

## Northwest Science Forum

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### Inaccurate Data and the Olympic National Park Mountain Goat Controversy

#### Introduction

About a dozen mountain goats (*Oreamnos americanus*) were released in the Olympic Mountains of western Washington in the 1920s (Moorhead and Stevens 1982). The fate of the descendants of these goats has recently become controversial (Scheffer 1993; Lyman 1994). Olympic National Park (ONP)—which now administers the land occupied by the goats—seeks to eradicate the population (National Park Service [NPS] 1995). Eradication is justified by scientific research that has “undergone thorough academic scrutiny [and] peer review” (Crawford 1993:15). It is, however, very easy to discover errors in that research. I focus here on one example of this, and briefly mention two others.

The purpose of a monograph titled “Mountain Goats in Olympic National Park” and published in late 1994 by the NPS is stated in the introduction: “Mountain goat management at Olympic National Park has been controversial. No matter how the issue is eventually resolved, the decision must be based, in part, on scientific information. We trust that this monograph provides the information necessary” (Houston and Schreiner 1994:12). Thus, data summarized in the

monograph are viewed by ONP personnel as critical to resolution of the controversy. Here, I document errors in the mammalian data presented in Chapter 3, “Biogeography of the Olympic Peninsula” (Houston et al. 1994), and illustrate how those errors might prompt a reader to conclude that the preferred wildlife-management decision should be to eliminate the extant mountain goats from ONP.

#### Rules and Missing Mammals

Biologists working on ONP—including Houston et al. (1994:34)—typically mention mammal species missing from the park but found in the Cascade Mountains of Washington (Table 1) as evidence that mountain goats were never present in the former area (e.g., Moorhead and Stevens 1982). However, the twelve species Houston et al. list do not have the same biogeographic access to the Olympics. One—the northern bog lemming, (*Synaptomys borealis*)—is today rarely found only in the extreme northernmost Cascades of Washington (Wilson et al. 1980), thus it should not be included with the other species as nearly all of them are today found in the southern Cascades (e.g., around Mount Rainier). By relaxing the

TABLE 1. Lists of mammal species historically absent from the Olympic Peninsula.<sup>a</sup>

species	Scheffer 1949	Johnson and Johnson 1952	Moorhead and Stevens 1982	Houston et al. 1994
<i>Ochotona princeps</i>	+	+	+	+
<i>Spermophilus saturatus</i>	+	+	+	+
<i>Microtus richardsoni</i>	+			+
<i>Synaptomys borealis</i>	+			+
<i>Erethizon dorsatum</i>	+			+
<i>Canis latrans</i>	+			+
<i>Vulpes vulpes</i>	+	+		+
<i>Ursus arctos</i>	+	+		+
<i>Gulo luscus</i>	+			+
<i>Lynx canadensis</i>	+	+		+
<i>Oreamnos americanus</i>	+	+	+	+
<i>Ovis canadensis</i>	+		+	+

<sup>a</sup>Species indicated by "+" are listed by author(s) heading the column as species not found in the Olympics but historically present in the Cascades of Washington.

criteria for inclusion of species in their list of missing mammals, and therefore including the northern bog lemming and other taxa, Houston et al. (1994) effectively double the length of the only list compiled by a non-park biologist (Johnson and Johnson 1952). The difference here probably resides in varied rules for defining the set of "missing mammals." Houston et al. (1994) specify no rules, and this leads to inaccurate data.

### Insular Faunas and Missing Mammals

Houston et al. (1994:37) compare the presence-absence of mammalian species on the Olympic Peninsula to the presence-absence of mammals on Vancouver Island, the Queen Charlotte Islands, and the Alexander Archipelago. They point out that "In common with the Olympic Peninsula, [these] landbridge islands have impoverished faunas compared to the adjacent mainland" (Houston et al. 1994:43-44). They continue:

Mammals missing from the landbridge island faunas include species that were absent historically from the Olympics as well—the mountain goat included. As with the Olympics, the mammal absences mean either that the species failed to colonize because of environmental barriers or that earlier populations met extinction.

Apparently, because the lists of mammals missing from the islands are similar, and because those lists are also similar to the list of mammals miss-

ing from the Olympics, those same mammals probably never colonized the islands or the Olympics. This is so because "No obvious characteristics or relations have been identified that are common among species absent from the peninsula and from the landbridge islands that would similarly predispose populations to extinction" (Houston et al. 1994:45). The critical point, then, is the similarity of the lists.

