STATE OF WASHINGTON

DEPARTMENT OF NATURAL RESOURCES

BERT L. COLE, Commissioner of Public Lands
RALPH A. BESWICK, Supervisor

DIVISION OF GEOLOGY AND EARTH RESOURCES

VAUGHN E. LIVINGSTON, JR., State Geologist

INFORMATION CIRCULAR 61

ANNOTATED GUIDE TO SOURCES OF INFORMATION ON THE GEOLOGY, MINERALS, AND GROUND-WATER RESOURCES OF THE PUGET SOUND REGION, WASHINGTON, KING COUNTY SECTION

By

WILLIAM H. REICHERT

With Supplemental References by David D. Dethier

Prepared in cooperation with
UNITED STATES GEOLOGICAL SURVEY

1978

For sale by Department of Natural Resources, Olympia, Washington
Price $ 1.50

PREFACE

Local and regional planning agencies are faced with an almost continual expansion of urban encroachment into suburban and rural areas in the Puget Sound region. This is especially so in King County where the geographic limitations of Puget Sound on the west and the Snohomish County border on the north only permit expansion to the eastern and, to some extent, the southern parts of the county.

Knowledge of the geologic conditions and the mineral and water resources of possibly future urban and suburban areas is of considerable aid to planners in their assessment of the industrial, residential, and recreational needs of future communities.

Hundreds of reports on the geology and mineral and water resources of King County have appeared during the period ranging from the early territorial days to the present time. A perusal of all of this published and unpublished literature in order to glean the pertinent information needed by planners would consume an amount of time and effort which they possibly could not spare. The annotated bibliography presented herewith is an attempt to provide planning agencies with representative literature presenting the varied facets of information dealing with the geologic conditions and the mineral and water resources of the region. Included are published and unpublished reports and theses that deal with such topics as general geology, glaciation, earthquakes, landslides, soils, minerals, and water resources.

Included with the bibliography are seven map sheets of King County on which are delineated the areas covered by geologic maps from the reports of authors cited in the bibliography. An index to topographic mapping by the U.S. Geological Survey in King County is also included.

This report is one of a series of guides to information on resource and environmental subjects for the Puget Sound region, Washington, being prepared under sponsorship of the U.S. Geological Survey and cooperating agencies.

ANNOTATED GUIDE TO SOURCES OF INFORMATION ON THE GEOLOGY, MINERALS, AND GROUND-WATER RESOURCES OF THE PUGET SOUND REGION, WASHINGTON

KING COUNTY SECTION

By

WILLIAM H. REICHERT

With Supplemental References by David D. Dethier [1]

Abernethy, R. F.; Cochrane, E. M., 1960, Fusibility of ash of United States coals: U.S. Bureau of Mines Information Circular 7923, 363 p. [King County, p. 11-12, 287-289].

Table of data on tipple and mine samples of coal from mine beds in King County. Included in the data are size of coal, fusibility of ash, percent of ash, and percent of sulfur.

Adams, M. F., 1960, Water resources of the State of Washington: Washington State Institute of Technology Bulletin 237, Supplement A, 11 unnumbered pages.

Analyses of four water samples from the Renton area. Data include temperature, hardness, pH, and chemical analyses.

Algermissen, S. T.; Harding, S. T., 1965, The Puget Sound, Washington, earthquake of April 29, 1965—Preliminary seismological report: U.S. Coast and Geodetic Survey, p. 1-26.

Describes the geologic setting, seismicity, hypocenter, time of origin, magnitude, intensity [including intensity map], foreshocks and aftershocks, and direction of faulting. Includes two accelerograph records from Seattle.

Anderson, C. A., 1965, Surficial geology of the Fall City area, Washington: University of Washington M.S. thesis, 70 p.

A detailed study of the Pleistocene glaciation of the Fall City area. Includes physiographic maps showing the ice front, glacial lakes, deltas, and drainage during various stages of the Vashon recession. Accompanied by a geologic map at the scale of $2\frac{1}{2}$ inches to the mile.

---

[1] U.S. Geological Survey

Anderson, J. Q., 1959, Puget Sound area has several prospective oil and gas basins: World Oil, v. 149, no. 1, p. 111-113, 117; reprinted as Washington Division of Mines and Geology Reprint 5, 4 p.

The stratigraphy and structure of the sedimentary basins in the Green River district in southern King County indicate there is a favorable chance of producing oil and gas. The Kummer anticline shows some promise, but more test-well drilling is needed in other areas in the district. Includes maps that show the location of several anticlinal folds, structure contours, and structure cross sections.

Anderson, N. R., 1954, Glacial geology of the Mud Mountain district, King County, Washington: University of Washington M.S. thesis, 48 p.

The Mud Mountain district is about 6 miles east of Enumclaw on the southern boundary of King County. Discussed are the general topographic relations, Pleistocene stratigraphy, and pre-Pleistocene rocks. Includes a geologic map of the area at the scale of 1 inch to 1,000 feet.

Anderson, Roy, 1968, Seattle Freeway. In McKee, Bates; Coombs, H. A., editors. Guidebook to field trips, Association of Engineering Geologists 1968 Annual Meeting, Seattle, Washington, October 22-26, 1968: Association of Engineering Geologists, p. 77-78.

Discusses the methods used in preventing potential slides during the construction of the Freeway in Seattle.

Artim, E. R., 1973, Geology in land use planning; some guidelines for the Puget Lowland: Washington Division of Mines and Geology Information Circular 47, 18 p.

Summarizes the geologic setting of the Puget Lowland, the geologic hazards, such as land subsidence and settlement, landslides, and earthquakes. Included are a correlation chart of the Quaternary deposits and a table giving a generalized description of engineering properties of the Quaternary stratigraphic unit in the Puget Lowland. Text pages 12-14 are a guide to use of the chart and table.

Bagley, C. B., 1929, History of King County, volume 1: S. J. Clarke Publishing Company, Chicago-Seattle, 889 p. [Coal, p. 280-300].

The section on coal presents a factural and very readable account of the history of coal mining in King County from its inception to 1928.

Barksdale, J. D.; Coombs, H. A., 1946, The Puget Sound earthquake of February 14, 1946: Seismological Society of America Bulletin, v. 36, no. 4, p. 349-354.

A report on the intensity and major damage due to the earthquake. Damage in the Seattle area was most pronounced in industrial buildings on filled ground in the Duwamish River valley, and in waterfront structures built on piling.

Beikman, H. M.; Gower, H. D.; Dana, T. A. M., 1961, Coal reserves of Washington: Washington Division of Mines and Geology Bulletin 47, 115 p. [King County, p. 33-62].

A comprehensive survey of the coal reserves of Washington. The introductory section discusses the classification of coal according to characteristics, abundance of reliable data, rank, reserves, and recoverability. A brief section on the geographic and geologic setting, beds, and history of mining of Washington coal deposits is followed by a discussion of the coking coal and coke in the state.

The major topics of discussion on the King County coal deposits are the geographic and geologic setting, coal beds, coal mining, and summary of reserves. The King County coal areas discussed are Newcastle-Grand Ridge, Renton, Cedar Mountain, Tiger Mountain and Niblock, Taylor, and Green River. Included are generalized columnar sections and maps, and tables of analyses and estimated reserves. The coal area map scales are at 2 1/8 miles to the inch and 1 7/8 miles to the inch.

Bethel, H. L., 1951, Geology of the southeastern part of the Sultan quadrangle, King County, Washington: University of Washington Ph. D. thesis, 244 p.

Describes the bedrock and surficial geology in the vicinity of the North and Middle Forks of the Snoqualmie River. Special emphasis is given to the origin of mineral deposits in this area. Includes a geologic map at a scale of 1 inch to a mile.

Bond, J. G., 1959, Sedimentary analysis of the Kummer Formation within the Green River canyon, King County, Washington: University of Washington M.S. thesis, 113 p.

Presents a study of the geologic history, structure, stratigraphy, depositional environment, and sedimentary analysis of the Kummer Formation within the Green River canyon near Black Diamond. Includes a geologic map at the scale of 5 inches to the mile.

Bravinder, K. M., 1932, Stratigraphy and paleontology of the Oligocene in the eastern portion of the Puget Sound basin: University of Washington M.S. thesis, 38 p.

Presents the results of stratigraphic and paleontologic studies of the Oligocene outcrops in the Puget Sound basin, including those at Alki Point, Columbia City, South Park, and Georgetown in south Seattle. Includes a geologic map of south Seattle at the scale of 1 inch to 800 feet.

Bretz, J. H., 1913, Glaciation of the Puget Sound region: Washington Geological Survey Bulletin 8, 244 p.

Although the stratigraphy of the Pleistocene glaciation has subsequently been considerably revised (see Easterbrook, Waldron, Mullineaux, and others for recent reports), Bretz' work is the most comprehensive study of Puget Sound glacial geology. Includes several large maps, such as Pleistocene Surface Deposits and Bathymetric Map of Puget Sound, and numerous small maps showing local detail, plus a considerable number of photographic illustrations and line drawings.

Brooke, J. P., 1972, Geologic hazards and cities: Engineering Geology and Soils Engineering Symposium, 10th Annual, Proceedings, Moscow, Idaho, April 5-7, 1972, p. 21-42.

Discusses geologic hazards such as earthquakes, landslides, air pollution, and waste disposal as related to city design, and offers suggested preventive or corrective measures to eliminate or lessen the problems arising from such hazards.

Campbell, K. V.; Miers, J. H.; Nichols, B. M.; Oliphant, Jerrelyn; Pytlak, Shirley; Race, R. W.; Shaw, G. H.; Gressens, R. L., 1970, A survey of thermal springs in Washington State: Northwest Science v. 44, no. 1, p. 1-11.

Gives physical and chemical data on the Diamond, Flaming Geyser, and Scenic thermal springs in King County. Includes a location map of sampled and unsampled springs.

Carr, F. E.; Bagshaw, E. W., 1908, Geology of Squak Mountain: University of Washington B.S. thesis, 34 p.

Describes the general geology, stratigraphy, historical geology, topography, economic geology, and igneous rocks of the Issaquah region. Includes a topographic map and a geologic map at the scale of 2 inches to the mile, and a geologic cross section.

Cary, A. S., 1968, Cascade border dam sites. In McKee, Bates; Coombs, H. A., editors. Guidebook to field trips, Association of Engineering Geologists 1968 Annual Meeting, Seattle, Washington, October 22-26, 1968: Association of Engineering Geologists, p. 58-66.

Discusses the problems facing designers of dams along certain rivers where Pleistocene glaciation occurred. Accompanying map shows Pleistocene drainage along the east border of the Puget Lobe.

Cary, A. S., 1968, Military Road slide. In McKee, Bates; Coombs, H. A., editors. Guidebook to field trips, Association of Engineering Geologists 1968 Annual Meeting, Seattle, Washington, October 22-26, 1968: Association of Engineering Geologists, p. 79-84.

Discusses slide conditions at a borrow pit east of the Military Road overpass of Interstate 5. Illustrations show cross sections of the area.

Cline, D. R., 1969, Availability of ground water in the Federal Way area, King County, Washington: U.S. Geological Survey Open-file Report, 60 p.

Ground water supplies are produced in the Federal Way area by means of wells. Included are a map showing location of the wells, a smaller map showing approximate availability in gallons per minute, and tables listing records of wells and well logs.

Coffman, J. L.; von Hake, C. A., editors, 1973, Earthquake history of the United States: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service Publication 41-1 (Revised edition through 1970), 208 p.

The most recent history of the prominent earthquakes in the United States through 1970. Includes a location map of U.S. earthquakes having an intensity of V or greater. The Washington and Oregon section lists earthquakes of intensity V and greater earthquakes, beginning with the Vancouver, Washington, earthquake of December 2, 1841. The earliest recorded earthquake in the Puget Sound area was on December 26, 1856 at Port Townsend. Also included is a descriptive and chronological list of intermediate and minor earthquakes.

Conradi, L. A., 1950, The chemical utilization of the subbituminous coals of Washington: University of Washington Engineering Experiment Station Report No. 6, 83 p.

A detailed study of the chemical utilization for energy sources of Washington coal, most of which is subbituminous. The King County coals selected for the study are from the Newcastle-Issaquah, Renton, and Cedar Mountain fields. Suggested methods for utilization include direct combustion, coal extraction, gasification, low-temperature carbonization, and hydrogenation.

Coombs, H. A., 1953, A summary of Washington earthquakes: Seismological Society of America Bulletin, v. 42, no. 1, p. 105.

A tabulation of earthquakes in the State of Washington for the years 1930-1951. Supplements the Townley and Allen catalog of earthquakes of the Pacific coast of the United States for the years 1769-1928. Data consists of year, day, and time of day, as well as the intensity, locality, and occurrence. Includes a map of Washington showing location and intensities of earthquakes from 1865 to 1951.

Coombs, H. A., 1968, Leakage through buried channels. In Symposium on reservoir leakage and ground water control, Association of Engineering Geologists 1968 Annual Meeting, Seattle, Washington, October 22-26, 1968: Association of Engineering Geologists, 6 p.

Discusses the geology of three damsites along the eastern margin of the Puget Sound continental glacial lobe, including the Tolt River Dam.

Crandell, D. R., 1963, Surficial geology and geomorphology of the Lake Tapps quadrangle, Washington: U.S. Geological Survey Professional Paper 388-A, 84 p.

A detailed geologic report and geologic map of the Pleistocene and Recent deposits of the area. A major portion of the area lies in Pierce County, with only the portion northeast of the White River lying in King County. Describes the drainage, relief, climate, bedrock, regional geologic setting, depositional environments, stratigraphy and Quaternary history, palynology, weathering, age determinations, surficial deposits, structure, correlation, economic deposits, engineering geology, and 13 measured sections. Has several page-size maps showing local geologic features. Includes a geologic map at the scale of $2\frac{1}{2}$ inches to the mile, and a map showing the sequence of Vashon deglaciation in the Lake Tapps quadrangle area.

Crandell, D. R., 1965, The glacial history of western Washington and Oregon. In Wright, H. E., Jr.; Frey, D. G., editors. The Quaternary of the United States: Princeton University Press, Princeton, New Jersey, p. 341-353.

Pleistocene glaciation in western Washington consisted of the Cordilleran continental glaciation and, adjacently, Cascade alpine glaciation. Includes a tabular summary of Pleistocene events in the southern part of King County, and a map indicating the inferred extent of glaciation in western Washington.

Crandell, D. R., 1971, Postglacial lahars from Mount Rainier volcano, Washington: U.S. Geological Survey Professional Paper 677, 75 p.

Among the lahars that originated at Mount Rainier during Holocene time is the Osceola Mudflow. It occurred about 5,700 years ago and flowed north along the White and Green Rivers to within a short distance of the present site of Kent. Description of the mudflow includes distribution, volume, texture, mineralogy, origin, and dating.

Crandell, D. R., 1973, Map showing potential hazards from future eruptions of Mount Rainier, Washington: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-836, map and text on one sheet.

The text includes a discussion of mudflows, floods, tephra (airborne volcanic-rock debris), lava flows, avalanches of rock debris, and volcanic monitoring. A study of the Puget Sound basin portion of the map reveals that, although the Osceola Mudflow of about 5,700 years ago extended from Mount Rainier to a point several miles north of Auburn, there is a low risk of mudflow occurrence and resultant flooding along the White River valley downstream from Mud Mountain Dam and along the valley floor that extends north and northwest from the vicinity of Sumner.

Crandell, D. R., 1976, Preliminary assessment of potential hazards from future volcanic eruptions in Washington: U.S. Geological Survey Miscellaneous Field Studies Map MF-774, map and text on one sheet.

Discusses products and effects of eruptions and their average past frequency at major volcanoes in Washington. Tephra (airborne volcanic-rock debris) hazard zones are evaluated. King County lies within the tephra-hazard zones of Mount Rainier and Mount St. Helens. Portions of southern King County may be subject to mudflows and resultant flooding from Mount Rainier. Map scale is about 15.8 miles to the inch.

Crandell, D. R.; Gard, L. M., Jr., 1959, Geology of the Buckley quadrangle, Washington: U.S. Geological Survey Geologic Quadrangle Maps of the United States Map GQ-125, map and text on one sheet.

The bedrock geology, surficial geology, including the Osceola Mudflow, soils, structure, geologic history, and mineral resources, consisting of building stone, coal, sand and gravel, and fill material are discussed in the text. The geologic map is at a scale of 2½ inches to the mile.

Crandell, D. R.; Mullineaux, D. R.; Waldron, H. H., 1958, Pleistocene sequence in southeastern part of the Puget Lowland, Washington: American Journal of Science, v. 256, no. 6, p. 384-397; reprinted as Washington Division of Mines and Geology Reprint 2, 14 p.

A revised sequence of the Pleistocene stratigraphic section in the southeastern part of the Puget Sound Lowland is established. Discussed are the Pleistocene succession, paleoclimatology, age, and correlation. The Pleistocene sediments are individually described and measured sections are presented.

Crandell, D. R.; Mullineaux, D. R.; Waldron, H. H., 1965, Age and origin of the Puget Sound trough in western Washington: U.S. Geological Survey Professional Paper 525-B, p. B132-B136.

Evidence on the glacial history of the Puget Sound trough suggests that it was formed solely by glacial scour due to southward movement of the Puget Lobe. Included in the paper is a discussion of the stratigraphy, chronology, and origin of the trough.

Crandell, D. R.; Mullineaux, D. R.; Waldron, H. H., 1965, [Quaternary geology of the Puget Lowland south of Seattle]. _In_ International Association for Quaternary Research, 7th Congress, Guidebook for Field Conference J—Pacific Northwest: Nebraska Academy of Sciences, Lincoln, Nebraska, p. 51-59.

Stops were made, and glacial features were described at Shilshole Bay; en route to and at Zenith, Auburn, north wall of Green River east of Auburn, and south wall of Green River east of Auburn; en route to and at west side of Puyallup Valley south of Alderton; and at the south end of the 12th Avenue viaduct in Seattle. Includes geologic maps and cross sections.

Crandell, D. R.; Waldron, H. H., 1956, A Recent volcanic mudflow of exceptional dimensions from Mount Rainier, Washington: American Journal of Science, v. 254, no. 6, p. 349-362.

