

Keith B. Aubry

College of Forest Resources, AR-10  
University of Washington  
Seattle, Washington 98195

## The Recent History and Present Distribution of the Red Fox in Washington

### Abstract

In Washington, indigenous red foxes (*Vulpes vulpes cascadenis*) occur in habitats at high elevations in the Cascade Mountains. Introduced red foxes have long occupied the lowlands of western Washington, yet neither their distribution nor the circumstances of their introduction has been documented. Non-native red foxes were intentionally introduced into several areas of western Washington; fox farms, both east and west of the Cascades, also contributed to the introductions. Distribution records of red foxes were collected from State and Federal agencies, museums, and correspondence with trappers from Washington. Three introduced populations of red foxes inhabit Washington State: a widely distributed population west of the Cascades and two less extensive populations east of the Cascades. Red foxes do not occupy the Blue Mountains of southeastern Washington, as was generally assumed, and red foxes in northeastern Washington are descended from introduced animals and do not belong to the Rocky Mountain or Cascade subspecies. The range of the Cascade red fox in Washington is similar to previous reports, but more restricted in extent, since some records from low elevations had been incorrectly assigned to the indigenous population.

### Introduction

In the State of Washington, fur-trapping is a widespread recreational and economic activity. One hundred or more red foxes (*Vulpes vulpes*), may be harvested annually, the great majority of which are from areas at low elevations in the western portion of the State (Wash. State Dept. Game, 1976-1980). Standard works, which present detailed distributional information for red foxes in Washington (Dalquest 1948, Ingles 1965, Hall 1981), refer only to the indigenous Cascade red fox (*V. v. cascadenis*). This variety is reportedly restricted to mountainous regions. No consideration was given to populations occurring at low elevations. The presence of an introduced 'lowland' red fox in the Puget Sound region, however, has long been recognized by residents and by personnel of the Washington State Department of Game. A comprehensive evaluation of the distribution of red foxes in Washington is needed, given the importance of introduced red foxes as furbearers and the possibility of their competing and interbreeding with native Cascade foxes.

In the western United States, indigenous populations of the red fox occupy subalpine meadow and parkland habitats. The Cascade red fox is found in the Cascade Mountains of Oregon, Washington, and southern British Columbia; the Sierra Nevada red fox (*V. v. necator*), in the Sierra Nevada Range of California; and the Rocky Mountain red fox (*V. v. macroura*) in the Rocky Mountains from New Mexico to Montana and the southern Canadian Rockies, and west to Idaho and the Blue Mountains of Oregon (Bailey 1936a). During the early 1900s, when western areas of the continent were being settled, populations of red foxes became established in valleys at low elevations and along coastal areas. In Oregon, red foxes are also found near the northwestern coast (Bailey 1936b, Maser *et al.* 1981) and in the Willamette Valley, west of the Cascades (Livezey

and Evenden 1943, Maser *et al.* 1981). According to Ingles (1965), these lowland populations are the result of introductions from the southern United States. Grinnell *et al.* (1937) reported that the population of red foxes in the Sacramento Valley of northern California is geographically isolated from the population in the Sierra Nevada and that red foxes were probably introduced sometime prior to 1900, although the circumstances of the introduction could not be determined. Recent work (Gray 1977) indicates that the Sacramento Valley population has significantly expanded its range since that time. In a review of the distribution of red foxes in Idaho, Fichter and Williams (1967) documented their presence in habitats previously unoccupied by the species, such as cultivated areas, cool deserts of the foothills, and the Snake River Plain. This range expansion is largely attributed to downslope movement by Rocky Mountain foxes, but they do not exclude the possibility that these populations result from accidental introductions. Fox farms were present in southern Idaho in the early part of the century, and the authors described several instances of individuals escaping from such farms.

Available information on the lowland red fox in Washington is limited and appears to have been based on documented records. Lauckhart (1970) claims that two races of red fox are present: a rare, indigenous high mountain form and a common, introduced lowland form whose ranges are separated by uninhabited expanses of forested foothills and mountains. Larrison (1970) assigns the lowland red fox to the subspecies *fulva* of the eastern United States and claims that it had been introduced into the Kitsap Peninsula in Puget Sound, farmlands south of the Olympic Peninsula, and the northeastern Puget Sound region. This form of red fox is now reported from nearly all lowland areas of western Washington. Lauckhart (1972) asserts that the Eastern red fox began to appear in the Skagit Valley of the north-eastern Puget Sound region sometime in the 1920s. The source of this population is believed to have been red foxes brought into the area by hound hunters, but he further speculates that escaped animals from private fur farms might have accelerated the spread of this population.

