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MINERAL RESOURCE POTENTIAL OF THE SKY LAKES ROADLESS AREA AND MOUNTAIN LAKES WILDERNESS, JACKSON AND KLAMATH COUNTIES, OREGON

SUMMARY REPORT

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STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Sky Lakes Roadless Area (A6143) and Mountain Lakes Wilderness, Rogue River and Winema National Forests, Jackson and Klamath Counties, Oregon. Sky Lakes Roadless Area was classified as recommended wilderness during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979. Mountain Lakes Wilderness was established by Public Law 88-577, September 3, 1964.

SUMMARY

The only deposits of interest are volcanic cinders, scoria, ash, and breccia. Development is unlikely because the deposits are remote, and larger deposts of equal or better quality occur at more accessible localities. The potential for geothermal energy is low because there is no indication of heat sources, and favorable structures for deep circulation of ground water are absent.

The study areas are not geologically favorable for metallic deposits or for coal, oil, or gas resources.

INTRODUCTION

The Sky Lakes Roadless Area and the Mountain Lakes Wilderness lie along the crest of the Cascade Range in southwestern Oregon (fig. 1). Sky Lakes Roadless Area, which is adjacent to the south boundary of Crater Lake National Park, comprises some 71,904 acres (277 km^2) in Rogue River National Forest and 44,439 acres (171 km^2) in the Winema National Forest. Access on the north is by State Highway 62, on the south by State Highway 140, and on the east and west by county and Forest Service roads. However, only foot trails provide access within the study area. Mountain Lakes Wilderness, 19 mi (31 km) northwest of Klamath Falls, Oreg., comprises 23,071 acres (89 km^2) in the Winema National Forest. State Highway 140 passes just north of the area and a network of paved secondary and unpaved logging roads provides good access to the east, south, and west sides.

Elevation ranges from 4,000 ft (1,220 m) to 9,495 ft (2,894 m) at the summit of Mount McLoughlin. Areas below 6,000 ft (1,829 m) are covered by dense stands of conifers. Forest floors west of the Cascade crest, particularly in the northern part of the area where rainfall is greater than 45 in. (114 cm), have a thick carpet of closely spaced shrubs. Above 6,000 ft (1,829 m) the climate is more severe, winter snowpack can accumulate to great depths, and trees are restricted to sheltered locations. Exposed slopes of the higher mountains, such as Mount McLoughlin, are bare.

GEOLOGY

The geology of Sky Lakes Roadless Area and the Mountain Lakes Wilderness and vicinity was mapped by Smith (1983). Prior to that investigation, the only detailed study of bedrock geology in the area was that by Maynard (1974) of the area around Mount McLoughlin. Williams (1942) study of Mount Mazama and Crater Lake National Park included a reconnaissance along the crest of the Cascade Range from Crater Lake to Mount Shasta, Calif., accomplished mostly on horseback. Carver (1972) studied in detail the glacial history of the Mountain lakes Wilderness and, in reconnaissance, the general features of the glacial history along the Cascade crest in the Sky Lakes Roadless Area. Nearby areas that have been studied include the Hyatt Reservoir and Surveyor Mountain 15-minute quadrangles, 15 mi (24 km) southwest of Mountain Lakes Wilderness (Naslund, 1977), and the Mount Bailey area directly northwest of Crater Lake National Park (Barnes, 1978). Sky Lakes Roadless Area and Mountain Lakes Wilderness are underlain by late Miocene to Holocene volcanic rocks. All bedrock units are part of the volcanic rocks of the High Cascade Range. Extensive glacial deposits mantle large parts of both study areas.

Volcanic rocks of the High Cascade Range consist of spectacular andesite stratovolcanoes, interspersed with less prominent basalt and basaltic andesite shield volcanoes, small generally monogenetic volcanoes of basalt, basaltic andesite, or andesite, extensive valley-filling flows, and cinder cones. Constructional volcanic landforms predominate, although stream erosion and glacial action have considerably modified the symmetrical shape of older volcanoes.

