**PREDICTED ROAD DENSITIES**
**VARIABLE 07 ( VB 07)**
**03/30/00**

**Vb7 (.dbf,.db)**

Field Definitions:

HUC6 – Subwatershed, 12 character numeric code.

H6_HECT – Area of Subwatershed (HUC6) in Hectares.

H6_ACRES – Area of Subwatershed (HUC6) in Acres. These data were calculated as a double precision field from the H6_HECT value, but have been rounded to 5 decimal places due to software limitations when creating the .dbf format file. The total acres for the basin from this file will not match published acreage reports due to this rounding of values. If the double precision version of acres is necessary, multiply the H6_Hect value by 2.471054073 .

MGR – 1 digit numeric code for SDEIS Management Region (numbers 1 through 4).
1 = ICBEMP
2 = NWFP
3 = GYE/WY
4 = NV/UT

MGR_NM – Up to 6 character code for SDEIS Management Region, (ICBEMP, NWFP, GYE/WY, NV/UT).

OWN – 1 digit numeric code for Ownership.
1 = FS/BLM
2 = Other

OWN_NM – Up to 6 character code, (FS/BLM, Other).

TRND – 1 digit numeric code for Road Density Trends, ( 1=increasing, 2=stable, 3=decreasing).

RDDN – 1 digit numeric code for Road Density Class, (1=none, 2=very low, 3=low, 4=moderate, 5=high, 6=extremely high).

CUR_FCT – Current Year 0 Road Density Trend Factor for each HUC6/MGR/OWN/RDDN/TRND combination in the subwatershed (reported to 5 decimal places).
Multiply by H6_Acres or H6_Hect to obtain Acres or Hectares of the Road Density Class/Trend combination per HUC6/MGR/OWN combination.

X1_10_FCT – X1 Year 10 Road Density Trend Factor for each HUC6/MGR/OWN/RDDN/TRND combination in the subwatershed (reported to 5 decimal places).
Multiply by H6_Acres or H6_Hect to obtain Acres or Hectares of the Road Density Class/Trend combination per HUC6/MGR/OWN combination.

X1_100_FCT X1 Year 100 RoadDensity Trend Factor for each HUC6/MGR/OWN/RDDN/TRND combination in the subwatershed (reported to 5 decimal places).
Multiply by H6_Acres or H6_Hect to obtain Acres or Hectares of the Road Density Class/Trend combination per HUC6/MGR/OWN combination.

X2_10_FCT – X1 Year 100 RoadDensity Trend Factor for each HUC6/MGR/OWN/RDDN/TRND combination in the subwatershed (reported to 5 decimal places).

Multiply by H6_Acres or H6_Hect to obtain Acres or Hectares of the Road Density Class/Trend combination per HUC6/MGR/OWN combination.

X2_100_FCT – X1 Year 100 RoadDensity Trend Factor for each HUC6/MGR/OWN/RDDN/TRND combination in the subwatershed (reported to 5 decimal places).
Multiply by H6_Acres or H6_Hect to obtain Acres or Hectares of the Road Density Class/Trend combination per HUC6/MGR/OWN combination.

X3_10_FCT – X1 Year 100 RoadDensity Trend Factor for each HUC6/MGR/OWN/RDDN/TRND combination in the subwatershed (reported to 5 decimal places).
Multiply by H6_Acres or H6_Hect to obtain Acres or Hectares of the Road Density Class/Trend combination per HUC6/MGR/OWN combination.

X3_100_FCT – X1 Year 100 RoadDensity Trend Factor for each HUC6/MGR/OWN/RDDN/TRND combination in the subwatershed (reported to 5 decimal places).
Multiply by H6_Acres or H6_Hect to obtain Acres or Hectares of the Road Density Class/Trend combination per HUC6/MGR/OWN combination.

**REQUIREMENTS FOR PROCESSING TRENDS IN ROAD DENSITY**
**VARIABLE 07 (VB 07)**

**Logic Overview**

Future road density will be calculated in GIS (at 1km cell level) based on a ruleset developed from the SDEIS Ch3 direction, associated recovery plans and BO requirements. It is estimated that very little change in road density classes will result for any of the alternatives for the first decade. This assumption is due to the large amount of road closures or new roads it would take to move a road density class from the current class. Trends of change (stable, up, down) will be estimated for the first decade and the long-term (100 year estimates) will show both a trend and a predicted road density class. The data will be passed to an access database for summary and reporting. Road density classes will not be a dominant by subwatershed. It will be estimated by ownership (BLM/FS, Other) within each subwatershed.

It is necessary to develop assumptions for predicting road density trends for the future for the SDEIS alternatives. There are instances where the current package of direction is not specific so assumptions are necessary in order to move forward with developing a modeling process. The following assumptions will guide the modeling exercise. Feedback from the EIS team on these assumptions is desired prior to processing of the NA and other action alternatives

**Assumptions**

Non-federal lands-- All alternatives

No changes in road density classes will be predicted in the short-term (10 years) or long-term (10 years) as it takes a large amount of road closures or new roads to increase or decrease 1 road density class. Non-federal lands are assumed to remain in static trend in short- and long-term.

NA alternative

No changes in road density classes in the short-term (10 years) will be predicted as it takes a large amount of road closures or new roads to increase or decrease 1 road density class.

Road increases

- Areas assigned the following Prescriptions (Rx) would show an increasing trend in road density classes for short-term, and in the long-term would increase 1 road density class (for those currently classified as very low, and low) OUTSIDE priority watersheds.
  Forested PVTGRPs: N3, N8, C2, C3, P3

Unroaded areas

- Areas currently unroaded (predicted road density=none) would remain unroaded (trend and density class) for short-term and long-term on BLM- and FS-administered lands. It is recognized that road entry is not prohibited but will be rare to deal with hazards, risks, and property.

Priority watersheds

- Areas within the bulltrout, steelhead, and chinook priority watersheds with high and extremely high road densities will be reduced in short- and long-term (declining trend), and there will be no net increases in road density classes in priority watersheds on BLM- and FS-administered lands.

Recovery plans

- Forested areas within grizzly bear recovery areas with high and extremely high road densities will be reduced in short-term (declining trend) and will be reduced by 1 road density class in the long-term on BLM- and FS- administered lands.
- Forested areas within the caribou recovery area with high and extremely high road densities will be reduced in short-term (declining trend) and long-term but not enough to reduce road density classes on BLM- and FS- administered lands.

Action alternatives -

No changes in road density classes in the short-term (10 years) will be predicted as it takes a large amount of road closures or new roads to increase or decrease 1 road density class.

Road increases

- Areas assigned the following Prescriptions (Rx) would show an increasing trend in road density classes for short-term and long-term with no changes in net road density class (for those currently classified as very low and low)
  Forested PVTGRPs: N3, N8, C2, C3, P3, A2, A3

Unroaded areas-- (same as NA)

- Areas currently unroaded (predicted road density=none) would remain unroaded (trend and density class) for short-term and long-term on BLM- and FS- administered lands. It is recognized that road entry is not prohibited but will be rare to deal with hazards, risks, and property.

Recovery plans-- (same as NA)

- Forested areas within grizzly bear recovery area with high and extremely high road densities will be reduced in short-term (declining trend) and will be reduced by 1 road density class in the long-term on BLM- and FS- administered lands.
- Forested areas within the caribou recovery area with high and extremely high road densities will be reduced in short-term (declining trend) and long-term but not enough to reduce road density classes on BLM- and FS- administered lands.

A1 and T areas

- No increases in trend or net increases in road density for short- and long-term in A1 and T areas.

A2 areas (outside A1 and T)

- No net increases in road density for short-term. Static trend in the short term.
- In short-term, there will be a decreasing trend in areas with greater than or equal to moderate road density and no net increase in road density.
- In A2 areas in the long-term, there will be a decreasing trend for extremely low, low, moderate, high, and extremely high road density areas. In A2 areas at the lower end of high and extremely high road density classes would reduce one density class. For modeling purposes it is assumed all pixels in high and extremely high in A2 areas (outside A and T) would reduce a class in long-term.

High aquatic functional priority areas (outside of A1, T and A2)

- For long-term, there will be a decreasing trend in moderate, high, and extremely high and a decrease in class for extremely high.

Other areas

There will a decreasing trend and not net change in density classes in high and extremely high road densities in the short- and long-term.

NOTE: A trend class needs to be assigned to each mgt strata (6H/MRC) for year 10 and 100. If not specifically mentioned, above trend is stable.

**Processing**

The following process should be used to create future road density trends by alternative year (10,100).

No-Action Alternative:

**Process 1.0 –** Combine current Predicted Road Density grid with H6AMP_HDI grid to create H6AMPHRD grid.

**Process 1.1 –** Join the H6AMPHRD.VAT with the H6AMP_HDI.VAT to bring the attributes over from the H6AMP_HDI grid.

**Process 1.2 –** Convert the H6AMPHRD.VAT file into a dbase IV format and call the file H6AMPHRD.dbf
Infodbase H6AMPHRD.VAT H6AMPHRD.DBF

**Process 1.3 –** Create an Access database called VB7.MDB and import H6AMPHRD.DBF into it.

**Process 1.4 –** Join all needed database files to H6AMPHRD

**Process 1.4.1 –** Using the grid H6AMP, pull out the items H6AMP_CODE and X1 into a new table called H6AMPX1.DAT. Convert this also into a dbaseIV table.
Pullitems H6AMP.VAT H6AMPX1.DAT
1st Item: H6AMP_CODE
2nd Item: X1

Infodbase H6AMPX1.DAT H6AMPX1.DBF

Import this table into VB7.MDB and link it to H6AMPHRD using H6AMP_CODE as the joinitem.

**Process 1.4.2 –** Import H6PAM2.DBF, H6_RCV.DBF, H6_PWS.DBF, H6BTRSTT.DBF, S2S3_T.DBF, H6AQ_FNC.DBF, and S1S2A1A2.DBF into VB7.MDB and establish links with H6AMPHRD

Link H6PAM2 with H6AMPHRD using h6amp_code as the link item.

Link H6_RCV, H6_PWS, H6BTRSTT, S2S3_T, H6AQ_FNC, and S1S2A1A2 with H6AMPHRD using huc6 as the link item.

**Process 2.1 –** Add two items called RDDN_10 and RDDN_100 that are both integer fields to H6AMPHRD in the design view in Access. Also add another integer field called DENSYES to the H6AMPHRD table.

The items RDDN_10 and RDDN_100 will have values that will combine the road density values (bgbrddn) and trends from the H6AMPHRD table. So for example, if the road density value changes from 3 to 2, resulting in a declining trend, the new value would be ((2 * 10) + 3) = 23. The DENSYES field will be set to 1, once the RDDN_10 and RDDN_100 are assigned a value (other than 0).

**Process 2.2.1 –** Create an update query called qry1_NonBLMFS that selects all the records for Non Forest Service / BLM lands and assigns them the same value of road density class for year 10 and year 100, and a trend of 2 reflecting no change in trend.
ownershp NE 'FS/BLM'
Update RDDN_10 to: (bgbrddn * 10) + 2
Update RDDN_100 to: (bgbrddn * 10) + 2

Create an update query to calculate the value of DENSYES to 1 once the RDDN_10 and RDDN_100 are assigned a value.

RDDN_10 NE 0 and RDDN_100 NE 0
Update DENSYES to: 1

NOTE: This query will be run after each of the other queries are run to update the value of DENSYES anytime new values are assigned to RDDN_10 and RDDN_100.

**Process 2.2.2 –** Of the BLM/FS lands (ownershp=FS/BLM), all the cells that fall in unroaded areas (1) remain unroaded in the years 10 and 100 i.e., cells will have road density value of 1 and trend of 2 in both year 10 and year 100. Create an update query called qry2_BLM/FSUnroaded which first selects all the records that have DENSYES not equal to 1 and then selects the unroaded areas and assigns them the new

values.

DENSYES <> 1 and bgbrddn EQ 1
Update RDDN_10 to: (bgbrddn * 10) + 2
Update RDDN_100 to: (bgbrddn * 10) + 2

Run qryDenYes to update the value of DENSYES in H6AMPHRD

**Process 2.3 –** Assign Road Densities to areas with terrestrial species (Grizzly Bear, Caribou)

**Process 2.3.1 –** In the BLM/FS lands (ownershp=FS/BLM), select those cells for which H6GRZCAL=Y that also have forested PVTGRPs (PVTGRP=3, 5, or 8). Assign the records that have high (5) or extremely high road (6) densities a declining trend (3) for short-term (year 10) and reduce by one density class with a declining trend (3) for long-term (year 100). Create an update query called qry3_BLM/FSGrz.

DENSYES <> 1 and H6GRZCAL EQ 'Y' and (PVTGRP = 3 or PVTGRP = 5 or PVTGRP = 8) and (bgbrddn = 5 or bgbrddn = 6 )
Update RDDN_10 to: ( bgbrddn * 10 ) + 3
Update RDDN_100 to: ( bgbrddn - 1) * 10 + 3

Run qryDenYes to update the value of DENSYES in H6AMPHRD

**Process 2.3.2 –** Select the forested parts (PVTGRP=3, 5, or 8) of the caribou recovery areas (H6CRBCAL=Y) having high (5) or extremely high road densities (6) that fall within BLM/FS administered lands (ownershp=FS/BLM). They will have a declining trend (3) for both year 10 and year 100 and the same road density value. If these areas overlap with the recovery area of the grizzly bear, according to the conditions in Step 7, then the latter will take precedence. Call this query qry4_BLM/FSCrb.

DENSYES <> 1 and H6CRBCAL EQ 'Y' and (PVTGRP = 3 or PVTGRP = 5 or PVTGRP = 8) and (bgbrddn = 5 or bgbrddn = )
Update RDDN_10 to: (bgbrddn * 10) + 3
Update RDDN_100 to: (bgbrddn * 10) + 3

Run qryDenYes to update the value of DENSYES in H6AMPHRD

**Process 2.4.1 –** Identify the cells that fall within priority subwatersheds for the bulltrout (Btr_stat=Y), steelhead (h6sthpws=Y), and chinook (h6chpws=Y), and also have high (5) and extremely high (6) road densities. Assign these cells a declining trend (3) for years 10 and 100 and the same density value. The update query is called qry5_BLM/FSPws

DENSYES NE 1 and (H6STHPWS = Y or H6CHPWS = Y or BTR_STAT = Y) and (bgbrddn = 5 or bgbrddn = 6)
Update RDDN_10 to: ( bgbrddn * 10 ) + 3
Update RDDN_100 to: ( bgbrddn * 10 ) + 3

Run qryDenYes to update the value of DENSYES in H6AMPHRD

**Process 2.4.2 –** For all the cells that do not meet the criteria listed from Steps 7 through 12, have a forested PVTGRP (PVTGRP=3, 5, or 8), low (3) or very low (2) road densities, and are assigned any of the following prescriptions (X1, X2, or X3 =): 33, 38, 22, 23, 43, and do not fall in priority watersheds for chinook, steelhead, and bull trout, assign the year 10 grid, an increasing trend (1) and same road density value. Assign the density class in the year 100 grid as one higher than the current road densities grid and an increasing trend (1). Call this update query qry6_BLM/FSRdIncrs.

DENSYES NE 1 and (H6STHPWS NE Y and H6CHPWS NE Y and BTR_STAT NE Y) and (PVTGRP = 3 or

PVTGRP = 5 or PVTGRP = 8) and (bgbrddn = 2 or bgbrddn = 3) and ( 1 = 33 or X1 = 38 or X1 = 22 or X1 = 23 or X1 = 43)
Update RDDN_10 to: (bgbrddn * 10) + 1
Update RDDN_100 to: ((bgbrddn + 1) * 10) + 1

Run qryDenYes to update the value of DENSYES in STR_RDDN

**Process 2.5 –** Select all the cells that have not been assigned any values for the fields RDDN_10 and RDDN_100. Assign them the same road density classes as the current road density classes and a trend of 2 (stable). This update query is called qry7_BLM/FSRemaining.

DENSYES <> 1
Update RDDN_10 to: ( bgbrddn * 10 ) + 2
Update RDDN_10 to: ( bgbrddn * 10 ) + 2

**Process 2.6.1 –** Create the predicted density grids for the Years 10 and 100 and summarize the predicted road densities and trends by each strata.

**Process 2.6.2 –** Summarize the road density and trends by h6amph_code, Alternative, and Year. Then convert into a dbase IV files by Alt and Year.

X1RD0.DBF
X1RD10.DBF
X1RD100.DBF

**Process 2.6.3 –** Export the H6AMPHRD table and call it RDDN_PRC.DBF. Import it into Arc/Info and join it with the H6AMPH_RD grid using value as the joinitem.
Dbaseinfo RDDN_PRC.DBF RDDN_PRC.DAT
Joinitem H6AMPHRD.VAT RDDN_PRC.DAT H6AMPHRD.VAT value H6AMPH_CODE linear

**Process 2.6.4 –** Create grids for years 10 and 100 using the items X1RD10 and X1RD100, respectively for assigning the values.
GRID> X1RD_10 = Select (H6AMPH_RDDN, 'value <> 0', RDDN_10)
GRID> X1RD_100 = Select (H6AMPH_RDDN, 'value <> 0', RDDN_100)

Convert these floating point grids into Integer grids
GRID>X1RD10 = INT (X1RD_10)
GRID>X1RD100 = INT (X1RD_100)

**Process 2.6.5 –** Add four fields in the new grids for years 10 and 100, two for separating out the road density class values and trends, and two to add descriptions for them.

<u>Action Alternatives</u>:

The initial steps for the Action Alternatives are similar to the steps followed in the No-Action Alternatives. Process 1.0 remains unchanged and does not need to be repeated for running the Action Alternatives. However, there are changes in the ruleset for assigning trends and road density classes. The following steps outline the process:

**Process 3.1 –** Add four items called X2_RD10, X2_RD100, RDX3_10, and X3_RD100 that are both integer fields to H6AMPHRD in the design view in Access.

The items X2_RD10, X2_RD100, X3_RD10, and X3_RD100 will have values that will combine the road density values (bgbrddn) and trends from the H6AMPHRD table. So for example, if the road density value changes from 3 to 2, resulting in a declining trend, the new value would be ((2 * 10) + 3) = 23.

**Process 3.2.0 –** Assign road density values and trends to Non BLM/FS lands and management regions outside the ICBEMP region.

**Process 3.2.1 –** Create an update query called qryXx1_NonBLMFS that selects all the records for Non Forest Service / BLM lands and assigns them the same value of road density class for year 10 and year 100, and a trend of 2 reflecting no change in trend.
Ownershp NE FS/BLM
Update X2_RD10 to: (bgbrddn * 10) + 2
Update X2_RD100 to: (bgbrddn * 10) + 2

Update X3_RD10 to: ( bgbrddn * 10 ) + 2
Update X3_RD100 to: (bgbrddn * 10 ) + 2

**Process 3.2.2 –** Select the management regions that are outside the ICBEMP, and calculate the year 10 and year 100 road density classes and trends to the values from the X1 run.
MGTREG NE 1 and MGTREG NE 2
Update X2_RD10 to X1_RD10
Update X2_RD100 to X1_RD100

Similarly update X3_RD10 and X3_RD100.

**Process 3.2.3 –** Of the BLM/FS lands (ownershp=FS/BLM), all the cells that fall in unroaded areas (1) remain unroaded in the years 10 and 100 i.e., cells will have road density value of 1 and trend of 2 in both year 10 and year 100. Create an update query called qryXx2_BLM/FSUnroaded which selects the unroaded areas for the records that have not been road density and trend values for years 10 and 100, and assigns them the new values.

X2_RD10 = 0 and bgbrddn EQ 1
Update X2_RD10 to: (bgbrddn * 10 ) + 2
X2_RD100 = 0 and bgbrddn EQ 1
Update X2_RD100 to: (bgbrddn * 10 ) + 2

X3_RD10 = 0 and bgbrddn EQ 1
Update X3_RD10 to: (bgbrddn * 10 ) + 2
X3_RD100 = 0 and bgbrddn EQ 1
Update X3_RD100 to: (bgbrddn * 10 ) + 2

**Process 3.3.1 –** Select the A2 areas that do not overlap with A1 or T areas and assign the moderate, high, and extremely high road densities a decreasing trend for short-term. The very low and low will have a static trend for short term. For long-term, the very low, low, moderate, high, and extremely high road densities will be assigned a decreasing trend. The high and extremely high road densities will be lowered by one road density class. Create an update query called qryXx3BLMFS_A2

X2_RD10 = 0
(H6AQCORES2 = 2 and T_AREA = N) and bgbrddn > = 4
Update X2_RD10 to: (bgbrddn * 10) + 3
(H6AQCORES2 = 2 and T_AREA = N) and bgbrddn > = 2 and bgbrddn < = 4
Update X2_RD100 to: (bgbrddn * 10) + 3
(H6AQCORES2 = 2 and T_AREA = N) and bgbrddn > = 5
Update X2_RD100 to: ((bgbrddn - 1) * 10) + 3

Repeat for calculating X3_RD10 and X3_RD100

**Process 3.3.2 –** In the BLM/FS lands (ownershp=FS/BLM), select those cells for which H6GRZCAL=Y, that also have forested PVTGRPs (PVTGRP=3, 5, or 8). Assign the records that have high (5) or extremely high road (6) densities a declining trend (3) for short-term (year 10) and moderate (4) road density class and

declining trend (3) for long-term (year 100). Create an update query called qryXx5_BLM/FSGrz.

X2_RD10 = 0 and H6GRZCAL EQ 'Y' and (PVTGRP = 3 or PVTGRP = 5 or PVTGRP = 8) and (bgbrddn = 5 or bgbrddn = 6)
Update X2_RD10 to: ( bgbrddn * 10 ) + 3

X2_RD100 = 0 and (H6GRZCAL EQ 'Y' and (PVTGRP = 3 or PVTGRP = 5 or PVTGRP = 8) and (bgbrddn = 5 or bgbrddn = 6 ))
Update X2_RD100 to: (bgbrddn - 1) * 10 + 3

Repeat for calculating X3_RD10 and X3_RD100

**Process 3.3.3 –** Create an update query called qryXx4AquaPrArea. Select all the high aquatic functional priority areas that are outside of A1, A2, and TCORE areas. Assign long-term decreasing trends to moderate, high, and extremely high road density class, and a decrease in road density class of the extremely high road density class by one class.

X2_RD10 = 0 and (H6AQCORES2 NE 1 and H6AQCORES2 NE 2 and T_AREA = N) and bgbrddn >= 4 and bgbrddn <= 5
X2_RD100 = (bgbrddn * 10) + 3

X2_RD100 = 0 and (H6AQCORES2 NE 1 and H6AQCORES2 NE 2 and T_AREA = N) and bgbrddn = 6
X2_RD100 = ( bgbrddn -1 ) * 10 + 3

Repeat for calculating X3_RD10 and X3_RD100

**Process 3.3.4 –** Assign Road Densities to areas with Caribou recovery zones.

Select the forested parts (PVTGRP=3, 5, or 8) of the caribou recovery areas (H6CRBCAL=Y) having high (5) or extremely high road densities (6) that fall within BLM/FS administered lands (ownershp=FS/BLM). They will have a declining trend (3) for both year 10 and year 100 and the same road density value. If these areas overlap with the recovery area of the grizzly bear according to the conditions in Step 7, then the latter will take precedence. Call this query qryXx6_BLM/FSCrb.

X2_RD10 = 0 and H6CRBCAL EQ 'Y' and (PVTGRP = 3 or PVTGRP = 5 or PVTGRP = 8) and (bgbrddn = 5 or bgbrddn = 6)
Update X2_RD10 to: (bgbrddn * 10) + 3

X2_RD100 = 0 and H6CRBCAL EQ 'Y' and (PVTGRP = 3 or PVTGRP = 5 or PVTGRP = 8) and (bgbrddn = 5 or bgbrddn = 6)
Update X2_RD100 to: (bgbrddn * 10) + 3

Repeat for X3 to calculate X3_RD10 and X3_RD100.

**Process 3.4.1 –** Assign Road Density classes and trends to remaining areas with high or extremely high road density classes. Call this query qryXx7_BLM/FSHiEHi

X2_RD10 = 0 and (bgbrddn = 5 or bgbrddn = 6)
Update X2_RD10 to: (bgbrddn * 10) + 3

X2_RD100 = 0 and (bgbrddn = 5 or bgbrddn = 6)
Update X2_RD100 to: (bgbrddn * 10) + 3

Repeat for X3 to calculate X3_RD10 and X3_RD100.

