

THE DISTRIBUTION OF AMPHIBIANS AND REPTILES
OF WALLOWA COUNTY, OREGON

by

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THE DISTRIBUTION OF AMPHIBIANS AND REPTILES OF WALLOWA COUNTY, OREGON

INTRODUCTION

STATEMENT OF PROBLEM

Wallowa County, Oregon, probably because of its rather remote location, has been much neglected by workers in the field of herpetology, although it possesses many interesting aspects which merit study of a herpetological nature. Prominent differences in the vegetation, climate, and geology of the county serve to differentiate it as a region wholly unlike the remainder of Oregon east of the Cascade Mountain Range. The Wallowa Mountains, which occupy a large portion of the area within the county, are a spur of the Rocky Mountains. Entering Oregon by way of the northeast corner of the state, they are largely responsible for these profound differences, since they rise well above the main plateau forming the greater portion of eastern Oregon.

Many of the amphibians and reptiles of the eastern section of Oregon have been found by previous workers to have an apparent northern limit in distribution on or near the lower slopes of the Blue Mountains. The Great Basin rattlesnake, Crotalus viridis lutosus (Klauber), may be cited as a form exemplifying this type of distributional arrangement. Similar situations exist in southeastern

Washington where forms entering Oregon from the north appear to come only as far as the lower reaches of the Blue Mountains; e.g. the northern alligator lizard, Elgaria coerulea principis (Baird and Girard). It is not known at the present whether the Blue Mountains actually serve as a distributional barrier to some of these forms, or whether their ranges extend farther into the higher elevations where they have not as yet been collected. Assuming the latter to be true, one could expect them to occur in Wallowa County.

The Wallowa Range is known to possess numerous geologic, floristic, and faunistic affinities with the Rocky Mountains. Limber pine, Pinus flexilis, and the once common Rocky Mountain bighorn, Ovis canadensis canadensis, are outstanding examples of these affinities. It might be suspected that similarities are to be found within the herpetofaunas of the two areas.

It is not yet clear what part certain of the hot, dry canyons, such as those of the Snake and Grande Ronde Rivers, play in regard to the distribution of Wallowa County amphibians and reptiles. If forms characteristic of the warmer areas of southeastern Oregon are able to use these canyons as passageways for extending their ranges northward, this would largely determine the herpetofauna of the eastern and northern borders of the county.

More specifically the problem has been one of attempting to record those amphibians and reptiles occurring in Wallowa County and to determine as nearly as possible the distribution for each of these animals within the county. Furthermore an effort has been made to present habitat and other data which seem to be of a significant nature.

The collecting and field work upon which this paper is based was carried out during the period dating from June 10, 1951 to August 29, 1951, with the exception of two specimens which were collected in November, 1950.

METHODS AND MATERIALS

Equipment used in this study is included in the following list:

- Aquatic dip-net
- Small pick
- Snake hoop
- 22 caliber rifle and shot shells
- Containers including cloth bags and coffee cans
- Specimen slips
- Notebooks for cataloguing and field notes
- Chloretone
- Ether
- Meter stick
- Labeling materials such as labels, thread, pen, and India ink
- Preserving supplies including a wax-bottom pinning tray, pins, dissecting kit, and 40% commercial solution formalin
- Gallon jars
- Available reference books
- Centigrade mercury thermometer
- Camera and film
- Miscellaneous articles

All specimens were kept alive, whenever circumstances permitted, in order to eliminate spoilage until the animals could be preserved.

Amphibians were placed in coffee cans in which small holes had previously been made for ventilation. Dampened leaves, grass or other moist materials were then placed with the specimens to prevent excessive drying.

Amphibians found in water, such as frogs, toads, and all larvae including the larvae of salamanders, were usually collected with the aid of an aquatic dip-net, with the exception of Ascaphus truei (Stejneger), the bell toad, and Rana catesbeiana (Shaw), the bullfrog. Ascaphus and

their larvae were taken by turning boulders in mountain streams and capturing them by hand. It was necessary to shoot bullfrogs, as their extreme alertness prohibited one from approaching to a distance close enough to capture them by other means without frightening them.

Adult salamanders were captured by turning logs, stones, and other objects in suitable habitats likely to be used as hiding places.

Lizards were collected by shooting them with small shot, as they were usually encountered in situations where they could quickly escape into nearby hiding places upon being disturbed.

All snakes except poisonous species were caught by hand. An aluminum tube with a fine wire hoop, which could be drawn secure after being placed over the head, was devised for the capture of poisonous snakes. All reptiles were kept in cloth bags until ready for preservation.

Below are listed the data which were recorded for each animal at the time of its capture and placed with the specimen. This practice eliminated the chance of separating the specimen and its proper data.

Name of specimen. When in doubt as to the identification of the animal, this information was not recorded until keys and descriptions had been consulted.

Date and time of day.

Locality. The location of the collecting site was designated in quarter sections, sections, ranges, and townships as nearly as could be determined. Also, when available, nearby landmarks such as streams, towns, and mountains were mentioned to better point out the site where the collection was made. This information was obtained from the 1948 edition of the United States Forest Service's map of the Wallowa and Whitman National Forests, Willamette Meridian, (Minam Division).

Habitat. Included are descriptions of the vegetation, temperature, moisture, soil, and the exact situation in which the animal was found.

Associated species. Records of other species of amphibians and reptiles found in the same habitat or general area were listed.

Miscellaneous remarks. These include notes on breeding, habits, and other observations that might be useful and of interest.

Before preservation, certain measurements were taken including the total body length for frogs, snout-to-rear-of-vent length and the tail length for salamanders, snakes and lizards. Total length only was recorded for amphibian larvae.

A numbered tag was then attached to the specimen, and all data obtained for the particular specimen including the above measurements were entered into a catalog of

specimens under a number corresponding to the one on the attached tag.

Amphibians were killed by placing them in a saturated solution of chlorethane. Reptiles were placed in a killing jar containing cotton saturated with ether. These procedures rendered the animals in a state of relaxation, so that they could easily be pinned out in a pinning tray in the desired position. The pinning tray contained a mixture of 8 parts water to 1 part commercial 40% formalin in sufficient quantity to insure that all parts of the animal were completely covered by the fluid. The body cavities of all reptiles and larger amphibians were opened to allow better penetration of the preservative. Amphibian larvae were killed by placing them in a 1 to 14 mixture of formalin. After remaining in the pinning tray for a time sufficient to attain the desired state of preservation, indicated by firmness and ability to retain the shape in which they had been pinned, the specimens were transferred to jars of preservative at a 10 to 1 mixture for amphibians and 8 to 1 for reptiles and stored in a cool place.

On various occasions when collecting trips were to be extended over a period of several days, all of the necessary equipment was taken by car into the field, and all phases of preservation were carried out under conditions which were far from desirable. On several occasions,

rather than attempt to preserve specimens in the face of hot weather and other conditions conducive to a high rate of spoilage, some animals were collected and then released after the usual data had been obtained.

The specimens upon which this paper is based have been placed in the collection of the Oregon State College Museum of Natural History at Corvallis, Oregon.

DESCRIPTION OF WALLOWA COUNTY

Geography

Wallowa County is located in the extreme northeastern corner of the state of Oregon, where it is bordered on the north by Washington, by Idaho to the east, Umatilla and Union Counties to the west, and Baker County to the south.

The county is very irregular in outline as rivers form a large proportion of its boundaries. The greatest dimensions are approximately 64 miles from north to south and 72 miles from east to west, with a total area of 3,178 square miles (Map 1).

Topography

Mountains:

The most prominent mountains in Wallowa County are the Wallowa Mountains which form the southern boundary of the county. The Wallows differ in origin and composition from all other mountains in the county by having a very rugged contour, many evidences of glaciation including numerous cirques and glacier-hewn valleys, and an abundance of non-volcanic materials such as granite, quartzite, limestone, marble, and slate (Plate 1). They rise well above the remainder of the county, with several peaks reaching 10,000 feet in elevation.

North of the Wallowa Mountains is found the Wallowa Valley. This valley has an elevation ranging from about 2,770 feet, near Wallowa, to 4,190 feet, near Joseph, and

is surrounded on all sides by highlands. These surrounding highlands, excepting the Wallowas, form a plateau which is composed mainly of Columbia River basalt as can be seen in various places throughout the county in the form of huge rocky cliffs and outcroppings. This lava is characteristically reddish-pink or orange-brown in color. The basaltic plateau extends in a half-circle from the lower slopes of the Wallowa Mountains in the southeast corner of the county so as to meet the Wallowas again in the southwest corner of the county. The resulting chain of mountains ranges from 4,000 to 7,000 feet in elevation and forms the wall of the Snake River Canyon to the east and the wall of the Grande Ronde River Canyon to the north and west.

Thus the Wallowa Valley lies completely surrounded by a chain of mountains which is penetrated effectively in only one place, where the Wallowa River passes from the west end of the valley through the mountains to join the Minam River near the town of Minam.

Rivers and Valleys:

The Wenaha, Minam, Lostine, Wallowa, Imnaha, Grande Ronde, and Snake Rivers are found in Wallowa County, but only the first five mentioned actually originate and have most or all of their watersheds within the county.

The Minam River drainage includes the western portion of the Wallowas, the stream originating in the south-central part of the range.

The Wallowa and Lostine Rivers have origins in the central Wallawas and drain the northern portion of the range. These two rivers join near the town of Wallowa and are known as the Wallowa River until joining the Grande Ronde River near Rondowa, after having gathered the waters of the Minam River near the town of Minam.

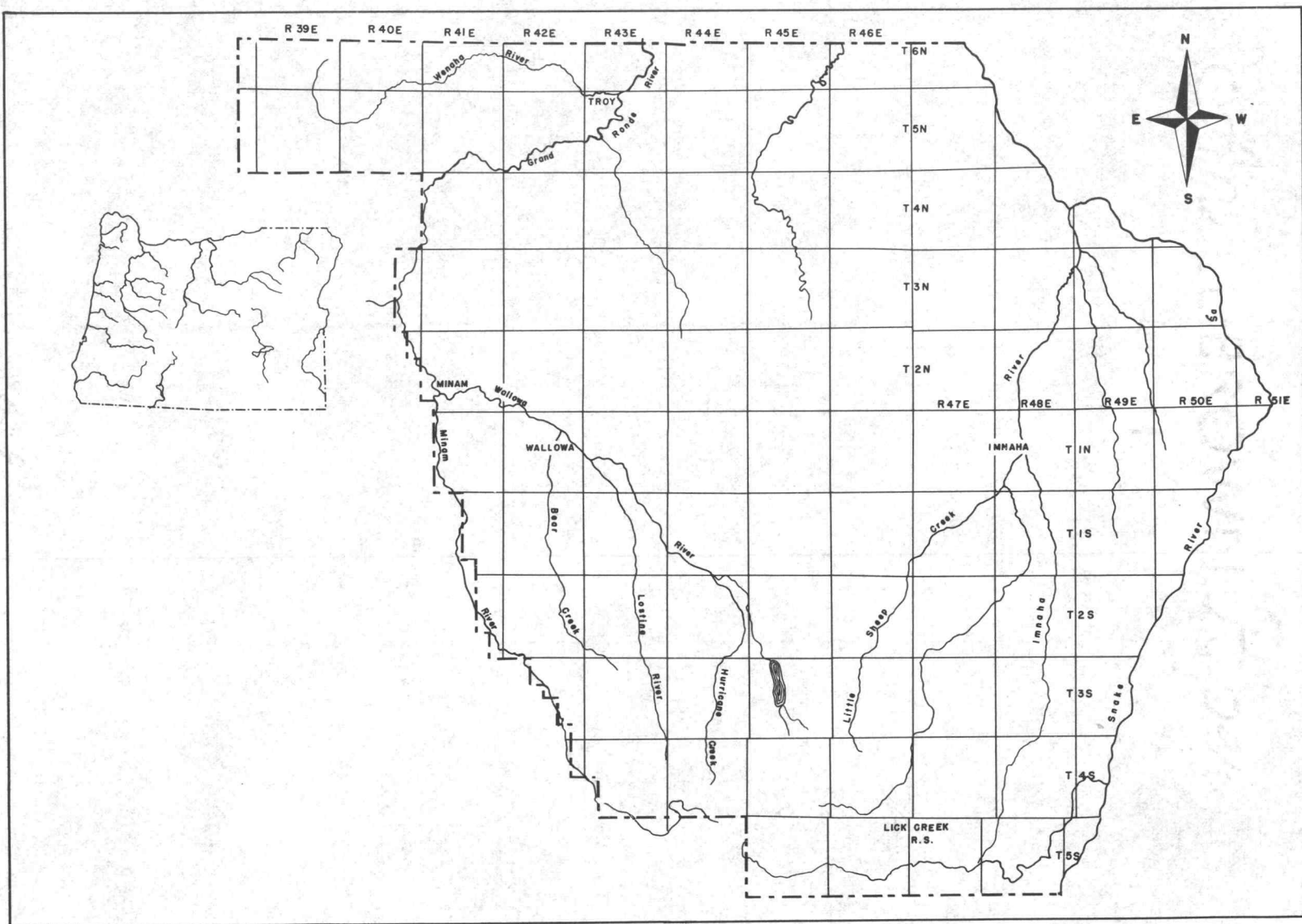
The Imnaha River watershed includes the southern and eastern portions of the Wallawas and nearly all of the remaining eastern part of the county (Plate 2).

The Snake River forms a boundary to the east separating the county from nearby Idaho. As the Snake River enters the county from the south and flows north it gathers many small side-streams in addition to the Imnaha River (Plates 3 and 4).

The Grande Ronde River having collected the waters of the Wallowa River flows north from Rondowa, turns northeast and passes into the state of Washington where it joins the Snake River.

A large number of lesser streams flow into the Grande Ronde all along its course. Included among these is the Wenaha River which joins the Grande Ronde near Troy after having collected water in the northwestern corner of Wallowa County and a portion of nearby Washington.

The Walla Walla River deserves some mention also, as it drains a small portion of the extreme northwestern part of the county.



Map 1. Wallowa County



Plate 1. View of the East Fork of the Lostine River Canyon showing the U-shaped appearance resulting from its having once contained a mountain glacier.



Plate 2. The Innaha River Canyon below the town of Innaha showing numerous layers of lava cliffs and arid conditions which are influential in determining the herpetofauna of the area.



Plate 3. View of the Imnaha River Canyon taken near its junction with the Snake River. Note the rugged topography and sparse vegetation.



Plate 4. The Snake River Canyon taken a few miles below where it enters Wallowa County. In this area the river occupies a box-canyon within the main canyon.

Only the Wallowa River occupies a valley of much consequence, as all other rivers mentioned above occupy canyons which are sharply V-shaped, with the river occupying most of the area at the bottom of the canyon. Very little agriculture is carried on in any of the river valleys with the exception of the Wallowa River Valley.

Climate

General:

Wallowa County can quite easily be divided into three areas which differ to a considerable extent with respect to climate, due to elevation. First, the canyons of the Snake, Imnaha, and Grande Ronde Rivers are characterized by extremely hot summers and scant precipitation. For example, the annual mean temperature of the lower Snake River Canyon is 56° and the average annual rainfall less than 16 inches.

The second and largest area includes the remainder of the county, with the exception of the Wallowa Mountains, and tends to have more moderate temperatures and in general larger amounts of precipitation. Snowfall goes to make a larger proportion of the precipitation and usually melts less rapidly than in the first area mentioned.

The Wallowa Mountains make up the third area and differ from the other two by receiving more precipitation, most of which is in the form of snow. This snow remains as snow-fields much of the year at higher elevations

furnishing a generous supply of water for agricultural purposes during the summer dry season. Other features of this region include lower temperatures and numerous thunderstorms in the summer.

Most of the precipitation falling in Wallowa County comes during the winter months with the greatest amount in January and the least in July. Numerous thunderstorms occur in mid and late summer, but add little to the total annual rainfall, as they are usually of very brief duration.

