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ALASKA RESOURCE EVALUATION AND MAPPING

By

Alaska Division of
Geological and Geophysical Surveys

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Alaska Resource Evaluation
and Mapping

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Department of Natural Resources

Division of Geological and Geophysical Surveys

RESOURCE EVALUATION PROGRAM

The Division of Geological and Geophysical Surveys (DGGS) Resource Evaluation Program is a comprehensive assessment of the resource potential within regions of State concern. The program includes an assessment of industrial materials, metallic minerals, coal, uranium, oil and gas, agricultural soils, quality and quanity of ground and surface water geothermal energy and vegetation and an evaluation of geologic hazards and engineering geology conditions. The purpose of the resource evaluation program is to provide the public, and administration, the legislature and local governments with meaningful estimates and descriptions of Alaska resources prior to or concurrent with their major resource and land-management decisions. The resource evaluation program will utilize but not duplicate resource assessment work being done within the State under existing DGGS projects.

Most resource studies conducted in Alaska over the past 75 years have been general in nature and directed at federal concerns. Many earlier studies, planned to answer immediate and short-term crises, are of little lasting value because they were limited in scope. Although much information gathered by earlier program is useful, most of it is not specific enough for truly informed decision making, or is not presented in a useful format. In addition, most previous efforts have attempted to compile existing data rather than to expand the resource data base, which is clearly inadequate for determining land classification and use, for providing resource information

information for use by the public and local governments, or for assessing the economic effects of many land-related decisions.

Resource assessments require systematic and protracted effort over a period of several years if high quality, useful products are to result. A comprehensive resource inventory program has the advantage of effectively coordinating and pooling a broad range of knowledge, logistics, and investigative techniques. For these reasons, the DGGS Resource Evaluation Program is being proposed as a Capital Improvent Project.

SCOPE

The DGGS Resource Evaluation Program proposes to investigate approximately 15 to 20 percent of State-controlled lands within the next 5 years. Eventually, all State-owned land should be studied in this manner. A systematic program to meet that objective -- an extension of this initial Resource Evaluation Program -- should take 25 to 30 years to accomplish.

The programm will investigate areas where increased public or industrial use is expected to lead to a demand for resource utilization or where pending decisions and potential conflicts over land use hinge upon resource information. The program is designed to produce resource data of sufficient detail to be useful at the local as well as the State level. The assessment will be more detailed than most of the work currently being planned and accomplished by federal agencies and will focus on areas where State concerns are paramount.

METHODS

The resource evaluation process consists of several distinct steps. The scope and cost of each step for a given region depend on the existing data base, potential resources, and the information requirements in that region. The process, however, is essentially similar for all regions.

Phase I: Compilation and Program Design

The first step in any resource assessment program is the compilation of existing data. From this effort, the need for additional data can be determined, and necessary investiagitons can be planned. For the regions which have been proposed in this program, the status of the existing data base is known to investigators within DGGS, and the formal collection of available resource data will not be difficult. The compiiation will be largely an internal process for use by the program's project managers for planning purposes, but separate publication of selective compilations is anticipated. Much of this information will be incorporated into final project reports.

Phase II: Data Collection and Analysis

The second step in the program is the acquisition of additional data to make resource extimates and maps in the detail required for the project. Field investigations over a period of several years are planned for each

region. Logistics for field investigations within and among regions will take advantage of the multiple use of equipment, transportation, and personnel, resulting in considerable cost savings.

Analysis of data and samples acquired by remote-sensing and field investigations is a major step in the program. Many of the sample analyses will be handled through the DGGS laboratories, but certain special analyses will be submitted to commercial or university laboratories. Some of the collection and analysis of remote-sensing data will be done by contract. The following resource data will constitute the primary objectives of the resource evaluation program.

Water

Water data collected will include surface and subsurface water quality determinations, aquifer location and characteristics, minimum stream flow determinations, compilation of well log data, including temperature measurements, lake level histories, ground water characteristics, meteorological information, and flood plain delineation. Some DGGS water resource evaluation projects will be cooperative projects with the Water Resources Division of the United States Geological Survey (USGS), through which state dollars are matched by federal dollars on a 1:1 ratio. The primary objective of the water resource assessment projects is an understanding of natural water systems so that water appropriation can be made on an informed basis.

Geothermal

An on-going statewide hot springs inventory, at present partially funded by Department of Energy (DOE) and state operating funds, will provide the basis for site specific evaluations. Geothermal resource studies will evaluate the energy resource potential of geothermal areas including hot springs, deep sedimentary zones, and volcanoes. Part of the work will be done in cooperation with the University of Alaska, USGS, and DOE.

Minerals

The resource potential of metallic, industrial (limestone, phosphate, etc.), and energy minerals (uranium, oil shale) will be defined through detailed geologic bedrock mapping and statistical analyses. Geologic maps with scale of one-inch equals 1-mile are now available for only an estimated 7 percent of the state. Most states have 100 percent coverage at a scale of inch to the mile and therefore are at a distinct advantage in their ability to provide mineral and energy resource information. Geologic maps represent the most frequent request from the coal, oil and gas, and mineral industries and are the basis for industry's decision to conduct detailed exploration in Alaska. Geologic maps are the primary source of information provided by DGGS to State management agencies.

Coal

The general location of Alaska's coal fields is known but very little detailed information on reserves and quality has been collected. The extent and volumes of coal can be defined through geologic mapping or drilling. Samples will be analyzed for rank, impurities, water and ash contents, and energy potential in cooperation with the University of Alaska School of Mineral Industry.

