Behavioral Studies in the Alaska Rain Forest

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The mist-bound lives of Alaska's rainforest animals exert special fascination. The coastal forests are remote from population centers, the animals themselves are difficult to observe, the country in which they live is vast and rugged and the area as a whole is relatively little-known and little-publicized. Because of these factors, viable populations of species like the Bald Eagle and entire forest landscapes persist on Alaska's coasts. However, their survival is not assured. Individual humans, interacting with individual forest animals, will ultimately decide the future of these species. Long-term study of animal behavior in this natural setting is essential to define requirements for survival, to monitor and inventory individuals and communities and to assess the effects of human activity and management policy. To cover such wide-ranging topics adequately, the discussion will need to address issues of many different kinds.

General Overview

The two sections that will follow are entitled "Biological Context" and "Observing and Recording." The common basis of these discussions is the observation that although every ecological setting offers unique biological relationships for study along with varying practical difficulties, scientists have developed standard techniques for observing behavior that work well in a variety of settings. These humane techniques are equally useful for studying eagles in a Southeastern Alaska rainforest, baboons in an African grassland and human children in a laboratory preschool. When using these techniques, it is essential to recognize the special qualities and the natural and cultural history of each specific setting for behavior - unique and distinct, as in the three cases cited above. This context inevitably contributes to the interpretation of field observations and even to the perception of ongoing behavior. The overall scientific context for these and all such studies is the realization that individual animals have distinct, unique personalities which affect behavior, ecology and evolution. Similarly, individual forest trees may well be distinct in ecologically significant ways. New information on Alaskan rainforest plant individuality could shed light on forest animal behavior and deserves systematic study from an ecological perspective. Full understanding of individual distinctiveness in animals and its diverse implications for population, landscape and evolutionary dynamics is essential for management of wildlife and fish resources. An adequate appreciation of these relationships in the specific context of each particular wildlife viewing opportunity is equally essential if an interpretive, educational or wildlife tourism program is to achieve its goals of quality experience for the participants. Information on unique individuals and their behavior is an essential element of scientifically-based monitoring and resource inventory, as well as economic and ecological modeling. This information contributes to management of wildlife-human interactions, resource management with

important population-level consequences, better public information about wildlife resources and wildlife-oriented education and interpretation. Often, these information needs flow from explicit management mandates and administrative direction, as based in enabling legislation. To meet these needs, it is essential to conduct long-term behavioral research on known individual animals at specific field sites whose characteristics are known to favor research of this sort.

The following section, entitled "Biological Context," expands the first of the three points made above under "General Overview:" Each setting for behavioral studies has special qualities that must inform any study from its outset. In particular, the Southeastern Alaska rainforest is a biome with special qualities that affect literally everything a behavioral researcher sees and does in the field. These special qualities include the proximity of glacier ice and the history of recent glaciation. These factors have created and today continue actively to shape a special environment, termed the periglacial environment. This setting has produced unique relationships between animals and landscapes and these relationships, in turn, both mold and reflect unique characteristics of both animals and landscapes. In the periglacial environment of Southeastern Alaska, land and water interpenetrate. The conventional distinction between "terrestrial" and "marine" science needs to be set aside, as it does not apply here and becomes counterproductive or even misleading whenever attempts are made to retain it in practice. In Southeastern Alaska, landscapes are seascapes and vice versa. Every particle of land and every drop of water in Southeastern Alaska, like the country itself, integrates sea and land in an emergent whole, a fact that is fundamental to the ecology of the entire coastal rainforest biome. This recognition acknowledges ecological reality and the impact of geological history, both of which deserve consideration by human activities and organizations concerned with the forest and its animals.

In our section on "Biological Context," we also enumerate and discuss the special characteristics of animals that, make their home in the periglacial environment of the coastal rainforest biome where land and ocean interpenetrate. These characteristics include large body size, long lifespan, low reproductive potential, large brains, ecological dependence on entire landscapes rather than on specific habitat types, playfulness both as young and as adults, a potential for long-distance dispersal over both land and water and strong individual personalities. This pattern is common to all of the forest's major animal groups, both mammals and birds. Because strong individual differences persist and because low reproductive potential and delayed maturity together mean that population-level changes are slow, rare events can have profound consequences for individuals, populations and landscapes. These characteristics of Alaskan rainforest animals further justify the critical need for long-term studies of known individuals of key animal species in varied areas of the forest.