Specific:

Only a meager amount of climatic data has been gathered, since only five stations for recording weather information exist in the county. Of these, only the Wallowa and Joseph Stations have kept reasonably complete records long enough to be of much value. The other stations have kept only precipitation data or else have not operated for a long enough period of time to be of much significance. It is with this reservation that the following summary is presented:

<u>Station</u>	<u>Length of Record</u>	<u>Annual Precipitation</u>	<u>Elevation</u>
Enterprise	14	13.25	3,700
Gumboot	12	26.94	5,600
Howardville	30	25.67	3,600
Joseph	40	18.01	4,400
Wallowa	36	16.81	2,950

Temperature records have been kept at Wallowa, Joseph, and Enterprise, and are given in part for the years 1934-1948:

<u>Station</u>	<u>Annual Mean Temperature</u>	<u>High Extreme</u>	<u>Low Minimum</u>
Enterprise	43.7	104	-34
Joseph	44.4	102	-28
Wallowa	45.4	107	-34

The average January temperature for the county as a whole is about 26°, and the July average is near 68°.

The average number of days without killing frost in the areas now under cultivation runs from 120 to 180 depending on the elevation and other factors.

Vegetation

The flora of Wallowa County lends itself to being divided into four quite distinct types, due largely to effects of climate, elevation, and perhaps to a lesser extent, soil. When divided in this manner, the different types tend to correspond very closely to the life zones as given by Vernon Baily (1936) for the county. Without subscribing to any particular definition of a life zone, but merely because the floral zones and life zones correspond so closely, the terminology of the life zone concept will be used here for reasons of convenience in describing the vegetation of the various parts of the county.

The first type of vegetation is found in what will be termed the Upper Sonoran Zone and includes the Snake,

Immaha, and Grande Ronde River Canyons (Map 2). The following assemblage of plants is most commonly found growing in this zone:

Cheat	<u>Bromus sp.</u>
Hackberry	<u>Celtis douglasii</u>
Western sumac	<u>Rhus glabra</u> Var. <u>occidentalis</u>
Poison ivy	<u>Rhus toxicodendron</u>
Prickly pear	<u>Opuntia polyacantha</u>

The Transition Zone includes the Wallowa Valley and the low hills surrounding it (Map 2). In addition the Grossman, Middle Point, and Paradise regions as well as the middle altitudes of Summit Ridge have vegetation designating them to this zone. The following plants are characteristic indicators:

Ponderosa pine	<u>Pinus ponderosa</u>
Douglas fir	<u>Pseudotsuga taxifolia</u>
Trillium	<u>Trillium petiolatum</u>
Buckbrush	<u>Ceanothus sanguineus</u>
Huckleberry	<u>Vaccinium membranaceum</u>

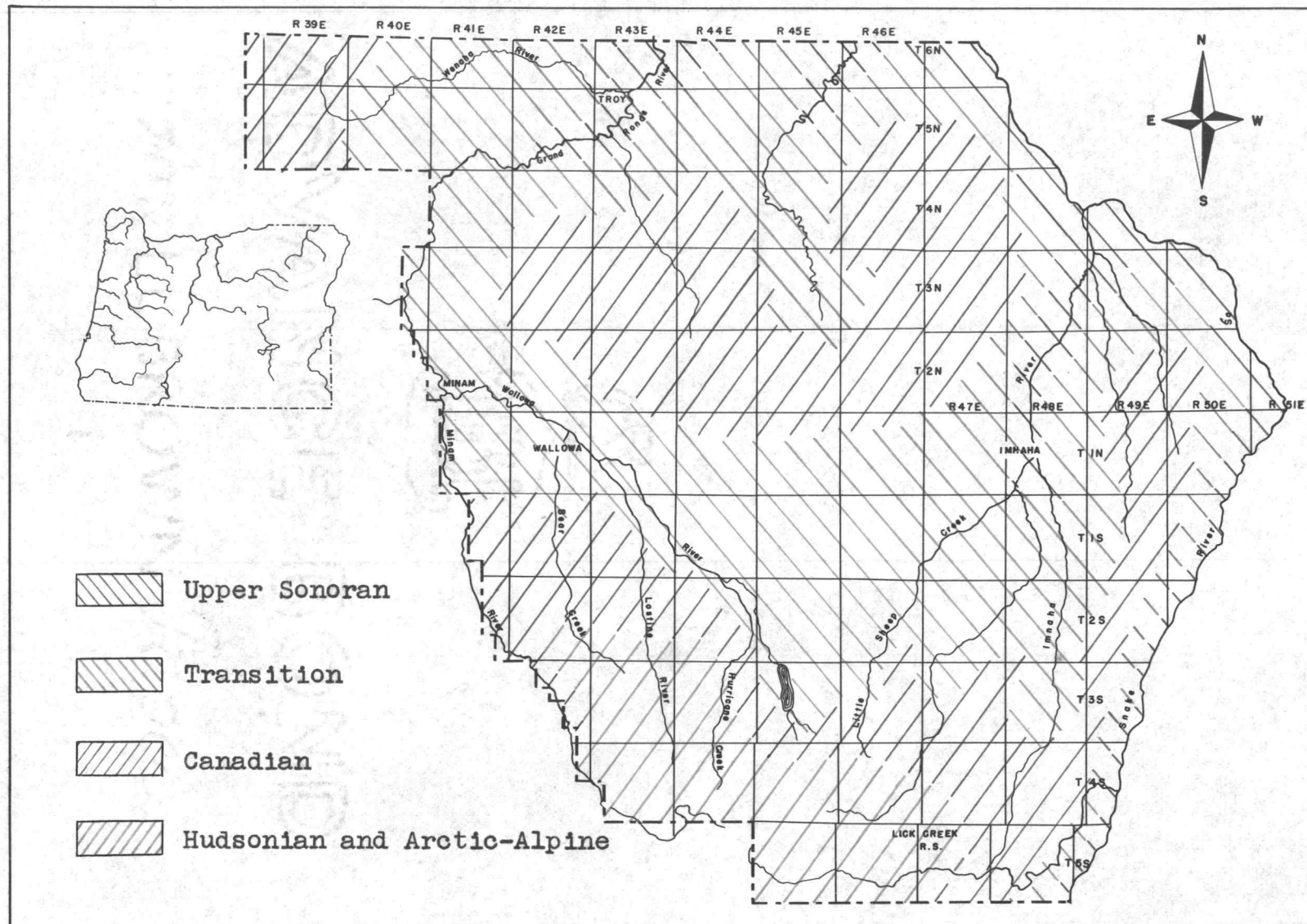
The mountains in the northwest corner of the county, the higher mountains for several miles around Chico in the central portion of the county, the top of Summit Ridge, and the slopes at middle altitudes in the Wallowas are considered as being in the Canadian Zone (Map 2). The plants characteristic of the Canadian Zone are these:

Lodgepole pine	<u>Pinus contorta</u> Var. <u>murrayana</u>
Western larch	<u>Larix occidentalis</u>
Engelman spruce	<u>Picea engelmanni</u>
Aspen	<u>Populus tremuloides</u>
Bunchberry	<u>Cornus canadensis</u>

The Hudsonian Zone includes the high Wallawas with the exception of those portions which lie above the timber line (Map 2). The vegetation above the timber line is of still another zone, the Arctic Alpine, but will not be considered here. Plants characteristically found growing in the Hudsonian Zone are listed below:

Limber pine	<u>Pinus flexilis</u>
Mountain hemlock	<u>Tsuga mertensiana</u>
Alpine fir	<u>Abies lasiocarpa</u>
Heather	<u>Phyllodoce empetriformis</u>
Northern valerian	<u>Valeriana sitchensis</u>
Spear-head senecio	<u>Senecio triangularis</u> Var. <u>subvestitus</u>

Map 2. Life Zones of Wallowa County



DISTRIBUTIONAL FACTORS

A combination of topographic, climatic, and edaphic factors is, in general, responsible in determining the present distribution of amphibians and reptiles in Wallowa County. It is often difficult to designate any one of these factors as the dominating one in determining a particular distributional arrangement of the flora and fauna of an area, as it is plainly the result of their combined effects in many cases. The following discussion is intended to point out the relative importance of these factors in determining the dispersal of the Wallowa County herpetofauna. Doing this necessitates reviewing the essential topographic features of the county.

As mentioned previously the county is formed of mountainous terrain surrounding the centrally located Wallowa Valley. The chain of highlands around the valley is effectively broken at only one place, that being the Wallowa Canyon.

Another conspicuous feature of topography is the numerous river canyons and their lesser branches. The latter originate in the higher areas and flow into the main rivers at various intervals along the course of the main streams. The result of this type of topography is a series of alternating canyons and ridges around the periphery of the main plateau.

The effect on the distribution of amphibians and reptiles resulting from the type of topography just described is that the ridges and main plateau serve as barriers to lowland forms and as pathways for dispersal to those favoring higher elevations. Similarly, lowland forms are able to find suitable habitat in the canyons, whereas these serve only as barriers to forms normally occupying higher regions.

Generally speaking, the canyons possess a narrow range in types of habitat found within them and are much better suited to reptiles than to amphibians. Some features making them unfit for most amphibians are that they are characteristically very hot, dry, and rocky. In addition, they are usually acutely V-shaped with a rapidly flowing stream occupying the bottom, leaving little room on either side for ponds or marshes in which amphibians might deposit eggs and larvae develop.

Damp forests, common to western Oregon, are not found in Wallowa County. In place of them are drier, yellow pine woodlands. Within such dry woodlands relatively few areas moist enough to support salamander populations exist. Several phenomena contributing to this extreme dryness are scant rainfall, coarse soils, a rapid rate of evaporation, low humidity, great freedom of wind movement, and absence of tree-top canopies. The effect of these conditions on amphibian distribution was noted when they were seen to

congregate in large numbers near man-made stock-watering ponds which were very often the only standing bodies of water to be found for several miles around. It would seem that salamanders not found near these ponds would be forced to live a subterranean mode of life in order to have adequate moisture for insuring their survival.

PREVIOUS HERPETOLOGICAL WORK IN WALLOWA COUNTY

The literature reveals two main sources of information on the distribution and occurrence of amphibians and reptiles in Wallowa County. These are Kenneth Gordon (1939) and Anderson and Slater (1941). Gordon's monograph includes the collecting of Stanley Jewett, Jr. who probably accounted for more forms than any other worker to date. As a result of the efforts of the above workers, the following list of specimens was known from the county at the beginning of the present study. The species name, the person publishing the information about each species, and the area from which it was collected are given in the list.

- | | | |
|--|---------------------|------------------------------------|
| 1. <u>Ambystoma macrodactylum</u> | Gordon | Wallowa Lake |
| 2. <u>Ascaphus truei</u> | Gordon | Near the Lick Creek Ranger Station |
| 3. <u>Bufo boreas boreas</u> | Gordon | Wallowa Canyon and Wallowa Lake |
| 4. <u>Rana pretiosa luteiventris</u> | Gordon | Wallowa River |
| 5. <u>Sceloporus occidentalis occidentalis</u> (or <u>biseriatus</u>) | Anderson and Slater | Grouse Flats |
| 6. <u>Charina bottae</u> | Gordon | Wallowa Lake |
| 7. <u>Coluber constrictor mormon</u> | Anderson and Slater | Snake River Canyon |

- | | | | |
|-----|--|---------------------------|--------------|
| 8. | <u>Pituophis catenifer</u>
<u>deserticola</u> | Anderson
and
Slater | Cache Creek |
| 9. | <u>Thamnophis elegans vagrans</u> | Gordon | Wallowa |
| | | Anderson
and
Slater | Grouse Flats |
| 10. | <u>Thamnophis sirtalis</u>
<u>tetrataenia</u> | Anderson
and
Slater | Grouse Flats |

Schonberger (1945) and Middleton (1948) have mentioned specimens from Wallowa County, but neither has given records which were not previously established in Gordon's writings.

SYSTEMATIC LIST OF THE AMPHIBIANS
AND REPTILES OF WALLOWA COUNTY

Phylum Chordata

Class Amphibia

Order Caudata

Family Ambystomidae

Genus Ambystoma

Ambystoma macrodactylum Baird

Order Salientia

Family Ascaphidae

Genus Ascaphus

Ascaphus truei montanus (Mittleman and Myers)

Family Bufonidae

Genus Bufo

Bufo boreas boreas (Baird and Girard)

Family Hylidae

Genus Hyla

Hyla regilla Baird and Girard

Family Ranidae

Genus Rana

Rana catesbeiana Shaw

Rana pretiosa luteiventris Thompson

Class Reptilia

Order Squamata

Suborder Sauria

Family Iguanidae

Genus SceloporusSceloporus occidentalis biseriatus Hallowell

Family Scincidae

Genus EumecesEumeces skiltonianus (Baird and Girard)

Suborder Serpentes

Family Boidae

Genus CharinaCharina bottae utahensis (Blainville)

Family Colubridae

Genus ColuberColuber constrictor mormon (Baird and Girard)Genus PituophisPituophis catenifer deserticola (Stejneger)Genus ThamnophisThamnophis elegans vagrans Baird and GirardThamnophis sirtalis tetrataenia Fitch

Family Crotalidae

Genus CrotalusCrotalus viridis oreganus Holbrook

ANNOTATED LIST

Ambystoma macrodactylum Baird

The long-toed salamander

General distribution in Oregon:

A. macrodactylum is found essentially throughout the state of Oregon, with the exception of the hot, dry southeastern portion, including Malheur, Harney, and the eastern half of Lake County. Within this general range, it occurs in suitable habitat from subalpine elevations down into the lower valleys and at all elevations between (Map 3).

Records of occurrence in Wallowa County:

Apparently the first record of this salamander for Wallowa County came from Wallowa Lake, where it was collected by Stanley Jewett, Jr.. Since the present study was made during the summer, few adults were collected, although numerous records of larvae were made in almost every locality visited.

The following records of occurrence were obtained: Numerous larvae were found in two springs in NE $\frac{1}{4}$, S20, T5S, R48E and in NW $\frac{1}{4}$, S33, T5S, R48E near the trail which leads from Coverdale to McGraw Creek near Snake River Canyon.

Both adults and larvae were taken on the East Fork of the Lostine River near the center of S20, T4S, R44E.

Larvae were present near the Bear Creek Guard Station in mid. S2,T2S,R42E and near the end of the road leading up Bear Creek in S21,T1S,R42E.

One adult and several larvae were collected in NW $\frac{1}{4}$, S19,T1S,R47E and numerous larvae in S16,T1S,R47E and NW $\frac{1}{4}$, S15,T1S,R47E, all of which are in the canyon of Little Sheep Creek.

Larvae were found in SE $\frac{1}{4}$,S6,T1N,R42E in Water Canyon. Three adults were taken at various places within the town of Wallowa and two more adults taken one mile northeast of Wallowa. Larvae were found in NE $\frac{1}{4}$,S1,T1N,R42E.

Larvae were found at the junction of the Swamp Creek Road with the Enterprise-Chico Road in S24,T2N,R45E.

Larvae were found in SW $\frac{1}{4}$,S11 and SE $\frac{1}{4}$,S16,T2N,R42E in Dry Creek Canyon.

One adult was collected near Maxville in NE $\frac{1}{4}$,S16,T3N,R42E. Larvae were collected in NW $\frac{1}{4}$,S24,T3N,R41E.

Adults and larvae were collected in the NW $\frac{1}{4}$,S25, larvae in NW $\frac{1}{4}$,S28, and larvae in NE $\frac{1}{4}$,S23,T4N,R41E near Deep Creek.

Probable distribution in Wallowa County:

Ambystoma macrodactylum occurs throughout Wallowa County wherever suitable habitat is available. It probably does not inhabit the Snake River and lower Imnaha Canyons, or the higher peaks of the Wallowas, as these areas are

lacking in the typical habitat in which Ambystoma is usually found. Collecting has shown that it ranges from approximately 2,000 feet in Little Sheep Creek Canyon to nearly 7,800 feet in the meadows of the Wallowa Mountains, which indicates that it can exist under very diverse conditions (Map 3).

Habitat discussion:

Adults were most often found beneath a log or other object very near to water, although some were found in damp places at considerable distances from standing water. For example, one was found under a board on the floor of a dirt basement and another in a head of garden lettuce. It is felt that most of the adults take to a subterranean mode of life in the latter part of the summer, as they become increasingly difficult to find as the summer progresses.

Larvae were always found in springs, ponds, or other such bodies of water. These pools were often situated in very dry places and could probably be entered only during the spring or rainy season. When the water dried up, the newly metamorphosed young were noted to crawl into the cracks left in the mud in order to remain near the small amount of available moisture.

