. The BFC identified the westside of the Emmett Ranger District as a high priority for active management, primarily due to information provided highlighting the area as a high-priority for restoring vegetation and short-term wildlife habitat (Forest Plan 2010), and includes subwatersheds identified as having impaired function based on the nationwide Watershed Condition Classification analysis. The Project Area includes wildland urban-interface (WUI) and falls within a priority landscape designated by the Governor of Idaho and approved by the Secretary of Agriculture for forests that are at high risk of insect and disease mortality under Section 8204 of the Agricultural Act of 2014 (Farm Bill). The project area is also under contract as a pilot GNA with the State of Idaho to improve efficiencies with implementation, has a lot of opportunities for improvement to recreation resources and includes a subwatershed identified as a high priority for aquatic conservation, primarily due to improvements needed for bull trout habitat.

The Coalition meets once a month, both in the field and in meeting rooms around the Boise area. There is steady feedback between the BFC and the Forest Service. Information is also shared on their website, through subgroup meetings (such as the Citizen Science Subgroup), and steering committee meetings.

Project Plan

Problem Definition

Boise is the fastest growing metro area in the country. Establishing an infrastructure to accommodate the increased land use, recreational impacts, wildland urban interface expansion, and demand on ecosystem services is paramount. Business as usual practices are not sufficient, and we need to gain efficiencies where feasible and build public support for ecologically sustainable and progressive land management. Engaging public involvement with federal land management and the decision making process is a challenge for numerous reasons. One of the main reason, which this project is attempting to address, is to provide a platform for engagement and an opportunity for those interested to actively participate with what happens on the ground, which can help foster broader understanding of the complexities and tradeoffs encountered when managing for multiple resource objectives and balancing opposing public interests. For example, reducing road densities (i.e. road decommissioning) to improve wildlife habitat while providing adequate access for hunters/recreationists. While members of the public will philosophically debate the need for greater or fewer roads, when both parties survey a road "on the ground" and observe indicators such as point source erosion and distances between other roads (or access points for recreation), it is often easier to form agreement or relate perspectives and build relationships, trust and awareness. Conducting this learning experience in an objective, repeatable, easily understood and published process, as we are doing for this project can reach a larger audience, at least within Idaho, and build a foundation for future projects.

Photo of BFC members viewing landscape planning project on September 13, 2018.

Project Objectives

One key objective is to reach a broader audience than those who currently engage with the Boise Forest Coalition. Working with students, from elementary through high school and college will reach parents and help to build a future for success. Engaging with other groups, such as tribal communities, can bring diverse perspectives and help improve collective agreement process. Fostering relationships and improved communication with other land owners and managers can facilitate cross boundary management and principles of shared stewardship.

Photo of Citizen Science Large Tree Age Transect training on August 07, 2019.

Another key objective is to build a dataset developed for and collected by members of the public to inform future recommendations and engagement on federal land management projects. This will help facilitate better understanding of complex ecological dynamics and build relationships, trust, and awareness to help streamline public engagement, which could increase support for essential land management projects.

Team Members

Table 1. Primary points of contact

Name	Title	Organization	Responsibilities (specific to this project)	Contact Info
Art Beal	Retired	Squaw Creek Soil Conservation District	Project Lead (Partner) Boise Forest Coalition Member (BFC) Steering Committee member	bealart@speedyquick.net 208-584-3567
Joh Riling	Forest Silviculturist	Forest Service	Project Lead (Forest Service)	John.riling@usda.gov 208-373-4171
Jonathan Oppenheimer	Government Relations Director	Idaho Conservation League	BFC Steering Committee member/Citizen Science Subgroup member	joppenheimer@idahoconservation.org 208-345-6933 x 26
Dave Dudley	Citizen	n/a	BFC Citizen Science Subgroup member	dmdudley@centurylink.net
Bill Moore	Coordinator	SWI RC & D	Grant Coordinator BFC Citizen Science Subgroup member	wmoore@canyonco.org 208-573-4875
John Roberts	Forester	Society of American Foresters	BFC Steering Committee member/Citizen Science Subgroup member	idahoforester@gmail.com 208-866-1912
Martha Brabec	Foothills Restoration Specialist	City of Boise	BFC Citizen Science Subgroup member	mbrabec@cityofboise.org 208-493-2535