Houston et al. (1994:43) state that various islands of the Alexander Archipelago lack 18 species. Several of the species they list as today missing from archipelago are, however, present there. Their list indicates that the hoary marmot (*Marmota caligata*), northern redback vole (*Clethrionomys rutilus*), muskrat (*Ondatra zibethicus*), jumping mouse (*Zapus hudsonius*), porcupine (*Erethizon dorsatum*), wolverine (*Gulo luscus*), moose (*Alces alces*), and mountain goat are not found on any of the islands of the Alexander Archipelago. Reviewing the literature they cite (Cowan and Guiguet 1965; Manville and Young 1965), plus an additional reference (Swarth 1936), I find all of the species listed in the preceding sentence to occur on one or more of the islands of the archipelago. Omitting from Houston et al.'s list those incorrectly listed species, the Alexander Archipelago is not impoverished by 18 species but rather by only 6. The latter include the northern water shrew

TABLE 2. Mammals historically missing from Vancouver Island.

Species listed by Houston et al. 1994	Cowan and Guiguet 1965 <sup>b</sup>	Banfield 1974 <sup>a</sup>
<i>Sorex cinereus</i>	46	10
<i>Scapanus orarius</i>	—	31
<i>Ochotona princeps</i>	94	74
<i>Lepus americanus</i>	103	84
<i>Aplodontia rufa</i>	—	95
<i>Eutamias amoenus</i>	141	104
<i>Glaucomys sabrinus</i>	159	146
<i>Neotoma cinerea</i>	193	177
<i>Synaptomys borealis</i>	197	190
<i>Clethrionomys gapperi</i>	204	183
<i>Microtus longicaudus</i>	226	217
<i>Ondatra zibethicus</i>	231	200
<i>Erethizon dorsatum</i>	—	236
<i>Canis latrans</i>	279	288
<i>Vulpes vulpes</i>	288	300
<i>Ursus arctos</i>	—	310
<i>Martes pennanti</i>	308	319
<i>Spilogale gracilis</i>	—	338
<i>Mephitis mephitis</i>	—	340
<i>Lynx rufus</i>	341	353
<i>Oreamnos americanus</i>	391	410
Species not listed by Houston et al.		
<i>Sorex bendirii</i>	55	15
<i>Sorex trowbridgii</i>	—	19
<i>Neurotrichus gibbsii</i>	—	28
<i>Scapanus townsendii</i>	—	29
<i>Eutamias townsendii</i>	144	105
<i>Clethrionomys occidentalis</i>	204	179
<i>Phenacomys intermedius</i>	201	192
<i>Microtus oregoni</i>	215	221
<i>Zapus trinotatus</i>	243	225
<i>Mustela frenata</i>	318	324

<sup>a</sup>Numbers in these columns are the page number on which the range map for the species is shown by the indicated author; if —, no map is shown and only verbal descriptions of the range are provided.

(*Sorex palustris*), collared pika (*Ochotona collaris*), showshoe hare (*Lepus americanus*), lynx (*Lynx canadensis*), coyote (*Canis latrans*), and red fox (*Vulpes vulpes*).

Houston et al. (1994:43) state that Vancouver Island lacks 19 species of mammals found on the mainland but list 21. Their data are summarized in Table 2, along with additional information. I consulted the same reference that Houston et al. did (Cowan and Guiguet 1965), plus two more recent titles (Banfield 1974; Nagorsen 1990). I found that at least ten additional species of mammals not listed by Houston et al.—but all listed in the single reference they cite—should be included in the list of mammals missing from Vancouver Island. If all species that occupied any fraction of the mainland coast adjacent to Vancouver Island are included, then the list of mammals missing from the island is not 19 or 21 species, rather it is the total 31 species listed here in Table 2.

If the errors are ignored, the lists of mammals absent from Vancouver Island, the Alexander Archipelago, and the Olympics appear similar; if those errors are corrected, then those lists are not very similar. Here I use the Sorenson Index to show how these errors make Houston et al.'s lists look more similar than the correct lists. The Sorenson Index is calculated with the formula

$$[2C/(A + B)] 100 = S$$

where C is the number of species held in common by the two compared species lists, A is the total number of species in one of the lists, B is the total number of species in the other list, and S is the index value. The Sorenson index, or S, is similar to a measure of the percentage of all the species found in two lists that are shared by the two lists.

Data used in the calculations are presented in Tables 1 and 2 and in the text above on the Alexander Archipelago. Houston et al. indicate the Olympics are missing 12 species, Vancouver Island is missing 21, and the Alexander Archipelago is missing 18. The number of species shared by each possible pair of lists is 9 for Vancouver Island and the Alexander Archipelago, 7 for the Alexander Archipelago and the Olympics, and 8 for Vancouver Island and the Olympics. The S values for each possible pair of biogeographic islands are:

Alexander Archipelago	46	
Olympic Mountains	48	47
	Vancouver Island	Alexander Archipelago

The S values indicate that about half of the missing species are found in each pair of lists; thus the lists of missing mammals produced by Houston et al. appear similar.

