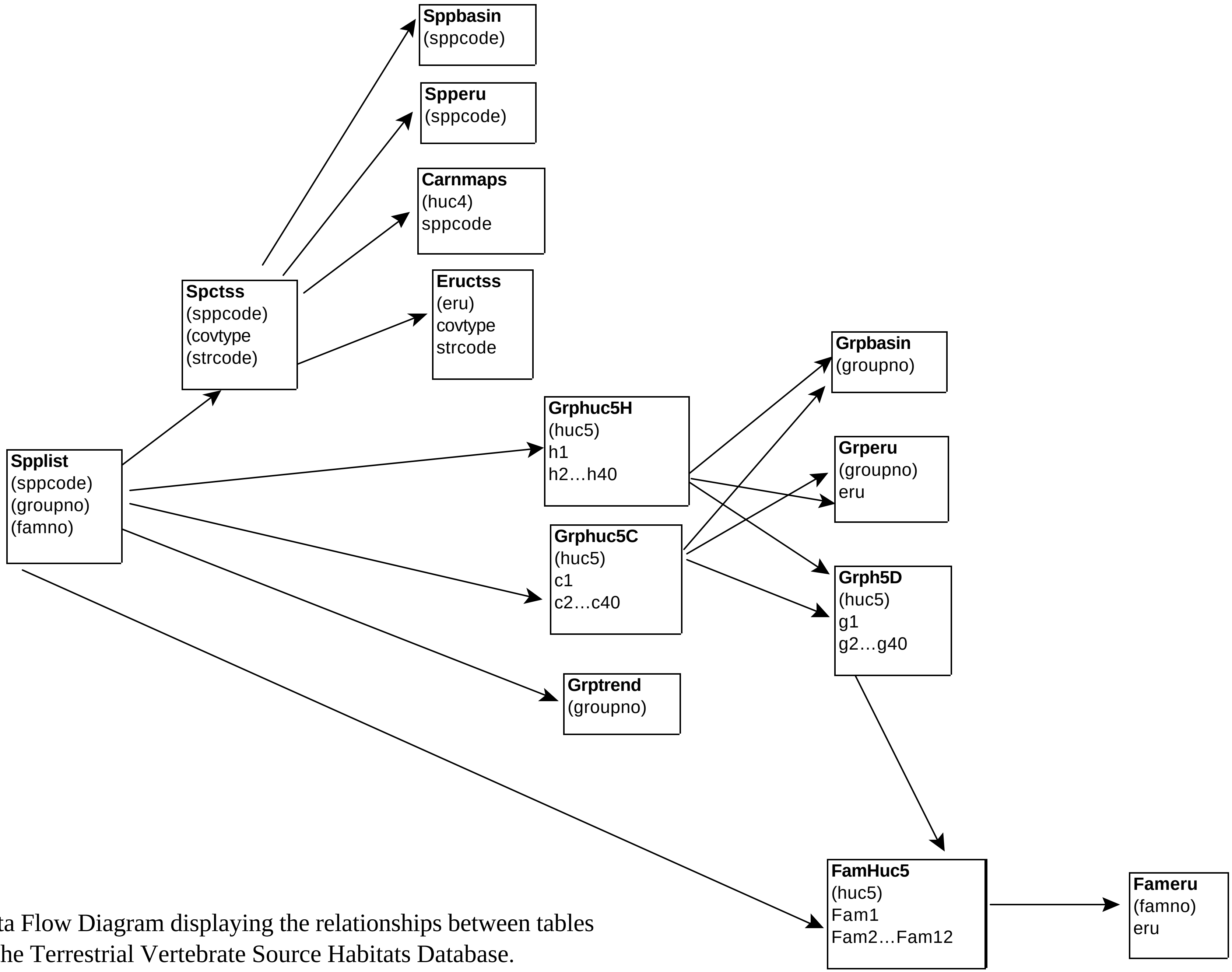

Data Flow Diagram displaying the relationships between tables in the Terrestrial Vertebrate Source Habitats Database.

METHODS AND DATABASES FOR FAMILY-LEVEL ANALYSES OF SOURCE HABITAT: FAMERU.DBF AND FAMHUC5.DBF

FORMING FAMILIES OF GROUPS TO SUMMARIZE RESULTS AMONG MULTIPLE GROUPS

To complete the hierarchical system of evaluating species, groups, and families, the group-level results were generalized by placing 37 of the 40 groups into 12 families (see **spplist.dbf**). (See Wisdom and others 2000 for complete details.)[1] Families were defined by using the generalized vegetative themes, based on a combination of formal cluster analysis and empirical knowledge of the habitat requirements of each species. The clustering method used to guide placement of groups into families was identical to that used to join species into groups (see methods, “Clustering the Species into Groups” in Wisdom and others 2000, and **grpmeta section of bdbsrchb.pdf auxilary metadata**), with one exception: instead of clustering species based on similarities in cover-type structural stage combinations that explicitly define source habitats, clustering was done on similarities of species in the 24 terrestrial community types developed by Hann and others (1997).

Two groups (group 38, composed of two species of rosy finches, and group 39, composed of the resident Lewis’ woodpecker) were not placed in any of the families because their source habitats were restricted to small areas of the basin and were potentially under-sampled because of the finer scale pattern at which their habitats exist. Moreover, group 40, which consists of one species, the brown-headed cowbird, also was excluded from the families because of its unique dependence on agricultural and livestock-dominated environments, and because change in its source habitats was already analyzed and shown clearly in the analysis at the group level.

Amounts of source habitat for families were summarized at the watershed (5th hydrologic unit code, or HUC; see **famhuc5.dbf**) and by Ecological Reporting Unit (ERU) (**see fameru.dbf**).

FAMILY-LEVEL RESULTS

Placement of the 91 species into 40 groups, and the further placement of 37 of the groups into 12 families, resulted in distinct differences among families in the number of terrestrial community types and source habitats used. Family 4 had the most restricted number of terrestrial community types and source habitats used by species of any family, with habitats restricted to early-seral forests. Species in family 1 also were restricted to a small number of terrestrial community types, and in this case, the types were composed of low-elevation, late-seral forests. By contrast, species in family 2 used a higher number and variety of terrestrial community types that encompassed all elevations of late-seral forests. Species in family 3 used an even greater variety of forested conditions; habitats encompassed the

---

[1] See **methmeta section of bdbsrchb.pdf auxilary metadata** for complete citations of references mentioned in this document.

highest number and type of source habitats within the highest number of terrestrial community types of any family dependent on forested habitats.

Species dependent strictly on rangelands were placed in families 10, 11, and 12. Species in families 11 and 12 were restricted to a relatively small number of terrestrial community types, with family 11 primarily dependent on sagebrush, and family 12 dependent on grassland and open-canopy sagebrush habitats. Species in family 10 used a broader set of terrestrial communities, consisting of various grassland, shrubland, woodland, and related cover types in comparison to families 11 and 12.

Species in families 5, 6, 7, 8, and 9 were associated with various terrestrial community types, but the set of source habitats for each family was distinctly different from the others. Habitats for species in family 9 were restricted to relatively few source habitats within the upland woodland and upland shrubland types. By contrast, species in family 5 used habitats that encompassed nearly all terrestrial community types. Species in family 6 also used various terrestrial communities, with the types composed of forests, woodlands, and montane shrubs. Terrestrial community types used by family 7 were similar to family 6, with the main difference being the use of sagebrush types instead of montane shrubs. Finally, habitats for family 8 spanned a fairly restrictive but unusual combination of terrestrial community types composed of both early- and late-seral forests, as well as woodland, shrubland, and grassland types.

