Appendix J

Information Summary and Analysis Process for the Experts Writing the Species Effects Sections

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To the extent that species information was available, effects writers for this SEIS compiled and analyzed species information with the aid of the summary forms and processes briefly described here.

Background

To ensure consistent interpretation and use of available information between writers of species-specific effects analysis across taxa groups, a process was developed to collect and summarize information and elements for each taxon. Writers were provided copies of all information available to, and the results of, the species review process panels. The writers were then asked to summarize the information.

Taxon Analysis Summary Table

Using the information from the species review process (see Appendix F) and their professional background with the species or group, each writer was asked to complete a Taxon Information Summary table for each species (see Figure J-1). To promote consistency, writers were provided with instructions and criteria for each element of the taxon information summary table (see Figure J-2). The table allowed the writer to summarize information on the range, distribution, population size, habitat, effect of Northwest Forest Plan land allocations, and number of sites for each species, as well as indicate the level of confidence in the answer. These tables were initially completed during the development of the Draft SEIS. In April 2000, during development of the Final SEIS, many of these Taxon Information Summary tables were updated with 1999 survey data and other new information .

Supplemental Taxon Summary Sheet

During development of the Final SEIS, writers were asked to complete a Supplemental Taxon Summary Sheet (Figure J-3) for each species, and were provided with instructions and criteria to promote consistency between writers (Figure J-4). Writers were also provided with a set of Effects Definitions (glossary terms) for use in the summary analysis (Figure J-5). In this process, the writers were asked to use the previous taxon information summary tables to characterize the historic and current overall range and distribution within that range. They were then asked to estimate the current and future biological distribution and size of individual populations. Writers were also asked to estimate the potential future condition of all four of these elements under the No-Action Alternative and the action alternatives. In all cases, the writers indicated the level of confidence in their answers.

Outcome/Uncertainty Matrix Form

Writers then estimated the stability of the species population, based on factors such as stability of the species' habitat and environment, number of sites, population size, and life history. Using their estimate of the stability of the species population and the information from the Supplemental Taxon Summary Sheet, the writers completed the Outcome/Uncertainty Matrix Form (Figure J-6),

including qualifying the level of uncertainty in the conclusion. As this process required the writer to compare expected distribution patterns against what would be considered "well-distributed" for the species, each was provided with a definition of a variety of distribution patterns that may be normal for different species (Figure J-7). A description of the outcomes and process for considering uncertainty are described in the Outcomes Determined from Species Stability and Changes of Patterns of Distribution section of Chapter 3&4.

Standard Conclusions

Finally, writers were asked to select from a series of standardized conclusions (Figure J-8) and provide the assumptions and rationale supporting the conclusion within the individual species effects section.

Figure J-1

Table #. Taxon Information Summary

Taxon:
Author:
Taxa Group:
Date:

Element	Level							Confidence		
Overall Range (2A3)	Wide-spread	Moderate	Limited	Very Limited	Extremely Limited	Unk.	Other	From Step 2 Notes		
Substantial Change from Historic Range	Yes	No				Unk.	Other	H	M	L
Distribution within Range (2A2)	Wide-spread and even	Wide-spread but spotty	Limited through-out	Limited to small portion		Unk.	Other	From Step 2 Notes		
Substantial Change from Historic Distribution	Increase	Decrease	No Change			Unk.	Other	H	M	L
Size of Individual Populations (2A1 comments)	High	Moderate	Low			Unk.	Other	H	M	L
Breadth of Habitat Association (2B1 & 2)	Very Broad	Broad	Medium	Narrow	Very Narrow	Unk.	Other	H	M	L
Distribution of Current Sites in Protected Land Allocations	Wide-spread and even	Wide-spread but spotty	Limited through-out	Limited to small portion		Unk.	Other	H	M	L

