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Research Final Report

WOLF—DEER—HABITAT RELATIONSHIPS IN SOUTHEAST ALASKA

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Job 14.13R
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SUMMARY

Although originally scheduled to continue for 5 years, field work for this study was terminated after 2 years. Reasons for termination include limited progress on study objectives due to adverse weather; low densities of deer (Odocoileus hemionus sitkensis) and wolf (Canis lupis) populations; limited sightability of deer and wolves due to dense vegetation; budget shortfalls; and personnel reductions. Results presented here are based on relatively small sample sizes and should be considered preliminary.

The wolf population of Revillagigedo Island appears to be relatively stable, consisting of 35 to 50 wolves in 7 or 8 packs which occupy distinct territories. Additional single wolves or pairs that roam over several packs' territories may also occur. Although packs occasionally trespass on adjacent wolves' ranges, all such movements that were detected were relatively brief; at least 1 wolf was killed by other wolves while trespassing. One juvenile male dispersed from his natal pack and moved extensively before apparently establishing a bond with remnant members of another pack that had been reduced through hunting and trapping. Our data imply that vacant areas do not exist on the island and that food resources are limiting wolf numbers.

Although overall deer population densities are relatively low on Revillagigedo Island, wolves appear to be extremely efficient at locating areas where deer occur. While direct evidence of hunting patterns is limited, the distribution of relocations and results of scat analyses confirm that deer are the major food source for these wolves. Nevertheless, regional differences in diet occur on the island and other food sources such as beaver (Castor canadensis) and garbage are important for some packs. In addition, most wolves on the island appear to feed heavily on spawning salmon (Oncorhynchus spp.) in late summer and fall.

The availability of diverse food sources may enable wolves to sustain their numbers at higher levels than could be supported by deer alone. As a result, wolf predation on deer may, in turn, be increased. Nevertheless, any major reduction in deer numbers due to catastrophic winter conditions, or due to habitat alteration resulting from clear-cutting, could be expected to reduce wolf numbers or productivity.

Key words: Canis lupus, deer, food habits, habitat relationships, Odocoileus hemionus sitkensis, predator-prey, wolf.

CONTENTS

BACKGROUND

This study was initiated as a long-term investigation of interactions between wolves (Canis lupus), deer (Odocoileus hemionus sitkensis), and habitat in coastal Alaska. Of particular concern was the effect of habitat alteration, through forest management, on the spatial relationships of deer and wolves, and the influence of wolf predation on deer numbers. A previous report completed under this study (Smith et al. 1986a) reviewed pertinent literature and identified the major needs for accomplishing the study objective. Concurrent work in the Petersburg area (Smith et al. 1986b, in press) also contributed to our understanding of relationships in this study.

Unfortunately, present levels of both wolf and deer populations are too low to facilitate efficient progress on several key jobs under this study. The nature of the vegetation and climate, combined with limited accessibility of

most of the study area, severely hampered attempts to capture wolves for telemetry and limited our ability to observe wolves or deer. Accordingly, it was decided to terminate this study at the end of the 2nd year.

STUDY OBJECTIVE

To determine the spatial and trophic relationships of wolves and deer in natural and altered habitats in Southeast Alaska.

JOB OBJECTIVES

1. To determine size, distribution, and stability of wolf packs.

2. To determine activity areas, hunting patterns, and deer-killing rates for specific packs.

3. To determine food habits of selected packs and of the overall wolf population.

4. To determine habitat composition of pack territories.[1]

5. To determine relative abundance of major prey species within selected pack territories.

6. To determine deer density relative to wolf pack territorial borders and habitat characteristics.

7. To monitor deer population trends in various habitat areas and wolf pack territories.

STUDY AREA

The study area consisted of Revillagigedo Island and the adjacent Cleveland Peninsula. Descriptions are provided in Smith et al. (1986a).

METHODS

Objective 1 - Size, Distribution, and Stability of Wolf Packs

Radiotelemetry was used to monitor wolf packs. Details of capture, handling, and monitoring techniques were presented in

[1] Due to the early termination of this project, no activities were undertaken on Objectives 4-7.

Smith et al. (1986a). However, to reduce the frequency of injury to captured wolves, foot traps were replaced with foot snares during the 1985-86 field season.