FILENAME: FAMERU.DBF

Table 1. Percentage of watersheds in three trend categories of source habitat for each family, by Ecological Reporting Unit.

Variable	Field type/size[a]	Range of values	Definition
FAMNO	N/2	1 - 12	Family number; part of a hierarchical system established to evaluate source habitats. Groups were clustered into families based on similarities in source habitats. Terrestrial families are identified with the following cover types: 1 - low-elevation old forest 2 - broad-elevation old forest 3 - forest mosaic 4 - early-seral montane and lower montane 5 - forest and range mosaic 6 - forests, woodlands, and montane shrubs 7 - forests, woodlands, and sagebrush 8 - rangeland and early- and late-seral forest 9 - woodland 10 - range mosaic 11 - sagebrush 12 - grassland and open-canopy sagebrush
ERU	N/2	1 - 13	Ecological Reporting Unit number. 1 Northern Cascades 2 Southern Cascades 3 Upper Klamath 4 Northern Great Basin 5 Columbia Plateau 6 Blue Mountains 7 Northern Glaciated Mountains 8 Lower Clark Fork 9 Upper Clark Fork 10 Owyhee Uplands 11 Upper Snake 12 Snake Headwaters 13 Central Idaho Mountains
ERU_NAME	C/40	e.g., Northern Cascades, Blue Mountains, etc.	Name of Ecological Reporting Unit; see names associated with ERU field.
DECR_PER	N/8	0 - 100	Percentage of watersheds decreasing.
NEUT_PER	N/8	0 - 100	Percentage of watersheds neutral.
INCR_PER	N/8	0 - 100	Percentage of watersheds increasing.

Variable	Field type/size[a]	Range of values	Definition
TREND	C/12	Decreasing, neutral, or increasing	Dominant trend for the ERU[b].

[a] Field type/size values: N = numeric; C = character (alphanumeric).
[b] ERUs were classified as increasing or decreasing for each family if >50 percent of the watersheds had positive or negative trends, respectively, in source habitat amounts. ERUs not classified as increasing or decreasing were classified as neutral.

FILENAME: FAMHUC5.DBF

Table 2. Trend in source habitat by family within watersheds in the Interior Columbia Basin.

Variable	Field type/size[a]	Range of values	Definition
HUC5	C/10	1604020102 - 1802000112	Watershed identifier.
FAM1	N/3	1, 2, 3, 99[b]	Trend category for source habitat, family 1 - low-elevation old forest.
FAM2	N/3	1, 2, 3, 99	Trend category for source habitat, family 2 - broad-elevation old forest.
FAM3	N/3	1, 2, 3, 99	Trend category for source habitat, family 3 - forest mosaic.
FAM4	N/3	1, 2, 3, 99	Trend category for source habitat, family 4 - early-seral montane and lower montane.
FAM5	N/3	1, 2, 3, 99	Trend category for source habitat, family 5 - forest and range mosaic.
FAM6	N/3	1, 2, 3, 99	Trend category for source habitat, family 6 - forests, woodlands, and montane shrubs.
FAM7	N/3	1, 2, 3, 99	Trend category for source habitat, family 7 - forests, woodlands, and sagebrush.
FAM8	N/3	1, 2, 3, 99	Trend category for source habitat, family 8 - rangeland and early- and late-seral forest.
FAM9	N/3	1, 2, 3, 99	Trend category for source habitat, family 9 - woodland.
FAM10	N/3	1, 2, 3, 99	Trend category for source habitat, family 10 - range mosaic.

Variable	Field type/size[a]	Range of values	Definition
FAM11	N/3	1, 2, 3, 99	Trend category for source habitat, family 11 - sagebrush.
FAM12	N/3	1, 2, 3, 99	Trend category for source habitat, family 12 - grassland and open-canopy sagebrush.

[a] Field type/size values: N = numeric; C = character (alphanumeric).
[b] 1 = decreasing; 2 = no change; 3 = increasing; 99 = no source habitat present for the family in the watershed. A watershed was classified as increasing if >50 percent of the groups in a family increased in source habitats >20 percent, considering only those groups that occurred in the watershed. A watershed was classified as decreasing if >50 percent of the groups in a family decreased in source habitats >20 percent, considering only those groups that occurred in the watershed. Watersheds not classified as increasing or decreasing were classified as no change.

GROUP-LEVEL ANALYSES: GRPBASIN.DBF, GRPERU.DBF, GRPHUC5H.DBF, GRPHUC5C.DBF, GRPHUC5D,DBF, AND GRPTREND.DBF

CLUSTERING THE SPECIES INTO GROUPS

To build the hierarchical system of habitat evaluation for species, groups, and families, hierarchical cluster analysis was used to form 40 groups of the 91 broad-scale species of focus. Composite groups were identified by using a hierarchical clustering algorithm based on pairwise similarities in source habitats between species (**sppctss.dbf**). For each pair of species, similarity was estimated by using the Ochiai index of similarity (OI) (Ludwig and Reynolds 1988).[1]

Dissimilarities between each pair of species were used to generate a distance matrix that was used in the clustering procedure. A hierarchical clustering procedure was used that began with 91 species and then sequentially joined species and groups of species into progressively fewer clusters until all species were joined in a single cluster. Species membership was examined within each set of clusters, looking for a degree of aggregation that would be consistent with ecological understanding of species relations. Based on this examination, the smallest number of groups was chosen that allowed aggregation without loss of important, unique patterns in source habitats for particular species. Experts then reviewed the initial groups and made recommendations for refining species membership and the number of groups to bring forward for analysis. The experts' recommended changes were reviewed, additional refinements made, and additional review obtained from experts to arrive at the final list of 40 groups (**spplist.dbf**).

DATA SUMMARIES

Amounts of source habitat for each group of terrestrial vertebrates were summarized at the scales of the watershed, Ecological Reporting Unit (ERU), and Basin. (See **spplist.dbf** for a complete list of the groups and their associated species and families.) Source habitats were first summarized for the historical and current periods at these scales (see **grphuc5H.dbf, grphuc5C.dbf, grperu.dbf**, and **grpbasin.dbf**). For watershed level analyses, source habitats were reported by classes of source habitats, not estimates of percentages by watershed.

Change in source habitats was calculated for each of the 40 groups using the same general steps used for individual species, but with one important difference. At the 1-km^2 (0.4-mi^2) pixel level, the percentage of area deemed to be source habitats for the group historically or currently, or "group score" historically or currently, was calculated based on whether a species in the group occurred in the pixel and whether source habitat was present. Group scores ranged in value from zero to one. Calculated in this manner, group scores at the pixel level depend only on the species whose ranges include a given pixel. Thus for a group composed of 10 species, a pixel that contains source habitat for

---

[1] See **methmeta section of bdbsrchb.pdf auxilary metadata** for complete citations of references mentioned in this document.

a single member species and is within the range of only that species would have the same score as a pixel within the range of all 10 species that supports all 10. For a specified area of the basin, group scores were calculated simply as the mean of the pixel-level scores over all pixels within the specified area. As was done with the species calculations, only those subwatersheds containing at least one pixel of source habitat, either historically or currently, were included in the calculations of group scores. Group-level measures of absolute change, relative change, and trend categories of change from historical to current were calculated in the same manner as done for species-level changes. See Wisdom and others (2000), "Assessing Change in Source Habitats from Historical to Current Conditions for Species and Groups," for details.

