State of Alaska
Department of Natural Resources
Division of Geological and Geophysical Surveys
ENERGY RESOURCES SECTION
3001 Porcupine Drive
Anchorage, Alaska 99501

June 1974

*Note: This report deals with the two major petroleum resources, oil and gas. The oil shale and tar sand potential of Interior Alaska is considered significant and will be covered in a later report.

ENERGY & MINERAL RESOURCES OF ALASKA & THE IMPACT OF FEDERAL LAND POLICIES ON THEIR AVAILABILITY

OIL & GAS*

ALASKA OPEN FILE REPORT 50

by
Robert M. Klein, William M. Lyle,
Patrick L. Dobey, and Kristina M. O'Connor

PURPOSE

PART I OF THIS REPORT INDICATES **WHERE** OIL AND GAS MAY BE LOCATED IN ALASKA, AND ESTIMATES **HOW MUCH** OF IT CAN BE ECONOMICALLY PRODUCED.

PART II DISCUSSES THE **AVAILABILITY** OF OIL AND GAS LANDS IN ALASKA WITH REGARD TO PRESENT AND PROPOSED LAND USE POLICIES.

TABLE OF CONTENTS

PART I

PART II

Part I

ESTIMATED SPECULATIVE RECOVERABLE RESOURCES

OF

OIL AND GAS IN ALASKA

INTRODUCTION

The Division of Geological and Geophysical Survey has calculated the estimated speculative recoverable resources of oil and natural gas for the State of Alaska. Included is a map of the State showing areas of oil and gas potential, and a table which summarizes the estimated speculative recoverable resources of oil and gas for each onshore basin and offshore petroleum province in the State.

Estimates of this type are subject to a high degree of error. However, the figures are considered to be conservative, as they assume an average distribution of reserves based on reasonable and moderate limits of other producing areas. Historically, calculations of this type do not take into consideration the possibility of discovering giant oil fields. Thus, the discovery of Prudhoe Bay; the possibility of 14 billion barrels of oil in the Marsh Creek anticline in the Arctic National Wildlife Refuge (Hartman, 1973), the large structures in the Gulf of Alaska and the large sedimentary province in the Bering Sea all suggest that there is a much better than average chance that Alaska contains a number of giant oil fields. It is therefore considered that pessimistically the figures could be 25% too high, but with the addition of a few giant oil fields they may be 50% too low.

Speculative recoverable petroleum resources are here defined as those petroleum resources which are completely undiscovered, and which after discovery can reasonably be expected to be produced using present technology and economic conditions.

CONCLUSIONS – Part I

1. It is estimated that Alaska has 231,887 square miles of land on shore, and 394,881 square miles of land offshore on the continental shelf which has the potential of containing economic deposits of oil and gas. These areas are delineated on the map titled, "Estimated Speculative Petroleum Potential."
2. Basin by basin estimates of the speculative recoverable oil and gas resources in Alaska are indicated in Table 1 and on the map titled, "Estimated Speculative Petroleum Potential." Total resources are estimated to be 76.1 billion barrels of oil and 439.6 trillion cubic feet of gas. Total discovered recoverable reserves are 10.5 billion barrels of oil and 29.7 trillion cubic feet of gas. Cumulative production as of March 1973 was .5 billion barrels of oil and .6 trillion cubic feet of gas. These figures sum to an estimated total potential ultimate production of onshore and offshore Alaska of 86.6 billion barrels of oil and 469.3 trillion cubic feet of gas.

CALCULATIONS

The following method was used for calculating the estimated speculative recoverable petroleum resources in Alaska basins:

1. Each sedimentary basin was given a rank of I, II, or III based on known parameters such as production, oil shows, age and quality of the sedimentary section, presence or absence of known reservoir and source beds, and known structures that may contain oil and/or gas.

2. A search of the literature was made to determine reasonable recoverable oil figures per cubic mile of sediment. This has been calculated to be:

a. 150-300 thousand barrels in selected Tertiary trends in the coastal zone of the Gulf of Mexico.
b. Average 80,000 barrels per cubic mile in all Gulf of Mexico coastal sediments (Mason, 1971)
c. Average 50,000 barrels per cubic mile in contiguous United States producing basins (Mason, 1971)
d. Crick (1971) calculated in place reserves in Upper Cook Inlet, at 1.5 million barrels per cubic mile. He estimated 386,000 barrels per cubic mile would be found in the entire Cook Inlet. This figure reduces to approximately 115,000 barrels per cubic mile assuming 30% recovery.

3. Each basin was assigned a barrels per cubic mile figure based on its rank. A Rank I basin was assigned 75,000 barrels per cubic mile; Rank II — 50,000; and Rank III — 30,000.

The exceptions to this were the Cook Inlet, which has enough production to get a more accurate figure, the North Slope Basin which has significant oil discoveries and high future potential, and the Gulf of Alaska offshore which is considered to have at least as much potential as Cook Inlet.

4. A map was made showing all of the potential oil and gas areas in the State. This was done for sedimentary basins onshore where the basin outlines are relatively well known. Sedimentary provinces were used offshore rather than basins. A sedimentary province is defined as an area with sufficient sedimentary section to have accumulated and trapped petroleum. Public data is very limited in offshore areas and it was therefore felt that a province approach was more realistic. The provinces are limited to the 1,500 meter water depth. The surface area of each basin and province was then calculated from the map.

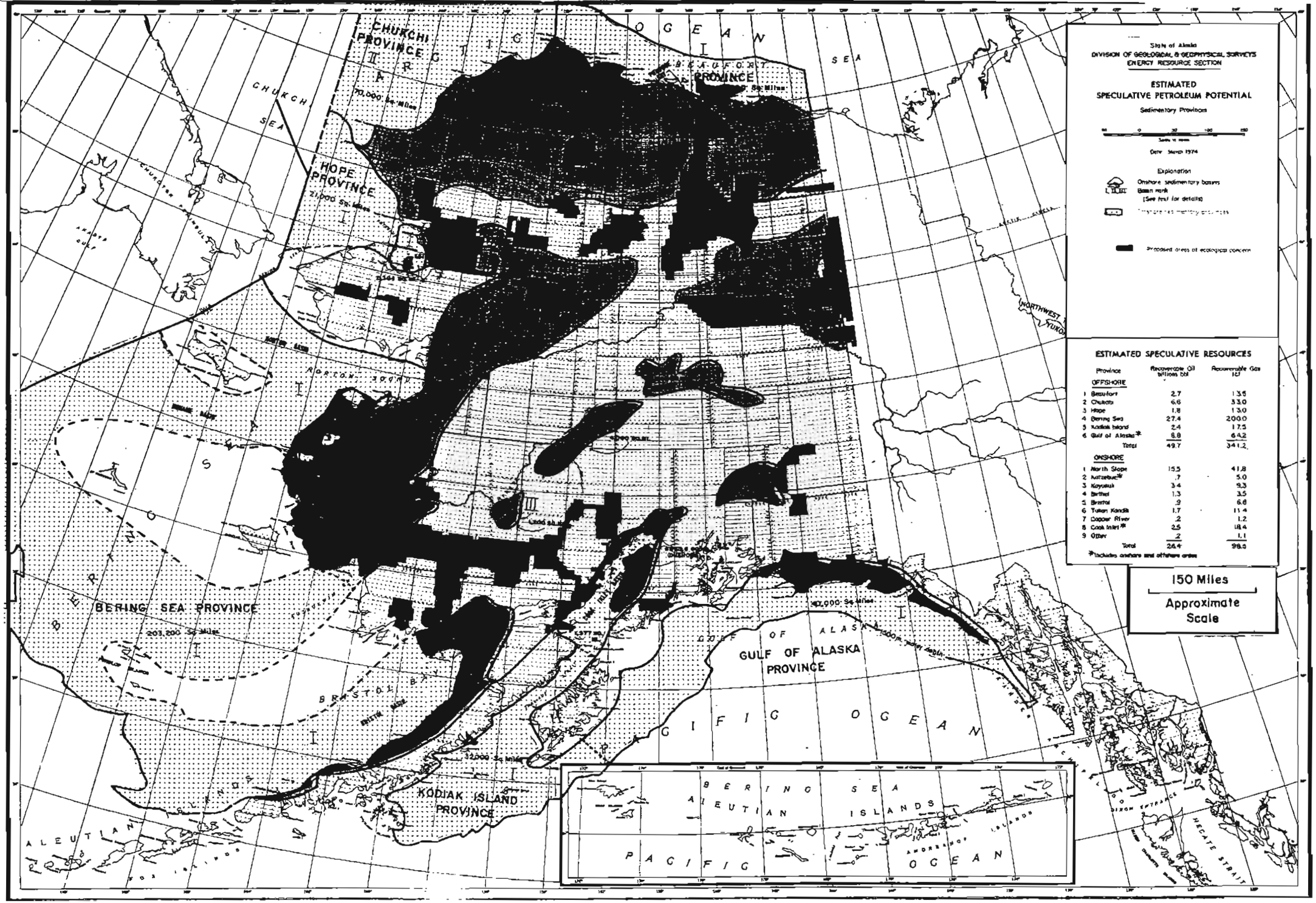
5. The average thickness of sedimentary rock was calculated for each basin and province. This figure was obtained from published data, well penetration depths, geophysical information, measured sections, and experience of different members of the Division of Geological and Geophysical Survey. An effective economic total thickness of 25,000 feet was used even though some basins contained 30,000 to 40,000 feet of sediment.

6. Speculative recoverable oil was calculated by multiplying area times average sediment thickness times anticipated barrels of oil per cubic mile. Speculative recoverable gas was calculated using the Cook Inlet ratio of 7.3 MCF (thousand cubic feet) per barrel of oil in Tertiary basins, and the Prudhoe Bay ratio of 2.7 MCF per barrel of oil in Mesozoic and Paleozoic basins.

Table 1
ESTIMATED SPECULATIVE RECOVERABLE RESOURCES OF OIL AND NATURAL GAS IN ALASKA

Geologic Basin or Province	Rank[1]	Geologic Section	Sq. Miles	Ave. Thick. (miles)	Cu. Mi. of Sediment (To Max. Drilling Depth of 25,000')	Bbls. of Oil Per Cu. Mi.	Estimated Speculative Recoverable Resources – Oil (Billions of Barrels)	MCF per Barrel	Estimated Speculative Recoverable Resources – Gas (Trillions of Cu. Ft.)
ONSHORE									
Cook Inlet*	I	Tertiary & Mesozoic	6,083	1.33	8,064	115,000	.93	7.3	6.67
Copper River	III	Tertiary	3,840	1.4	5,376	30,000	.16	7.3	1.20
Holitna	III	Tertiary	1,200	.47	564	30,000	.02	7.3	.12
Minchumina	III	Tertiary	4,000	.47	1,894	30,000	.06	7.3	.41
Middle Tanana	III	Tertiary	5,440	.47	2,556	30,000	.08	7.3	.55
Yukon – Kandik	II	Tertiary & Paleozoic	15,440	1.9	29,336	50,000	1.50	7.3	10.90
Yukon – Kandik	III	Mesozoic & Paleozoic	4,064	1.42	5,770	30,000	.17	2.7	.47
Gulf of Alaska*	I	Tertiary	10,080	2.08	20,966	76,000	1.6	7.3	11.6
Bristol Bay	II	Tertiary & Mesozoic	12,320	1.52	18,726	50,000	.94	7.3	6.83
Kotzebue* (Selawik)	II	Tertiary & Mesozoic	3,200	1.89	6,048	50,000	.30	7.3	2.19
North Slope	I	Tertiary & Mesozoic	66,400	1.9	126,160	100,000	12.6	2.7	34.0
North Slope	II	Mesozoic & Paleozoic	30,240	1.9	57,456	50,000	2.9	2.7	7.8
Yukon – Koyukuk	I	Mesozoic	2,400	1.89	4,545	75,000	.34	2.7	.91
Yukon – Koyukuk	III	Mesozoic	53,440	1.9	101,536	30,000	3.1	2.7	8.4
Bethel	II	Tertiary & Mesozoic	13,760	1.9	26,144	50,000	1.3	2.7	3.5
Subtotal			231,887		415,141		26		95.5
OFFSHORE									
Cook Inlet+	I	Tertiary & Mesozoic	7,377	1.89	13,943	115,000	1.6	7.3	11.68
Gulf of Alaska+	I	Tertiary	40,000	1.8	72,000	100,000	7.2	7.3	52.6
Kodiak Island Prov.	I	Tertiary & Mesozoic	32,000	1.0	32,000	75,000	2.4	7.3	17.5
Bering Sea Prov.	I	Tertiary & Mesozoic	203,000	1.8	365,400	75,000	27.4	7.3	200.0
Kotzebue+	I	Tertiary & Mesozoic	2,304	2.27	5,230	75,000	.39	7.3	2.84
Hope Province	I	Tertiary	21,000	1.14	23,940	75,000	1.8	7.3	13.0
Chukchi Province	II	Tertiary, Mesozoic & Possibly Older	70,000	1.89	132,575	50,000	6.6	5.0	33.0
Beaufort Prov.	I	Tertiary & Older	19,200	1.89	36,288	75,000	2.7	5.0	13.5
Subtotal			394,881		681,376		50.1		344.1
Total Speculative Petroleum Resources							76.1		439.6
Total Discovered but not Produced Resources							10.5		29.7
Total Cumulative Production as of March 1973							.5		.6

1 – Each basin is ranked according to its estimated petroleum potential (see text for details)
* – Onshore portion only
+ – Offshore portion only



State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION

ESTIMATED SPECULATIVE PETROLEUM POTENTIAL

Sedimentary Provinces

Date: March 1974

Explanation

Onshore sedimentary basins
Basin rank
(See text for details)