Objective 2 - Activity Areas, Hunting Patterns, and Deer-Kill Rates

Radiolocations of each collared wolf were plotted on the territory-minimum convex polygon to identify activity areas within the territory. Timing of relocations was used to interpret the significance of replicate relocations within 1 general area (i.e., use of potential den sites from late April through June).

Objective 3 - Food Habits

Wolf scats were collected on a regular basis from logging roads and trails within the range of the Town Pack and opportunistically along other logging roads, beaches, and trails on Revillagigedo Island and the adjacent mainland. In addition, den and rendezvous sites used by radio-collared wolves were visited in late summer and all scats present were collected. Scats were also collected from rendezvous sites discovered by T. Kogut, USDA Forest Service Biologist, on Prince of Wales and Dall Islands.

Attempts were made to collect scats from all parts of Revillagigedo Island. However, scats were not collected in equal proportions from various pack territories or in different seasons, and none of the collections are likely to constitute a true random sample of scats from any area. Accordingly, results of analyses should be considered as indicative of general trends, and comparisons between subsamples should be interpreted with caution.

Collected scats were individually bagged in plastic, labeled with location, date, and estimated date of deposition (for fresh scats) and then frozen. Prior to analysis, scats were oven-dried at 100 C for 24 hours to kill Echinococcus eggs. Scats were then weighed to the nearest gram, broken apart in a tray, and a visual estimate made of the percentage of the scat composed of various diet items (e.g., adult deer hair or bones, fawn hair, bird feathers, etc.). Hair and bone fragments were compared with a reference collection and, if necessary, hair-scale imprints were used (Adorjan and Kolenosky 1969).

Scats less than 2 cm in diameter, collected in summer, were considered pup scats. Samples from den and/or rendezvous sites were treated separately to compare diets for specific packs during early pup-rearing periods.

Two statistics were calculated for each scat subsample:

(1) Percent frequency of occurrence = number of times a diet item (e.g., deer hair) was found in the scat sample, divided by the total number of diet items found in the scats; and

(2) Mean diet items per scat = total number of diet items in subsample divided by the number of scats.

The 1st variable provides information on the relative importance of various prey types in the diet. The 2nd value is an index of variety in the diet (Kuyt 1972).

Scats were grouped into subsamples (minimum $\underline{n}$ = 20), based on the location of deposition, to provide estimates of diet composition for various wolf packs. Seasonal comparisons of summer (Apr-Sep) versus winter (Oct-Mar) diet were based on scats with known deposition dates.

RESULTS AND DISCUSSION

Objective 1 - Size, Distribution, and Stability of Wolf Packs

No additional wolves were captured and radio-collared during the 1985-86 season. On 2 occasions wolves were caught in neck snares, but managed to escape by chewing through the snare cable before we returned to check the snare. Wolf No. 2, a young male that was first captured on 13 February 1985, was recaptured and fitted with a new radio collar on 23 March 1986.

Results of radio tracking and observations of tracks supported the conclusion of Smith et al. (1986a) that a minimum of 7 wolf packs occur on Revillagigedo Island. The packs vary in size from 2 to at least 9 wolves and were found to use largely distinct territories (Fig. 1). Because pack movements were only monitored for 15 to 18 months, no firm conclusions regarding the pack's territorial stability could be made. However, some pack boundaries and use areas appeared to differ between 1985 and 1986. Descriptions of individual pack histories follow.

Town Pack:

Smith et al. (1986a) reported that this pack numbered 7 to 11 wolves in late 1984 and produced a litter of pups in 1985. During the 1985-86 winter at least 1 pack member was killed by other wolves in an apparent territorial dispute and 3 wolves were taken by a recreational trapper. At least 4-5 wolves remained in this pack subsequent to these losses, so the

minimum pack size in late 1985 had to have been 8-9 wolves. Although we observed 2 members of this pack breeding in February 1986, we did not confirm the presence of pups in spring. At the end of the study this pack was estimated to consist of at least 5 wolves.