#### Methods and Materials

During three winter trapping seasons (1978 to 1980), all registered trappers in Washington were contacted by mail. They were asked to provide detailed reports of all previous sightings or trappings of red foxes and to include any information regarding the introduction of red foxes into Washington. Over the three year period, an average of about 1900 trappers from all areas of the State were contacted each year. I received 153, 38, and 74 replies for the years 1978, 1979, and 1980, respectively. Local trappers are probably better informed about red foxes in Washington than any other sizeable group of people. Trappers are distributed throughout the state, and some have lived and trapped in this region for most of the century. I therefore believe that they can accurately identify red foxes and are a reliable source of information on the history of red foxes in Washington.

Records of the Washington State Dept. of Game, National Park Service, and U.S. Forest Service were searched for pertinent information. All museums in the United States and Canada that potentially contained red fox material from Washington (Choate and Genoways 1975) were either visited or contacted by mail to obtain locality records of specimens.

All records that could be located on a map to an area less than one township in ex-

tent were used. These were plotted on a 1:500,000 scale USGS map of Washington. Areal, elevational, and ecological information were used to delineate boundaries around populations of red foxes. West of the Cascade Crest, red foxes occur either in relatively undisturbed habitats in mountainous regions, or at lower elevations in areas of human settlement. A wide, uninhabited zone of dense forest separates fox populations in these two areas, and boundaries around each were easily drawn. Because forested habitats differ east of the Crest, no such 'buffer zone' exists there. Nevertheless, eastern records are also either from relatively unsettled, forested areas at high elevations or from non-forested areas at lower elevations near towns or along river valleys and highways. Therefore, east of the Cascade Crest, records are assigned to introduced populations if a source of introduction in the area is documented and the records are from areas of human activity at low elevations. Records are assigned to the Cascade population if they are from the less disturbed forested habitats at higher elevations.

## Results and Discussion

### History of Introductions

Introductions of red foxes, both intentional and accidental, are shown in Fig. 1. Mr.

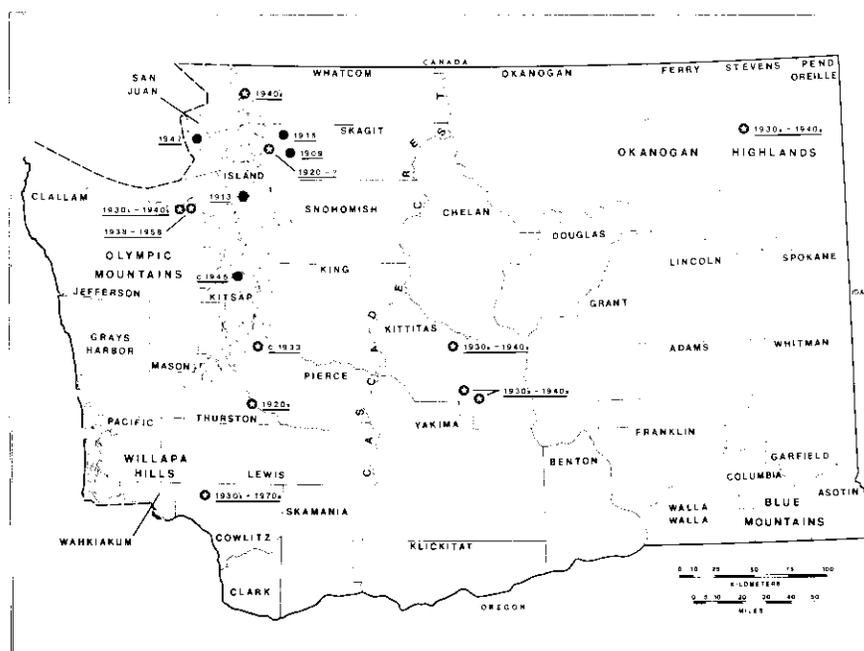


Figure 1. Dates and locations of fox farms (circled stars) and points of introduction of red foxes (solid circles) in Washington.

Floyd G. Squires, a long-term resident of Bow, Washington, in western Skagit Co., has spoken to many 'old timers' in the area, and informed me that in "1909, two females and one male were imported from the State of Illinois . . . each vixen produced a litter of pups which were raised and released that fall. Shortly after the release of the pups, both females escaped from the enclosure. The male was released the following day." The next spring, one of the females was observed denning on a nearby ridge. Accord-

ing to the 'old timers,' red foxes did not occur in Skagit Co. at that time and were introduced for hunting with hounds by settlers who came from the southeastern United States and missed having red foxes to hunt. He further stated that "about 1915, . . . between five and eight fox were released on the south side of Alger Mountain [in northwestern Skagit Co.]. These fox . . . were also from the State of Illinois." This last report was confirmed by M. Splane of Sedro Wooley, Skagit Co., who was interviewed by Scheffer (1939) and reportedly "believes fox [were] introduced 25 years ago by Dave and Don Henry on Butler's knob [near Alger Mountain]". In addition, according to Brooks (1930) in a report on the larger mammals of the Mt. Baker National Forest, which covered much of Whatcom, Skagit, and Snohomish Counties, red foxes were "absolutely unknown up to about 1910. Now common."