Oil and Gas

DGGS oil and gas evaluation projects are tied directly to the State's leasing schedule and are separately funded. Basin-wide resource estimates, however, are not presently funded and will constitute the main contribution of DGGS Resource Evaluation Programs. The methodology for oil and gas estimates as well as minerals is described in Phase III.

Vegetation

Data to be collected will include distribution and type of vegetation, timber volumes, mortality ratios, growth per acre per species, range conditions, and browse type. Most of the vegetation studies will be accomplished through contracts.

Surficial Geology

Studies of unconsolidated materials at the Earth's surface include evaluations of the distribution and volume of construction materials (sand and gravel), engineering characteristics, wetlands, geologic hazards, and soils. With the exception of soils few studies detailed enough for making quality decisions have been completed. Data collected will utilize remote sensing techniques, especially aerial photointerpretation, and field mapping. Some agricultural soils inventories will be done in cooperation with the U.S. Soil Conservation Service.

Phase III: Resource Estimates and Computer Modelling

The DGGS Resource Evaluation Program will include computer modelling as an integral part of the inventory process, so that users of the results will have quantifiable estimates of the resource potential of an area along with the statistical certainty of that resource estimate. The application of computer simulation models for deriving quantitative resource estimates has not often been used effectively by DNR agencies, although a major effect was made for the 1979 Beaufort Sea Lease Sale using the facilities and programs of the USGS. In that instance, estimates were made of oil and gas resources on acreage offered for lease for the purpose of estimating the value of various tracts. Analogous computer models exist for estimating the value of various tracts. Analogous computer models exist for estimating oil and gas resources on a regional basis, and for estimating mineral

potential. The results can be used by individuals in the private sector as well as by policy and decision makers for land sue and classification decisions, land disposals, land trades and general resource planning.

Resource estimates are the basis for economic studies of the potential resource values. Economic studies, however are based on a great many factors, including market forecasts, the cost of production and transportation facilities, supply forecasts on a world-wide basis, and so forth. Because such studies require specialized knowledges, generally outside the scope of DGGS mandates, no plans exist to carry the resource inventory program beyond the stage of resource estimation. Such economic studies could be accomplished expeditiously because resource estimates will be available, along with a knowledge of other factors, such as engineering conditions nad geologic hazards.

Phase IV: Reports and Publications

The remainder of the resource inventory program is devoted to publication of the results in a number of different user-oriented formats. Initial reports will be technician scope and will include maps that document the data and the results of technical analysis and computer modelling. Such technical reports constitute the permanent scientific record of the investigations, and are widely used by professionals in industry, government, and the academic world. Final products will include resource estimates, location and derivative maps, and reports written for geneal use by the public, the legislature, and the administration, DNR ALARS*, and local governments.

*Alaska Lands and Resource System

Regions

The DGGS Resource Evaluation Program is subdivided into a series of projects focusing on State resource information needs within 6 regions of the State (figure 1). The program can be regarded as incremental on a region-by-region basis, and additions or deletions to the program will not affect the quality of the product but only which regions are to be investigated. However, the nucleus of personnel and the minimum computer time needed to produce computer simulation models is essential to the program as a whole. Descriptions of study areas and products from the 6 State regions to be studied during the first 5 years of the DGGS Resources Inventory Program follow.

South-central Region

The South-central Region includes the Susitna basin, Chugach Mts., Kenai Peninsula, Matanuska and Copper River areas, and Gulf of Alaska (see figure 1). Resources in the Chugach/Matanuska/Copper River area include metallic and industrial minerals, construction materials, oil and gas, coal, agricultural soils, forests, and water including vast hydroelectric potential. Proximity to the central transportation facilities in the State makes this a likely area for population expansion, which will in turn increase pressure to exploit all potential resources. DGGS has begun a mineral resource investigation in the Chugach Mountains, and the present proposal expands the area and provides additional appraisals of sand and gravel, agricultural soils, vegetation, water, and coal resources.

In the near future coal extration will likely stimulate additional development in the Beluga area. Mineral resources of the Alaska Range, Talkeetna Mts., and Chugach Mts. also are an important foci for exploration. Significant potential for agriculture, forestry, and geothermal energy exists, and recreational activity in the area will increase substantially with development of other natural resources. Geologic factors and hazards affecting development of the area will be important consideration in future planning at both State and local levels.

The individual areas designated for study within the South-central Region have been chosen on the basis of consultation with the Department of Commerce and Economic Development, Department of Community and Regional Affairs, the Alaska Power Authority, the Matanuska Susitna Borough,

Cook Inlet Region Corp, Ahtna Corporation, University of Alaska, and the various divisions and committees within the Department of Natural Resources. Federal agencies consulted include the U.S. Forest Service and the U.S. Soil Conservation Service. Industry interests have been expressed by Marathon Oil co., conoco, Resource Associates, Eskil Anderson Consultants, the Alaska Geological Society and the Alaska Miner's Association. The Alaska Council of Science and Technology has also endorsed these studies.

A number of map quadrangles (1:63,360) (figure 1 and 2) were chosen as primary targets for the resource investigation based on the needs expressed by the various interest groups named above. These quadrangles include existing or potential transportation corridors and are near areas where development is anticipated. Specific products are planned for the South-central Region:

Products (Five years)

1. General history of current and past mineral production of Mat-Su Borough
    (a) report
    (b) map (1:1,000,000)
2. Reports on geology and mineral potential of North Chugach Mts., Southwest Talkeetna Mts., and part of southern Alaska Range.
3. Geologic, geochemical, and construction material maps and geophysical maps where appropriate of the following at 1:63,360 or larger scale.