Project Timeline

Table 2. Project Activities and Timeline

Activities	Individual/organization responsible for activity completion	Timeframe work will be done
Installation of monitoring plots, points, transects and establish baseline data	Boise Forest Coalition	2018-2020
Volunteer work days	Boise Forest Coalition and expanded volunteer network	2019-2020
Post treatment monitoring	Boise Forest Coalition	2020-2025
Long Term Monitoring	Boise Forest Coalition	2030-2035

Budget Break-Out

Table 3. Budget Break-Out

Expense Category	Expense Description	CitSci Fund Cost	Forest Service Unit Cost	Partner Cost
Personnel				
Salaries and Wages	International students, interns, and salaries	2,000	8,000	16,000
Fringe Benefits	Vehicle rentals, mileage costs, etc	1,500	4,500	3,000
Contracted Services	website	7,000		14,000
Total Personnel	56,000			
Travel				
Mileage	To and from sites	2,000	4,500	2,500
Per Diem	Field rate		500	1,000
Total Travel	10,500			
Equipment and Supplies				
Communications and Outreach	Social media advertising, fliers, digital networking, story map, etc.	1,500	2,500	1,000
Monitoring and data collection	Tablet, water level meter, auger, diameter tape, 360 degree camera, game cameras, GPS, increment bore, basal area prism, computer, rebar, flagging, paint, smart phones	4,850	5,500	2,000
Total Equipment and Supplies	17,350			
Technical Costs				

Database Development	Photo points and other user friendly spatial applications for sharing data/results		2,000	6,000
App Development	Arc Collector, etc.		1,500	
Data Analysis	Large tree, tree density, hydro meter ranges, wildlife, and sedimentation		1,000	4,000
Software	ArcGIS, Arc Collector, Avenza, Microsoft applications		5,000	
Training Development	Monitoring procedures and web updates		2,000	
Total Technical Costs	21,500			
Other costs				
Facilitation	Working between Forest Service, Collaborative Groups, additional volunteers and grant coordinator	4,500	5,000	5,000
Grant Administration	Reporting requirements and cost associated with grant administration	1,650	3,000	3,000
Total Other Costs	22,150			
Totals		**25,000**	**45,000**	**57,500**
Total Project Budget	**127,500**			

Project Design

Data will be collected using ArcGIS Collector and Survey123. Data will be collected by the Coalition, with technical assistance from the US Forest Service. Existing partnerships with the Forest Service Research branch and Universities will be utilized to assist with any detailed analysis that is needed. Data will be shared on the BFC website.

Project Location

The project area is located around High Valley, Idaho. The project falls within the High Valley Integrated Restoration Project, which was an Environmental Assessment decision document developed with recommendations from the Boise Forest Coalition. This site provides representative treatments for the types of project the Coalition provides recommendations.

Existing Data

Results from the initial dataset that will be used as a baseline for the Large Tree Age Transects were published in 2019:

John Riling, Kathleen Geier-Hayes, Theresa Jain, Decoupling the Diameter–Age Debate: The Boise National Forest's Legacy Tree Guide, *Forest Science*, Volume 65, Issue 4, August 2019, Pages 519–527

Table 4. Existing Data Sources

Existing Data	Data Source	How Data will be Used	Acceptance Criteria
GIS spatial Data	USDA Forest Service	Establish sampling location and for navigation and reporting	NAD 1983 Datum, Zone 11N, with complete metadata and available for open-source sharing.
Large Tree Age Transect Data	USDA Forest Service	Age data and for a comparison analysis between using legacy tree guide	

Data Quality Objectives

The following describes the data quality objectives that define the type, quantity and quality of data needed to answer specific questions, and support proper decisions.

Precision

Precision is defined as the ability of a measurement to consistently be reproduced. Repeated measurements are usually used to determine precision. In the case of repeated measurements, one would see how close those measurements agree.