Figure J-1, continued

Element	Level							Confidence		
Distribution of Current and Projected Sites in Protected Land Allocations	Wide-spread and even	Wide-spread but spotty	Limited through-out	Limited to small portion		Unk.	Other	H	M	L
Potential Federal Habitat Protected (3D)	Low	Moderate	High			Unk.	Other	From Step 2 Notes		
Current and Projected Sites in Protected Land Allocations	High	Moderate	Low			Unk.	Other	H	M	L
Sensitivity to Management	High	Moderate	Low			Unk.	Other	H	M	L

Number/Proportion of Sites/Records

Total Records/Sites (2A1) _____
Federal Records/Sites (2A1) _____
Likely Extant Federal Records/Sites (table) _____
Federal Records/Sites in Protected Land Allocations (3C) _____

Comments: (Other information relative to interpreting the number of records/sites)

Figure J-2

Instructions and Criteria for Taxon Information Summary

Element Definition

Overall range of species within NFP area (based on known and suspected range) (from Step 2 Question 2A3).

Optional answers:
- Widespread within the NFP area (found or suspected in most provinces)
- Well distributed within NFP area (found or suspected in several provinces, over more than 1 state)
- Limited within NFP area (found or suspected in a few province, may be limited to one state)
- Very limited within NFP area (found or suspected in only 1 province or similar small area)
- Extremely limited within NFP area (only found or suspected at 1 or a few very specialized locations such as springs or natural refugia)
- Other

Substantial Change from Historic Range: Has there been a substantial change in the historic range of the species (not just our knowledge of the species' range)? ?

Optional answers:
- Yes
- No
- Unknown
- Other (describe)

Distribution of known sites within suspected range of the species in the NFP area (from Step 2 Question 2A2).

Optional answers:
- Widespread within the suspected range
- Found throughout the suspected range, but distribution of known sites spotty
- Limited locations scattered throughout the suspected range
- Limited locations confined to a small portion of the suspected range
- Other

Substantial Change in Distribution Within Species' Range from Historic:

Optional answers:
- Increase
- Decrease
- No Change
- Unknown
- Other (describe)

Figure J-2, continued

Size of Populations at Individual Sites (may be in Step 2, Question 2A1 comments):
- Optional answers:
  - High
  - Moderate
  - Low
  - Unknown
  - Other (describe)

Breadth of habitat association: If a broad or very broad habitat association is based on a simple lack of habitat knowledge, please indicate so. (from Step 2 Question 2B2.)
- Optional answers (based on the panel s current level of knowledge of species habitat):
  - Habitat requirements
    - Very broad (e.g. on wet to dry sites under conifers or hardwoods, permanent streams)
    - Broad (e.g. wet coniferous forest)
    - Medium (e.g. a few association series, rocky soils in forests)
    - Narrow (e.g. talus, 1 or 2 plant association series, serpentine, very oligotrophic lakes)
    - Very narrow (e.g. cliff face in fog zone, single uncommon tree species, caves, single uncommon plant association)
    - Other

Confidence in the knowledge of habitat association of species for above question: (from Step 2 Question 2B1.)
- Optional answers:
  - High - Habitat association is well known from species-specific studies or surveys with habitat data, representing a good portion of the range of the species and allowing us to define specific habitat associations across the range or fairly well known from survey or study with some habitat information, representing more than 1 part, but not all of, the range of the species and allowing for some specificity of habitat association across the range.
  - Moderate - general information based on several locations and surveys, with limited habitat information and/or limited coverage of range of the species, allowing for general description of habitat association across the range
  - Low - limited information based on a few locations and surveys, with limited habitat information and/or limited coverage of range of the species, allowing for very general description of habitat association across the range or poorly known - few to only one known location - little documented habitat information
  - Other

Distribution of currently-known sites within protected land allocations (LSR and Congressionally-withdrawn lands) as compared to the suspected range of the species in the NFP area.
- Optional answers: Within protected land, distribution of sites is:
  - Widespread and generally evenly distributed within the suspected range
  - Found throughout the suspected range, but distribution of known sites spotty
  - Limited locations scattered throughout the suspected range
  - Limited locations confined to a small portion of the suspected range
  - Other (describe)

Figure J-2, continued

Distribution of all sites (current and projected) within protected land allocations (LSR and Congressionally-withdrawn lands) as compared to the suspected range of the species in the NFP area.