**Process 3.4.2 –** Assign increasing trends to areas with very low or low road densities that do not fall in A1,

A2, or T Areas which have forested PVGs and one of the Prescription Assignments, N3, N8, C2, C3, P3, A2, A3. Call this query qryXx8_BLM/FSRdIncr

X2_RD10 = 0 and (H6AQCORES2 NE 1 and H6AQCORES2 NE 2 and T_AREA = N) and (bgbrddn = 2 or bgbrddn = 3) and (PVTGRP = 3 or PVTGRP = 5 or PVTGRP = 8) and (X2 = 12 or X2 = 13 or X2 = 22 or X2 = 23 or X2 = 33 or X2 = 38 or X2 = 43)
Update X2_RD10 to: (bgbrddn * 10) + 1

X2_RD100 = 0 and (H6AQCORES2 NE 1 and H6AQCORES2 NE 2 and T_AREA = N) and (bgbrddn = 2 or bgbrddn = 3) and (PVTGRP = 3 or PVTGRP = 5 or PVTGRP = 8) and (X2 = 12 or X2 = 13 or X2 = 22 or X2 = 23 or X2 = 33 or X2 = 38 or X2 = 43)
Update X2_RD100 to: (bgbrddn * 10) + 1

Do the same for X3.

**Process 3.5 –** Select all the cells that have not been assigned any values for the fields X2_RD10 and X2_RD100. Assign them the same road density classes as the current road density classes and a trend of 2 (stable). This update query is called qryXx9_BLM/FSRemain.

X2_RD10 = 0
Update X2_RD10 to: (bgbrddn * 10) + 2

X2_RD100 = 0
Update X2_RD100 to: (bgbrddn * 10) + 2

Repeat for X3.

**Process 3.6 –** Create the predicted density grids for the Years 10 and 100 and summarize the predicted road densities and trends by each strata.

**Process 3.6.1 –** Summarize the road density and trends by h6amph_code, Alternative, and Year. Then convert into a dbase IV files by Alt and Year.

X2_RD10.DBF
X2_RD100.DBF
X3_RD10.DBF
X3_RD100.DBF

**Process 3.6.2 –** Export the H6AMPHRD table and call it RDDN_PRC.DBF. Import it into Arc/Info and join it with the H6AMPH_RD grid using value as the joinitem.
Dbaseinfo RDDN_PRC.DBF RDDN_PRC.DAT
Joinitem H6AMPHRD.VAT RDDN_PRC.DAT H6AMPHRD.VAT value H6AMPH_CODE linear

**Process 3.6.3 –** Create grids for years 10 and 100 using the items X2RD10 and X2RD100, respectively for assigning the values.
GRID> X2_RD_10 = Select (H6AMPH_RDDN, 'value <> 0', X2_RD10)
GRID> X2_RD_100 = Select (H6AMPH_RDDN, 'value <> 0', X2_RD100)

Convert these floating point grids into Integer grids
GRID> X2_RD10 = INT (X2_RD_10)
GRID>X2_RD100 = INT (X2_RD_100)

**Process 3.6.4 –** Joinitem with a lookup table that contains the indivual items of road density class, road density class description, trends, trend description for each road density and trend combination.

**Note:** These steps will be performed using the conditional if function, i.e., if the first condition is met then the others will not be considered. If it is not met, then the second condition would be evaluated, then the third, if the second condition was also not met, and so on. The items higher up take precedence over the items that are lower. Once a value has been assigned to say, X2_RD10 for a particular record, that record will not be considered for any remaining steps, and so on.

Codes:
Road Densities:
1 - None
2 - Very Low
3 - Low
4 - Moderate
5 - High
6 - Extremely High

Road Density Trends:
1 - Increasing
2 - Static
3 - Decreasing

**Input files**
Predicted road density (1km) for current – BGBRDDN (grid)
Recovery areas for caribou and grizzly bear (presence/absence by watershed) (H6_RCV.DBF)
Priority watersheds for Bull trout, Chinook and Steelhead (H6PWS.DBF, H6BTRSTT.DBF)
A1, A2, and T areas for S2 and S3
6th huc, MRC, PVTGRP – H6AMP (grid)
H6PAM2.DBF
H6AMP grid with prescription assignments (X1, X2, X3)

**DISTURBANCE / ACTIVITIES**
**VARIABLE 09 (VB 09)**
**03/30/00**

This document contains the attribute information for two separate files, Vb9 and Vb9cl. Vb9 and Vb9cl contain thematic information at the Subwatershed (Huc6) level. The Vb9cl file contains classifications of the Vb9 data across the basin with one value (such as L, M, H) assigned per Huc6, per theme. See each item for specific classifications.

**Vb9 (.dbf, .db)**

Field Definitions:

HUC6 -- Subwatershed, 12 character numeric code.

H6_HECT -- Area of Subwatershed in Hectares.

H6_ACRES -- Area of Subwatershed in Acres. These data were calculated as a double precision field from the H6_HECT value, but have been rounded to 5 decimal places due to software limitations when creating the .dbf format file. The total acres for the basin from this file will not match published acreage reports due to this rounding of values. If the double precision version of acres is necessary, multiply the H6_Hect value by 2.471054073 .

CUR_FMA -- Annual Average Forest/Woodland Management Activity Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.
This is HRV + THN.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average. Forest/Woodland Management Activity for the subwatershed.

CUR_HRV -- Annual Average Harvest Management Activity Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Harvest Management Activity for the subwatershed.

CUR_THN -- Annual Average Thinning Management Activity Coefficient (reported to 5 decimal places) for HUC6 by HUC6 for X1, Year 0.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Thinning Management Activity for the subwatershed.

CUR_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Range Allotment Maintenance/Restoration Activity.

CUR_FAD -- Annual Average Fire Activity and Disturbance Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.
This is PRS + PRN + WLF.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Fire Activity and Disturbance for the subwatershed.

CUR_WLF -- Annual Average Wildfire Disturbance Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.

Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Wildfire Disturbance for the subwatershed.

CUR_PNF -- Annual Average Prescribed Natural Fire Activity Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Natural Fire Activity for the subwatershed.

CUR_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Fire and Fuel Management Activity for the subwatershed.

CUR_VOL -- Timber Volume Management Activity for Current, Year 0.
This field is in millions of board feet (MMBF), and not as a coefficient.

CUR_AUM -- Authorized Animal Unit Month Activity for Current, Year 0.
This field is in animal unit months, and not as a coefficient.

X1_10_FMA -- Annual Average Forest/Woodland Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.
This is HRV + THN.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Forest/Woodland Management Activity for the subwatershed.

X1_10_HRV -- Annual Average Harvest Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Harvest Management Activity for the subwatershed.

X1_10_THN -- Annual Average Thinning Management Activity Coefficient (reported to 5 decimal places) for HUC6 by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Thinning Management Activity for the subwatershed.

X1_10_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Range Allotment Maintenance/Restoration Activity.

X1_10_FAD -- Annual Average Fire Activity and Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.
This is PRS + PNF + WLF.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Fire Activity and Disturbance for the subwatershed.

X1_10_WLF -- Annual Average Wildfire Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Wildfire Disturbance for the subwatershed.

X1_10_PNF -- Annual Average Prescribed Natural Fire Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.

Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Natural Fire Activity for the subwatershed.

X1_10_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Fire and Fuel Management Activity for the subwatershed.

X1_10_VOL -- Timber Volume Management Activity for X1, Year 10.
This field is in millions of board feet (MMBF), and not as a coefficient.

X1_10_AUM -- Authorized Animal Unit Month Activity for X1, Year 10.
This field is in animal unit months, and not as a coefficient.

X1_100_FMA -- Annual Average Forest/Woodland Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.
This is HRV + THN.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Forest/Woodland Management Activity for the subwatershed.

X1_100_HRV -- Annual Average Harvest Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Harvest Management Activity for the subwatershed.

X1_100_THN -- Annual Average Thinning Management Activity Coefficient (reported to 5 decimal places) for HUC6 by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Thinning Management Activity for the subwatershed.

X1_100_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Range Allotment Maintenance/Restoration Activity.

X1_100_FAD -- Annual Average Fire Activity and Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.
This is PRS + PNF + WLF.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Fire Activity and Disturbance for the subwatershed.

X1_100_WLF -- Annual Average Wildfire Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Wildfire Disturbance for the subwatershed.

X1_100_PNF -- Annual Average Prescribed Natural Fire Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Natural Fire Activity for the subwatershed.

X1_100_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.

Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Fire and Fuel Management Activity for the subwatershed.

X1_100_VOL -- Timber Volume Management Activity for X1, Year 100.
This field is in millions of board feet (MMBF), and not as a coefficient.

X1_100_AUM -- Authorized Animal Unit Month Activity for X1, Year 100.
This field is in animal unit months, and not as a coefficient.

X2_10_FMA -- Annual Average Forest/Woodland Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10.
This is HRV + THN.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Forest/Woodland Management Activity for the subwatershed.

X2_10_HRV -- Annual Average Harvest Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Harvest Management Activity for the subwatershed.

X2_10_THN -- Annual Average Thinning Management Activity Coefficient (reported to 5 decimal places) for HUC6 by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Thinning Management Activity for the subwatershed.

X2_10_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Range Allotment Maintenance/Restoration Activity.

X2_10_FAD -- Annual Average Fire Activity and Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10.
This is PRS + PNF + WLF.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Fire Activity and Disturbance for the subwatershed.

X2_10_WLF -- Annual Average Wildfire Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Wildfire Disturbance for the subwatershed.

X2_10_PNF -- Annual Average Prescribed Natural Fire Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Natural Fire Activity for the subwatershed.

X2_10_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Fire and Fuel Management Activity for the subwatershed.

X2_10_VOL -- Timber Volume Management Activity for X2, Year 10.
This field is in millions of board feet (MMBF), and not as a coefficient.

X2_10_AUM -- Authorized Animal Unit Month Activity for X2, Year 10.
This field is in animal unit months, and not as a coefficient.

X2_100_FMA -- Annual Average Forest/Woodland Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
This is HRV + THN.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Forest/Woodland Management Activity for the subwatershed.

X2_100_HRV -- Annual Average Harvest Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Harvest Management Activity for the subwatershed.

X2_100_THN -- Annual Average Thinning Management Activity Coefficient (reported to 5 decimal places) for HUC6 by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Thinning Management Activity for the subwatershed.

X2_100_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Range Allotment Maintenance/Restoration Activity.

X2_100_FAD -- Annual Average Fire Activity and Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
This is PRS + PNF + WLF.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Fire Activity and Disturbance for the subwatershed.

X2_100_WLF -- Annual Average Wildfire Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Wildfire Disturbance for the subwatershed.

X2_100_PNF -- Annual Average Prescribed Natural Fire Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Natural Fire Activity for the subwatershed.

X2_100_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Fire and Fuel Management Activity for the subwatershed.

X2_100_VOL -- Timber Volume Management Activity for X2, Year 100.
This field is in millions of board feet (MMBF), and not as a coefficient.

X2_100_AUM -- Authorized Animal Unit Month Activity for X2, Year 100.
This field is in animal unit months, and not as a coefficient.

X3_10_FMA -- Annual Average Forest/Woodland Management Activity Coefficient (reported to 5

decimal places) by HUC6 for X3, Year 10.
This is HRV + THN.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Forest/Woodland Management Activity for the subwatershed.

X3_10_HRV -- Annual Average Harvest Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Harvest Management Activity for the subwatershed.

X3_10_THN -- Annual Average Thinning Management Activity Coefficient (reported to 5 decimal places) for HUC6 by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Thinning Management Activity for the subwatershed.

X3_10_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Range Allotment Maintenance/Restoration Activity.

X3_10_FAD -- Annual Average Fire Activity and Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 10.
This is PRS + PNF + WLF.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Fire Activity and Disturbance for the subwatershed.

X3_10_WLF -- Annual Average Wildfire Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Wildfire Disturbance for the subwatershed.

X3_10_PNF -- Annual Average Prescribed Natural Fire Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Natural Fire Activity for the subwatershed.

X3_10_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Fire and Fuel Management Activity for the subwatershed.

X3_10_VOL -- Timber Volume Management Activity for X3, Year 10.
This field is in millions of board feet (MMBF), and not as a coefficient.

X3_10_AUM -- Authorized Animal Unit Month Activity for X3, Year 10.
This field is in animal unit months, and not as a coefficient.

X3_100_FMA -- Annual Average Forest/Woodland Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
This is HRV + THN.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Forest/Woodland Management Activity for the subwatershed.

X3_100_HRV -- Annual Average Harvest Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Harvest Management Activity for the subwatershed.

X3_100_THN -- Annual Average Thinning Management Activity Coefficient (reported to 5 decimal places) for HUC6 by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Thinning Management Activity for the subwatershed.

X3_100_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Range Allotment Maintenance/Restoration Activity.

X3_100_FAD -- Annual Average Fire Activity and Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
This is PRS + PNF + WLF.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Fire Activity and Disturbance for the subwatershed.

X3_100_WLF -- Annual Average Wildfire Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Wildfire Disturbance for the subwatershed.

X3_100_PNF -- Annual Average Prescribed Natural Fire Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Natural Fire Activity for the subwatershed.

X3_100_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get hectares or acres of Annual Average Prescribed Fire and Fuel Management Activity for the subwatershed.

X3_100_VOL -- Timber Volume Management Activity for X3, Year 100.
This field is in millions of board feet (MMBF), and not as a coefficient.

X3_100_AUM -- Authorized Animal Unit Month Activity for X3, Year 100.
This field is in animal unit months, and not as a coefficient.

**Vb9cl (.dbf , .db)**

The Vb9cl file contains classifications of the Vb9 data across the basin with one value (such as L, M, H) assigned per Huc6, per theme. See each item for specific classifications. See Class Interpretations portion of this document for details of classification methods per field.

Field Definitions:

HUC6 -- Subwatershed, 12 character numeric code.

CUR_FMA -- Annual Average Forest/Woodland Management Activity Classification by HUC6 for Current,Year 0.
This is HRV + THN.
(N = None, L = Low, M = Moderate, H = High)

CUR_HRV -- Annual Average Harvest Management Activity Classification by HUC6 for Current, Year 0.
(N = None, L = Low, M = Moderate, H = High)

CUR_THN -- Annual Average Thinning Management Activity Classification for HUC6 by HUC6 for X1, Year 0.
(N = None, L = Low, M = Moderate, H = High)

CUR_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Classification by HUC6 for Current, Year 0.
(N = None, L = Low, M = Moderate, H = High)

CUR_FAD -- Annual Average Fire Activity and Disturbance Classification by HUC6 for Current, Year 0.
This is PRS + PRN + WLF.
(N = None, L = Low, M = Moderate, H = High)

CUR_WLF -- Annual Average Wildfire Disturbance Classification by HUC6 for Current, Year 0.
(N = None, L = Low, M = Moderate, H = High)

CUR_PNF -- Annual Average Prescribed Natural Fire Activity Classification by HUC6 for Current, Year 0.
(N = None, L = Low, M = Moderate, H = High)

CUR_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Classification by HUC6 for Current, Year 0.
(N = None, L = Low, M = Moderate, H = High)

CUR_AUM -- Authorized Animal Unit Month Activity Classification by HUC6 for Current, Year 0.
(N = None, L = Low, M = Moderate, H = High)

X1_10_FMA -- Annual Average Forest/Woodland Management Activity Classification by HUC6 for X1, Year 10.
This is HRV + THN.
(N = None, L = Low, M = Moderate, H = High)

X1_10_HRV -- Annual Average Harvest Management Activity Classification by HUC6 for X1, Year 10.

(N = None, L = Low, M = Moderate, H = High)

X1_10_THN -- Annual Average Thinning Management Activity Classification for HUC6 by HUC6 for X1, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X1_10_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Classification by HUC6 for X1, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X1_10_FAD -- Annual Average Fire Activity and Disturbance Classification by HUC6 for X1, Year 10.
This is PRS + PNF + WLF.
(N = None, L = Low, M = Moderate, H = High)

X1_10_WLF -- Annual Average Wildfire Disturbance Classification by HUC6 for X1, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X1_10_PNF -- Annual Average Prescribed Natural Fire Activity Classification by HUC6 for X1, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X1_10_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Classification by HUC6 for X1, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X1_10_AUM -- Authorized Animal Unit Month Activity Classification by HUC6 for X1, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X1_100_FMA -- Annual Average Forest/Woodland Management Activity Classification by HUC6 for X1, Year 100.
This is HRV + THN.
(N = None, L = Low, M = Moderate, H = High)

X1_100_HRV -- Annual Average Harvest Management Activity Classification by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X1_100_THN -- Annual Average Thinning Management Activity Classification for HUC6 by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X1_100_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Classification by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X1_100_FAD -- Annual Average Fire Activity and Disturbance Classification by HUC6 for X1, Year 100.
This is PRS + PNF + WLF.
(N = None, L = Low, M = Moderate, H = High)

X1_100_WLF -- Annual Average Wildfire Disturbance Classification by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X1_100_PNF -- Annual Average Prescribed Natural Fire Activity Classification by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X1_100_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Classification by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X1_100_AUM -- Authorized Animal Unit Month Activity Classification by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X2_10_FMA -- Annual Average Forest/Woodland Management Activity Classification by HUC6 for X2, Year 10.
This is HRV + THN.
(N = None, L = Low, M = Moderate, H = High)

X2_10_HRV -- Annual Average Harvest Management Activity Classification by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X2_10_THN -- Annual Average Thinning Management Activity Classification for HUC6 by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X2_10_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Classification by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X2_10_FAD -- Annual Average Fire Activity and Disturbance Classification by HUC6 for X2, Year 10.
This is PRS + PNF + WLF.
(N = None, L = Low, M = Moderate, H = High)

X2_10_WLF -- Annual Average Wildfire Disturbance Classification by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X2_10_PNF -- Annual Average Prescribed Natural Fire Activity Classification by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X2_10_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Classification by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X2_10_AUM -- Authorized Animal Unit Month Activity Classification by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X2_100_FMA -- Annual Average Forest/Woodland Management Activity Classification by HUC6 for X2, Year 100.
This is HRV + THN.
(N = None, L = Low, M = Moderate, H = High)

X2_100_HRV -- Annual Average Harvest Management Activity Classification by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X2_100_THN -- Annual Average Thinning Management Activity Classification for HUC6 by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X2_100_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Classification by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X2_100_FAD -- Annual Average Fire Activity and Disturbance Classification by HUC6 for X2, Year 100. This is PRS + PNF + WLF.
(N = None, L = Low, M = Moderate, H = High)

X2_100_WLF -- Annual Average Wildfire Disturbance Classification by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X2_100_PNF -- Annual Average Prescribed Natural Fire Activity Classification by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X2_100_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Classification by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X2_100_AUM -- Authorized Animal Unit Month Activity Classification by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X3_10_FMA – Annual Average Forest/Woodland Management Activity Classification by HUC6 for X3, Year 10.
This is HRV + THN.
(N = None, L = Low, M = Moderate, H = High)

X3_10_HRV -- Annual Average Harvest Management Activity Classification by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X3_10_THN -- Annual Average Thinning Management Activity Classification for HUC6 by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X3_10_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Classification by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X3_10_FAD -- Annual Average Fire Activity and Disturbance Classification by HUC6 for X3, Year 10. This is PRS + PNF + WLF.
(N = None, L = Low, M = Moderate, H = High)

X3_10_WLF -- Annual Average Wildfire Disturbance Classification by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X3_10_PNF -- Annual Average Prescribed Natural Fire Activity Classification by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X3_10_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Classification by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X3_10_AUM -- Authorized Animal Unit Month Activity Classification by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X3_100_FMA -- Annual Average Forest/Woodland Management Activity Classification by HUC6 for X3, Year 100.
This is HRV + THN.
(N = None, L = Low, M = Moderate, H = High)

X3_100_HRV -- Annual Average Harvest Management Activity Classification by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X3_100_THN -- Annual Average Thinning Management Activity Classification for HUC6 by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X3_100_RST -- Annual Average Range Allotment Maintenance/Restoration Activity Classification by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X3_100_FAD -- Annual Average Fire Activity and Disturbance Classification by HUC6 for X3, Year 100.
This is PRS + PNF + WLF.
(N = None, L = Low, M = Moderate, H = High)

X3_100_WLF -- Annual Average Wildfire Disturbance Classification by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X3_100_PNF -- Annual Average Prescribed Natural Fire Activity Classification by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X3_100_PRS -- Annual Average Prescribed Fire and Fuel Management Activity Classification by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X3_100_AUM -- Authorized Animal Unit Month Activity Classification by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High)

**PROCESS REQUIREMENTS FOR DISTURBANCE / ACTIVITIES**
**VARIABLE 09 (VB 09)**

**Abbreviations Used in the Document**

| Abbreviation | Description |
|---|---|
| X1 | SDEIS Alternative S1 |
| Xx | SDEIS Alternatives S2/S3. |
| FMA | Forest/Woodland Management Activity |
| HRVVol | Timber Volume Activity |
| AUM | Authorized Animal Unit Month Activity |
| RST | Livestock Range Allotment Maintenance/Restoration Activity |
| FAD | Fire Activity Disturbance |
| EXO | Exotic Invasion/Increase |
| SCG | Successional Change Grazing |
| SNG | Successional No-change Grazing |
| HRV | Harvest for Woodland/Forest Management-Restoration Activity |
| THN | Non-Commercial Thinning Activity |
| WLF | Wildfire Activity |
| PNF | Prescribed Natural Fire Activity |
| PRS | Prescribed Fire and Fuel Management |
| CDC | Corrected Disturbance Coefficient |
| AAC | Adjusted Activity Coefficient |
| UAC | Uniform Activity Coefficient |
| H6AMPH | smallest unit used for SDEIS analysis |
| MGTREG | Management Region |
| MCLSS | Management Class |
| Rx | Prescription Assignments |
| FRG | Forest / Range Groups |
| ADM | Administrative Unit |
| EPIV | Exotic Plant Invasion Vulnerability |
| GRO | Grazing AMP Revision Opportunity |

**Processing**

The following is an overview of processes used to create the Disturbance and Acticities variable by Alternative and Year. Note: “Xx” is used in reference to SDEIS Simulations X2 and X3 in this document.

**Process 3.1 --** Create Uniform Activity Coefficients (UAC) for all lands using FS and BLM reported Administrative Unit Activity Levels (1988 - 1997) data.

**Process 3.1.1 --** Calculate “Other Land” Activity coefficients by assigning the average activty coefficients and slopes for Administrative units to non FS/BLM lands.

**Process 3.1.2 --** Combine the FS/BLM Activity Coefficients with Other Land Activity coefficients.

**Process 3.2.1 --** Make X1 Disturbance Group Prescription Area Assignments in the GIS using the CRBSUM disturbance data.

**Process 3.2.2 --** Correct known errors in CRBSUM data for Alternative X1 CRBSUM Disturbance Coefficients.

**Process 3.2.2.1 --** Convert X1 Year 100 Cumulative Disturbance Coefficients to 100 year average. The disturbance coefficients from CRBSUM in the year 100 field are a cumulative sum of disturbance for a 100 year period. This value is coverted to a 100 year average by dividing the sum by 100.

**Process 3.2.2.2 --** Set the timber activity in wilderness areas to zero. Set the CRBSUM disturbance coefficients for HRV and THN to zero where management class is wilderness like or roadless (MCLSS = 1, 2, 4, 6, 11, 22, 44, 91, or 92)

**Process 3.2.2.3 --** Create prescribed natural fire for wilderness like lands and reduce prescribed fire (PRS) coefficients on Other Lands.

Where prescribed fire occurs in wilderness management classes 1 and 6, change the assignment to prescribed natural fire (PNF).

Correct the Northwest Forest Plan unmodified and congressional withdrawals management classes (11 or 91) by setting the PRS to zero. Set the disturbance coefficient for PNF in management classes 1 or 6 that fall within Management Regions 1, 5, or 6 to zero.

For all private lands (Management class 7 or 8), reduce the amount of prescribed fire by 20 percent.

**Process 3.2.2.4 --** Adjust Livestock Range Allotment and Restoration (RST) Coefficient using the Seasonal Use Patterns, Forest/Range groups, and assigned prescriptions (Rx). Use lookup table TlkpRstRxAdjust for adjusting for prescription assignments (RxAdjust). Rst_Coef is the CRBSUM disturbance coefficient value for Restoration. Correct_Rst is the term used for Corrected Disturbance coefficient for Livestock Range Allotment and Restoration.

