North Idaho Nutrition Guidelines By Rock Type
Version 1.1*

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Nutrition guidelines for use in conjunction with current digital geology for most of north Idaho and portions of northeastern Washington

***** *This version includes corrected Category labels for intrusive and extrusive dikes and sills in Appendix C. Both paper tables in this document and electronic tables which accompany this report have been updated. Also, contact information for obtaining paper and digital geology maps have been revised.*

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Introduction

This document was prepared as a guideline for foresters to use in determining appropriate nutrient management strategies for forest stands on various rock types in north Idaho and portions of northeastern Washington. The guidelines proposed in this document are based on both observational and experimental evidence compiled by the Intermountain Forest Tree Nutrition Cooperative (IFTNC) since its inception in 1980.

Nine digital geologic maps covering most of north Idaho and portions of northeastern Washington were compiled for this report. A location map showing the maps used in this compilation is shown in Appendix A. *Four of these maps, the Headquarters, Missoula West, Kookia and Hamilton 1:100000 quadrangles, are in preliminary form. Expect the map units to change over time. Stands in these areas MUST be field checked for rock type before proceeding with nutrient management decisions.* A listing of all rock units from each of the nine maps was extracted, for a total of approximately 435 rock units. Each of these rock units was assigned to one of 59 lithology groups, labeled as 'LITH_GRP' A complete listing of rock units by map is shown in Appendix D, along with a brief description and the corresponding lithology grouping. Each rock unit was also assigned to one of four broad categories, labeled 'CATEGORY.' These four categories include extrusive/ basaltic rocks, intrusive/ granitic rocks, metamorphic rocks, and mixed rocks.

The following section of the report discusses nutrient management strategies for each rock category. Within each category, the guidelines are further subdivided based on the lithology groupings. These guidelines are based on the current state of knowledge regarding rocks and forest growth. We fully expect these guidelines to be further refined with additional experience and experimentation.

Caveats: Geology maps are a useful tool in forest management. However, the user must be aware that geology maps were not developed for use at the forest stand level. We have found the updated north Idaho geology maps to be very good for giving a general idea of the rocks likely to be found in a particular area, and often the maps are precise to the stand level. Nonetheless, foresters must always verify the rock type in the field before considering fertilization options. The information included in this report is intended only to provide general guidelines to be considered in the formulation of silvicultural prescriptions.

Nutrient Management

"Nutrient management" refers to silvicultural activities and their effect on the nutrient capital of a forest stand. We know that most of the nutrients in a mature stand are contained in the foliage and branches. Thus a good, conservative nutrient management strategy would be to leave the tops and limbs on-site during harvesting operations. We know that some species are more nutrient-demanding than others, so planting a nutritionally-challenged site with less-demanding species would be a good nutrient management strategy. We know that fire suppression has increased the presence of shade-tolerant, nutrient-demanding species and has also altered the cycle by which nutrients were naturally returned to the system through fire. We also know that a cool fire can effectively return much of the on-site nutrient capital to the soil. Therefore, using cool burns for slash control, site preparation or intermediate treatments can be a good nutrient management strategy.

Fertilization

Fertilization is an additional nutrient management strategy which may be used to improve the health or productivity of forest sites. Regardless of rock type, we recommend that good nutrient management always be practiced during silvicultural operations. Vegetation series is the first criteria to review when considering a fertilizer application. Western red cedar vegetation series, which usually indicate the presence of an ash cap, are the highest priority for fertilization, followed in descending order by grand fir then Douglas-fir series. Do not fertilize true ponderosa pine series.

If the vegetation series is appropriate for fertilization, rock type should then be considered. Use the guidelines in this report to determine whether a rock type is appropriate for fertilization, and which elements are recommended for application. The decision of how much of each element to apply will be dictated by financial and other operational constraints. The IFTNC can provide guidance on application rates based on these constraints as well as the current state of knowledge regarding rates and responses.

Recent experience suggests that young stands, particularly plantations established after high levels of biomass removal and mechanical site preparation, are often deficient in sulfur and boron. This seems to be true for all rock types, but the nutrient status is relatively worse on "bad" rock types. Thus, stand management history should be considered when assigning fertilization priorities for any site.

Nutrient Assessment by Nutrient Management Group

The following section of the report discusses nutrient management strategies for each of the four broad rock categories, labeled CATEGORY. Within each CATEGORY, the lithology groupings (LITH_GRP) are used to assign nutrient management guidelines. Appendix A discusses how to use this report in collaboration with geology maps for north Idaho and northeastern Washington. Source data for each of the nine maps used in this report is given in Appendix B. In Appendix C, classification tables for each of the nine maps are shown, which include the CATEGORY and LITH_GRP assignments for each rock unit on each map. A compiled table showing all rock units and their original map descriptions is provided in Appendix D.

Nutrient Management Guidelines

CATEGORY 1: Extrusive/ Basaltic Rocks

Extrusive igneous rocks were formed when magma moved to the earth's surface either as a flow or eruption and then cooled rapidly, producing a fine grain size. Basalts are the most common extrusive rocks, but rhyolites, dacites and andesites are other types of extrusive rocks. Basalts in our area most often occur as widespread floods of basaltic lava. Some extrusives occur in dikes and sills. Also included in this category are volcanic rocks, which include anything from ash flows to pumice to ejecta such as glass and rock fragments, which occur during the violent explosions associated with volcanic eruptions. Some additional metamorphism of extrusive rocks may have occurred in some cases, leading to the occurrence of metavolcanic rocks.

LITH_GRP: Basalt and Basalt, P

Basalts are the most common extrusive rocks, and are typically composed of plagioclase feldspar and clinopyroxene. Plagioclase feldspars contain Si, Al and some combination of Ca and/or Na. The term 'clinopyroxene' refers to a group of minerals which contain Si, Ca, and some combination of Mg and/or Fe. Basalts do not contain quartz. Some basalts are referred to as 'porphyry,' which means that they are full of air pockets and pores. This does not affect their chemical composition but may contribute to increased weathering rates due to increased surface area. Some basalts have a high content of glass, which may break down relatively quickly due to its unstable nature, but could also inhibit overall rock weathering due to decreased rock porosity.

Some basalts show particularly high phosphorus levels, and these basalts were labeled as 'basalt, P.' One high-P basalt unit known as Wanapum basalt has shown poor response to N-only fertilization in IFTNC trials. Whether the high P levels or some other feature affects the response is uncertain, however to be conservative we have separated out the high P basalts wherever possible.

Fertilization recommendation for basalt and basalt, P

Due to their fine-grained nature, basalts tend to form clay-rich soils. One of the greatest values of basalt-derived soils is the moisture-holding capacity. Basaltic soils should be fairly rich in several important nutrients, including Mg and Ca. While K content of basalt rocks is fairly low, the K-retention of basaltic soils should be quite good. High cation exchange capacity (CEC) and base saturation are important qualities provided by basalt parent materials. Basalts are generally considered 'good' rocks and good candidates for fertilization. Research on IFTNC study sites in central Washington and northeast Oregon indicates that some differences in fertilization response may be expected between the 'generic' basalts and the high P basalts. Generally, good response may be expected on most basalts when N-only is applied. Experience with some high P basalts has shown that S may be necessary in order to elicit a growth response to fertilization.

Expected Soil Development: Moderate to deep, fine loamy soils
Expected Nutrient Status: Good
Expected Fertilization Response: Good
Recommended Formulation:

N only on most basalts.

N+S on high-P basalts.
Good multi-nutrient blend candidates, consider screening trials.

LITH_GRP: Extrusive Dikes and Sills, Volcanic Rocks, and Metavolcanic Rocks

Extrusive dikes and sills have been mapped in a number of north Idaho locations. Some of these dikes and sills are composed of rhyolite or dacite, both of which are light-colored extrusive rocks. We do not currently recommend fertilization on these rock types. Units mapped as volcanic rocks can be composed of a wide array of materials, from solidified ash to rock shards to glass. One IFTNC research site occurred on a site mapped as volcanic rock, and this site was very difficult to characterize for rock type due to the wide variation of materials, including everything from siliceous fragments to pumice. However, basalts may also be included in map units labeled as 'volcanic rocks.' Sites labeled in this manner should be field-checked, and if the rock is in fact basalt, the site may be treated as a basalt. Otherwise, we do not currently recommend fertilization on volcanic rocks. The metavolcanic group includes rocks such as amphibolite, which usually refers to a metamorphosed basalt, and otherwise metamorphosed volcanic rocks.

Fertilization recommendation for extrusive dikes and sills, volcanic and metavolcanic rocks

We do not currently recommend fertilization on any of these rock types. Conservative nutrient management practices should be followed.

Expected Soil Development: Variable
Expected Nutrient Status: Variable
Expected Fertilization Response: Unknown
Recommended Formulation:

Fertilization not recommended.

CATEGORY 2: Intrusive/ Granitic Rocks

Intrusive rocks are igneous rocks formed from magma which cooled inside the earth's crust. Because of this slow cooling process, intrusive rocks formed large grains which are usually visible in hand sample. Granites are the most common example of intrusive rocks.

LITH_GRP: Light, Dark and Undivided Granites (including Priest River Complex)

For purposes of this document, the granites were designated light, dark or undivided. 'Light' granites are those such as quartz monzonite, syenite, other granites which contain predominantly quartz and potassium feldspar, with some plagioclase feldspar, and very few dark minerals. These granites will probably be pink, orange or white in appearance. 'Dark' granites are the quartz diorites and tonalites, which tend to contain primarily quartz and plagioclase feldspar, with some potassium feldspar and an abundance of dark minerals. These granites will probably be gray or have salt-and-pepper appearance. The main difference between these two classes of granites is that one of the black minerals often contained in dark granites is biotite, a potassium-bearing black mica. Biotite expands when it weathers, which contributes to a faster

breakdown of the granite, and furthermore is a good potassium source. The other dark mineral commonly found in dark granites is hornblende. The difference between biotite and hornblende is that biotite appears very shiny and breaks easily into sheets. Hornblende is more blocky, not as sparkly in the sun, and does not break into sheets. Hornblende does not have the same weathering properties as biotite, and is not a potassium source.

Granitic rocks belonging to the Priest River Complex were designated separately from the other granites, because these granites are described as being intermingled with metamorphic rocks. Most of the metamorphic rocks are from the Belt Series metasedimentary group, and other metamorphic and carbonate rocks are mixed in as well. Therefore, some caution must be exercised in determining nutrient management strategies for these rocks. The best strategy would be to visit the stand and make an on-site rock assessment. The site should then be treated based on the predominant rock type.

Fertilization recommendation for granites

Granitic rocks are expected to weather to coarse, well-drained soils with low water-holding and low nutrient-holding capacity. Soil particles will be largely composed of quartz and feldspars, with plagioclase feldspars dominating the dark granite types and K-feldspars becoming more evident on the light granite types. In all granitic soils, cation-exchange capacity is expected to be low due to low clay content. Generally, moderate to poor results have been obtained through fertilization with N-only on these rock types. The addition of K to the blend is expected to give a better response than N alone, especially on the light granites and the hornblende-dominated dark granites. Multinutrients might be an option here, however fertilization screening trials would be recommended as a means of evaluating the cost-effectiveness of such an operation. With Priest River Complex granites, evaluate the site for rock type and treat the stand accordingly.

Expected Soil Development: Moderate to deep coarse soils
Expected Nutrient Status: Moderate
Expected Fertilization Response: Moderate
Recommended Formulation:

Light granites: Do not fertilize with N-only.
Dark granites: Maybe fertilize with N-only, but only if rock shows high biotite (K) content.
All granites: N+K recommended.
Possible multi-nutrient blend candidate -- recommend screening trials.

LITH_GRP: Intrusive Dikes and Sills

Also in the intrusive/granites category are 'intrusive dikes and sills.' Dikes and sills tend to be harder rocks, often occurring in outcrops because they don't weather as easily as surrounding rocks, and don't tend to support good tree growth. Until we have more information, fertilization on sills and dikes is not recommended.

Fertilization recommendation for intrusive dikes and sills

We do not currently recommend fertilization on dikes and sills. Conservative nutrient management practices should be followed.

Expected Soil Development: Poor
Expected Nutrient Status: Moderate
Expected Fertilization Response: Unknown
Recommended Formulation:

Fertilization not recommended.

CATEGORY 3: Metamorphic Rocks

A large proportion of land in north Idaho falls into the metamorphic category. The vast majority of these are metasedimentary rocks, most of which pertain to the Belt Supergroup of metasedimentary rocks, also known as the Belt series or Belt rocks. The formal nomenclature of these rocks is based on a hierarchy composed of groups, formations, and members. In north Idaho, the Belt rocks are commonly known by their formation names. The most common *formations* in north Idaho include Prichard, Burke, Revett, St. Regis, Wallace, Striped Peak, and Libby. Several formations are further subdivided into *members*. Both the Prichard and Wallace formations are subdivided into upper and lower members, and the Wallace also includes a middle member. The Striped Peak formation is subdivided into members 1, 2, 3 and 4. Sometimes, the formations are *group*ed together. The Burke, Revett and St. Regis formations are often jointly referred to as the Ravalli Group. In northeast Washington, the Deer Trail Group is another set of metasedimentary rocks which occur over a fairly wide area. These are not part of the Belt Supergroup. In addition to or instead of the formal names described above, metamorphic rocks may have lithology descriptors. The most common lithologies are argillite, siltite, quartzite, schist and gneiss. Sometimes we see carbonate rocks, phyllites, or general metamorphic or metasedimentary rocks in this category as well.