(a) Anchorage B-6, B-7, C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8, D-1, D-2, D-3, D-4, D-5, D-6, D-7, D-8.

(b) Tyonek A-3, A-4, A-5, A-6, B-1, B-2, B-3, D-4, B-5, C-1, C-2, C-3, C-4, C-5, D-1, D-2, D-3, D-4, D-5, D-6, D-7, D-8.

4. Report and booklet on geology of Chugach State Park

5. Archaeological inventory of selected sites

6. Geologic highway guide and road log of Denali Highway

7. Other special purpose derivative maps particularly requested (e.g. suitability for sewage disposal system; slope stability; excavation conditions; etc.)

8. Surface water reports maps and analysis

(a) Discharge data reports

(b) Streamflow hydrographs

(c) Annual runoff maps

(d) Water quality maps

(e) Sediment transport analyses

(f) Floodplain maps

(g) Lake level and quality reports

Streams: Beluga River, Tokositna River, Long Creek, Ramsdyke Creek, Talchulitna River, Contract Creek, Thursday Creek, Matanuska River System, Copper River.

Lakes: Lake Louise, Tazlina Lake, Klutina Lake, Kenney Lake, Crosswind Lake, 17 Mile Lake, Elks Lake, Beluga Lake, Strandline Lake, Shell Lake.

9. Climate, snow-survey, and glaciology reports Skwentna, Alexander Lake, Beluga, Pt. MacKenzie, Cooper River Basin
10. Groundwater reports, maps and analyses as needed
    (a) Groundwater level and quality map
    (b) Groundwater data reports
    (c) Hydro-geological section
    (d) Groundwater fluctuation maps

    Monitoring wells at Pt. MacKenzie Agricultural area, Beluga-Tyonek coastal lowland, Glenallen, Kenney Lake, Wasilla, Palmer, Big Lake

    Test drilling: Beluga, Tyonek
11. Report on geothermal resource of Kalwasi hot springs
12. Geothermal resources of Mt. Spurr area
13. Report on agricultural soils in Fox River Valley
14. Report on agricultural soils in Glenallen area
15. Maps and report on vegetation and forestry resources for selected areas
16. Report on seismic activity of upper Cook Inlet

East-central Region

The East-central region includes the Tanana Basin, Yukon-Tanana Upland, and Central Yukon River areas. The mineral potential of parts of the region is high, as is interest in the water, forest, and agriculture. The development of housing and industry near cities and villages will also lead to increased interest in geologic factors limited such activities.

Several DNR resource investigations are in progress for portions of this area, and the main objectives of the DGGS Resource Evaluation Program are to coordinate and compile the results of these investigations, and evaluate in detail the soil, forest, and mineral resources. Additional field investigations will be conducted to fill gaps between existing projects and to expand the resource data for the entire region.

The individual areas designated for study within the East-central Region have been chosen on the basis of consultation with the Department of Commerce and Economic Development, Department of Community and Regional Affairs, the Alaska Power Authority, the Matanuska Susitna Borough, Ahtna Corporation, University of Alaska, and the various divisions and committees within the Department of Natural Resources. Federal agencies consulted include the U.S. Forest Service and the U.S. Soil Conservation Service. Industry interests have been expressed by Marathon Oil Co., Conoco, Resource Associates, Eskil Anderson Consultants, the Alaska Geological Society and the Alaska Miner's Association. The Alaska Council of Science and Technology has also endorsed these studies.

A number of map quadrangles (1:63,360) (figures 2 and 3) were chosen as primary targets for the resource investigation based on the needs expressed by the various interest groups named above. These quadrangles include existing or potential transportation corridors and are near areas where development is anticipated. Specific products are planned for the East-central Region:

Products (Five year)

1. Geologic, geochemical, and construction material maps and geophysical maps where appropriate of the following at 1:63,360 or larger scale.
2. Report on geothermal resources of Manley Hot Springs.
3. Other special purpose derivative maps particularly requested (e.g., suitability for sewage disposal system; slope stability; permafrost; excavation conditions, etc.).
4. Surface water maps, reports and analyses
    (a) surface water availability maps
    (b) flood potential maps
    (c) stream hydrographs
    (d) flood recurrence graphs
    (e) lake level and quality reports
    (f) reconnaissance survey reports

    River Systems: Kantishna, Toklat, Teklanika, Gerstle, Goodpastor,

    Lakes: Agricultural area lakes
5. Groundwater maps, reports and analyses
    (a) aquifer thickness maps of agricultural areas
    (b) hydro-geological sections of agricultural areas
    (c) aquifer potential graphs of agricultural areas
    (d) groundwater hydrographs
    (e) water level fluctuation and level data reports

6. Report on geothermal resources of Tolovana Hot Springs
7. Report on soils of State selected Tanana Basin agricultural areas
8. Maps and reports on forestry resources of selected areas
9. Report on seismic activity of Tanana River Basin
10. Reports on geology and mineral potential of Tolovana, Richardson, and Circle mining districts, and parts of Delta mineral belt and Ray Mts.