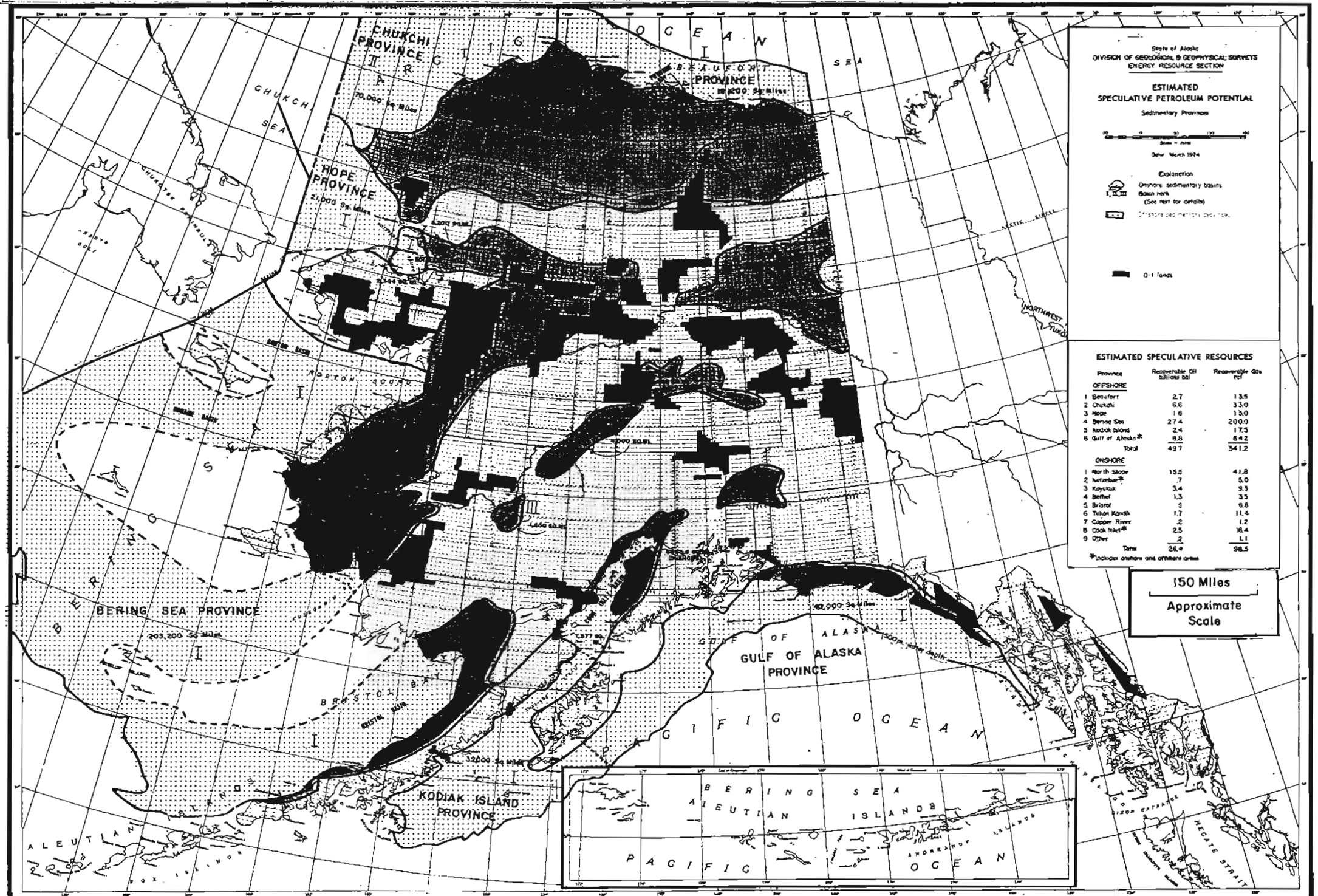
Proposed areas of ecological concern

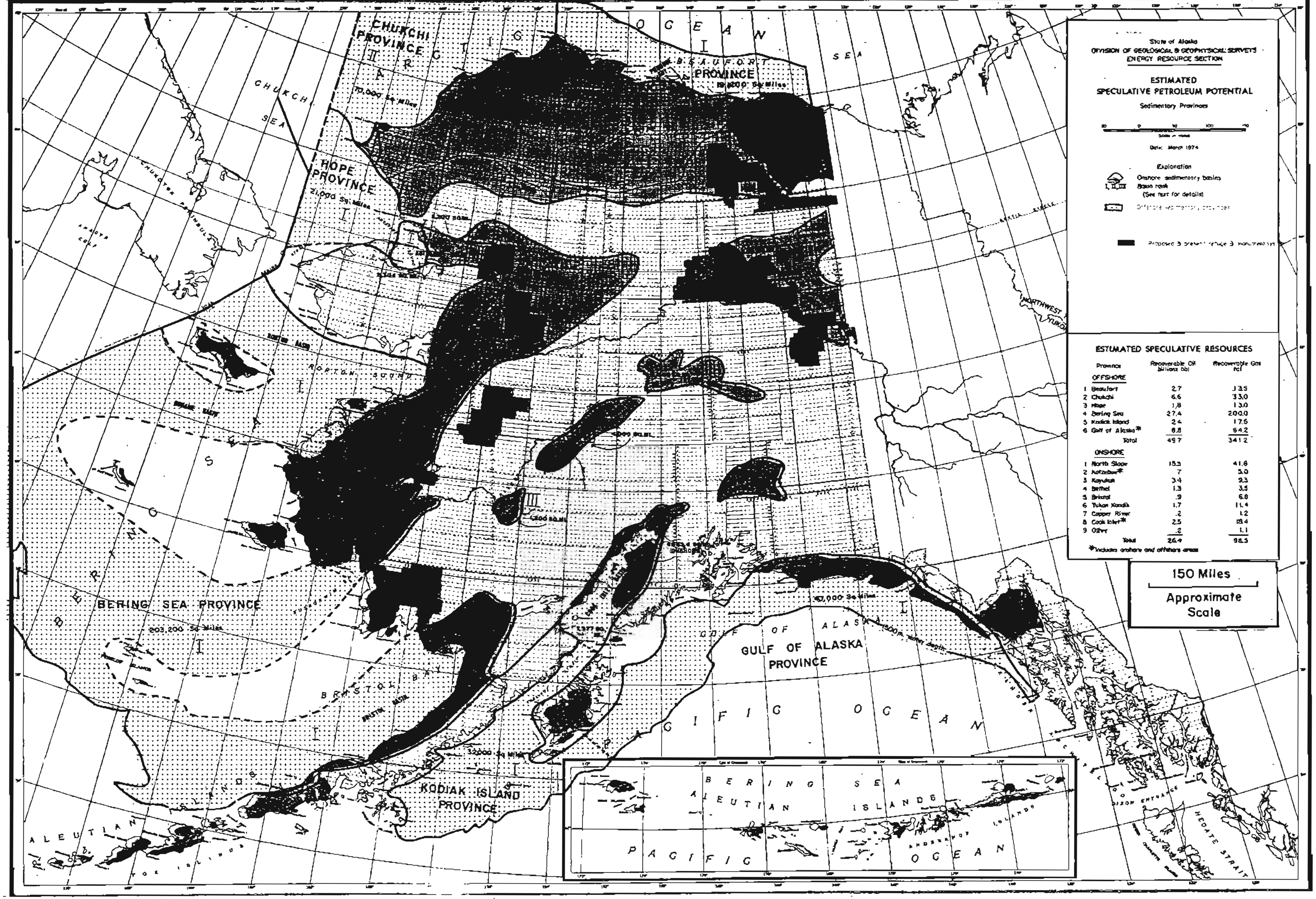
ESTIMATED SPECULATIVE RESOURCES

Province	Recoverable Oil billions bbl	Recoverable Gas Tcf
OFFSHORE		
1 Beaufort	2.7	13.5
2 Chukchi	6.6	33.0
3 Hope	1.8	13.0
4 Bering Sea	27.4	200.0
5 Kodiak Island	2.4	17.5
6 Gulf of Alaska*	8.8	64.2
Total	49.7	341.2
ONSHORE		
1 North Slope	15.5	41.8
2 Kotzebue*	.7	5.0
3 Koyukuk	3.4	9.3
4 Barrhel	1.3	3.5
5 Bristol	.9	6.6
6 Tuluk Kandik	1.7	11.4
7 Copper River	.2	1.2
8 Cook Inlet*	2.5	18.4
9 Other	.2	1.1
Total	26.4	98.6

*Includes onshore and offshore areas

150 Miles
Approximate Scale

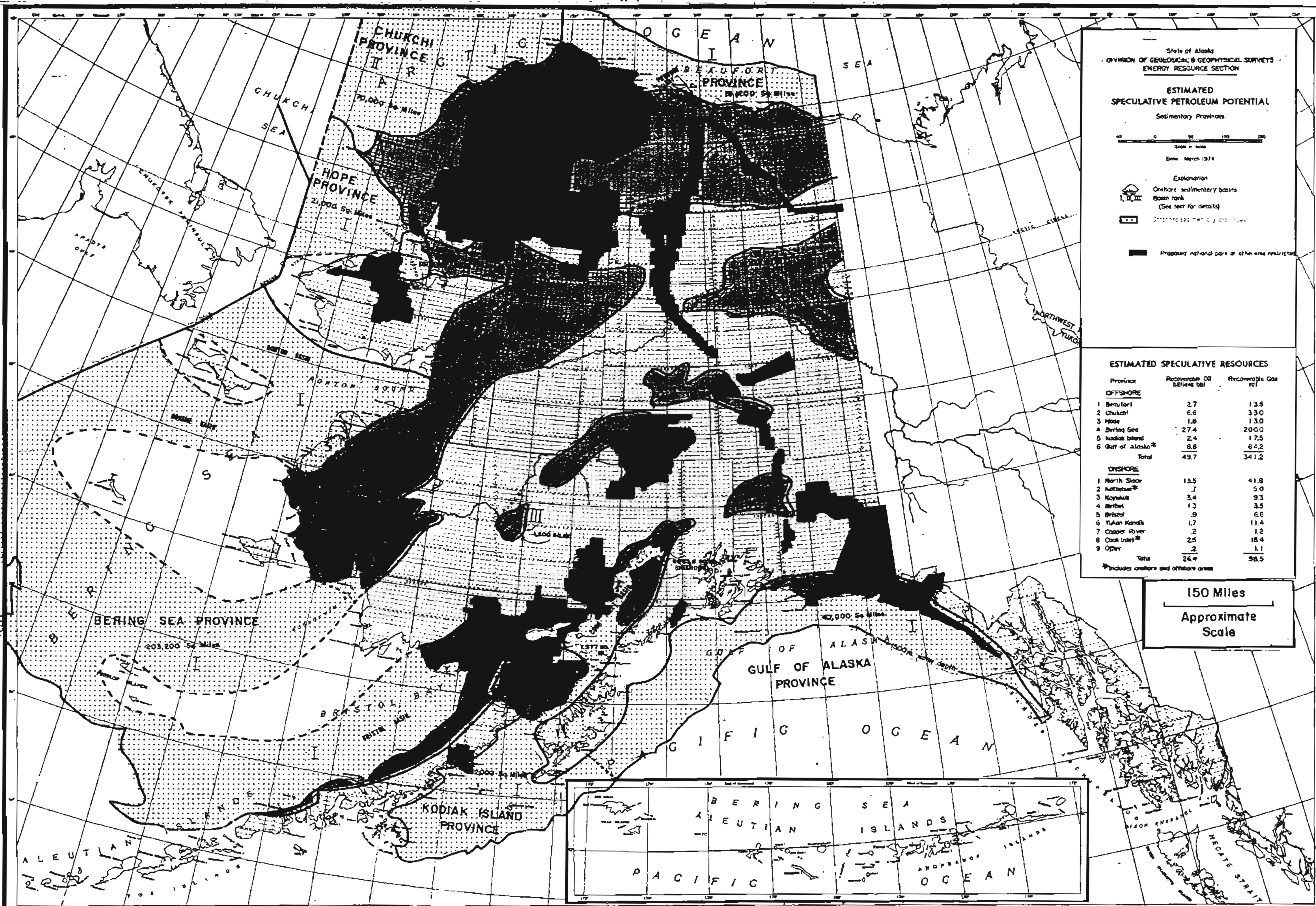

State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION
ESTIMATED
SPECULATIVE PETROLEUM POTENTIAL
Sedimentary Provinces
Date: March 1974
Explanation
Onshore sedimentary basins
Basin rank
(See text for details)
Offshore sedimentary basins
0-1 fields
ESTIMATED SPECULATIVE RESOURCES
Province | Recoverable Oil billions bbl | Recoverable Gas tcf
OFFSHORE
1 Beaufort 2.7 13.5
2 Chukchi 6.6 33.0
3 Hope 1.8 13.0
4 Bering Sea 27.4 200.0
5 Kodiak Island 2.4 17.5
6 Gulf of Alaska* 8.8 64.2
Total 49.7 341.2
ONSHORE
1 North Slope 15.5 41.8
2 Nortzebuk* .7 5.0
3 Koyukuk 3.4 9.3
4 Bethel 1.3 3.5
5 Bristol .9 6.8
6 Yukon Kanda 1.7 11.4
7 Copper River .2 1.2
8 Cook Inlet* 2.5 18.4
9 Other .2 1.1
Total 26.4 98.5
*Includes onshore and offshore areas
150 Miles
Approximate Scale
CHUKCHI PROVINCE
70,000 Sq Miles
BEAUFORT PROVINCE
HOPE PROVINCE
21,000 Sq. Miles
BERING SEA PROVINCE
203,200 Sq Miles
KODIAK ISLAND PROVINCE
32,000 Sq Miles
GULF OF ALASKA PROVINCE
40,000 Sq Miles
ARCTIC OCEAN
CHUKCHI SEA
BEAUFORT SEA
BERING SEA
PACIFIC OCEAN
GULF OF ALASKA
ALEUTIAN ISLANDS
BRISTOL BAY
NORTON SOUND
KOTZEBUE SOUND
CHUKOTSK PENINSULA
NORTHWEST TERRITORIES
ARCTIC CIRCLE
PRINCE WILLIAM SOUND
HECATE STRAIT
PACIFIC OCEAN
BERING SEA
ALEUTIAN ISLANDS
ANDREANOF ISLANDS
PACIFIC OCEAN