Optional answers: Within land allocations, distribution of sites is:

- Widespread and generally evenly distributed within the suspected range
- Found throughout the suspected range, but distribution of known sites spotty
- Limited locations scattered throughout the suspected range
- Limited locations confined to a small portion of the suspected range
- Other (describe)

Likely proportion of all sites (current and projected) sites in protected land allocations (LSR and Congressionally-withdrawn lands):

- Low: a low proportion of the current and projected sites (approximately 1-19 percent) is likely to be within protective land allocations.
- Moderate: a moderate number of current and projected sites (approximately 20-70 percent) is likely to be within protective land allocations.
- High: most current and projected sites (> 70 percent) are likely to be within protective land allocations.

Confidence: High Moderate Low

Sensitivity to Management:

Number/Proportion of Sites/Records

Total Records/Sites (2A1) _____
Federal Records/Sites (2A1) _____
Likely Extant Federal Records/Sites (table) _____
Federal Records/Sites in Protected Land Allocations (3C) _____

Comments: (Other information relative to interpreting the number of records/sites)

Figure J-3

Supplemental Taxon Summary Sheet

Species: _____ Date: _____

Preparer: _____ (Attach list of reference materials)

Element	Level							Uncertainty		
Overall range (Geographic)	Wide-spread	Moderate	Limited	Very limited	Extremely limited	Other	Unk.	H	M	L
Historic										
Current										
Future: NAA										
Future: Alt 1										
Future: Alt 2										
Future: Alt 3										
Distribution within range (Geographic)	Wide-spread and even	Wide-spread but spotty	Limited through-out	Limited to small portion	Other	Unknown		H	M	L
Historic										
Current										
Future: NAA										
Future: Alt 1										
Future: Alt 2										
Future: Alt 3										
Biological distribution	Pattern 1 Isolated sites	Pattern 2 Isolated site clusters	Pattern 3 Limited connect-ivity	Pattern 4 Multiple connect-ivity	Other	Unknown		H	M	L
Historic (Reference)										
Current										
Future: NAA										
Future: Alt 1										
Future: Alt 2										
Future: Alt 3										
Size of individual populations	High	Moderate	Low	Other	Unknown			H	M	L
Historic										
Current										
Future: NAA										
Future: Alt 1										
Future: Alt 2										
Future: Alt 3										

Figure J-4

Instructions and Criteria for Supplemental Taxon Summary Sheet

Element Definition

Overall [suspected] range of species within NFP area (based on known and suspected range) (from Step 2 Question 2A3).

Optional answers:

Widespread within the NFP area (found or suspected in most provinces)
Moderate within NFP area (found or suspected in several provinces)
Limited within NFP area (found or suspected in a few province).
Very limited within NFP area (found or suspected in only 1 province or similar small area)
Extremely limited within NFP area (only found or suspected at 1 or a few very specialized locations such as springs or natural refugia)
Other (describe in text)
Unknown

Distribution of species occurrences **within suspected range of the species in the NFP area** (from Step 2 Question 2A2).

Optional answers:

Widespread within the suspected range
Found throughout the suspected range, but **actual occurrences** spotty
Limited locations scattered throughout the suspected range
Limited locations confined to a small portion of the suspected range
Other (describe in text) Unknown

Biological Distribution: *For a description of patterns, see Olson and O Dell 6/15 definition*

Optional answers:

Pattern 1: **Isolated sites**
Pattern 2: **Isolated site clusters**
Pattern 3: **Limited connectivity among multiple sites and/or clusters**
Pattern 4: **Multiple avenues of connectivity among sites and clusters**
Other (describe in text)
Unknown

Note: Where biological distribution occurs as a mixed pattern, indicate all patterns that may apply. Indicate in the text where each pattern identified in the mix applies.