Northern Region

The Northern Region includes the Upper Koyukuk River Basin, Brooks Range, and North Slope. The potential for metallic minerals including strategic minerals in upper Koyukuk and Brooks Range areas in important in a statewide and national scale. Tens of billions of dollars of proven reserves exist in parts of the southern and western Brooks Range. Critical questions now exist about the development of transportation and production facilities, and conflicts over land use and ownership in the area are serious. For these reasons, a knowledge of the location, character, and potential of the mineral resources, the engineering and geologic constraints on development of transportation and production facilities, and the potential for other decisions on State, regional, and local levels. The North Slope Basin, onshore and offshore, has the highest potential for oil, gas, and coal development of any area in North America. Because resource evaluation of oil and gas and coal on State lands is being conducted under a separate CIP, the main resource information needs for the North Slope Basin under the DGGS Resource Evaluation Program includes sand and gravel, permafrost, and water.

The individual areas designated for study within the South-central Region have been chosen on the basis of consultation with the Department of Commerce and Economic Development, Department of Community and Regional Affairs, the Alaska Power Authority, the Matanuska Susitna Borough, Ahtna Corporation, Univeristy of Alaska, and the various divisions and committees within the Department of Natural Resources. Federal agencies consulted include the U.S. Forest Service and the U.S. Soil Conservation Service. Industry interests have been expressed by Marathon Oil Co., Conoco, Resource Associates, Eskil Anderson Consultants, the Alaska Geological Society and the Alaska Miner's Association. The Alaska Council of Science and Technology has also endorsed these studies.

A number of map quadrangles (1:63,360) (figures 1 and 2) were chosen as primary targets for the resource investigation based on the needs expressed by the various interest groups named above. These quadrangles include existing or potential transportation corridors and are near areas where development is anticapted. A number of specific products are planned for the Northern Region.

Products (Five years)

1. Geologic, geochemical, and construction material maps and geophysical maps where appropriate of the following at 1:63,360 or larger scale.
    (a) Ambler River A-1, A-2, A-3, B-1.
    (b) Survey Pass A-1, A-2
    (c) Wiseman A-1, A-5, A-6, B-1, B-5, B-6, C-6
    (d) Chandalar A-5, A-6, B-4, B-5, B-6, C-3, C-4, C-5, D-5, D-6

(e) Umiat B-4, C-1, C-2, C-3, D-1, D-2, D-3

(f) Sagavanirktok A-4, B-4, D-1, D-2, D-3, D-4, D-5

(g) Mt. Michelson C-4, C-5, D-4, D-5

(h) Philip Smith D-4

(i) Flaxman Island A-4, A-5, B-5

(j) Harrison Bay A-1, A-2, A-3, B-1, B-2, C-1

2. Other special purpose derivative maps particularly requested (e.g., suitability for sewage disposal system; slope stability; excavations conditions, sand and gravel, etc.)

3. Surface water map, reports and analyses

(a) runoff hydrographs

(b) discharge

(c) flood frequency curves

(d) sediment load curves

(e) water quality reports

(f) lake level and quality reports

Rivers: Canning, Colville, Meade, Utukok, John, Altna, North Fork Koyukuk, Kanuti

Lakes: Those between Sagavanirktok River and Canning River.

4. Special reports on springs along Canning River, Meade River, Utukok river and Colville (if possible).

5. Climate and snow-survey reports of Staines River area.

6. Groundwater maps, reports and analyses

(a) groundwater level maps

(b) water quality maps

(c) groundwater data reports

Crevice Creek, Coldfoot, Wiseman.

7. Maps and report on forestry resources of upper Koyukuk area
8. Reports on geology and mineral potential of Chandalar mining districts, southern Brooks Range Mineral Belt
9. Geologic map of Ambler mining district
10. Report on slush-flow avalanche hazards central Brook Range

West-central Region

The West-central Region includes the Seward peninsula area and portions of the Central Yukon, Selawik, and lower Koyukuk River areas. Mineral resources have been a primary interest in this region, particularly the Seward Peninsula, since the days of the gold rush. Recent increases in the market price of certain metallic minerals, including gold, and a natural awareness of strategic minerals, have led to renewed exploration and evaluation of the area by private industry. Interest exists for both hard rock and placer deposits. A modest potential for coal for local use and geothermal energy also exists in the region. Agricultural potential for reindeer grazing is important. The land ownership pattern in the region is very complex, and will probably lead to efforts by State, Federal, and private (native) agencies to trade and consolidate holdings into a coherent pattern. The proximity of scheduled oil/gas lease sales on the offshore continental shelf by the Federal government could lead to an accelerated increase in population and to the siting of industrial facilities. Water resources and other geologic factors affecting development will be very important in deciding how, where, and if many of these activities will be carried out.

The individual areas designated for study within the West-central Region have been chosen on the basis of consultation with the Department of Commerce and Economic Development, Department of Community and Regional Affairs, the Alaska Power Authority, the Maatanuska Susitna Borough, Ahtna Corporation, University of Alaska, and the various divisions and committees within the Department of Natural Resources. Federal agencies consulted include the U.S. Forest Service and U.S. Soil Conservation Service. Industry interests have been expressed by Marathon Oil Co., Conoco, Resource Associates, Eskil Anderson Consultants, the Alaska Geological Society and the Alaska Miner's Association. The Alaska Council of Science and technology has also endorsed these studies.

A number of map quadrangles (1:63,360) (figures 1 and 2) were chosen as primary targets for the resource investigation based on the needs expressed by the various interest groups named above. These quadrangles include existing or potential transportation corridors and are near areas where development is anticipated. A number of specific products are planned for West-central Region.