Data precision will be ensured through the use of ArcCollector and Survey123, with survey forms that have been developed by the Forest Service, working with the BFC. Error messages are generated when data does not conform to standards and will not allow the user to proceed without using proper GPS accuracy and standards designed for the given survey.

Bias

Bias is defined as any influence in the project that might sway or skew the data in a particular direction. The following describes potential biases that could exist and how they will be addressed in the project.

ArcGIS was used to generate a random stratified sample. Sampling strata was developed based on variables of interest identified by the collaborative.

Representativeness

Representativeness is how well the collected data depicts the true system. The following describes how the collected data will accurately represent the population, place, time and/or situation of interest.

Collection sites were assigned based on previous data collection, but a process is in place to allow for changing sites if the site on the ground does not meet the sampling objectives. When changes are made, this is noted in the survey and members of the BFC and USFS have the opportunity to validate the change.

Comparability

Comparability is defined as the extent to which data from one data set can be compared directly to another data set. The data sets should have enough common ground, equivalence or similarity to permit a meaningful analysis.

Depending on the survey, data can either be expanded for use across the Boise National Forest, across the Central Idaho Ecogroup, or as a template for other collaborative groups working with land managers/agencies. For the large tree age transect, similar data was collected in eastern Oregon and sampling procedures were designed to be used as a direct comparison. Some of the road surveys were developed to comply with National Best Management Practice (BMP) monitoring, and could be compared nation-wide.

Completeness

Completeness is the amount of data that must be collected in order to achieve the goals and objectives stated for the project.

The project is designed to be considered successful, even if a small percentage of the surveys are completed. The surveys have been prioritized by the BFC, with concurrence provided by the USFS, to ensure the most useful (of highest interest) data is collected first and the locations are prioritized to ensure existing condition information is collected before treatments (e.g. timber harvesting) are implemented. The photo monitoring survey was prioritized, and the plots in the northern portion of the project area are scheduled for the first treatments.

Sensitivity

Sensitivity is essentially the lowest detection limit of a method, instrument or process for each of the measurement parameters of interest.

Sensitivity measures are established and built into each Survey123 form. For example, minimums for GPS accuracy, diameter at breast height measurements (nearest $1/10^{th}$ inch), hyro meter measurements, tree vigor assessments, basal area factors, and others. Refer to surveys forms.

Sampling Design

The BFC Citizen Science has differing sample designs, depending on the variable of interest and the data's intended use. The sample design has been updated from the start of the project to be more flexible with the amount of data required and associated work needed from volunteers, thus making completion more realistic. Sampling intensity could increase if volunteers have more field time/availability.

Photo Point Monitoring

Table 5 details the photo monitoring plot stratification. This was paired down from an initial stratification with over twice the collection points. If time allows, more plots will be collected, potentially looking a more variables, including control plots, and increasing sampling intensity for each variable of interest. For now it was determined the below plots were ambitious and would provide a meaningful and useful data set.

Table 5. Photo monitoring stratification

Priority	Plot Number	Management Difference	Ecological	Cutting Method	Stratum Code	Plots	Sale/Contract Name	Unit Number	Aspect
Very High	1	1. IDL	B. Mixed 1 Fire Regime	i. Regeneration Harvest	1Bi	3	High Fork	21	E
Very High	2							21	W
Very High	3							30	E
Very High	10	1. IDL	B. Mixed 1 Fire Regime	ii. Intermediate Harvest	1Bii	3	High Fork	7	E
Very High	11							23	E
Very High	12							8	E
Very High	19	1. IDL	C. RCA	i. Regeneration Harvest	1Ci	3	High Fork	37	W
Very High	20							37	S
Very High	21							6	S
Very High	22	1. IDL	D. Ponderosa Pine Plantation	iii. Variable Density Thin from Below Harvest	1Biii	3	High Fork	36	S
Very High	23							36	E
Very High	24							36	E
Low	25	2. DxP sale	A. Nonlethal Fire Regime	iii. Variable Density Thin from Below Harvest	2Aiii	3	Shirts	73	S
Low	26							73	S
Low	27							77	S
Mod-High	4	2. DxP sale	B. Mixed 1 Fire Regime	i. Regeneration Harvest	2Bi	3	High Buck	52B	E
Mod-High	5							52B	W
Mod-High	6							43G	W