For Seasonal Use Pattern = “NoUse” , Correct_Rst = Rst_Coef
For Seasonal Use Pattern = “LowUse” and Forest/Range group = “DR” or “OR” or “DF” (Dry range, Other range, Dry forest, respectively), Correct_Rst = (Rst_Coef + 0.01)
For Seasonal Use Pattern = “LowUse” and Forest/Range group = “OF” (Other forest), Correct_Rst = Rst_Coef.
For Seasonal Use Pattern = “Mod” and Forest/Range group = “DR” or “OR” or “DF,” Correct_Rst = (Rst_Coef + 0.02) * RxAdjust
For Seasonal Use Pattern = “Mod” and Forest/Range group = “OF,” Correct_Rst = (Rst_Coef + 0.01) * RxAdjust

For Seasonal Use Pattern = “High” and Forest/Range group = “DR” or “OR” or “DF,” Correct_Rst = (Rst_Coef + 0.03) * RxAdjust
For Seasonal Use Pattern = “High” and Forest/Range group = “OF,” Correct_Rst = (Rst_Coef + 0.02) * RxAdjust

**Process 3.2.2.5 --** Fill missing X1 disturbance coefficients based on the Prescription assignments and Forest/Range groups.

**Process 3.2.2.5.1 --** Create a summary of Rx - FRG areas

**Process 3.2.2.5.2 --** Calculate a weighted average of disturbance coefficients by the Rx _FRG areas.
DstrbncCoeffWtAvg = Sum(([DstrbncCoeff]*[Hectares])/[X1RxFrgHectares])

The gaps in data should be identified at this point and assignments should be made based on similar Rx-FRG strata that already have data. Update the disturbance coefficients in the main table using these data.

**Process 3.2.2.5.3 --** Re-run process 3.2.2.2 to set the timber activity in wilderness areas to zero.

**Process 3.2.3 --** Create X1 Adjusted Activity Coefficients

**Process 3.2.3.1 --** Create X1 Yr0 Adjusted Activity Coefficients

**Process 3.2.3.1.1 --** Calculate Harvest Amount, Prescribed Fire, Animal Unit Months, Wildfire Adjusted Activity Coefficient and Uniform Adjusted Coeffiecient. For X1 Yr 0.

Build Lookup tables of the disturbances and their corresponding strata hectares. (tlkpCdcAdmSum and tlkpCdcEisSum respectively)

For FS/BLM (Admin Unit is 10 or greater) and Non- FS/BLM administrative units (Administrative Unit Code is < 11) Calculate the Adjusted Activity coefficient by using the following calculation:

For FS/BLM Administrative Units: Corrected Disturbance Coefficient (CDC)/the Sum of the CDC coefficients for the Administrative Unit) * the Uniform Adjusted Coefficient (UAC) * (Total Hectares in Administrative Unit) for Year 0.

For Non FS/BLM Administrative Units: Corrected Disturbance Coefficient (CDC)/the Sum of the CDC coefficients for the EIS) * the Uniform Adjusted Coefficient (UAC) * Total Hectares in EIS affected by the Coefficient for Year 0 (from tlkpCDCEisSum).

Repeat calculation for HrvAmt, Prs, Aum and Wlf Adjusted Activity Coefficients.

**Process 3.2.3.1.2 --** Calculate X1 Yr 0 Harvest Volume using Corrected Disturbance Coefficient/Uniform Adjustment Coefficient and prescription lookup table.

This is done by performing the same calculations as were performed in the previous step using the Harvest Volume except multiplying the end product by RxVol from the TlkpRxAdjust table.

**Process 3.2.3.1.3 --** Calculate X1 Yr 0 Thn using CDC and Rx lut.

Calculate the AAC by multiplying CDC (from the tblDstrbncCffcnt) by the Prescription Area Coefficient (from the tlkpRxAdjust lookup table) , then determine the disturbance coefficient hectares by multiplying the

strata hectares by the AAC.

**Process 3.2.3.1.4 --** Calculate X1 Yr 0 Exo using CDC, Rx lut and EPIV lut

Calculate the AAC by multiplying the CDC by the prescription area coefficient and the adjustment coefficient (ExoAdj) from the tlkpEpivAdjust lookup table then determine the Hectares affected by multiplying the AAC and the strata hectares.

**Process 3.2.3.1.5 --** Calculate X1 Yr 0 Sng, Scg using CDC, Rx lut and GRO lut

Caculate AAC for Successional No Change Grazing (SNG) and Successional Change Grazing (SCG) by dividing the sum of the adjustment coeffcient (SCG or SNG) and the related prescription coefficient by two and then multiplying by the corrected disturbance coefficient(CDC).

**Process 3.2.3.1.6 --** Calculate X1 Yr 0 Pnf and Rst using direct assignment of CDC

AAC = CDC

**Process 3.2.3.2 --** Create X1 Yr 10 AAC

**Process 3.2.3.2.1 --** Calculate X1 Yr 10 HrvAmt, HrvVol, Aum AAC using UAC slope

Use the AAC calculated in the previous steps to determine the Year 10 AAC using Yr10AAC: [AAC]+([AAC]*[UAC Coeff Slope]*10) for each disturbance coefficient.

**Process 3.2.3.2.2 --** Calculate X1 Yr 10 Wlf AAC using UAC slope + 15%

Use the AAC calculated in the previous step to determine the Year 10 AAC using Yr10AAC: [AAC]+([AAC]*[UAC Coeff Slope + 15%]*10) for the Wildfire disturbance coefficient.

**Process 3.2.3.2.3 --** Calculate X1 Yr 10 Thn, Pnf, Rst, Scg & Sng AAC using a proxy UAC slope

Use the same calculation as in step 3.2.3.2.1 and the UAC slope found in the tlkpUniformActivityCoefficient which was built using a UAC averages from a table (tblAdminUnitActivityCoefficientAvg) linked from prescription assignment database RxX1Assignment.mdb.

**Process 3.2.3.2.4 --** Calculate X1 Yr 10 Exo using UAC slope and LUT adjustment

Calculate the AAC by using the following equation: ((([DstrbncCoeff from Year 100]-[DstrbncCoeff from Year 0])/10)+[DstrbncCoeff from year 0])*[the prescription Area(RxRArea) from tlkpRxAdjust]*[The Exo adjustement coefficient from the tlkpEpivAdjst lookup table]

**Process 3.2.3.3 --** Create X1 Yr 100 AAC

**Process 3.2.3.3.1 --** Calculate X1 Yr 100 HrvAmt, Prs, Aum & Wlf AAC using CDC and UAC

Calculate the AAC hectares by using the following calculation:

If FS/BLM Admin Unit then AacHectares=

[CdcWtAvgRatio]*([CDC]/[Sum of Hectares for the administrative unit CDC])*(UAC*Sum of Hectares for the

administrative unit CDC])),

For Non FS/BLM Admin Units AacHectares=

[CdcWtAvgRatio]*[CDC]/[Sum of Hectares in the EIS for the disturbance CDC])*([UAC]*[the total Hectares in the EIS]

CdcWtAvgRatio:

If([Year 0 Cdc weighted Avg]=0,

Year 100 Cdc weighted average]/CdcAvg from lookup table [tlkpCdcAvg]

Otherwise ,

CdcWtAvgRatio: [Year 100 Cdc weighted average]/Year 0.[CdcAdmWtAvg]

* This Calculation is repeated for Prs, Aum & Wlf

**Process 3.2.3.3.2 --** Calculate X1 Yr 100 HrvVol using CDC/UAC and Rx lut

Perform the same calculation from the previous step except for Non FS/BLM Administrative Units use the following calculation:

[CdcWtAvgRatio]*[CDC]/[Sum of Hectares in the EIS for the disturbance CDC])*([UAC]*[the total Hectares in the EIS] * [Harvest Volume Adjustment Coefficient from tlkRxAdjust]

**Process 3.2.3.3.3 --** Calculate X1 Yr 100 Thn using CDC and Rx lut

Calculate the AAC for X! Yr 100 Thn by multiplying the CDC by the Prescription area coefficient (from tlkpRxAdjust).

**Process 3.2.3.3.4 --** Calculate X1 Yr 100 Exo using CDC, Rx lut & EPIV lut

Calculate AAC by finding the product of the CDC, the Prescription Area Coefficient (from tlkpRxAdjust)and the Exo Adjustment Coefficient (from tlkpEpivAdjst).

**Process 3.2.3.3.5 --** Calculate X1 Yr 100 Sng & Scg using CDC, Rx lut & GRO lut

AAC: [CDC]* (the adjustment coefficient (from tlkpGroAdjst)+[the prescription adjustment (from tlkpRxAdjust))/2)

**Process 3.2.3.3.6 --** Calculate X1 Yr 100 Pnf and Rst using direct assignment of CDC

AAC = CDC

**Process 3.2.3.4 --** Make X1 Pnf AAC corrections

If management class = 6 or 1 then set the AAC to the CDC otherwise set it to 0.

**Process 3.3 --** Create Action Alternatives (Xx) Disturbance Coefficients.

**Process 3.3.1.2 --** Make Xx Disturbance CRBSUM Count and Coefficient assignments to H6AMPH strata.

**Process 3.3.2.1 --** Set all the areas outside the SDEIS decision space to the X1 Corrected Disturbance Coefficients (CDC).

If MGTREG > 2 or (MGTREG < 3 and MCLSS > 5),
Set Disturbance coefficients for Xx Yr 10 to X1 Yr 10 values and Xx Yr100 to X1 Yr 100 values.

Note: MGTREG 1 and 2 denote the Management region ICBEMP. MCLSS greater than 5 represents Management Classes designated as "Other Lands"

**Process 3.3.2.2 --** Set Xx HRV and THN in Wilderness and Roadless areas to zero.

If MGTREG = 1 or 2 and MCLSS = 1 or 2 or 4, then set HRV and THN values to zero.

**Process 3.3.2.3 --** Assign Prescribed Natural Fire to FS/BLM lands with Management Class 1 (Unmodified Lands).
Set the PNF disturbance coefficient to the Prescribed Fire (PRS) coefficient for Management Regions 1 or 2 and Management Class = 1. Then set the PRS to zero in the same areas.

**Process 3.3.2.4 --** Adjust Livestock Range Allotment and Restoration Coefficient for Xx using the Seasonal Use Patterms, Forest/Range groups, and assigned prescriptions (Rx). Use lookup table TlkpRstRxAdjust for adjusting for prescription assignments (RxAdjust). Rst_Coef is the CRBSUM disturbance coefficient value for Restoration. Correct_Rst is the term used for Corrected Disturbance coefficient for Livestock Range Allotment and Restoration.

For Management Regions 1 and 2, if the year is 10 then in the following equations, substitute Rst_Coef with (Sum of count * 10/ hectares). For year 100 and Management Regions 1 and 2, substitute Rst_Coef with (Sum of Count / hectares) in the following equations to calculate Correct_Rst.

For Seasonal Use Pattern = "NoUse" , Correct_Rst = Rst_Coef
For Seasonal Use Pattern = "LowUse" and Forest/Range group = "DR" or "OR" or "DF" (Dry range, Other range, Dry forest, respectively), Correct_Rst = (Rst_Coef + 0.01)
For Seasonal Use Pattern = "LowUse" and Forest/Range group = "OF" (Other forest), Correct_Rst = Rst_Coef.
For Seasonal Use Pattern = "Mod" and Forest/Range group = "DR" or "OR" or "DF," Correct_Rst = (Rst_Coef + 0.02) * RxAdjust
For Seasonal Use Pattern = "Mod" and Forest/Range group = "OF," Correct_Rst = (Rst_Coef + 0.01) * RxAdjust
For Seasonal Use Pattern = "High" and Forest/Range group = "DR" or "OR" or "DF," Correct_Rst = (Rst_Coef + 0.03) * RxAdjust
For Seasonal Use Pattern = "High" and Forest/Range group = "OF," Correct_Rst = (Rst_Coef + 0.02) * RxAdjust

**Process 3.3.2.5 --** Fill missing Rx / MCLSS / FRG disturbance coefficients from lookup table containing current weighted average values for MCLSS / Rx / FRG aggregates for HRV, PRS, and THN.

Wherever activity should occur but is zero in the table, new values are filled in by

scientists. These values are then used to populate the disturbance coefficients by H6AMPH table.

**Process 3.3.3 --** Create Xx Adjusted Activity Coefficients.

**Process 3.3.3.1 --** Create Xx process support tables

Create a corrected disturbance coefficient weighted average table, TlkpCdcAdmWtAvg, by activity type, alternative and year, and administrative unit (ADM). Weighted average is calculated using the following formula:

CdcAdmWtAvg = Sum ((Disturb_coef * H6AMPH_hectares) / ADM_hectares)

Create a corrected disturbance coefficient sum table, TlkpCdcAdmSum, by adding up coefficients and their area by activity type, alternative, and year for each administrative unit.

Create a table, TlkpCdcEisSum, that has a sum of disturbance coefficients and hectares by DEIS EIS groups, EEIS and UCRB for Non-FS/BLM administrative units (ADM < 11).

Create another table, TlkpCdcAvg, that has averages of disturbance coefficients by activity, alternative, and year.

**Process 3.3.3.2 --** Replace zero Corrected Disturbance Coefficient (CDC) values with basin-wide average.

**Process 3.3.3.3 --** Calculate Xx AAC (Adjusted Activity Coefficient) using the CDC (Corrected Disturbance Coefficient) and UAC (Uniform Activity Coefficient).

**Process 3.3.3.3.1 --**Create Xx HRVAmt, HRVVol, WLF, and PRS using CDC/UAC and X1Yr0 reference.

For FS/BLM administrative units, use the following formula to calculate Adjusted Activity coefficient hectares and AAC, respectively:

AacHectares = (XxCdcAdmAvg / X1Yr0AdmCdcWtAvg) * (CDC_Dist_coef / XxCdcAdmSum) * UAC_Dist_Coef * ADM_hectares

AAC: AacHectares / H6AMPH_hectares

For Non FS/BLM administrative units, use the following formula to calculate Adjusted Activity coefficient hectares and AAC, respectively:

AacHectares = (XxCdcAdmAvg / X1Yr0AdmCdcWtAvg) * (CDC_Dist_coef / XxCdcEisSum) * UAC_Dist_Coef * EIS_hectares

**Process 3.3.3.3.2 --** Create Xx AUM using CDC/UAC with X1Yr0 reference and limit.

First create a table that calculates the maximum value of AUM by H6AMPH strata out of Alternative X1, years 10 and 100. Using the following equation, calculate the AAC AUM coefficient:

For FS/BLM Administrative units (ADM > 10):
If X1MaxAum <= ((XxAdmCdcWtAvg / X1Yr0CdcWtAvg) * (CDC_Dist_coef / XxCdcAdmSum) * UAC_Dist_coef * AdmHectares) / Cdc_Hectares, then

XxAac_Aum_Dist_coef = X1MaxAum
Else,
XxAac_Aum_Dist_coef = ((XxAdmCdcWtAvg / X1Yr0CdcWtAvg) * (CDC_Dist_coef /
XxCdcAdmSum) * UAC_Dist_coef * AdmHectares) / Cdc_Hectares

For Non FS/BLM Administrative units (ADM < 11):
If X1MaxAum <= ((XxAdmCdcWtAvg / X1Yr0CdcWtAvg) * (CDC_Dist_coef /
XxCdcEisSum) * UAC_Dist_coef * EISHectares) / Cdc_Hectares, then
XxAac_Aum_Dist_coef = X1MaxAum
Else,
XxAac_Aum_Dist_coef = ((XxAdmCdcWtAvg / X1Yr0CdcWtAvg) *
(CDC_Dist_coef / XxCdcEisSum) * UAC_Dist_coef * EISHectares) / Cdc_Hectares

**Process 3.3.3.3.3 --** Create Xx THN, PNF, and RST Adjusted Activity Coefficients using direct assignment of Corrected Disturbance Coefficients.

**Process 3.3.3.3.4 --** Set PNF to zero, X1Aac_PNF_Dist_Coef, or leave it unchanged according to the following conditions:
If MGTREG = 3 or ((MGTREG = 1 or 2) and MCLSS = 6) then,
XxPnfAac = X1Aac_Pnf_Dist_Coef

If (MGTREG <> 1 and MGTREG <> 2) or (MGTREG = 1 or 2) and (MCLSS <> 1 and <> 2 and <> 4) then,
XxPnfAac = 0
Else
XxPnfAac = XxPnfAac

**Process 3.3.3.4 --** Set Non SDEIS regions that remain constant for AUM, HRVAmt, HRVVol, PNF, PRS, RST, THN, and WLF.

If MGTREG > 2 or (MGTREG < 3 and MCLSS > 5) then set XxAac_Dist_Coef and XxAac_Hectares to X1Aax_Dist_Coef and X1Aac_Hectares, respectively, for each of the activities.

**Process 3.3.3.5 --** Set the PNF Adjusted Activty Coefficient to zero in Northwest Forest Plan area (MGTREG = 7) using the same equation as in Process 3.3.3.3.4.

**Process 3.3.3.6 --** Calculate Xx FAD and FMA AAC.
FMA = THN + HRV
FAD = PRS + PNF + WLF

**Process 3.4 --** Create Huc6 AAC weighted average and Classify

**Process 3.4.1 --** Create subwatershed AAC weighted average.
X1H6AacWtAvg_dist = (X1AAC_dist * H6AMPH_hectares) / Huc6_Hectares
XxH6AacWtAvg_dist = (XxAAC_dist * H6AMPH_hectares) / Huc6_Hectares

**Process 3.4.2 --** Create subwatershed FAD and FMA Adjusted Activity coefficient (AAC) weighted average.
X1H6AacWtAvg_FAD = (X1AAC_FAD * H6AMPH_hectares) / Huc6_hectares
XxH6AacWtAvg_FAD = (XxAAC_FAD * H6AMPH_hectares) / Huc6_hectares

X1H6AacWtAvg_FMA = (X1AAC_FMA * H6AMPH_hectares) / Huc6_hectares

XxH6AacWtAvg_FMA = (XxAAC_FMA * H6AMPH_hectares) / Huc6_hectares

**Process 3.4.3 --** Classify Huc6 Adjusted Activity Coefficient (AAC).

The AAC values are split into thirds. The top third are assigned a “H” or high rating, the middle “M” or moderate, the bottom third is given a “L” or Low rating. The null values are given a “N” or null rating.

**LOOKUP TABLES**

**TlkpRstRxAdjust**

| Rx | RxAdjst |
|---|---|
| A1 | 2 |
| A2 | 4 |
| A3 | 5 |
| C1 | 1 |
| C2 | 2 |
| C3 | 2 |
| N1 | 1.5 |
| N2 | 1 |
| N3 | 2 |
| N4 | 3 |
| N5 | 1 |
| N6 | 1 |
| N7 | 1 |
| N8 | 3 |
| P1 | 1 |
| P2 | 3 |
| P3 | 2 |

**TlkpPvtEisMgtRgn**

| MgtReg | PvtEis |
|---|---|
| 1 | EEIS |
| 2 | UCRB |
| 3 | UCRB |
| 4 | UCRB |
| 5 | UCRB |
| 6 | UCRB |
| 7 | EEIS |

**TlkpAacCdcUac**

| AacName | CdcName | UacName | AacDesc |
|---|---|---|---|
| X1Aum | X1Rst | AumAmt | Authorized AUM |
| X1Exo | X1Exo | | Exotic Weed Increase and Invasion |
| X1HrvAmt | X1Hrv | HrvAmt | Harvest Area |
| X1HrvVol | X1Hrv | HrvVol | Harvest Volume (mbf) |
| X1Pnf | X1Pnf | | Prescribed Natural Fire |
| X1Prs | X1Prs | PrsAmt | Prescribed Fire |
| X1Rst | X1Rst | | Range allotment Maintenance and Restoration (fencing, operating plans, range improvements) |
| X1Scg | X1Scg | | Sucessional Change Grazing (excessive utilization) |
| X1Sng | X1Sng | | Sucessional No-Change Grazing (no effect) |
| X1Thn | X1Thn | | Thinning (precommercial) |
| X1Wlf | X1Wlf | WlfAmt | Wildfire |

**TlkpRxAdjust**

| Rx | RxRAre | RxRVo | RxExo | RxSc | RxSn | RxSi | RxAu | RxDisLt |
|---|---|---|---|---|---|---|---|---|
| A1 | 1.00 | 1.00 | 0.80 | 0.80 | 1.00 | 0.95 | 0.6 | 1 |
| A2 | 2.00 | 1.00 | 0.50 | 0.60 | 1.00 | 0.75 | 0.7 | 0.98 |
| A3 | 3.00 | 1.50 | 0.40 | 0.60 | 1.00 | 0.8 | 0.7 | 1 |
| C1 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.7 | 0.4 | 0.92 |
| C2 | 1.00 | 1.00 | 1.00 | 1.20 | 0.80 | 0.4 | 0.5 | 0.9 |
| C3 | 1.00 | 1.00 | 1.00 | 1.40 | 0.60 | 0.3 | 0.9 | 0.9 |
| N1 | 1.00 | 1.00 | 0.90 | 0.90 | 1.00 | 0.9 | 0.5 | 0.93 |
| N2 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.6 | 0.7 | 0.85 |
| N3 | 1.00 | 1.00 | 1.00 | 1.20 | 0.80 | 0.5 | 0.5 | 0.9 |
| N4 | 1.20 | 0.80 | 0.70 | 0.70 | 1.00 | 0.7 | 0.6 | 0.95 |
| N5 | 1.00 | 1.00 | 1.00 | 1.20 | 0.80 | 0.6 | 0.5 | 0.91 |
| N6 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.75 | 0.4 | 0.92 |
| N7 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.6 | 0.7 | 0.85 |
| N8 | 1.00 | 1.00 | 1.00 | 1.20 | 0.80 | 0.5 | 0.5 | 0.9 |
| P1 | 1.00 | 1.00 | 1.00 | 1.30 | 0.70 | 0.65 | 0.4 | 0.75 |
| P2 | 1.00 | 1.00 | 1.00 | 1.40 | 0.60 | 0.3 | 0.3 | 0.75 |
| P3 | 1.00 | 1.00 | 1.00 | 1.50 | 0.50 | 0.2 | 1 | 0.9 |

**TlkpEpivAdjst**

| EpivClass | ExoAdj |
|---|---|
| EH | 2.00 |
| H | 1.50 |
| L | 0.50 |
| M | 1.00 |
| N | 0.01 |
| VH | 1.75 |
| VL | 0.10 |

**TlkpGroAdjst**

| GroClass | ScgAdjst | SngAdjst |
|---|---|---|
| VL | 1.00 | 1.00 |
| L | 1.00 | 1.00 |
| M | 1.10 | 0.90 |
| H | 1.20 | 0.80 |
| VH | 1.30 | 0.70 |

**CLASS INTERPRETATIONS --DISTURBANCE AND MANAGEMENT ACTIVITIES**
**Variable 09 (VB 09)**

For modeling purposes it may be necessary to classify the weighted average coefficients in the deliverable dbf files. The following suggestions are provided for determining class breaks for each coefficient for this particular variable.

## Variable 9 - Time Period Definitions

**Current (CUR) -** Current time period generally reflects the current year (1999) plus or minus 5 years (i.e. 1994 - 2004). Developed from data and models using administrative unit data for the past 10 year or 3 year average. Reflects the average activities or disturbance from 1988 to 1997 (10 year average) or 1995 to 1997 (3 year average) and probabilities of activity and disturbance occurrence that are associated with current management prescriptions.

**Future Decade (10) -** Short-term future, projected 10 years into the future (2009) from the current year (1999) plus or minus 5 years (i.e. 2004-2014). Developed from data and models using the slope from the 10 year or 3 year administrative unit data and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives.

**Long-term (100) -** Long-term future, projected as an average of the 10 future decade projections from the current year. Developed from data and models using the current year as the starting point and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives.

**Variable 9 - Disturbance and Management Activity Classification and Class Interpretations**

Annual Average Forest/Woodland Management-Restoration (FMA), Variable 9 Activity
Subwatershed current year statistics:

Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S2/S3.

Definition: area coefficient for amount of timber harvest, forest restoration, or rangeland encroachment restoration that produce commercial products plus amount of thinning of non-commercial products within the total subwatershed area. Current levels based on administrative unit 10 year average (1988-1997).