Subsequent introductions were apparently made on two of the larger islands in Puget Sound. Mr. Squires reported that "in 1912 or 1914, five of the original stocking were live-trapped and released on Whidbey Island [in Island Co.]. Prior to this time, it is reported that there were no fox on this island. . . . Subsequent trappings and releases were made on San Juan Island [in San Juan Co.]." Schoen (1972) reported that red foxes were introduced on San Juan Island in an attempt to control an irruptive population of European rabbits (*Oryctolagus cuniculus*). A man named Osburn, who was the Extension Agent for San Juan Co., informed him that a pair of red foxes was introduced in 1947, and that others were brought in during the following years. In 1972, red foxes were apparently nearing extinction on the Island. Trapping records of the State Dept. of Game further illuminate that situation (Table 1). One red fox was taken from San

TABLE 1. Summary in five-year blocks of the harvest of red foxes in Washington west of the Cascade Crest, as reported by licensed trappers between 1938 and 1980. Data from Washington State Department of Game.

County	1938- 1942	1943- 1947	1948- 1952	1953- 1957	1958- 1962	1963- 1967	1968- 1972	1973- 1977	1978- 1980	Total
Whatcom	77	115	26	32	70	7	83	17	3	505
Skagit	115	291	30	84	64	82	73	53	15	807
Snohomish	31	78	28	58	74	85	25	10	1	390
King	1	4	1	1	2	4	14	20	7	54
Pierce	4	2	7	1	24	23	61	26	16	164
Lewis	7	2	1	3	38	16	7	15	1	90
Skamania	1	0	0	0	0	0	5	3	0	9
Clark	0	0	2	2	0	1	0	5	3	13
Cowlitz	0	0	0	2	2	0	12	13	3	32
Wahkiakum	0	1	0	0	1	0	1	0	0	3
Pacific	0	0	0	0	1	0	14	0	0	15
Grays Harbor	0	1	0	5	17	16	25	4	3	71
Thurston	1	19	20	15	4	9	40	22	17	155
Mason	0	0	3	1	5	27	14	35	13	98
Kitsap	0	0	3	0	5	34	53	94	33	222
Jefferson	0	0	0	0	0	0	0	25	63	88
Clallam	0	0	0	5	6	27	5	48	23	114
Island	0	0	0	2	23	33	20	285	46	409
San Juan	1	2	0	0	5	26	143	0	0	177

Juan Co. in 1942, and two in 1947. These probably represent animals remaining from the original stocking. From 1948 to 1959, no foxes were taken on the Island. After that, presumably when the population began to build up again after the second introduction, foxes were trapped in increasing numbers until in 1968, 1969, and 1970 there were 25, 83, and 35 animals taken, respectively. None has been reported after that.

Whether red foxes are extinct on San Juan Island, or simply at the low end of a population cycle, is not known.

Mr. Andy Rogers of Seabeck, Washington, in Kitsap Co., a trapper of over 40 years' experience, informed me that "foxes were unheard of [in Kitsap Co.] until they began to be sighted . . . shortly after World War II. Some years ago, in a conversation with Bill Glud of Brownsville, I learned that he and Russell Root of Fernwood . . . had released foxes here thinking they might be good game for hound hunting." He was not told, however, where these foxes had originated.

The escape or release of red foxes from fur farms has also been an important mechanism of introduction. Mr. Squires stated that "in 1920, a fox farm was started at Bay View Ridge [in western Skagit Co.]. The population being comprised of both . . . blue and silver [foxes]. Some of these escaped and it is reported that they mated with the already established population of [introduced] red fox." Mr. Bill Hoffman of Concrete, Washington, a retired employee of the State Dept. of Game, informed me that in the early 1950s he trapped a silver fox that had a brand on it, indicating that it had escaped from a fur farm. He believed this animal came from a farm that had operated in the 1940s near Ferndale in western Whatcom Co. Presumably, when fur prices significantly declined in the early 1950s, the animals at this farm were turned loose. During this period, the average pelt-price for red foxes in Washington dropped to a low of \$0.65 (Fig. 2), which no doubt rendered fox farming uneconomical.