The IFTNC has generally considered rocks in this category to be poor nutrient sources. Most of them are metasedimentary rocks, and the 'parent' sediments would have consisted of stable, transported minerals such as quartz, feldspars, and muscovite. Because these minerals were so stable to begin with, and were then recrystallized and cemented together, these rocks are expected to be a poor nutrient source. We have few fertilization trials on these rock types, mostly because it is so difficult to find successful stands of trees on these rocks in which to install the trials. Where we do have trials on these rock types, mostly on schists, we consider those rocks to be 'the best of the worst.' More recent observations of soil development and stand behavior have led us to believe that different metasedimentary rocks may weather at different rates. Softer rocks may yield deeper soils, which may in turn provide a better nutrient source for forest stands. It may be that as we continue to work with metamorphic, and especially metasedimentary rocks, more of the rocks currently thought unsuitable for fertilization may be reconsidered for fertilization. At the moment, we do not have strong fertilization recommendations largely because we don't have many trials on these rock types.

LITH_GRP: Schists, Gneisses, lower and middle Wallace formation

A schist is a highly metamorphosed foliated rock of either granitic or sedimentary derivation, often mica-bearing. Most of the schists in north Idaho and northeastern Washington belong to the Belt Supergroup. The Wallace, Prichard, St. Regis and Revett formations and the

Ravalli group all contain schist members. Since we do have some information on Wallace and Prichard schists, we have labeled schists as 'medium' rocks from a nutrition perspective. Stands on schists responded better to N+K than to N-alone. Sulfur is an element which should be monitored closely on schist types, as foliar S deficiencies have been detected for both Douglas-fir and grand fir on mica schist parent materials on at least one IFTNC study site.

A gneiss is a highly metamorphosed rock of either granitic or sedimentary derivation. These rocks also show alignment, however rather than forming thin sheets like schists, these tend to have more of a banded appearance. The black bands often contain biotite, which may be a good potassium source as described in the section on granitic rocks. Gneisses often behave rather like granitic rocks in terms of decomposition and soil properties. However, we don't have a large number sites on gneiss. Some gneisses may be harder than granites, making them less likely to form the deep, sandy soils which are characteristic of granites.

The lower and middle Wallace formation rocks are composed primarily of siltite and argillite. While some of the other Belt rocks also have siltite and argillite members, the Wallace unit seems to be a softer, more weatherable rock than the others. While the nutrient properties of the Wallace siltite and argillite are probably not much different than other Belt rocks, the fact that these rocks weather to deep soils probably allows for a reasonably large pool of nutrients to be available to tree growth. We do recommend that foresters field check stands on lower and middle Wallace formation and verify the presence of deep soils, particularly if considering fertilization.

While we are tentatively rating schist, gneiss and lower and middle Wallace as potential fertilization candidates, sites mapped for these units should be examined for soil depth and stand condition. If a site shows shallow soils or is difficult to regenerate, the site should probably not be considered for fertilization at this time.

Fertilization recommendation for schist, gneiss and middle and lower Wallace

These rocks are expected to weather to loamy to sandy soils, well-drained with low to moderate water-holding and nutrient-holding capacity. Soil particles will be largely composed of quartz, muscovite and feldspars. Cation-exchange capacity is expected to be low due to low clay content.

Expected Soil Development: Moderate to deep sandy to loamy soils
Expected Nutrient Status: Moderate
Expected Fertilization Response: Moderate
Recommended Formulation:

Do not fertilize with N-only.
N+K recommended minimum formulation.
For schists, consider N+K+S.
Possible multi-nutrient blend candidate -- recommend screening trials.

LITH_GRP: Metamorphic rocks, quartzites, argillites, phyllites Deer Trail Group, other Belt rocks

All of the remaining rocks in the metamorphic category are currently considered unsuitable for fertilization, primarily due to lack of information. Quartzites in particular are very low in nutrients, and contain mostly quartz sand. Argillites often have a very high potassium

content, but little else in the way of nutrients, and are likely to weather to a slaty, layered rock which forms very shallow soils. Phyllites are another type of highly metamorphosed rock, similar to schists and gneisses. We have no fertilization trial sites on this rock type. The Deer Trail Group are metasedimentary rocks found mostly in northeastern Washington. We have one seedling trial on a Deer Trail argillite, and it is considered a bad rock site, with very thin soils and poor tree growth. The other Deer Trail rocks include carbonate rocks, quartzite and metasedimentary rocks. We don't have much information on Deer Trail rocks, and pending additional research we do not currently recommend fertilization. Similarly, all Belt rocks besides the middle and lower Wallace formation are currently considered unsuitable for fertilization, pending further information.

Fertilization recommendation for other metamorphic rocks

We do not currently recommend fertilization on any of these rock types. Conservative nutrient management practices should be followed.

Expected Soil Development: Poor
Expected Nutrient Status: Variable
Expected Fertilization Response: Unknown
Recommended Formulation:

Fertilization not currently recommended.
Screening trials may be an option to sort out possible responders in this category.

CATEGORY 4: Mixed Rocks

"Mixed rock deposits" refer to deposits of rocks which were transported from another site to their present site, either by wind, water, glacial activity, tectonic activity, other geomorphic processes, or some combination thereof. As such, they may include a wide variety of rocks, leading to a wide array of possible geochemistry and mineralogy. This not only makes these rocks difficult to assign to a single rock-type category, but they are also difficult to categorize for nutrient management purposes. These transported materials are likely to contain large percentages of minerals which are resistant to weathering, as any easily-weathered materials would have either weathered out prior to transport, or were lost during transport. Probably the poorest nutrient environment will be provided by the deposits of fine materials, such as loess and tertiary sediments. The most common weathering-resistant minerals likely to be found in these finer sediments are quartz, potassium feldspar and muscovite. Because of their stable nature, these minerals are not likely to provide a readily available source of nutrition to the vegetation on the site. If larger pieces of rock were transported to the site, such as in glacial deposits, a somewhat better nutrient environment may be provided as these larger rocks decompose. In any case, the site should be examined and evaluated for both rock type and stand health prior to considering fertilization treatments.

LITH_GRP: Tertiary sediments

Tertiary sediments are typically associated with basalt flats, and are thought to be the result of materials eroding off of surrounding high points onto the basalt flats which formed when drainages were filled with lava during periodic basalt flows. By viewing the landforms in an area, it is often possible to detect the source of the sediments, simply by looking at the composition of the high points upstream from the flat or bench. For example, many of the high points in the St. Marie's area are Belt series metasedimentary rocks, thus many of the tertiary sediments in this area are formed from metasedimentary materials. Additionally, due to mineral weathering patterns, each transport event will result in an 'upgrade' of stable minerals in the parent material. That means an increase in the percentage of the stable minerals which are considered poor nutrient sources. So a rock which was 'medium' up on the hill might become 'poor' by the time it gets eroded and transported as sediment.

Fertilization recommendation for tertiary sediments:

The primary value of tertiary sediment materials is its water-holding capacity. Furthermore, the presence of clays in much of this material should allow for reasonably good cation-holding capacity following fertilization. However fertilization should be carried out with caution, as 'square death' has occurred on IFTNC sites on similar sediments in northeast Oregon following application of nitrogen (N) at a rate of 400 lb/ac. Based on recent experience with operational N fertilization response, our guess is that materials derived from basalts show good response to N only fertilization. However we have also found that stands on some basalts need S in addition to N in order to achieve positive growth response. Therefore, N+S should be considered as a possible fertilization option on basaltic materials. Materials derived from granites or meta-sediments, as well as streamside and other mixed deposits, should not be fertilized with N only. That blend should at least include K in addition to N.

Expected Soil Development: Moderately deep to deep, clay-rich soils
Expected Nutrient Status: Variable
Expected Fertilization Response: Variable
Recommended Formulation:

Basaltic source: N alone probably OK, S may be needed.
Granitic or metasedimentary source: N+K.
Unknown source: N+K, possibly N+K+S.
Possible multi-nutrient blend candidate -- recommend screening trials.

LITH_GRP: Loess, sedimentary rocks, and carbonate rocks

Loess refers to deep, windblown deposits of mostly silt. In north Idaho, the loess is thought to have blown in from the south-central Washington area. Where we find forest stands growing on loess, an ash cap is also often present. Sedimentary rocks in the north Idaho area include a variety of sandstones, siltstones, claystones, and carbonate rocks, often intermixed with each other. Carbonate rocks include limestones, dolomites and marble, and are often found intermixed with other sedimentary rocks.

Generally speaking, these rock types are probably not going to provide a good source of nutrition to a forest stand. Loess types are probably more likely to support forest stands when found in conjunction with ash cap. We do not currently have enough information on loess,

sedimentary or carbonate types to make fertilization recommendations. We do recommend the use of good nutrient management practices.

Fertilization recommendation for loess, sedimentary rocks and carbonate rocks

We do not currently recommend fertilization on loess, sedimentary rocks or carbonate rocks. Good nutrient management practices should be followed.

Expected Soil Development: Variable
Expected Nutrient Status: Unknown
Expected Fertilization Response: Unknown
Recommended Formulation:

Fertilization not currently recommended.
Screening trials may be an option to sort out possible responders in this category.

LITH_GRP: Landslide Deposits

Landslide deposits refer to materials from a nearby source which were deposited in a landslide event. These could be modern or older landslide occurrences. Whereas modern scree-type deposits will obviously not provide much in the way of soil development for tree growth, older deposits may have well-developed soils and support forest stands. With landslide deposits, the recommended approach is to treat the site based on the lithology of the deposited material. The rock type should be verified on site. This information will often be available in the literature which accompanies the area geology map, as well.

Fertilization recommendation for landslide deposits:

Determine the source rock for the landslide deposit. This information might be found in the map literature, but will probably require field verification. Treat the site based on the dominant lithology of the deposit.

LITH_GRP: Glacial Deposits and Alluvial Deposits

Glacial deposits are commonly found in northern Idaho, western Montana and northeastern Washington. Glacial deposits may contain a wide array of rocks varying in both lithology and size. Many of the glacial deposits in our area were deposited by continental glaciers that carried rocks in from distant areas. We also have occasional smaller mountain glaciers, which were more likely to bring rocks in from small, local areas. The variety of rocks of different mineralogies and at different stages of decomposition provided by glacial deposits provide a fair to good nutrient environment for tree growth. Sites on the glacial flats in the Rathdrum Prairie area of northern Idaho which were subjected to agricultural activities such as plowing and discing prior to stand establishment may require special attention. These activities displaced and/or removed organic materials and topsoil to the extent that the nutrient environment was considerably altered. Stands on these glacial flats often show signs of nutrient stress at or shortly after crown closure.

Alluvial deposits generally refer to modern (quaternary era) streamside deposits, and are usually much younger than the tertiary sediments. Due to their relatively recent occurrence, these deposits will probably provide less well-developed soils than tertiary sediments. Alluvial

flats may occur near rivers as part of a floodplain, while in other instances, alluvial deposits may occupy wide expanses across drainages and show moderate to steep slopes. In all cases, the source material may or may not be local, and soil development and nutrition properties will be variable. As with the tertiary sediments, an upgrade in stable minerals will occur with each transport event. However, modern alluvial deposits will probably also retain a larger proportion of intact gravels and cobbles, providing a possible source of minerals for future weathering.

Fertilization recommendation for glacial deposits and alluvial deposits:

Good response to nitrogen fertilization has been obtained on glacial deposits. We don't currently have response data for alluvial deposits. Due to the wide array of possible parent rocks in both glacial and alluvial deposits, we would recommend the addition of K with N in order to assure proper nutrient balance. Sulfur is also an element which might be recommended for these mixed deposits. In the case of the Rathdrum Prairie glacial flats, preliminary data indicate that P and B may also be necessary. Glacial and alluvial deposits would be good candidates for multinutrient screening trials.

Expected Soil Development: Moderately deep to deep, loamy soils
Expected Nutrient Status: Moderate to Good
Expected Fertilization Response: Glacial till good, Alluvium unknown
Recommended Formulation:

Glacial deposits: N-only probably OK, but N+K, and maybe S, recommended.
Possible multi-nutrient blend candidate -- recommend screening trials.
Alluvial sites should probably have screening trials installed before initiating operational fertilization trials.