In this paper, the term "ethologist" is used to indicate a student of the behavior of animals under natural conditions. The science of ethology, comprising much of current-day research on animal behavior, includes both field and laboratory studies. A college course in animal behavior or comparative psychology will cover most of the field of ethology as currently defined.

It is not the purpose of this paper to address the important safety considerations for behavioral research in the Alaska rainforest. Safety considerations are exclusively and entirely the responsibility of the legally-specified parties, which may include the researcher and/or the entity that administers the actual work. This chapter is solely intended to address scientific issues relating to behavioral studies in the Alaska rainforest. Appropriate training on safety and health procedures must be obtained from certified professionals by any individual wishing to do such behavioral research before going into the field.

Bald Eagles and other birds take advantage of spawning sand lance. Photo by Bob Armstrong.

Biological Context

Southeastern Alaska is a geologically-young periglacial landscape. The history of its

animals involves repeated glaciations, a changing climate and the mass extinctions of Alaska's Pleistocene. Relationships between animals and their physical and biotic environment that have developed in Southeastern Alaska over the past 10,000 years are the joint outcome of long-term cycles and rare events involving individuals or individual ecological sites. Knowledge of history and long-term study of individual behavior are essential to understand these outcomes and their current-day consequences.

Rare events, such as periods of food scarcity and abundance, glacial recession and the emergence of new land, favor large-brained, intelligent, large bodied, behaviorally plastic predators, scavengers and generalists with highly-developed dispersal abilities (Geist 1978). Southeastern Alaska has some of the largest concentrations of Bald Eagles, brown bears, orcas (killer whales), Steller sea lions and river otters. Many of these species and additional species in this biome such as the Common Raven, are among the consummate generalists of the animal kingdom.

As a broad generalization, the feature that most sharply differentiates them from other animal species is the use of entire landscapes to survive. This generalization holds especially well for brown bears, but the same principle applies, in varying degrees, to many other Southeastern Alaska animal species.

The vertebrate species most commonly encountered in ecology and animal behavior textbooks (Anolis lizards, rhesus macaques, coniferous forest warblers, Red-winged Blackbirds, voles, sticklebacks, juncos, etc.) display a kind of ecology that is much more familiar, relatively well-studied by scientists and fairly typical of most animal species. They depend on just a few particular features of a large area, but can get along without the rest as long as that one particular feature is present in sufficient quantity. Some of these species, like juncos and sticklebacks, may be prominent in periglacial environments, may exhibit one or more features marking them as ecological generalists and/or may be good dispersers, but do not depend on entire landscapes for survival. (In Southeastern Alaska, where land and sea fuse together, "earthscape" is perhaps a better term than landscape or seascape. Scientists working in the rainforest are burdened with inadequate terminology based in western European and urban North American lifestyles.) After a few months in the field in Southeastern Alaska, patterns of individualistic, landscape-oriented resource use become apparent to even the untrained observer. To cite three casual examples from our own experience, a Sitka black-tailed deer swam from island to island and ate kelp, a brown bear dug for clams and two brown bear cubs handled and mouthed a small flatfish (flounder or sole). Foraging and diet of these species and their individual members is diverse in Southeastern Alaska because of the interpenetration of marine and terrestrial elements in each actual habitat.

The life cycle of any salmon species found in Southeastern Alaska illustrates the interdependence of saltwater and terrestrial organisms. A good year for salmon is generally a good year for seals, bears, eagles, ravens and gulls. The salmon caught by a bear or an eagle may also feed Mew and Bonaparte's gulls, Northwestern Crows and ravens, as well as fertilizing the sedges in an estuary, a 400-year old Sitka spruce in the forest and a buttercup in the alpine.