Size of Individual Populations:

Optional answers: (note - factors influencing these responses need to be describe in the text)

High
Moderate
Low
Unknown
Other (describe)

Figure J-5

Effects Definitions

Well Distributed: This term is generally defined in the FEMAT report as

> *A geographic distribution of habitats that maintains a population throughout a planning area and allows for interaction of individuals through periodic interbreeding and colonization of unoccupied habitats.*

For species considered in this SEIS, this term is defined as

> *Distribution sufficient to permit normal biological function and species interactions, considering life history characteristics of the species and the habitats for which it is specifically adapted.*

Stable: A taxon that, over time, maintains population numbers, given inherent levels of population fluctuation and **variability of** habitats to which they are adapted. The species may become stable at a different population level than the current or (inferred) historical level.

Geographical Distribution: The physical distribution of a species as described at multiple scales, including the overall range within a landscape of interest, and the local distribution within its overall range.

Biological Distribution: The distribution of species occurrences in suitable habitats within its geographic distribution, interpreted according to the ability of that distribution to support **species** biological functions and species interactions.

Reference Distribution: Historic or inferred **biological** distribution pattern (limited by historic potential) that serves as a baseline to compare current and future distribution. For purposes of this analysis, the reference distribution is considered to be well-distributed .

Historic (as in distribution): In general, when applied to either biological or geographic distribution, refers to time periods before European settlement. Historic should be estimated over a long-enough period of time to encompass the range of variability resulting from disturbance and ecological processes.

Uncertainty: As used in the Outcome/Uncertainty matrix, is the lack of predictability **due to** lack of knowledge (basis to predict an outcome) or **due to** unpredictable environmental variation and stochasticity (risk to projected outcome). Disturbance within the expected range of variability should not be considered uncertainty.

Figure J-6

Survey and Manage Outcome Descriptions

Species:_____ Date:_____
Prepared By:_____

OUTCOME/UNCERTAINTY MATRIX FORM

Level of Uncertainty[1]	Outcome[2] 1 - Reference Distribution & Stable		Outcome 2 - Altered from Reference Distribution & Stable		Outcome 3 - Not Stable		Outcome 4[4] Unknown Distribution & Unknown Stability	
Low[3]	**1**		**2**		**3**		**10**	
Moderate	**4**		**5**		**6**			
High	**7**		**8**		**9**			

[1] Uncertainty, for this exercise, is defined as: Lack of predictability, either from lack of knowledge (basis to predict an outcome) or from environmental variation and stochasticity (risk to projected outcome).
[2]See Outcome Descriptions in definitions.
[3] Assumed level of Uncertainty if no other level is stated in the following standard conclusion statements.
[4] Outcome 4 should be used when information regarding a particular species results in an unknown distribution and unknown stability. The effects under each alternative would be the same. Therefore, if outcome 4 is used, it will apply to all alternatives.

The standard conclusion statements require a reason **(lack of knowledge or environmental stochasticity)** for moderate and high uncertainty.
Risk of loss of sites or change in referenced distribution due to management (i.e. the alternatives) is captured in the outcome matrix.

Figure J-7

Patterns of Biological Distribution

To assess *biological* distribution patterns across taxa and to make determinations of whether or not species are well-distributed, basic knowledge is needed of species rarity patterns (Rabinowitz 1981), population structure and dynamics (e.g., Gilpin and Hanski 1981; Harrison 1994), connectivity (e.g., Harrison and Voller 1998), and fragmentation (e.g., Meffe and Carroll 1997). These concepts incorporate habitat associations, dispersal abilities, and life history elements. The spectrum of potential distribution patterns might be somewhat reduced for rare endemic species, such as many of those under the Survey and Manage provision. However, several distribution categories can be described for such species with restricted spatial patterns.

This document provides a framework for classifying distribution patterns for Survey and Manage taxa, including patterns that would be considered well distributed.

Well distributed: For application to Survey and Manage species, well distributed means distributed sufficient to permit normal biological function and species interactions, considering life history characteristics of the species and the habitat for which it is specifically adapted. This can be restated as species Outcome 1: Habitat (including managed species sites) is sufficient to allow species to stabilize in a pattern similar to historic pattern of distribution.