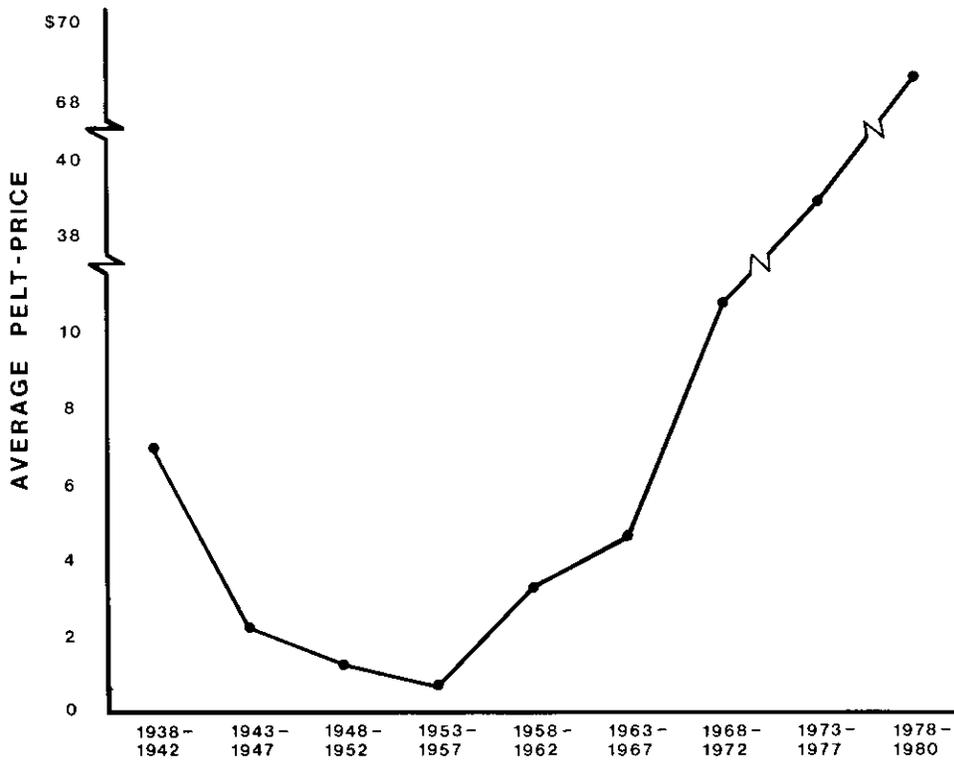


Figure 2. Average pelt-price for red fox in Washington between 1938 and 1980. No data available for 1942, 1943, 1945, or 1950. Data from Washington State Department of Game.

The presence of a fur farm in the southern Puget Sound region in the 1930s is indicated by a museum specimen that was obtained from a silver fox farm near Tacoma in western Pierce Co. in December 1933 (Mus. Nat. Hist., Univ. Puget Sound, specimen no. 522). In addition, Sid Hayes of Twisp, Washington, a native of Yelm in eastern Thurston Co., reported that "a neighbor . . . Roy Shearer . . . raised red fox. About 1920 or 1922, a bunch of his foxes dug under [the] fence. Before that time, I'd never [seen] a fox in Washington . . . or spoke to anyone who had. I do know that they became quite plentiful in the coast area after that. . . ." John and Stuart Keatley of Castle Rock, Washington, ran a silver fox farm just above the mouth of the Toutle River in Cowlitz Co. from the 1930s to the 1970s. According to one of the owners, however, none of their animals ever escaped.

The only records of fox farms on the Olympic Peninsula were in northeastern Clallam Co. Mr. Dowell Hilt, of Port Angeles, Clallam Co., and a retired mink rancher, reported that there were two fox farms in this region. One was a farm at McDonald Creek that raised silver fox breeders in the 1930s and 1940s. According to Mr. Hilt, these foxes were worth thousands of dollars at the time, and it is unlikely that any escaped or were released. The other was operated by Mr. Milo Rice on the Dungeness River from about 1938 to 1958. He raised several color phases, including red, platinum, silver, and gray (probably cross). They escaped frequently, and he reportedly also let many go. According to Mr. Hilt, wild foxes were not present before this farm began operating. State trapping records (Table 1) and historical reports support this assertion. Red foxes were not trapped in Clallam Co. until 1955. In Jefferson Co., which is situated south and east of Clallam Co., however, red foxes were not reported by trappers until 1974, indicating that red foxes did not colonize the northern Olympic Peninsula from the mainland to the south, where they had been common for some time, but that they originated in Clallam Co. and subsequently moved into the coastal areas of eastern Jefferson Co. Scheffer (1949) conducted a survey of mammals on the Olympic Peninsula in the late 1940s and reported that red foxes did not occur there. By the early 1950s that situation remained unchanged (Johnson and Johnson 1952).