Recent studies by the authors indicate that the Osceola till as named and described by Bailey Willis in 1898 is really a mudflow of volcanic origin from Mount Rainier and has been renamed the Osceola Mudflow. The authors discuss the appearance, composition, distribution, thickness, volume, stratigraphic relations, age, and origin of this mudflow.

Crosson, R. S., 1972, Small earthquakes, structure, and tectonics of the Puget Sound region: Seismological Society of America Bulletin, v. 62, no. 5, p. 1133-1171.

Presents data on a network of short-period seismograph stations on bedrock around the Puget Sound region operated to obtain additional information on the seismicity, tectonics, and structure of the region. Data derived thus far indicate a low incidence of earthquakes of magnitude 5 and above in this region.

Curran, T. A., 1965, Surficial geology of the Issaquah area, Washington: University of Washington M.S. thesis, 57 p.

Presents a detailed study of the stratigraphy and Pleistocene history of the Issaquah area. Includes several physiographic maps showing the ice front, glacial lakes, deltas, and drainage during various stages of the Vashon recession. Accompanied by a geologic map at the scale of 2½ inches to the mile.

Daněs, Z. F.; Bonno, M. M.; Brau, E.; Gilham, W. D.; Hoffman, T. F.; Johansen, D.; Jones, M. H.; Malfait, B.; Masten, J.; Teague, G. O., 1965, Geophysical investigation of the southern Puget Sound area, Washington: Journal of Geophysical Research, v. 70, no. 22, p. 5573-5580.

Geologic and gravity data are used to interpret the subsurface structure of the southern Puget Sound area. Includes a Bouguer gravity anomaly map, a gravity interpretation and earthquake epicenters map, and a north-south cross section of the Puget Lowland at longitude 122°45' W.

Daniels, Joseph; Yancey, H. F.; Geer, M. R.; Abernethy, R. F.; Aresco, S. J.; Hartner, F. E., 1958, Analyses of Washington coals; supplement to Technical Papers 491 and 618: U.S. Bureau of Mines Bulletin 572, 92 p. [King County, p. 6, 10-12, 29-35, 48-57, 72-74, 80-81, 85].

A compilation of analyses of Washington coals in which various aspects of the topic are presented by one or more of the cited authors. Discussed are the Washington coalfields, coking coals, mining methods, coal washing and preparation, production, distribution, use, relationship of mine samples to commercial shipments, analyses of mine and tipple and delivered samples, description of mine samples, description of borehole samples, description of tipple and delivered samples, true specific gravities, and sulfur forms.

Danner, W. R., 1966, Limestone resources of western Washington: Washington Division of Mines and Geology Bulletin 52, 474 p. [King County, p. 359-386].

A comprehensive and detailed survey of the limestone deposits in western Washington. Discussed are the classification of limestone, its varieties, mineralogical composition, origin, sampling, analyses, production, consumption, uses, and a section on the stratigraphy of the deposits. The King County deposits and occurrences are in the Grotto area and in the Denny Mountain area, both of which are north and east of the Snoqualmie River. Some of these deposits are described in regard to location, size, accessibility, geology, geologic maps and cross sections, development, ownership, chemical analyses, and core logs.

Easterbrook, D. J.; Rahm, D. A., 1970, Landforms of Washington—The geologic environment: Western Washington State College Department of Geology, Bellingham, Washington, 156 p. [Chapter 2. Puget Lowland, p. 42-72].

Contains an illustrated chapter on Pleistocene glaciation and its effects on the Puget Lowland, with a section on the Snoqualmie Falls area. Includes a small-scale map showing the probable extent of Vashon glaciation in northern Washington.

Ellis, R. C., 1959, Geology of the Dutch Miller Gap area, Washington: University of Washington Ph. D. thesis, 113 p.

Discusses the bedrock geology of the northeastern margin of King County, in what is now the Alpine Lakes Wilderness area. Evaluates the structural relationship between high-grade and lower grade metamorphic rocks located near the Cascade crest. Includes a geologic map at a scale of 1 inch to a mile.

Ellis, R. C., 1961, Amber near Seattle, Washington: Gems and Minerals, no. 291, p. 24.

Location and description of an amber deposit east of Issaquah.

Eppley, R. A., 1965, Earthquake history of the United States—Part 1, Stronger earthquakes of the United States

(Exclusive of California and western Nevada): U.S. Coast and Geodetic Survey Special Publication 41-1 (Revised edition through 1963), 120 p. [Originally published in 1938].

Tabular data on earthquakes of intensity V or greater in Washington and Oregon from 1841-1963. Also gives descriptive reports of intermediate and minor earthquakes for the same time period. Summary gives earthquakes felt in each state by date.

Erikson, E. H., Jr., 1968, Petrology of the composite Snoqualmie batholith, central Cascade Mountains, Washington: Southern Methodist University Ph. D. thesis, 111 p.

Describes the general geology, regional relationship, age, and petrology of the Snoqualmie batholith in eastern King County. Includes a geologic map at the scale of 1 inch to the mile.

Evans, G. W., 1912, The coal fields of King County: Washington Geological Survey Bulletin 3, 247 p.

The geologic map accompanying this report is considerably outmoded when it is compared with recent geologic mapping in King County (Crandell, 1959; Mullineaux, 1965; Waldron, 1961, 1962, 1967; and others); later reports on the coal deposits and reserves (Warren, W. C., and others, 1945; Beikman, H. M., and others, 1961) give more recent data, but this report still serves as a useful reference to detailed descriptions of the coal districts and mines of King County. Included are numerous cross sections, columnar sections, and mine maps. A table gives data on coal production of independent mines in King County from 1888 to 1911. One of the chapters is devoted to the coal-mining methods employed, and another chapter deals with the general character of King County coal.

Fettke, C. R., 1910, A study of the bed-rock geology in the vicinity of Seattle, Port Orchard, and Renton, Washington: University of Washington B.S. thesis, 21 p.

Presents a study of the general geology, topography, stratigraphy, and economic geology of the central Puget Lowland area, and includes a geologic map at the scale of 4 inches to the mile.

Folger, D. W., 1972, Characteristics of estuarine sediments of the United States: U.S. Geological Survey Professional Paper 742, 94 p. [Puget Sound, p. 78-80].

Summarizes the geology, bathymetry, hydrology, sediment texture, and sediment composition of Puget Sound. Includes small-scale maps showing the bathymetry and the texture of the bottom sediments.

Folsom, M. M., 1970, The glacial geomorphology of the Puget Lowland, Washington and British Columbia; comments and selected references: Northwest Science, v. 44, no. 2, p. 143-146.

Contains an extensive list of references pertaining to the glacial geomorphology of the Puget Lowland.

Foster, R. J., 1955, A study of the Guye Formation, Snoqualmie Pass, King and Kittitas Counties, Washington: University of Washington M.S. thesis, 55 p.

Discusses the geology of the upper Eocene Guye Formation and associated sedimentary and volcanic rocks. Evaluates the relationship between these rocks and the Snoqualmie batholith in eastern King County.

Foster, R. J., 1957, The Tertiary geology of a portion of the central Cascade Mountains, Washington: University of Washington Ph. D. thesis, 186 p.

Describes the geology of the central Cascades from immediately west of Snoqualmie Pass to the Teanaway area. Included in this zone are the metamorphic and igneous rocks of the Snoqualmie Pass area. A bedrock geology map, at a scale of 1 inch to 2 miles, is included in the report.

Foster, R. J., 1960, Tertiary geology of a portion of the central Cascade Mountains, Washington: Geological Society of America Bulletin, v. 71, no. 2, p. 99-125.

Describes the geology of that portion of the central Cascades extending east from Snoqualmie Pass to the Table Mountain area just east of Liberty. Recognized in this study are two distinct Tertiary stratigraphic sections separated by a north-south fault through Kachess Lake. Most of the rocks in the western area have been named or redefined by the author. Includes a geologic map at the scale of 1 inch to 2 miles.

Foxworthy, B. L., 1972, Emergency ground-water supplies in the Seattle-Tacoma urban complex and adjacent areas, Washington: U.S. Geological Survey Basic Data Contribution No. 2 (open-file report), map and text on one sheet.

Suggests the use of wells as a source of emergency water supply in case of a major disruption such as an earthquake. Includes a map at the scale of 4 miles to the inch showing the distribution and yield of wells that may be usable in case of emergency.

Fuller, R. E., 1925, The geology of the northeastern part of Cedar Lake quadrangle, with special reference to the de-roofed Snoqualmie batholith: University of Washington M.S. thesis, 96 p.

Discusses the topography, glaciation, stratigraphy, petrography, and age of the geologic formations in the area, and includes a detailed geologic study of the Snoqualmie batholith. Has a geologic map at the scale of 1 inch to 2 miles.

Gabriel, Alton; Dasher, John, 1942, Beneficiation of alunite: U.S. Bureau of Mines Report of Investigations 3610, 20 p.

Gives the results of petrographic and beneficiation studies of samples from an alunite deposit at Enumclaw.

Galster, R. W., 1956, Geology of Miller-Foss River area, King County, Washington: University of Washington M.S. thesis, 96 p.

Discusses the bedrock geology of northeastern King County. Special emphasis is placed on the relationship between low- and high-grade metamorphic rocks of the area and the Mount Stuart granodiorite. Includes a geologic map at a scale of 2 inches to the mile.

Garling, M. E.; Molenaar, Dee; and others, with contributions by the United States Geological Survey, 1965, Water resources and geology of the Kitsap Peninsula and certain adjacent islands: Washington Division of Water Resources Water Supply Bulletin 18, 309 p.

A comprehensive survey of the ground- and surface-water resources of the Kitsap Peninsula and certain adjacent islands that includes Vashon and Maury Islands. Contains data on precipitation, stream flows, wells, water quality, and water use. Appendix A consists of well driller's logs, and Appendix B lists pertinent data on municipal, community, and group water-supply systems. Appendices C and D list all recorded filings for ground-water rights and all valid surface-water filings, respectively; Appendix E consists of 33 maps, each showing points of diversion and withdrawal in a specific township for valid water-right filings.

An accompanying set of 5 plates includes the geology and diagrammatic sections, representative wells showing the ground-water supply, surface water map, effective precipitation and runoff map, and water development sites and stream areas utilized by migratory fish.

Gates, G. O., 1969, Earthquake hazards. In Olson, R. A.; Wallace, M. M., editors. Geologic hazards and public problems, Conference Proceedings, May 27-28, 1969: U.S. Office of Emergency Preparedness, Region Seven, Santa Rosa, California, P. 19-52.

Briefly discusses the potential behavior of the Seattle area to strong seismic shocks. Includes a small-scale map of shock intensities in the Puget Sound area, and a larger scale map of the seismically vulnerable areas of Seattle.

Geer, M. R., 1969, Disposal of solid wastes from coal mining in Washington, Oregon, and Montana: U.S. Bureau of Mines Information Circular 8430, 39 p.

Discusses solid waste disposal from coal mines at Black Diamond, Issaquah, Newcastle, Renton, and Ravensdale. Some of the older dumps are now overgrown with vegetation and blend with the nearby hills.

Geer, M. R., 1973, State-by-state reports on coal west of the Mississippi including Canada—Washington: Coal Age, v. 78, no. 5, p. 177-179, 182-183, 186.

A summarization of the principal coal deposits in Washington. The important King County coal deposits discussed are in the Black Diamond-Ravensdale and Newcastle areas.

Geer, M. R.; Yancey, H. F., 1961, Washability examinations of coals from the Rocky Mountain and Pacific coast states: U.S. Bureau of Mines Report of Investigations 5905, 34 p. [King County, p. 11-12, 25-26].

Bed thickness and specific-gravity analysis, including ash content, of the McKay bed and the Raven bed of the McKay mine.

Gilbert, W. G., 1967, Petrology of the Sunday stock, King County, Washington: University of Washington Undergraduate report, 20 p.

Presents the geologic history and petrologic studies of an intrusive stock within an area of about six square miles along the North Fork of the Snoqualmie River, about 25 miles east of Seattle. Includes a geologic map at the scale of 1 inch to 2,000 feet.

Gilkeson, R. H.; Starr, W. A.; Steinbrenner, E. C., 1961, Soil survey of the Snoqualmie Falls tree farm: Weyerhaeuser Company, 10 pages plus 28 unnumbered pages. [Folio size.]

Detailed soils study of the area of the Snoqualmie Falls tree farm in King County. Describes the geomorphology, the acreage and mapping intensity, and the 81 soils series and other mapping units. Landform definitions, a glossary, and a table giving the classification and important characteristics of the soils are included.

A set of 13 map sheets, with scales of 2 inches to the mile, delineate the locations of the various soils. The primary symbols on the map units identify the series, and the suffixed symbol represents the landform on which the soil is situated.

Glover, S. L., 1941, Clays and shales of Washington: Washington Division of Geology Bulletin 24, 368 p.

A comprehensive study of the clays and shales in Washington. The informative introductory sections discuss the origin of clays, their classification, constitution, working properties, technology, production statistics, testing, grouping by location and origin, and high-alumina content.

In the section that has descriptions of clay and shale deposits by counties, the King County part of the report discusses the properties of four residual clay samples, a considerable number of shale samples, and samples from the Hammer Bluff clays and the Puget Sound glacial clays. Appendix One gives locations and properties of the clays and shale; Appendix Two tabulates their chemical analyses.

Gould, H. R.; Budinger, T. F., 1958, Control of sedimentation and bottom configuration by convection currents, Lake Washington, Washington: Journal of Marine Research, v. 17, p. 183-198.

Discusses the bottom topography, the origin of the W-shaped trough, bottom sediments, and postglacial history of Lake Washington. Includes a map of Lake Washington bottom topography and several E-W cross sections.

Gower, H. D.; Wanek, A. A., 1963, Preliminary geologic map of the Cumberland quadrangle, King County, Washington: Washington Division of Mines and Geology Geologic Map GM-2, map and text on one sheet.

The map is at the scale of $2\frac{1}{2}$ inches to the mile. The geologic structure, mines or prospects, and mined areas are indicated by appropriate symbols. The text includes discussion of the stratigraphy of the quadrangle area, landslide debris, structure, and the economic deposits of coal, clay, silica sand, and quicksilver.

Hagen, C. B., 1958, Lengths of shoreline in Washington State: Washington Department of Natural Resources, Bureau of Surveys and Maps, 12 p.

The measurements include lengths of shoreline in kilometers, nautical miles, and statute miles for Harbor Island, Maury Island, Vashon Island, and the King County mainland.

Hall, J. B.; Othberg, K. L., 1974, Thickness of unconsolidated sediments, Puget Lowland, Washington: Washington Division of Geology and Earth Resources Geologic Map GM-12, map accompanied by 3 p. of text.

The map shows that the depth to bedrock in King County ranges from less than 10 feet in the eastern portion to more than 3600 feet in the Seattle area. An accompanying three-page pamphlet describes the geology of the Puget Lowland and the sources of data, plotting methods, and limitations of the map. Map scale is 5 miles to the inch.

Halliday, W. R., 1963, Caves of Washington: Washington Division of Mines and Geology Information Circular 40, 132 p.

A comprehensive survey of the known caves in the State of Washington, replete with many cave maps and illustrations. Eighteen King County caves are described in regard to location, elevation, length, and depth, and maps of Danger, Lookout, Newton, and Prospector's Caves are included.

Hammond, P. E., 1963, Structure and stratigraphy of the Keechelus volcanic group and associated Tertiary rocks in the west-central Cascade Range, Washington: University of Washington Ph. D. thesis, 229 p.

Describes the topography, general geology, stratigraphy, structural geology, and geologic history of a substantial part of southeastern King County. Appendices contain a number of stratigraphic sections, and the localities of outcrops, leaf fossils, and hand specimens. Includes geologic sections and a reconnaissance geologic map at the scale of 1 inch to the mile.

Hansen, H. P., 1941, Further pollen studies of post-Pleistocene bogs in the Puget Lowland of Washington: Torrey Botanical Club Bulletin, v. 68, no. 3, p. 133-148.

Pollen analyses and paleoclimatology of a peat bog near Black Diamond.

Hansen, H. P.; Mackin, J. H., 1940, A further study of interglacial peat from Washington: Torrey Botanical Club Bulletin, v. 67, no. 2, p. 131-142.

Discusses the geologic and stratigraphic relationships, pollen analysis, and paleoclimatology of a peat deposit in the Beacon Hill section of Seattle.

Harris, H. M.; Strandberg, K. G.; Kelly, H. J., 1962, Resources for making expanded aggregate in western Washington and Oregon: U.S. Bureau of Mines Report of Investigations 6061, 41 p.

Gives locations, and tabulates the physical properties of King County shales that bloated during tests, expanded aggregates made from the shales, and locations and descriptions of the shale samples that did not bloat.

Hidaka, F. T.; Garrett, A. A., 1967, Evaluation of seepage from Chester Morse Lake and Masonry Pool, King County, Washington: U.S. Geological Survey Water-Supply Paper 1839-J, p. J1-J26.

A study of hydrologic data in the Cedar and Snoqualmie River basins in order to evaluate the seepage from Chester Morse Lake and Masonry Pool, and resulting gain of the seepage by the Cedar and Snoqualmie Rivers. The study of the areas includes information about the climate, geologic setting, hydrologic setting, records of streamflow, wells and precipitation, and seepage estimates for the water years 1957-1964.

Hill, T. P.; Werner, M. A., 1972, Chemical composition of sedimentary rocks in Alaska, Idaho, Oregon, and Washington: U.S. Geological Survey Professional Paper 771, 319 p. [King County, p. 10-11, 30-31, 52-53, 134-135, 206-207, 214, 256-257, 264-265, 301-302].

Data on chemical analyses, lithologic character, locality, and uses of sedimentary rocks composed of silica, clay, limestone, and coal.

Hirsch, R. M., 1975, Glacial geology and geomorphology of the Upper Cedar River Watershed, Cascade Range, Washington: University of Washington M.S. thesis, 48 p.

Describes the surficial deposits, landforms, and glacial history of the southeast portion of King County. Includes diagrams that show the interactions between Cascade alpine ice and continental ice in the Puget Lowland. Map scale is 1 inch to 1¼ miles.