Eruption of the volcanic rocks of the High Cascade Range in southern Oregon began about 7 m.y. ago. Some 20

mi (32 km) west of the Sky Lakes Roadless Area, along State Highway 62 near Lost Creek Reservoir, and along the north wall of Big Butte Creek, are outcrops of a series of thick columnar valley-filling black glassy olivine-bearing two-pyroxene andesite flows. These flows erupted from now-buried vents somewhat west of the Sky Lakes Roadless Area, and traveled down the ancestral Rogue River for more than 40 mi (65 km). Two K-Ar ages average about 7 m.y.

Closer to the study area, the eroded lavas of Bessie Rock volcano, 3 mi (4.8 km) west of the Sky Lakes Roadless Area, were dated at 4.88±0.15 m.y. and the lavas of Burton Butte, 2 mi (3.2 km) southwest of the Mountain Lakes Wilderness, were dated at 3.4 m.y., but with a large analytical error.

The oldest dated rock unit within the two study areas is the pyroxene andesite of Mountain Lakes Wilderness, although the dated sample itself, from a valley-filling flow, was collected 0.5 mi (0.8 km) west of Lake of the Woods at 5,180 ft (1,580 m). Its age was 3.62±0.19 m.y.

Most volcanoes in the study area formed between 3.5 and 0.5 m.y. More than three-fourths of the individually mapped volcanic units formed during this time period. Most of the undifferentiated olivine phyric basaltic andesite of the High Cascade Range and undifferentiated andesite of the High Cascade Range are believed to have erupted in this time interval as well. Volcanic units younger than 500,000 years include the stratovolcano of Mount McLoughlin, two small basaltic shield volcanoes, a chain of pyroxene-andesite vents, numerous cinder cones, and ash deposits from the climactic eruption of Mount Mazama.

The volcanic units show neither compositional trends with time nor a spatial pattern to volcanism.

Surficial deposits consist of loose aggregates of boulders, cobbles, pebbles, gravel, sand, silt, and clay deposited as alluvium along stream valleys, alluvial fans at the mouths of streams, and glacial deposits in glacially carved canyons and along the broad crest of the Cascade Range.

Ice sheets extended over most of the study area more than once covering the crest of the Cascades to a depth of hundreds of feet (greater than 100 m). Valley glaciers spread eastward down canyons to elevations as low as 4,140 ft (1,281 m), at Upper Klamath Lake, and westward to elevations as low as 3,600 ft (1,100 m) (Carver, 1972).

GEOCHEMISTRY

Samples of all major rock types in the study areas were collected during geologic mapping, including any float rocks or stream pebbles that were suggestive of alteration. Sediment samples were collected from most of the drainages and from many of the bogs in the areas. Rock samples were crushed and sieved, and sediment samples were sieved. Material smaller than about 0.025 in. (0.6 mm) was analyzed for 22 elements by a semiquantitative emission-spectrographic method (Grimes and Marranzino, 1968). Rocks and stream sediments were also analyzed for mercury by a vapor-detector technique (Vaughn and McCarthy, 1964).

The results of the geochemical investigation indicate that there are no areas of clustered samples that contain unusually high concentrations of metallic elements, and that Sky Lakes Roadless Area and Mountain Lakes Wilderness have a very low mineral resource potential for metallic-mineral deposits.

MINING DISTRICTS AND MINERALIZATION

There are no mining districts located within the Sky Lakes Roadless Area or Mountain Lakes Wilderness. No mining claims have been recorded in either area, nor is there any evidence of past or present mining activity. Geologic mapping, aeromagnetic surveys, and spectrographic analyses of rock and stream sediments by the U.S. Geological Survey and field observations, scintillation surveys, and assays of samples from the most likely sites within the area by the U.S. Bureau of Mines failed to show any evidence of mineralization or hydrothermally altered areas.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The absence of claims, history of mining, or known mineral deposits of economic importance, as well as the data acquired during this study, suggest that the Sky Lakes Roadless Areas and Mountain Lakes Wilderness have little or no mineral resource potential. The only deposits of any interest are volcanic cinders, scoria, ash, and breccia which are suitable construction materials. Development is unlikely because the deposits are remote, and larger deposits of equal or better quality occur at more accessible locales.