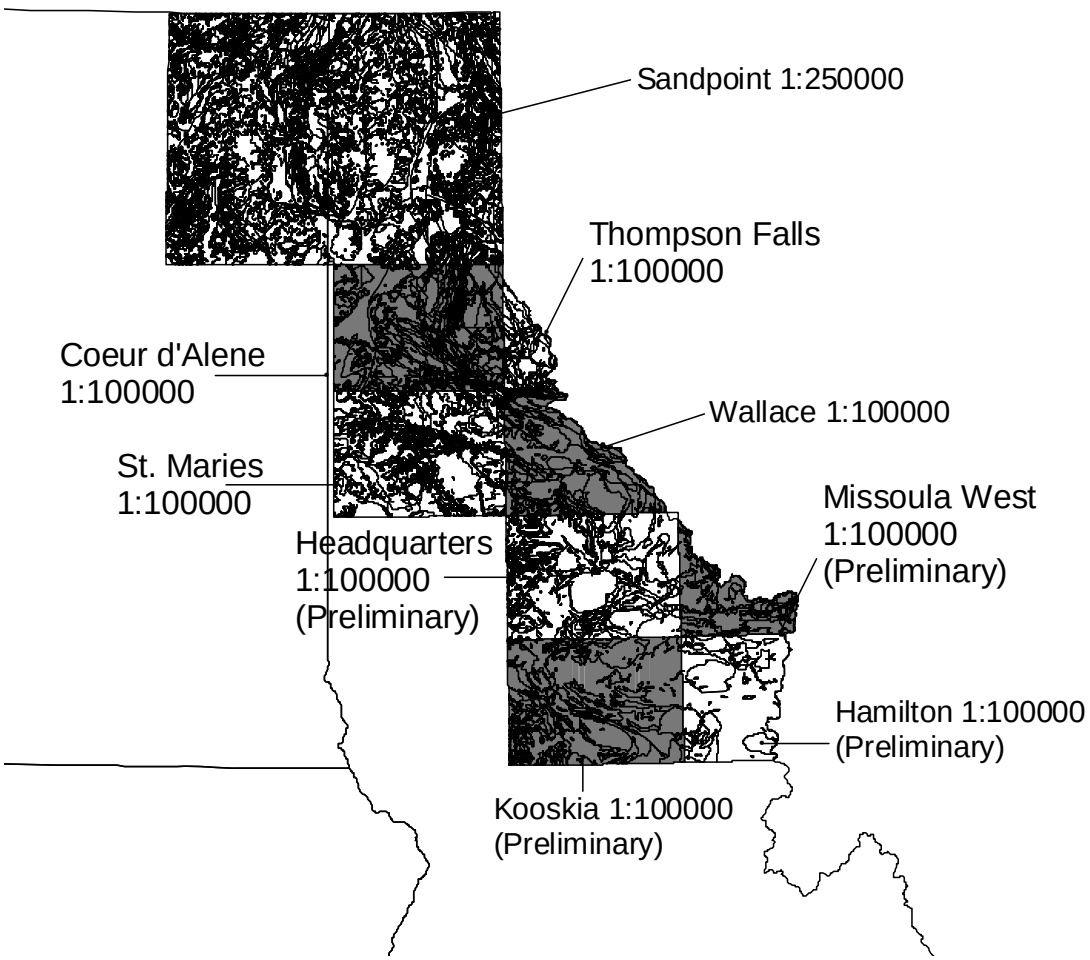
APPENDICES

Appendix A

Instructions for using this document

Get Maps

Obtain maps pertaining to the area of interest as shown in Figure A. Refer to Appendix B for source information.



If Using Paper Maps

If using paper maps, simply locate the rock unit for the stand of interest and look that unit up in the corresponding classification table in Appendix C.

If Using Digital Maps

If using digital maps, the same procedures described above may be followed, by looking up the rock unit label for the stand of interest and referring to Appendix C. Additionally, a set of electronic dBASE (*.dbf) files may be obtained to accompany this report. The set consists of nine files, one for each of the nine maps used to compile this report. Each file contains one table identical to the corresponding classification table provided in Appendix C. Each table may be brought directly into ArcView and joined to the corresponding map attribute table. The LABEL field in the dBASE table should be joined to the corresponding field in the digital map attribute tables as listed below. The one exception is the digital geology for the Wallace quadrangle, for which labels were not given with the digital map, but rather a numerical unit code was assigned. For the Wallace quadrangle, join the UNIT field in the dBASE table with the UNIT field in the digital map attribute table. This will bring in labels along with the additional IFTNC groupings. The following table shows which fields to use when joining the IFTNC tables with the digital map attribute tables.

MAP:	dBASE table field	Joined To	Digital Map Attribute table field
Coeur d'Alene:	Label		Label
Hamilton:	Label		Value
Headquarters:	Label		Value
Kooskia	Label		Value
Missoula West:	Label		Value
St. Maries:	Label		Value
Sandpoint:	Label		Label
Thompson Falls:	Label		Label
Wallace:	Unit		Unit

Classification Tables

The tables shown in Appendix C and the electronic tables which accompany this report contain four columns.

The first column is labeled '**LABEL**,' and includes a list of all the rock unit labels for the corresponding map. This is the same label found on paper or digital maps, and is an abbreviated text label for the rock mapped in that area. The LABEL field may be used to join the electronic table to the map attribute table for all maps except the Wallace 1:100000. For Wallace only, an additional column labeled '**UNIT**' is included in the DBASE table for use with the digital map. The UNIT is a numerical code corresponding to the map labels, which are not included in the digital version of the Wallace quadrangle. The IFTNC table includes both the UNIT codes and corresponding labels.

The next column is the lithology grouping, labeled '**LITH_GRP**,' and gives just a few words describing what type of rock the LABEL refers to. The LITH_GRP groups the rocks on the basis of lithology, and in the case of metasedimentary rocks may also include the formation name. For more detailed rock descriptions, refer to the original map documentation.

The third column gives the broad grouping labeled '**CATEGORY**.' The category refers to which of the four general rock groups that unit pertains to. This grouping is also based on lithology, and includes intrusive/granite, extrusive/basalt, metamorphic rocks, and mixed rocks. Water and man-made units are assigned to a category called 'Other' and are not discussed in this report. Once the LITH_GRP and CATEGORY are known, the user may refer to the appropriate portion of the preceding report which describes general nutrition guidelines for that rock.

The last column in the accompanying tables gives a quick evaluation of the rock's potential for supporting productive forest growth, and is labeled '**QUICKEVAL**'. This evaluation includes six categories, which are good, medium, bad, unknown, variable and other. Many of the rocks are labeled as 'unknown', mostly because we don't have fertilization trials or hard data on forest growth for these types. A number of units are also labeled as 'variable,' because these encompass a broad range of potential rock types. The 'other' category includes water and man-made units.

Edge-Matching

Users of these maps will find that some of the maps do not appear well edge-matched with surrounding maps. Some discrepancies exist between the Sandpoint 1:250K and Coeur d'Alene 1:100K quadrangles, which are primarily due to different language used by the map authors to describe the same or similar rocks. Most of the other discrepancies involve the edges of the four preliminary maps with each other and with surrounding maps, which should be resolved over time as these maps are updated. In all cases, the LITH_GRP assignments are based strictly on the written description of the rock unit accompanying the current digital geology maps used in this report. For this reason, the LITH_GRP and other IFTNC categories may also change when crossing map boundaries in what otherwise appears to be the same rock unit. Foresters should be particularly diligent about field checking rocks in these cases. Assistance may also be provided by geologists with the Idaho Geological Survey, who are currently working in most of these areas and are knowledgeable about the local rock types.

Appendix B

Map Source Information

Coeur d'Alene 1:100,000

Munts, S.R. and Idaho Geological Survey, 2000, Digital geologic map of the Coeur d'Alene 1:100,000 quadrangle, Idaho and Montana: U.S. Geological Survey, Open-File Report OF-00-135, scale 1:100000.

Source: United States Geological Survey (USGS) and Idaho Geological Survey (IGS)

Digital Map: http://ngmdb.usgs.gov/Prodesc/proddesc_34289.htm

Paper Map: Idaho Geological Survey
website: http://www.idahogeology.org
email: stanford@uidaho.edu
phone: (208)-885-7991
contact: Loudon Stanford

Hamilton 1:100,000

Idaho Geological Survey, 1996. Digital geologic map compilation of north central Idaho by 30 x 60 minute quadrangles. Digital geology of Nez Perce and Clearwater Forests. Scale 1:100000.

Source: Idaho Geological Survey (IGS)

Digital and Paper Maps: Idaho Geological Survey
website: http://www.idahogeology.org
email: stanford@uidaho.edu
phone: (208)-885-7991
contact: Loudon Stanford

Headquarters 1:100,000

Idaho Geological Survey, 1996. Digital geologic map compilation of north central Idaho by 30 x 60 minute quadrangles. Digital geology of Nez Perce and Clearwater Forests. Scale 1:100000.

Source: Idaho Geological Survey (IGS)

Digital and Paper Maps: Idaho Geological Survey
website: http://www.idahogeology.org
email: stanford@uidaho.edu
phone: (208)-885-7991
contact: Loudon Stanford

Kooskia 1:100,000

Idaho Geological Survey, 1996. Digital geologic map compilation of north central Idaho by 30 x 60 minute quadrangles. Digital geology of Nez Perce and Clearwater Forests. Scale 1:100000.

Source: Idaho Geological Survey (IGS)

Digital and Paper Maps: Idaho Geological Survey
website: http://www.idahogeology.org
email: stanford@uidaho.edu
phone: (208)-885-7991
contact: Loudon Stanford

Missoula West 1:100,000

Idaho Geological Survey, 1996. Digital geologic map compilation of north central Idaho by 30 x 60 minute quadrangles. Digital geology of Nez Perce and Clearwater Forests, scale 1:100000.

Source: Idaho Geological Survey (IGS)

Digital and Paper Maps: Idaho Geological Survey
website: http://www.idahogeology.org
email: stanford@uidaho.edu
phone: (208)-885-7991
contact: Loudon Stanford

St. Maries 1:100,000

Burmester, R.F., Frost T.P., Kauffman, J.D., and Lewis, R. S, 2000. Geologic Map of the St. Maries 30 x 60 Minute Quadrangle, Idaho, Idaho Geological Survey, Geologic Map GM-28, scale 1:100000.

Source: Idaho Geological Survey (IGS)

Paper Map:
http://www.idahogeology.org/Products/reverselook.asp?switch=title&value=Geologic_Map_of_the_St._Maries_30_x_60_Minute_Quadrangle,_Idaho

Digital and Paper Maps: Idaho Geological Survey
website: http://www.idahogeology.org
email: stanford@uidaho.edu
phone: (208)-885-7991
contact: Loudon Stanford

Sandpoint 1:250,000

Miller, F.K., Burmester, R.F., Powell, R.E., Miller, D.M., and Derkey, P.D., 1999, Digital geologic map of the Sandpoint 1 degree X 2 degree quadrangle, Washington, Idaho, and Montana: U.S. Geological Survey, Open-File Report OF-99-144, scale 1:250000.

Source: United States Geological Survey (USGS) and Idaho Geological Survey (IGS)

Digital Map: http://ngmdb.usgs.gov/Prodesc/proddesc_22659.htm

Paper Map:
http://www.idahogeology.org/Products/reverselook.asp?switch=title&value=Geologic_Map_of_the_Sandpoint_Quadrangle,_Idaho_and_Washington

Thompson Falls 1:100,000

Lewis, R.S. and Derkey, Pamela, 1999, Digital geologic map of part of the Thompson Falls 1:100,000 quadrangle, Idaho: U.S. Geological Survey, Open-File Report OF-99-438, scale 1:100000.

Source: United States Geological Survey (USGS) and Idaho Geological Survey (IGS)

Digital and Paper Maps: http://ngmdb.usgs.gov/Prodesc/proddesc_22795.htm

Wallace 1:100,000

Lewis, R.S., Burmester, R.F., McFaddan, M.D., Derkey, P.D., and Oblad, J.R., 1999, Digital geologic map of the Wallace1:100,000 quadrangle, Idaho: U.S. Geological Survey, Open-File Report OF-99-390, scale 1:100000.

Source: Source: United States Geological Survey (USGS) and Idaho Geological Survey (IGS)

Digital and Paper Maps: http://ngmdb.usgs.gov/Prodesc/proddesc_22505.htm

Appendix C

Classification Tables

Coeur d'Alene 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Cl	carbonate rocks	mixed rocks	unknown
Crg	quartzite	metamorphic rocks	unknown
pCbgh	metamorphic rocks	metamorphic rocks	variable
pCmu	metamorphic rocks	metamorphic rocks	variable
pCmuq	quartzite	metamorphic rocks	unknown
Qal	alluvium	mixed rocks	variable
Qgo	glacial deposits	mixed rocks	medium
Qgy	glacial deposits	mixed rocks	medium
Qls	landslide deposits	mixed rocks	variable
Qp	loess	mixed rocks	unknown
QTg	tertiary sediments	mixed rocks	variable
Tcr	basalt	extrusive/ basaltic rocks	good
TKg	granite, undivided	intrusive/ granitic rocks	medium
Yb	Burke Formation	metamorphic rocks	variable
Yl	Libby Formation	metamorphic rocks	variable
Yp	Prichard Formation	metamorphic rocks	variable
Ypl	Prichard Formation, lower	metamorphic rocks	unknown
Ypu	Prichard Formation, upper	metamorphic rocks	unknown
Yqd	granite, dark	intrusive/ granitic rocks	medium
Yr	Revett Formation	metamorphic rocks	variable
Yrb	Ravalli Group	metamorphic rocks	variable
Ysp	Striped Peak Formation	metamorphic rocks	variable
Ysr	St. Regis Formation	metamorphic rocks	variable
Ywl	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywu	Wallace Formation, upper	metamorphic rocks	unknown
	water	other	other

Hamilton 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Kdi	granite, dark	intrusive/ granitic rocks	medium
Kg	granite, dark	intrusive/ granitic rocks	medium
Kgd	granite, dark	intrusive/ granitic rocks	medium
Kmgd	granite, dark	intrusive/ granitic rocks	medium
Kmig	metamorphic rocks	metamorphic rocks	variable
Kt	granite, dark	intrusive/ granitic rocks	medium
Qal	alluvium	mixed rocks	variable
Qg	glacial deposits	mixed rocks	medium
Tg	granite, undivided	intrusive/ granitic rocks	medium
Tgd	granite, dark	intrusive/ granitic rocks	medium
Ycs	Wallace Formation, gneiss	metamorphic rocks	medium
Yq	Wallace Formation, quartzite	metamorphic rocks	unknown
Yqi	Wallace Formation, quartzite	metamorphic rocks	unknown
Yw	Wallace Formation	metamorphic rocks	variable