If we use the corrected lists—as I have described them—of missing mammals, Vancouver Island has 31 missing species (Table 2), the Alexander Archipelago is missing 6 (only species missing from all islands of the archipelago are included), and the Olympics are missing 11 (northern bog lemming omitted). The lists of missing mammals for Vancouver Island and the Alexander Archipelago share 4 species, the Alexander Archipelago and the Olympics lists share 3 species, and the Vancouver Island and the Olympics lists share 7 species. The S values calculated using these numbers are:

Alexander Archipelago	22	
Olympic Mountains	33	35
	Vancouver Island	Alexander Archipelago

These S values are 12 to 24 points less (they drop 25 to 52%) than those derived using Houston et al.'s lists. The greatest proportion of missing mammals of any one pair is only 35 percent.

Comparison of the S values calculated using the corrected lists of missing mammals with those calculated using Houston et al.'s lists show how the inaccuracies in the latter enhance their similarities. Perhaps the errors crept into Houston et al. (1994) simply because mistakes happen. But if one wishes to argue that the Olympic Mountains were never colonized by a certain set of mammal species—including mountain goats—then one strategy would be to show that most members of that set of species failed to colonize other, similar geographic places. Which ever is the case, while Houston et al. consulted several mammalogists familiar with Vancouver Island (e.g., D. Nagorsen), they failed to read Banfield's (1974) book and they did not read Cowan and Guiguet's (1965) book very closely (they consistently misspell the second author's name).

Twenty-three scientists read a draft of the chapter (Houston et al. 1994:210) prior to its publication, but none detected the errors described above

(the published version is similar to a draft that nine reviewers saw). Nine of those scientists were paid for their efforts by NPS, but they were only given three weeks to complete their reviews of Houston et al.'s paper, along with three other documents. Thus, maybe these nine reviewers did not have the time to read and study the relevant *primary* literature. Of course, had any of these nine reviewers been experts in mammalian biogeography or the mammalogy of the Pacific Northwest, one of them should have detected some of the errors. Instead, one of the nine paid reviewers (an historian) found the argument and the data on mammals missing from the Olympics, Vancouver Island, and the Alexander Archipelago to be "compelling evidence" that mountain goats never occupied the Olympics; another of the nine (an historian) found this same inaccurate data to argue "very strongly" for the failure to colonize hypothesis (unpublished documents on file, ONP, Port Angeles, Washington).

### Ignorance is Bliss, and Advantageous

I informed then ONP Superintendent Maureen Finnerty that factual errors were contained in a draft of Houston et al. (1994) and offered to describe those errors in letters dated May 19, 1994, and August 25, 1994. While I received responses to these letters from ONP, my offer was ignored. The monograph in which Houston et al. (1994) is found was shipped from the printers in Salt Lake City to the Denver distribution center on January 13, 1995 (NPS Publications Coordinator, Denver, personal communication to Lyman, Jan. 20, 1995). Was it, then, too late to make corrections to the manuscript in May 1994? It was not (D. B. Houston letter to Lyman dated March 9, 1995). Because the implications of the data found in Houston et al. (1994) are explicitly meant to have a direct bearing on the resolution of the Olympic mountain-goat controversy, it is important to document errors in the data in order to avoid uncritical acceptance of the flawed implications. Remaining ignorant of them would, of course, make the management decision ONP prefers—elimination of the extant mountain goats (NPS 1995)—a pill much more easily swallowed (Houston and Schreiner 1994:11-12).

I have become increasingly skeptical of the research produced by ONP scientists. It is, for example, easy to demonstrate that ONP resource

management specialist Paul Crawford's (1993:15) statement that "A thorough search of historical and archeological records has been conducted to answer any lingering doubts about the exotic status of the goats" is false. The ONP-sponsored review of the archaeological record was not thorough; 10 of the 34 total sites studied on the Olympic Peninsula are not mentioned (Lyman 1995). Further, the ONP historian (Schultz 1994) failed to mention Fannin and Grinnell's (1890:62) report that mountain goats "are found in considerable numbers on the high mountains west of Puget Sound...They are abundant on the Olympian Range

mountains." I thus urge interested scientists to critically examine all data relevant to the resolution of the ONP mountain goat controversy. Extinction of the mountain goats in Olympic National Park would, after all, be an irreversible management action. Just as Houston and Schreiner (1994) hope that their monograph helps, it is my hope that this paper will help with making the best-informed management decision.

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