Construction materials

The study areas have a low potential for construction materials. The cinder cones and vent breccias that make up Goose Nest, Goose Egg, and Ruth, Ethel, and Maude Mountains contain approximately 240 million yd^3 (183 million m^3) of volcanic cinders, scoria, ash, and breccia. A second group of cinder cones and vent breccia that makes up the area around Devils Peak, the area south of No-See-Um Lake, Imagination Peak, the summit of Pelican Butte, Lost Creek Cinder cone, the area north of Storm Lake, and between Whiteface Peak and Crater Mountain probably contains close to an equal amount of volcanic cinders, scoria, ash, and breccia. Areas labeled "A" on figure 2 have young, poorly indurated deposits of cinders, scoria, ash, and breccia. Areas labeled "B" on figures 2 and 3 generally have older, more indurated deposits of cinders, scoria, ash, and breccia. The resource potential of areas labeled "B" is lower than areas labeled "A," because they are generally more remote and contain a larger proportion of unsuitable breccia with large unvesiculated clasts. Demand for material from either group is unlikely because the deposits are remotely located and other cinder deposits of equal or better quality occur outside the study area. These deposits will probably supply local needs indefinitely.

Cinders from numerous cinder pits in operation outside the study areas on U.S. Forest Service land are used for road construction and maintenance by the Forest Service. Cinder pits are located in sec. 16, T. 33 S., R. 6 E., in secs. 16 and 25, T. 36 S., R. 6 E., and in sec. 22, T. 34 S., R. 6 E.

Sources of crushed rock are also readily available outside the study areas, closer to areas of use. A rock quarry is located 0.5 mi (0.8 km) east of Sky Lakes Roadless Area along Cherry Creek in sec. 22, T. 34 S., R. 6 E. It is on Forest Service managed land, and rocks quarried there are sold to the public for construction and decorative purposes. Numerous other quarries outside the study areas have supplied crushed rock for local use.

Sand and gravel deposits are found throughout the study area. They occur as small lenses and are usually associated with narrow stream channels. Development is unlikely due to their small size and inaccessibility; local demand for sand and gravel is met by pits with large resources outside the study area.

Geothermal energy

The potential for geothermal energy in the study areas is low. In the United States, the only areas of development or active exploration for geothermal energy are associated with either young silicic volcanic rocks or regions of exceptionally high heat flow in extensional tectonic zones characterized by numerous normal faults. To date, the largest geothermal systems with the highest temperatures generally are those associated with very young volcanic fields (Smith and Shaw, 1975). Within the study areas, there are no young, suitably silicic volcanic rocks exposed at the surface. Geologic mapping and aeromagnetic and gravity surveys likewise give no indication of buried silicic magma bodies of sufficient size to serve as sources of heat for geothermal systems.

The nearest area where geothermal phenomena are observed is in the vicinity of Klamath Falls, some 19 mi (31 km) southeast of Mountain Lakes Wilderness. Manifestations of geothermal energy observed in the Klamath Falls area include hot springs with temperatures close to 204°F (96°C), steam and water wells with temperatures greater than 266°F

(130°C), and hundreds of warm-water wells with temperatures from 68° to 140°F (20° to 40°C) (Sammel, 1980). The hot waters are spatially associated with major young normal faults and fracture zones with displacements of hundreds of feet, and they are presumably related to deep circulation of groundwater in these zones.

The system of normal faults present in Klamath Falls area continues north-northwest and passes a few miles east of the Sky Lakes and Mountain Lakes areas. Extensive young faulting, with the east side of most faults down dropped, was responsible for the formation of the Klamath graben in which Upper Klamath Lake lies. No young normal faults with significant displacement are present in either study area. No hot or warm springs or wells are present in either area or in adjacent areas.

Metallic minerals

The study areas are not geologically favorable for metallic deposits. However, it is rumored that Cherry Creek, within the study area, was prospected for placer gold during the 1850's (Francis Brown, oral commun.); examination of the area revealed no evidence of placer working. Two placer samples from Cherry Creek contained no recoverable gold or other metals.

Several small pits were found along the Pacific Crest Trail 1 mi (1.6 km) southwest of Deer Lake. Because these pits are on and near a possible fault structure trending N. 50° W., three grab samples were taken, from alluvium containing andesite cobbles; analyses indicated that no valuable metals were present. The pits were later confirmed as borrow pits used in trail construction (Ted Cobo, U.S. Forest Service, oral commun.).

Near Trapper Lake, two pits were found 175 ft (53 m) east of the intersection of Sky Lakes and Cherry Creek Trails. Two grab samples were taken, and their assays indicated no anomalous concentrations of metals. The origin of these pits is unknown.