Headquarters 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Kbgd	granite, dark	intrusive/ granitic rocks	medium
Kfg	granite, undivided	intrusive/ granitic rocks	medium
Kfgd	granite, dark	intrusive/ granitic rocks	medium
Kg	granite, dark	intrusive/ granitic rocks	medium
Kgb	intrusive dikes and sills	intrusive/ granitic rocks	unknown
Kgd	granite, dark	intrusive/ granitic rocks	medium
Kmig	metamorphic rocks	metamorphic rocks	variable
Kp	intrusive dikes and sills	intrusive/ granitic rocks	unknown
Kpgd	granite, dark	intrusive/ granitic rocks	medium
Kqd	granite, dark	intrusive/ granitic rocks	medium
Ks	metavolcanic rocks	extrusive/ basaltic rocks	variable
Kt	granite, dark	intrusive/ granitic rocks	medium
pCan	metamorphic rocks	metamorphic rocks	variable
pCbq	Burke Formation, quartzite	metamorphic rocks	unknown
pCbsg	Burke Formation, quartzite	metamorphic rocks	unknown
pCpl	Prichard Formation	metamorphic rocks	variable
pCpq	Prichard Formation, quartzite	metamorphic rocks	unknown
pCqp	Prichard Formation, quartzite	metamorphic rocks	unknown
pCqrv	Ravalli Group, quartzite	metamorphic rocks	unknown
pCrq	Revett Formation, quartzite	metamorphic rocks	unknown
pCrs	Revett Formation, schist	metamorphic rocks	medium
pCsp	Prichard Formation	metamorphic rocks	variable
pCsrs	St. Regis Formation, schist	metamorphic rocks	medium
pCwss	schist	metamorphic rocks	medium
Qal	alluvium	mixed rocks	variable
Qg	glacial deposits	mixed rocks	medium
Qls	landslide deposits	mixed rocks	variable
Ta	intrusive dikes and sills	intrusive/ granitic rocks	unknown
Tcb	basalt	extrusive/ basaltic rocks	good
Tfc	basalt	extrusive/ basaltic rocks	good
Tg	granite, undivided	intrusive/ granitic rocks	medium
Tgb	intrusive dikes and sills	intrusive/ granitic rocks	unknown
Tgd	granite, dark	intrusive/ granitic rocks	medium
Tgn1	basalt	extrusive/ basaltic rocks	good
Tgr1	basalt	extrusive/ basaltic rocks	good
Tla	basalt	extrusive/ basaltic rocks	good
Tqs	granite, light	intrusive/ granitic rocks	medium
Trp	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Ts	tertiary sediments	mixed rocks	variable
Tw	basalt	extrusive/ basaltic rocks	good
Twe	basalt	extrusive/ basaltic rocks	good

Headquarters 1:100000 Quadrangle Continued

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
um	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
water	water	other	other
Yam	metavolcanic rocks	extrusive/ basaltic rocks	variable
Ycs	Wallace Formation, gneiss	metamorphic rocks	medium
Ymg	Wallace Formation, upper	metamorphic rocks	unknown
Yqi	Wallace Formation, quartzite	metamorphic rocks	unknown
Ysg	Wallace Formation, schist	metamorphic rocks	medium
Yw	Wallace Formation	metamorphic rocks	variable
Ywg	Wallace Formation, gneiss	metamorphic rocks	medium
Ywl	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywm	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywq	Wallace Formation, quartzite	metamorphic rocks	unknown
Yws	Wallace Formation, schist	metamorphic rocks	medium

Kooskia 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Kbgt	granite, undivided	intrusive/ granitic rocks	medium
Kdi	granite, dark	intrusive/ granitic rocks	medium
Kfgd	granite, dark	intrusive/ granitic rocks	medium
Kg	granite, dark	intrusive/ granitic rocks	medium
Kgd	granite, dark	intrusive/ granitic rocks	medium
Kht	granite, dark	intrusive/ granitic rocks	medium
KJi	granite, dark	intrusive/ granitic rocks	medium
Kmgd	granite, dark	intrusive/ granitic rocks	medium
Kmig	metamorphic rocks	metamorphic rocks	variable
Kpgd	granite, dark	intrusive/ granitic rocks	medium
Kqd	granite, dark	intrusive/ granitic rocks	medium
Kt	granite, dark	intrusive/ granitic rocks	medium
Ktc	granite, dark	intrusive/ granitic rocks	medium
Mzhg	metamorphic rocks	metamorphic rocks	variable
Mzm	carbonate rocks	mixed rocks	unknown
Mzrg	schist	metamorphic rocks	medium
pCbg	gneiss	metamorphic rocks	medium
pCbs	schist	metamorphic rocks	medium
pCcsm	metamorphic rocks	metamorphic rocks	variable
pCgcs	gneiss	metamorphic rocks	medium
pCps	Prichard Formation, schist	metamorphic rocks	medium
pCqcs	quartzite	metamorphic rocks	unknown
pCqi	metamorphic rocks	metamorphic rocks	variable
pCqs	quartzite	metamorphic rocks	unknown
pCrq	Revett Formation, quartzite	metamorphic rocks	unknown
pCsq	schist	metamorphic rocks	medium
pCsrs	St. Regis Formation, schist	metamorphic rocks	medium
Qal	alluvium	mixed rocks	variable
Qg	glacial deposits	mixed rocks	medium
Qls	landslide deposits	mixed rocks	variable
T_Psd	volcanic rocks	extrusive/ basaltic rocks	variable
Tcb	basalt	extrusive/ basaltic rocks	good
Td	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Tdi	granite, dark	intrusive/ granitic rocks	medium
Tg	granite, undivided	intrusive/ granitic rocks	medium
Tgd	granite, dark	intrusive/ granitic rocks	medium
Tgn1	basalt	extrusive/ basaltic rocks	good
Tgr1	basalt	extrusive/ basaltic rocks	good
Tgr2	basalt	extrusive/ basaltic rocks	good
Tgv	basalt	extrusive/ basaltic rocks	good
TKg	granite, dark	intrusive/ granitic rocks	medium

Kooskia 1:100000 Quadrangle Continued

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Tpr	basalt, P	extrusive/ basaltic rocks	medium
Tr	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Trp	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Ts	tertiary sediments	mixed rocks	variable
Tsa	basalt	extrusive/ basaltic rocks	good
Twe	basalt	extrusive/ basaltic rocks	good
um	metavolcanic rocks	extrusive/ basaltic rocks	variable
Yam	metavolcanic rocks	extrusive/ basaltic rocks	variable
Ycs	Wallace Formation, gneiss	metamorphic rocks	medium
Yq	quartzite	metamorphic rocks	unknown
Yqi	Wallace Formation, quartzite	metamorphic rocks	unknown
Ysg	Wallace Formation, schist	metamorphic rocks	medium
Ywg	Wallace Formation, gneiss	metamorphic rocks	medium
Yws	Wallace Formation, schist	metamorphic rocks	medium

Missoula West 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Kbgd	granite, dark	intrusive/ granitic rocks	medium
Kdi	granite, dark	intrusive/ granitic rocks	medium
Kg	granite, dark	intrusive/ granitic rocks	medium
Kgd	granite, dark	intrusive/ granitic rocks	medium
Kmgd	granite, dark	intrusive/ granitic rocks	medium
Kmig	metamorphic rocks	metamorphic rocks	variable
Kt	granite, dark	intrusive/ granitic rocks	medium
pCqg	Ravalli Group, quartzite	metamorphic rocks	unknown
pCqrv	Ravalli Group, quartzite	metamorphic rocks	unknown
pCsp	Prichard Formation, schist	metamorphic rocks	medium
Pzm	carbonate rocks	mixed rocks	unknown
Qal	alluvium	mixed rocks	variable
Qg	glacial deposits	mixed rocks	medium
Qls	landslide deposits	mixed rocks	variable
Tcv	volcanic rocks	extrusive/ basaltic rocks	variable
Tg	granite, undivided	intrusive/ granitic rocks	medium
Tqs	granite, light	intrusive/ granitic rocks	medium
Trb	volcanic rocks	extrusive/ basaltic rocks	variable
Trp	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Ts	tertiary sediments	mixed rocks	variable
um	intrusive dikes and sills	intrusive/ granitic rocks	unknown
Yam	metavolcanic rocks	extrusive/ basaltic rocks	variable
Ymg	Wallace Formation, upper, argillite	metamorphic rocks	unknown
Yms2	Striped Peak formation, quartzite	metamorphic rocks	bad
Yqi	Wallace Formation, quartzite	metamorphic rocks	unknown
Yw	Wallace Formation	metamorphic rocks	variable
Ywam	metavolcanic rocks	extrusive/ basaltic rocks	variable
Ywl	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywm	Wallace Formation, middle and lower	metamorphic rocks	medium

Sandpoint 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Cgc	quartzite	metamorphic rocks	unknown
Clr	carbonate rocks	mixed rocks	unknown
Cmc	carbonate rocks	mixed rocks	unknown
Cmp	phyllite	metamorphic rocks	unknown
Csu	sedimentary rocks	mixed rocks	variable
CZq	quartzite	metamorphic rocks	unknown
Ddl	carbonate rocks	mixed rocks	unknown
Ds	metasedimentary rocks	metamorphic rocks	variable
Dv	metavolcanic rocks	extrusive/ basaltic rocks	variable
Jcm	granite, dark	intrusive/ granitic rocks	medium
Jlm	granite, dark	intrusive/ granitic rocks	medium
Jrg	metavolcanic rocks	extrusive/ basaltic rocks	variable
Jrs	metavolcanic rocks	extrusive/ basaltic rocks	variable
JTRpl	granite, light	intrusive/ granitic rocks	medium
JTRw	granite, light	intrusive/ granitic rocks	medium
Kag	granite, undivided	intrusive/ granitic rocks	medium
Kb	granite, light	intrusive/ granitic rocks	medium
Kbc	granite, undivided	intrusive/ granitic rocks	medium
Kbf	granite, dark	intrusive/ granitic rocks	medium
Kbgm	granite, light	intrusive/ granitic rocks	medium
Kbm	granite, light	intrusive/ granitic rocks	medium
Kbr	granite, light	intrusive/ granitic rocks	medium
Kbu	granite, dark	intrusive/ granitic rocks	medium
Kc	granite, dark	intrusive/ granitic rocks	medium
Kcl	granite, dark	intrusive/ granitic rocks	medium
Kco	granite, dark	intrusive/ granitic rocks	medium
Kcu	granite, undivided	intrusive/ granitic rocks	medium
Kdc	granite, dark	intrusive/ granitic rocks	medium
Kfl	granite, dark	intrusive/ granitic rocks	medium
Kg	granite, light	intrusive/ granitic rocks	medium
Kgm	granite, undivided	intrusive/ granitic rocks	medium
Kgp	granite, dark	intrusive/ granitic rocks	medium
Kgpl	granite, dark	intrusive/ granitic rocks	medium
Kgs	granite, undivided	intrusive/ granitic rocks	medium
Kh	granite, undivided	intrusive/ granitic rocks	medium
Khm	granite, dark	intrusive/ granitic rocks	medium
Kjl	granite, dark	intrusive/ granitic rocks	medium
Kk	granite, dark	intrusive/ granitic rocks	medium
Kkp	granite, dark	intrusive/ granitic rocks	medium
Klc	granite, dark	intrusive/ granitic rocks	medium
Klcc	granite, dark	intrusive/ granitic rocks	medium

Sandpoint 1:100000 Quadrangle Continued

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Klgs	granite, light	intrusive/ granitic rocks	medium
Kli	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Klm	granite, undivided	intrusive/ granitic rocks	medium
Klr	granite, dark	intrusive/ granitic rocks	medium
Km	granite, undivided	intrusive/ granitic rocks	medium
Kmc	granite, dark	intrusive/ granitic rocks	medium
Kmg	granite, undivided	intrusive/ granitic rocks	medium
Kmm	granite, dark	intrusive/ granitic rocks	medium
Kmo	granite, dark	intrusive/ granitic rocks	medium
Knb	granite, dark	intrusive/ granitic rocks	medium
Knc	granite, undivided	intrusive/ granitic rocks	medium
Koc	granite, undivided	intrusive/ granitic rocks	medium
Kpbc	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kpbi	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kpcb	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kpcc	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kpcp	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kpdc	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kpfc	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kpgb	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kph	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kphc	granite, dark	intrusive/ granitic rocks	medium
Kpkm	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kpl	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kplc	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kpll	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kplm	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kpm	granite, dark	intrusive/ granitic rocks	medium
Kpml	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kpms	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kpsh	Priest River Complex, granite, undivided	intrusive/ granitic rocks	medium
Kpsl	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kpsp	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Kptc	Priest River Complex, granite, dark	intrusive/ granitic rocks	medium
Krc	granite, dark	intrusive/ granitic rocks	medium
Krl	granite, dark	intrusive/ granitic rocks	medium
Kru	granite, dark	intrusive/ granitic rocks	medium
Ksc	granite, undivided	intrusive/ granitic rocks	medium
Kse	granite, dark	intrusive/ granitic rocks	medium
Ksg	granite, dark	intrusive/ granitic rocks	medium
Ksh	granite, dark	intrusive/ granitic rocks	medium