Hodges, L. K., editor, 1897, Mining in the Pacific Northwest; a complete review of the mineral resources of Washington and British Columbia: The Seattle Post-Intelligencer, 192 p. [A facsimile reproduction of the original work was published by the Shorey Book Store, Seattle, Washington in 1967] [King County, p. 36-43, 46-48].

"It can be safely said that this is the first attempt to describe with any approach to thoroughness the mineral resources of this section, and to tell what has been done to develop them. The aim has been to collate information on the subject from the most reliable sources available and to mass the material facts without any exaggeration or verbal flourishes, leaving them to tell their own story." [From the author's preface.]

Includes reports on the following mining districts: Miller River, Money Creek, Snoqualmie, Buena Vista, and Cedar River. Accompanying the report are sketch maps showing claim locations, railways, wagon roads, and trails.

Howard, D. A., 1967, Economic geology of Quartz Creek, King County, Washington: University of Washington M.S. thesis, 48 p.

Describes the geology of an important group of prospects located near the Middle Fork of the Snoqualmie River, in eastern King County. Includes a geologic map at a scale of 4 inches to the mile.

Howlett, Bruce; Brodsky, Harold, 1964, Landslide hazardous areas in the central Puget Sound region (Project Open Space, volume 2—Natural Open Spaces; Report 10): Puget Sound Governmental Conference-Puget Sound Regional Planning Council, Seattle, Washington, 27 p.

Discusses the factors that contribute to landslide occurrence. Includes a delineation of landslide-hazardous areas, the effect of past landslides on slope development, landslides and public policy, landslide areas and open space, and recommendations in regard to use of landslide-hazardous areas. Includes a map at the scale of 10 miles to the inch, showing landslide-hazardous areas in the urbanizing areas in the southeastern portion of the Puget Lowland.

Appendix A lists the source maps (geologic) from which information was obtained in order to cite those formations considered to be landslide hazardous to some degree.

Appendix B consists of (1) table of landslide occurrences reported by engineers' offices, consisting of date of occurrence, location by section, township, and range, and street address; (2) a table on slide damage to King County roads; and (3) a table on typical landslide occurrences in Seattle and vicinity as reported in the Seattle Times, 1956-63. Table 3 gives the location, date, and damage reported.

Huntting, M. T., 1955, Gold in Washington: Washington Division of Mines and Geology Bulletin 42, 158 p. [King County, p. 31, 34, 61-64, 121-122].

A detailed survey of the gold occurrences in Washington. The introductory text discusses the properties of gold, uses, ores and ore minerals, types of deposits, prospecting advice, locating claims, patenting claims, mining methods and treatment, marketing, history of gold, placer gold localities, production, and occurrences in Washington.

The ten lode gold occurrences in King County are described in regard to location, access, extent, ownership, type of ore, brief description of the deposit and its development, and assays. The four placer gold properties are very briefly described.

All of the gold occurrences in King County are located in the northeastern part of the county. An extensive list of references, referred to by number in the sections on occurrences, provides supplemental reading for more information on the occurrences.

Huntting, M. T., 1956, Inventory of Washington minerals; Part 2—Metallic minerals: Washington Division of Mines and Geology Bulletin 37, part 2, 2 volumes—text and maps, 428 pages plus 67 pages.

A comprehensive compilation of all of the known occurrences of metallic minerals in the State of Washington. The information has been gathered from published and unpublished reports and data.

Each mineral is described in regard to properties, uses, production, prices, ore minerals, and the geology of the deposits. Following the text description is a section listing the occurrences in alphabetical arrangement by county, and by deposit or occurrence name. Available information on each deposit or occurrence is described by location, elevation, access, owner, ore, ore minerals, extent of deposit, development, and references from which the information was obtained.

Metallic mineral occurrences in King County listed in both volumes are antimony, arsenic, bismuth, cerium, chromium, copper, gallium, gold (lode), gold (placer), iron, lead, mercury, molybdenum, silver, thorium, tin, titanium, tungsten, uranium, and zinc.

Huntting, M. T.; Bennett, W. A. G.; Livingston, V. E., Jr.; Moen, W. S., 1961, Geologic map of Washington: Washington Division of Mines and Geology, 2 sheets.

The map is a compilation of all available data from maps dealing with the geology of Washington through 1960. A total of 121 cited references were used.

A list gives the names of 302 formations, their sources in the literature, the areas in which they are found, and the 104 rock units into which they were combined. These units, with brief descriptions of each, are listed in a legend; the rock units range in age from Precambrian to Recent.

The major faults are indicated by appropriate symbols and the approximate extent of the Pleistocene glaciation is delineated. The scale of the map is 8 miles to the inch.

Kelly, H. J.; Strandberg, K. G.; Mueller, J. I., 1956, Ceramic industry development and raw-material resources of Oregon, Washington, Idaho, and Montana: U.S. Bureau of Mines Information Circular 7752, 77 p. [King County, p. 31-34, 73].

A survey of the ceramic industry development and the ceramic raw-material resources of the Pacific Northwest. Includes 13 deposits in King County. Brief discussions of the ceramic plants in the area are included, and an appendix lists tabular data about them.

Knoll, K. M., 1967, Surficial geology of the Tolt River area, Washington: University of Washington M.S. thesis, 91 p.

A detailed study of the stratigraphy and Pleistocene glaciation in the Tolt River area at the eastern border of the Puget Lowland. Includes a number of physiographic maps showing the ice fronts, glacial lakes, and drainage of the Vashon recession. Accompanied by a geologic map at the scale of 2½ inches to the mile.

Kremer, D. E., 1959, Geology of the Preston-Mount Si area: University of Washington M.S. thesis, 103 p.

Presents a detailed study of the physiography, glacial geology, stratigraphy, and structure of the Preston-Mount Si area. Includes several geologic cross sections and a geologic map at the scale of $1\frac{1}{2}$ inches to the mile.

Kroft, D. J., 1972, Sand and gravel deposits in western King County, Washington: University of Washington M.S. thesis, 62 p.

A comprehensive, detailed study of the amount, type, and location of sand and gravel in western King County. Populated areas were excluded from the survey. Most of the deposits were formed during the Pleistocene glaciation and deglaciation of the Puget Sound region. The three sources of sand and gravel are deltas, alluvium, and outwash or channel deposits. Estimated reserves in western King County exceed three billion cubic yards. Included are 15 geologic maps showing types of deposits and the maps are at the scale of 7/8 inch to the mile.

Leighton, M. M., 1919, The road building sands and gravels of Washington: Washington Geological Survey Bulletin 22, 307 p. [King County, p. 179-184].

The first four chapters of this old but useful report are concerned with the studies of the materials, general description of the sand and gravel deposits by provinces, character and tests of the gravels, and tests on sand and gravel for use in making portland cement concrete, bituminous concrete, and sand for sheet asphalt construction. The balance of the report is devoted to the distribution and character of the road-building sands and gravels by counties.

The portion dealing with King County discusses the topography, climate, distribution, and tests of the deposits. Test results of five samples are given. Map numbers refer to the outline map on page 180 for location. Table 3 gives data on composition and mechanical analyses of three of the King County samples. Table 4 gives the results of tensile strength tests and colorimetric tests made on all of the King County samples. Table 5 gives the physical character and mechanical analyses of one of the samples, and table 6 gives the results of compressional strength on field concrete cylinders.

Liesch, B. A., 1955, Records of wells, water levels, and quality of ground water in the Sammamish Lake area, King County, Washington: U.S. Geological Survey Open-file Report, 193 p.

A preliminary survey of wells and springs in the Sammamish Lake area. Most of the report consists of four data tables: table 1, well data, including hardness; table 2, data on representative springs; table 3, the materials penetrated by representative wells; and table 4, the chemical analyses of selected wells. The report is accompanied by a map of the area showing the location of representative wells and springs.

Liesch, B. A.; Price, C. E.; Walters, K. L., 1963, Geology and ground-water resources of northwestern King County, Washington: Washington Division of Water Resources Water Supply Bulletin 20, 241 p.

Describes the geology, geologic history, and ground water of the northwestern part of the county. Included in the section on ground water are data on the use of ground water for public water supply, and water quality. Table 5 gives records of representative wells, records of selected springs, driller's well logs, and selected analyses of the ground water.

The accompanying geologic map and cross sections have a scale of about 1 1/3 inches to the mile. An additional map shows the location of representative wells and springs.

Livingston, V. E., Jr., 1958, Oil and gas exploration in Washington, 1900-1957: Washington Division of Mines and Geology Information Circular 29, 61 p. [King County, p. 5-6, 28-29].

Presents a detailed accumulation of data on wells drilled for oil and gas in the State of Washington. The introductory section gives a condensed report on the stratigraphy and structure of the Black Diamond area. The major portion of the report is devoted to exploration data arranged in tabular form, alphabetically by counties. The data consist of company or owner name, well name, location and elevation, date spudded, depth, and pertinent remarks.

An accompanying dry-hole map shows the locations of wells deeper than 500 feet. Ninteen wells are listed under the King County heading.

A supplemental list that was compiled and released in 1973 includes data on an additional 6 wells in King County.

Livingston, V. E., Jr., 1971, Geology and mineral resources of King County, Washington: Washington Division of Mines and Geology Bulletin 63, 200 p.

A detailed report on King County. The introductory portion deals with the climate, transportation facilities, industries, land use, and water resources of the county. The geology section describes the physiography, rocks, and structure. The section on mineral resources describes the nonmetallic and metallic mineral deposits of the county and includes a list of patented mining claims and an index to the mineral locations within King County.

The report is replete with useful maps, figures, and tables. Among the maps are those showing land ownership, published and unpublished geologic mapping, topographic mapping, detailed geologic maps of various deposits and prospects, distribution of geologic units that may contain commercial quantities of sand and gravel, metallic mineral deposits, and claim maps. A geologic map of King County at the scale of 2 miles to the inch is also included.

The tables include sources of information relative to mining and land status, criteria for evaluating sanitary landfill sites for putrescible waste, community sources of domestic water, estimated remaining reserves of various coal deposits in King County, summary of oil and gas test wells drilled in King County, summary of peat bogs in the county, summary of metallic mineral properties, list of patented claims, index of mineral properties, summary of coal production in King County by mine and year from 1888 through 1967, and a generalized description of engineering properties of the geologic map units shown on the geologic map of King County.

Luzier, J. E., 1969, Geology and ground-water resources of southwestern King County, Washington: Washington Department of Water Resources Water Supply Bulletin 28, 260 p.

A study of the geology, geologic history, and ground water of the southwestern part of the county. Included in the ground-water section are source and movement, availability by area, chemical quality, utilization, and future development of the ground-water resources. Several tables include data on 1960 population with estimates projected to 1985, stratigraphy and water-bearing properties of the principal geologic units, utilization by public-supply systems, well records, driller's logs, spring records, and chemical analyses. Accompanied by a geologic map and cross sections in color at the scale of 1 1/3 inches to the mile, and a map showing locations of wells, test holes, and springs in the report area.

Mackin, J. H., 1941, A geologic interpretation of the failure of the Cedar Reservoir, Washington: University of Washington Engineering Experiment Station Series Bulletin 107, 30 p.

Presents an engineering geology study of the glacial history of the Cedar Reservoir area, the damsite geology, and an interpretation of the Cedar Reservoir failure.

Mackin, J. H., 1941, Glacial geology of the Snoqualmie-Cedar area, Washington: Journal of Geology, v. 49, no. 5, p. 449-481.

Presents a detailed study of the glacial geology of the Snoqualmie-Cedar area. Topics discussed include the Snoqualmie-Cedar embankment, origin of the Cedar spillway, the failure of the Cedar Reservoir, relations of the local Cascade Glacier to the Vashon Puget Glacier, and the origin of Snoqualmie Falls.

Mackin, J. H., 1949, Engineering geology of West Seattle: University of Washington Engineering Experiment Station Trend in Engineering, v. 1, no. 3, p. 24-26.

A brief but thorough report on the geologic relations of West Seattle hill, the probable causes of the Alki Avenue slide problem, and suggestions for the alleviation of the problem. Includes a diagrammatic E-W cross section of West Seattle hill.

Mackin, J. H.; Cary, A. S., 1965, Origin of Cascade landscapes: Washington Division of Mines and Geology Information Circular 41, 35 p.

An excellent interpretation of the geologic events from Eocene time to the present time that led to the current topography of the Cascade Range in Washington. Includes numerous line drawings and a selected reading list.

Mackin, J. H.; Mullineaux, D. R.; Stark, W. J., 1950, Glacial geology of Seattle: University of Washington Engineering Experiment Station Trend in Engineering, v. 2, no. 4, p. 19-21.

A brief statement on the glacial geology of Seattle, based on a report placed on file in the Seattle City Engineer's office.

Mark, D. M.; Ojamaa, P. M., 1972, The glacial geomorphology of the Puget Lowland—Further comments and references: Northwest Science, v. 46, no. 4, p. 336-338.

Consists of addenda to Folsom's 1970 list.

McKee, Bates, 1968, Glaciation of the Puget Lowland. In McKee, Bates; Coombs, H. A., editors, Guidebook to field trips, Association of Engineering Geologists 1968 Annual Meeting, Seattle, Washington, October 22-26, 1968: Association of Engineering Geologists, p. 53-57.

A resume of the Pleistocene glaciation of the Puget Lowland. Includes two maps showing the extent of the Puget Lobe in Washington.

McKee, Bates, 1972, Cascadia—The geologic evolution of the Pacific Northwest: McGraw-Hill Book Company, New York, 394 p. [The Puget-Willamette Lowland, p. 290-304].

The chapter devoted to the Puget-Willamette Lowland presents a summary of the pre-Tertiary rock exposures, the Pleistocene glaciation, the glacial sediments, the effect of the glaciation with regard to construction costs, and the glacial dating of the geologic units.

McKenzie, Dan; Julian, Bruce, 1971, Puget Sound, Washington, earthquake and the mantle structure beneath the northwestern United States: Geological Society of America Bulletin, v. 82, no. 12, p. 3519-3523.

A study of the Puget Sound earthquake of April 29, 1965 placed the focus at a depth of 58 kilometers. Evidence was discovered of the existence of a slab of the Pacific Ocean floor thrusting beneath southwestern Canada and northwestern United States. It is either active, or it has only recently ceased to be so.

McLerran, J. H.; Krashevski, S. H., 1954, State of Washington Engineering Soils Manual; Part 3—Soils of King County: Washington State Council for Highway Research, 107 p.

This manual, together with Part 1—The engineer and pedology, was prepared to facilitate the use of the soil survey map of King County in deriving the engineering properties of the described soils series. The introductory pages present brief general data on King County, such as climate, physiography, and geology. Most of the report is devoted to soil-profile descriptions, which present data as to type of soil, parent material, location, description, topography, drainage, vegetation, and engineering problems.

McManus, D. A., 1963, Postglacial sediments in Union Bay, Lake Washington, Seattle, Washington: Northwest Science, v. 37, no. 2, p. 61-73.

Detailed description and interpretation of the postglacial sediments in Union Bay. Includes a bathymetric chart and a sediment profile.

Miller, A. L., 1953, Earthquake lessons from the Pacific Northwest: University of Washington Engineering Experiment Station Trend in Engineering, v. 5, no. 1, p. 13-17, 32.

A brief summary of the April 13, 1949 earthquake in the Pacific Northwest and recognition of the hazards that could lead to disaster. A list of such hazards includes structural damage, falling debris, disruption of utilities, possible fires, interruption of communications and transportation, release of materials from containers, psychological effects, and earthquake motion and its effects on buildings. Accompanied by an isoseismal map of the April 13, 1949 earthquake.

Miller, R. D., 1973, Map showing relative slope stability in part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-852A, map and text on one sheet, scale 1 1/3 inches to the mile.

The text discusses the slope stability classes and their relationship to land use, and the relationship of slope instability to landslides. The map area north and south boundaries extend from the Renton area south to the Kent area, and the eastern and western boundaries extend from about $3\frac{1}{2}$ miles east of the town of Maple Falls westward to include the major portions of Vashon and Maury Islands. Map scale is 1 1/3 inches to the mile.

Miller, R. D., 1974, Map showing relative compressibility of earth materials in part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Investigations Map I-852 C, map and text on one sheet.

Discusses how knowledge of areas of differing compressibility can be valuable in determining suitability for various land uses. Results of standard-penetration and volume-change tests are reported for glacial materials. Moderately to highly compressible materials are common in the valley areas of King County. Map scale is 1 1/3 inches to the mile.

Minning, G. V., 1967, The significance of till-fabric analysis in the Puget Lowland, Washington: University of Washington M.S. Research Paper, 30 p.

Till fabrics in 28 exposures (mostly King County) were found to be useful as ice-flow indicators. Text includes a number of till-fabric diagrams.

Moen, W. S., 1962, Mineral rights and land ownership in Washington: Washington Division of Mines and Geology Information Circular 36, 23 p.

An aid to differentiation between public and private ownership of all land in the State of Washington. Includes detailed information on lands that are open to mining location as well as lands that are not. Accompanied by a map of the State of Washington, at the scale of approximately 13 miles to the inch, that shows, by means of a color scale, lands open or closed to mining location.

Moen, W. S., 1967, Building stone in Washington: Washington Division of Mines and Geology Bulletin 55, 85 p.

A comprehensive report on the building stone deposits in the State of Washington. Discussed are production and value, forms of building stone, acquisition, examination of deposits, general quarrying methods, and physical properties. Under the general rock-name headings, the common building stones are discussed in regard to geology and distribution, physical properties, varieties, desired qualities, and uses as building stone. Included are tables listing quarries that have produced in the past and those that were producing in 1964. Also included are maps showing quarry locations and rock distribution. The rocks that occur in King County are granite, sandstone, basalt, and felsite.

Molenaar, Dee, 1961, Flowing artesian wells in Washington State: Washington Division of Water Resources Water Supply Bulletin 16, 115 p.