Three members of the Town Pack were radio-collared in February 1985 and subsequent relocations indicated this pack utilized a territory of approximately 150-200 km² including the drainages of the White River and Ward, Ketchikan, Mahoney, and Silvis Creeks. In December 1985 this pack made a brief incursion into the territory of the Naha River Pack near Clover Passage. During this time radio-collared wolf No. 3, a juvenile male, was killed by other wolves (presumably members of the Naha Pack). The lack of snow made it impossible to determine if other wolves were killed in this conflict. In January 1986, radio-collared wolf No. 5, an adult female, made a brief incursion into the territory of the East Chuck Pack.

Naha River Pack:

The Naha River Pack contained 6-8 wolves in late 1985. Two female pack members were taken by a local trapper in January 1986.

Reported sightings by local residents, as well as our observations, indicated this pack ranged over an area of approximately 450 km² including the drainages into Clover Passage, Mosier, Margarita, and Naha Bays, Traitors Cove, and Leask Creek (Fig. 1). No members of this pack were radio-collared, however, so actual pack boundaries were not established. The limited amount of sign observed along the beaches in this pack's territory indicates it spent much of its time inland along major lake and stream systems.

East Chuck Pack:

Smith et al. (1986a) indicated that this pack consisted of 3 to 5 wolves in 1984, including radio-collared wolf No. 2, a juvenile male. It was suspected that the pack produced pups in 1985. No direct observations of the East Chuck Pack were made prior to late November 1985; at that time, wolf No. 2 dispersed, but tracks in the snow indicated the pack still numbered about 5 wolves. Following No. 2's dispersal, contact with this pack was lost; however, 2 other members were subsequently caught by a local trapper in the vicinity of George Inlet, and tracks of more wolves were seen, indicating several pack members remained.

The 2 wolves that were trapped were an adult female and a male pup. Both trapped wolves were in extremely poor condition when caught and neither had any body-fat deposits. Although

these wolves may have lost some weight while in the traps, their poor body condition suggests that wolves in this pack are food-stressed.

Wolf No. 2 was observed alone within the pack's territory several times in November 1985; he then left the territory in December. Initially, he moved to Rudyerd Island where he was observed to have killed a deer. After 2 weeks there he returned to his natal pack territory for 1 week, but was not observed with other wolves. He then moved west to Carlanna Lake in the Town Pack territory for 1 week, returned to his natal pack area, and finally moved east across Carroll Inlet and settled into the territory of the Carroll Inlet Pack.

Carroll Inlet Pack:

Smith et al. (1986a) reported that the Carroll Inlet Pack had been reduced through trapping and hunting in 1984 from 10, to 12, to as few as 2 wolves. Tracks observed on logging roads west of Thorne Arm in November 1985 indicated only 2 or 3 wolves were using the area at that time. Subsequently, wolf No. 2 moved into this territory and, based on tracks observed at the time he was recaptured, he joined up with 2 wolves; presumably these were the remnants of the Carroll Inlet Pack.

Although these 3 wolves were running together prior to the mating period in 1986, it is not known whether either of the Carroll Inlet Pack wolves were females which might have bred with wolf No. 2, or if this pack produced pups in 1986. From February through the end of June 1986, these wolves ranged over an area of approximately 160 km² (Fig. 2).

Alava Bay Pack:

Smith et al. (1986a) reported that the Alava Bay Pack consisted of 2-3 wolves, including radio-collared wolf No. 7, an adult male, in late winter 1984-85, and that there was evidence that the pack had produced pups in spring 1985. Several repeat observations of this pack in November and December 1985 confirmed that the pack had increased to a minimum of 9 wolves. Although the lack of snow at low elevations prevented tracking and hampered direct observation in 1986, at least 7 wolves remained in this pack in late February. It is not known whether additional pups were produced in spring 1986.

During late winter and spring 1985, Smith et al. (1986a) reported that this pack ranged over approximately 75-100 km² (Fig. 1). Summer movements of wolf No. 7 were also confined to this area, but beginning in fall, the pack began to heavily exploit what previously had appeared to be a buffer zone between its territory and that of the Lake Grace Pack.

In 1986, wolf No. 7 "disappeared" for several weeks but was eventually relocated 5 km northwest of his previous extreme movement. At that time he was apparently returning from an even longer extraterritorial excursion (Messier 1985). From late April until the end of the project he remained in the southern portion of the territory within 5-10 km of the 1985 den site.