FILENAME: GRPBASIN.DBF

Table 1. Historical and current estimates of areal extent (percentage of area) of source habitats at the scale of the Basin for 40 groups of 91 broad-scale species of focus, and resulting changes in source habitats based on three measures: absolute change, relative change (both all lands and public/mixed ownership lands), and trend category of relative change.[a]

Variable	Field type/size[b]	Range of values	Definition
GROUPNO	N/2	1 - 40	Group number; part of a hierarchical system established to evaluate source habitats. Species were clustered into groups based on similarities in source habitats.
HIS_PER	N/8	0 - 100	Historical estimate as a percent.
CUR_PER	N/8	0 - 100	Current estimate as a percent.
ABS_CHNG	N/8	(-100) - 100	Absolute change from historical to current.
REL_CHNG	N/8	(-100) - 100[c]	Relative change from historical to current on all lands in the Basin.
TREND	N/2	-2, -1, 0, 1, 2	Trend category for relative change on all lands; five trend categories were defined: -2, -1, 0, 1, and 2, where -2 equals a decrease ≥60 percent; -1 equals a decrease ≥20 percent and <60 percent; 0 equals a decrease or increase of <20 percent; 1 equals an increase ≥20 percent and <60 percent; and 2 equals an increase ≥60 percent.
REL_PUBL	N/8	(-100) - 100[c]	Relative change from historical to current on public and mixed ownership lands in the Basin.

[a] Calculations of historical and current estimates of extent of source habitats for each group excluded areas outside species ranges and also excluded those subwatersheds containing no source habitats both historically and currently.

[b] Field type/size values: N = numeric; C = character (alphanumeric).
[c] Values >100% relative change were entered as 100%.

FILENAME: GRPERU.DBF

Table 2. Historical and current estimates of areal extent (percentage of area) of source habitats and the absolute and relative change in source habitats, by Ecological Reporting Unit (ERU), for each of the 40 groups of broad-scale species of focus, and trend categories for each group by ERU.[a]

Variable	Field type/size[b]	Range of values	Definition
GROUPNO	N/2	1 - 40	Group number; part of a hierarchical system established to evaluate source habitats. Species were clustered into groups based on similarities in source habitats.
ERU	N/2	1 - 13	Ecological Reporting Unit. 1 Northern Cascades 2 Southern Cascades 3 Upper Klamath 4 Northern Great Basin 5 Columbia Plateau 6 Blue Mountains 7 Northern Glaciated Mountains 8 Lower Clark Fork 9 Upper Clark Fork 10 Owyhee Uplands 11 Upper Snake 12 Snake Headwaters 13 Central Idaho Mountains
HIS_PER	N/8	0 - 100	Historical estimate as a percent.
CUR_PER	N/8	0 - 100	Current estimate as a percent.
ABS_CHNG	N/8	(-100) - 100	Absolute change from historical to current.
REL_CHNG	N/8	(-100) - 100[c]	Relative change from historical to current.
TREND	N/2	-2, -1, 0, 1, 2	Trend category for relative change; five trend categories were defined, where -2 = a decrease ≥60 percent; -1 = a decrease ≥20 percent and <60 percent; 0 = a decrease or increase of <20 percent; 1 = an increase ≥20 percent and <60 percent; and 2 = an increase ≥60 percent.

[a] Calculations of historical and current estimates of extent of source habitats for each group excluded areas outside species ranges and, by ERU, also excluded those subwatersheds containing no source habitats both historically and currently. See “Assessing Change in Source Habitats From Historical to

Current Conditions for Species and Groups" in the "Methods" section of volume 1 for further details.
[b] Field type/size values: N = numeric; C = character (alphanumeric).
[c] Values >100% relative change were entered as 100%.

FILENAME: GRPHUC5H.DBF

Table 3. Database with percent area identified as source habitats historically for each group within each of 2,562 watersheds in the Interior Columbia Basin.

Variable	Field type/size[a]	Range of values	Definition
HUC5	C/10	1604020102 - 1802000112	Watershed identifier.
H1 through H40	N/1	0, 1, 2, 3, 4	Historical abundance of source habitat for Groups 1 - 40; 0 = group not present; 1 denotes >0% but <25% area as source habitat; 2 denotes $25% but <50% area as source habitat; 3 denotes $50% but <75% area as source habitat; and 4 denotes $75% area as source habitat.

[a] Field type/size values: N = numeric; C = character (alphanumeric).

FILENAME: GRPHUC5C.DBF

Table 4. Database with percent area identified as source habitats currently for each group within each of 2,562 watersheds in the Interior Columbia Basin.

Variable	Field type/size[a]	Range of values	Definition
HUC5	C/10	1604020102 - 1802000112	Watershed identifier.
C1 through C40	N/1	0, 1, 2, 3, 4	Current abundance of source habitat for Groups 1 - 40; 0 = group not present; 1 denotes >0% but <25% area as source habitat; 2 denotes $25% but <50% area as source habitat; 3 denotes $50% but <75% area as source habitat; and 4 denotes $75% area as source habitat.

[a] Field type/size values: N = numeric; C = character (alphanumeric).

FILENAME: GRPHUC5D.DBF

Table 5. Database with relative change in percentage of area of source habitats from historical to current periods for each group within each of 2,562 watersheds in the Interior Columbia Basin.

Variable	Field type/size[a]	Range of values	Definition
HUC5	C/10	1604020102 - 1802000112	Watershed identifier.
G1 through G40	N/1	0, 1, 2, 3, 4, 5	Trend category of relative change in source habitat by watershed for Groups 1 - 40. Five trend categories were defined, where 1 equals a decrease ≥60 percent; 2 equals a decrease ≥20 percent and <60 percent; 3 equals a decrease or increase of <20 percent; 4 equals an increase ≥20 percent and <60 percent; and 5 equals an increase ≥60 percent. A "0" denotes no source habitat for the group in the watershed.

[a] Field type/size values: N = numeric; C = character (alphanumeric).

FILENAME: GRPTREND.DBF

Table 6. Database with percentage of watersheds within 5 trend categories of relative change in source habitats from historical to current periods for 40 groups, basin-wide and by Ecological Reporting Unit.

Variable	Field type/size[a]	Range of values	Definition
GROUPNO	N/2	1 - 40	Group number; part of a hierarchical system established to evaluate source habitats. Species were clustered into groups based on similarities in source habitats.
TREND	N/2	-2, -1, 0, 1, 2	Trend category of relative change in source habitats from historical to current, where 2 = an increase of ≥60 percent; 1 = an increase of ≥20 percent but <60 percent; 0 = an increase or decrease of <20 percent; -1 = a decrease of ≥20 percent but <60 percent; and -2 = a decrease of ≥60 percent.
BASIN	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within the Basin.[b]

Variable	Field type/size[a]	Range of values	Definition
ERU1	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 1-Northern Cascades.
ERU2	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 2-Southern Cascades.
ERU3	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 3-Upper Klamath.
ERU4	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 4-Northern Great Basin.
ERU5	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 5-Columbia Plateau.
ERU6	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 6-Blue Mountains.
ERU7	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 7-Northern Glaciated Mountains.
ERU8	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 8-Lower Clark Fork.
ERU9	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 9-Upper Clark Fork.
ERU10	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 10-Owyhee Uplands.
ERU11	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 11-Upper Snake.
ERU12	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 12-Snake Headwaters.
ERU13	N/6	0 - 100	Percentage of watersheds, by trend category, for each group within ERU 13-Central Idaho Mountains.