Classification method: j-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | No timber harvest, forest restoration, or rangeland encroachment restoration resulting in commercial products and/or thinning per unit area within subwatershed. Spatial distribution highly correlated with agricultural lands and dry rangelands in current. |
| Low | > 0 | < .00276181 | Low timber harvest, forest restoration, or rangeland encroachment restoration resulting in commercial products and/or thinning per unit area - activities uncommon and only affect a small area of the subwatershed that may be in one place or scattered small patches. Spatial distribution highly correlated with the cool shrub, woodlands, and dry forest PVGs in current. |
| Moderate | >= .00276181 | < .00899841 | Moderate timber harvest, forest restoration, or rangeland encroachment restoration resulting in commercial products and/or thinning per unit area - Activities common within the subwatershed, but can be concentrated or scattered in many small patches. Spatial distribution highly correlated with the dry forest PVG in current. |
| High | >= .00899841 | 1.0 | High timber harvest, forest restoration, or rangeland encroachment restoration resulting in commercial products and/or thinning per unit area - activities abundant within the subwatershed, generally distributed throughout, but can be concentrated or checkerboard. Spatial distribution highly correlated with the moist forest PVG in current. |

Harvest (HRV) for Woodland/Forest Management-Restoration, Variable 9 Activity
Subwatershed current year statistics:

Average current year non-zero values:

Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S3/S3.

Definition: area coefficient for amount of timber harvest, forest restoration, or rangeland encroachment restoration that produce commercial products within the total subwatershed area. Current levels based on administrative unit 10 year average (1988-1997).

Classification method: j-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | No timber harvest, forest restoration, or rangeland encroachment restoration resulting in commercial products per unit area within subwatershed. Spatial distribution highly correlated with agricultural lands and dry rangelands in current. |
| Low | > 0 | < .00175261 | Low timber harvest, forest restoration, or rangeland encroachment restoration resulting in commercial products per unit area - activities uncommon and only affect a small area of the subwatershed that may be in one place or scattered small patches. Spatial distribution highly correlated with the cool shrub, woodlands, and dry forest PVGs in current. |
| Moderate | >= .00175261 | < .00794632 | Moderate timber harvest, forest restoration, or rangeland encroachment restoration resulting in commercial products per unit area - Activities common within the subwatershed, but can be concentrated or scattered in many small patches. Spatial distribution highly correlated with the dry forest PVG in current. |
| High | >= .00794632 | 1.0 | High timber harvest, forest restoration, or rangeland encroachment restoration resulting in commercial products per unit area - activities abundant within the subwatershed, generally distributed throughout, but can be concentrated or checkerboard. Spatial distribution highly correlated with the moist forest PVG in current. |

Non-commercial Thinning (THN), Variable 9 Planned Activity
Subwatershed current year statistics:

Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: n-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S2/S3.

Definition: area coefficient for amount of non-commercial thinning for forest restoration or rangeland encroachment restoration within the total subwatershed area. Current levels based on administrative unit 10 year average (1988-1997).

Classification method: n-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | No thinning for forest restoration or rangeland encroachment restoration per unit area within subwatershed. Spatial distribution highly correlated with agricultural and rangelands in current. |
| Low | > 0 | < .00153846 | Low thinning for forest restoration or rangeland encroachment restoration per unit area - activities uncommon and only affect a small area of the subwatershed that may be in one place or scattered small patches. Spatial distribution highly correlated with the cool shrub, woodlands, and dry forest PVGs in current. |
| Moderate | >= .00153846 | < .00270270 | Moderate thinning for forest restoration or rangeland encroachment restoration per unit area - Activities common within the subwatershed, but can be concentrated or scattered in many small patches. Spatial distribution highly correlated with the dry forest PVG in current. |
| High | >= .00270270 | 1.0 | High thinning for forest restoration or rangeland encroachment restoration per unit area - activities abundant within the subwatershed, generally distributed throughout, but can be concentrated or checkerboard. Spatial distribution highly correlated with the moist forest PVG in current. |

Range Livestock Allotment Maintenance and Restoration (RST), Variable 9 Planned Activity
Subwatershed current year statistics:

Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: n-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S2/S3.

Definition: area coefficient for amount of range livestock allotment maintenance and restoration within the total subwatershed area. Maintenance includes annual allotment administration, weed management to avoid invasion and spread, water developments, salting, riding and fencing to achieve operating plan objectives. Restoration includes weed control, seeding, mechanical treatments, new fence construction, and new water developments. Current levels based on administrative unit 10 year average (1988-1997).

Classification method: n-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | None or very little range livestock allotment maintenance and restoration within subwatershed. Spatial distribution highly correlated with agricultural, urban lands, moist forest, and cold forest PVGs in current. |
| Low | > 0 | < .04000000 | Low range livestock allotment maintenance and restoration per unit area - activities uncommon and only affect a small allotment within the subwatershed or very little activity across the whole subwatershed. Spatial distribution highly correlated with moist forest and cold forest PVGs in current. |
| Moderate | >= .04000000 | < .06972973 | Moderate range livestock allotment maintenance and restoration rate per unit area - activities common within the subwatershed, and usually distributed across most of the subwatershed. Spatial distribution highly correlated with the dry forest and the dry end of the moist forest in current. |
| High | >= .06972973 | 1.0 | High range livestock allotment maintenance and restoration rate per unit area - activities abundant within the subwatershed and generally distributed throughout. Spatial distribution highly correlated with the non-forest rangelands and dry forest PVG in current. |

Fire Activity and Disturbance (FAD) - Total Wildfire + Prescribed Fire + Prescribed Natural Fire, Variable 9
Unplanned Disturbance & Planned Activities
Subwatershed current year statistics:

Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S2/S3.

Definition: area coefficient for amount of wildfire, wildland fire use for resource benefit (prescribed natural fire), and prescribed fire within the total subwatershed area. Current levels based on administrative unit 10 year average (1988-1997).

Classification method: j-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | No fire activity or disturbance per unit area within subwatershed. Spatial distribution highly correlated with agricultural and urban lands in current. |
| Low | > 0 | < .00226908 (6/7/99 version < .00227280) | Low fire activity or disturbance per unit area - occurrence < 1 times in 100 years and only affects a small area of the subwatershed and typically in one area. Spatial distribution highly correlated with the dry (desert) end of the dry shrub and the cold forest PVGs in current. |
| Moderate | < .00226908 (6/7/99 version < .00227280) | < .00855623 (6/7/99 version < .00855142) | Moderate fire activity or disturbance per unit area - occurrence 1-2 times in 100 years and can effect a large area of the subwatershed, but often concentrated in one area. Spatial distribution highly correlated with the dry shrub, cool shrub, and moist forest in current. |
| High | < .00855623 (6/7/99 version < .00855142) | some values can be > 1.0 (6/7/99 version = 1.0) | High fire activity or disturbance per unit area - occurrence > 2 times in 100 years in the subwatershed, commonly distributed throughout, but can be concentrated in one large area. Spatial distribution highly correlated with the dry end of the moist forest, dry forest, and moist end of the dry shrub PVGs in current. A small number of values can occur that are greater than 1.0. This occurs where the gross area sum of wildfire, prescribed fire, and prescribed natural fire exceed the area of the 6HUC. In these cases the net area sum would be < = 1.0. |

Wildfire (WLF), Variable 9 Unplanned Disturbance
Subwatershed current year statistics:

Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S2/S3.

Definition: area coefficient for amount of wildfire within the total subwatershed area. Current levels based on administrative unit 10 year average (1988-1997). Typically wildfires burn in the summer and early fall. Wildfires typically have high resistance to control once they become larger than 40 hectares (100 acres). The amount of wildfire has low correlation with severe or uncharacteristic fire effects.

Classification method: j-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | No wildfire per unit area within subwatershed. Spatial distribution highly correlated with agricultural and urban lands in current. |
| Low | > 0 | < .00165965 | Low wildfire per unit area - wildfire occurrence < 1 time in 100 years and only affects a small area of the subwatershed and typically in one area. Spatial distribution highly correlated with the dry (desert) end of the dry shrub and the cold forest PVGs in current. |
| Moderate | >= .00165965 | < .00708283 | Moderate wildfire per unit area - wildfire occurrence 1-2 times in 100 years and can effect a large area of the subwatershed, but often concentrated in one area. Spatial distribution highly correlated with the dry shrub, cool shrub, and moist forest in current. |
| High | >= .00708283 | note - some values can be > 1.0 (6/7/99 version = 1.0) | High wildfire per unit area - wildfire occurrence > 2 times in 100 years in the subwatershed, commonly distributed throughout, but can be concentrated in one large area. Spatial distribution highly correlated with the dry end of the moist forest, dry forest, and moist end of the dry shrub PVGs in current. In a small number of cases the gross area of wildfire can be modeled to exceed the area of the 6HUC. This is just a ratio function related to the underlying administrative unit data on wildfire and should be assumed to = 1.0. |

Prescribed Natural Fire (PNF), Wildland Fire Use - Variable 9 Activity
Subwatershed current year statistics:

Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S2/S3.

Definition: area coefficient for amount of wildland fire use for resource benefit (prescribed natural fire) within the total subwatershed area. These are summer/fall lightning ignitions that are not suppressed because they meet a prescription for fire behavior that is specified in a fire management plan. Even though they burn under a prescription for fire behavior they may be burning in unnaturally high fuel levels or altered conditions (such as cheatgrass or other exotics) and dry conditions that can cause uncharacteristic fire effects. Burn periods can last up to 60 days for a prescribed natural fire. Current levels based on administrative unit 3 year average (1995-1997).

Classification method: j-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | No wildland fire for resource benefit (prescribed natural fire) per unit area within subwatershed. Spatial distribution highly correlated other land ownerships, roaded management classes, and EEIS management area in current. |
| Low | > 0 | < .00104167 (6/7/99 version < .00000077) | Low wildland fire for resource benefit (prescribed natural fire) per unit area - activities uncommon and only affect a small area of the subwatershed and typically in one area. Spatial distribution highly correlated with small wilderness, wilderness study areas, or roadless areas in UCRB and GYE management regions in current. |
| Moderate | < .00104167 (6/7/99 version < .00000077) | .00192308 (6/7/99 version < .00133333) | Moderate wildland fire for resource benefit (prescribed natural fire) per unit area - Activities common within the subwatershed, but typically concentrated in one area. Spatial distribution highly correlated with the periphery of moderate to large size wilderness, wilderness study areas, or roadless areas in UCRB and GYE management regions in current. |
| High | .00192308 (6/7/99 version < .00133333) | 1.0 | High wildland fire for resource benefit (prescribed natural fire) per unit area - activities abundant within the subwatershed, generally distributed throughout, but could be concentrated in one large area. Spatial distribution highly correlated with the interior of large wilderness, wilderness study areas, or roadless areas in UCRB and GYE management regions in current. |

Prescribed Fire and Fuel Management (PRS), Variable 9 Planned Activity

Subwatershed current year statistics:

Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S2/S3.

Definition: area coefficient for amount of prescribed fire and fuel management within the total subwatershed area. Current levels based on administrative unit 3 year average (1995-1997). These are spring, summer or fall management ignitions designed to meet a prescription for both fire behavior and effects that is specified in a prescribed fire burn plan. In roaded areas with forest there may be considerable mechanical fuel reduction to reduce small diameter understory woody fuels. This may provide considerable opportunity for fuel wood, post, and pole type materials. Even though they may burn in unnaturally high fuel levels or altered conditions (such as cheatgrass or other exotics) the burn plan attempts to minimize uncharacteristic fire effects. Burn periods typically only last 1-2 days as compared to up to 60 days for a prescribed natural fire. Current levels based on administrative unit 3 year average (1995-1997).

Classification method: j-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | No prescribed fire and fuel management per unit area within subwatershed. Spatial distribution highly correlated with agricultural and urban lands in current |
| Low | > 0 | < .00006483 | Low prescribed fire and fuel management per unit area - activities uncommon and only affect a small area of the subwatershed and typically in one area. Spatial distribution highly correlated with dry rangelands, cold forest, and moist and wet ends of the moist forest PVGs in current. |
| Moderate | >= .00006483 | < .00093908 | Moderate prescribed fire and fuel management per unit area - Activities common within the subwatershed, and usually distributed in a mosaic. Spatial distribution highly correlated with the cool shrub and grassland PVGs in current. |
| High | >= .00093908 | 1.0 | High prescribed fire and fuel management per unit area - activities abundant within the subwatershed, generally distributed throughout. Spatial distribution highly correlated with the dry forest and dry end of the moist forest PVGs in current. |

Authorized Animal Unit Months (AUM), Variable 9 Activity
Subwatershed current year statistics:

Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year and same classes for S1/S2/S3.

Definition: relative coefficient of forest or rangeland livestock grazing animal unit months for the total subwatershed area. An animal unit month is generally equivalent to one cow/calf pair or 5 sheep for one month. Rangeland health, riparian condition, or achievement of properly functioning conditions are highly correlated with the combination of numbers of AUMs, allotment management for distribution and season of use, terrain, fencing and water developments, class of livestock, and vegetation condition. This combination is reflected in the variable Uncharacteristic Livestock Grazing (variable 15).
Classification method: j-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class).

| ***Class*** | ***Low*** | ***High*** | ***Interpretation*** |
|---|---|---|---|
| None | = 0 | = 0 | None or almost no forest or rangeland livestock grazing per unit area within subwatershed. Spatial distribution highly correlated with agriculture and urban lands and the cold and moist forest in current. |
| Low | > 0 | < .21150780 | Low livestock grazing per unit area - livestock scattered within subwatershed. Negative effects of concentrated livestock in riparian areas and near stock water can occur in steep, complex topography. Stocking levels may be appropriate depending on the terrain, disturbance regime, and productivity. Spatial distribution highly correlated with the dry shrub PVG in current. |
| Moderate | >= .21150780 | < .71019864 | Moderate livestock grazing per unit area - livestock common within the subwatershed. Negative effects of concentrated livestock in riparian areas and near stock water can occur in steep, complex topography. Stocking levels may be appropriate depending on the terrain, disturbance regime, and productivity. Spatial distribution highly correlated with the dry and moist forest PVGs in S1. |

| *Class* | *Low* | *High* | *Interpretation* |
|---|---|---|---|
| High | >= .71019864 | note - some values can be > 1.0 | High livestock grazing per unit area - livestock abundant through the growing season; even distribution across suitable forage areas of the subwatershed. Negative effects of concentrated livestock in riparian areas and near stock water can occur in steep, complex topography. Stocking levels may be appropriate depending on the terrain, disturbance regime, and productivity. Spatial distribution highly correlated with the dry forest and cool shrub PVGs in current. A fair number of values can exceed 1.0 because AUMs are number of months of animal units and not an area. |

**WILDFIRE EFFECTS DEPARTURE (UNCHARACTERISTIC WILDFIRE)**
**VARIABLE 14 (VB 14)**
**03/30/00**

**Vb14 (.dbf, .db)**

Field Definitions:

HUC6 -- Subwatershed, 12 character numeric code.

H6_HECT -- Area of subwatershed (HUC6) in Hectares.

H6_ACRES -- Area of subwatershed (HUC6) in Acres. These data were calculated as a double precision field from the H6_HECT value, but have been rounded to 5 decimal places due to software limitations when creating the .dbf format file. The total acres for the basin from this file will not match published acreage reports due to this rounding of values. If the double precision version of acres is necessary, multiply the H6_Hect value by 2.471054073 .

CUR_UWE -- Annual Average Uncharacteristic Wildfire Event Probability (coefficient reported to 5 decimal places) by HUC6 for Current, Year 0.
Multiply by H6_HECT or H6_ACRES to get area in hectares or acres, respectively.

X1_10_UWE -- Annual Average Uncharacteristic Wildfire Event Probability (coefficient reported to 5 decimal places) by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get area in hectares or acres, respectively.

X1_100_UWE -- Annual Average Uncharacteristic Wildfire Event Probability (coefficient reported to 5 decimal places) by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get area in hectares or acres, respectively.

X2_10_UWE -- Annual Average Uncharacteristic Wildfire Event Probability (coefficient reported to 5 decimal places) by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get area in hectares or acres, respectively.

X2_100_UWE -- Annual Average Uncharacteristic Wildfire Event Probability (coefficient reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get area in hectares or acres, respectively.

X3_10_UWE -- Annual Average Uncharacteristic Wildfire Event Probability (coefficient reported to 5 decimal places) by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get area in hectares or acres, respectively.

X3_100_UWE -- Annual Average Uncharacteristic Wildfire Event Probability (coefficient reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get area in hectares or acres, respectively.

**Vb14cl (.dbf, .db)**

The Vb14cl file contains classifications of the Vb14 data across the basin with one value (such as L, M, H) assigned per Huc6, per theme. See each item for specific classifications. See Class Interpretations portion of this document for details of classification methods per field.

Field Definitions:

HUC6 -- Subwatershed, 12 character numeric code.

CUR_UWE -- Annual Average Uncharacteristic Wildfire Event Probability Classes, by HUC6 for Current, Year 0.
(N = None, L = Low, M = Moderate, H = High, VH = Very High)

X1_10_UWE -- Annual Average Uncharacteristic Wildfire Event Probability Classes, by HUC6 for X1, Year 10.
(N = None, L = Low, M = Moderate, H = High, VH = Very High)

X1_100_UWE -- Annual Average Uncharacteristic Wildfire Event Probability Classes, by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High, VH = Very High)

X2_10_UWE -- Annual Average Uncharacteristic Wildfire Event Probability Classes, by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High, VH = Very High)

X2_100_UWE -- Annual Average Uncharacteristic Wildfire Event Probability Classes, by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High, VH = Very High)

X3_10_UWE -- Annual Average Uncharacteristic Wildfire Event Probability Classes, by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High, VH = Very High)

X3_100_UWE -- Annual Average Uncharacteristic Wildfire Event Probability Classes, by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High, VH = Very High)

**REQUIREMENTS FOR PROCESSING WILDFIRE EFFECTS DEPARTURE (UNCHARACTERISTIC WILDFIRE)**
**VARIABLE 14 (VB 14)**

## Logic Overview

Uncharacteristic wildfires—
These are wildfires that have effects and behavior that are outside the normal range of effects and behavior for the historical (natural) system. The normal range is considered to be within the 400 year historic range of variability minimum + 25% and maximum - 25%. The 400 year period includes the variation that is predicted to occur within the recent and current climate without influence of Euro-American settlement influence. The historical regime accounts in general for the cumulative biotic adaptation and soil development influences of the past 10-15 thousand years since the last glacial period. Many native species adaptations evolved over the last 1-3 million years in response to changing paleo-ecological climates and disturbances.

Uncharacteristic wildfire behavior—
These kinds of wildfires produce substantial resistance to wildfire control. This resistance to control results in a 90% chance that a wildfire ignition in flammable wildland fuels during periods of high fire weather danger will not be controlled or contained during initial attack. Average cost of fire suppression = $1000 per acre.

Uncharacteristic wildfire effects—
These kinds of wildfires cause higher severity effects than those that occurred within the normal range of fire events during soil development over the past 10,000 years or within the normal dynamic changes of vegetation. Consequently, soils are heated to levels that have high chance of creating hydrophobic conditions. Chance of soil erosion is greatly increased because of the severe reduction in upper layer vegetation, mortality to the soil surface vegetation root crown cover, and high consumption of litter and wood.

Uncharacteristic wildfire effects are determined by evaluating the probability that differences between the historical (inherent biophysical or natural) fire intensity regime and the current (human induced) fire intensity regime will produce uncharacteristic effects.

The following table illustrates the various combinations that can occur.

| | Wildfire Severity to Biotic Diversity, Vegetation Cover and Structure, Hazard of Soil Erosion, and Resistance to Control | |
|---|---|---|
| **Historical Fire Regime** | **Low Current Fire Intensity Regime** | **High Current Fire Intensity Regime** |
| **Low Historical Fire Intensity Regime** | Low | High |
| **High Historical Fire Intensity Regime** | Low | Moderate |

**None** - low probability of wildfire occurrence.

**Low** - Low Historical and Low Current: these fires have effects that occur within the normal range of occurrence with 95% probability, and have low resistance to wildfire control with 99% probability.

**High** - Low Historical and High Current: these fires have effects that occur outside the normal range of occurrence with 90% probability, and have high resistance to wildfire control with 95% probability.

**Low** - High Historical and Low Current: these fires have effects that occur within the normal range of occurrence with 99% probability, and have low resistance to wildfire control with 99% probability. These types of low intensity disturbances were very common as intermediate events in the historically high intensity regimes and usually occurred during low to moderate fire weather conditions.

**Moderate** - High Historical and High Current: these fires have effects that occur outside the normal range of occurrence with 90% probability, and have high resistance to wildfire control with 60% probability. Even though these regimes were historically high intensity, the wildfires that occur currently are commonly occurring in fuels that have higher loadings and are more contiguous than occurred within the normal historical range. Consequently, they commonly have more severe effects and inherently have higher potential for resistance to control than low intensity regimes.

**Processing**

The following process should be used to create the Uncharacteristic Wildfire variable by Alternative and Year. NOTE: "Xx" is used in reference to all SDEIS Simulations, X1, X2, and X3.

**Process 1.0** -- Assign Terrestrial Community Groups (TCG) to H6AMPH strata.

**Process 1.1** -- Assign Terrestrial Community Groups to H6AMPH Strata for Current, Year 0.

**Process 1.2** -- Assign Terrestrial Community Groups to H6AMPH Strata for Xx Yr.

**Process 2.0** -- Assign Wildfire Severity / Severe Soil Vegetative (WFSV) using the Uncharacteristic Wildfire Lookup Table (UWL) to PVTGRP/HDI/TCG combinations.

XxWFSV_Yr will be by H6/PVG/HDI/TCG

**Process 3.0** -- Calculate Uncharacteristic Wildfire Coefficient (UWF) per H6AMPH strata using WFSV and Adjusted Wildfire Coefficient, X1Aac_WlfYr (output from variable 9). The WFSV values from Process 2.0 were assigned at the H6AMPH/TCG level and must be converted to the H6AMPH level in this process using an area weighted average WFSV value.

XxUWF_Yr = H6AMPH strata weighted average of WFSV * XxAac_WlfYr

**Logic:** This is the amount of simulation (Xx) uncharacteristic (high intensity) wildfire which would burn with severity exceeding the characteristic effects of fire on soil and vegetation. Zero values for wildfire do not reduce this probability because it is a cumulative value for the amount of wildfire that occurs. When wildfire is zero then the calculated value becomes zero.

**Process 4.0** -- Calculate Subwatershed Uncharacteristic Wildfire Event Probability (UWEP) by HUC6 to get H6XxUWEP_Yr.

**Process 4.1** -- Sum all the H6AMPH strata area to get the total area in the HUC6 (Total HUC6 Area).

**Process 4.2** -- Calculate HUC6 Uncharacteristic Wildfire Occurrence weighted average.

H6 XxUWF_Yr = (( H6AMPH XxUWF_Yr  Value ) * (H6AMPHArea )) / Total HUC6 Area )

Do a Frequency Diagram at this point.  All values should be $\leq$ 1.0.

**Process 4.3** -- Set all the H6AMPH strata (UWF) Uncharacteristic Wildfire Occurrence values that are less than or equal to the H6 weighted average (H6 XxUWF_Yr)  to zero creating a new table, H6AMPH XxUWFaavg_Yr.

If H6AMPH XxUWF_Yr $\leq$  H6 XxUWF_Yr,
Then
H6AMPH XxUWFaavg_Yr = H6AMPH XxUWF_Yr

If  H6AMPH XxUWFaavg_Yr > 1.0 then set  H6AMPH XxUWFaavg_Yr =  1.0
Else
H6AMPH XxUWFaavg_Yr = 0

**Process 4.4** -- Calculate the HUC6 area of above average UWF  by summarizing  the area of the H6AMPH strata within the HUC6s that have uncharacteristic wildfire occurrence values greater than the weighted average for the HUC6.

H6 XxUWFaavg_Area = Summary of area in H6 where  H6AMPH XxUWFaavg_Yr <> 0

**Process 4.5** -- Compute a new average value (the average of above average uncharacteristic wildfire occurrence for the subwatershed) by using only the strata that have a value greater than the weighted average of all H6AMPH strata in the HUC6.  The new weighted average uses the sum of all of the greater than average strata area calculated in process 4.4

Should divide output from 4.4 by sum of area of output in 4.4 per HUC6.

H6 XxUWFaavg_Coef =
H6 sum of  (H6AMPH XxUWFaavg_Yr * H6AMPH area ) / H6 XxUWFaavg_Area

Create Frequency diagram of these values for QC and classify.

**Logic:** This weighted average probability is for the strata with greater than or equal to average chance of uncharacteristic wildfire for all strata with uncharacteristic wildfire occurrence in the subwatershed.  Assumes only average or above average uncharacteristic wildfire probability have the opportunity to become a large HUC6 uncharacteristic wildfire event.