Lake Grace Pack:

Smith et al. (1986a) reported that prior to birth of pups, this pack had declined from 6 or 7 in late 1984, to 3, including radio-collared wolf No. 6, an adult male. Observations in summer and early winter confirmed that at least 3 pups had been produced. No wolves from this pack were trapped or shot during the 1985-86 season and the pack remained at 6 wolves through March 1986.

Movements of wolf No. 6 in spring 1986 indicated the pack was using a den and probably had pups. However, no observations were obtained to confirm pack size at the end of the study. This pack ranged over a total of approximately 400-450 km^2 including Smeaton Island (Fig. 1). The pack moved onto Smeaton Island at least 3 times during the period in which it was monitored, including a 3-week stay in January and a 4-week stay in February-March 1986.

Northeast Pack:

Smith et al. (1986a) estimated that a total of 8 wolves occurred within this pack's territory in late 1984, although 2 of these were a distinct social group from the other 6. By June 1985, 1 member of each group had been radio-collared but each died of starvation soon after marking. One additional wolf may have been lost as a result of a trapping encounter (Smith et al. 1986a).

In September 1985, evidence was found that 4 to 6 wolves from this pack were feeding on spawning salmon (Oncorhynchus spp.) and beaver (Castor canadensis) in the vicinity of Portage Cove. Throughout the remainder of the 1985-86 field season, however, only 2 sets of single wolf tracks were observed along beaches and trails in this pack's territory. At present, the size of this pack is unknown.

Although the total area identified as being within the territory of this pack is 350-400 km^2, much of the northeastern half of this area is virtually devoid of deer, beaver, and salmon-spawning streams. We believe the area actually used by this pack is much smaller and is centered on the drainages of Portage Cove, Neets Bay, Shrimp Bay, Gedney Pass, and Behm

Canal west of Claude Point. The limited sign observed along beaches in 1986 indicates this pack must spend much of its time inland along major lake and stream systems.

Objective 2 - Activity Areas, Hunting Patterns, and Deer-Kill Rates

During late summer 1985, 2 of the 4 radio-collared packs centered their activities on major salmon spawning systems. The Town Pack was repeatedly relocated in the lower White River drainage from mid-August through early October. During that time, in excess of 120,000 salmon spawned and died in the White River (ADF&G, unpubl. data). The East Chuck Pack spent the same time period in the vicinity of 2 creeks draining into the salt chuck at the head of George Inlet. These streams each contained more than 10,000 pink and coho salmon.

On-the-ground observations in both areas used by these packs confirmed that wolves were catching spawning salmon and feeding extensively on the fish. In addition, fisheries personnel who were interviewed after stream surveys were completed reported evidence of wolves feeding on salmon along virtually every major spawning stream in the Behm Canal district. The Alava Bay Pack also made frequent visits to salmon spawning streams, but did not remain in 1 area as much as the Town or East Chuck Packs. This may reflect the relatively large number of small stream systems in the Alava Bay Pack territory, as opposed to the few large spawning streams in the other packs' ranges.

The Lake Grace Pack was the only pack that did not appear to use spawning salmon in summer. However, it made more extensive use of alpine and subalpine areas than other packs and also used a clear-cut valley that had been extensively colonized by beaver. The pack's use of high elevations was apparently associated with deer on alpine summer range.

The efficiency with which wolves located deer within their territories was demonstrated by the Lake Grace Pack. In several summers' flying along alpine ridges, we only observed deer in 2 locations within this pack's territory (Smith 1984, and unpubl. data), one of which was west of Mirror Lake. Five days after we first observed 13 deer on this ridge in early September 1985, the Lake Grace Pack was located on an apparent kill where these deer had been. The wolves remained in this area for 2 weeks, during which time we did not see deer again.

During the 1985-86 winter months, the Town Pack again made frequent use of the Ketchikan landfill as reported for the winter of 1984-85 (Smith et al. 1986a). However, the pack spent more time hunting other parts of its territory than in

1984-85. In addition, juvenile female wolf No. 4 was more frequently located apart from her mother, wolf No. 5, during this 2nd winter.