[a] Field type/size values: N = numeric; C = character (alphanumeric).
[b] Because some watersheds occurred in more than one ERU (i.e., watersheds were not completely nested within ERUs), these watersheds were partitioned among the appropriate ERUs. This resulted in the generation of additional ERU/watershed combinations. Thus, some of the percentages reported for the Basin and by ERU include more values (watersheds) than are reported in the group results by watershed (grphuc5C.dbf, grphuc5H.dbf, and grphuc5D.dbf).

OVERVIEW OF PURPOSE AND METHODS USED TO ASSESS TRENDS IN SOURCE HABITATS FOR TERRESTRIAL VERTEBRATES OF FOCUS IN THE INTERIOR COLUMBIA BASIN: ERUCTSS.DBF AND SPPLIST.DBF

INTRODUCTION

*Note: The following text, and that in the other metadata text files, has been largely excerpted from the publication, "Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-Scale Trends and Management Implications" by Wisdom and others (2000). This document is a USDA Forest Service General Technical Report, scheduled for publication in June 2000, and is also available at the Interior Columbia Basin Ecosystem Management Project (ICBEMP) web site (http://www.icbemp.gov). Users of the databases are strongly encouraged to refer to the more complete text in this document for additional details on methods and caveats about the data. Databases described below and in other auxiliary metadata files (****sppmeta , grpmeta****, and* ***fammeta*** **sections of bdbsrchb.pdf auxilary metadata***) support the information presented in the tables and figures of the Wisdom GTR.*

In response to declines in habitats for terrestrial wildlife, managers of Federal lands are moving increasingly toward broad-scale, ecosystem-based strategies for conserving and restoring habitats. Results of such an ecosystem-based analysis of habitat change and a synthesis of road-associated effects on selected terrestrial vertebrates are presented here in support of the Interior Columbia Basin Ecosystem Management Project (ICBEMP). The ICBEMP was established in January 1994 through a charter signed by the Chief of the USDA Forest Service (FS) and the Director of the USDI Bureau of Land Management (BLM). The charter directed that work be undertaken to develop and adopt an ecosystem-based strategy for all lands administered by the FS and BLM within the interior Columbia basin (hereafter referred to as the Basin). This area extends over 58 million ha (145 million acres) in Washington, Oregon, Idaho, Montana, and small portions of Wyoming, Nevada, California, and Utah. Fifty-three percent of the Basin is public land administered by the FS or BLM.

The purpose for these analyses was to (1) develop an understanding of changes in habitats that have occurred across the basin since early European settlement; (2) assess effects of these changes on source habitats for species of terrestrial vertebrates for which there is ongoing concern about population or habitat status (species of focus); (3) summarize effects of roads and associated factors on populations and habitats of these species; (4) display broad-scale patterns of road density as a spatially explicit measure of road effects on terrestrial vertebrates, particularly in relation to four species of terrestrial carnivores; and (5) synthesize results from these evaluations into major patterns, implications of which could be addressed by managers in the form of broad-scale strategies and practices.

OBJECTIVES

Within the purpose framework, six objectives formed the basis for the methods:

1. Identify species of terrestrial vertebrates whose habitats might require further assessment and management at broad spatial scales within the basin; these species are referred to as broad-scale species of focus. Broad-scale species of focus are vertebrate species whose population size is known or suspected to be declining in response to habitat decline or to nonhabitat effects of human activities, and whose habitats can be estimated reliably by using a large mapping unit (pixel size) of 100 ha (247 acres) and broad-scale methods of spatial analysis.

2. Determine species relations with source habitats. Source habitats are those characteristics of macrovegetation that contribute to stationary or positive population growth for a species in a specified area and time. Source habitats contribute to source environments, which represent the composite of all environmental conditions that results in stationary or positive population growth for a species in a specified area and time.

3. Conduct a spatial assessment of source habitats for all broad-scale species of focus, including an assessment of change in source habitats from early European to current conditions. The spatial assessment was based on the composition and structure of vegetation estimated to exist during early European settlement (historical, circa 1850 to 1890) and current (circa 1985 to 1995) conditions, based on prior ICBEMP landscape assessments. Specifically, the analysis was designed to relate historical and current estimates of vegetation characteristics to source habitats deemed to contribute to sustainable populations of the species of focus, and to assess changes in those habitats from historical to current periods.

4. Develop a system to evaluate source habitats for individual species as well as for groups of species. This system was designed to nest evaluations of individual species hierarchically within evaluations conducted for groups of species and for multiple groups (families of groups). The system was developed to enable managers to identify broad-scale, robust patterns of habitat change that affect multiple species in a similar manner, and to allow managers to address the needs of all species efficiently, accurately, and holistically with the use of broad-scale strategies and practices.

5. Identify species whose populations or habitats may be negatively affected by roads and associated factors, summarize the effects, display the broad-scale patterns of road density as an index of these effects, and map areas that contain both abundant source habitats and low road densities for selected species of terrestrial carnivores.

6. Describe the broad-scale implications for managing terrestrial vertebrates whose source habitats have undergone long-term decline, or for terrestrial vertebrates whose habitats or populations are negatively affected by one or more factors associated with roads. Management implications are broad-scale considerations about the potential to conserve or restore source habitats, or to manage human access and human activities, on FS- and BLM-administered lands in response to habitat decline or to negative effects of human disturbance.

STUDY AREA

This assessment covered the basin east of the crest of the Cascade Range and those portions of the Klamath and Great Basins within Oregon. The 58 million-ha (145 million-acre) basin is stratified into four spatial scales: (1) Ecological reporting unit (ERU), (2) subbasin, (3) watershed, and (4) subwatershed. Ecological reporting units, of which there are 13, range in size from about 740 000 to 6 800 000 ha (1,829,000 to 16,800,000 acres; mean size of about 2 375 000 ha [5,866,250 acres]). The 164 subbasins, or 4th hydrologic unit code (HUC), average about 345 000 ha (850,000 acres), whereas the 2,562 watersheds, or 5th HUCs, average about 22 500 ha (56,000 acres) each. The 7,654 subwatersheds (6th HUCs) average about 7700 ha (19,000 acres).