ESTIMATED SPECULATIVE RESOURCES

Province	Recoverable Oil Billions bbl	Recoverable Gas tcf
OFFSHORE		
1 Beaufort	2.7	13.5
2 Chukchi	6.6	33.0
3 Hope	1.8	13.0
4 Bering Sea	27.4	200.0
5 Kodiak Island	2.4	17.6
6 Gulf of Alaska*	8.8	64.2
Total	49.7	341.2
ONSHORE		
1 North Slope	15.3	41.8
2 Kotzebue*	7	5.0
3 Koyukuk	3.4	9.3
4 Bethel	1.3	3.5
5 Bristol	.9	6.8
6 Yukon Kandik	1.7	11.4
7 Copper River	.2	1.2
8 Cook Inlet*	2.5	18.4
9 Other	.2	1.1
Total	26.4	98.5

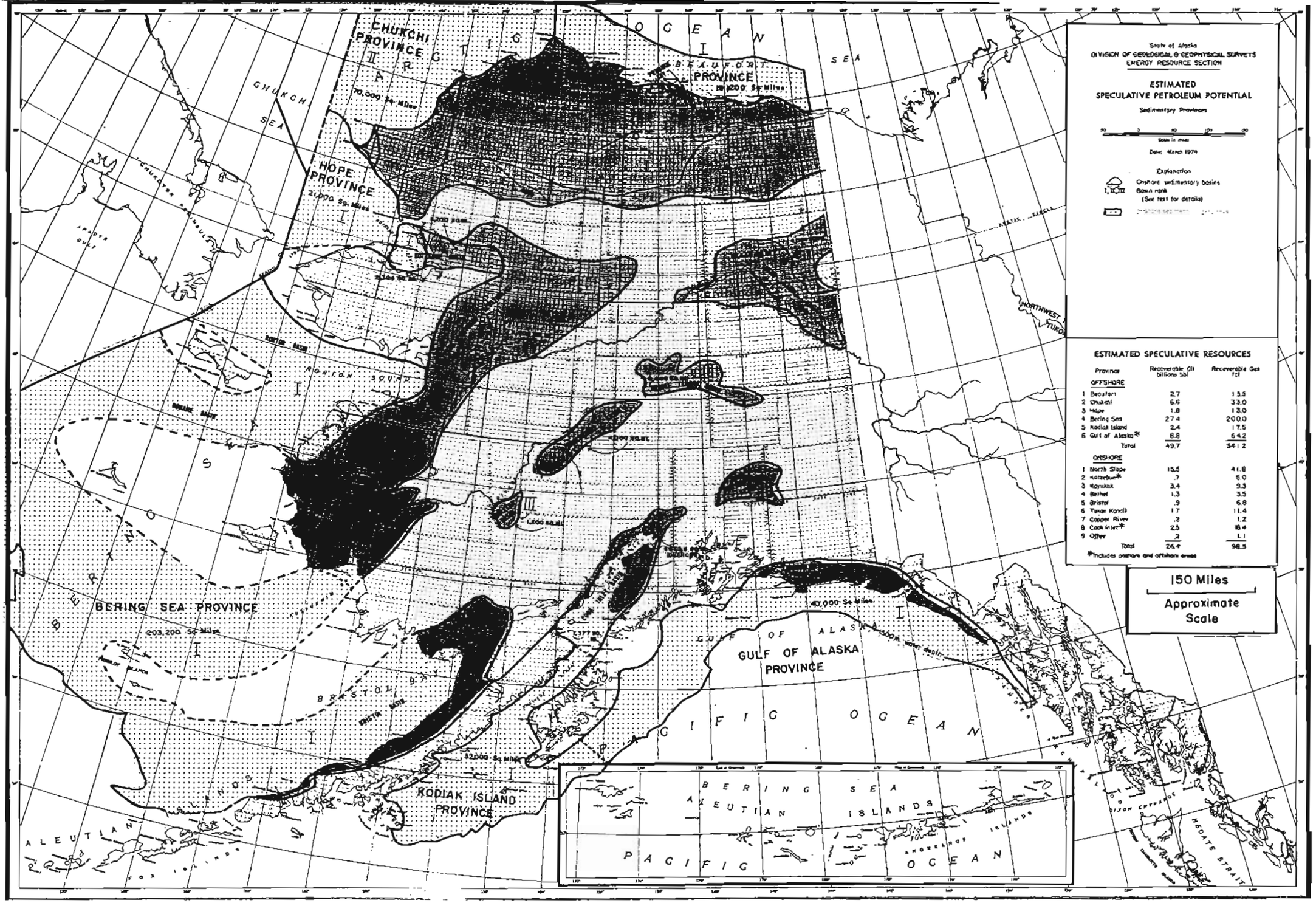
*Includes onshore and offshore areas



ESTIMATED SPECULATIVE RESOURCES

Province	Recoverable Oil billions bbl	Recoverable Gas tcf
OFFSHORE		
1 Beaufort	2.7	13.5
2 Chukchi	6.6	33.0
3 Hope	1.8	13.0
4 Bering Sea	27.4	200.0
5 Kodiak Island	2.4	17.5
6 Gulf of Alaska*	8.8	64.2
Total	49.7	341.2
ONSHORE		
1 North Slope	13.5	41.8
2 Kotzebue*	.7	5.0
3 Koyukuk	3.4	9.3
4 Bethel	1.3	3.5
5 Bristol	.9	6.8
6 Yukon Kandik	1.7	11.4
7 Copper River	.2	1.2
8 Cook Inlet*	2.5	18.4
9 Other	.2	1.1
Total	26.4	98.5

*Includes onshore and offshore areas



State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION

ESTIMATED SPECULATIVE PETROLEUM POTENTIAL

Sedimentary Provinces

50 0 50 100 150
Scale in miles

Date: March 1978

Explanation

Onshore sedimentary basins
I, II, III Basin rank
(See text for details)

ESTIMATED SPECULATIVE RESOURCES

Province	Recoverable Oil billions Sbl	Recoverable Gas tcf
OFFSHORE		
1 Beaufort	2.7	15.5
2 Chukchi	6.6	33.0
3 Hope	1.8	13.0
4 Bering Sea	27.4	200.0
5 Kodiak Island	2.4	17.5
6 Gulf of Alaska*	6.8	64.2
Total	49.7	341.2
ONSHORE		
1 North Slope	15.5	41.8
2 Kotzebue*	.7	5.0
3 Koyukuk	3.4	9.3
4 Bethel	1.3	3.5
5 Bristol	.9	6.8
6 Tyonek Kandik	1.7	11.4
7 Copper River	.2	1.2
8 Cook Inlet*	2.5	18.4
9 Other	.2	1.1
Total	26.4	98.5

*Includes onshore and offshore areas

150 Miles
Approximate Scale

Part II

LAND RESOURCE EVALUATION

(AVAILABILITY OF OIL AND GAS IN ALASKA)

INTRODUCTION – Part II

An attempt has been made to objectively evaluate the effect of previous and proposed public land withdrawals on the oil and gas potential land in Alaska, with respect to its ultimate use. Some of the lands are withdrawn under section 17(d) of ANCSA, and the proposal was made to classify them by the Secretary of the Interior in December of 1973. Some of the lands have been previously withdrawn.

Before oil production can take place in any specified area, the following conditions must be met: (1) The land must be made available for leasing so that private enterprise has the justification to begin exploring for oil; (2) The land must be leased and drilled to evaluate the economic potential of the area (a two- to five-year process); (3) If an economic field is discovered, the necessary engineering, transportation, and drilling procedures must be undertaken to bring the field to production (a three- to five-year process). This report is concerned only with step 1; that is when and how much of the oil and gas potential land in Alaska will be available and open for exploration. Presently approximately 96% of the onshore oil potential land in Alaska is unavailable for leasing, and even if all this land was to be made available immediately, it would be six to 10 years before any of the potential oil and gas could be used.

The following overlays indicate the total amount of prospective onshore oil and gas land which lie in the various pre-existing and proposed classifications of land in Alaska. The accompanying tables express the amount of land in each classification which lie within oil potential areas. This is expressed as a per cent of the total oil potential land in onshore Alaska. For example, it is estimated that the State contains 231,887 square miles of onshore oil potential land. Within this 231,887 square miles there are 34,146 square miles of proposed and pre-existing wildlife refuges; or 15% of the total oil and gas potential land in Alaska. This is tabulated in Fig. 3 and shown on the accompanying map.

A summary of the present and estimated ultimate impact of existing and proposed public land withdrawals on oil and gas potential land is given in Figures 1 and 2. Due to the uncertainty of how the land will be finally classified, the summary diagram (Fig. 2) is based on statistical averages from the other overlays. For example, in the case of "Areas of Ecological Concern," one-third of the land was estimated to remain in Federal ownership and possibly be highly restricted or closed to oil development. The other two-thirds were assumed to have been selected by the Natives or the State. Also it is assumed that the same regulations will apply to the proposed land withdrawals that apply to existing withdrawals. For example, proposed refuges and monuments are considered closed to development because the Arctic National Wildlife Range and other wildlife refuges are effectively closed to development by regulations, stipulations, or restrictions.

The areas of D-2 withdrawals (Parks, Wildlife Refuges, etc.) were taken directly from the environmental impact statements furnished by the National Park Service. The land overlays for other than D-2 withdrawals were compiled from unofficial Federal sources. The State of Alaska does not recognize these overlays as official documents.

CONCLUSION – Part II

1. The present impact of the public lands withdrawn under section 17(d) of ANCSA, coupled with previous Federal withdrawals virtually eliminate onshore oil development in Alaska. At the present time approximately 96% of the onshore oil potential land in Alaska is not leasable for oil development. This "freeze" has been in existence for five years and can continue indefinitely at the discretion of the

Secretary of the Interior unless Congress specifically stipulates the land use policies of each area.

2. Private development of onshore petroleum resources is considered to be severely limited in the future. It is estimated that 42% of onshore oil potential land may be closed to private oil and gas development indefinitely due to previous and proposed Federal withdrawals, and another 35% may not be open for development for five to ten years. **This represents 176,234 square miles of oil potential land** (an area Two-thirds the size of the entire state of Texas). These estimates are summarized in Figure 2, and explained in Figures 3-6. The accompanying maps and overlays show the impact of the various Federal withdrawals on oil and gas potential land in Alaska.

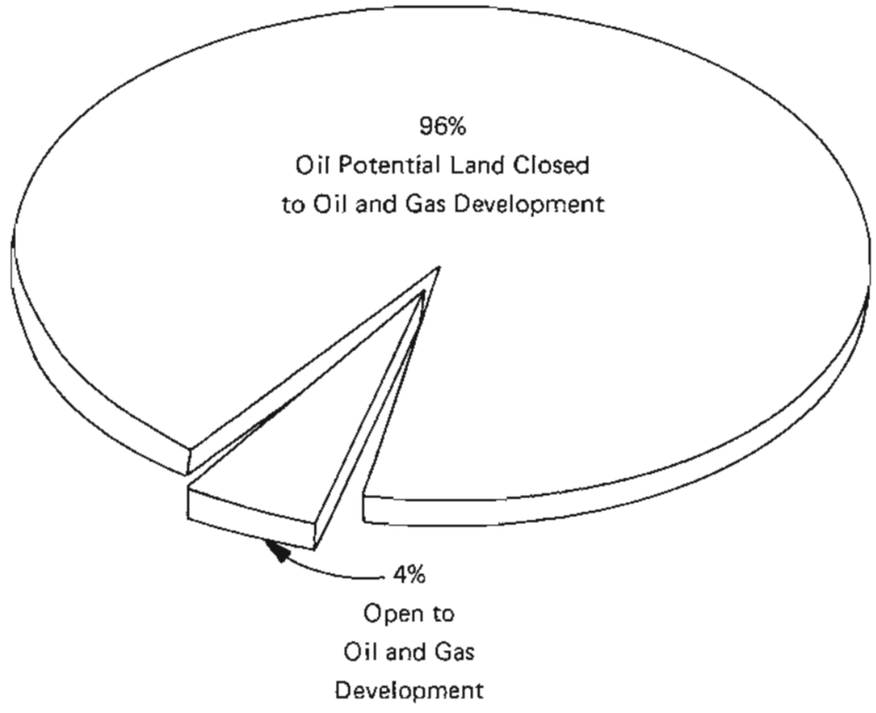
RECOMMENDATIONS

This report emphasizes the huge petroleum potential of Alaska. This resource should be developed in an orderly and conservative manner. If the present trend of Federal land administration continues in Alaska, its natural resource development will be chaotic.