The Alava Bay Pack moved extensively throughout its territory in winter and did not concentrate its activities in any particular location. However, relocations were frequently made along stream courses where beaver dams and/or houses were evident, as well as in beach fringe areas or on points where deer densities were relatively higher.

The Lake Grace Pack was generally found during early- and mid-winter 1985-86 to be hunting relatively steep slopes along the major lakes within its range, near beaver colonies at the inlets to these lakes, or on Smeaton Island. In the latter area, the pack was apparently feeding on deer, as there is no evidence that beaver occur on this island.

In late winter of 1986, the Lake Grace Pack abandoned Smeaton Island and returned to hunting near beaver colonies at the head of Mirror Lake and along the Manzanita River. The pack also made several visits to low ridges in the southwest portion of its territory where deer tracks were occasionally observed in the snow.

In spring 1986 the Lake Grace Pack appeared to settle into a den site in the lower Manzanita River drainage. The area was similar to its 1985 den site, consisting of a stand of mature spruce trees in the vicinity of a large complex of beaver dams.

The lack of snow at most elevations used by wolves during the majority of the winter of 1985-86, combined with dense vegetation, prevented our gathering further data on hunting patterns or deer-killing rates. However, given an average pack size of 5-7 wolves, and each wolf's ability to consume 5-10 kg of deer following a kill (Mech 1970:118), the packs studied here could easily consume an entire deer (average live weight: 35-45 kg [ADF&G unpubl. data]) within hours. Thus, even under ideal conditions it is unlikely that wolves would often be found on a kill.

Objective 3 - Food Habits

A total of 511 scats containing 594 diet items from 13 different food sources was collected during this study (Table 1). Deposition date could accurately be determined for 271 of these scats. For the overall sample during summer, wolves fed predominantly on deer, including a high proportion of fawns. Beaver also constituted a major proportion of the summer diet (Table 1). For the Revillagigedo Island summer subsample (n = 196) the same general pattern prevails (Table 2).

Numerous other studies report a similar high proportion of deer fawns, or other young ungulates, in summer wolf scats (Murie 1944, Mech 1966, Pimlott et al. 1969, Carbyn 1974, Peterson 1974, Voight et al. 1976, Scott and Shackelton 1980, Hatter 1984). In fact, Hatter (1984) concluded that on Vancouver Island, black-tailed deer fawns were the major prey item for wolves from June through August. The ratio of fawn:adult remains in scats analyzed by Hatter was almost identical to the ratios from Southeast Alaska and Revillagigedo Island samples (Tables 1 & 2), so fawns may be more important than adults in the summer diet here as well.

Although many other studies report the use of beaver by wolves (Murie 1944, Mech 1966, 1970; Peterson 1974, Carbyn 1974, Theberge et al. 1978, Scott and Shackelton 1980, Hatter 1984) few have indicated use as high as found here. Those studies that do indicate levels of use of beaver, in summer, of over 20% frequency of occurrence (Pimlott et al. 1969, Frenzel 1974, Voight et al. 1976) were generally conducted in areas with very low deer populations.

As previously discussed, wolves were known to be feeding extensively on salmon during late summer, but this use was not reflected in scats. Two potential sources of bias may have caused this. First, only scats that could positively be identified as wolf scats were collected, so amorphous scats, which were found along stream banks and composed entirely of fish remains, were rejected, as they might possibly have been from bears. Second, observations and telemetry indicated that although the wolves came down to the streams to catch and feed on the salmon, they usually moved away from the stream to bed down. This movement may have been designed to avoid contact with bears and would have resulted in the wolves' defecating away from the stream banks where we searched for scats.

The winter diet of wolves in Southeast Alaska in general and Revillagigedo Island in particular, was also dominated by deer (Tables 1 and 2). However, beaver continued to represent approximately 20%, and other sources accounted for about 10% of the diet items.

Throughout much of the range of wolves in North America beavers are unavailable in winter (Mech 1970) and only Scott and Shackelton (1980) reported significant use of beaver in winter. The availability of beavers year-round in coastal regions provides an important supplement to the wolf diet and may increase wolves' ability to regulate deer populations (Van Ballenberghe and Hanley 1982).