Priority	Plot Number	Management Difference	Ecological	Cutting Method	Stratum Code	Plots	Sale/Contract Name	Unit Number	Aspect
Moderate	13	2. DxP sale	B. Mixed 1 Fire Regime	ii. Intermediate Harvest	2Bii	3	High Buck	50B	W
Moderate	14							44A	E
Moderate	15							42A	E
Moderate	28	2. DxP sale	B. Mixed 1 Fire Regime	iii. Variable Density Thin from Below Harvest	2Biii	3	High Buck	52	N
Moderate	29							54	N
Moderate	30							54	N
High	31	2. DxP sale	C. RCA	i. Regeneration Harvest	2Ci	3	High Buck	53	N
High	32							53	W
High	33							48	W
Moderate	34	3. USFS Stewardship	A. Nonlethal Fire Regime	ii. Intermediate Harvest	3Aii	3	Long Pine	95	W
Moderate	35							97	W
Moderate	36							98	W
Low	37	3. USFS Stewardship	A. Nonlethal Fire Regime	iii. Variable Density Thin from Below Harvest	3Aiii	3	Long Pine	96	W
Low	38							96	W
Low	39							96	W
Very High	7	3. USFS traditional sale	B. Mixed 1 Fire Regime	i. Regeneration Harvest	3Bi	3	Padget	2	W
Very High	8							2	E
Very High	9							2	E
Very High	16	3. USFS traditional sale	B. Mixed 1 Fire Regime	ii. Intermediate Harvest	3Bii	3	Padget	1	W
Very High	17							1	E
Very High	18							3	E
Low	40	3. USFS Stewardship	B. Mixed 1 Fire Regime	iii. Variable Density Thin from Below Harvest	3Biii	3	Long Pine	81	N
Low	41							88	N
Low	42							89	E
High	43		C. RCA		3Ci	3	Long Pine	86	W

Priority	Plot Number	Management Difference	Ecological	Cutting Method	Stratum Code	Plots	Sale/Contract Name	Unit Number	Aspect
High	44	3. USFS traditional sale		i. Regeneration Harvest				87	W
High	45							91	N
High	46	4. Service Contract	C. RCA	iv. Noncommercial thin	4Civ	3	Beaver Pond	n/a	N
High	47							n/a	W
High	48							n/a	W
Low	49	3. USFS Stewardship	D. Ponderosa Pine Plantation	iii. Variable Density Thin from Below Harvest	3Diii	3	Long Pine	E	W
Low	50							E	W
Low	51							F	E
Low	52	4. Service Contract	D. Ponderosa Pine Plantation	iv. Noncommercial thin	4Div	3		E	N
Low	53							G	W
Low	54							F	N

Priority was assigned based on BFC interest, anticipated harvest schedule, and redundancy in strata. That said, if close to a plot, it is recommended to collect it as travel distance is time consuming.

Initial Setup Instructions for Photo Monitoring Plot Installation

1. Using Avenza application or ArcCollector, locate plot Center
2. Pound rebar into ground, leaving 8 inches above ground
3. Paint top 4" of rebar and flag rebar including three flags around plot Center
4. Take average lat/long with GPS unit and save the Photo Monitoring location with the plot number (e.g. PM05)

Form

5. Fill out form in Survey123 application (see "how to" document for more details if needed) with name, date, and plot number
6. Reference photo plot spreadsheet for stratum code
7. Document slope position (reference handout)

8. Measure basal area using a 20 BAF prism
9. Document any pertinent notes, such as changes to plot location

Photo

10. Record the following items on the whiteboard:
    a. Camera distance to ground
    b. Distance from camera to the board
    c. Direction of board in degrees (e.g. north =360)
    d. Data recorders, Date and Plot number
11. Extend tripod as tall as will go (bottom of camera should over 3 feet high)
12. Level tripod and camera
13. Face front of camera due north
14. Turn on the camera and Wi-Fi
15. Connect tablet to camera using “my sphere” app on tablet. Camera WiFi is MJXJ
16. Carefully dust off camera lens
17. Move what is needed (debris, branches, vegetation) to get a good picture of board. If cannot get clear picture, adjust the distance to the camera. If cannot adjust distance to camera, adjust aspect, going clockwise until a good spot is located.

