FLNRORD Standard for Developing Tactical Overview and Operational Unit Plans for Wildfire Risk Reduction

Purpose

The purpose of this document is to provide direction for the development of tactical overview and/or operational unit fuel treatment plans in areas of higher risk. High risk areas have priority values (e.g communities or critical infrastructure) identified as a higher wildfire threat in the Provincial Strategic Threat Analysis or Wildland Urban Interface Risk Class Maps. This document assumes that all other approaches to, and components within, the tactical overview and operational unit plans meet legal requirements. and follow Association of BC Forest Professionals (ABCFP) published guidance, specifically around quality prescription development including, but not limited to: Standards of Professional Practice: Guidelines for Interpretation, Interim Guidelines –Fire and Fuel Management, Guidance for Professional Quality Field work, and Guidance for Professional Quality Rationales and Comments. In addition, the BC Wildfire Service (BCWS) has developed a suite of tools to support fuel management activities that are located on the BCWS Tools for Fuel Management webpage. These tools and other direct supporting information are hyperlinked in this document.

Scope

This standard is applicable to wildland risk reduction (WRR) projects on crown lands where areas of concentrated high value resources and assets have been identified at a strategic level. This standard was established to support WRR provincial planning activities on Crown land. This document is focused primarily on providing guidance on fuel management planning, including larger landscape level design, and treatment unit identification.

Roles and Responsibilities and Expertise Required

Forest professionals that are within their scope of practice with regards to fuel management and wildfire expertise are required for the development of a tactical WRR plan. The members of the Association of BC Forest Professionals are entrusted to ensure that practices applied to forest, forest lands, forest resources and forest ecosystems comply with legislative requirements, including the *Wildfire Act*, *Forest Act* and *the Forest and Range Practises Act;* and that assessments, plans and prescriptions for fire and fuel management will meet the intended objectives. Many aspects of fuel management fall under the scope of practice of professional forestry with the Association of BC Forest Professionals (ABCFP). In 2013 the ABCFP released *Interim Guidelines – Fire and Fuel Management* to provide ABCFP members with information and guidance to be consdiered when working in the area of fire and fuel management.

Expert involvement is required during the development of a tactical overview plan, though this varies depending upon the nature of the operational area. At a minimum these planning projects require guidance from fire behaviour and fire behaviour modeling experts as well as expert-supported fire related ecological inputs, managerial input (priorities) and geographical information system (GIS) support.

The fire suppression and overall guidance role will be fulfilled by a BCWS staff member (wildfire prevention officer) or designate) and the fire behaviour and fire behaviour modeling expertise must come from within the BCWS or an approved contractor. Fire effects knowledge must be obtained from appropriate subject matter experts.

Introduction

In British Columbia, creating or maintaining fire resilient ecosystems and communities that are fire adapted is fundamental to ensuring the long-term sustainability and health of our forests while also reducing the impacts of wildfire to those who live within the wildland urban interface. Fuel management activities can aid in achieving the above through the manipulation or reduction of living or dead vegetation in the various components of the forest fuel strata. Fuel management is an important part of wildfire prevention; if done correctly and maintained over time, its impact on potential fire behaviour can be significant. There are two main approaches to manipulating fuels forest strata: either through mechanical treatment, or the use of prescribed fire, (or a combination of the two).

Definitions

Anchoring – linking a fuel treatment to a non-burnable or very low intensity burnable feature on the landscape (i.e. rock outcrop, swamp, lake, river, etc.).

BEC – The biogeoclimatic ecosystem classification (BEC) is an integrated hierarchical classification scheme that combines climate, vegetation and site classifications.[1]

BurnP3 – A modeling system that estimates burn probabilities for pixels across a raster-based map of a landscape.

CWPPs/CWRPs – Community wildfire protection plans/Community Wildfire Resiliency Plans.

Fire Adapted – Is referring to specific species that are adapted to live with the presence of fire (e.g. ponderosa pine, Douglas fir).

Fire Resilient Ecosystem – Also called ecosystem robustness, it is the ability for an ecosystem to maintain normal patterns of nutrient cycling and biomass production even with the frequent presence of fire.

[1] Meidinger D.V., Pojar J. 1991. Ecosystems of British Columbia. Ministry of Forests. ISSN 0843-6452.

Fuelbreak - An existing barrier or change in fuel type (to one that is less flammable than that surrounding it), or a wide strip of land on which the native vegetation has been modified or cleared, that act as a buffer to fire spread.