Miscellaneous remarks:

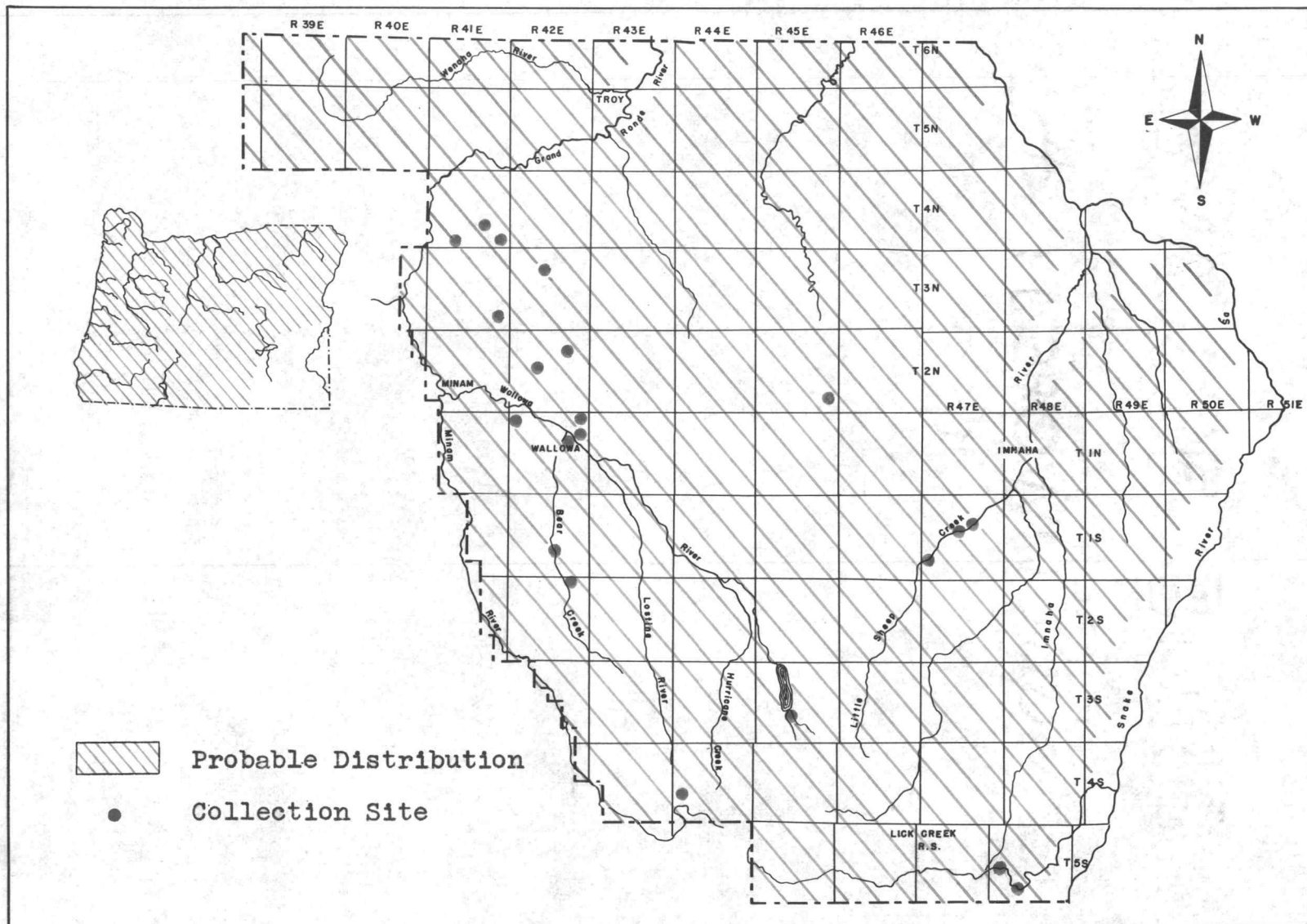
Three exceptionally large individuals measuring 139,

141, and 155 m.m. in total length were collected at 7,700 feet elevation on the East Fork of the Lostine River, not far from Mirror Lake (Plate 1). Bishop (3, pp.140-141) has stated that two specimens measuring 122.5 and 127 m.m. "are perhaps exceptionally large individuals".

Although salamanders from Wallowa County have been placed in the species macrodactylum for this writing, it is quite apparent that they differ considerably from the macrodactylum found west of the Cascades in Oregon. Mittelman (9, p.93) has divided the species macrodactylum into several subspecies, placing both those from western and eastern Oregon in the subspecies macrodactylum. Since his work does not appear to have received wide acceptance, subspecies will not be considered at this time. However, the differences noted seem worthy of mention here. In the first place, the dorsal stripe of the Wallowa County forms always appears much more pronounced after preservation than do those from western Oregon. The dorsal stripe of the Wallowa specimens is also more often broken into blotches or spots anteriorly, and it is uneven along the edges. The Wallowa form appears somewhat blacker in ground color as opposed to brown displayed by western Oregon specimens after having been preserved for several weeks.

A. macrodactylum was the only salamander collected in the county. If others are there, it may be that collecting in late winter and spring would reveal them. Much effort

Map 3. Distribution of Ambystoma macrodactylum 32



was expended in an attempt to find other species, particularly in the Wallowa Mountains. If others do occur there the dryness of the summer might partially explain why they were not discovered.

Ascaphus truei montanus (Mittleman and Myers)

The bell toad

General distribution in Oregon:

This species is found quite widely distributed in western Oregon, having been collected at several places in the Cascades, Coast Range, and in the Siskiyou. It probably is found in most areas in western Oregon excepting the Willamette Valley. In eastern Oregon it has been collected only in Wallowa County (Map 4).

Records of occurrence in Wallowa County:

Previous to the present study Ascaphus had been recorded from one locality within Wallowa County, that being near the Lick Creek Ranger Station, Gordon (1939). This was verified for this writing when four Ascaphus were collected in S1,T5S,R46E, which is one-half mile south of the Ranger Station. Three more were taken in the mid. S35, T4S,R46E, which is about one-half mile north of the Lick Creek Ranger Station.

Several Ascaphus were collected from Hurricane Creek and its tributaries. One was taken in the SE $\frac{1}{4}$,S28,T3S,R44E

from a small stream which enters Hurricane Creek at this location. Four more were collected near the mouth of Granite Creek in the mid. S33,T3S,R44E.

Although Ascaphus were found to be present in the two areas just mentioned, they were never found to be as abundant as on the Lostine River System, for nine were taken from the main Lostine and its smaller side-streams, forty-two from the East Fork of the Lostine River, and twenty-six from the West Fork.

Of those collected from the Lostine, one was taken at the point where Bowman Creek meets the Lostine River in the NE $\frac{1}{4}$,S23,T3S,R43E, ten more from the East Fork of the Lostine, near Lost Lake in SW $\frac{1}{4}$,S8,T4S,R44E. The remaining sixty-six were taken within one mile up or downstream from the forks of the Lostine. Thus eight were taken from the main Lostine River or its smaller side-streams within one mile of the forks downstream, thirty-two were collected from the East Fork, and twenty-six from the West Fork, within one mile above their junction.

Probable distribution in Wallowa County:

It seems probable that Ascaphus is confined to the cold, fast-flowing streams of the Wallowa Mountains. Other streams within the county are usually either too warm or else not permanent, drying up or becoming very slow and stagnated during the hot part of the summer. Further col-

lecting would probably reveal Ascaphus in other major streams having their origins within the Wallowas, such as Bear Creek, the Minam River, the upper Imnaha River, the headwaters of both forks of the Wallowa River above Wallowa Lake, and Big Sheep Creek. This form should also be looked for in those streams originating within the Wallowas which flow south into Union County such as Catherine Creek, Eagle Creek, and Pine Creek (Map 4).

Habitat discussion:

A. t. montanus in Wallowa County is most often found in swiftly-flowing, well-shaded, mountain streams above 5,000 feet in elevation. These streams are usually lined along both banks and on the bottom with large boulders or other objects under which the bell toads take refuge from the swift current, as they are rather poor swimmers (Plate 5). When temperatures were taken in these streams, they were found to be from 9° to 11° C. The fact that Ascaphus requires these low temperatures is shown quite well by death resulting from their being enclosed in a person's hand for only a short length of time. A. truei is able to breathe through its skin as is shown by the fact that it is found under objects in the water and seldom appears at the surface to breathe. Such a method of respiration requires a particularly well aerated stream in order to furnish a sufficient supply of oxygen. Larvae are usually

found under rocks or on the downstream side of a rock where they attach themselves by their large suction-cup mouths. Upon being disturbed they often swim to another rock but sometimes make little or no effort to escape. Adults ordinarily do not attempt an escape when the object under which they are hiding is removed, but are frequently carried away by the current.

On one occasion, near Lost Lake on the East Fork of the Lostine in a well-shaded place, several Ascaphus were found on land, although none was more than a few feet from the water's edge.

Miscellaneous remarks:

On August 19, 1951, a series of 66 Ascaphus was collected near the forks of the Lostine River, which included 21 tadpoles ranging from 21 to 62 millimeters in total length and 45 adults ranging from 25 to 43 millimeters in body length. Nearly all stages or age groups were represented as there were small tadpoles, very large tadpoles without limbs, some with well developed limbs and a large tail, some with well developed limbs and only the vestige of the tail remaining, some which were only recently transformed, and many full grown adults. It seems almost certain that the poorly developed tadpoles found this late in the summer, at an elevation of more than 5,000 feet, would be unable to complete their transformation to adults before

Map 4. Distribution of Ascepus truet montanus 37

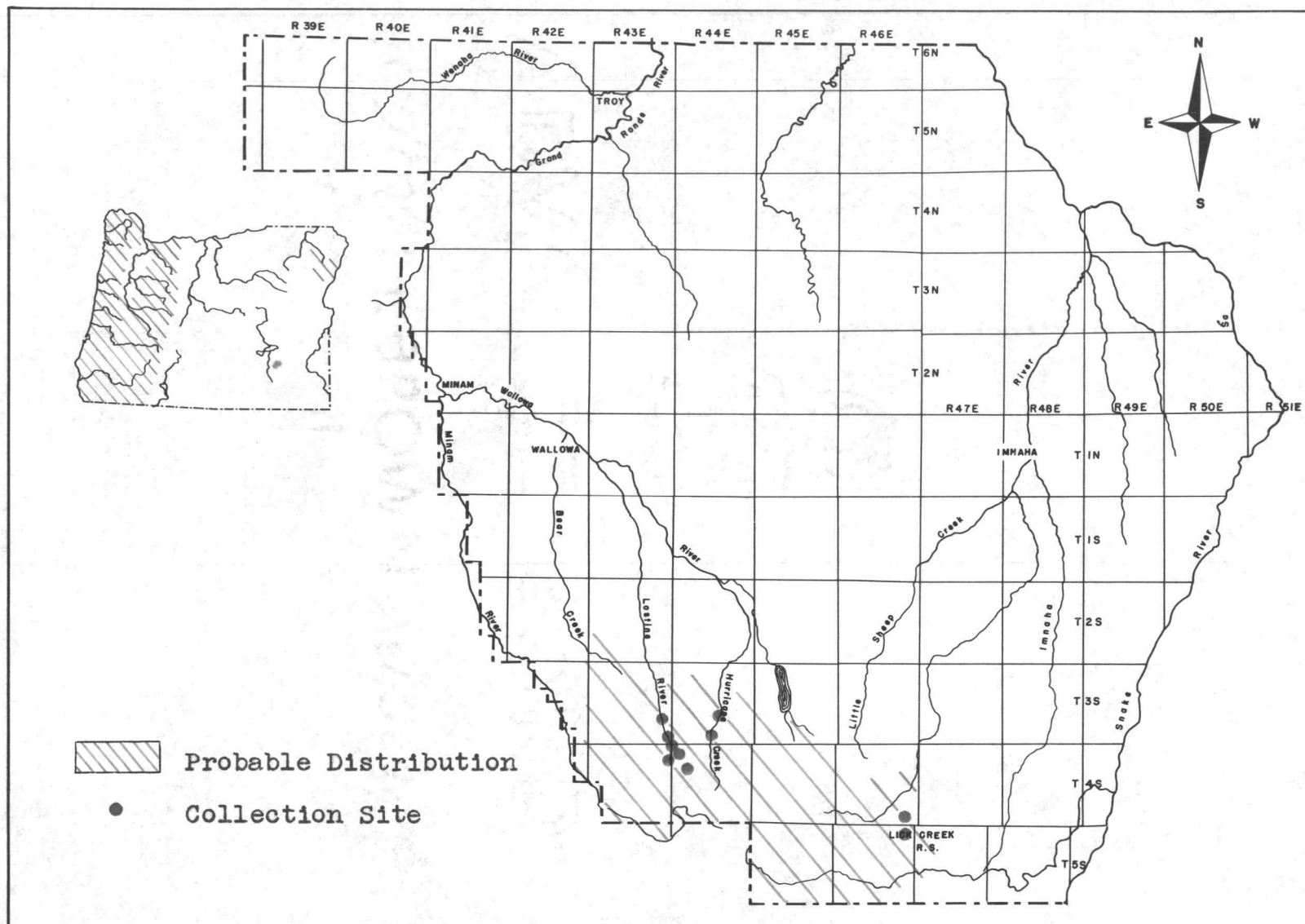




Plate 5. A tributary of Hurricane Creek from which Ascaphus truei montanus was collected. This is rather characteristic habitat, having an abundance of large boulders and being well aerated.

the arrival of winter. On the other hand, it was very apparent that some had or would complete transformation by the end of the summer. From this data it seems a likely conclusion that in the Wallowa Mountains, A. t. montanus requires two summers to reach the postmetamorphic stage.

Bufo boreas boreas (Baird and Girard)

The northwestern toad

General distribution in Oregon:

Bufo boreas boreas is found in all parts of Oregon exclusive of the northwestern corner of the state and the desert areas. It has not been collected in the central Willamette Valley, northern Coast Mountains, or lower Columbia River regions (Map 5).

Records of occurrence in Wallowa County:

B. b. boreas has previously been recorded from Wallowa Lake and Wallowa, Oregon in Wallowa County by Stanley Jewett, Jr., and from Wallowa Lake by Schonberger (1945).

Two adults were found in Olson's Swamp in the mid. S27, T1S, R43E. One adult was taken in the town of Wallowa. Larvae were found in S30, T1S, R47E on Little Sheep Creek. One adult was taken from the town of Imnaha in SW $\frac{1}{4}$, S15, T1N, R48E. Two adults were taken from the south end of Wallowa Lake in NE $\frac{1}{4}$, S20, T3S, R45E. Two adults and numerous larvae were found about seven miles north of Wallowa in SE $\frac{1}{4}$, S16,

T2N,R42E. Adults were taken in S21,T4N,R41E., NW $\frac{1}{4}$,S26,T3N,R41E., and NE $\frac{1}{4}$,S36,T4N,R41E all in West Grossman. Two adults were collected from near Falls Creek Forest Camp in NW $\frac{1}{4}$,S15,T3S,R44E., and another from S22,T4S,R44E on Hurricane Creek. One adult was taken from the mid. S20,T4S,R44E on the East Fork of the Lostine River. One adult was found near the Lick Creek Ranger Station in the mid. S35,T4S,R46E. Several recently metamorphosed young were obtained near the town of Minam in mid. S29,T2N,R41E. Two adults were taken about two miles northwest of Wallowa in NE $\frac{1}{4}$,S4,T1N,R42E. Two more adults were collected from near Promise in SE $\frac{1}{4}$,S27,T4N,R42E. Adults were seen in S32,T2N,R45E, and S24,T2N,R45E near Swamp Creek. At the Memalocse Airport near Hat Point, S34,T1S,R49E, adults and larvae were observed. One adult was found in S10,T1S,R48E on the Imnaha River. Many larvae were observed in S5,T1N,R43E in Whiskey Creek. Several adults were found in the North Minam Meadows near S32,T3S,R43E. Adults were collected in NW $\frac{1}{4}$,S25,T3N,R41E, and NW $\frac{1}{4}$,S28,T4N,R41E near Deep Creek. One adult was noted in S17,T2N,R42E on Rock Creek. Larvae were found in NE $\frac{1}{4}$,S23,T4N,R41E, and an adult in NE $\frac{1}{4}$,S11,T3N,R41E on Grossman Creek. One adult was seen near Bowman Creek in NE $\frac{1}{4}$,S22,T3S,R43E. Adults were collected from S24,T4N,R40E and S34,T5N,R41E on the Grande Ronde River. One adult was seen in S23,T3N,R44E two miles north

of Sled Springs, and another adult was collected near the mouth of Wildcat Creek in S19,T5N,R43E.