A comprehensive compilation of data on flowing artesian wells in the state. The introductory portion discusses the general geology and occurrences of artesian wells in the five provinces as defined for this report, and mentions the notable flowing artesian wells in each of the provinces. The accompanying table of data includes information on 81 wells in King County, and the locations of the wells are shown on the accompanying map, scaled at 13 miles to the inch.

Mullineaux, D. R., 1965, Geologic map of the Auburn quadrangle, King and Pierce Counties, Washington: U.S. Geological Survey Geologic Quadrangle Maps of the United States Map GQ-406, one sheet.

The geologic map units are described, and distribution and thickness in the map area are given. Appropriate symbols are used to denote the geologic structure and to indicate the locations of gravel or sand pits, quarries, coal mines, prospect pits, deep exploratory drill holes, and fossil plant localities. The scale is 2½ inches to the mile.

Mullineaux, D. R., 1965, Geologic map of the Black Diamond quadrangle, King County, Washington: U.S. Geological Survey Geologic Quadrangle Maps of the United States Map GQ-407, one sheet.

The geologic map units are described, and distribution and thickness in the map area are given. Appropriate symbols are used to denote the structure, and to indicate the locations of gravel or sand pits, quarries, coal mines, prospect pits, deep exploratory drill holes, and fossil plant localities. The map scale is 2½ inches to the mile.

Mullineaux, D. R., 1965, Geologic map of the Renton quadrangle, King County, Washington: U.S. Geological Survey Geologic Quadrangle Maps of the United States Map GQ-405, one sheet.

The geologic map units are described, and distribution and thickness in the map area are given. Appropriate symbols are used to denote the structure, and to indicate gravel or sand pits, quarries, coal mines, prospect pits, deep exploratory drill holes, and fossil plant localities. The map scale is 2½ inches to the mile.

Mullineaux, D. R., 1967, Gross composition of Pleistocene clays in Seattle, Washington: U.S. Geological Survey Professional Paper 575-B, p. B69-B76.

Presents methods of distinguishing between glacial clays and nonglacial clays in the Seattle area by means of their clay mineral composition. Includes a table of data on samples of a number of clays from various locations in the area.

Mullineaux, D. R., 1970, Geology of the Renton, Auburn, and Black Diamond quadrangles, King County, Washington: U.S. Geological Survey Professional Paper 672, 92 p.

A comprehensive geologic report on an area, recently rural, which is gradually becoming urban and suburban. Describes the topography, drainage, climate, vegetation, culture, stratigraphy, lithology, Pleistocene glaciation, Holocene deposits, Osceola Mudflow and its distribution, geomorphology, geologic structure, geologic history, engineering geology including landslides, and mineral deposits including sand and gravel, stone, silica sand, oil and gas, clay, coal, peat, and topsoil. Includes a table with generalized description of the engineering properties of the principal mapped units.

Mullineaux, D. R.; Bonilla, M. G.; Schlocker, Julius, 1967, Relation of building damage to geology in Seattle, Washington, during the April 1965 earthquake: U.S. Geological Survey Professional Paper 575-D, p. D183-D191.

A study on the relationship of geologic terrane to building damage from an earthquake. The discussion of the geologic environment of the Seattle area is accompanied by a generalized geologic map. The relation of damage to geologic units at the surface is mapped on the basis of areas underlain chiefly by bedrock, areas underlain chiefly by Pleistocene sediments, and areas underlain chiefly by postglacial deposits. Includes a map showing the distribution of the chief geologic units and fallen chimneys in part of West Seattle.

Mullineaux, D. R.; Gard, L. M., Jr.; Crandell, D. R., 1959, Continental sediments of Miocene age in Puget Lowland, Washington: American Association of Petroleum Geologists Bulletin, v. 43, no. 3, part 1, p. 688-696.

Includes a few paragraphs on the lithology, structure, age, correlation, and paleoenvironment of the Hammer Bluff Formation along the Green River in King County.

Mullineaux, D. R.; Nichols, T. C.; Speirer, R. A., 1964, A zone of montmorillonitic weathered clay in Pleistocene deposits at Seattle, Washington: U.S. Geological Survey Professional Paper 501-D, p. D99-D103.

Discusses the stratigraphy, weathering, engineering properties, and distribution of a zone of montmorillonitic weathered clay in Pleistocene deposits discovered along the Freeway route on the west side of Capitol Hill. Includes a location map, a table giving the geologic age and stratigraphic position, and 2 diagrammatic geologic sections.

Mullineaux, D. R.; Waldron, H. H.; Rubin, Meyer, 1965, Stratigraphy and chronology of later interglacial and early Vashon glacial time in the Seattle area, Washington: U.S. Geological Survey Bulletin 1194-O, 10 p.

Examination of a measured section of conformable late Pleistocene interglacial and glacial sediments indicates that this sequence is composed of a nonglacial unit and two members of the Vashon Drift.

Based upon radiocarbon dates of samples of the three units, the Puget glacial lobe of Vashon age advanced across the Seattle area later than 15,000 years ago, and retreated from the area about 13,500 years ago.

Nichols, R. L., 1945, Preliminary report on the King County, Washington, high-alumina clay deposits: U.S. Geological Survey Open-file Report, 28 p. plus 10 figures and 12 tables.

Presents information on the location, accessibility, mining history, general geology, mineralogy, chemistry, lithology, ore bodies, origin, and reserves of the King County high-alumina clay deposits. Accompanied by geologic maps, structure and columnar sections, reserves of the various deposits, and by tables of chemical data.

Oles, K. F., 1951, The petrology of the Stevens Pass-Nason Ridge area, Washington: University of Washington M.S. thesis, 92 p.

Describes the bedrock geology and petrology of the northeast corner of King County. Includes a reconnaissance geologic map at a scale of one inch to the mile.

Oles, K. F., 1956, The geology and petrology of the crystalline rocks of the Beckler River-Nason Ridge area, Washington: University of Washington Ph. D. thesis, 192 p.

Discusses the bedrock geology and structure of the crystalline rocks located in the vicinity of Stevens Pass. This thesis represents an expansion of the author's earlier (1951) work in the area. Includes a geologic map at a scale of about $1\frac{1}{4}$ miles to the inch.

Olmstead, T. L., 1969, Geological aspects and engineering properties of glacial till in the Puget Lowland, Washington: Engineering Geology and Soils Engineering Symposium, 7th Annual, Moscow, Idaho, April 9-11, 1969, Proceedings, p. 223-233.

The origin, description, and distribution of Vashon till are presented, as well as diagnostic features to aid in distinguishing till from till-like sediments. Information on engineering properties needed for design and construction is also given.

Pacific Northwest River Basins Commission; Puget Sound Task Force. Report Planning Committee, 1971, Puget Sound and Adjacent Waters—Comprehensive study of water and related land resources—Summary Report and 15 Appendices, paging varies, 1970 and 1971.

"This report describes the expected needs of the Puget Sound area's future population for water and related land resources projected to the year 2020 and presents a comprehensive plan for meeting these needs. This plan is intended as a guide to the future use of water and related land resources. Along with a plan and alternative, a discussion of the effects of the plan on the area and the requirements of implementation are included together with the conclusions and recommendations of the Puget Sound Task Force."

"The Summary Report is supplemented by 15 appendices. Appendix I contains a digest of public hearings. Appendices II through IV contain studies on the political, natural, and economic environments. Appendices V through XIV each contain an inventory of present status, present and future needs, and a means to satisfy the needs, based upon a single use or control of water. Appendix XV contains a detailed description of the Comprehensive Plan for the Puget Sound Area and its individual basins and describes the alternatives considered in formulating this multiple-purpose plan." From the Foreword to the Summary Report.

Patton, T. C., 1971, Geology and hydrothermal alteration of the Middle Fork Copper prospect, King County, Washington: University of Washington Ph. D. thesis, 83 p.

Discusses the geology and mineralization of an altered area within the Snoqualmie batholith. This prospect is considered to have the best economic potential of any mineralized area in western Washington.

Pierce, R. H.; and predecessors, 1920-1962, Annual report of coal mines: Washington Department of Labor and Industries, Division of Safety, paging varies.

Gives production statistics of operating coal mines by mine, by county, and by state. Also gives data on number of employees, methods of shipment, daily and yearly output, and value per ton at the mine.

Pierce, R. H.; and predecessors, April 1940-December 1973, Annual coal production report: Washington Department of Labor and Industries, mimeo, paging varies.

Gives production in short tons in monthly and annual totals of operating coal mines by mine, by county, and by state.

Plummer, C. C. 1964, The geology of the Mount Index area of Washington State: University of Washington M.S. thesis, 62 p.

Discusses the intrusive relations of different phases of the Index batholith. Geology of the associated metamorphic rocks is reviewed, and the mineral deposits of the area are evaluated. Includes a geologic map at a scale of 2 inches to a mile.

Popoff, C. C., 1945, Green River high-alumina clay deposits, Project No. 1202, King County, Washington: U.S. Bureau of Mines War Minerals Report No. 18 [unpublished], 56 total pages plus 7 map sheets.

Gives the location, physical features, history and ownership of properties, exploration, mapping and analyses by the U.S. Bureau of Mines, geology, description of the deposits, and reserves of the Green River high-alumina clay deposits in King County. The appendices presents pertinent exploration data, a record of diamond drill-hole values, and diamond drill-hole logs. Accompanied by geologic maps and cross sections, and plans for estimation of ore reserves, underground exploration and development of the deposits.

Porter, S. C., 1965, [Quaternary geology of the route between Yakima and Seattle via Ellensburg]. In International Association for Quaternary Research, 7th Congress, Guidebook for Field Conference J—Pacific Northwest: Nebraska Academy of Sciences, Lincoln, Nebraska, p. 34-50.

The King County part of the 5th-day route describes the glacial features at stopping points at Snoqualmie Pass, Denny Creek Forest Camp, the Snoqualmie embayment east of North Bend, the Sallal moraine, and the Issaquah delta. The stops are indicated on an accompanying geologic sketch map.

Porter, S. C., 1976, Pleistocene glaciation in the southern part of the north Cascade Range, Washington: Geological Society of America Bulletin, v. 87, no. 1, p. 61-75.

Provides a detailed discussion of the glacial deposits found in the eastern part of King County. Glacial history and deposits found along the South Fork of the Snoqualmie River are evaluated from recent mapping data.

Poulson, E. N.; Miller, J. T.; Fowler, R. H.; Flannery, R. D.; Lapham, M. H., 1952, Soil survey of King County, Washington: U.S. Bureau of Plant Industry, Soils, and Agricultural Engineering, Soil Survey Series 1938, no. 31, 106 p.

Describes the relief, physiography, drainage, climate, and agriculture of King County, with emphasis on soils. Discusses soil management and productivity, morphology, and genesis. Each of the soils series and units is described in detail, including agricultural relations. The soil map, composed of 2 sheets, is at the scale of 1 inch to the mile. The accompanying data sheet lists a summary of important characteristics for each soil unit.

Pratt, R. M., 1954, Geology of the Deception Pass area, Chelan, King, and Kittitas Counties, Washington: University of Washington M.S. thesis, 58 p.

The King County portion of the thesis area extends east from the Mount Daniel-Mount Sawyer line to the Cascade crest. The major formations studied are the Keechelus volcanics, the Swauk sediments, and the Tye Soda Granite in the Deception Creek and Tye River areas. Includes a geologic map at the scale of 2 inches to the mile.

Pratt, R. M., 1958, The geology of the Mount Stuart area, Washington: University of Washington Ph. D. thesis, 229 p.

The King County portion covers approximately the same area as that delineated in R. M. Pratt's M.S. thesis done in 1954, but more detailed results of geologic studies in the Mount Stuart area are presented in this doctoral thesis. Includes geologic cross sections and a geologic map at the scale of 1 inch to the mile.

Purdy, C. P., Jr., 1951, Antimony occurrences of Washington: Washington Division of Mines and Geology Bulletin 39, 186 p. [King County, p. 74-87, 160-161].

Discusses the properties, treatment, uses, consumption, market, identification, and origin of antimony. The King County occurrences that were investigated are located in the northeast part of the county.

Purdy, C. P., Jr., 1954, Molybdenum occurrences of Washington: Washington Division of Mines and Geology Report of Investigations 18, 118 p. [King County, p. 28-31, 97-98].

Has an introductory section that is concerned with the properties, uses, marketing, identification, and geologic environment of molybdenum. The King County molybdenum occurrences described are in the northeastern part of the county.

Rasmussen, N. H., 1967, Washington State earthquakes 1840 through 1965: Seismological Society of America Bulletin, v. 57, no. 3, p. 463-476.

A comprehensive list of data including date, hour, location, magnitude of earthquake, and brief remarks. A generalized intensity-distribution map and a list of pertinent references are included. A supplemental unpublished list by the author gives data for the years 1966 through March 17, 1973.

Rasmussen, N. H., 1969, Seismic trends in Washington State: University of Washington Office of Engineering Research Trend in Engineering, v. 21, no. 3, p. 21-23.

Continues the list 1840-1965 (Rasmussen 1967) with a table for 1966 through 1968. Includes a seismic trend map of Washington State and an accompanying table listing the linear seismic trends.

Rasmussen, N. H.; Millard, R. C.; Smith, S. W., 1974, Earthquake hazard evaluation of the Puget Sound region, Washington State: Washington State Department of Emergency Services; Washington State Office of Program Planning and Fiscal Management; U.S. Department of Housing and Urban Development; U.S. Geological Survey; and University of Washington Geophysics Program, 99 p. plus one roll of 35-mm film.

"This report has been designed to be used by land use planners and others attempting to project damage in future populated or industrialized areas in the Puget Sound basin. We feel that with the information in this report one can come to general conclusions as to the potential seismic hazard to be expected at any specific location within the Puget Sound region" [From the authors' How to Use This Report]. Following this statement, there are instructions on how to determine the seismic risk potential for a specific site.

The report is replete with tables of data and illustrations and includes a location map of all earthquakes felt over 10,000 square miles and earthquakes of intensity VI or greater for the period 1841-1974; a list of definitions of terms used in the report; and an unabridged Modified Mercalli Intensity Scale of 1931.

Also included is a 35-mm roll of film showing the county soil maps that are used in conjunction with the report. An index to the county soil maps by frame numbers is given on page 99.

Rice, William, 1975, Map showing nonmetallic mineral resources in part of west-central King County, Washington: U.S. Geologicical Survey Miscellaneous Investigations Series Map I-852-D, map and text on one sheet.

Evaluates the sand and gravel, quarry rock, peat, ceramic materials, and coal resources of a part of King County. Sand and gravel deposits are by far the most important nonmetallic mineral commodities in the area; extensive coal reserves are located in the Renton and Cedar Mountain areas. Nonmetallic resources must be given careful consideration in overall land-use plans. Map scale is 1 1/3 inches to the mile.

Richardson, Donald; Bingham, J. W.; Madison, R. J., 1968, Water resources of King County, Washington; with a section on sediment in streams by R. C. Williams: U.S. Geological Survey Water-Supply Paper 1852, 74 p.

A comprehensive report on the water resources of King County. Describes the physiography, climate, culture, precipitation, evapotranspiration, streamflow of the major drainage basins, floods, low flows, ground water including springs, quantity of water available, quality of the water, water use, and future problems. Includes a map showing locations of hydrologic sites in the county, and a generalized geologic map at the scale of 4 inches to the mile that includes statements for the water yields of the stratigraphic units in the county.

Rigg, G. B., 1958, Peat resources of Washington: Washington Division of Mines and Geology Bulletin 44, 272 p.

A definitive, comprehensive report on the peat deposits of the State of Washington. Discusses the general description, kinds, rates of accumulation, mineral content, origin and development, and distribution by physiographic provinces and by counties. The 46 major peat deposits of King County are described as to location, areal extent, type of deposit. In most cases, there is a profile of the deposit. Included are a chapter on chemical analyses of peat samples, and a chapter on utilization of the deposits.

A list of peat areas by county, and a location map with deposit numbers keyed to the list are included, as well as physiographic descriptions of the counties that have peat deposits.

Rigg, G. B.; Gould, H. R., 1957, Age of Glacier Peak eruption and chronology of postglacial peat deposition in Washington and surrounding areas: American Journal of Science, v. 255, no. 5, p. 341-363.

Volcanic ash, erupted from Glacier Peak about 6,700 years ago, is found in many peat bogs in the Puget Sound Lowland. In the Moss Lake Bog, for example, the ash deposit is one inch thick.

Riley, R. R.; Mueller, J. I.; Shapiro, H. L., 1953, Lightweight aggregate from Pacific Northwest clays and shales: University of Washington Engineering Experiment Station Trend in Engineering, v. 5, no. 2, p. 5-9.

A report on tests of some clays and shales from King County to determine their suitability in the production of a lightweight-aggregate concrete.

Rogers, W. P., 1970, A geological and geophysical study of the central Puget Lowland: University of Washington Ph. D. thesis, 123 p.

Reports an investigation of the subsurface structure of the Puget Lowland, including much of King County. Some of the linear structures on this map are interpreted as major faults, and may be "active" at the present time. Includes a gravity map at a scale of about 1 inch to 6 miles.

Rosengreen, T. E., 1965, Surficial geology of the Maple Valley and Hobart quadrangles, Washington: University of Washington M.S. thesis, 71 p.

A detailed study of the stratigraphy and Pleistocene glaciation in the Maple Valley and Hobart areas at the eastern border of the Puget Lowland. Includes a number of physiographic maps showing the ice fronts, glacial lakes, deltas, and drainage of the Vashon maximum and recessional ice stands. Accompanied by a geologic map at the scale of 2½ inches to the mile.

Schuster, J. E., 1973, Directory of Washington mining operations 1971-72: Washington Division of Mines and Geology Information Circular 48, 97 p.

The most recent directory of metallic and nonmetallic mining operations, and sand and gravel operations in the State of Washington. The data are presented in tabular form and consist of the name of the operator, product, and location.

King County products include copper, zinc, lead, silver, expandable shale, silica sand, quarry rock, peat, cinders, clay, roofing chips, coal, and sand and gravel.

Schwarz, S. D., 1968, Geophysical site exploration, Third Lake Washington Floating Bridge. In Engineering Geology and Soils Engineering Symposium, 6th Annual, Boise, Idaho, April 17-19, 1968, Proceedings: Idaho Department of Highways, Boise, p. 147-156.