Fuel Management - is defined by the *2002 CIFFC Glossary of Forest Fire Management Term*s CIFFC as *"the identification, planning, and treatment of hazardous wildland fuels in forested areas. It is applied at all spatial scales across the land base."* In addition, fuel management can also be defined as "*the planned manipulation and (or) reduction of living or dead forest fuels for forest management and other land use objectives (such as hazard reduction, silvicultural purposes, wildlife habitat improvement) by prescribed fire, mechanical, chemical or biological means, and (or) changing stand structure and species composition*"[2]. It is the process of changing forest (or range) fuels to reduce aggressive wildfire behaviour. The main goal of fuel management is improving public safety through; the reduction of wildfire intensities, the reduction of potential for crown fires, improved wildfire suppression success, improved firefighter safety, and improved forest resilience to wildfires.

Fuel Treatment – Operational stand level treatment to reduce the amount of fuel within an area and alter it to mitigate fire behaviour and intensity.

Fuel Treatment Opportunities Document – Documents describing where fuel treatments may be implemented. Available for some parts of BC (Cariboo, Southeast).

Landscape Fire Management Plan – Generally older landscape plans which identified potential treatment areas. These exist for several Natural Resource Districts in BC.

Prometheus – A fire growth modeling tool.

PSTA – Provincial Strategic Threat Analysis.

RSWAP – Resource Sharing Wildfire Allocation Protocol establishing general priority categories. Life is the highest category followed by critical infrastructure, then high cultural and environmental values and then resource values.

Wildland Urban Interface (WUI) – As defined in the FireSmart manual, the wildland urban interface (WUI) is any area where combustible forest fuel is found adjacent to homes, farm structures or other outbuildings. This may occur at the interface, where development and forest fuel (vegetation) meet at a well-defined boundary, or in the intermix, where development and forest fuel intermingle with no clearly defined boundary. In BC it is defined as any area where combustible wildland fuels are found near residential structures, businesses, or other built assets or infrastructure that may be damaged by a wildfire.

[2] Mooney M.C. 2010. Fuel break Effectiveness in Canada's Boreal Forests: A synthesis of current knowledge. FP Innovations.

WUI Risk Class - a classification system that ranks the potential wildfire threat within WUI and assesses eligibility for wildfire risk reduction projects. The risk class maps can be found here.

General Fuel Management Principles

Fire behaviour has three components to it, weather, topography, and fuel. As we are unable to change weather or topography, altering fuels across landscapes is the only approach to lowering fire intensity and changing fire behaviour. Fuel management is a key component of wildfire risk reduction activities and applying fuel management treatments on the landbase can be an effective land management tool. Fuel treatments will range in approach based on a number of factors that include but are not limited to:

- wildfire risk reduction objective,
- value at risk (VAR),
- local fire behaviour factors (fuel type, topography, weather patterns etc.), and
- land use objectives and other values on the landscape.

Planning Overview

The BC Public Service Agency utilizes the ISO 31000 standard for risk management.[3] The framework for risk management in a wildfire context emphasizes the necessity for a risk-based process for fire management planning that integrates land management through the prioritization of values from a wildfire perspective, and locally identifying wildfire risk and mitigation opportunities.[4] Planning for WRR activities should incorporate direction outlined in existing higher-level plans and products such as WUI risk class maps, and PSTA data.

There are two levels of wildfire risk reduction planning that occur under the strategic wildfire risk management plans.

1. Operational/tactical level plan – where treatment unit polygons, prescribed fire opportunity areas, and fuel break locations are determined based on factors such as values at risk, site level wildfire threat (fire behaviour, distance to value etc.) and location on the landscape in relation to historical weather patterns. This may include ground truthing of wildfire threat and general at-risk areas of interest (AOI) identified and prioritized.
2. Stand-level plan – where treatment prescriptions, prescribed fire burn plans, etc are created.

In many cases, plans for wildfire risk reduction already exist. Examples of existing plans include; a Risk Based Fire Management Plan that is endorsed by the land manager (typically the Ministry of Forests, Lands and Natural Resource Districts or BC Parks), an Integrated Investment Plan that identifies areas of

[3] Risk Management Guideline for the B.C. Public Sector. 2019. Risk Management Branch & Government Security Office.
[4] Stockmann K.D., Hyde K., Jones J.G., Loeffler D., and Silverstein R.P. 2010. Integrating fuel treatment in ecosystem management: a proposed project planning process. International Journal of Wildland Fire. 19(6): 725-736.