Fox farms were also in operation on the east side of the Cascades. According to Mr. Russell Thompson of Thorp, Kittitas Co., a former Federal trapper and employee of the State Dept. of Game, three fox farms were in operation in Kittitas Co. in the 1930s and 1940s. One was in the northern part of the county near Liberty in the foothills of the Wenatchee Mountains, the other two in the vicinity of Ellensburg in southern Kittitas Co. C. E. McFarland, who was interviewed by Scheffer (1938), reported "there are a few [red foxes] between Cashmere and Leavenworth [in southern Chelan Co.], mostly blacks. Silvers occasionally escape from farms."

Mr. Bob Lynds of Colville, Stevens Co., reported that a fox farm was operated four miles north of Colville in the 1930s and 1940s by a man named Mottler. In 1942, Mr. Lynds trapped two tame silver foxes that had escaped from the fur farm. Upon contacting Mr. Mottler, he learned that a few foxes escaped every year. According to Mr. Lynds, whose father and grandfather began trapping northeastern Washington before 1900, there were no red foxes in that area before this farm came into operation.

The average pelt-price for red foxes in Washington has risen sharply since the late 1960s (Fig. 2). Apparently, this increase has once again stimulated interest in fox farming. I am aware of three farms currently operating in the State: at Cle Elum in

central Kittitas Co., since 1981; in the Cathcart area of southwestern Snohomish Co., since 1977; and at Graham in western Pierce Co., during the last few years. There is no indication that any foxes have escaped or been released from these farms.

#### Present Distribution

Distribution records of red foxes in Washington, which include State and Federal records, museum specimen localities and records gathered from correspondence with trappers, are shown in Fig. 3. All records are included, except for the area contained

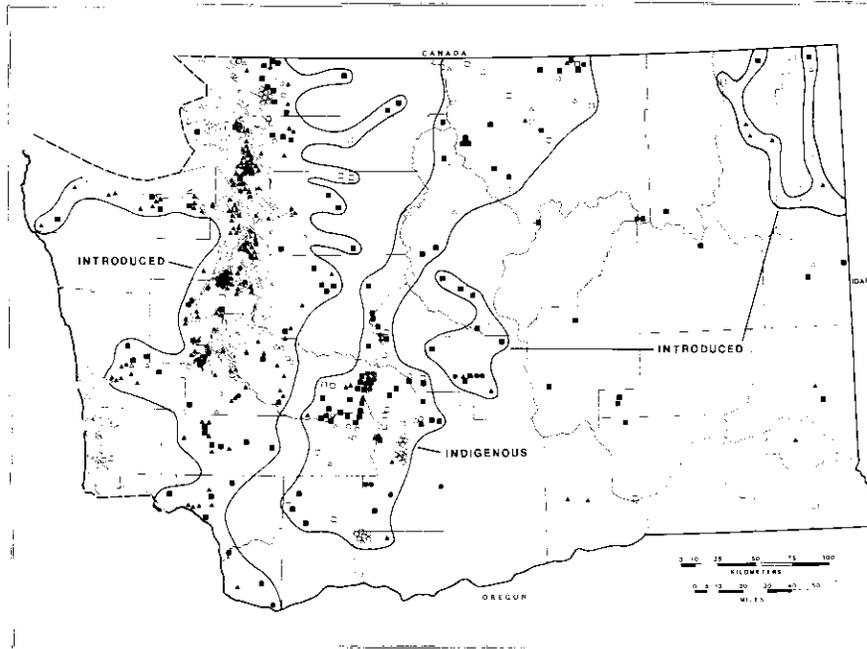


Figure 3. Distribution records and geographic ranges for indigenous and introduced populations of red foxes in Washington. Squares represent sight reports; triangles, trapping records; and circles, locality records of museum specimens. Hollow symbols indicate records dated prior to 1970.

within Mt. Rainier National Park. There are over 140 sight records from the Park dating back to 1897. Consequently, I have indicated only those records that represent different areas where foxes have been sighted. It is noteworthy that only three of these records came from the north or west side of Mt. Rainier, and of these, only one was made since 1970.