## Wildfire Look up Table

**Probability Assignments For Uncharacteristic Wildfire and Crown Fire**
PVG - potential vegetation group
HDI - historical disturbance intensity regime
X1DI - disturbance intensity regime for no action (X1) alternatives all years
WFSV - probability of wildfire severe soil and vegetation effects
CRNFIR - Crown fire probability

To use table:

If PVG = x and HDI = x and TCG = x, Then .....

**Note:** Blank HDI indicates “assign to all cases of HDI”

| **PVG** | **HDI** | **TCG Code** | **WFSV** | **CRNFIR** |
|---|---|---|---|---|
| Agricultural, Urban | | AUR | 0 | 0 |
| Water, Rock | | WRB | 0 | 0 |
| Woodland | L | HRB | .01 | 0 |
| “Same” | H | “Same” | .01 | 0 |
| Woodland | L | SHB | .1 | 0 |
| “Same” | H | “Same” | .01 | 0 |
| Woodland | L | MSF | 1.0 | 1.0 |
| “Same” | H | “Same” | .2 | 1.0 |
| Dry Forest | L | HRB | .01 | 0 |
| “Same” | H | “Same” | .01 | 0 |
| Dry Forest | L | SHB | .01 | 0 |
| “Same” | H | “Same” | .01 | 0 |
| Dry Forest | L | ESF | .01 | 0 |
| “Same” | H | “Same” | .01 | 0 |
| Dry Forest | L | MSF | 1.0 | 1.0 |
| “Same” | H | “Same” | .2 | 1.0 |
| Dry Forest | L | LSF | .01 | .01 |
| “Same” | H | “Same” | .01 | .1 |
| Dry Forest | L | LMF | 1.0 | 1.0 |
| “Same” | H | “Same” | .2 | 1.0 |
| Moist Forest | L | HRB | .001 | 0 |
| “Same” | H | “Same” | .001 | 0 |
| Moist Forest | L | SHB | .001 | 0 |
| “Same” | H | “Same” | .001 | 0 |
| Moist Forest | L | ESF | .001 | 0 |
| “Same” | H | “Same” | .001 | 0 |
| Moist Forest | L | MSF | .9 | .8 |

| PVG | HDI | TCG Code | WFSV | CRNFIR |
|---|---|---|---|---|
| “Same” | H | “Same” | .2 | .8 |
| Moist Forest | L | LSF | .01 | .01 |
| “Same” | H | “Same” | .01 | .01 |
| Moist Forest | L | LMF | 1.0 | .9 |
| “Same” | H | “Same” | .2 | .9 |
| Cold Forest | L | HRB | .001 | 0 |
| “Same” | H | “Same” | .001 | 0 |
| Cold Forest | L | SHB | .001 | 0 |
| “Same” | H | “Same” | .001 | 0 |
| Cold Forest | L | ESF | .001 | 0 |
| “Same” | H | “Same” | .001 | 0 |
| Cold Forest | L | MSF | .8 | .7 |
| “Same” | H | “Same” | .1 | .7 |
| Cold Forest | L | LSF | .01 | .005 |
| “Same” | H | “Same” | .01 | .005 |
| Cold Forest | L | LMF | .8 | .7 |
| “Same” | H | “Same” | .1 | .6 |
| Dry Shrub, Dry Grass | L | HRB | .8 | 0 |
| “Same” | H | “Same” | .9 | 0 |
| Dry Shrub, Dry Grass | L | SHB | 1.0 | 0 |
| “Same” | H | “Same” | 1.0 | 0 |
| Dry Shrub, Dry Grass | L | MSF | 1.0 | 0 |
| “Same” | H | “Same” | 1.0 | 0 |
| Cool Shrub | L | HRB | .005 | 0 |
| “Same” | H | “Same” | .005 | 0 |
| Cool Shrub | L | SHB | .01 | 0 |
| “Same” | H | “Same” | .005 | 0 |
| Cool Shrub | L | MSF | 1.0 | 0 |

| PVG | HDI | TCG Code | WFSV | CRNFIR |
|---|---|---|---|---|
| “Same” | H | “Same” | .8 | 0 |
| Alpine, Riparian<br>Shrub, Riparian<br>Herb, Riparian<br>Woodland | L | | .005 | 0 |
| “Same” | H | | .005 | 0 |

**CLASS INTERPRETATIONS - UNCHARACTERISTIC WILDFIRE EVENT DEFINITION AND CLASSIFICATION**
**Variable 14 (VB 14)**

For modeling purposes it may be necessary to classify the weighted average coefficients in the deliverable dbf files. The following suggestions are provided for determining class breaks for each coefficient for this variable.

**Variable 14 - Time Period Definitions**

Current (CUR) - Current time period generally reflects the current year (1999) plus or minus five years (i.e., 1994-2004). Developed from data and models using administrative unit data from the past 10 years as one input. Reflects the disturbance from 1988 to 1997 (10-year average).

Future Decade (10) - Short-term future, projected 10 years into the future (2009) from the current year (1999) plus or minus five years (i.e., 2004-2014). Developed from data and models using the slope from the 10-year administrative unit data and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives.

Long-term (100) - Long-term future, projected as an average of the 10 future decade projections from the current year. The average over this period represents average conditions over the total 100-year period. Developed from data and models using the current year as the starting point and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives.

**Uncharacteristic Wildfire Event Probability (UWE), Variable 14 Unplanned Disturbance**
Subwatershed current year statistics:
Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape distribution with long tail and spike. Classified into none, low, moderate, high, and very high through correlation of the above average coefficient with the input wildfire probability.
Notes on 10-year and 100-year distribution: same class breaks and similar distribution shape as current year. N, L, M, H, and VH classes same for S1/S2/S3.

Definition: Area coefficient for probability of above average size uncharacteristic wildfire events within the subwatershed. Current levels based on administrative unit 10-year average (1988-1997) as one input. Uncharacteristic wildfire events are those wildfires that have an above average probability of burning in one event more than 20 percent of the net area of the subwatershed wildland vegetation with effects outside the normal range of the historical (natural) system. The normal range is considered to be within the 400-year historic range of variability minimum plus 25 percent and maximum minus 25 percent. Uncharacteristic effects of this magnitude would have higher probabilities of reducing vegetation/litter cover, root binding capability, and heating the soil surface across large enough areas that could result in erosion events, reduction in riparian habitat condition, and increased stream temperatures.

Classification method: Stratified into classes based on the current distribution and correlation of coefficient with input wildfire probabilities (prior to determining above average event). Major wildfire events that would be contained within one subwatershed (1000-5000 gross hectares) tend to occur on a 3-6 year cycle within an ecological province. About one percent of subwatersheds within an ecological province incur these kinds of wildfire events during one of these kinds of fire years (about 3-7 large fires in an ecological province

in a major wildfire year). Extreme wildfire events that contiguously burn multiple subwatersheds (5,000-100,000 gross hectares) tend to occur on a 20-30 year cycle within an ecological province following extended drought periods. When these events occur about two percent of the subwatersheds within an ecological province can be burned during one of these kinds of fire years (about 2-4 extremely large fire events in an ecological province in an extreme wildfire year). Within the basin about 400 subwatersheds will have some type of large wildfire event over the next 100 years.

The following classifications average these long-term probabilities with the vulnerability (based on ignition probability, fuel, and terrain conditions) of the subwatershed to severe wildfire effects. The moderate, high, and very high classes have similar probabilities (0.1 or greater) of occurrence during a 100-year period, but have increasingly higher probability of severe fire effects and resistance to control. Where moderate, high, and very high classes occur in a contiguous clump there is a high probability of an extreme fire event that could burn across several or more subwatersheds.

| **Class** | **Low** | **High** | **Interpretation** |
|---|---|---|---|
| None | 0 | .0000000001 | No probability of an uncharacteristic wildfire event occurrence or severe fire effects and resistance to control in the subwatershed. Spatial distribution highly correlated with agricultural and urban lands in S1. |
| Low | .0000000002 | < .05 | Low probability of an uncharacteristic wildfire event in the subwatershed - wildfire event occurrence probability less than 0.1. Less than 0.5 probability of severe fire effects and resistance to control if an event occurs. |
| Moderate | >= .05 | < .095 | Moderate probability of an uncharacteristic wildfire event in the subwatershed - wildfire occurrence probability greater than 0.1. Greater or = 0.5 probability of moderately severe fire effects and resistance to control if an event occurs. Spatial distribution highly correlated with subwatersheds that have complex terrain and extensive amounts of high departure conditions in the dry shrub, cool shrub, and moist forest in S1. |
| High | >= .095 | < .245 | High probability of an uncharacteristic wildfire event in the subwatershed - wildfire occurrence probability greater than 0.1. Greater than 0.5 probability of severe fire effects and resistance to control if an event occurs. Spatial distribution highly correlated with subwatersheds that have complex terrain and extensive amounts of high departure conditions in the dry end of the moist forest, dry forest, and moist end of the dry shrub PVGs in S1. |
| Very High | >= .245 | <= 1.0 | Very High probability of an uncharacteristic wildfire event in the subwatershed - wildfire occurrence probability greater than 0.1. Greater than 0.5 probability of very severe fire effects and resistance to control if an event occurs. Spatial distribution highly correlated with subwatersheds that have complex terrain and extensive amounts of high departure conditions in the dry end of the moist forest, dry forest, and moist end of the dry shrub PVGs in S1. |

**LIVESTOCK GRAZING EFFECTS DEPARTURE AND UNCHARACTERISTIC LIVESTOCK GRAZING VARIABLE 15 (VB 15)**
**03/30/00**

**Vb15 (.dbf, .db)**

Field Definitions:

HUC6 – Subwatershed, 12 character numeric code.

H6_HECT – Area of subwatershed (HUC6) in Hectares.

H6_ACRES – Area of subwatershed (HUC6) in Acres. These data were calculated as a double precision field from the H6_HECT value, but have been rounded to 5 decimal places due to software limitations when creating the .dbf format file. The total acres for the basin from this file will not match published acreage reports due to this rounding of values. If the double precision version of acres is necessary, multiply the H6 Hect value by 2.471054073.

CUR_ULG – Annual Average Uncharacteristic Livestock Grazing Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Annual Average Uncharacteristic Livestock Grazing in the subwatershed.

X1_10_ULG – Annual Average Uncharacteristic Livestock Grazing Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Annual Average Uncharacteristic Livestock Grazing in the subwatershed.

X1_100_ULG – Annual Average Uncharacteristic Livestock Grazing Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Annual Average Uncharacteristic Livestock Grazing in the subwatershed.

X2_10_ULG – Annual Average Uncharacteristic Livestock Grazing Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Annual Average Uncharacteristic Livestock Grazing in the subwatershed.

X2_100_ULG – Annual Average Uncharacteristic Livestock Grazing Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Annual Average Uncharacteristic Livestock Grazing in the subwatershed.

X3_10_ULG – Annual Average Uncharacteristic Livestock Grazing Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Annual Average Uncharacteristic Livestock Grazing in the subwatershed.

X3_100_ULG – Annual Average Uncharacteristic Livestock Grazing Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Annual Average Uncharacteristic Livestock Grazing in the subwatershed.

**Vb15cl (.dbf, .db)**

The Vb15cl file contains classifications of the Vb15 data across the basin with one value (such as L, M, H) assigned per Huc6, per theme. See each item for specific classifications. See Class Interpretations portion of this document for details of classification methods per field.

Field Definitions:

HUC6 – Subwatershed, 12 character numeric code.

CUR_ULG – Annual Average Uncharacteristic Livestock Grazing Classes, by HUC6 for Current, Year 0.
(N = None, L = Low, M = Moderate, H = High)

X1_10_ULG – Annual Average Uncharacteristic Livestock Grazing Classes, by HUC6 for X1, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X1_100_ULG – Annual Average Uncharacteristic Livestock Grazing Classes, by HUC6 for X1, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X2_10_ULG – Annual Average Uncharacteristic Livestock Grazing Classes, by HUC6 for X2, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X2_100_ULG – Annual Average Uncharacteristic Livestock Grazing Classes, by HUC6 for X2, Year 100.
(N = None, L = Low, M = Moderate, H = High)

X3_10_ULG – Annual Average Uncharacteristic Livestock Grazing Classes, by HUC6 for X3, Year 10.
(N = None, L = Low, M = Moderate, H = High)

X3_100_ULG – Annual Average Uncharacteristic Livestock Grazing Classes, by HUC6 for X3, Year 100.
(N = None, L = Low, M = Moderate, H = High)

**REQUIREMENTS FOR PROCESSING LIVESTOCK GRAZING EFFECTS DEPARTURE AND UNCHARACTERISTIC LIVESTOCK GRAZING VARIABLE 15 (VB 15)**

## Logic Overview

Uncharacteristic livestock grazing has effects outside of the normal range of effects that occurred in the historical (natural) system. The normal range is considered to be within the 400 year historic range of variability minimum +25% and maximum -25%. The 400 year period includes the variation that is predicted to occur within the recent and current climate without influence of Euro-American settlement influence. The historical regime accounts in general for influences of native species adaptations and soil development for the past 10-15 thousand years since the last glacial period. Some native species adaptations have evolved over the last 1-3 million years in response to changing paleoecological climates and disturbances.

Effects of livestock grazing are grouped at the broad-scale into successional change grazing (SCG) and successional no effect grazing (SNG). SCG can have several different or combined effects: 1) cause mortality to "decreaser" native plants, thus disturbing the community and causing change to another community dominated by "increasers" or "invaders"; 2) speeding the rate of succession by reducing the competitive ability of herbs in comparison to shrubs and trees; and 3) reducing herb fuels and thus causing a reduction in the historical fire frequency. SNG would not cause these effects, generally resulting in low to moderate utilization without consistent repetition in a given season or location. At the broad-scale in the historical (natural) system SCG did not occur; the predominance of effects were SNG, related to moving herds of large ungulates or scattered individuals. Consequently, uncharacteristic livestock grazing can be estimated by using the cumulative probability of SCG. Certain PVGs are much more sensitive to the cumulative effects of SCG. Some areas are subject to SCG effects from concentrated native large ungulate use (i.e. elk, deer), but at the broad-scale this does not emerge as an extensive effect.

None (N) = no grazing or very little grazing.
Low (L) = successional no effect grazing (SNG) occurs, but with no successional change grazing (SCG).
Moderate (M) = successional change grazing occurs with moderate probability of uncharacteristic effects.
High (H) = successional change grazing occurs with high probability of uncharacteristic effects.

## Processing

The Livestock Grazing Effects Departure and Uncharacteristic Livestock Grazing are based on Successional Change Grazing and certain combinations of Potential Vegetation groups and Terrestrial Community groups.

The following process should be used to create the Uncharacteristic Livestock Grazing variable by Alternative and Year.

**Process 1.0 –** Assign Terrestrial Community Groups to H6AMP Strata.

**Process 1.1 –** Assign Terrestrial Community Groups to H6AMP Strata for Current, Year 0.

**Process 1.2 –** Assign Terrestrial Community Groups to H6AMP Strata for X1/Xx Yr.

**Process 2.0 –** Assign Uncharacteristic Grazing Effects (ULGE) to PVG/TCG combinations using the Uncharacteristic Livestock Grazing Effects Look up Table.

**Process 3.0 –** Calculate Uncharacteristic Grazing Coefficient (ULG) by H6AMPH and H6AMP strata and Average Annual Uncharacteristic Grazing (X1ULG_Yr or XxULG_Yr) using Animal Unit Months , X1ADC_Aum Yr/XxADC_AumYr, (Variable 9 output).

**Logic**: This is the amount of no action or action uncharacteristic livestock grazing.

**Process 3.1 –** Calculate Uncharacteristic Grazing Coefficient by H6AMPH and H6AMP strata and Average Annual Uncharacteristic Grazing for Current Veg Yr 0. This calculation uses the H6 based GRO lookup table from Ah 56.5.3 and requires conversion of GRO class to GROulg values. See the GROulg lookup table at the end of the requirements.

X1XxULG_0 =(H6Amph strata average of ULGE) * (AumYr0/AumYr0) * GROulg * (1.3 - RxSim)

Note: Set any negative values to zero. If AUM Yr0 = 0 assign X1ULG0 a value of 0.

**Process 3.2 –** Calculate Uncharacteristic Grazing Coefficient by H6AMPH and H6AMP strata and Average Annual Uncharacteristic Grazing for X1 Veg Yr.

X1XxULG_Yr =(H6Amph strata average of ULGE) * (2 * AumYr/ (AumYr + AumYr0)) * GROulg * (1.3 - RxSim)

Note: Set any negative values to zero.

**Process 4.0 –** Calculate Subwatershed Uncharacteristic Grazing (ULG) by HUC6 using a weighted average of X1XxULG_Yr for Aquatic and Terrestrial.

**Input Files**

S1Vg0 grid
X1XxVegYr grids
TCG lookup table
PVG lookup table
H6PAM2 table
Uncharacteristic Grazing Look Up Table
Adjusted Animal Unit Months Coefficient
RxSim look up table
GROulg look up table

**Look Up Tables**

**1. Uncharacteristic Grazing Look Up Table.**

| PVGRPID | PVGRPNAME | TCG_CODE | ULGE |
|---|---|---|---|
| 1 | AGRICULTURAL | AUR | 1 |
| 1 | AGRICULTURAL | ESF | 1 |
| 1 | AGRICULTURAL | HRB | 1 |
| 1 | AGRICULTURAL | LMF | 1 |
| 1 | AGRICULTURAL | LSF | 1 |
| 1 | AGRICULTURAL | MSF | 1 |
| 1 | AGRICULTURAL | RIA | 1 |
| 1 | AGRICULTURAL | SHB | 1 |
| 1 | AGRICULTURAL | WRB | 0 |
| 2 | ALPINE | AUR | 1 |
| 2 | ALPINE | ESF | 1 |
| 2 | ALPINE | HRB | 1 |

| PVGRPID | PVGRPNAME | TCG_CODE | ULGE |
|---|---|---|---|
| 2 | ALPINE | LMF | 1 |
| 2 | ALPINE | LSF | 1 |
| 2 | ALPINE | MSF | 1 |
| 2 | ALPINE | RIA | 1 |
| 2 | ALPINE | SHB | 1 |
| 2 | ALPINE | WRB | 0 |
| 3 | COLD FOREST | AUR | 1 |
| 3 | COLD FOREST | ESF | 0.7 |
| 3 | COLD FOREST | HRB | 0.7 |
| 3 | COLD FOREST | LMF | 0.1 |
| 3 | COLD FOREST | LSF | 0.7 |
| 3 | COLD FOREST | MSF | 0.1 |
| 3 | COLD FOREST | RIA | 1 |
| 3 | COLD FOREST | SHB | 0.5 |
| 3 | COLD FOREST | WRB | 0 |
| 4 | COOL SHRUB | AUR | 1 |
| 4 | COOL SHRUB | ESF | 0.8 |
| 4 | COOL SHRUB | HRB | 0.8 |
| 4 | COOL SHRUB | LMF | 0.1 |
| 4 | COOL SHRUB | LSF | 0.8 |
| 4 | COOL SHRUB | MSF | 0.5 |
| 4 | COOL SHRUB | RIA | 1 |
| 4 | COOL SHRUB | SHB | 0.9 |
| 4 | COOL SHRUB | WRB | 0 |
| 5 | DRY FOREST | AUR | 1 |
| 5 | DRY FOREST | ESF | 0.7 |
| 5 | DRY FOREST | HRB | 0.7 |
| 5 | DRY FOREST | LMF | 0.1 |
| 5 | DRY FOREST | LSF | 0.7 |
| 5 | DRY FOREST | MSF | 0.1 |
| 5 | DRY FOREST | RIA | 1 |
| 5 | DRY FOREST | SHB | 0.9 |
| 5 | DRY FOREST | WRB | 0 |
| 6 | DRY GRASS | AUR | 1 |
| 6 | DRY GRASS | ESF | 1 |
| 6 | DRY GRASS | HRB | 1 |
| 6 | DRY GRASS | LMF | 0.2 |
| 6 | DRY GRASS | LSF | 1 |
| 6 | DRY GRASS | MSF | 0.9 |
| 6 | DRY GRASS | RIA | 1 |
| 6 | DRY GRASS | SHB | 1 |
| 6 | DRY GRASS | WRB | 0 |

| PVGRPID | PVGRPNAME | TCG_CODE | ULGE |
|---|---|---|---|
| 7 | DRY SHRUB | AUR | 1 |
| 7 | DRY SHRUB | ESF | 1 |
| 7 | DRY SHRUB | HRB | 1 |
| 7 | DRY SHRUB | LMF | 0.2 |
| 7 | DRY SHRUB | LSF | 1 |
| 7 | DRY SHRUB | MSF | 0.9 |
| 7 | DRY SHRUB | RIA | 1 |
| 7 | DRY SHRUB | SHB | 1 |
| 7 | DRY SHRUB | WRB | 0 |
| 8 | MOIST FOREST | AUR | 1 |
| 8 | MOIST FOREST | ESF | 0.2 |
| 8 | MOIST FOREST | HRB | 0.2 |
| 8 | MOIST FOREST | LMF | 0.1 |
| 8 | MOIST FOREST | LSF | 0.2 |
| 8 | MOIST FOREST | MSF | 0.1 |
| 8 | MOIST FOREST | RIA | 1 |
| 8 | MOIST FOREST | SHB | 0.4 |
| 8 | MOIST FOREST | WRB | 0 |
| 9 | RIPARIAN HERB | AUR | 1 |
| 9 | RIPARIAN HERB | ESF | 1 |
| 9 | RIPARIAN HERB | HRB | 1 |
| 9 | RIPARIAN HERB | LMF | 1 |
| 9 | RIPARIAN HERB | LSF | 1 |
| 9 | RIPARIAN HERB | MSF | 1 |
| 9 | RIPARIAN HERB | RIA | 1 |
| 9 | RIPARIAN HERB | SHB | 1 |
| 9 | RIPARIAN HERB | WRB | 0 |
| 10 | RIPARIAN SHRUB | AUR | 1 |
| 10 | RIPARIAN SHRUB | ESF | 1 |
| 10 | RIPARIAN SHRUB | HRB | 1 |
| 10 | RIPARIAN SHRUB | LMF | 1 |
| 10 | RIPARIAN SHRUB | LSF | 1 |
| 10 | RIPARIAN SHRUB | MSF | 1 |
| 10 | RIPARIAN SHRUB | RIA | 1 |
| 10 | RIPARIAN SHRUB | SHB | 1 |
| 10 | RIPARIAN SHRUB | WRB | 0 |
| 11 | ROCK | AUR | 1 |
| 11 | ROCK | ESF | 0 |
| 11 | ROCK | HRB | 0 |
| 11 | ROCK | LMF | 0 |
| 11 | ROCK | LSF | 0 |
| 11 | ROCK | MSF | 0 |

| PVGRPID | PVGRPNAME | TCG_CODE | ULGE |
|---|---|---|---|
| 11 | ROCK | RIA | 0 |
| 11 | ROCK | SHB | 0 |
| 11 | ROCK | WRB | 0 |
| 12 | URBAN | AUR | 1 |
| 12 | URBAN | ESF | 0 |
| 12 | URBAN | HRB | 0 |
| 12 | URBAN | LMF | 0 |
| 12 | URBAN | LSF | 0 |
| 12 | URBAN | MSF | 0 |
| 12 | URBAN | RIA | 0 |
| 12 | URBAN | SHB | 0 |
| 12 | URBAN | WRB | 0 |
| 13 | WATER | AUR | 1 |
| 13 | WATER | ESF | 0 |
| 13 | WATER | HRB | 0 |
| 13 | WATER | LMF | 0 |
| 13 | WATER | LSF | 0 |
| 13 | WATER | MSF | 0 |
| 13 | WATER | RIA | 0 |
| 13 | WATER | SHB | 0 |
| 13 | WATER | WRB | 0 |
| 14 | WOODLAND | AUR | 1 |
| 14 | WOODLAND | ESF | 1 |
| 14 | WOODLAND | HRB | 1 |
| 14 | WOODLAND | LMF | 0.2 |
| 14 | WOODLAND | LSF | 1 |
| 14 | WOODLAND | MSF | 0.2 |
| 14 | WOODLAND | RIA | 1 |
| 14 | WOODLAND | SHB | 1 |
| 14 | WOODLAND | WRB | 0 |
| 15 | RIPARIAN WOODLAND | AUR | 1 |
| 15 | RIPARIAN WOODLAND | ESF | 1 |
| 15 | RIPARIAN WOODLAND | HRB | 1 |
| 15 | RIPARIAN WOODLAND | LMF | 1 |
| 15 | RIPARIAN WOODLAND | LSF | 1 |
| 15 | RIPARIAN WOODLAND | MSF | 1 |
| 15 | RIPARIAN WOODLAND | RIA | 1 |
| 15 | RIPARIAN WOODLAND | SHB | 1 |
| 15 | RIPARIAN WOODLAND | WRB | 0 |

**2. RxSim Look Up Table**.

| Rx | RxSim |
|---|---|
| A1 | .95 |
| A2 | .75 |
| A3 | .8 |
| C1 | .7 |
| C2 | .4 |
| C3 | .3 |
| N1 | .9 |
| N2 | .6 |
| N3 | .5 |
| N4 | .7 |
| N5 | .6 |
| N6 | .75 |
| N7 | .6 |
| N8 | .5 |
| P1 | .65 |
| P2 | .3 |
| P3 | .2 |

**3) GROulg Look Up Table.**

| GRO Class (Ah 56.5.3) | GROulg |
|---|---|
| VH | .9 |
| H | .8 |
| M | .7 |
| L | .2 |
| VL | .1 |

**CLASS INTERPRETATIONS -UNCHARACTERISTIC LIVESTOCK GRAZING DEFINITION AND CLASSIFICATION**
**Variable 15 (VB 15)**

For modeling purposes it may be necessary to classify the weighted average coefficients in the deliverable dbf files. The following suggestions are provided for determining class breaks for each coefficient for this

particular variable.

