LEAST FLYCATCHER

(Empidonax minimus)

Source: Salt and Salt (1976)

Prepared for Millar Western Forest Products'
Biodiversity Assessment Project

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May 2000

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1.0 CONSERVATION AND THE EFFECT OF FOREST ACTIVITIES

1.1 Introduction

From spring until early fall, the forests east of the Rocky Mountains in Canada and the United States are home to the Least Flycatcher *(Empidonax minimus,* Bent 1942, Figure 1). The southward migration to Texas, Mexico, or Central America occurs in July and August (Bent 1942; Sealy and Biermann 1983).

Within its summering range, the Least Flycatcher is the smallest representative of its genus. Though its prominent eye ring, bright white ventral side, and white wing bars make it easily identifiable (Bent 1942), it may be mistaken for other *Empidonax* flycatcher species if not engaging in its distinctive song (Villard pers. comm. 1999).

1.2 Effects of Forest Management Activities

The evidence presented in the literature regarding the impact of forestry on Least Flycatchers is conflicting. Some biologists suggest that the Least Flycatcher is able to nest and forage in stands with variable overstorey characteristics (Darveau *et al.* 1992) and state that it may even enjoy the edge environment (Bent 1942; Freemark and Merriam 1986). Others have noted that Least Flycatcher occurrence decreases with increasing edge association (Della Sala and Rabe 1987; Villard *et al.* 1999). In addition, the unpublished data of Villard and Bourque (1999) suggest that edge is neither beneficial nor detrimental to the Least Flycatcher, as no significant relationship was found between its presence and behaviour and experimentally-created forest edge habitat.

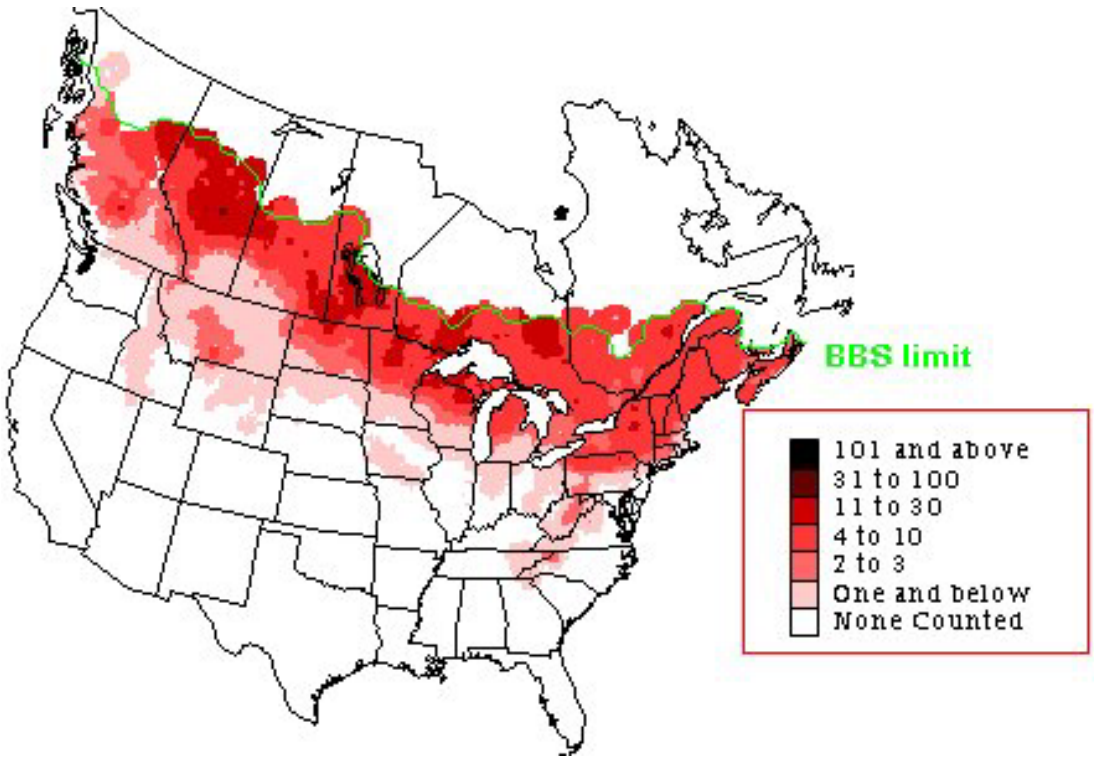

Figure 1. Breeding distribution of the Least Flycatcher in North America, BBS data (Gough *et al.* 1998).