Comparison of the diets of 5 wolf packs on Revillagigedo Island reflects regional variation (Table 3). Wolves in the Alava Bay and East Chuck Packs consumed approximately 90%

deer, whereas wolves in the Naha and Northeast Packs consumed only about 65% deer, and the Town Pack wolves, only 55% deer. Beaver constituted one-third of the diet for the Naha and Northeast Packs, and the Town Pack fed heavily on garbage from the Ketchikan landfill. The variation in diet reflects deer population density and availability of alternative food sources.

Similar patterns are reflected in scats collected from summer-use sites on Revillagigedo, Prince of Wales, and Dall Islands (Table 4). Scats from wolves on southern Revillagigedo (Alava Bay Pack) as well as on Prince of Wales and Dall Islands, where deer densities are relatively high, contained 93-96% deer, much of which was fawn hair. Scats from the Town and Lake Grace Packs' areas revealed that deer constituted less than half the diet in summer. The former pack used human garbage, and the latter pack, beaver, in nearly equal proportions to deer in the summer. These trends reflect the fact that the Town Pack's den was located near the Ketchikan landfill and that the Lake Grace Pack's den was near an area of extensive beaver colonies.

The mean number of prey items per scat ranged from 1.0 to 1.5 for various subsamples (Table 5). Comparisons between summer and winter diets of wolves on Revillagigedo Island indicate a more varied diet in summer (Table 5). It would seem logical to find a more varied diet in summer, when fish, small mammals, and birds are more available, than in winter, and to find a more varied diet where deer are less available. Comparisons between the sampled packs' diets revealed that the Town Pack had a more varied diet than any other group, both in summer and overall (Table 5). This variation was largely due to the availability of human garbage as a supplement to the usual prey items.

Scott and Shackelton (1980) reported finding only 1 prey item per scat in Vancouver Island wolf feces, but Murie (1944) found more than 1 prey item per scat in feces from wolves in interior Alaska when wolves were preying on rodents in addition to ungulates. Kuyt (1972) reported highly varied spring and summer diets for tundra wolves, particularly during periods when the primary prey species, caribou (Rangifer tarandus), was less available.

The significance, for wolves, of dietary variation, has not been assessed, but the availability of alternative sources such as beaver, salmon, and garbage should reduce this predator's dependence on deer. When other food resources are available, wolves may be able to sustain themselves with relatively low deer-killing rates, despite the small size of Sitka black-tailed deer.

CONCLUSION

Although results of this study are limited, they generally support the concepts and concerns advanced by Van Ballenberghe and Hanley (1982). Specifically, we determined that while wolves prey mainly on deer, other sources of food such as beaver, salmon, and human garbage supplement the diet and enable wolves to persist in relatively stable numbers despite low deer densities. Nevertheless, a wolf pack's territory size and the number of pack members appeared to be related to deer population density, so further declines in deer numbers or productivity due to climate or habitat alteration will probably result in fewer wolves as well.

Wolves were found to be efficient at finding localized areas with relatively high deer numbers, and packs could be expected to take advantage of artificial concentrations of deer in habitat patches created through forest management. Accordingly, timber harvests should be designed so as to minimize formation of small "islands" of old growth and to assure mobility of deer between areas as suggested by Harris (1984).