Variable 15 - Time Period Definitions

**Current (CUR)** - Current time period generally reflects the current year (1999) plus or minus 5 years (i.e. 1994 - 2004). Developed from data and models using administrative unit data from the past 10 years as one input. Reflects the disturbance from 1988 to 1997 (10 year average) .

**Future Decade (10)** - Short-term future, projected 10 years into the future (2009) from the current year (1999) plus or minus 5 years (i.e. 2004-2014). Developed from data and models using the slope from the 10 year administrative unit data and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives..

**Long-term (100)** - Long-term future, projected as an average of the 10 future decade projections from the current year.. The average over this period represents average conditions over the total 100 year period. Developed from data and models using the current year as the starting point and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives.

Uncharacteristic Livestock Grazing, Variable 15, Planned Disturbance
Subwatershed current year statistics:
Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape
Notes on 10 year and 100 year distribution: same class breaks and similar distribution shape as current year. N, L, M, and H classes same for S1/S2/S3, but add VH class for S2 and S3. VH class added to account for probabilities above the current distribution.

Definition: area coefficient for relative probability of uncharacteristic livestock grazing effects within the subwatershed. Current levels based on administrative unit 10 year average (1988-1997) as one input. Uncharacteristic livestock grazing effects have a probability of causing a change of more than 20% dissimilarity compared to native (historical) vegetation composition and structure, and effects to soil cover and surface characteristics. These effects are outside the normal range of the historical (natural) system. The normal range is considered to be within the 400 year historic range of variability minimum + 25% and maximum - 25%. Uncharacteristic effects of these types could reduce native species habitat quality, vegetation/litter cover, root binding capability, and riparian condition, and increase probability of erosion, compaction, weeds and exotic plants, stream bank erosion/failure, and increased stream temperatures. This variable does not account for recent (past 5 years) changes in grazing systems that exclude or reduce livestock grazing through fencing or have agressive weed management/control programs. This variable does account for recent reductions in livestock stocking (animal unit months) levels and general changes as a result of implementation of healthy rangelands strategies.

Classification method: j-shape distribution split into classes with 1/3 in low, moderate, high excluding the zeros (none class). Very high class added to account for increases above the current distribution.

| Class | Low | High | Interpretation |
|---|---|---|---|
| None | 0 | .0000000001 | Almost no probability of uncharacteristic livestock grazing in the subwatershed. Spatial distribution highly correlated with agricultural, urban lands, and moist forest in S1. |
| Low | .0000000002 | .049981818 | Low probability of uncharacteristic livestock grazing in the subwatershed - It is unlikely that this level of uncharacteristic livestock grazing would cause extensive effects, but in steep, complex terrain could result in negative impacts on riparian systems. Spatial distribution highly correlated with the dry forest, moist forest, and cool shrub PVGs in S1. |
| Moderate | .049981819 | .549471264 | Moderate probability of extensive uncharacteristic livestock grazing effects in the subwatershed - This level of uncharacteristic livestock grazing could result in negative effects, particularly on riparian systems in steep, complex terrain, unless mitigated with distribution mgt. Spatial distribution highly correlated with the dry shrub, cool shrub, and moist forest in S1. |
| High | .549471265 | .900000000 | High probability of extensive uncharacteristic livestock grazing effects in the subwatershed with considerable cumulative effects from high stocking levels in the early to mid 1900s - This level of uncharacteristic livestock grazing would likely result in negative effects to both upland and riparian systems, unless mitigated with distribution mgt. Spatial distribution highly correlated with the dry shrub PVGs in S1. |
| Very High | .900000001 | 1.0 | Very High probability of uncharacteristic livestock grazing in the subwatershed - Does not occur in S1. |

**HISTORICAL RANGE OF VARIABILITY COMPOSITE DEPARTURE**
**VARIABLE 16 (VB 16)**
**03/30/00**

**VB16cl (.dbf, .db)**

Field Definitions:

HUC6 – Subwatershed, 12 character numeric code

H6_HECT – Area of subwatershed (HUC6) in Hectares

H6_ACRES – Area of subwatershed (HUC6) in Acres These data were calculated as a double precision field from the H6_HECT value, but have been rounded to 5 decimal places due to software limitations when creating the .dbf format file. The total acres for the basin from this file will not match published acreage reports due to this rounding of values. If the double precision version of acres is necessary, multiply the H6_Hect value by 2.471054073 .

CURR_HRV – Current Year HRV Departure Class.
L = Low , M = Moderate, H = High

X1_10_HRV – X1 Year 10 HRV Departure Class.
L = Low , M = Moderate, H = High

X1_100_HRV – X1 Year 100 HRV Departure Class.
L = Low , M = Moderate, H = High

X2_10_HRV – X2 Year 10 HRV Departure Class.
L = Low , M = Moderate, H = High

X2_100_HRV – X2 Year 100 HRV Departure Class.
L = Low , M = Moderate, H = High

X3_10_HRV – X3 Year 10 HRV Departure Class.
L = Low , M = Moderate, H = High

X3_100_HRV – X3 Year 100 HRV Departure Class.
L = Low , M = Moderate, H = High

**REQUIREMENTS FOR PROCESSING HISTORICAL RANGE OF VARIABILITY COMPOSITE DEPARTURE (HRVDEP) VARIABLE 16 (VB 16)**

**Logic Overview:**
Calculated value will be a probability of departure (100-similarity) from the historical disturbance intensity regime and the terrestrial community group for the potential vegetation group.

The classification of this departure into three classes of low, moderate, and high will provide a very similar variable to the landscape mosaic fragmentation departure (FRAG) variable developed for integrated risk and used in the supplemental draft EIS spatial prioritization analysis.

The integrated risk landscape mosaic similarity (SIM) and fragmentation departure (FRAG) variables were extrapolated at the subwatershed scale using data from Hessburg and others (1998) which assessed differences in fragmentation index (contagion) and landscape mosaic composition and structure between historic and current conditions in relation to ownership, management history, road density, and fire exclusion.

The calculated HRVDCLASS values are a probability of departure from HRV landscape mosaics. The classes of these values are comparable to those calculated for historical and current in integrated risk.

**Processes**

**Process 1.0** – Assign X1/Xx Disturbance Intensity Regimes using the look up table for "No Action and Action Assignment of Disturbance Intensity Regime."
For X1/Xx all Years.

**Process 1.1** – Assign Terrestrial Community Groups to X1/XxVegYr data.

**Process 1.2** – Assign X1/Xx Disturbance Intensity Regime.

**Process 2.0** – Calculate Disturbance Intensity Regime Change Classes/Coefficients.
For X1/Xx all Years.

**Process 2.1** – Assign DIC change Classification to H6AMPH/TCG strata.

DIClss =
NL (No Change in Low), If HDI_CODE = LI and DIR = L.

NH (No Change in High), If (HDI_CODE = HI or UK) and DIR = H.

LH (Low to High), If HDI_CODE = LI and DIR = H.

HL (High to Low), If (HDI_CODE = HI or UK) and DIR = L.

**Process 2.2** – Calculate DIC coefficients (DICoeff) for H6AMPH strata.

NLCoeff = ( H6AMPH/TCG hectares "where DIClss = NL" / H6AMPH hectares ).

NHCoeff = ( H6AMPH/TCG hectares "where DIClss = NH" / H6AMPH hectares ).

LHCoeff = ( H6AMPH/TCG hectares "where DIClss = LH" / H6AMPH hectares ).

HLCoeff = ( H6AMPH/TCG hectares "where DIClss = HL" / H6AMPH hectares ).

QC Step: (NLCoeff + NHCoeff + LHCoeff + HLCoeff ) = 1.0

**Process 3.0** – Calculate Intermediate Similarity Coefficients from DICoefficients for X1/Xx all Years.

SimCoI = (sum of NLCoeff per H6AMPH) + ( sum of NHCoeff per H6AMPH).

**Logic:** In actual HRV similarity calculation would use Sorenson's similarity formula for calculating similarity of terrestrial vegetation, succession/disturbance regimes, hydrologic conditions, soil conditions, and aquatic and terrestrial species composition to estimate similarity to HRV. In this Hrvdep variable we are using the disturbance regime where there is no change as a proxy to broad-scale terrestrial vegetation and succession/disturbance regime similarity. In the next step we will bring in the mid-scale SIM variable and management prescription as proxies for hydrologic conditions, soil conditions, and aquatic and terrestrial species composition.

**Process 4.0** – Adjust Strata Similarity Coefficient with H6 Mid-scale Similarity Context at H6AMPH strata level. For X1Yr0:

SimCo = ((.60 * SimCoI) + (.35 * ((SIM + 1) / ( 10 + 1))) + (.05 * RxSim)) * (PVGsim).

For X1/Xx Yr 10:

SimCo = ((.60 * SimCoI) + (.35 * ((SIM + 1) / ( 10 + 1))) + (.05 * RxSim)) * (PVGsim).

For X1/Xx Yr 100:

SimCo = ((.75 * SimCoI) + (.05 * ((SIM + 1) / ( 10 + 1))) + (.2 * RxSim)) * (PVGsim).

**Note:** PVGsim values are in the "Potential Vegetation Group Similarity to HRV Look Up Table," whereas RxSim values can be found in the "Prescription Management Similarity to HRV Look Up Table."

**Logic:** This is the coefficient for similarity of the strata based on use of proxies for similarity of succession/disturbance regime, terrestrial vegetation, hydrologic conditions, soil conditions, and aquatic and terrestrial species composition. Adjustments were made to include context of current subwatershed mid- and fine-scale landscape mosaic similarity, PVG, and adjustment based on the management prescription. The subwatershed current SIM variable is ranked from 0 to 10, with 10 inferring 100% similarity and 0 inferring 0% similarity of current condition to HRV. This current SIM condition affects the starting point for how future management and disturbances may change overall similarity. In this formula 1 is added to the SIM rank and the sum is divided by 10 + 1 so there will be no zero values. The current SIM is used to adjust the 0 year and 10 year, but not the 100 year.

**Process 5.0** – Calculate Historical Range Of Variation Departure.
For X1/Xx all Years.

**Process 5.1** – Calculate H6 Similarity Coefficient.

H6SimCo = weighted average of H6AMPH SimCo at HUC6.

**Process 5.2** – Create Historical Range of Variation Departure by Classifying H6HrvDep.

Create 2 page frequency diagrams for X1Yr0 **H6HrvDep**.

Classify class breaks in frequency distribution in correlation with summary findings from terrestrial subbasin departure (assessment and DEIS eval of alts) and Sim

(integrated risk Huc6 similarity variable).

Class breaks based on frequency diagrams of H6HrvDep:

H6HrvDep = None (N) < .225
H6HrvDep = Low (L) >= .225, < .375
H6HrvDep = Moderate (M) >= .375, < .595
H6HrvDep = High (H) >= .595

**Note:** This is very similar to the Landscape Mosaic Fragmentation Departure (Frag) from integrated risk and as used for the SDEIS spatial prioritization.

**Look Up Tables**

**1. Look Up Table for No Action and Action Assignment of Disturbance Intensity Regime**.

Look Up Table Variables:
PVG = potential vegetation group.

HDI = historical disturbance intensity regime.

X1XxYxDI = disturbance intensity regime for no action (X1) and action (x) alternatives all years.

**To use table**:
If PVG = x and HDI = x and X1XxYxTCG = x, then X1XxYxSimco = x
**Note: L = LI and H = HI**
**Note: treat HDI = UK as = HI**

| PVG | HDI | X1XxYxTCG | X1XxYxDI |
|---|---|---|---|
| Agricultural, Urban | L, H | AUR | H |
| Water, Rock | L | WRB | L |
| Woodland | L | HRB | L |
| “Same” | H | “Same” | L |
| Woodland | L | SHB | H |
| “Same” | H | “Same” | H |
| Woodland | L | MSF | H |
| “Same” | H | “Same” | H |
| Dry Forest | L | HRB | L |
| “Same” | H | “Same” | L |
| Dry Forest | L | SHB | L |
| “Same” | H | “Same” | L |
| Dry Forest | L | ESF | L |

| PVG | HDI | X1XxYxTCG | X1XxYxDI |
|---|---|---|---|
| “Same” | H | “Same” | L |
| Dry Forest | L | MSF | H |
| “Same” | H | “Same” | H |
| Dry Forest | L | LSF | L |
| “Same” | H | “Same” | L |
| Dry Forest | L | LMF | H |
| “Same” | H | “Same” | H |
| Moist Forest | L | HRB | L |
| “Same” | H | “Same” | L |
| Moist Forest | L | SHB | L |
| “Same” | H | “Same” | L |
| Moist Forest | L | ESF | L |
| “Same” | H | “Same” | L |
| Moist Forest | L | MSF | H |
| “Same” | H | “Same” | H |
| Moist Forest | L | LSF | L |
| “Same” | H | “Same” | L |
| Moist Forest | L | LMF | H |
| “Same” | H | “Same” | H |
| Cold Forest | L | HRB | L |
| “Same” | H | “Same” | L |
| Cold Forest | L | SHB | L |
| “Same” | H | “Same” | L |
| Cold Forest | L | ESF | L |
| “Same” | H | “Same” | L |
| Cold Forest | L | MSF | H |
| “Same” | H | “Same” | H |
| Cold Forest | L | LSF | L |
| “Same” | H | “Same” | L |

| PVG | HDI | X1XxYxTCG | X1XxYxDI |
|---|---|---|---|
| Cold Forest | L | LMF | H |
| “Same” | H | “Same” | H |
| Dry Grass | L | HRB | L |
| “Same” | H | “Same” | L |
| Dry Grass | L | SHB | H |
| “Same” | H | “Same” | H |
| Dry Grass | L | MSF | H |
| “Same” | H | “Same” | H |
| Dry Shrub | L | HRB | L |
| “Same” | H | “Same” | L |
| Dry Shrub | L | SHB | L |
| “Same” | H | “Same” | H |
| Dry Shrub | L | MSF | H |
| “Same” | H | “Same” | H |
| Cool Shrub | L | HRB | L |
| “Same” | H | “Same” | L |
| Cool Shrub | L | SHB | L |
| “Same” | H | “Same” | H |
| Cool Shrub | L | MSF | H |
| “Same” | H | “Same” | H |
| Alpine, Riparian Shrub, Riparian Herb, Riparian Woodland | L | exclude AUR and WRB | L |
| “Same” | H | “same” | H |

**2. Potential Vegetation Group Similarity to HRV Look Up Table**

| PVG | PVGsim |
|---|---|
| Agricultural | .01 |
| Urban | .01 |
| Water | 1.0 |

| PVG | PVGsim |
|---|---|
| Rock | 1.0 |
| Woodland | .95 |
| Dry Forest | 1.0 |
| Moist Forest | .95 |
| Cold Forest | .95 |
| Dry Shrub | .9 |
| Dry Grass | .9 |
| Cool Shrub | .95 |
| Alpine | 1.0 |
| Riparian Shrub | .95 |
| Riparian Herb | .95 |
| Riparian Woodland | .95 |

**3. Prescription Management Similarity to HRV Look Up Table**

**Logic:** This is a factor that accounts for the emphasis of the management prescription in attempting to mimic historical range of variability (HRV). HRV in this context includes all biological and physical components of the historical or native system: 1) effects of anthropogenic native Americans; 2) the diversity of native aquatic and terrestrial species and their habitats; 3) vegetation composition/structure and landscape mosaic patterns; 4) succession/disturbance regime patterns; 5) hydrologic channel, sedimentation, and flow regimes; 6) soil development and erosion regimes.

| Rx | RxSim |
|---|---|
| A1 | .95 |
| A2 | .75 |
| A3 | .8 |
| C1 | .7 |
| C2 | .4 |
| C3 | .3 |
| N1 | .9 |
| N2 | .6 |
| N3 | .5 |
| N4 | .7 |
| N5 | .6 |
| N6 | .75 |

| Rx | RxSim |
|---|---|
| N7 | .6 |
| N8 | .5 |
| P1 | .65 |
| P2 | .3 |
| P3 | .2 |

**SNAGS AND DOWN WOOD**
**VARIABLE 20 (VB 20)**
**03/30/00**

**Vb20 (.dbf, .db)**

Field Definitions:

HUC6 – Subwatershed, 12 character numeric code.

H6_ACRES – Area of subwatershed (HUC6) in Acres. This is a double precision data field that was calculated from the H6_Hect field. This is the most accurate "official" version of acres per Huc6.

HI_LS – Historic Year 0 Large Snags (LS) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Large Snags for Subwatershed.

HI_SS – Historic Year 0 Small Snags (SS) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Small Snags for Subwatershed.

HI_LD – Historic Year 0 Large Down Wood (LD) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

HI_SD – Historic Year 0 Small Down Wood (SD) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Small Down Wood for Subwatershed.

CUR_LS – Current Year 0 Large Snags (LS) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Large Snags for Subwatershed.

CUR_SS – Current Year 0 Small Snags (SS) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Small Snags for Subwatershed.

CUR_LD – Current Year 0 Large Down Wood (LD) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

CUR_SD – Current Year 0 Small Down Wood (SD) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Small Down Wood for Subwatershed.

X1_10_LS – X1 Year 10 Large Snags (LS) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Large Snags for Subwatershed.

X1_10_SS – X1 Year 10 Small Snags (SS) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Small Snags for Subwatershed.

X1_10_LD – X1 Year 10 Large Down Wood (LD) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

X1_10_SD – X1 Year 10 Small Down Wood (SD) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

X1_100_LS – X1 Year 100 Large Snags (LS) per acre for HUC6 (to 5 decimal places). Multiply by H6_ACRES to calculate numbers of Large Snags for Subwatershed.

X1_100_SS – X1 Year 100 Small Snags (SS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Snags for Subwatershed.

X1_100_LD – X1 Year 100 Large Down Wood (LD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

X1_100_SD – X1 Year 100 Small Down Wood (SD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Down Wood for Subwatershed.

X2_10_LS – X2 Year 10 Large Snags (LS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Large Snags for Subwatershed.

X2_10_SS – X2 Year 10 Small Snags (SS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Snags for Subwatershed.

X2_10_LD – X2 Year 10 Large Down Wood (LD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

X2_10_SD – X2 Year 10 Small Down Wood (SD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Down Wood for Subwatershed.

X2_100_LS – X2 Year 100 Large Snags (LS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Large Snags for Subwatershed.

X2_100_SS – X2 Year 100 Small Snags (SS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Snags for Subwatershed.

X2_100_LD – X2 Year 100 Large Down Wood (LD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

X2_100_SD – X2 Year 100 Small Down Wood (SD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Down Wood for Subwatershed.

X3_10_LS – X3 Year 10 Large Snags (LS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Large Snags for Subwatershed.

X3_10_SS – X3 Year 10 Small Snags (SS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Snags for Subwatershed.

X3_10_LD – X3 Year 10 Large Down Wood (LD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

X3_10_SD – X3 Year 10 Small Down Wood (SD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Down Wood for Subwatershed.

X3_100_LS – X3 Year 100 Large Snags (LS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Large Snags for Subwatershed.

X3_100_SS – X3 Year 100 Small Snags (SS) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Snags for Subwatershed.

X3_100_LD – X3 Year 100 Large Down Wood (LD) per acre for HUC6 (to 5 decimal places).

Multiply by H6_ACRES to calculate numbers of Large Down Wood for Subwatershed.

X3_100_SD – X3 Year 100 Small Down Wood (SD) per acre for HUC6 (to 5 decimal places).
Multiply by H6_ACRES to calculate numbers of Small Down Wood for Subwatershed.

**REQUIREMENTS FOR PROCESSING SNAGS AND DOWN WOOD**
**VARIABLE 20 (VB 20)**

**Process 1.0** – Assign Terrestrial Community Groups to Vegetation Data.

**Process 1.1** – Assign Terrestrial Community Groups to H2 Veg Year 0 / H6AMPH data.

**Process 1.2** – Assign Terrestrial Community Groups to S1 Veg Year 0 / H6AMPH data.
These data may be available from previous Variable work.

**Process 1.3** – Assign Terrestrial Community Groups to X1/XxVegYr / H6AMPH data.
These data may be available from previous Variable work.

**Process 2.0** – Assign Snag/Downed Wood Classes (SDW), Density Classes (DC) and Density per Hectare (D).

The possible SDW classes are:
Large Snag (Lsng)
Small Snag (Ssng)
Large Down Wood (Ldwd)
Small Down Wood (Sdwd)

The possible DC classes are:
Abundant (A)
Common ( C)
None (N)
Rare (R)
Uncommon (U)

**Process 2.1** – Assign SDW and DC to Historic Year 0 /H6AMPH/TCG data.

Use SNGDWD lookup table, with a key of PVG,HDI,TCG combinations to assign Large Snag (Lsng), Small Snag (Ssng), Large Down Wood (Ldwd), and Small Down Wood (Sdwd) classes and Density Classes (DC).

H2LsngDc = LsngHrv
H2SsngDc = SsngHrv
H2LdwdDc = LdwdHrv
H2SdwdDc = SdwdHrv

**Process 2.2** – Determine Rx assignments per /H6AMPH/TCG strata for S1yr0, X1/Xx for all years.

**Process 2.3** – Assign SDW and DC to S1yr0 , X1/Xx /H6AMPH/TCG strata for all years.

Use SNGDWD lookup table, with a key of PVG,HDI,TCG combinations to assign Large Snag (Lsng), Small Snag (Ssng), Large Down Wood (Ldwd), and Small Down Wood (Sdwd) classes.

Where Rx = A1,A2,A3,N1,N4
X1/Xx LsngDc = LsngHrv
X1/Xx SsngDc = SsngHrv

X1/Xx LdwdDc = LdwdHrv
X1/Xx SdwdDc = SdwdHrv

Where Rx = C1,N6,P1, N2, N7
X1/Xx LsngDc = LsngTrs
X1/Xx SsngDc = SsngTrs
X1/Xx LdwdDc = LdwdTrs
X1/Xx SdwdDc = SdwdTrs

Where Rx = C2,C3,N3,N5,N8,P2,P3
X1/Xx LsngDc = LsngTcm
X1/Xx SsngDc = SsngTcm
X1/Xx LdwdDc = LdwdTcm
X1/Xx SdwdDc = SdwdTcm

**Process 2.4** – Assign Density of Snags/Downed Wood to H2yr 0 , S1yr0 , X1/XxYr /H6AMPH/TCG strata for all years based on the Density Classes from Process 2.3.

The following table is in (number of snags or downed wood) / hectare. Where Density Class represents the classes contained per H6AMPH/TCG in the variables from Process 2.3 , LsngDc, SsngDc, LdwdDc, and SdwdDc.

These values represent the numeric mid-point of density within a class.

| Density Class | LsngD | SsngD | LdwdD | SdwdD |
|---|---|---|---|---|
| A | 20 | 77 | 25 | 309 |
| C | 9 | 46 | 25 | 154 |
| U | 4 | 22 | 4 | 43 |
| R | 1 | 6 | 1 | 12 |
| N | 0 | 0 | 0 | 0 |

For LsngDc assign LsngD values.
For SsngDc assign SsngD values.
For LdwdDc assign LdwdD values.
For SdwdDc assign SdwdD values.