2.0 HABITAT USE INFORMATION

2.1 Food Requirements

The insectivorous Least Flycatcher uses four feeding techniques: hovering, hawking, flush-chasing, and gleaning (Robinson and Holmes 1982). Hovering is by far the most prevalent technique (Table 1).

A flycatcher's diet is composed predominantly of insects of the orders *Hymenoptera*, *Coleoptera*, and *Diptera* (Bent 1942; Robinson and Holmes 1982). *Diptera* are the least favoured (Table 2).

As an insectivore, the Least Flycatcher requires foraging habitat with a high density of accessible prey. Though it seems that deciduous stands are preferred, populations of Least Flycatchers have also been found in pine, fir, spruce, and tamarack stands (Bent 1942; MacQueen 1950). Within a stand, the bird does not prefer one tree species to another and has an equal probability of feeding on or around any tree within its home range (Rogers 1985). In spring, the bird may enjoy the opportunity to feed among alders along the banks of streams (Bent 1942).

Well-developed canopies with significant total crown height are favoured. Research by Darveau *et al.* (1992) has shown that total crown height of 8.1 to 11.4 m is optimal for foraging.

To ensure accessibility of the prey, the bird must have space to perform its hovering and hawking techniques. Therefore, an important variable in determining access to suitable foraging sites is the density of the understorey. A relatively clear understorey is preferred (Darveau *et al.* 1992).

2.2 Cover Requirements

Though the Least Flycatcher is frequently subjected to the advances of predators and the threat of nest parasitism by Brown-headed Cowbirds, its specifications for cover are not as stringent as would be expected (Bent 1942; Briskie and Sealy 1987). The bird has been observed to nest in relatively open woodlands adjacent to clearings (Bent 1942) and canopy closure was not shown to be a critical habitat element in the study completed by Darveau *et al.* (1992). Instead, the Least Flycatcher relies on its intensive aggression as protection from these disturbances (Bent 1942; Briskie and Sealy 1987) and cover requirements do not appear to be limiting.

Table 1. The foraging techniques used by the Least Flycatcher.

Foraging Technique	Description	Percentage of Feeding Efforts Using this Method
Hovering	Prey is picked from a substrate, usually the foliage of a tree, while the bird is in flight.	81%
Hawking	The bird searches for prey from a perch in a relatively open stand below the main canopy. It pursues and captures prey while in flight.	10%
Flush-chasing	The bird chases the prey in a long downward flight.	6%
Gleaining	The bird stands still and removes stationary prey from the leaves of a tree or shrub.	3%

Table 2. The diet of the Least Flycatcher.

Order	Percentage of Diet
Hymenoptera (ants, bees, and wasps)	15-41%
Coleoptera (beetles)	28-50%
Diptera (flies)	11-21%

2.3 Reproduction Requirements

Although nests have been identified in pure coniferous stands at little more than 2 m above the ground, the Least Flycatcher most often nests in tall deciduous trees, usually more than 7 m above the ground (Bent 1942; MacQueen 1950; Murphy 1983; Rogers 1985; Darveau *et al.* 1992). Nests of bark, twigs, and grasses are constructed shortly after the return migration from the wintering area (Bent 1942). One egg per day is deposited into the nest for a total of two to five eggs (an average of four, Bent 1942; Briskie and Sealy 1989a; Briskie and Sealy 1989b).

Research by Rogers (1985) revealed that the Least Flycatcher's choice of nesting sites is based on the stand's ability to provide sufficient food resources for adults and their young. Since the presence of other Least Flycatcher pairs within a particular section of the forest is a strong incentive to settle, Darveau *et al.* (1992) pointed out that selection is also a social decision. In general, a stand suitable for foraging is also suitable for nesting (Rogers 1985).