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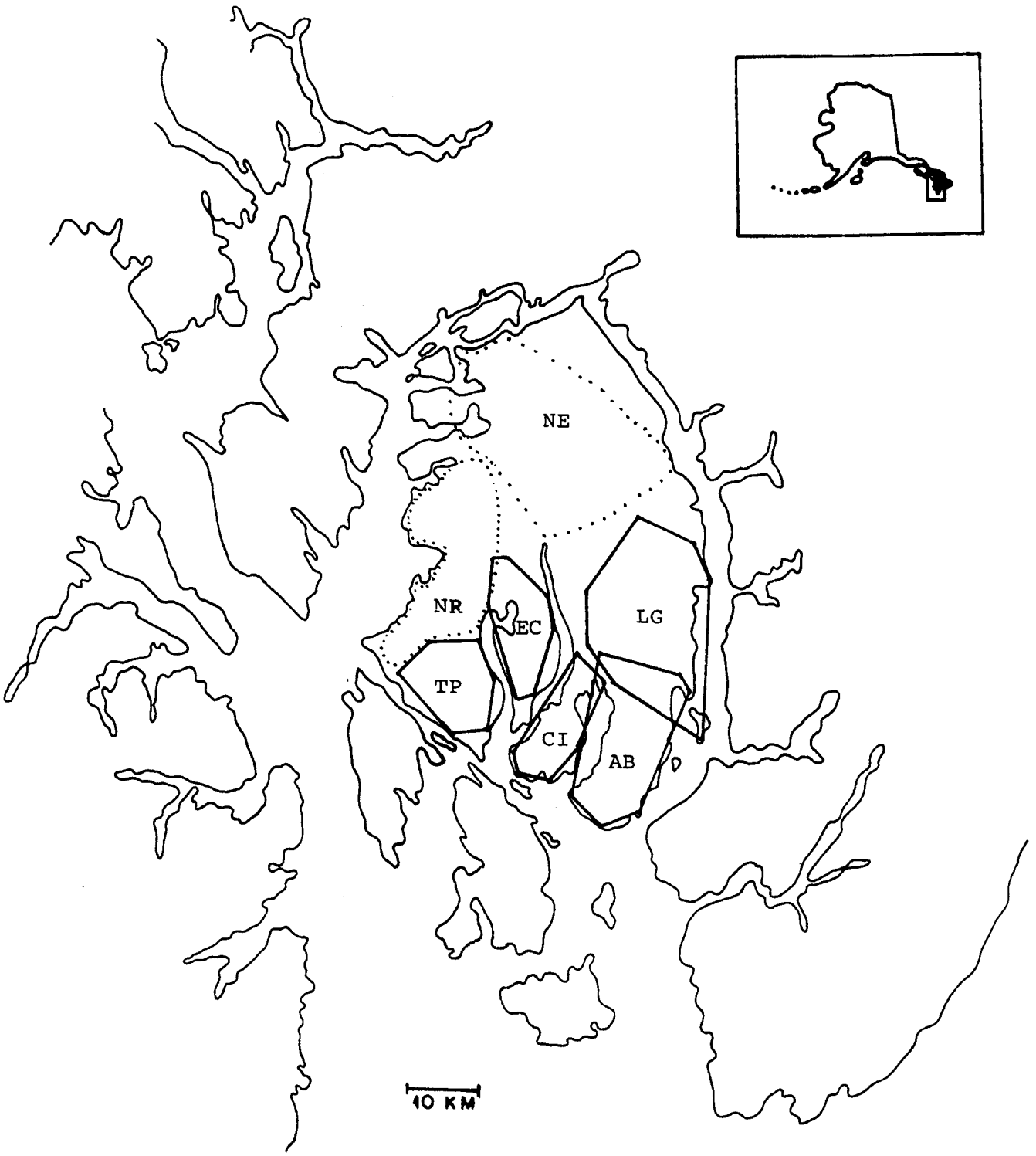

Fig. 1. Location of known (solid lines) and suspected (dotted lines) wolf pack territories on Revillagigedo Island, Alaska, 1985-86. TP = Town Pack, EC = East Chuck Pack, CI = Carroll Inlet Pack, AB = Alava Bay Pack, LG = Lake Grace Pack, NR = Naha River Pack, and NE = Northeast Pack.

Table 1. Percent frequency of occurrence for items in the diet from summer (Apr-Sep) and winter (Oct-Mar), and from total scats collected from wolves in Southeast Alaska, 1984-86.

Diet item	Season		
	Summer[a]	Winter[b]	Total[c]
Adult deer	42.1	68.5	50.2
Fawn deer	29.8	--	20.2
Total deer	71.9	68.5	70.4
Beaver	23.7	17.8	13.5
Seal	0.0	0.0	0.2
Bird	1.3	4.1	2.5
Wolf	0.4	1.4	1.2
Garbage	0.9	1.4	8.2
Porcupine	0.0	1.4	1.3
Fish	0.9	1.4	1.3
Toad	0.9	2.7	0.3
Unidentified bones	0.4	0.9	1.2
Black bear	0.9	0.9	0.3
Mustelids	0.4	0.9	0.3

[a] n = 201 scats, 228 items.