Probable distribution in Wallowa County:

Bufo boreas boreas occurs all over the county exclusive of the alpine peaks and perhaps some very arid places such as the Snake River Canyon. In all other areas it is apparently limited only by available waters in which the eggs can develop and the young mature. This species was collected at elevations ranging from 2,000 feet up to 7,700 feet, much the same as was A. macrodactylum (Map 5).

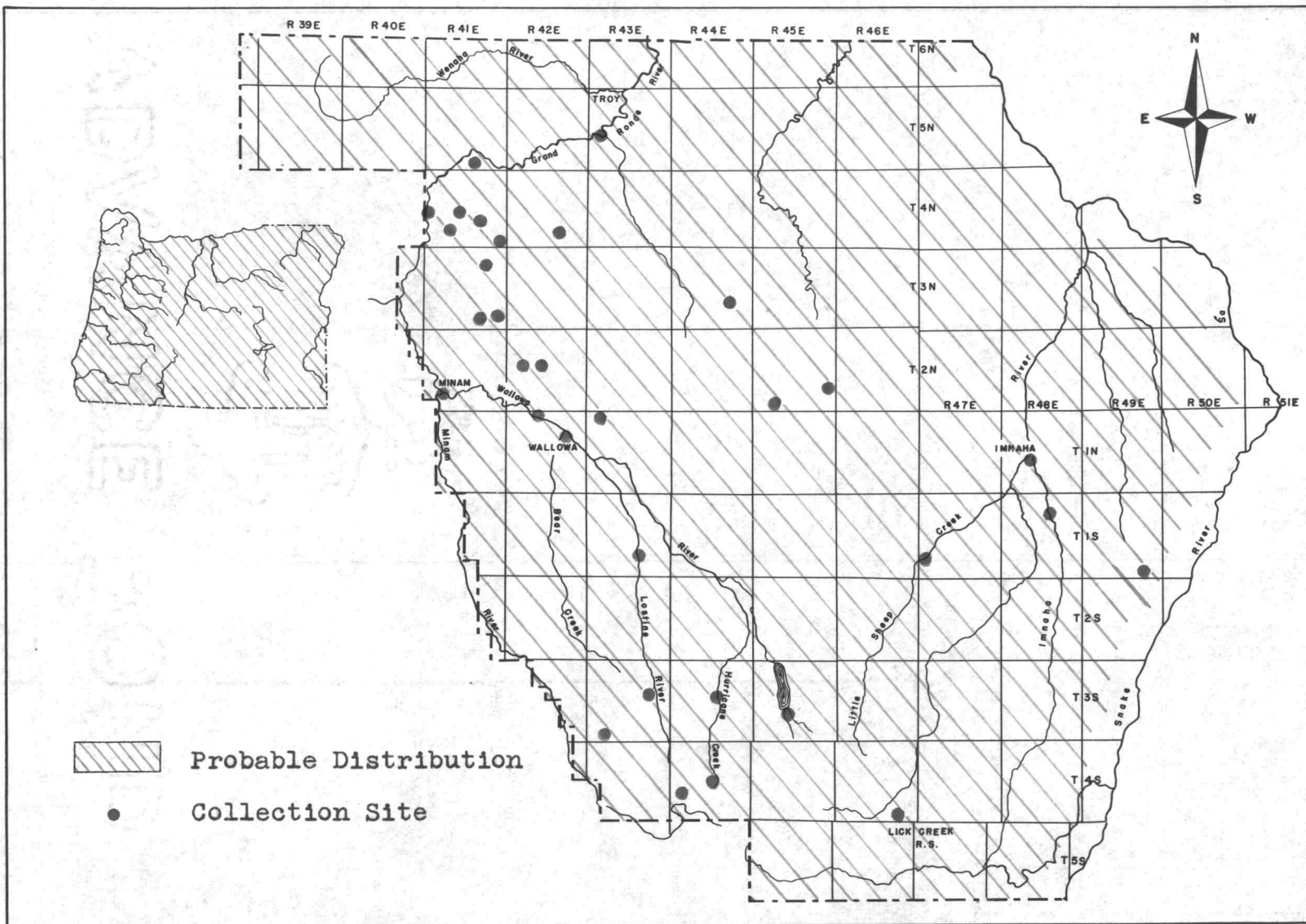
Habitat discussion:

This toad tends toward a terrestrial mode of life much of the time other than during the breeding season. However, it is most often encountered near water, such as springs, small ponds, streams, and swamps. It may be found during the day sitting on a floating object in the water, in grasses and other vegetation at the water's edge, or under a board or log at some distance from the water. At night Bufo leaves these hiding places and moves about, when it is often seen hopping about on lawns and in the road.

The larvae were found in ponds, springs and streams, usually where there was little water movement. The water in which they were most often found was very warm and usually quite muddy. Larvae were found to be present in

Map 5. Distribution of Bufo boreas boreas

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great abundance in some areas, so that the bottom of the pond would appear almost covered with a solid layer of them.

Miscellaneous remarks:

On August 14, 1951 a series of 16 recently metamorphosed young was collected on the banks of the Wallowa River near the town of Minam, which ranged from 17 to 22 millimeters in total body length. There seemed to be thousands of them hopping toward the river making it extremely difficult to walk without stepping upon them.

On one occasion near Promise, a farmer volunteered to donate a Bufo to the collection, whereupon he went to a small stock pond to procure it and discovered the overflow pipe to be clogged up and the pond flooding over the dam. A stick inserted into the pipe served to drive from the other end a particularly large toad which had been the source of difficulty.

On Hurricane Creek, a Bufo was found in a stream having a temperature of 11° C.

Hyla regilla (Baird and Girard)

The Pacific tree frog

General distribution in Oregon:

Hyla regilla is very common and widely distributed throughout the entire state, excepting perhaps the alpine

peaks and extremely arid sections of the deserts in southeastern Oregon (Map 6).

Records of occurrence in Wallowa County:

Hyla was not mentioned as having been collected from Wallowa County in Gordon's monograph. There are no specimens in the Oregon State College Museum of Natural History Collection, although a record of them having been collected from Forks Meadows in Wallowa County is on file. None of the available maps shows Forks Meadows, so it is not at this time certain as to the authenticity of these records.

Hyla was collected from the following areas in the present study: in the town of Wallowa at three different locations; NE $\frac{1}{4}$, S3, T3N, R42E near Maxville; NE $\frac{1}{4}$, S20, T3S, R45E south end of Wallowa Lake; S13, T4N, R46E Billy Meadows; NE $\frac{1}{4}$, S1, T1N, R42E two miles north of Wallowa; NW $\frac{1}{4}$, S28, T4N, R41E Deep Creek; NW $\frac{1}{4}$, S26, T3N, R41E near Howard Meadows; SW $\frac{1}{4}$, S23, T5S, R47E near the Coverdale Ranger Station; SW $\frac{1}{4}$, S26, T5N, R42E Wart Creek near Promise; NW $\frac{1}{4}$, S17, T4S, R44E near Lost Lake on the East Fork of the Lostine River.

Probable distribution in Wallowa County:

Hyla regilla probably occurs every place in Wallowa County where pools of water exist which are free from ice and last long enough to enable the eggs to hatch and the

young to mature. The only two localities within the county which do not seem to offer these necessary breeding ponds in abundance are the alpine peaks and the hot, rocky canyons of the Snake, and perhaps the lower Imnaha River. However, since Hyla breeds so early in the spring, it may be that the young are able to complete development in the hot canyons before extremely hot weather approaches. Spring collecting might furnish more information in regard to this point (Map 6).

Habitat discussion:

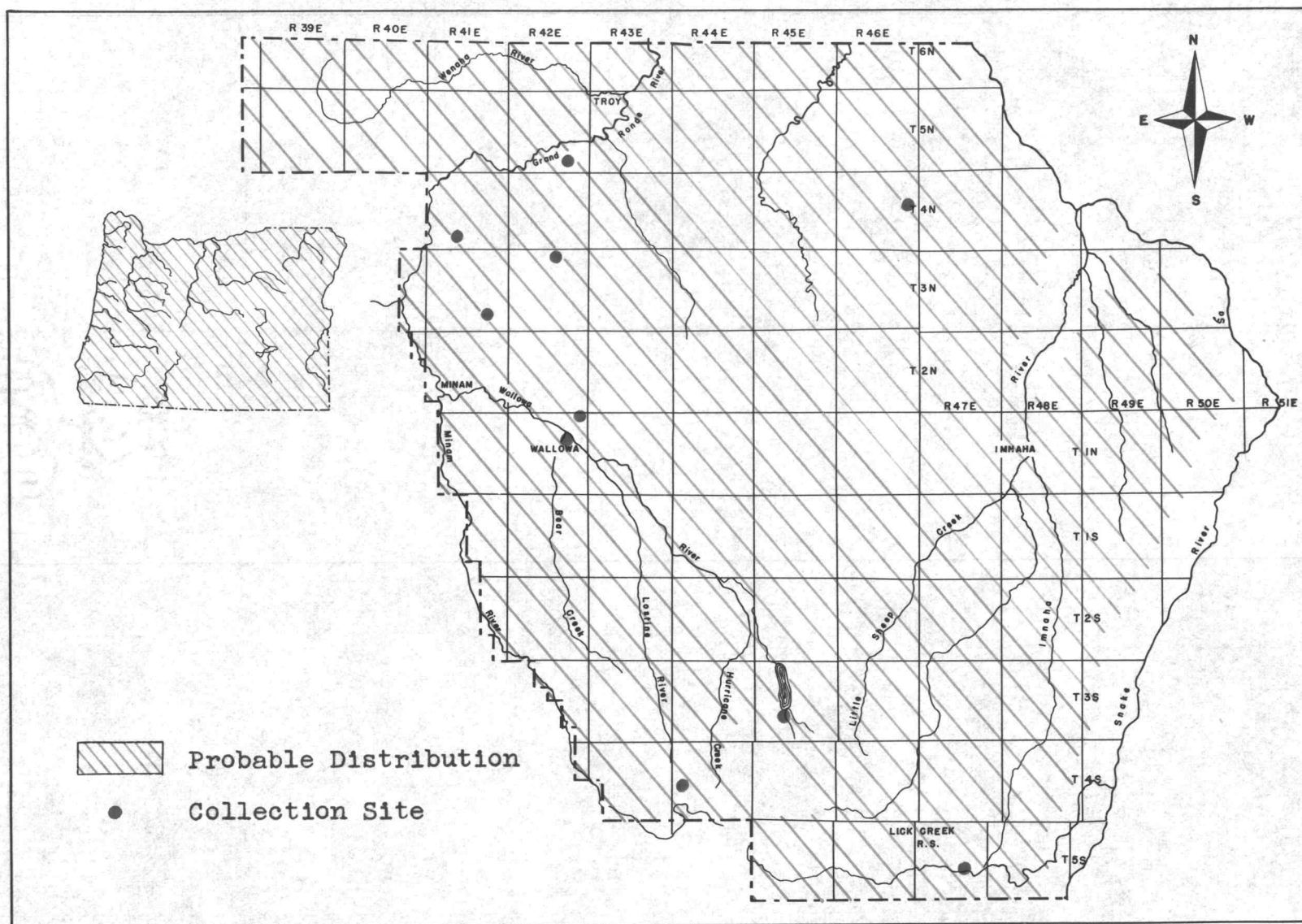
Hyla requires, as stated previously, a slow-moving or standing body of water such as a spring, pond or marsh in which to deposit its eggs. During the non-breeding season, adults may be found under buildings, in and on the edges of lakes or ponds, among vegetation near streams, or near swampy places. In dry areas, they are more often heard than seen, for they tend to remain unexposed to the heat during the day and venture out only in the evenings.

Miscellaneous remarks:

On June 25, 1951, two miles north of Wallowa, a pond was visited which was in a state of drying up. Water remained only in a few small holes. A great number of recently transformed Hyla were leaving the water and seeking shelter from the sun under boards and in mud cracks.

Map 6. Distribution of Hyla regilla

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A series of eight was collected. Measurements showed the series to average 16 m.m. in total length, some of which had a millimeter or two of tail remaining that had not yet been absorbed.

Another young Hyla with a total body length of 13 m.m. plus one millimeter of unabsorbed tail was collected at nearly the same elevation near Promise on August 22, 1951.

Comparing the dates of these two findings indicates a very late breeding season for the parents of the last mentioned. This seems particularly true when it is noted that a specimen measuring 19 millimeters was collected at nearly 7,500 feet, close by Lost Lake on August 25, 1951.

Rana pretiosa luteiventris Thompson

The Nevada spotted frog

General distribution in Oregon:

R. p. luteiventris is found on the eastern slope of the Cascade Mountains and throughout the remainder of eastern Oregon (Map 7).

Records of occurrence in Wallowa County:

A record from the Wallowa River in Gordon's work is apparently the first mention made of this subspecies occurring in Wallowa County. The following records for other localities within the county were obtained as a result of the present study: NW $\frac{1}{4}$, S16, T1N, R42E, SW $\frac{1}{4}$, S20, T1N, R43E,

NW $\frac{1}{4}$,S33,T1S,R43E, SW $\frac{1}{4}$,S13,T1N,R42E, SW $\frac{1}{4}$,S18,T1S,R44E, NE $\frac{1}{4}$,S32,T2N,R42E, NW $\frac{1}{4}$,S19,T1N,R43E, mid. S9,T1N,R42E, NE $\frac{1}{4}$,S4,T1N,R42E, all in the Wallowa Valley; SE $\frac{1}{4}$,S34,T1S,R43E, mid. S20,T4S,R44E, SW $\frac{1}{4}$,S8,T4S,R44E, on the Lostine River; NW $\frac{1}{4}$,S34,T5N,R41E on the Grande Ronde River; NE $\frac{1}{4}$,S27,T4N,R41E, NE $\frac{1}{4}$,S17,T4N,R41E, NE $\frac{1}{4}$,S11,T3N,R41E, near Deep and Grossman Creeks; NE $\frac{1}{4}$,S15,T1S,R47E, on Little Sheep Creek; NW $\frac{1}{4}$,S28,T4N,R41E, in Slade Meadows; NW $\frac{1}{4}$,S26,T3N,R41E, near Howard Meadows; S22,T4S,R44E, on Hurricane Creek; SW $\frac{1}{4}$,S23,T5S,R47E, at the Coverdale Ranger Station; NE $\frac{1}{4}$,S3,T3N,R42E, Cougar Lake; S32,T3S,R43E, in the North Minam Meadows.

Probable distribution in Wallowa County:

R. p. luteiventris is commonly distributed throughout nearly all of the county. It probably does not occur in alpine areas or in the Snake River Canyon where the river is confined to a very narrow canyon. It was collected at elevations ranging from around 2,100 feet to over 7,700 feet (Map 7).