Products (Five years

1. Geologic, geochemical, and construction material maps and geophysical maps where appropriate of the following at 1:63,360 or larger scale.
    (a) Bendeleben A-1, B-2, B-1, B-2, C-1, C-2, D-1, D-2
    (b) Candle A-4, A-5, A-6, B-4, B-5, B-6, C-4, C-5, C-6, D-4, D-5, D-6
    (c) Melozitna A-3, B-3

(d) Kotzebue A-1, A-2, C-1, C-2, D-1, D-2

(e) Selawik A-5, A-6, B-5, B-6, C-6

(f) Hughes C-1, C-2, C-3, C-4, C-5, C-6, D-1, D-2, D-3, D-4, D-5, D-6

(g) Shungnak D-1, D-2

2. Surficial geology, hazards and materials maps of coast between Nome and Cape Douglas

3. Surficial geology map of lower Pilgrim River Valley

4. Other special purpose derivative maps particularly requested (e.g., suitability for sewage disposal system, slope stability, excavation conditions, permafrost)

5. Surface water maps, reports and analyses

   (a) reconnaissance survey reports

   (b) streamflow hydrographs

   (c) discharge data reports

   (d) water source maps

   (e) water quality reports

   (f) lake level charts

   Rivers: Buckland, Kuygruk, White, Kliwak

   Lakes: Imaruk Lake

6. Climate and snow-survey reports for Nome and Buckland areas

7. Groundwater map, reports, and analyses

   (a) hydrogeologic sections

   (b) groundwater level maps

   (c) groundwater data reports

   Areas: Nome, Buckland, Pilgrim Hot Springs, Shishmaref, Kuialik

8. Vegetation/reindeer grazing study of Seward Peninsula
9. Reports on geology and mineral resources of eastern Bendeleben Western Candle area

Southwestern Region

The southwestern Region includes the Kuskokwim and lower Yukon River Basins, Bristol Bay, Aleutian Islands and Kodiak area. The Kuskokwim area contians a number of different resource values, including both hardrock and placer mineral deposits, coal, oil and gas, and a potential for agriculture and forestry. DGGS has already initiated some field investigations related to mineral resources in parts of the area, and the DGGS Resource Evaluation Program proposal would integrate and expand the scope of present investigations to include hydrologic, soils, and forest resource studies. The D-2 legislation commits the State to a cooperative management program with the federal government in the Bristol Bay area. Resource values in the area include minerals, oil and gas, weater, coal, geothermal energy, soils, and forests. Resource development will be in possible conflict with habitat and recreational interests. The area has been identified by DNR's Regional Resource Plans project as one where major amounts of new resource information are needed for pending land management decisions.

The individual areas designated for study within the Southwestern Region have been chosen on the basis of consultation with the Department of Commerce and Economic Development, Department of Community and Regional Affairs, the Alaska Power Authority, the Matanuska Susitna Borough, Ahtna Corporation, Univeristy of Alaska, and the various divisions and committees

within the Department of Natural Resources. Federal agencies consulted include the U.S. Forest Service and the U.S. Soil Conservation Service. Industry interests have been expressed by Marathon Oil Co., Conoco, Resources Associates, Eskil Anderson Consultants, the Alaska Geological Society and the Alaska Miner's Association. The Alaska Council of Science and Technology has also endorsed these studies.

A number of map quadrangles (1:63,360) (figures 1 and 2) were chosen as primary targets for the resource investigation based on the needs expressed by the various interest groups named above. These quadrangles include existing or potential transportaiton corridors and are near areas where development is anticipated. A number of specific products are planned for the Southwestern Region.

Products (Five years)

1. Geologic, geochemical, and construction material maps and geophysical maps where appropriate of the following at 1:63,360 or larger scale.
   (a) Ophir A-1, A-2, B-1, B-2, C-1
   (b) Idatarod A-5, A-6, B-4, B-5, C-3, D-1, D-2
   (c) McGrath A-2, A-3, A-4, A-5, A-6, B-1, B-2, B-3, B-4, B-5, B-6, C-1, C-2, C-3, C-6
   (d) Sleetmute A-1, A-2, A-3, A-4, A-5, B-4, B-5, B-6, C-6, C-7, C-8, D-7, D-8
   (e) Lime Hills C-4, C-5, C-6, C-7, C-8, D-4, D-5, D-6, D-7, D-8

(f) Taylor Mtns. D-1, D-2, D-3, D-4, D-5

(g) Cold Bay A-1, B-1, C-1

(h) Port Moller A-6, B-6, C-6, D-2, D-3, D-4

(i) Hagemeister D-6, D-7, C-7

(j) Goodnews Bay A-1, A-2, A-3, A-4, A-5, A-6

(k) Dillingham A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-8

(l) Naknek A-1, A-2, A-3, A-4, A-5, B-1, B-2, B-3, B-4, B-5, C-1, C-2, C-3, C-4, D-1, D-2, D-3

(m) Nushagak Bay D-1, D-2, D-3, D-4, D-5, D-6, C-1, C-4, C-5

(n) Ugashik D-4, D-5, C-5, B-5, B-6, A-6

(o) Chignik A-7, B-4, B-5, B-6, C-3, C-4, D-2

2. Other special purpose derivative maps particularly requested (e.g., suitability for sewage disposal systems, slope stability, permafrost, excavation conditions, etc.)