On the basis of these records, geographic ranges were drawn for existing populations of red foxes (Fig. 3). A widely distributed population of introduced red foxes occurs throughout the lowlands west of the Cascade Mountains. These foxes inhabit farmlands, the coastal areas of Puget Sound and the Strait of Juan de Fuca, and developed river valleys in the western foothills of the Cascade Mountains. Areas that are apparently

unsuitable for introduced red foxes in western Washington include the dense forests of the Cascades, the Willapa Hills in southwestern Washington, the outer coast zone, and the forests and subalpine meadows of the Olympic Mountains.

The range of the Cascade red fox differs somewhat from that shown on distribution maps published previously (Booth 1947, Dalquest 1948, U.S. Army Corps of Engineers 1974). Because of the presence of high mountains in central and eastern Whatcom Co., most notably Mt. Baker, this area has been included within the range of the Cascade fox. This region, however, is cut off from the main Cascade chain by the deep valley of the Skagit River, and no records of red foxes from high elevations have been reported from this area. Presumably, this river acts as a barrier to the movements of Cascade foxes and, as a result, the only red foxes present are introduced animals that have moved into the area along river valleys and highways. In addition, the eastern boundary of the range of the Cascade fox has typically been drawn to include portions of the Columbia Basin to accommodate distributional records that are, in fact, representative of introduced populations.

In the southern end of their range, Cascade foxes inhabit extensive areas west of the Cascade Crest. Appropriate habitat on two volcanoes, Mt. St. Helens in northwestern Skamania Co. and Mt. Rainier, account for these distributional records. Unlike the situation in the Mt. Baker area, there is no barrier to the movement of Cascade foxes between these areas and the meadows near the Cascade Crest.

Since most records of lowland red foxes were gathered during the course of this study, it is not possible to determine whether range expansion or contraction has occurred for introduced foxes in recent years. Many historical records for the Cascade fox exist, however, and these are indicated by hollow symbols in Fig 3. Comparing these records with those dated since 1970 (indicated by solid symbols), it is evident that no significant changes in distribution have occurred in recent years. Cascade foxes were present on the slopes of Mt. St. Helens, but their population status following the May 1980 eruption is unknown.

At mid-elevations, the western slope of the Cascades is characterized by dense, wet forests dominated by western hemlock, (*Tsuga heterophylla*) and Douglas fir (*Pseudotsuga menziesii*) with a lush understory (Franklin and Dyrness 1973). This habitat appears to be unsuitable for both the Cascade and lowland populations, probably because red foxes are cursorial predators favoring open meadows for hunting small rodents, their principal prey (Bailey 1936b). Consequently, west of the Cascade Crest, introduced and indigenous populations of red foxes are separated by a belt of dense coniferous forest. Red foxes would be capable of crossing this uninhabited zone, because these forests do not present a physical barrier to their movements. Introduced foxes have not colonized the subalpine meadows of the Olympic Mountains, even in the absence of competition from native foxes. This observation indicates that introduced red foxes are restricted to habitat at low elevations by physiological or behavioral limitations and provides strong evidence that introduced red foxes have not invaded the meadows at upper elevations in the western Cascades to interbreed with native foxes. Apparently, such limitations have also operated to restrict indigenous red foxes to habitat at high elevations.

Cascade red foxes clearly favor the eastern slope of the Cascade Range. At mid-elevations, annual precipitation is much lower than on the western side, the forests are

drier and the understory less dense. Dominant forest species are principally grand fir (*Abies grandis*) and ponderosa pine (*Pinus ponderosa*) (Franklin and Dyrness 1973). Because the east-side forests are open, they probably provide enough space for cursorial predators to effectively exploit available prey, whereas the dense forests at similar elevations on the western slope do not.

The red fox is reportedly absent from the Columbia Basin east of the Cascades (Dalquest 1948, Larrison 1970). Information gathered from trappers, however, indicates that foxes are infrequently found in this region. The river valleys and populated areas of central Kittitas and southern Chelan Counties appear to support a sizeable population that is presumably derived from foxes that escaped from fur farms in the 1930s and 1940s. The other scattered reports from the Columbia Basin probably represent wandering or dispersing individuals, because the great majority of trappers from those areas have reported never sighting or trapping a red fox.

On the east side of the Cascades, unlike the west, no wide buffer zone of uninhabited forest separates indigenous and introduced populations of red foxes. Consequently, these populations are nearly parapatric in Chelan and Kittitas Counties, and it is here that hybridization would most likely occur. Assessment of this possibility, however, must await collection of an adequate series of specimens.

The presence of red foxes in the highlands of northeastern Washington has long been recognized. This population has been assigned to both the Rocky Mountain (Dalquest 1948) and Cascade (Booth 1947) subspecies. All records, however, are from developed sites at low elevations along river valleys. A game-mammal census conducted in 1925 on the Colville National Forest in northeastern Washington made no mention of red foxes (Anonymous 1925). A similar census five years later, estimated a population of five foxes (Anonymous 1931). These facts, along with the information provided by Mr. Lynds on the introduction of farm foxes into this area, provide strong evidence that this population is descended from introduced animals.