Following are options for determining whether or not a species is assessed as well-distributed under the SEIS alternatives.

<u>Assumptions and Distribution Framework</u>

If historic distribution pattern is known:

In the context of this SEIS, the reference state of a taxon s distribution is its historic pattern in the planning area. As such, well-distributed refers to any historic species distribution, regardless of whether or not that distribution is likely to be stable. Thus, a well-distributed species with a very restricted spatial pattern may be in an unstable state and go extinct over the long-term.

If historic distribution is not known:

historic distribution might be inferred if the following 4 elements are known or can be estimated -- habitat associations, occupancy rate in suitable habitat, historic habitat distribution, and potential past disturbance signatures (e.g., gaps in distribution from catastrophic fires, landslides, volcanic explosions)

and if it cannot be inferred, our best knowledge is the currently known distribution (plus any inferences that are possible given limited knowledge), which is then our reference state for well-distributed.

Reference distributions for a species or taxa are a continuum from isolated sites to homogenous or continuous patterns across a landscape, with intermediate patterns having varying patch sizes and configurations, fragmentation and connectivity. As a framework for discussion, four categories

Figure J-7, continued

of species distribution patterns are described: 1) Isolated sites; 2) Isolated site clusters; 3) Limited connectivity of sites and/or clusters; 3) Multiple avenues of connectivity among sites and clusters. Across taxa, these are spatiotemporal scale- and grain-dependent categories. A species may be classified into a single category, or described as a mix of categories across its range (for example, ½ of known sites might be Pattern 1, ¼ in Pattern 2, and ¼ in Pattern 3).

Pattern 1: **Isolated sites** -- The species has highly isolated occurrences or populations, with little potential for gene flow between them. An extremely rare species may be known from a single site.

Pattern 2: **Isolated site clusters** -- The species is distributed as groups or clusters of occurrences or sub-populations, with good potential for gene flow among subpopulations within the groups (i.e., metapopulation or source-sink dynamics) and little potential for gene flow between the isolated groups. This distribution pattern results in a higher effective population size within site clusters than would occur if sites were isolated as in the first pattern, above.

Pattern 3: **Limited connectivity among multiple sites and/or clusters** -- The species has a spatial pattern with potential for connectivity between isolated sites or isolated site clusters. The distinction between this pattern of connected sites or clusters and isolated site clusters, pattern 2 above, may be a taxon specific determination, and may be an issue of spatio-temporal scale or spatial configuration. Strings of sites may have the potential for connectivity, but may not function as a cluster. Gene flow between sites and clusters may be less frequent than within isolated clusters. Populations in distinct geographic locations or ecoregions might be identified as separate clusters, and connectivity may occur as intervening stepping stones of suitable habitats, refugia or suboptimal dispersal habitats.

Pattern 4: **Multiple avenues of connectivity among sites and clusters** -- The species has multiple sites and/or clusters of sites which are nested within a web of potential inter-connections. The extreme case would be a homogeneous or uniform distribution pattern. Many species with specific habitat affinities occurring in heterogeneous landscapes would have gaps in their distribution, but could still maintain multiple potential connectivity pathways.

Not well-distributed (or Outcomes 2 or 3) indicates that the distribution has been significantly altered from the historic state via anthropogenic disturbance or will be altered from current state by the SEIS alternatives such that population and/or habitats are affected such that interactions among individuals are limited in some portions of their range. To become not well-distributed is a taxon-specific determination, a taxon may be assessed to move between distribution categories, or to have a significantly altered distribution within a category. Examples of determinations of not well-distributed are provided below for each distribution pattern.

Figure J-7, continued

Pattern 1: For a species with a distribution of isolated sites, loss of any sites might be considered a dire condition and assessed as becoming not well-distributed.