priority for other government funded activities, or a Community Wildfire Protection Plan (CWPP), which is designed to identify the wildfire risks within and surrounding a community and to examine possible ways to reduce those risks. Fuel treatment opportunity plans, or maps may also have been identified for priority at-risk communities or areas. If a plan does not exist, contact the local fire centre's Wildfire Prevention Officer (WPO) to discuss potential project areas. Several additional fuel management planning initiatives may have resulted in the identification of potential areas for wildfire risk reduction activities. These areas are commonly associated with the WUI and generally do not prioritize or consider other values on the landscape from a wildfire mitigation perspective. Risk-based landscape level planning identifies areas of high risk containing many priority values. These areas can be delineated and used as operational units for tactical/overview planning.

Review of Existing and Approved Plans

One of the initial steps in developing an operational unit tactical/overview plan should be to gather all updated information from current plans, completed projects and any relevant documents. This will ensure that redundancies are minimized and opportunities for larger collaborative fuel breaks can be explored. Selecting and designing appropriate fuel management polygons for wildfire risk reduction involves consideration of a number of parameters across the landscape. Integrating existing planning initiatives is critical to ensuring effective wildfire risk reduction. Forest management programs may be underway in the given area of interest. Within these documents, sections that are relevant to the proposed project should be identified and considered. Additional documentation to consider for identifying complimentary resource objectives or constraints will come into play during the design phase.

Analysis Process

Planning Unit Identification

Operational units may be identified from existing plans or be identified on maps. Risk based landscape scale plans may have already identified areas of high and low risk that can influence how landscapes are treated. CWPPs, fuel treatment opportunity plans, or landscape level fire management plans may also assist in identifying operational units. Operational units may also be defined by areas of concentrated values or follow features such as rivers, watershed boundaries, roads, jurisdictional boundaries, etc when not identified within existing plans.

Development of Values at Risk (VAR) Priorities and Fire Management Objectives

Once an operational unit has been identified, values priorities and associated fire management objectives need to be determined.

Values at Risk Prioritization

Values are usually prioritized based on consequence of the value's interaction with fire. Priority values may have already been identified via landscape scale risk-based plans; however, they may need some refinement. If priorities have not been identified, then workshops and/or direction from the land manager may be required to establish priorities. Priorities must follow the RSWAP categorization for values unless accompanied by a written justification. So, values within the life category are priority one followed by critical infrastructure, high environmental and cultural values and lastly resource values.

Fire Management Objectives

Developing fire management objectives is a key component of operational unit tactical planning. For an operational unit fire management objective are needed. These objectives are intended to provide for the minimization of harm to values at risk, provide for additional suppression options and describe the role of fire within the operational unit. Hence, FireSmarting of values, fuels treatments with specific value protection objectives, and changes in practice to reduce fuel loading and application of beneficial prescribed or wildfire to achieve ecological benefits are all potentially fire management objectives depending upon the nature of the operational unit. Wildfire specific fire management objectives may also be appropriate. These objectives usually relate to efforts to limit wildfire size or reduce overall fire intensity for the operational unit. The level of planning to achieve fire management objectives may range from broad in which fire is desired over large areas with few values at risk to intensively managed landscapes in which there are many values at risk. As operational units change over time in terms of fuel growth and development fire management objectives may need to be reviewed and adjusted accordingly.

Fire management objectives may compliment or be inconsistent with other identified land management objectives. Inconsistencies will need to be resolved during the tactical planning work. As much as possible efforts should be made to have objectives compliment one another however this may not always be feasible and guidance from higher level management may be required. That said public safety is always paramount.

Development of Potential Treatment Options

The general process for identifying fuel management opportunities, including prescribed fire, consists of the following two key steps.

1) Gathering relevant input data
    a. Current plans and polygons for proposed areas
    b. Updated spatial data on treated areas or areas undergoing treatments including other disturbance history (e.g. recent wildfires, forest health impacts, biomass utilization potential)
    c. PSTA and WUI Risk Class data
    d. Jurisdictional Boundaries
    e. Land Manager Priorities and Values

f. Any other relevant data (See Appendix A)

2) Analysis: Utilizing input data and performing an updated spatial analysis to highlight areas in which fuels management and/or changes in practice may be located.
   a. This would ordinarily consist of identifying on a map the potential fuel treatment area and identify the corresponding fuel type.
   b. The associated fuel type map be modified to reflect the identified area. The existing fuel type(s) would be modified to reflect a lower hazard fuel type or be converted to nonfuel for potential efficacy modeling within Prometheus or BurnP3.
   c. In combination with expert opinion run treatment efficacy modelling using modified fuel type to align with proposed treatment objectives (Optional).
3) Ground Truthing

Strategic Treatment Placement and Boundaries

Determining where to place fuel breaks, how big those treatments should be, and how often these treatments need to be maintained have all proven difficult questions to answer for people working in diverse landscapes.[5] Trying to identify where the WRR investment can have the largest impact is a key problem for land managers. Principles for the strategic placement of fuel treatment areas include location in consideration of anticipated fire spread toward values, improvement to suppression effectiveness during of a wildfire event, and investment efficiencies.