TABLE 2. Summary in five-year blocks of the harvest of red foxes in Washington east of the Cascade Crest, as reported by licensed trappers between 1938 and 1980. Data from Washington State Department of Game.

County	1938- 1942	1943- 1947	1948- 1952	1953- 1957	1958- 1962	1963- 1967	1968- 1972	1973- 1977	1978- 1980	Total
Asotin	0	0	0	0	0	0	0	0	0	0
Garfield	0	0	0	0	0	0	0	0	0	0
Columbia	0	0	0	0	0	0	0	0	0	0
Walla Walla	0	0	0	0	0	0	0	0	0	0
Benton	12	0	0	0	0	0	0	1	1	14
Franklin	0	0	0	0	0	0	0	0	0	0
Douglas	0	0	0	0	1	0	0	0	0	1
Grant	0	0	0	0	0	0	1	0	0	1
Adams	0	0	0	0	0	0	1	0	0	1
Whitman	0	0	0	0	0	0	2	0	0	2
Lincoln	0	0	0	0	0	0	0	0	0	0
Spokane	0	1	0	0	0	2	1	0	0	4
Pend Oreille	0	2	0	0	0	0	0	6	1	9
Stevens	0	0	0	0	0	0	0	0	0	0
Ferry	2	0	0	0	0	0	0	0	0	2
Okanogan	6	4	5	2	0	1	1	0	0	19
Chelan	5	2	0	0	0	1	0	0	0	8
Kittitas	17	3	4	2	5	21	37	21	8	118
Yakima	16	12	0	0	1	0	5	0	1	35
Klickitat	8	10	0	0	4	0	0	1	0	23

The Blue Mountains in southeastern Washington have consistently been included within the range of the Rocky Mountain red fox (Booth 1947, Dalquest 1948, Hall 1981). In 1923, a red fox was collected from the Blue Mountains of Washington (Nat. Mus. Natur. Hist., specimen no. 244010), although no specific collecting locality was recorded. This specimen constitutes the only evidence that indigenous red foxes occur in southeastern Washington. The one other record of a red fox from this area came from a ploughed field at the base of the Blue Mountains in Garfield Co. (Fig. 3). Numerous trappers, many of whom have trapped for decades, consistently reported that red foxes do not occur in the Blue Mountains. As shown in Table 2, red foxes have not been reported by trappers in any of the four counties that encompass the Blue Mountains (Asotin, Garfield, Columbia, and Walla Walla). It is evident that these were wandering foxes that were not from an established local population.

Because the geographic origins of the introduced red fox in Washington are largely unknown and probably diverse, assignment of these populations to established subspecies is unwarranted. It is also doubtful that anything significant can be gained by granting unique subspecific status to introduced populations of red foxes in Washington.

#### Acknowledgments

This investigation was supported through funds granted by the Washington State Department of Game as part of Study No. 4, Project No. E-1. The Department of Game also provided access to trapping records and sight reports and their cooperation during the course of this study is appreciated. This research was in partial fulfillment of my Ph.D. degree at the College of Forest Resources, University of Washington. I am grateful to Dr. Richard D. Taber, the chairman of my graduate committee, for advice and support. I am also indebted to Drs. Stephen D. West, Robert L. Rausch, Sievert A. Rohwer and Murray L. Johnson, and to Stephanie Livingston and Carol A. Apruzzese for reading early drafts of the manuscript and offering valuable suggestions. I am especially grateful to the members of the Washington State Trappers Association, without whose help this work could not have been completed. The following museums provided specimen locality records from Washington: Thomas Burke Memorial Washington State Museum, University of Washington, Seattle; National Museum of Natural History, Washington D.C.; Museum of Natural History, University of Puget Sound, Tacoma, Washington; Charles R. Conner Museum, Washington State University, Pullman; National Museum of Natural Sciences, Ottawa, Ontario; Denver Collection of the Bird and Mammal Laboratories, U.S. Fish and Wildlife Service; Battelle Northwest, Hanford, Washington; and the private collection of Arthur Peck, Jr., Ellensburg, Washington.