Discusses the methods and equipment used in the geophysical exploration of the Third Lake Washington Floating Bridge site. Included are graphs and charts showing profiles and bottom contours.

Shedd, Solon, 1910, The clays and shales of the State of Washington; their geology, mineralogy, and technology: State College of Washington, Pullman, 341 p. [King County, p. 237-271, 318-319].

A thorough report on the properties of clays and their occurrence in Washington. King County clays are discussed with regard to origin, laboratory examination, and plant description. A table of chemical analyses is appended.

Smith, G. O.; Calkins, F. C., 1906, Description of the Snoqualmie quadrangle: U.S. Geological Survey Geologic Atlas of the United States, Folio No. 139, 14 p.

One of the earliest geologic studies of the southeastern portion of King County adjacent to the Cascade crest. Topics covered are geologic history, descriptive geology, economic geology, and soils. Included are a topographic map and a geologic map at the scale of 1 inch to 2 miles, and columnar and structure sections.

Smith, Mackey, 1975, Preliminary surficial geologic map of the Edmonds East and Edmonds West quadrangles, Snohomish and King Counties, Washington: Washington Geology and Earth Resources Division Geologic Map GM-14.

The geologic map units are described in terms of texture and physical appearance. Includes the locations of active landslide zones. Map scale is about 2.6 inches to the mile.

Smith, W. S.; Carr, D. E., 1912, The geology and economic resources of the Lake Dorothy region, Washington: University of Washington B.S. thesis, 62 p.

Describes the physical geology, general geology, and economic resources of this region in the northeastern part of King County, about 5 miles west of the Cascade crest. Includes a geologic map of the district at the scale of 1 inch to the mile, and a detailed geologic map of the Lake Dorothy region at the scale of 1 inch to 1,000 feet.

Snavely, P. D., Jr.; Wagner, H. C., 1963, Tertiary geologic history of western Oregon and Washington: Washington Division of Mines and Geology Report of Investigations 22, 25 p.

By means of a series of paleogeologic maps and accompanying descriptive text, a presentation is given of the sequence of Tertiary deposition of marine and continental sediments in western Washington and Oregon. A number of photographs are included to aid in graphically illustrating some of the sediments.

Snyder, D. E.; Gale, P. S.; Pringle, R. F., 1973, Soil survey of King County area, Washington: U.S. Soil Conservation Service in cooperation with Washington Agricultural Experiment Station, 100 p. accompanied by 22 map sheets.

For the western part of King County, this survey replaces the King County soil survey by E. N. Poulson and others [see entry under Poulson] published in 1952.

"This Soil Survey contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation." [From the authors' introductory statement].

Describes the soil associations in the King County area, and their components—the numerous soil series. Accompanying tables present data on estimated properties of the soils; engineering interpretations; degree of limitations for town and country planning; degree and kind of limitations for recreational uses; and woodland groups, wood crops, and factors in management. Includes sections on the formation and classification of the soils; the climate and geology of the area; and a map of the geologic rock units in the King County area.

Accompanied by a general soil map of the area at the scale of 3 miles to the inch, and a set of 20 orthophoto map sheets at the scale of $2\frac{1}{2}$ inches to the mile forming a composite soil map of the King County area.

Sohn, I. G., 1952, Industrial clays other than potential sources of alumina of the Columbia basin: U.S. Geological Survey Circular 158, 18 p. [King County, p. 9-10, 14-15].

Presents a table of information on brick and tile clay, and pottery clay deposits in King County. Accompanying map uses symbols to indicate locations of the deposits.

Stark, W. J.; Mullineaux, D. R., 1950, Glacial geology of the City of Seattle: University of Washington M.S. thesis, 85 p.

Presents the Pleistocene stratigraphy, geologic history, and geomorphology of Seattle, and is accompanied by a number of geologic cross sections and illustrations.

Steinbrugge, K. V.; Cloud, W. K., 1965, The Puget Sound, Washington, earthquake of April 29, 1965—Preliminary engineering report: U.S. Coast and Geodetic Survey, p. 27-51.

Gives description and analysis of the damage caused by the earthquake. Includes 16 photographic illustrations.

Strickland, Helen; Beatty, Charlotte; Zerback, Barbara, 1974, Natural disasters in the State of Washington: Compiled by the Washington State Library for the Washington State Department of Emergency Services, 183 p.

A comprehensive directory of hundreds of references on such natural disasters as floods, tsunamis, earthquakes, landslides, avalanches, windstorms, and tornadoes. Represents a detailed search in over a dozen major libraries in the State of Washington for subject material and can be a valuable source of information for local and regional planning agencies.

The reference sources are published and unpublished reports including books, newspaper articles, and theses. Entries are arranged in three broad areal divisions and also alphabetically by counties. A geographic index to the references in included.

Tharp, Marilyn, 1957, Story of coal at Newcastle: Pacific Northwest Quarterly, v. 48, no. 4, p. 120-126.

A chronological and documented history of coal mining at Newcastle in King County. Includes views of buildings of the New Castle coal mine.

Thoenen, J. R., 1941, Alunite resources of the United States: U.S. Bureau of Mines Report of Investigations 3561, 48 p. [King County, p. 35-38].

Describes the alunite deposits near Enumclaw and gives chemical analyses, estimates of tonnage, and the percentage of alunite in the deposits.

Thorndale, C. W., 1965, Washington's Green River Coal Company, 1880-1930: University of Washington M.A. thesis, 168 p.

A comprehensive history of coal mining in the Green River region of King County, based on extensive research in both the literature and personal interviews.

Thorsen, G. W., 1970, Washington's landslide survey (A progress report). In Engineering Geology and Soils Engineering Symposium, 8th Annual, April 1-3, 1970, Pocatello, Idaho, Proceedings: Idaho Department of Highways, Boise, p. 285-293.

Describes and discusses a proposed survey of landslides in Washington. The data will be recorded in a continuing keysort card file which will be augmented by a bibliography of published and unpublished information on landslides in the State of Washington.

Tubbs, D. W., 1974, Landslides in Seattle: Washington Division of Geology and Earth Resources Information Circular 52, 15 p.

Discusses the climatic factors, the geologic conditions that determine the locations of the landslides, and the human activities that contribute to the production of the slides. Presents pertinent background information on the geologic history of the area.

Includes a base map of Seattle at the scale of 2 inches to the mile covering the area from Lake Washington to Puget Sound, and from the vicinity of North 145th Street to an east-west line 3 miles north of the entrance to Seattle-Tacoma International Airport. Symbols on the map indicate hazardous zones and locations of earthquakes that occurred during early 1972.

Tubbs, D. W., 1974, Landslides and associated damage during early 1972 in part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Investigations Series Map I-852-B, map and text on one sheet.

The large number of landslides which occurred in 1972 are discussed with respect to geologic, human, and climatic factors. Much of the damage caused by the slides could have been averted if these factors had been recognized and efforts made to minimize their effects. Map scale is 1 1/3 inches to the mile.

Tubbs, D. W., 1975, Causes, mechanisms and prediction of landsliding in Seattle: University of Washington Ph. D. thesis, 88 p.

Presents a detailed discussion of Seattle landslides, with particular emphasis on geologic, climatic, and human factors that contribute to slide potential. Seattle landslides of 1972 and 1974 are used as examples.

United States Army Corps of Eningeers. Seattle District, 1949, Report on damage resulting from earthquake of 13 April 1949: U.S. Army Corps of Engineers, Seattle District Office, 28 p. plus 15-page appendix.

A preliminary report consisting largely of general information on damage, seismological data, and damage-cost data. Discussed are location of seismic observations, characteristics of the earthquake, general description of damage, landslides, general geology of the region, foundation conditions in the principal cities, structural damage to building, and damage to bridges, utilities, and to the Seattle District facilities. Includes 5 photographic illustrations depicting structural damage. An appendix to the report describes structural damages to various buildings and installations in the area, and a tabular summarization of damage to Northern Pacific Railway Company installations. Includes a map showing the intensity boundaries in the Pacific Northwest.

United States Bureau of Mines Staff, 1965, Mercury potential of the United States: U.S. Bureau of Mines Information Circular 8252, 376 p. [King County, p. 362-365].

Presents a brief discussion of mercury mines and properties in the Green River Gorge area. A table of Washington mercury properties includes data on the known deposits in King County.

United States Bureau of Mines Staff, 1967, Potential sources of aluminum: U.S. Bureau of Mines Information Circular 8335, 148 p. [King County, p. 136, 138].

Estimated resources, chemical analyses, and brief description of the Green River high-alumina clay deposits.

United States Geological Survey; and others, 1966, Mineral and water resources of Washington: U.S. Congress, 89th, 2nd Session, Committee on Interior and Insular Affairs, Committee Print, 436 p.; reissued as Washington Division of Mines and Geology Reprint 9, 436 p., 1966.

A comprehensive, detailed summary report on the geology, mineral resources, and water resources of the State of Washington. The first section of the report describes the geology and mineral resources of the state; the second section deals with the water resources and their development.

The geology of the Puget Lowland is discussed under the western Washington heading in the geology portion of the report. A geologic map of the state, at the scale of 1 inch to approximately 26.7 miles and showing the location of the major sedimentary, volcanic, and crystalline rocks, is within the geology portion of the text.

Among the metallic and nonmetallic minerals occurring in King County are alunite, antimony, clays, copper, gem materials, gold, iron, mercury, mica, molybdenum, peat, perlite, sand and gravel, silica, silver, stone, thorium and the rare earths, tin, and uranium.

The stratigraphy and structure of the Puget Lowland indicate that it is a favorable area for oil and gas exploration. Some of the test wells already drilled had traces or shows of oil and(or) gas.

The estimated remaining reserves of coal in King County are 827,670,000 short tons, and the range in rank is from subbituminous B to high-volatile A bituminous.

The chapters on ground water in the state include a description of the occurrences, chemical quality, and dissolved solids of well water in the Puget Sound area. The streamflows of the Puget Sound basins are described in the chapters on surface water.

Selected lists of references follow the major sections and subsections within the report.

United States Geological Survey, 1970, Mercury in the environment: U.S. Geological Survey Professional Paper 713, 67 p.

"A compilation of papers on the abundance, distribution, and testing of mercury in rocks, soil, waters, plants, and the atmosphere." From the title page of the publication.

No entries on King County, but it is cited here as a useful and pertinent report on the subject.

United States Geological Survey, 1975, Slope map of part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Investigations Series Map I-852-E, map and text on one sheet.

Discusses methods of preparation, engineering and planning applications, and limitations of slope maps. Slope interpretation of this map for the King County comprehensive plan, and other land-use decisions is evaluated. Map scale is 1 1/3 inches to the mile.

United States Geological Survey. Special maps and sheets.

Plan and profile of Calligan Creek and Calligan Lake, and damsite. Scale, 5¼ inches to the mile. Contour intervals on land, 20 and 100 feet; on water surface, 5 and 100 feet. Vertical scale of profile, 200 feet to the inch. One sheet. 1956.

Plan and profile of Green River from a point 4 miles above mouth to Mile 9, and damsites. Scale, 2 inches to the mile. Contour interval on land, 20 feet; on river surface, 5 feet. Vertical scale of profile, 40 feet to the inch. One sheet. 1937.

Plan and profile of Hancock Creek and Lake Hancock, and damsite. Scale, 5¼ inches to the mile. Contour intervals on land, 20 and 100 feet; on water surface, 5 and 100 feet; underwater, 20 feet. Vertical scale of profile, 100 feet to the inch. One sheet. 1954.

Plan and profile of North Fork of Tolt River and South Fork of Tolt River, including Tokul Creek, and damsites. Scale, 2 inches to the mile. Contour interval, 20 feet. Vertical scale of profile, 80 feet to the inch. Three sheets (1 plan, 1 profile, 1 sheet showing damsites). 1941.

Plan of Green River and tributaries from Kanaskat to Humphrey, and Sunday Creek to Tacoma Creek, and damsites. Scale, 2½ inches to the mile. Contour interval on land, 20 feet; on river surface, 5 feet. Two sheets. 1947.

University of Washington, Department of Oceanography, 1953, Puget Sound and approaches—A literature survey: University of Washington Department of Oceanography, Seattle, 3 volumes individually paged.

The three volumes present summarizations, maps, tables, and lists of references on the following subjects: geography, climatology, hydrology, geology, volcanology, seismology, geomagnetism, geodesy, hydrography, physical oceanography, marine biology, and a general summary.

University of Washington Geology Department Staff, 1963, A geologic trip along Snoqualmie, Swauk, and Stevens Pass Highways, revised by V. E. Livingston, Jr.: Washington Division of Mines and Geology Information Circular 38, 51 p.

A guide book in the form of a road log beginning at Seattle and going east along U.S. 10 and over Snoqualmie Pass to Teanaway Junction, thence northerly over Swauk Pass (U.S. 97) to the junction with U.S. 2, thence westerly along the Stevens Pass Highway to Sultan in Snohomish County.

The King County portion of the road log begins at the east end of the floating bridge and describes the geology as seen from the highway while travelling to the eastern boundary of the county at Snoqualmie summit. The road log also indicates the distances between adjacent points as well as the cumulative mileage to any given point of interest from the beginning of the trip.

University of Washington, Department of Geological Sciences, 1972, The Alpine Lakes—Environmental Geology: University of Washington, Department of Geological Sciences, Seattle, 161 p.

Reviews the bedrock and surficial geology of the eastern King County region and describes mineral resources and potential geologic hazards of the area. A geologic map at a scale of 1 inch to 4 miles is included in the publication.

Valentine, G. M., 1960, Inventory of Washington minerals; Part 1—Nonmetallic minerals, 2nd edition, revised by M. T. Huntting: Washington Division of Mines and Geology Bulletin 37, Part 1, 2 volumes—text and maps, 175 p. plus 83 p.

A comprehensive compilation of the known occurrences of nonmetallic minerals in the State of Washington. The information has been gathered from published and unpublished reports and data. Each mineral is described in regard to properties, uses, production, and prices. Included is a section listing the occurrences, arranged alphabetically by county and by deposit or occurrence name. Available information on each deposit or occurrence is described by location, description, value, and references from which the information was obtained. Occurrence numbers in the text of the report correspond to the numbers indicated on the respective maps.

Nonmetallic mineral occurrences in King County that are listed in both the text and the map volume include alunite, basalt and allied volcanic rocks, common clays and shales, refractory clays and shales, coal, diatomite, garnet, granite and allied plutonic rocks, graphite, limestone, mica, mineral waters, peat, perlite, quartz crystal, massive quartz, quartzite, sand and gravel, sandstone, silica sand, and sulfur.

Van Denburgh, A. S., 1965, Chemical distinction between ground water of four sedimentary units on the Kitsap Peninsula and adjacent islands, Washington: U.S. Geological Survey Professional Paper 525-D, p. D219-D221.

Analyses of three ground water samples from Vashon Island show that differences in dissolved constituents can serve to identify the source of ground water from any of four sedimentary units with reasonable accuracy.

Van Denburgh, A. S.; Santos, J. F., 1965, Ground water in Washington; its chemical and physical quality: Washington Division of Water Resources Water Supply Bulletin 24, 93 p.

A survey of the chemical and physical quality of ground water in Washington. In the report, the state is divided into five provinces, one of which is the Puget Sound province. The ground water in this province is discussed with regard to occurrence and general chemical character, specific constituents and properties, salt-water contamination, chemical quality variation with time, and suitability for use.

The appendix gives tabular data on the ground water of King County with regard to well and spring location, ownership, depth, aquifer, temperature, chemical analyses, dissolved solids, hardness, pH, and color. Included are a number of maps of the state showing distributions of dissolved solids, fluoride nitrate, orthophosphate and iron concentrations, and hardness-of-water values in the ground-water samples tested.

Vine, J. D., 1962, Preliminary geologic map of the Hobart and Maple Valley quadrangles, King County, Washington: Washington Division of Mines and Geology Geologic Map GM-1, map and text on one sheet.

The text includes discussion of the stratigraphy of the Tertiary and Quaternary deposits, the structure, and the economic deposits such as coal, clay, construction stone, sand and gravel, and oil and gas possibilities. Geologic structures, mines or prospects, mined areas, and coal beds are indicated by appropriate symbols on the map. The map is at a scale of $2\frac{1}{2}$ inches to the mile.

Vine, J. D., 1962, Stratigraphy of Eocene rocks in a part of King County, Washington: Washington Division of Mines and Geology Report of Investigations 21, 20 p.

A stratigraphic study of a sequence of Eocene rocks in the Tiger Mountain-Taylor Mountain area southeast of Issaquah. Includes a map showing the location of the various type areas of the rocks, a correlation chart, lists of fossil invertebrates and fossil leaves found, and a composite stratigraphic section of the more than 14,000 feet of Eocene rocks that crop out in the area.

Vine, J. D., 1969, Geology and coal resources of the Cumberland, Hobart, and Maple Valley quadrangles, King County, Washington: U.S. Geological Survey Professional Paper 624, 67 p.

A comprehensive geologic report of the area immediately east of the Renton, Auburn, and Black Diamond quadrangles area. Describes the topography, drainage, climate and vegetation, economic development, stratigraphy, lithology, fossil occurrences, Pleistocene glaciation, Holocene deposits, intrusive igneous rocks, structure, landslides, and the economic deposits including clay, sand and gravel, coal, quicksilver, and oil and gas possibilities. Tables give analyses of samples for clay minerals, clay deposits in the area, coal mines and prospects, analyses of coal samples, and estimated remaining sources of coal. The geologic map is at the scale of $2\frac{1}{2}$ inches to the mile, and additional map sheets show the extent of coal beds, columnar sections of coal beds, and columnar sections of the Puget Group.

Waldron, H. H., 1961, Geology of the Poverty Bay quadrangle, Washington: U.S. Geological Survey Geologic Quadrangle Maps of the United States Map GQ-158, map and text on one sheet.

Indicated on the map are structure, landslide scarps, and sand and gravel pits. The map has a scale of $2\frac{1}{2}$ inches to the mile, the geologic units are in color and are indicated on the map by appropriate symbols. The accompanying text describes the Pleistocene and Recent deposits including landslides, structure, geologic history, economic resources, and engineering geology.