Large Tree Age Transect Survey

Objectives
Monitor large tree and legacy tree density and distribution before and after treatment within the High Valley Integrated Restoration project area. Legacy status classification can be compared with USFS classification. Rating criteria can be analyzed to show trends. Tree vigor and photos can be used to assess how large trees respond to treatment. Post treatment data collection can include notes on suspected rational for tree removal, e.g. meet restoration objectives for density or species composition, temporary road development or other safety/operational reasons.

Sample timeframes
Pre-treatment, post treatment(s) and long-term.

Summary of data collection
In 2014, 241 large trees were sampled across four transects to support data collection and analysis for the High Valley Integrated Restoration Project Environment Assessment. All large trees were measured and cored, with a goal of obtaining a minimum 15 complete cores (legible core to tree center). This data was analyzed with four other projects on the Boise National Forest, which showed efficiencies in using a legacy tree guide to identify old trees, build trust among stakeholders, and improve the NEPA planning process (Riling et al. 2019).

This citizen science project will follow the pre-established transects, which will save time by not requiring tree coring, habitat typing, and tree painting, but will provide an opportunity for a comparative analysis with the original dataset.

Equipment and Supplies
- Boise Legacy Tree Guide (version 1.5)
- White aerosol paint
- smart phone or tablet
- Navigation maps (digitally loaded into Avenza)
- Compass
- Diameter tape/loggers tape
- Laser
- Blue flagging and white flagging
- Increment bores (optional)
- Sharpie
- Habitat Typing Guide & indicator species handbook (optional)

General Field Procedures
- Reference points and the transect azimuth were predetermined in the office and displayed on the provided map. Reference point was flagged (blue), painted (white), and GPSed in a conspicuous location. The predesignated azimuth was maintained for the entire transect.
- Transect line was flagged (blue).
- Two individuals will follow the transect and measure large trees (≥20" DBH) where the face of the tree falls within 22 feet either side of the line (this roughly equates to 1 acre every thousand feet). Sample trees were originally numbered using white aerosol paint and flagged with white and blue flagging. "Butt" marks were painted to allow for monitoring of how many large trees are harvested. **Refresh paint and flagging as needed.**
- Sample all trees ≥20" DBH. Measure the tree diameter using CSE protocols (USDA Forest Service 2014).
- The following can be documented in Survey123 for ArcGIS, or paper forms as a backup:
    1. Transect letter (A-D)

2. Date and name of data recorder(s)
3. Tree number (**cross reference tree number/species/diameter with original dataset**)
4. Species (Douglas-fir [DF], ponderosa pine [PP], or grand fir [GF])
5. Diameter at Breast Height (DBH) to nearest 0.1" (refer to "how to measure tree diameter" handout)
6. Tree Vigor (A-D) using the tree vigor form
7. Height to live foliage and height to first dead branch (using laser)
8. Elevation (from GPS unit)
9. Legacy tree status (Y or N). Use form for PP and DF, and indicators for GF.
10. GPS the sample tree. Add notes to the GPS file indicating the transect (A-D), tree number, species, and diameter e.g. B03PP26.1
11. Photograph the tree setting (tree with surrounding habitat), with individual to represent scale (figure 2).
12. Add notes, for example if a fire scar is present or factors of tree health, such as Douglas-fir tussock moth.

- Write a unique identifier on the flagging of the tree e.g. B03PP26.1, as detailed in #10.
- Transect is complete when all trees from 2014 transect have been relocated and flagging/paint refreshed. **Do not paint over blue "cut" paint or orange "leave" paint**, if present.