3. Surface water reports, maps and analysis

(a) reconnaissance survey reports

(b) Streamflow hydrographs

(c) discharge data reports

(d) water supply maps

(e) flood plain maps

(f) water quality maps and reports

(g) lake level adn quality reports

Rivers: Big River, Middle Fork Kuskokwim, North For, East Fork, South Fork, Tonzona, Nushagak, Mulchatna, Kvichak

Lakes: Tikchik Lakes, Lake Iliamna, Lake Clark, Farewell Lake, Lake Minchumina

4. Climate and snow-survey reports for Farewell, North Fork, Dillingham, Tikchik Lake, Nahsik areas
5. Groundwater maps, reports and analyses
    (a) groundwater level maps
    (b) groundwater level hydrographs
    (c) groundwater supply and quality reports
    (d) aquifer identification reports and maps
    (e) groundwater data reports

    Areas: Naknek, Dillingham, King Salmon, Iliamna, McGrath, Nikalai, Telida, lake Minchumina, Farewell Lake
6. Reports on major resources of Aleutain and Alaska Peninsula
7. Report on agricultural soils of part of Kuskokwim Basin areas
8. Vegetation reports for Kuskokwim area
9. Report on the geology and mineral potential of parts of the Kuskokwim Mts. and Alaska Range
10. Report on the geology and mineral potential of the Port Moller-Cold Bay area
11. Reports on geology and major geothermal sites of Aleutian Islands and Alaska potential

Southeastern Region

The DGGS Resource Evaluation Program in Southeastern Alaska will focus on resources of State-owned land and areas where resource development might substantially affect local communities. Southeastern Alaska is one of the most highly mineralized regions in the State, and current exploration

interest is extremely high. Water resource data are lacking for most hydroelectric power sites.

The individual areas designated for study within Southeastern Region have been chosen on the basis of consultation with the Department of Commerce and Economic Development, Department of Community and Regional Affairs, the Alaska Power Authority, the Matanuska Susitna Borough, Ahtna Corporation, University of Alaska, and the various divisions and committees within the Department of Natural Resources. Federal agencies consulted include the U.S. Forest SErvice and the U.S. Soils Conservation Service. Industry interests have been expressed by Marathon Oil Co., Conoco, Resource Associates, Eskil Anderson Consultants, the Alaska Geological Society and the Alaska Miner's Association. The Alaska Council of Science and Technology has also endorsed these studies.

A number of map quadrangles (1:63,360) (figure) were chosen as primary targets for the resource investigation based on the needs expressed by the various interest groups named above. These quadrangles include existing or potential transportation corridors and are near areas where development is anticipated. A number of specific products are planned for the Southeastern Region:

Products (Five Years

1. Geologic, geochemical, and construction material maps and geophysical maps where appropriate of the following at 1:63,360 or larger scale.
   (a) Skagway A-2, B-2, B-3, B-4, C-3, C-4
   (b) Sitka A-4, A-5, B-4, B-5

2. Report on geology and geothermal resources of Tenakee Hot Springs
3. Report on geology and geothermal resources of Goddard Hot Springs
4. Report on geology and geothermal resources of Fish Bay Hot
5. Report on geology and geothermal resources of Bell Island Hot Springs
6. Report on geology and coal resources portions Kuiu-Etolin Trough
7. Other special purpose derivative maps particularly requested (e.g., suitability for sewage disposal systems, slope stability, excavation conditions, etc.)
8. Surface water maps, reports and analysis
    (a) stream discharge data reports
    (b) streamflow hydrographs
    (c) flood frequency curves
    (d) sediment load curves
    (e) water quality reports and maps
    (f) floodplain maps

    Rivers: Alsek River, Chilkat River, Taku River, Endicott River, Stikine Delta, miscellaneous small streams

    Lakes: Auke Lake
9. Climate and snow-survey reports for Petersburg, Eagle Crest, Fish Creek, Crystal Lake
10. Special study report on Tsirku Fan and Chilkat River upwelling condition
11. Groundwater maps, reports and analyses
    (a) Groundwater level maps
    (b) Groundwater quality maps
    (c) Groundwater data reports