Waldron, H. H., 1962, Geology of the Des Moines quadrangle, Washington: U.S. Geological Survey Geologic Quadrangle Maps of the United States GQ-159, map and text on one sheet.

Geologic units are shown, as well as structures, landslide scarps, and sand and gravel pits. The map is at the scale of 2½ inches to the mile. The accompanying text describes the Tertiary and Quaternary deposits of the area including landslides, and also discusses the geologic history, economic deposits, and engineering geology.

Waldron, H. H., 1967, Geologic map of the Duwamish Head quadrangle, King and Kitsap Counties, Washington: U.S. Geological Survey Geologic Quadrangle Maps of the United States Map GQ-706, one sheet.

The geologic map-units are described and there are two geologic cross sections. Appropriate symbols are used to denote the structure and to indicate the locations of gravel or sand pits, and radiocarbon sample localities. The map scale is at 2½ inches to the mile.

Waldron, H. H.; Liesch, B. A.; Mullineaux, D. R.; Crandell, D. R., 1962, Preliminary geologic map of Seattle and vicinity, Washington: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-354, one sheet.

Geologic units and the structure are indicated by appropriate map symbols. Included on the map sheet is a chart giving a generalized description of the engineering properties of the map-units. Among these property headings are ease of excavation, slope stability, and seismic stability. The map is at the scale of 2 inches to the mile.

Walker, F. E.; Hartner, F. E., 1966, Forms of sulfur in U.S. coals: U.S. Bureau of Mines Information Circular 8301, 51 p.

Statistical data on the moisture, ash, and sulfur content of tipple samples from some King County coal mines.

Ward, T. E., 1968, Howard A. Hanson Dam. In McKee, Bates; Coombs, H. A., editors. Guidebook to field trips, Association of Engineering Geologists 1968 Annual Meeting, Seattle, Washington, October 22-26, 1968: Association of Engineering Geologists, p. 68-74.

Discusses the damsite geology at the Howard A. Hanson Dam in the Eagle Gorge section of the Green River.

Waring, G. A., 1965, Thermal springs of the United States and other countries of the world; a summary. Revised by Reginald R. Blankenship and Ray Bentall: U.S. Geological Survey Professional Paper 492, 383 p. [King County, p. 12, 44, 273].

Table includes data on three of the thermal springs in King County. Gives name of spring, location, temperature, flow, references on chemical quality, remarks, and additional references.

Warren, W. C.; Norbisrath, Hans; Grivetti, R. M.; Brown, S. P., 1945, Preliminary geologic map and brief description of the coal fields of King County, Washington: U.S. Geological Survey Preliminary Map, one sheet.

The map sheet includes measured sections of coal beds whose assigned numbers refer to location numbers on the map; the text discusses the stratigraphy, structure, and coal districts. A list of mines, prospects, and other localities referred to in the text, and shown on the geologic map, is also included. The geologic map is at the scale of 2 inches to the mile.

Washington Division of Geology and Earth Resources, 1976, Engineering geologic studies: Washington Division of Geology and Earth Resources Information Circular 58, 40 p.

Includes short articles on soil, ground water, and slope stability. Potential land-use problems of Puget Sound bluffs and seismic risk are also described. Discussions are applicable to much of the Puget Low-land, as well as King County.

Wegner, D. E., 1968, Glacial geology of Seattle Freeway: Washington Department of Highways in cooperation with the U.S. Bureau of Public Roads, 23 p.

Presents the geologic history and a detailed study of the stratigraphic units encountered during the construction of the *Seattle* Freeway (Interstate 5) along a stretch extending north from South Snoqualmie Street to Lake Union.

Includes a geologic map at the scale of 1 inch to 200 feet and five cross sections.

Whetten, J. T., 1966, Lake Washington's third dimension: Pacific Search, v. 1, no. 3, Technical Insert 66-7, 2 p.

Determination of the bottom and sub-bottom profiling along a line from Houghton to Sand Point in Lake Washington. The present bottom has a maximum depth of 208 feet and the sub-bottom revealed by the seismic profiler has a depth of 455 feet below the present water level. Bottom stratigraphy, determined by means of a weighted core barrel, indicates a layer of *limnic peat* beneath which is a thick clay deposit composed largely of glacial rock flour. A cross section shows the position of the bottom materials and the seismic profile of the sub-bottom.

Williams, V. S., 1971, Glacial geology of the drainage basin of the Middle Fork of the Snoqualmie River: University of Washington M.S. thesis, 45 p.

Describes the surficial deposits and landforms of a portion of eastern King County. Map and diagrams portray the relationship between the middle fork glacier and the continental ice in the Puget Lowland. Includes a map of surficial geology at a scale of 1 inch to a mile.

Willis, Bailey; Smith, G. O., 1899, Description of the Tacoma quadrangle: U.S. Geological Survey Geologic Atlas of the United States, Folio No. 54, 10 p.

One of the earliest geologic studies of the southeastern portion of the Puget Lowland. The area covered includes a major portion of Vashon Island, Maury Island, and that part of King County extending south from the vicinity of Renton, and west from a north-south line running through Black Diamond. Topics covered are geologic history, climatic conditions, fauna and flora, topography, stratigraphy, glaciation, columnar sections, coal resources, construction materials, and soils. Included are a topographic map and a geologic map at the scale of 2 miles to the inch, and structure maps of coal beds in the Renton and Green River districts.

Wilson, Hewitt, 1923, The clays and shales of Washington; their technology and uses: University of Washington Engineering Experiment Station Series Bulletin 18, 224 p.

Descriptions and test results on the varied types of clay and shale deposits in King County. Also includes numerous tables of data on the properties of the clays and shales.

Wilson, Hewitt; Goodspeed, G. E., 1934, Kaolin and china clay in the Pacific Northwest: University of Washington Engineering Experiment Station Series Bulletin 76, 184 p. [King County, p. 98-100].

Brief description, analyses, and properties of a white clay from Taylor in King County.

Wilson, Hewitt; Skinner, K. G.; Couch, A. H., 1942, Silica sands of Washington: University of Washington Engineering Experiment Station Series Bulletin 108, 76 p. [King County, p. 28-38, 57-61, 64-65].

Presents a study of selected silica sand deposits in 19 of the 39 counties of Washington. Descriptions and test results are given of silica sand deposits of the following areas in King County: Cedar River, Green River, Newcastle-Issaquah, Renton, White River, and miscellaneous sites. Includes tables giving data on specific gravity analyses, concentration tests, pyrometric cone equivalents, mineral constituents, silica content, and friability.

Wilson, R. T., 1975, Solid-waste disposal sites in relation to water resources in the Seattle-Tacoma urban complex and vicinity, Washington: U.S. Geological Survey Open-file Report 75-344 (Basic Data Contribution 6), map and text on one sheet.

Discusses the relationship between ground-water quality and solid-waste disposal sites. Active and inactive King County waste-disposal areas are located on the map, and specific water-quality problems are discussed in relation to selected sites. Map scale is 4 miles to 1 inch.

Wilson, S. D.; Johnson, K. A., 1964, Slides in over-consolidated clays along the Seattle Freeway. In Engineering Geology and Soils Engineering Symposium, 2nd Annual, Pocatello, Idaho, March 23-25, 1964, Proceedings: Idaho Department of Highways, Boise, p. 29-43.

Presents a detailed engineering geology study of the route of the Freeway along the west side of Capitol Hill. The use of concrete piles helped to stabilize the potential slide conditions during construction. Includes tables, graphs, and cross sections.

Wimmler, Norman, 1908, Geology of the east side of the Duwamish Valley, King County, Washington: University of Washington B.S. thesis, 14 p.

Discusses the general geology, physiography, stratigraphy, and petrology of the area. The geologic map is at the scale of 2 inches to the mile. A geologic map of Duwamish buttes is at the scale of 1 inch to about 4,000 feet.

Yeats, R. S., Jr., 1956, Petrology and structure of the Mt. Baring area, northern Cascades, Washington: University of Washington M.S. thesis, 78 p.

Consists primarily of the structural geology and petrologic studies of the rock units in the mountainous eastern part of King County. Includes a geologic map at the scale of 1 inch to about 1 mile.

Yeats, R. S., Jr., 1958, Geology of the Skykomish area, in the Cascade Mountains of Washington: University of Washington Ph. D. thesis, 243 p.

Describes the bedrock geology near Skykomish, Washington, in the northern part of King County. The thesis emphasizes the metamorphic history of the complex folded and faulted rocks of the area. Includes a geologic map at a scale of 1 inch to $1\frac{1}{4}$ miles.

INDEX

TO

GEOLOGIC MAPPING

Following are seven map sheets of King County on which are delineated the areas covered by geologic maps from the reports of authors cited in the bibliography. An index to topographic mapping by the U.S. Geological Survey in King County is also included.

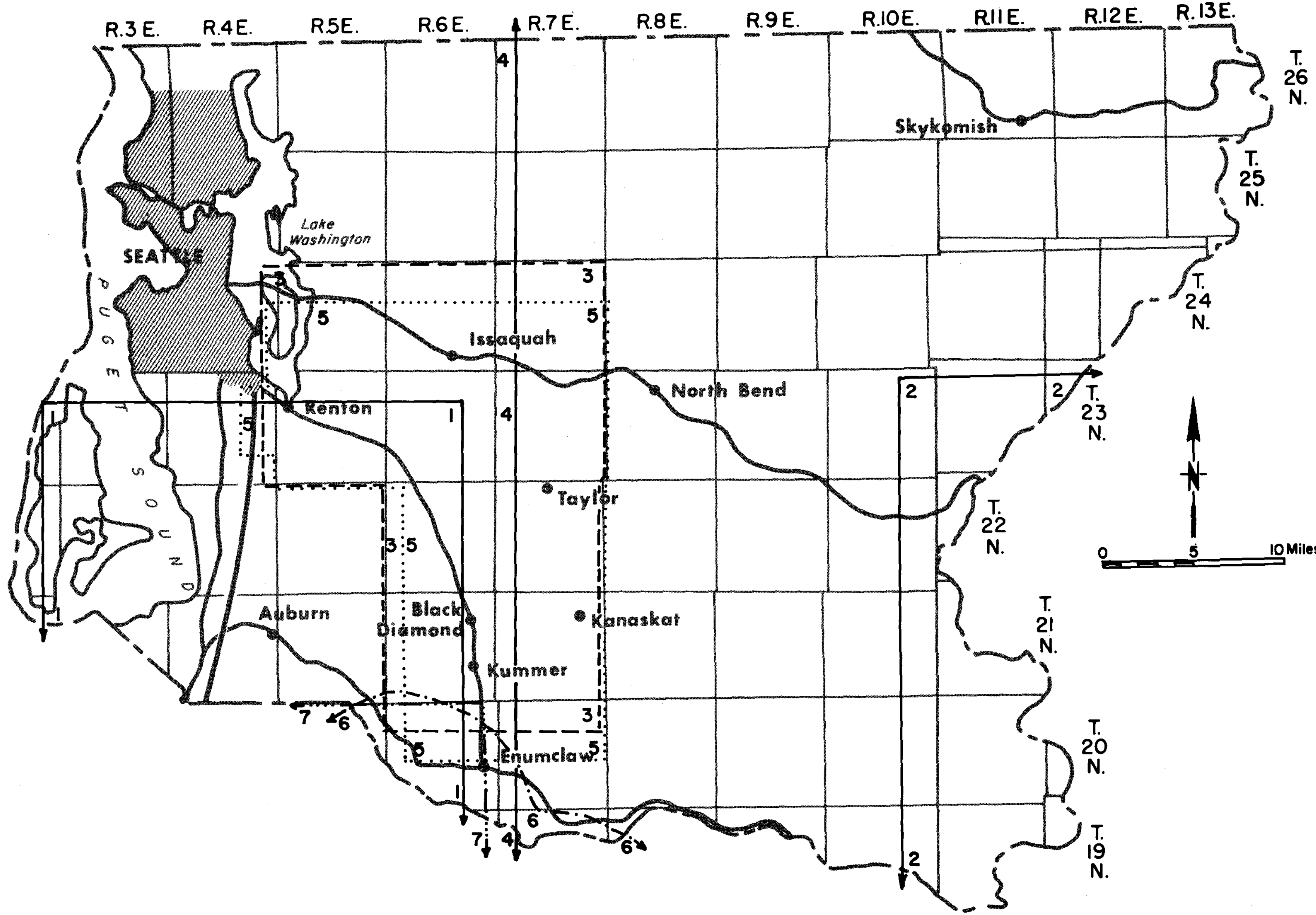

FIGURE 1.—Published geologic mapping.

AUTHORS OF PUBLISHED GEOLOGIC MAPPING SHOWN ON FIGURE 1

1. Willis, Bailey; Smith, G. O., 1899, Description of the Tacoma quadrangle: U.S. Geological Survey Geologic Atlas of the United States, Folio No. 54, 10 p. Scale, 1 inch to 2 miles.

2. Smith, G. O.; Calkins, F. C., 1906, Description of the Snoqualmie quadrangle: U.S. Geological Survey Geologic Atlas of the United States, Folio No. 139, 14 p. Scale, 1 inch to 2 miles.

3. Evans, G. W., 1912, The coal fields of King County: Washington Geological Survey Bulletin 3, 247 p. Plate 1, scale 1 inch to the mile.

4. Bretz, J H., 1913, Glaciation of the Puget Sound region: Washington Geological Survey Bulletin 8, 244 p. Plate 22, scale 6 miles to the inch.

5. Warren, W. C.; Norbisrath, Hans; Grivetti, R. M.; Brown, S. P., 1945, Preliminary geologic map and brief description of the coal fields of King County, Washington: U.S. Geological Survey Preliminary Map, map and text on 1 sheet. Scale, 2 inches to the mile.

6. Crandell, D. R.; Waldron, H. H., 1956, A Recent volcanic mudflow of exceptional dimensions from Mt. Rainier, Washington: American Journal of Science, v. 254, no. 6, p. 349-362. Figure 1, scale of 1 inch to about 6½ miles.

7. Crandell, D. R.; Gard, L. M., Jr., 1959, Geology of the Buckley quadrangle, Washington: U.S. Geological Survey Geologic Quadrangle Map GQ-125, map and text on 1 sheet. Scale, 2½ inches to the mile.

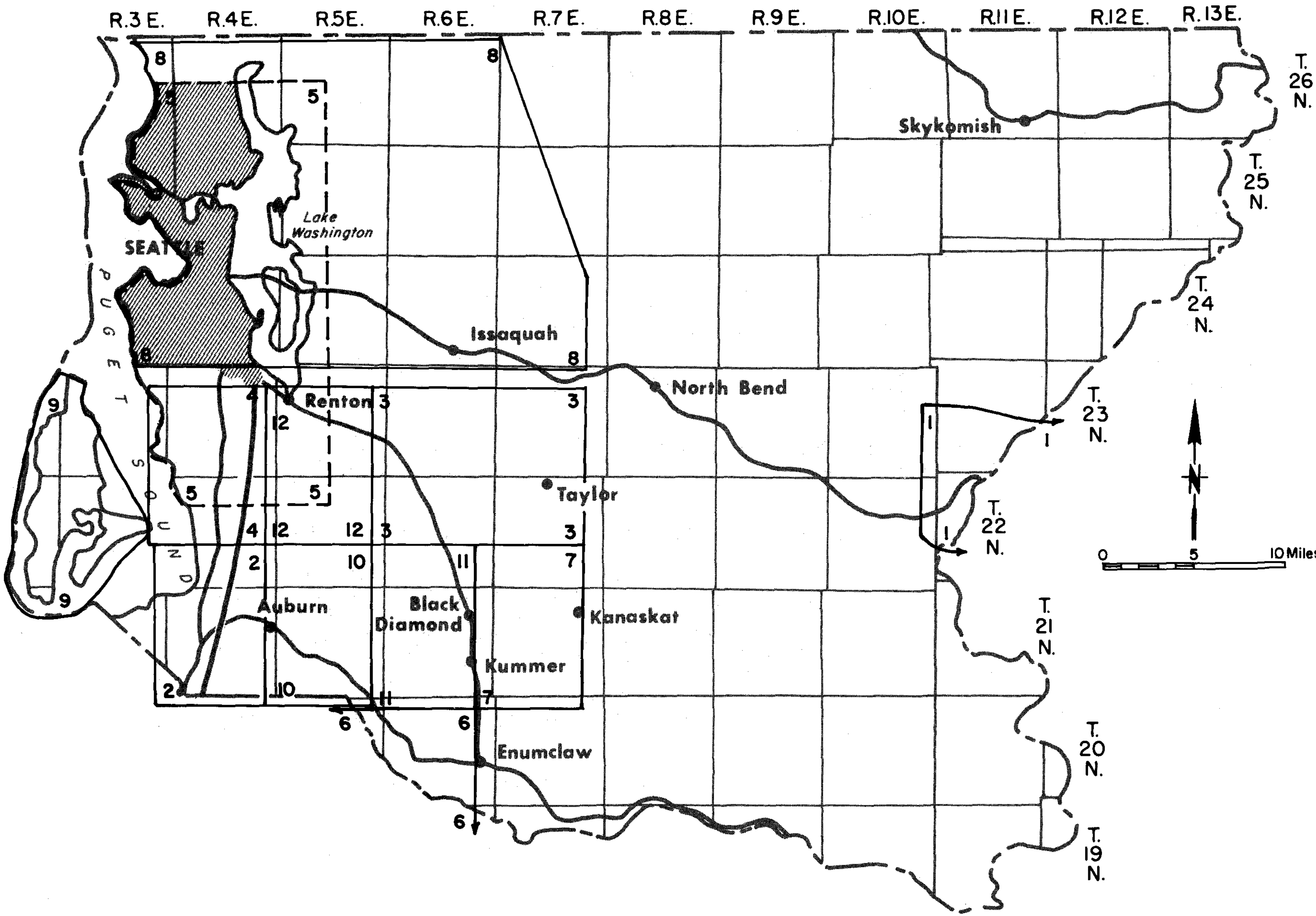

FIGURE 2.—Published geologic mapping.