IT IS RECOMMENDED THAT:

a. Thorough and complete scientific inventory of all mineral resources be conducted on Federal lands;
b. That a plan for the development of the resources under proper environmental guidelines be undertaken immediately;
c. That the State of Alaska be allowed its right of selection on these potential lands enacted by Congress in the Statehood Act of 1958;

Figure 1
PRESENT IMPACT OF PREVIOUS AND PROPOSED PUBLIC LAND WITHDRAWALS ON OIL AND GAS POTENTIAL LAND IN ALASKA (ONSHORE)



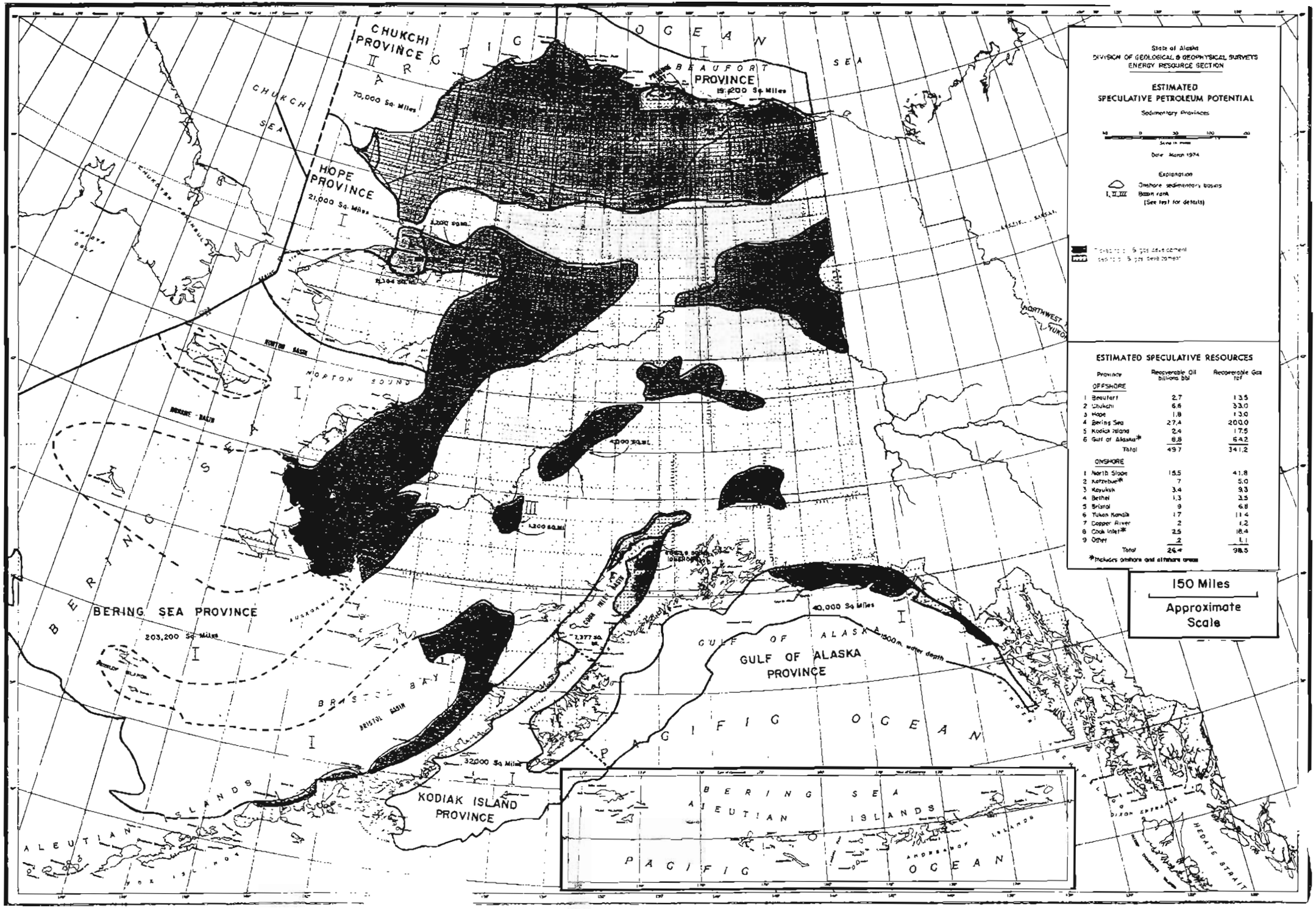
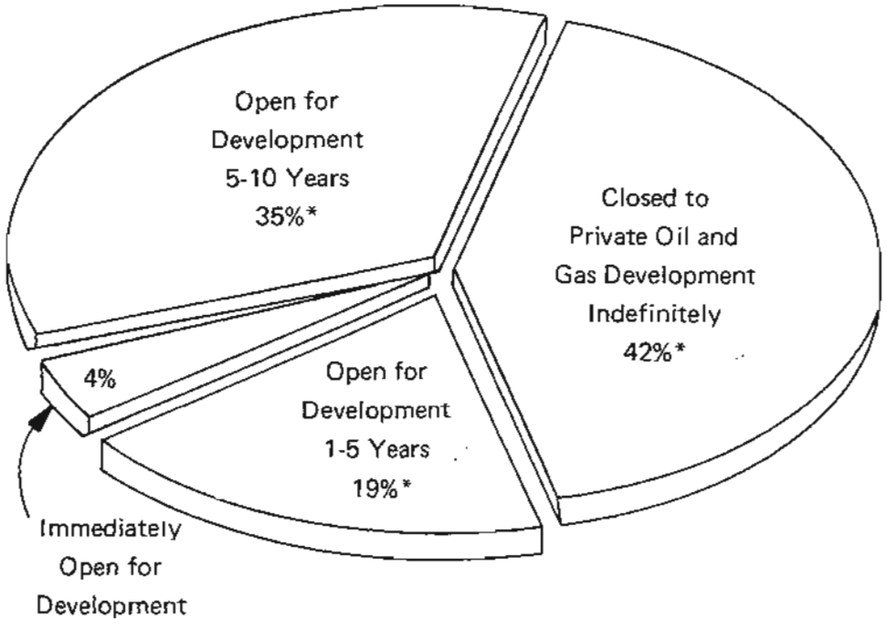

State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION
ESTIMATED
SPECULATIVE PETROLEUM POTENTIAL
Sedimentary Provinces
Scale in miles
Date: March 1974
Explanation
Onshore sedimentary basins
Basin rank
(See text for details)
Probable oil & gas development
Possible oil & gas development
ESTIMATED SPECULATIVE RESOURCES
Province | Recoverable Oil billions bbl | Recoverable Gas tcf
OFFSHORE
1 Beaufort | 2.7 | 13.5
2 Chukchi | 6.6 | 33.0
3 Hope | 1.8 | 13.0
4 Bering Sea | 27.4 | 200.0
5 Kodiak Island | 2.4 | 17.5
6 Gulf of Alaska* | 6.8 | 64.2
Total | 49.7 | 341.2
ONSHORE
1 North Slope | 15.5 | 41.8
2 Kotzebue* | 7 | 5.0
3 Koyukuk | 3.4 | 9.3
4 Bethel | 1.3 | 3.5
5 Bristol | 9 | 6.8
6 Yukon Kandik | 1.7 | 11.4
7 Copper River | 2 | 1.2
8 Cook Inlet* | 2.5 | 18.4
9 Other | .2 | 1.1
Total | 26.4 | 98.5
*Includes onshore and offshore areas
150 Miles
Approximate Scale
CHUKCHI PROVINCE II
70,000 Sq. Miles
BEAUFORT PROVINCE
19,200 Sq Miles
HOPE PROVINCE
21,000 Sq. Miles
BERING SEA PROVINCE
203,200 Sq Miles
KODIAK ISLAND PROVINCE
32,000 Sq Miles
GULF OF ALASKA PROVINCE
40,000 Sq Miles
1500m water depth
CHUKCHI SEA
BEAUFORT SEA
NORTHWEST YUKON
NORTON SOUND
NORTON BASIN
HOPE BASIN
BRISTOL BAY
BRISTOL BASIN
COOK INLET BASIN
ALEUTIAN ISLANDS
PACIFIC OCEAN
ARCTIC OCEAN
BERING SEA
ANDREANOF ISLANDS
DIXON ENTRANCE
HECATE STRAIT

Figure 2
ESTIMATED ULTIMATE IMPACT OF PREVIOUS AND PROPOSED PUBLIC LAND WITHDRAWALS ON OIL AND GAS POTENTIAL LAND (ONSHORE)



* These are approximate average figures from the table.

Estimated Land Status	% of Total Oil Potential Land	Land Classification
Open for development:		
A. Immediately	4%	State land: National Forest land
B. Within 1-5 Years	6% to 41%	Native selections; future State selections
C. Within 5-10 Years	20% to 55%	D-1 land; proposed National Forest land
Closed to development:		
A. Closed; but could be opened by Secretary of the Interior**	15%	Refuge and Monument
B. Highly restricted to no mineral entry	0% to 16%	Areas of Ecologic Concern
C. Closed to all mineral entry	21%***	Parks, NPR-4, utility corridors, etc.

** Based on rules now in effect on Arctic National Wildlife Range and National Wildlife Refuges in Alaska.

*** 16% of this figure is NPR-4 land.

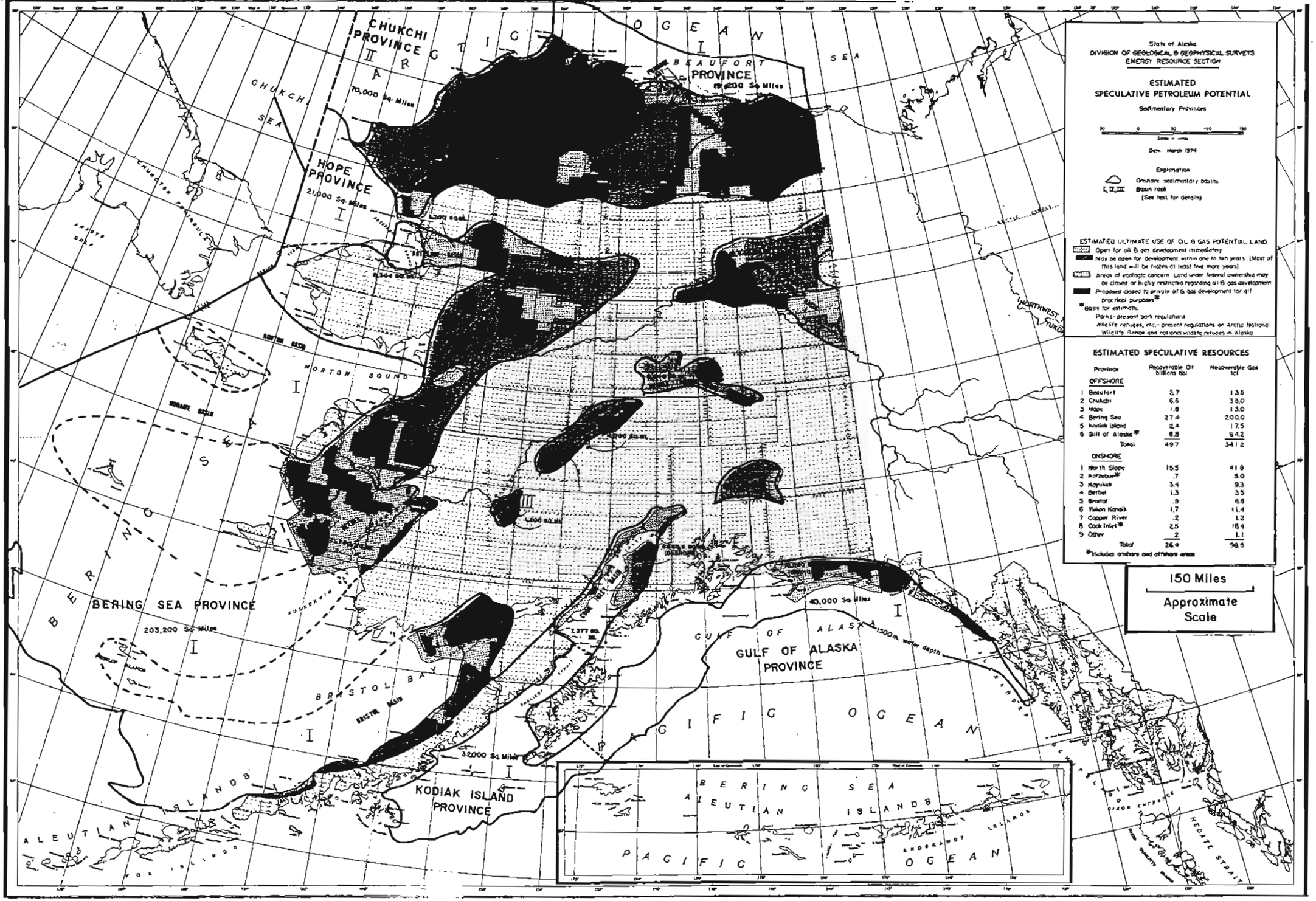
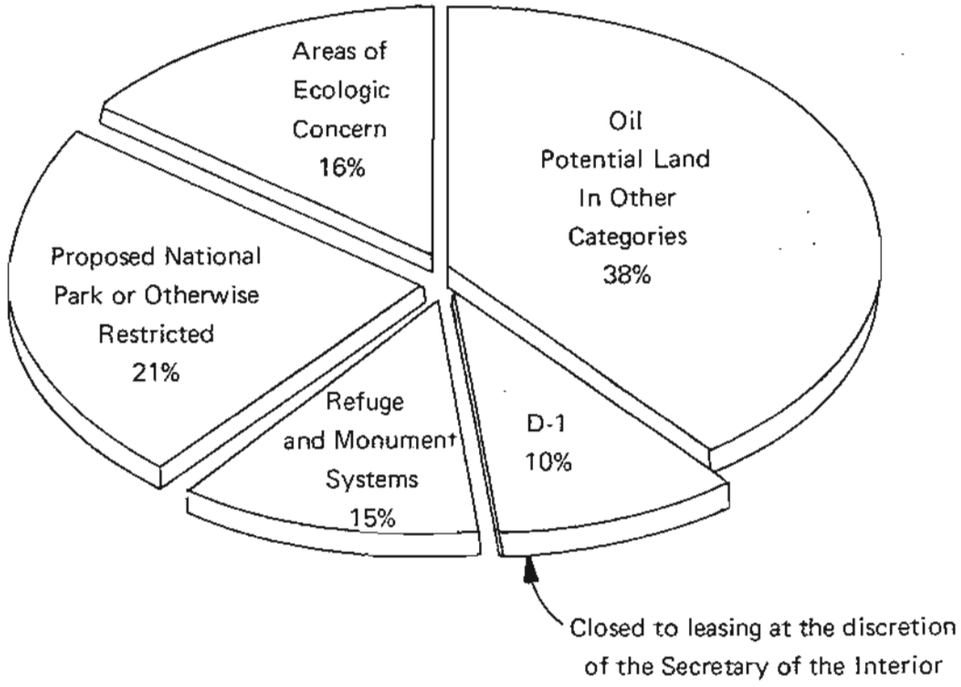