When a salmon run fails, poor nutrition, poor reproductive success or migration may change the composition of a deme or population of animals. Loss or displacement of key individuals may affect social behavior, cultural transmission or habitat use within a population. The failure of the pink salmon run in 1988 in upper Seymour Canal was a unique event superimposed on a canon of long-term environmental cycles. Indeed, rare events may determine a population or species' history more than "the daily rhythms of birth, feeding, sex and death" (Gould 1989). A valid picture of the life of any species and particularly species of the sort we are discussing here, can only emerge after known individuals of the species are studied across major natural cycles and over several generations.

Observing and Recording Behavior

After many hours of watching an individual, a trained observer will begin to notice distinct behavioral acts emerging from many behavioral states. It is at this point that you realize an animal is not just shaking its head, but it is shaking its head at another animal and sending a subtle message. It may seem a contradiction then to state that an observer should be careful not to prejudice his or her observations by recording what he or she "thinks" is happening. In order to record what the ethologist sees objectively it is necessary first to see the behavior as distinct movements. A purely verbal description of movement may be inadequate.

Seeing behavior and thinking in movements are essential research skills for studies in any habitat. To acquire these skills involves real discipline and long hours of training by a qualified teacher. Concentration and focus, freedom from preconceptions about behavior, the learned ability to perceive both small details of movement and large patterns of movement and above all patience are essential (Darling 1937). Most people can learn to do all of these things well, but it takes time. Training in non-biological areas, such as dance, clinical psychology or classroom observation, often involves these same skills.

Thinking in terms of body movements and movement patterns helps scientists observe behavior more clearly and accurately. Movement research has contributed formal systems of notation, new modes of analysis and new concepts of movement to the study of behavior (Golani 1976, Pellis 1981 and Fagen 1990). Although the early pioneers of movement research (e.g., Eshkol and Wachmann 1958, Laban 1960) recognized the broad implications of their findings, dancers and students of behavior are only now coming to recognize that their fields have much in common. Today, students of behavior increasingly include some form of movement analysis in their professional training.

To study a species, you must first get to know an individual. This truism seems incontestable. However, in the past, scientists were unaware of the importance of individual effects at the population level. As ecologists, ethologists or resource managers, they were trained to study a population of animals and make generalizations about the species. Individuals whose behavior was deviant from the group were not thought to deserve much scrutiny. However, in large-brained, intelligent mammals, the importance of the individual in cultural transmission and innovation is beginning to be recognized. Jane Goodall had observed more than a decade of peaceful living within chimpanzee

troops at Gombe Stream before witnessing the first cannibalistic attack (Goodall 1986). Over the next four years only one infant was raised. The innovation of cannibalism of infants by two cooperating individuals at Gombe Stream (Goodall 1986) is a prime example of individual behavior affecting the demography and reproductive success of the population.

If you are fortunate to be able to study a species whose members are large, visible and all with individually distinct pelage or feathers, identification of individuals will be easy. However, getting to know individuals is usually not that simple and it is often necessary to depend on a combination of identifying factors. Answers to the following questions will help identify many individuals: Is the animal male or female, young or old, exceptionally large, small, fat, thin? Does it have offspring and how many? Does it have any scars, spots, stripes? Does it spend most of its time in one area? Is it seen with another animal? How does it interact with other known individuals? Does it have a strange gait, or any man-made marks such as tags, radio collars or streamers?

Once an individual is identified it must be named. It is often easiest to name it for its distinguishing characteristic. However, names such as Scarface or Mom may imply behavior or personality. Lehner (1979) examines some of the biases names create.

Avoiding bias is important in another area of ethology, that of sampling. Methods for obtaining valid samples of behavior are various (Lehner 1979) and include a method called focal-animal sampling that is particularly useful for studying known individuals (Altmann 1974). In focal-animal sampling, each individual in a group is observed for the same length of time in random order. This method benefits the animals as well as the observer, because no animal is observed for such a long period of time that it becomes uncomfortable at being watched.

This consideration of focal-animal sampling raises the point that the welfare of animals is important for all research. Increasing numbers of researchers are putting the animals first by choosing study questions and observational techniques that are compatible with the animals' long-term and short-term well-being. There is no shortage of crucially-important problems of this sort, both in field and in laboratory settings.

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