AUTHORS OF PUBLISHED GEOLOGIC MAPPING SHOWN ON FIGURE 2

1. Foster, R. J., 1960, Tertiary geology of a portion of the central Cascade Mountains, Washington: Geological Society of America Bulletin, v. 71, no. 2, p. 99-125. Plate 1, scale, 2 miles to the inch.

2. Waldron, H. H., 1961, Geology of the Poverty Bay quadrangle, Washington: U.S. Geological Survey Geologic Quadrangle Map GQ-158, map and text on 1 sheet. Scale $2\frac{1}{2}$ inches to the mile.

3. Vine, J. D., 1962, Preliminary geologic map of the Hobart and Maple Valley quadrangles, King County, Washington: Washington Division of Mines and Geology Geologic Map GM-1, map and text on 1 sheet. Scale $2\frac{1}{2}$ inches to the mile.

4. Waldron, H. H., 1962, Geology of the Des Moines quadrangle, Washington: U.S. Geological Survey Geologic Quadrangle Map GQ-159, map and text on 1 sheet. Scale $2\frac{1}{2}$ inches to the mile.

5. Waldron, H. H.; Liesch, B. A.; Mullineaux, D. R.; Crandell, D. R., 1962, Preliminary geologic map of Seattle and vicinity, Washington: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-354. Scale, 2 inches to the mile.

6. Crandell, D. R., 1963, Surficial geology and geomorphology of the Lake Tapps quadrangle, Washington: U.S. Geological Survey Professional Paper 388-A, 84 p. Plate 1, scale $2\frac{1}{2}$ inches to the mile.

7. Gower, H. D.; Wanek, A. A., 1963, Preliminary geologic map of the Cumberland quadrangle, King County, Washington: Washington Division of Mines and Geology Geologic Map GM-2, map and text on 1 sheet. Scale $2\frac{1}{2}$ inches to the mile.

8. Liesch, B. A.; Price, C. E.; Walters, K. L., 1963, Geology and ground-water resources of northwestern King County, Washington: Washington Division of Water Resources Water Supply Bulletin 20, 241 p. Plate 1, scale, about 1 1/3 inches to the mile.

9. Garling, M. E.; Molenaar, Dee; and others, 1965, Water resources and geology of the Kitsap Peninsula and certain adjacent islands [including Vashon and Maury Islands in King County]: Washington Division of Water Resources Water Supply Bulletin 18, 309 p. Plate 1, scale, 1 inch to the mile.

10. Mullineaux, D. R., 1965, Geologic map of the Auburn quadrangle, King and Pierce Counties, Washington: U.S. Geological Survey Geologic Quadrangle Maps Map GQ-406. Scale, $2\frac{1}{2}$ inches to the mile.

11. Mullineaux, D. R., 1965, Geologic map of the Black Diamond quadrangle, King County, Washington: U.S. Geological Survey Geologic Quadrangle Maps Map GQ-407. Scale, $2\frac{1}{2}$ inches to the mile.

12. Mullineaux, D. R., 1965, Geologic map of the Renton quadrangle, King County, Washington: U.S. Geological Survey Geologic Quadrangle Maps Map GQ-405. Scale, $2\frac{1}{2}$ inches to the mile.

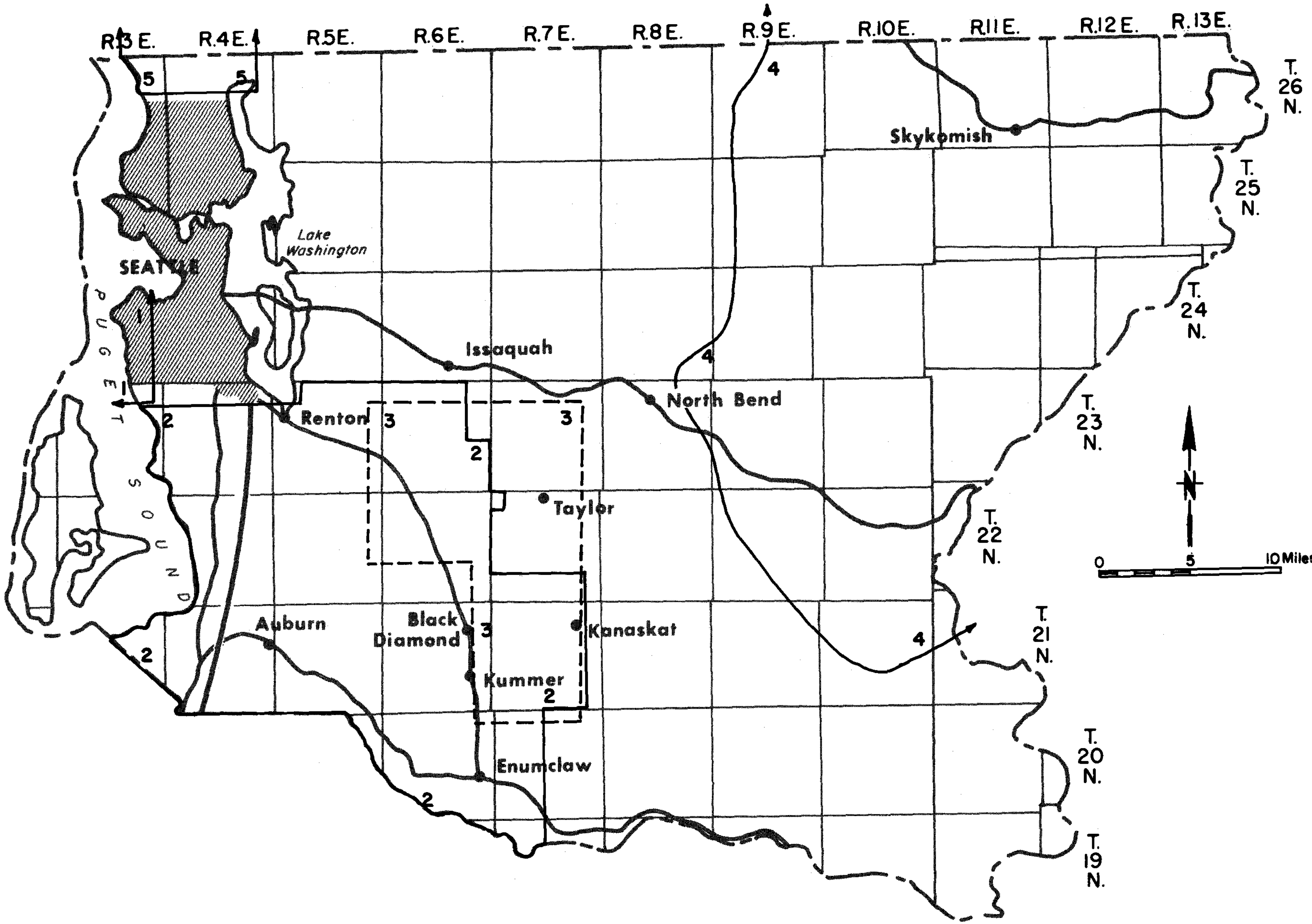

FIGURE 3.—Published geologic mapping.

AUTHORS OF PUBLISHED GEOLOGIC MAPPING SHOWN ON FIGURE 3

1. Waldron, H. H., 1967, Geologic map of the Duwamish Head quadrangle, King and Kitsap Counties, Washington: U.S. Geological Survey Geologic Quadrangle Maps Map GQ-706. Scale, $2\frac{1}{2}$ inches to the mile.

2. Luzier, J. E., 1969, Geology and ground-water resources of southwestern King County, Washington: Washington Department of Water Resources Water Supply Bulletin 28, 260 p. Plate 1, scale, about 1 1/3 inches to the mile.

3. Vine, J. D., 1969, Geology and coal resources of the Cumberland, Hobart, and Maple Valley quadrangles, King County, Washington: U.S. Geological Survey Professional Paper 624, 67 p. Plate 1, scale, $2\frac{1}{2}$ inches to the mile.

4. University of Washington Department of Geological Sciences, 1972, The Alpine Lakes—Environmental Geology: University of Washington Department of Geological Sciences Publications in Geological Sciences no. 2, 161 p. Plate 1, scale, 4 miles to the inch.

5. Smith, Mackey, 1975, Preliminary surficial geologic map of the Edmonds East and Edmonds West quadrangles, Snohomish and King Counties, Washington: Washington Division of Geology and Earth Resources Geologic Map GM-14, map and text on one sheet. Scale, $2\frac{1}{2}$ inches to the mile.

Not Shown on Figure 3

Crandell, D. R., 1973, Map showing potential hazards from future eruptions of Mount Rainier, Washington: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-836, map and text on one sheet. Scale, 1 inch to 4 miles.

Huntting, M. T.; Bennett, W. A. G.; Livingston, V. E., Jr.; Moen, W. S., 1961, Geologic map of Washington: Washington Division of Mines and Geology, 2 sheets. Scale, 1 inch to 8 miles.

Livingston, V. E., Jr., 1971, Geology and mineral resources of King County, Washington: Washington Division of Mines and Geology Bulletin 63, 200 p. Plate 1, scale, 2 miles to the inch. [Covers King County.]

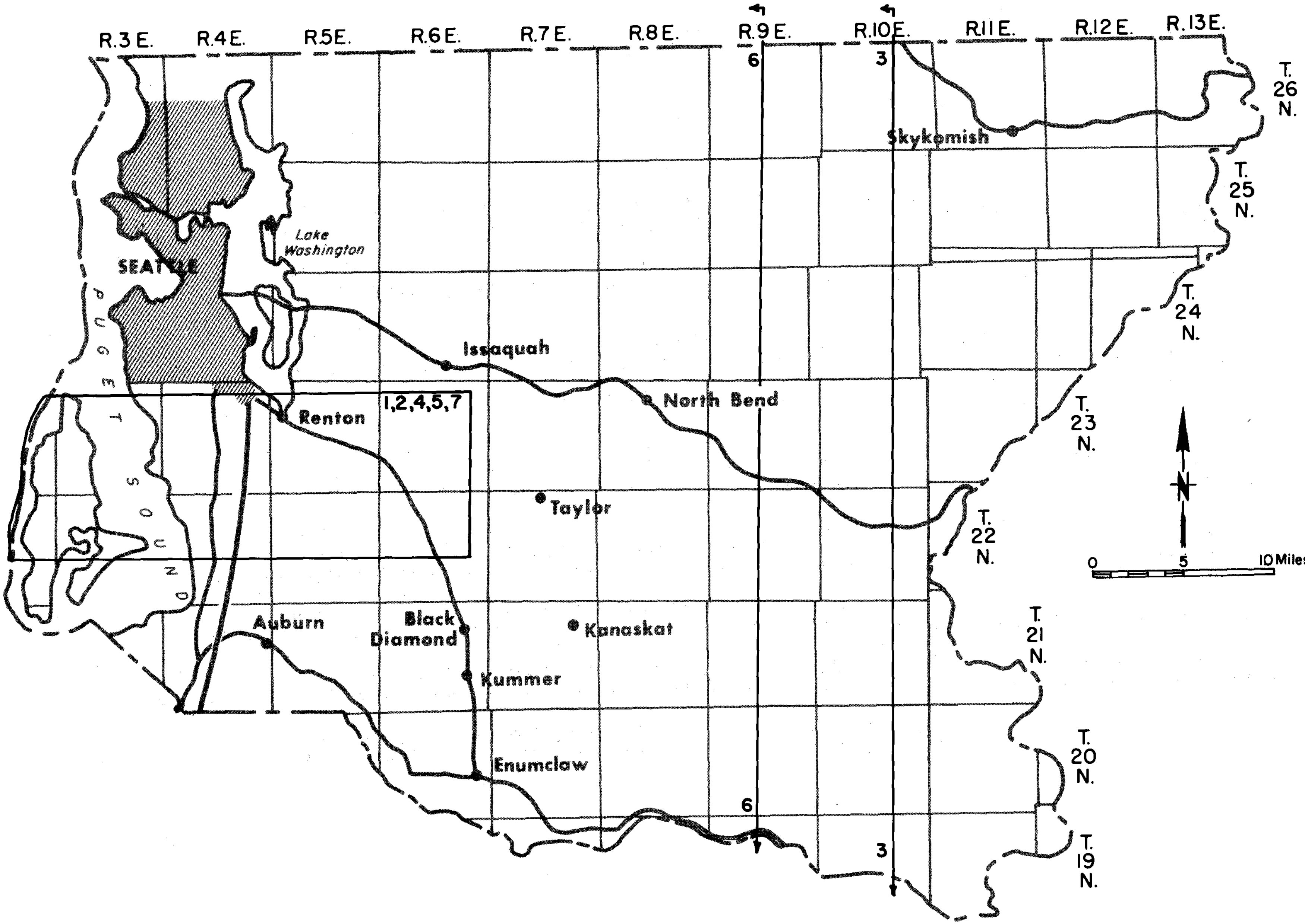

FIGURE 4.—Interpretive land use maps.

AUTHORS OF INTERPRETIVE LAND USE MAPS SHOWN ON FIGURE 4

1. Miller, R. D., 1973, Map showing relative slope stability in part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-852-A, map and text on 1 sheet. Scale, 1 1/3 inches to the mile.

2. Miller, R. D., 1974, Map showing relative compressibility of earth materials in part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Investigations Series Map I-852-C, map and text on 1 sheet. Scale, 1 1/3 inches to the mile.

3. Hall, J. B.; Othberg, K. L., 1974, Thickness of unconsolidated sediments, Puget Lowland, Washington: Washington Division of Geology and Earth Resources Geologic Map GM-12, map accompanied by 3 pages of text. Scale, 5 miles to the inch.

4. Tubbs, D. W., 1974, Landslides and associated damage during early 1972 in part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Investigations Series Map I-852-B, map and text on 1 sheet. Scale, 1 1/3 inches to the mile.

5. Rice, William, 1975, Map showing nonmetallic mineral resources in part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Investigations Series Map I-852-D, map and text on 1 sheet. Scale, 1 1/3 inches to the mile.

6. Wilson, R. T., 1975, Solid-waste disposal sites in relation to water resources in the Seattle-Tacoma urban complex and vicinity, Washington: U.S. Geological Survey Open-file Report 75-344 (Basic Data Contribution 6), map and text on one sheet.

7. U.S. Geological Survey, 1975, Slope map of part of west-central King County, Washington: U.S. Geological Survey Miscellaneous Investigations Series Map I-852-E, map and text on 1 sheet. Scale, 1 1/3 inches to the mile.

Not Shown on Figure 4

Crandell, D. R., 1976, Preliminary assessment of potential hazards from future volcanic eruptions in Washington: U.S. Geological Survey Miscellaneous Field Studies Map MF-774, map and text on 1 sheet. Scale, 16 miles to the inch. [Includes all of King County.]

Kroft, D. J., 1972, Sand and gravel deposits in western King County, Washington: University of Washington M.S. thesis, 62 p. Has 15 geologic maps at the scale of 7/8 inch to the mile.

Tubbs, D. W., 1974, Landslides in Seattle: Washington Division of Geology and Earth Resources Information Circular 52, 15 p. Map is at the scale of 2 inches to the mile.

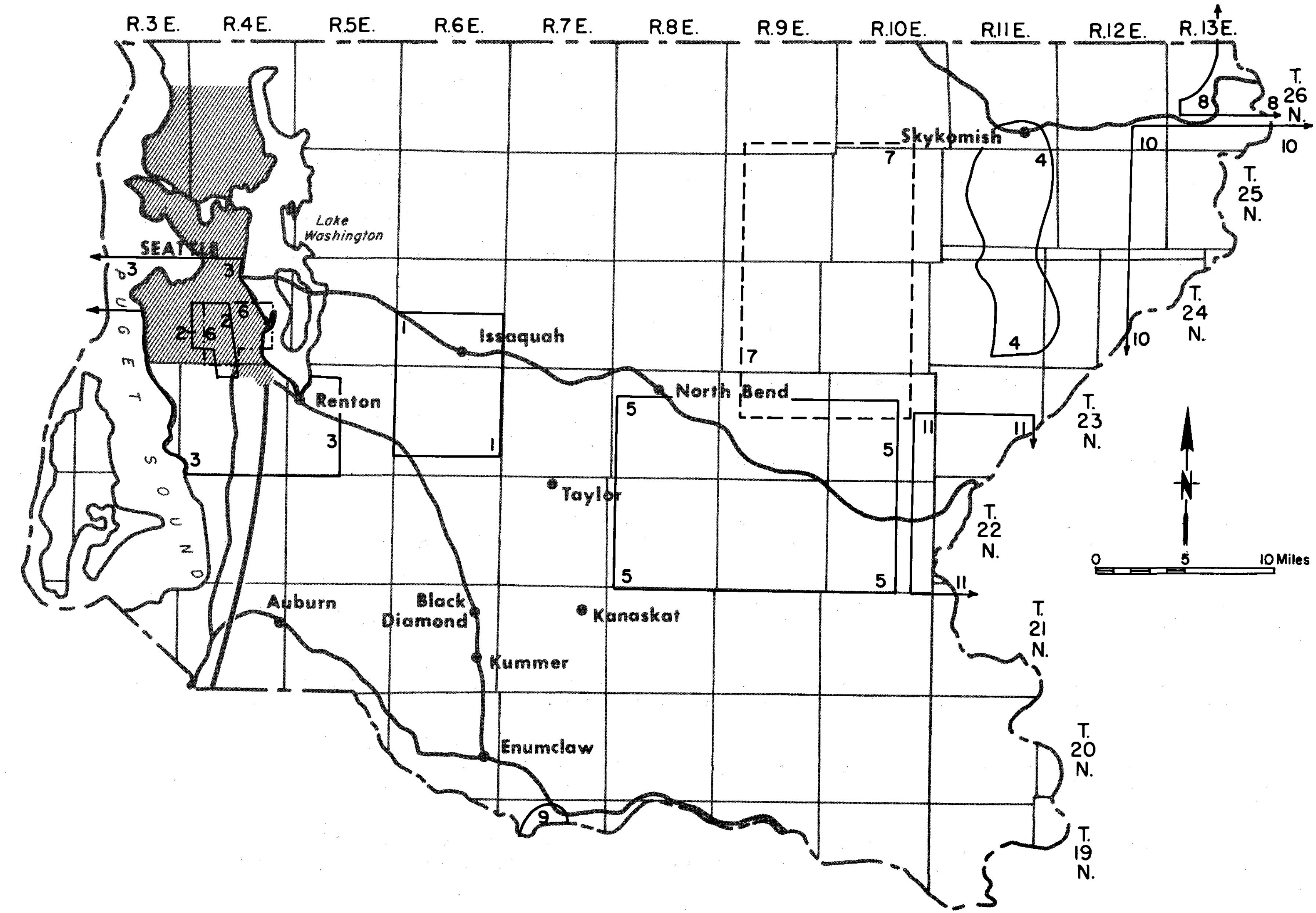

FIGURE 5.—Geologic theses maps.