Figure 1. High Valley Transect C, Tree 07, grand Fir (*Abies grandis*), 33.6" DBH and 108 years of age, incorrectly classified in the field as a Legacy tree. Photo by Charlie Brown.

Figure 2. High Valley Transect D, Tree 14, grand fir (*Abies grandis*), 24.9" DBH and 111 years of age, classified in the field as a non-legacy tree. Photo by Brian Smith, featuring Charlie Brown.

Road Condition Data Collection

NOTE: These instructions assume: 1) you have a Boise National Forest Citizen Science AGOL account; 2) you have downloaded the Arc Collector and Arc Survey123 apps; 3) have downloaded the Beaver Pond Road Condition map; and 4) have downloaded the Road Condition Survey form.

To Collect Data

2. Open the Arc Collector application
3. From the maps page, tap the Beaver Pond Road Condition map to open it
4. First walk or drive the road and determine the road segment locations
    a. To record a segment marker, tap the blue add icon in the lower right corner of the map
    b. Tap Road Segment from the layer list
    c. Tap Update Point - your GPS location will be recorded as the point
    d. Enter the Segment Number
    e. Tap the Submit button in the upper right corner of the screen

Numbering Road Segments

- The start of the spur road (i.e. it's junction to the leading road) is the start of Segment 1
- Add segment indicators as needed
    - In the example to the right, the road is broken into 3 segments:
        - Segment #1 starts at the junction (Segment #1 marker) and extends to the Segment #2 marker
        - Segment #2 starts at the Segment #2 marker and extends to the Segment #3 marker
        - Segment #3 starts at the Segment #3 marker and extends to the end of the spur

Collecting Road Condition Data

- To collect a road condition point:
    - Zoom into the road at the GPS indicator and tap the road
    - This brings up the Feature dialog box, tap the dark triangle in the lower right part of the Road listing

- Note the road id value then tap the Enter Road Condition Data link
- This brings up the Survey 123 My Surveys page, tap the Rd Condition Survey
- Tap the Collect icon in the lower left corner of the screen
- This brings up the Road Condition Survey form
- Enter the full name of the surveyor(s)
- Ensure that the road number is correct (e.g., 643S), if not, correct the value
- Assign a segment value
- Select the appropriate value for the road surface, hill slope position, road gradient, hill slope gradient and surface material questions
- Answer all of the Road Condition Evaluation questions
  - At the end of the section you will see the number of questions that were indicated as being functioning and at risk
  - If the number of functioning responses is greater than the number of at risk, then indicate that the segment condition is Functional
  - If the number of at risk responses is equal to or greater than the number of functioning, then indicate that the segment condition is At-Risk
  - If the number of at risk responses is twice (or more) than the number of functional responses, then indicate that the segment condition is Impaired
- Select the Is sediment transport occurring value, if yes, then the 5 additional questions will appear, if not proceed to the photos
- Take at least one photo with your smart device and provide a caption for the photo
- If needed, take up to 2 additional photos to document the site; be sure to include captions for each additional photo
- Add any additional comments you feel are needed
- When done, tap the green check ☐ in the lower right hand corner

- If you are using one of the Boise National Forest Samsun tablets, you will not be able to upload your data until you have a WiFi connection.
- If you are using a personal device that has a cellular data plan, and you are out of cell coverage, be sure to upload your data when you return to a location with cell coverage
- Regardless, always ensure you have uploaded both segment markers and survey forms at the end of the day

The BNF Legacy Tree Guide, how to setup an AGOL partner account document, tree vigor rating forms, slop identification, tree measurement protocol (common stand exam), and other references are available on the BFC Citizen Science website and are provided as hard copies to data collectors.

GPS Settings in Arc Collector

Before beginning any data collections using Arc Collector, ensure the following settings are in place

1. Open Arc Collector

5. From the Maps page in Arc Collector tap the Profile icon
6. From the Profile page you will make the following settings:
   a. Accuracy – set to 20 feet
   b. GPS Averaging
      1) Turn GPS Averaging on
      2) Set points to Average to 10
   c. Streaming
      1) Ensure Distance is checked
      2) Set Distance to 10 feet
   d. Photo Size
      1) Set to Large
   e. Units (scroll down to the General section)
      1) If using standard measures
         a) Set Measurement Units to US Standard
         b) Set Coordinates to Degrees Decimal Minutes
         c) Set Area to Acres
      2) If using metric measures
         a) Set Measurement Units to Metric
         b) Set Coordinates to Degrees Decimal Minutes
         c) Set Area to Automatic
4. Tap Done when completed

Specialized Experience

Table 6 is not a comprehensive list of specialized experience, simply a starting point.