METHODS

The original 157 cover type-structural stage combinations (CTSS) used in the CRBSUM modeling of vegetation were modified for the source habitats analyses as follows (see table 1, appendix 1 in vol. 3 of Wisdom and others 2000 for a complete list of CTSS):

1) low and medium shrub structural stages of all of the shrubland types were combined;

2) all of the structural stages of the upland woodland types were combined;

3) young multi-storied forests were divided into two different types: “managed” and “unmanaged.” Managed young-forests are defined as young forests within areas that are roaded and have some history of timber harvest; these stands contain relatively few large snags and trees >64 cm (25 in) d.b.h (table 3.178, Hann and others 1997). By contrast, unmanaged young-forests are within areas that are unroaded, have no history of timber harvest, and contain relatively higher densities of large snags and trees. Roadless areas for unmanaged young multi-strata forest structure types were defined using Management Classes;

4) although CRBSUM did not list the following 16 cover type-structural stage combinations as occurring in the Basin, they were included in the list of possible source habitats (these were identified as possible CTSS combinations in earlier versions of the vegetation mapping for the Basin) :

Cover-type	**Structural Stages**
Alpine Tundra	Clms
Native Forb	Ch
Red Fir	MYf
Red Fir	Ofm

Red Fir	Sec
Red Fir	Si
Red Fir	UYf
Red Fir	Ur
Mountain Mahogany	Olms
Low Sage	Clms
Aspen	Ofm
Cottonwood/Willow	Si
Sierra Nevada Mixed Conifer	MYf
Sierra Nevada Mixed Conifer	Sec
Sierra Nevada Mixed Conifer	UYf
Sierra Nevada Mixed Conifer	Ur

See table 4 in Wisdom and others (2000) for definitions of structural stages.

The major steps of the terrestrial source habitat analysis were (1) identifying species on which to focus the analysis; (2) delineating species ranges; (3) determining the relation of species with source habitats; (4) designing a hierarchical system of single- and multi-species assessment; (5) clustering the species into groups, based on similarities in source habitats; (6) assessing change in source habitats from historical to current conditions for species and groups; (7) forming families of groups to summarize results among multiple groups; (8) correlating change in source habitats among species within groups and families to verify how well group and family trends reflected trends of individual species; (9) summarizing knowledge about species-road relations; (10) mapping road density in relation to abundance of source habitats for selected species; (11) interpreting results and identifying broad-scale management implications for those species, groups, and families whose source habitats have undergone long-term decline, or for those species whose populations or habitats are negatively affected by factors associated with roads; and (12) validating agreement between change in source habitats and trends in viability that were projected by Lehmkuhl and others (1997). Specific methods for each of these steps are presented by Wisdom and others (2000); brief descriptions are in the metadata files associated with the different levels of analysis: **sppmeta, grpmeta**, and **fammeta sections of bdbsrchb.pdf auxilary metadata**.

Species were initially selected for analysis using seven criteria, most of which were based on results of the viability assessment of species-habitat conditions under planning alternatives (Lehmkuhl and others 1997) that were developed for the basin as part of the Draft EIS (USDA Forest Service and USDI

Bureau of Land Management 1997a, 1997b; see Wisdom and others 2000 for details). Application of these seven criteria resulted in a final list of 91 species whose source habitats could be mapped reliably by using a pixel size of 100 ha (247 acres), as determined by expert panels. These species, referred to as broad-scale species of focus, composed the broad-scale analysis reported here (see **spplist.dbf**).

Species range maps were drawn using several criteria, usually reflecting the outer extent of the occurrence of broadly distributed species, or the outer extent of each population of less common species. For species whose range shifted significantly from historical conditions (as defined by Marcot and others, in prep.), separate maps were developed for current and historical range. For all other species, maps that delineate the current range by definition also denote the historical range. Maps of each species range were drawn only for areas within the boundaries of the basin because the evaluation was restricted to the basin.

The vegetation classification system of cover types and structural stages that was derived for broad-scale vegetation assessments of the ICBEMP (Hann and others 1997) was used as the basis for defining source habitats for each species of focus (see Wisdom and others 2000 for reasons for selecting this system). Maps of vegetation cover types (CT) and structural stages (ST) were derived originally as part of the Columbia River basin succession model (CRBSUM) (Keane and others 1996) for broad-scale assessment of vegetation in the basin. As part of this process, cover types were developed to estimate the plant species that characterize the vegetative composition of a mapping unit, with the mapping unit defined as a pixel or cell of 1 km^2 (0.4 mi^2) at the broad scale, e.g., lodgepole pine, western larch, and whitebark pine. By contrast, structural stages were developed to estimate the structural conditions (e.g., stand initiation) of plant species that characterize a mapping unit of 1 km^2 (0.4 mi^2). Methods for deriving the initial estimates of the cover types and structural stages were described by Hann and others (1997) and Menakis and others (1996). Amounts of cover type-structural stage combinations identified as source habitats for the species of focus, and changes from historical to current amounts, were summarized at the scale of the ERU (**eructss.dbf**).

Methods of assigning source habitats to species, and forming species groups and families, are described in the auxiliary metadata files **sppmeta, grpmeta**, and **fammeta sections of bdbsrchb.pdf auxilary metadata**.

USE CONSTRAINTS

The assessment relied on coarse-scale data which is not accurate at fine scales. In addition, the assessment was conducted for 91 species for which knowledge of environmental requirements is highly variable. As such, results should be interpreted with the following cautions and caveats in mind:

(1) The definition of source habitats for each species does not include all environmental conditions that determine whether a population is growing, declining, or stationary. Rather, *source habitats* are those characteristics of macrovegetation that contribute to stationary or positive population growth. Evaluation of *source environments*, which represent the composite of all environmental conditions that result in stationary or positive population growth, would be required to estimate population trends.

(2) Trends in source habitats for a species should not be expected to be correlated with trends in populations of that species for several reasons. First, the spatial scale at which changes in source habitats were measured (collections of watersheds within each Ecological Reporting Unit, or ERU) was the not the same as that at which population data have been typically collected. Second, the temporal scale at which changes in source habitats are measured is far longer (>100 yr) than even the longest term data on population trends. Third, populations of some species may respond strongly to non-vegetative factors, such as human presence or human activities, which are not accounted for in source habitat trends, as stated in caveat number 1 above. And fourth, population trends of many species are difficult to detect without intensive monitoring, which typically has not occurred for most non-game species.

(3) Estimates of areal extent and trend in source habitats are of acceptable accuracy when summarized to the scales of the basin and ERU. Acceptable accuracy was defined by Wisdom and others (2000) in the Methods section and table 2 of volume 1. Estimates also are of acceptable accuracy when summarized across at least 5-10 subbasins or at least 75-150 watersheds. Consequently, users of these habitat data should not attempt to derive estimates for local areas such as a Ranger District or Resource Area unless such estimates are summarized across a sufficient number of subbasins or watersheds.

(4) Habitat estimates also are of lower accuracy for cover types that occur in small or linear patches. Linear features such as roads, narrow riparian vegetation, and streams cannot be mapped at the scale of 1-km^2 pixels. Cover types that occur in small patches of < 4 ha (10 acres) and that have an average patch size less than 1/4 the area of a 1-km^2 (0.4-mi^2) cell also are not mapped.

(5) Estimates of areal extent and trend in source habitats are less accurate for individual species and more accurate for groups of species and families of groups. In addition, estimates for species with broad ranges that use many source habitats are likely to be more accurate than estimates for narrowly-distributed species that use few source habitats. These patterns are due to the increased accuracy of the higher number of cover type-structural stage combinations that are estimated for most groups of species, and the increased accuracy of these estimates when calculated over large areas occupied by widely-distributed species.