In order to modify fire behaviour across broad landscapes, fuel treatments need to be strategically located and of adequate size in anticipation of fire movement. This means considering local factors affecting spread patterns including wind patterns and topography. Further, taking advantage of pre-existing low threat conditions as well as ease of access both for treatment can help maximize the effectiveness. Taking this into account, table 1 summarizes considerations for strategic placement and adequate size of fuel treatments. Factors are further expanded on below

Factors	Placement & Size Considerations	Influence		
		Spread	Control	Effectiveness
Wind patterns	Upwind of values at risk	✓		
	Rate of spread and spotting distance for size		✓	
Topography	Treat downhill of values to protect against uphill spread	✓		✓
	Increase size to accommodate topographic influences		✓	✓
Existing fire barriers	Anchored to areas of existing relatively low flammability		✓	✓
Access	Tie in to adjacent roads		✓	✓

Table 1 - considerations for strategic placement and size of fuel management projects

Generally, larger areas are more effective at moderating fire behavior than smaller areas. Treatment size should consider creating gaps and openings to further reduce the potential for crown fire. Treating in strategic locations can help break up continuity in both horizontal and vertical layers of fuels. For

[5] US Forest Service. 2008. Fire Science Brief Issue 5.

example, reducing fuels adjacent to natural features, such as meadows and rock outcroppings, and manmade features, such as roads, helps fire response personnel connect fire control lines to these locations.[6]

Developing fuel management objectives entails the consideration of any of the following as well as any additional issues identified by team members.

a. Fuel treatments whether prescribed fire or manual/mechanical fuel modification, should be located to achieve desired outcomes.
b. Stand treatments should be spatially designed to achieve fire behaviour objectives and may achieve other ecological objectives (e.g. width, prescribed fire compatible – shape, road locations etc.).
c. Proposed treatment units should be accessible for both initial treatment and maintenance and consideration given to associated costs for less accessible treatment units.
d. Fuel treatment design should also consider constrained areas (i.e. private land, constraints that preclude treatment), and treatment method (commercial timber harvest, mechanical, prescribed fire, etc.).
e. For each proposed fuel treatment unit (uniquely identified) specify the rationale for and the fire management objectives related to the desired change in fire behaviour that will guide future fuel treatment prescription development. For example:
    i. conduct fuel treatments in the WUI to create residual stands characteristics that do not support active crown fire.
f. Prescribed burning may include both fuel reduction as well as ecological enhancement/restoration objectives.
g. Plan for the application of prescribed fire under suitable conditions to provide ecological benefits, reduce fuel loading, and reduce the probability of catastrophic fire in the future.
    i. Where prescribed fire is a planned activity boundary design should be consistent with logical burn unit planning principles including: utilizing topographical breaks and manmade and natural features (roads, railways, hydro transmission lines, gas pipelines, wetlands, lakes, irrigated fields, non-fuel areas, etc.).
h. Fuel treatment objectives that involve stand conversion from, for example, conifer to less flammable deciduous as well as prescribed fire need to consider ecological constraints. Sites need to be conducive to the establishment and growth of deciduous species (see BEC and/or fire management stocking standard guidance).

[6] Fitzgerald S.A., and Bennett M. 2017. A Land Manager's Guide for Creating Fire-Resistant Forests. OSU Extension Catalog. EM 9087.

i. Consider all potential options during operational planning, including: commercial timber harvesting, ecosystem restoration, etc., as well as all relevant programs and funding sources such as land-based investments, habitat conservation, Community Resilience Investment (CRI), Emergency Response (ER), and other potential partners.
j. It is good practice to consult with area tenure/permit holders to ensure there are no conflicts with proposed WRR planning and to look for opportunities to work together/create partnerships.

Simulating Potential Treatment Options

Multiple fuel treatment scenarios may be evaluated through iterative modeling of different fuel break/fuel treatment/practice change options by employing benign fuel types or non-breach able nonfuel fuel types within BurnP3/ Prometheus runs.