**Process 2.5** – Calculate number of snags/downed wood per Snag Type (Dn) for H2yr0, S1yr0, X1/XxYr for all years at the H6AMPH/TCG level.

H6AMPH/TCG LsngDn = H6AMPH/TCG LsngD * H6AMPH/TCG hectares
H6AMPH/TCG SsngDn = H6AMPH/TCG SsngD * H6AMPH/TCG hectares
H6AMPH/TCG LdwdDn = H6AMPH/TCG LdwdD * H6AMPH/TCG hectares
H6AMPH/TCG SdwdDn = H6AMPH/TCG SdwdD * H6AMPH/TCG hectares

**Process 3.0** – Calculate weighted average of density (Da) Per Huc6 and per Snag Type for H2yr0, S1yr0, X1/XxYr for all years.

**NOTE:** This weighted average calculation may have to occur at various levels, one for each report type

strata since down wood is not usually reported by number but by amount per area. In the following calculations Strata can represent whatever unit is being used to report/deliver these data.

General Formula:
LsngDa = Number of LsngDn per Strata / Sum of hectares or acres per Strata.
SsngDa = Sum of SsngDn per Strata / Sum of hectares or acres per Strata.
LdwdDa = Sum of LdwdDn per Strata / Sum of hectares or acres per Strata.
SdwdDa = Sum of SdwdDn per Strata / Sum of hectares or acres per Strata.

**Process 3.1** – For Deliverable file calculate **H6Da** for Lsng,Ssng,Ldwd,Sdwd where Strata = HUC6.

**Process 3.2** – For Report Format 1 calculate **OPDa** for Lsng,Ssng,Ldwd,Sdwd where Strata = OWN/PVTGRP.

**Process 3.3** – For Report Format 2 calculate **OMPDa** for Lsng,Ssng,Ldwd,Sdwd where Strata = OWN/MRG/PVTGRP.

**Process 3.4** – For Report Format 3 calculate **OMRPDa** for Lsng,Ssng,Ldwd,Sdwd where Strata = OWN/MRG/RACPAC/PVTGRP.

**UNCHARACTERISTIC SOIL DISTURBANCES**
**VARIABLE 22 (VB 22)**
**03/30/00**

**Vb22 (.dbf, .db)**

Field Definitions:

HUC6 – Subwatershed, 12 character numeric code.

H6_HECT – Area of subwatershed (HUC6) in Hectares.

H6_ACRES – Area of subwatershed (HUC6) in Acres. These data were calculated as a double precision field from the H6_HECT value, but have been rounded to 5 decimal places due to software limitations when creating the .dbf format file. The total acres for the basin from this file will not match published acreage reports due to this rounding of values. If the double precision version of acres is necessary, multiply the H6_Hect value by 2.471054073 .

CUR_USD – Uncharacteristic Soil Disturbance Coefficient (reported to 5 decimal places) by HUC6 for Current, Year 0.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Soil Disturbance in the subwatershed.

X1_10_USD – Uncharacteristic Soil Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Soil Disturbance in the subwatershed.

X1_100_USD – Uncharacteristic Soil Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Soil Disturbance in the subwatershed.

X2_10_USD – Uncharacteristic Soil Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 10. Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Soil Disturbance in the subwatershed.

X2_100_USD – Uncharacteristic Soil Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Soil Disturbance in the subwatershed.

X3_10_USD – Uncharacteristic Soil Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 10. Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Soil Disturbance in the subwatershed.

X3_100_USD – Uncharacteristic Soil Disturbance Coefficient (reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Soil Disturbance in the subwatershed.

**Vb22cl (.dbf, .db)**

The Vb22cl file contains classifications of the Vb22 data across the basin with one value (such as L, M, H) assigned per Huc6, per theme. See each item for specific classifications. See Class Interpretations portion of this document for details of classification methods per field.

Field Definitions:

HUC6 – Subwatershed, 12 character numeric code.

CUR_USD – Uncharacteristic Soil Disturbance Classes (reported to 5 decimal places) by HUC6 for Current, Year 0.
(N = None, VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High)

X1_10_USD – Uncharacteristic Soil Disturbance Classes (reported to 5 decimal places) by HUC6 for X1, Year 10.
(N = None, VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High)

X1_100_USD – Uncharacteristic Soil Disturbance Classes (reported to 5 decimal places) by HUC6 for X1, Year 100.
(N = None, VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High)

X2_10_USD – Uncharacteristic Soil Disturbance Classes (reported to 5 decimal places) by HUC6 for X2, Year 10.
(N = None, VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High)

X2_100_USD – Uncharacteristic Soil Disturbance Classes (reported to 5 decimal places) by HUC6 for X2, Year 100.
(N = None, VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High)

X3_10_USD – Uncharacteristic Soil Disturbance Classes (reported to 5 decimal places) by HUC6 for X3, Year 10.
(N = None, VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High)

X3_100_USD – Uncharacteristic Soil Disturbance Classes (reported to 5 decimal places) by HUC6 for X3, Year 100.
(N = None, VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High)

**REQUIREMENTS FOR PROCESSING UNCHARACTERISTIC SURFACE SOIL DISTURBANCE VARIABLE 22 (VB 22)**

## Logic Overview

Uncharacteristic surface soil disturbance has effects outside of the normal range of effects that occurred in the historical (natural) system. The normal range is considered to be within the 400 year historic range of variability minimum +25% and maximum -25%. The 400 year period includes the variation that is predicted to occur within the recent and current climate without influence of Euro-American settlement influence. The historical regime accounts in general for influences of native species adaptations and soil development for the past 10-15 thousand years since the last glacial period. Some native species adaptations have evolved over the last 1-3 million years in response to changing paleo-ecological climates and disturbances.

Uncharacteristic soil surface disturbance occurs from prescribed activities that disturb vegetation, litter, and down wood cover exposing soil to erosion, or disrupt the surface soil structure, in ways differing from what occurred during the HRV. For this analysis the effects are limited to those occurring from timber harvest and prescribed fire activities that do not mimic the inherent biophysical disturbance regime. This variable does not include soil surface disturbance related to roads as roads are considered an altered type of biophysical site and thus are dealt with as a separate variable. Soil surface disturbance effects of uncharacteristic wildfire and uncharacteristic livestock grazing are acute or chronic effects respectively and require different modeling procedures. Thus they are addressed in separate variables. Uncharacteristic surface soil disturbance vulnerability also varies depending on potential vegetation group (PVG), terrestrial community group (TCG), and cumulative departure in the biophysical disturbance regime.

## Processing

The following process should be used to create the Uncharacteristic Soil Disturbance variable by Alternative and Year.

**Process 1.0** – Assign Terrestrial Community Groups to Vegetation Data.

**Process 1.1** – Assign Terrestrial Community Groups to S1 Veg Year 0 / H6AMPH data.
These data may be available from previous Variable work.

**Process 1.2** – Assign Terrestrial Community Groups to X1/XxVegYr / H6AMPH data.
These data may be available from previous Variable work.

**Process 2.0** – Assign and Calculate H6AMPH Weighted Usoild_b Coefficient.

**Process 2.1 –** Assign Usoild_b coefficient to H6AMPH/TCG strata for X1/Xx Yrs.

Use Usoils lookup table (PVG/HDI/TCG combinations as key).

***** re-run from this point (5/7/99)**

**Process 2.2** – Create Usoild_b_w and Usoild_a_w coefficients (Usoild_b and Usoild_a rolled up to H6AMPH rather than H6AMPH/TCG).

[Sum of (H6amph/TCG Usoild_b * H6amph/TCG area )per H6amph] / H6amph area = Usoild_b_w

These Usoild_b_w and Usoild_a_w coefficients give the appropriate soil disturbance when multiplied by H6AMPH area.

**Process 3.0** – Determine Rx Assignments per H6AMPH/TCG per X1/XxVegYr.

Use Rxx1v3 file to assign Rx to X1/Xx Veg Yr based on H6AMP combinations. Output files need to be at H6AMPH level.

**Process 4.0** – Calculate ( H6AMPHUSD ) Uncharacteristic Soil Surface Disturbance value. Note that this process requires output files from Variable #11/13 and Variable #9 as input as well as the RxSim lookup table.

**Note**: look up table values in Usoild_b have changed (5/7/99) so need to rerun process 2.2

Formula:
H6AMPHUSD = ( Usoild_b * 0.75 ) + ( NetPrs * Usoild_a * (1.0 - RxSim) ) + ( (Hrv + Thn) * Usoild_a * (1.3 - RxSim) ) + ( NetPnf * Usoild_a )

**Logic**:
1) Usoild_b is the amount of soil disturbance from agricultural and urban land uses. Multiply by .75 for soil conservation practices.
2) Usoild_a is the amount of soil disturbance if an area is burned or harvested as mitigated by the prescription.
3) Prescribed natural fire is not mitigated by the prescription, only by the fuels and burning conditions.
4) Removed from equation because of inconsistency of Exotics data. Exotics are not mitigated by the prescription, but provide some soil cover so are multiplied by .8

**Process 5.0** – Calculate H6 Uncharacteristic Soil Disturbance (USD) per X1/Xx Veg Yr.

H6 USD = [ Sum of (H6amph USD * H6amph area) per H6 ] / H6 area

**Look Up Tables**

**1. Intermediate Surface Soil Disturbance (Iusoild) Soil Look Up Table (SOL_v22b.XLS)**
Look Up Table Variables
PVG - potential vegetation group.
HDI - historical disturbance intensity regime.
TCG - terrestrial community group.
DIR - disturbance intensity regime for no action (X1) and action (Xx) alternatives all years.
Usoild_b -the amount of soil disturbance from agricultural and urban land uses.
Usoild_a - the amount of soil disturbance if an area is burned or harvested as mitigated by the prescription.

**2. Prescription Management Similarity to HRV Look Up Table**
**Logic:** This is a factor that accounts for the emphasis of the management prescription in attempting to mimic historical range of variability (HRV). HRV in this context includes all biological and physical components of the historical or native system: 1) effects of anthropogenic native Americans; 2) the diversity of native aquatic and terrestrial species and their habitats; 3) vegetation composition/structure and landscape mosaic patterns; 4) succession/disturbance regime patterns; 5) hydrologic channel, sedimentation, and flow regimes; 6) soil development and erosion regimes.

| Rx | RxSim |
|---|---|
| A1 | .95 |
| A2 | .75 |
| A3 | .8 |

| Rx | RxSim |
|---|---|
| C1 | .7 |
| C2 | .4 |
| C3 | .3 |
| N1 | .9 |
| N2 | .6 |
| N3 | .5 |
| N4 | .7 |
| N5 | .6 |
| N6 | .75 |
| N7 | .6 |
| N8 | .5 |
| P1 | .65 |
| P2 | .3 |
| P3 | .2 |

**CLASS INTERPRETATIONS -UNCHARACTERISTIC SOIL DISTURBANCE DEFINITION AND CLASSIFICATION**
**Variable 22 (VB 22)**

For modeling purposes it may be necessary to classify the weighted average coefficients in the deliverable dbf files. The following suggestions are provided for determining class breaks for each coefficient for this particular variable.

**Variable 22 - Time Period Definitions**

**Current (CUR)** - Current time period generally reflects the current year (1999) plus or minus 5 years (i.e. 1994 - 2004). Developed from data and models using administrative unit data from the past 10 years as one input. Reflects the disturbance from 1988 to 1997 (10 year average) .

**Future Decade (10)** - Short-term future, projected 10 years into the future (2009) from the current year (1999) plus or minus 5 years (i.e. 2004-2014). Developed from data and models using the slope from the 10 year administrative unit data and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives..

**Long-term (100)** - Long-term future, projected as an average of the 10 future decade projections from the current year.. The average over this period represents average conditions over the total 100 year period. Developed from data and models using the current year as the starting point and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives.

**Uncharacteristic Soil Disturbance, Variable 22, Planned Disturbance**
Subwatershed current year statistics:
Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: **j-shape with long tail and spike**
Notes on 10 year and 100 year distribution: class breaks set at points in the distribution that are generally associated with severity of soil surface disturbance effects**. N, VL, L, M, H, and VH classes set using current distribution so that S1, S2 and S3 futures will be relative.**

**Definition**: annual area coefficient for relative probability of prescribed activities (timber harvest, prescribed fire, prescribed natural fire, agriculture) that can cause potential surface soil disturbance and a lack of vegetation/litter cover that could result in uncharacteristic soil disturbance effects within the subwatershed. Occurrence of actual soil surface disturbance and erosion is dependent on the combination of this type of soil disturbance with sensitive soil and watershed type conditions and the associated cumulative effects over time. In order to determine actual risk of soil disturbance effects these effects could be combined with a soil type and watershed type sensitivity variable and the cumulative effects summed through time in a ratio with recovery rate.

These soil disturbance effects purposely exclude soil disturbance effects caused by roads, uncharacteristic wildfire or livestock grazing since they are predicted in other variables (H6Rds, UWF, ULG). Current levels of uncharacteristic soil disturbance are based on administrative unit 10 year average (1988-1997) of planned activities as one input and correlation of broad-scale proxy variables with plot data ground cover and surface soil disturbance summaries.

Uncharacteristic soil disturbance effects have a probability of causing a change of more than 20% dissimilarity compared to native (historical) effects of disturbance to soil vegetation/litter cover and surface characteristics. These effects are outside the normal range of the historical (natural) system. The normal range is considered to be within the 400 year historic range of variability minimum + 25% and maximum - 25%. Uncharacteristic effects of these types could reduce vegetation/litter cover, root binding capability, and increase probability of erosion, compaction and stream bank erosion/failure. The use of management prescriptions as an input accounts for general differences in effects resulting from use of low impact harvest techniques and prescribed fire techniques that attempt to mimic effects of native (natural) disturbance.

The cumulative effects of surface soil disturbance over time vary depending on frequency and intensity of impact. For this broad-scale variable the breakpoints for classes were applied at levels that generally correlate with frequencies of soil surface disturbance in relation to general recovery rates.

**Classification method**: j-shape distribution with long tail and spike split into classes of low, moderate, high, and very high, excluding the zeros (none class).

| Class | Low | High | Interpretation |
|---|---|---|---|
| None | 0 | .0000000001 | Almost no probability of uncharacteristic soil disturbance in the subwatershed. Spatial distribution is rare in current. |
| Very Low | .0000000002 | < .005 | Very Low probability of uncharacteristic soil disturbance in the subwatershed - It is unlikely that this level of soil disturbance would cause extensive cumulative effects. Recovery rates would usually return soil surface to normal conditions in a relatively short time, except where woodland encroachment is the causal effect. This class is generally associated with infrequent, low impact effects resulting from prescribed fire or prescribed natural fire, or from soil erosion in low to moderate woodland encroachment types that shade out understory plant cover. Primarily correlated with the cold forest, moist forest, cool shrub, and dry shrub PVGs in current. |
| Low | >= .005 | < .095 | Low probability of uncharacteristic soil disturbance in the subwatershed - It is unlikely that this level of soil disturbance would cause extensive cumulative effects. Recovery rates would usually return soil surface to normal conditions in a relatively short time, except where woodland encroachment is the causal effect. This class is generally associated with the moderate, but infrequent impact effects resulting from the combination of prescribed fire and timber harvest, or from soil erosion in moderate to high woodland encroachment types that shade out understory plant cover. Primarily correlated with the dry forest, moist forest, cool shrub, and the dry shrub PVGs in current. |

| Class | Low | High | Interpretation |
|---|---|---|---|
| Moderate | >= .095 | < .245 | Moderate probability of uncharacteristic soil disturbance effects in the subwatershed - It is likely that this level of soil disturbance would cause cumulative effects. Recovery rates in high impact areas may not return soil surface to normal conditions before the next prescribed activity that causes soil disturbance. This class is generally associated with moderate to high and frequent to infrequent impact effects resulting from the combination of prescribed fire and traditional timber harvest techniques, or from extensive soil erosion in high woodland encroachment types that shade out understory plant cover. Some of these subwatersheds contain small areas of agriculture cultivation that result in annual soil surface disturbance. Primarily correlated with the dry forest, moist forest, cool shrub, and the dry shrub PVGs in current. |
| High | >= .245 | > .495 | High probability of extensive uncharacteristic soil disturbance effects in the subwatershed - It is likely that this level of soil disturbance would cause extensive cumulative effects. Recovery rates in high impact areas would not return soil surface to normal conditions before the next prescribed activity that causes soil disturbance. This class is generally associated with frequent, moderate to high impact effects of traditional timber harvest techniques mixed with effects of agricultural cultivation and rural or urban activities. These subwatersheds often are located on the periphery of agricultural and urban subwatersheds and have connected effects. Primarily correlated with the dry forest, agriculture, and urban PVGs in current. |
| Very High | > .495 | 1.0 | Very High probability of extensive uncharacteristic soil disturbance in the subwatershed - Spatial distribution highly correlated with a history of agricultural tillage and urbanization with some timber harvest. Primarily correlated with agriculture and urban PVGs in current. |

**LONG-TERM TRENDS IN COMPOSITE ECOLOGICAL INTEGRITY**
**VARIABLE 24 (VB 24)**
**03/30/00**

**Vb24 (.dbf, .db)**

Field Defintions :

HUC4 -- Subbasin, 8 character numeric code.

SUBBAS_NM -- Up to 40 characters, Name of Subbasin.

X1_100_HRV -- Historical Range of Variability Departure Trend by subbasin (huc4) for X1, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X2_100_HRV -- Historical Range of Variability Departure Trend by subbasin (huc4) for X2, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X3_100_HRV -- Historical Range of Variability Departure Trend by subbasin (huc4) for X3, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X1_100_RD -- Road Density Trend by subbasin (huc4) for X1, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X2_100_RD -- Road Density Trend by subbasin (huc4) for X2, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X3_100_RD -- Road Density Trend by subbasin (huc4) for X3, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X1_100_AQH -- Aquatic Habitat Trend by subbasin (huc4) for X1, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X2_100_AQH -- Aquatic Habitat Trend by subbasin (huc4) for X2, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X3_100_AQH -- Aquatic Habitat Trend by subbasin (huc4) for X3, Year 100
(-1 = decreasing, 0 = stable, +1 = increasing)

X1_100_CEI -- Composite Ecological Integrity by subbasin (huc4) for X1, Year 100
(AQH - (RD + HRV))
Possible range of -3 to +3 (Actual range may be a subset of the possible range)
0 = No change in ecological integrity
+1 to +3 = increase in ecological integrity with +3 being the highest value of ecological integrity,
-1 to -3 = decline in ecological integrity with -3 being the lowest value of ecological integrity

X2_100_CEI -- Composite Ecological Integrity by subbasin (huc4) for X2, Year 100
(AQH - (RD + HRV))
Possible range of -3 to +3 (Actual range may be a subset of the possible range)
0 = No change in ecological integrity
+1 to +3 = increase in ecological integrity with +3 being the highest value of ecological integrity,
-1 to -3 = decline in ecological integrity with -3 being the lowest value of ecological integrity

X3_100_CEI -- Composite Ecological Integrity by subbasin (huc4) for X3, Year 100
(AQH - (RD + HRV))
Possible range of -3 to +3 (Actual range may be a subset of the possible range)
0 = No change in ecological integrity
+1 to +3 = increase in ecological integrity with +3 being the highest value of ecological integrity,
-1 to -3 = decline in ecological integrity with -3 being the lowest value of ecological integrity

**PROCESS REQUIREMENTS FOR LONG-TERM TRENDS IN COMPOSITE ECOLOGICAL INTEGRITY VARIABLE 24 (VB 24)**

Variable 24 - Trends in Ecological Integrity Compared to Current

**Process 1.0** – 6HUC Long-term Ecological Integrity Trend Input Variables
Input: XxX100H6HrvDep, XxX0H6HrvDep
XxX100H6RoadDenTrendClass
XxX100H6AqHab

**Process 1.1 --** Calculate and Classify Trend for HrvDep

**Logic:** HrvDep is a proxy for the ecological integrity components of terrestrial vegetation, disturbance regime, and landscape mosaic.

**XxLtH6HrvDepTrend = (XxX100H6HrvDep - XxX0H6HrvDep) / XxX100H6HrvDep**
Increase (I) >= .10
Decrease (D) <= - .10
Stable (S) < .10, > - .10

**Process 1.2 --** Trend classes for Road Density
**Logic:** Trends in road density are a proxy for trend of non-aquatic/hydrologic negative road effects.

Road density trends were calculated differently because unique road density trends were not assigned to the 6th huc. Rather all three trends were found in many of the subwatersheds. To obtain one value per huc, a weighted average method was adopted.

**Process 1.2.1 --** Area in each trend class was calculated by multiplying the coefficients by the total area of the huc. So the area for any trend in Alternative S1, year 100 would be calculated by multiplying x1_100_fct by h6_acres (or h6_hect),
**x1_100_fct * h6_acres**

**Process 1.2.2 --** The percentage of area in each trend was then calculated by dividing its area by the total area of the huc6. The values for decreasing trends were all assigned a negative sign.

**Process 1.2.3 --** The percentages for the Increasing and Decreasing trends were then added up to get the road density trend coefficient per huc6. The processes 1.2.1 through 1.2.3 were repeated for year 100 for all the other alternatives.

**Process 1.2.4 --** All the road density trend coefficients were classified into trends by using the following class breaks:
Increase (I) >= .20
Decrease (D) <= - .20
Stable (S) < .20, > - .20

**Process 1.3 --** Process Aquatic Habitat Condition
**Logic:** Aquatic habitat condition provides the most appropriate general trend proxy for aquatic, riparian, hydrologic, and associated biotic conditions. The values for 6HUC aquatic habitat condition are the 100 year outcomes divided by the current year.

Input:

X1Habsum.dbf
X2Habsum.dbf
X3Habsum.dbf
Second to the last field of the file contains “RATIO100"; this is the ratio of the 100 year aquatic habitat condition divided by the current aquatic habitat condition for the alternative.

Extract from the 3 files the fields containing 6HUC, X1RATIO100, X2RATIO100, X3RATIO100;
Rename each field to create one file called Ahabtr100 with format of:
6HUC, X1Ahabcon100, X2Ahabcon100, X3Ahabcon100

Classify the values according to the following rule set and assign trend classes to three variables called X1Ahabtr100, X2Ahabtr100, X3Ahabtr100:

Increase (I) > 1.2
Decrease (D) < 1.0
Stable (S) >= 1.0, <= 1.2,

Note: All the records that are within the ICBEMP management region and fall in MCLSS 6 (National Park Service lands) are assigned a stable trend (0).

**QC Maps and summary of area by class**

**Process 2.0 --** 4HUC HrvDep, Road Density, and Aquatic Habitat Condition Trend
(Each H4 value should be >= - 1, <= + 1)

**Process 2.1 --** Calculate weighted average of the HRV Trends for huc4. 4HUC HrvDep Trend, Road Density Trend, and Aquatic Habitat Condition Trend
Calculate HrvDepTr, RoadDenTr, and AquaTr weighted average 4HUC value

**H4HrvDepWtAve = Sum (H6HrvDep * H6Area/H4Area)**

Calculate HRV Departure Trends by huc4 using the following break points:
Increase (I > 0.34
Decrease (D) < -0.30
Stable (S) <= 0.34, >= -0.30

Assign Numeric Class to Trend Classes
I = +1
D = -1
S = 0

**Process 2.2 --** Calculate Huc4 Trends for Road Density
**H4RdWtAve = Sum (H6RdTrend * H6Area / H4 Area)**

Calculate Road Density Trends by huc4 using the following break points:
Increase (I) >= .20
Decrease (D) <= - .20
Stable (S) < .20, > - .20

**Process 2.3 --** Calculate Huc4 Trends for Aquatic Habitat
**H4AqHabWtAve = Sum (H6AqHabTrend * H6Area / H4 Area)**

Calculate Aquatic Habitat Trends by huc4 using the following break points:

Increase (I) >= .20
Decrease (D) <= - .20
Stable (S) < .20, > - .20

Assign Numeric Class to Trend Classes
I = +1
D = -1
S = 0

**Process 3.0 --** Calculate Ecological Integrity by huc4 using the following formula:

**4HUC Ecological Integrity Sum = (EcoIntAquaHabTr - EcoIntHrvDepTr - EcoIntRoadDenTr)**

Each 4HUC will have a -1, +1, or 0 for each of the three variables. The ecological integrity sum variable will range between -3 and + 3 for each 4HUC.