Sandpoint 1:100000 Quadrangle Continued

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Ksha	granite, undivided	intrusive/ granitic rocks	medium
Kslc	granite, dark	intrusive/ granitic rocks	medium
Ksm	sedimentary rocks	mixed rocks	variable
Ksv	granite, dark	intrusive/ granitic rocks	medium
Ktc	granite, undivided	intrusive/ granitic rocks	medium
Ktmc	granite, undivided	intrusive/ granitic rocks	medium
Kv	granite, dark	intrusive/ granitic rocks	medium
Kw	granite, dark	intrusive/ granitic rocks	medium
Kwm	granite, undivided	intrusive/ granitic rocks	medium
Kyl	granite, dark	intrusive/ granitic rocks	medium
MCu	carbonate rocks	mixed rocks	unknown
MDs	carbonate rocks	mixed rocks	unknown
Ml	carbonate rocks	mixed rocks	unknown
MZPZf	metasedimentary rocks	metamorphic rocks	variable
OCgc	metasedimentary rocks	metamorphic rocks	variable
OCm	carbonate rocks	mixed rocks	unknown
Ol	carbonate rocks	mixed rocks	unknown
Ps	metasedimentary rocks	metamorphic rocks	variable
Qag	glacial deposits	mixed rocks	medium
Ql	glacial deposits	mixed rocks	medium
Qls	landslide deposits	mixed rocks	variable
QTs	sedimentary rocks	mixed rocks	variable
Sc	sedimentary rocks	mixed rocks	variable
sgg	metamorphic rocks	metamorphic rocks	variable
Sms	metasedimentary rocks	metamorphic rocks	variable
Tam	granite, dark	intrusive/ granitic rocks	medium
Tcb	metamorphic rocks	metamorphic rocks	variable
Tcc	metamorphic rocks	metamorphic rocks	variable
Tcg	sedimentary rocks	mixed rocks	variable
Tcr	basalt	extrusive/ basaltic rocks	good
Tcs	granite, light	intrusive/ granitic rocks	medium
Thd	intrusive dikes and sills	intrusive/ granitic rocks	unknown
Tll	granite, light	intrusive/ granitic rocks	medium
To	sedimentary rocks	mixed rocks	variable
Tot	volcanic rocks	extrusive/ basaltic rocks	variable
TRft	granite, dark	intrusive/ granitic rocks	medium
TRs	metasedimentary rocks	metamorphic rocks	variable
Ts	volcanic rocks	extrusive/ basaltic rocks	variable
Tsp	granite, light	intrusive/ granitic rocks	medium
Ttp	granite, light	intrusive/ granitic rocks	medium
Tw	granite, dark	intrusive/ granitic rocks	medium

Sandpoint 1:100000 Quadrangle Continued

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Yb	Deer Trail Group, quartzite	metamorphic rocks	bad
Ybk	Burke Formation	metamorphic rocks	variable
Ybmh	Striped Peak Formation, argillite	metamorphic rocks	unknown
Ybo	Striped Peak Formation, quartzite	metamorphic rocks	bad
Yc	Deer Trail Group, metasedimentary rocks	metamorphic rocks	variable
Ydtu	Deer Trail Group, metasedimentary rocks	metamorphic rocks	variable
Ye	St. Regis Formation	metamorphic rocks	variable
Yhm	metasedimentary rocks	metamorphic rocks	variable
Yl	Libby Formation	metamorphic rocks	variable
Ylg	gneiss	metamorphic rocks	medium
Ym	Deer Trail Group, argillite	metamorphic rocks	bad
Ymi	intrusive dikes and sills	intrusive/ granitic rocks	unknown
Yms	Striped Peak Formation	metamorphic rocks	variable
Ynl	gneiss	metamorphic rocks	medium
Yp	Prichard Formation	metamorphic rocks	variable
Ypm	Prichard Formation	metamorphic rocks	variable
Yr	Revett Formation	metamorphic rocks	variable
Yru	Ravalli Group	metamorphic rocks	variable
Ys	Deer Trail Group, carbonate rocks	metamorphic rocks	unknown
Ysh	Wallace Formation, upper	metamorphic rocks	unknown
Yshs	Wallace Formation, upper	metamorphic rocks	unknown
Ysr	St. Regis Formation	metamorphic rocks	variable
Yss	Wallace Formation, upper	metamorphic rocks	unknown
Yssw	Wallace Formation, upper	metamorphic rocks	unknown
Yt	Deer Trail Group, argillite	metamorphic rocks	bad
Yw	Wallace Formation	metamorphic rocks	variable
Ywcu	Deer Trail Group, metasedimentary rocks	metamorphic rocks	variable
Ywd	Deer Trail Group, carbonate rocks	metamorphic rocks	unknown
Ywr	Wallace Formation and Ravalli Group	metamorphic rocks	variable
Zhc	metamorphic rocks	metamorphic rocks	variable
Zhg	metavolcanic rocks	extrusive/ basaltic rocks	variable
Zl	metavolcanic rocks	extrusive/ basaltic rocks	variable
Zm	metasedimentary rocks	metamorphic rocks	variable
Zsc	metasedimentary rocks	metamorphic rocks	variable
Zsg	metavolcanic rocks	extrusive/ basaltic rocks	variable
Zsl	carbonate rocks	mixed rocks	unknown
Zsp	phyllite	metamorphic rocks	unknown
Zt	metamorphic rocks	metamorphic rocks	variable
ZYmi	intrusive dikes and sills	intrusive/ granitic rocks	unknown
	water	other	other

St. Maries 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Kog	gneiss	metamorphic rocks	medium
KYam	metavolcanic rocks	extrusive/ basaltic rocks	variable
m	man-made	other	other
Qal	alluvium	mixed rocks	variable
Qg	glacial deposits	mixed rocks	medium
Qls	landslide deposits	mixed rocks	variable
Td	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Ted	basalt	extrusive/ basaltic rocks	good
Tgd	granite, dark	intrusive/ granitic rocks	medium
Tgn2	basalt	extrusive/ basaltic rocks	good
Tgr2	basalt	extrusive/ basaltic rocks	good
TKdd	intrusive dikes and sills	intrusive/ granitic rocks	unknown
TKgb	intrusive dikes and sills	intrusive/ granitic rocks	unknown
TKla	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Ton	basalt, P	extrusive/ basaltic rocks	medium
Tpr	basalt, P	extrusive/ basaltic rocks	medium
Tr	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Ts	tertiary sediments	mixed rocks	variable
water	water	other	other
Yb	Burke Formation	metamorphic rocks	variable
Yl	Libby Formation	metamorphic rocks	variable
Yp	Prichard Formation	metamorphic rocks	variable
Ypl	Prichard Formation, lower	metamorphic rocks	unknown
Ypu	Prichard Formation, upper	metamorphic rocks	unknown
Yq	quartzite	metamorphic rocks	unknown
Yqp	Prichard Formation, quartzite	metamorphic rocks	unknown
Yqrv	Ravalli Group, quartzite	metamorphic rocks	unknown
Yqw	Wallace Formation, quartzite	metamorphic rocks	unknown
Yr	Revett Formation	metamorphic rocks	variable
Yrb	Ravalli Group	metamorphic rocks	variable
Ys	schist	metamorphic rocks	medium
Ysp	Striped Peak Formation	metamorphic rocks	variable
Ysp1a	Striped Peak Formation, argillite	metamorphic rocks	unknown
Ysp1q	Striped Peak Formation, quartzite	metamorphic rocks	bad
Ysp4	Striped Peak Formation, quartzite	metamorphic rocks	bad
Ysr	St. Regis Formation	metamorphic rocks	variable
Ysrv	Ravalli Group, schist	metamorphic rocks	medium
Ysw	Wallace Formation, schist	metamorphic rocks	medium
Ywl	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywm	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywml	Wallace Formation, middle and lower	metamorphic rocks	medium

St. Maries 1:100000 Quadrangle Continued

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Ywu	Wallace Formation, upper	metamorphic rocks	unknown
Ywu1	Wallace Formation, upper	metamorphic rocks	unknown
Ywu2	Wallace Formation, upper	metamorphic rocks	unknown
Ywu3	Wallace Formation, upper	metamorphic rocks	unknown
YXq	quartzite	metamorphic rocks	unknown
YXs	schist	metamorphic rocks	medium

Thompson Falls 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Kms	granite, light	intrusive/ granitic rocks	medium
Qa	alluvium	mixed rocks	variable
Qg	glacial deposits	mixed rocks	medium
Tsm	tertiary sediments	mixed rocks	variable
Ybk	Burke Formation	metamorphic rocks	variable
Ypl	Prichard Formation, lower	metamorphic rocks	unknown
Ypu	Prichard Formation, upper	metamorphic rocks	unknown
Yr	Revett Formation	metamorphic rocks	variable
Ysp	Striped Peak Formation	metamorphic rocks	variable
Ysr	St. Regis Formation	metamorphic rocks	variable
Ywml	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywu	Wallace Formation, upper	metamorphic rocks	unknown

Wallace 1:100000 Quadrangle

LABEL	LITH_GRP	CATEGORY	QUICKEVAL
Kgd	granite, dark	intrusive/ granitic rocks	medium
Kog	gneiss	metamorphic rocks	medium
Qa	alluvium	mixed rocks	variable
Qg	glacial deposits	mixed rocks	medium
Qog	tertiary sediments	mixed rocks	variable
Tcr	basalt	extrusive/ basaltic rocks	good
Tdp	extrusive dikes and sills	extrusive/ basaltic rocks	unknown
Tgd	granite, dark	intrusive/ granitic rocks	medium
TKgb	intrusive dikes and sills	intrusive/ granitic rocks	unknown
Ts	tertiary sediments	mixed rocks	variable
Tsm	tertiary sediments	mixed rocks	variable
Yam	metavolcanic rocks	extrusive/ basaltic rocks	variable
Yan	metamorphic rocks	metamorphic rocks	variable
Ybk	Burke Formation	metamorphic rocks	variable
Yc	metamorphic rocks	metamorphic rocks	variable
Ypu	Prichard Formation, upper	metamorphic rocks	unknown
Yq	quartzite	metamorphic rocks	unknown
Yqrv	Ravalli Group, quartzite	metamorphic rocks	unknown
Yqw	Wallace Formation, middle and lower, quartzite	metamorphic rocks	unknown
Yr	Revett Formation	metamorphic rocks	variable
Ys	schist	metamorphic rocks	medium
Ysp	Striped Peak Formation	metamorphic rocks	variable
Ysp1	Striped Peak Formation, quartzite	metamorphic rocks	unknown
Ysp2	Striped Peak Formation, carbonate	metamorphic rocks	unknown
Ysp3	Striped Peak Formation, argillite	metamorphic rocks	unknown
Ysr	St. Regis Formation	metamorphic rocks	variable
Ysrv	Ravalli Group, schist	metamorphic rocks	medium
Ysw	Wallace Formation, schist	metamorphic rocks	medium
Ywl	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywm	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywml	Wallace Formation, middle and lower	metamorphic rocks	medium
Ywu1	Wallace Formation, upper	metamorphic rocks	unknown
Ywu2	Wallace Formation, upper	metamorphic rocks	unknown
Ywu3	Wallace Formation, upper	metamorphic rocks	unknown

Appendix D. Map Descriptions for All Rock Units

MAP	LABEL	LITH_GRP	DESCRIPTION
Coeur d'Alene 1:100K	Cl	carbonate rocks	Lakeview Limestone
Coeur d'Alene 1:100K	Crg	quartzite	Rennie Shale and Gold Creek Quartzite
Coeur d'Alene 1:100K	pCbgh	metamorphic rocks	Hauser Lake Gneiss
Coeur d'Alene 1:100K	pCmu	metamorphic rocks	metamorphic rocks, undivided
Coeur d'Alene 1:100K	pCmuq	quartzite	quartzite
Coeur d'Alene 1:100K	Qal	alluvium	alluvium
Coeur d'Alene 1:100K	Qgo	glacial deposits	older glacial deposits
Coeur d'Alene 1:100K	Qgy	glacial deposits	younger glacial deposits
Coeur d'Alene 1:100K	Qls	landslide deposits	landslide deposits
Coeur d'Alene 1:100K	Qp	loess	Palouse Formation
Coeur d'Alene 1:100K	QTg	tertiary sediments	older gravel deposits
Coeur d'Alene 1:100K	Tcr	basalt	Columbia River Group and Latah Formation
Coeur d'Alene 1:100K	TKg	granite, undivided	granitic rocks
Coeur d'Alene 1:100K	Yb	Burke Formation	Burke Formation, Belt Supergroup
Coeur d'Alene 1:100K	Yl	Libby Formation	Libby Formation, Belt Supergroup
Coeur d'Alene 1:100K	Yp	Prichard Formation	Prichard Formation, undivided, Belt Supergroup
Coeur d'Alene 1:100K	Ypl	Prichard Formation, lower	lower part of Prichard Formation, Belt Supergroup
Coeur d'Alene 1:100K	Ypu	Prichard Formation, upper	upper part of Prichard Formation, Belt Supergroup
Coeur d'Alene 1:100K	Yqd	granite, dark	quartz diorite
Coeur d'Alene 1:100K	Yr	Revett Formation	Revett Formation, Belt Supergroup
Coeur d'Alene 1:100K	Yrb	Ravalli Group	Revett and Burke Formations, undivided; Belt Supergroup
Coeur d'Alene 1:100K	Ysp	Striped Peak Formation	Striped Peak Formation, Belt Supergroup
Coeur d'Alene 1:100K	Ysr	St. Regis Formation	St. Regis Formation, Belt Supergroup
Coeur d'Alene 1:100K	Ywl	Wallace Formation, middle and lower	lower part of Wallace Formation, Belt Supergroup
Coeur d'Alene 1:100K	Ywu	Wallace Formation, upper	upper part of Wallace Formation, Belt Supergroup
Coeur d'Alene 1:100K		water	water body
Hamilton 1:100K	Kdi	granite, dark	Hornblende diorite
Hamilton 1:100K	Kg	granite, dark	Muscovite-biotite granite
Hamilton 1:100K	Kgd	granite, dark	Biotite granodiorite
Hamilton 1:100K	Kmgd	granite, dark	Megacrystic granodiorite
Hamilton 1:100K	Kmig	metamorphic rocks	Migmatite