(6) Estimates of trend in source habitats reflect change in the amount of habitat, but not the quality. Trend estimates were based on plant composition of overstory cover types, and do not reflect the quality of understory vegetation that may make some cover types unsuitable as habitat. For example, areas dominated by sagebrush and other rangeland cover types contain highly variable composition of understory vegetation, ranging from a full complement of native grasses and forbs to complete dominance of exotic plants. Because these methods could not assess such conditions, the areal extent of source habitats for many of the rangeland species for the current time period was probably overestimated. Thus, trends likely underestimated the level of change that occurred from historical to current periods in many of the rangeland cover types where invasion of understory exotic plants has eliminated native understory plants.

(7) Knowledge of source habitat requirements is generally better for game species or former game species than for non-game species, and also is generally better for birds than mammals, and for mammals than reptiles. These varying levels of knowledge reflect like differences in the number and quality of studies conducted on game versus non-game species, and on birds versus mammals and reptiles. (No amphibian species were included in the assessment, largely due to their dependence on riparian and wetland habitats, which could not be mapped accurately.)

(8) Results are presented for individual species, for groups of species, and for families of groups. Results for groups and families were intended to be used for broad-scale ecosystem planning and management, such that large numbers of species with similar habitat requirements could be managed efficiently. However, each species occupies its own niche, and group- and family-level habitat trends do not always mimic habitat trends for individual species within the group or family (see "Correlation of Habitat Trends between Species and Groups," and "Correlation of Habitat Trends between Species within Families," volume 1, Wisdom and others 2000). Consequently, any broad-scale management strategy should be evaluated in terms of its effect on individual species. The broad-scale strategy can then be improved through a number of iterations of its development in concert with checking its effect on individual species. For similar reasons, use of indicator species or umbrella species will inadequately represent the needs of all species analyzed; use of these concepts is not recommended.

(9) The above caveats in mind, a major assumption of this work was that validation research will be conducted by agency scientists and other researchers to corroborate these findings. Results of the assessment also were assumed to lead to finer scale evaluations of habitats for some species, groups, or families as part of implementation procedures. Implementation procedures are necessary to relate these findings to local conditions; this would enable managers to effectively apply local conservation and restoration practices to support broad-scale conservation and restoration strategies that may evolve from these results. Similarly, the results serve as broad-scale hypotheses for testing and validation through large-scale management experiments and observational research. Ultimately, the utility of these results will depend largely on the scale and magnitude of both validation research and local implementation procedures.

REFERENCES

Hann, Wendel J.; Jones, Jeffrey L.; Karl, Michael G. [and others]. 1997. Landscape dynamics of the basin. In: Quigley, Thomas M.; Arbelbide, S.J., tech. eds. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 337-1055. Vol. 2. Chapter 3. (Quigley, Thomas M., tech. ed. Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Lehmkuhl, John F.; Raphael, Martin G.; Holthausen, Richard S. [and others]. 1997. Historical and current status of terrestrial species and the effects of proposed alternatives. In: Quigley, Thomas M.; Lee, Kristine M.; Arbelbide, Sylvia J., tech. eds. Evaluation of EIS alternatives by the Science Integration Team. Gen. Tech. Rep. PNW-GTR-406. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 537-730. Vol. 2.

Ludwig, John A.; Reynolds, James F. 1988. Statistical ecology. New York, NY: John Wiley and Sons. 337 p.

Marcot, Bruce G.; Castellano, Michael A.; Christy, John A. [and others]. 1997. Terrestrial ecology of the Basin. In: Quigley, Thomas M.; Arbelbide, S.J., tech. eds. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 1497-1713. Vol. 3. (Quigley, Thomas M., tech. ed. Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Marcot, Bruce G.; Wales, Barbara C.; Murphy, Wally. [In prep.]. Range maps for terrestrial vertebrates in the interior Columbia basin. On file with: Bruce Marcot, U.S. Department of Agriculture, Pacific Northwest Research Station, Forestry Sciences Laboratory, 1221 S.W. Yamhill Street, Suite 200, Portland, OR 97208.

Menakis, James P.; Long, Donald G.; Keane, Robert E. 1996. The development of key broad-scale layers and characterization files. In: Keane, Robert E.; Jones, Jeffrey L..; Riley, Laurienne S.; Hann, Wendel J., tech. eds. Compilation of administrative reports: multi-scale landscape dynamics in the basin and portions of the Klamath and Great basins. [Irregular pagination]. On file with: U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management; Interior Columbia Basin Ecosystem Management Project, USDA Forest Service, 304 N. 8th Street, Boise, ID 83702.

U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management. 1997a. Eastside draft environmental impact statement. Walla Walla, WA: Interior Columbia Basin Ecosystem Management Project. [Irregular pagination]. 2 vol.

U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management. 1997b. Upper Columbia River basin draft environmental impact statement. Boise, ID: Interior Columbia Basin Ecosystem Management Project. [Irregular pagination]. 2 vol.

Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendel J.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. Volume 1--Overview. Gen. Tech. Rep. PNW-GTR-485. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 3 vol. (Quigley, Thomas M., tech. ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

FILENAME: SPPLIST.DBF

Table 1. Format of database listing 91 species (97 species-seasonal combinations) of terrestrial vertebrates of focus in the Interior Columbia Basin.

Variable	Field type/size[a]	Range of values	Definition
SPPCODE	C/14	e.g., ATFLYCAT	Unique code assigned to each species, based on its common name. Links with similar field in other databases.
COMNAME	C/41	e.g., Ash-Throated Flycatcher	Common name of species.
SCINAME	C/47	e.g., MYIARCHUS CINERASCENS	Scientific or Latin name of species.
SPPNO	N/3	1 - 97	Species number; unique numeric identifier assigned to each species for tracking during analyses.
GROUPNO	N/2	1 - 40	Group number; part of a hierarchical system established to evaluate source habitats. Species were clustered into groups based on similarities in source habitats.
FAMNO	N/2	1 - 15[b]	Family number; part of a hierarchical system established to evaluate source habitats. Groups were clustered into families based on similarities in source habitats. Terrestrial families are identified with the following cover types: 1 - low-elevation old forest 2 - broad-elevation old forest 3 - forest mosaic 4 - early-seral montane and lower montane 5 - forest and range mosaic 6 - forests, woodlands, and montane shrubs 7 - forests, woodlands, and sagebrush 8 - rangeland and early- and late-seral forest 9 - woodland 10 - range mosaic 11 - sagebrush 12 - grassland and open-canopy sagebrush. 13,14,15 data sorting purposes only
CLASS	C/2	B, M, R	Taxonomic class; B = bird; M = mammal; R = reptile.

Variable	Field type/size[a]	Range of values	Definition
SEASON	C/25	Migrant breeding Migrant winter Resident summer Resident winter Resident year-long	Residency and season of habitat function.[c]
TAXNO	N/2	1 - 56	Taxonomic number, used to order species by taxonomic level within each taxonomic class (CLASS variable).

[a] Field type/size values: N = numeric; C = character (alphanumeric).
[b] Three groups, 38-40, were not placed in families because their source habitats were limited in area or dominated by agricultural landscapes (see text in **fammeta.wpd** for more detail). The family numbers assigned to these groups, 13-15, were for data sorting purposes only.
[c] It is not known whether certain bat species (spotted, pallid, Yuma myotis, long-eared myotis, and fringed myotis) hibernate within the Basin or leave the Basin during winter. In the absence of migratory information, we have assumed that source habitats for these species include winter hibernacula, in addition to non-winter habitat.