Table 6. Specialized Experience

Person	Specialized Experience	Number of Years of Experience
John Roberts	Tree measurements	40+ years
Randy Fox	Photo Monitoring	1+ years
Rob Miller	Citizen Science, specifically related to wildlife	15+ years

Assessments and Oversight

Assessments and project oversight include various reviews to identify shortcomings or deviations from the project (Table 7).

Table 7. Data Quality Assessments and Oversight

Assessment Type	Frequency of Assessment	What is Being Assessed	Who will Conduct the Assessment	How Issues or Deviations will be Addressed
On-Site Field Validation	Continuously as data is collected	Data format and completeness	ArcGIS survey123	User will not be able to proceed
Office Validation	Once a month or as data is available	Data format and completeness	John Riling or Steve Kovach	Data checked as processed from ArcGIS survey to local drive and transferred to BFC website

Data Management

Data management includes: recording and transcribing field notes, logging and retrieval of instrument data, transmittal of automated field and laboratory results, data transformation and reduction procedures, compilation of survey results, and data storage, retrieval and security uses throughout the project.

Data Management Process

Data will be collected on smart devices, uploaded into ArcGIS server, and then transferred to the USFS T-drive. A replicate will be stored on an external hard drive and stored with the data collection materials and a copy will be uploaded to the BFC website for public distribution and sharing. Data will be checked at each step to avoid errors and make corrections as needed. Any changes or updates required will be presented at a monthly BFC meeting.

Data Management Procedures

Data will be collected in Survey123 and uploaded onto an ArcGIS server. Data will be stored on external hard drive indefinitely and online as long as funding allows. Nonconforming data should be infrequent, but when it occurs depending on the discrepancy, it will either be corrected in the office or recollected in the field. Data will be openly accessible to USFS employees through an internal server link, open to the public through the BFC website, and we are looking into other public "warehouse" serves to share, where there is similar data.

Data Handling

Data will be generated electronically. There are paper backup forms available if there are tech issues in the field.

Management Requirements
There is currently no plan to use, or rely on the data for Agency reporting. That said, there is an opportunity to utilize the data to help answer questions regarding required Forest Plan monitoring, Best Management Practice monitoring, and to address effectiveness reporting for CFLRP.

Data Review and Usability

Although data verification, validation, and usability are typically conducted sequentially, it may be beneficial (and more cost effective) for many projects to combine steps.

Data Review Procedure

If issues or errors are identified, they will be brought up at a monthly BFC meeting and a consensus vote, if needed, will be conducted for how to proceed.

Data Analysis

The following describes initial thoughts regarding who will analyze the data and what data will be analyzed and under what timeframe.

Data Users

The Boise Forest Coalition and USFS will use the datasets to deconstruct complex ecological and management scenarios into products that can be absorbed by individuals with diverse ranges of experience and technical expertise. This critical piece of information would be used to develop a shared understanding and vision, helping to facilitate recommendations for future management actions.

Volunteers and Training

Training will be offered throughout the field season to ensure competency in data collection software and procedures. Some training sessions will be organized in rotating group sessions, with multiple trainers, and others will be focused on one sampling procedure while collecting data. As Forest Service employees train BFC members, BFC members will then train other interested community members (Table 5). One or two large group events are planned per year, with a focused effort to recruit community members who do not typically engage with the BFC.

Table 8. Volunteers and Planned Training

Personnel/Group to be Trained	Description of Training	Frequency of Training
BFC members (10-30)	Field training on data collection by John Riling and other FS specialists	Hosted 2-3 times per year
Other interested citizens (50+)	Field training on data collection by BFC members	Hosted 1-2 times per year and onsite "OJT" while collecting data.

