

U.S. GEOLOGICAL SURVEY CIRCULAR 1096



Statistics of Petroleum Exploration in the  
Caribbean, Latin America, Western Europe,  
the Middle East, Africa, Non-Communist  
Asia, and the Southwestern Pacific

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# Statistics of Petroleum Exploration in the Caribbean, Latin America, Western Europe, the Middle East, Africa, Non-Communist Asia, and the Southwestern Pacific

By EMIL D. ATTANASI and DAVID H. ROOT

A summary of the geographic location, amount, and results of petroleum exploration, including an atlas showing explored and delineated prospective areas through 1990. This report updates and expands Circular 981

U.S. GEOLOGICAL SURVEY CIRCULAR 1096

U.S. DEPARTMENT OF THE INTERIOR

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# CONTENTS

|   |   |
|---|---|
| Abstract  | 1 |
| Introduction  | 1 |
| Acknowledgments   | 2 |
| Exploration and Discoveries Since 1950                          | 2 |
| Exploration   | 2 |
| Discoveries   | 3 |
| Size Distribution of Petroleum Provinces                        | 4 |
| Study Area  | 4 |
| Mexico  | 5 |
| South America   | 5 |
| Western Europe  | 5 |
| Middle East   | 5 |
| Africa  | 5 |
| Non-Communist Asia  | 5 |
| Southwestern Pacific  | 6 |
| Delineated Prospective Area                                     | 6 |
| Explored and Delineated Prospective Areas                       | 6 |
| Delineated Prospective Area by Region—Exploration and Discovery | 6 |
| Other Applications of Delineated Prospective Area               | 7 |
| Growth in Estimates of Field Sizes                              | 8 |
| Summary and Conclusions   | 8 |
| References Cited  | 9 |

## FIGURES

[Figures follow Tables]

- 1, 2. Time profiles for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific, showing the cumulative number of wildcat wells drilled, 1950–90:
  1. Offshore and onshore 34
  2. Offshore 35
3. Time profile of annual wildcat drilling in the study area and U.S. refiners' crude-oil acquisition price, 1968–90 36
4. Graphs showing oil and gas discovery rates for the study area averaged for 5-year periods, 1951–85, and the 4-year period, 1986–89 36
- 5–7. Graphs showing oil and gas discovery rates for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific, averaged for 5-year periods, 1951–85, and the 4-year period, 1986–89:
  5. Oil discovered per year 38
  6. Oil discovered per wildcat well 39
  7. Gas discovered per year 40
8. Graph showing frequency distribution of sizes of the 99 significant petroleum provinces identified through 1990 in the study area 41

- 9–12. Graphs showing the historical sequence by year of first discovery in each significant petroleum province and the magnitude of total discoveries through 1990 in each province in—
  9. South America 42
  10. Western Europe 43
  11. Africa 44
  12. Non-Communist Asia 45
13. Graphs showing growth in delineated prospective and explored areas and oil discovered in the study area through 1990 46
14. Graphs showing growth in prospective and explored areas delineated by drilling through 1990 for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific 47
15. Graphs showing oil discovered through 1990 ordered by the year its field location was classified as part of the delineated prospective area for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific 48
16. Graphs showing growth in fields discovered by 1980 for five regions 49
- 17–54. Maps and graphs of delineated prospective areas, explored areas, and known petroleum provinces of—
  17. The Caribbean 52
  18. Central America 54
  19. Guyana, Suriname, and French Guiana 56
  20. Chile 58
  21. Argentina, Uruguay, and Paraguay 60
  22. Ecuador 62
  23. Colombia 64
  24. Peru 66
  25. Venezuela and Trinidad and Tobago 68
  26. Bolivia 70
  27. Brazil 72
  28. The northern part of Western Europe 74
  29. The middle and southern parts of Western Europe 78
  30. Turkey and Cyprus 80
  31. The Arabian Peninsula 82
  32. Syria, Lebanon, Israel, and Jordan 84
  33. Iraq 86
  34. Iran 88
  35. Senegal, The Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, and Cape Verde 90
  36. Ethiopia, Djibouti, Somalia, and Kenya 92
  37. Angola 94
  38. Nigeria 96
  39. Tunisia and Libya 98
  40. Morocco and Algeria 100
  41. Egypt 102
  42. Tanzania, Malawi, Mozambique, Burundi, and Rwanda 104
  43. Swaziland, Namibia, Lesotho, Zimbabwe, Zambia, Botswana, and South Africa 106
  44. Cameroon, Central African Republic, Equatorial Guinea, Gabon, Sao Tome and Principe, Congo, and Zaire 108
  45. Western Sahara, Mauritania, Mali, Burkina Faso (formerly Upper Volta), Niger, Chad, Sudan, and Uganda 110
  46. Madagascar, Mauritius, Seychelles, and Comoros 112
  47. Afghanistan and Pakistan 114

- 17–54. Maps and graphs of delineated prospective areas, explored areas, and known petroleum provinces of—
  48. Maldives, India, Bangladesh, Myanmar (formerly Burma), Thailand, Sri Lanka, Nepal, and Bhutan **116**
  49. Taiwan, Philippines, Japan, and South Korea **118**
  50. Indonesia **120**
  51. Malaysia, Brunei, and Singapore **122**
  52. Papua New Guinea and Oceania **124**
  53. New Zealand **126**
  54. Australia and New Caledonia **128**

## TABLES

[Tables follow References Cited]

1. Exploration wells by year, 1950–89, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific **12**
2. Wildcat wells by year, 1951–90, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific **20**
3. Regional distribution of total and offshore wildcat wells drilled through 1990 and discoveries in terms of estimated ultimate recovery **28**
4. Year of first discovery and cumulative recoverable oil and gas discoveries through 1990 in the 99 significant petroleum provinces in the study area **29**
5. Regional distribution of land area, delineated prospective area, explored area, and rate of addition to prospective area **32**
6. Estimates of ultimate recovery of cumulative oil discovered by region from 1900 to 1980 as recorded by Petroconsultants in the first tapes issued in 1981, 1984, 1987, and 1990 **32**



# Statistics of Petroleum Exploration in the Caribbean, Latin America, Western Europe, the Middle East, Africa, Non-Communist Asia, and the Southwestern Pacific

By Emil D. Attanasi and David H. Root

## Abstract

This circular presents a summary of the geographic location, amount, and results of petroleum exploration, including an atlas showing explored and delineated prospective areas through 1990. The data show that wildcat well drilling has continued through the last decade to expand the prospective area by about 40,000 to 50,000 square miles per year. However, the area delineated by 1970, which represents only about one-third of the prospective area delineated to date, contains about 80 percent of the oil discovered to date. This discovery distribution suggests that, from an overall prospective, the industry was successful in delineating the most productive areas early. The price increases of the 1970's and 1980's allowed the commercial exploration and development of fields in high-cost areas, such as the North Sea and Campos Basin, Brazil. Data on natural-gas discoveries also indicate that gas will be supplying an increasing share of the worldwide energy market.

The size distribution of petroleum provinces is highly skewed. The skewed distribution and the stability in province size orderings suggest that intense exploration in identified provinces will not change the distribution of oil within the study area. Although evidence of the field-growth phenomenon outside the United States and Canada is presented, the data are not yet reliable enough for projecting future growth. The field-growth phenomenon implies not only that recent discoveries are substantially understated, but that field growth could become the dominant source of additions to proved reserves in the future.

## INTRODUCTION

The intention of this report is to summarize, for the general reader, basic statistics of petroleum exploration in the areas outside the United States and Canada and outside former and current Communist areas of Eastern Europe and

Asia. This report updates and expands our original report entitled "Statistics of Petroleum Exploration in the Non-Communist World Outside the United States and Canada," U.S. Geological Survey Circular 981 (Root and others, 1987). During the last 40 years, even though the United States and Canada accounted for most of the world's drilling, most of the oil was discovered outside of these areas. U.S. and Canadian petroleum industries are mature, and domestic exploration potential is better known than that in the rest of the world. This report, therefore, focuses on areas outside of the United States and Canada. The unavailability of reliable data on exploratory wells and oil and gas fields for the republics of the former Soviet Union, formerly Communist Eastern European countries, and Communist Asian countries necessitated that these countries still be excluded from this study. As private exploration is permitted, perhaps historical exploration data and the new data from ongoing exploration activities will be assembled and made available to researchers. Hereafter, we refer to the study area as the areas outside the United States and Canada and outside the areas formerly or currently Communist in Eastern Europe and Asia.

Where possible, the revisions to most of the original data series published in U.S. Geological Survey Circular 981 have been extended through 1990. The series that related to the crew months of geologic and geophysical activity was discontinued. The data had come from the annual foreign developments issues of the *Bulletin of the American Association of Petroleum Geologists* (AAPG). This annual collection of regional and individual country reports did not cover all areas having exploration, and the crew-month data were frequently not accurately reported. In the absence of wildcat drilling, crew-month activity provides evidence that areas have been screened and also indicates the intensity of predrilling evaluation. In recent years, the AAPG report writers focused more on describing results of certain strategic exploratory wells rather than on presenting a full accounting of geologic and geophysical

activity and exploration wells. Moreover, because of the changes in technology during the last 30 years, annual amounts of crew-month activity are not comparable in terms of both cost and the information value of data collected.

Exploration well data are from AAPG; some were published in the annual foreign developments issues of the *AAPG Bulletin*, and some were published in the *International Petroleum Encyclopedia* (Penn Well Publishing Company, 1986–90). Wildcat well data were taken from the well computer tape released by Petroconsultants S.A., Geneva, in January 1991. Reported discoveries of crude oil and natural gas are from the field tape received in January 1991 from Petroconsultants. The field data were augmented by additional data from W.D. Dietzman (retired) and Gary Long, both of the Energy Information Administration Office, U.S. Department of Energy, Dallas, Tex. (written commun., 1990). The data were subjected to additional validation tests, and corrections were then made as necessary. Unless otherwise stated, all field-size estimates used here are based on this data set. In this report, oil and gas discovered were classified as offshore only when the field containing the resource was entirely offshore.

In addition to updating most of the original data presented in U.S. Geological Survey Circular 981, this report presents new topics and data series. The field-growth (reserve-appreciation) phenomenon is discussed, and natural-gas discovery data are also presented for the study area. Because of product distribution problems and a limited international market, natural gas has not been an economic commodity for many countries. However, the share of natural gas in the overall worldwide energy market is beginning to increase.

Even with some data deficiencies, the information provides a summary, based on the historical results of exploration, of available knowledge on the petroleum potential of a country. The assemblage of this information is time consuming, costly, and beyond the reach of individual analysts, many private organizations, and the public. By placing this information in the public domain, we hope it will be of assistance to those responsible for planning or evaluating exploration programs in industry, government, and international agencies.

This report summarizes basic statistics of petroleum exploration drilling and discovery. The discussion initially focuses on numbers of exploration wells and wildcat wells drilled each year by country (tables 1 and 2). Graphs (figs. 1–15) show aggregate and regional trends in exploration and oil and gas discoveries, as well as the regional distribution of petroleum provinces. The phenomenon of growth in field-size estimates over time is discussed and shown to lead to substantial revisions in the interpretation of historical discovery data (fig. 16). Maps show the area that has been drilled, and accompanying graphs (figs. 17–54) show expansion of the areas explored and trends in the amounts of oil discovered in newly drilled areas.

## Acknowledgments

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## EXPLORATION AND DISCOVERIES SINCE 1950

### Exploration

Exploration and wildcat well data are summarized in tables 1 and 2. The exploration well data for 1950–80 represent the compilations presented in the regional reports by various writers published in the annual foreign developments issues of the *AAPG Bulletin*. Exploration well data for 1980–85 were taken from both the annual summary of the AAPG data and the compilations of the AAPG data published by the *International Petroleum Encyclopedia*. Data for 1985–89 are from the *International Petroleum Encyclopedia*. AAPG exploration wells include new-field wildcat wells, new-pool wildcat wells, extension wells, and deeper pool tests. The AAPG data are compiled from summaries that provide aggregate numbers of exploration wells spudded or completed during the year. These reports do not generally contain information about individual wells.

Wildcat well data are from the Petroconsultants well tape released in January 1991. The Petroconsultants wildcat wells summarized in table 2 are only new-field wildcat wells. The Petroconsultants data included longitude and latitude, well depth, and formations penetrated.

Because India, Iraq, and several other countries regarded the petroleum industry as vital to national security, information about drilling was regarded as a state secret, and dissemination of such information was prohibited. Drilling levels from these countries may be substantially understated.

U.S. and Canadian exploration and wildcat drilling have typically accounted for 70 to 90 percent of drilling outside of Eastern Europe and Communist Asia. For example, in 1989 the AAPG reported that the United States and Canada had 3,056 wildcat wells, and the Petroconsultants data show wildcat drilling in the study area to be 1,006. For exploration wells, comparable numbers are 8,257 and 1,354, respectively. Comparison of absolute drilling levels is misleading. A significant proportion of wildcat and exploration drilling done outside the United States and Canada is directed at testing new plays and provinces, whereas nearly all of U.S. and Canadian drilling is in productive plays and provinces that are mature from an exploration standpoint.

The time profile in the growth of cumulative wildcat wells drilled since 1950 is presented on a regional basis in figure 1. The most wildcat wells in the study area were

drilled in Western Europe; the number of wildcat wells decreases for South America, Africa, non-Communist Asia, the southwestern Pacific, and the Middle East. The gross number of cumulative wildcat wells drilled may not accurately measure the level of exploration effort or the degree to which an area has been evaluated. Many of the wildcat wells in Western Europe were drilled to find small onshore oil and gas fields that could be commercially developed because of Europe's advanced infrastructure and established markets. In comparisons of gross drilling statistics, these wells are given the same weight as the expensive high-risk wells drilled in the North Sea. Alternatively, information gathered from a few wildcat wells may allow the reconstruction of geologic history, which may indicate that the province is too immature geochemically to have generated hydrocarbons. There may be little further drilling. Although drilling in such an area appears to be sparse, the area may actually be considered to be evaluated.

Regional levels of cumulative offshore wells drilled in the study area are shown in figure 2. Even though in 1990 offshore wells represented 43 percent of the annual wildcat drilling, on a cumulative basis, offshore wildcats accounted for just under a quarter of cumulative wildcats in the study area. In Western Europe, offshore discoveries accounted for 90 percent of total crude oil discoveries, while, for non-Communist Asia and the southwestern Pacific, they accounted for 64 and 72 percent of total discoveries. Table 3 presents data showing the regional distribution of cumulative wildcat wells and discoveries. Offshore drilling and production costs are typically higher than costs for similar depths and fields onshore. The growth in offshore exploration in many instances reflects the perceived superiority of the offshore prospects to remaining onshore prospects in terms of field size. In other instances, lower infrastructure costs are associated with offshore field development when compared to those required for development of remote onshore prospects.

The level of annual wildcat drilling for the study area increased very little relative to the crude-oil price increases in the 1970's (fig. 3). Outside of the members of the Organization of Petroleum Exporting Countries (OPEC), the price increases in the 1970's allowed drilling and development in high-cost areas such as the North Sea and the Campos Basin in deep water off Brazil. For the study area, in 1970 about one-third of the wildcat wells were offshore. In 1980, offshore wildcat wells accounted for 46 percent of the wildcats drilled in the study area. By the 1981-85 period, about half of the average annual oil discovered in the study area outside of the Middle East was offshore.

## Discoveries

For the study area, annual oil discovery rate, oil discovery rate per well, and the annual gas discovery rate in

5-year intervals from year-end 1950 to year-end 1985 are presented in figures 4A, 4B, and 4C, respectively. Because there are probably unreported 1990 discoveries, the discovery rate for the last interval runs from 1986 to 1989. The annual oil discovery rate (fig. 4A) shows that, from 1955 to 1985, offshore discoveries accounted for at least one-third of the annual average oil discovered in the study area. The oil discovery rate per well (fig. 4B) for the study area has declined from over 50 million barrels of oil per well in the early 1950's to 7 million barrels in the early 1980's. Through the late 1970's, the discovery rate was over about 20 billion barrels of oil per year, and about half the oil was discovered offshore. Figure 4C shows that at least half of the natural gas reported discovered since the 1970's was offshore. However, reported quantities of gas discoveries are probably incomplete or understated because gas is still not commercially developable in many countries.

The regional annual oil discovery rates and oil discovery rates per well are shown in figures 5 and 6. The Middle East dominates average annual oil discovered and oil-per-well discovery rates. In South America, the annual and per-well oil discovery rates declined in the 1960's and 1970's and then increased in the 1980's (see figs. 5 and 6) because of large deep-water discoveries (Campos Basin, Brazil) and discoveries in deep horizons of provinces in eastern Venezuela. The North Sea discoveries accounted for the increase in average annual oil and per-well discovery rates in Western Europe. However, average annual and per-well oil discovery rates have declined dramatically in Western Europe since they reached a maximum during 1970-75.

Petroleum exploration in the period from 1955 to 1960 resulted in major discoveries in North Africa and Nigeria. Figures 5 and 6 show that, since that period, average annual and per-well discovery rates have declined dramatically in Africa. After 1975, most of the oil was discovered offshore.

Offshore discoveries accounted for most of the oil discovered since 1965 in non-Communist Asia. The per-well Asian discovery rates increased in 1960-70 as exploration shifted offshore. Nearly all the oil discovered in the southwestern Pacific was offshore.

The regional average annual gas discovery rates are presented in figure 7. The quality, reliability, and availability of gas data will not support the intensive analysis that crude-oil data have been subjected to. Historically, natural-gas discoveries and the associated gas in crude-oil fields have been underreported. Even in the United States, it is estimated that at least 24 trillion cubic feet of associated gas was flared between 1935 and 1971 (Rotty, 1974). The development of seamless pipe, which permitted transmission of natural gas long distances without significant product losses, allowed gas producers to expand gas markets beyond their immediate location. The gas price increases in the 1970's and 1980's provided incentives for U.S. gas

producers to search intensively for and develop moderate-size gas fields. Even with well-organized gas markets, half of the gas wells drilled in the United States have been drilled since 1974. The halfway point for oil wells drilled was in 1954. Areas outside of the United States are generally not as far along in exploration and development of their gas resources. Outside the United States there is evidence that gas is becoming more than simply a byproduct of oil production.

In most of the published international data, no distinction is made between associated or dissolved gas, which is associated with and frequently entrained in crude oil, and nonassociated gas. Nonassociated gas reservoirs are generally developed for natural gas as the primary product. Under this definition, about three-fourths of the U.S. gas is nonassociated. Because Petroconsultants provides field rather than reservoir estimates of ultimate oil and gas recovery, a field was classified as either a crude oil field having associated gas or a nonassociated gas field on the basis of the field's gas-to-liquids ratio.

Nonassociated gas fields were defined as having gas-to-liquids ratios of at least 20,000 cubic feet to one barrel of liquids. By this definition, at least 80 percent of the gas reported by Petroconsultants in Western Europe, Asia, and the southwestern Pacific is in nonassociated gas fields (see table 3). For the whole study area, 64 percent of gas was classified as nonassociated. With the exception of Western Europe and Africa, most areas had at least two-thirds of their nonassociated gas discovered since 1970. In the study area, 60 percent of the nonassociated gas, but only 25 percent of the oil, was discovered since 1970. This indicates that active exploration for, and development of, gas are relatively recent phenomena.

Without more detailed information on the geologic nature of oil and gas occurrence, it is not possible to accurately estimate the degree that identified gas resources may be understated. For the United States and Canada, the overall gas-to-oil ratio is between 5 and 6, that is, thousands of cubic feet per barrel of crude oil. For the study area, this ratio is 2.5; on the basis of regions, the ratios, from lowest to highest, are as follows: South America, 1.4; the Middle East, 1.8; Africa, 2.5; Asia, 6.7; Western Europe, 8.0; and the southwestern Pacific, 14.3. Regions with advanced domestic and export gas markets have the highest ratios.

## SIZE DISTRIBUTION OF PETROLEUM PROVINCES

### Study Area

The rate of oil discovered per wildcat well is determined, in part, by the size distribution of undiscovered fields within a petroleum province. Original province field-size distributions are typically highly skewed, where a few

large fields are so large that they contain most of the recoverable oil in a province. The distribution is important because once these very large fields are discovered, improvements in geologic understanding or exploration technology will generally be insufficient to sustain the initial discovery rate. The discovery rate drops because the remaining fields are orders of magnitude smaller than the large discoveries. Improvements in technology and geologic understanding, however, will help to mitigate exploration risks.

Within a province, rapidly declining discovery rates produce declining returns to exploration, and they, in turn, encourage explorationists to begin exploring new provinces. The size distribution of provinces is also skewed when size is measured in terms of barrels of recoverable oil. The ultimate recovery of oil in provinces is not nearly as well defined as that in fields because provinces are not as completely delineated and evaluated as individual fields. Petroleum exploration continues in both new and old provinces. Comparison of province size is necessarily confined to hydrocarbons discovered to date and omits the undiscovered portion of the province.

As a result of differences in geologic interpretations and availability of data, there is now no universally accepted set of definitions and delineations of the world's petroleum provinces. Fields contained in the files of Petroconsultants are cross-referenced by specific province names provided by Petroconsultants. In order to enhance the chances that province names corresponded to accepted nomenclature, the province names were chosen from the set provided by Petroconsultants that represented the greatest level of aggregation in the geologic and geographic sense.

Collectively, fields in the study area were designated with 351 unique province names. For the purposes of this report, a province is considered significant if it has at least one field containing at least 100 million barrels of recoverable crude oil discovered by 1991. According to this designation, there were 99 different significant provinces in the study area. Table 4 lists the 99 significant provinces by region, with estimates of the amount of oil and gas discovered through 1990 in each province. The significant provinces account for just over 99 percent of the 1,144 billions of barrels of recoverable oil found in the study area.

Figure 8 shows the size distribution of the 99 significant provinces in the study area. The distribution is highly skewed. The largest province, the Arabian Basin, accounted for almost half of the discovered oil in the study area. The largest four provinces in terms of discovered oil accounted for more than 70 percent of the total oil discovered and about 85 percent of the gas discovered in the study area. On a regional basis, the distribution of known recoverable oil is as follows: the Middle East, 62 percent; South America, 12 percent; Africa, 10 percent; Mexico and Western Europe, 5 percent each; Asia, 4 percent; and the



southwestern Pacific, 0.5 percent. Central America and the Caribbean do not contain any significant provinces.

Figures 9 to 12 display, for four regions, the temporal ordering of the first discovery in each significant province as well as the relative size of each province in terms of oil discovered. The significant provinces in seven regions are discussed below.

## Mexico

Discoveries in Mexico's largest provinces, the Tampico-Misantla Basin and the Salina Basin, occurred before 1905. The Tampico-Misantla Basin includes the Golden Lane area and the giant Chicontepec field, which is estimated to contain over 12 billion barrels of recoverable oil. The Salina Basin is in the Chiapas-Tobasco region and contains the Reforma area fields, including the Bermudez Complex. The large offshore discoveries in the Gulf of Campeche, which extend the Cantarell Complex, were made in the late 1970's. The most recent discoveries of at least 100 million barrels were in the Salina Basin and occurred in 1982.

## South America

Maracaibo Basin, Eastern Venezuela Basin, and the Greater Furrial Trend<sup>1</sup> contain the largest quantities of discovered oil in South American onshore basins. Oil in each of these provinces was discovered before 1930. Together the three provinces account for about 70 percent of the oil discovered in South America. The largest South American field, Bolivar Coastal located in Venezuela and Colombia, is credited with 36.7 billion barrels of oil (BBO). About 18 percent of the oil and 28 percent of the gas discovered in South America are offshore. The seven significant South American provinces that had reported discoveries since 1985 are Maracaibo Basin, Greater Furrial Trend, Neuquen Basin, Llanos Basin, Austral Basin, Campos Basin, and Santos Basin. Venezuela accounts for 77 percent of the oil discovered in South America.

## Western Europe

Of the oil and gas discovered through 1990 in Western Europe, 90 percent of the oil and 60 percent of the gas were in offshore fields. The North Sea Graben, the largest province in Western Europe, accounts for more than three-fourths of the oil discovered in that region. Many of the onshore provinces, particularly in southern Europe, are considered to be gas prone rather than oil prone. Since

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<sup>1</sup>Although many geologists consider the Greater Furrial Trend to be a play in the Eastern Venezuela Basin, Petroconsultants lists it as a separate province.

1985, seven of the twenty-one provinces of Western Europe have had discoveries of at least 100 million barrels in size. These discoveries have been made in the North Sea Graben, the Vestland Arch, the East Shetland Platform, the Norwegian-Danish Basin, the Kristiansund-Bodo Fault Complex, the Voring Basin, and the Anglo-Paris Basin.

## Middle East

The Arabian Basin and the Zagros Fold Belt together account for three-fifths of the oil in the study area. Both were identified before 1940. The Arabian Basin contains 25 supergiant fields (defined as having at least 5 BBO). The world's two largest oil fields, Ghawar and Burgan, both containing more than 80 BBO of recoverable oil, are also in the Arabian Basin. There are five supergiant fields in the Zagros Fold Belt. Offshore fields contain about one-fifth of the oil and one-third of the gas in the Middle East. With the exception of the Qom Basin, all the significant provinces in the Middle East have reported new discoveries of at least 100 million barrels since 1985.

## Africa

Of the 13 significant petroleum provinces in Africa, the 4 largest contain more than 80 percent of the oil discovered to date. Most of the oil in Africa, as well as nearly all of the significant provinces, was identified after 1950. Africa's three supergiant fields—Hassi Messaoud, with 11 BBO in the Hassi Messaoud High; Sarir, with 5 BBO in the Sirte Basin; and Amal, with 6 BBO also in the Sirte Basin—are all in North Africa. Only the Niger Delta, the Gabon Coastal Basin, and the Lower Congo Basin have reported individual discoveries of at least 100 million barrels of oil or greater since 1985. About one-fourth of the oil and 16 percent of the gas in Africa are in offshore fields. Initial African discoveries were along coastal areas in North Africa. During the 1970's and 1980's, exploration was carried to some interior areas. The very low gas-to-oil ratios in most of the African provinces probably reflect understatement of the gas resources discovered because of low commercial value.

## Non-Communist Asia

In non-Communist Asia, 13 of the 23 significant provinces were already identified with discoveries by the end of 1950. Thus far, no supergiant fields have been discovered in this area. However, 6 of the 23 provinces had discoveries of at least 1 BBO. These provinces are Kutei Basin, Baram Delta, Central Sumatra Basin, Malaya Basin, West Java Basin, and Bombay Basin; together they account for nearly three-fourths of the oil discovered. Offshore fields contain 43 percent of the oil and 60 percent of the gas.

The five provinces having 100-million-barrel discoveries since 1985 are the South Sumatra Basin, Baram Delta, West Java Basin, Bombay Basin, and Cauvery Basin.

## Southwestern Pacific

The significant provinces of the southwestern Pacific are in Australia and Papua New Guinea. The Gippsland Basin accounts for about three-fourths of the oil discovered. Offshore fields contain 86 percent of the oil and 71 percent of the gas. Discoveries of at least 100 million barrels of oil have been reported since 1985 in the North Carnarvon Basin and Papuan Fold Belt.

## DELINEATED PROSPECTIVE AREA

### Explored and Delineated Prospective Areas

Oil and gas exploration has typically been confined to only a small fraction of the land area of any given country. Petroleum exploration is generally focused on sedimentary basins where oil and gas might have formed. Sedimentary basins are not uniformly distributed throughout the world. Moreover, only relatively small fractions of most sedimentary basins have been intensively drilled. The geologic information used to site exploration and development wells obviously cannot be replicated by any single source, but the well locations, density of drilling, and results of exploration reflect the industry's collective evaluation of the area.

Drilling density is often used to gauge the exploration maturity of an area. However, drilling density is more often calculated relative to the area within a given political boundary rather than relative to the area of interest to explorationists. The concepts of prospective and explored areas are introduced to allow the delineation of areas that have been subjected to a minimum threshold level of exploration. The explored area is a part of the prospective area where the density of wells probably precludes very large or giant discoveries.

As used here, the prospective area delineated by drilling, that is, the *delineated prospective area*, is defined as that area reasonably close to wells and interior to the area drilled. The area is computed as the combined area of triangles having a well at each vertex. Only the triangles small enough to be covered by a circle of 20-mile radius are used. The 20-mile radius was chosen to correspond to the scale convenient for presentation in this report and to the precision of drilling and discovery data available. A much smaller radius than 20 miles would have produced numerous holes in the prospective areas evaluated, whereas a much larger radius would have resulted in a loss of resolution in defining the prospective area. The delineated prospective area within 2 miles of a well is called the *explored area*. Except at depths not already tested, it is

unlikely that very large fields remain to be discovered in explored areas because such fields typically have planar surface areas much larger than 2 square miles. The recently discovered deep giant field El Furrial (in Venezuela) is just such an exception. In the study area, the total explored areas account for only 19 percent of the delineated prospective area. Much of the delineated prospective area may never become as densely drilled as explored areas because it was found to be unproductive and not worth further evaluation.

The algorithm for computing and locating the delineated prospective area began with the identification of possible locations with grid points at a 2.8-mile spacing. Each grid point was identified by longitude and latitude. Field locations and all available well locations (for exploration, development, and production wells) were used in the computations. If the wells were redundant, that is, close to each other, they did not generally add to the prospective area. The well and field locations were compared to nearby wells and grid points to determine whether any grid point close to a well (or field) met the criteria for inclusion in the prospective area. Each grid point in the prospective area was also designated with the year that the point became part of the prospective area and whether the grid point was closest to a field or well. Grid points closest to the fields were assigned the oil and gas associated with the field. Although the nearest grid points of an isolated well are shown on the maps in figures 17–54, such grid points add only 1 square mile to the total delineated prospective area.

The method of calculating prospective and explored areas has been refined somewhat from the procedures used in U.S. Geological Survey Circular 981. The earlier method treated grid points along the north-south and east-west axes differently than grid points in other directions. In the method used here, all directions are treated the same. Also, all isolated wells are now assigned an area of 1 square mile, rather than the 8 square miles assigned by the earlier method. Therefore, prospective and explored areas in some countries are smaller in this circular than in Circular 981 even where the number of wildcat wells has increased.

### Delineated Prospective Area by Region— Exploration and Discovery

Computations of delineated prospective areas and explored areas for individual countries are presented in figures 17–54. Figures 13 and 14 and table 5 summarize the results when the individual country computations are aggregated to the regional level. Figures 13A and 14 show the profiles of the growth in prospective and explored areas when expressed on the bases of wildcat wells. The shape of the curve indicates whether wildcat wells were opening new areas or whether they followed earlier drilling and were sited in areas already classified as prospective. A linear curve indicates that there was a constant increment in prospective area with each wildcat well drilled. A rollover

in the graph signifies that a larger proportion of the wildcat wells were sited in areas already considered prospective. Alternatively, an increase in the slope implies that wildcat wells were opening new areas.

Figures 13B and 15 show the profiles of cumulative oil discovered through 1990 when the discovery date is replaced by the date when the nearest grid point to the discovery became part of the delineated prospective area. A rolling over of the curve suggests that the newly added prospective area is not as rich in terms of discovered oil as the older areas. If the industry were operating so that the most productive areas were explored early, a rollover in the graph would occur. A graph with a constant slope implies that the newly added area is just as productive as the old area, whereas a graph with an increase in slope signifies that the latest prospective area is richer than the early prospective area. These figures reflect the quality of the prospective area as well as the efficiency of the industry's exploration program.

Figures 13A and 13B show the aggregate profiles for the study area. The delineated prospective area accounts for about 7 percent of the land area, and the explored area amounts to 19 percent of the delineated prospective area. About half of the total prospective area was delineated by 1970. This area contained about 80 percent of the oil discovered to date. Since 1970, the growth of prospective and explored areas has been relatively constant while the amount of oil discovered per square mile of prospective area has dropped dramatically.

The delineated prospective area in South America has more than doubled since 1970. The area added since 1971 contains about 16 percent of the cumulative oil (see figs. 14 and 15). Most of the oil in the recently added prospective area is in the Campos Basin, a deep-water Brazilian offshore province. In South America, total prospective area amounts to about 6.2 percent of the land area, and the explored areas amount to about one-fourth of the prospective area. Although South America and Western Europe have about the same number of wildcat wells and prospective area, Western Europe has half the oil. The prospective area profile for Western Europe (fig. 14) shows a steep increase in prospective area per wildcat well in the late 1960's, reflecting the exploration of the North Sea provinces. The prospective area delineated after 1971 accounts for less than half the total prospective area but has nearly 70 percent of the oil discovered. North Sea exploration added new prospective area, and this new area contains most of Western Europe's discovered oil.

The Middle East accounts for 62 percent of the oil discovered in the study area. Supergiant fields that were discovered early dominated the discovery history of the area. Nearly 90 percent of the oil discovered was located in the area that became prospective by 1971 (see fig. 15).

Africa has about the same prospective area as Western Europe but is not nearly as well explored. Africa's

prospective area represents less than 4 percent of the land area. Most of the interior regions of Africa have not had sufficient exploration to be classified as part of the prospective area. Even though the growth in prospective area in Africa has been at a relatively constant rate in terms of area added per wildcat well, the prospective area delineated by 1971 contains almost 90 percent of the region's oil (see figs. 14 and 15).

In non-Communist Asia, only 21.4 percent of its prospective area was delineated before 1971 (fig. 14). This early area contains 62 percent of the oil discovered (fig. 15). Since 1970, Indonesia has had its prospective area quadruple, and all other countries in the region have had their prospective areas at least double in size.

In the southwestern Pacific, 80 percent of the oil was discovered in the prospective area delineated by 1971. Even though the southwestern Pacific is comparable to non-Communist Asia in land area, its prospective area had cumulative discoveries that are much smaller. Natural gas is regarded as an economic commodity in both regions, and so part of the wildcat drilling was directed at gas.

## Other Applications of Delineated Prospective Area

The concept of delineated prospective area can be applied (1) to partition areas for discovery-process modeling and (2) to characterize the relative richness of older or newly added prospective areas. In the first application, the concept of the delineated prospective area is used as a tool for identifying wildcat wells and discoveries within bounded areas so that discovery decline functions can be used to project future discoveries. In particular, the partitioning of areas is used to separate the confounding effects of crowding of wildcat wells in areas that have already had some exploration from the erratic arrival of discoveries in newly opened areas. Typically, the prospective area is partitioned into an early and late part, and then wildcat wells and discoveries are assigned to each part on the basis of location. The empirical discovery rate for the early part generally shows sufficient regularity that it can be estimated. The discovery-rate function for the late part is estimated by using the rate of decline for the early part, but adjustments compensate for the relative richness of the two different areas; specifically, the decline rate for the early area and the discovery sizes for the late area are used to estimate the ultimate number of fields in the late area (see Attanasi and Root, 1988, for details).

A second application of prospective area is to determine the relative richness of new areas that have recently been the target of petroleum exploration. The graph showing the expansion of the delineated prospective area in the whole study area (fig. 13A) indicates that about 40,000 to 50,000 square miles of new prospective area is added per year or about 50 square miles per wildcat well. Figure 13B

shows the quantities of crude oil found to date in the prospective area in the study area when the areas are ordered according to the date when their location was classified as prospective. About a third of the prospective area accounts for 80 percent of the discoveries. There continue to be major discoveries, but the flattening of the curve indicates that the area delineated early is richer than the areas delineated later. This shape suggests that, in the aggregate for the study area, explorationists have been relatively efficient in delineating the richest area early. For regions where changes in economics or the state of technology were required to make an area commercially attractive, such as the North Sea of Western Europe or the deep waters off of Brazil, South America, the slope of the graph of oil ordered by prospective area sharply increases (see fig. 15). This shape indicates that relatively large quantities of oil were discovered in the more recently added prospective areas.

## GROWTH IN ESTIMATES OF FIELD SIZES

In the United States and Canada, it has long been recognized that the initial estimates of field size (ultimate recoverable oil) are conservative and tend to increase as the fields are developed and placed into production. During the period from 1977 through 1988, oil and gas estimates of ultimate recovery in pre-1978 discoveries in the lower 48 United States increased by 21 billion barrels (from 145 to 166 billion barrels) and by 148 trillion cubic feet (from 735 to 883 trillion cubic feet), respectively (Energy Information Administration, 1990). Reserve appreciation in old fields typically accounts for two-thirds to three-fourths of annual additions to U.S. proved reserves.

Several explanations are given for the field-growth phenomenon. Initial engineering estimates are conservative because the economic penalties for overestimation are more severe than those for underestimation. Initial engineering estimates need only be detailed enough to estimate a minimum threshold field size that will allow an operator to proceed with field development and therefore are not intended to measure the full potential of the new discovery.

Field growth is also an economic phenomenon. During periods of high prices, development drilling is generally accelerated and at higher intensity (that is, closer well spacing). For example, in the United States, natural gas in pre-1967 discoveries grew 35 trillion cubic feet from 1967 to 1977 (American Petroleum Institute, American Gas Association, and Canadian Petroleum Association, 1967-78). These same fields also grew 87 trillion cubic feet from 1977 to 1987 (Energy Information Administration, 1990). Price increases allowed the commercial use of enhanced oil-recovery techniques in California's heavy-oil fields, resulting in a 20 percent increase in estimates of California's ultimate oil recovery in the period from 1977 to 1988.

There is evidence that field growth also occurs outside of the United States and Canada, but available data are probably not yet reliable enough to develop traditional growth factors that would permit projection of additions to reserves from growth in identified fields. Petroconsultants provides field estimates of ultimate recovery of oil and gas in field file tapes issued four times a year to subscribers. Figure 16A shows cumulative discoveries in the five main regions of the study area from 1900 to 1980 computed from the data on the first tape issued in each of years 1981, 1984, 1987, and 1990. Figure 16B shows cumulative discoveries for the same regions as in figure 16A except that data for the Middle East are omitted. The figures show increases in the estimates of cumulative oil from more recent tapes. Some of the apparent growth is, however, due to missing discovery data.

Missing data account for about half the difference between the 1981 and 1984 curves in figure 16A and for about two-fifths of the difference between these curves in figure 16B. The missing data are fields discovered before 1980 but added to the Petroconsultants' data by 1984. Less than 10 percent of the difference between the 1984 and 1990 curves in figure 16A,B was the result of missing data. Table 6 shows how the estimates of cumulative oil discovered from 1900 to 1980 in the study area regions changed from the 1984 to 1990 tapes.

Even though data presented in figure 16 and table 6 provide evidence of field growth outside of the United States and Canada, little is known about how the estimates of ultimate field recovery were made and if the method has been applied consistently. The field-growth phenomenon explains why proved reserves in the study area continued to increase even though estimates of aggregate annual discoveries are much smaller than annual production. It implies not only that recent discoveries are substantially understated, but that field growth could become the dominant source of additions to proved reserves in future years.

## SUMMARY AND CONCLUSIONS

Data on wildcat wells showed exploration drilling continuing at a relatively constant rate in spite of significant changes in world oil prices. Price increases appear to have allowed commercial exploration and development of fields in high-cost areas, such as the North Sea and Campos Basin. The proportion of wildcat wells drilled offshore in the study area has increased dramatically over the last 30 years, and recent data show that about 4 of 10 new wildcat wells drilled in the study area are offshore wells. If the pattern of wildcat drilling is analyzed in relation to the growth in prospective area, one can conclude that drilling in the study area has continued to open up new areas at nearly a constant increment per wildcat well.

Although the annual oil discovery rate in the 1980's is lower than that in the 1970's, it is too early to tell the extent

of the decline. Discovery data for the latter part of the decade are incomplete, and it is likely that the estimated sizes of the discoveries in the early 1980's will be revised substantially upward as development and production occur. Comparison of the gas-to-oil ratios in areas having markets for gas with those having no markets suggests that gas contained in new discoveries for the study area has historically been understated. Since 1970, most of the natural gas discovered is in nonassociated gas fields, suggesting, perhaps, that gas is starting to be regarded as a commercial commodity.

The size distribution of petroleum provinces is highly skewed. In particular, of the 99 significant provinces identified in the study area, the largest 4 account for 70 percent of the oil. Discovery statistics indicate that most of the large provinces continue to have discoveries of at least 100 million barrels. The skewed distribution in province sizes and stability in province size orderings suggest that intense exploration in identified provinces will not change the distribution of oil within the study area.

The notion of prospective area was devised to identify areas that have been subjected to a minimum threshold of exploration. The matching of discoveries with prospective area and the dates when the field location became part of the prospective area allows construction of profiles of the discovered oil ordered by prospective area. For most regions, profiles showed that the industry had identified the most productive areas early in the exploration process. The North Sea discoveries of Western Europe and the Campos Basin discoveries in South America are exceptions, representing late prolific prospective areas.

The reader can examine the location of the prospective and explored areas for individual countries and small groups of countries in figures 17–54. Maps are labeled with the names of petroleum provinces and the year of the earliest discovery we know of in each province. Profiles showing the growth in prospective and explored areas as well as the oil discovered by prospective area are also presented. The salient statistics about exploration and petroleum provinces in each country or group of countries are presented in figures 17–54.

Evidence of the field-growth phenomenon outside the United States and Canada was demonstrated. However,

without estimates of ultimate field recovery consistently constructed over a number of years, the data are not reliable enough to project the magnitude of the expected field growth into the future. Because a significant component of field growth is driven by economic forces, the magnitude of the potential additions to proved reserves from this source may not become apparent until (if ever) the fields in the study area are as intensively developed as those in the United States and Canada.

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## TABLES 1–6

[Figures 1–54 follow table 6]

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**Table 1.** Exploration wells by year, 1950–89, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific

[Data for 1950–80 are from the annual foreign developments issues of the *Bulletin of the American Association of Petroleum Geologists* (AAPG). Data for 1980–85 are from these annual issues and from compilations of the AAPG data published in the *International Petroleum Encyclopedia*. Data for 1985–89 are from the *International Petroleum Encyclopedia*]

| Area                               | 1950 | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  |
|------------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Mexico .....                       | 100  | 129 | 111 | 128 | 121 | 114 | 113 | 108 | 76  | 133 | 176 | 160 | 133 | 99  | 109 | 139 | 153 | 135 | 151 | 134 |
| <b>Caribbean</b>                   |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Bahamas .....                      | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Cuba <sup>1</sup> .....            | 0    | 0   | 0   | 1   | 0   | 31  | 45  | 27  | 28  | 10  | 0   | 11  | 4   | 0   | 7   | 0   | 0   | 0   | 0   | 0   |
| Haiti .....                        | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Dominican Republic .....           | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 7   |
| Jamaica .....                      | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Barbados .....                     | 0    | 0   | 0   | 0   | 1   | 1   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 9   | 1   | 0   | 0   |
| Lesser Antilles <sup>2</sup> ..... | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal .....                     | 0    | 0   | 0   | 1   | 1   | 34  | 45  | 31  | 32  | 11  | 2   | 11  | 4   | 0   | 7   | 0   | 9   | 1   | 1   | 7   |
| <b>Central America<sup>3</sup></b> |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Belize .....                       | 0    | 0   | 0   | 0   | 0   | 1   | 1   | 1   | 6   | 0   | 0   | 1   | 4   | 1   | 0   | 0   | 0   | 2   | 0   | 0   |
| Honduras .....                     | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 1   |
| Guatemala .....                    | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 5   | 0   | 3   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 2   | 0   |
| Nicaragua .....                    | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 2   | 5   |
| Costa Rica .....                   | 0    | 0   | 0   | 0   | 0   | 3   | 2   | 0   | 1   | 2   | 2   | 0   | 1   | 2   | 0   | 0   | 0   | 0   | 0   | 0   |
| Panama .....                       | 0    | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 2   | 0   | 0   | 1   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal .....                     | 0    | 0   | 0   | 0   | 0   | 4   | 4   | 3   | 14  | 2   | 5   | 4   | 9   | 4   | 0   | 0   | 0   | 3   | 4   | 6   |
| <b>South America</b>               |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Colombia .....                     | 4    | 8   | 50  | 14  | 24  | 20  | 18  | 26  | 32  | 60  | 50  | 39  | 20  | 22  | 30  | 20  | 24  | 18  | 21  | 30  |
| Venezuela .....                    | 66   | 99  | 111 | 151 | 178 | 165 | 140 | 174 | 193 | 110 | 72  | 80  | 64  | 51  | 53  | 56  | 26  | 31  | 29  | 33  |
| Trinidad and Tobago .....          | 9    | 9   | 7   | 5   | 9   | 10  | 22  | 19  | 12  | 17  | 24  | 31  | 20  | 37  | 53  | 37  | 36  | 14  | 23  | 20  |
| Guyana .....                       | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 6   | 0   | 0   |
| Suriname .....                     | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 2   | 1   | 4   | 17  |
| French Guiana <sup>4</sup> .....   | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Ecuador .....                      | 2    | 4   | 25  | 24  | 23  | 26  | 16  | 25  | 3   | 6   | 8   | 4   | 0   | 0   | 6   | 21  | 31  | 14  | 8   | 8   |
| Peru .....                         | 32   | 43  | 38  | 62  | 55  | 24  | 31  | 16  | 14  | 3   | 21  | 26  | 25  | 26  | 8   | 30  | 24  | 50  | 36  | 38  |
| Bolivia .....                      | 2    | 1   | 0   | 0   | 6   | 2   | 5   | 0   | 9   | 12  | 18  | 14  | 13  | 10  | 13  | 16  | 15  | 28  | 28  | 15  |
| Uruguay .....                      | 0    | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Paraguay .....                     | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 0   |
| Brazil .....                       | 6    | 4   | 4   | 6   | 6   | 10  | 8   | 38  | 56  | 92  | 95  | 76  | 70  | 89  | 86  | 98  | 98  | 110 | 115 | 86  |
| Chile .....                        | 5    | 4   | 6   | 12  | 20  | 13  | 15  | 17  | 20  | 19  | 11  | 14  | 19  | 14  | 14  | 8   | 15  | 10  | 17  | 19  |
| Argentina .....                    | 0    | 23  | 47  | 40  | 54  | 48  | 51  | 38  | 33  | 0   | 121 | 84  | 130 | 76  | 55  | 78  | 116 | 92  | 85  | 86  |
| Subtotal .....                     | 126  | 195 | 288 | 314 | 376 | 318 | 306 | 353 | 372 | 319 | 420 | 368 | 361 | 325 | 319 | 364 | 390 | 377 | 366 | 352 |



| Area   | 1970 | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | TOTAL |
|--|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Mexico .....                                 | 130  | 129 | 143 | 104 | 98  | 87  | 79  | 79  | 83  | 83  | 85  | 63  | 65  | 65  | 44  | 78  | 68  | 27  | 33  | 24  | 4089  |
| <b>Caribbean—Continued</b>                   |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| Bahamas.....                                 | 1    | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 4     |
| Cuba <sup>1</sup> .....                      | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 165   |
| Haiti .....                                  | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 5     |
| Dominican Republic .....                     | 2    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 19    |
| Jamaica.....                                 | 1    | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 4   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 13    |
| Barbados .....                               | 1    | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 3   | 0   | 0   | 10  | 5   | 2   | 0   | 0   | 2   | 39    |
| Lesser Antilles <sup>2</sup> .....           | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2     |
| Subtotal.....                                | 5    | 4   | 1   | 0   | 0   | 0   | 0   | 4   | 1   | 3   | 0   | 5   | 6   | 0   | 10  | 5   | 4   | 0   | 0   | 2   | 247   |
| <b>Central America<sup>3</sup>—Continued</b> |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| Belize .....                                 | 0    | 0   | 5   | 3   | 0   | 4   | 0   | 0   | 0   | 2   | 0   | 3   | 2   | 0   | 1   | 3   | 0   | 0   | 0   | 0   | 40    |
| Honduras .....                               | 0    | 1   | 3   | 3   | 0   | 1   | 0   | 0   | 2   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 14    |
| Guatemala .....                              | 0    | 0   | 1   | 1   | 2   | 3   | 5   | 0   | 0   | 3   | 4   | 6   | 9   | 0   | 0   | 4   | 4   | 0   | 2   | 4   | 61    |
| Nicaragua.....                               | 8    | 3   | 0   | 0   | 3   | 2   | 0   | 3   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 31    |
| Costa Rica.....                              | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 2   | 1   | 20    |
| Panama.....                                  | 0    | 1   | 0   | 0   | 2   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 16    |
| Subtotal .....                               | 8    | 5   | 9   | 7   | 7   | 11  | 5   | 3   | 6   | 6   | 6   | 9   | 11  | 0   | 1   | 7   | 4   | 3   | 4   | 8   | 182   |
| <b>South America—Continued</b>               |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| Colombia.....                                | 16   | 17  | 20  | 20  | 24  | 14  | 21  | 27  | 29  | 30  | 34  | 114 | 73  | 35  | 42  | 67  | 44  | 49  | 85  | 72  | 1363  |
| Venezuela .....                              | 38   | 44  | 64  | 63  | 76  | 35  | 45  | 48  | 46  | 63  | 142 | 351 | 250 | 19  | 18  | 6   | 25  | 177 | 17  | 23  | 3432  |
| Trinidad and Tobago .....                    | 21   | 35  | 23  | 15  | 13  | 14  | 12  | 17  | 8   | 13  | 13  | 16  | 23  | 11  | 4   | 14  | 8   | 8   | 6   | 8   | 696   |
| Guyana.....                                  | 0    | 1   | 0   | 0   | 2   | 3   | 1   | 0   | 0   | 0   | 0   | 1   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 19    |
| Suriname .....                               | 7    | 1   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 3   | 0   | 3   | 8   | 9   | 9   | 11  | 8   | 86    |
| French Guiana <sup>4</sup> .....             | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2     |
| Ecuador .....                                | 20   | 15  | 20  | 8   | 5   | 3   | 3   | 5   | 3   | 9   | 0   | 3   | 5   | 10  | 3   | 2   | 4   | 9   | 14  | 11  | 406   |
| Peru.....                                    | 28   | 21  | 25  | 31  | 43  | 43  | 36  | 37  | 28  | 3   | 13  | 17  | 12  | 23  | 29  | 13  | 11  | 13  | 8   | 7   | 1043  |
| Bolivia .....                                | 10   | 4   | 8   | 4   | 7   | 7   | 16  | 14  | 13  | 12  | 6   | 19  | 18  | 9   | 3   | 11  | 4   | 10  | 12  | 13  | 407   |
| Uruguay.....                                 | 0    | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 1   | 0   | 0   | 8     |
| Paraguay .....                               | 0    | 11  | 6   | 0   | 0   | 1   | 1   | 3   | 3   | 1   | 0   | 1   | 1   | 0   | 0   | 0   | 1   | 2   | 1   | 1   | 36    |
| Brazil .....                                 | 100  | 87  | 80  | 78  | 86  | 87  | 105 | 100 | 89  | 134 | 166 | 245 | 328 | 262 | 243 | 229 | 163 | 176 | 160 | 115 | 4186  |
| Chile .....                                  | 24   | 20  | 33  | 20  | 25  | 23  | 22  | 7   | 14  | 22  | 16  | 62  | 41  | 5   | 7   | 13  | 18  | 35  | 26  | 17  | 722   |
| Argentina.....                               | 113  | 145 | 110 | 139 | 117 | 78  | 83  | 143 | 81  | 71  | 110 | 127 | 107 | 130 | 136 | 161 | 92  | 45  | 102 | 120 | 3467  |
| Subtotal.....                                | 377  | 401 | 389 | 378 | 398 | 310 | 347 | 401 | 317 | 358 | 500 | 956 | 863 | 504 | 488 | 524 | 382 | 534 | 442 | 395 | 15873 |

<sup>1</sup>Data for Cuba for 1960–89 are incomplete.

<sup>2</sup>For this report, the Lesser Antilles are considered to consist of the islands from Grenada to St. Thomas, except Barbados, which is listed separately.

<sup>3</sup>No exploration wells were reported for El Salvador.

<sup>4</sup>French Guiana is listed separately although it is an overseas department of France.