[b] n = 70 scats, 73 items.

[c] n = 511 scats, 594 items.

Table 2. Percent frequency of occurrence of items in the diet from summer (Apr-Sept) and winter (Oct-Mar), and from total scats collected from wolves on Revillagigedo Island, Alaska, 1984-86.

Diet item	Season		
	Summer[a]	Winter[b]	Total[c]
Adult deer	42.5	71.2	55.6
Fawn deer	30.3	--	18.7
Total deer	72.8	71.2	74.3
Beaver	24.0	19.7	20.1
Bird	0.9	1.5	1.1
Wolf	0.4	1.6	0.8
Garbage	0.4	1.5	1.1
Fish	0.9	1.5	0.6
Toad	0.9	3.9	0.6
Unidentified bones	0.4	0.9	0.8
Black bear	0.9	0.9	0.6

[a] n = 196 scats, 221 items.

[b] n = 64 scats, 66 items.

[c] n = 329 scats, 363 items.

Table 3. Percent frequency of occurrence of items in the diet from scats collected from 5 wolf packs on Revillagigedo Island, Alaska, 1984-86.

Diet item	Wolf pack				
	Town[a]	Naha River[b]	Alava Bay[c]	Northeast[d]	East Creek[e]
Adult deer	50.9	65.1	58.8	57.9	90.9
Fawn deer	4.9	0.0	29.9	5.3	0.9
Total deer	55.8	65.1	88.6	63.2	90.9
Beaver	1.2	34.9	9.9	31.6	0.0
Bird	3.1	0.0	0.8	2.6	0.0
Wolf	3.1	0.0	0.0	2.6	0.0
Garbage	30.1	0.0	0.0	0.0	0.0
Fish	1.2	0.0	0.0	0.0	9.1
Toad	1.2	0.0	0.0	0.0	0.0
Unidentified bones	3.7	0.0	0.0	0.0	0.0
Black bear	0.6	0.0	0.8	0.0	0.0

[a] n - 124 scats, 163 items.

[b] n = 40 scats, 43 items.

[c] n = 124 scats, 131 items.

[d] n = 36 scats, 38 items.

[e] n = 21 scats, 22 items.

Table 4. Percent frequency of occurrence of diet items in scats collected at den and summer rendezvous sites for 5 wolf packs on Revillagigedo, Prince of Wales, and Dall Islands, Alaska, 1985.

Diet item	Wolf pack				
	Town[a]	Old Tom's Lake[b]	Alava Bay[c]	Bob's Bay[d]	Lake Grace[e]
Adult deer	30.5	35.3	60.6	48.2	12.8
Fawn deer	11.9	58.8	32.0	48.2	37.1
Total deer	42.4	94.1	92.6	96.4	49.9
Beaver	0.0	2.0	5.7	0.0	45.7
Fish	3.4	0.0	0.0	0.0	0.0
Garbage	39.0	0.0	0.0	0.0	0.0
Bird	1.7	2.0	0.8	0.0	1.4
Black bear	0.0	0.0	0.8	0.0	0.0
Unidentified bones	6.8	0.0	0.0	0.0	1.4
Mustelid	0.0	2.0	0.0	0.0	0.0
Seal	0.0	0.0	0.0	3.7	0.0

[a] n = 39 scats, 59 items.

[b] n = 43 scats, 51 items.

[c] n = 115 scats, 122 items.

[d] n = 26 scats, 26 items.

[e] n = 55 scats, 70 items.

Table 5. Mean number of diet items per scat in wolf feces collected in Southeast Alaska, 1984-86.

Source	Season	Mean	(n)
Town Pack	Summer	1.51	39
Old Tom's Pack	Summer	1.19	43
Alava Bay Pack	Summer	1.06	115
Bob's Bay Pack	Summer	1.00	26
Lake Grace Pack	Summer	1.27	55
Revillagigedo Is.	Summer	1.13	196
Revillagigedo Is.	Winter	1.05	64
Town Pack	Total	1.31	124
Naha River Pack	Total	1.08	40
Alava Bay Pack	Total	1.06	124
Northeast Pack	Total	1.06	36
East Chuck Pack	Total	1.05	21
Southeast Alaska	Total	1.16	511