State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION
ESTIMATED
SPECULATIVE PETROLEUM POTENTIAL
Sedimentary Provinces
Date: March 1974
Explanation
Onshore sedimentary basins
I, II, III Basin rank
(See text for details)
ESTIMATED ULTIMATE USE OF OIL & GAS POTENTIAL LAND
Open for oil & gas development immediately
May be open for development within one to ten years (Most of this land will be frozen at least five more years)
Areas of ecologic concern. Land under federal ownership may be closed or highly restrictive regarding oil & gas development
Proposed closed to private oil & gas development for all practical purposes*
* Basis for estimate.
Parks-present park regulations
Wildlife refuges, etc.-present regulations on Arctic National Wildlife Range and national wildlife refuges in Alaska
ESTIMATED SPECULATIVE RESOURCES
Province | Recoverable Oil billions bbl | Recoverable Gas tcf
OFFSHORE
1 Beaufort 2.7 13.5
2 Chukchi 6.6 33.0
3 Hope 1.8 13.0
4 Bering Sea 27.4 200.0
5 Kodiak Island 2.4 17.5
6 Gulf of Alaska* 6.8 64.2
Total 49.7 341.2
ONSHORE
1 North Slope 15.5 41.8
2 Porcupine* .7 5.0
3 Kotzebue 3.4 9.3
4 Norton 1.3 3.5
5 Bristol 3.9 6.8
6 Yukon Kandik 1.7 11.4
7 Copper River .2 1.2
8 Cook Inlet* 2.5 18.9
9 Other .2 1.1
Total 29.9 98.5
*Includes onshore and offshore areas
150 Miles
Approximate Scale
CHUKCHI PROVINCE
70,000 Sq. Miles
BEAUFORT PROVINCE
49,200 Sq. Miles
HOPE PROVINCE
21,000 Sq. Miles
BERING SEA PROVINCE
203,200 Sq. Miles
GULF OF ALASKA PROVINCE
40,000 Sq. Miles
KODIAK ISLAND PROVINCE
32,000 Sq. Miles
CHUKCHI SEA
BEAUFORT SEA
NORTON SOUND
BRISTOL BAY
GULF OF ALASKA
1500m. water depth
PACIFIC OCEAN
ALEUTIAN ISLANDS
BERING SEA
ALEUTIAN ISLANDS
PACIFIC OCEAN

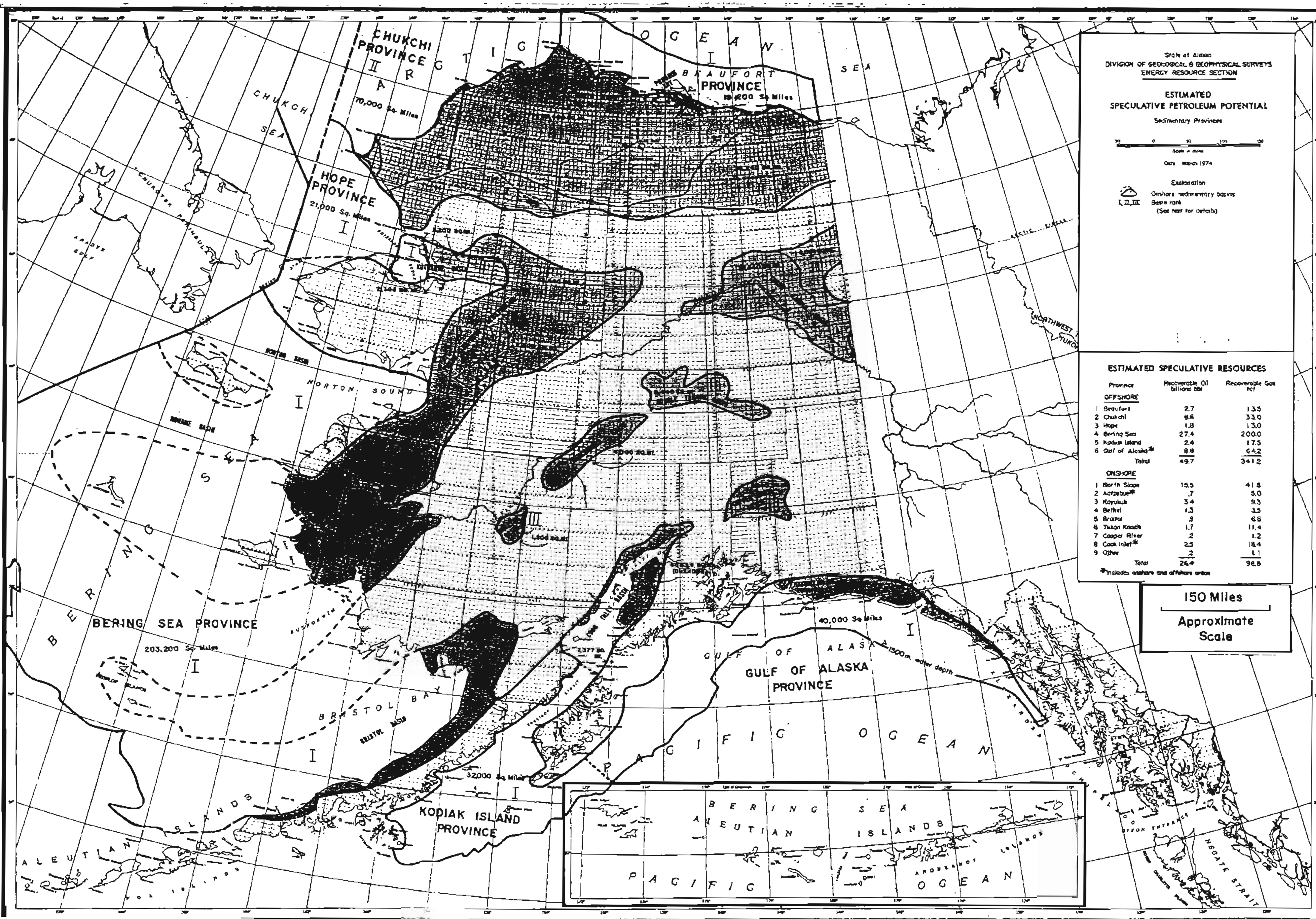
Figure 3

EFFECT OF LANDS OF HIGH ADVERSE IMPACT ON OIL AND GAS DEVELOPMENT



Land Category	Estimate of Proposed Land Use	% Resources In Land Category	Amount of Resource In Land Category (Sq. Mi.)
Proposed National Park or otherwise restricted	Closed to mineral entry	21*	48,900
Proposed and present refuge and monument systems	**Old systems** – development precluded by regulation New systems – closed to mineral entry by law. This will probably continue indefinitely.**	15	34,146
Proposed areas of Ecologic Concern	Those areas not selected by State or Natives; probably highly restricted mineral entry	16***	36,576
D-1 land	Closed to non-metallic mineral staking or leasing from 5 to 10 years	10	22,130
TOTAL		62	141,752

* Includes NPR-4 which is 16% of this figure
** Based on rules in effect Arctic National Wildlife Range and other refuges
*** This is if all this land remains in Federal ownership



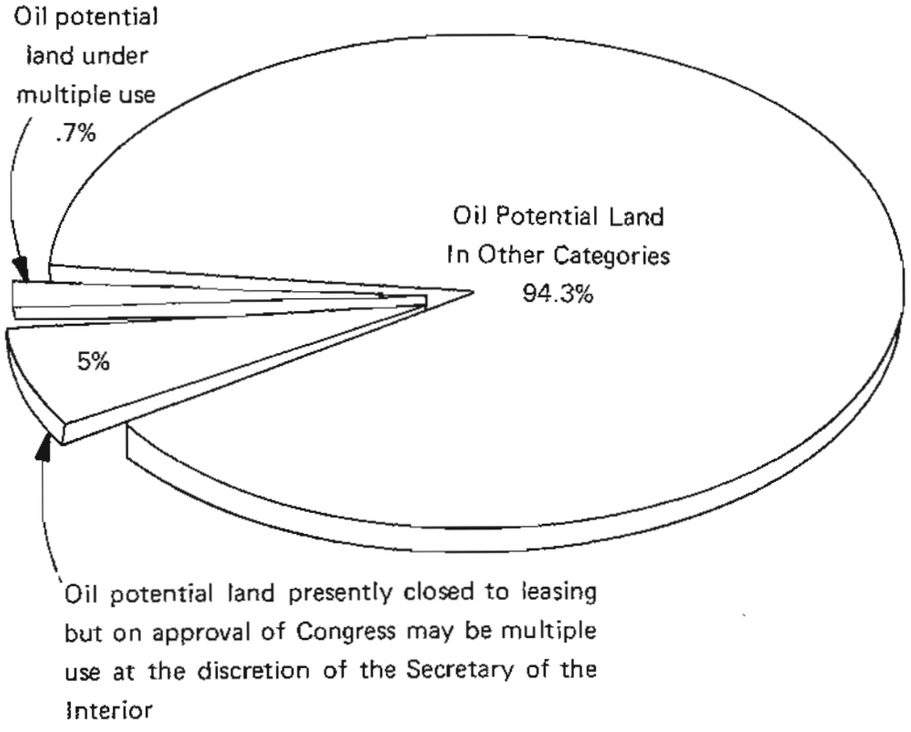
ESTIMATED SPECULATIVE RESOURCES

Province	Recoverable Oil billions bbl	Recoverable Gas tcf
OFFSHORE		
1 Beaufort	2.7	13.3
2 Chukchi	8.6	33.0
3 Hope	1.8	13.0
4 Bering Sea	27.4	200.0
5 Kodiak Island	2.4	17.5
6 Gulf of Alaska*	8.8	64.2
Total	49.7	341.2
ONSHORE		
1 North Slope	15.5	41.8
2 Kotzebue*	.7	5.0
3 Koyukuk	3.4	9.3
4 Bethel	1.3	3.5
5 Bristol	.9	6.8
6 Yukon Koandik	1.7	11.4
7 Copper River	.2	1.2
8 Cook Inlet*	2.5	18.4
9 Other	.2	1.1
Total	26.4	98.5

*Includes onshore and offshore areas

Figure 4

EFFECT OF MULTIPLE USE LANDS ON OIL AND GAS POTENTIAL AREAS



Land Category	Estimate of Proposed Land Use	% Resources In Land Category	Amount of Resource In Land Category (Sq. Mi.)
Present National Forest	Multiple Use	.7	1,692
Proposed National Forest	Presently closed to development. Multiple use 5 to 10 years?	5	10,584
TOTAL		5.7	12,276