Areas: Mendenhall Valley, Auke Bay, Haines, Skagway, Sitka

12. Selected maps and reports on State forest resources in Southeastern Alaska

13. Report on the geology and mineral potential of Haines/Skagway area

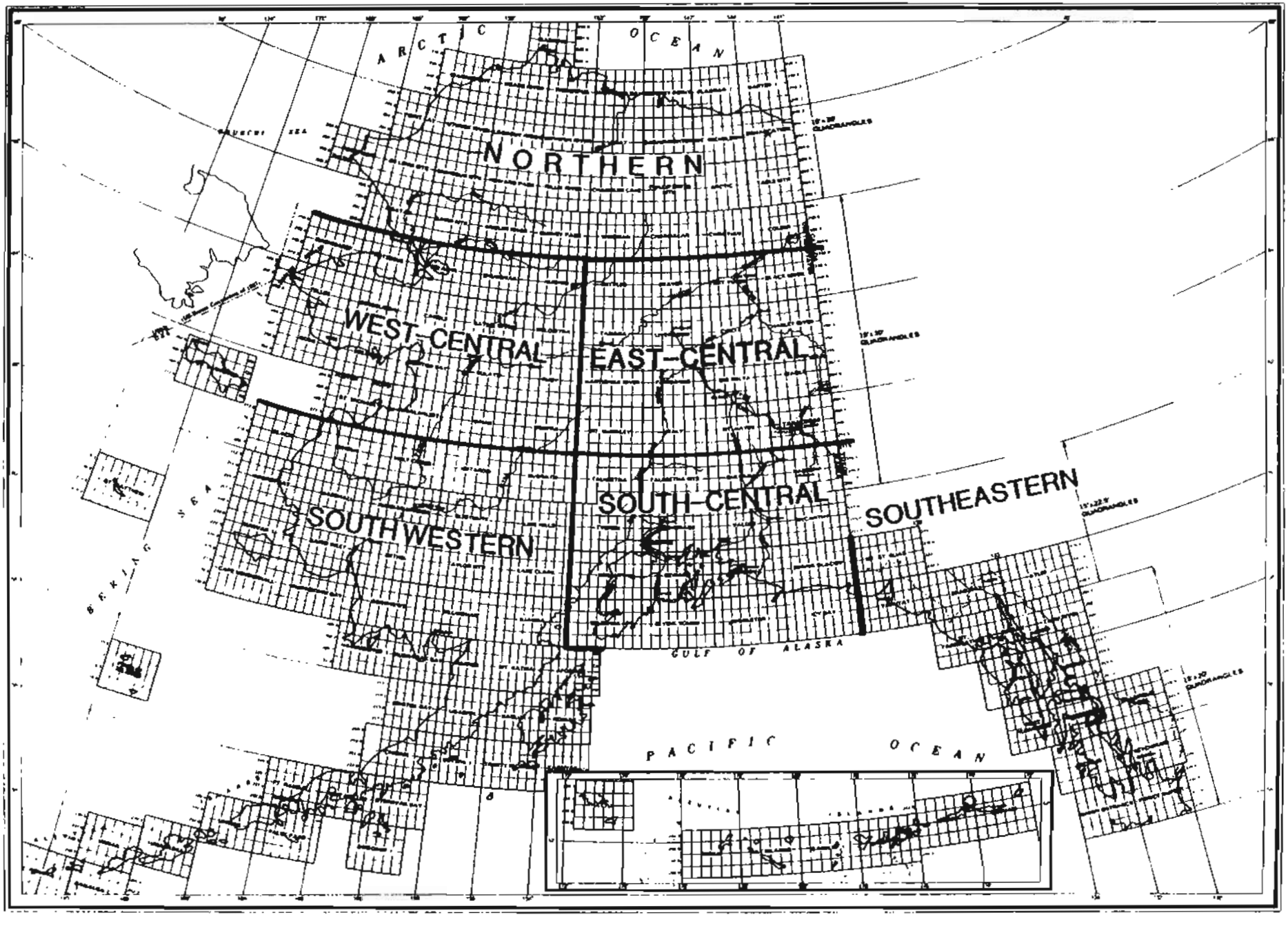

Figure 1. Map of Alaska showing regions referred to in this report and standard reference system for quadrangle locations.