Hamilton 1:100K	Kt	granite, dark	Tonalite
Hamilton 1:100K	Qal	alluvium	Alluvium
Hamilton 1:100K	Qg	glacial deposits	Glacial deposits
Hamilton 1:100K	Tg	granite, undivided	Granite
Hamilton 1:100K	Tgd	granite, dark	Hornblende-biotite granodiorite
Hamilton 1:100K	Ycs	Wallace Formation, gneiss	Calc-silicate gneiss of Wallace Formation
Hamilton 1:100K	Yq	Wallace Formation, quartzite	Quartzite of Wallace(?) Formation
Hamilton 1:100K	Yqi	Wallace Formation, quartzite	Impure quartzite of Wallace(?) Formation
Hamilton 1:100K	Yw	Wallace Formation	Wallace Formation, undivided
Headquarters 1:100K	Kbgd	granite, dark	Biotite-rich Granodiorite
Headquarters 1:100K	Kfg	granite, undivided	Foliated granite
Headquarters 1:100K	Kfgd	granite, dark	Foliated Granodiorite
Headquarters 1:100K	Kg	granite, dark	Muscovite-Biotite Granite
Headquarters 1:100K	Kgb	intrusive dikes and sills	Gabbro
Headquarters 1:100K	Kgd	granite, dark	Biotite Granodiorite
Headquarters 1:100K	Kmig	metamorphic rocks	Migmatite
Headquarters 1:100K	Kp	intrusive dikes and sills	Pegmatite and Aplite
Headquarters 1:100K	Kpgd	granite, dark	Porphyritic Biotite Granodiorite
Headquarters 1:100K	Kqd	granite, dark	Quartz diorite
Headquarters 1:100K	Ks	metavolcanic rocks	Serpentine
Headquarters 1:100K	Kt	granite, dark	Tonalite
Headquarters 1:100K	pCan	metamorphic rocks	Anorthosite
Headquarters 1:100K	pCbq	Burke Formation, quartzite	Quartzite of the Burke(?) Formation
Headquarters 1:100K	pCbsg	Burke Formation, quartzite	Biotite schist and gneiss of Burke(?) Formation
Headquarters 1:100K	pCpl	Prichard Formation	Calc-silicate of the Prichard(?) Formation
Headquarters 1:100K	pCpq	Prichard Formation, quartzite	Micaceous quartzite of Prichard(?) Formation
Headquarters 1:100K	pCqp	Prichard Formation, quartzite	Quartzite of the Prichard(?) Formation
Headquarters 1:100K	pCqrv	Ravalli Group, quartzite	Quarztite of Ravalli(?) Group
Headquarters 1:100K	pCrq	Revett Formation, quartzite	Quartzite of Revett(?) Formation
Headquarters 1:100K	pCrs	Revett Formation, schist	Schist of Revett(?) Formation
Headquarters 1:100K	pCsp	Prichard Formation	Schist of the Prichard(?) Formation
Headquarters 1:100K	pCsrs	St. Regis Formation, schist	Mica schist. St. Regis(?) Formation
Headquarters 1:100K	pCwss	schist	Schist of Wallace(?) and St. Regis(?) Formations
Headquarters 1:100K	Qal	alluvium	Alluvium

Headquarters 1:100K	Qg	glacial deposits	Glacial deposits
Headquarters 1:100K	Qls	landslide deposits	Landslide deposits
Headquarters 1:100K	Ta	intrusive dikes and sills	Andesite dikes
Headquarters 1:100K	Tcb	basalt	Columbia River Basalt Group Undivided
Headquarters 1:100K	Tfc	basalt	Basalt of Feary Creek
Headquarters 1:100K	Tg	granite, undivided	Granite
Headquarters 1:100K	Tgb	intrusive dikes and sills	Ultramafic pyroxene gabbro and lamprophyric dikes
Headquarters 1:100K	Tgd	granite, dark	Hornblende-biotite granodiorite
Headquarters 1:100K	Tgn1	basalt	Grande Ronde Lower normal flow
Headquarters 1:100K	Tgr1	basalt	Grande Ronde Lower reversed flow
Headquarters 1:100K	Tla	basalt	Basalt of Lapwai
Headquarters 1:100K	Tqs	granite, light	Quartz Syenite
Headquarters 1:100K	Trp	extrusive dikes and sills	Rhyolite Porphyry plugs and dikes
Headquarters 1:100K	Ts	tertiary sediments	Lacustrine and fluvial sediments, sand and gravel
Headquarters 1:100K	Tw	basalt	Wilbur Creek Member, Saddle Mtn Basalt
Headquarters 1:100K	Twe	basalt	Basalt of Weippe
Headquarters 1:100K	um	extrusive dikes and sills	Ultramafic rock
Headquarters 1:100K	water	water	
Headquarters 1:100K	Yam	metavolcanic rocks	Amphibolite
Headquarters 1:100K	Ycs	Wallace Formation, gneiss	Calc-silicate gneiss of Wallace Formation
Headquarters 1:100K	Ymg	Wallace Formation, upper	Missoula Group, undivided
Headquarters 1:100K	Yqi	Wallace Formation, quartzite	Impure quartzite of Wallace (?) Formation
Headquarters 1:100K	Ysg	Wallace Formation, schist	Schist and gneiss of Wallace(?) Formation
Headquarters 1:100K	Yw	Wallace Formation	Wallace Formation, undivided
Headquarters 1:100K	Ywg	Wallace Formation, gneiss	Wallace Gneiss
Headquarters 1:100K	Ywl	Wallace Formation, middle and lower	Wallace Formation, Lower Member
Headquarters 1:100K	Ywm	Wallace Formation, middle and lower	Wallace Formation, middle Member
Headquarters 1:100K	Ywq	Wallace Formation, quartzite	Wallace Quartzite
Headquarters 1:100K	Yws	Wallace Formation, schist	Wallace Schist
Kooskia 1:100K	Kbgt	granite, undivided	
Kooskia 1:100K	Kdi	granite, dark	Hornblende diorite
Kooskia 1:100K	Kfgd	granite, dark	Foliated Granodiorite
Kooskia 1:100K	Kg	granite, dark	Muscovite-Biotite Granite
Kooskia 1:100K	Kgd	granite, dark	Biotite Granodiorite

Kooskia 1:100K	Kht	granite, dark	Hornblende tonalite with metamorphic lenses
Kooskia 1:100K	KJi	granite, dark	Intrusive rocks of the accreted terraine, primarily quartz dirorite
Kooskia 1:100K	Kmgd	granite, dark	Megacrystic Granodiorite
Kooskia 1:100K	Kmig	metamorphic rocks	Migmatite
Kooskia 1:100K	Kpgd	granite, dark	Porphyritic Biotite Granodiorite
Kooskia 1:100K	Kqd	granite, dark	Quartz diorite
Kooskia 1:100K	Kt	granite, dark	Tonalite
Kooskia 1:100K	Ktc	granite, dark	Tonalite of Coolwater Ridge
Kooskia 1:100K	Mzhg	metamorphic rocks	Hornblende Gneiss, (Riggins Group)
Kooskia 1:100K	Mzm	carbonate rocks	Marble
Kooskia 1:100K	Mzrg	schist	Schist, Riggins Group
Kooskia 1:100K	pCbg	gneiss	Biotite gneiss and schist of Elk City metamorphic sequence
Kooskia 1:100K	pCbs	schist	Biotite schist and gneiss of Elk City metamorphic sequence
Kooskia 1:100K	pCcsm	metamorphic rocks	Calc-silicate rocks of Meadow Creek metamorphic sequence
Kooskia 1:100K	pCgcs	gneiss	Calc-silicate gneiss
Kooskia 1:100K	pCps	Prichard Formation, schist	Garnet-mica schist, Prichard Formation?
Kooskia 1:100K	pCqcs	quartzite	Quartzite and calc-silicate rocks of Syringa metamorphic sequence
Kooskia 1:100K	pCqi	metamorphic rocks	
Kooskia 1:100K	pCqs	quartzite	Quartzite and schist of Syringa metamorphic sequence
Kooskia 1:100K	pCrq	Revett Formation, quartzite	Quartzite, Revett Formation?
Kooskia 1:100K	pCsq	schist	Schist and quartzite of Syringa metamorphic sequence
Kooskia 1:100K	pCsrs	St. Regis Formation, schist	Mica schist, St. Regis Formation?
Kooskia 1:100K	Qal	alluvium	Alluvium
Kooskia 1:100K	Qg	glacial deposits	Glacial Deposits
Kooskia 1:100K	Qls	landslide deposits	Landslide deposits
Kooskia 1:100K	T_Psd	volcanic rocks	Seven Devils Volcanics
Kooskia 1:100K	Tcb	basalt	Columbia River Basalt Group Undivided
Kooskia 1:100K	Td	extrusive dikes and sills	Dacite and rhyodacite dikes
Kooskia 1:100K	Tdi	granite, dark	Diorite
Kooskia 1:100K	Tg	granite, undivided	Granite
Kooskia 1:100K	Tgd	granite, dark	Hornblende-biotite granodiorite
Kooskia 1:100K	Tgn1	basalt	Grande Ronde Lower normal flow
Kooskia 1:100K	Tgr1	basalt	Grande Ronde Lower reversed flow
Kooskia 1:100K	Tgr2	basalt	Grande Ronde Upper reversed flow

Kooskia 1:100K	Tgv	basalt	Basalt of Grangeville
Kooskia 1:100K	TKg	granite, dark	Porphyritic Biotite Granite
Kooskia 1:100K	Tpr	basalt, P	Priest Rapids Member
Kooskia 1:100K	Tr	extrusive dikes and sills	Rhyolite dikes
Kooskia 1:100K	Trp	extrusive dikes and sills	Rhyolite Porphyry plugs and dikes
Kooskia 1:100K	Ts	tertiary sediments	Lacustrine and fluvial sediments
Kooskia 1:100K	Tsa	basalt	Asotin Member
Kooskia 1:100K	Twe	basalt	Basalt of Weippe
Kooskia 1:100K	um	metavolcanic rocks	Ultramafic Rock
Kooskia 1:100K	Yam	metavolcanic rocks	Amphibolite
Kooskia 1:100K	Ycs	Wallace Formation, gneiss	Calc-silicate gneiss, Wallace Formation
Kooskia 1:100K	Yq	quartzite	Quartzite
Kooskia 1:100K	Yqi	Wallace Formation, quartzite	Impure quartzite, Wallace Formation?
Kooskia 1:100K	Ysg	Wallace Formation, schist	Schist and gneiss, Wallace Formation?
Kooskia 1:100K	Ywg	Wallace Formation, gneiss	Gneiss, Wallace Formation
Kooskia 1:100K	Yws	Wallace Formation, schist	Schist, Wallace Formation
Missoula West 1:100K	Kbgd	granite, dark	Biotite-rich Granodiorite
Missoula West 1:100K	Kdi	granite, dark	Hornblende Diorite
Missoula West 1:100K	Kg	granite, dark	Muscovite-Biotite Granite
Missoula West 1:100K	Kgd	granite, dark	Biotite Granodiorite
Missoula West 1:100K	Kmgd	granite, dark	Megacrystic Granodiorite
Missoula West 1:100K	Kmig	metamorphic rocks	Migmatite
Missoula West 1:100K	Kt	granite, dark	Tonalite
Missoula West 1:100K	pCqg	Ravalli Group, quartzite	Quartzite and Cals-silicate gneiss of the Ravalli(?) Group and Wallace
Missoula West 1:100K	pCqrv	Ravalli Group, quartzite	Quartite of Ravalli
Missoula West 1:100K	pCsp	Prichard Formation, schist	Schist of the Prichard
Missoula West 1:100K	Pzm	carbonate rocks	Marble
Missoula West 1:100K	Qal	alluvium	Alluvium
Missoula West 1:100K	Qg	glacial deposits	Glacial deposits
Missoula West 1:100K	Qls	landslide deposits	Landslide deposits
Missoula West 1:100K	Tcv	volcanic rocks	Volcanic Rocks, Challis(?) Volcanic Group
Missoula West 1:100K	Tg	granite, undivided	Granite
Missoula West 1:100K	Tqs	granite, light	Quartz Syenite
Missoula West 1:100K	Trb	volcanic rocks	Rhyolite Breccia