Pattern 2: Loss of single sites might **not** result in a not well-distributed assessment for Pattern 2. However, loss of single sites that serve a significant role for population persistence, such as a source subpopulation within a cluster of neighboring sites, or in the biological diversity of the taxon (e.g., a distinct population segment), might result in a determination of not well-distributed. If there are few clusters, risk to a single cluster might result in a not well-distributed determination. Depending on number of sites and clusters, and their distribution across the species range, loss of single or multiple significant sites or site-clusters may or may not result in a not well-distributed determination. Each potential loss scenario needs to be evaluated in terms of its effect on the effective population size and influence on population or metapopulation stability.

Pattern 3: Loss of single sites might **not** result in a not well-distributed assessment for Pattern 3. However, loss of single sites that serve a significant role for population persistence, such as a source subpopulation within a cluster of neighboring sites or a stepping stone subpopulation along a connectivity area, or in the biological diversity of the taxon (e.g., a distinct population segment), might result in a determination of not well-distributed. If there are few clusters, risk to a single cluster might result in a not well-distributed determination. Depending on number of sites and clusters and connectivity areas, and their distribution across the species range, loss of single or multiple significant sites or site-clusters may or may not result in a not well-distributed determination. Each potential loss scenario needs to be evaluated in terms of its effect on the effective population size and influence on population or metapopulation stability.

Pattern 4: For a species with multiple avenues of connectivity among sites and clusters, it might be possible for it to remain well-distributed with numerous losses of sites and connections among sites, and gaps in its distribution. However, fragmentation should be recognized as a serious risk to population stability, and the projected distribution pattern need not move to the limited connections category for it to be determined to be not well-distributed. As in Pattern 3, loss of single sites that serve a significant role for population persistence, such as a source subpopulation within a cluster of neighboring sites or a stepping stone subpopulation along a connectivity area, or in the biological diversity of the taxon (e.g., a distinct population segment), might result in a determination of not well-distributed.

Pattern Mix: For a species that is best described as having a mix of distribution patterns across its range, the mix should be assessed under the different management alternatives and compared to the reference state. To become not well-distributed, the change within and among patterns should be described, using concepts such as those presented above for Patterns 1-4. Are potentially significant sites, clusters, or connections affected?

Figure J-8

STANDARD CONCLUSIONS

(Listed by cell number as they appear in above table)
In moderate or high uncertainty conclusion statements, name **and describe** the source of uncertainty (lack of knowledge or **environmental** stochasticity).

L-1. Alternative ___would provide sufficient habitat (including known sites) to allow the species to stabilize in a pattern similar to its reference distribution.

L-2. Alternative ___would provide habitat (including known sites) sufficient to allow species to stabilize in a pattern different from its reference distribution..

L-3. Alternative ___would provide inadequate habitat to maintain the species.

M-1. While there is a moderate level of uncertainty due to (lack of knowledge or unpredictable stochastic event - describe), Alternative ___would provide sufficient habitat (including known sites) to allow the species to stabilize in a pattern similar to its reference distribution.

M-2. While there is a moderate level of uncertainty due to (lack of knowledge or unpredictable stochastic event - describe), Alternative ___would provide habitat (including known sites) sufficient to allow species to stabilize in a pattern different from its reference distribution.

M-3. While there is a moderate level of uncertainty due to (lack of knowledge or unpredictable stochastic event - describe), Alternative ___would provide inadequate habitat to maintain the species.

H-1. While there is a high level of uncertainty due to (lack of knowledge or unpredictable stochastic event - describe), Alternative ___would provide sufficient habitat (including known sites) to allow species to stabilize in a pattern similar to its reference distribution.

H-2. While there is a high level of uncertainty due to (lack of knowledge or unpredictable stochastic event - describe), Alternative ___would provide habitat (including known sites) sufficient to allow species to stabilize in a pattern different from its reference distribution.

H-3. While there is a high level of uncertainty due to (lack of knowledge or unpredictable stochastic event - describe), Alternative ___would provide inadequate habitat to maintain the species.

4. There is insufficient information regarding this species to determine how any alternative would affect distribution and stability.

NOTE: Do not use low uncertainty in relation to the low uncertainty row. We will assume it is low uncertainty if there is not a moderate or high qualifier.