

## Rating Guide:

### Flammulated owl (*Otus flammeolus*)

#### Rating Scheme:

A 4-Class rating scheme will be utilized given the available time for project completion, although habitat knowledge exceeds an 'Intermediate' level (DeMarchi et al. 1997). The 2-season (winter and growing) rating system utilizing the 'Growing', code G, will be used since the Flammulated owl is migratory and only its breeding habitat will be modeled.

#### Notes:

Post-fledging habitat accounts for the knowledge limitations of Flammulated owl habitat requirements. However, assumptions can be made with reasonable confidence based on field observations (pers. obs.), limited data (unpub. data 1996), and published results of field investigations in Colorado (Linkhart and Reynolds 1987). Post-fledging habitat is likely characterized by forest structure that provides cover adjacent to openings, similar to foraging habitat, and provides opportunities for flight development. The greatest knowledge gap is the spatial relationship of habitat features in post-fledging habitat. For example, large openings may be required for birds learning to hunt. However, fledglings' nightly increase in distance from the nest tree is not well documented. As well, fledglings may require larger openings adjacent to security cover than foraging habitat utilized by nesting adults. The spatial orientation of the larger openings with nest sites is unknown and likely important for pre-and post-fledging security.

#### Modeling Theme:

The model will predict breeding, foraging, and security habitats **for the period generally starting early May and lasting until the fledging period of mid-July to early August. It is recognized that the model will include habitat for a portion of the non-breeding males in the population.** This covers, respectively, Activities Reproducing, Feeding, and Security, and Codes RP, FD, and SH from DeMarchi et al. (1997).

#### Suppressed or Unrated Values:

North, east and west aspects (cold, cool and warm) were suppressed in the IDF mw2, IDF dk1, dk2 and dk3 variants due to a lack of sampling. Certain elevational ranges were suppressed within different zones based upon sampling experience and biogeoclimatic data (Lloyd et al. 1990). All variables were valued based on field data, literature, and field experience working with the Flammulated owl.

#### Hierarchy of Life Requisites and/or Seasonal Use Patterns:

Seasonal use patterns in the Southern Interior of British Columbia are breeding habitat occupancy between early May and late August (Christie 1994, van Woudenberg 1992, Cannings and Cannings 1982).

Spring migration arrival to B.C. is early to mid May (van Woudenberg 1992, Campbell et al. 1990). Clutch initiation is mid-May to mid-June (Cannings et al. 1978) and fledging occurs between mid-July to late August (Christie 1994, van Woudenberg 1992; pers. obs.). Post-fledging period is suspected to last between late July/mid-August until late September/mid-October (pers. obs., unpub. data 1996).

Life requisites are prioritized by food supply (large insect abundance – Lepidopterans and Orthopterans) and security cover (thickets of regenerating Douglas-fir 8-15m tall), and then by nest cavities (Pileated woodpecker or Common flicker) in suitable nest trees (snags or veteran Ponderosa pine or Douglas-fir >35cm DBH). Availability of food supply depends on small openings (<0.5ha) adjacent to Douglas-fir thickets (security cover) (unpub. data 1996, van Woudenberg 1992). Also, canopies of large diameter, veteran trees can provide insect food; if heavily branched, these trees can also provide roost and song positions for owls (McCallum 1994).

### **Habitat Use/Ratings Assumptions:**

Note: Ratings are based on the following three sources:

- (1) field data and observations from British Columbia and United States authors,
- (2) digitally derived data from Christie (1996) and
- (3) digitally derived data extracted from newly derived Forest Cover inventory data (to be used for the model) using confirmed nest site locations documented in Christie (1996). The new digital data is referred to as “1998 digital data” and is the basis for the ratings used for the model.

Due to the generalized nature of the digital aspect data, rankings have been selected which best represent the more detailed field information. This has resulted in no nil ranking for the digital aspect data. Many inferences about stand characteristics and terrain have been derived from Lloyd et al.(1990) for the more poorly understood/sampled zones and variants.

### **Forest Cover**

1. Age Class Utilization: high = 9-7; medium = 6; low = 5; Nil<5 (Christie 1996 and 1998 digital data and ground truthing).
2. DBH (nest tree and/or leading species): high > 25 cm; medium <=25 and > 20 cm; low <= 20 and > 15 cm; nil <= 15 cm.
3. Crown Closure: high = 36-65%; medium = 26-35% and 66-75%; low = 16-25% and 76-85%; Nil < 16 and > 85% (1998 digital data); high = 40-50%; medium = 30-40%; low = 20-30% and 50-60%; Nil < 20 and > 60% (Christie 1996); in southerly parts of the species range where Ponderosa pine is more abundant, from McCallum (1994): high = 25-30%; medium = 15-25% and 30-40%, low = 40-60% and 10-15%;nil <= 10 and > 60.
4. Primary (leading species): high = Fd; nil = anything other than Fd.
5. Secondary (sub-dominant species): high = Py; medium = none; low = At, Ac, Ep; nil = any conifer other than Py (IF > 10%) (Christie 1996, van Woudenberg 1992).