Uranium occurrences have been found in brecciated tuff deposits 30 mi (48 km) west of the study area in volcanic rocks of the Western Cascade Range. Because the Sky Lakes Roadless Area also contains similar volcanic deposits, although of much younger age, several scintillation surveys were made, but no significant radioactivity was detected.

Other resources

Except for low-value construction materials, the Sky Lakes Roadless Area and the Mountain Lakes Wilderness have no indications of deposits of nonmetallic minerals. Coal, oil, and gas resources are not likely to be found here because favorable rocks and geologic structures are absent.

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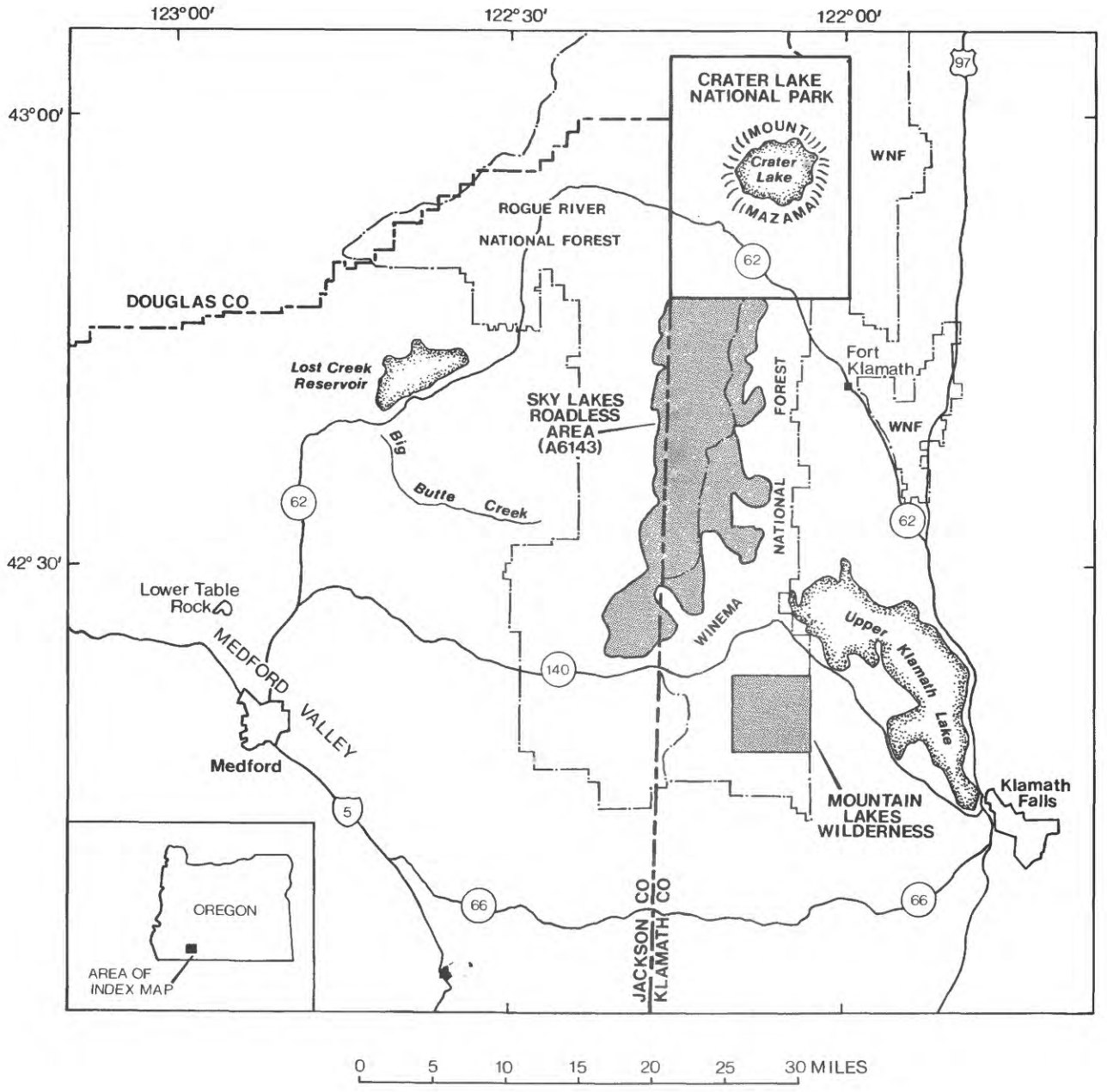


Figure 1.--Index map showing location of the Sky Lakes Roadless Area and Mountain Lakes Wilderness, Oregon.