Output from BurnP3 and Prometheus runs should include fire perimeter(s), fire intensities and rates of spread across the area of interest. These parameters will assist in evaluating treatment scenarios. Contact Dana.Hicks@gov.bc.ca for information on Burn P3 products, and scenarios runs.

All modelling must be done by competent, trained individuals that have a full understanding of the assumptions and limitations of the model. Many of the modelling products available require considerable set up and data/information collection. The lack of availability of trained individuals to run these models is an issue. It should not be assumed that modellers are always available. A minimum of one-month lead time is suggested for any Prometheus or Burn P3 requests.

Evaluating Potential Treatment Scenarios (optional)

The evaluation of treatment options derived from simulations consists of analysis of outputs relating to:

1) fire behaviour,
2) impact on values at risk,
3) fire management objectives achievement, and
4) evaluation of overlapping land management objectives.

From the perspective of fire behaviour, evaluation of change in burn probability for priority values at risk, fire intensity (if fire impacts values at risk), and rate of spread are key parameters to be considered.

Impact of treatment strategies on values at risk is primarily concerned with fire intensity if a value is impacted by wildfire. Some values are enhanced by fire with respect to ecosystem function, community values, or ecosystem resilience while others are destroyed. Different effects should be considered in evaluating treatment regimes.

Achievement of fire management objectives should also be considered. Objectives might include reduced fire size or intensity across the area, maintenance of low fuel conditions through prescribed fire, enhanced suppression opportunities through establishment of places to use in fire suppression (e.g.

safe zones, places from which to back burn or burn off against the main fire), potential enhancement of wildlife habitat, etc.

Evaluation of overlapping land management objectives could be conducted in order to determine if they will be achieved or increased by potential fuel management strategies. Simulation of fuel treatments may result in differences between land management objectives and/or be incompatible with legally identified objectives (e.g. species at risk, VQOs, etc). Identification and resolution of these kinds of conflicts is a part of developing a tactical plan.

The working group evaluating different tactical treatment plans will need to consider the different options and select the most appropriate plan considering public safety, efficacy, costs, practicality, and potential impacts on stakeholders.

Outputs

The primary output from the tactical planning must be a written plan detailing the operational area, including a description of the area that includes some fuel weather, fire history, fuel management treatments/breaks and changes in practice and constraints identified. Assumptions made during the development of the plan must also be indicated. Finally, the plan should include necessary information for areas requiring post-treatment maintenance. Treatment areas must be identified on accompanying maps.

Deliverables should include:

1. A table of prioritized fuel treatment or reconnaissance areas, including a unique Fuel Treatment ID, total area (Ha), treatment objective(s) and rationale, identification of overlapping objectives.
2. PDF map and spatial data, as identified in Appendix B, incorporating:
    a. land status overlaps,
    b. proposed Fuel treatments units,
    c. previously completed treatment areas,
    d. assessment plot locations.

Appendix A - Additional Prerequisite Information and Tools for Operational Planning

The following table lists a number of additional information items and tools which may assist in tactical planning.

Operational Unit Land Management Issues	Prerequisite Tools for Operational Planning
- Land manager prioritization of values	- WUI risk class analysis ranked WUIs) of high and low risk)
- Operational unit fire management objectives	- Values Maps (50m pixels raster)
- Land management activities and limitations associated with the operational unit	- Aspect and slope maps - Biogeoclimatic zone information
- Land management activities timing	- Fire Response functions
- Land management practices (hazard abatement, grazing intensity, etc)	- Fuel type map including Natural non-fuel (rivers lakes rock snow ice etc) and developed fuel breaks (fuel breaks, roads, young harvest blocks <3yrs etc)
- Land management restrictions	- Provincial strategic threat analysis
- Fire management stocking standard guidance	- Wind roses
- Ministry stocking standard guidance and spreadsheets	- Prometheus output - perimeter
	- BurnP3 output - burn probabilities - simulated fire perimeters - fire intensities (seasonal)

Appendix B – Requirements for Map and Spatial Data

Geoferenced PDF map that clearly represents (at a suitable scale) the following required content and spatial data submissions.