#### Literature Cited

- Anonymous. 1925. Animal census in Colville National Forest, Washington. *Murrelet* 6: 5.  
———. 1931. Wild game census in Colville National Forest, northeastern Washington. *Murrelet* 12: 26.  
Bailey, V. 1936a. The red fox in America. *Nature* 28: 269-272, 317.  
———. 1936b. The mammals and life zones of Oregon. *N. Amer. Fauna* 55: 1-416.  
Booth, E. S. 1947. Systematic review of the land mammals of Washington. Unpubl. Ph.D. dissert., Wash. State Univ., Pullman.  
Brooks, A. 1930. Early big game conditions in the Mount Baker district, Washington. *Murrelet* 11: 65-67.  
Choate, J. R., and H. H. Genoways. 1975. Collections of Recent mammals in North America. *J. Mamm.* 56: 452-502.

- Dalquest, W. W. 1948. Mammals of Washington. Univ. Kans. Publ. Nat. Hist., 2.
- Fichter, E., and R. Williams. 1967. Distribution and status of the red fox in Idaho. J. Mamm. 48: 219-230.
- Franklin, J. F., and C. T. Dyrness. 1973. Natural vegetation of Oregon and Washington. U.S. For. Serv. Gen. Tech. Rep. PNW-8.
- Gray, R. L. 1977. Extension of red fox distribution in California. Calif. Dept. Fish and Game 63: 58.
- Grinnell, J., J. S. Dixon, and J. M. Linsdale. 1937. Fur-bearing Mammals of California. Univ. Calif. Press, Berkeley.
- Hall, E. R. 1981. The Mammals of North America. Second ed., J. Wiley and Sons, New York.
- Ingles, L. G. 1965. Mammals of the Pacific States. Stanford Univ. Press.
- Johnson, M. L., and S. Johnson. 1952. Checklist of mammals of the Olympic Peninsula. Murrelet 33: 32-37.
- Larrison, E. J. 1970. Washington Mammals, Their Habitats, Identification and Distribution. Seattle Audubon Soc.
- Lauckhart, J. B. 1970. Rare Mammals of Washington. Wildl. Soc., Wash. Chap.
- . 1972. The Red Fox in the Northwest. Unpubl. manuscript.
- Livezey, R., and F. Evenden. 1943. Notes on the Western red fox. J. Mamm. 24: 500-501.
- Maser, C., B. R. Mate, J. F. Franklin, and C. T. Dyrness. 1981. Natural history of Oregon Coast mammals. U.S. For. Serv. Gen. Tech. Rep. PNW-133.
- Scheffer, V. B. 1938. Unpubl. field notes.
- . 1939. Unpubl. field notes.
- . 1949. Mammals of the Olympic National Park and Vicinity. Unpubl. manuscript.
- Schoen, J. W. 1972. Mammals of the San Juan Archipelago: distribution and colonization of native land mammals and insularity in three populations of *Peromyscus maniculatus*. Unpubl. M.S. thesis, Univ. Puget Sound, Tacoma.
- United States Army Corps of Engineers. 1974. Washington Environmental Atlas. Second ed., U.S. Govt. Print. Office, Wash., D.C.
- Washington State Department of Game. 1976-1980. Individual trapper's reports of catch.

Received March 19, 1982

Accepted for publication May 3, 1982

## Meetings

The Animal Behavior Society will hold its 1984 annual meeting (13-17 August) at Eastern Washington Univ., Cheney, Wash. Program information may be obtained from Lee C. Drickamer, Biology Dept., Williams College, Williamstown, Mass. 01267. Information on registration and housing may be obtained from Steven B. Christopher, Office of Academic Affairs, Showalter Hall, Eastern Washington Univ., Cheney, Wash. 99004.

The 1984 annual meeting of The American Ornithologists' Union will be held 5-10 August at the Univ. of Kansas, Lawrence.

## 1983 Manuscript Reviewers

The editorial staff and the Association thank the following people for serving as manuscript referees during the past year:

E. G. Bizeau, D. W. Bushaw, I. O. Buss, J. A. Byers, E. P. Catts, R. del Moral, C. Driver, J. R. Dunn, T. Fleming, W. H. Funk, D. P. Furman, H. L. Gibbons, A. J. Gilmartin, D. Helvey, E. Hindin, D. L. Johnstone, A. Kendall, J. O. Klemmedson, E. Kozloff, W. Lopuskinsky, R. Mack, D. Medin, E. H. Merrill, D. L. Nelson, J. R. Nelson, F. W. Rabe, R. Rice, T. L. Righetti, S. W. Running, L. A. Sharp, C. Slaughter, M. V. Stalmaster, E. H. Stauber, N. Stark, K. Swedberg, J. M. Taylor, R. J. Taylor, D. W. Uresk, E. S. Verry, L. Volland, E. B. Welch, S. N. Wiemeyer, C. Williams, and D. Zobel.