**Table 1.** Exploration wells by year, 1950–89, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific—Continued

| Area                                   | 1950 | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  |
|--|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>Western Europe<sup>5</sup></b>      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Norway.....                            | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 5   | 11  | 14  |
| Svalbard <sup>6</sup> .....            | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Sweden.....                            | 0    | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 3   | 1   | 1   |
| Denmark.....                           | 2    | 2   | 1   | 3   | 0   | 0   | 2   | 0   | 9   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 1   | 7   | 2   |
| Ireland.....                           | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 4   | 0   | 0   | 0   | 0   | 0   | 0   |
| United Kingdom.....                    | 2    | 1   | 1   | 4   | 7   | 15  | 10  | 6   | 17  | 9   | 8   | 4   | 0   | 6   | 5   | 21  | 33  | 39  | 39  | 55  |
| Netherlands.....                       | 11   | 11  | 7   | 17  | 14  | 9   | 7   | 8   | 8   | 11  | 4   | 4   | 4   | 4   | 23  | 40  | 10  | 4   | 19  | 35  |
| Belgium.....                           | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| West Germany.....                      | 63   | 125 | 140 | 80  | 103 | 107 | 113 | 107 | 123 | 99  | 76  | 53  | 49  | 46  | 16  | 36  | 57  | 40  | 42  | 45  |
| France.....                            | 31   | 17  | 34  | 42  | 42  | 17  | 42  | 98  | 138 | 132 | 111 | 104 | 102 | 105 | 78  | 58  | 30  | 23  | 15  | 23  |
| Switzerland.....                       | 0    | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   | 0   | 3   | 2   | 1   | 2   | 3   | 2   | 1   | 0   | 0   | 0   |
| Austria.....                           | 0    | 0   | 0   | 0   | 0   | 0   | 15  | 21  | 13  | 17  | 17  | 11  | 11  | 11  | 13  | 17  | 16  | 8   | 14  | 19  |
| Italy.....                             | 6    | 3   | 35  | 26  | 27  | 41  | 56  | 72  | 72  | 80  | 78  | 68  | 83  | 69  | 70  | 37  | 46  | 24  | 31  | 38  |
| Greece.....                            | 0    | 0   | 0   | 0   | 2   | 0   | 1   | 8   | 1   | 0   | 0   | 6   | 6   | 9   | 0   | 2   | 1   | 10  | 0   | 0   |
| Portugal.....                          | 1    | 0   | 0   | 0   | 14  | 6   | 1   | 2   | 5   | 8   | 1   | 1   | 1   | 4   | 0   | 0   | 0   | 0   | 0   | 0   |
| Spain.....                             | 2    | 3   | 3   | 2   | 4   | 12  | 15  | 17  | 15  | 13  | 9   | 14  | 19  | 23  | 11  | 15  | 17  | 14  | 17  | 9   |
| Malta.....                             | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal.....                          | 118  | 162 | 221 | 175 | 214 | 207 | 262 | 339 | 402 | 372 | 307 | 267 | 278 | 283 | 219 | 228 | 216 | 171 | 196 | 241 |
| <b>Middle East</b>                     |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Turkey.....                            | 1    | 4   | 4   | 2   | 1   | 0   | 0   | 7   | 11  | 21  | 21  | 39  | 19  | 16  | 14  | 23  | 31  | 21  | 21  | 11  |
| Cyprus.....                            | 0    | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   |
| Syria.....                             | 1    | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 4   | 2   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 1   |
| Lebanon.....                           | 0    | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 2   | 6   | 0   | 1   | 1   | 0   | 0   |
| Israel.....                            | 0    | 0   | 0   | 1   | 1   | 8   | 10  | 7   | 7   | 4   | 6   | 4   | 7   | 6   | 12  | 10  | 11  | 10  | 12  | 5   |
| Jordan.....                            | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 3   | 1   | 0   | 0   | 0   | 1   | 5   | 0   | 0   | 0   | 1   |
| Iraq.....                              | 1    | 2   | 0   | 6   | 5   | 4   | 8   | 6   | 7   | 5   | 10  | 5   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   |
| Iran.....                              | 2    | 0   | 1   | 0   | 0   | 0   | 2   | 4   | 2   | 3   | 3   | 6   | 9   | 8   | 16  | 7   | 19  | 40  | 9   | 11  |
| Saudi Arabia.....                      | 0    | 7   | 6   | 1   | 2   | 6   | 3   | 1   | 0   | 0   | 10  | 10  | 8   | 2   | 3   | 7   | 3   | 8   | 6   | 3   |
| Kuwait.....                            | 0    | 2   | 2   | 0   | 2   | 1   | 2   | 1   | 2   | 3   | 2   | 8   | 3   | 6   | 5   | 6   | 5   | 1   | 1   | 0   |
| Former Neutral Zone <sup>7</sup> ..... | 3    | 1   | 1   | 0   | 3   | 2   | 1   | 0   | 0   | 0   | 1   | 4   | 7   | 9   | 0   | 2   | 3   | 2   | 0   | 0   |
| Bahrain.....                           | 4    | 11  | 0   | 0   | 9   | 4   | 2   | 0   | 0   | 1   | 0   | 1   | 1   | 3   | 0   | 1   | 1   | 0   | 0   | 0   |
| Qatar.....                             | 0    | 0   | 1   | 2   | 0   | 1   | 1   | 0   | 0   | 0   | 3   | 1   | 1   | 4   | 6   | 0   | 0   | 5   | 0   | 0   |
| Oman.....                              | 0    | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 1   | 2   | 0   | 3   | 2   | 0   | 1   | 0   | 0   | 0   | 5   |
| Yemen.....                             | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 4   | 0   | 1   | 1   | 0   | 0   | 0   | 0   |
| United Arab Emirates.....              | 0    | 1   | 1   | 0   | 1   | 1   | 2   | 2   | 3   | 4   | 4   | 0   | 4   | 5   | 8   | 5   | 16  | 11  | 13  | 12  |
| Subtotal.....                          | 12   | 28  | 16  | 14  | 24  | 27  | 33  | 30  | 34  | 49  | 66  | 80  | 66  | 63  | 72  | 68  | 91  | 99  | 63  | 52  |

| Area  | 1970 | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | TOTAL |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| <b>Western Europe<sup>5</sup>—Continued</b> |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| Norway.....                                 | 13   | 13  | 14  | 13  | 18  | 14  | 21  | 14  | 14  | 26  | 35  | 41  | 50  | 50  | 18  | 43  | 41  | 33  | —   | 23  | 525   |
| Svalbard <sup>6</sup> .....                 | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | —   | 1   | 1     |
| Sweden.....                                 | 0    | 5   | 22  | 21  | 25  | 31  | 5   | 7   | 32  | 11  | 21  | 18  | 19  | 15  | 20  | 16  | 0   | 6   | —   | 17  | 298   |
| Denmark.....                                | 3    | 3   | 1   | 4   | 3   | 5   | 7   | 5   | 3   | 2   | 4   | 5   | 5   | 13  | 4   | 15  | 8   | 7   | —   | 4   | 135   |
| Ireland.....                                | 0    | 3   | 3   | 3   | 4   | 7   | 6   | 6   | 15  | 8   | 3   | 11  | 4   | 6   | 7   | 6   | 7   | 4   | —   | 5   | 114   |
| United Kingdom.....                         | 34   | 32  | 34  | 55  | 74  | 93  | 70  | 72  | 45  | 60  | 81  | 92  | 123 | 141 | 64  | 187 | 210 | 142 | —   | 184 | 2075  |
| Netherlands.....                            | 27   | 29  | 33  | 18  | 19  | 24  | 26  | 28  | 28  | 31  | 37  | 38  | 58  | 49  | 27  | 52  | 41  | 35  | —   | 45  | 895   |
| Belgium.....                                | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 4   | 0   | 0   | 0   | 0   | 0   | 0   | —   | 0   | 4     |
| West Germany.....                           | 24   | 27  | 26  | 22  | 30  | 26  | 29  | 37  | 27  | 49  | 37  | 65  | 62  | 44  | 48  | 44  | 34  | 24  | —   | 12  | 2187  |
| France.....                                 | 14   | 7   | 11  | 11  | 9   | 11  | 15  | 14  | 17  | 24  | 24  | 38  | 50  | 28  | 40  | 49  | 78  | 38  | —   | 47  | 1767  |
| Switzerland.....                            | 0    | 0   | 0   | 1   | 0   | 0   | 0   | 1   | 1   | 0   | 1   | 3   | 4   | 0   | 0   | 0   | 0   | 1   | —   | 1   | 29    |
| Austria.....                                | 15   | 25  | 21  | 21  | 24  | 37  | 36  | 26  | 33  | 28  | 26  | 33  | 37  | 21  | 23  | 23  | 13  | 24  | 20  | 12  | 701   |
| Italy.....                                  | 27   | 40  | 43  | 24  | 20  | 24  | 25  | 20  | 61  | 43  | 60  | 91  | 103 | 66  | 77  | 73  | 117 | 96  | 88  | 38  | 2098  |
| Greece.....                                 | 2    | 1   | 2   | 3   | 4   | 0   | 1   | 5   | 3   | 5   | 5   | 5   | 14  | 5   | 6   | 5   | 2   | 3   | —   | 4   | 121   |
| Portugal.....                               | 0    | 0   | 0   | 0   | 3   | 8   | 8   | 1   | 0   | 2   | 0   | 1   | 2   | 3   | 0   | 1   | 0   | 0   | 0   | 0   | 73    |
| Spain.....                                  | 7    | 13  | 7   | 19  | 10  | 16  | 23  | 18  | 18  | 18  | 24  | 33  | 19  | 24  | 15  | 21  | 18  | 12  | —   | 10  | 559   |
| Malta.....                                  | 0    | 1   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 7     |
| Subtotal.....                               | 166  | 199 | 219 | 216 | 243 | 296 | 272 | 254 | 297 | 307 | 359 | 478 | 551 | 465 | 349 | 535 | 569 | 425 | 108 | 403 | 11589 |
| <b>Middle East—Continued</b>                |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| Turkey.....                                 | 34   | 21  | 25  | 35  | 37  | 56  | 53  | 33  | 26  | 12  | 29  | 19  | 50  | 35  | 19  | 24  | 25  | 31  | 37  | 39  | 907   |
| Cyprus.....                                 | 1    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3     |
| Syria.....                                  | 1    | 1   | 1   | 0   | 1   | 0   | 0   | 0   | 0   | 3   | 2   | 4   | 4   | 20  | 30  | 11  | 24  | 10  | 14  | 20  | 158   |
| Lebanon.....                                | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 12    |
| Israel.....                                 | 8    | 6   | 4   | 2   | 1   | 9   | 12  | 12  | 5   | 7   | 11  | 8   | 14  | 18  | 0   | 2   | 3   | 2   | 1   | 3   | 249   |
| Jordan.....                                 | 0    | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 5   | 0   | 0   | 0   | 0   | 0   | 0   | 22    |
| Iraq.....                                   | 1    | 0   | 1   | 3   | 2   | 1   | 2   | 5   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 10  | 19  | 2   | 109   |
| Iran.....                                   | 8    | 10  | 6   | 36  | 26  | 26  | 26  | 25  | 17  | 2   | 5   | 1   | 0   | 0   | 0   | 0   | 7   | 0   | 0   | 0   | 337   |
| Saudi Arabia.....                           | 2    | 4   | 10  | 7   | 9   | 21  | 16  | 12  | 8   | 37  | 40  | 49  | 25  | 4   | 0   | 7   | 6   | 0   | 3   | 3   | 349   |
| Kuwait.....                                 | 1    | 2   | 2   | 0   | 0   | 0   | 2   | 1   | 0   | 7   | 0   | 24  | 8   | 29  | 11  | 2   | 0   | 2   | 0   | 2   | 145   |
| Former Neutral Zone <sup>7</sup> .....      | 0    | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 0   | 0   | 2   | 0   | 0   | 0   | 44    |
| Bahrain.....                                | 0    | 0   | 1   | 1   | 0   | 1   | 0   | 0   | 1   | 0   | 1   | 14  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 57    |
| Qatar.....                                  | 3    | 4   | 5   | 1   | 0   | 0   | 2   | 0   | 2   | 2   | 4   | 2   | 4   | 2   | 3   | 3   | 0   | 0   | 7   | 3   | 72    |
| Oman.....                                   | 2    | 10  | 16  | 7   | 0   | 0   | 0   | 9   | 19  | 19  | 17  | 29  | 31  | 37  | 29  | 39  | 32  | 36  | 40  | 44  | 432   |
| Yemen.....                                  | 0    | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 1   | 2   | 1   | 4   | 4   | 0   | 1   | 5   | 3   | 0   | 28  | 33  | 92    |
| United Arab Emirates.....                   | 14   | 9   | 15  | 16  | 12  | 9   | 20  | 9   | 0   | 0   | 14  | 13  | 26  | 34  | 17  | 27  | 13  | 0   | 8   | 4   | 353   |
| Subtotal.....                               | 75   | 70  | 86  | 109 | 88  | 123 | 134 | 107 | 80  | 91  | 124 | 167 | 168 | 184 | 110 | 120 | 117 | 91  | 157 | 153 | 3341  |

<sup>5</sup>No exploration wells were reported for Andorra, Finland, Iceland, Liechtenstein, Luxemburg, or Monaco. Dashes in 1988 column indicate data not available.

<sup>6</sup>Svalbard (or Spitsbergen) is a group of islands in the Arctic Ocean north of and belonging to Norway.

<sup>7</sup>The former Neutral Zone was located between Kuwait and Saudi Arabia.

**Table 1.** Exploration wells by year, 1950-89, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific—Continued

| Area                          | 1950 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  |
|-------------------------------|------|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>Africa<sup>8</sup></b>     |      |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| Morocco.....                  | 20   | 66 | 38 | 53 | 40 | 26 | 12 | 5  | 5   | 3   | 4   | 13  | 8   | 3   | 8   | 5   | 12  | 9   | 8   | 14  |
| Algeria.....                  | 14   | 12 | 11 | 11 | 18 | 22 | 46 | 30 | 39  | 37  | 48  | 64  | 62  | 25  | 46  | 24  | 17  | 17  | 17  | 31  |
| Tunisia.....                  | 3    | 0  | 3  | 7  | 12 | 5  | 4  | 4  | 5   | 5   | 0   | 1   | 8   | 4   | 4   | 7   | 7   | 10  | 5   | 4   |
| Libya.....                    | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 4  | 25  | 41  | 98  | 125 | 173 | 245 | 167 | 136 | 62  | 41  | 80  | 70  |
| Egypt.....                    | 6    | 0  | 0  | 0  | 3  | 4  | 2  | 5  | 5   | 2   | 6   | 4   | 6   | 12  | 9   | 8   | 14  | 7   | 21  | 23  |
| Western Sahara.....           | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 2   | 13  | 30  | 7   | 4   | 3   | 4   | 5   | 0   | 1   |
| Mauritania.....               | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   |
| Mali.....                     | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Niger.....                    | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 6   | 1   | 2   | 0   | 0   | 0   | 0   | 0   |
| Chad.....                     | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Sudan.....                    | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 1   | 3   | 2   | 0   | 0   | 0   | 0   | 0   | 0   |
| Senegal.....                  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 3   | 11  | 5   | 8   | 1   | 0   | 0   | 0   | 2   | 5   | 2   | 3   |
| The Gambia.....               | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Guinea-Bissau.....            | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 1   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 3   |
| Guinea.....                   | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   |
| Sierra Leone.....             | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Liberia.....                  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Ivory Coast.....              | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1   | 1   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Ghana.....                    | 0    | 0  | 0  | 0  | 0  | 0  | 1  | 3  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   |
| Togo.....                     | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   |
| Benin.....                    | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 2   |
| Nigeria.....                  | 0    | 0  | 1  | 2  | 10 | 7  | 4  | 1  | 17  | 37  | 25  | 15  | 5   | 22  | 37  | 65  | 66  | 79  | 38  | 27  |
| Cameroon.....                 | 0    | 0  | 14 | 3  | 2  | 2  | 3  | 3  | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 4   | 1   | 1   |
| Equatorial Guinea.....        | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 5   | 0   |
| Gabon.....                    | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 25  | 19  | 7   | 8   | 15  | 4   | 2   | 8   | 9   | 10  | 10  | 20  |
| Central African Republic..... | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Congo.....                    | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 2   | 1   | 6   | 1   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 1   |
| Zaire.....                    | 0    | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   |
| Ethiopia.....                 | 1    | 0  | 1  | 1  | 0  | 6  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 2   | 0   | 0   | 2   |
| Kenya.....                    | 0    | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1   | 2   | 2   | 1   | 1   | 2   | 0   | 0   | 0   | 1   | 1   | 0   |
| Somalia.....                  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 2  | 2   | 5   | 4   | 3   | 4   | 0   | 1   | 4   | 1   | 1   | 2   | 2   |
| Uganda.....                   | 3    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Angola.....                   | 0    | 0  | 0  | 3  | 4  | 1  | 8  | 6  | 4   | 10  | 11  | 10  | 6   | 10  | 6   | 10  | 15  | 24  | 55  | 31  |
| Zambia.....                   | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Tanzania.....                 | 0    | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 4   | 5   | 5   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Mozambique.....               | 0    | 0  | 0  | 2  | 0  | 0  | 1  | 2  | 0   | 0   | 0   | 1   | 3   | 2   | 0   | 5   | 1   | 16  | 0   | 0   |
| Burundi.....                  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Namibia.....                  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 2   | 1   | 1   | 0   | 0   | 0   | 0   | 0   |
| Lesotho.....                  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Madagascar.....               | 0    | 1  | 2  | 0  | 0  | 3  | 3  | 4  | 5   | 3   | 6   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 0   | 0   |
| South Africa.....             | 0    | 0  | 0  | 0  | 1  | 1  | 3  | 0  | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 6   | 2   | 2   | 9   |
| Mauritius.....                | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Seychelles.....               | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal.....                 | 47   | 79 | 70 | 82 | 90 | 78 | 90 | 69 | 144 | 183 | 232 | 273 | 337 | 343 | 288 | 279 | 219 | 233 | 251 | 248 |

| Area                          | 1970 | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | TOTAL |
|-------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Africa—Continued              |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| Morocco.....                  | 1    | 8   | 7   | 4   | 2   | 5   | 8   | 5   | 4   | 7   | 10  | 14  | 11  | 8   | 5   | 6   | 5   | 7   | 2   | 0   | 471   |
| Algeria.....                  | 37   | 25  | 10  | 13  | 9   | 17  | 11  | 15  | 23  | 33  | 32  | 1   | 1   | 2   | 3   | 25  | 30  | 25  | 14  | 18  | 935   |
| Tunisia.....                  | 6    | 13  | 12  | 9   | 16  | 8   | 10  | 10  | 11  | 13  | 15  | 33  | 21  | 14  | 17  | 15  | 6   | 16  | 10  | 8   | 361   |
| Libya.....                    | 51   | 41  | 34  | 25  | 32  | 45  | 22  | 33  | 41  | 28  | 37  | 43  | 34  | 61  | 51  | 45  | 27  | 41  | 25  | 26  | 2009  |
| Egypt.....                    | 33   | 22  | 26  | 15  | 12  | 20  | 34  | 30  | 24  | 33  | 45  | 64  | 82  | 70  | 45  | 76  | 54  | 55  | 58  | 43  | 978   |
| Western Sahara.....           | 1    | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 72    |
| Mauritania.....               | 2    | 0   | 1   | 1   | 3   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   | 13    |
| Mali.....                     | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 3     |
| Niger.....                    | 0    | 0   | 0   | 0   | 0   | 6   | 0   | 0   | 0   | 3   | 3   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 23    |
| Chad.....                     | 0    | 0   | 0   | 0   | 4   | 4   | 4   | 3   | 5   | 1   | 0   | 0   | 0   | 0   | 0   | 4   | 4   | 0   | 0   | 0   | 29    |
| Sudan.....                    | 0    | 0   | 0   | 0   | 0   | 1   | 2   | 1   | 4   | 6   | 8   | 14  | 17  | 24  | 4   | 6   | 2   | 1   | 0   | 4   | 100   |
| Senegal.....                  | 5    | 6   | 1   | 0   | 0   | 1   | 2   | 1   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 57    |
| The Gambia.....               | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 4   | 10    |
| Guinea-Bissau.....            | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   | 11    |
| Guinea.....                   | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2     |
| Sierra Leone.....             | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 2     |
| Liberia.....                  | 0    | 4   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 3   | 0   | 0   | 0   | 0   | 8     |
| Ivory Coast.....              | 0    | 0   | 2   | 1   | 1   | 3   | 1   | 10  | 5   | 3   | 2   | 10  | 14  | 4   | 5   | 3   | 0   | 0   | 1   | 1   | 70    |
| Ghana.....                    | 11   | 2   | 1   | 1   | 1   | 5   | 0   | 2   | 1   | 2   | 0   | 1   | 1   | 0   | 2   | 2   | 2   | 11  | 0   | 3   | 54    |
| Togo.....                     | 1    | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 0   | 5     |
| Benin.....                    | 4    | 0   | 1   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 12    |
| Nigeria.....                  | 31   | 55  | 61  | 45  | 51  | 33  | 21  | 24  | 35  | 22  | 31  | 26  | 30  | 24  | 12  | 17  | 29  | 44  | 42  | 47  | 1138  |
| Cameroon.....                 | 6    | 2   | 5   | 3   | 5   | 7   | 7   | 32  | 21  | 25  | 17  | 18  | 11  | 4   | 6   | 9   | 5   | 0   | 3   | 1   | 223   |
| Equatorial Guinea.....        | 0    | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 4   | 0   | 1   | 1   | 0   | 1   | 0   | 0   | 14    |
| Gabon.....                    | 13   | 11  | 17  | 15  | 13  | 23  | 19  | 19  | 20  | 22  | 15  | 23  | 16  | 11  | 18  | 13  | 12  | 16  | 20  | 26  | 479   |
| Central African Republic..... | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 1     |
| Congo.....                    | 1    | 2   | 7   | 4   | 6   | 4   | 0   | 0   | 6   | 11  | 11  | 5   | 9   | 4   | 3   | 9   | 5   | 10  | 10  | 7   | 128   |
| Zaire.....                    | 2    | 1   | 6   | 3   | 0   | 4   | 2   | 1   | 5   | 1   | 0   | 3   | 4   | 4   | 3   | 1   | 2   | 1   | 4   | 1   | 52    |
| Ethiopia.....                 | 1    | 0   | 3   | 5   | 3   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 28    |
| Kenya.....                    | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 1   | 1   | 2   | 3   | 4   | 25    |
| Somalia.....                  | 0    | 0   | 1   | 0   | 1   | 1   | 0   | 1   | 0   | 0   | 1   | 0   | 3   | 0   | 2   | 2   | 1   | 1   | 2   | 1   | 48    |
| Uganda.....                   | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3     |
| Angola.....                   | 25   | 29  | 15  | 8   | 20  | 10  | 0   | 6   | 6   | 6   | 2   | 14  | 23  | 22  | 13  | 20  | 17  | 24  | 29  | 19  | 522   |
| Zambia.....                   | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 1   | 0   | 3     |
| Tanzania.....                 | 0    | 0   | 0   | 0   | 2   | 0   | 3   | 1   | 0   | 1   | 0   | 0   | 2   | 1   | 2   | 3   | 0   | 2   | 0   | 0   | 33    |
| Mozambique.....               | 12   | 5   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 0   | 53    |
| Burundi.....                  | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 0   | 2     |
| Namibia.....                  | 3    | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 11    |
| Lesotho.....                  | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1     |
| Madagascar.....               | 1    | 8   | 1   | 2   | 4   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 5   | 3   | 2   | 0   | 0   | 56    |
| South Africa.....             | 15   | 13  | 10  | 18  | 5   | 7   | 8   | 12  | 9   | 12  | 8   | 12  | 10  | 11  | 10  | 16  | 32  | 17  | 17  | 19  | 286   |
| Mauritius.....                | 0    | 0   | 0   | 0   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2     |
| Seychelles.....               | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3     |
| Subtotal.....                 | 262  | 249 | 223 | 176 | 191 | 208 | 154 | 208 | 220 | 231 | 239 | 284 | 298 | 265 | 206 | 284 | 241 | 280 | 247 | 235 | 8336  |

\*No exploration wells were reported for Botswana, Burkina Faso (formerly Upper Volta), Cape Verde, Comoros, Djibouti, Malawi, Rwanda, Sao Tome and Principe, Swaziland, or Zimbabwe.

**Table 1.** Exploration wells by year, 1950-89, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific—Continued

| Area                                     | 1950       | 51         | 52         | 53         | 54         | 55         | 56         | 57          | 58          | 59          | 60          | 61          | 62          | 63          | 64          | 65          | 66          | 67          | 68          | 69          |
|--|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Non-Communist Asia<sup>9</sup></b>    |            |            |            |            |            |            |            |             |             |             |             |             |             |             |             |             |             |             |             |             |
| Pakistan .....                           | 1          | 0          | 3          | 0          | 2          | 2          | 2          | 9           | 3           | 9           | 6           | 4           | 4           | 3           | 3           | 4           | 3           | 6           | 5           | 4           |
| Maldives .....                           | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| India .....                              | 2          | 0          | 0          | 2          | 4          | 0          | 3          | 10          | 5           | 6           | 7           | 3           | 0           | 5           | 0           | 0           | 0           | 0           | 0           | 10          |
| Bangladesh .....                         | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 0           | 0           | 4           | 1           | 4           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Myanmar .....                            | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 2           | 4           | 3           | 3           | 15          | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Thailand .....                           | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 0           | 1           | 3           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Sri Lanka .....                          | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Malaysia .....                           | 0          | 1          | 1          | 4          | 3          | 10         | 7          | 8           | 2           | 2           | 9           | 6           | 8           | 3           | 4           | 0           | 9           | 12          | 17          | 22          |
| Brunei .....                             | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 5           |
| Indonesia .....                          | 19         | 24         | 14         | 9          | 7          | 7          | 9          | 23          | 12          | 19          | 20          | 1           | 3           | 28          | 19          | 14          | 3           | 5           | 17          | 34          |
| Japan .....                              | 1          | 6          | 3          | 25         | 39         | 40         | 18         | 45          | 79          | 72          | 44          | 98          | 95          | 55          | 95          | 105         | 78          | 67          | 71          | 49          |
| South Korea .....                        | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Taiwan .....                             | 3          | 0          | 0          | 0          | 2          | 5          | 4          | 6           | 0           | 5           | 4           | 7           | 4           | 5           | 1           | 5           | 6           | 8           | 15          | 15          |
| Philippines .....                        | 3          | 0          | 3          | 1          | 0          | 0          | 1          | 2           | 4           | 9           | 32          | 12          | 8           | 2           | 15          | 0           | 0           | 0           | 0           | 0           |
| Subtotal .....                           | 29         | 31         | 24         | 41         | 57         | 64         | 44         | 103         | 107         | 127         | 132         | 135         | 141         | 101         | 137         | 128         | 99          | 98          | 125         | 139         |
| <b>Southwestern Pacific<sup>10</sup></b> |            |            |            |            |            |            |            |             |             |             |             |             |             |             |             |             |             |             |             |             |
| Papua New Guinea .....                   | 8          | 5          | 8          | 1          | 12         | 14         | 7          | 8           | 8           | 5           | 5           | 0           | 1           | 0           | 0           | 1           | 2           | 4           | 8           | 4           |
| Oceania <sup>11</sup> .....              | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Australia .....                          | 0          | 1          | 1          | 2          | 20         | 37         | 61         | 47          | 27          | 52          | 23          | 17          | 53          | 107         | 137         | 155         | 100         | 83          | 86          | 51          |
| New Zealand .....                        | 0          | 0          | 0          | 0          | 0          | 0          | 0          | 0           | 0           | 1           | 2           | 1           | 2           | 4           | 8           | 7           | 3           | 1           | 1           | 10          |
| Subtotal .....                           | 8          | 6          | 9          | 3          | 32         | 51         | 68         | 55          | 35          | 58          | 30          | 18          | 56          | 111         | 145         | 163         | 105         | 88          | 95          | 65          |
| <b>GRAND TOTAL .....</b>                 | <b>440</b> | <b>630</b> | <b>739</b> | <b>758</b> | <b>915</b> | <b>897</b> | <b>965</b> | <b>1091</b> | <b>1216</b> | <b>1254</b> | <b>1370</b> | <b>1316</b> | <b>1385</b> | <b>1329</b> | <b>1296</b> | <b>1369</b> | <b>1282</b> | <b>1205</b> | <b>1252</b> | <b>1244</b> |

| Area   | 1970 | 71   | 72   | 73   | 74   | 75   | 76   | 77   | 78   | 79   | 80   | 81   | 82   | 83   | 84   | 85   | 86   | 87   | 88   | 89   | TOTAL |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| <b>Non-Communist Asia<sup>9</sup>—Continued</b>    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |
| Pakistan .....                                     | 6    | 4    | 3    | 3    | 5    | 5    | 1    | 4    | 6    | 11   | 10   | 13   | 10   | 14   | 17   | 26   | 15   | 9    | 31   | 20   | 286   |
| Maldives .....                                     | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 2     |
| India .....  | 0    | 0    | 7    | 10   | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 17   | 0    | 11   | 37   | 87   | 49   | 37   | 51   | 0    | 364   |
| Bangladesh .....                                   | 0    | 0    | 0    | 1    | 0    | 2    | 5    | 5    | 2    | 0    | 0    | 5    | 2    | 1    | 0    | 0    | 0    | 2    | 5    | 0    | 39    |
| Myanmar .....                                      | 1    | 0    | 6    | 0    | 6    | 10   | 9    | 0    | 0    | 0    | 11   | 17   | 19   | 0    | 45   | 9    | 3    | 3    | 4    | 0    | 170   |
| Thailand .....                                     | 0    | 1    | 4    | 3    | 14   | 10   | 17   | 3    | 8    | 10   | 14   | 21   | 30   | 38   | 38   | 28   | 7    | 23   | 50   | 0    | 323   |
| Sri Lanka .....                                    | 0    | 0    | 0    | 0    | 1    | 0    | 3    | 0    | 0    | 0    | 0    | 2    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 6     |
| Malaysia .....                                     | 14   | 11   | 19   | 18   | 31   | 11   | 12   | 14   | 16   | 58   | 44   | 61   | 25   | 20   | 16   | 25   | 14   | 13   | 13   | 17   | 580   |
| Brunei .....                                       | 0    | 0    | 6    | 10   | 0    | 0    | 11   | 3    | 7    | 5    | 1    | 4    | 6    | 6    | 14   | 9    | 13   | 12   | 13   | 0    | 125   |
| Indonesia .....                                    | 87   | 138  | 140  | 169  | 168  | 184  | 130  | 115  | 146  | 154  | 182  | 224  | 204  | 267  | 216  | 208  | 122  | 75   | 103  | 102  | 3421  |
| Japan .....  | 0    | 4    | 8    | 36   | 28   | 25   | 19   | 29   | 36   | 25   | 24   | 27   | 27   | 23   | 18   | 16   | 17   | 12   | 11   | 9    | 1479  |
| South Korea .....                                  | 0    | 0    | 1    | 5    | 0    | 2    | 0    | 0    | 0    | 0    | 2    | 1    | 0    | 1    | 0    | 2    | 1    | 0    | 3    | 0    | 18    |
| Taiwan .....                                       | 5    | 9    | 5    | 18   | 17   | 18   | 10   | 15   | 20   | 18   | 30   | 16   | 13   | 18   | 4    | 12   | 13   | 9    | 13   | 0    | 358   |
| Philippines .....                                  | 2    | 17   | 8    | 10   | 7    | 13   | 8    | 15   | 18   | 23   | 23   | 17   | 13   | 4    | 3    | 0    | 0    | 2    | 7    | 6    | 288   |
| Subtotal .....                                     | 115  | 184  | 207  | 283  | 277  | 280  | 227  | 203  | 259  | 304  | 341  | 426  | 349  | 403  | 408  | 422  | 254  | 197  | 304  | 154  | 7459  |
| <b>Southwestern Pacific<sup>10</sup>—Continued</b> |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |
| Papua New Guinea .....                             | 2    | 2    | 1    | 6    | 0    | 3    | 2    | 1    | 1    | 0    | 0    | 14   | 2    | 4    | 5    | 5    | 3    | 5    | 15   | 23   | 195   |
| Oceania <sup>11</sup> .....                        | 0    | 2    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 3    | 2    | 0    | 4    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 11    |
| Australia .....                                    | 110  | 65   | 92   | 61   | 51   | 20   | 17   | 17   | 51   | 49   | 67   | 125  | 149  | 182  | 263  | 267  | 139  | 167  | 140  | 63   | 3155  |
| New Zealand .....                                  | 10   | 9    | 6    | 0    | 0    | 5    | 7    | 3    | 3    | 2    | 4    | 8    | 6    | 15   | 8    | 25   | 24   | 0    | 0    | 5    | 180   |
| Subtotal .....                                     | 122  | 78   | 99   | 67   | 51   | 28   | 26   | 21   | 55   | 54   | 73   | 147  | 161  | 201  | 276  | 297  | 166  | 172  | 155  | 91   | 3541  |
| GRAND TOTAL .....                                  | 1260 | 1319 | 1376 | 1340 | 1353 | 1343 | 1244 | 1280 | 1318 | 1437 | 1727 | 2535 | 2472 | 2087 | 1892 | 2272 | 1805 | 1729 | 1450 | 1465 | 54657 |

<sup>9</sup>No exploration wells were reported for Afghanistan, Bhutan, Nepal, or Singapore.

<sup>10</sup>No exploration wells were reported for New Caledonia (an overseas territory of France).

<sup>11</sup>For this report, Oceania is considered to consist of Fiji, Kiribati, Nauru, Solomon Islands, Tonga, Tuvalu, Vanuatu (formerly New Hebrides), and Western Samoa.

**Table 2.** Wildcat wells by year, 1951–90, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific

[Data are from a computer tape released in January 1991 by Petroconsultants S.A., Geneva. Column denoted "Unkn" means year unknown; these wells are not plotted in the graphs]

| Area                               | Pre-1951 | 51 | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  |
|------------------------------------|----------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Mexico .....                       | 68       | 8  | 5   | 3   | 9   | 8   | 10  | 9   | 10  | 10  | 21  | 21  | 15  | 0   | 2   | 0   | 1   | 0   | 2   | 1   |
| <b>Caribbean</b>                   |          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Bahamas .....                      | 1        | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Cuba <sup>1</sup> .....            | 11       | 0  | 1   | 0   | 3   | 11  | 29  | 22  | 22  | 13  | 4   | 6   | 1   | 0   | 6   | 2   | 0   | 0   | 1   | 2   |
| Haiti .....                        | 4        | 0  | 0   | 0   | 0   | 1   | 2   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Dominican Republic .....           | 2        | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 4   | 0   | 2   | 3   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 6   |
| Jamaica .....                      | 0        | 0  | 0   | 0   | 0   | 1   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Barbados .....                     | 1        | 0  | 0   | 0   | 2   | 2   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 9   | 2   | 0   | 0   |
| Lesser Antilles <sup>2</sup> ..... | 0        | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal .....                     | 19       | 0  | 1   | 0   | 5   | 15  | 32  | 25  | 26  | 16  | 6   | 9   | 1   | 0   | 6   | 2   | 9   | 4   | 1   | 8   |
| <b>Central America<sup>3</sup></b> |          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Belize .....                       | 0        | 0  | 0   | 0   | 0   | 0   | 2   | 1   | 6   | 2   | 0   | 1   | 1   | 1   | 0   | 0   | 0   | 2   | 0   | 0   |
| Honduras .....                     | 2        | 0  | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 2   | 4   | 1   | 0   | 1   |
| Guatemala .....                    | 1        | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 5   | 2   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 1   | 0   |
| Nicaragua .....                    | 5        | 0  | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 2   | 5   |
| Costa Rica .....                   | 6        | 0  | 0   | 0   | 0   | 3   | 2   | 2   | 1   | 3   | 2   | 0   | 1   | 2   | 0   | 0   | 0   | 0   | 0   | 0   |
| Panama .....                       | 11       | 0  | 0   | 0   | 0   | 0   | 2   | 1   | 2   | 2   | 0   | 1   | 4   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal .....                     | 25       | 0  | 0   | 0   | 0   | 3   | 7   | 6   | 10  | 12  | 4   | 4   | 7   | 4   | 0   | 2   | 4   | 4   | 3   | 6   |
| <b>South America</b>               |          |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Colombia .....                     | 174      | 9  | 7   | 15  | 21  | 13  | 13  | 20  | 34  | 27  | 37  | 33  | 18  | 24  | 23  | 18  | 20  | 18  | 21  | 20  |
| Venezuela .....                    | 808      | 58 | 52  | 62  | 63  | 98  | 83  | 75  | 122 | 75  | 33  | 36  | 14  | 9   | 1   | 12  | 5   | 12  | 3   | 7   |
| Trinidad and Tobago .....          | 31       | 1  | 5   | 4   | 6   | 8   | 9   | 2   | 9   | 11  | 7   | 6   | 7   | 14  | 7   | 8   | 3   | 3   | 9   | 5   |
| Guyana .....                       | 1        | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 0   |
| Suriname .....                     | 2        | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 6   | 1   | 4   | 4   |
| French Guiana <sup>4</sup> .....   | 0        | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Ecuador .....                      | 39       | 1  | 1   | 1   | 4   | 0   | 0   | 3   | 0   | 5   | 9   | 1   | 0   | 1   | 1   | 0   | 0   | 3   | 4   | 5   |
| Peru .....                         | 29       | 4  | 6   | 5   | 13  | 11  | 12  | 7   | 8   | 2   | 11  | 12  | 4   | 4   | 0   | 7   | 4   | 6   | 6   | 4   |
| Bolivia .....                      | 22       | 0  | 0   | 0   | 1   | 1   | 2   | 1   | 11  | 7   | 12  | 12  | 16  | 10  | 10  | 7   | 12  | 15  | 11  | 1   |
| Uruguay .....                      | 26       | 0  | 0   | 0   | 0   | 1   | 1   | 0   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   |
| Paraguay .....                     | 5        | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 0   |
| Brazil .....                       | 22       | 4  | 4   | 4   | 2   | 9   | 2   | 18  | 28  | 39  | 46  | 32  | 39  | 45  | 38  | 46  | 45  | 61  | 56  | 40  |
| Chile .....                        | 14       | 5  | 6   | 12  | 17  | 8   | 2   | 8   | 6   | 3   | 16  | 13  | 21  | 14  | 13  | 14  | 15  | 12  | 16  | 19  |
| Argentina .....                    | 308      | 15 | 23  | 31  | 32  | 29  | 37  | 24  | 23  | 69  | 111 | 77  | 99  | 55  | 50  | 82  | 76  | 72  | 66  | 55  |
| Subtotal .....                     | 1481     | 97 | 104 | 134 | 159 | 178 | 161 | 158 | 244 | 242 | 282 | 222 | 218 | 176 | 144 | 195 | 187 | 208 | 196 | 160 |



| Area   | 1970 | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | Unkn | TOTAL |
|--|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-------|
| Mexico .....                                 | 0    | 0   | 0   | 0   | 0   | 0   | 1   | 21  | 14  | 5   | 2   | 4   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0    | 251   |
| <b>Caribbean—Continued</b>                   |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |       |
| Bahamas .....                                | 1    | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0    | 5     |
| Cuba <sup>1</sup> .....                      | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 184  | 320   |
| Haiti .....                                  | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 11    |
| Dominican Republic .....                     | 1    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 5    | 30    |
| Jamaica .....                                | 1    | 1   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 4   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 11    |
| Barbados .....                               | 1    | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 5   | 1   | 0   | 0   | 1   | 0   | 31   | 60    |
| Lesser Antilles <sup>2</sup> .....           | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 3     |
| Subtotal .....                               | 4    | 4   | 0   | 1   | 0   | 0   | 0   | 4   | 1   | 3   | 0   | 2   | 6   | 0   | 0   | 5   | 2   | 0   | 0   | 3   | 0   | 220  | 440   |
| <b>Central America<sup>3</sup>—Continued</b> |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |       |
| Belize .....                                 | 0    | 0   | 5   | 2   | 1   | 4   | 0   | 2   | 0   | 2   | 0   | 3   | 2   | 2   | 0   | 3   | 0   | 0   | 0   | 0   | 2   | 0    | 44    |
| Honduras .....                               | 0    | 1   | 3   | 3   | 0   | 1   | 0   | 0   | 2   | 0   | 2   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 26    |
| Guatemala .....                              | 3    | 2   | 3   | 3   | 1   | 2   | 3   | 4   | 0   | 1   | 3   | 7   | 9   | 4   | 1   | 4   | 1   | 0   | 3   | 1   | 0   | 0    | 68    |
| Nicaragua .....                              | 8    | 3   | 0   | 0   | 2   | 3   | 0   | 2   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1    | 36    |
| Costa Rica .....                             | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 0   | 0    | 25    |
| Panama .....                                 | 0    | 1   | 0   | 0   | 2   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 0    | 31    |
| Subtotal .....                               | 11   | 7   | 11  | 8   | 6   | 11  | 3   | 8   | 6   | 4   | 5   | 10  | 11  | 7   | 1   | 8   | 1   | 1   | 3   | 4   | 2   | 1    | 230   |
| <b>South America—Continued</b>               |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |       |
| Colombia .....                               | 19   | 18  | 19  | 18  | 16  | 10  | 12  | 14  | 17  | 22  | 28  | 55  | 63  | 23  | 37  | 49  | 41  | 57  | 79  | 52  | 46  | 34   | 1294  |
| Venezuela .....                              | 1    | 2   | 18  | 18  | 10  | 5   | 11  | 4   | 9   | 20  | 105 | 118 | 119 | 37  | 16  | 13  | 9   | 4   | 5   | 3   | 1   | 13   | 2169  |
| Trinidad and Tobago .....                    | 7    | 15  | 14  | 9   | 7   | 7   | 10  | 6   | 4   | 3   | 2   | 6   | 9   | 2   | 1   | 2   | 0   | 1   | 1   | 3   | 1   | 26   | 291   |
| Guyana .....                                 | 0    | 1   | 0   | 0   | 2   | 3   | 1   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1    | 13    |
| Suriname .....                               | 4    | 1   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 1   | 3   | 6   | 0   | 3   | 0   | 0   | 0   | 1   | 0   | 11   | 51    |
| French Guiana <sup>4</sup> .....             | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 2     |
| Ecuador .....                                | 11   | 13  | 18  | 8   | 5   | 1   | 1   | 4   | 3   | 9   | 7   | 1   | 5   | 7   | 1   | 2   | 5   | 8   | 15  | 11  | 3   | 8    | 224   |
| Peru .....                                   | 11   | 4   | 12  | 13  | 15  | 38  | 10  | 11  | 7   | 1   | 4   | 7   | 7   | 14  | 18  | 3   | 3   | 6   | 2   | 3   | 0   | 5    | 349   |
| Bolivia .....                                | 4    | 3   | 6   | 4   | 5   | 6   | 12  | 8   | 9   | 8   | 4   | 12  | 7   | 4   | 2   | 7   | 1   | 3   | 3   | 5   | 1   | 0    | 265   |
| Uruguay .....                                | 0    | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 2   | 0   | 0   | 0   | 24   | 64    |
| Paraguay .....                               | 0    | 11  | 5   | 0   | 0   | 1   | 1   | 3   | 3   | 1   | 0   | 1   | 1   | 0   | 0   | 0   | 1   | 1   | 1   | 1   | 0   | 0    | 43    |
| Brazil .....                                 | 42   | 56  | 52  | 58  | 53  | 70  | 76  | 63  | 82  | 105 | 119 | 126 | 152 | 165 | 151 | 107 | 85  | 84  | 76  | 60  | 45  | 11   | 2418  |
| Chile .....                                  | 17   | 18  | 32  | 20  | 27  | 19  | 18  | 5   | 3   | 1   | 4   | 15  | 5   | 8   | 7   | 1   | 10  | 9   | 8   | 14  | 9   | 62   | 546   |
| Argentina .....                              | 98   | 125 | 93  | 118 | 91  | 63  | 68  | 90  | 55  | 47  | 61  | 74  | 69  | 114 | 120 | 137 | 72  | 71  | 67  | 70  | 59  | 58   | 3154  |
| Subtotal .....                               | 214  | 267 | 269 | 266 | 231 | 225 | 222 | 208 | 195 | 218 | 334 | 416 | 442 | 380 | 353 | 324 | 229 | 246 | 257 | 223 | 165 | 253  | 10883 |

<sup>1</sup>Data for Cuba for 1960–90 are incomplete.

<sup>2</sup>For this report, the Lesser Antilles are considered to consist of the islands from Grenada to St. Thomas, except Barbados, which is listed separately.

<sup>3</sup>No wildcat wells were reported for El Salvador.

<sup>4</sup>French Guiana is listed separately although it is an overseas department of France.

**Table 2.** Wildcat wells by year, 1951–90, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific—Continued

| Area                                   | Pre-1951 | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  |
|--|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>Western Europe<sup>5</sup></b>      |          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Norway.....                            | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 4   | 10  | 15  |
| Svalbard <sup>6</sup> .....            | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   |
| Sweden.....                            | 0        | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 2   | 0   |
| Denmark <sup>7</sup> .....             | 7        | 4   | 4   | 3   | 0   | 0   | 0   | 0   | 9   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 2   | 6   | 2   |
| Ireland.....                           | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 4   | 0   | 0   | 0   | 0   | 0   | 0   |
| United Kingdom.....                    | 129      | 1   | 1   | 5   | 6   | 11  | 6   | 4   | 17  | 10  | 11  | 9   | 3   | 7   | 6   | 28  | 31  | 41  | 35  | 52  |
| Netherlands.....                       | 35       | 12  | 7   | 8   | 11  | 9   | 5   | 7   | 6   | 9   | 4   | 2   | 4   | 2   | 23  | 33  | 9   | 2   | 15  | 29  |
| Belgium.....                           | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 2   | 0   | 1   | 0   | 0   | 0   | 0   | 0   |
| West Germany.....                      | 188      | 74  | 73  | 75  | 105 | 96  | 114 | 97  | 115 | 87  | 73  | 47  | 48  | 18  | 57  | 33  | 54  | 35  | 50  | 43  |
| France.....                            | 112      | 39  | 42  | 33  | 36  | 53  | 65  | 82  | 114 | 125 | 106 | 102 | 101 | 100 | 77  | 59  | 31  | 26  | 13  | 24  |
| Switzerland.....                       | 5        | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   | 0   | 3   | 2   | 1   | 2   | 2   | 3   | 0   | 0   | 0   | 0   |
| Austria.....                           | 12       | 0   | 0   | 0   | 0   | 0   | 2   | 7   | 4   | 13  | 15  | 12  | 9   | 11  | 11  | 12  | 13  | 9   | 16  | 20  |
| Italy.....                             | 41       | 3   | 7   | 25  | 20  | 32  | 42  | 80  | 66  | 91  | 101 | 85  | 109 | 90  | 79  | 46  | 66  | 30  | 28  | 48  |
| Greece.....                            | 3        | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 1   | 0   | 0   | 6   | 5   | 7   | 2   | 2   | 0   | 10  | 0   | 0   |
| Yugoslavia.....                        | 15       | 3   | 1   | 2   | 1   | 3   | 2   | 3   | 2   | 6   | 3   | 3   | 5   | 6   | 5   | 6   | 5   | 8   | 5   | 6   |
| Portugal.....                          | 12       | 1   | 1   | 3   | 2   | 3   | 1   | 2   | 5   | 8   | 1   | 1   | 1   | 4   | 0   | 0   | 0   | 0   | 0   | 0   |
| Spain.....                             | 45       | 2   | 3   | 3   | 7   | 3   | 11  | 12  | 12  | 20  | 10  | 15  | 16  | 23  | 10  | 15  | 18  | 12  | 17  | 10  |
| Malta.....                             | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal.....                          | 604      | 139 | 139 | 158 | 188 | 211 | 249 | 295 | 352 | 372 | 328 | 284 | 306 | 274 | 273 | 237 | 233 | 181 | 197 | 249 |
| <b>Middle East</b>                     |          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Turkey.....                            | 16       | 3   | 5   | 2   | 2   | 1   | 0   | 8   | 9   | 19  | 20  | 35  | 18  | 12  | 14  | 26  | 28  | 18  | 27  | 13  |
| Cyprus.....                            | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   |
| Syria.....                             | 9        | 1   | 0   | 0   | 0   | 0   | 1   | 0   | 2   | 4   | 3   | 1   | 4   | 2   | 0   | 0   | 1   | 0   | 0   | 0   |
| Lebanon.....                           | 1        | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 2   | 0   | 0   | 1   | 0   | 0   | 0   |
| Israel.....                            | 1        | 0   | 0   | 0   | 2   | 6   | 9   | 9   | 8   | 5   | 4   | 6   | 5   | 3   | 8   | 11  | 11  | 7   | 9   | 5   |
| Jordan.....                            | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 3   | 1   | 0   | 0   | 1   | 0   | 2   | 0   | 0   | 0   | 0   |
| Iraq.....                              | 52       | 1   | 1   | 4   | 1   | 2   | 2   | 5   | 4   | 5   | 9   | 8   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   |
| Iran.....                              | 48       | 2   | 0   | 0   | 2   | 0   | 1   | 1   | 2   | 4   | 3   | 9   | 8   | 6   | 6   | 9   | 17  | 21  | 17  | 13  |
| Saudi Arabia.....                      | 12       | 2   | 0   | 0   | 0   | 0   | 1   | 1   | 1   | 0   | 0   | 0   | 0   | 3   | 2   | 2   | 3   | 8   | 7   | 4   |
| Kuwait.....                            | 2        | 1   | 1   | 0   | 1   | 1   | 1   | 0   | 1   | 3   | 0   | 1   | 4   | 12  | 1   | 2   | 5   | 1   | 0   | 0   |
| Former Neutral Zone <sup>8</sup> ..... | 2        | 0   | 2   | 1   | 3   | 2   | 1   | 0   | 0   | 0   | 1   | 3   | 7   | 3   | 0   | 1   | 3   | 2   | 0   | 0   |
| Bahrain.....                           | 1        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 1   | 0   | 0   | 1   | 1   | 0   | 0   | 0   |
| Qatar.....                             | 1        | 0   | 1   | 2   | 0   | 1   | 1   | 0   | 0   | 0   | 3   | 1   | 5   | 4   | 3   | 1   | 1   | 4   | 3   | 2   |
| Oman.....                              | 0        | 0   | 0   | 0   | 0   | 1   | 0   | 6   | 3   | 8   | 8   | 1   | 3   | 3   | 4   | 1   | 9   | 2   | 3   | 6   |
| Yemen.....                             | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 1   | 1   | 0   | 0   | 0   | 0   |
| Abu Dhabi <sup>9</sup> .....           | 0        | 1   | 0   | 0   | 1   | 0   | 1   | 1   | 1   | 0   | 0   | 0   | 4   | 1   | 4   | 3   | 4   | 5   | 7   | 8   |
| Al Fujayrah <sup>9</sup> .....         | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   |
| Dubai <sup>9</sup> .....               | 0        | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 1   | 1   | 0   | 1   | 0   |
| Ra's al Khaymah <sup>9</sup> .....     | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   |
| Ajman <sup>9</sup> .....               | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Sharjah <sup>9</sup> .....             | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   | 1   | 1   | 1   | 1   | 0   | 0   |
| Umm al Qaywayn <sup>9</sup> .....      | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   |
| Subtotal.....                          | 145      | 11  | 11  | 10  | 12  | 14  | 18  | 32  | 33  | 52  | 53  | 67  | 62  | 53  | 46  | 63  | 87  | 69  | 74  | 56  |

| Area  | 1970 | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | Unkn | TOTAL |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-------|
| <b>Western Europe<sup>5</sup>—Continued</b> |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |       |
| Norway.....                                 | 12   | 12  | 12  | 15  | 15  | 15  | 20  | 10  | 15  | 15  | 20  | 21  | 31  | 27  | 30  | 25  | 25  | 17  | 19  | 14  | 23  | 6    | 430   |
| Svalbard <sup>6</sup> .....                 | 0    | 1   | 2   | 2   | 2   | 1   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0    | 12    |
| Sweden.....                                 | 0    | 4   | 10  | 13  | 14  | 27  | 6   | 7   | 34  | 11  | 12  | 18  | 15  | 11  | 11  | 15  | 0   | 5   | 12  | 12  | 26  | 12   | 279   |
| Denmark <sup>7</sup> .....                  | 3    | 2   | 0   | 4   | 2   | 3   | 8   | 9   | 3   | 2   | 6   | 2   | 5   | 10  | 6   | 13  | 2   | 3   | 2   | 4   | 2   | 1    | 134   |
| Ireland.....                                | 0    | 3   | 2   | 4   | 4   | 6   | 5   | 6   | 16  | 8   | 2   | 8   | 4   | 6   | 7   | 6   | 7   | 4   | 4   | 4   | 4   | 0    | 116   |
| United Kingdom.....                         | 29   | 33  | 34  | 56  | 68  | 79  | 63  | 74  | 36  | 38  | 34  | 54  | 81  | 82  | 123 | 120 | 128 | 85  | 103 | 105 | 142 | 43   | 2023  |
| Netherlands.....                            | 24   | 28  | 22  | 20  | 17  | 22  | 21  | 25  | 22  | 19  | 28  | 28  | 44  | 40  | 39  | 42  | 33  | 29  | 26  | 29  | 35  | 19   | 844   |
| Belgium.....                                | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3    | 7     |
| West Germany.....                           | 28   | 26  | 25  | 28  | 29  | 25  | 28  | 27  | 30  | 30  | 25  | 34  | 41  | 30  | 32  | 28  | 22  | 14  | 14  | 6   | 10  | 96   | 2110  |
| France.....                                 | 13   | 8   | 10  | 12  | 9   | 11  | 14  | 14  | 17  | 22  | 21  | 39  | 37  | 23  | 36  | 50  | 71  | 26  | 35  | 33  | 23  | 32   | 1896  |
| Switzerland.....                            | 0    | 0   | 0   | 1   | 0   | 0   | 0   | 1   | 1   | 0   | 1   | 1   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0    | 29    |
| Austria.....                                | 15   | 25  | 16  | 15  | 18  | 33  | 20  | 38  | 20  | 22  | 17  | 20  | 20  | 18  | 20  | 11  | 11  | 13  | 17  | 6   | 10  | 62   | 613   |
| Italy.....                                  | 34   | 42  | 47  | 30  | 23  | 28  | 29  | 23  | 61  | 40  | 53  | 73  | 76  | 49  | 60  | 52  | 85  | 72  | 70  | 29  | 28  | 105  | 2198  |
| Greece.....                                 | 2    | 1   | 2   | 4   | 3   | 0   | 1   | 5   | 4   | 5   | 5   | 8   | 11  | 7   | 7   | 4   | 2   | 3   | 4   | 3   | 0   | 10   | 129   |
| Yugoslavia.....                             | 6    | 10  | 1   | 16  | 10  | 6   | 6   | 7   | 18  | 16  | 13  | 10  | 16  | 13  | 13  | 25  | 13  | 4   | 5   | 10  | 6   | 33   | 347   |
| Portugal.....                               | 0    | 0   | 0   | 0   | 3   | 7   | 9   | 1   | 0   | 2   | 0   | 1   | 3   | 2   | 0   | 1   | 0   | 0   | 3   | 0   | 2   | 0    | 79    |
| Spain.....                                  | 8    | 12  | 6   | 17  | 8   | 15  | 19  | 16  | 18  | 14  | 22  | 22  | 11  | 18  | 14  | 17  | 16  | 12  | 8   | 8   | 4   | 7    | 556   |
| Malta.....                                  | 0    | 0   | 3   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 2   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0    | 9     |
| Subtotal.....                               | 174  | 207 | 192 | 238 | 225 | 278 | 249 | 264 | 295 | 244 | 260 | 339 | 400 | 336 | 398 | 410 | 415 | 288 | 322 | 264 | 315 | 429  | 11811 |
| <b>Middle East—Continued</b>                |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |       |
| Turkey.....                                 | 36   | 18  | 23  | 29  | 33  | 43  | 41  | 24  | 22  | 10  | 23  | 19  | 30  | 24  | 16  | 20  | 23  | 27  | 34  | 32  | 24  | 9    | 836   |
| Cyprus.....                                 | 1    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 2     |
| Syria.....                                  | 0    | 0   | 0   | 0   | 1   | 2   | 12  | 5   | 11  | 4   | 2   | 3   | 3   | 1   | 4   | 5   | 16  | 5   | 12  | 3   | 7   | 16   | 140   |
| Lebanon.....                                | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 7     |
| Israel.....                                 | 8    | 4   | 5   | 2   | 1   | 9   | 8   | 15  | 5   | 0   | 7   | 6   | 8   | 10  | 4   | 1   | 3   | 3   | 1   | 2   | 3   | 13   | 227   |
| Jordan.....                                 | 2    | 4   | 2   | 0   | 1   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 2   | 4   | 0   | 1   | 2   | 6   | 3   | 1   | 0    | 38    |
| Iraq.....                                   | 0    | 1   | 0   | 3   | 3   | 0   | 3   | 2   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3    | 114   |
| Iran.....                                   | 14   | 11  | 9   | 19  | 21  | 21  | 19  | 11  | 12  | 5   | 1   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 1   | 1    | 318   |
| Saudi Arabia.....                           | 4    | 6   | 7   | 4   | 6   | 5   | 3   | 4   | 5   | 6   | 5   | 2   | 3   | 1   | 2   | 0   | 0   | 0   | 0   | 2   | 4   | 1    | 116   |
| Kuwait.....                                 | 2    | 1   | 1   | 1   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 1   | 0   | 0   | 1   | 0   | 0   | 3    | 51    |
| Former Neutral Zone <sup>8</sup> .....      | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 32    |
| Bahrain.....                                | 0    | 0   | 1   | 1   | 0   | 1   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 0   | 0   | 0   | 1    | 14    |
| Qatar.....                                  | 2    | 3   | 3   | 2   | 0   | 0   | 1   | 1   | 1   | 4   | 1   | 0   | 2   | 1   | 0   | 0   | 0   | 1   | 6   | 2   | 3   | 2    | 68    |
| Oman.....                                   | 3    | 11  | 14  | 12  | 4   | 9   | 11  | 8   | 10  | 14  | 17  | 16  | 21  | 18  | 37  | 26  | 33  | 24  | 20  | 18  | 31  | 1    | 416   |
| Yemen.....                                  | 0    | 0   | 2   | 0   | 0   | 0   | 1   | 1   | 1   | 2   | 1   | 4   | 3   | 0   | 3   | 5   | 17  | 9   | 4   | 2   | 4   | 3    | 67    |
| Abu Dhabi <sup>9</sup> .....                | 13   | 9   | 1   | 9   | 10  | 6   | 6   | 2   | 5   | 7   | 1   | 6   | 8   | 10  | 7   | 9   | 3   | 0   | 1   | 1   | 3   | 0    | 158   |
| Al Fujayrah <sup>9</sup> .....              | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 3     |
| Dubai <sup>9</sup> .....                    | 0    | 1   | 1   | 1   | 0   | 0   | 4   | 1   | 0   | 2   | 2   | 1   | 3   | 0   | 6   | 5   | 1   | 2   | 2   | 1   | 1   | 0    | 40    |
| Ra's al Khaymah <sup>9</sup> .....          | 0    | 1   | 1   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 1   | 0   | 1   | 2   | 2   | 2   | 1   | 0   | 1   | 0   | 0   | 0    | 16    |
| Ajman <sup>9</sup> .....                    | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 1     |
| Sharjah <sup>9</sup> .....                  | 0    | 1   | 1   | 0   | 1   | 0   | 0   | 0   | 1   | 0   | 2   | 1   | 1   | 2   | 2   | 2   | 0   | 1   | 0   | 0   | 0   | 0    | 21    |
| Umm al Qaywayn <sup>9</sup> .....           | 0    | 1   | 0   | 0   | 0   | 0   | 2   | 1   | 1   | 0   | 0   | 1   | 1   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0    | 10    |
| Subtotal.....                               | 85   | 72  | 71  | 83  | 81  | 96  | 113 | 78  | 78  | 55  | 65  | 59  | 86  | 73  | 89  | 76  | 101 | 74  | 91  | 66  | 82  | 53   | 2695  |

<sup>5</sup>No wildcat wells were reported for Andorra, Finland, Iceland, Liechtenstein, Luxemburg, or Monaco. Data for Yugoslavia are incomplete.

<sup>6</sup>Svalbard (or Spitsbergen) is a group of islands in the Arctic Ocean north of and belonging to Norway.

<sup>7</sup>Data for Denmark include five wildcat wells drilled in Greenland—one drilled in 1976 and four drilled in 1977.

<sup>8</sup>The former Neutral Zone was located between Kuwait and Saudi Arabia.

<sup>9</sup>One of the seven United Arab Emirates.