Habitat discussion:

This species is very aquatic, rarely being found beyond the point where it can reach water in one leap. When disturbed it takes to the water where it swims to the bottom to burrow in mud or moss and other vegetation, if it

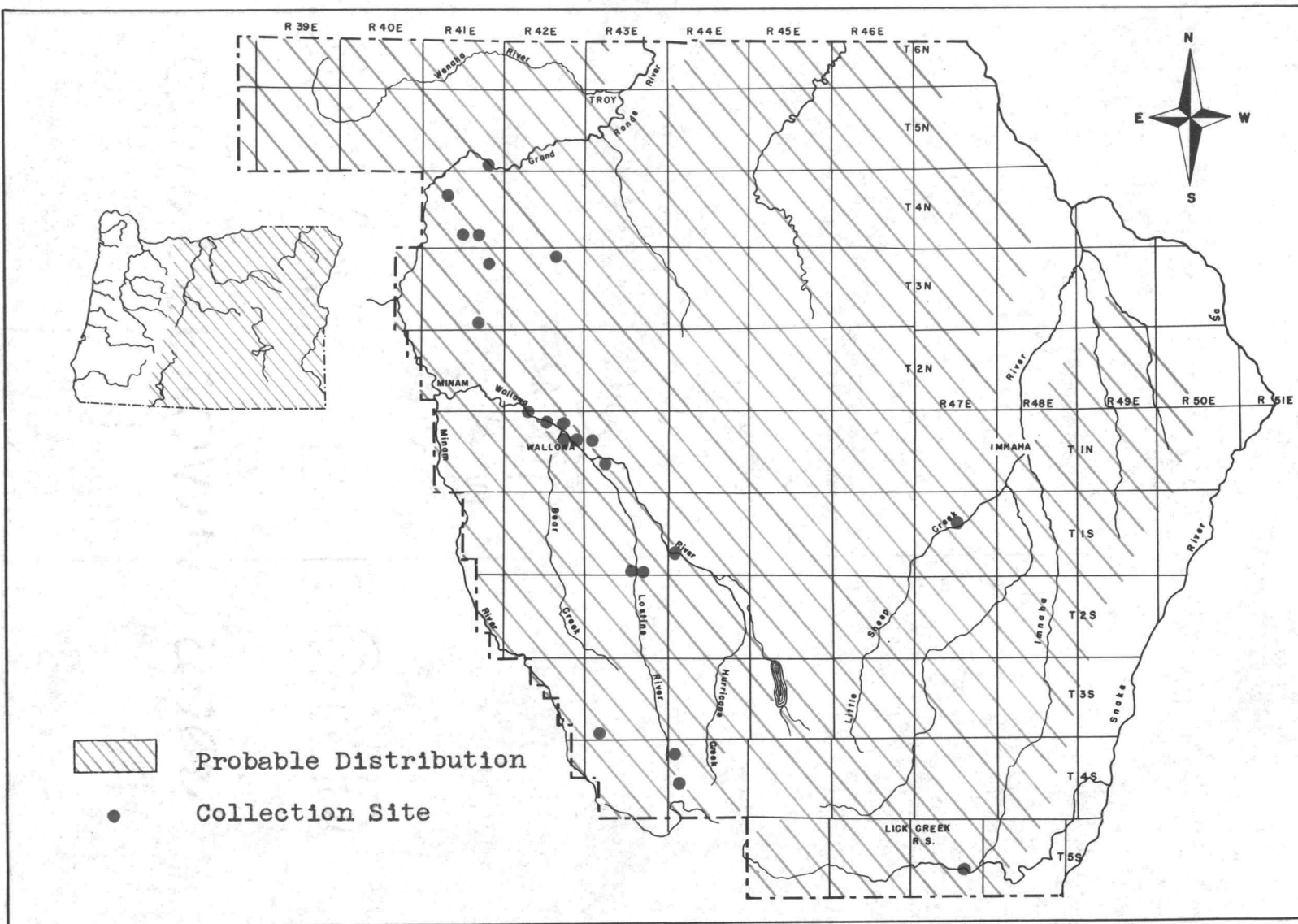
is available. It usually seeks clear water which is flowing quite rapidly. Thus its preferred habitat is irrigation ditches, creeks, rivers, ponds and swampy areas. In streams where R. p. luteiventris is found, it is often very abundant with as many as a dozen in sight at one particular place where they have climbed upon bits of floating vegetation to sun themselves.

The eggs are placed in ponds or ditches where larvae are often found in great numbers. The larvae, like the adults, hide in mosses or algae on being disturbed.

Miscellaneous remarks:

A great deal of variation was noted in the specimens collected in Wallowa County. For example, a series of nine was collected from upper Hurricane Creek at an elevation of 7,500 feet or more, all of which showed an extreme glandular condition between the dorso-lateral folds on the back. Numerous very conspicuous glandular areas, yellow in color, were present. All of this series shed their skins upon being preserved, although they received the same treatment in the processes of preservation as others collected elsewhere. It is difficult to determine the significance of this, for much individual variation was found in nearly all the specimens taken from all parts of the county. This variation consisted mainly of differences in spotting, ventral pigmentation, and general coloration.

Map 7. Distribution of Rana pretiosa luteiventris 50



Recently transformed young were collected on August 18, 1951 from a pond one mile east of Wallowa, some of which still had unabsorbed tails. More young specimens were found near the Coverdale Ranger Station on August 11, 1951. These were about 27.5 millimeters in average total body length.

Rana catesbeiana Shaw

The bullfrog

General distribution in Oregon:

This frog, though not native to Oregon, is now found quite widely spread throughout the state. It has been introduced in a number of places particularly in the Willamette Valley in western Oregon. In eastern Oregon it is found in Grant County near John Day, Union County near La Grande, in Umatilla County, and perhaps in other areas as well (Map 8).

Records of occurrence in Wallowa County:

One specimen was collected in an abandoned gravel pit in the NE $\frac{1}{4}$, S4, T1N, R42E, which is about three miles west of the town of Wallowa.

Probable distribution in Wallowa County:

The bullfrog was introduced into the pond from which the above specimen was collected by a group of local

people, when they were brought from near Hot Lake in Union County probably in 1949. Since the bullfrog requires two years to metamorphose, it seems quite certain that it has not as yet spread to other areas from this pond as the result of over-crowded conditions. Thus, at the present time this pond appears to harbor the only bullfrogs to be found within the county (Map 8).

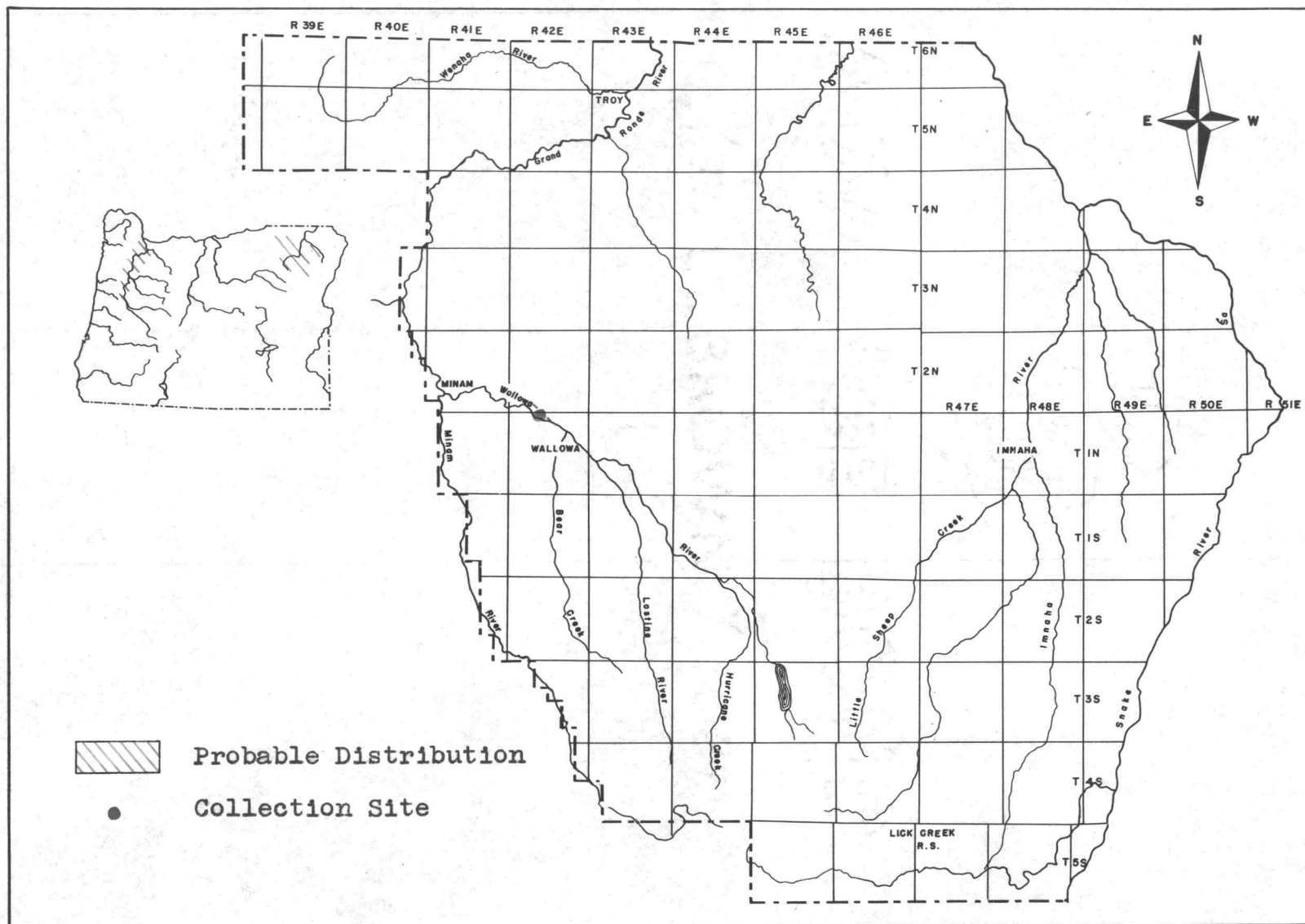
Habitat discussion:

The specimen was in an abandoned gravel pit which had long since filled with spring waters. The pond thus formed is about 75 yards in diameter with a great many algae and other aquatic plants growing in it. The pond is nearly inaccessible due to the masses of sedge, cattail, willow, and cottonwood found growing near the water's edge. A spring-fed stream flows from one end of the pond and into the Wallowa River a short distance away. All of the nearby area consists of moist, irrigated pasturelands with numerous streams flowing through them.

Miscellaneous remarks:

Only the one specimen was collected but what was taken to be a second year larvae of R. catesbeiana was observed swimming in shallow water near the bank. The fact that adult bullfrogs were found to be present in such small numbers might be explained as the result of their being taken by persons wishing to try them as an item of food.

Map 8. Distribution of Rana catesbeiana



A group of local boys told of having shot several of them with 22 caliber rifles. With this ever present pressure on them it may be that the few remaining bullfrogs will be killed before they have a chance to become common throughout the Wallowa Valley, as they usually do when introduced into a new area.

The following species were found to occupy the same pond from which the specimen of R. catesbeiana was taken: Bufo boreas boreas, Rana pretiosa luteiventris, Thamnophis elegans vagrans and Thamnophis sirtalis tetrataenia. Collecting R. p. luteiventris in this same pond caused some surprise as the bullfrog has a reputation for completely replacing all other species of frogs, using them as a source of food. However, the few bullfrogs in this particular place would probably not eat all of the other frogs present since other sources of food seemed very plentiful.

Sceloporus occidentalis biseriatus (Hallowell)

The western blue-bellied lizard

General distribution in Oregon:

The range of this subspecies in Oregon apparently includes the eastern-most counties plus Harney, Lake, and Grant Counties. It is not clear at this time just how far west of these counties it occurs (Map 9).

Records of occurrence in Wallowa County:

A specimen recorded from Grouse Flats, in Wallowa County, by Anderson and Slater may have been this subspecies or perhaps S. o. occidentalis. The following records serve to expand the known range within the county: SE $\frac{1}{4}$, S29, T2N, R48E; SE $\frac{1}{4}$, S20, T2N, R48E; NE $\frac{1}{4}$, S32, T2N, R48E; mid. S6, T3N, R49E; S13, T3N, R48E; (These are all from the Imnaha River Canyon). SW $\frac{1}{4}$, S24, T4N, R49E, which is from Dug Bar on the Snake River; S15, T5N, R42E, from the Eden School House; NW $\frac{1}{4}$, S20, T2S, R41E, one and one-half miles below Minam, in the Wallowa Canyon; mid. S29, T2S, R41E, Minam.

A lizard seen near the mouth of Bear Creek in the SW $\frac{1}{4}$, S27, T5N, R41E is thought to have been S. o. biseriatus.

Probable distribution in Wallowa County:

The distribution of S. o. biseriatus in Wallowa County is mainly limited to the hot, dry canyons of the Snake, Imnaha, Grande Ronde, and Wallowa Rivers.

It apparently is found the full length of the Snake River Canyon along the eastern edge of the county and up the Imnaha Canyon perhaps to a point just above the town of Imnaha. In the Grande Ronde Canyon it gets as far as Rondowa where it enters the Wallowa Canyon to extend nearly to the Wallowa Valley.

Where this lizard occurs in such larger main canyons, it seems certain that it enters most of the smaller side-

branching canyons and gullies, even spreading out upon the surrounding plateau whenever its habitat is available (Map 9).

Habitat discussion:

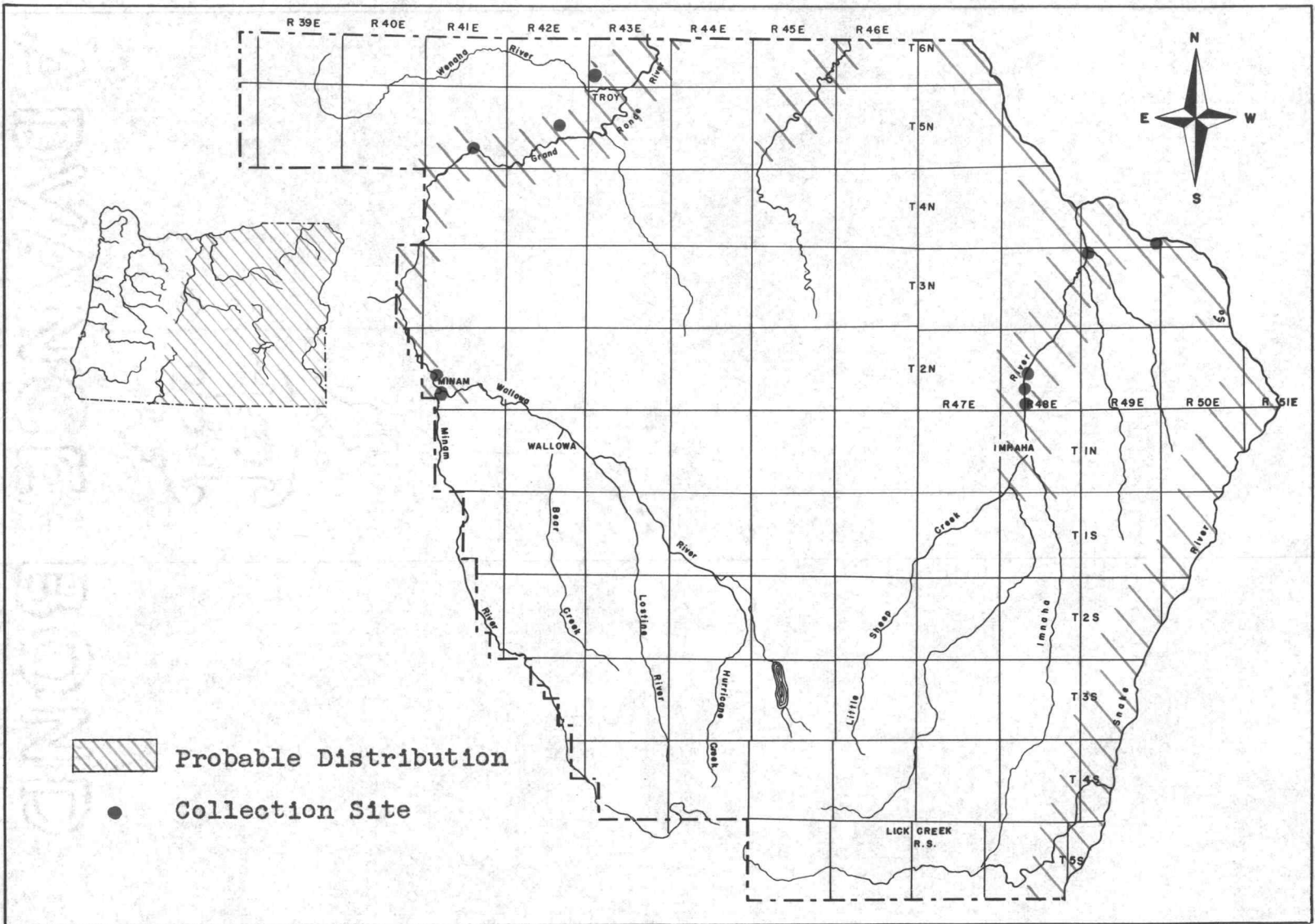
Collecting has indicated that the lower reaches of the yellow pine belt more or less coincide with the upper reaches of the zone inhabited by S. o. biseriatus. The actual habitat for this subspecies consists of talus slides, rock piles, cliffs, piles of boards, and brushy, boulder-strewn stream beds. This habitat is always well exposed having vantage points such as large boulders or logs, from which the lizards are able to watch for danger while sunning themselves. The vegetation growing within the habitat consists usually of cheat grass, low bushes, and shrubs.

One specimen was shot down from a height of about 10 feet in a tree.