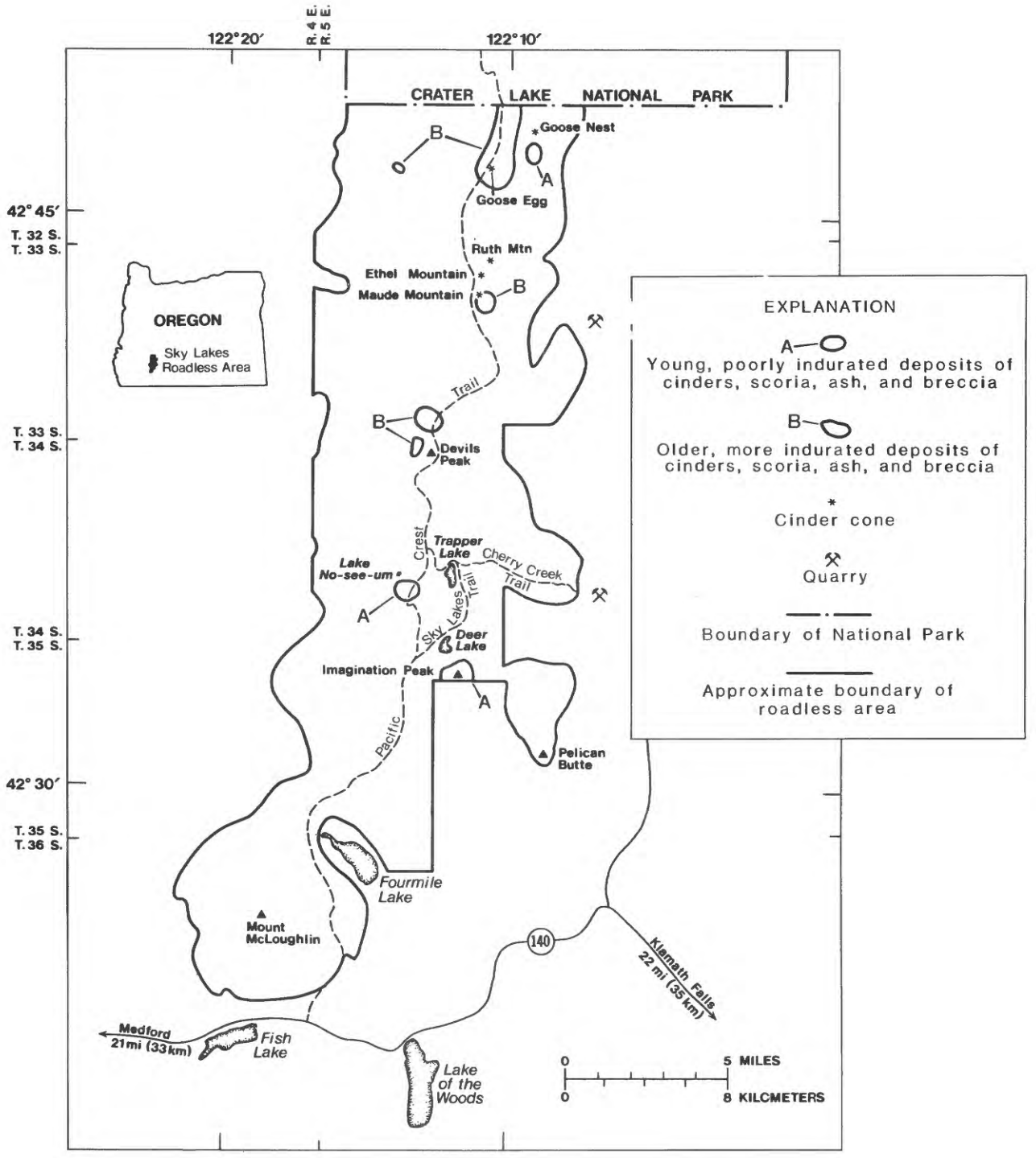
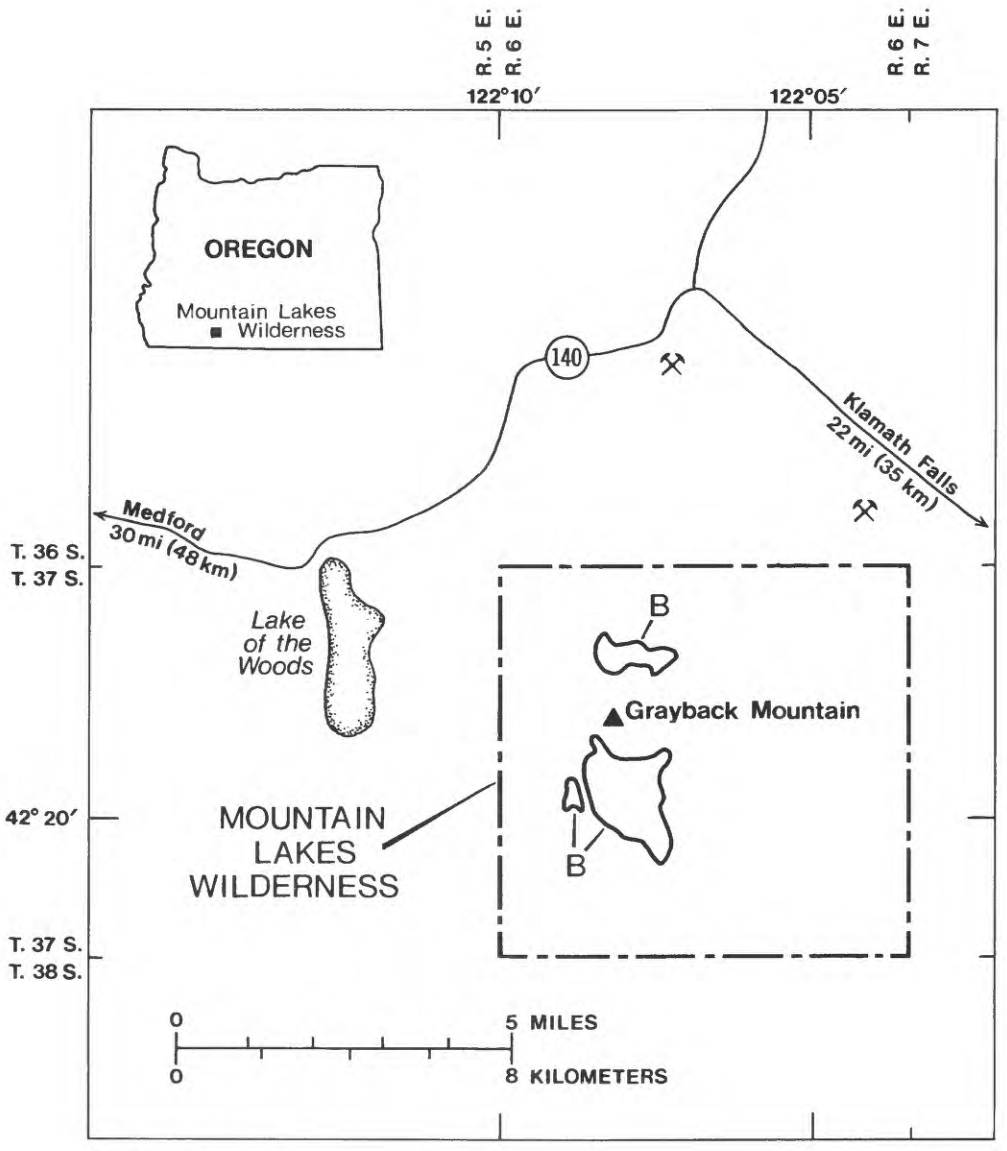


Figure 2.--Map showing location of potential resources of volcanic cinders, scoria, ash, and breccia in Sky Lakes Roadless Area, Oregon.



EXPLANATION

B Older, more indurated deposits of cinders, scoria, ash, and breccia

Quarry

Approximate boundary of wilderness

Figure 3.--Map showing location of potential resources of volcanic cinders, scoria, ash, and breccia in Mountain Lakes Wilderness.