FILENAME: ERUCTSS.DBF

Table 2. Historical and current estimates of areal extent (percentage of area) of cover type-structural stage combinations, and the absolute and relative change in these combinations, from historical to current periods, by Ecological Reporting Unit.[a]

Variable	Field type/size[b]	Range of values	Definition
ERU	N/2	1 - 13	Ecological Reporting Unit. 1 Northern Cascades 2 Southern Cascades 3 Upper Klamath 4 Northern Great Basin 5 Columbia Plateau 6 Blue Mountains 7 Northern Glaciated Mountains 8 Lower Clark Fork 9 Upper Clark Fork 10 Owyhee Uplands 11 Upper Snake 12 Snake Headwaters 13 Central Idaho Mountains
COVTYPE	C/42	e.g. Interior Ponderosa Pine	Cover type name as described by Hann and others (1997); 40 types.
STRCDE	C/6	e.g. Ofm, Si	Structural stage code; see sppctss.dbf for code definitions.
HIS_PER	N/8	0 - 100	Historical estimate as a percent.
CUR_PER	N/8	0 - 100	Current estimate as a percent.
ABS_CHNG	N/8	(-100) - 100	Absolute change from historical to current.
REL_CHNG	N/8	(-100) - 100[c]	Relative change from historical to current.

[a] Percentage of area of cover type-structural stage combinations was calculated as the percentage of 1-km^2 pixels in an ERU containing that combination. Absolute change in areal extent of cover type-structural combinations was calculated as (current percentage of area - historical percentage of area). Relative change was calculated as ([current percentage of area - historical percentage of area] / historical percentage of area) X 100.

[b] Field type/size values: N = numeric; C = character (alphanumeric).

[C] Values >100% relative change were entered as 100%.

SPECIES-LEVEL ANALYSES: CARNMAPS.DBF, SPPCTSS.DBF, SPPBASIN.DBF, AND SPPERU.DBF

BUILDING SPECIES-SOURCE HABITAT MATRICES

Marcot and others (1997)[1] originally developed matrices of habitat associations for 547 vertebrate species occurring within the basin. These matrices included species associations with macrohabitats based on species occurrence, as well as species use of finer scale or nonvegetative features termed key environmental correlates. These data were used a starting point to define source habitats and special habitat features for each of the 91 terrestrial species of focus. Special habitat features are those nonvegetative factors or finer scale characteristics of vegetation that also contribute to stationary or positive population growth.

The species-habitat matrices of Marcot and others (1997) were refined by asking experts to identify each cover type-structural stage combination that presumably contributes to positive or stationary population growth for a given species (source habitat) and for a given season of habitat function. Experts also identified nonvegetative factors or fine-scale vegetative characteristics that presumably contribute to stationary or increasing rate of population growth.

For a given species, experts assigned a value of one to each combination of cover type-structural stage that was designated as source habitat, and a value of zero to each combination that was designated as nonsource habitat. These same binary codes were used to identify special habitat features deemed to contribute to stationary or positive population growth (value of one) versus those features determined not to contribute to stationary or positive growth (value of zero).

Designations of source habitats for each of the 91 broad-scale species of focus were summarized and stored in a database (**sppctss.dbf**; see below). These data were used as the basis for analysis of change in source habitats for species and groups.

DATA SUMMARIES

Amounts of source habitat for each of 97 species-seasonal combinations of terrestrial vertebrates were summarized at the scales of the Ecological Reporting Unit (ERU) and Basin. (See **spplist.dbf** for a complete list of the species, their common and scientific names, and associated groups and families.) Source habitats were first summarized for the historical and current periods at these two scales (see **spperu.dbf** and **sppbasin.dbf**). Change in source habitats was evaluated by using a combination of species range maps (Marcot and others, in prep.), historical and current broad-scale vegetation maps

---

[1]See **methmeta section of bdbsrchb.pdf auxilary metadata** for complete citations of references mentioned in this document.

(Hann and others 1997), and the species-source habitats information previously described. Absolute change was calculated as the difference between current and historical abundance of source habitats, and relative change was calculated as the difference between current and historical abundance of source habitats, divided by the historical amount. See Wisdom and others (2000), “Assessing Change in Source Habitats from Historical to Current Conditions for Species and Groups,” for details.

CARNIVORE SOURCE HABITAT ABUNDANCE IN RELATION TO ROAD DENSITY

Roads hypothetically pose a direct threat to population fitness for several terrestrial carnivores by facilitating overtrapping (wolverine and lynx) or other fatal interactions with humans (gray wolf and grizzly bear). Because of these observed or suspected effects on population fitness, the current abundance of source habitats was mapped in relation to road density for each of the four species. Mapping was intended to identify large areas of abundant source habitats that have low road density. Presumably, these areas would have highest potential to support populations that could persist without additive mortality that may be caused by road-associated factors.

Mapping involved three steps: (1) generating a map of current habitat abundance for each species at the appropriate scale; (2) generating a map of road density at the same scale as the map of habitat abundance; and (3) generating a map of the intersection of moderate to high habitat abundance with zero to low road density. Each of these maps was generated at the scale of the subbasin. Subbasins were used as mapping units because their large size (mean size of 345 000 ha [850,000 acres] each) is compatible with the broad scale at which lynx, wolf, wolverine, and grizzly bear function to meet their life requirements. Data supporting these maps are in **carnmaps.dbf**.

FILENAME: SPPCTSS.DBF

Table 1. Vegetation cover-type structural stage combinations identified as source habitats for 91 broad-scale species of focus.

Variable	Field type/size[a]	Range of values	Definition
SPPCODE	C/14	e.g., ATFLYCAT	Unique code assigned to each species, based on its common name. Links with similar field in other databases. See **spplist.dbf** for complete common and scientific names.
COVTYPE	C/42	e.g., Interior Ponderosa Pine	Cover type name as described by Hann and others (1997); 40 types.
STRCDE	C/6	e.g., Ofm, Si	Structural stage code.
STRDEF	C/35	e.g., Old Forest Multi-storied	Structural stage definition as defined by Hann and others (1997).[b]
TERCOMM	C/50	e.g., Mid-seral Montane Forest	Terrestrial community type, as adapted by Hann and others (1997).

[a] Field type/size values: N = numeric; C = character (alphanumeric).
[b] See table 4, volume 1, in Wisdom and others (2000) for complete descriptions of structural stages.

FILENAME: SPPBASIN.DBF

Table 2. Historical and current estimates of areal extent (percentage of area) of source habitats for 91 broad-scale species of focus calculated at the scale of the Basin, and resulting changes in source habitats based on three measures: absolute change, relative change, and trend categories of relative change.[a]

Variable	Field type/size[b]	Range of values	Definition
SPPCODE	C/14	e.g. ATFLYCAT	Unique code assigned to each species, based on its common name. Links with similar field in other databases (e.g., **sppctss.dbf**). See **spplist.dbf** for complete common and scientific names.
HIS_PER	N/8	0 - 100	Historical estimate as a percent.
CUR_PER	N/8	0 - 100	Current estimate as a percent.
ABS_CHNG	N/8	(-100) - 100	Absolute change from historical to current.
REL_CHNG	N/8	(-100) - 100[c]	Relative change from historical to current on all lands in the Basin.
REL_PUBL	N/8	(-100) - 100[c]	Relative change from historical to current on public and mixed ownership lands in the Basin.
TREND	N/2	-2, -1, 0, 1, 2	Trend category of relative change; five trend categories were defined: -2, -1, 0, 1, and 2, where -2 equals a decrease ≥60 percent; -1 equals a decrease ≥20 percent and <60 percent; 0 equals a decrease or increase of <20 percent; 1 equals an increase ≥20 percent and <60 percent; and 2 equals an increase ≥60 percent.