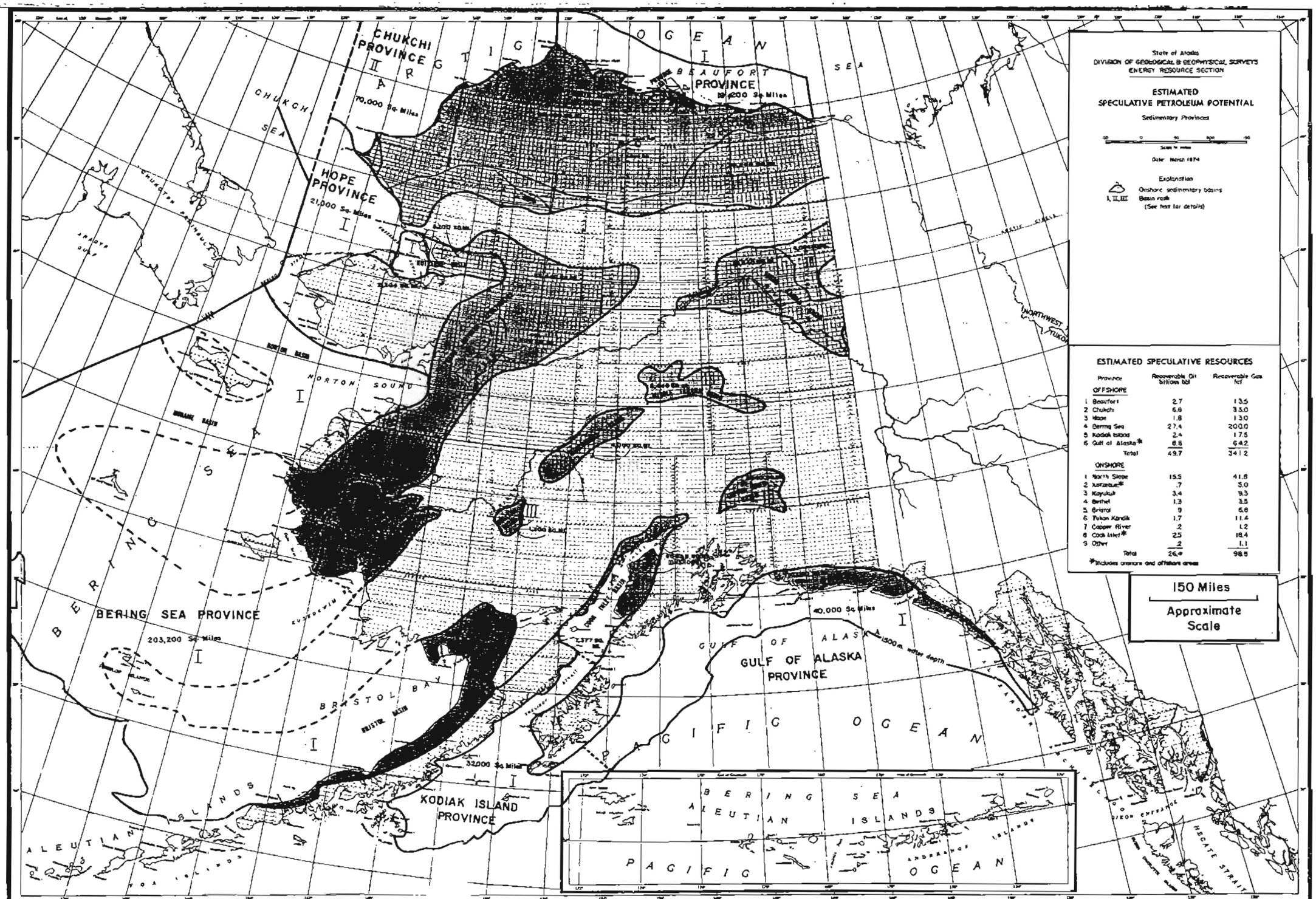
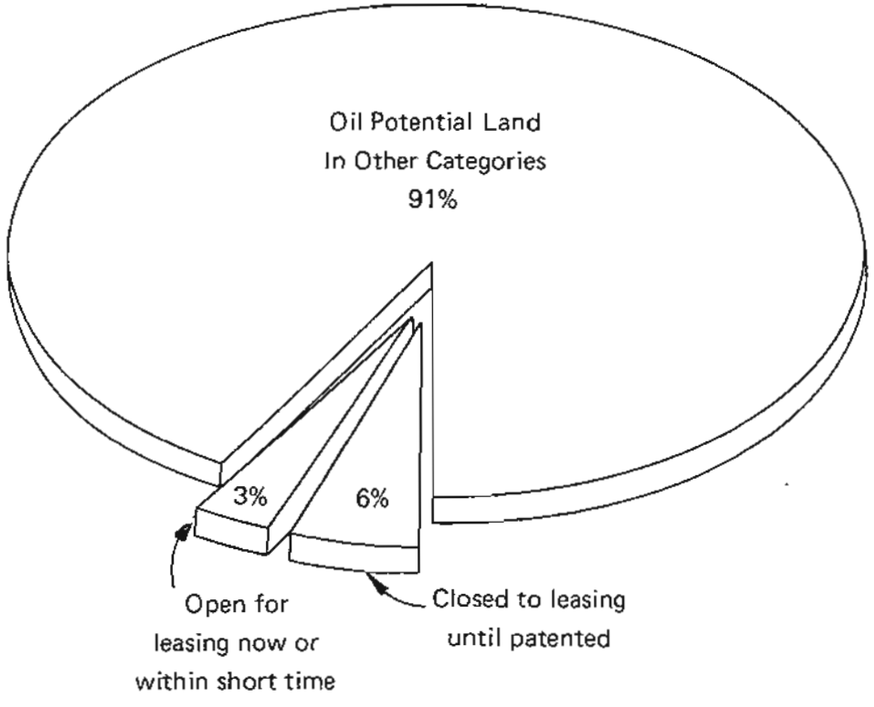
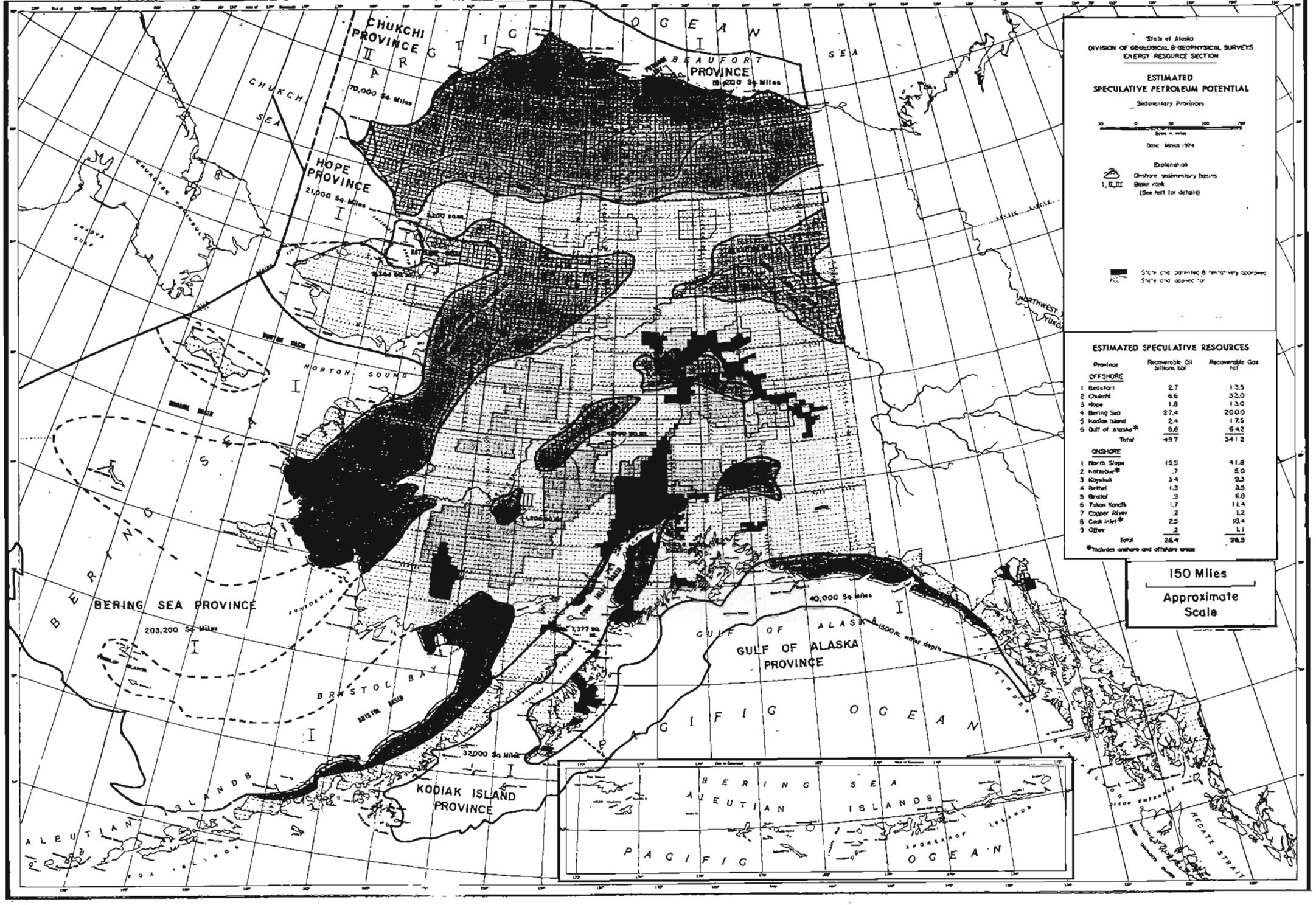
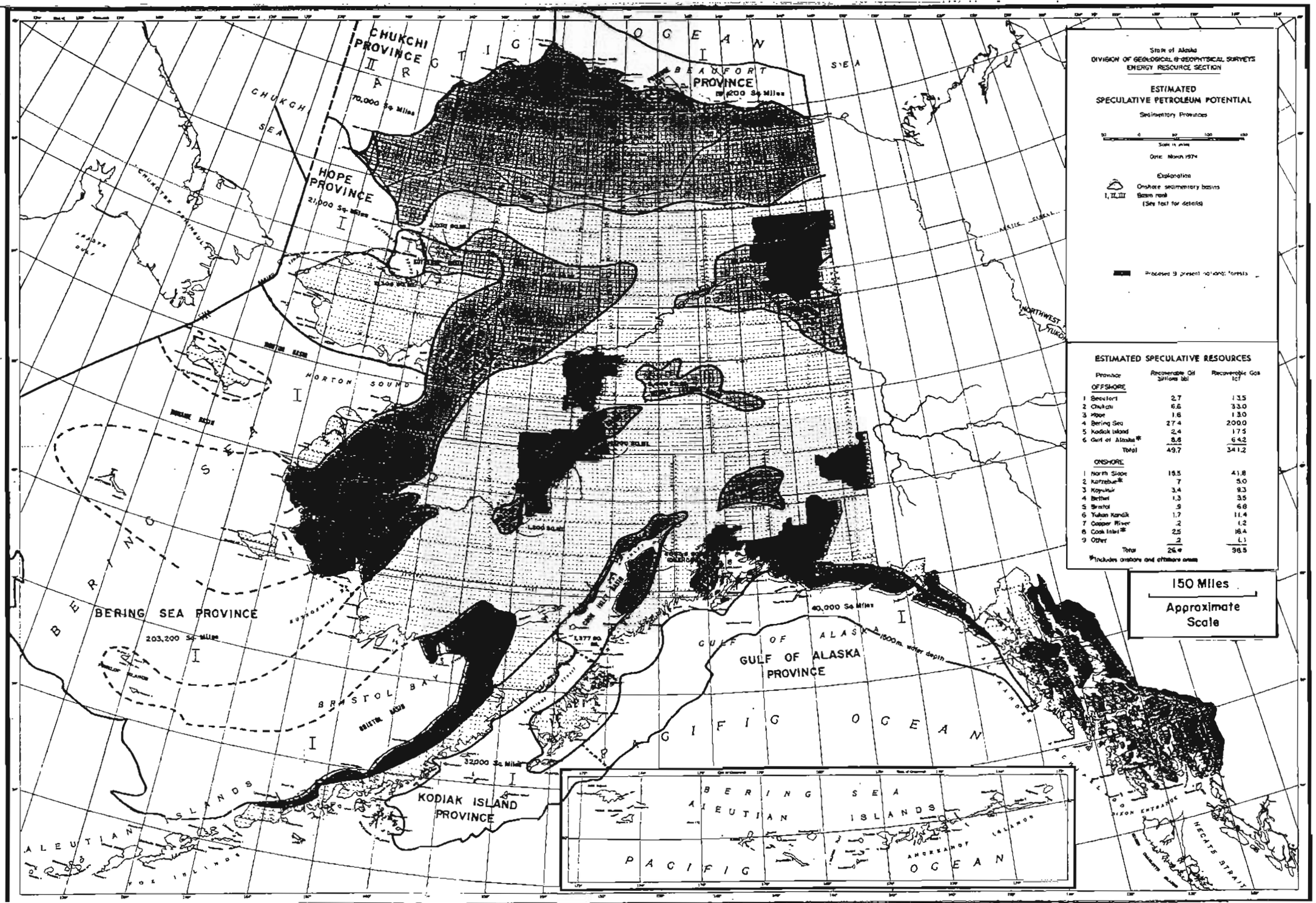

State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION
ESTIMATED
SPECULATIVE PETROLEUM POTENTIAL
Sedimentary Provinces
Date: March 1974
Explanation
Onshore sedimentary basins
I, II, III Basin rank
(See text for details)
ESTIMATED SPECULATIVE RESOURCES
Province | Recoverable Oil billions bbl | Recoverable Gas tcf
OFFSHORE
1 Beaufort | 2.7 | 13.5
2 Chukchi | 6.6 | 33.0
3 Hope | 1.8 | 13.0
4 Bering Sea | 27.4 | 200.0
5 Kodiak Island | 2.4 | 17.5
6 Gulf of Alaska* | 8.8 | 64.2
Total | 49.7 | 341.2
ONSHORE
1 North Slope | 15.5 | 41.8
2 Kotzebue* | .7 | 3.0
3 Kayukuk | 3.4 | 9.3
4 Bethel | 1.3 | 3.5
5 Bristol | 9 | 6.6
6 Yukon Kandik | 1.7 | 11.4
7 Copper River | .2 | 1.2
8 Cook Inlet* | 2.5 | 18.4
9 Other | .2 | 1.1
Total | 26.4 | 98.5
*Includes onshore and offshore areas
150 Miles
Approximate Scale
CHUKCHI PROVINCE
70,000 Sq. Miles
HOPE PROVINCE
21,000 Sq. Miles
BEAUFORT PROVINCE
BERING SEA PROVINCE
203,200 Sq. Miles
KODIAK ISLAND PROVINCE
32,000 Sq. Miles
GULF OF ALASKA PROVINCE
40,000 Sq. Miles
1500 m. water depth
CHUKCHI SEA
BEAUFORT SEA
NORTON SOUND
BERING SEA
BRISTOL BAY
ALEUTIAN ISLANDS
PACIFIC OCEAN
GULF OF ALASKA
NORTHWEST TERRITORIES
YUKON
ALASKA
HECATE STRAIT
DIXON ENTRANCE