Project Evaluation

The following defines qualitative and quantitative methods for measuring success of the project, based on the objectives described earlier.

Some important measures for success include:

1. Did the BFC collect monitoring data? Monitoring whether the Forest Service did what we said we were going to do will give the BFC credibility and show they are not simply providing recommendations, but are also engaging with management on the ground.

2. Did member engagement with the BFC expand as a result of Citizen Science? Even if members who do not typically attend BFC meetings assist with Citizen Science, this is considered a strong positive because their perspectives and voices can be brought back and shared at BFC meetings, even if they do not attend BFC meetings themselves.

3. Is information collected being used to inform future management recommendations and helping to form a shared understanding of project complexities?

Reporting and Sharing Results

Videos are being developed to share information on the BFC's efforts with Citizen Science, why it is important, how to engage, and how to collect data.

How this Plan will be Updated

This plan will be updated as portions of the project are completed, or a need for change is identified.

Table 9. Project Plan Updates

Version	Date	Changes Made
v.1	*03/13/2019*	*Updated data collection intensity (reduced to realistic amount, with option to expand if capacity grows)*
v.2	*09/09/2019*	*Updated to use Arc Collector and Survey123*

Appendix A: Key Messages

Key messages include:

- Multi-party monitoring fosters trust between land management agencies and stakeholders. It also builds credibility for collaborative groups, such as the Boise Forest Coalition, who are engaged and provide recommendations for land management planning projects.

- Citizen science provides an opportunity for community members to get involved with something they are interested in and brings together two important Forest Service values — using sound science to guide our management and decision making, and connecting our work to the public that we serve. It also can establish a volunteer network to help accomplish monitoring that the agency would not be able to afford otherwise.

- By engaging in Citizen, or Community Science, the Boise Forest Coalition can potentially expand their membership or at least get feedback on federal land management in demographics currently underrepresented in their collaborative group.

Appendix B: Communication Tools

This appendix is under development, but will describe the tools for reaching internal Forest Service stakeholders (staff at the local unit, Regional Office, and Washington DC Office) as well as external individuals and entities (groups, agencies, others). Some communication tools will be required and others will be used when adequate resources are available.

Some examples:

Mailing Lists and Listservs; Meetings / Workshops – Forest Service hosted; Meetings/ Workshops – Group hosted; Press Releases; Public Notices Stakeholder / Cooperating Agency Letters; Webpages; Interested Parties Briefings / NGOs updates; Outreach briefings to Community Contacts; Working Groups; Workshops; Roundtables; Open Houses; VTC / Conference Calls; Webinars; Podcasts; Talking Points; PowerPoint Presentations; Briefing Papers; E-Bulletins; Calendars; Newsletters, People, Places and Things; Blogs and Organizational Newsletters; Brochures; Fact Sheets; approved Social Media tools such as Twitter, Facebook, or YouTube; Speeches; Videos; Brown Bags; Advertisements or Public Service Announcements; Newspaper Editorials; Radio Spots in English and Other Languages; Ranger in the Classroom Programs; Online open houses; listening sessions; Fairs and Festivals; Annual Days (e.g. Get Outdoors Day).

Consider developing a list of social media accounts, internal and external blogs and newsletters, popular forums or meetings, and local newspapers or magazines.

This appendix will describe any resources used to reach audiences where English is their second language or to make your documents and media 508 compliant. This will include a description of which communities will most likely need these resources translated and any other information about how they will be developed and distributed.

Appendix C: Forms and Agreements

All required forms are available on the BFC website. If something is missing, please let us know.

Appendix D: Project Organization Chart

An organization chart shows the lines of communication and reporting for the project. This appendix is under development and revision.

Appendix E: References Cited

Riling, J; Geier-Hayes, K; Jain, T. 2019. Decoupling the Diameter-Age Debate: The Boise National Forest's Legacy Tree Guide. Forest Science, Volume 65, Issue 4, August 2019, Pages 519-527 https://doi.org/10.1093/forsci/fxz004

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