[a] Calculations of historical and current estimates of extent of source habitats for each species excluded areas outside species ranges and also excluded those subwatersheds containing no source habitats both historically and currently. See “Assessing Change in Source Habitats from Historical to Current Conditions for Species and Groups” in the Methods section of volume 1 for further details about calculations of areal extent of source habitats and changes.
[b] Field type/size values: N = numeric; C = character (alphanumeric).
[c] Values >100% relative change were entered as 100%.

FILENAME: SPPERU.DBF

Table 3. Historical and current estimates of areal extent (percentage of area) of source

habitats for 91 broad-scale species of focus, resulting changes in source habitats based on two measures, absolute change and relative change, by ecological reporting unit (ERU), and trend categories of relative change by ERU.[a]

Variable	Field type/size[b]	Range of values	Definition
SPPCODE	C/14	e.g., ATFLYCAT	Unique code assigned to each species, based on its common name. Links with similar field in other databases. See **spplist.dbf** for complete common and scientific names.
ERU	N/2	1 - 13	Ecological Reporting Unit. 1 Northern Cascades 2 Southern Cascades 3 Upper Klamath 4 Northern Great Basin 5 Columbia Plateau 6 Blue Mountains 7 Northern Glaciated Mountains 8 Lower Clark Fork 9 Upper Clark Fork 10 Owyhee Uplands 11 Upper Snake 12 Snake Headwaters 13 Central Idaho Mountains
HIS_PER	N/8	0 - 100	Historical estimate as a percent.
CUR_PER	N/8	0 - 100	Current estimate as a percent.
ABS_CHNG	N/8	(-100) - 100	Absolute change from historical to current.
REL_CHNG	N/8	(-100) - 100[c]	Relative change from historical to current.
TREND	N/2	-2, -1, 0, 1, 2	Trend categories of relative change were defined such that -2 equals a decrease ≥60 percent; -1 equals a decrease ≥20 percent and <60 percent; 0 equals a decrease or increase of <20 percent; 1 equals an increase ≥20 percent and <60 percent; and 2 equals an increase ≥ 60 percent.

[a] Calculations of historical and current estimates of extent of source habitats excluded areas outside each species ranges and, by ERU, also excluded those subwatersheds containing no source habitats both historically and currently. See "Assessing Change in Source Habitats From Historical to Current Conditions for Species and Groups" in the Methods section of volume 1 for further details.
[b] Field type/size values: N = numeric; C = character (alphanumeric).
[c] Values >100% relative change were entered as 100%.

FILENAME: CARNMAPS.DBF

Table 4. Format of database displaying classes of source habitat for four carnivore species and road density classes for subbasins in the Interior Columbia Basin.

Variable	Field type/size[a]	Range of values	Definition
HUC4	C/8	16040201-18020001	Subbasin identifier.
WOLV_CLS	N/4	1, 2, 3, 99[b]	1 = low current habitat status for wolverine 2 = moderate current habitat status for wolverine 3 = high current habitat status for wolverine 99 = habitat absent
LYNX_CLS	N/4	1, 2, 3, 99	1 = low current habitat status for lynx 2 = moderate current habitat status for lynx 3 = high current habitat status for lynx 99 = habitat absent
GRWOLF_CLS	N/4	1, 2, 3	1 = low current habitat status for gray wolf 2 = moderate current habitat status for gray wolf 3 = high current habitat status for gray wolf
GRBEAR_CLS	N/4	1, 2, 3	1 = low current habitat status for grizzly bear 2 = moderate current habitat status for grizzly bear 3 = high current habitat status for grizzly bear
RD_CLS	N/1	1, 4, 6	Road class; 1 = >50% of HUC5's (watersheds) in the subbasin with $0 to #0.7 mi/sq.mile of roads; 4 = >50% of HUC5's with >0.7 to #1.7 mi/sq.mile OR no dominant trend; 6 = >50% of HUC5's with >1.7 mi/sq.mile of roads.

[a] Field type/size values: N = numeric; C = character (alphanumeric).

[b] Percentage of area in source habitats for 4 carnivore species (gray wolf, grizzly bear, lynx, and wolverine) was calculated at the scale of the subbasin (HUC4) and then ranked by subbasin from lowest to highest percentages. High habitat status was the highest one-third of values (class = 3), moderate was the middle one-third of source habitat values (class = 2), and low was the lowest one-third of values (class = 1).

Crosswalk of Tables and Figures in Wisdom et al. PNW-GTR-485
to Terrestrial Vertebrate Source Habitat Database (BDBSRCHB)

April 11, 2000

Table or Figure	**Database(s)**	**Comments**
Volume 1		
Table 1	NA	A subset of these species are included in spplist.dbf
Table 2	NA	
Table 3	NA	
Table 4	NA	
Table 5	spplist.dbf	
Table 6	spplist.dbf	
Table 7	sppbasin.dbf	
Table 8	spperu.dbf	
Table 9	grpbasin.dbf	Relative change percentages from Fig. 7 were added to this database
Table 10	grperu.dbf	Ranks are given for each group/ERU combination, from which the percentage of ERUs per category can be derived.
Table 11	sppctss.dbf	A count of the combinations of cover type-structural stages in this database will yeld the numbers in Table 11, vol. 1.
Table 12	fameru.dbf	
Tables 13-15	NA	no numeric data
Figs. 1-5	NA	Either provided by GIS spatial team or miscellaneous line drawings (not data-based)
Fig. 6	sppbasin.dbf	Fields "rel_chng" and "rel_publ" contain data plotted in this figure
Fig. 7	grpbasin.dbf	Fields "rel_chng" and "rel_publ" contain data plotted in this figure
Fig. 8	NA	Additional analysis, no specific database to link

Table or Figure	**Database(s)**	**Comments**
Figs. 9-20	famhuc5.dbf	
Fig. 21	NA	Map from GIS spatial team of road density classes
Fig. 22	carnmaps.dbf	This database has a field with road classification by subbasin
Fig. 23	carnmaps.dbf	Query database for any HUC4 with a 2 or 3 habitat class for any of the 4 carnivores plus road class = 1
Figs. 24-27	carnmaps.dbf	
Volume 2		
Fig. 1	NA	GIS spatial team provided
Fig. 2	NA	GIS spatial team provided
Figs. 3, 6, 9, 12...120	NA	Species range maps prepared by GIS spatial team, based on data provided by B. Marcot
Figs. 4, 7, 10, 13...121	grphuc5H.dbf, grphuc5C.dbf, grphuc5D.dbf	Source habitats by species groups (historical and current) and maps of differences (change maps) between historical and current
Figs. 5, 8, 11, 14...122	grptrend.dbf	Bar charts of trend categories in source habitat basin-wide and by ERU for each group.
Volume 3		
Appendix 1, Table 1	sppctss.dbf	
Appendix 1, Table 2	NA	
Appendix 1, Table 3	grperu.dbf	
Appendix 1, Table 4	eructss.dbf	
Appendix 1, Table 5	spperu.dbf	