Miscellaneous remarks:

The most interesting characteristic noted in connection with this lizard was its extreme curiosity when encountered in the field. Every individual collected had an excellent opportunity to escape but would instead remain to observe the actions of the collector. Even after having been shot and injured only slightly it would make no attempt to escape. One which had been wounded slipped from the collector's grasp and instead of escaping, ran up to

Map 9. Distribution of Sceloporus occidentalis biserialatus 57



perch on the collector's shoulder from where it was easily recaptured.

Eumeces skiltonianus (Baird and Girard)

The western skink

General distribution in Oregon:

The skink is distributed over the entire state except along the coast and in the northwestern corner (Map 10).

Records of occurrence in Wallowa County:

Previous to the present investigation, when the following three records were made, the skink had not been recorded from Wallowa County.

One was collected within the town of Wallowa; one was seen but not collected in the NE $\frac{1}{4}$, S11, T3N, R41E; another was seen in the town of Troy by this writer several years ago.

Certain individuals when engaged in conversation during the time collecting was being done expressed opinions based on their observations that the skink is very common at Wade Point in the SW $\frac{1}{4}$, S13, T1S, R43E, along Bear Creek from its junction with Little Bear Creek to the Wallowa City water intake, along the western edge of Diamond Prairie, and in the Wallowa Canyon near Water Canyon. Due to the almost unmistakable color characters of this species it seems quite certain that it could not

be confused with any other reptile within the county. Thus, for the purposes of this writing, these records will be considered as valid since the sincerity and observation of the said individuals seems, without question, to be reliable.

Probable distribution in Wallowa County:

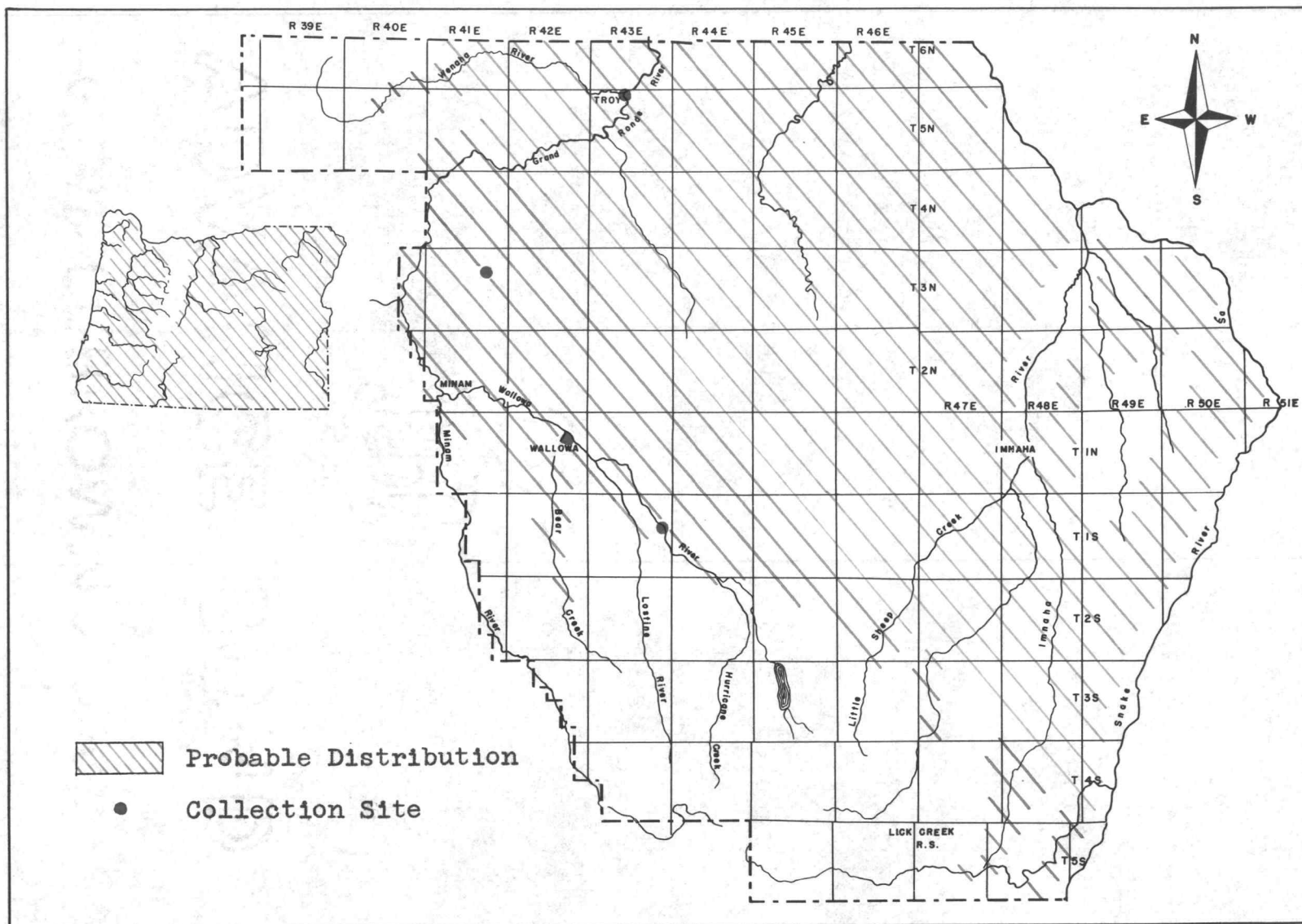
The small number of records available makes it extremely difficult to postulate the probable distribution of the skink with any degree of accuracy. However, on the basis of known records, and through comparison and study of other areas within the county with those in which the skink is already known to occur, it is concluded that the probable distribution includes the entirety of the county, excepting regions at high altitudes in the Wallowa and Blue Mountains.

When inhabiting dry canyons it is probably restricted to a narrow strip close along the edges of streams (Map 10).

Habitat discussion:

The habitat of the skink includes such places as under logs, buildings, boulders, and in talus slides. Ordinarily these habitats are located in areas covered with a rather profuse growth of shrubs and other vegetation furnishing protection. The skink does not usually occur far from water or at least not far from moist conditions.

Map 10. Distribution of Eumeces skiltonianus 60



Miscellaneous remarks:

Within its habitat, the skink is rarely seen above ground and is thought by some observers to be mainly nocturnal in habit. Analysis of stomach content has revealed that it very often procures its food under objects rather than by feeding in the open (16, pp.382-383).

Charina bottae utahensis (Blainville)

The rubber boa

General distribution in Oregon:

The distribution of C. b. utahensis includes all of Oregon excepting the southeastern quarter. It does not appear that this snake occurs in regions which are typically desert-like, but, instead, tends to be found in more moist, mountainous surroundings (Map 11).

Records of occurrence in Wallowa County:

C. b. utahensis has been reported from Wallowa Lake by Gordon. It was collected from the following localities during the present investigation: S1,T2N,R40E, near Vincent; S12,T1N,R42E, near the town of Wallowa; S21,T1S,R42E, at the end of the road leading up Bear Creek.

Probable distribution in Wallowa County:

The rubber boa probably occurs throughout Wallowa County in the humid sections having an elevation of 2,250

to 5,500 feet and an abundance of moist woods or stream-side habitats. It is most likely found only along streams at lower elevations, and not at all in the higher parts of the Wallowas (Map 11).

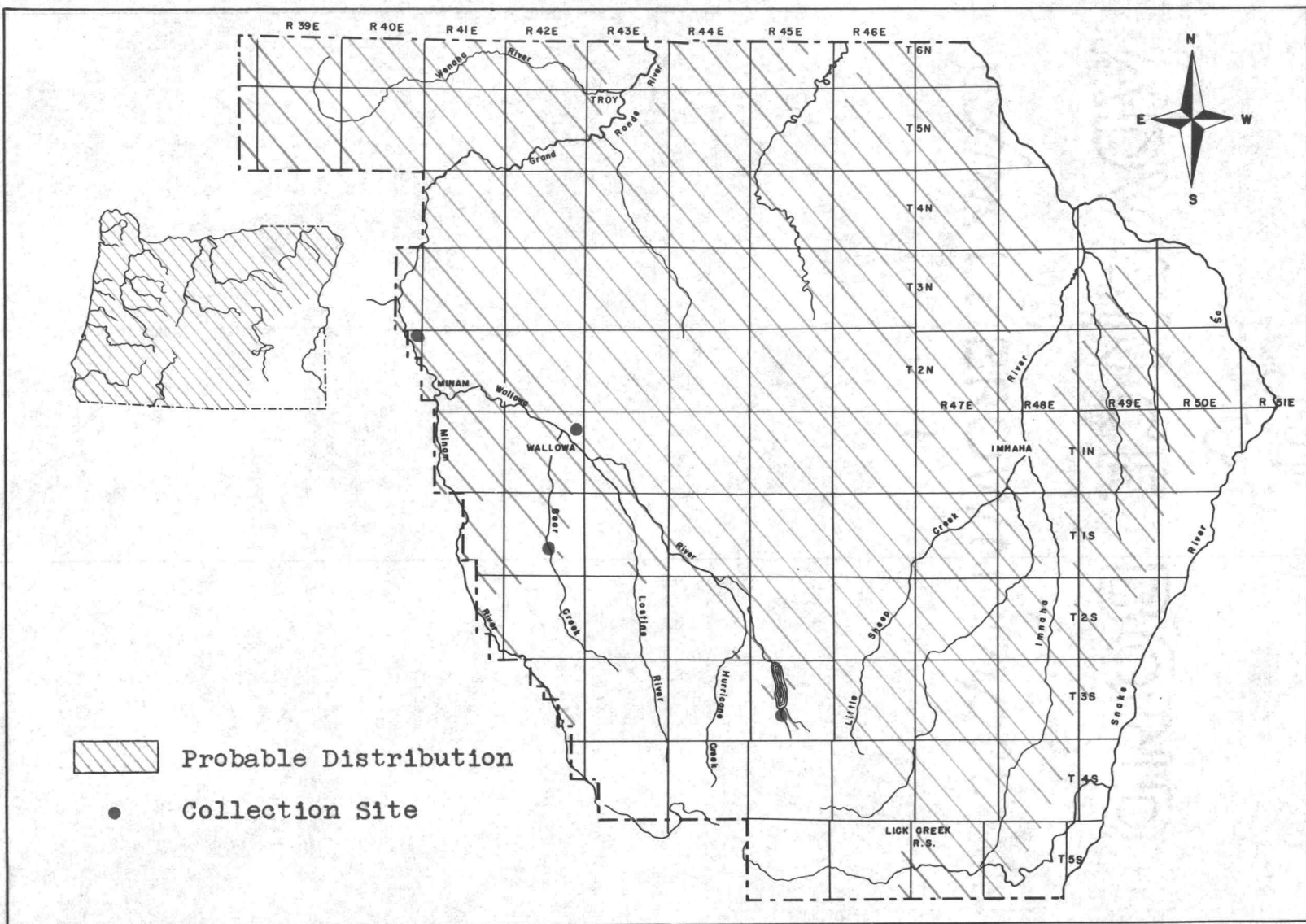
Habitat discussion:

This subspecies was encountered most often along the moist borders of streams, where shade was plentiful. One was discovered in a crevice under a rock which was embedded in the bank of a moist road-cut, located just below the lodge pole pine belt and very near a cold stream. This situation suggested a tendency toward a burrowing type of habitat. Charina also seems to show some preference for the large boulder strewn areas found near the lower edge of talus slides which are close to a stream and under the influence of the stream-side vegetation.

Miscellaneous remarks:

It was interesting to note that the rubber boa apparently possesses some sort of a resistance to ether as compared to several other species of snakes. On two different occasions snakes of several species along with a rubber boa were placed together in a killing jar into which ether was administered. On both such occasions, the C. b. utahensis remained alive long after all other species had succumbed to the ether, and continued to be quite active. These observations may or may not be of significance, since only

Map 11. Distribution of Charina bottae utahensis 63



two were made, but it is felt that they deserve some mention because the phenomenon was so definitely obvious in the two cases cited.

Coluber constrictor mormon (Baird and Girard)

The western yellow-bellied racer

General distribution in Oregon:

C. c. mormon is distributed throughout all of the state of Oregon except along the coast and northern Coast Range (Map 12).

Records of occurrence in Wallowa County:

This snake was first recorded from Wallowa County by Anderson and Slater when a record from the Snake River Canyon was given. The following records were obtained for the present study: S7,T4N,R43E, near the point where Wal-lupa Creek flows into Wildcat Creek; NE $\frac{1}{4}$,S11,T1N,R42E, near the town of Wallowa; NE $\frac{1}{4}$,S29,T2N,R42E, about three miles northwest of Wallowa; SE $\frac{1}{4}$,S20,T2N,R48E, about five miles below the town of Imnaha on the Imnaha River; NE $\frac{1}{4}$,S29,T4N,R49E, about two miles west of Dug Bar in the lower Imnaha Canyon; S31,T1N,R48E, at the junction of Big and Little Sheep Creeks; NE $\frac{1}{4}$,S9,T5N,R43E, near the mouth of Courtney Creek; S20,T1N,R48E, one mile southwest of the town of Imnaha; S26,T1N,R48E, near the five-mile post on the Grizzly Ridge Road to Hat Point; S6,T1N,R42E, Water Canyon;

SE $\frac{1}{4}$, S19, T2N, R41E, one mile below Minam in the Wallowa River Canyon.

Probable distribution in Wallowa County:

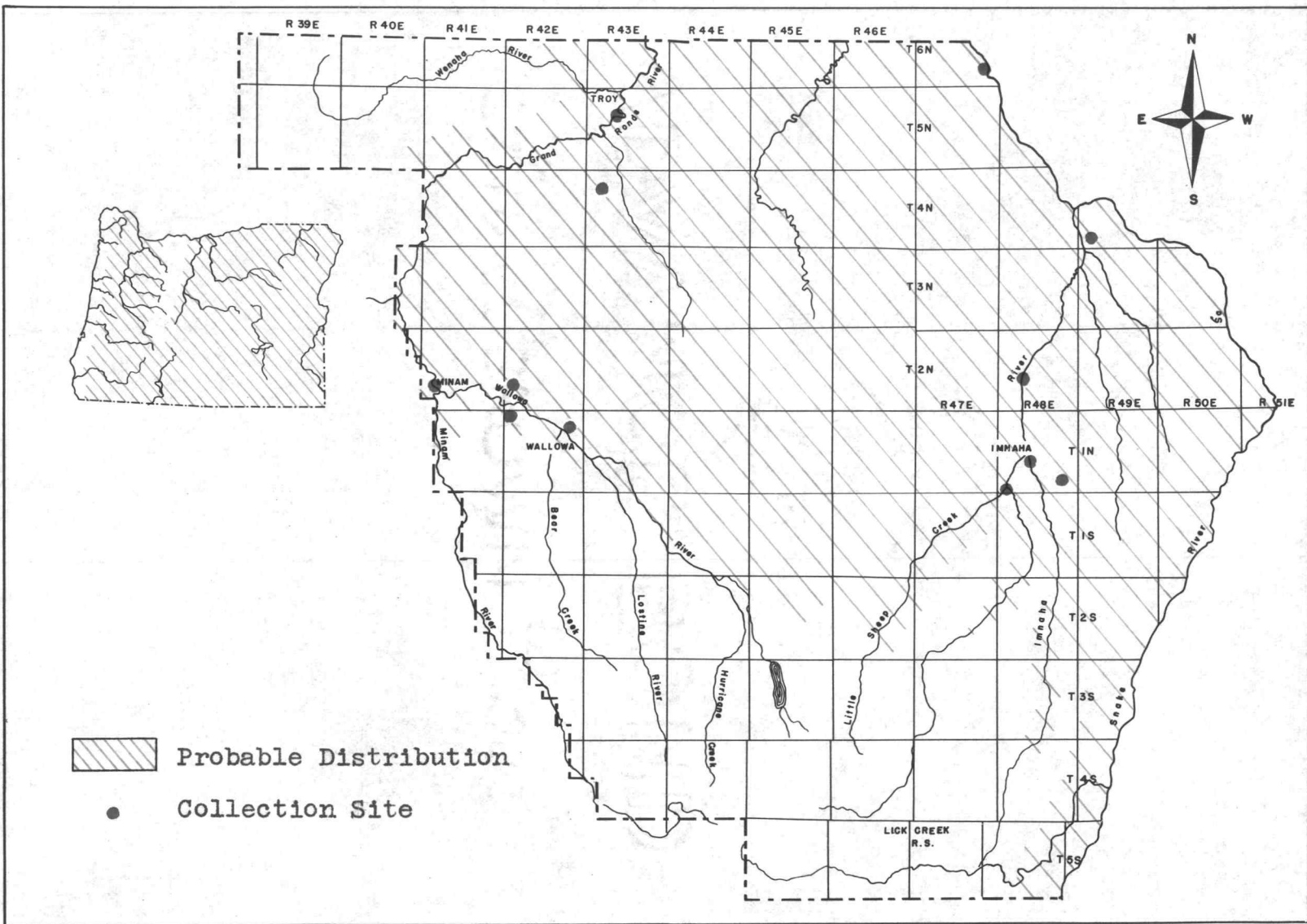
C. c. mormon probably occurs the full length of the Snake River Canyon and throughout those dryer parts of the Imnaha River Canyon and its tributaries which lie below 3,500 - 4,000 feet in elevation. In the Grande Ronde Canyon it occurs throughout the area reaching from the Washington border to Rondowa and in all of the side-branching canyons between these two points.