**Table 2.** Wildcat wells by year, 1951–90, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific—Continued

| Area                          | Pre-1951 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  |
|-------------------------------|----------|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>Africa<sup>10</sup></b>    |          |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| Morocco.....                  | 8        | 9  | 6  | 16 | 14 | 11 | 8  | 5  | 3   | 4   | 3   | 14  | 13  | 2   | 8   | 6   | 11  | 9   | 9   | 15  |
| Algeria.....                  | 4        | 8  | 8  | 8  | 23 | 25 | 35 | 29 | 39  | 37  | 53  | 63  | 66  | 64  | 46  | 19  | 14  | 18  | 13  | 30  |
| Tunisia.....                  | 14       | 0  | 4  | 7  | 15 | 4  | 5  | 4  | 5   | 5   | 0   | 1   | 7   | 4   | 5   | 6   | 7   | 10  | 5   | 3   |
| Libya.....                    | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 7  | 24  | 31  | 72  | 91  | 112 | 145 | 134 | 114 | 60  | 40  | 76  | 73  |
| Egypt.....                    | 117      | 1  | 0  | 0  | 3  | 5  | 4  | 6  | 7   | 3   | 8   | 10  | 8   | 10  | 9   | 9   | 14  | 7   | 23  | 25  |
| Western Sahara.....           | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 1   | 9   | 14  | 7   | 4   | 3   | 4   | 5   | 0   | 1   |
| Mauritania.....               | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 2   |
| Mali.....                     | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Niger.....                    | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 6   | 1   | 2   | 0   | 0   | 0   | 0   | 0   |
| Chad.....                     | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Sudan.....                    | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 1   | 3   | 2   | 0   | 0   | 0   | 0   | 0   | 0   |
| Senegal.....                  | 0        | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 3   | 7   | 6   | 7   | 2   | 0   | 0   | 0   | 2   | 5   | 2   | 3   |
| The Gambia.....               | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Guinea-Bissau.....            | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 1   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 3   |
| Guinea.....                   | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Sierra Leone.....             | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Liberia.....                  | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Ivory Coast.....              | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 2  | 3   | 1   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Ghana.....                    | 0        | 0  | 0  | 0  | 0  | 0  | 1  | 3  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 0   |
| Togo.....                     | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Benin.....                    | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   |
| Nigeria.....                  | 0        | 0  | 1  | 1  | 3  | 6  | 2  | 1  | 17  | 35  | 23  | 17  | 6   | 17  | 32  | 60  | 66  | 81  | 39  | 22  |
| Cameroon.....                 | 0        | 0  | 0  | 3  | 4  | 0  | 2  | 2  | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 4   | 0   | 1   |
| Equatorial Guinea.....        | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 5   | 0   |
| Gabon.....                    | 0        | 3  | 9  | 9  | 5  | 8  | 4  | 11 | 24  | 19  | 8   | 8   | 15  | 5   | 1   | 8   | 8   | 10  | 11  | 21  |
| Central African Republic..... | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Congo.....                    | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1   | 1   | 6   | 1   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 1   |
| Zaire.....                    | 0        | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 3   | 0   | 0   | 0   | 0   |
| Ethiopia.....                 | 7        | 0  | 0  | 0  | 1  | 8  | 7  | 0  | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 2   | 0   | 0   | 2   |
| Kenya.....                    | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 2   | 1   | 1   | 1   | 1   | 0   | 0   | 1   | 1   | 0   |
| Somalia.....                  | 0        | 0  | 0  | 0  | 0  | 0  | 1  | 4  | 7   | 6   | 3   | 3   | 2   | 3   | 1   | 3   | 1   | 1   | 2   | 2   |
| Angola.....                   | 0        | 0  | 0  | 3  | 4  | 1  | 1  | 5  | 4   | 7   | 24  | 10  | 3   | 9   | 4   | 16  | 8   | 15  | 44  | 27  |
| Zambia.....                   | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Tanzania.....                 | 0        | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Mozambique.....               | 0        | 0  | 0  | 2  | 0  | 0  | 1  | 2  | 0   | 0   | 0   | 1   | 3   | 1   | 0   | 5   | 1   | 15  | 0   | 0   |
| Zimbabwe.....                 | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Burundi.....                  | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Namibia.....                  | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Lesotho.....                  | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Madagascar.....               | 3        | 0  | 2  | 3  | 0  | 1  | 3  | 3  | 5   | 3   | 6   | 0   | 0   | 1   | 1   | 1   | 0   | 0   | 0   | 0   |
| South Africa.....             | 1        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 2   | 4   | 3   | 11  |
| Mauritius.....                | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Seychelles.....               | 0        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal.....                 | 154      | 21 | 30 | 52 | 72 | 71 | 77 | 86 | 143 | 161 | 218 | 242 | 265 | 275 | 249 | 256 | 200 | 228 | 236 | 243 |

| Area                            | 1970 | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | Unkn | TOTAL |
|---------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-------|
| Africa <sup>10</sup> —Continued |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |       |
| Morocco.....                    | 1    | 7   | 6   | 3   | 4   | 4   | 6   | 2   | 4   | 7   | 10  | 11  | 6   | 4   | 4   | 6   | 4   | 7   | 1   | 0   | 1   | 154  | 426   |
| Algeria.....                    | 39   | 26  | 9   | 9   | 15  | 17  | 28  | 23  | 8   | 4   | 2   | 1   | 0   | 3   | 3   | 4   | 3   | 3   | 10  | 15  | 9   | 9    | 842   |
| Tunisia.....                    | 5    | 11  | 13  | 9   | 16  | 8   | 8   | 8   | 7   | 12  | 16  | 33  | 21  | 11  | 12  | 12  | 7   | 12  | 9   | 8   | 7   | 16   | 372   |
| Libya.....                      | 47   | 41  | 31  | 25  | 18  | 42  | 24  | 26  | 36  | 21  | 21  | 34  | 27  | 40  | 37  | 22  | 14  | 16  | 13  | 15  | 4   | 58   | 1591  |
| Egypt.....                      | 35   | 23  | 20  | 16  | 14  | 19  | 35  | 43  | 29  | 30  | 34  | 49  | 47  | 40  | 31  | 57  | 56  | 49  | 45  | 31  | 22  | 28   | 1022  |
| Western Sahara.....             | 1    | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 14   | 65    |
| Mauritania.....                 | 2    | 0   | 1   | 1   | 3   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   | 0   | 0    | 14    |
| Mali.....                       | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0    | 3     |
| Niger.....                      | 0    | 0   | 0   | 0   | 0   | 7   | 0   | 0   | 0   | 3   | 3   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 0    | 26    |
| Chad.....                       | 0    | 0   | 0   | 0   | 4   | 2   | 4   | 3   | 5   | 1   | 0   | 0   | 0   | 0   | 0   | 4   | 4   | 0   | 0   | 2   | 1   | 0    | 30    |
| Sudan.....                      | 0    | 0   | 0   | 0   | 0   | 1   | 2   | 1   | 4   | 5   | 2   | 11  | 11  | 11  | 3   | 6   | 2   | 1   | 0   | 4   | 0   | 0    | 70    |
| Senegal.....                    | 5    | 5   | 1   | 0   | 0   | 1   | 2   | 1   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 0   | 1   | 2   | 0   | 13   | 72    |
| The Gambia.....                 | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 3     |
| Guinea-Bissau.....              | 0    | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 3   | 0    | 14    |
| Guinea.....                     | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 1     |
| Sierra Leone.....               | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0    | 2     |
| Liberia.....                    | 0    | 4   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0    | 7     |
| Ivory Coast.....                | 0    | 0   | 2   | 1   | 1   | 0   | 0   | 3   | 5   | 3   | 1   | 8   | 11  | 2   | 7   | 1   | 0   | 0   | 1   | 0   | 0   | 0    | 54    |
| Ghana.....                      | 9    | 1   | 1   | 1   | 1   | 4   | 0   | 1   | 1   | 1   | 0   | 2   | 1   | 0   | 0   | 2   | 0   | 1   | 0   | 3   | 1   | 0    | 36    |
| Togo.....                       | 1    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0    | 3     |
| Benin.....                      | 4    | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 8     |
| Nigeria.....                    | 24   | 53  | 55  | 41  | 52  | 32  | 16  | 28  | 31  | 27  | 33  | 26  | 24  | 21  | 13  | 17  | 17  | 17  | 25  | 25  | 25  | 5    | 1036  |
| Cameroon.....                   | 6    | 2   | 4   | 2   | 3   | 7   | 4   | 24  | 13  | 13  | 18  | 17  | 9   | 3   | 5   | 4   | 3   | 0   | 0   | 0   | 0   | 0    | 156   |
| Equatorial Guinea.....          | 0    | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 4   | 0   | 1   | 1   | 1   | 0   | 1   | 0   | 0   | 0    | 15    |
| Gabon.....                      | 12   | 11  | 17  | 13  | 15  | 17  | 14  | 16  | 11  | 19  | 15  | 22  | 15  | 12  | 15  | 13  | 7   | 5   | 18  | 25  | 21  | 10   | 510   |
| Central African Republic.....   | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0    | 1     |
| Congo.....                      | 2    | 2   | 7   | 6   | 6   | 4   | 0   | 0   | 5   | 7   | 9   | 8   | 9   | 4   | 3   | 7   | 3   | 8   | 5   | 3   | 8   | 2    | 122   |
| Zaire.....                      | 0    | 1   | 7   | 4   | 0   | 4   | 2   | 1   | 2   | 1   | 0   | 3   | 4   | 4   | 4   | 1   | 1   | 0   | 3   | 1   | 0   | 0    | 49    |
| Ethiopia.....                   | 1    | 0   | 2   | 5   | 3   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 2   | 1   | 1   | 0   | 0   | 0   | 0   | 1   | 6    | 52    |
| Kenya.....                      | 0    | 2   | 0   | 0   | 0   | 1   | 2   | 0   | 1   | 0   | 0   | 2   | 1   | 0   | 0   | 1   | 1   | 0   | 3   | 4   | 1   | 0    | 27    |
| Somalia.....                    | 0    | 0   | 0   | 1   | 1   | 1   | 1   | 1   | 0   | 0   | 1   | 0   | 3   | 0   | 2   | 2   | 0   | 1   | 2   | 0   | 3   | 0    | 58    |
| Angola.....                     | 18   | 30  | 11  | 6   | 28  | 9   | 1   | 5   | 4   | 3   | 3   | 11  | 18  | 22  | 11  | 17  | 16  | 16  | 17  | 10  | 16  | 29   | 486   |
| Zambia.....                     | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0    | 2     |
| Tanzania.....                   | 0    | 0   | 0   | 0   | 2   | 0   | 2   | 0   | 0   | 1   | 0   | 0   | 2   | 2   | 2   | 2   | 1   | 2   | 0   | 0   | 2   | 0    | 22    |
| Mozambique.....                 | 10   | 6   | 2   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 0    | 52    |
| Zimbabwe.....                   | 1    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 1     |
| Burundi.....                    | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   | 0   | 0   | 0   | 0    | 2     |
| Namibia.....                    | 3    | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2    | 6     |
| Lesotho.....                    | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 1     |
| Madagascar.....                 | 1    | 8   | 1   | 2   | 4   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 8   | 4   | 4   | 3   | 2   | 0   | 0   | 1   | 0    | 71    |
| South Africa.....               | 15   | 18  | 11  | 17  | 2   | 15  | 15  | 11  | 10  | 6   | 8   | 3   | 4   | 10  | 12  | 14  | 21  | 14  | 15  | 19  | 14  | 17   | 293   |
| Mauritius.....                  | 0    | 0   | 0   | 0   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 2     |
| Seychelles.....                 | 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 2   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 3     |
| Subtotal.....                   | 242  | 252 | 202 | 166 | 194 | 199 | 166 | 199 | 176 | 166 | 178 | 243 | 222 | 199 | 173 | 204 | 167 | 157 | 171 | 168 | 142 | 363  | 7628  |

<sup>10</sup>No wildcat wells were reported for Botswana, Burkina Faso (formerly Upper Volta), Cape Verde, Comoros, Djibouti, Malawi, Rwanda, Sao Tome and Principe, Swaziland, Uganda, or Zambia.

**Table 2. Wildcat wells by year, 1951–90, for the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific—Continued**

| Area                                     | Pre-1951 | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  |
|--|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>Non-Communist Asia<sup>11</sup></b>   |          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Afghanistan.....                         | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 4   | 0   | 4   | 0   | 0   | 0   | 0   | 0   |
| Pakistan.....                            | 21       | 0   | 4   | 0   | 1   | 2   | 3   | 10  | 12  | 8   | 2   | 2   | 2   | 3   | 4   | 2   | 3   | 2   | 4   | 2   |
| Maldives.....                            | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| India.....                               | 4        | 0   | 0   | 2   | 0   | 0   | 1   | 2   | 4   | 3   | 7   | 3   | 8   | 5   | 8   | 13  | 8   | 6   | 9   | 2   |
| Bangladesh.....                          | 4        | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 1   | 2   | 5   | 1   | 2   | 1   | 0   | 1   | 0   | 1   | 0   | 2   |
| Myanmar.....                             | 2        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 4   | 0   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Thailand.....                            | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 2   |
| Sri Lanka.....                           | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Malaysia.....                            | 20       | 1   | 5   | 4   | 2   | 7   | 4   | 4   | 1   | 1   | 2   | 5   | 5   | 2   | 3   | 0   | 4   | 11  | 12  | 22  |
| Brunei.....                              | 14       | 1   | 0   | 1   | 1   | 4   | 0   | 1   | 0   | 1   | 0   | 1   | 1   | 1   | 0   | 0   | 1   | 0   | 2   | 4   |
| Indonesia.....                           | 56       | 5   | 5   | 2   | 8   | 7   | 4   | 7   | 5   | 6   | 5   | 3   | 3   | 8   | 15  | 6   | 6   | 8   | 19  | 28  |
| Japan.....                               | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 3   | 1   | 5   | 0   | 3   | 3   | 3   | 3   | 4   | 3   | 6   |
| South Korea.....                         | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 6   | 1   | 0   |
| Taiwan.....                              | 7        | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 2   | 1   | 0   | 0   | 1   | 0   | 4   | 3   | 7   | 8   | 5   | 10  |
| Philippines.....                         | 20       | 0   | 3   | 1   | 0   | 0   | 1   | 3   | 4   | 13  | 17  | 14  | 10  | 3   | 16  | 0   | 0   | 0   | 0   | 0   |
| Subtotal.....                            | 148      | 7   | 17  | 11  | 12  | 22  | 14  | 27  | 31  | 42  | 40  | 35  | 39  | 26  | 57  | 28  | 32  | 46  | 55  | 78  |
| <b>Southwestern Pacific<sup>12</sup></b> |          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Papua New Guinea.....                    | 29       | 0   | 1   | 0   | 0   | 5   | 2   | 2   | 4   | 2   | 2   | 0   | 1   | 1   | 1   | 1   | 0   | 4   | 8   | 4   |
| Australia.....                           | 206      | 1   | 2   | 3   | 5   | 32  | 38  | 32  | 30  | 34  | 19  | 17  | 68  | 101 | 132 | 145 | 90  | 78  | 74  | 91  |
| New Zealand.....                         | 52       | 0   | 1   | 0   | 0   | 2   | 2   | 2   | 0   | 3   | 1   | 3   | 3   | 4   | 9   | 6   | 3   | 5   | 4   | 8   |
| Fiji.....                                | 0        | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| Subtotal.....                            | 287      | 1   | 4   | 3   | 5   | 39  | 42  | 36  | 34  | 39  | 22  | 20  | 72  | 106 | 142 | 152 | 93  | 87  | 86  | 103 |
| GRAND TOTAL.....                         | 2931     | 284 | 311 | 371 | 462 | 561 | 610 | 674 | 883 | 946 | 974 | 904 | 985 | 914 | 919 | 935 | 846 | 827 | 850 | 904 |

| Area   | 1970 | 71   | 72   | 73   | 74   | 75   | 76  | 77  | 78  | 79  | 80   | 81   | 82   | 83   | 84   | 85   | 86   | 87   | 88   | 89   | 90   | Unkn | TOTAL |
|--|------|------|------|------|------|------|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| <b>Non-Communist Asia<sup>11</sup>—Continued</b>   |      |      |      |      |      |      |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |       |
| Afghanistan.....                                   | 1    | 1    | 1    | 0    | 1    | 0    | 0   | 1   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 7    | 22    |
| Pakistan.....                                      | 3    | 0    | 4    | 3    | 6    | 4    | 2   | 2   | 3   | 4   | 2    | 8    | 3    | 10   | 18   | 15   | 15   | 8    | 19   | 18   | 9    | 11   | 254   |
| Maldives.....                                      | 0    | 0    | 0    | 0    | 0    | 0    | 1   | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1     |
| India.....   | 5    | 2    | 4    | 6    | 4    | 6    | 17  | 15  | 16  | 11  | 10   | 15   | 5    | 20   | 28   | 21   | 33   | 35   | 32   | 45   | 72   | 91   | 578   |
| Bangladesh.....                                    | 0    | 0    | 0    | 0    | 0    | 0    | 6   | 3   | 1   | 0   | 1    | 2    | 2    | 0    | 0    | 0    | 0    | 1    | 4    | 2    | 0    | 0    | 44    |
| Myanmar.....                                       | 0    | 0    | 3    | 2    | 7    | 8    | 10  | 0   | 0   | 1   | 0    | 5    | 4    | 4    | 5    | 5    | 0    | 2    | 3    | 2    | 2    | 2    | 75    |
| Thailand.....                                      | 0    | 1    | 4    | 3    | 13   | 6    | 16  | 0   | 1   | 1   | 3    | 12   | 12   | 23   | 11   | 8    | 2    | 14   | 12   | 2    | 9    | 0    | 155   |
| Sri Lanka.....                                     | 0    | 0    | 0    | 0    | 1    | 1    | 3   | 0   | 0   | 0   | 0    | 2    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 7     |
| Malaysia.....                                      | 44   | 22   | 21   | 22   | 11   | 23   | 5   | 11  | 18  | 36  | 22   | 26   | 10   | 5    | 5    | 11   | 2    | 6    | 7    | 16   | 26   | 16   | 480   |
| Brunei.....  | 2    | 1    | 5    | 5    | 1    | 13   | 9   | 3   | 6   | 3   | 1    | 3    | 6    | 3    | 9    | 3    | 2    | 2    | 5    | 4    | 6    | 1    | 126   |
| Indonesia.....                                     | 84   | 135  | 117  | 145  | 150  | 131  | 106 | 79  | 95  | 113 | 117  | 128  | 136  | 150  | 122  | 119  | 68   | 54   | 93   | 69   | 72   | 95   | 2584  |
| Japan.....   | 0    | 4    | 7    | 13   | 19   | 23   | 16  | 18  | 21  | 14  | 9    | 9    | 8    | 7    | 9    | 11   | 12   | 7    | 8    | 9    | 6    | 3    | 268   |
| South Korea.....                                   | 0    | 0    | 0    | 5    | 0    | 2    | 0   | 0   | 0   | 0   | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 1    | 2    | 1    | 2    | 0    | 21    |
| Taiwan.....  | 5    | 7    | 3    | 15   | 14   | 16   | 8   | 9   | 7   | 9   | 9    | 6    | 0    | 6    | 4    | 5    | 3    | 1    | 0    | 2    | 0    | 43   | 222   |
| Philippines.....                                   | 0    | 6    | 9    | 10   | 8    | 12   | 8   | 13  | 13  | 18  | 23   | 13   | 14   | 3    | 1    | 0    | 0    | 3    | 6    | 5    | 4    | 14   | 288   |
| Subtotal.....                                      | 144  | 179  | 178  | 229  | 235  | 245  | 207 | 154 | 181 | 210 | 197  | 229  | 200  | 232  | 212  | 198  | 137  | 134  | 191  | 175  | 208  | 283  | 5125  |
| <b>Southwestern Pacific<sup>12</sup>—Continued</b> |      |      |      |      |      |      |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |       |
| Papua New Guinea.....                              | 2    | 2    | 1    | 5    | 2    | 3    | 2   | 1   | 1   | 0   | 1    | 0    | 1    | 1    | 4    | 3    | 2    | 3    | 3    | 10   | 14   | 1    | 129   |
| Australia.....                                     | 93   | 57   | 73   | 50   | 42   | 19   | 14  | 16  | 43  | 43  | 56   | 100  | 149  | 139  | 152  | 187  | 105  | 155  | 128  | 88   | 115  | 84   | 3106  |
| New Zealand.....                                   | 10   | 10   | 9    | 2    | 1    | 5    | 6   | 2   | 8   | 1   | 4    | 5    | 2    | 7    | 17   | 17   | 16   | 10   | 9    | 5    | 5    | 2    | 261   |
| Fiji.....  | 0    | 0    | 0    | 0    | 0    | 0    | 0   | 0   | 0   | 0   | 2    | 1    | 4    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 7     |
| Subtotal.....                                      | 105  | 69   | 83   | 57   | 45   | 27   | 22  | 19  | 52  | 44  | 63   | 106  | 156  | 147  | 173  | 207  | 123  | 168  | 140  | 103  | 134  | 87   | 3503  |
| GRAND TOTAL.....                                   | 979  | 1057 | 1006 | 1048 | 1017 | 1081 | 983 | 955 | 998 | 949 | 1104 | 1408 | 1523 | 1374 | 1399 | 1432 | 1175 | 1068 | 1176 | 1006 | 1048 | 1689 | 42566 |

<sup>11</sup>No wildcat wells were reported for Bhutan, Nepal, or Singapore.

<sup>12</sup>No wildcat wells were reported for New Caledonia (an overseas territory of France), Kiribati, Nauru, Solomon Islands, Tonga, Tuvalu, Vanuatu (formerly New Hebrides), or Western Samoa.

**Table 3. Regional distribution of total and offshore wildcat wells drilled through 1990 and discoveries in terms of estimated ultimate recovery**

[Drilling data are from a computer tape released in January 1991 by Petroconsultants S.A., Geneva (see table 2). Drilling data for Mexico, India, and some countries in the Middle East are known to be incomplete. Oil and gas data are from a computer tape released in January 1991 by Petroconsultants and are supplemented by field estimates from the Dallas Field Office of the Energy Information Administration (written commun., November 1990). BBO, billion ( $\times 10^9$ ) barrels of oil; TCF, trillion ( $\times 10^{12}$ ) cubic feet]

|                            | Total         |           |           | Offshore      |           |           |
|----------------------------|---------------|-----------|-----------|---------------|-----------|-----------|
|                            | Wildcat wells | Oil (BBO) | Gas (TCF) | Wildcat wells | Oil (BBO) | Gas (TCF) |
| Mexico .....               | 251           | 61.6      | 38.5      | 17            | 22.3      | 13.9      |
| Caribbean .....            | 440           | .109      | .166      | 20            | .021      | .005      |
| Central America .....      | 230           | .068      | .001      | 66            | 0         | 0         |
| South America .....        | 10,883        | 135       | 180       | 1,430         | 24.4      | 52.6      |
| Western Europe* .....      | 11,464        | 58        | 467       | 3,310         | 52.2      | 286       |
| Middle East .....          | 2,695         | 712       | 1,410     | 338           | 126       | 441       |
| Africa .....               | 7,628         | 120       | 305       | 2,007         | 29.7      | 48.4      |
| Non-Communist Asia .....   | 5,125         | 49.3      | 322       | 2,197         | 21.5      | 200       |
| Southwestern Pacific ..... | 3,503         | 6.58      | 98.7      | 619           | 5.43      | 70.1      |
| Total study area .....     | 42,219        | 1,141.657 | 2,821.367 | 10,004        | 281.551   | 1,112.005 |

\*Data for Western Europe exclude data for Yugoslavia, which are incomplete.



**Table 4.** Year of first discovery and cumulative recoverable oil and gas discoveries through 1990 in the 99 significant petroleum provinces in the study area

[The study area is the world outside the United States, Canada, Eastern Europe, and Communist areas of Asia. Each significant province has at least one field containing 100 million barrels of recoverable oil. Data are from a computer tape released in January 1991 by Petroconsultants S.A., Geneva, and are supplemented by field estimates from the Dallas Field Office of the Energy Information Administration (written commun., November 1990). Data for oil discoveries in four areas are graphed in figures 9–12]

| Petroleum province, country                                      | Year of first discovery | Oil, cumulative recoverable discoveries through 1990, in barrels $\times 10^6$ | Gas, cumulative recoverable discoveries through 1990, in cubic feet $\times 10^9$ |
|--|-------------------------|--|---|
| <b>Mexico</b>  |                         |  |   |
| Tampico-Misantla Basin .....                                     | 1901                    | 21,687   | 5,261   |
| Salina Basin .....   | 1904                    | 24,034   | 17,782  |
| Tamaulipas Arch .....  | 1909                    | 291  | 0   |
| Cantarell Complex (Campeche Shelf) .....                         | 1948                    | 15,035   | 8,015   |
| Total .....  |                         | 61,047   | 31,058  |
| <b>South America (fig. 9)</b>                                    |                         |  |   |
| Progreso Basin, Peru and Ecuador .....                           | 1863                    | 152  | 504   |
| Eastern Venezuela Basin, Trinidad and Tobago and Venezuela ..... | 1867                    | 25,428   | 25,911  |
| Talara Basin, Peru .....   | 1875                    | 2,442  | 2,629   |
| Southern Range Uplift, Trinidad and Tobago .....                 | 1912                    | 288  | 356   |
| Maracaibo Basin, Venezuela .....                                 | 1914                    | 59,667   | 17,370  |
| San Jorge Basin, Argentina .....                                 | 1916                    | 3,893  | 6,491   |
| Middle Magdalena Basin, Colombia .....                           | 1918                    | 2,379  | 3,097   |
| Catatumbo Basin, Colombia .....                                  | 1920                    | 473  | 922   |
| Falcon Basin, Venezuela .....                                    | 1921                    | 371  | 395   |
| Neuquen Basin, Argentina .....                                   | 1922                    | 2,668  | 25,895  |
| Sub-Andean Zone, Argentina, Bolivia, and Peru ...                | 1926                    | 289  | 16,653  |
| Serrania Interior Oriental Belt, Venezuela .....                 | 1928                    | 922  | 2,358   |
| Greater Furrial Trend, Venezuela .....                           | 1929                    | 9,253  | 6,918   |
| Cuyo Basin, Argentina .....                                      | 1932                    | 1,484  | 356   |
| Reconcavo Basin, Brazil .....                                    | 1939                    | 1,608  | 2,001   |
| Llanos Basin, Colombia .....                                     | 1948                    | 2,413  | 71  |
| Barinas-Apure Basin, Colombia and Venezuela ....                 | 1948                    | 1,671  | 13  |
| Putumayo Basin, Colombia .....                                   | 1949                    | 370  | 1,261   |
| Austral Basin, Argentina .....                                   | 1949                    | 759  | 12,676  |
| Upper Magdalena Basin, Colombia .....                            | 1950                    | 968  | 243   |
| Sergipe-Alagoas Basin, Brazil .....                              | 1957                    | 736  | 1,379   |
| Napo Basin, Ecuador .....  | 1967                    | 3,748  | 659   |
| Ariari-Apiay Block, Colombia .....                               | 1969                    | 255  | 221   |
| Maranon Basin, Peru .....  | 1971                    | 1,163  | 78  |
| Potiguar Basin, Brazil .....                                     | 1973                    | 428  | 747   |
| Campos Basin, Brazil .....                                       | 1975                    | 10,005   | 11,654  |
| Santos Basin, Brazil .....                                       | 1979                    | 120  | 333   |
| Total .....  |                         | 133,953  | 141,191   |

**Table 4.** Year of first discovery and cumulative recoverable oil and gas discoveries through 1990 in the 99 significant petroleum provinces in the study area—Continued

| Petroleum province, country  | Year of first discovery | Oil, cumulative recoverable discoveries through 1990, in barrels $\times 10^6$ | Gas, cumulative recoverable discoveries through 1990, in cubic feet $\times 10^9$ |
|--|-------------------------|--|---|
| <b>Western Europe<sup>1</sup> (fig. 10)</b>  |                         |  |   |
| Po Basin, Italy .....  | 1866                    | 225  | 15,093  |
| Northwest German Basin, Germany, Denmark, and Netherlands .....  | 1874                    | 2,329  | 150,921   |
| Anglo-Paris Basin, France and United Kingdom ...   | 1895                    | 913  | 440   |
| Carpathian Flysch Zone, Austria .....  | 1930                    | 654  | 1,425   |
| Anglo-Dutch Basin, Netherlands and United Kingdom .....  | 1939                    | 910  | 80,268  |
| Aquitaine Basin, France .....  | 1939                    | 512  | 10,749  |
| Ibleian Platform, Italy and Malta .....  | 1952                    | 553  | 144   |
| Caltanissetta Basin, Italy .....   | 1956                    | 174  | 38  |
| North Sea Graben, United Kingdom, Norway, Denmark, Germany, and Netherlands .....  | 1966                    | 44,023   | 108,354   |
| Vestland Arch, Norway and United Kingdom .....   | 1968                    | 1,555  | 2,577   |
| Catalano-Balearic Basin, Spain .....   | 1970                    | 330  | 140   |
| North Aegean Sea Basin, Greece .....   | 1971                    | 173  | 160   |
| Mid North Sea High, United Kingdom .....   | 1971                    | 240  | 2   |
| Norwegian-Danish Basin, Norway .....   | 1972                    | 195  | 35  |
| Adriatic Basin, Italy (and E. Europe) .....  | 1972                    | 706  | 8,925   |
| East Shetland Platform, United Kingdom .....   | 1975                    | 742  | 320   |
| West Shetland Basin, United Kingdom .....  | 1977                    | 840  | 650   |
| Horda Platform, Norway .....   | 1979                    | 404  | 44,214  |
| Kristiansund-Bodo Fault Complex, Norway .....  | 1981                    | 1,345  | 7,734   |
| Trondelag Platform, Norway .....   | 1984                    | 464  | 610   |
| Voring Basin, Norway .....   | 1985                    | 138  | 2,685   |
| Total .....  |                         | 57,425   | 435,484   |
| <b>Middle East</b>   |                         |  |   |
| Zagros Fold Belt, Iran, Iraq, Syria, and Turkey ....   | 1903                    | 133,132  | 576,982   |
| Arabian Basin, Iran, Iraq, Saudi Arabia, Kuwait, former Neutral Zone, <sup>2</sup> Bahrain, Qatar, Syria, Oman, and United Arab Emirates ..... | 1932                    | 566,628  | 770,433   |
| Qom Basin, Iran .....  | 1956                    | 175  | 1,138   |
| Oman Basin, Oman .....   | 1957                    | 9,379  | 9,593   |
| Taurus-Zagros Foothill Belt, Turkey .....  | 1961                    | 620  | 281   |
| Ma'rib-Al Jawf Basin, Yemen .....  | 1984                    | 1,427  | 12,500  |
| Shabwa, Yemen .....  | 1987                    | 500  | 0   |
| Total .....  |                         | 711,861  | 1,370,927   |

**Table 4.** Year of first discovery and cumulative recoverable oil and gas discoveries through 1990 in the 99 significant petroleum provinces in the study area—Continued

| Petroleum province, country                                 | Year of first discovery | Oil, cumulative recoverable discoveries through 1990, in barrels $\times 10^6$ | Gas, cumulative recoverable discoveries through 1990, in cubic feet $\times 10^9$ |
|---|-------------------------|--|---|
| <b>Africa (fig. 11)</b>                                     |                         |  |   |
| Gulf of Suez Basin, Egypt .....                             | 1886                    | 9,459  | 4,893   |
| Pelagian Basin, Libya and Tunisia .....                     | 1949                    | 2,237  | 5,685   |
| Niger Delta, Cameroon, Equatorial Guinea, and Nigeria ..... | 1954                    | 32,107   | 72,247  |
| Illizi Basin, Algeria .....                                 | 1956                    | 2,532  | 27,226  |
| Hassi Messaoud High, Algeria .....                          | 1956                    | 12,746   | 22,982  |
| Atchan Uplift, Algeria and Libya .....                      | 1956                    | 1,553  | 5,271   |
| Gabon Coastal Basin, Gabon .....                            | 1956                    | 2,605  | 795   |
| Lower Congo Basin, Angola, Congo, Gabon, and Zaire .....    | 1957                    | 6,790  | 7,971   |
| Sirte Basin, Libya .....                                    | 1958                    | 44,049   | 22,478  |
| Ghadames Basin, Algeria, Libya, and Tunisia .....           | 1958                    | 2,447  | 7,526   |
| Oued Mya Basin, Algeria .....                               | 1961                    | 1,099  | 702   |
| Muglad Basin, Sudan .....                                   | 1979                    | 499  | 0   |
| Atchan Saddle, Libya .....                                  | 1984                    | 230  | 0   |
| Total .....   |                         | 118,353  | 177,776   |
| <b>Non-Communist Asia (fig. 12)</b>                         |                         |  |   |
| North Sumatra Basin, Indonesia .....                        | 1885                    | 711  | 25,927  |
| East Java Basin, Indonesia .....                            | 1888                    | 386  | 7,697   |
| Mizoram-Manipur Foothills, India .....                      | 1889                    | 344  | 1,360   |
| South Sumatra Basin, Indonesia .....                        | 1896                    | 2,915  | 5,386   |
| Kutei Basin, Indonesia .....                                | 1897                    | 3,349  | 29,540  |
| Tarakan Basin, Indonesia .....                              | 1900                    | 447  | 1,502   |
| Central Burma Basin, Myanmar .....                          | 1902                    | 656  | 7,210   |
| Baram Delta, Malaysia and Brunei .....                      | 1910                    | 6,074  | 25,562  |
| Potwar Basin, Pakistan .....                                | 1915                    | 360  | 2,669   |
| Central Sumatra Basin, Indonesia .....                      | 1920                    | 13,399   | 2,060   |
| Salawati Basin, Indonesia .....                             | 1936                    | 724  | 493   |
| Barito Basin, Indonesia .....                               | 1937                    | 180  | 66  |
| Tiga Pulah Arch, Indonesia .....                            | 1940                    | 137  | 0   |
| Assam Basin, India .....                                    | 1953                    | 1,585  | 1,785   |
| Cambay Basin, India .....                                   | 1958                    | 1,391  | 3,858   |
| Narmada Graben, India .....                                 | 1960                    | 637  | 528   |
| Balingian Basin, Malaysia .....                             | 1962                    | 470  | 808   |
| Malaya Basin, Malaysia and Indonesia .....                  | 1969                    | 4,697  | 18,487  |
| West Java Basin, Indonesia .....                            | 1969                    | 2,915  | 6,641   |
| Sunda Basin, Indonesia .....                                | 1970                    | 1,141  | 639   |
| West Natuna Basin, Indonesia .....                          | 1972                    | 396  | 2,329   |
| Bombay Basin, India .....                                   | 1974                    | 4,494  | 16,278  |
| Cauvery Basin, India .....                                  | 1979                    | 186  | 326   |
| Total .....   |                         | 47,594   | 161,151   |
| <b>Southwestern Pacific</b>                                 |                         |  |   |
| Gippsland Basin, Australia .....                            | 1924                    | 4,546  | 10,844  |
| North Carnarvon Basin, Australia .....                      | 1953                    | 695  | 2,773   |
| Papuan Fold Belt, Papua New Guinea .....                    | 1956                    | 260  | 3,975   |
| Bonaparte Basin, Australia .....                            | 1964                    | 375  | 6,779   |
| Total .....   |                         | 5,876  | 24,371  |

<sup>1</sup>The Pannonian Basin, which extends into Austria, is a significant province only in Eastern Europe.

<sup>2</sup>The former Neutral Zone was located between Kuwait and Saudi Arabia.

**Table 5.** Regional distribution of land area, delineated prospective area, explored area, and rate of addition to prospective area

[Mexico is excluded from this table because drilling data are substantially incomplete. Data from figures 17–54. Some data in the last two columns are also shown in figures 14 and 15]

| Region                     | Land area<br>(mi <sup>2</sup> ) | Prospective<br>area through<br>1990<br>(mi <sup>2</sup> ) | Explored<br>area through<br>1990<br>(mi <sup>2</sup> ) | Rate of addition to<br>prospective area,<br>1981–90<br>(mi <sup>2</sup> /wildcat well) | Percentage of<br>total prospective<br>area delineated<br>by 1971 | Percentage of<br>oil discoveries in<br>area delineated<br>by 1971 |
|----------------------------|---------------------------------|---|--|--|--|---|
| Caribbean .....            | 85,172                          | 12,345  | 1,797  | 31.6   | 86.2   | 44.0  |
| Central America .....      | 212,318                         | 14,007  | 1,605  | 75.3   | 32.0   | 88.2  |
| South America .....        | 6,863,319                       | 430,794   | 105,895  | 33.7   | 46.2   | 83.8  |
| Western Europe .....       | 2,224,255                       | 479,186   | 106,340  | 24.5   | 55.4   | 30.2  |
| Middle East .....          | 2,388,187                       | 222,333   | 31,128   | 61.2   | 39.5   | 87.1  |
| Africa .....               | 11,644,658                      | 459,860   | 77,425   | 47.0   | 56.3   | 89.7  |
| Non-Communist Asia .....   | 3,443,324                       | 295,445   | 50,997   | 57.6   | 21.4   | 62.0  |
| Southwestern Pacific ..... | 3,293,782                       | 220,211   | 32,854   | 64.0   | 40.5   | 79.4  |
| Total .....                | 30,155,015                      | 2,134,181   | 408,041  | 42.3   | 45.9   | 82.3  |

**Table 6.** Estimates of ultimate recovery of cumulative oil discovered by region from 1900 to 1980 as recorded by Petroconsultants in the first tapes issued in 1981, 1984, 1987, and 1990

[Oil in barrels  $\times 10^6$ . Data are graphed in figure 16]

| Region                   | Petroconsultants' tape |         |         |         |
|--------------------------|------------------------|---------|---------|---------|
|                          | 1981                   | 1984    | 1987    | 1990    |
| South America .....      | 37,597                 | 66,432  | 66,260  | 81,578  |
| Western Europe .....     | 27,270                 | 31,069  | 31,899  | 35,847  |
| Middle East .....        | 421,907                | 516,908 | 525,658 | 643,802 |
| Africa .....             | 72,216                 | 78,510  | 86,829  | 84,471  |
| Non-Communist Asia ..... | 23,280                 | 28,516  | 33,199  | 38,951  |
| Total .....              | 582,270                | 721,435 | 743,845 | 884,649 |

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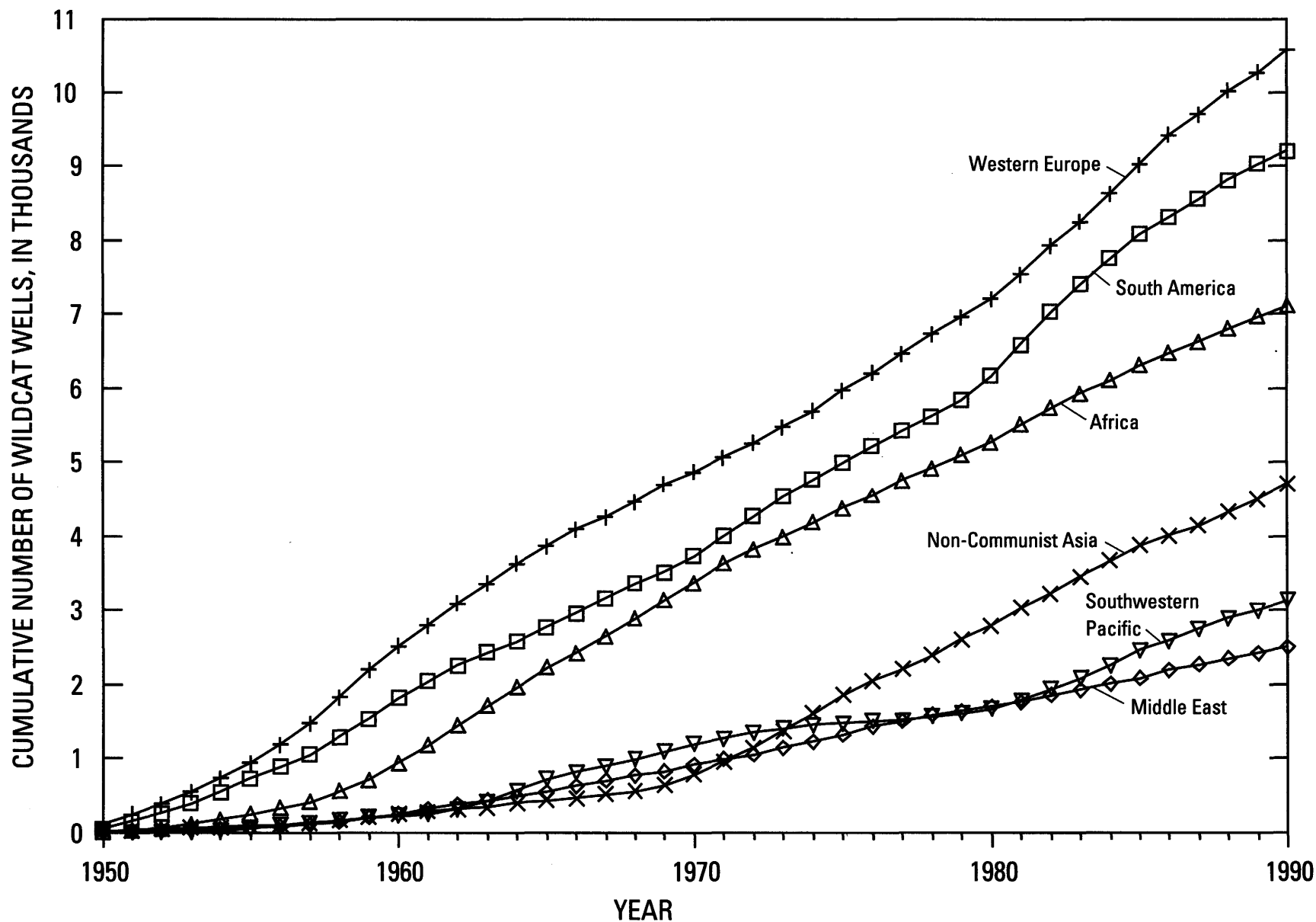
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## FIGURES 1–16

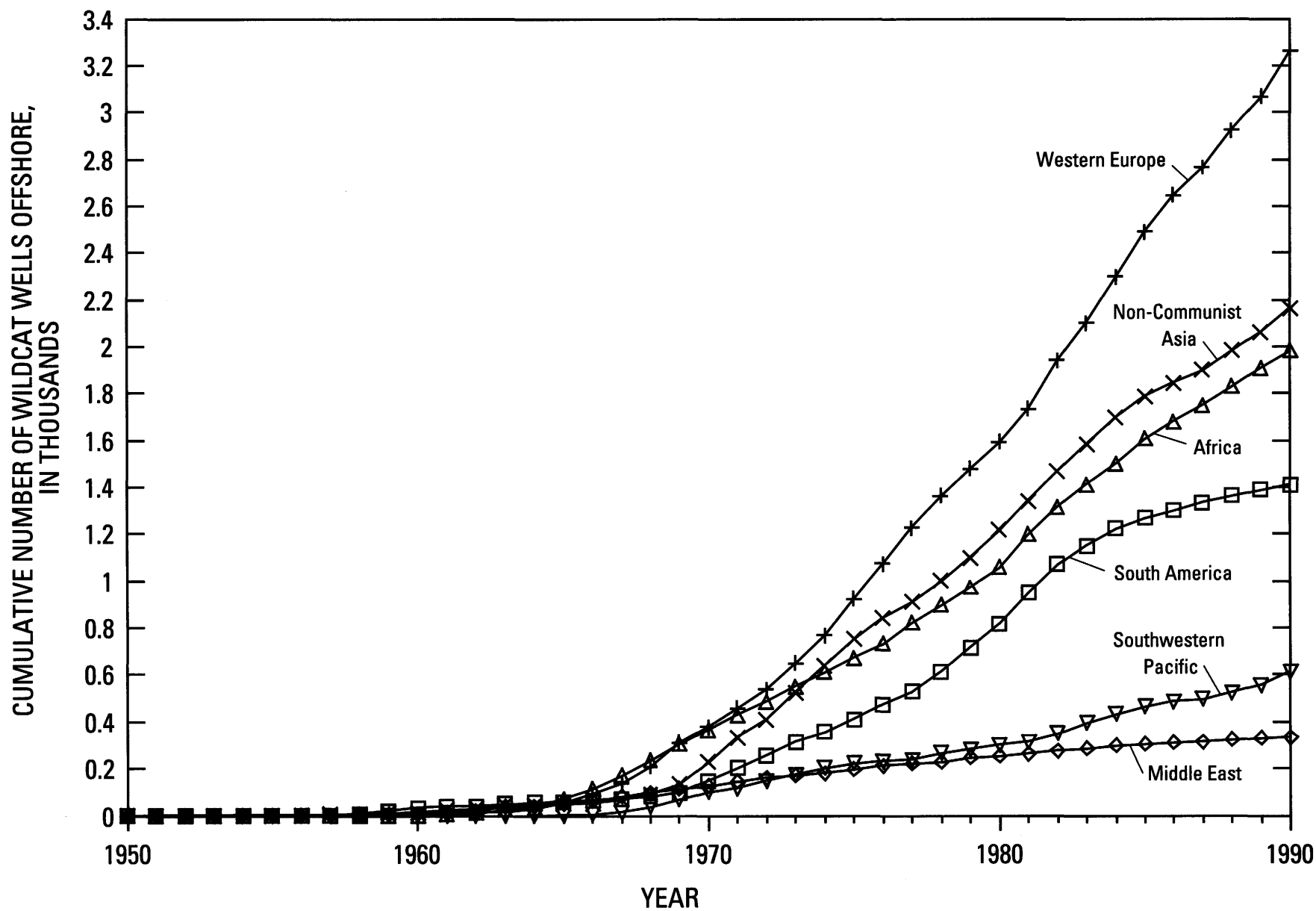
[An introduction to figures 17–54 and the figures themselves follow figure 16]

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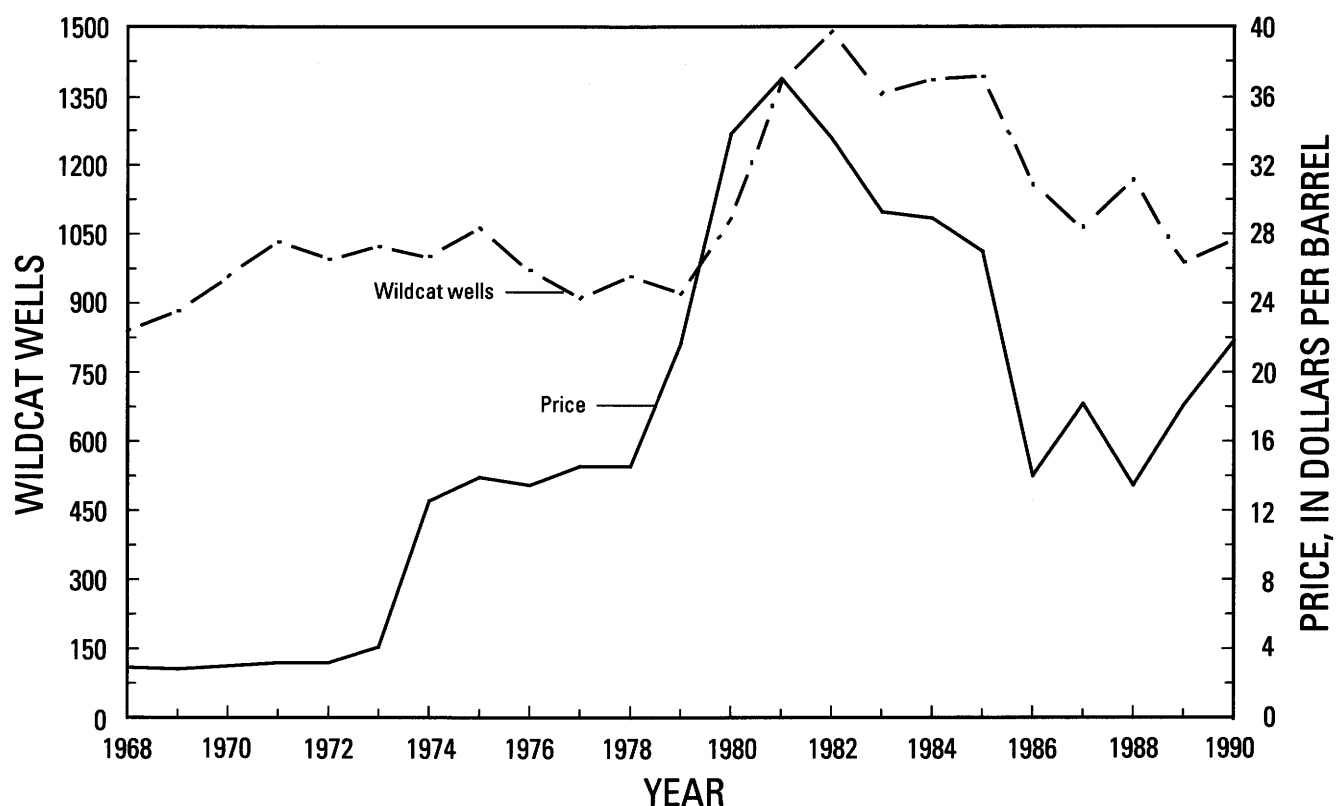
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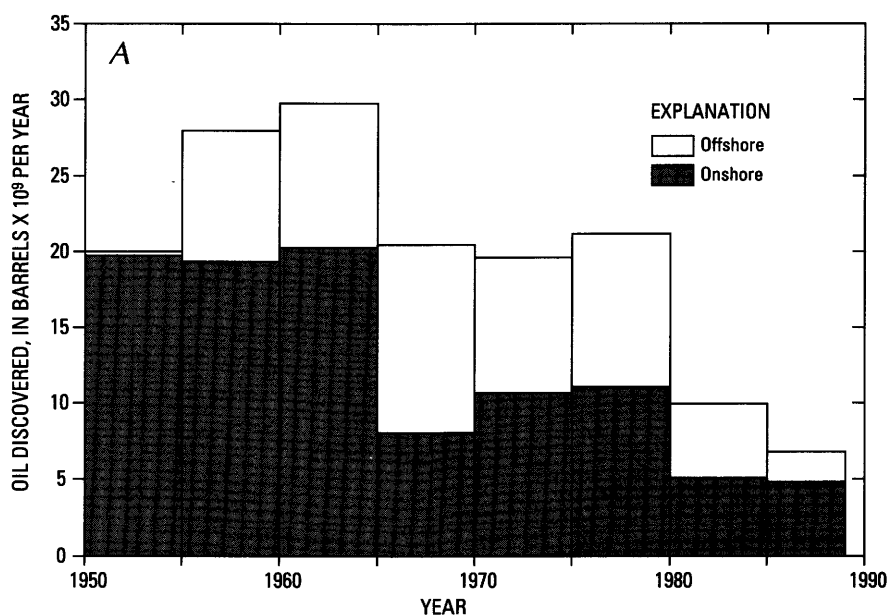
**Figure 1.** Time profiles of the cumulative number of offshore and onshore wildcat wells drilled in South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific, 1950–90. Data are from a computer tape released in January 1991 by Petroconsultants S.A., Geneva, and are given by country and year in table 2.



**Figure 2.** Time profiles of the cumulative number of offshore wildcat wells drilled in South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific, 1950–90. Data are from a computer tape released in January 1991 by Petroconsultants S.A., Geneva.



**Figure 3.** Time profile of annual wildcat drilling in the study area and U.S. refiners' crude-oil acquisition price, 1968-90. Wildcat well data are from a computer tape released in January 1991 by Petroconsultants S.A., Geneva, and crude-oil acquisition prices are from the American Petroleum Institute's *Basic Petroleum Data Book*, January 1992. Prices are in current dollars.