A. **A Fuel Management Treatment Map** (PDF format), at appropriate scale**:**
   - Operational Unit Boundary with land status and tenure overlaps (e.g. range, area-based tenures, woodlots)
   - Proposed Treatment Unit / labelled by Treatment Unit ID)
   - Relevant Assessment plot locations / labelled by Plot Number
   - Previously completed fuel treatments if applicable (labelled by year)
   - Descriptive title
   - Project number and proponent name
   - Date
   - Scale (as text or scale bar)

- Reference data: roads, railways, transmission lines, pipelines, water bodies and rivers/creeks etc.
- North arrow
- Legend
- Compress map files to reduce unnecessary large file sizes

B. Spatial data layers (compatible with ESRI ArcGIS 10.6 and accompanied by KMZ format)**:**

Feature Layer Name	KMZ	Feature Layer Description	Mandatory Attributes	Attribute Description	Attribute Details (Data type, length)
PROJECT_ BOUNDARY	YES	Single or multi-part dissolved polygon layer defining the net project area	DATA_COLLECTION_DATE	Date spatial data was collected	Date (DD/MM/YYYY)
			DATA_COLLECTION_METHOD	Method of spatial data collection (ex. GPS, digitized, etc.). See Attribute Value Reference Table.	Text, 45
PROPOSED_TREATMENT_ UNIT	YES	Operational treatment units	TREATMENT_UNIT_ID	Treatment Unit ID	Text, 10
			LOCATION_NAME	Geographic description of treatment unit	Text, 50
			DATA_COLLECTION_DATE	Date spatial data was collected	Date (DD/MM/YYYY)
			DATA_COLLECTION_METHOD	Method of spatial data collection (ex. GPS, digitized, etc.). See Attribute Value Reference Table.	Text, 45
			AREAHA	Area in hectares	Double
ASSESSMENT_ PLOT	YES	Field assessment plot locations	PLOT_NUMBER	Plot number corresponding to Assessment Worksheet	Text, 7
			DATA_COLLECTION_DATE	Date spatial data was collected.	Date (DD/MM/YYYY)
			DATA_COLLECTION_METHOD	Method of spatial data collection (ex. GPS, digitized, etc.). See Attribute Value Reference Table.	Text, 45
			COMMENTS	Any comments not included in accompanying table.	Text, 255

C. Spatial data requirements:

e. Data Format and Naming Conventions:

Data must be in a file geodatabase (GDB) and KMZ format and must conform to the conventions for feature dataset names, feature class names, attribute names, and attribute values as identified in these accompanying tables. It is strongly recommended that you use the template GDB to facilitate meeting this requirement.

GDB and KMZ names should adhere to this naming standard: <NR District>_ <Project Name>

f. GDB Projection:

NAD_1983_BC_Environment_Albers (EPSG:3005)

Central meridian:	*-126.0° (126°00'00" West longitude)*
Latitude of projection origin:	*45.0 (45°00'00 North latitude)*
First standard parallel:	*50.0° (50°00'00" North latitude)*
Second standard parallel:	*58.5° (58°30'00" North latitude)*
False easting:	*1000000.0 (one million metres)*
False northing	*0.0*
Datum:	*NAD83, based on the GRS80 ellipsoid.*

g. Data Quality:

Submitted data must meet general data quality guidelines to ensure corporate data quality standards are met. Data with slivers, gaps between adjacent polygons, and geometry errors will not be accepted.

h. Submission:

- The method for spatial data submission is a file geodatabase (GDB) compressed into a zip file and KMZ file(s)

i. Additional notes:

- The Operational Unit Boundary represents the net operational area.
- One single or multi part polygon must be submitted for each treatment unit and/or activity.
- Project boundary, Treatment unit and spatial hectares must match the net hectares stated on the maps and in the table.

D. Attribute Value Reference Table:

DATA_COLLECTION_METHOD	DESCRIPTION
differentialGPS	The data was captured with a differential GPS unit, or was post-processed with information received from known reference stations, to improve data accuracy.
Digitizing	The data was converted from an analog map into a digital format using a digitizing tablet connected to a computer.
GISAnalysis	The data was created as a result of a GIS Analysis.
nondifferentialGPS	The data was captured with a GPS unit but was not post-processed or was captured with a GPS unit incapable of doing differential GPS.
orthoPhotography	The data was delineated from an orthophoto (aerial photography).
Photogrammetric	The data was delineated using photographs or images in stereo pairs
satelliteImagery	The data was delineated from a satellite image.
sketchMap	The data was hand sketched, either on an analog map or on-screen.
tightChainTraverse	The data was surveyed with a hand compass and chain to create a closed traverse.

References

Fitzgerald S.A., and Bennett M. 2017. A Land Manager's Guide for Creating Fire-Resistant Forests. OSU Extension Catalog. EM 9087.

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