2.4 Habitat Area Requirements

The home range of a pair of Least Flycatchers varies with the density of conspecific birds populating the stand. Records of Davis' observations (1959) show that a single territory may be as large as 1.13 ha if the population density of flycatchers in the forest is low. In contrast, a territory may be only 0.025 to 0.09 ha in a highly populated stand (Rogers 1985). Average territories range from 0.14 to 0.22 ha. For HSM development, the home range will be set at one pixel (25 m X 25 m) or 0.0625 ha.

2.5 Landscape Configuration Requirements

Since the literature review revealed no consensus as to the Least Flycatcher's relationship to edge habitat, we will assume, at this time, that the birds are indifferent to its presence. Therefore, edge habitat is not considered further in the development of the HSM. Bent (1942) observed the birds foraging preferentially in streamside habitats.

2.6 Sensitivity to Human Disturbance

The Least Flycatcher is well adapted to human environments (Bent 1942) and there is no evidence in the literature that the bird is negatively influenced by human activities.

3.0 MODEL

3.1 Envirogram

The availability of appropriate food resources is the most important habitat element for the Least Flycatcher. As shown in Figure 2, several forest attributes are thought to influence the bird's ability to acquire food.

In deciduous-dominated stands that support trees with well-developed crowns, there are suitable populations of insects available for the Least Flycatcher. In particular, stands close to streams are considered most valuable. For the bird to successfully perform its foraging techniques, it requires relatively clear free-to-manoeuvre flying space.

3.2 Application Boundaries

Season: This model produces SI values for use during spring and summer.

Habitat Area: Home range is equal to the area of one pixel. Because of the small size of this territory, no home range smoothing is required.

Model Output: The model assigns a SI value for foraging habitat to each 25 m pixel of forested habitat.

3.3 Model Description

The HSM for Least Flycatcher spring and summer habitat (Figure 3) follows the structure described in the envirogram. As shown above, food availability is a function of deciduous composition of the stand, degree of crown development, and proximity to streams. In addition, the birds require sufficient flying space. Deciduous representation, crown height, and flying space can all be inferred from habitat type. Therefore, the SI_{food} consists of only two variables: habitat type and proximity to streams. Though the experience of Villard (pers. comm. 1999) causes him to doubt the Least Flycatcher's supposed attraction to stream habitats, we will include proximity to stream as a minor variable in the model. The suitability rating of pixels in proximity to streams is improved with the use of a bonus function.

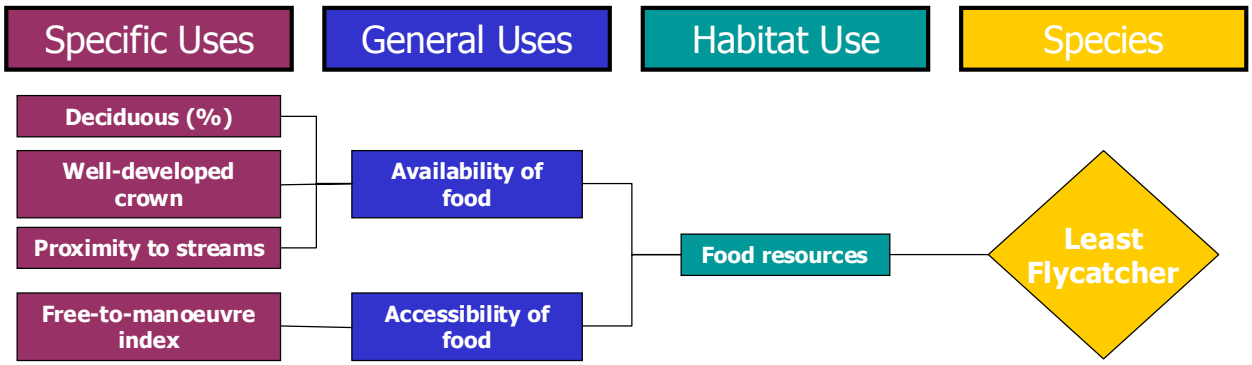

Figure 2. Envirogram of the Least Flycatcher based on available habitat information for HSM development.