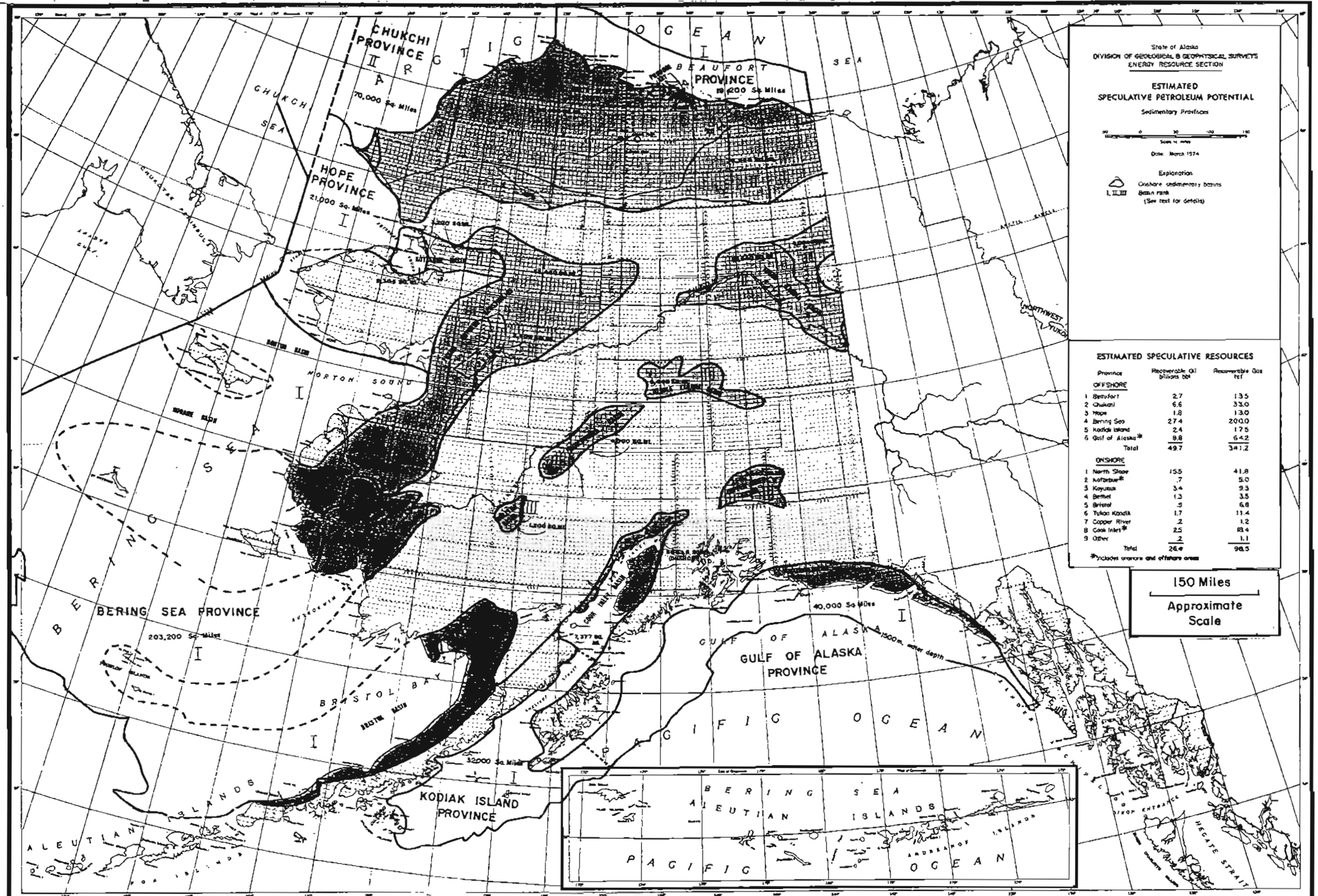
Figure 5
EFFECT OF STATE LAND ON OIL AND GAS POTENTIAL AREAS



Land Category	Estimate of Proposed Land Use	% Resource In Land Category	Amount of Resource In Land Category (Sq. Mi.)
Patented and Tentatively Approved	Patented-leasable Approved-leasable when patented	3	6,768
Land Applied For	Leasable when patented	6	13,428
TOTAL		9	20,196


State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION
ESTIMATED
SPECULATIVE PETROLEUM POTENTIAL
Sedimentary Provinces
Scale in miles
Date: March 1974
Explanation
Onshore sedimentary basins
I, II, III Basin rank
(See text for details)
State and patented & tentatively approved
State land applied for
ESTIMATED SPECULATIVE RESOURCES
Province | Recoverable Oil billions bbl | Recoverable Gas tcf
OFFSHORE
1 Beaufort 2.7 13.5
2 Chukchi 6.6 33.0
3 Hope 1.8 13.0
4 Bering Sea 27.4 200.0
5 Kodiak Island 2.4 17.5
6 Gulf of Alaska* 8.8 64.2
Total 49.7 341.2
ONSHORE
1 North Slope 15.5 41.8
2 Notzebue* .7 5.0
3 Koyukuk 3.4 9.3
4 Bethel 1.3 3.5
5 Bristol .3 6.8
6 Yukon Kandik 1.7 11.4
7 Copper River .2 1.2
8 Cook Inlet* 2.5 13.4
9 Other .2 1.1
Total 26.4 96.5
*Includes onshore and offshore areas
150 Miles
Approximate Scale
CHUKCHI PROVINCE
II
70,000 Sq. Miles
HOPE PROVINCE
21,000 Sq. Miles
I
BEAUFORT PROVINCE
I
BERING SEA PROVINCE
203,200 Sq. Miles
I
BRISTOL BAY
I
32,000 Sq. Miles
I
KODIAK ISLAND PROVINCE
GULF OF ALASKA PROVINCE
40,000 Sq. Miles
I
CHUKCHI SEA
BEAUFORT SEA
BERING SEA
ALEUTIAN ISLANDS
PACIFIC OCEAN
GULF OF ALASKA
NORTHWEST YUKON
DIXON ENTRANCE
HECATE STRAIT


CHUKCHI PROVINCE
II
70,000 Sq Miles
BEAUFORT PROVINCE
HOPE PROVINCE
21,000 Sq Miles
CHUKCHI SEA
BEAUFORT SEA
NORTHWEST TERRITORIES
YUKON
NORTON SOUND
BERING SEA PROVINCE
203,200 Sq Miles
BRISTOL BAY
GULF OF ALASKA PROVINCE
40,000 Sq Miles
1500 m. water depth
KODIAK ISLAND PROVINCE
32,000 Sq Miles
ALEUTIAN ISLANDS
PACIFIC OCEAN
BERING SEA
ALEUTIAN ISLANDS
ANDREANOF ISLANDS
PACIFIC OCEAN
DIXON ENTRANCE
HECATE STRAIT
State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION
ESTIMATED
SPECULATIVE PETROLEUM POTENTIAL
Sedimentary Provinces
Scale in miles
Anch. March 1974
Explanation
Onshore sedimentary basins
I, II, III Basin rank
(See text for details)
Proposed & present national forests
ESTIMATED SPECULATIVE RESOURCES
Province | Recoverable Oil billions bbl | Recoverable Gas tcf
OFFSHORE
1 Beaufort 2.7 13.5
2 Chukchi 6.6 33.0
3 Hope 1.8 13.0
4 Bering Sea 27.4 200.0
5 Kodiak Island 2.4 17.5
6 Gulf of Alaska* 8.8 64.2
Total 49.7 341.2
ONSHORE
1 North Slope 18.5 41.8
2 Kotzebue* .7 5.0
3 Koyukuk 3.4 9.3
4 Bethel 1.3 3.5
5 Bristol .9 6.8
6 Yukon Kandik 1.7 11.4
7 Copper River .2 1.2
8 Cook Inlet* 2.5 18.4
9 Other .2 1.1
Total 29.4* 98.5
*Includes onshore and offshore areas
150 Miles
Approximate Scale



State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION

ESTIMATED SPECULATIVE PETROLEUM POTENTIAL

Sedimentary Provinces

Scale in miles

Date: March 1974

Explanation

I, II, III — Onshore sedimentary basins; basin rank (See text for details)

ESTIMATED SPECULATIVE RESOURCES

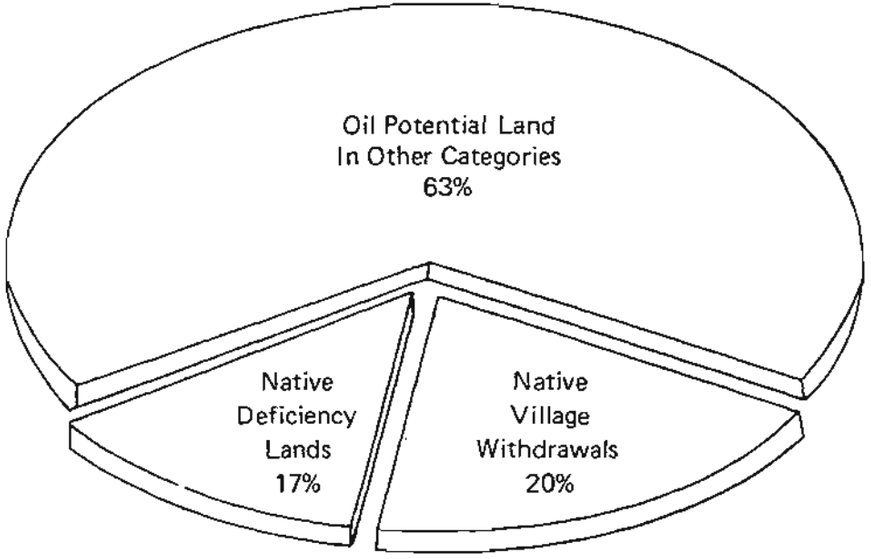
Province	Recoverable Oil billions bbl	Recoverable Gas tcf
OFFSHORE		
1 Beaufort	2.7	13.5
2 Chukchi	6.6	33.0
3 Hope	1.8	13.0
4 Bering Sea	27.4	200.0
5 Kodiak Island	2.4	17.5
6 Gulf of Alaska*	9.8	64.2
Total	49.7	341.2
ONSHORE		
1 North Slope	15.5	41.8
2 Kotzebue*	.7	5.0
3 Kayukuk	3.4	9.3
4 Bethel	1.3	3.5
5 Bristol	.5	6.8
6 Tyonek Kandik	1.7	11.4
7 Copper River	.2	1.2
8 Cook Inlet*	2.5	18.4
9 Other	.2	1.1
Total	26.4	98.5

*Includes onshore and offshore areas

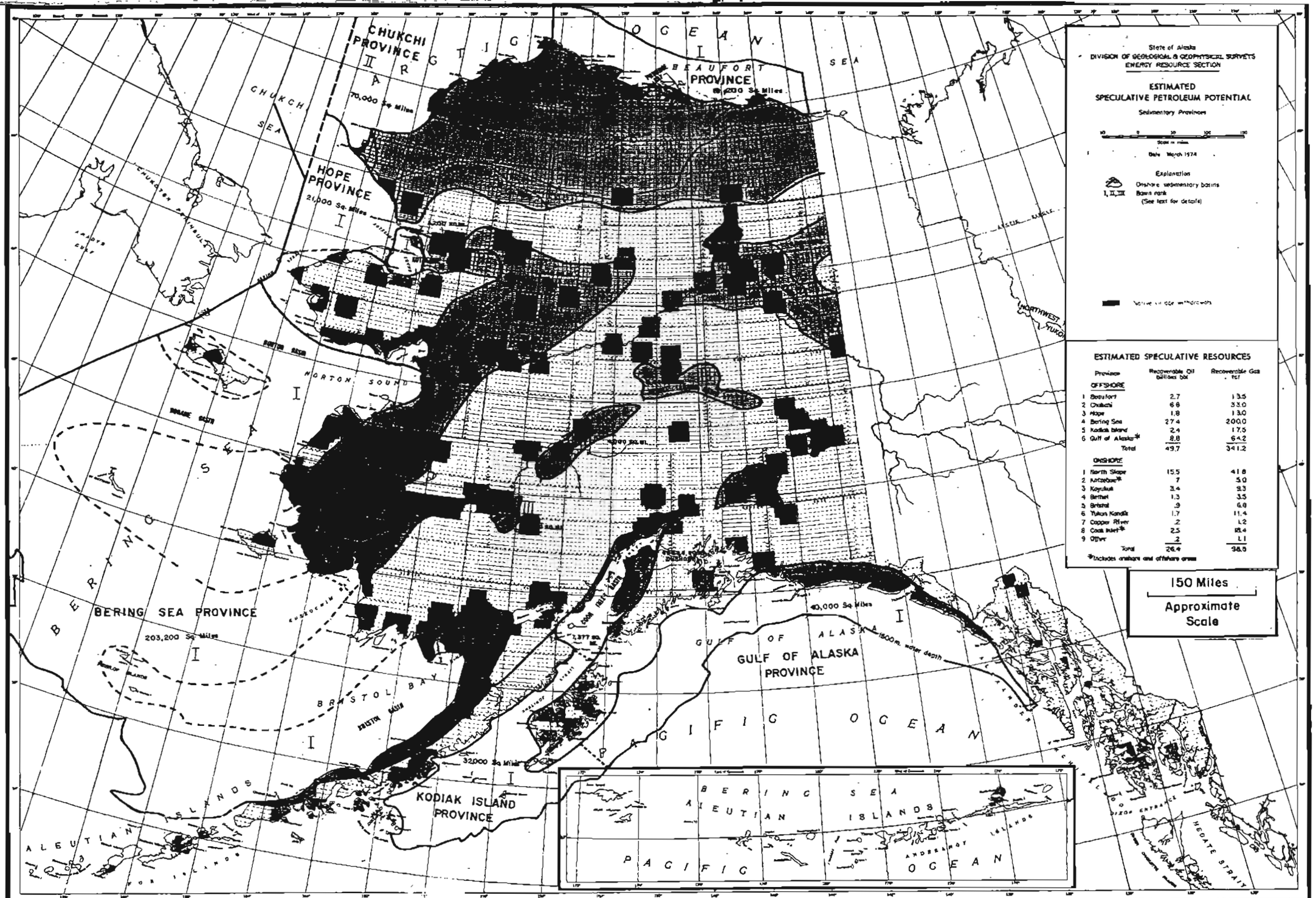
Figure 6

EFFECT OF NATIVE LANDS ON OIL AND GAS POTENTIAL AREAS

Conclusion: Up to 73% of oil potential land in native withdrawals may be owned by Natives. This would be 40 million acres or 62,500 square miles, the total amount that can be selected by the natives. **This is 27% of all of the onshore oil potential lands in Alaska.**



Land Category	Estimate of Proposed Land Use	% Resource In Land Category	Amount of Resource In Land Category (Sq. Mi.)
Regional and Village Withdrawals	73% of this land may be selected by the natives. 27% to 100% may revert to D-1 status.	17	39,822
Native Village Withdrawals		20	45,828
TOTAL		37	85,650



State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION

ESTIMATED SPECULATIVE PETROLEUM POTENTIAL

Sedimentary Provinces

Scale in miles

Date March 1974

Explanation

I, II, III Onshore sedimentary basins
Basin rank
(See text for details)