**Reliability: Good**

6. Activity\*: high = L; medium = L and none; low = L, T and J; nil = other (1998 digital data, van Woudenberg 1992, unpub data 1996). (L=logging, T=thinning, J=juvenile spacing).
7. Activity Year: high = 1960-1968; medium < 1960; low >= 1968 (L), <1969 (T) and <1938 (J) (1998 digital data, B. Olsen and D. Piggin pers comm.).

**Stand Characteristics**

1. Site Series: high = 3-4; medium = 2, 5 and 1; low = 6; nil = 7-9 (unpub data 1996, van Woudenberg 1992).
2. Biogeoclimatic Distribution: high = IDF xh2, xh1, xw (van woudenbegr 1992, D.Low pers comm., pers); medium = PP xh2, xh1 (Okanagan, St. John 1991, Cannings and Booth 1997, unpub data 1996), IDF xm (Williams Lake, unpub. data 1997), IDF dk1b; low = IDF dk1 (D.Low pers comm., pers obs), IDF dk2 (Merritt, Okanagan; Cannings and Booth 1997), IDF dk3-4 (Williams Lake, unpub. data 1997), maybe mw, nil=all moist IDF, BG, and any elevation greater than IDF.

**Terrain**

1. Slope: Digital equivalents: high = 6-30%; med = 0-5% and 36-45%; low = 46-60%; nil > 61%. Field: high = 15-25%; medium = 26-35% and 10-15%; low = 35-75% and 9-5%; nil <= 5% (Christie 1996, McCallum 1994, Christie 1994, van Woudenberg 1992).
  2. Aspect: Digital equivalents: high = west and south; medium = north; low = east; (Christie 1996, McCallum 1994, Christie 1994, van Woudenberg 1992). Field: high = west and south-west; medium = south, south-east and north-west; low = east and north-east; nil = north (Christie 1996, McCallum 1994, Christie 1994, van Woudenberg 1992).
  3. Elevation: (depends on BEC and forest cover – calibrated for IDF xh2) high = 900-1100m; medium = 800-900 and 1100-1200; low = 600-800 and 1200-1400; nil >= 1400 and < 600m (Christie 1996).
- Activity is ranked as low if there is logging (L) with no year entered in the corresponding Activity Year field. Could be nil if logging is recent.

**Other**

1. Water: 200 meter buffer around rivers and lakes = nil; 150 meter buffer around streams and indefinite lakes = nil; 100 meter buffer around indefinite streams, swamps and marshes. All other water features not buffered.

**Ecosystem Capability Rating Table**

| Ecosystem Hierarchy                  |         | Life Requisite |                          |
|--------------------------------------|---------|----------------|--------------------------|
|                                      |         | Lg             | Comments                 |
| Biogeoclimatic Subzone Variant Phase | BGxh1   | 3              |                          |
|                                      | BGxh2   | 3              |                          |
|                                      | BGxw1   | 3              |                          |
|                                      | PPxh1   | 1              |                          |
|                                      | PPxh2   | 1              |                          |
|                                      | IDFxh1  | 0              |                          |
|                                      | IDFxh2  | 0              |                          |
|                                      | IDFxm   | 0              |                          |
|                                      | IDFdk1  | 2              | Step up 1 on Hot Aspect* |
|                                      | IDFdk1b | 1              |                          |
|                                      | IDFdk2  | 2              | Step up 1 on Hot Aspect* |
|                                      | IDFdk3  | 2              | Step up 1 on Hot Aspect* |
|                                      | IDFmw2  | 2              | Step up 1 on Hot Aspect* |
|                                      | Other   | 3              |                          |

\* Hot Aspect = 136 – 240 degrees (southerly).

- Habitat ratings based on documented nesting habitat variables for IDF xh2 (Christie 1996). Adjustments are made for differences between BEC zones, subzones and variants and the resultant habitat shifts relative to slope and aspect. Inferences about stand characteristics and terrain have been derived from Lloyd et al. (1990) for the more poorly understood/sampled zones and variants.

**Rating Adjustments**

Rating adjustments utilize a secondary rating adjustment to initial habitat suitability ratings applied using Biogeoclimatic classification. A rating value of zero implies that the habitat attribute has no effect on the initial rating. A rating value of one reduces the initial rating by one, a value of two reduces the rating by two. A value of three implies that the habitat is unsuitable based upon the attribute in question. Unless otherwise stated, forest cover variables used in the adjustments are for Layer 1 only.