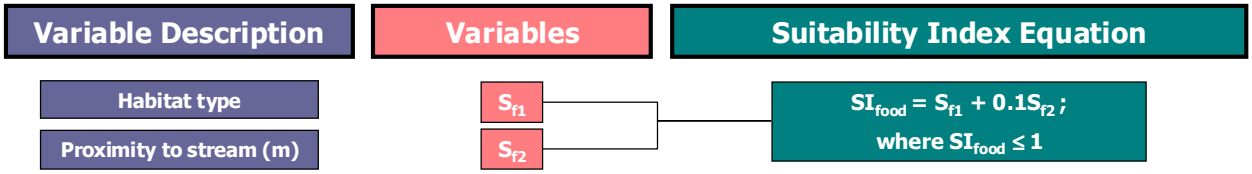

Figure 3. HSM structure for the Least Flycatcher within Millar Western's FMA area.

3.4 Habitat Variable SIs

The SI_{food} includes variables indicating habitat type (S_{f1}) and proximity to streams (S_{f2}).

All habitat types in the opening and regenerating stages of development are not considered valuable for the Least Flycatcher and have, therefore, been rated 0 for variable S_{f1}. Suitability ratings applied by habitat type are shown in Table 3 below.

A bonus is given to pixels in proximity to streams. Pixels adjacent to streams receive a suitability rating of 1 for this variable.

3.5 Computation

Each pixel is first given a rating of suitability as foraging habitat based on its habitat type: S_{f1}. Following this, a bonus is applied to all forested pixels within 25 m of a stream environment. To accomplish this, the streams within the FMA area are buffered to a distance of 25 m. All pixels existing within the buffer receive a rating of 1 for variable S_{f3}. A bonus is applied to these pixels as follows:

$$\mathbf{SI_{food} = S_{f1} + 0.1S_{f2};}$$

$$\mathbf{where\ SI_{food} \leq 1.}$$

Table 3. Least Flycatcher suitability ratings for variable S_{f1} by habitat type.

		Opening	Developing		Forest		Old
Broad	Specific	Clearcut & Burns	Regenerating	Young	Immature	Mature	Old
Hardwoods	Aspen					1	1
	Poplar					1	1
	White birch					1	1
Hardwood Mixed	Aspen-Pine					.8	.8
	Aspen-White spruce					.8	.8
	Aspen-Black spruce					.8	.8
	Poplar-Pine					.8	.8
	Poplar-White spruce					.8	.8
	Poplar-Black spruce					.8	.8
Softwood Mixed	Pine-Poplar					.6	.6
	Pine-Aspen					.6	.6
	White spruce-Poplar					.6	.6
	White spruce-Aspen					.6	.6
	Black spruce-Poplar					.6	.6
	Black spruce-Aspen					.6	.6
Conifers	Pine					.4	.4
	White spruce					.2	.2
	Black spruce					.2	.2
	Larch					.2	.2

4.0 EXTERNAL REVISION

Arlen Todd, wildlife biologist with Alberta Environment, Fisheries and Wildlife Management Division, in Whitecourt, Alberta read a draft version of the Least Flycatcher HSM on June 17, 1999. He did not recommend any substantial changes.

Dr. M.A. Villard from the University of Moncton reviewed a draft version of the Least Flycatcher HSM on July 7, 1999. The following changes were made based on his advice:

1) The early draft had stated that Least Flycatchers were sufficiently distinctive in appearance that they could be easily distinguished by familiar observers. Villard mentioned that the Least Flycatcher is often confused with other *Empidonax* species unless it engages in its distinctive song.

2) The original model enhanced the value of edge habitat since the reviewed references had suggested that edge was beneficial. Villard presented additional references to indicate that the birds may either avoid or are indifferent to edge habitat.

3) Villard stated that, in his experience, there seemed to be no correlation between Least Flycatcher habitat use and the presence of streams. Since we had come across this suggestion in the published literature, we decided to retain it as a variable in the model, though its influence on habitat suitability is small.

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