It is found along the entire length of the Wallowa River Canyon, getting into the foothills surrounding the Wallowa Valley, probably occurring along the northern side of the valley nearly to Enterprise. It seems further probable that this snake is not by any means restricted to canyons but apparently is found on the higher ridges as in the Powatka, Promise, and Flora regions (Map 12).

Habitat discussion:

The habitat in which this snake is most often encountered is one of dry, rocky, cheat-covered hills, where it is frequently found in the summertime lying in an exposed place sunning itself. Its speed of travel relieves it of the necessity of having hiding places, although it will eventually take refuge in talus slides and bushes, if present, upon being disturbed. Its habitat is usually in a

Map 12. Distribution of Coluber constrictor mormon 66



non-wooded area but may extend into the zone of yellow pine, when these are in scattered growth and in a very rocky soil such as that found near basaltic out-croppings. The chief vegetation within the habitat consists mainly of grasses, with cheat grass ordinarily being the most abundant kind.

Miscellaneous remarks:

Probably the most remarkable feature of this snake is the swiftness with which it travels, one which results in extreme difficulty when attempting to collect it. It has been the experience of this writer that more specimens escape than are collected. One individual, however, was collected with little effort when it was found blind, previous to molting its skin.

Another feature of interest regarding the locomotion of Coluber constrictor mormon, which is more rarely observed, is the ease with which it is able to crawl at a rapid rate over the tops of bushes.

Pituophis catenifer deserticola Stejneger

The desert gopher snake

General distribution in Oregon:

This form apparently occurs throughout those parts of Oregon east of the Cascade Mountains. Just where its range meets that of the western Oregon form, Pituophis

catenifer catenifer, is not yet certain (Map 13).

Records of occurrence in Wallowa County:

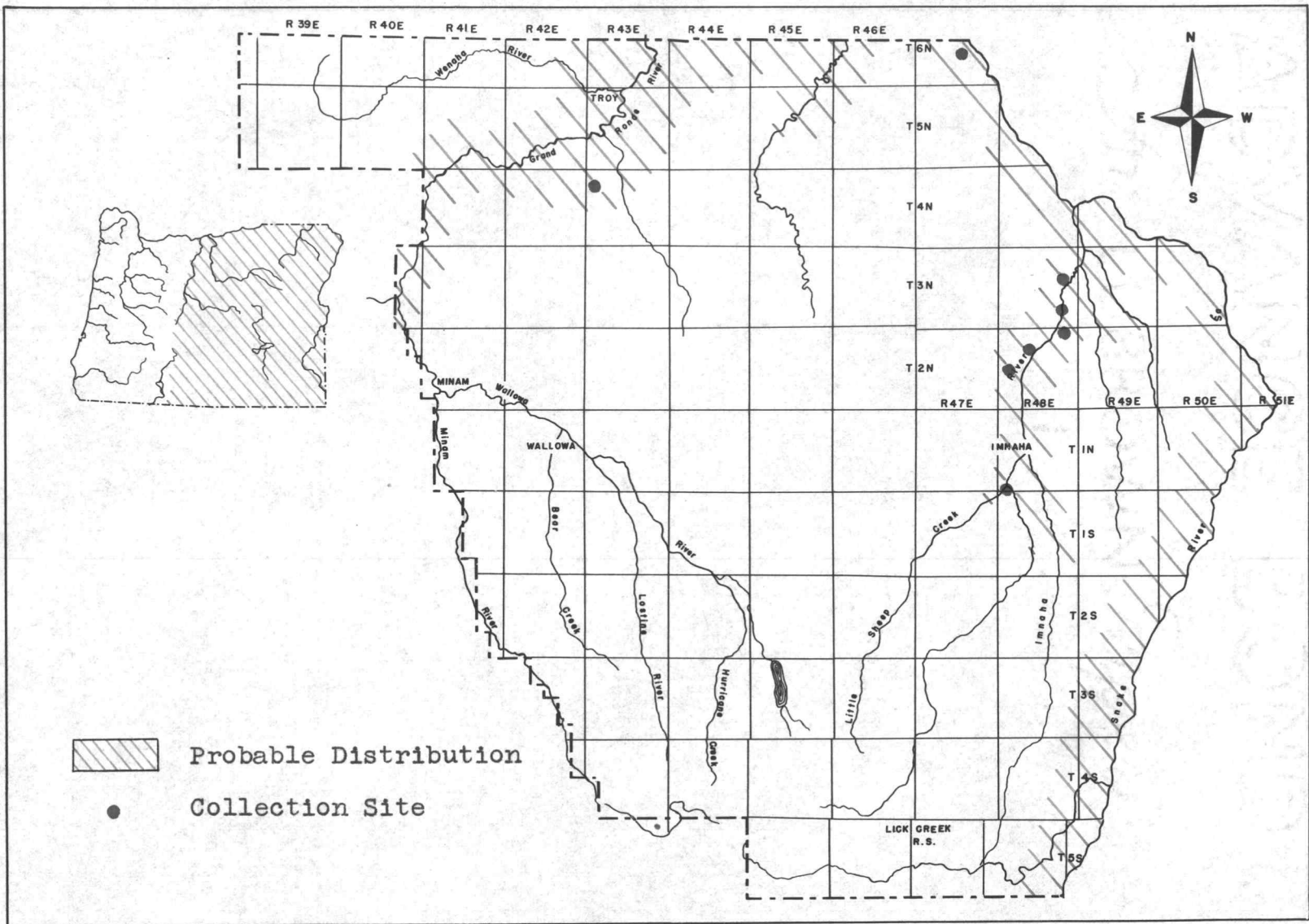
Previous to this writing, P. c. deserticola has been reported from Wallowa County at Cache Creek, located in the northeastern corner of the county by Anderson and Slater. The present investigation has revealed it in the following localities: S7,T4N,R43E, near the point where Wallupa and Wildcat Creeks merge; SE $\frac{1}{4}$,S20,T2N,R48E, near the bridge which crosses the Imnaha River at a point about four and one-half miles below the town of Imnaha; NE $\frac{1}{4}$,S26,T3N,R48E, NE $\frac{1}{4}$,S14,T3N,R48E, NW $\frac{1}{4}$,S2,T2N,R48E, NE $\frac{1}{4}$,S9,T2N,R48E, all four from the lower Imnaha Canyon; NW $\frac{1}{4}$,S6,T1S,R48E, near the junction of Big and Little Sheep Creeks.

Probable distribution in Wallowa County:

Out of seven specimens recorded, all but one was from the Imnaha River drainage system, thus the data for the remainder of the county is quite scant and necessitates basing the range of this species upon the premise that it occurs in similar habitats in between the areas where it has been collected.

The desert gopher snake is found throughout the Imnaha River Canyon from where it joins the Snake River up to about five miles above the town of Imnaha. It probably is found along the entire length of the Snake River Canyon and in the Grande Ronde Canyon from the Washington border

Map 13. Distribution of Pituophis catenifer deserticola 69



to near Rondowa. It is almost certain that it gets out of the canyons where dry ridges and plateaus afford its habitat (Map 13).

Habitat discussion:

This species is found in hot, dry, and rocky regions, where the vegetation consists principally of cheat grass, poison ivy, western summac, and a few scattered pines. It is ordinarily found in the open, only rarely occurring in heavily wooded areas. It is quite often discovered while lying in the road sunning itself, particularly in late afternoon.

Individuals of this species are usually quite commonly found around ranches, especially near barns and granaries where it seeks mice as food. Several ranchers along the Imnaha River told this writer that they had more or less made pets of "bull snakes", and allowed them to inhabit their barns without harm, explaining that they were very useful as "mousers".

Thamnophis elegans vagrans Baird and Girard

The wandering garter snake

General distribution in Oregon:

T. e. vagrans ranges throughout eastern Oregon with exception perhaps of the southwestern part, where it may be replaced by T. e. biscutatus (Cope) in the southern

parts of Klamath and Lake Counties (Map 14).

Records of occurrence in Wallowa County:

First mention of this species being present in Wallowa County comes from Gordon, where a record from Wallowa is given. Anderson and Slater also have recorded it from Grouse Flats. The following records indicate a very widespread distribution within the county: NW $\frac{1}{4}$,S16,T1N,R42E; NW $\frac{1}{4}$,S33,T1S,R44E; NW $\frac{1}{4}$,S19,T1N,R43E; NW $\frac{1}{4}$,S11,T1N,R42E; S17,T2N,R42E; SW $\frac{1}{4}$,S7,T1N,R43E in the Wallowa Valley; NE $\frac{1}{4}$,S36,T4N,R40E; S24,T4N,R40E; NW $\frac{1}{4}$,S34,T5N,R41E on the Grande Ronde River; SE $\frac{1}{4}$,S34,T1S,R43E; NW $\frac{1}{4}$,S3,T2S,R43E on the Lostine River; SE $\frac{1}{4}$,S8,T3S,R46E; S10,T1S,R47E on Sheep Creek; SW $\frac{1}{4}$,S15,T1N,R48E; SW $\frac{1}{4}$,S23,T5S,R47E; NW $\frac{1}{4}$,S21,T5S,R47E; SW $\frac{1}{4}$,S1,T5S,R46E; NE $\frac{1}{4}$,S32,T2N,R48E, all on the Imnaha River; S2,T2S,R42E at the junction of Bear and Goat Creeks; S32,T3S,R43E; SE $\frac{1}{4}$,S28,T3S,R43E North Minam Meadows; S26,T3N,R41E; NE $\frac{1}{4}$,S11,T3N,R41E in Grossman north of the Wallowa Valley; SW $\frac{1}{4}$,S4,T2N,R42E; SW $\frac{1}{4}$,S15,T2N,R42E; S4,T2N,R42E on Dry Creek; NE $\frac{1}{4}$,S3,T3N,R42E near Maxville; S22,T3S,R44E on Hurricane Creek; mid. S29,T2N,R41E near the town of Minam; S23,T3N,R44E one mile north of Sled Springs on the Enterprise-Lewiston Highway.

Probable distribution in Wallowa County:

This snake is the most common and most widely ranging member of the Wallowa County herpetofauna. It was found

to occur from approximately 7,300 feet at John Henry Wilson Lake down to less than 2,000 feet, below Imnaha on the Imnaha River. Furthermore, it seems almost certain that it ranges all along the bottom of the Snake River Canyon at even lower altitudes where it may be found at an elevation of little more than 1,000 feet.

In general, the only factor which appears at all limiting to this species is an absence of water. Thus, it ranges essentially wherever its habitat occurs over the entire county except for some parts of the Wallowas (Map 14).

Habitat discussion:

The habitat of the wandering garter snake is quite variable and includes the following types with a body of water of some sort apparently being the only thing in common among them.

It was found in an abandoned gravel pit on a dry ridge. The pit was dug for the purpose of removing basalt for road-making and had since filled with water, there being no other water within a mile of the site. The region was very dry with cheat grass and pine woodland as vegetation cover. The edges of the pit were lined with large pieces of basalt.

Another habitat in which it was commonly encountered was the rocky banks of streams and rivers. Here the

vegetation was typically that of streamsides with willows, horsetails, and mulein in abundance. In this habitat it escapes danger by crawling into the piles of rocks or taking to the water.

T. e. vagrans was collected in swamps and ponds in the Wallowa Valley where it often was found sunning itself on a log or mat of vegetation. Some were taken from under boards and others from under the bark of decaying logs. The vegetation of this habitat consisted usually of sedges, cattails, willows and numerous algae.

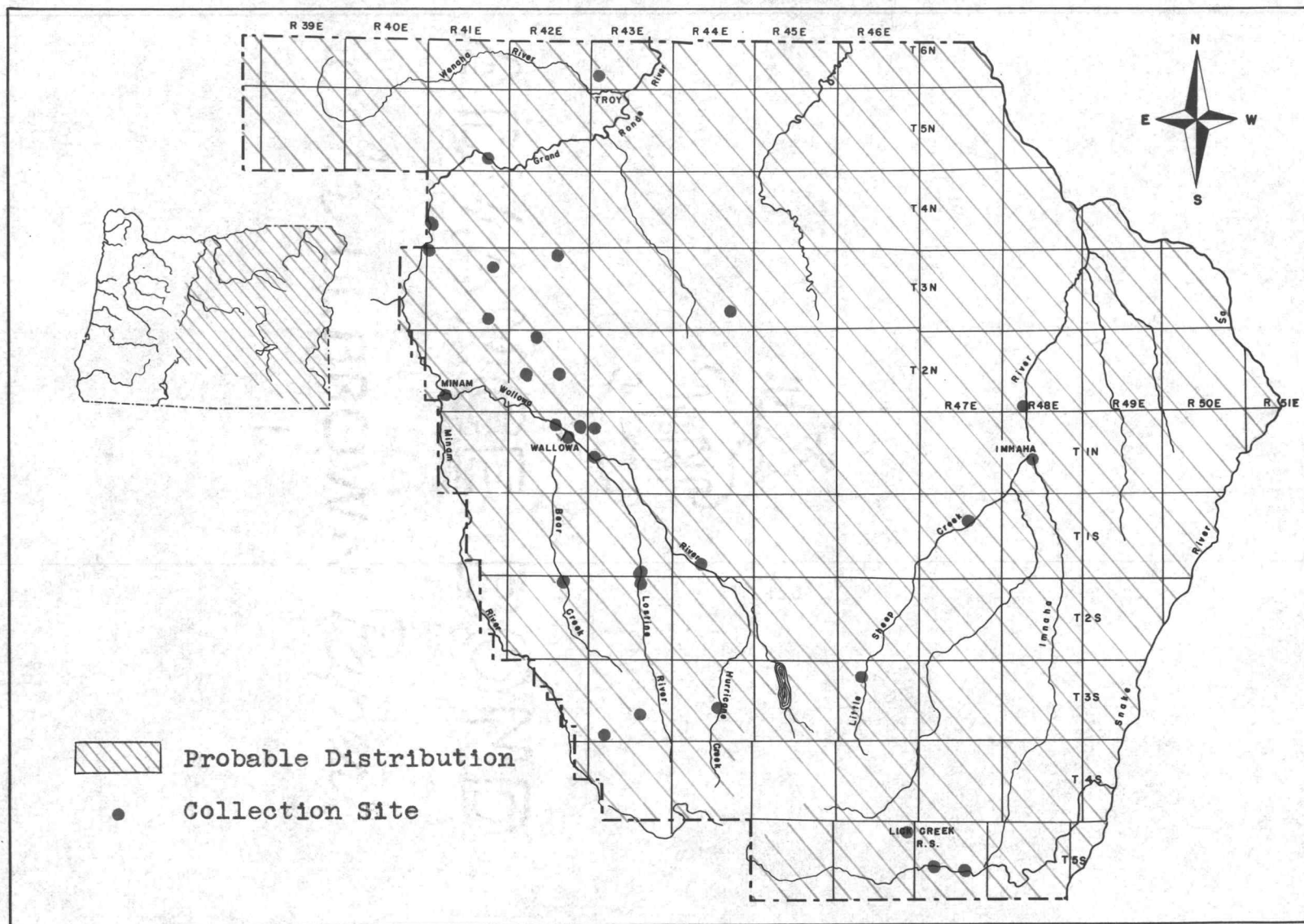
One of the most extreme habitats in which it was found to occur was on the edges of John Henry Wilson Lake at approximately 7,300 feet in the Wallawas. This lake is fed by streams from melting snow and is lined along the edges in part by granite boulders.