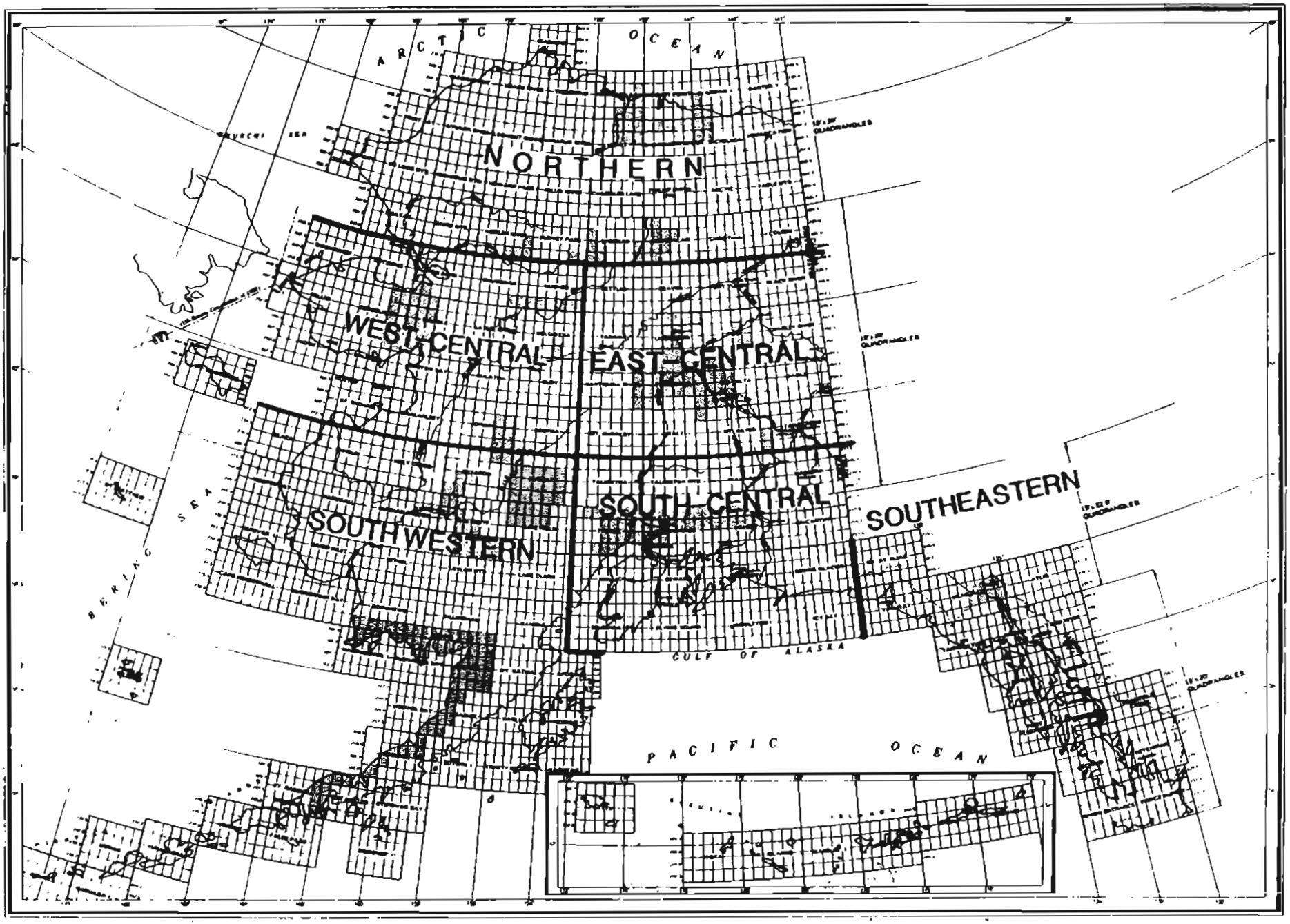

Figure 2. Map of Alaska showing specific areas for which geologic, geophysical, geochemical and surficial geology mapping will occur during the next 5 years. Not shown are vegetation, water, and geothermal study areas.

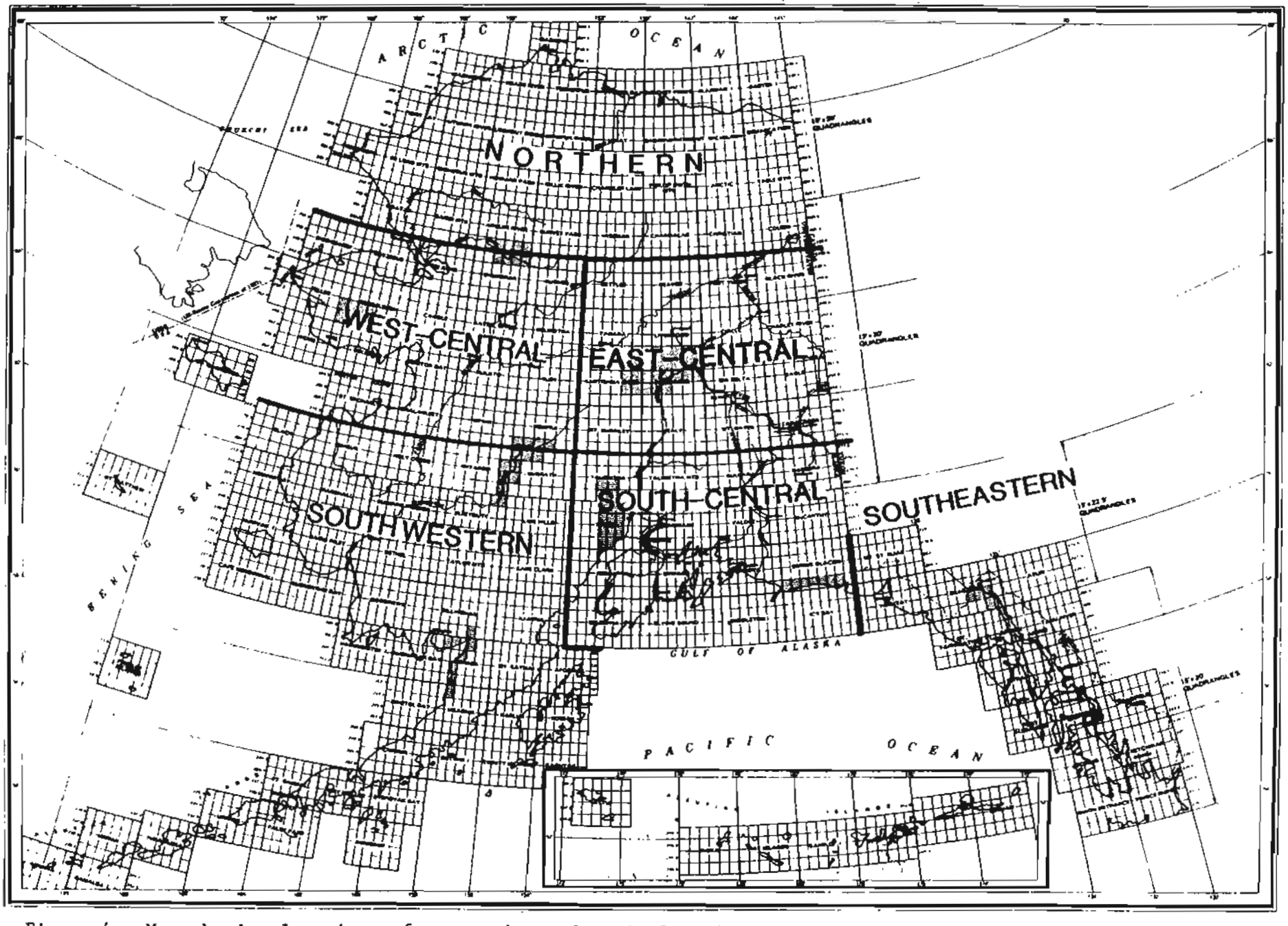

Figure 4. Map showing locations of vegetation and agricultural studies.