Missoula West 1:100K	Trp	extrusive dikes and sills	Rhyolite Porphyry plugs and dikes
Missoula West 1:100K	Ts	tertiary sediments	Lacustrine and fluvial sediments
Missoula West 1:100K	um	intrusive dikes and sills	Ultramafic Rock
Missoula West 1:100K	Yam	metavolcanic rocks	Amphibolite
Missoula West 1:100K	Ymg	Wallace Formation, upper, argillite	Missoula Group, Undivided: Siltite and Argillite, some Quartzitic portions
Missoula West 1:100K	Yms2	Striped Peak formation, quartzite	Mount Shields Formation, Quartzite
Missoula West 1:100K	Yqi	Wallace Formation, quartzite	Impure quartzite of Wallace(?) Formation
Missoula West 1:100K	Yw	Wallace Formation	Wallace Formation, undivided
Missoula West 1:100K	Ywam	metavolcanic rocks	Amphibolite, Wallace Formaion
Missoula West 1:100K	Ywl	Wallace Formation, middle and lower	Wallace Formation, Lower Member
Missoula West 1:100K	Ywm	Wallace Formation, middle and lower	Wallace Formation, middle Member
Sandpoint 1:250K	Cgc	quartzite	Gold Creek Quartzite
Sandpoint 1:250K	Clr	carbonate rocks	Rennie Shale and Lakeview Limestone, undivided
Sandpoint 1:250K	Cmc	carbonate rocks	Carbonate rocks of the Maitlen Phyllite
Sandpoint 1:250K	Cmp	phyllite	Phyllite of the Maitlen Phyllite
Sandpoint 1:250K	Csu	sedimentary rocks	Sedimentary rocks, undivided
Sandpoint 1:250K	CZq	quartzite	Quartzite
Sandpoint 1:250K	Ddl	carbonate rocks	dolomite and limestone
Sandpoint 1:250K	Ds	metasedimentary rocks	Metasedimentary rocks
Sandpoint 1:250K	Dv	metavolcanic rocks	Metavolcanic rocks
Sandpoint 1:250K	Jcm	granite, dark	Tonalite and trondhjemite of Continental Mountain
Sandpoint 1:250K	Jlm	granite, dark	Quartz monzodiorite of Lane Mountain
Sandpoint 1:250K	Jrg	metavolcanic rocks	Greenstone, Rossland Group
Sandpoint 1:250K	Jrs	metavolcanic rocks	Metasedimentary and metavolcanic rocks, Rossland Group
Sandpoint 1:250K	JTRpl	granite, light	Monzonite of Long Canyon
Sandpoint 1:250K	JTRw	granite, light	Syenite of Wall Mountain
Sandpoint 1:250K	Kag	granite, undivided	Granitic rocks of Algoma Lake
Sandpoint 1:250K	Kb	granite, light	Blickensderfer Quartz Monzonite
Sandpoint 1:250K	Kbc	granite, undivided	Monzogranite porphyry of Bodie Canyon
Sandpoint 1:250K	Kbf	granite, dark	Granodiorite of Bonners Ferry
Sandpoint 1:250K	Kbgm	granite, light	Muscovite monzogranite of Blue Grouse Mountain
Sandpoint 1:250K	Kbm	granite, light	Monzogranite of Big Meadows
Sandpoint 1:250K	Kbr	granite, light	Monzogranite of Blanchard Road
Sandpoint 1:250K	Kbu	granite, dark	Granodiorite of Bunchgrass Meadows

Sandpoint 1:250K	Kc	granite, dark	Biotite monzogranite of Camden
Sandpoint 1:250K	Kcl	granite, dark	Tonalite of Clagstone
Sandpoint 1:250K	Kco	granite, dark	Granodiorite of Copeland
Sandpoint 1:250K	Kcu	granite, undivided	Granitic rocks of Cabinet Mountains, undivided
Sandpoint 1:250K	Kdc	granite, dark	Granodiorite of Dubius Creek
Sandpoint 1:250K	Kfl	granite, dark	Fan Lake Granodiorite
Sandpoint 1:250K	Kg	granite, light	Monzogranite of Granite Pass
Sandpoint 1:250K	Kgm	granite, undivided	Monzogranite of Gleason Mountain
Sandpoint 1:250K	Kgp	granite, dark	Galena Point Granodiorite
Sandpoint 1:250K	Kgpl	granite, dark	Granodiorite of Priest Lake
Sandpoint 1:250K	Kgs	granite, undivided	Granitic rocks of Spirit pluton
Sandpoint 1:250K	Kh	granite, undivided	Monzogranite of Hungry Mountain
Sandpoint 1:250K	Khm	granite, dark	Granodiorite of Hall Mountain
Sandpoint 1:250K	Kjl	granite, dark	Granitic rocks of Jewel Lake
Sandpoint 1:250K	Kk	granite, dark	Granodiorite of Kelso Lake
Sandpoint 1:250K	Kkp	granite, dark	Granodiorite of Kelly Pass
Sandpoint 1:250K	Klc	granite, dark	Granodiorite of Lightning Creek
Sandpoint 1:250K	Klcc	granite, dark	Granodiorite of Le Clerc Creek
Sandpoint 1:250K	Klgs	granite, light	Leucocratic granitic rocks of Scotia
Sandpoint 1:250K	Kli	extrusive dikes and sills	Leucocratic intrusive rocks
Sandpoint 1:250K	Klm	granite, undivided	Monzogranite of Long Mountain
Sandpoint 1:250K	Klr	granite, dark	Monzogranite of Little Roundtop
Sandpoint 1:250K	Km	granite, undivided	Monzogranite of Middle Creek
Sandpoint 1:250K	Kmc	granite, dark	Granodiorite of Mill Creek
Sandpoint 1:250K	Kmg	granite, undivided	Muscovite-biotite monzogranite
Sandpoint 1:250K	Kmm	granite, dark	Monzogranite of Midnight Mine
Sandpoint 1:250K	Kmo	granite, dark	Granodiorite of Molybdenite Mountain
Sandpoint 1:250K	Knb	granite, dark	Two-mica monzogranite of North Basin
Sandpoint 1:250K	Knc	granite, undivided	Monzogranite of Narcisse Creek
Sandpoint 1:250K	Koc	granite, undivided	Monzogranite of Otter Creek
Sandpoint 1:250K	Kpbc	Priest River Complex, granite, undivided	mixed two-mica rocks of Ball Creek, Priest River Complex
Sandpoint 1:250K	Kpbi	Priest River Complex, granite, undivided	Granitic rocks of Big Creek, Priest River Complex
Sandpoint 1:250K	Kpcb	Priest River Complex, granite, dark	Biotite-rich granodiorite of Cavanaugh Bay, Priest River Complex
Sandpoint 1:250K	Kpcc	Priest River Complex, granite, dark	Granodiorite of Caribou Creek, Priest River Complex

Sandpoint 1:250K	Kpcp	Priest River Complex, granite, undivided	mixed granitic rocks of Camels Prairie, Priest River Complex
Sandpoint 1:250K	Kpdc	Priest River Complex, granite, undivided	Mixed granitic and metamorphic rocks of Deep Creek, Priest River Complex
Sandpoint 1:250K	Kpfc	Priest River Complex, granite, dark	Granodiorite of Falls Creek, Priest River Complex
Sandpoint 1:250K	Kpgb	Priest River Complex, granite, dark	Garnet-bearing granodiorite, Priest River Complex
Sandpoint 1:250K	Kph	Priest River Complex, granite, undivided	Two-mica granitic rocks of Horton Creek, Priest River Complex
Sandpoint 1:250K	Kphc	granite, dark	Monzogranite of Hunt Creek
Sandpoint 1:250K	Kpkm	Priest River Complex, granite, undivided	Monzogranite of Klootch Mountain, Priest River Complex
Sandpoint 1:250K	Kpl	Priest River Complex, granite, dark	Phillips Lake Granodiorite, Priest River Complex
Sandpoint 1:250K	Kplc	Priest River Complex, granite, dark	Biotite-rich granodiorite of Lucky Creek, Priest River Complex
Sandpoint 1:250K	Kpll	Priest River Complex, granite, light	Mixed leucocratic granitic rocks of Lost Creek, Priest River Complex
Sandpoint 1:250K	Kplm	Priest River Complex, granite, undivided	mixed granitic and metamorphic rocks of Lookout Mountain, Priest River Complex
Sandpoint 1:250K	Kpm	granite, dark	Granodiorite porphyry of Packsaddle Mountain
Sandpoint 1:250K	Kpml	Priest River Complex, granite, dark	Biotite-rich granodiorite of Marsh Lake, Priest River Complex
Sandpoint 1:250K	Kpms	Priest River Complex, granite, undivided	mixed granitic and metamorphic rocks of Soldier Creek, Priest River Complex
Sandpoint 1:250K	Kpsh	Priest River Complex, granite, undivided	Monzogranite of Shorty Peak, Priest River Complex
Sandpoint 1:250K	Kpsl	Priest River Complex, granite, dark	Granodiorite of Search Lake, Priest River Complex
Sandpoint 1:250K	Kpsp	Priest River Complex, granite, dark	Tonalite of Snow Peak, Priest River Complex
Sandpoint 1:250K	Kptc	Priest River Complex, granite, dark	Granodiorite of Trapper Creek, Priest River Complex
Sandpoint 1:250K	Krc	granite, dark	Granodiorite of Reeder Creek
Sandpoint 1:250K	Krl	granite, dark	Granodiorite of Rapid Lightning Creek
Sandpoint 1:250K	Kru	granite, dark	Granodiorite of Ruby Creek
Sandpoint 1:250K	Ksc	granite, undivided	Monzogranite of Sand Creek
Sandpoint 1:250K	Kse	granite, dark	Granodiorite of Sema Meadows
Sandpoint 1:250K	Ksg	granite, dark	Granodiorite of Sawyer
Sandpoint 1:250K	Ksh	granite, dark	Hornblende-biotite monzogranite and granodiorite of the Starvation Flat Quartz Mo
Sandpoint 1:250K	Ksha	granite, undivided	Arden pluton of the Starvation Flat Quartz Monzonite
Sandpoint 1:250K	Kslc	granite, dark	Granodiorite of Salee Creek
Sandpoint 1:250K	Ksm	sedimentary rocks	Sophie Mountain Formation
Sandpoint 1:250K	Ksv	granite, dark	Granodiorite of Spring Valley
Sandpoint 1:250K	Ktc	granite, undivided	Monzogranite of Tango Creek
Sandpoint 1:250K	Ktmc	granite, undivided	Two-mica monzogranite of Twentymile Creek
Sandpoint 1:250K	Kv	granite, dark	Granodiorite of Road V-78
Sandpoint 1:250K	Kw	granite, dark	Granodiorite of Whiskey Creek
Sandpoint 1:250K	Kwm	granite, undivided	White Mud Lake porphyritic body

Sandpoint 1:250K	Kyl	granite, dark	Granodiorite of Yocum Lake
Sandpoint 1:250K	MCu	carbonate rocks	Sedimentary rocks, undivided
Sandpoint 1:250K	MDs	carbonate rocks	Dolomite and slate
Sandpoint 1:250K	Ml	carbonate rocks	limestone
Sandpoint 1:250K	MZPZf	metasedimentary rocks	fault-zone rocks on Eagle Mountain
Sandpoint 1:250K	OCgc	metasedimentary rocks	phyllite and quartzite of Gardiner Creek
Sandpoint 1:250K	OCm	carbonate rocks	Metaline Formation
Sandpoint 1:250K	Ol	carbonate rocks	Ledbetter Formation
Sandpoint 1:250K	Ps	metasedimentary rocks	Metasedimentary rocks
Sandpoint 1:250K	Qag	glacial deposits	glacial and alluvial deposits
Sandpoint 1:250K	Ql	glacial deposits	glacial-lacustrine deposits
Sandpoint 1:250K	Qls	landslide deposits	landslide deposits
Sandpoint 1:250K	QTs	sedimentary rocks	consolidated alluvial and (or) glacial deposits
Sandpoint 1:250K	Sc	sedimentary rocks	Quartz-granule conglomerate
Sandpoint 1:250K	sgg	metamorphic rocks	schist, gneiss, and leucocratic granitic rocks
Sandpoint 1:250K	Sms	metasedimentary rocks	Metasedimentary rocks
Sandpoint 1:250K	Tam	granite, dark	Quartz monzodiorite of Ahern Meadows
Sandpoint 1:250K	Tcb	metamorphic rocks	chlorite breccia and cataclastic rocks associated with Newport Fault Zone
Sandpoint 1:250K	Tcc	metamorphic rocks	Tectonic breccia of Cusick Creek
Sandpoint 1:250K	Tcg	sedimentary rocks	conglomerate
Sandpoint 1:250K	Tcr	basalt	Columbia River Basalt Group
Sandpoint 1:250K	Tcs	granite, light	Coryell plutonic rocks and Sheppard Granite, undivided
Sandpoint 1:250K	Thd	intrusive dikes and sills	hypabyssal dikes
Sandpoint 1:250K	Tll	granite, light	Quartz monzonite of Loon Lake
Sandpoint 1:250K	To	sedimentary rocks	O'Brien Creek Formation
Sandpoint 1:250K	Tot	volcanic rocks	Olivine trachybasalt flows
Sandpoint 1:250K	TRft	granite, dark	Flowery Trail Granodiorite
Sandpoint 1:250K	TRs	metasedimentary rocks	Metasedimentary rocks
Sandpoint 1:250K	Ts	volcanic rocks	Sanpoil Volcanics
Sandpoint 1:250K	Tsp	granite, light	Silver Point Quartz Monzonite
Sandpoint 1:250K	Ttp	granite, light	Quartz monzonite of Trapper Peak
Sandpoint 1:250K	Tw	granite, dark	Granodiorite of Wrenco
Sandpoint 1:250K	Yb	Deer Trail Group, quartzite	Buffalo Hump Formation, Deer Trail Group
Sandpoint 1:250K	Ybk	Burke Formation	Burke Formation, Ravalli Group