**UNCHARACTERISTIC INSECT/DISEASE TREE MORTALITY INDEX BY HUC6**
**VARIABLE 29 (VB 29)**
**05/17/00**

**Vb29 (.dbf, .db)**

Field Definitions

HUC6 -- Subwatershed, 12 character numeric code.

H6_HECT – Area of subwatershed (HUC6) in Hectares.

H6_ACRES – Area of subwatershed (HUC6) in Acres. These data were calculated as a double precision field from the H6_HECT value, but have been rounded to 5 decimal places due to software limitations when creating the .dbf format file. The total acres for the basin from this file will not match published acreage reports due to this rounding of values. If the double precision version of acres is necessary, multiply the H6_Hect value by 2.471054073 .

CUR_ID – Uncharacteristic Insect/Disease Tree Mortality Index (coefficient reported to 5 decimal places) by HUC6 for Current, Year 0.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Insect and Disease Tree Mortality in the subwatershed.

X1_10_ID – Uncharacteristic Insect/Disease Tree Mortality Index (coefficient reported to 5 decimal places) by HUC6 for X1, Year 10.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Insect and Disease Tree Mortality in the subwatershed.

X1_100_ID – Uncharacteristic Insect/Disease Tree Mortality Index (coefficient reported to 5 decimal places) by HUC6 for X1, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Insect and Disease Tree Mortality in the subwatershed.

X2_10_ID – Uncharacteristic Insect/Disease Tree Mortality Index (coefficient reported to 5 decimal places) by HUC6 for X2, Year 10.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Insect and Disease Tree Mortality in the subwatershed.

X2_100_ID – Uncharacteristic Insect/Disease Tree Mortality Index (coefficient reported to 5 decimal places) by HUC6 for X2, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Insect and Disease Tree Mortality in the subwatershed.

X3_10_ID – Uncharacteristic Insect/Disease Tree Mortality Index (coefficient reported to 5 decimal places) by HUC6 for X3, Year 10.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Insect and Disease Tree Mortality in the subwatershed.

X3_100_ID – Uncharacteristic Insect/Disease Tree Mortality Index (coefficient reported to 5 decimal places) by HUC6 for X3, Year 100.
Multiply by H6_HECT or H6_ACRES to get area (hectares or acres) of Uncharacteristic Insect and Disease Tree Mortality in the subwatershed.

**Vb29cl (.dbf, .db)**

The Vb29cl file contains classifications of the Vb29 data across the basin with one value (such as L, M, H) assigned per Huc6, per theme. See each item for specific classifications. See Class Interpretations portion of this document for details of classification methods per field.

Field Definitions

HUC6 – Subwatershed, 12 character numeric code.

CUR_ID – Uncharacteristic Insect/Disease Tree Mortality Index Classes by HUC6 for Current, Year 0.
(VL = Very Low, N = None, L = Low, M = Moderate, H = High)

X1_10_ID – Uncharacteristic Insect/Disease Tree Mortality Index Classes by HUC6 for X1, Year 10.
(VL = Very Low, N = None, L = Low, M = Moderate, H = High)

X1_100_ID – Uncharacteristic Insect/Disease Tree Mortality Index Classes by HUC6 for X1, Year 100.
(VL = Very Low, N = None, L = Low, M = Moderate, H = High)

X2_10_ID – Uncharacteristic Insect/Disease Tree Mortality Index Classes by HUC6 for X2, Year 10.
(VL = Very Low, N = None, L = Low, M = Moderate, H = High)

X2_100_ID – Uncharacteristic Insect/Disease Tree Mortality Index Classes by HUC6 for X2, Year 100.
(VL = Very Low, N = None, L = Low, M = Moderate, H = High)

X3_10_ID – Uncharacteristic Insect/Disease Tree Mortality Index Classes by HUC6 for X3, Year 10.
(VL = Very Low, N = None, L = Low, M = Moderate, H = High)

X3_100_ID – Uncharacteristic Insect/Disease Tree Mortality Index Classes by HUC6 for X3, Year 100.
(VL = Very Low, N = None, L = Low, M = Moderate, H = High)

**REQUIREMENTS FOR PROCESSING UNCHARACTERISTIC INSECT/DISEASE TREE MORTALITY INDEX VARIABLE 29 (VB 29)**

## Logic Overview

Uncharacteristic insect/disease tree mortality has effects outside of the normal range of effects that occurred in the historical (natural) system. The normal range is considered to be within the 400 year historic range of variability minimum +25% and maximum -25%. The 400 year period includes the variation that is predicted to occur within the recent and current climate without influence of Euro-American settlement influence. The historical regime accounts in general for influences of native species adaptations and soil development for the past 10-15 thousand years since the last glacial period. Some native species adaptations have evolved over the last 1-3 million years in response to changing paleo-ecological climates and disturbances.

Amount of insect and disease tree mortality are affected by several variables: 1) differences in tree species composition, structure, and density that are more or less vulnerable to insect and disease attack; 2) differences in associated biotic and environmental composition; and 3) interactions with other landscape scale disturbances (e.g. fire, timber harvest and thinning, mechanical disturbance, windthrow).

Insect and disease tree mortality can have combined effects: 1) cause mortality to vulnerable tree species and size classes thus disturbing the community and causing change to another community dominated by less vulnerable tree species or shrubs/herbs with higher standing or down woody fuel accumulation; and 2) reversing succession (retrogression) to an earlier stage dominated by shrubs or herbs.

The uncharacteristic insect/disease tree mortality index is based on a combination of PVTGRP, HDI and Terrestrial Community groups.

## Processing

The following process should be used to create the Uncharacteristic Insect/Disease Tree Mortality Probability variable by Alternative and Year.

**Logic:** Calculated value will be a probability of departure from the characteristic historical insect/disease tree mortality regime. This will be based on relationships to changes from the historical disturbance regime, the terrestrial community group, and management prescription for the potential vegetation group.

The calculated Uidtm values are a probability of uncharacteristic insect/disease tree mortality levels.

**Process 1.0** -- Intermediate Uncharacteristic Insect / Disease Tree Mortality Probability (IUIDTM) to H6AMPH strata using the UIDTM lookup table.

**Process 1.1** -- Assign Intermediate Uncharacteristic Insect / Disease Tree Mortality Probability (IUIDTM) to Current Yr 0 / H6AMPH.

**Process 1.2** -- Assign Intermediate Uncharacteristic Insect / Disease Tree Mortality Probability (IUIDTM) to X1/Xx Yr / H6AMPH.

**Process 2.0** -- Calculate Uncharacteristic Insect / Disease Tree Mortality Probability (UIDTM) for X1/Xx Yr by H6AMPH using the Prescription Management Similarity to HRV lookup table (RxSIM.DBF).

**Logic:** The look up table probabilities for Iuistm take into account change in PVG as a result of introduced blister rust in the moist and cold PVGs and changes in tree and community composition and structure that effect vulnerability to insect/disease tree mortality. The prescription similarity accounts for landscape mosaic conditions that affect contagion processes of insect and disease spread.

**Process 2.1** -- Calculate Uncharacteristic Insect / Disease Tree Mortality Probability for X1/Xx Veg Yrs 0, 10, 100 by H6AMPH.

If IUIDTM > 0 Then,
X1Xx_Yr_UIDTM = X1Xx_Yr_IUIDTM * ( 1 + ( 1 - RxSIM))

If X1Xx_Yr_UIDTM > 1.0 set = to 1.0

**Process 2.2** -- Adjust Yr 100 for Cumulative Insect / Disease Probability.

Calculate Final Uncharacteristic Insect / Disease Tree Mortality Probability for X1/Xx Veg Yr 100 by H6AMPH

Final X1Xx100UIDTM = X1Xx100UIDTM + ((1-RxDistLt) * X1Xx100UIDTM)
If X1Xx_100_UIDTM > 1.0 set = to 1.0

**Logic:** CRBSUM provides a vegetation composition that is stratified by cover type and structural stage. This composition is based on the outcomes of succession and disturbance. The insect and disease mortality was projected from this vegetation composition. However, the general composition of cover types and structural stages as combined into terrestrial community groups does not provide a reflection of the long-term cumulative effects of 2 factors:

1) the increasing probability of insect/disease tree mortality in response to increasing changes to a more vulnerable tree species composition within the same cover type/structural stage, as well as increasing continuity of those vulnerable conditions; combined with

2) the increasing probability of attack in areas where insect/disease tree mortality has not occurred.

The most sensitive variable for adjusting the 100 year uncharacteristic insect/disease tree mortality index at the H6Amph strata scale is a departure from the management prescription similarity in disturbance amounts to the biophysical disturbance regime (RxDistLt). This is highly correlated (but different) with the departure from the similarity of the management prescription to the historical range of variability for landscape mosaics (1 - RxSim). The use of this variable in the formula adds to the amount of gross area insect/disease disturbance. Since the average insect/disease probability ranges between 0 and .05, and the maximum amount of change because of this adjustment would be less than a .5 multiplier of CRBSUM projected insect/disease probability, the predicted vegetation composition would be similar. This adjustment will improve the prediction of the gross amount of insect/disease tree mortality at the 100 year period.

**Look Up Tables**

1. Look Up Table for No Action and Action Assignment of Insect/Disease Uncharacteristic Tree Mortality Probability (Iuidtm).

<u>Look Up Table Variables</u>

PVG = potential vegetation group.

HDI = historical disturbance intensity regime.

TCG = terrestrial community group.

DIR = disturbance intensity regime for no action (X1) and action (x) alternatives all years.

Iuidtm = intermediate uncharacteristic tree mortality probability.

**To use table**:

If PVG = x and HDI = x and TCG = x and X1XxYxDI = x, then X1XxYxIuidtm = x

**2. Departure from management prescription similarity in disturbance amounts to the biophysical disturbance regimes look up table (RxDistLt).**

| Rx | RxSim | RxDistLt |
|---|---|---|
| A1 | .95 | 1.0 |
| A2 | .75 | .95 |
| A3 | .8 | 1.0 |
| C1 | .7 | .80 |
| C2 | .4 | .70 |
| C3 | .3 | .75 |
| N1 | .9 | .90 |
| N2 | .6 | .70 |
| N3 | .5 | .70 |
| N4 | .7 | .90 |
| N5 | .6 | .75 |
| N6 | .75 | .80 |
| N7 | .6 | .70 |
| N8 | .5 | .70 |
| P1 | .65 | .50 |
| P2 | .3 | .50 |
| P3 | .2 | .75 |

**Input Files**
H6AMPH grid.
HDI lookup table.
Uncharacteristic Insect/Disease Tree Mortality Probability lookup table.
S1Vg0.
X1XxH6AMPH.
TCG lookup table.
PVG lookup table.
Prescription Management Similarity to HRV lookup table (same as for HRVDep).
Departure from management prescription similarity in disturbance amounts to the biophysical disturbance regimes look up table (RxDistLt).

**CLASS INTERPRETATIONS -UNCHARACTERISTIC FOREST INSECT AND DISEASE DISTURBANCE DEFINITION AND CLASSIFICATION**
**Variable 29 (VB 29)**

For modeling purposes it may be necessary to classify the weighted average coefficients in the deliverable dbf files. The following suggestions are provided for determining class breaks for each coefficient for this particular variable.

**Variable 29 - Time Period Definitions**

Current (CUR) - Current time period generally reflects the current year (1999) plus or minus five years (i.e., 1994 - 2004). Developed from data and models using administrative unit data from the past 10 years as one input. Reflects the disturbance from 1988 to 1997 (10-year average).

Future Decade (10) - Short-term future, projected 10 years into the future (2009) from the current year (1999) plus or minus five years (i.e., 2004-2014). Developed from data and models using the slope from the 10-year administrative unit data and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives.

Long-term (100) - Long-term future, projected as an average of the 10 future decade projections from the current year. The average over this period represents average conditions over the total 100-year period. Developed from data and models using the current year as the starting point and probabilities of activity and disturbance occurrence that are associated with the mapping of different management prescriptions to reflect the alternatives.

**Uncharacteristic Forest Insects and Disease Disturbance, Variable 29, Unplanned Disturbance**
Subwatershed current year statistics:
Average current year non-zero values:
Standard deviation current year non-zero values:
Minimum current year non-zero values:
Maximum current year non-zero values:
Number current year zeros:
Current year distribution shape: j-shape with tail
Notes on 10-year and 100-year distribution: class breaks set at points in the distribution that are generally associated with severity of forest insect and disease disturbance effects**. N, VL, L, M, and H classes set using current distribution so that S1, S2 and S3 futures will be relative.**

Definition: annual area coefficient for relative probability of forest tree vulnerability to insects and diseases that can cause uncharacteristic mortality within the subwatershed.

Current levels of uncharacteristic forest insect and disease disturbance are based on administrative unit 10-year average (1988 to 1997) of disturbance activities as one input and correlation of broad-scale proxy variables with plot level data on insect and disease effects.

Uncharacteristic forest insect and disease effects have a probability of causing a change of more than 20 percent dissimilarity compared to native (historical) effects of forest insect and disease disturbance to. These effects are outside the normal range of the historical (natural) system. The normal range is considered to be within the 400-year historic range of variability minimum plus 25 percent and maximum minus 25 percent. Uncharacteristic effects of these types could result in extensive tree mortality or stress. The use of management prescriptions as an input accounts for general differences in effects resulting from interactions with other disturbances, such as fire, and management activities, such as thinning and timber harvest.

The cumulative effects of forest insect and disease disturbance over time vary depending on frequency and intensity of infestations and epidemics. For this broad-scale variable the breakpoints for classes were applied at levels that generally correlate with the cumulative effects of frequency and severity of forest insect and disease effects.

**Classification method:** j-shape distribution with long tail and spike split into classes of very low, low, moderate, and high excluding the zeros (none class).

| Class | Low | High | Interpretation |
|---|---|---|---|
| None | 0 | .0000000001 | Almost no probability of uncharacteristic forest insect and disease effects in the subwatershed. Spatial distribution is correlated with non-forest/woodland areas in current. |
| Very Low | .0000000002 | < .095 | Very Low probability of uncharacteristic forest insect and disease in the subwatershed - This class is generally associated with infrequent, low mortality effects resulting from scattered individual tree or small patch attacks. Primarily correlated with the savannah forests or woodlands in the dry forest or woodland PVGs in current. |
| Low | >= .095 | < .285 | Low probability of concentrated uncharacteristic forest insect and disease in the future decade in the subwatershed. High probability that substantial mortality has already occurred. - This class is generally associated with frequent mortality to remaining susceptible live individual trees or small patches. Many susceptible trees have already been attacked and died over the past decades. Primarily correlated with the dry forest and dry end of the moist forest and encroachment on rangelands in the current. |
| Moderate | >= .285 | < .495 | Moderate probability of uncharacteristic forest insect and disease in the future decade in the subwatershed. High probability that some mortality has already occurred. - This class is generally associated with frequent, extensive mortality to susceptible live individual trees with some large patches. Some susceptible trees have already been attacked and died over the past decades. Primarily correlated with the moist end of the dry forest, the moist forest, and the warmer end of the cold forest in the current. |
| High | >= .495 | | High probability of future epidemics of extensive uncharacteristic forest insect and disease in the future decades in the subwatershed. This class is generally associated with infrequent, but extensive mortality to susceptible live individual trees that expand into large patches. Some susceptible trees or patches have already been attacked and died over the past decades. Primarily correlated with the moist and cold forest PVGs in the current. |

**TRENDS IN LANDSCAPE HEALTH**
**VARIABLE 31 (VB 31)**
**03/30/00**

**Vb31 (.dbf, .db)**

**Field Definitions:**

HUC6 -- Subwatershed, 12 character numeric code.

H6_HECT Area of subwatershed (HUC6) in Hectares.

H6_ACRES -- Area of subwatershed (HUC6) in Acres. These data were calculated as a double precision field from the H6_HECT value, but have been rounded to 5 decimal places due to software limitations when creating the .dbf format file. The total acres for the basin from this file will not match published acreage reports due to this rounding of values. If the double precision version of acres is necessary, multiply the H6_Hect value by 2.471054073 .

X1_LNDHLTH -- Landscape Health Trend Classifications for X1, Year 100
(Increasing = +1, Decreasing = -1, Stable = 0)

X2_LNDHLTH -- Landscape Health Trend Classifications for X2, Year 100
(Increasing = +1, Decreasing = -1, Stable = 0)

X3_LNDHLTH -- Landscape Health Trend Classifications for X3, Year 100
(Increasing = +1, Decreasing = -1, Stable = 0)

**TRENDS IN LANDSCAPE HEALTH**
**VARIABLE 31 (VB 31)**

## 1.0 Input -- 6HUC Trend Variables from Long-term Ecological Integrity Variables

Input:
Xx100H6HrvDepTrend
Xx100H6RoadDenTrend
Xx100H6AquHabTrend
Classes of Increase (I = +1), Decrease (D = - 1), and Stable (S = 0)

## 1.1 Process -- 6HUC Long-term Land Use Activity and Restoration Trend Variable

Input: Year 0 and 100 values for:
XxYrH6AUM
XxYrH6RST
XxYrH6FMA
XxYrH6PRS
XxYrH6PNF

Xx100H6AumRatio = 100H6AUM / 0H6AUM

if 0AUM = 0 then set Xx100H6AumRatio = 0

Xx100H6OtherRatio = (100H6RST + 100H6FMA + 100H6PRS + 100H6PNF) /
(0H6RST + 0H6FMA + 0H6PRS + 0H6PNF)

if (0H6RST + 0H6FMA + 0H6PRS + 0H6PNF) = 0 then set Xx100H6OtherRatio = 0

Xx100H6LandActRatio = ( Xx100H6AumRatio + ( 4 * Xx100H6OtherRatio ) ) / 5

Where (0AUM + 0RST + 0FMA + 0PRS + 0PNF) = 0 exclude from calculation

If (100AUM + 100RST + 100FMA + 100PRS + 100PNF) > 0
Then Xx100H6LandActTrend = +1 (I)
Else = 0 (S)

Where (0AUM + 0RST + 0FMA + 0PRS + 0PNF) > 0 Calculate Xx100H6LandActTrend

Assign Land Use Activity Trends using the following breakpoints:

If Xx100H6LandActRatio <= 0.9 then Xx100H6LandActTrend = -1 (decreasing trend)

If Xx100H6LandActRatio > 0.9 and Xx100H6LandActRatio < 1.10
then Xx100H6LandActTrend = 0 (stable trend)

If Xx100H6LandActRatio >= 1.10 then Xx100H6LandActTrend = 1 (increasing trend)

## 1.2 Process -- 6HUC Long-term RxFit Trend Variable

Input: XxH6AmphRx
Assign RxFit Value from Lookup Table

**Logic**: This value indexes from 0 to 1.0 how well the management prescription under each alternative, based on integration of the theme, objectives, and standards, achieves the best fit of land use and restoration activities with the definition of landscape health (Hann and others 1997).

| **Rx** | **RxSim** | **Alternative 1 RxFit (.5*RxSim)** | **Alternative 2 RxFit (.95*RxSim)** | **Alternative 3 RxFit (.8*RxSim)** |
|---|---|---|---|---|
| A1 | .95 | .48 | .90 | .76 |
| A2 | .75 | .38 | .71 | .60 |
| A3 | .8 | .40 | .76 | .64 |
| C1 | .7 | .35 | .67 | .56 |
| C2 | .4 | .20 | .38 | .32 |
| C3 | .3 | .15 | .29 | .24 |
| N1 | .9 | .45 | .86 | .72 |
| N2 | .6 | .30 | .57 | .48 |
| N3 | .5 | .25 | .48 | .40 |
| N4 | .7 | .35 | .67 | .56 |
| N5 | .6 | .30 | .57 | .48 |
| N6 | .75 | .33 | .71 | .60 |
| N7 | .6 | .30 | .57 | .48 |
| N8 | .5 | .25 | .48 | .40 |
| P1 | .65 | .33 | .62 | .52 |
| P2 | .3 | .15 | .29 | .24 |
| P3 | .2 | .10 | .19 | .16 |

Calculate XxYrH6RxFit = weighted average XxYrH6AmphRxFit

XxYrH6RxFit = SUM((area of H6AMPH / area of huc6) * XxYrH6AmphRxFit )

Calculate XxH6RxFitTrendRatio = XxH6RxFit / X1H6RxFit
Check to make sure X1H6RxFit not equal zero where XxH6RxFit > 0

Assign RxFitTrends based on the following breakpoints:
If XxH6RxFitTrendRatio < 1.0, then XxH6RXFITTR = -1 (decreasing -- there shouldn't be any that occur)

If XxH6RxFitTrendRatio >= 1.0 and XxH6RxFitTrendRatio <= 2.0, then XxH6RXFITTR = 0 (stable)

If XxH6RxFitTrendRatio > 2.0, then XxH6RXFITTR = +1 (increasing)

**2.0 Process -- Landscape Health Trend Calculation and Classification**
Input:
Xx100H6HrvDepTrend
Xx100H6RoadDenTrend
Xx100H6AquHabTrend
Xx100H6LandActTrend
Xx100H6RxFitTrend

**2.1 Process** - **Calculation of Landscape Health Trend**

Xx100H6LshlthTrend = (-HrvDep) + (-RoadDenTrend) + (AquHabTrend) + (LandActTrend) + (RxFitTrend)

**Logic**: Landscape health trend should be increasing where it is positive; when HRVDEP is positive it is taking away from landscape health so need to reverse the sign; when RoadDenTrend is positive it is taking away from landscape health so need to reverse the sign; when AquHabTrend is positive it is adding to landscape health so leave the sign the same; when LandActTrend is positive it is adding to land use or restoration so leave the sign the same; when RxFitTrend is positive it is adding to the best fit of land use and restoration with landscape regimes so leave the sign the same.

Scores can potentially range from - 5 to +5.

**2.2 Process** - **Classification of 6HUC Landscape Health Trend**

Using the following breakpoints classify the HUC6 Landscape Health Trends:
If Xx100H6LshlthTrend < -0.3, then Xx H6WTLNDHLTH = -1 (decreasing)

If Xx100H6LshlthTrend >= -0.3 and Xx100H6LshlthTrend <= 0.3,
then XxH6WTLNDHLTH = 0 (stable)

If Xx100H6LshlthTrend > 0.3, then XxH6WTLNDHLTH = +1 (increasing)

**QC and map variables in a 4 panel map**

Input:
6HUCLandscapeHealth Class from Ah69
XxH6WTLNDHLTH

**3.0 Process -- Calculate 6HUC Cost / Unit Area for Landscape Health Benefits**
Input:
XxH6WTLNDHLTH
Xx100H6LshlthTrend
Xx100H6CostArea - this is the ICBEMP BLM/FS amount of area in the 6HUC used to calculate RxCost
Xx100H6TotCost (from Variable 32)

If XxH6WTLNDHLTH = Increase (I), Then

Xx100H6_LndHlth_Cst/Area = 100H6TotCost / (Xx100H6LshlthTrend* H6CostArea)

**Logic:** if positive, the H6WTLNDHLTH (landscape health trend) in increasing trend can potentially go from .3 to 5.0. When the H6Cost is divided by this area the resulting value will be a $ per unit area invested to achieve the positive landscape health trend value. As the landscape health trend coefficient values becomes smaller the $ per unit area cost should increase and vice.

If XxH6WTLNDHLTH = Stable (S), Then

Xx100H6LndHlth_Cst/Area = 100H6TotCost / (.2 * H6CostArea)

**Logic:** if stable, the H6WTLNDHLTH (landscape health trend) in increasing trend can potentially go from .3 to - .3 and can include zeros. We assume that the stable condition has a constant area coefficient of .2. This constant of .2 times the H6CostArea will create a smaller number for the divisor than any of the comparative values for Increasing (I) trend because the smallest value in that divisor is .3. Consequently the cost / area will be higher for the stable condition, in comparison to increasing trend.

Else,

Xx100H6LndHlth_Cst/Area = 0

**Logic:** If the XxH6WTLNDHLTH (landscape health trend) is in decreasing trend then the cost/area is computed to 0. This indicates that the dollars expended would have zero value in achieving landscape health because they have been expended in a manner that created a decreasing trend.

Note - all values should be positive or zero. Can have zero values for two conditions, no ICBEMP BLM/FS lands or zero cost / benefit ratio. <u>If possible, classify the no ICBEMP BLM/FS lands as null rather than zero cost / area so we can differentiate.</u>