Miscellaneous remarks:

T. e. vagrans is an extremely aquatic species and swims excellently. It does not hesitate to enter even the most rapid flowing mountain streams when approached by danger, swimming apparently without much effort to the opposite bank.

On the whole this snake was found to be quite consistent in regard to coloration, showing little variation. However, a specimen collected on June 30, 1951 in SW $\frac{1}{4}$, S4, T2N, R42E, about nine miles north of Wallowa, furnished

Map 14. Distribution of Thamnomys elegans vagrans 74



a remarkable exception. It was almost wholly black, and the dorsal stripe became visible only when the specimen was moistened. Only one such melanistic specimen was collected in the area, although several other snakes of this species were found nearby. Hebard (6, pp.217-219) has noted similar melanistic patterns in studying this species in northwestern Washington.

Thamnophis sirtalis tetrataenia Fitch

The Pacific garter snake

General distribution in Oregon:

In general, the range of the Pacific garter snake includes all of Oregon east of the Cascades and the southern half of Oregon west of the Cascades. Its actual status in Oregon is not too well known, for it has been collected in only a relatively small number of places within the state (Map 15).

Records of occurrence in Wallowa County:

The first locality record given for Wallowa County was when Anderson and Slater recorded it from Grouse Flats. It was collected in the following places for this writing: SE $\frac{1}{4}$, S34, T1S, R43E in Olson Swamp on the Lostine River; S30, T5N, R43E on Wildcat Creek; NW $\frac{1}{4}$, S10, T1N, R42E; SE $\frac{1}{4}$, S3, T1N, R42E; NE $\frac{1}{4}$, S4, T1N, R42E all in the Wallowa Valley near Wallowa; SW $\frac{1}{4}$, S26, T5N, R42E near Wart Creek in Promise.

Probable distribution in Wallowa County:

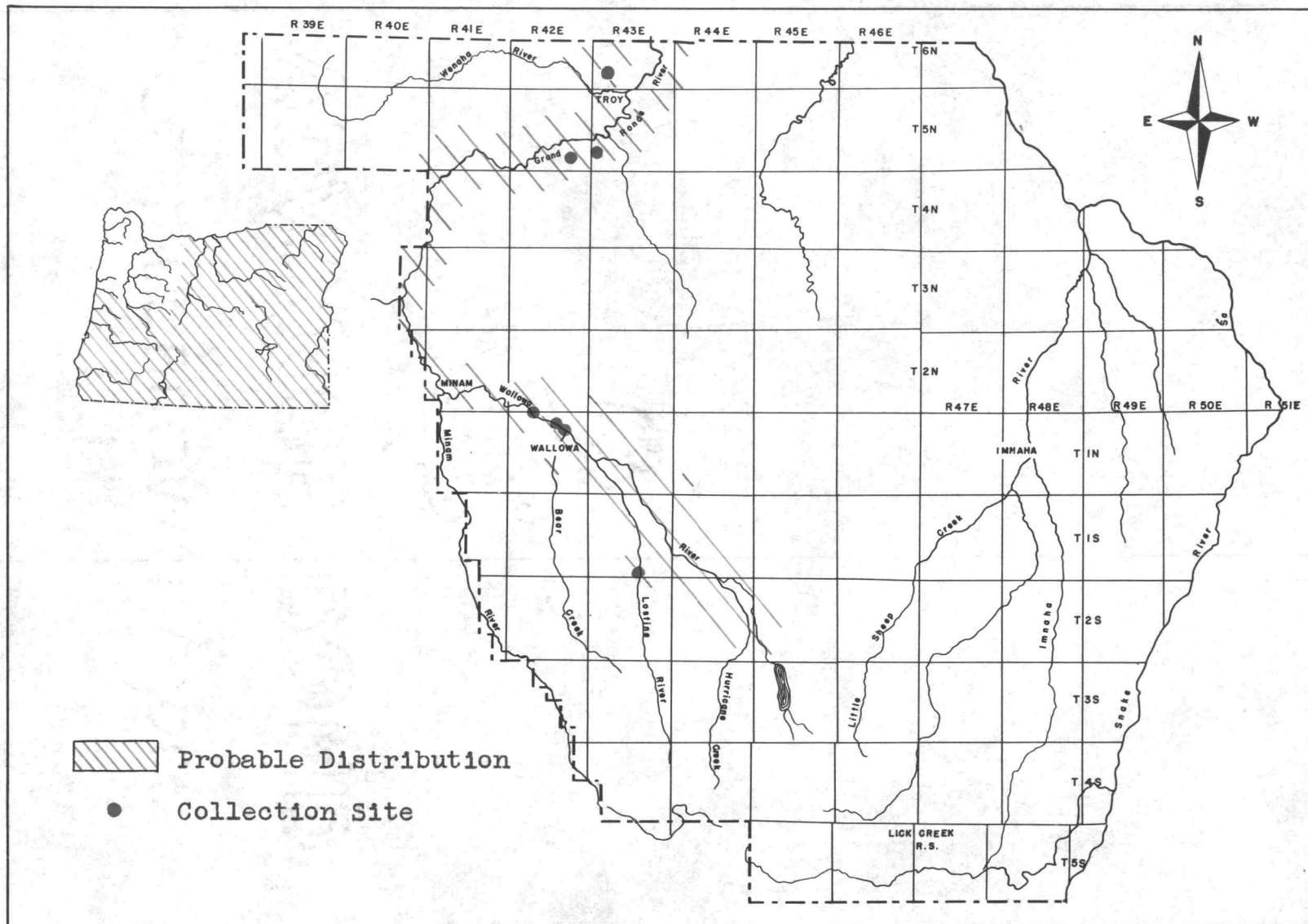
It is an extremely difficult task to postulate the distribution of T. s. tetrataenia on the basis of the few localities in which it is now known to occur, because all excepting two of the records were obtained from a relatively small area in the Wallowa Valley. The two not from the valley were taken at a considerable distance from it and from habitats entirely different from those in which the valley forms were usually found. As a result of these facts, it is with uncertainty in regard to exactness that the probable range of the subspecies is here presented.

There does not seem to be any doubt that this species occurs throughout the entire Wallowa Valley. Elsewhere in the county, it apparently is found sparingly in and above the yellow pine zone in the Wallowa and Grande Ronde River Canyons from the Wallowa Valley to the Washington border, wherever its habitat is available. It is not known if it occurs elsewhere, but its known range would indicate that it has entered Wallowa County from either the Grande Ronde Valley or the Blue Mountains on the western edge of the county and has not for some reason occupied the remainder of the county, particularly the hot canyons and higher plateau areas (Map 15).

Habitat discussion:

In general, T. s. tetrataenia tends to be aquatic, as

Map 15. Distribution of Thamnomphis sirtalis tetrataenta 77



shown by the fact that seven of the eight specimens collected were within but a few feet of water when discovered. The habitat was usually a pond or stream, with vegetation consisting of willow, cattails, sedges, and other typical stream-side species.

One specimen was found crossing a road on a dry ridge of the Grande Ronde River Canyon, not far from Promise, which was about 150 yards from water. This spot was in a rocky opening, supporting an abundant growth of cheat grass, and was near to a forest consisting of a mixture of yellow pine, larch, and Douglas fir. The water mentioned above was a spring with many sedges growing therein, and searching revealed another of this species in it.

Miscellaneous remarks:

Perhaps the most striking thing about the Pacific garter snake in Wallowa County was the relatively few numbers of them which were encountered. It was first thought that the explanation for this situation lay in its inability to compete with Thamnophis elegans vagrans, but it was later found on several occasions to occupy the same pond with vagrans.

Crotalus viridis oregonus Holbrook

The Pacific rattlesnake

General distribution in Oregon:

In western Oregon it is found from the California border north into the Willamette Valley near Monroe and Lebanon. In eastern Oregon it occurs everywhere except in the southeastern corner where it is apparently replaced by Crotalus viridis lutosus (Map 16).

Records of occurrence in Wallowa County:

The following records are the first from Wallowa County: S26,T6N,R43E two miles below Troy on the Grande Ronde River; SW $\frac{1}{4}$,S3,T2N,R48E about eight miles below the town of Imnaha on the Imnaha River; NE $\frac{1}{4}$,S20,T1N,R48E Imnaha; NW $\frac{1}{4}$,S29,T2N,R41E town of Minam; S31,T1N,R48E at the junction of Big and Little Sheep Creeks; S26,T6N,R44E about two miles from the Washington border on the Enterprise-Lewiston Highway. One other was taken about two miles west of the Wallowa County line in Union County on the Grande Ronde River.

Probable distribution in Wallowa County:

C. v. oregonus is found along the entire length of the Snake River Canyon, and from the mouth of the Imnaha River to above the town of Imnaha in the Imnaha Canyon. In the Grande Ronde Canyon it occurs from the Washington border to Rondowa, and along the Wallowa River to a point near where it leaves the Wallowa Valley (Map 16).

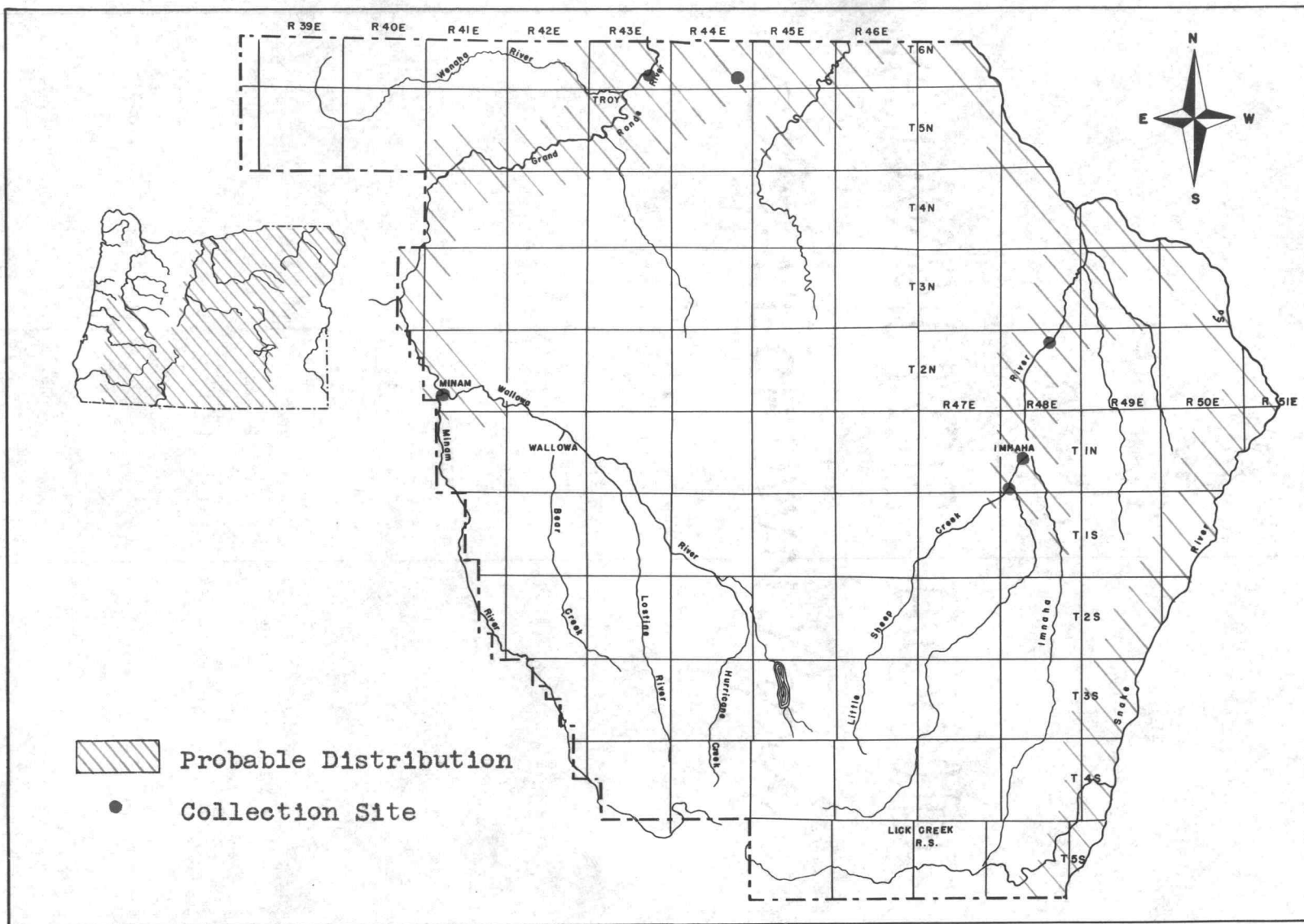
Habitat discussion:

Its habitat is in rocky situations in the hot, dry canyons of the county. It particularly favors areas having abundant cliffs and talus slopes where dens are present which serve as places to spend the winter hibernation. The habitat is usually in open areas, but they are found well up into the yellow pine belt, heavily forested regions being avoided. In the spring and early summer they may range quite widely in all directions from the den. In mid-summer when it becomes very hot, they are found in brushy ravines where seeps of water flow during the heat of the day. When the hottest days arrive and these seeps dry up, particularly on the steep, hot canyon sides, the rattlesnakes migrate to the bottom of the canyon where they are often found in great abundance along the stream there. When the days start becoming colder, they begin to move back toward the dens, thus having inhabited several types of habitats during the non-hibernating season.

Miscellaneous remarks:

Residents of the town of Innaha told the writer that several dens of rattlesnakes had been dynamited during the last few winters while the snakes were in hibernation, and that there was a definite decrease in the number of them found since the beginning of this practice.

Map 16. Distribution of Crotalus viridis oregonus 81



SUMMARY

The herpetofauna of Wallowa County was chosen for investigation because it had received little attention by previous workers and seemed likely to contribute information necessary to establishing the ranges of Oregon species more exactly. Wallowa County possesses certain interesting features of topography and vegetation that are not to be encountered elsewhere in Oregon. The field work upon which this paper is based, was done during the summer of 1951. Whenever possible, all specimens were collected alive and pertinent data recorded at the site of collection. Measurements were taken immediately after the animals had been killed. All specimens were preserved in formalin and are now in the Oregon State College Museum of Natural History Collection.

Wallowa County is located in the northeast corner of Oregon. Topographically, Wallowa County consists of a large basaltic plateau, having many rugged canyons formed by abundant rivers and creeks. The Wallowa Mountains with several peaks above 10,000 feet, rise well above the main plateau. The climate is quite variable, depending largely upon elevation. Vegetation can be divided into four types, corresponding closely to the life zones as given by Vernon Bailey in "Mammals and Life Zones of Oregon". Definite indicator-species characterize each of the types.

Extreme variations in topography, climate, and soils within the county are very influential in determining the ranges of the species of amphibians and reptiles found there. Gordon (1939) and Anderson and Slater (1941) furnish the main references to previous herpetological work in Wallowa County.

Fourteen species of amphibians and reptiles were found to occur, ten of which were definitely known to occur there previous to the present study. One species of salamander, Ambystoma macrodactylum, was found to be present and quite widely distributed throughout the county.

Five species of frogs and toads were collected, including Ascaphus truei, Bufo boreas boreas, Hyla regilla, Rana catesbeiana, and Rana pretiosa luteiventris. A. truei was found to be very common in the mountain streams of the Wallowas, where 89 adults and larvae were collected. B. b. boreas was collected from a variety of habitats in nearly all areas visited. H. regilla was found to occur over most of the county including the high meadows of the Wallowa Mountains. R. catesbeiana was collected from one pond in the Wallowa Valley, where it had been introduced. R. p. luteiventris was found very frequently in ponds and streams over much of the county.

Two species of lizards were collected. Sceloporous occidentalis biseriatus was found to inhabit the hot, dry canyons of the Snake, Imnaha, Grande Ronde, and lower

Wallowa Rivers. Eumeces skiltonianus was collected in only one area but is apparently quite widely distributed over the county.

Six species of snakes were found to occur. Charina bottae utahensis was taken only occasionally near streams. Coluber constrictor mormon was collected throughout most of the county in the hot, dryer canyons. Pituophis catenifer deserticola was taken in much the same areas as C. c. mormon. Thamnophis elegans vagrans was found to be the most common member of the Wallowa County herpetofauna, occurring near water in almost all areas visited. Thamnophis sirtalis tetrataenia was shown to be present but not at all plentiful in some areas. Crotalus viridis oreganus appears to be limited to the low, hot canyons of the county.

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