Sandpoint 1:250K	Ybmh	Striped Peak Formation, argillite	Bonner Formation, Mount Shields Formation, and argillite of Half Moon Lake, undiv
Sandpoint 1:250K	Ybo	Striped Peak Formation, quartzite	Bonner Formation, Belt Supergroup
Sandpoint 1:250K	Yc	Deer Trail Group, metasedimentary rocks	Chamokane Creek Formation, Deer Trail Group
Sandpoint 1:250K	Ydtu	Deer Trail Group, metasedimentary rocks	undivided part, Deer Trail Group
Sandpoint 1:250K	Ye	St. Regis Formation	Empire Formation, Belt Supergroup
Sandpoint 1:250K	Yhm	metasedimentary rocks	Argillite of Half Moon Lake, Belt Supergroup
Sandpoint 1:250K	Yl	Libby Formation	Libby Formation, Belt Supergroup
Sandpoint 1:250K	Ylg	gneiss	Gneiss of Laclede
Sandpoint 1:250K	Ym	Deer Trail Group, argillite	McHale Slate, Deer Trail Group
Sandpoint 1:250K	Ymi	intrusive dikes and sills	mafic intrusive rocks, Ravalli Group
Sandpoint 1:250K	Yms	Striped Peak Formation	Mount Shields Formation, Belt Supergroup
Sandpoint 1:250K	Ynl	gneiss	Newman Lake Gneiss
Sandpoint 1:250K	Yp	Prichard Formation	Pritchard Formation, Ravalli Group
Sandpoint 1:250K	Ypm	Prichard Formation	Pritchard Formation, metamorphosed, Ravalli Group
Sandpoint 1:250K	Yr	Revett Formation	Revett Formation, Ravalli Group
Sandpoint 1:250K	Yru	Ravalli Group	Undivided part, Ravalli Group
Sandpoint 1:250K	Ys	Deer Trail Group, carbonate rocks	Stensgar Dolomite, Deer Trail Group
Sandpoint 1:250K	Ysh	Wallace Formation, upper	Shepard Formation, Belt Supergroup
Sandpoint 1:250K	Yshs	Wallace Formation, upper	Shepard Formation and Snowslip Formation, undivided, Belt Supergroup
Sandpoint 1:250K	Ysr	St. Regis Formation	St. Regis Formation, Ravalli Group
Sandpoint 1:250K	Yss	Wallace Formation, upper	Snowslip Formation, Belt Supergroup
Sandpoint 1:250K	Yssw	Wallace Formation, upper	Shepard Formation, Snowslip Formation, and Wallace Formation, undivided, Belt S
Sandpoint 1:250K	Yt	Deer Trail Group, argillite	Togo Formation, Deer Trail Group
Sandpoint 1:250K	Yw	Wallace Formation	Wallace Formation, Belt Supergroup
Sandpoint 1:250K	Ywcu	Deer Trail Group, metasedimentary rocks	Wabash Detroit Formation and Chamokane Creek Formation, undivided, Deer Tra
Sandpoint 1:250K	Ywd	Deer Trail Group, carbonate rocks	Wabash Detroit Formation, Deer Trail Group
Sandpoint 1:250K	Ywr	Wallace Formation and Ravalli Group	Wallace Formation and Ravalli Group, undivided, Belt Supergroup
Sandpoint 1:250K	Zhc	metamorphic rocks	Conglomerate member, Huckleberry Formation of the Windermere Group
Sandpoint 1:250K	Zhg	metavolcanic rocks	Greenstone member, Huckleberry Formation of the Windermere Group
Sandpoint 1:250K	Zl	metavolcanic rocks	Leola Volcanics, Windermere Group
Sandpoint 1:250K	Zm	metasedimentary rocks	Monk Formation, Windermere Group

Sandpoint 1:250K	Zsc	metasedimentary rocks	Conglomerate member, Shedroof Conglomerate of the Windermere Group
Sandpoint 1:250K	Zsg	metavolcanic rocks	Greenstone member, Shedroof Conglomerate of the Windermere Group
Sandpoint 1:250K	Zsl	carbonate rocks	Sandy limestone member, Shedroof Conglomerate of the Windermere Group
Sandpoint 1:250K	Zsp	phyllite	Phyllite member, Shedroof Conglomerate of the Windermere Group
Sandpoint 1:250K	Zt	metamorphic rocks	Three Sisters Formation, Windermere Group
Sandpoint 1:250K	ZYmi	intrusive dikes and sills	mafic intrusive rocks in upper part of Belt Supergroup
Sandpoint 1:250K		water	water body
St.Maries 1:100K	Kog	gneiss	Orthogneiss
St.Maries 1:100K	KYam	metavolcanic rocks	Amphibolite
St.Maries 1:100K	m	man-made	man-made
St.Maries 1:100K	Qal	alluvium	Alluvial deposits
St.Maries 1:100K	Qg	glacial deposits	Glacial deposits
St.Maries 1:100K	Qls	landslide deposits	Landslide deposits
St.Maries 1:100K	Td	extrusive dikes and sills	Dacite dikes
St.Maries 1:100K	Ted	basalt	Basalt of Dodge
St.Maries 1:100K	Tgd	granite, dark	Biotite- and hornblende-biotite granodiorite
St.Maries 1:100K	Tgn2	basalt	Grande Ronde N2 magnetostratigraphic unit
St.Maries 1:100K	Tgr2	basalt	Grande Ronde R2 magnetostratigraphic unit
St.Maries 1:100K	TKdd	intrusive dikes and sills	Diabase and diorite dikes
St.Maries 1:100K	TKgb	intrusive dikes and sills	Gabbro
St.Maries 1:100K	TKla	extrusive dikes and sills	Lamprophyre dikes
St.Maries 1:100K	Ton	basalt, P	Onaway Member
St.Maries 1:100K	Tpr	basalt	Priest Rapids Member
St.Maries 1:100K	Tr	extrusive dikes and sills	Rhyolite dikes
St.Maries 1:100K	Ts	tertiary sediments	Sediment
St.Maries 1:100K	water	water	water
St.Maries 1:100K	Yb	Burke Formation	Burke Formation
St.Maries 1:100K	Yl	Libby Formation	Libby Formation
St.Maries 1:100K	Yp	Prichard Formation	Prichard Formation, undivided
St.Maries 1:100K	Ypl	Prichard Formation, lower	Prichard Formation, lower part
St.Maries 1:100K	Ypu	Prichard Formation, upper	Prichard Formation, upper part
St.Maries 1:100K	Yq	quartzite	Quartzite
St.Maries 1:100K	Yqp	Prichard Formation, quartzite	Quartzite of the Prichard Formation
St.Maries 1:100K	Yqrv	Ravalli Group, quartzite	Quartzite of the Ravalli Group, undivided

St.Maries 1:100K	Yqw	Wallace Formation, quartzite	Quartzite of the Wallace Formation
St.Maries 1:100K	Yr	Revett Formation	Revett Formation
St.Maries 1:100K	Yrb	Ravalli Group	Revett and Burke Formations, undivided
St.Maries 1:100K	Ys	schist	Schist
St.Maries 1:100K	Ysp	Striped Peak Formation	Striped Peak Formation, undivided
St.Maries 1:100K	Ysp1a	Striped Peak Formation, argillite	Striped Peak Formation, argillite part of member one
St.Maries 1:100K	Ysp1q	Striped Peak Formation, quartzite	Striped Peak Formation, quartzite part of member one
St.Maries 1:100K	Ysp4	Striped Peak Formation, quartzite	Striped Peak Formation, member four
St.Maries 1:100K	Ysr	St. Regis Formation	St. Regis Formation
St.Maries 1:100K	Ysrv	Ravalli Group, schist	Schist of the Ravalli Group
St.Maries 1:100K	Ysw	Wallace Formation, schist	Schist and phyllite of the Wallace Formation
St.Maries 1:100K	Ywl	Wallace Formation, middle and lower	Wallace Formation, lower member
St.Maries 1:100K	Ywm	Wallace Formation, middle and lower	Wallace Formation, middle member
St.Maries 1:100K	Ywml	Wallace Formation, middle and lower	Wallace Formation, middle and lower members, undivided
St.Maries 1:100K	Ywu	Wallace Formation, upper	Wallace Formation, upper member, undivided
St.Maries 1:100K	Ywu1	Wallace Formation, upper	Wallace Formation, upper member one
St.Maries 1:100K	Ywu2	Wallace Formation, upper	Wallace Formation, upper member two
St.Maries 1:100K	Ywu3	Wallace Formation, upper	Wallace Formation, upper member three
St.Maries 1:100K	YXq	quartzite	Quartzite of the Priest River metamorphic complex
St.Maries 1:100K	YXs	schist	Schist of the Priest River metamorphic complex
Thompson Falls 1:100K	Kms	granite, light	monzonite and syenite
Thompson Falls 1:100K	Qa	alluvium	alluvial deposits
Thompson Falls 1:100K	Qg	glacial deposits	glacial deposits
Thompson Falls 1:100K	Tsm	tertiary sediments	sediment
Thompson Falls 1:100K	Ybk	Burke Formation	Burke Formation, Belt Supergroup
Thompson Falls 1:100K	Ypl	Prichard Formation, lower	lower member of the Pritchard Formation
Thompson Falls 1:100K	Ypu	Prichard Formation, upper	upper member of the Pritchard Formation
Thompson Falls 1:100K	Yr	Revett Formation	Revett Formation, Belt Supergroup
Thompson Falls 1:100K	Ysp	Striped Peak Formation	Striped Peak Formation
Thompson Falls 1:100K	Ysr	St. Regis Formation	St. Regis Formation, Belt Supergroup
Thompson Falls 1:100K	Ywml	Wallace Formation, middle and lower	undivided middle and lower members of the Wallace Formation
Thompson Falls 1:100K	Ywu	Wallace Formation, upper	upper member of the Wallace Formation
Wallace 1:100K	Kgd	granite, dark	biotite granodiorite
Wallace 1:100K	Kog	gneiss	orthogneiss

Wallace 1:100K	Qa	alluvium	alluvial deposits
Wallace 1:100K	Qg	glacial deposits	glacial deposits
Wallace 1:100K	Qog	tertiary sediments	older gravels
Wallace 1:100K	Tcr	basalt	Columbia River Basalt Group
Wallace 1:100K	Tdp	extrusive dikes and sills	porphyritic dacite dikes
Wallace 1:100K	Tgd	granite, dark	hornblende-biotite granodiorite, includes Roundtop pluton and Herrick stock
Wallace 1:100K	TKgb	intrusive dikes and sills	gabbroic and dioritic dikes and sills
Wallace 1:100K	Ts	tertiary sediments	
Wallace 1:100K	Tsm	tertiary sediments	sediment
Wallace 1:100K	Yam	metavolcanic rocks	amphibolite
Wallace 1:100K	Yan	metamorphic rocks	anorthosite
Wallace 1:100K	Ybk	Burke Formation	Burke Formation, Ravalli Group
Wallace 1:100K	Yc	metamorphic rocks	calc-silicate rocks
Wallace 1:100K	Ypu	Prichard Formation, upper	upper member of the Pritchard Formation
Wallace 1:100K	Yq	quartzite	quartzite
Wallace 1:100K	Yqrv	Ravalli Group, quartzite	quartzite of the Ravalli(?) Group
Wallace 1:100K	Yqw	Wallace Formation, middle and lower, quartzite	quartzite of the middle Wallace Formation
Wallace 1:100K	Yr	Revett formation	Revett Formation, Ravalli Group
Wallace 1:100K	Ys	schist	schist
Wallace 1:100K	Ysp	Striped Peak Formation	Striped Peak Formation
Wallace 1:100K	Ysp1	Striped Peak Formation, quartzite	Striped Peak Formation, member one
Wallace 1:100K	Ysp2	Striped Peak Formation, carbonate	Striped Peak Formation, member two
Wallace 1:100K	Ysp3	Striped Peak Formation, argillite	Striped Peak Formation, member three
Wallace 1:100K	Ysr	St. Regis Formation	St. Regis Formation, Belt Supergroup
Wallace 1:100K	Ysrv	Ravalli Group, schist	schist of the Ravalli(?) Group
Wallace 1:100K	Ysw	Wallace Formation, schist	schist and phyllite of the upper Wallace Formation
Wallace 1:100K	Ywl	Wallace Formation, middle and lower	lower member of the Wallace Formation
Wallace 1:100K	Ywm	Wallace Formation, middle and lower	middle member of the Wallace Formation
Wallace 1:100K	Ywml	Wallace Formation, middle and lower	undivided middle and lower members of the Wallace Formation
Wallace 1:100K	Ywu1	Wallace Formation, upper	upper member 1 of the Wallace Formation
Wallace 1:100K	Ywu2	Wallace Formation, upper	upper member 2 of the Wallace Formation
Wallace 1:100K	Ywu3	Wallace Formation, upper	upper member 3 of the Wallace Formation