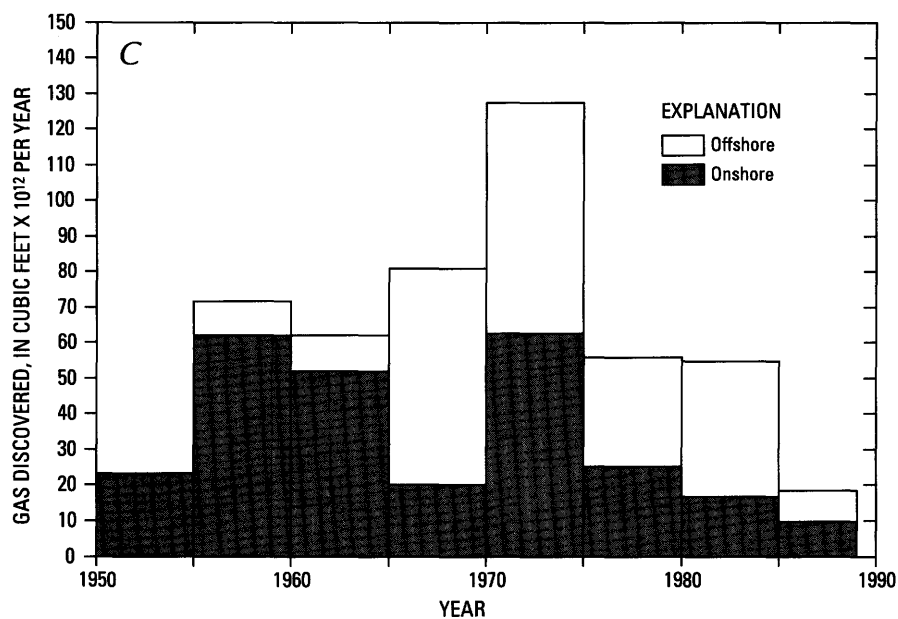
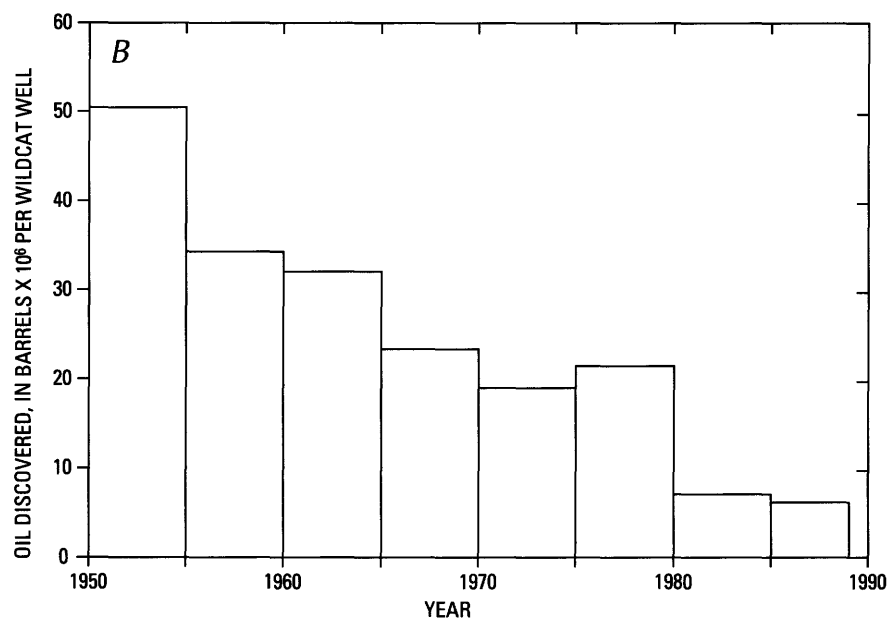
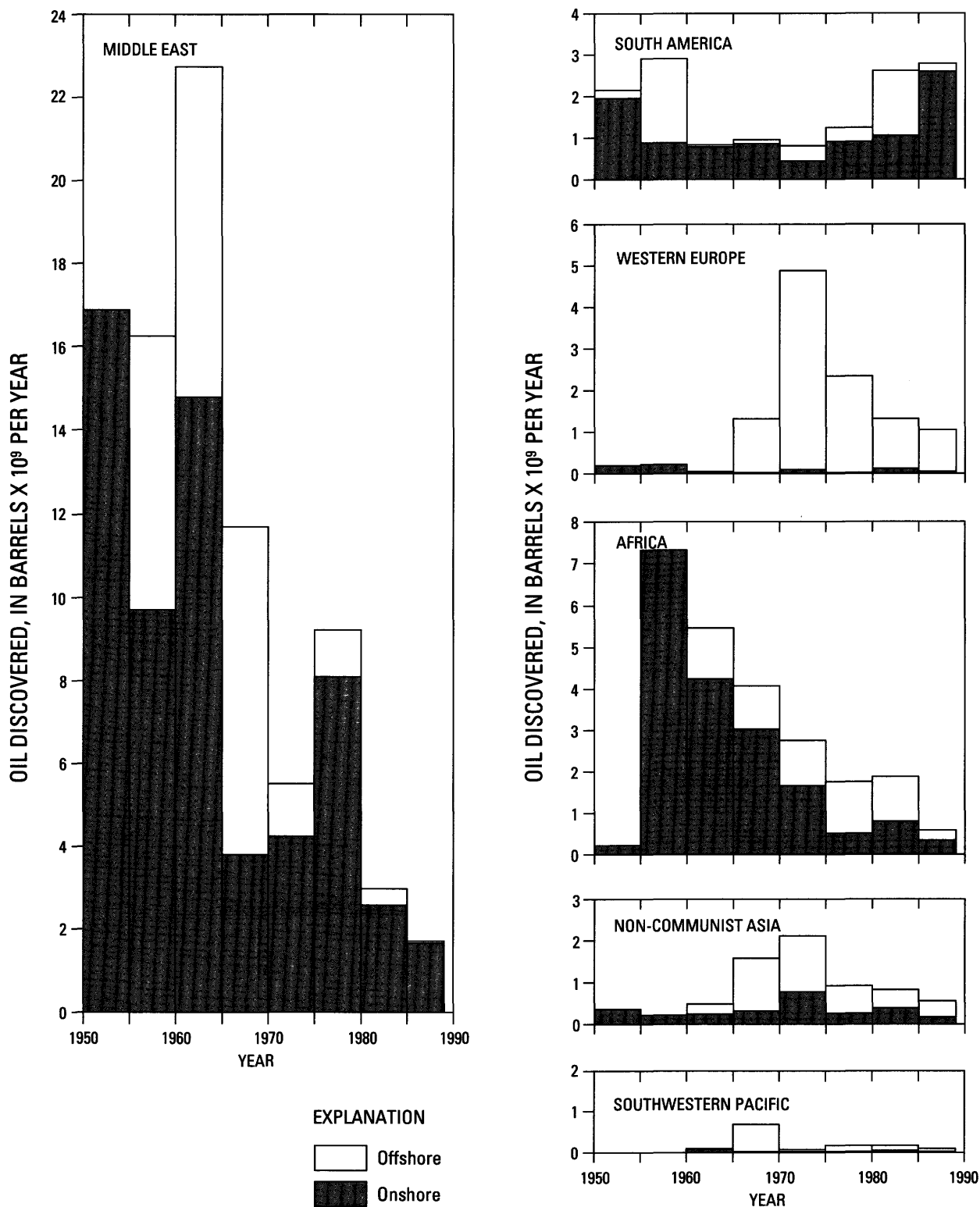
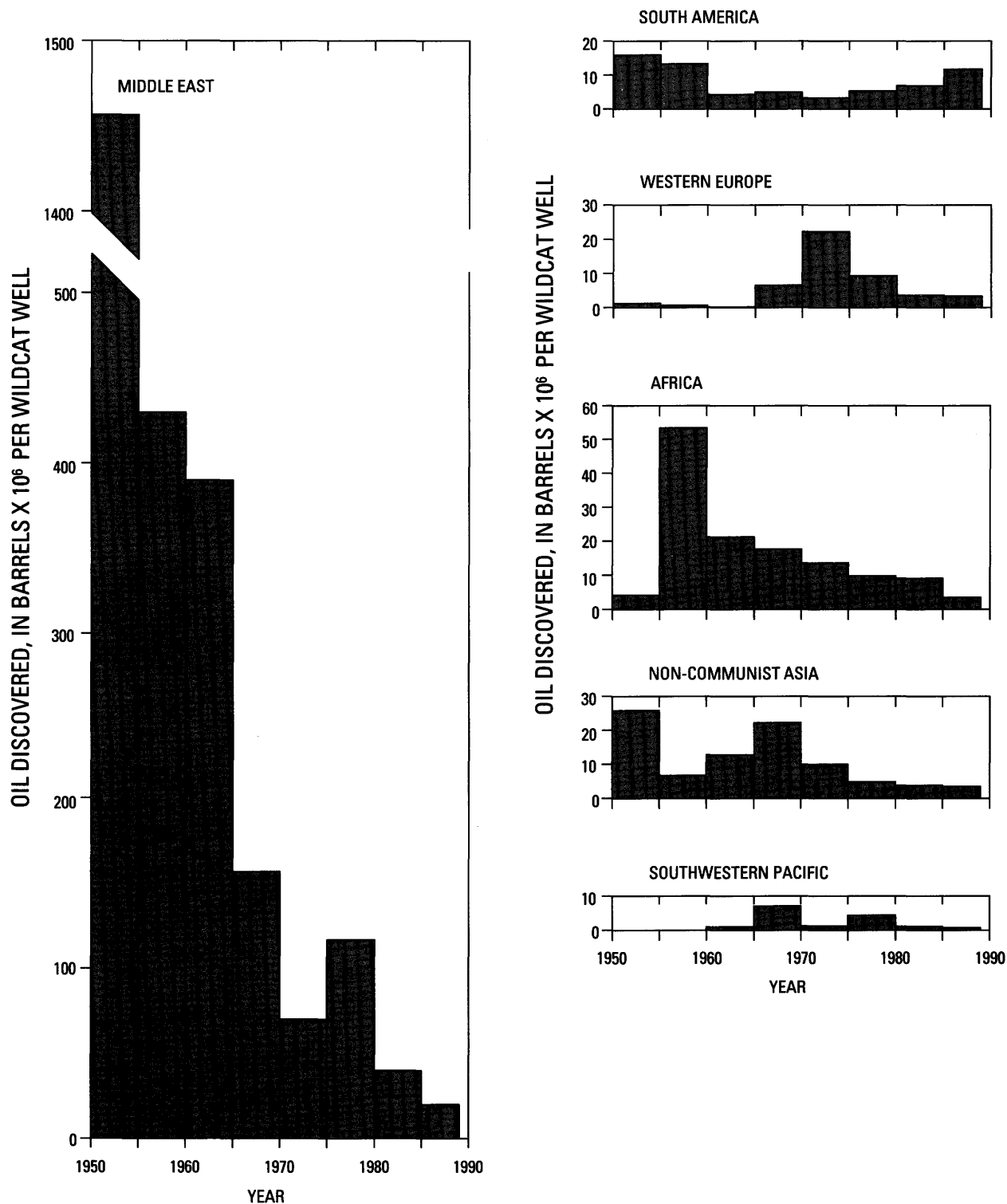


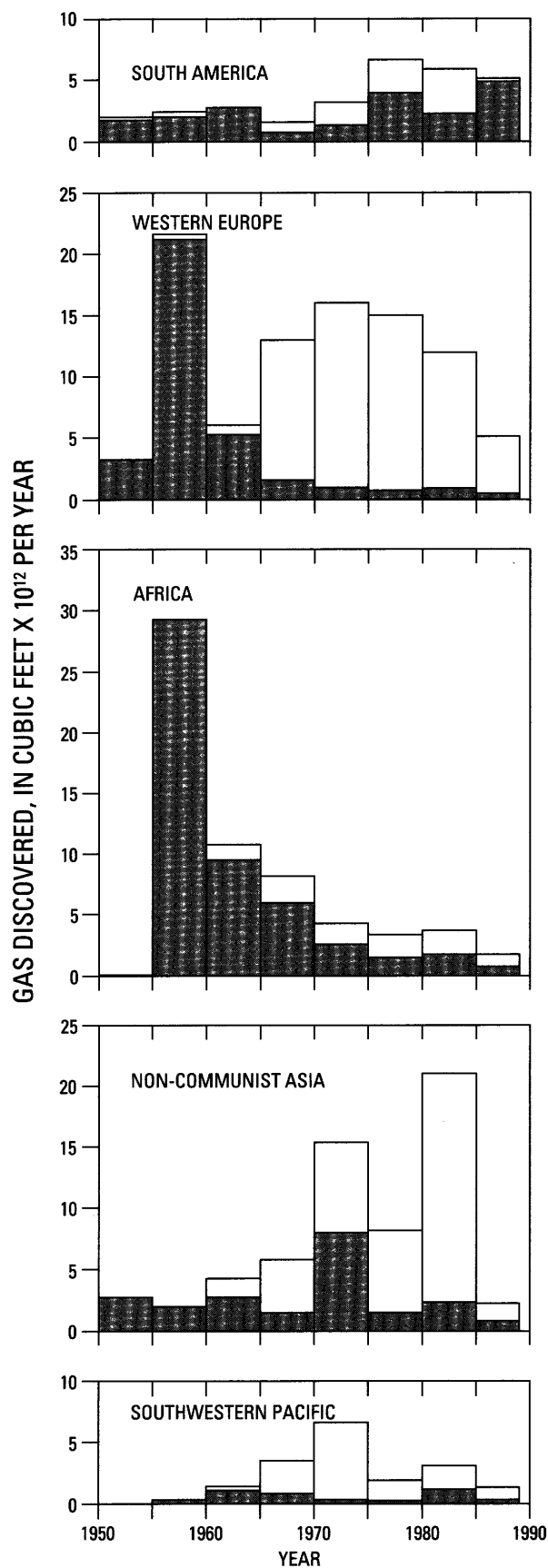
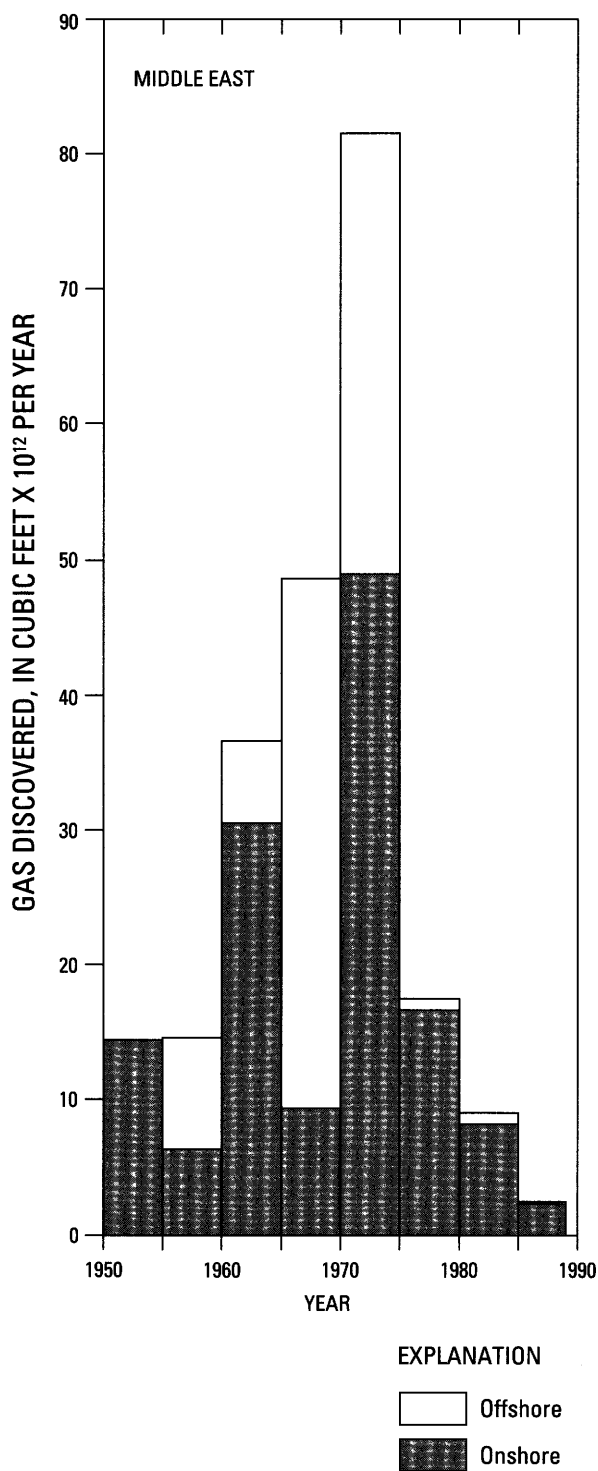
Figure 4. Oil and gas discovery rates for the study area. A, Annual onshore and offshore oil discovery rates. B, Amount of oil discovered per wildcat well. C, Annual onshore and offshore gas discovery rates. For figure 4A-C, data are averaged for 5-year periods, 1951-85, and the 4-year period, 1986-89. The estimates are from a computer tape released in January 1991 by Petroconsultants, and supplemental information on oil was provided by the Dallas Field Office of the Energy Information Administration. Oil or gas discovered was classified as offshore only when it was found in a field that was entirely offshore.



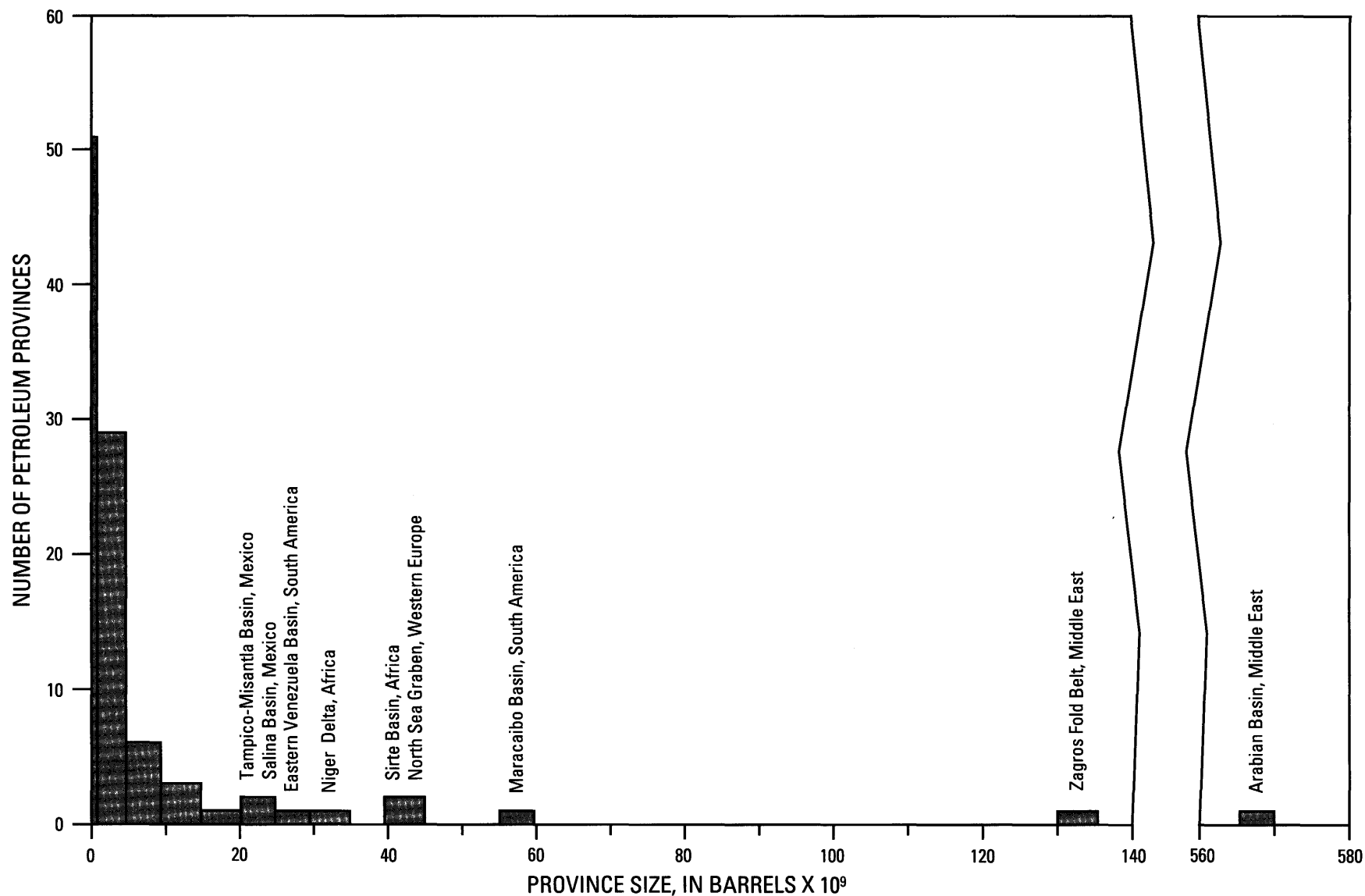
**Figure 5.** Annual offshore and onshore regional oil discovery rates for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific. Data are averaged for 5-year periods, 1951–85, and the 4-year period, 1986–89. The field estimates of recoverable oil are from a computer tape released in January 1991 by Petroconsultants and were supplemented by information provided by the Dallas Field Office of the Energy Information Administration. Oil discovered was classified as offshore only when it was found in a field that was entirely offshore.



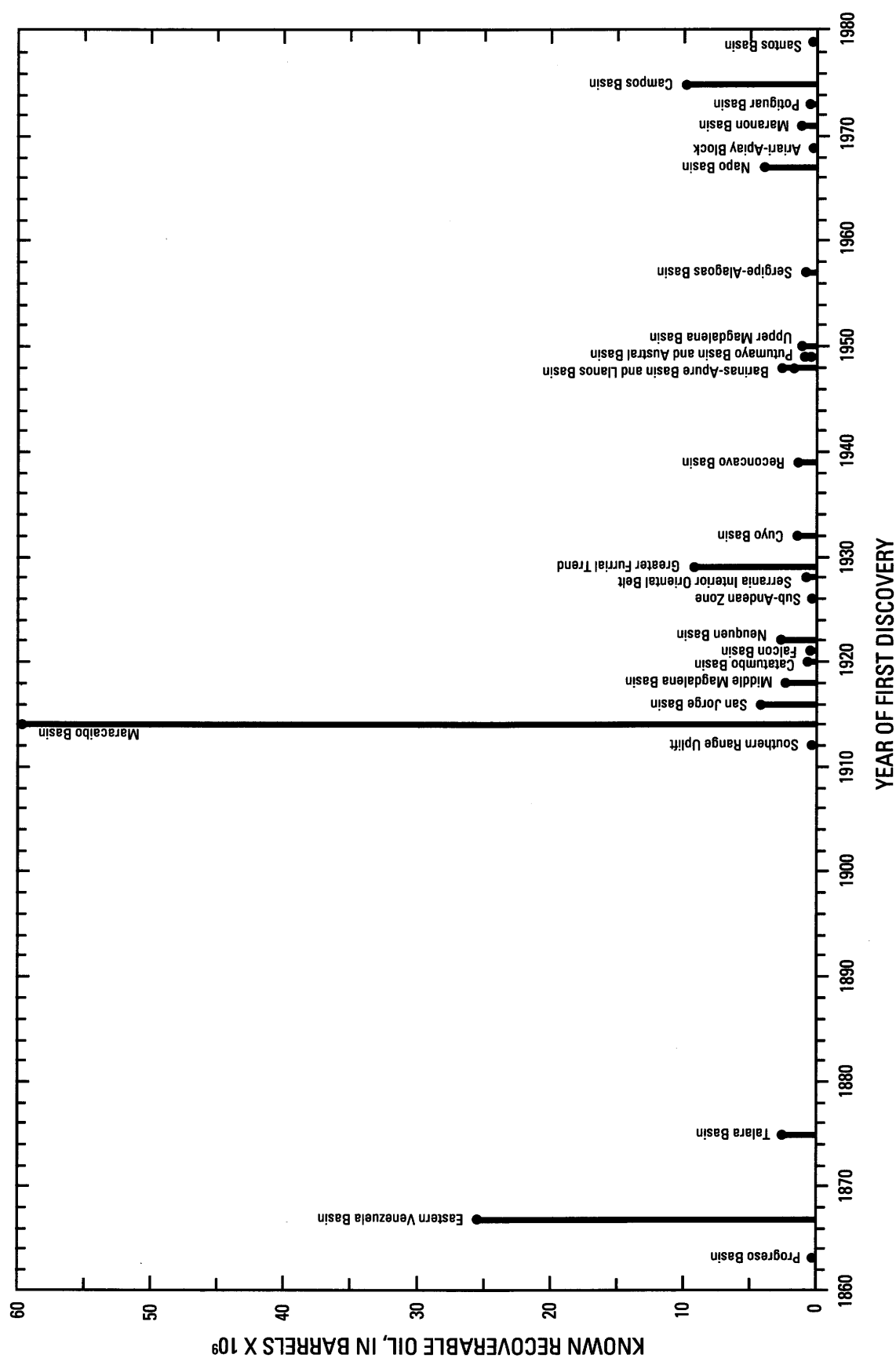
**Figure 6.** The amount of oil discovered per wildcat well for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific. Data are averaged for 5-year periods, 1951–85, and the 4-year period, 1986–89. The vertical scale of the graph for the Middle East is half the scale of the other graphs; even so, the discovery rate in the first period requires the graph to be broken. Wildcat-well data are from a computer tape released in January 1991 by Petroconsultants. The field estimates of recoverable oil are from a computer tape released in January 1991 by Petroconsultants and were supplemented by information provided by the Dallas Field Office of the Energy Information Administration.



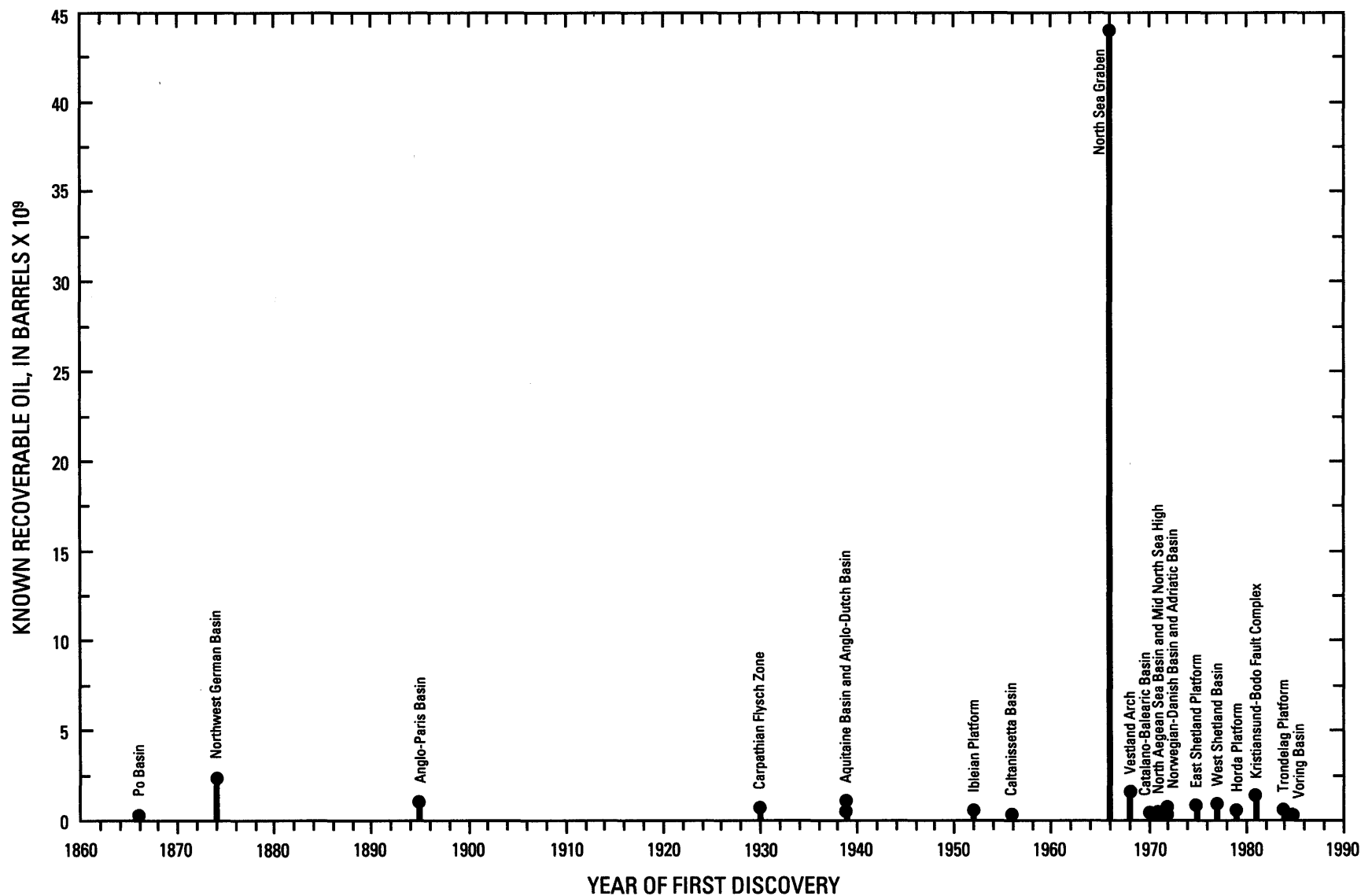
**Figure 7.** Annual offshore and onshore regional gas discovery rates for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific. Data are averaged for 5-year periods, 1951–85, and the 4-year period, 1986–89. The field estimates of recoverable gas are from a computer tape released in January 1991 by Petroconsultants. Gas discovered was classified as offshore only when it was found in a field that was entirely offshore.



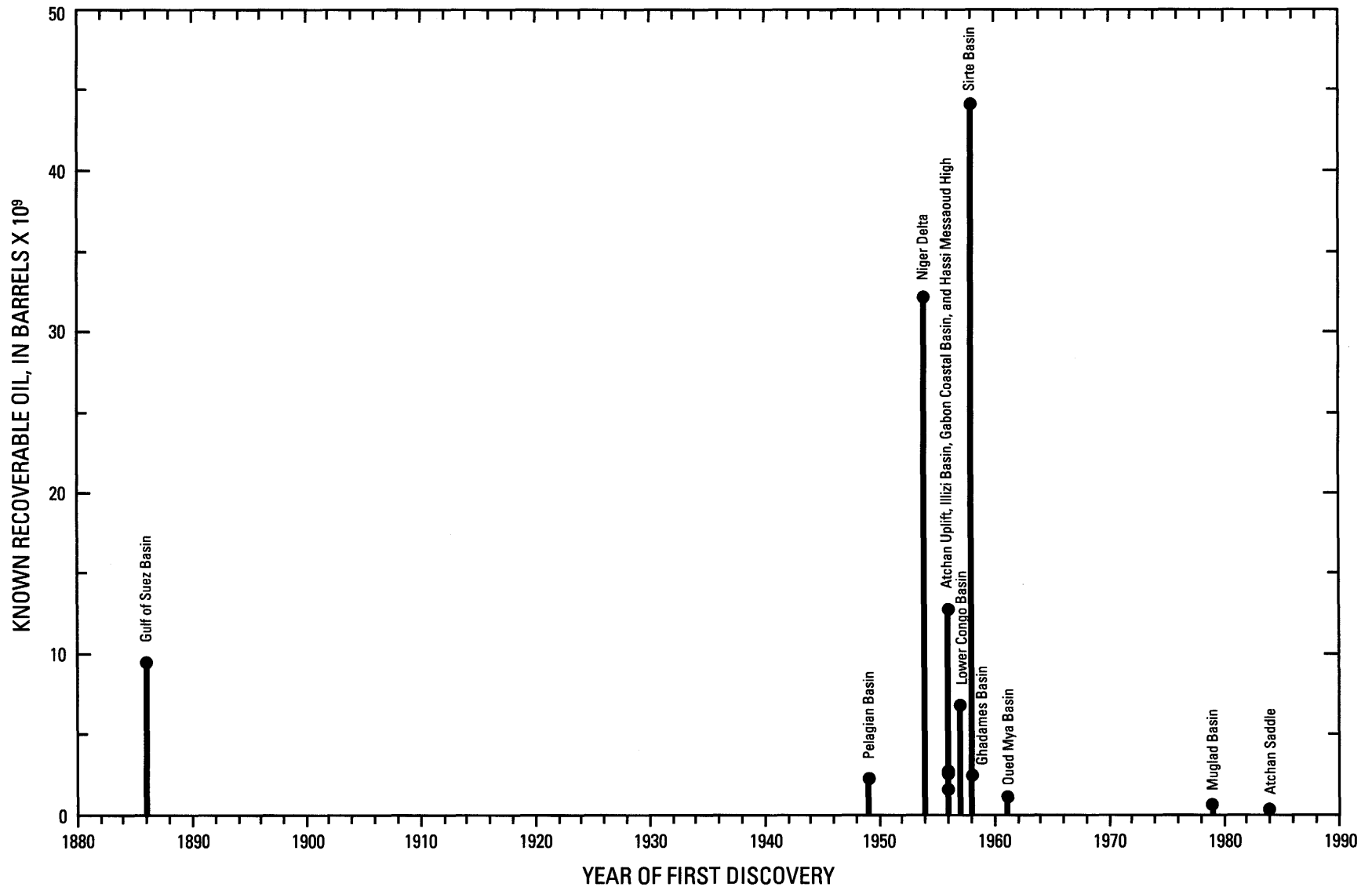
**Figure 8.** Frequency distribution of sizes of the 99 significant petroleum provinces identified through 1990 in the study area. Estimates of recoverable oil in each province are from a computer tape released in January 1991 by Petroconsultants, and supplemental information was provided by the Dallas Field Office of the Energy Information Administration. Each significant province has at least one field containing 100 million barrels of recoverable crude oil. All the significant provinces are named in table 4; the largest provinces are labeled in this graph.



**Figure 9.** Historical sequence by year of the first discovery in each significant petroleum province of South America. Heights of the spikes show the magnitude of total oil discovered through 1990 in each province. Discovery dates, discovery magnitudes, and province names are from a computer tape released in January 1991 by Petroconsultants and were supplemented by field estimates from the Dallas Field Office of the Energy Information Administration. Province discovery estimates are also given in table 4.

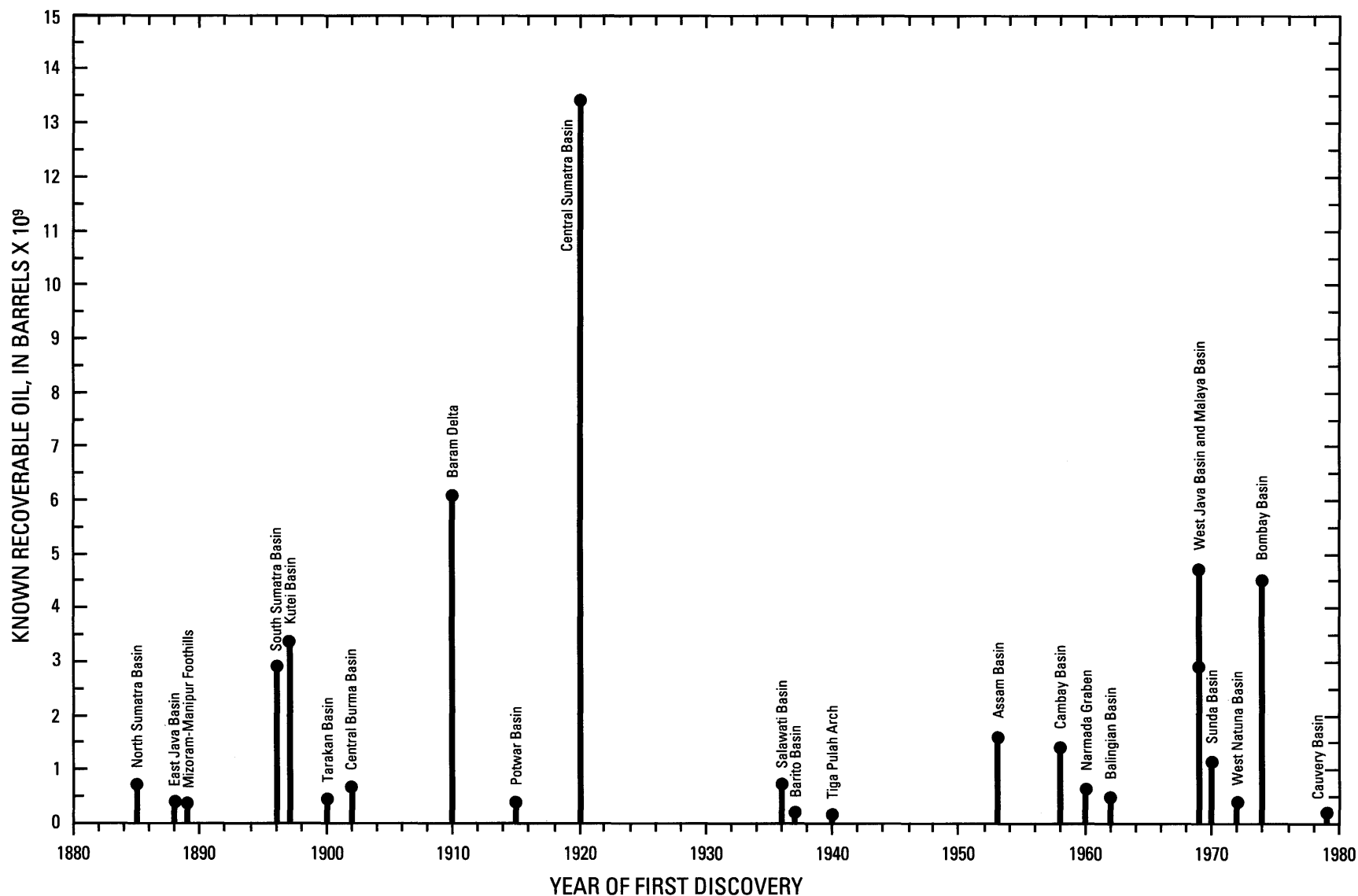


**Figure 10.** Historical sequence by year of the first discovery in each significant petroleum province of Western Europe. Heights of the spikes show the magnitude of total oil discovered through 1990 in each province. Discovery dates, discovery magnitudes, and province names are from a computer tape released in January 1991 by Petroconsultants and were supplemented by field estimates from the Dallas Field Office of the Energy Information Administration. Province discovery estimates are also given in table 4.

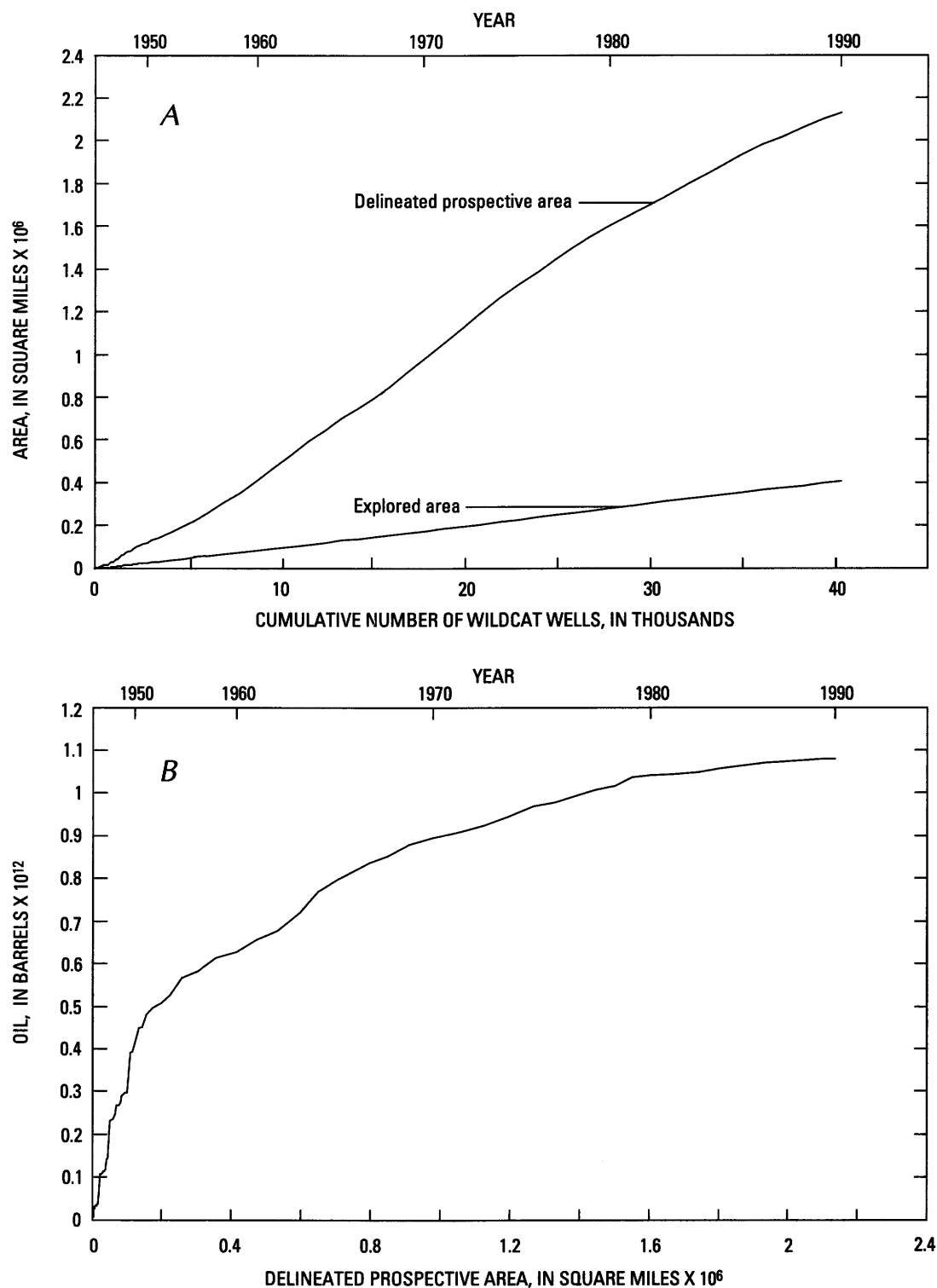


**Figure 11.** Historical sequence by year of the first discovery in each significant petroleum province of Africa. Heights of the spikes show the magnitude of total oil discovered through 1990 in each province. Discovery dates, discovery magnitudes, and province names are from a computer tape released in January 1991 by Petroconsultants and were supplemented by field estimates from the Dallas Field Office of the Energy Information Administration. Province discovery estimates are also given in table 4.

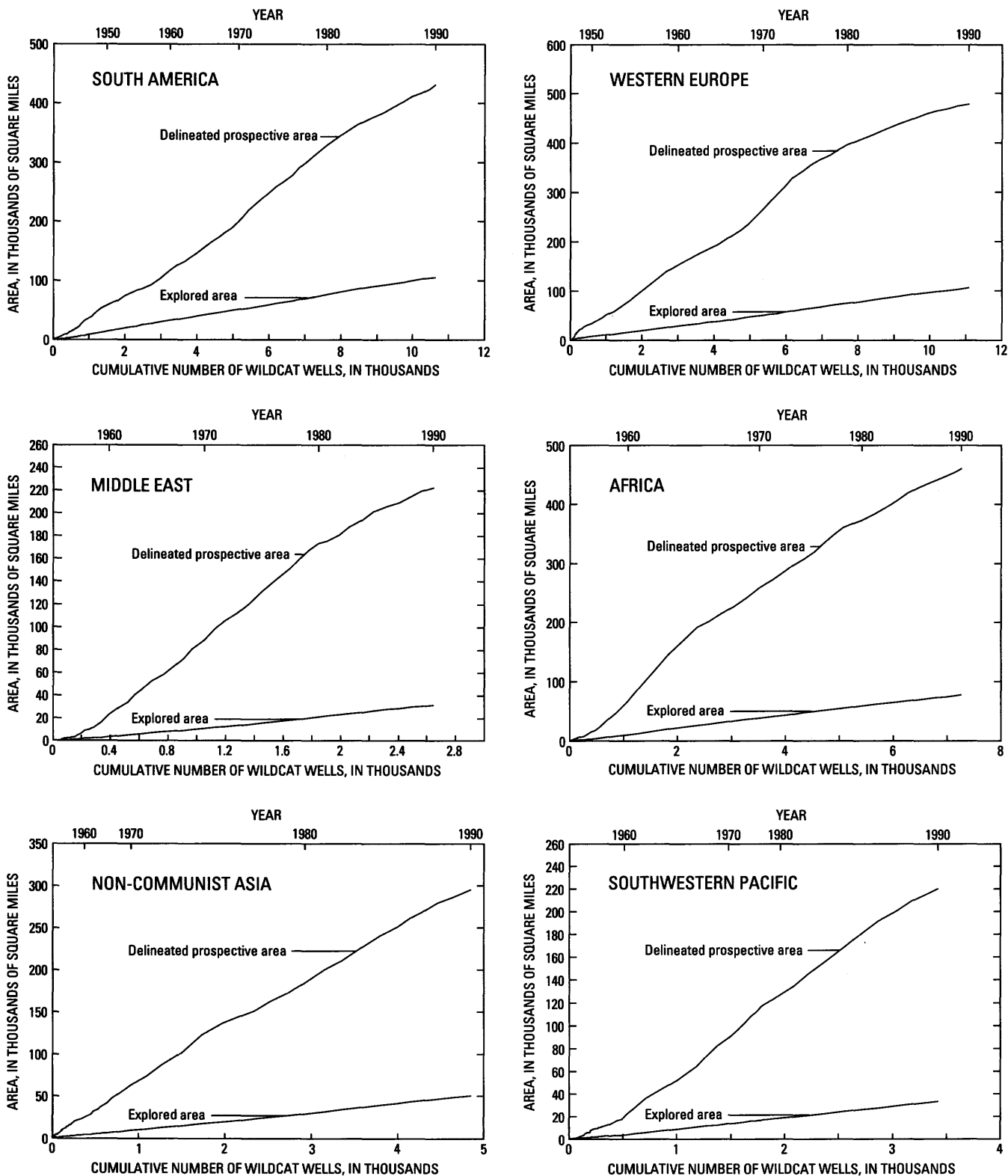




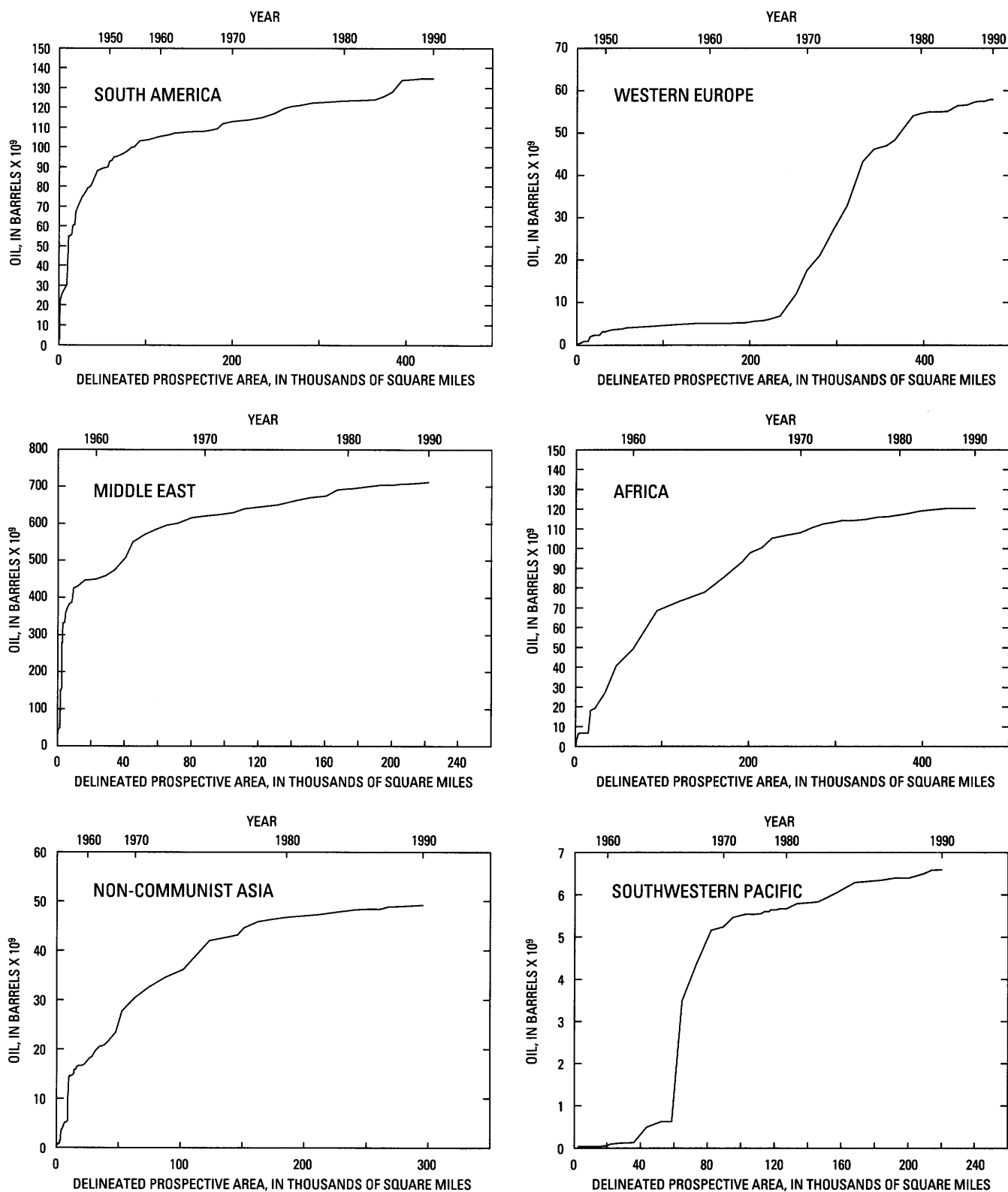
**Figure 12.** Historical sequence by year of the first discovery in each significant petroleum province of non-Communist Asia. Heights of the spikes show the magnitude of total oil discovered through 1990 in each province. Discovery dates, discovery magnitudes, and province names are from a computer tape released in January 1991 by Petroconsultants and were supplemented by field estimates from the Dallas Field Office of the Energy Information Administration. Province discovery estimates are also given in table 4.



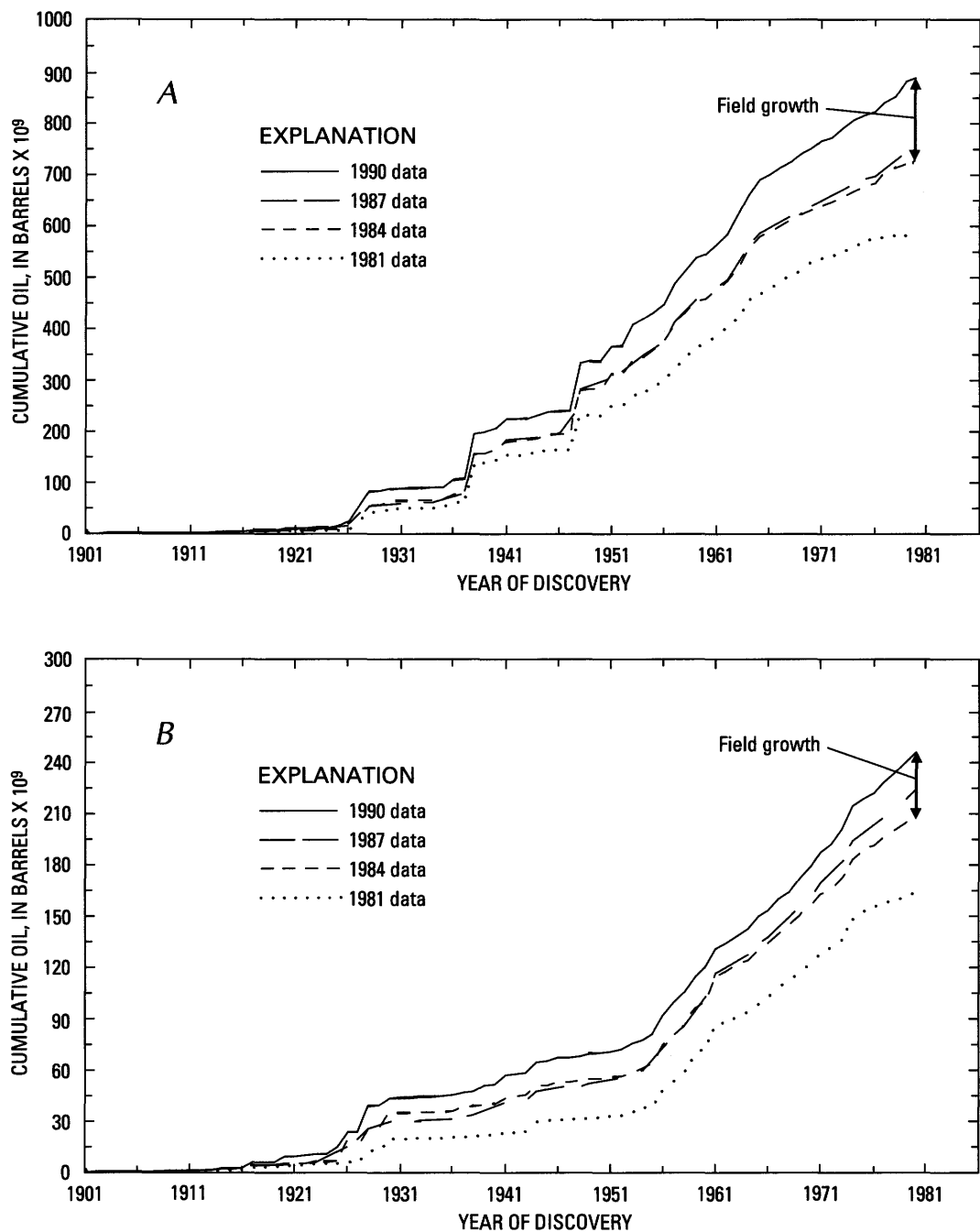
**Figure 13.** Growth in delineated prospective area and explored area and growth in oil discovered in the study area. *A*, Growth in prospective and explored areas delineated by wells drilled through 1990 in the study area. *B*, Oil discovered through 1990 graphed by the year its field location was classified as part of the delineated prospective area in the study area. Well data are from a computer tape released in January 1991 by Petroconsultants. Calculation of delineated prospective and explored areas is explained in the text. Estimates of recoverable oil in each field are from a computer tape released in January 1991 by Petroconsultants and were supplemented by information provided by the Dallas Field Office of the Energy Information Administration.



**Figure 14.** Growth in prospective area and explored area delineated by wells drilled through 1990 for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific. The graphs are at different scales. Well data are from a computer tape released in January 1991 by Petroconsultants. Calculation of delineated prospective and explored areas is explained in the text.



**Figure 15.** Oil discovered through 1990 graphed by the year its field location was classified as part of the delineated prospective area for South America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific. The graphs are at different scales. Calculation of delineated prospective area is explained in the text. Estimates of recoverable oil in each field are from a computer tape released in January 1991 by Petroconsultants and were supplemented by information provided by the Dallas Field Office of the Energy Information Administration.



**Figure 16.** Growth in fields discovered by 1980 in five regions. *A*, Cumulative amounts of oil discovered in South America, Western Europe, the Middle East, Africa, and non-Communist Asia calculated from field estimates of ultimate recovery as recorded in field tapes received from Petroconsultants at 3-year intervals in 1981, 1984, 1987, and 1990. The difference between the 1981 and 1984 curves is primarily due to late reporting of earlier discoveries. Actual field growth is approximated by the difference between the 1984 and 1990 curves. *B*, Data on the same regions as in figure 16A, except data for the Middle East are excluded.



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## FIGURES 17-54

Figures 17-54 show the delineated prospective areas, explored areas, and known petroleum provinces of the Caribbean, Latin America, Western Europe, the Middle East, Africa, non-Communist Asia, and the southwestern Pacific. No figure was prepared for Mexico because data were incomplete. Each figure contains a map, two graphs (except figures 36, 42, and 46, which have only one graph each because oil field sizes are not available), and a summary of exploration data. If significant petroleum provinces are present in the mapped area, a table provides information on them. Definitions of terms and sources of information in figures 17-54 are given below.

**Maps.**—All maps were drawn by ARC/INFO software (1987, Environmental Systems Research Institute, Redlands, Calif.); country boundaries are from the World Data Bank II released by the U.S. Central Intelligence Agency and are not necessarily correct. Scales are not provided as the scale varies within many of the maps. The methods for computing and identifying the delineated prospective and explored areas are explained in the text and differ from those used in U.S. Geological Survey (USGS) Circular 981. If only part of a country is shown, no explored or delineated prospective area was identified in the rest of the country. The grid point closest to a well drilled inside the country mapped may plot as an isolated circle outside the border of that country.

Names of known petroleum provinces (called basins on some maps) and years of first discoveries in them in each country are shown on each map and are from a computer tape released in January 1991 by Petroconsultants S.A., Geneva. Of all the known petroleum provinces shown in figures 17-54, 99 have at least one field containing 100 million barrels and were therefore classified as significant (see table 4). Information on the significant provinces is given in the tables facing the maps.

**Graphs.**—The graphs show (1) the growth in delineated prospective area and explored area in relation to the cumulative number of wildcat wells drilled in a country or group of countries through 1990 and (2) the profile of discovered oil cumulated through 1990 ordered by when its field location was classified as part of the delineated prospective area. Years are shown at the top of both graphs. Wildcat wells are from a computer tape released in January 1991 by Petroconsultants. The well data graphed are those in table 2 minus the wells whose dates or coordinates are unknown; some wells are assigned to a country in table 2 but lack coordinates and cannot be used to delineate prospective area. Estimates of recoverable oil and gas in each province are from a computer tape released in January 1991 by Petroconsultants and from supplemental information provided by the Dallas Field Office of the Energy Information Administration of the U.S. Department of Energy (written commun., 1990).

Many wildcat wells drilled before 1950 were not recorded in our data so that the delineated prospective and explored areas as of 1950 are underestimated. Records of followup drilling after 1950 probably result in an overestimate of the rate of increase in the delineated prospective area after 1950. Nonetheless, we believe that the growth in delineated prospective area after 1970 is real and is not an artifact of earlier missing data. Rate of growth in explored area has been relatively constant since 1950.

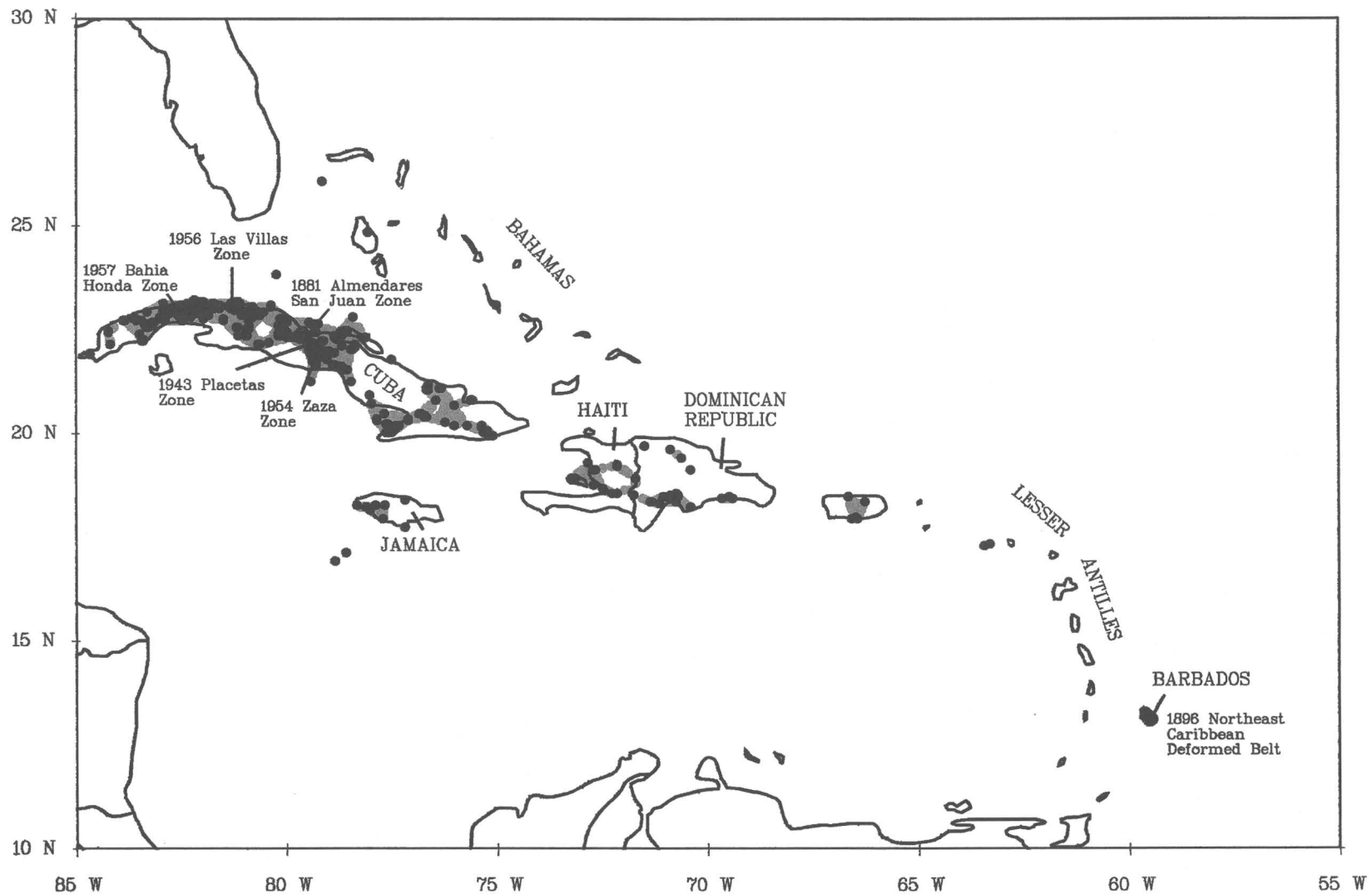
**Summaries of exploration data.**—Land areas are from individual country entries in *The Random House College Dictionary* (Random House, Inc., 1973). Computation of the delineated prospective areas and the explored areas is explained in the text. Wildcat wells are from a computer tape released in January 1991 by Petroconsultants; the 1990 totals are those in table 2 minus the wells whose dates or coordinates are unknown. Current growth in delineated prospective area per wildcat well is derived from the graph showing growth in prospective area. Reported discoveries of recoverable crude oil and gas are from a Petroconsultants computer tape released in January 1991 and from the Dallas Field Office of the Energy Information Administration of the U.S. Department of Energy (written commun., 1990). The information on discoveries is incomplete.