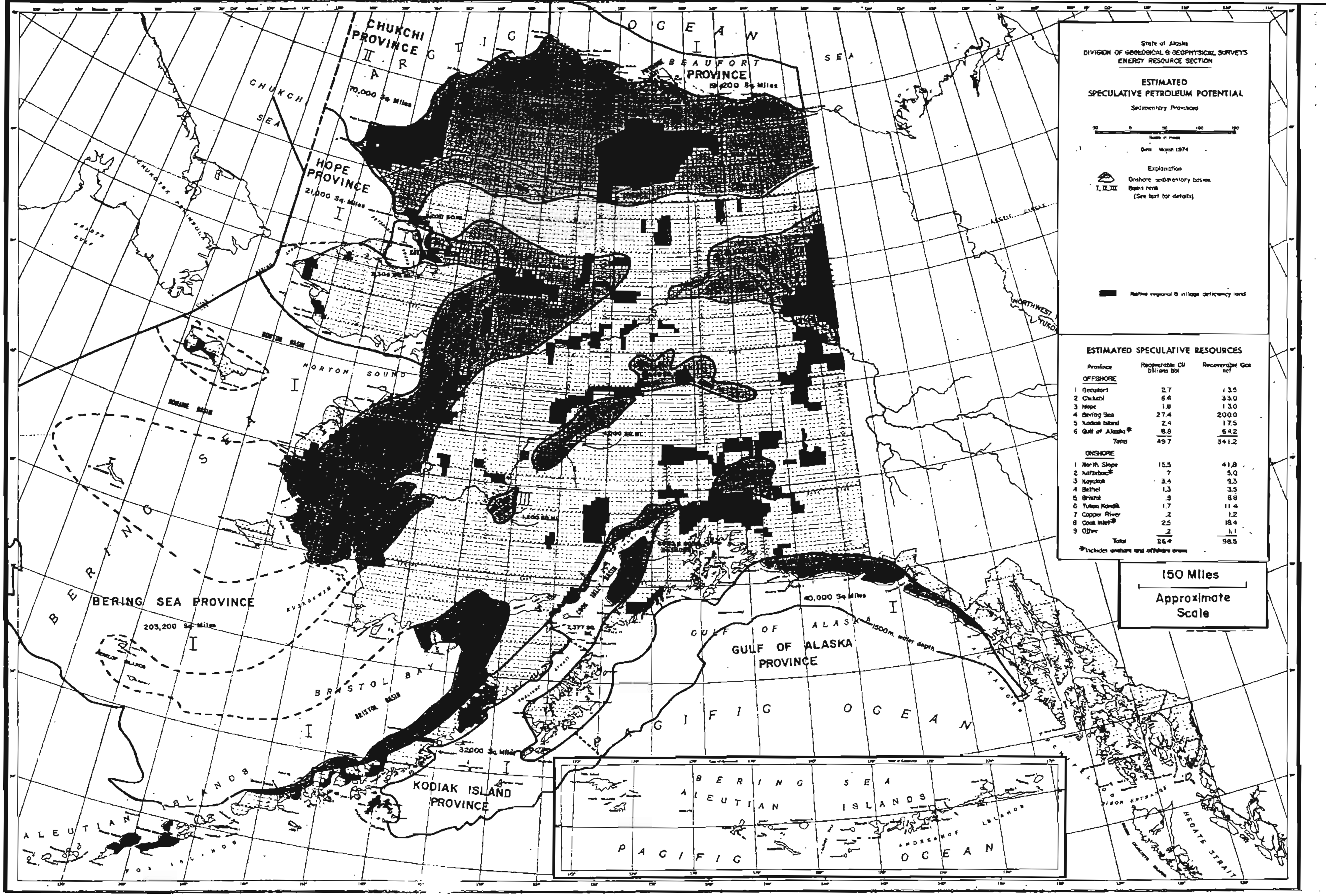
Native village settlements

ESTIMATED SPECULATIVE RESOURCES

Province	Recoverable Oil billions bbl	Recoverable Gas tcf
OFFSHORE		
1 Beaufort	2.7	13.5
2 Chukchi	6.6	33.0
3 Hope	1.8	13.0
4 Bering Sea	27.4	200.0
5 Kodiak Island	2.4	17.5
6 Gulf of Alaska*	8.8	64.2
Total	49.7	341.2
ONSHORE		
1 North Slope	15.5	41.8
2 Kotzebue*	.7	5.0
3 Koyukuk	3.4	9.3
4 Bethel	1.3	3.5
5 Bristol	.9	6.8
6 Yukon Kandik	1.7	11.4
7 Copper River	.2	1.2
8 Cook Inlet*	2.5	15.4
9 Other	.2	1.1
Total	26.4	98.8

*Includes onshore and offshore areas

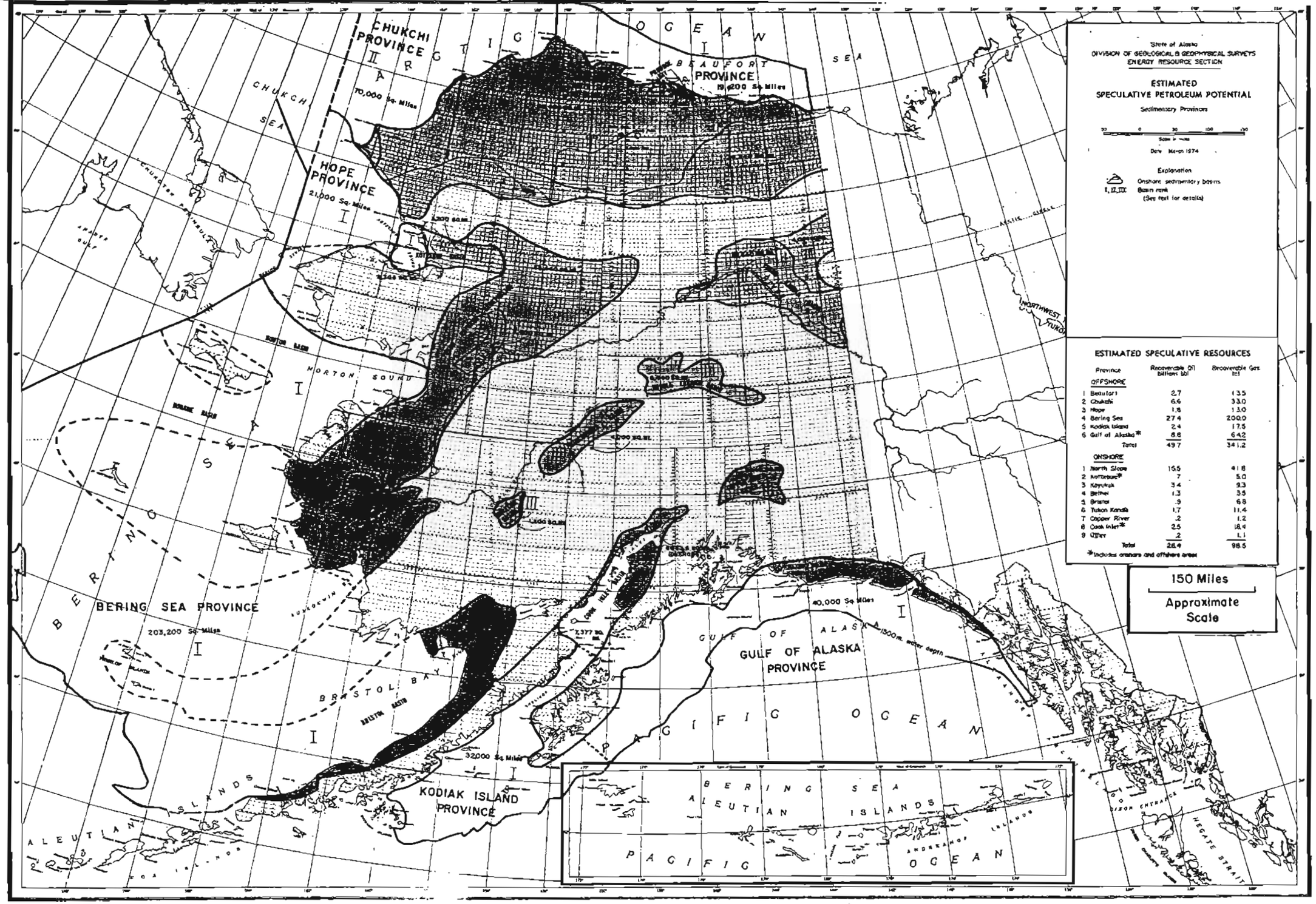
150 Miles
Approximate Scale



ESTIMATED SPECULATIVE RESOURCES

Province	Recoverable Oil billions bbl	Recoverable Gas tcf
OFFSHORE		
1 Beaufort	2.7	13.5
2 Chukchi	6.6	33.0
3 Hope	1.8	13.0
4 Bering Sea	27.4	200.0
5 Kodiak Island	2.4	17.5
6 Gulf of Alaska*	8.8	64.2
Total	49.7	341.2
ONSHORE		
1 North Slope	15.5	41.8
2 Kotzebue*	.7	5.0
3 Koyukuk	3.4	9.3
4 Bethel	1.3	3.5
5 Bristol	.9	8.8
6 Yukon Kandik	1.7	11.4
7 Copper River	.2	1.2
8 Cook Inlet*	2.5	18.4
9 Other	.2	1.1
Total	26.4	98.5

*Includes onshore and offshore areas


CHUKCHI PROVINCE
II
70,000 Sq. Miles
BEAUFORT PROVINCE
19,200 Sq. Miles
CHUKCHI SEA
HOPE PROVINCE
21,000 Sq. Miles
BEAUFORT SEA
NORTHWEST TERRITORIES
MORTON SOUND
BERING SEA PROVINCE
203,200 Sq. Miles
BRISTOL BAY
GULF OF ALASKA PROVINCE
40,000 Sq. Miles
GULF OF ALASKA 1500m. water depth
KODIAK ISLAND PROVINCE
32000 Sq. Miles
ALEUTIAN ISLANDS
PACIFIC OCEAN
BERING SEA
ALEUTIAN ISLANDS
ANDREANOF ISLANDS
PACIFIC OCEAN
DIXON ENTRANCE
HECATE STRAIT
State of Alaska
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
ENERGY RESOURCE SECTION
ESTIMATED
SPECULATIVE PETROLEUM POTENTIAL
Sedimentary Provinces
Scale in miles
Date March 1974
Explanation
Onshore sedimentary basins
I, II, III Basin rank
(See text for details)
ESTIMATED SPECULATIVE RESOURCES
Province | Recoverable Oil Billions bbl | Recoverable Gas tcf
OFFSHORE
1 Beaufort | 2.7 | 13.5
2 Chukchi | 6.6 | 33.0
3 Hope | 1.8 | 13.0
4 Bering Sea | 27.4 | 200.0
5 Kodiak Island | 2.4 | 17.5
6 Gulf of Alaska* | 6.8 | 64.2
Total | 49.7 | 341.2
ONSHORE
1 North Slope | 15.5 | 41.8
2 Kotzebue* | .7 | 5.0
3 Koyukuk | 3.4 | 9.3
4 Bethel | 1.3 | 3.5
5 Bristol | .9 | 6.8
6 Yukon Kandik | 1.7 | 11.4
7 Copper River | .2 | 1.2
8 Cook Inlet* | 2.5 | 18.4
9 Other | .2 | 1.1
Total | 26.4 | 98.5
*Includes onshore and offshore areas
150 Miles
Approximate Scale

This report is one of the following series:

I	OIL AND GAS
II	COAL
III	URANIUM (SEDIMENTARY)
IV	GEOTHERMAL
V	MINERALS
VI	RESOURCE SUMMARY
VII	HYDROELECTRIC
VIII	OIL SHALE AND TAR SANDS
IX	GRAVEL AND BUILDING MATERIALS
X	SUMMARY

Reports I thru V are considered of highest priority and should be completed in 1974. The results of reports I thru V will be combined into a land resource evaluation summary. This summary will indicate priority lands for selection by the State of Alaska and show the relative resource potential of Alaskan lands.

REFERENCES

Alaska Division of Oil and Gas provided data for reserve estimates on Cook Inlet and Prudhoe Bay.

Bassenger, B.G., Marine Magnetics in the NE Chukchi Sea: Journal of Geophysical Research, Vol. 73, No. 2, p. 683-687.

Crick, Richard W., 1971, Potential Petroleum Reserves, Cook Inlet, Alaska: Am. Assoc. of Pet. Geol., Memoir 15, Vol. 1.

Hartman, D.C., 1973, Geology and Mineral Evaluation of the Arctic National Wildlife Range, Northeast Alaska: Div. Geol. & Geoph. Surveys, Alaska Open File Rept. No. 22.

Mason, B. B., 1971, Summary of Possible Future Petroleum Potential of Region 6, Western Gulf Basin: Am. Assoc. of Pet. Geol., Memoir 15, Vol. 2.

Meyerhoff, A. A., 1972, Russians Look Hard at the Anadyr Basin: Oil & Gas Journal, Vol. 70, Nos. 43, 44.

Moody, G. B., 1961, Petroleum Exploration Handbook: McGraw-Hill, p. 18-25.

Moore, David G., 1960, Acoustic-Reflection Reconnaissance of Continental Shelves Eastern Bering and Chukchi Seas: U.S. Navy Electronics Laboratory, San Diego, California.

Ostenso, Ned A., 1968, A Gravity Survey of the Chukchi Sea Region and Its Bearing on Westward Extension of Structures in Noritan Alaska: Geol. Soc. of Am., Bull., Vol. 79, p. 241-254.

Potential Gas Committee, 1973, Potential Supply of Natural Gas in the United States: Mineral Resources Institute, Colorado School of Mines.

Pressure builds for Gulf of Alaska Sale: Oil and Gas Journal, October 1, 1973.

Scholl, D.W.; Hopkins, D. M., 1969, Newly Discovered Cenozoic Basins, Bering Sea Shelf, Alaska: Am. Assoc. of Pet. Geol., Bull., Vol. 53, No. 10, pp. 2067-2078.

Theobald, P. K., et al., 1972, Energy Resources of the United States: U.S. Geol. Survey, Circular 650.

National Park Service – Environmental Impact Statements for Federal Withdrawals of December 18, 1973.