**Forest Cover**

**1. Age Class**

Table 1.0

| Structural Stage | Stand Age (years) | Stand Age Class | Life Requisite |                 |
|------------------|-------------------|-----------------|----------------|-----------------|
|                  |                   |                 | <b>Lg</b>      | <b>Comments</b> |
| Pole/Sapling     | 1 - 20            | 1               | 3              |                 |
|                  | 21 - 40           | 2               | 3              |                 |
| Young Forest     | 41 - 60           | 3               | 3              |                 |
|                  | 61 - 80           | 4               | 3              | * #             |
|                  | 81 - 100          | 5               | 2              | * #             |
| Mature Forest    | 101 - 120         | 6               | 1              | * #             |
|                  | 121 - 140         | 7               | 0              | *               |
|                  | 141 - 250         | 8               | 0              | *               |
| Old Forest       | 251 +             | 9               | 0              | *               |

\* Stepped up 1 if Activity = 'L' and Activity year < 1979.

# Stepped up 1 if Veteran Layer > 6 or if Maximum Age > 6.

**2. Tree Species Effect**

Table 2.1 Leading Species.

| Tree Species        | Species Code | Life Requisite |   |
|---------------------|--------------|----------------|---|
|                     |              | <b>Lg</b>      | <b>Comments</b>   |
| Douglas fir         | Fd           | 0              |   |
| Ponderosa Pine      | Py           | 2              | If secondary species = Fd and secondary species >= 30%. |
| Other than Fd or Py | Not Fd or Py | 3              |   |

Table 2.2 Secondary Species.

| Tree Species                                    | Species Code | Life Requisite |                      |
|---|--------------|----------------|----------------------|
|   |              | <b>Lg</b>      | <b>Comments</b>      |
| Other than Py, At, Ac, Ep and none.             |              | 3              | If > 30%.            |
| “ “   |              | 2              | If <= 30% and > 15%. |
| “ “   |              | 1              | If <= 15%.           |
| None  |              | 1              |                      |
| Trembling aspen, Black cottonwood, Paper birch. | At, Ac, Ep   | 2              | If > 30%.            |
| Trembling aspen, Black cottonwood, Paper birch. | At, Ac, Ep   | 1              | If <= 30%.           |
| Ponderosa pine                                  | Py           | 0              |                      |

## 2. Crown Closure Effect

Table 3.0

| Crown Closure Range % | Crown Closure Class | Life Requisite |                 |
|-----------------------|---------------------|----------------|-----------------|
|                       |                     | <b>Lg</b>      | <b>Comments</b> |
| 0 – 5                 | 0                   | 3              |                 |
| 6 – 15                | 1                   | 2              |                 |
| 16 – 25               | 2                   | 1              |                 |
| 26 – 35               | 3                   | 0              |                 |
| 36 – 45               | 4                   | 0              |                 |
| 46 – 55               | 5                   | 0              |                 |
| 56 – 65               | 6                   | 0              |                 |
| 66 – 75               | 7                   | 1              |                 |
| 76 – 85               | 8                   | 2              |                 |
| 86 – 95               | 9                   | 3              |                 |
| 96 - 100              | 10                  | 3              |                 |

## 4. Activity\* Effect

| Activity         | Activity Code | Life Requisite |                            |
|------------------|---------------|----------------|----------------------------|
|                  |               | <b>Lg</b>      | <b>Comments</b>            |
| Juvenile Spacing | J             | 3              | Eliminates security cover. |
| Other activities |               | 0              |                            |

**Terrain**

**1. Slope Effect**

Table 1.0

| Slope Range (%) | Slope Class | Life Requisite |                               |
|-----------------|-------------|----------------|-------------------------------|
|                 |             | <b>Lg</b>      | <b>Comments</b>               |
| 0 – 5           | 1           | 1              |                               |
| 6 – 30          | 2           | 0              |                               |
| 31-45           | 3           | 1              | Step up 1 for IDFdK and IDFmw |
| 46 - 60         | 4           | 2              | Step up 1 for IDFdK and IDFmw |
| 61 +            | 5+          | 3              |                               |

**Other**

**1. Water Effect**

| Water Feature       | FCODE          | Life Requisite |                                  |
|---------------------|----------------|----------------|----------------------------------|
|                     |                | <b>Lg</b>      | <b>Comments</b>                  |
| River               | GA90000110,120 | 3              | 200 meter buffer around feature. |
| Lake                | GB15300000     | 3              | 200 meter buffer around feature. |
| Lake - indefinite   | GB15300130     | 3              | 150 meter buffer around feature. |
| Stream              | GB24850000     | 3              | 150 meter buffer around feature. |
| Stream - indefinite | GB24850140     | 3              | 100 meter buffer around feature. |
| Marsh               | GC17100000     | 3              | 100 meter buffer around feature. |
| Swamp               | GC30050000     | 3              | 100 meter buffer around feature. |
| All others          |                | 0              |                                  |

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## **Personal Communications**

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