For consistency with USGS Circular 981, the oil richness indices have been calculated and presented in figures 17-54. This index is defined as the number of barrels of recoverable crude oil discovered through 1990 divided by the number of square miles in the delineated prospective area. The factor tends to be largest in areas such as the Middle East where exploration has been concentrated in a few very prolific areas. As shown by the accompanying graphs, most oil is concentrated in a small part of the prospective area, and the total resources of a country should not be estimated by multiplying the richness by a higher figure for the prospective area.

**Tables of significant provinces.**—The tables contain provinces that are significant in the country mapped and provinces that are significant in neighboring countries but that have not had discoveries of 100 million barrels of oil in the country mapped. Some of the extensions of significant provinces contain only natural gas and natural gas liquids.

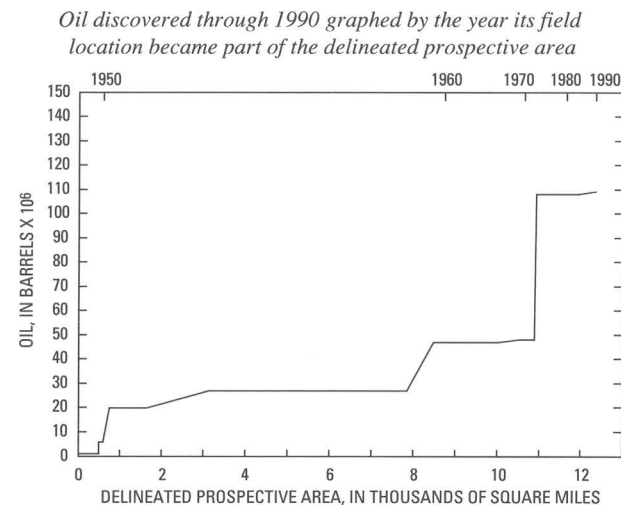
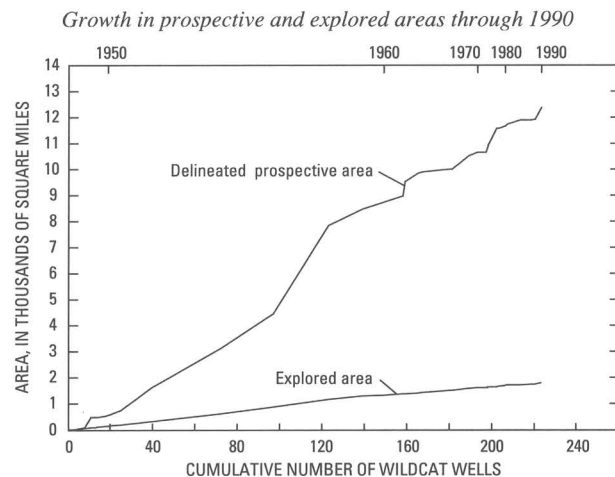
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**Figure 17.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of the Caribbean.





#### Exploration data

| Country                            | Land area (mi <sup>2</sup> ) |
|------------------------------------|------------------------------|
| Bahamas .....                      | 4,404                        |
| Cuba <sup>1</sup> .....            | 44,218                       |
| Haiti .....                        | 10,714                       |
| Dominican Republic .....           | 19,129                       |
| Jamaica .....                      | 4,413                        |
| Barbados .....                     | 161                          |
| Lesser Antilles <sup>2</sup> ..... | 2,133                        |
| Total .....                        | 85,172                       |

Delineated prospective area through 1990: 12,345 mi<sup>2</sup>

Explored area through 1990: 1,797 mi<sup>2</sup>

Wildcat wells through 1990: 223

Current growth in delineated prospective area per wildcat: 141 mi<sup>2</sup>

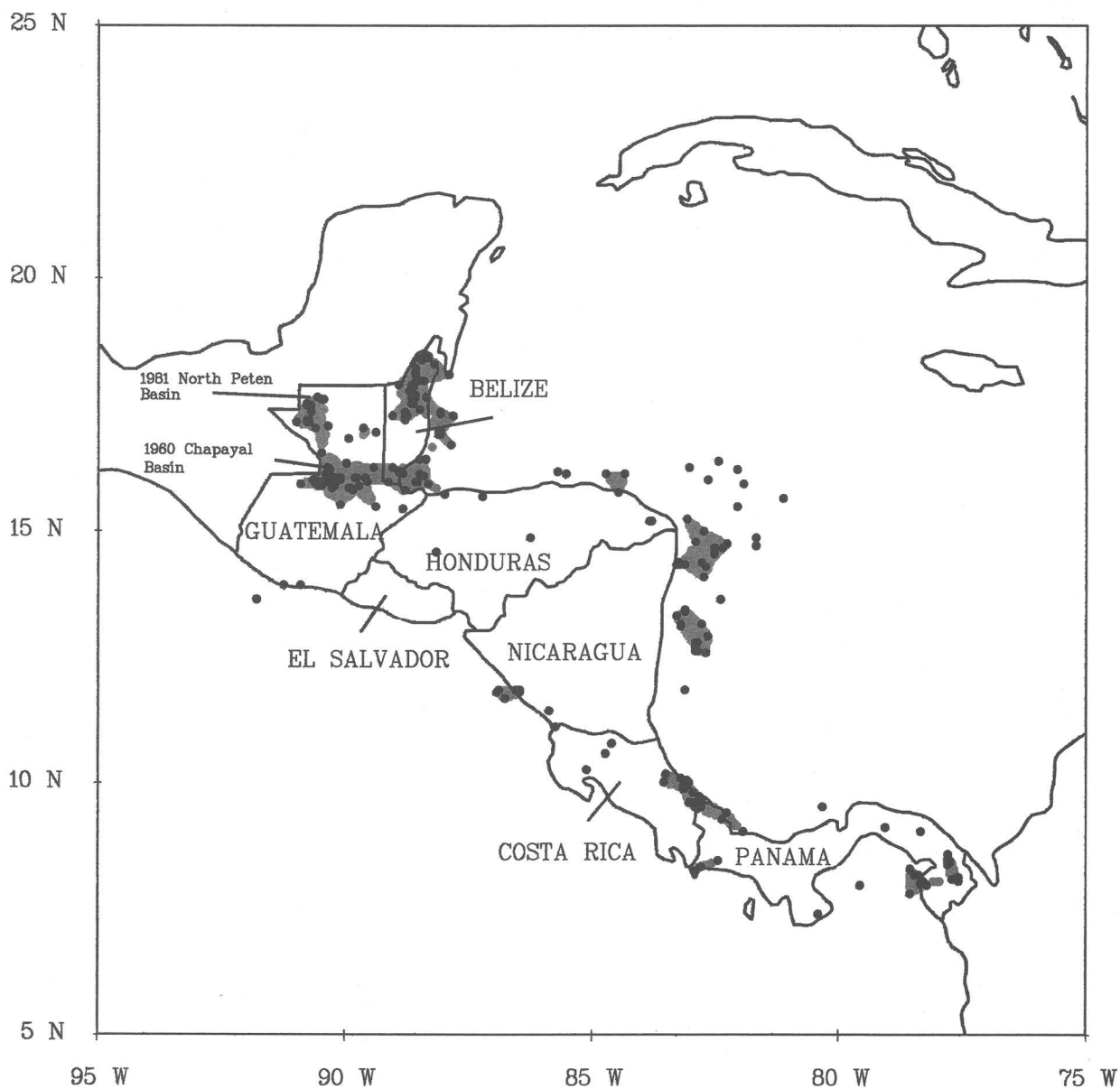
Reported discoveries of recoverable crude oil and gas through 1990:  
0.109 × 10<sup>9</sup> bbl oil and 0.166 × 10<sup>12</sup> cubic feet gas

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.008 \times 10^6 \text{ bbl/mi}^2$

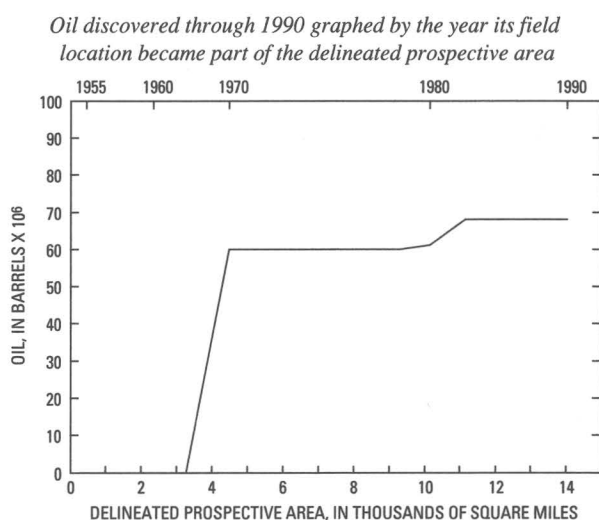
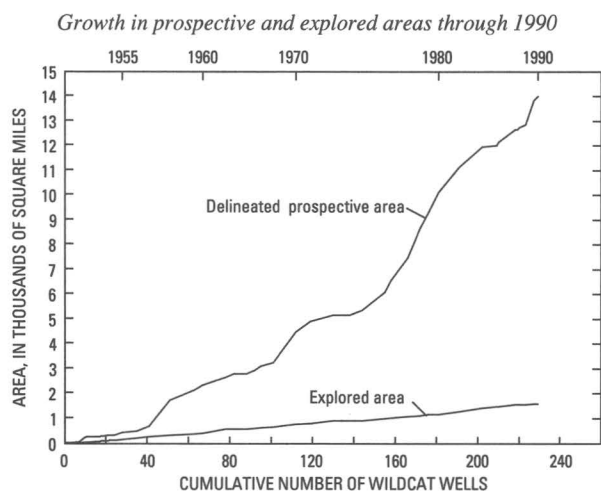
<sup>1</sup>Data for Cuba are incomplete since 1960.

<sup>2</sup>For this report, the Lesser Antilles are considered to consist of the islands from Grenada to St. Thomas, except Barbados, which is listed separately.

Figure 17. Continued.



**Figure 18.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Central America.



#### Exploration data

| Country           | Land area<br>(mi <sup>2</sup> ) |
|-------------------|---------------------------------|
| Belize .....      | 8,867                           |
| Honduras .....    | 43,277                          |
| Guatemala .....   | 42,042                          |
| Nicaragua .....   | 57,143                          |
| El Salvador ..... | 13,176                          |
| Costa Rica .....  | 19,238                          |
| Panama .....      | 28,575                          |
| Total .....       | 212,318                         |

Delineated prospective area through 1990: 14,007 mi<sup>2</sup>

Explored area through 1990: 1,605 mi<sup>2</sup>

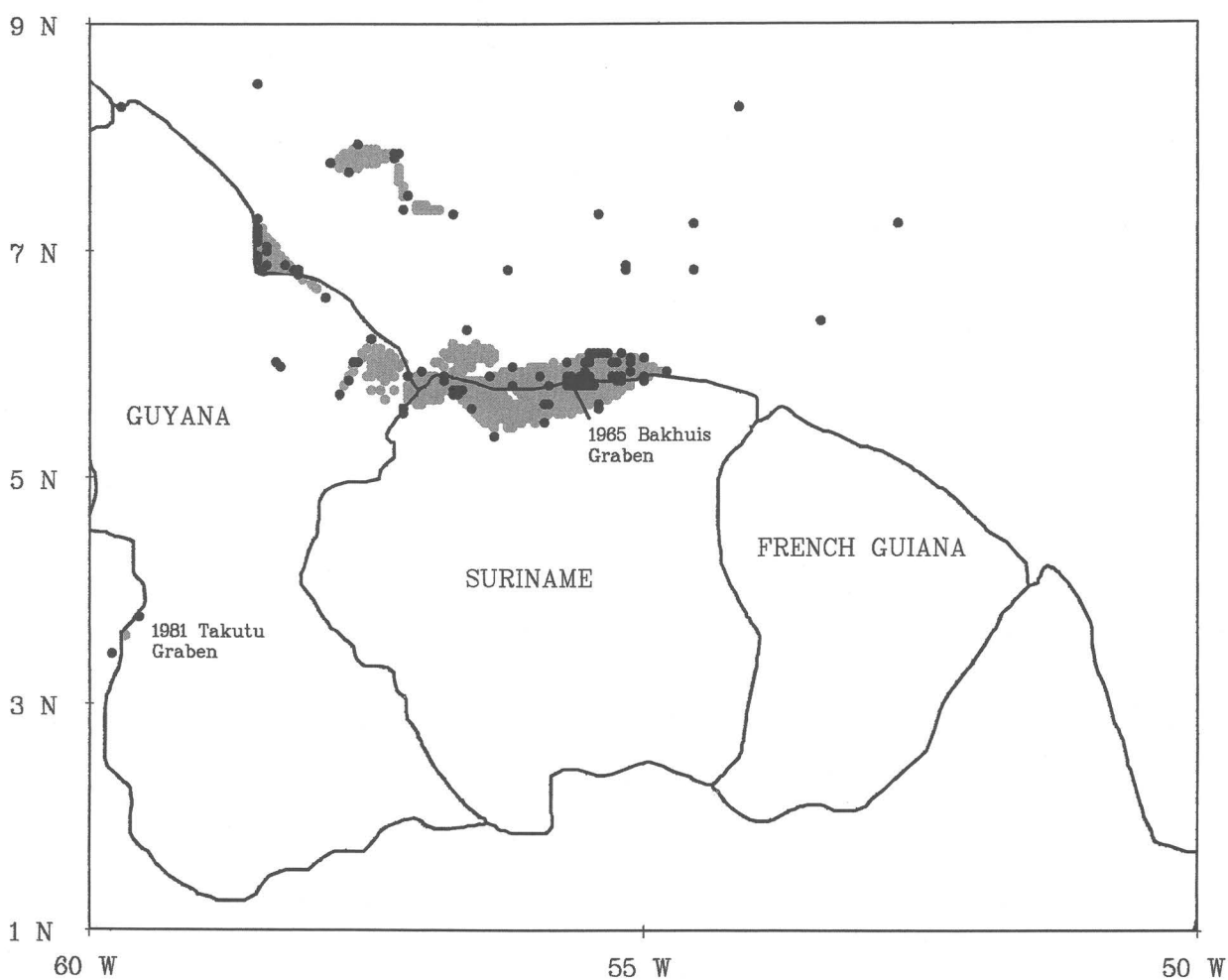
Wildcat wells through 1990: 229

Current growth in delineated prospective area per wildcat: 87 mi<sup>2</sup>

Reported discoveries of recoverable crude oil through 1990:  
0.068 × 10<sup>9</sup> bbl

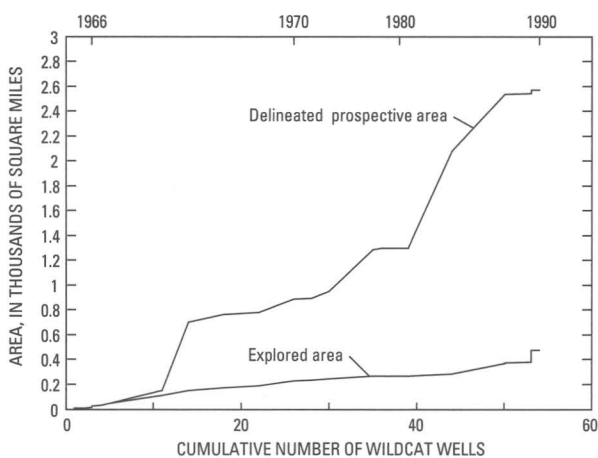
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.005 \times 10^6 \text{ bbl/mi}^2$

Figure 18. Continued.

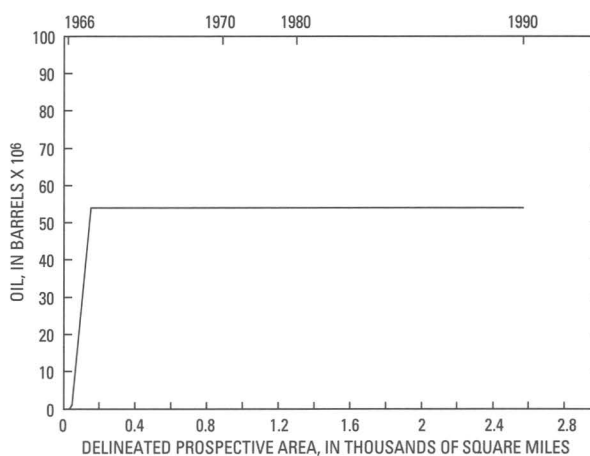


**Figure 19.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Guyana, Suriname, and French Guiana, South America. French Guiana is listed separately although it is an overseas department of France.

Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



#### Exploration data

| Country             | Land area (mi <sup>2</sup> ) |
|---------------------|------------------------------|
| Guyana .....        | 82,978                       |
| Suriname .....      | 60,230                       |
| French Guiana ..... | 35,135                       |
| Total .....         | 178,343                      |

Delineated prospective area through 1990: 2,568 mi<sup>2</sup>

Explored area through 1990: 479 mi<sup>2</sup>

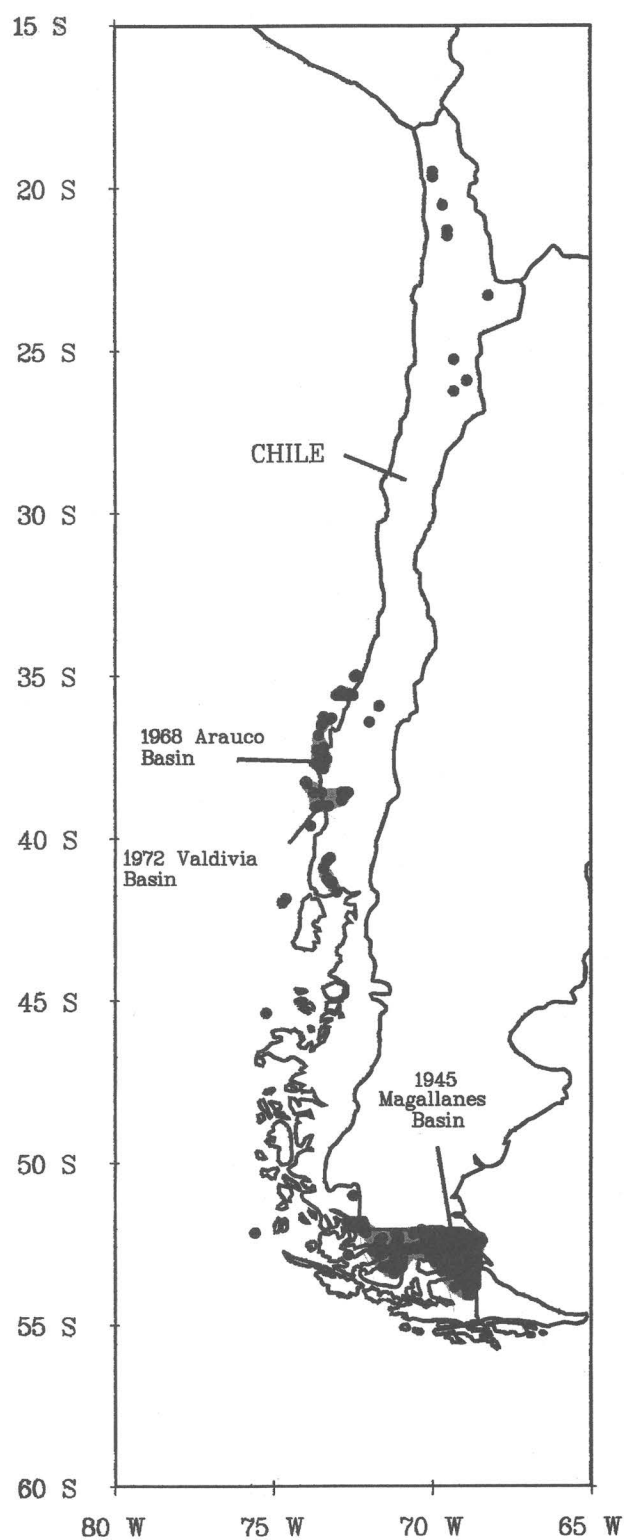
Wildcat wells through 1990: 54

Current growth in delineated prospective area per wildcat: 6 mi<sup>2</sup>

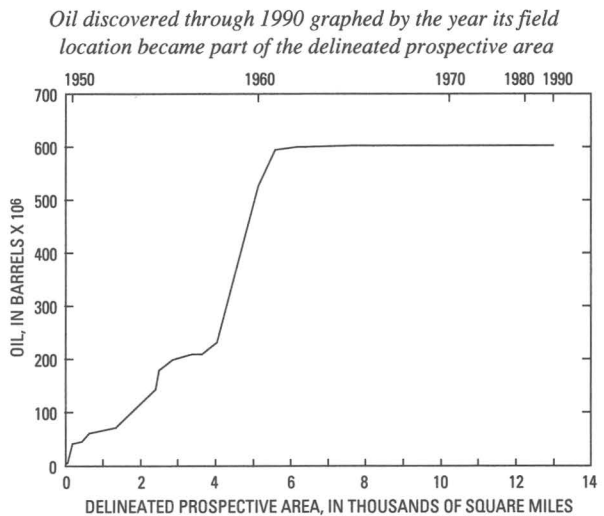
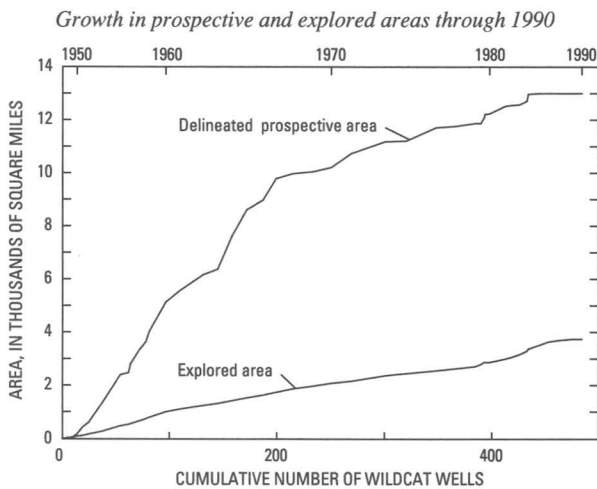
Reported discoveries of recoverable crude oil through 1990:  
0.054 × 10<sup>9</sup> bbl

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.019 \times 10^6 \text{ bbl/mi}^2$

Figure 19. Continued.



**Figure 20.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Chile, South America.



#### *Exploration data*

Land area: 286,396 mi<sup>2</sup>

Delineated prospective area through 1990: 12,985 mi<sup>2</sup>

Explored area through 1990: 3,762 mi<sup>2</sup>

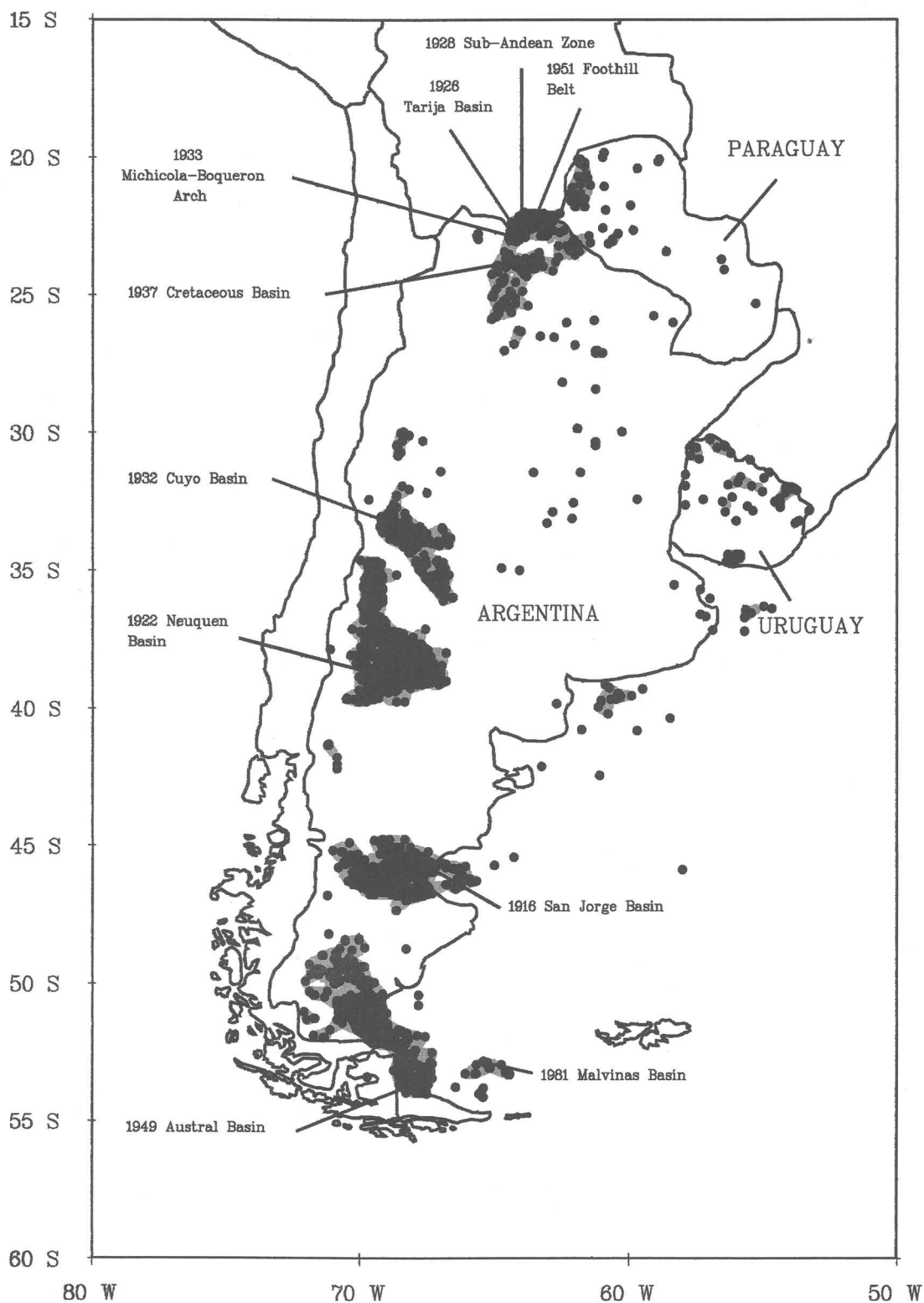
Wildcat wells through 1990: 484

Current growth in delineated prospective area per wildcat: 5 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
 $0.602 \times 10^9$  bbl oil and  $9.79 \times 10^{12}$  cubic feet gas

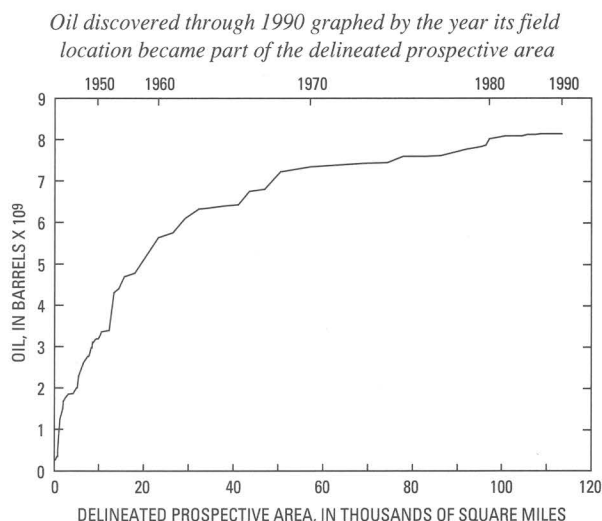
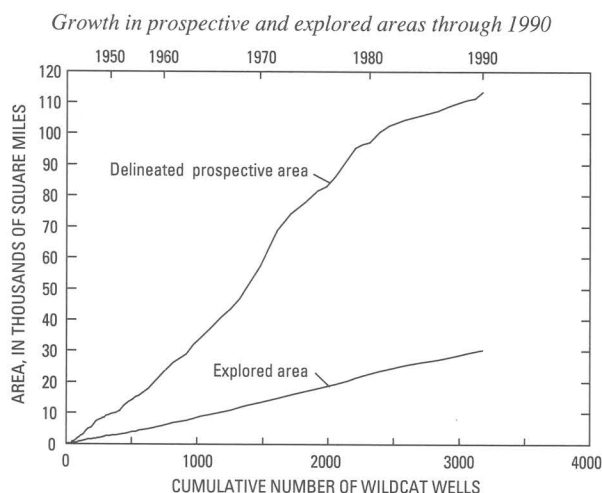
$$\text{Richness} = \frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.046 \times 10^6 \text{ bbl/mi}^2$$

**Figure 20.** Continued.



**Figure 21.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Argentina, Uruguay, and Paraguay, South America.





#### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in Argentina | Cumulative discoveries in this province in Argentina through 1990 |                                     |  |
|--------------------------------|---|---|-------------------------------------|--|
|                                |   | Crude oil   |                                     | Gas  |
|                                |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)                | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| San Jorge Basin . . . . .      | 1916  | 2,517   | 3,893                               | 6,491  |
| Neuquen Basin . . . . .        | 1922  | 1,209   | 2,668                               | 25,895   |
| Sub-Andean Zone . . . . .      | 1928  | 110   | 142                                 | 348  |
| Cuyo Basin . . . . .           | 1932  | 1,056   | 1,484                               | 356  |
| Austral Basin . . . . .        | 1949  | 100   | 759                                 | 12,676   |
| Total . . . . .                |   | 4,992   | 8,946                               | 45,766   |

#### Exploration data

| Country             | Land area (mi <sup>2</sup> ) |
|---------------------|------------------------------|
| Argentina . . . . . | 1,084,120                    |
| Uruguay . . . . .   | 72,172                       |
| Paraguay . . . . .  | 157,047                      |
| Total . . . . .     | 1,313,339                    |

Delineated prospective area through 1990: 113,354 mi<sup>2</sup>

Explored area through 1990: 30,303 mi<sup>2</sup>

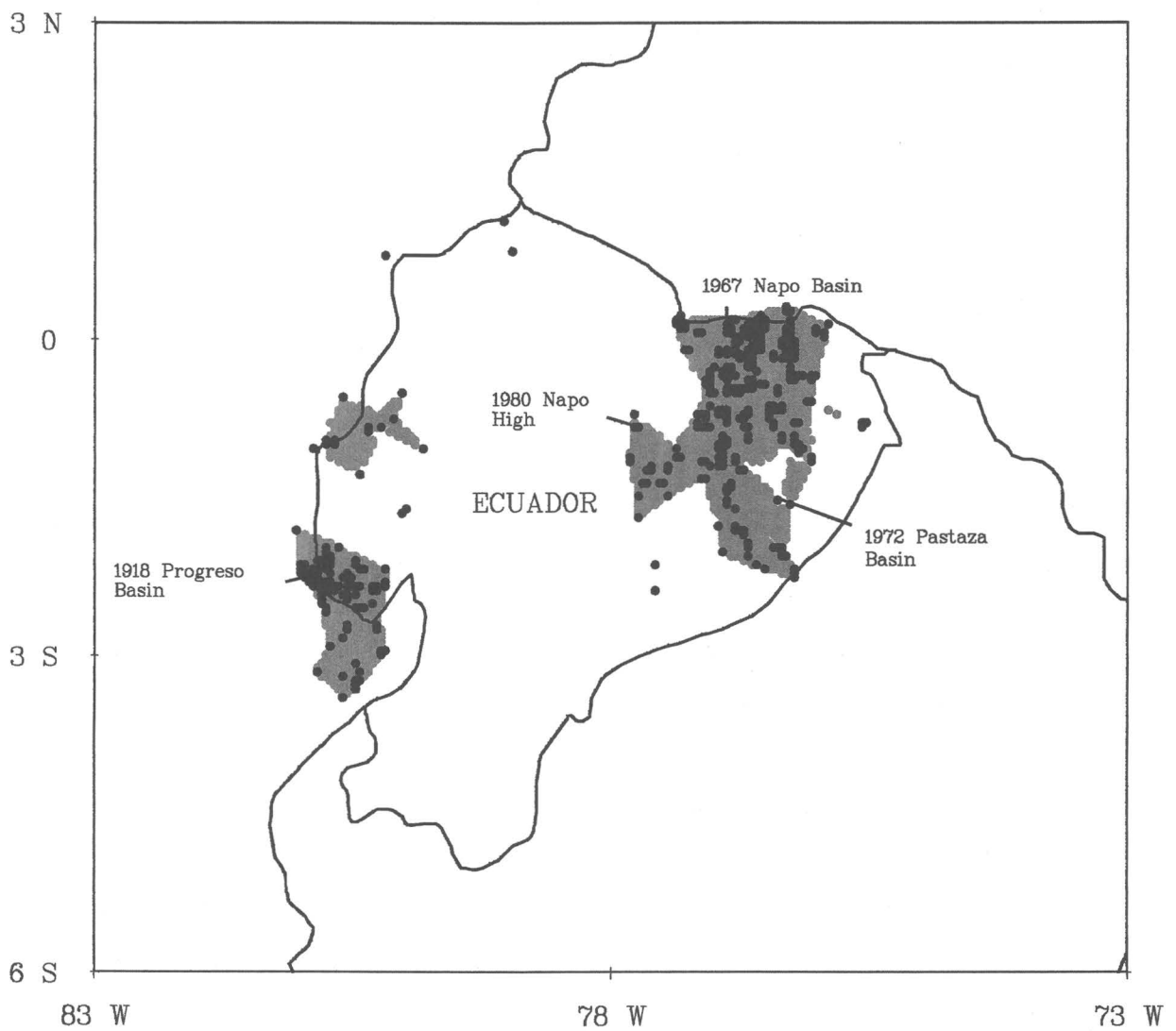
Wildcat wells through 1990: 3,179

Current growth in delineated prospective area per wildcat: 33 mi<sup>2</sup>

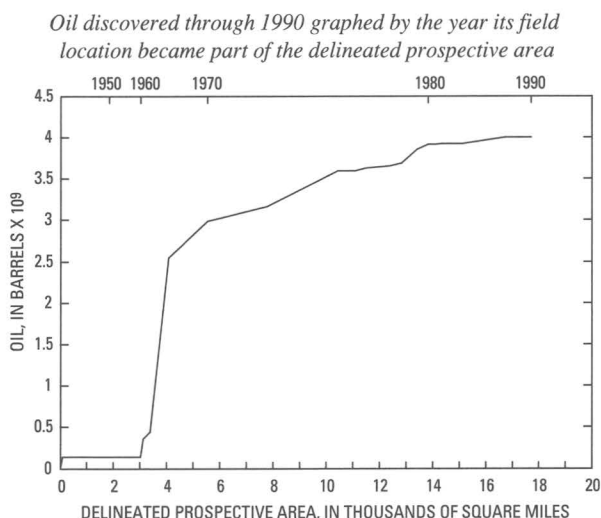
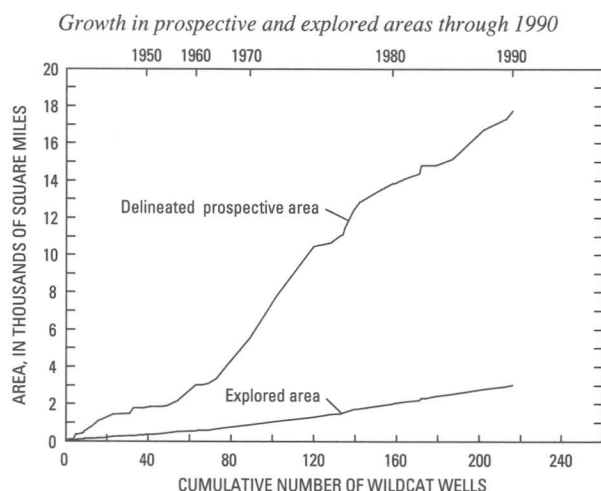
Reported discoveries of recoverable crude oil and gas through 1990:  
 $8.13 \times 10^9$  bbl oil and  $49.4 \times 10^{12}$  cubic feet gas

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.072 \times 10^6 \text{ bbl/mi}^2$

Figure 21. Continued.



**Figure 22.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Ecuador, South America.



#### *Significant petroleum provinces*

| Significant petroleum province | Year of first discovery in this province in Ecuador | Cumulative discoveries in this province in Ecuador through 1990 |                                     |  |
|--------------------------------|---|---|-------------------------------------|--|
|                                |   | Crude oil   |                                     | Gas  |
|                                |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)              | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Progreso Basin. . . . .        | 1918  | 130   | 145                                 | 464  |
| Napo Basin . . . . .           | 1967  | 2,853   | 3,748                               | 659  |
| Total. . . . .                 |   | 2,983   | 3,893                               | 1,123  |

#### *Exploration data*

Land area: 104,510 mi<sup>2</sup>

Delineated prospective area through 1990: 17,715 mi<sup>2</sup>

Explored area through 1990: 3,015 mi<sup>2</sup>

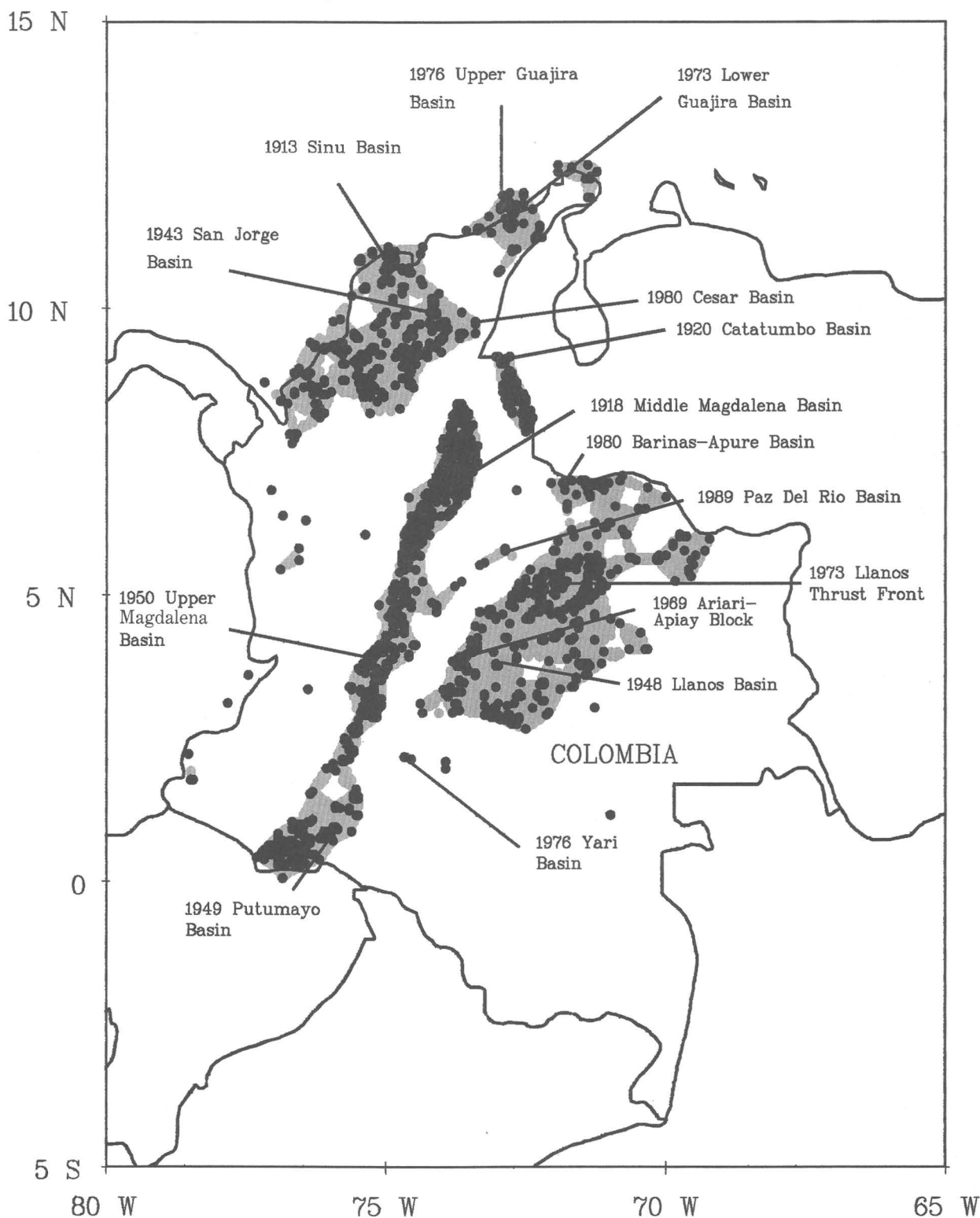
Wildcat wells through 1990: 216

Current growth in delineated prospective area per wildcat: 125 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
4.0 × 10<sup>9</sup> bbl oil and 1.12 × 10<sup>12</sup> cubic feet gas

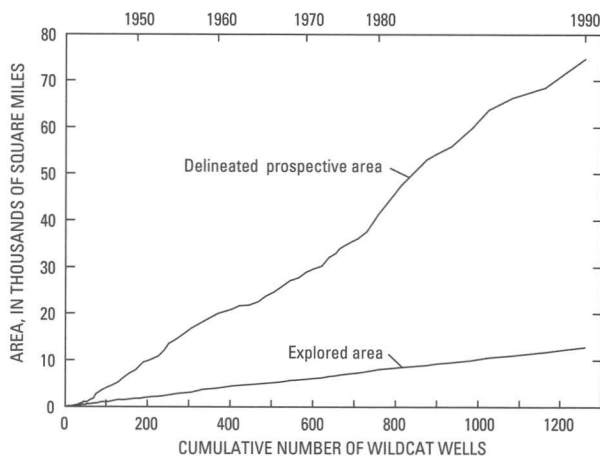
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.226 \times 10^6 \text{ bbl/mi}^2$

**Figure 22.** Continued.

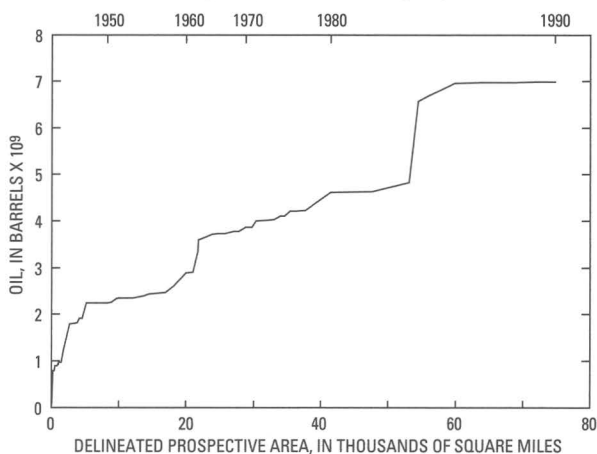


**Figure 23.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Colombia, South America.

Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



#### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in Colombia | Cumulative discoveries in this province in Colombia through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)               | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Middle Magdalena Basin .....   | 1918   | 1,902  | 2,379                               | 3,097  |
| Catatumbo Basin .....          | 1920   | 400  | 473                                 | 922  |
| Llanos Basin .....             | 1948   | 2,050  | 2,413                               | 71   |
| Putumayo Basin .....           | 1949   | 242  | 370                                 | 1,261  |
| Upper Magdalena Basin .....    | 1950   | 534  | 968                                 | 243  |
| Ariari-Apiay Block .....       | 1969   | 100  | 255                                 | 221  |
| Barinas-Apure Basin .....      | 1980   | 0  | 9                                   | 10   |
| Total .....                    |  | 5,228  | 6,867                               | 5,825  |

#### Exploration data

Land area: 439,828 mi<sup>2</sup>

Delineated prospective area through 1990: 74,725 mi<sup>2</sup>

Explored area through 1990: 12,852 mi<sup>2</sup>

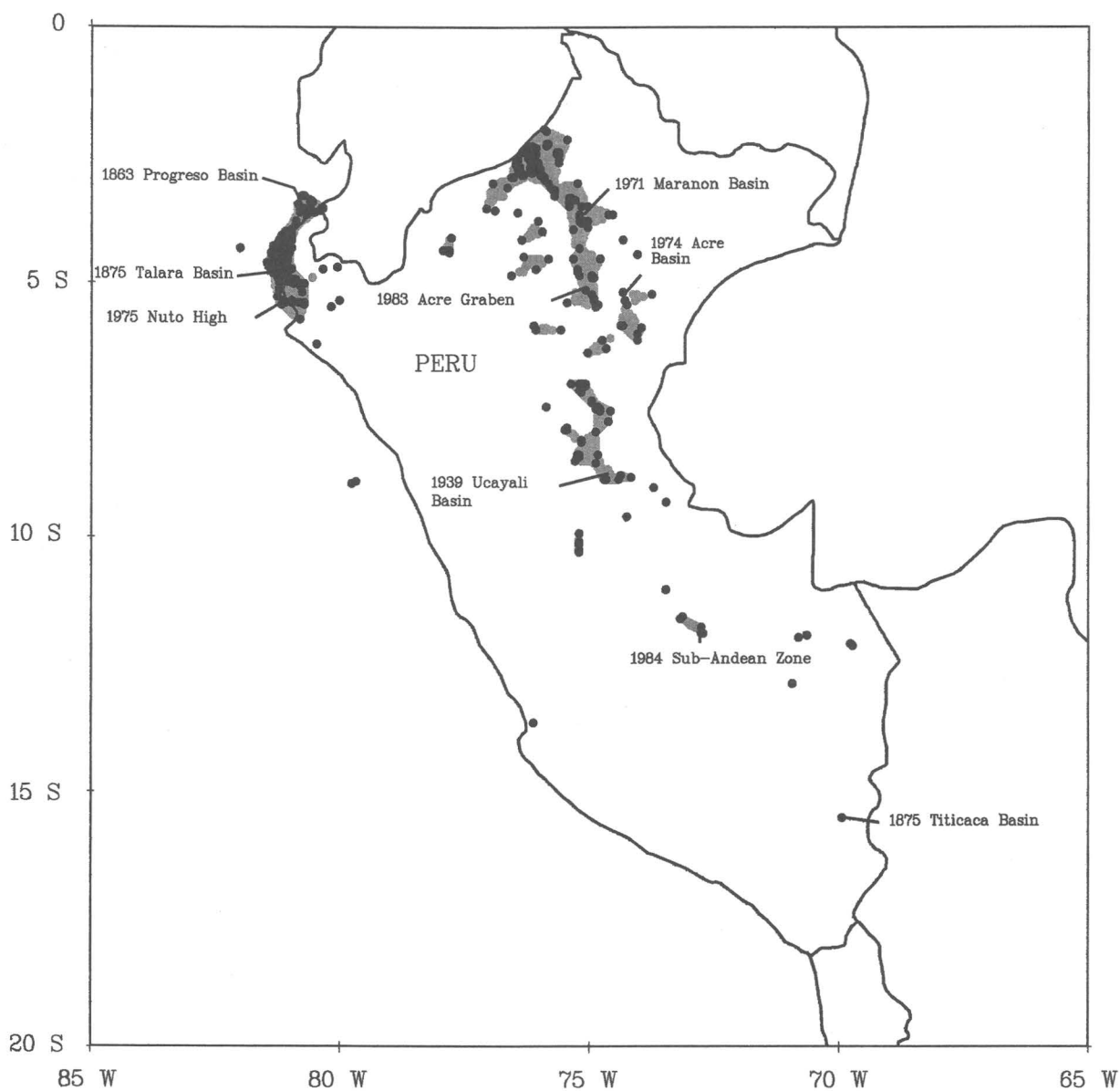
Wildcat wells through 1990: 1,260

Current growth in delineated prospective area per wildcat: 64 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
6.99 × 10<sup>9</sup> bbl oil and 11.4 × 10<sup>12</sup> cubic feet gas

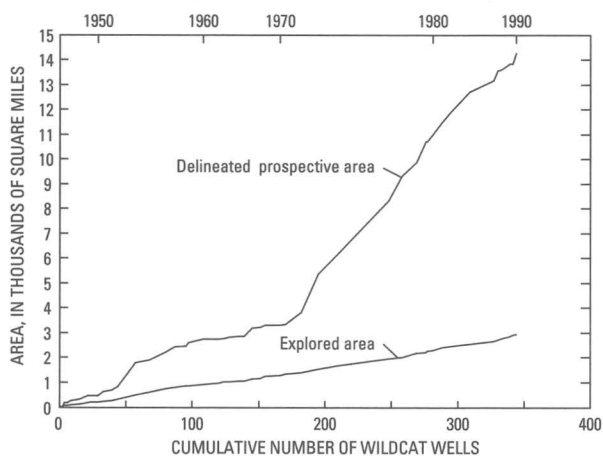
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.094 \times 10^6 \text{ bbl/mi}^2$

Figure 23. Continued.

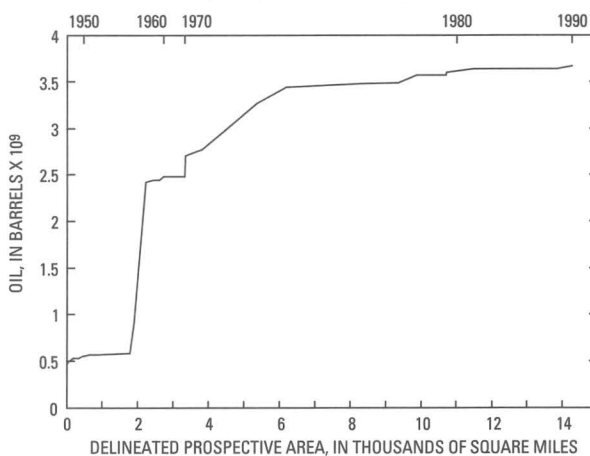


**Figure 24.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Peru, South America.

Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in Peru | Cumulative discoveries in this province in Peru through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)           | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Progeso Basin .....            | 1863   | 0  | 7                                   | 40   |
| Talara Basin .....             | 1875   | 2,226  | 2,442                               | 2,629  |
| Maranon Basin .....            | 1971   | 564  | 1,163                               | 78   |
| Sub-Andean Zone .....          | 1984   | 0  | 0                                   | 16,000   |
| Total .....                    |  | 2,790  | 3,612                               | 18,747   |

### Exploration data

Land area: 496,222 mi<sup>2</sup>

Delineated prospective area through 1990: 14,259 mi<sup>2</sup>

Explored area through 1990: 2,948 mi<sup>2</sup>

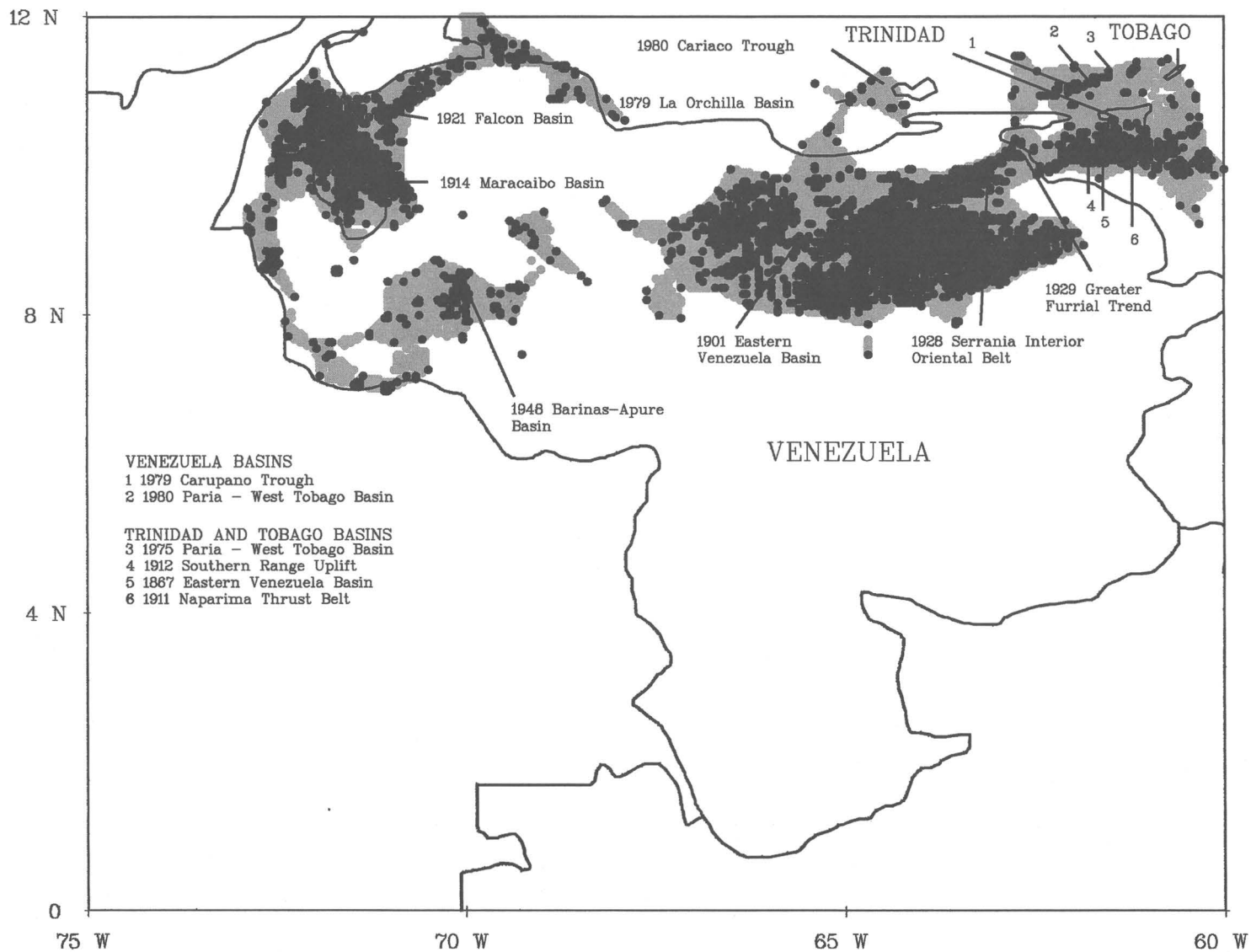
Wildcat wells through 1990: 344

Current growth in delineated prospective area per wildcat: 138 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
 $3.67 \times 10^9$  bbl oil and  $19.7 \times 10^{12}$  cubic feet gas

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.257 \times 10^6 \text{ bbl/mi}^2$

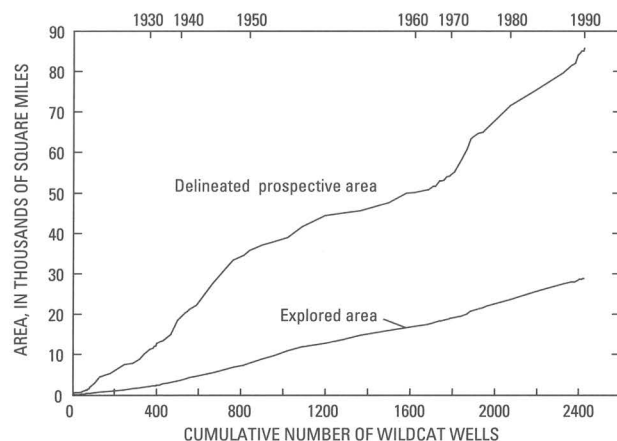
Figure 24. Continued.



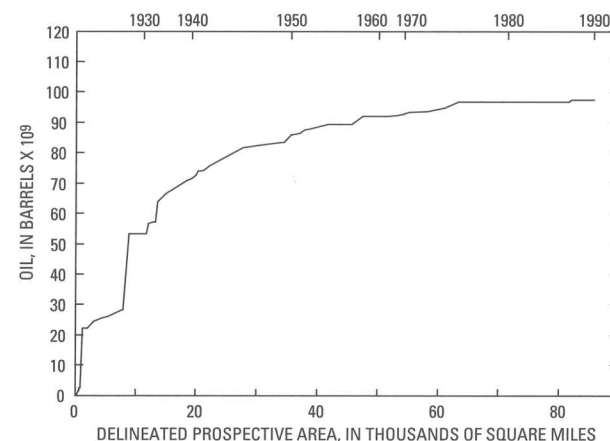
**Figure 25.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Venezuela and Trinidad and Tobago, South America.



Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area

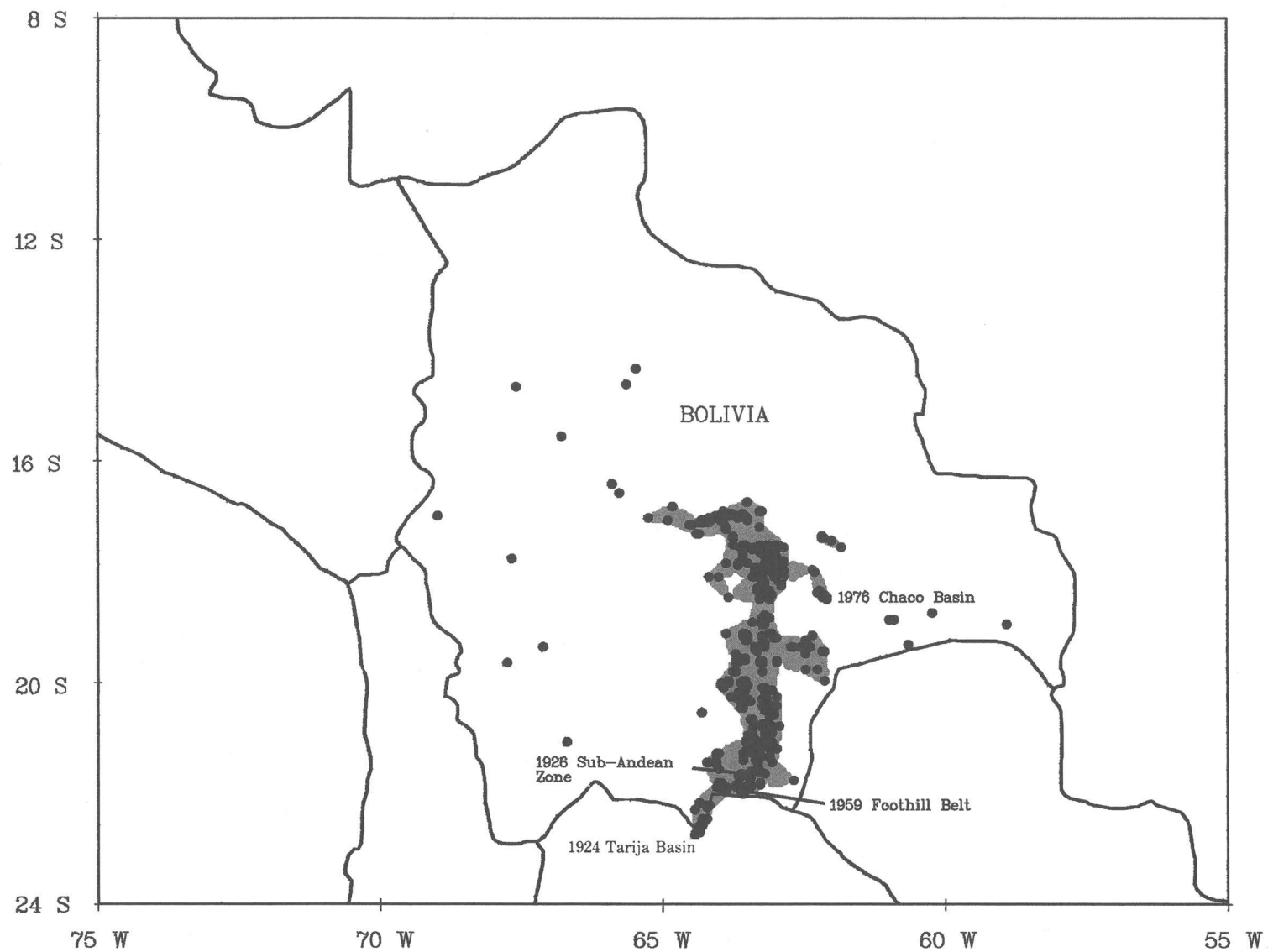


#### Exploration data

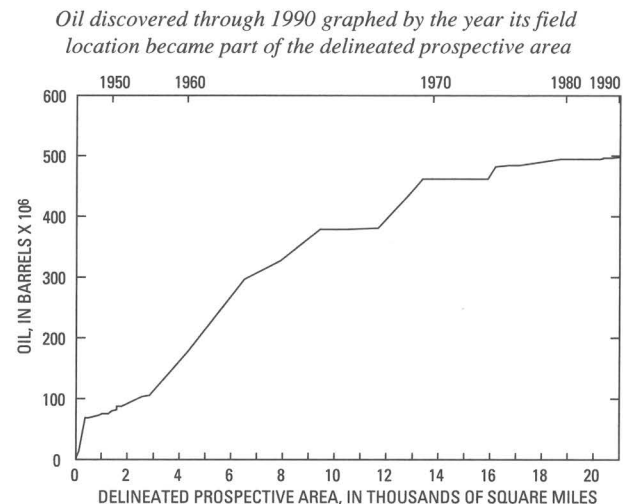
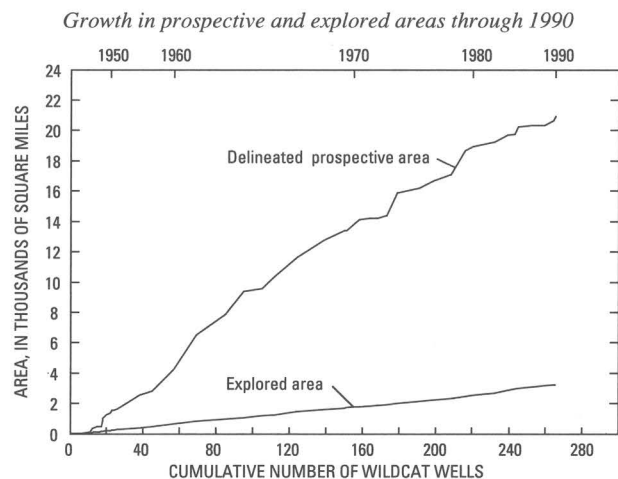
| Country                  | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990: 85,636 mi <sup>2</sup>  |
|--------------------------|------------------------------|---|
| Venezuela .....          | 352,143                      | Explored area through 1990: 28,884 mi <sup>2</sup>  |
| Trinidad and Tobago..... | 1,980                        | Wildcat wells through 1990: 2,421   |
| Total .....              | 354,123                      | Current growth in delineated prospective area per wildcat: 72 mi <sup>2</sup>   |
|                          |                              | Reported discoveries of recoverable crude oil and gas through 1990: $97.7 \times 10^9$ bbl oil and $63.2 \times 10^{12}$ cubic feet gas |
|                          |                              | Richness = $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$  |
|                          |                              | $= 1.139 \times 10^6 \text{ bbl/mi}^2$  |

#### Significant petroleum provinces

| Significant petroleum province  | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|---------------------------------|--|--|-------------------------------------|--|
|                                 |  | Crude oil  |                                     | Gas  |
|                                 |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| <b>Venezuela</b>                |  |  |                                     |  |
| Eastern Venezuela Basin...      | 1901   | 17,940   | 21,737                              | 11,131   |
| Maracaibo Basin .....           | 1914   | 58,879   | 59,667                              | 17,370   |
| Falcon Basin .....              | 1921   | 100  | 371                                 | 395  |
| Serrania Interior Oriental Belt | 1928   | 810  | 922                                 | 2,358  |
| Greater Furrial Trend .....     | 1929   | 9,064  | 9,253                               | 6,918  |
| Barinas-Apure Basin .....       | 1948   | 1,513  | 1,662                               | 3  |
| Total .....                     |  | 88,306   | 93,612                              | 38,175   |
| <b>Trinidad and Tobago</b>      |  |  |                                     |  |
| Eastern Venezuela Basin...      | 1867   | 2,579  | 3,691                               | 14,780   |
| Southern Range Uplift .....     | 1912   | 255  | 288                                 | 356  |
| Total .....                     |  | 2,834  | 3,979                               | 15,136   |



**Figure 26.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Bolivia, South America.



#### *Exploration data*

Land area: 404,388 mi<sup>2</sup>

Delineated prospective area through 1990:  
20,937 mi<sup>2</sup>

Explored area through 1990: 3,252 mi<sup>2</sup>

Wildcat wells through 1990: 265

Current growth in delineated prospective  
area per wildcat: 98 mi<sup>2</sup>

Reported discoveries of recoverable crude oil  
and gas through 1990:  $0.498 \times 10^9$  bbl  
oil and  $6.33 \times 10^{12}$  cubic feet gas

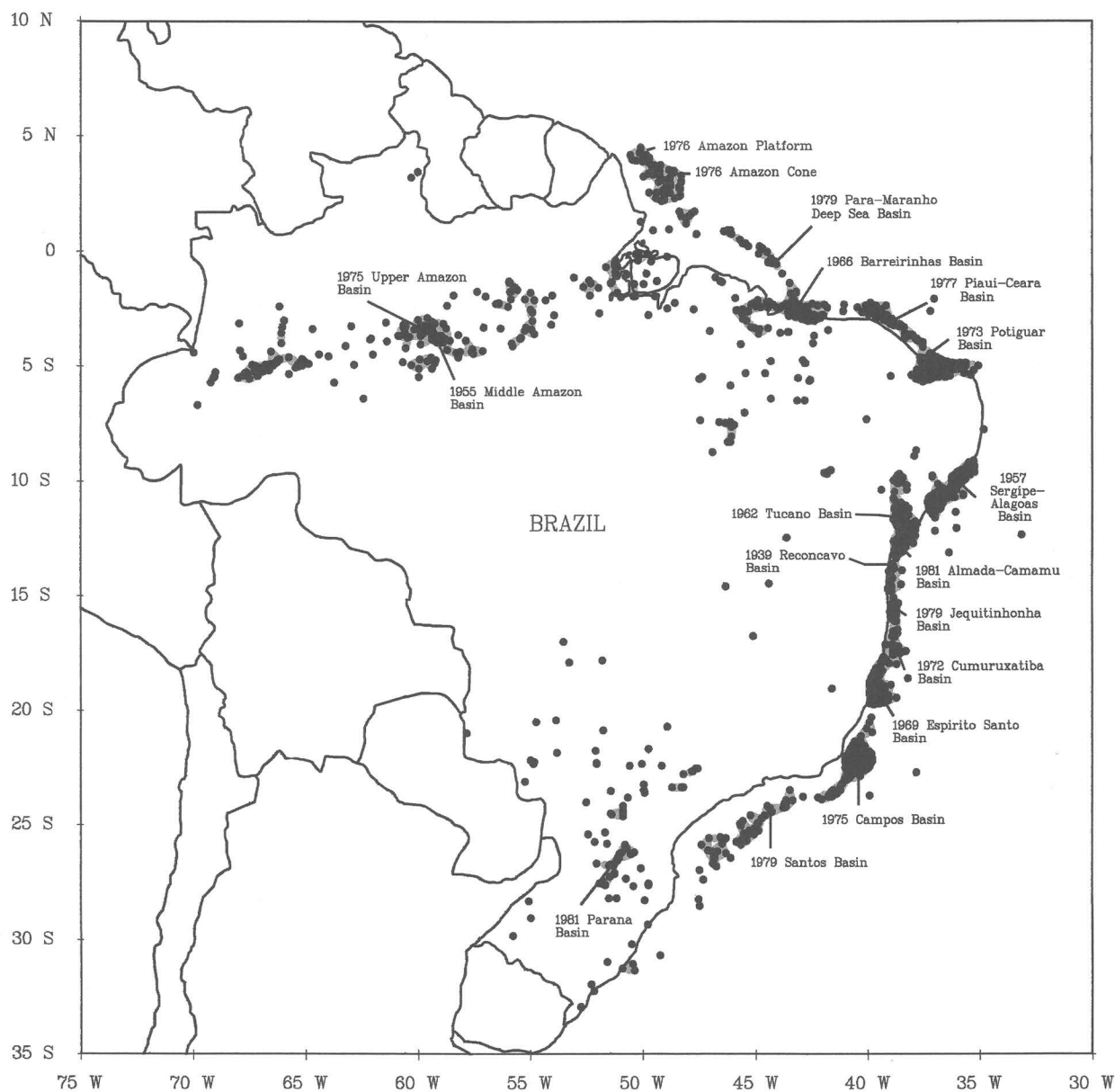
$$\text{Richness} = \frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$$

$$= 0.024 \times 10^6 \text{ bbl/mi}^2$$

#### *Significant petroleum province*

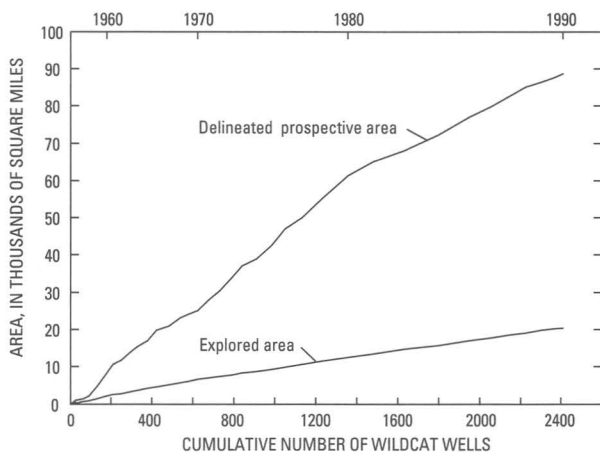
| Significant petroleum province | Year of first discovery in this province in Bolivia | Cumulative discoveries in this province in Bolivia through 1990 |                                     |  |
|--------------------------------|---|---|-------------------------------------|--|
|                                |   | Crude oil   |                                     | Gas  |
|                                |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)              | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Sub-Andean Zone . . . . .      | 1926  | 0   | 147                                 | 305  |

**Figure 26.** Continued.

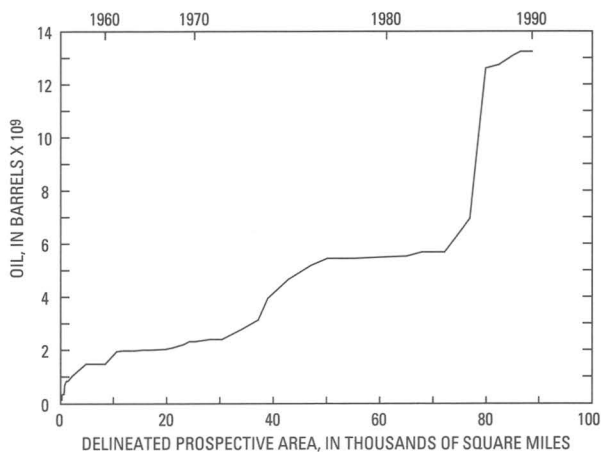


**Figure 27.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Brazil, South America.

Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in Brazil | Cumulative discoveries in this province in Brazil through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)             | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Reconcavo Basin .....          | 1939   | 1,285  | 1,608                               | 2,001  |
| Sergipe-Alagoas Basin .....    | 1957   | 330  | 736                                 | 1,379  |
| Potiguar Basin .....           | 1973   | 227  | 428                                 | 747  |
| Campos Basin .....             | 1975   | 9,244  | 10,005                              | 11,654   |
| Santos Basin .....             | 1979   | 120  | 120                                 | 333  |
| Total .....                    |  | 11,206   | 12,897                              | 16,114   |

### Exploration data

Land area: 3,286,170 mi<sup>2</sup>

Delineated prospective area through 1990: 88,615 mi<sup>2</sup>

Explored area through 1990: 20,400 mi<sup>2</sup>

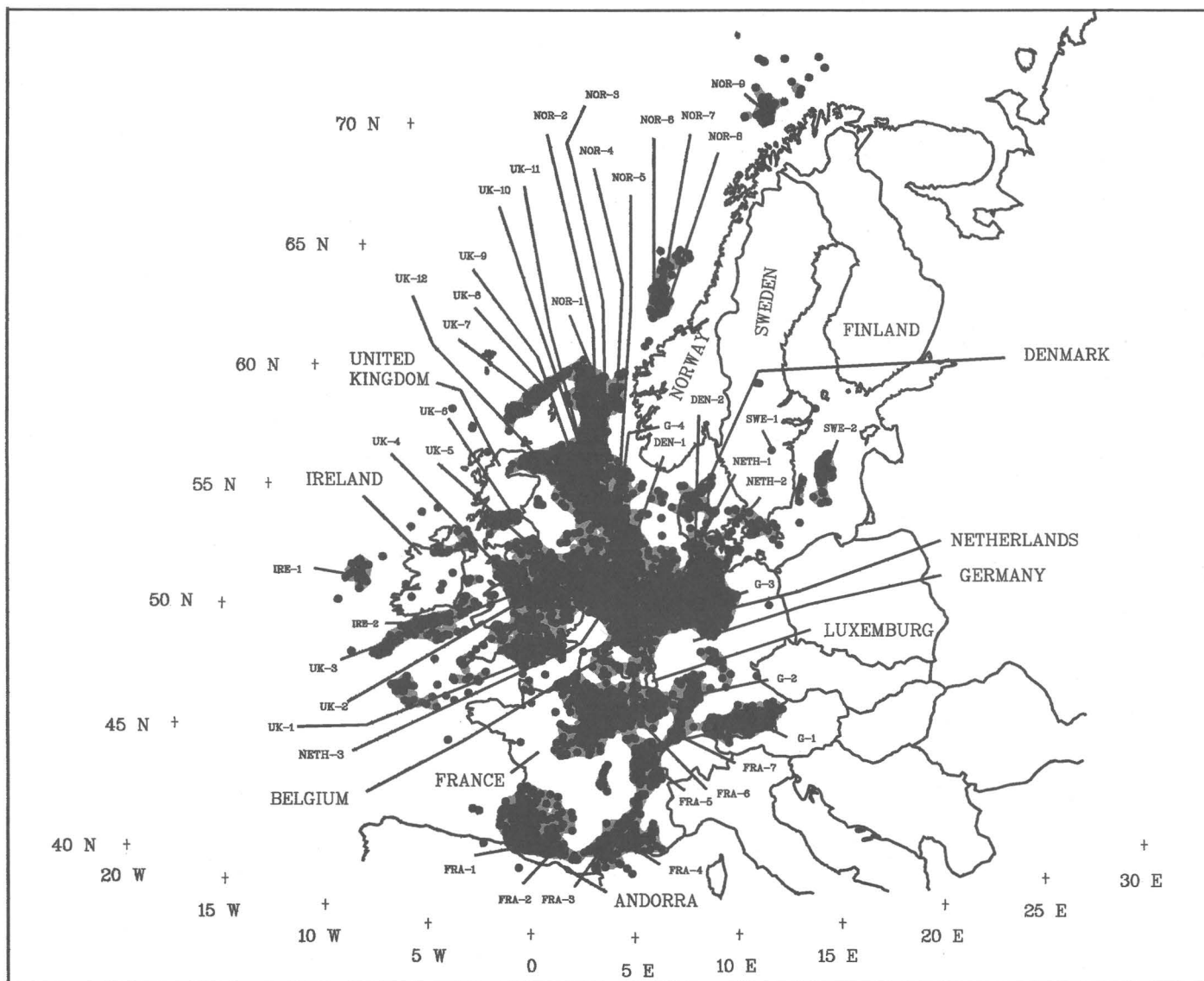
Wildcat wells through 1990: 2,407

Current growth in delineated prospective area per wildcat: 23 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
13.28 × 10<sup>9</sup> bbl oil and 19.1 × 10<sup>12</sup> cubic feet gas

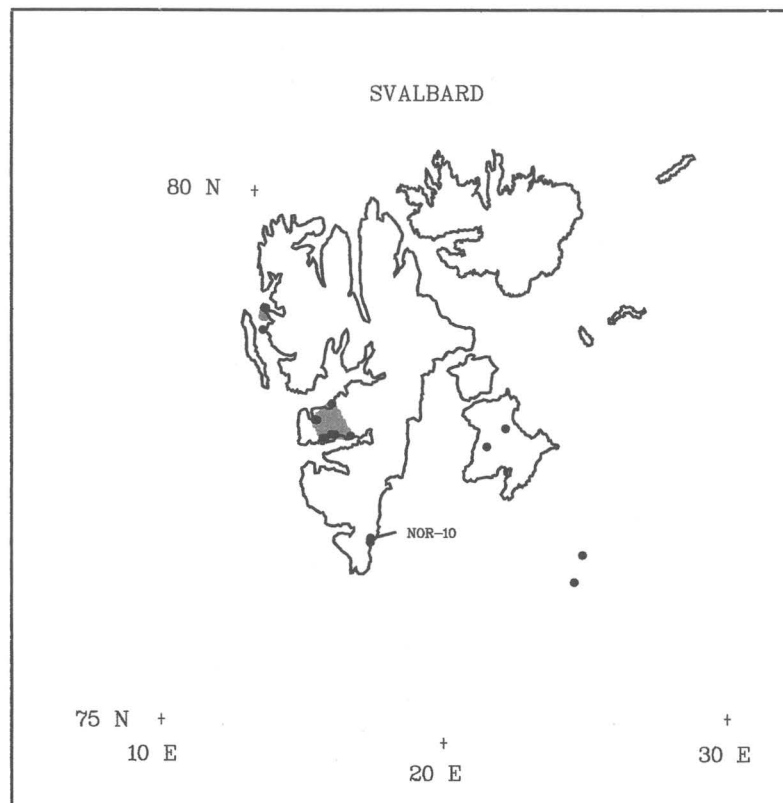
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.149 \times 10^6 \text{ bbl/mi}^2$

Figure 27. Continued.



**Figure 28.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of the northern part of Western Europe.

Area north of mainland Norway



# EXPLANATION OF PROVINCE DESIGNATIONS

## DENMARK

- DEN -1 1966 North Sea Graben
- 2 1980 Northwest German Basin

## FRANCE

- FRA -1 1967 North Pyrenean-North Cantabrian Zone
- 2 1939 Aquitaine Basin
- 3 1924 Languedoc-Provence Basin
- 4 1951 Golfe Du Lion-Camargue Basin
- 5 1957 Jura Fold Belt
- 6 1954 Anglo-Paris Basin
- 7 1952 Upper Rhine Graben

## IRELAND

- IRE -1 1978 Porcupine Basin
- 2 1971 Celtic Sea Graben

## NETHERLANDS

- NETH -1 1943 Northwest German Basin
- 2 1949 Anglo-Dutch Basin
- 3 1968 North Sea Graben

## NORWAY

- NOR -1 1987 More Basin
- 2 1968 Vestland Arch
- 3 1969 North Sea Graben
- 4 1979 Horda Platform
- 5 1972 Norwegian-Danish Basin
- 6 1985 Voring Basin
- 7 1981 Kristiansund-Bodo Fault Complex
- 8 1984 Trondelag Platform
- 9 1981 South Barents Sea Basin
- 10 1977 Vestspitsbergen Trough (small map)

## SWEDEN

- SWE -1 1987 Fennoscandian Shield
- 2 1968 Baltic Depression

## UNITED KINGDOM

- UK -1 1895 Anglo-Paris Basin
- 2 1938 Welsh Platform
- 3 1918 Pennine High
- 4 1939 East Irish Sea Basin
- 5 1939 Anglo-Dutch Basin
- 6 1938 Midland Valley Graben
- 7 1977 West Shetland Basin
- 8 1984 Faroes-Shetland Trough
- 9 1969 North Sea Graben
- 10 1975 East Shetland Platform
- 11 1972 Vestland Arch
- 12 1971 Mid North Sea High

## GERMANY

- G -1 1883 Molasse Basin
- 2 1935 Upper Rhine Graben
- 3 1874 Northwest German Basin
- 4 1974 North Sea Graben

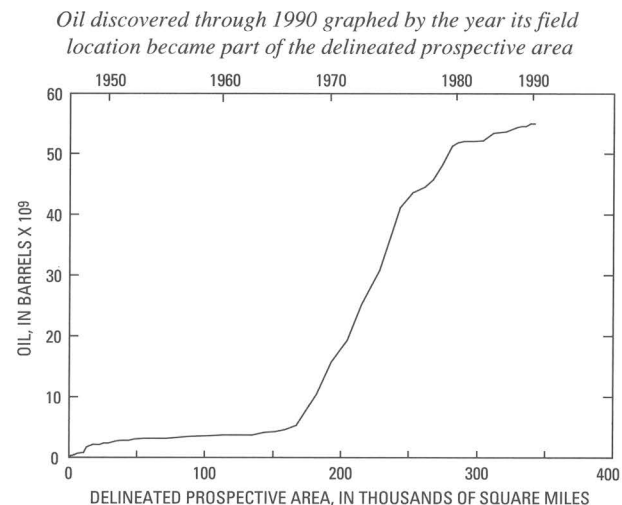
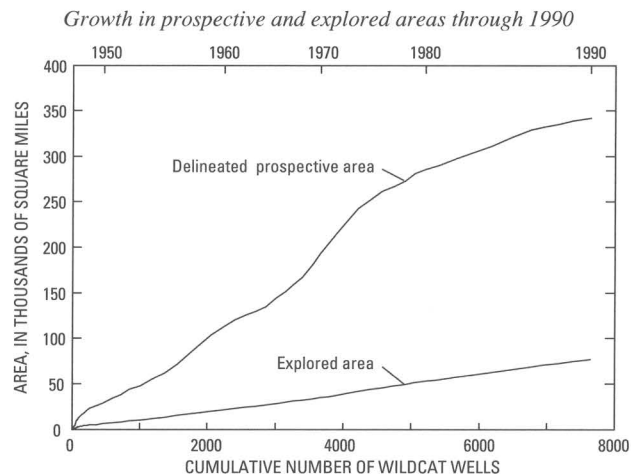
Figure 28. Continued.

## Significant petroleum provinces

| Significant petroleum province                 | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|--|--|--|-------------------------------------|--|
|  |  | Crude oil  |                                     | Gas  |
|  |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| United Kingdom                                 |  |  |                                     |  |
| Anglo-Paris Basin . . . . .                    | 1895   | 550  | 597                                 | 332  |
| Anglo-Dutch Basin . . . . .                    | 1939   | 0  | 87                                  | 53,748   |
| North Sea Graben . . . . .                     | 1969   | 23,083   | 27,325                              | 39,451   |
| Mid North Sea High . . . . .                   | 1971   | 120  | 240                                 | 2  |
| Vestland Arch . . . . .                        | 1972   | 0  | 50                                  | 600  |
| East Shetland Platform . . . . .               | 1975   | 542  | 742                                 | 320  |
| West Shetland Basin . . . . .                  | 1977   | 800  | 840                                 | 650  |
| Total . . . . .                                |  | 25,095   | 29,881                              | 95,103   |
| France   |  |  |                                     |  |
| Aquitaine Basin . . . . .                      | 1939   | 226  | 512                                 | 10,749   |
| Anglo-Paris Basin . . . . .                    | 1954   | 0  | 316                                 | 108  |
| Total . . . . .                                |  | 226  | 828                                 | 10,857   |
| Netherlands                                    |  |  |                                     |  |
| Northwest German Basin . . . . .               | 1943   | 385  | 385                                 | 117,224  |
| Anglo-Dutch Basin . . . . .                    | 1949   | 232  | 823                                 | 26,520   |
| North Sea Graben . . . . .                     | 1968   | 0  | 86                                  | 1,735  |
| Total . . . . .                                |  | 617  | 1,294                               | 145,479  |
| Germany (formerly Federal Republic of Germany) |  |  |                                     |  |
| Northwest German Basin . . . . .               | 1874   | 666  | 1,944                               | 33,696   |
| North Sea Graben . . . . .                     | 1974   | 0  | 0                                   | 175  |
| Total . . . . .                                |  | 666  | 1,944                               | 33,871   |
| Norway   |  |  |                                     |  |
| Vestland Arch . . . . .                        | 1968   | 1,291  | 1,505                               | 1,977  |
| North Sea Graben . . . . .                     | 1969   | 14,232   | 15,371                              | 60,526   |
| Norwegian-Danish Basin . . . . .               | 1972   | 150  | 195                                 | 35   |
| Horda Platform . . . . .                       | 1979   | 404  | 404                                 | 44,214   |
| Kristiansund-Bodo Fault Complex . . . . .      | 1981   | 1,228  | 1,345                               | 7,734  |
| Trondelag Platform . . . . .                   | 1984   | 428  | 464                                 | 610  |
| Voring Basin . . . . .                         | 1985   | 138  | 138                                 | 2,685  |
| Total . . . . .                                |  | 17,871   | 19,422                              | 117,781  |
| Denmark  |  |  |                                     |  |
| North Sea Graben . . . . .                     | 1966   | 894  | 1,241                               | 6,467  |
| Northwest German Basin . . . . .               | 1980   | 0  | 0                                   | 1  |
| Total . . . . .                                |  | 894  | 1,241                               | 6,468  |

Figure 28. Continued.





#### Exploration data

| Country                          | Land area<br>(mi <sup>2</sup> ) |
|----------------------------------|---------------------------------|
| United Kingdom . . . . .         | 93,377                          |
| Ireland . . . . .                | 27,137                          |
| France . . . . .                 | 212,736                         |
| Netherlands . . . . .            | 13,433                          |
| Belgium . . . . .                | 11,779                          |
| Luxemburg . . . . .              | 999                             |
| Germany <sup>1</sup> . . . . .   | 94,905                          |
| Norway <sup>2</sup> . . . . .    | 124,555                         |
| Denmark . . . . .                | 16,576                          |
| Sweden . . . . .                 | 173,394                         |
| Finland . . . . .                | 130,119                         |
| Andorra . . . . .                | 191                             |
| Monaco (not shown) . . . . .     | .5                              |
| Greenland <sup>3</sup> . . . . . | 840,000                         |
| Iceland (not shown) . . . . .    | 39,698                          |
| Total . . . . .                  | 1,778,899.5                     |

Delineated prospective area through 1990: 342,007 mi<sup>2</sup>

Explored area through 1990: 77,207 mi<sup>2</sup>

Wildcat wells through 1990: 7,634

Current growth in delineated prospective area per wildcat: 11 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
55.0 × 10<sup>9</sup> bbl oil and 436 × 10<sup>12</sup> cubic feet gas

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.161 \times 10^6 \text{ bbl/mi}^2$

<sup>1</sup>Statistics here are for the part of Germany formerly known as the Federal Republic of Germany. Data were not complete for the rest of the country.

<sup>2</sup>Norway includes Svalbard.

<sup>3</sup>Greenland is listed separately here although it is part of Denmark. Greenland is not shown on the map, and its five wildcat wells and the explored and delineated prospective areas defined by them are not included in the data given here.

**Figure 28.** Continued.

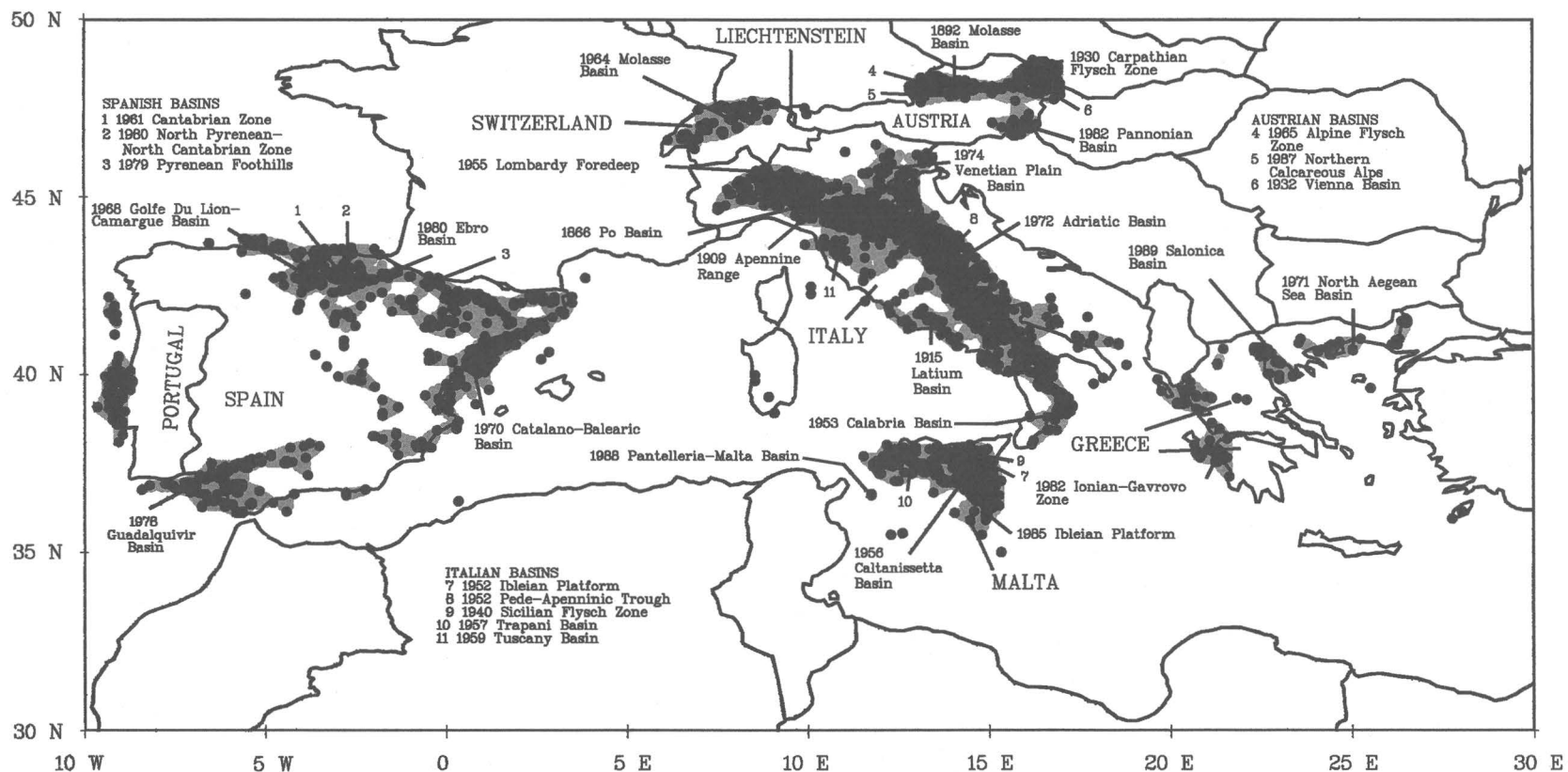
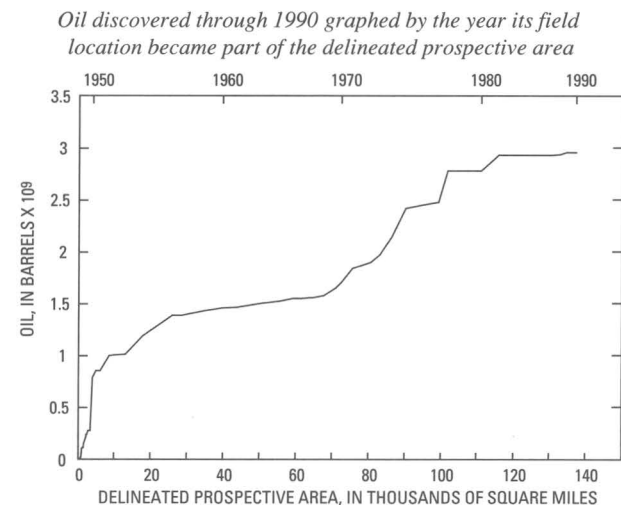
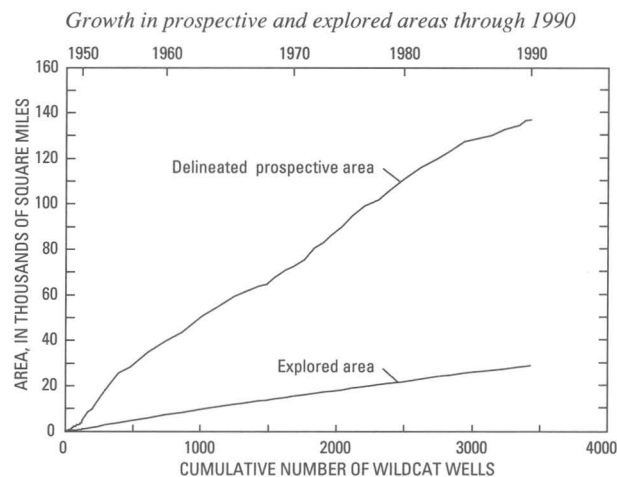


Figure 29. Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of the middle and southern parts of Western Europe.



#### Exploration data

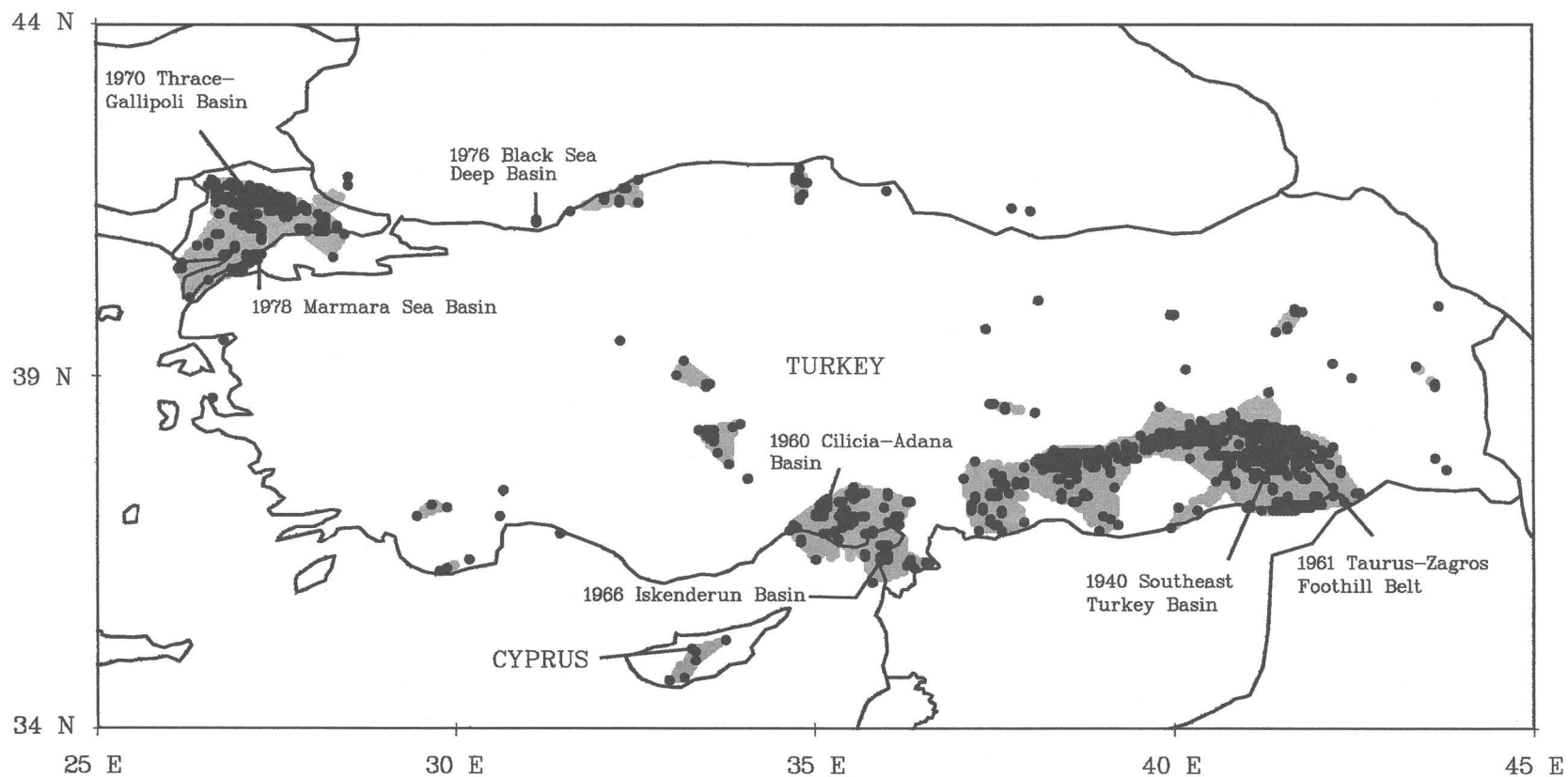
| Country             | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990: 137,179 mi <sup>2</sup>   |
|---------------------|------------------------------|---|
| Austria .....       | 32,381                       | Explored area through 1990: 29,133 mi <sup>2</sup>  |
| Liechtenstein ..... | 65                           | Wildcat wells through 1990: 3,429   |
| Italy .....         | 116,294                      | Current growth in delineated prospective area per wildcat: 10 mi <sup>2</sup>   |
| Switzerland .....   | 15,944                       | Reported discoveries of recoverable crude oil and gas through 1990: $2.95 \times 10^9$ bbl oil and $30.5 \times 10^{12}$ cubic feet gas |
| Greece .....        | 50,147                       |   |
| Portugal .....      | 35,414                       |   |
| Spain .....         | 194,988                      |   |
| Malta .....         | 122                          |   |
| Total .....         | 445,355                      |   |

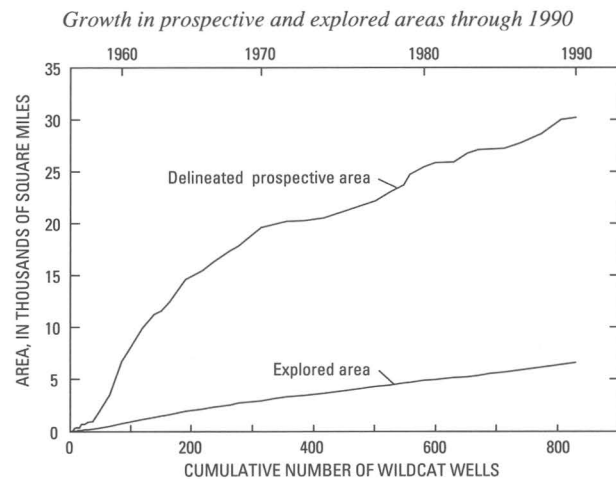
|            |   |
|------------|---|
| Richness = | $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$ |
|            | $= 0.022 \times 10^6 \text{ bbl/mi}^2$  |

#### Significant petroleum provinces

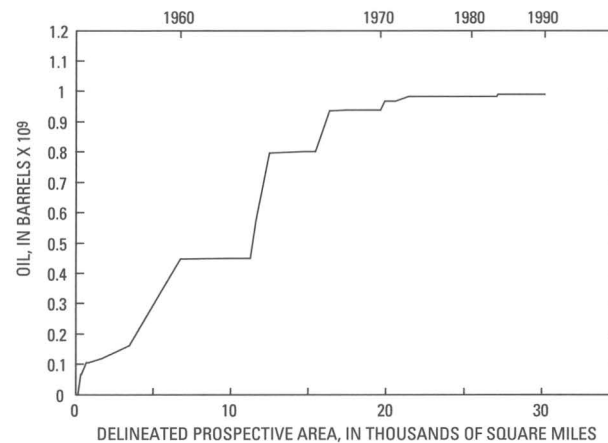
| Significant petroleum province | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  | Gas                                 |  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| <b>Austria</b>                 |  |  |                                     |  |
| Carpathian Flysch Zone ....    | 1930   | 500  | 654                                 | 1,425  |
| <b>Italy</b>                   |  |  |                                     |  |
| Po Basin .....                 | 1866   | 150  | 225                                 | 15,093   |
| Ibleian Platform .....         | 1952   | 445  | 518                                 | 144  |
| Caltanissetta Basin .....      | 1956   | 144  | 174                                 | 38   |
| Adriatic Basin .....           | 1972   | 278  | 360                                 | 821  |
| Total .....                    |  | 1,017  | 1,277                               | 16,096   |
| <b>Greece</b>                  |  |  |                                     |  |
| North Aegean Sea Basin ....    | 1971   | 172  | 173                                 | 160  |
| <b>Spain</b>                   |  |  |                                     |  |
| Catalano-Balearic Basin ....   | 1970   | 159  | 330                                 | 140  |
| <b>Malta</b>                   |  |  |                                     |  |
| Ibleian Platform .....         | 1985   | 0  | 35                                  | 0  |



**Figure 30.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Turkey and Cyprus, Middle East.



*Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area*

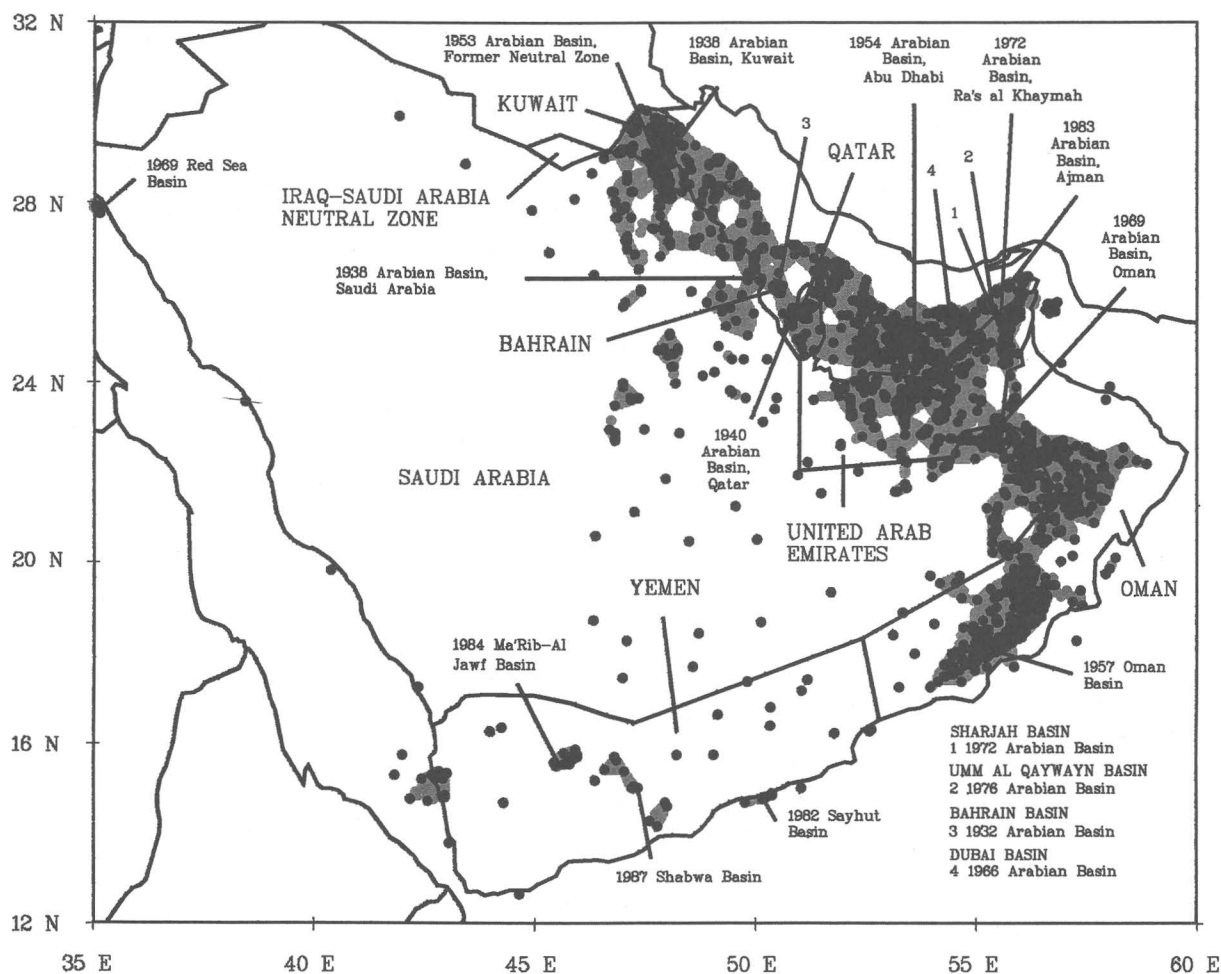
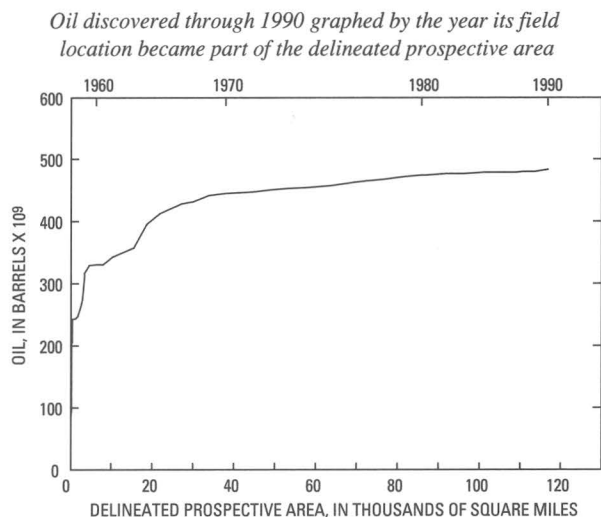
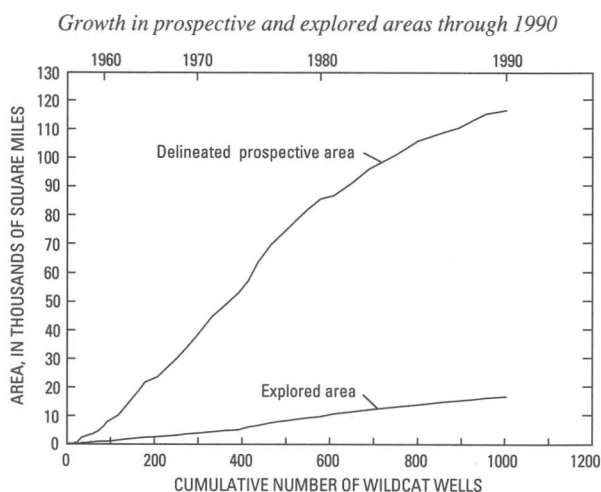


*Exploration data*

| Country      | Land area<br>(mi <sup>2</sup> ) | Delineated prospective area through 1990:<br>30,168 mi <sup>2</sup>  |
|--------------|---------------------------------|--|
| Turkey ..... | 296,184                         | Explored area through 1990: 6,618 mi <sup>2</sup>  |
| Cyprus ..... | 3,572                           | Wildcat wells through 1990: 829  |
| Total .....  | 299,756                         | Current growth in delineated prospective area per<br>wildcat: 7 mi <sup>2</sup>  |
|              |                                 | Reported discoveries of recoverable crude oil and<br>gas through 1990: $0.989 \times 10^9$ bbl oil and<br>$1.18 \times 10^{12}$ cubic feet gas |
|              |                                 | Richness = $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$   |
|              |                                 | $= 0.033 \times 10^6 \text{ bbl/mi}^2$   |

*Significant petroleum provinces*

| Significant petroleum<br>province                  | Year of first<br>discovery in<br>this province<br>in Turkey | Cumulative discoveries in this<br>province in Turkey through 1990 |   |  |
|--|---|---|---|--|
|  |   | Crude oil   |   | Gas  |
|  |   | in 100-million-<br>barrel fields<br>(10 <sup>6</sup> bbl)         | in all<br>fields<br>(10 <sup>6</sup> bbl) | in all<br>fields<br>(10 <sup>9</sup> ft <sup>3</sup> ) |
| Southeast Turkey Basin<br>(Zagros Fold Belt) ..... | 1940  | 210   | 362                                       | 391  |
| Taurus-Zagros Foothill Belt. . .                   | 1961  | 112   | 620                                       | 281  |
| Total .....  |   | 322   | 982                                       | 672  |



**Figure 31.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of the Arabian Peninsula, Middle East.

*Significant petroleum provinces*

| Significant petroleum province          | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|---|--|--|-------------------------------------|--|
|   |  | Crude oil  |                                     | Gas  |
|   |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Saudi Arabia                            |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1938   | 255,024  | 255,351                             | 148,613  |
| Kuwait                                  |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1938   | 110,080  | 110,080                             | 62,226   |
| Former Kuwait-Saudi Arabia Neutral Zone |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1953   | 18,605   | 18,609                              | 11,715   |
| Bahrain                                 |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1932   | 1,005  | 1,005                               | 12,500   |
| Qatar                                   |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1940   | 8,300  | 8,550                               | 168,565  |
| Oman                                    |  |  |                                     |  |
| Oman Basin . . . . .                    | 1957   | 6,916  | 9,379                               | 9,593  |
| Arabian Basin . . . . .                 | 1969   | 520  | 762                                 | 2,776  |
| Total . . . . .                         |  | 7,436  | 10,141                              | 12,369   |
| Abu Dhabi*                              |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1954   | 68,652   | 69,793                              | 129,157  |
| Ajman*                                  |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1983   | 0  | 0                                   | 250  |
| Dubai*                                  |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1966   | 5,175  | 5,195                               | 4,850  |
| Umm al Qaywayn*                         |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1976   | 0  | 0                                   | 750  |
| Ra's al Khaymah*                        |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1972   | 1,943  | 1,943                               | 1,293  |
| Sharjah*                                |  |  |                                     |  |
| Arabian Basin . . . . .                 | 1972   | 505  | 505                                 | 7,100  |
| Yemen                                   |  |  |                                     |  |
| Ma'Rib-Al Jawf Basin . . . . .          | 1984   | 1,204  | 1,427                               | 12,500   |
| Shabwa Basin . . . . .                  | 1987   | 500  | 500                                 | 0  |
| Total . . . . .                         |  | 1,704  | 1,927                               | 12,500   |

\*One of the seven United Arab Emirates. (Umm al Qaywayn is also spelled Uhm Al Qawai, and Ra's al Khaymah is also spelled Ras Al Khaim.)

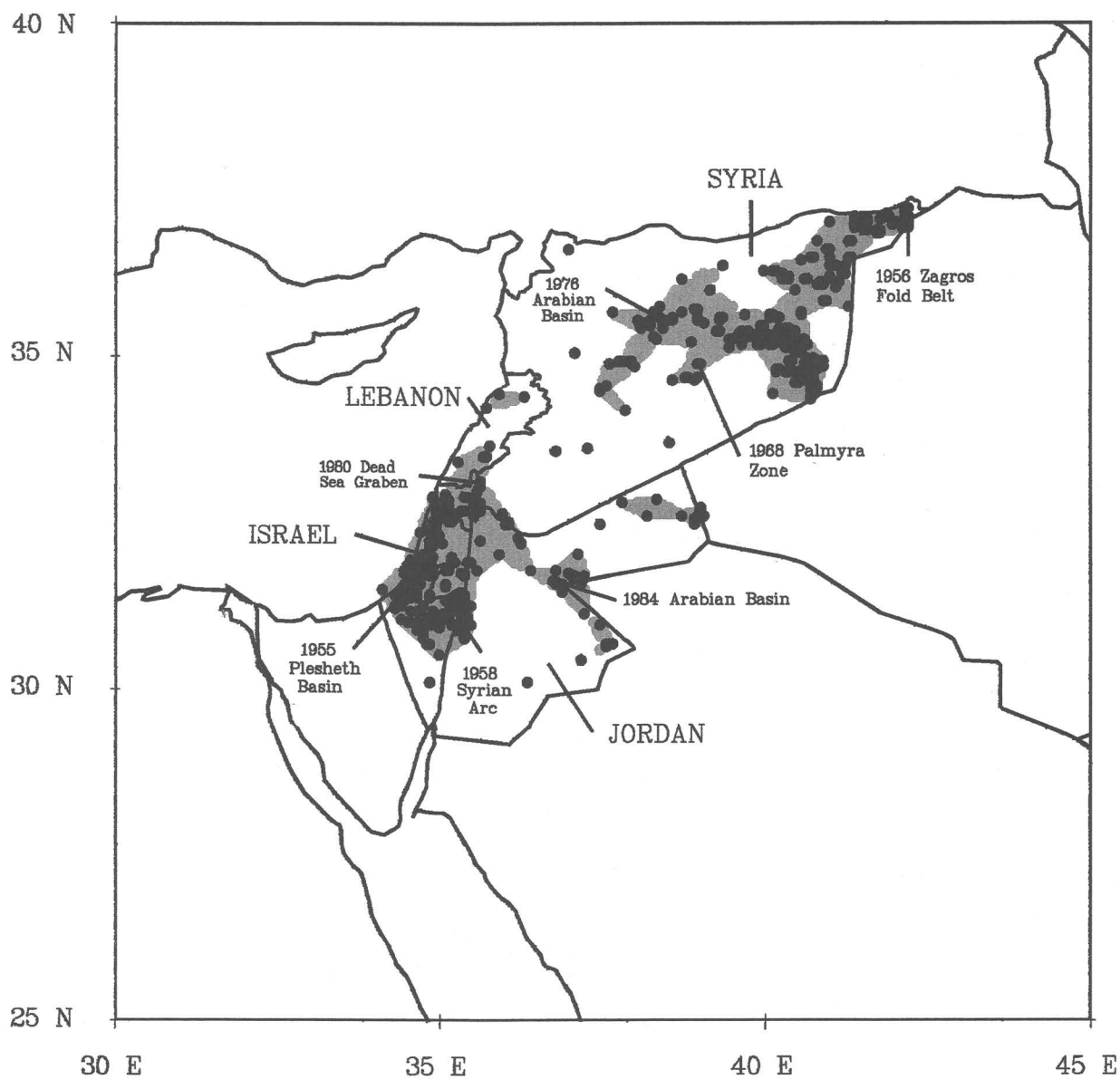
*Exploration data*

| Country                                 | Land area <sup>1</sup> (mi <sup>2</sup> ) |   |
|---|---|---|
| Saudi Arabia .....                      | 830,000                                   | Delineated prospective area through 1990: 116,689 mi <sup>2</sup>   |
| Kuwait .....                            | 6,880                                     | Explored area through 1990: 16,745 mi <sup>2</sup>  |
| Iraq-Saudi Arabia Neutral Zone .....    | 1,360                                     | Wildcat wells through 1990: 1,002   |
| Bahrain .....                           | 239                                       | Current growth in delineated prospective area per wildcat: 43 mi <sup>2</sup>   |
| Qatar .....                             | 4,250                                     | Reported discoveries of recoverable crude oil and gas through 1990:   |
| Oman .....                              | 82,000                                    | 483 × 10 <sup>9</sup> bbl oil and 572 × 10 <sup>12</sup> cubic feet gas   |
| United Arab Emirates <sup>2</sup> ..... | 32,300                                    |   |
| Yemen .....                             | 204,000                                   |   |
| Total .....                             | 1,161,029                                 | Richness = $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 4.140 \times 10^6 \text{ bbl/mi}^2$ |

<sup>1</sup>Land areas from *World Factbook 1991* (U.S. Central Intelligence Agency, 1991).

