WILDLIFE ECOLOGY AND HABITAT MANAGEMENT

FOREST STEWARDSHIP MANAGEMENT NOTE #40

WHAT IS WILDLIFE ECOLOGY?

Wildlife ecology is a science that attempts to understand the habits of native and naturalized animals, what controls their population levels, and how they can be managed.

Although all animal species are sometimes included in the definition of "wildlife", most wildlife ecologists generally deal with mammals and birds, especially game species. Other animals are usually studied by specialists, such as fisheries biologists, entomologists, etc. Wildlife management is a closely related discipline that applies the theories of wildlife ecology to practical problems.

This Note gives a brief overview of selected concepts from the field of wildlife ecology that have special relevance for private woodland managers and summarizes of how these concepts can be applied.

1. POPULATION DYNAMICS - The basic mechanisms by which population sizes of wildlife species are determined are summarized in the following equation:

   POP. SIZE = REPRO. CAPACITY - ENVIRONMENTAL RESISTANCE

   Where,

Pop. Size = actual population size.
Repro. Capacity = population size under ideal conditions.
Environ. Resistance = Welfare Factors + Decimating Factors:

   And,

Welfare Factors = habitat requirements, such as food, cover, water, space, and special requirements, the lack of which indirectly cause mortality.
Decimating Factors = direct causes of mortality, such as predation, and disease.

2. "THE" LIMITING FACTOR - Although several environmental resistance factors may be affecting individual members of a population, one factor, termed the limiting factor (or bottleneck), will have an overriding effect on the size of the population at a given time and place.

3. BIOLOGICAL CARRYING CAPACITY - The maximum population size that an area can support without degrading the quality of the habitat is known as the biological carrying capacity (see FSMN #42 for a discussion of cultural carrying capacity and biodiversity carrying capacity). The concept is usually applied to herbivorous species, such as deer and rabbits.

4. HABITAT SELECTION - Although, the success of a species ultimately depends to a great extent on the availability of welfare factors, we do not know much about these factors for many species. Furthermore, ecologists believe that many animals are themselves unable to directly detect some of these factors at the time they select habitats in which to live. Rather, it appears that animals often key in on readily detected habitat characteristics that are not welfare factors themselves but that indicate the presence of welfare factors.

5. THE NON-EQUILIBRIUM NATURE of NATURE - The idea that natural populations of plants and animals, if undisturbed by humans, tend toward a state of approximate equilibrium, or balance, in which populations are fairly stable has been a common concept about nature throughout history. There is surely some truth to this notion, but the consensus of ecologists in the late 20th century has swung toward the idea that nature is in constant change.

WHY ARE THESE WILDLIFE ECOLOGY CONCEPTS IMPORTANT?

1. POPULATION DYNAMICS - A population dynamics perspective provides an overview of the possible factors that may be limiting population levels of wildlife species. Efforts to increase or decrease the population of a species should consider all of these factors.

2. "THE" LIMITING FACTOR - The theory that wildlife populations are controlled at any point in time by a single limiting factor is often impossible to apply. This is because the data required to determine the identity of the limiting factor in a given situation is often impossible or too expensive to obtain. Nevertheless, the concept should always be kept in mind to prevent unrealistic expectations about the effects of management practices.

   For example, predators may be killing grouse, but if winter food is the limiting factor for grouse, reducing predators would not increase grouse numbers as those saved from predation would die of starvation anyway. On the other hand, if predation is the limiting factor, increasing the amount of winter food would not increase grouse numbers because those saved from starvation would be taken by predators.

   The population size of a species is seldom limited by its reproductive capacity. More animals are almost always produced by natural reproduction than can survive the various forms of environmental resistance they are subjected to. Thus, animal stocking practices are usually limited to expensive "put and take" programs or to situations where the breeding stock in an area has been eliminated or reduced to very low levels.

3. BIOLOGICAL CARRYING CAPACITY - Although it is usually impractical to determine the actual population size at biological carrying capacity, the habitat deterioration that accompanies this state is easily detected and is a warning signal that immediate action should be taken to reduce the population size (FSMN #42).

4. HABITAT SELECTION - The concept of habitat selection described above is useful because it allows us to predict the species of wildlife that are likely to occur in various habitats and to design our management practices to encourage selected species even though we may not know their true habitat requirements. So far, vegetation structure has proven to be the most successful indicator of habitat suitability for many species (FSMN #41).

5. THE NON-EQUILIBRIUM NATURE of NATURE - The concept of continual change and uncertainty in nature is important to understand because it prevents us from expecting nature to "work right" if we "fix it". It gives us the humility to realize how little we know and that we are not in control.

HOW CAN THESE CONCEPTS BE APPLIED ON PRIVATE LANDS?

The most effective way to manage wildlife populations on private lands is indirectly through habitat management. Although habitat management is usually used to enhance welfare factors of desirable species, it may also be used to reduce welfare factors for undesirable species. Attempts to affect wildlife populations directly may be necessary in some cases, but unless habitat conditions change, through management or natural processes, any improvements brought about by such attempts will generally be short-lived.

Following is a three-step approach to habitat management:

1. IDENTIFYING DESIRED HABITATS - Begin by learning the preferred habitats of the species you wish to encourage (#1-7).

2. DEVELOP DESIRED HABITATS - Next, with the help of foresters and wildlife biologists, select management practices that will maintain, create, or improve the desired habitat types (#8, FSMN #24-31).

3. MAINTAIN DESIRED HABITATS - Finally, realize that the key to managing habitat for wildlife is to understand the natural dynamics of the vegetation (FSMN #41). Observe the changes taking place on the land and schedule management practices with a long-term perspective and be prepared to adapt to unexpected events.

REFERENCES

FSMN #'s refer to other Forest Stewardship Management Notes in this series.

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