AUTHORS OF GEOLOGIC THESES MAPS SHOWN ON FIGURE 5

1. Carr, F. E.; Bagshaw, E. W., 1908, Geology of Squak Mountain: University of Washington B.S. thesis, 34 p. Map, 2 inches to the mile.

2. Wimmler, Norman, 1908, Geology of the east side of the Duwamish Valley, King County, Washington: University of Washington B.S. thesis, 14 p. Map, 2 inches to the mile.

3. Fettke, C. R., 1910, A study of the bedrock in the vicinity of Seattle, Port Orchard, and Renton, Washington: University of Washington B.S. thesis, 21 p. Map, 4 inches to the mile.

4. Smith, W. S.; Carr, D. E., 1912, Geology and economic resources of the Lake Dorothy region, Washington: University of Washington B.S. thesis, 62 p. Map, 1 inch to the mile.

5. Fuller, R. E., 1925, The geology of the northeastern part of the Cedar Lake quadrangle, with special reference to the deroofed Snoqualmie batholith: University of Washington M.S. thesis, 96 p. Map, 1 inch to 2 miles.

6. Bravinder, K. M., 1932, Stratigraphy and paleontology of the Oligocene in the eastern portion of the Puget Sound basin: University of Washington M.S. thesis, 38 p. Plate 5, 1 inch to 800 feet.

7. Bethel, H. L., 1951, Geology of the southeastern part of the Sultan quadrangle, King County, Washington: University of Washington Ph. D. thesis, 244 p. Plate 70, 1 inch to the mile.

8. Oles, K. F., 1951, Petrology of the Stevens Pass-Nason Ridge area, Washington: University of Washington M.S. thesis, 92 p. Plate B, 1 inch to the mile.

9. Anderson, N. R., 1954, Glacial geology of the Mud Mountain district, King County, Washington: University of Washington M.S. thesis, 48 p. Plate 3, about $2\frac{1}{4}$ inches to the mile.

10. Pratt, R. M., 1954, Geology of the Deception Pass area, Chelan, King, and Kittitas Counties, Washington: University of Washington M.S. thesis, 58 p. Map, 2 inches to the mile.

11. Foster, R. J., 1955, A study of the Guye formation, Snoqualmie Pass, King and Kittitas Counties, Washington: University of Washington M.S. thesis, 55 p. Plate 1, 1 inch to about 5/8 mile.

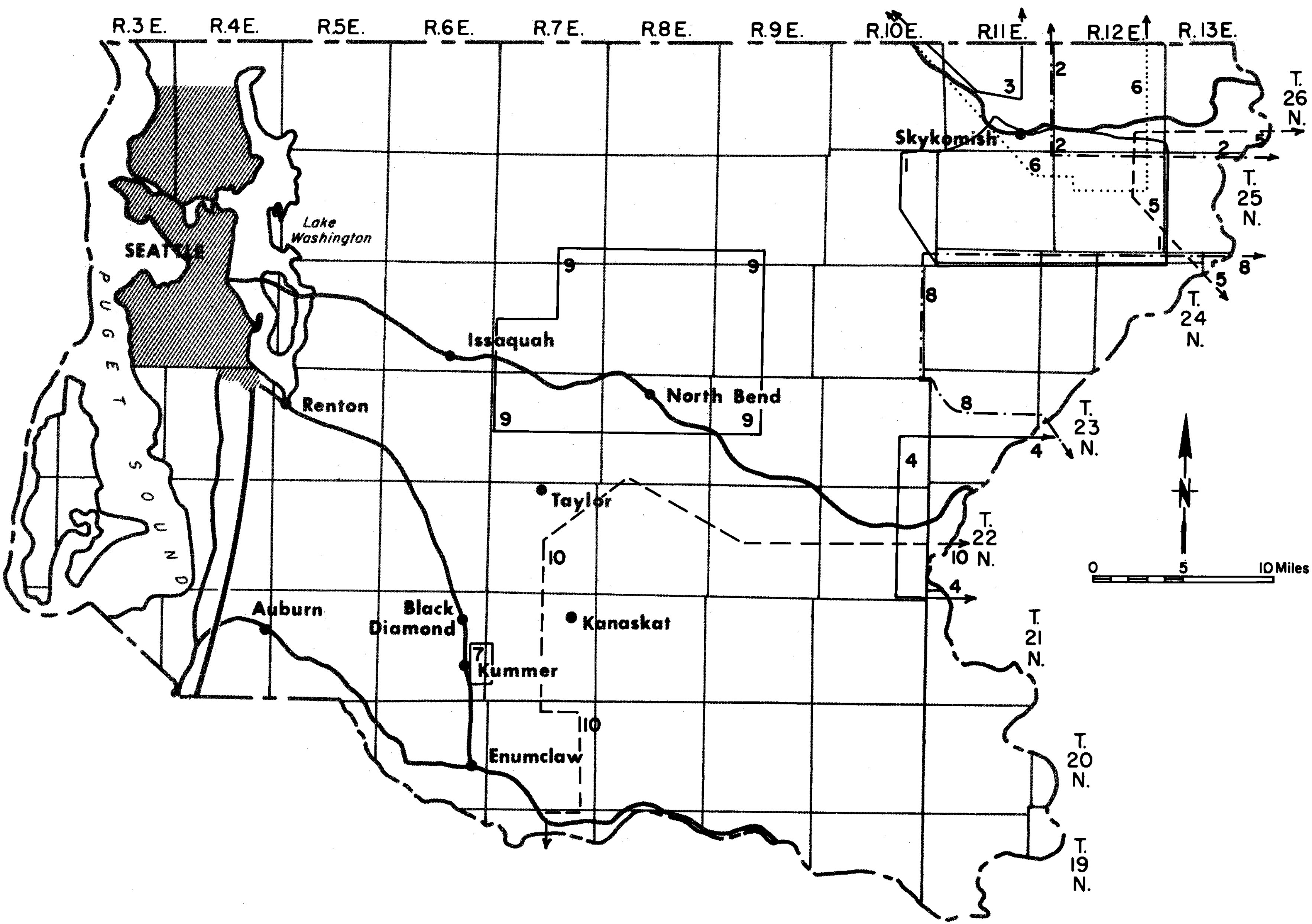

FIGURE 6.—Geologic theses maps.

AUTHORS OF GEOLOGIC THESES MAPS SHOWN ON FIGURE 6

1. Galster, R. W., 1956, Geology of the Miller-Foss River area, King County, Washington: University of Washington M.S. thesis, 96 p. Plate 3, 2 inches to the mile.

2. Oles, K. F., 1956, Geology and petrology of the crystalline rocks of the Beckler River-Nason Ridge area, Washington: University of Washington Ph. D. thesis, 192 p. Plate B, about 1.2 inches to the mile.

3. Yeats, R. S., Jr., 1956, Petrology and structure of the Mount Baring area, northern Cascades, Washington: University of Washington M.S. thesis, 78 p. Map, 1 inch to nearly a mile.

4. Foster, R. J., 1957, Tertiary geology of a portion of the central Cascade Mountains, Washington: University of Washington Ph. D. thesis, 186 p. Figure 55, 1 inch to 2 miles.

5. Pratt, R. M., 1958, Geology of the Mount Stuart area, Washington: University of Washington Ph. D. thesis, 228 p. Plate 7, 1 inch to the mile.

6. Yeats, R. S., 1958, Geology of the Skykomish area in the Cascade Mountains of Washington: University of Washington Ph. D. thesis, 243 p. Plate 1, 1 inch to the mile.

7. Bond, J. G., 1959, Sedimentary analysis of the Kummer formation within the Green River Canyon, King County, Washington: University of Washington M.S. thesis, 113 p. Figure 3, 1 inch to 1,000 feet.

8. Ellis, R. C., 1959, Geology of the Dutch Miller Gap area, Washington: University of Washington Ph. D. thesis, 113 p. Figure 44, 1 inch to the mile.

9. Kremer, D. E., 1959, Geology of the Preston-Mount Si area: University of Washington M.S. thesis, 103 p. Plate 29, 1 inch to about $1\frac{1}{2}$ miles.

10. Hammond, P. E., 1963, Structure and stratigraphy of the Keechelus volcanic group and associated Tertiary rocks in the west-central Cascade Range, Washington: University of Washington Ph. D. thesis, 264 p. Plate 1, 1 inch to the mile.

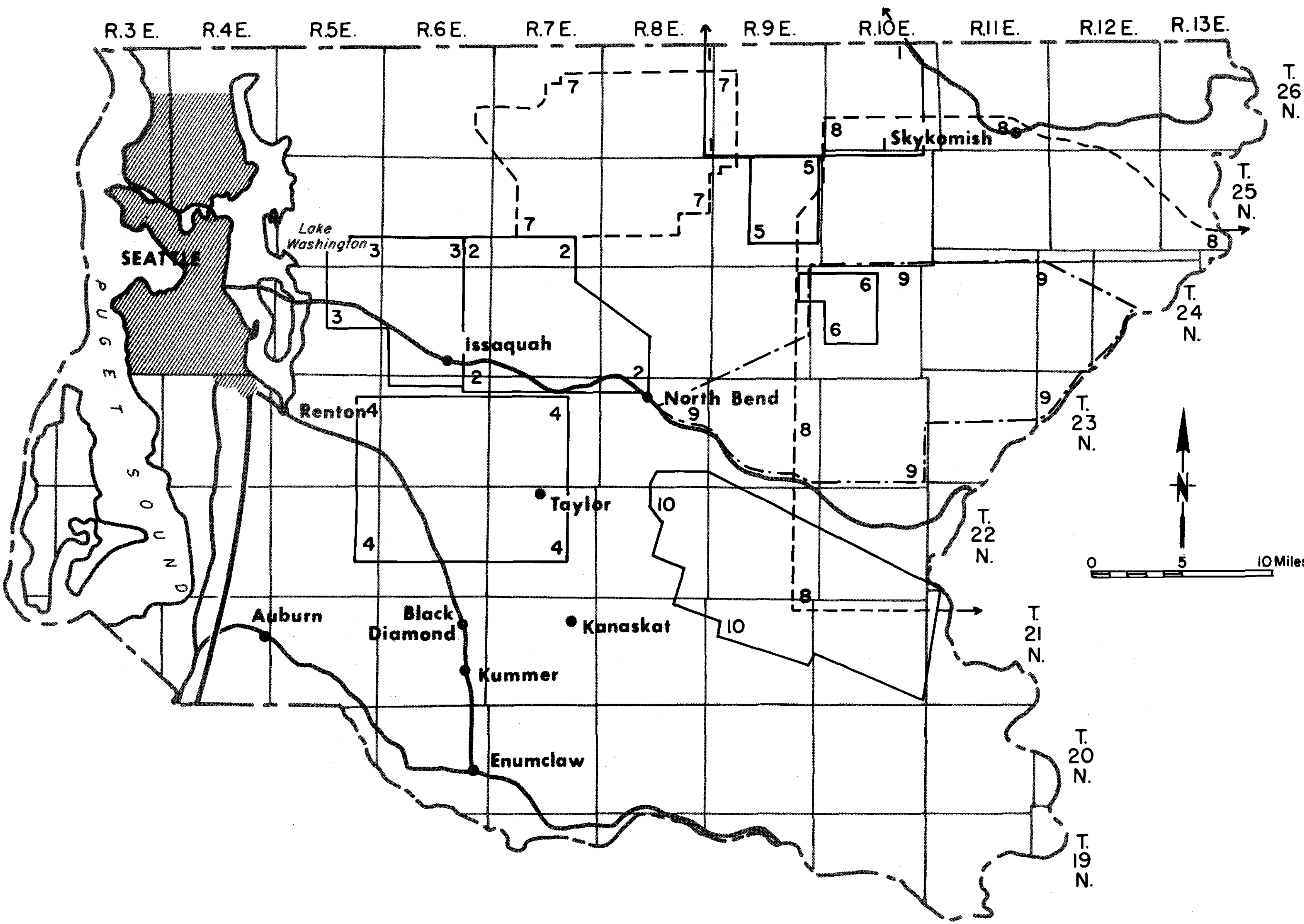

FIGURE 7.—Geologic theses maps.

AUTHORS OF GEOLOGIC THESES MAPS SHOWN ON FIGURE 7

1. Plummer, C. C., 1964, Geology of the Mount Index area of Washington State: University of Washington M.S. thesis, 62 p. Plate 1, 2 inches to the mile.

2. Anderson, C. A., Surficial geology of the Fall City area, Washington: University of Washington M.S. thesis, 70 p. Plate 1, 1 inch to 2,000 feet.

3. Curran, T. A., 1965, Surficial geology of the Issaquah area, Washington: University of Washington M.S. thesis, 57 p. Plate 1, 1 inch to 2,000 feet.

4. Rosengreen, T. E., 1965, Surficial geology of the Maple Valley and Hobart quadrangles, Washington: University of Washington M.S. thesis, 71 p. Plate 1, 1 inch to 2,000 feet.

5. Gilbert, W. G., 1967, Petrology of the Sunday stock, King County, Washington: University of Washington undergraduate report, 20 p. Plate 2, 1 inch to 2,000 feet.

6. Howard, D. A., 1967, Economic geology of Quartz Creek, King County, Washington: University of Washington M.S. thesis, 48 p. Plate 1, 4 inches to the mile.

7. Knoll, K. M., 1967, Surficial geology of the Tolt River area, Washington: University of Washington M.S. thesis, 91 p. Plate 1, 1 inch to 2,000 feet.

8. Erikson, E. H., Jr., 1968, Petrology of the composite Snoqualmie batholith, central Cascade Mountains, Washington: Southern Methodist University Ph. D. thesis, 111 p. Plate 1, 1 inch to the mile.

9. Williams, V. S., 1971, Glacial geology of the drainage basin of the Middle Fork of the Snoqualmie River: University of Washington M.S. thesis, 45 p. Plate 1, 1 inch to the mile.

10. Hirsch, R. M., 1975, Glacial geology and geomorphology of the upper Cedar River watershed, Cascade Range, Washington: University of Washington M.S. thesis, 48 p. Figure 4, 1 inch to $2\frac{1}{4}$ miles.

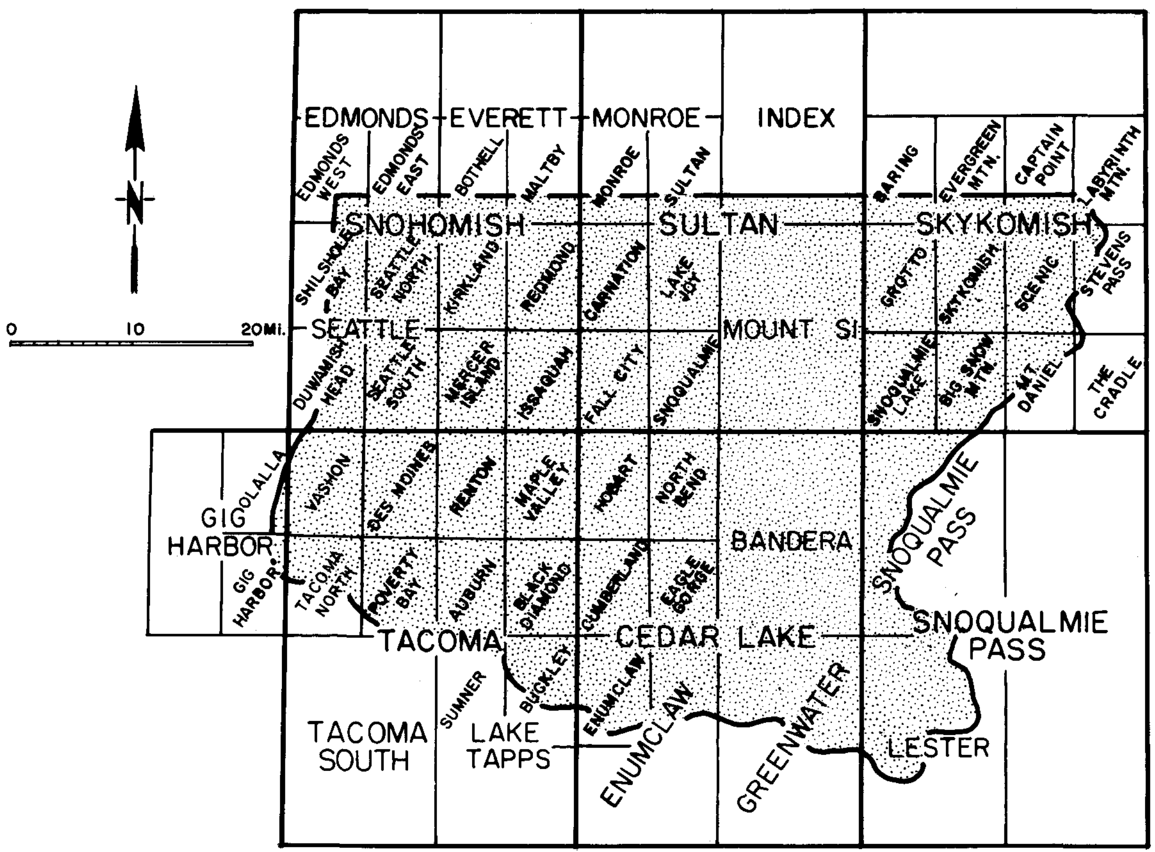

FIGURE 8.—Index to topographic mapping in King County, Washington.