<sup>2</sup>Outlines of individual emirates in the United Arab Emirates are not shown.

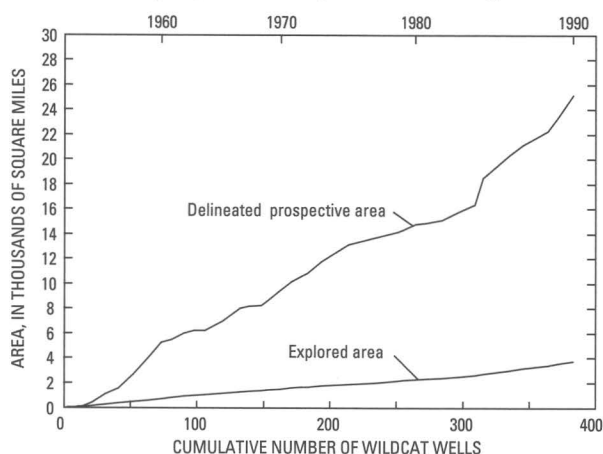
**Figure 31.** Continued.



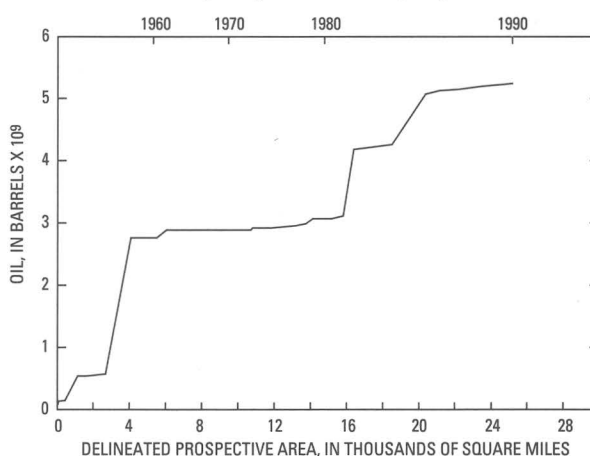
**Figure 32.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Syria, Lebanon, Israel, and Jordan, Middle East.



Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Syria                          |  |  |                                     |  |
| Zagros Fold Belt .....         | 1956   | 2,687  | 2,984                               | 3,035  |
| Arabian Basin .....            | 1976   | 1,601  | 2,183                               | 1,015  |
| Total .....                    |  | 4,288  | 5,167                               | 4,050  |
| Jordan                         |  |  |                                     |  |
| Arabian Basin .....            | 1984   | 0  | 50                                  | 410  |

### Exploration data

| Country       | Land area (mi <sup>2</sup> ) |
|---------------|------------------------------|
| Syria .....   | 71,227                       |
| Lebanon ..... | 3,927                        |
| Israel .....  | 7,984                        |
| Jordan .....  | 37,264                       |
| Total .....   | 120,402                      |

Delineated prospective area through 1990: 25,153 mi<sup>2</sup>

Explored area through 1990: 3,742 mi<sup>2</sup>

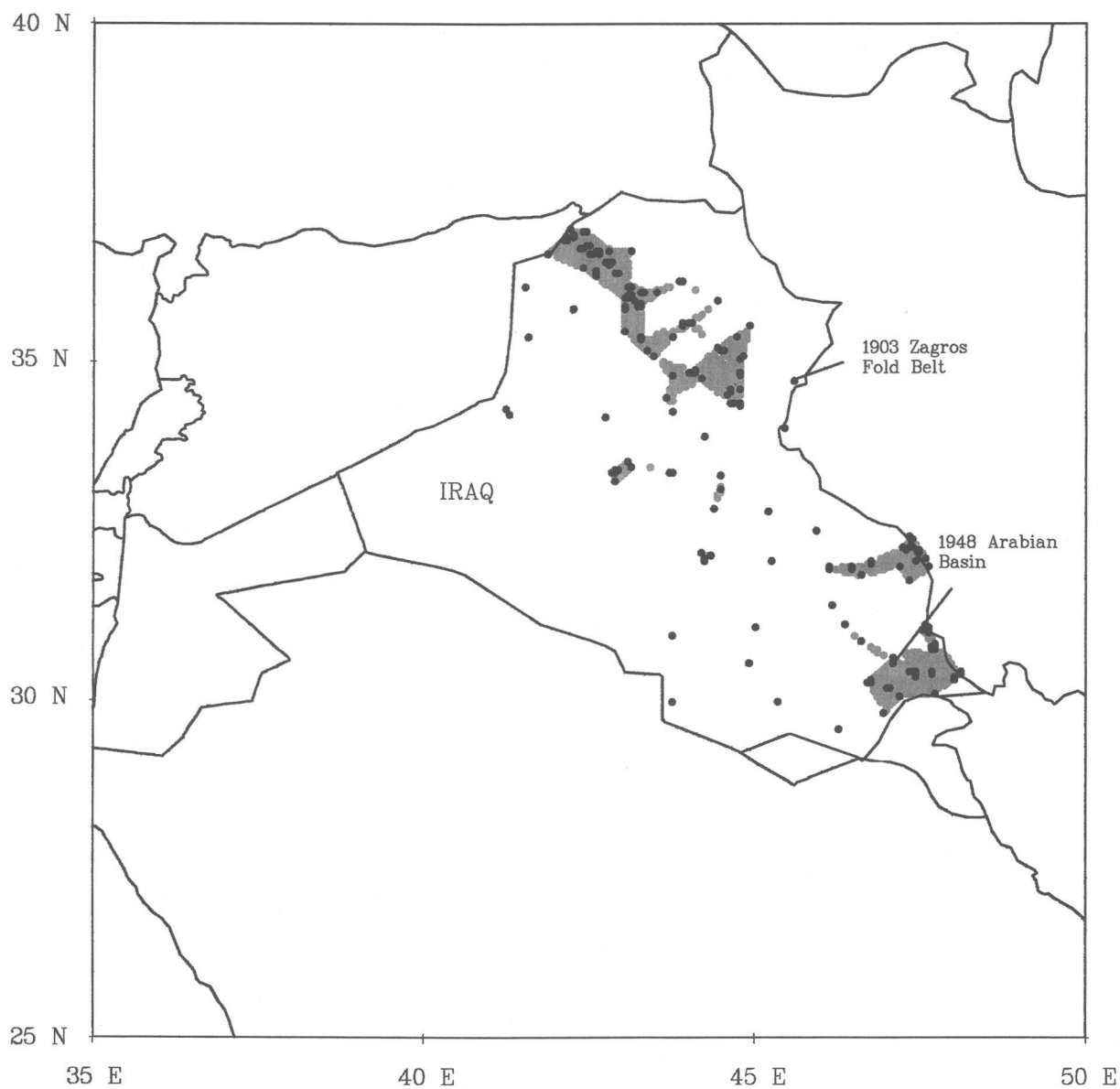
Wildcat wells through 1990: 383

Current growth in delineated prospective area per wildcat: 155 mi<sup>2</sup>

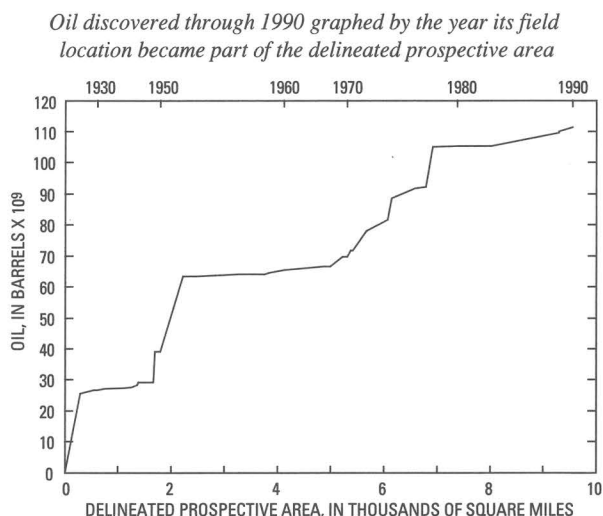
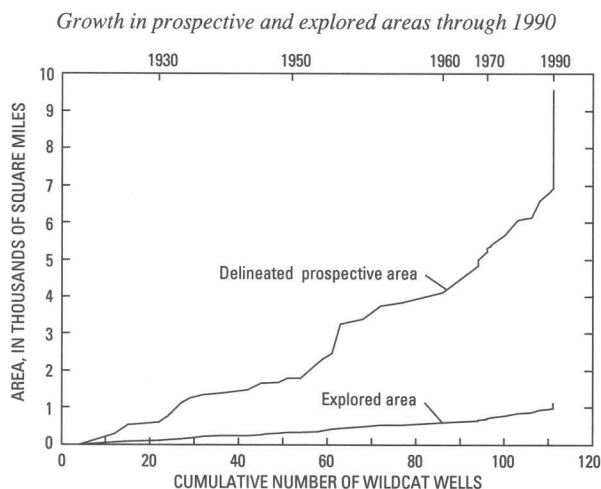
Reported discoveries of recoverable crude oil and gas through 1990:  
5.24 × 10<sup>9</sup> bbl oil and 6.46 × 10<sup>12</sup> cubic feet gas

$$\text{Richness} = \frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.208 \times 10^6 \text{ bbl/mi}^2$$

Figure 32. Continued.



**Figure 33.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Iraq, Middle East.



#### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in Iraq | Cumulative discoveries in this province in Iraq through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)           | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Zagros Fold Belt .....         | 1903   | 38,673   | 39,434                              | 18,833   |
| Arabian Basin .....            | 1948   | 71,885   | 71,905                              | 42,035   |
| Total .....                    |  | 110,558  | 111,339                             | 60,868   |

#### Exploration data

Land area: 172,000 mi<sup>2</sup>

Delineated prospective area through 1990: 9,550 mi<sup>2</sup>

Explored area through 1990: 1,120 mi<sup>2</sup>

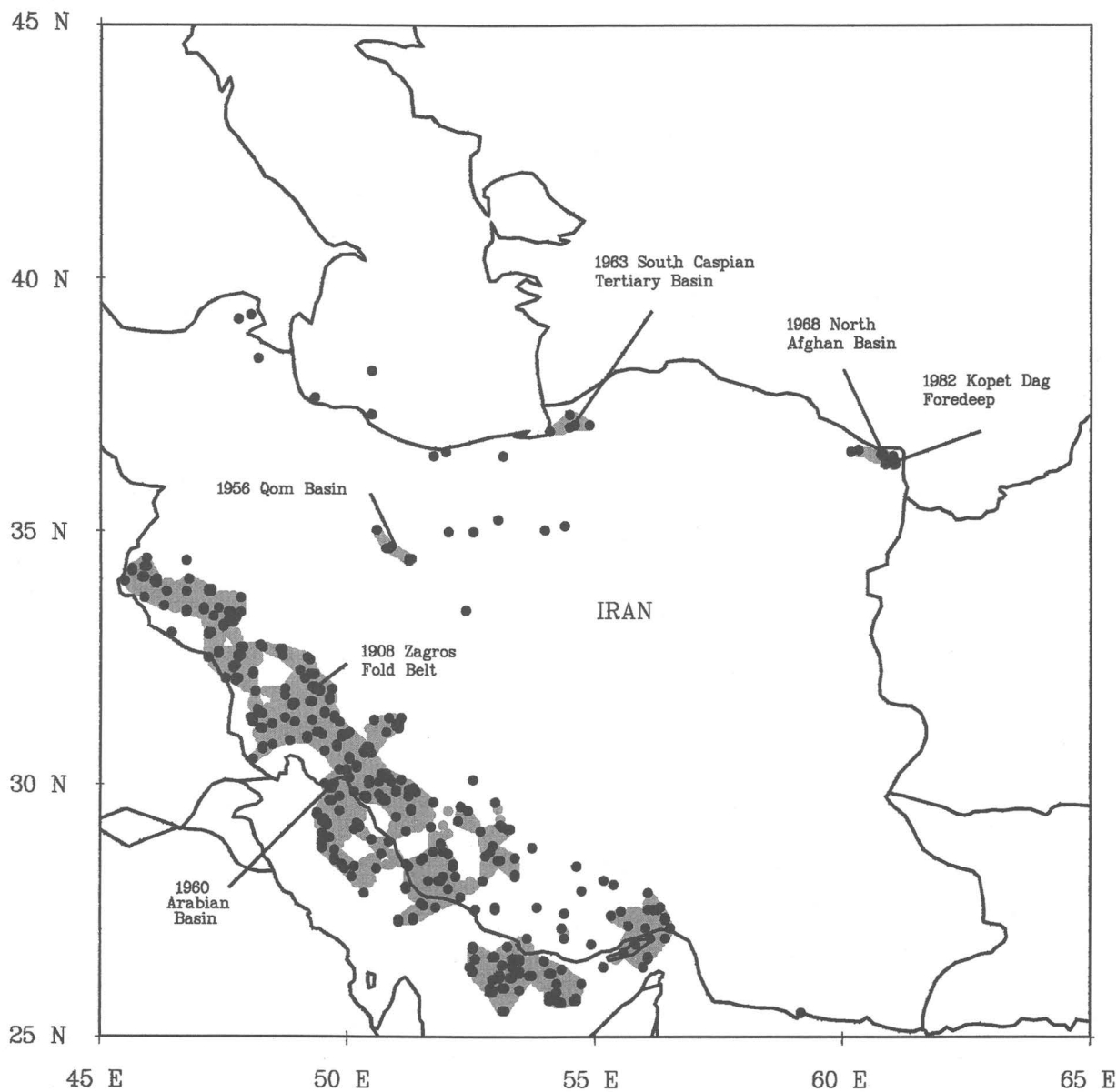
Wildcat wells through 1990: 111

Current growth in delineated prospective area per wildcat: 125 mi<sup>2</sup>

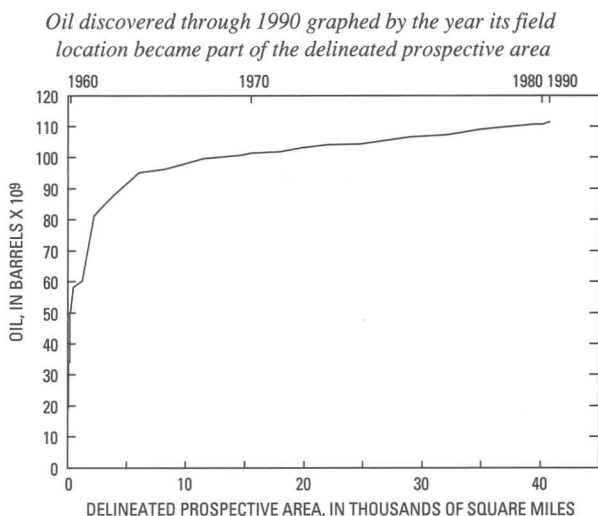
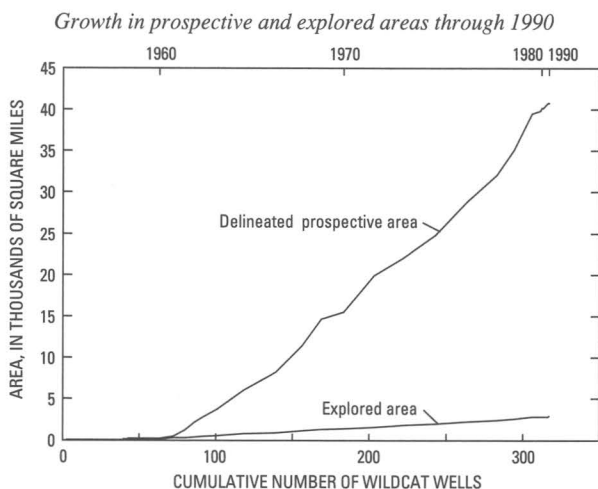
Reported discoveries of recoverable crude oil and gas through 1990:  
111 × 10<sup>9</sup> bbl oil and 60.9 × 10<sup>12</sup> cubic feet gas

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 11.658 \times 10^6 \text{ bbl/mi}^2$

Figure 33. Continued.



**Figure 34.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Iran, Middle East.



#### *Significant petroleum provinces*

| Significant petroleum province | Year of first discovery in this province in Iran | Cumulative discoveries in this province in Iran through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)           | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Zagros Fold Belt .....         | 1908   | 89,802   | 90,352                              | 554,723  |
| Qom Basin .....                | 1956   | 125  | 175                                 | 1,138  |
| Arabian Basin .....            | 1960   | 20,694   | 20,747                              | 177,588  |
| Total .....                    |  | 110,621  | 111,274                             | 733,449  |

#### *Exploration data*

Land area: 635,000 mi<sup>2</sup>

Delineated prospective area through 1990: 40,773 mi<sup>2</sup>

Explored area through 1990: 2,903 mi<sup>2</sup>

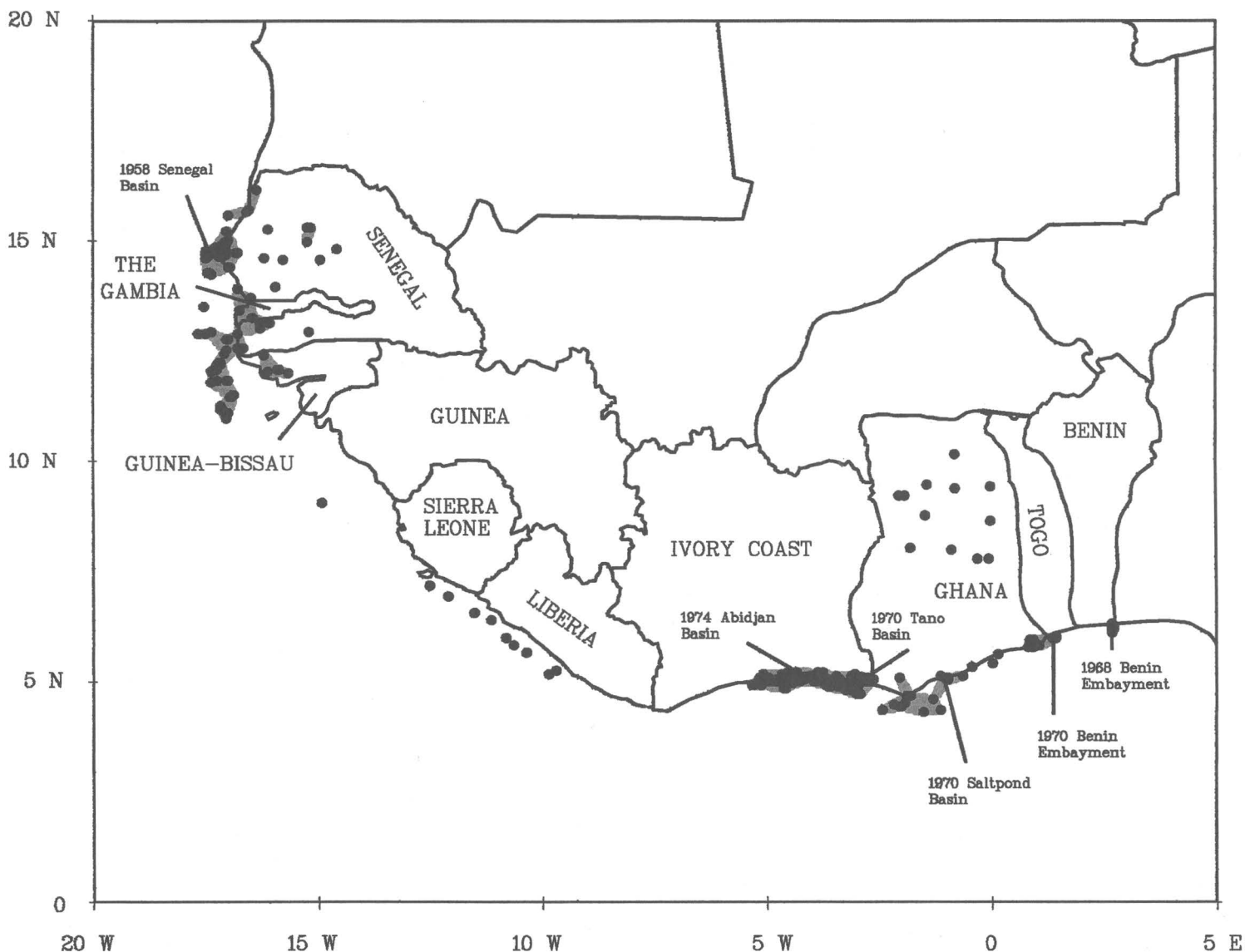
Wildcat wells through 1990: 317

Current growth in delineated prospective area per wildcat: 73 mi<sup>2</sup>

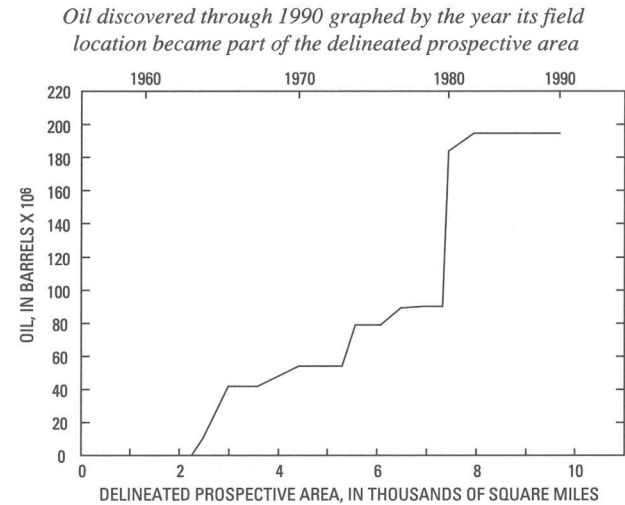
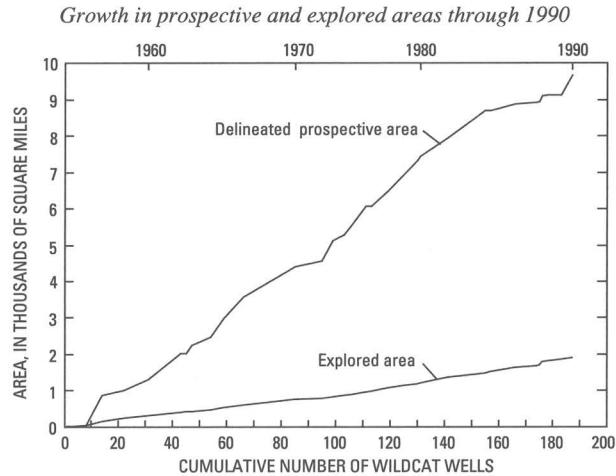
Reported discoveries of recoverable crude oil and gas through 1990:  
111 × 10<sup>9</sup> bbl oil and 770 × 10<sup>12</sup> cubic feet gas

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 2.473 \times 10^6 \text{ bbl/mi}^2$

**Figure 34.** Continued.



**Figure 35.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Senegal, The Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, and Cape Verde, Africa. Because Cape Verde is west of the area mapped and has no reported wells, it is not shown.



#### Exploration data

| Country                      | Land area (mi <sup>2</sup> ) |
|------------------------------|------------------------------|
| Senegal .....                | 76,084                       |
| The Gambia .....             | 4,003                        |
| Guinea-Bissau .....          | 13,948                       |
| Guinea .....                 | 96,900                       |
| Sierra Leone .....           | 27,925                       |
| Liberia .....                | 43,000                       |
| Ivory Coast .....            | 127,520                      |
| Ghana .....                  | 91,843                       |
| Togo .....                   | 21,830                       |
| Benin .....                  | 43,484                       |
| Cape Verde (not shown) ..... | 1,557                        |
| Total .....                  | 548,094                      |

Delineated prospective area through 1990: 9,680 mi<sup>2</sup>

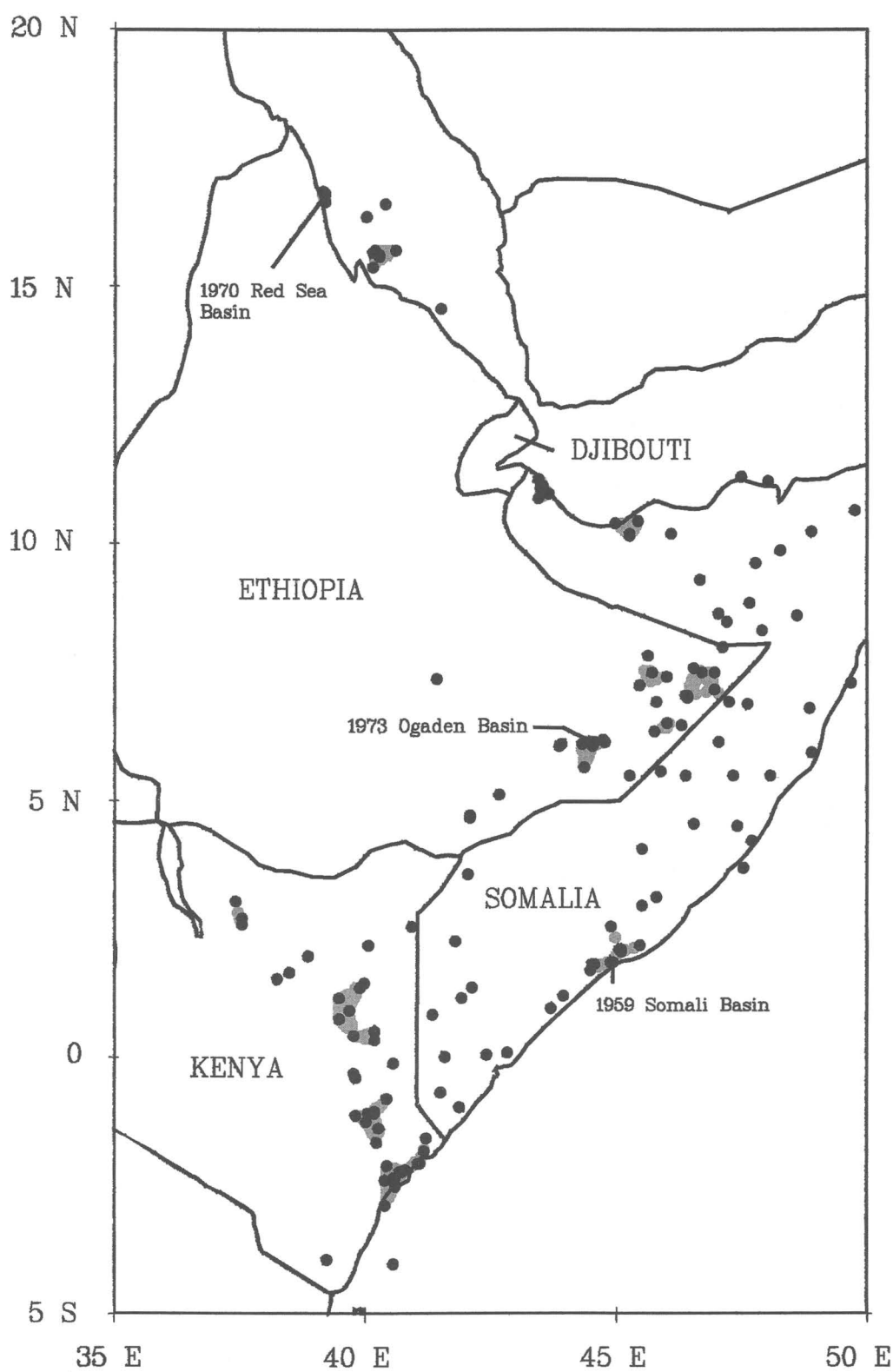
Explored area through 1990: 1,913 mi<sup>2</sup>

Wildcat wells through 1990: 187

Current growth in delineated prospective area per wildcat: 63 mi<sup>2</sup>

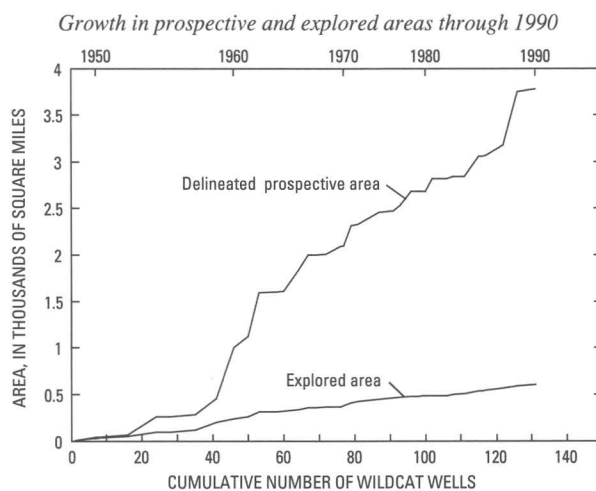
Reported discoveries of recoverable crude oil and gas through 1990:  
 $0.195 \times 10^9$  bbl oil and  $0.968 \times 10^{12}$  cubic feet gas

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.020 \times 10^6 \text{ bbl/mi}^2$



**Figure 36.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Ethiopia, Djibouti, Somalia, and Kenya, Africa.





*Exploration data*

| Country        | Land area<br>(mi <sup>2</sup> ) |
|----------------|---------------------------------|
| Ethiopia ..... | 409,266                         |
| Djibouti ..... | 8,492                           |
| Somalia .....  | 246,198                         |
| Kenya .....    | 223,478                         |
| Total .....    | 887,434                         |

Delineated prospective area through 1990: 3,781 mi<sup>2</sup>

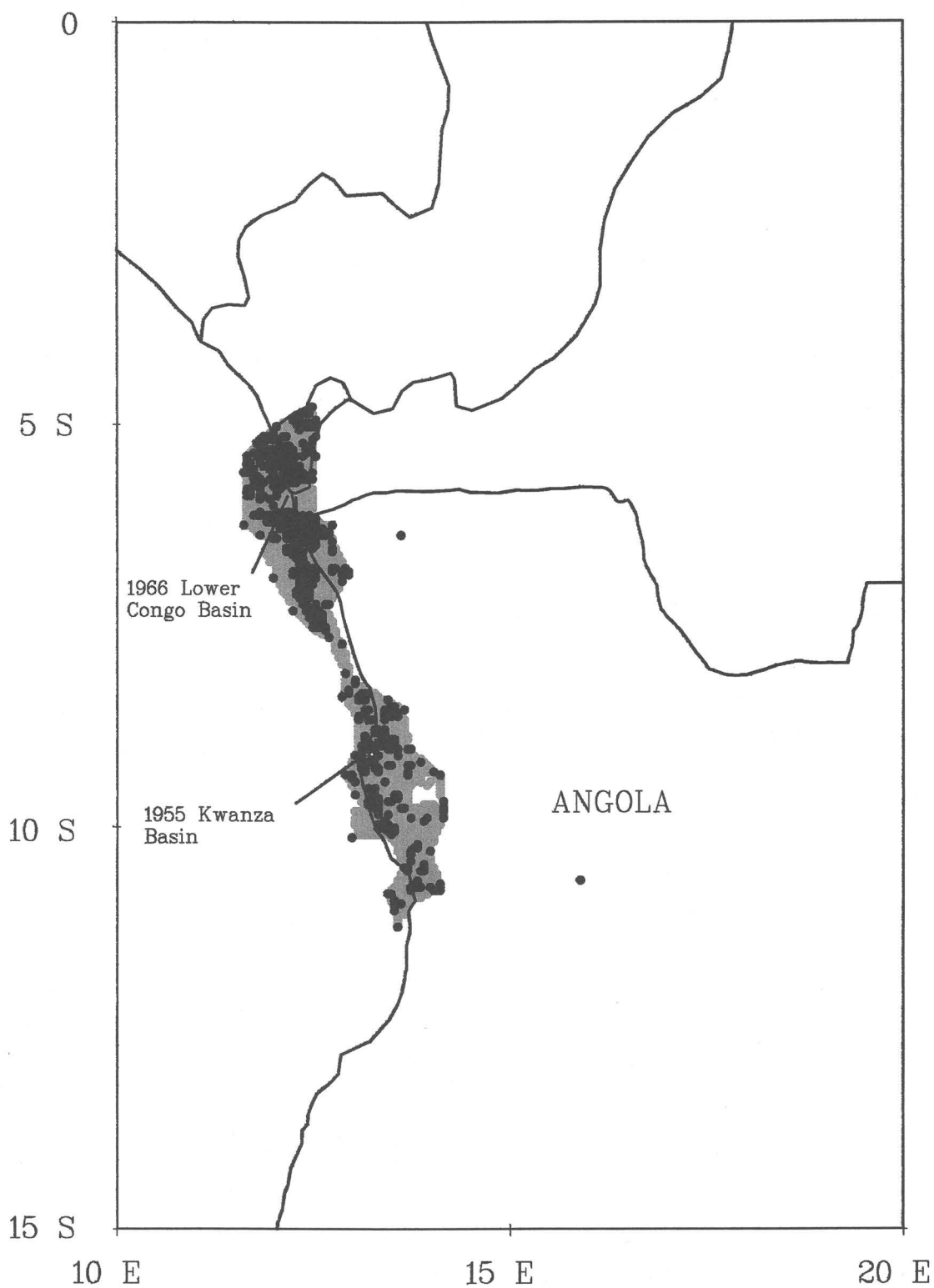
Explored area through 1990: 603 mi<sup>2</sup>

Wildcat wells through 1990: 131

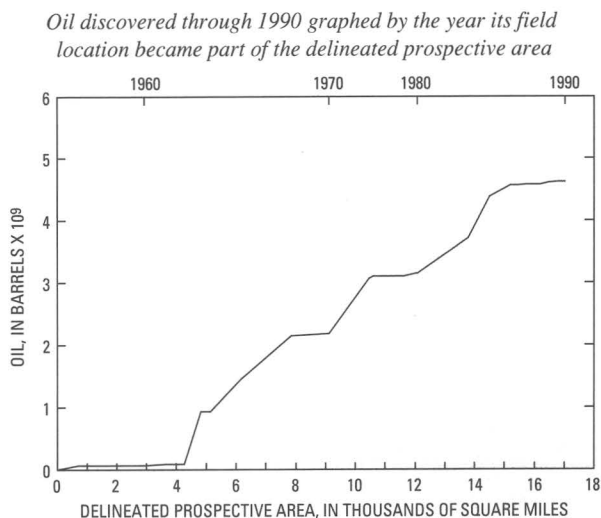
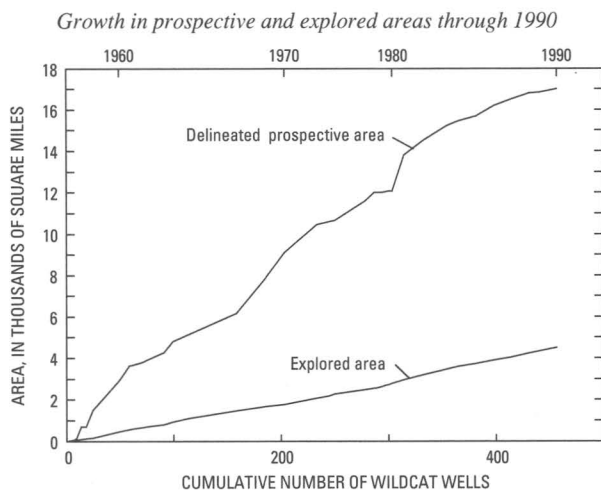
Current growth in delineated prospective area per wildcat: 66 mi<sup>2</sup>

Field sizes not available for oil; reported discoveries of recoverable gas through 1990:  $3.01 \times 10^{12}$  cubic feet

**Figure 36.** Continued.



**Figure 37.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Angola, Africa.



#### *Significant petroleum province*

| Significant petroleum province | Year of first discovery in this province in Angola | Cumulative discoveries in this province in Angola through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)             | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Lower Congo Basin .....        | 1966   | 3,532  | 4,518                               | 6,712  |

#### *Exploration data*

Land area: 481,226 mi<sup>2</sup>

Delineated prospective area through 1990: 17,021 mi<sup>2</sup>

Explored area through 1990: 4,496 mi<sup>2</sup>

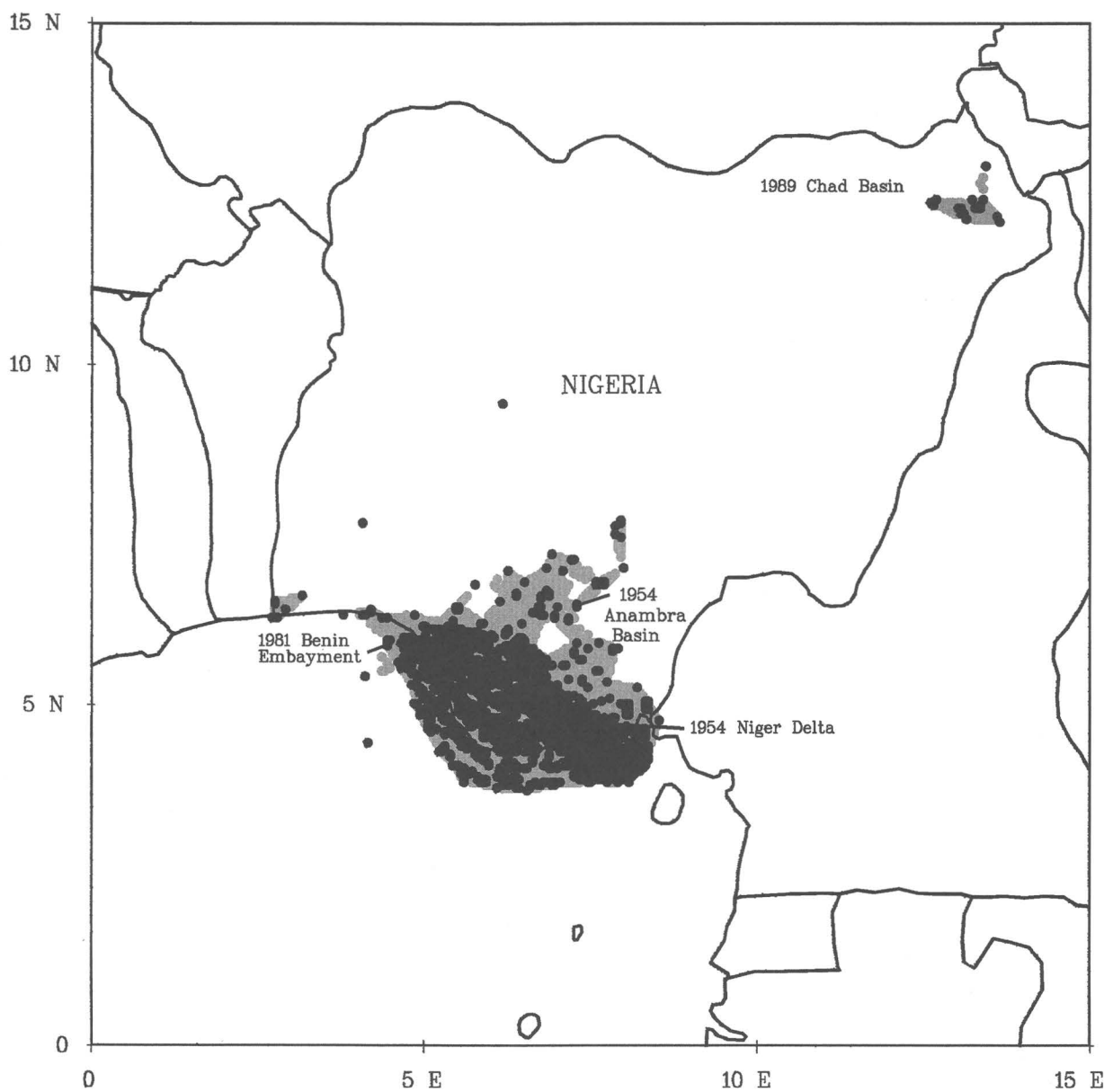
Wildcat wells through 1990: 457

Current growth in delineated prospective area per wildcat: 11 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
4.62 × 10<sup>9</sup> bbl oil and 6.76 × 10<sup>12</sup> cubic feet gas

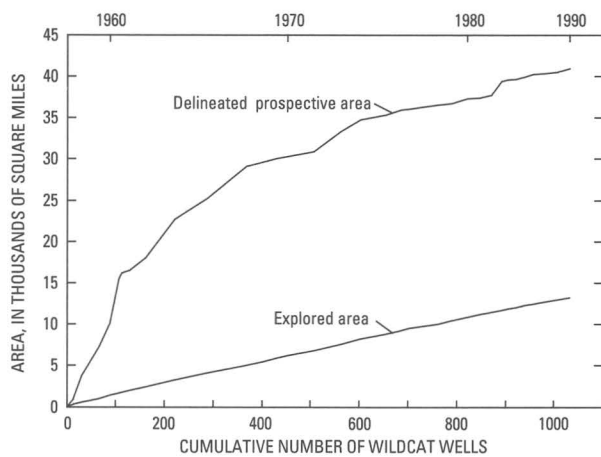
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.272 \times 10^6 \text{ bbl/mi}^2$

**Figure 37.** Continued.

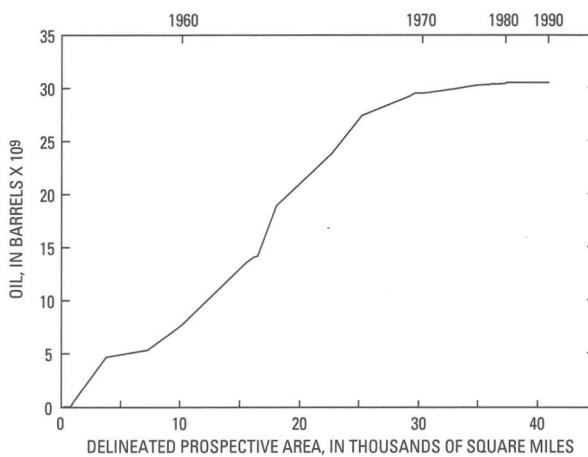


**Figure 38.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Nigeria, Africa.

Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



### Significant petroleum province

| Significant petroleum province | Year of first discovery in this province in Nigeria | Cumulative discoveries in this province in Nigeria through 1990 |                                     |  |
|--------------------------------|---|---|-------------------------------------|--|
|                                |   | Crude oil   |                                     | Gas  |
|                                |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)              | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Niger Delta .....              | 1954  | 22,284  | 30,499                              | 69,763   |

### Exploration data

Land area: 356,599 mi<sup>2</sup>

Delineated prospective area through 1990: 40,902 mi<sup>2</sup>

Explored area through 1990: 12,245 mi<sup>2</sup>

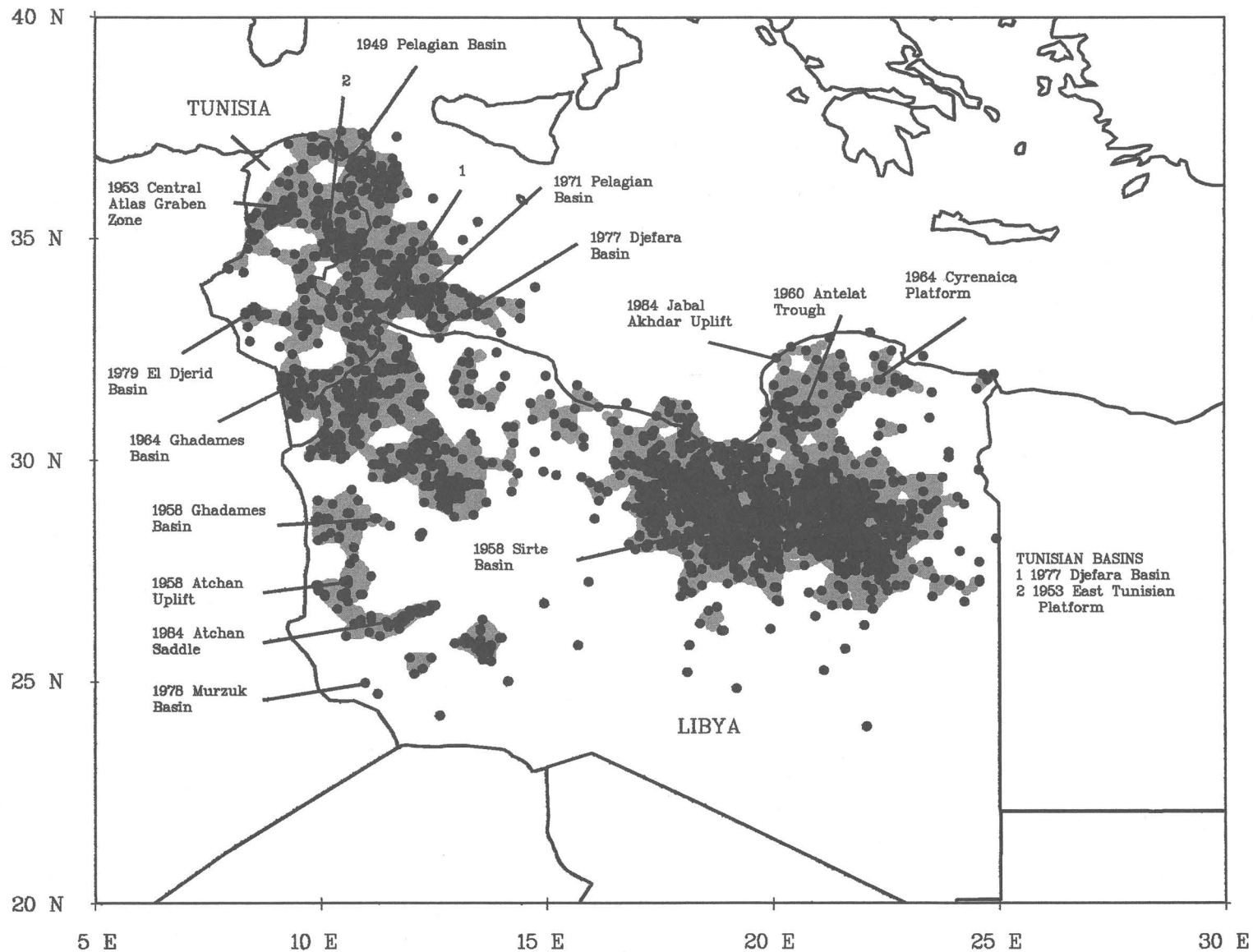
Wildcat wells through 1990: 1,031

Current growth in delineated prospective area per wildcat: 15 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
30.5 × 10<sup>9</sup> bbl oil and 69.8 × 10<sup>12</sup> cubic feet gas

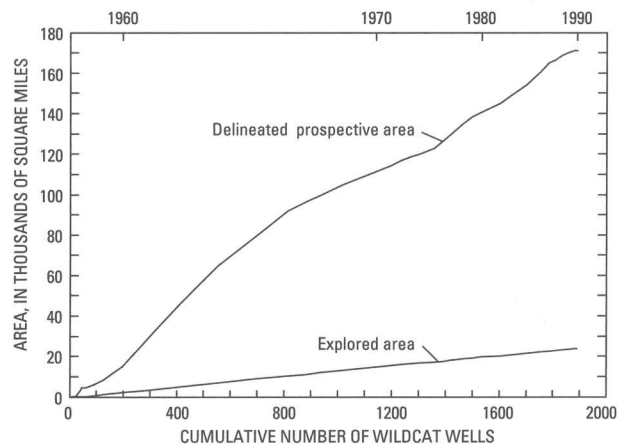
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.746 \times 10^6 \text{ bbl/mi}^2$

Figure 38. Continued.

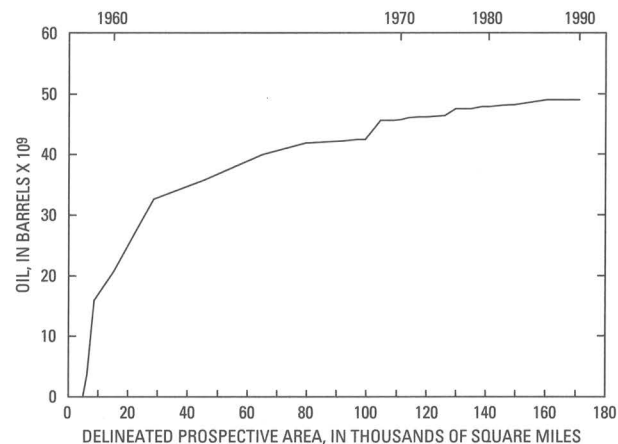


**Figure 39.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Tunisia and Libya, Africa.

Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



#### Exploration data

| Country       | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990: 171,114 mi <sup>2</sup>   |
|---------------|------------------------------|---|
| Tunisia ..... | 48,330                       | Explored area through 1990: 23,916 mi <sup>2</sup>  |
| Libya .....   | 679,400                      | Wildcat wells through 1990: 1,889   |
| Total .....   | 727,730                      | Current growth in delineated prospective area per wildcat: 46 mi <sup>2</sup>   |
|               |                              | Reported discoveries of recoverable crude oil and gas through 1990: 49.0 × 10 <sup>9</sup> bbl oil and 33.8 × 10 <sup>12</sup> cubic feet gas |
|               |                              | Richness = $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$  |
|               |                              | = 0.286 × 10 <sup>6</sup> bbl/mi <sup>2</sup>   |

#### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| <b>Tunisia</b>                 |  |  |                                     |  |
| Pelagian Basin .....           | 1949   | 336  | 777                                 | 1,940  |
| Ghadames Basin .....           | 1964   | 793  | 892                                 | 1,611  |
| Total .....                    |  | 1,129  | 1,669                               | 3,551  |
| <b>Libya</b>                   |  |  |                                     |  |
| Sirte Basin .....              | 1958   | 41,462   | 44,049                              | 22,478   |
| Atchan Uplift. ....            | 1958   | 0  | 9                                   | 1,610  |
| Ghadames Basin .....           | 1958   | 150  | 1,269                               | 2,162  |
| Pelagian Basin .....           | 1971   | 1,250  | 1,460                               | 3,745  |
| Atchan Saddle .....            | 1984   | 110  | 230                                 | 0  |
| Total .....                    |  | 43,972   | 47,017                              | 29,995   |

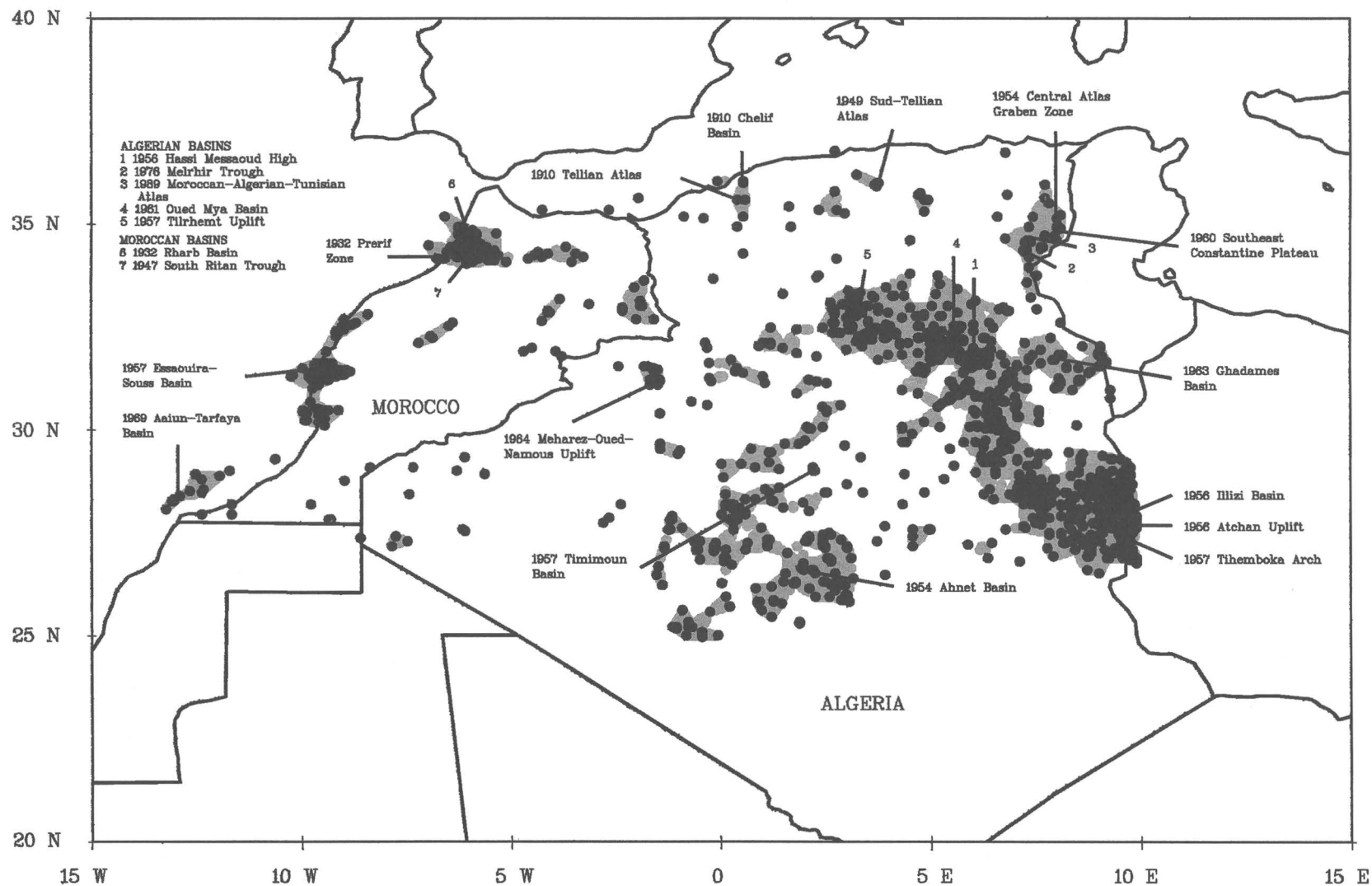
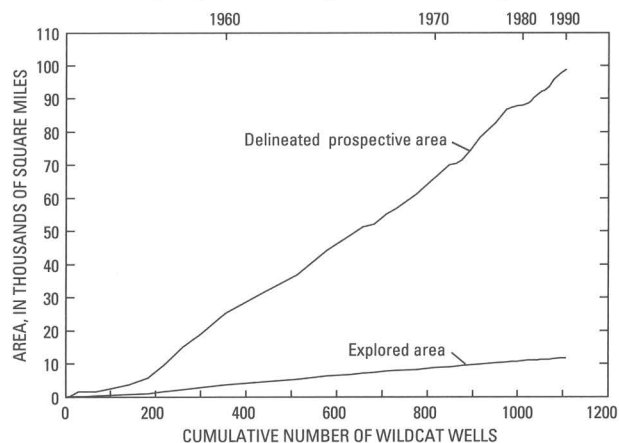


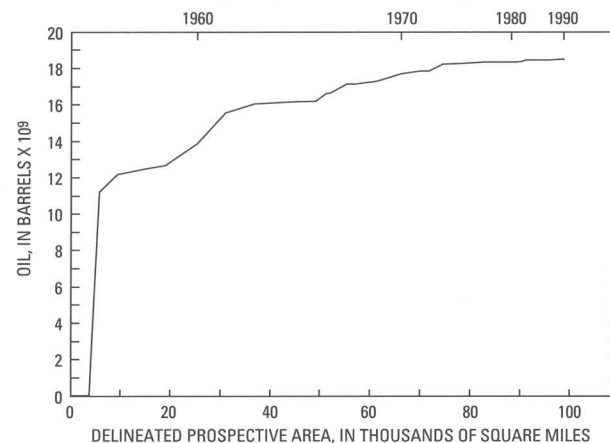
Figure 40. Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Morocco and Algeria, Africa.



Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



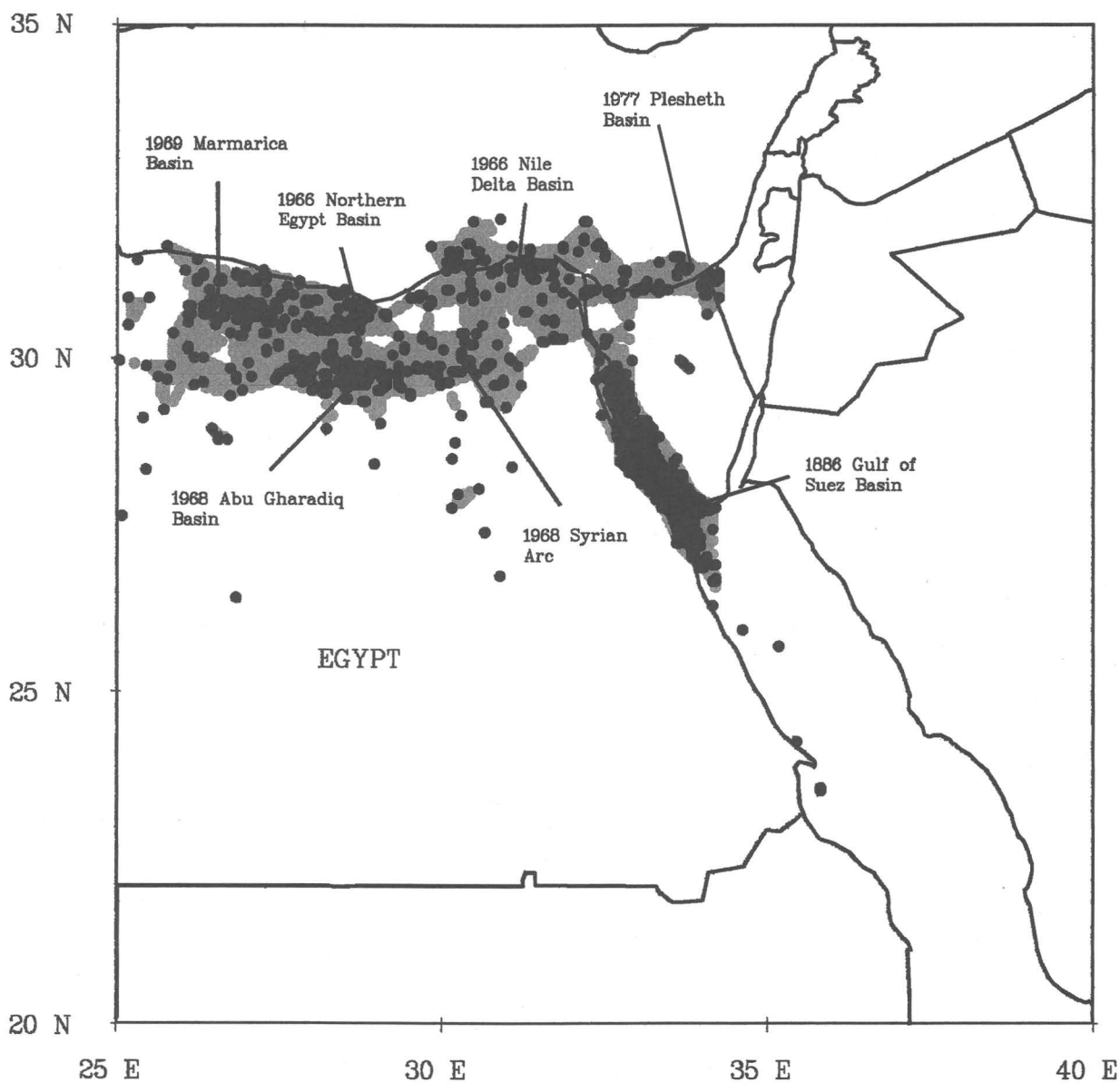
#### Exploration data

| Country       | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990: 98,674 mi <sup>2</sup>   |
|---------------|------------------------------|--|
| Morocco ..... | 172,104                      | Explored area through 1990: 11,815 mi <sup>2</sup>   |
| Algeria ..... | 919,595                      | Wildcat wells through 1990: 1,105  |
| Total .....   | 1,091,699                    | Current growth in delineated prospective area per wildcat: 94 mi <sup>2</sup>  |
|               |                              | Reported discoveries of recoverable crude oil and gas through 1990: 18.5 × 10 <sup>9</sup> bbl oil and 157 × 10 <sup>12</sup> cubic feet gas |
|               |                              | Richness = $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$   |
|               |                              | = 0.187 × 10 <sup>6</sup> bbl/mi <sup>2</sup>  |

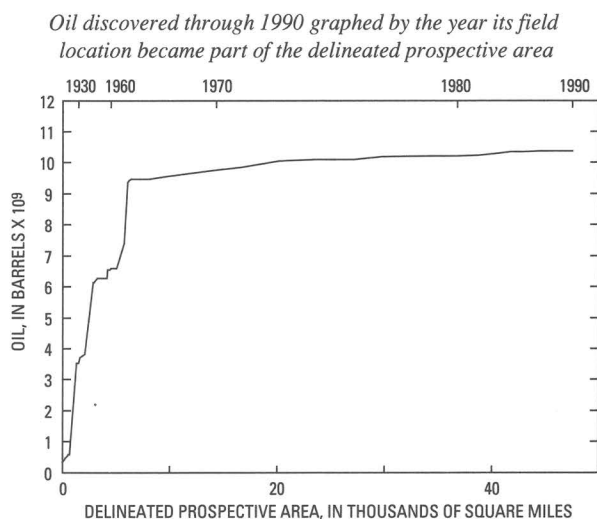
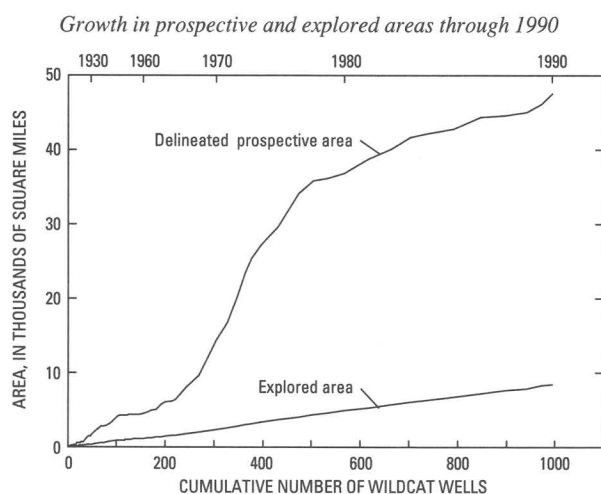
#### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in Algeria | Cumulative discoveries in this province in Algeria through 1990 |                                     |  |
|--------------------------------|---|---|-------------------------------------|--|
|                                |   | Crude oil   |                                     | Gas  |
|                                |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)              | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Hassi Messaoud High .....      | 1956  | 12,499  | 12,746                              | 22,982   |
| Illizi Basin .....             | 1956  | 1,906   | 2,532                               | 27,226   |
| Atchan Uplift .....            | 1956  | 1,522   | 1,544                               | 3,661  |
| Oued Mya Basin .....           | 1961  | 582   | 1,099                               | 702  |
| Ghadames Basin .....           | 1963  | 130   | 286                                 | 3,753  |
| Total .....                    |   | 16,639  | 18,207                              | 58,324   |

Figure 40. Continued.



**Figure 41.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Egypt, Africa.



*Significant petroleum province*

| Significant petroleum province | Year of first discovery in this province in Egypt | Cumulative discoveries in this province in Egypt through 1990 |                                     |  |
|--------------------------------|---|---|-------------------------------------|--|
|                                |   | Crude oil   |                                     | Gas  |
|                                |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)            | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Gulf of Suez Basin .....       | 1886  | 8,101   | 9,459                               | 4,893  |

*Exploration data*

Land area: 386,198 mi<sup>2</sup>

Delineated prospective area through 1990: 47,540 mi<sup>2</sup>

Explored area through 1990: 8,463 mi<sup>2</sup>

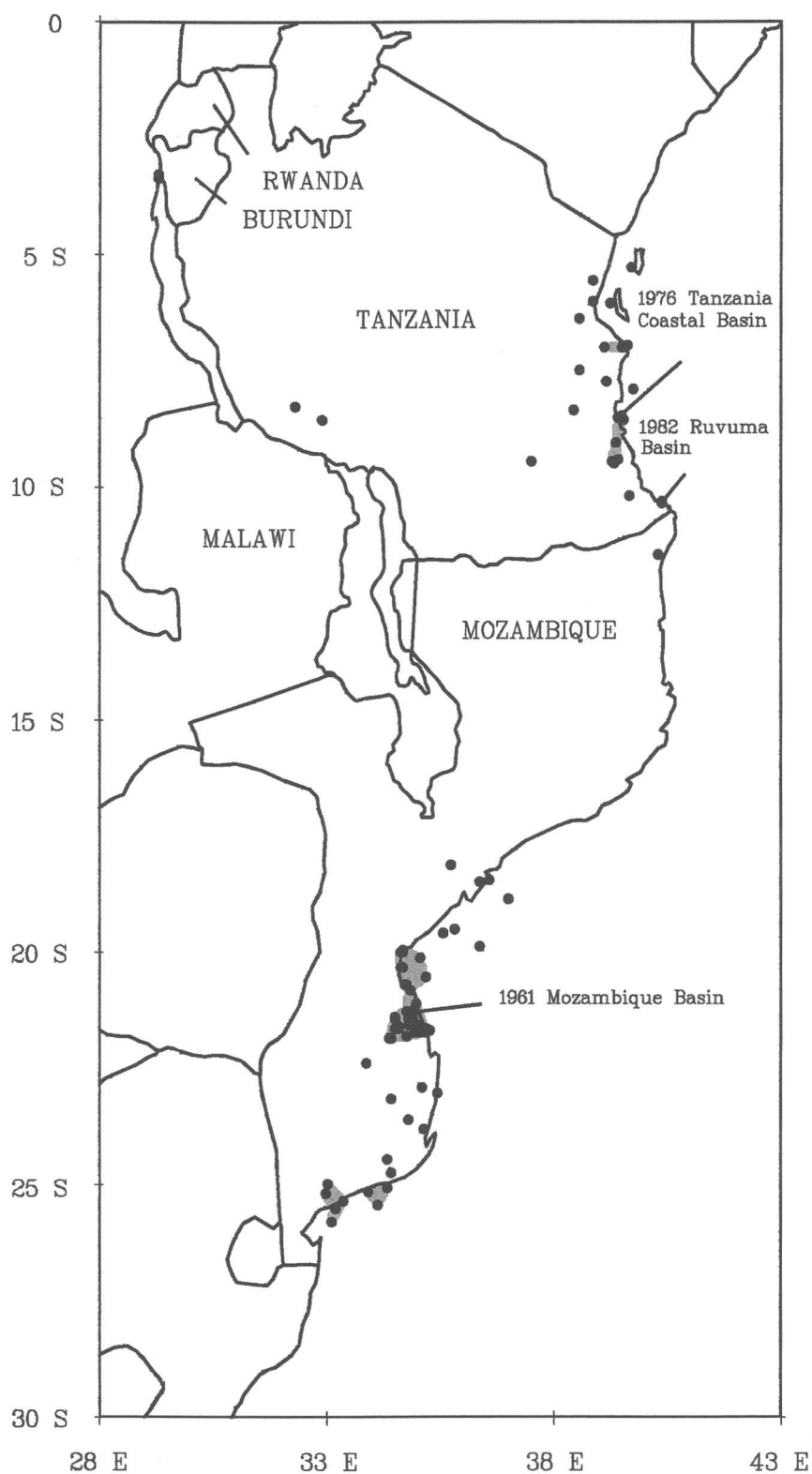
Wildcat wells through 1990: 994

Current growth in delineated prospective area per wildcat: 62 mi<sup>2</sup>

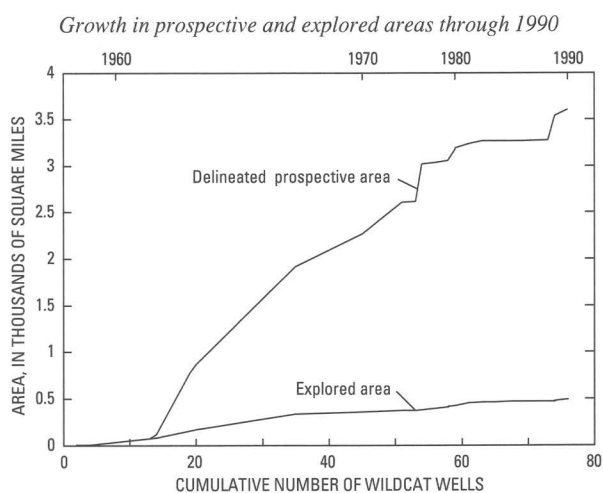
Reported discoveries of recoverable crude oil and gas through 1990:  
10.3 × 10<sup>9</sup> bbl oil and 17.4 × 10<sup>12</sup> cubic feet gas

Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.218 \times 10^6 \text{ bbl/mi}^2$

**Figure 41.** Continued.



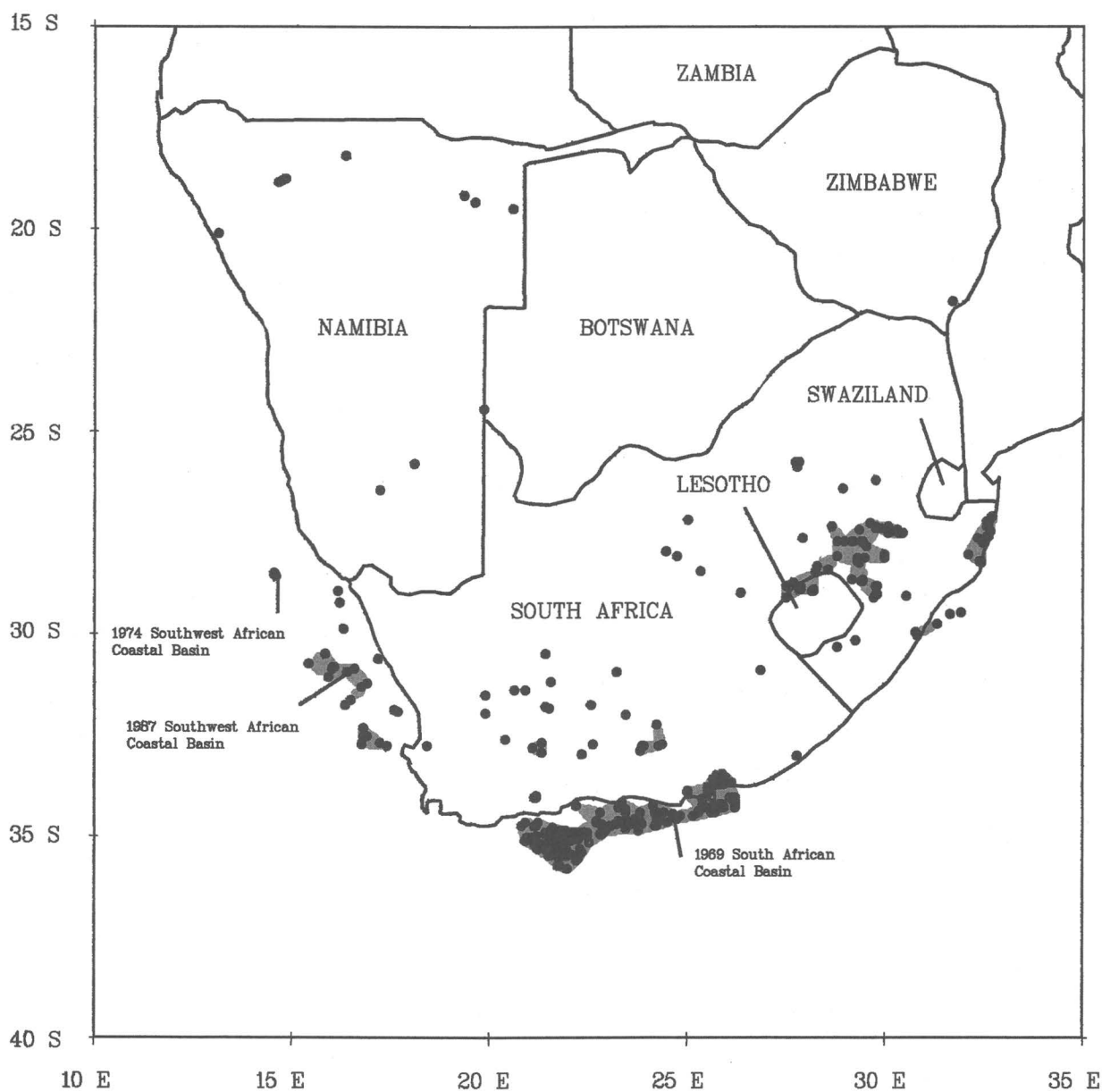
**Figure 42.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Tanzania, Malawi, Mozambique, Burundi, and Rwanda, Africa.



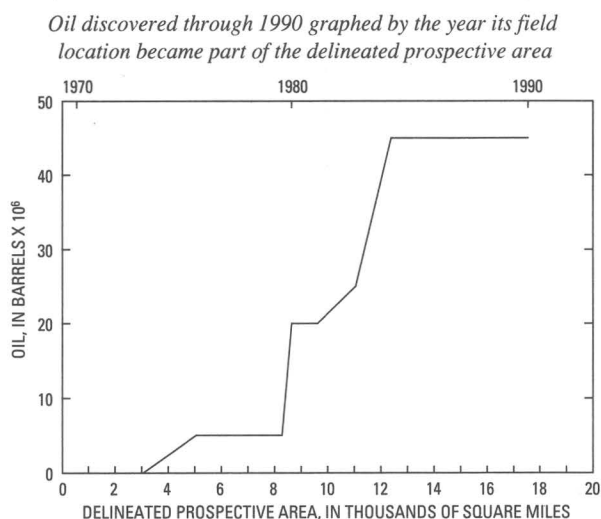
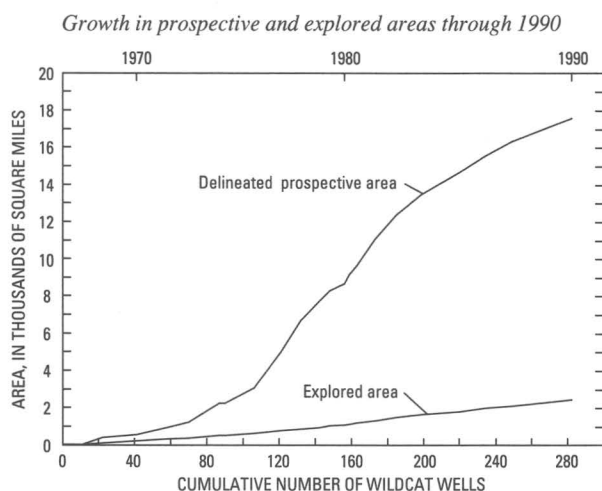
*Exploration data*

| Country          | Land area (mi <sup>2</sup> ) |   |
|------------------|------------------------------|---|
| Tanzania .....   | 362,820                      | Delineated prospective area through 1990: 3,606 mi <sup>2</sup>   |
| Malawi .....     | 49,177                       | Explored area through 1990: 491 mi <sup>2</sup>   |
| Mozambique ..... | 297,731                      | Wildcat wells through 1990: 76  |
| Burundi .....    | 10,747                       | Current growth in delineated prospective area per wildcat: 33 mi <sup>2</sup>   |
| Rwanda .....     | 10,169                       | Field sizes not available for oil; reported discoveries of recoverable gas through 1990: $5.29 \times 10^{12}$ cubic feet |
| Total .....      | 730,644                      |   |

**Figure 42.** Continued.



**Figure 43.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Swaziland, Namibia, Lesotho, Zimbabwe, Zambia, Botswana, and South Africa, Africa.



#### Exploration data

| Country           | Land area (mi <sup>2</sup> ) |
|-------------------|------------------------------|
| Swaziland.....    | 6,704                        |
| Namibia.....      | 317,725                      |
| Lesotho.....      | 11,716                       |
| Zimbabwe.....     | 150,338                      |
| Zambia.....       | 288,130                      |
| Botswana.....     | 275,000                      |
| South Africa..... | 472,000                      |
| Total.....        | 1,521,613                    |

Delineated prospective area through 1990: 17,564 mi<sup>2</sup>

Explored area through 1990: 2,420 mi<sup>2</sup>

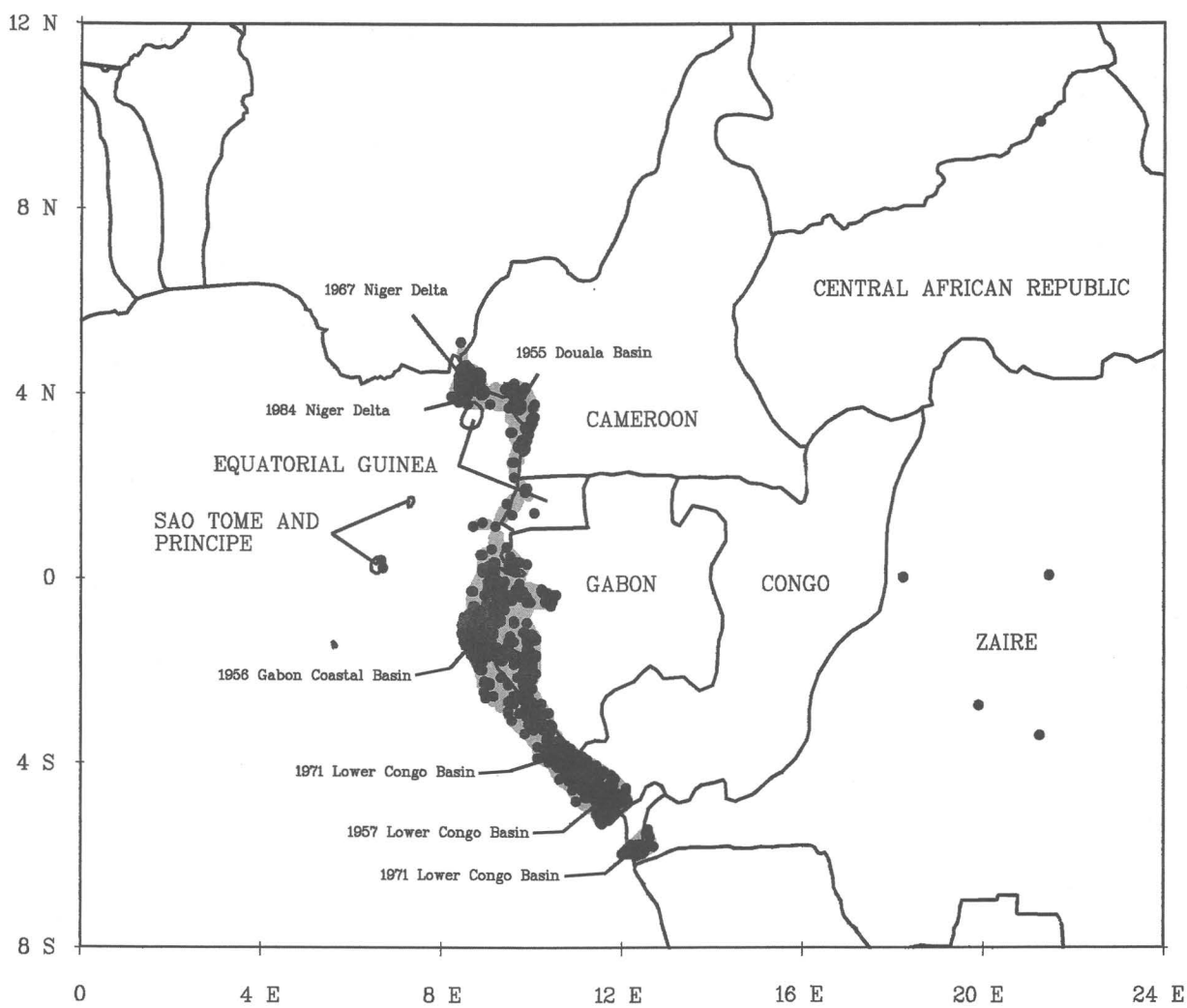
Wildcat wells through 1990: 282

Current growth in delineated prospective area per wildcat: 38 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
 $0.045 \times 10^9$  bbl oil and  $4.42 \times 10^{12}$  cubic feet gas

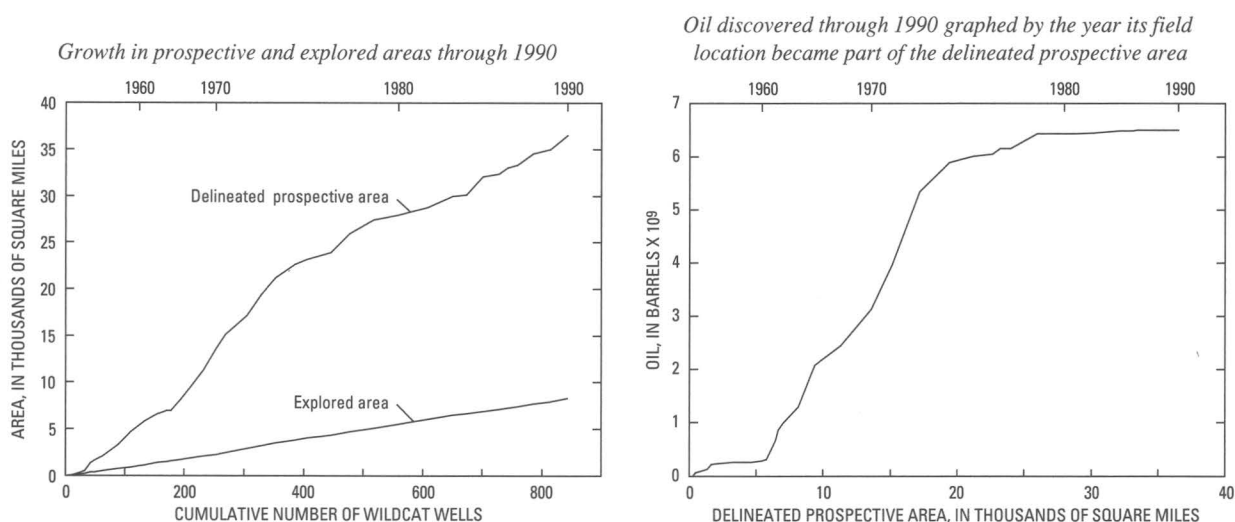
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.002 \times 10^6 \text{ bbl/mi}^2$

Figure 43. Continued.



**Figure 44.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Cameroon, Central African Republic, Equatorial Guinea, Gabon, Sao Tome and Principe, Congo, and Zaire, Africa.





### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Cameroon                       |  |  |                                     |  |
| Niger Delta . . . . .          | 1967   | 806  | 1,608                               | 1,632  |
| Equatorial Guinea              |  |  |                                     |  |
| Niger Delta . . . . .          | 1984   | 0  | 0                                   | 852  |
| Gabon                          |  |  |                                     |  |
| Gabon Coastal Basin . . . . .  | 1956   | 1,704  | 2,605                               | 795  |
| Lower Congo Basin . . . . .    | 1971   | 106  | 209                                 | 0  |
| Total . . . . .                |  | 1,810  | 2,814                               | 795  |
| Congo                          |  |  |                                     |  |
| Lower Congo Basin . . . . .    | 1957   | 1,409  | 1,721                               | 1,185  |
| Zaire                          |  |  |                                     |  |
| Lower Congo Basin . . . . .    | 1971   | 182  | 342                                 | 74   |

### Exploration data

| Country                        | Land area (mi <sup>2</sup> ) |
|--------------------------------|------------------------------|
| Cameroon.....                  | 183,350                      |
| Central African Republic ..... | 238,000                      |
| Equatorial Guinea .....        | 10,824                       |
| Gabon.....                     | 102,290                      |
| Sao Tome and Principe.....     | 372                          |
| Congo.....                     | 132,046                      |
| Zaire.....                     | 905,063                      |
| Total.....                     | 1,571,945                    |

Delineated prospective area through 1990: 36,500 mi<sup>2</sup>

Explored area through 1990: 8,308 mi<sup>2</sup>

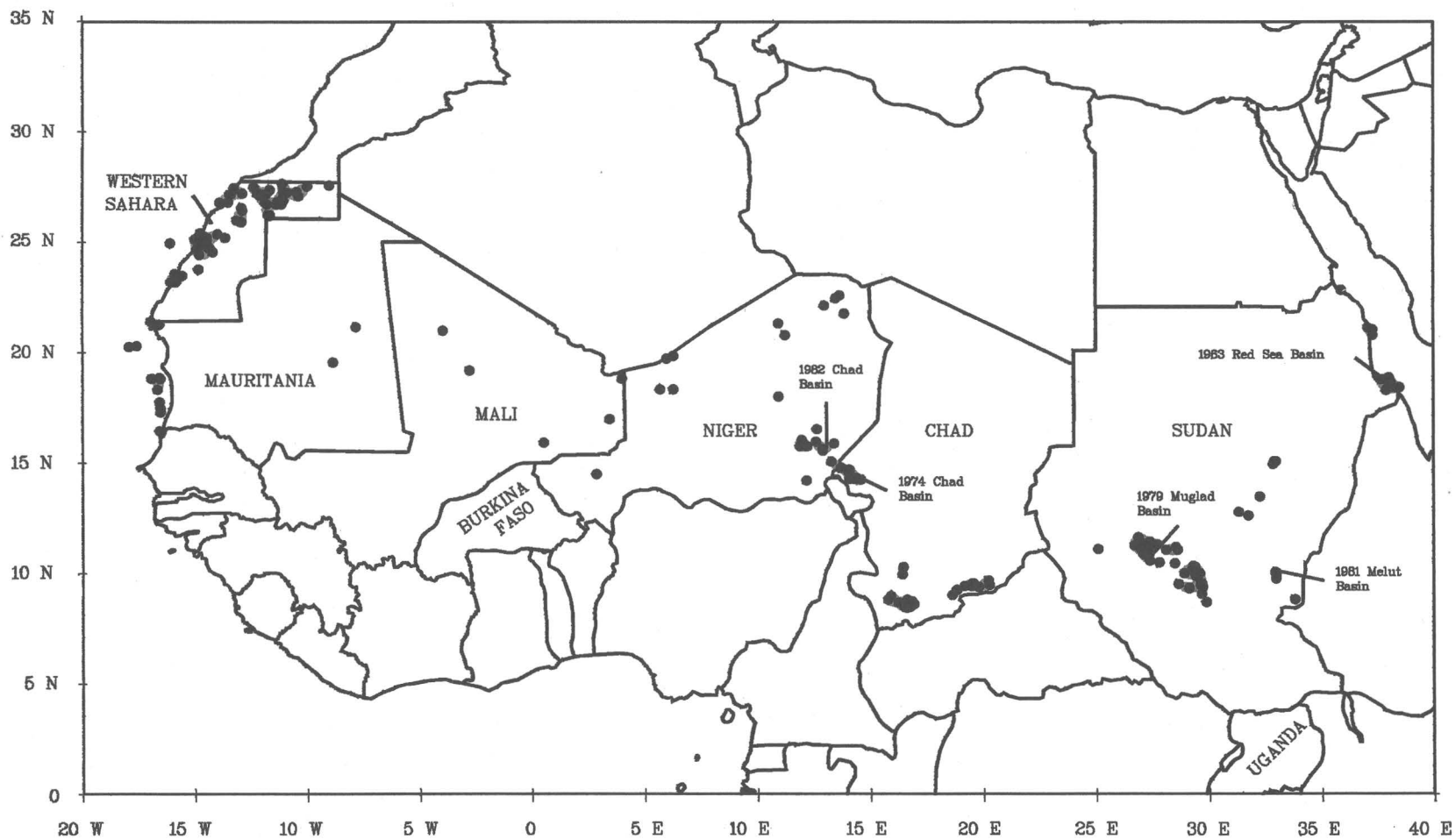
Wildcat wells through 1990: 843

Current growth in delineated prospective area per wildcat: 51 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
6.49 × 10<sup>9</sup> bbl oil and 5.67 × 10<sup>12</sup> cubic feet gas

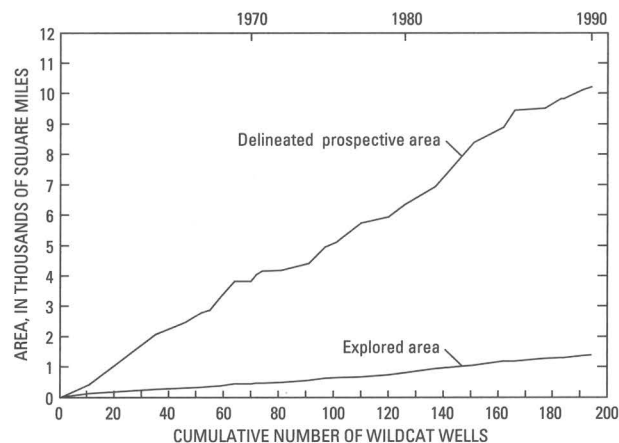
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.178 \times 10^6 \text{ bbl/mi}^2$

Figure 44. Continued.

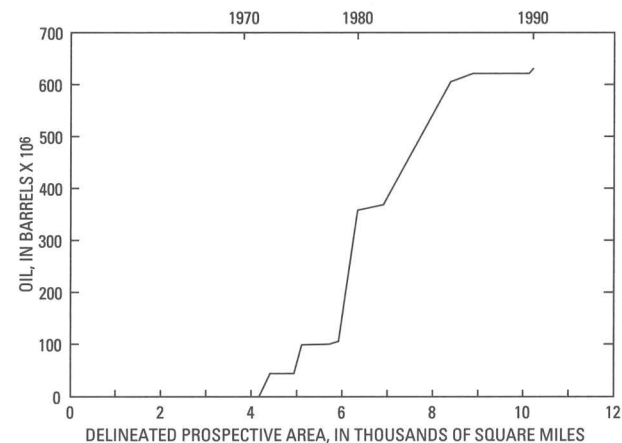


**Figure 45.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Western Sahara, Mauritania, Mali, Burkina Faso (formerly Upper Volta), Niger, Chad, Sudan, and Uganda, Africa.

Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



#### Exploration data

| Country                  | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990: 10,204 mi <sup>2</sup>   |
|--------------------------|------------------------------|--|
| Western Sahara . . . . . | 102,703                      | Explored area through 1990: 1,386 mi <sup>2</sup>  |
| Mauritania . . . . .     | 418,120                      | Wildcat wells through 1990: 194  |
| Mali . . . . .           | 463,500                      | Current growth in delineated prospective area per wildcat: 30 mi <sup>2</sup>  |
| Burkina Faso . . . . .   | 106,111                      | Reported discoveries of recoverable crude oil and gas through 1990: 0.630 × 10 <sup>9</sup> bbl oil and 1.01 × 10 <sup>12</sup> cubic feet gas |
| Niger . . . . .          | 458,976                      |  |
| Chad . . . . .           | 501,000                      |  |
| Sudan . . . . .          | 967,500                      |  |
| Uganda . . . . .         | 93,981                       |  |
| Total . . . . .          | 3,111,891                    |  |

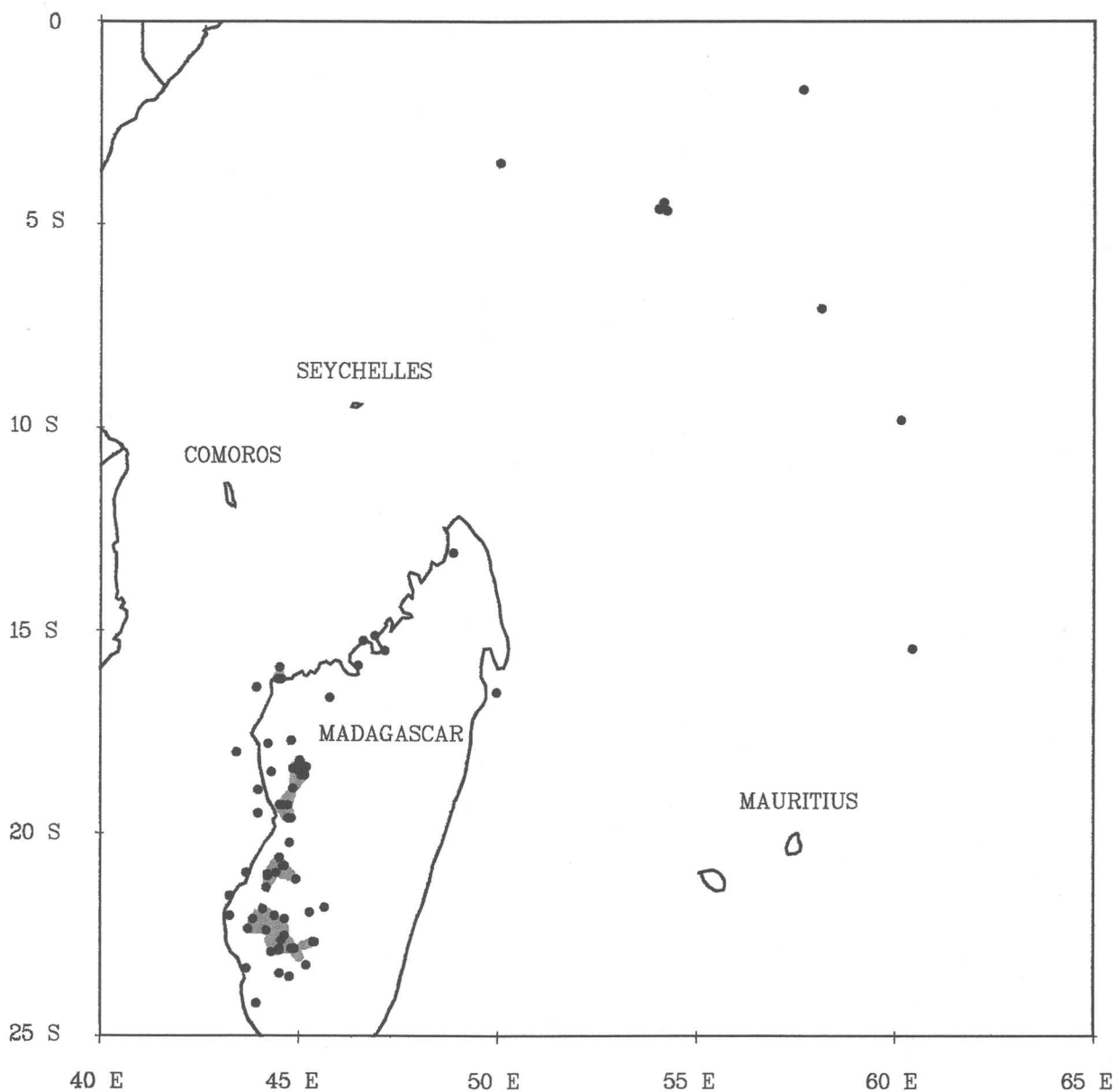
  

|            |   |
|------------|---|
| Richness = | $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$ |
|            | $= 0.062 \times 10^6 \text{ bbl/mi}^2$  |

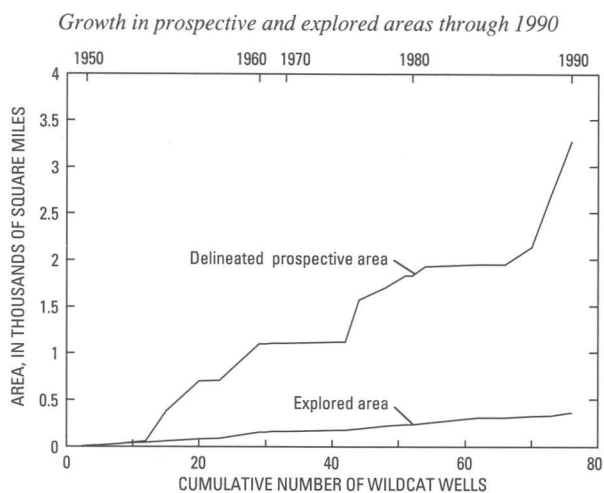
#### Significant petroleum province

| Significant petroleum province | Year of first discovery in this province in Sudan | Cumulative discoveries in this province in Sudan through 1990 |                                     |  |
|--------------------------------|---|---|-------------------------------------|--|
|                                |   | Crude oil   |                                     | Gas  |
|                                |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)            | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Muglad Basin . . . . .         | 1979  | 465   | 499                                 | 0  |

Figure 45. Continued.



**Figure 46.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Madagascar, Mauritius, Seychelles, and Comoros, Africa.



*Exploration data*

| Country          | Land area<br>(mi <sup>2</sup> ) |
|------------------|---------------------------------|
| Madagascar ..... | 227,800                         |
| Mauritius .....  | 809                             |
| Seychelles ..... | 156                             |
| Comoros .....    | 820                             |
| Total .....      | 229,585                         |

Delineated prospective area through 1990: 3,274 mi<sup>2</sup>

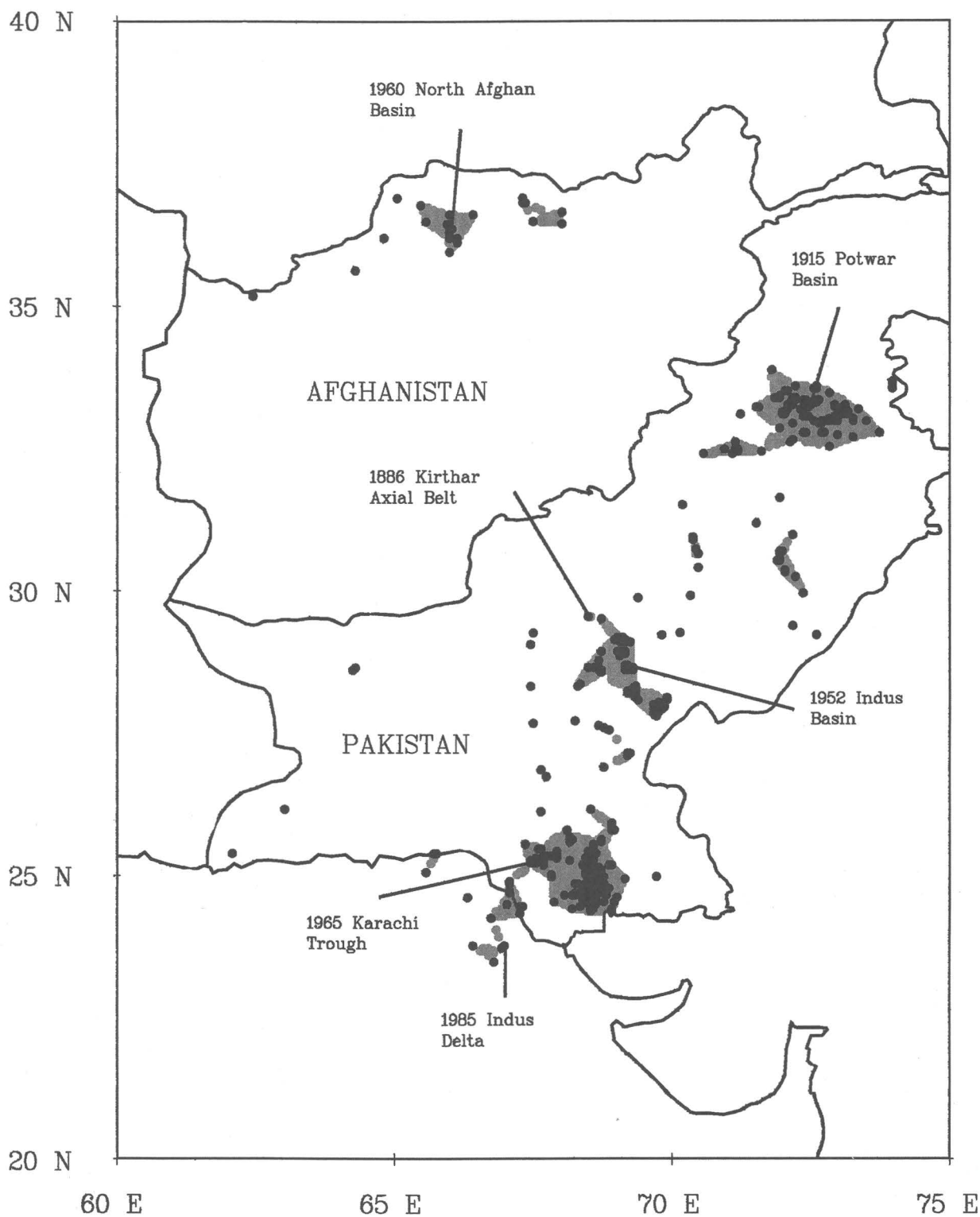
Explored area through 1990: 369 mi<sup>2</sup>

Wildcat wells through 1990: 76

Current growth in delineated prospective area per wildcat: 59 mi<sup>2</sup>

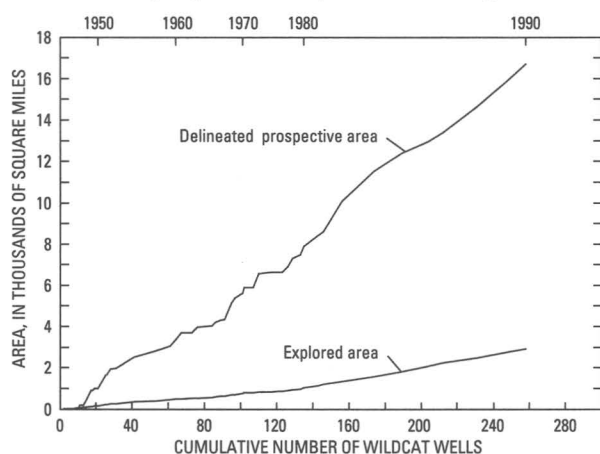
Reported discoveries of recoverable crude oil and gas through 1990:  
Field sizes not available

**Figure 46.** Continued.

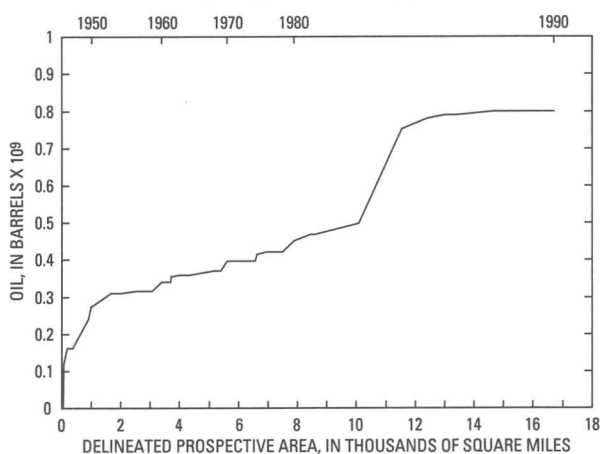


**Figure 47.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Afghanistan and Pakistan, Asia.

Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



### Significant petroleum province

| Significant petroleum province | Year of first discovery in this province in Pakistan | Cumulative discoveries in this province in Pakistan through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)               | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Potwar Basin .....             | 1915   | 115  | 360                                 | 2,669  |

### Exploration data

| Country           | Land area (mi <sup>2</sup> ) |
|-------------------|------------------------------|
| Afghanistan ..... | 250,000                      |
| Pakistan .....    | 310,236                      |
| Total .....       | 560,236                      |

Delineated prospective area through 1990: 16,707 mi<sup>2</sup>

Explored area through 1990: 2,928 mi<sup>2</sup>

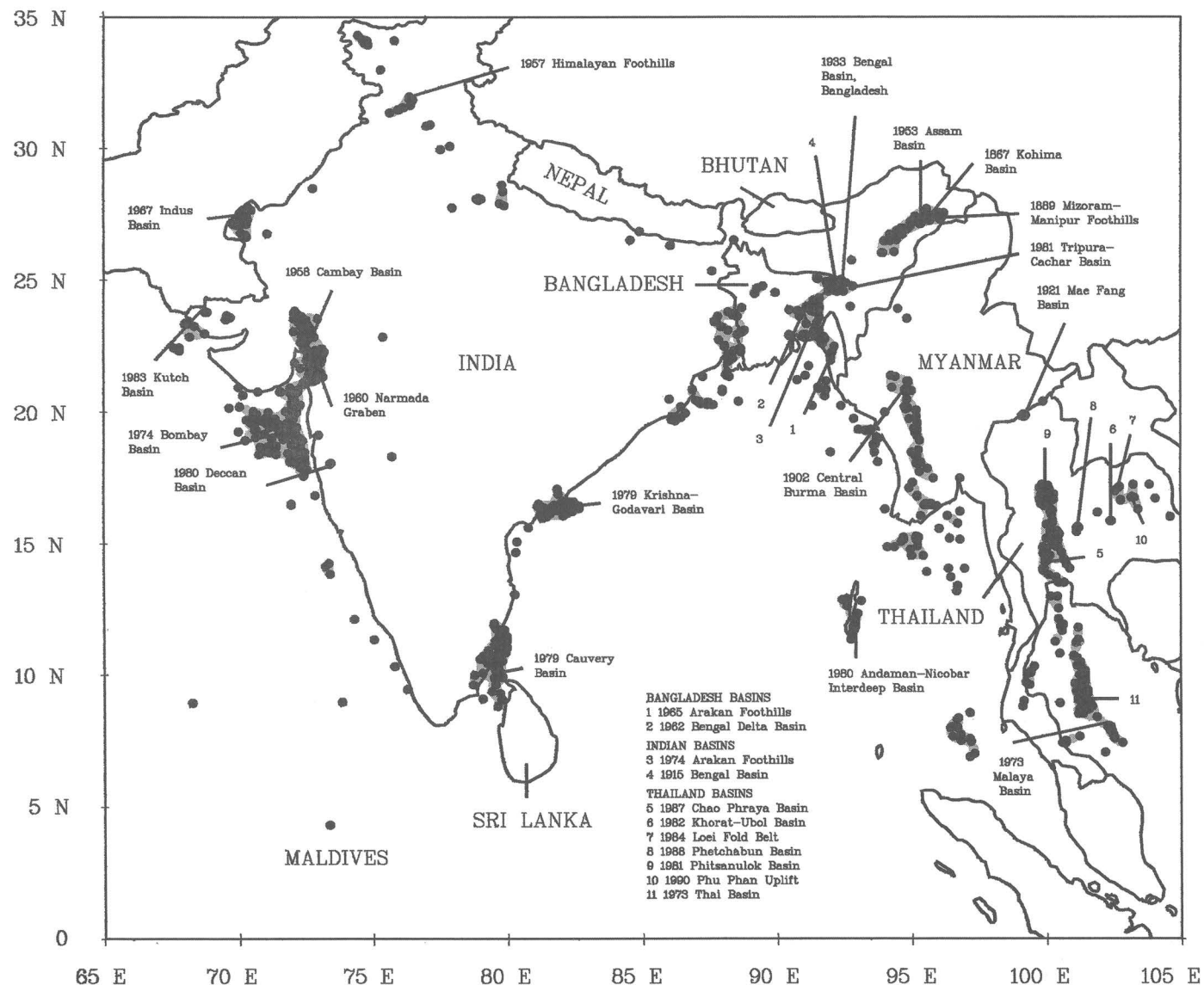
Wildcat wells through 1990: 258

Current growth in delineated prospective area per wildcat: 78 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
 $0.8 \times 10^9$  bbl oil and  $30.6 \times 10^{12}$  cubic feet gas

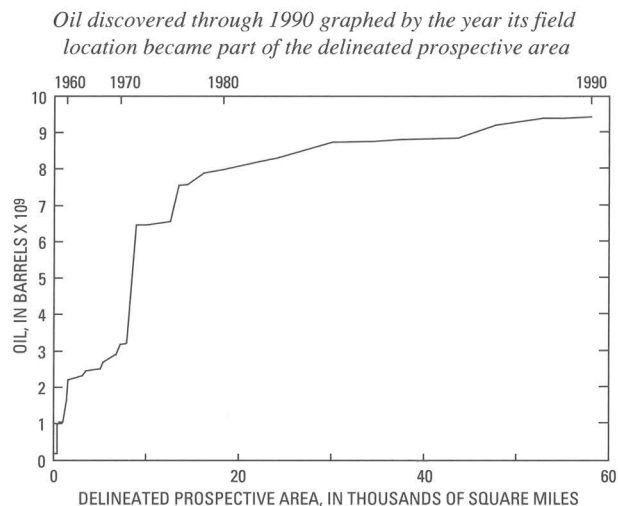
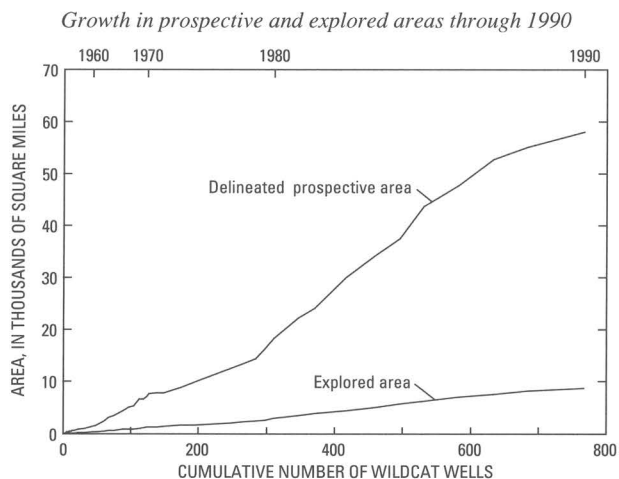
Richness =  $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.048 \times 10^6 \text{ bbl/mi}^2$

Figure 47. Continued.



**Figure 48.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Maldives, India, Bangladesh, Myanmar (formerly Burma), Thailand, Sri Lanka, Nepal, and Bhutan, Asia. Some explored area is shown for the Maldives, although the islands themselves are not shown.





#### Exploration data

| Country                        | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990: 58,014 mi <sup>2</sup>  |
|--------------------------------|------------------------------|---|
| Maldives (not shown) . . . . . | 115                          | Explored area through 1990: 8,785 mi <sup>2</sup>   |
| India . . . . .                | 1,246,880                    | Wildcat wells through 1990: 767   |
| Bangladesh . . . . .           | 54,501                       | Current growth in delineated prospective area per wildcat: 35 mi <sup>2</sup>   |
| Myanmar . . . . .              | 261,789                      | Reported discoveries of recoverable crude oil and gas through 1990: 9.44 × 10 <sup>9</sup> bbl oil and 57.6 × 10 <sup>12</sup> cubic feet gas |
| Thailand . . . . .             | 198,242                      |   |
| Sri Lanka . . . . .            | 25,332                       |   |
| Nepal . . . . .                | 54,000                       |   |
| Bhutan . . . . .               | 19,300                       |   |
| Total . . . . .                | 1,860,159                    |   |

$$\text{Richness} = \frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.162 \times 10^6 \text{ bbl/mi}^2$$

#### Significant petroleum provinces

| Significant petroleum province      | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|-------------------------------------|--|--|-------------------------------------|--|
|                                     |  | Crude oil  |                                     | Gas  |
|                                     |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| <b>India</b>                        |  |  |                                     |  |
| Mizoram-Manipur Foothills . . . . . | 1889   | 146  | 344                                 | 1,360  |
| Assam Basin . . . . .               | 1953   | 1,395  | 1,585                               | 1,785  |
| Cambay Basin . . . . .              | 1958   | 835  | 1,391                               | 3,858  |
| Narmada Graben . . . . .            | 1960   | 600  | 637                                 | 528  |
| Bombay Basin . . . . .              | 1974   | 4,103  | 4,494                               | 16,278   |
| Cauvery Basin . . . . .             | 1979   | 140  | 186                                 | 326  |
| Total . . . . .                     |  | 7,219  | 8,637                               | 24,135   |
| <b>Myanmar</b>                      |  |  |                                     |  |
| Central Burma Basin . . . . .       | 1902   | 574  | 656                                 | 7,210  |

Figure 48. Continued.

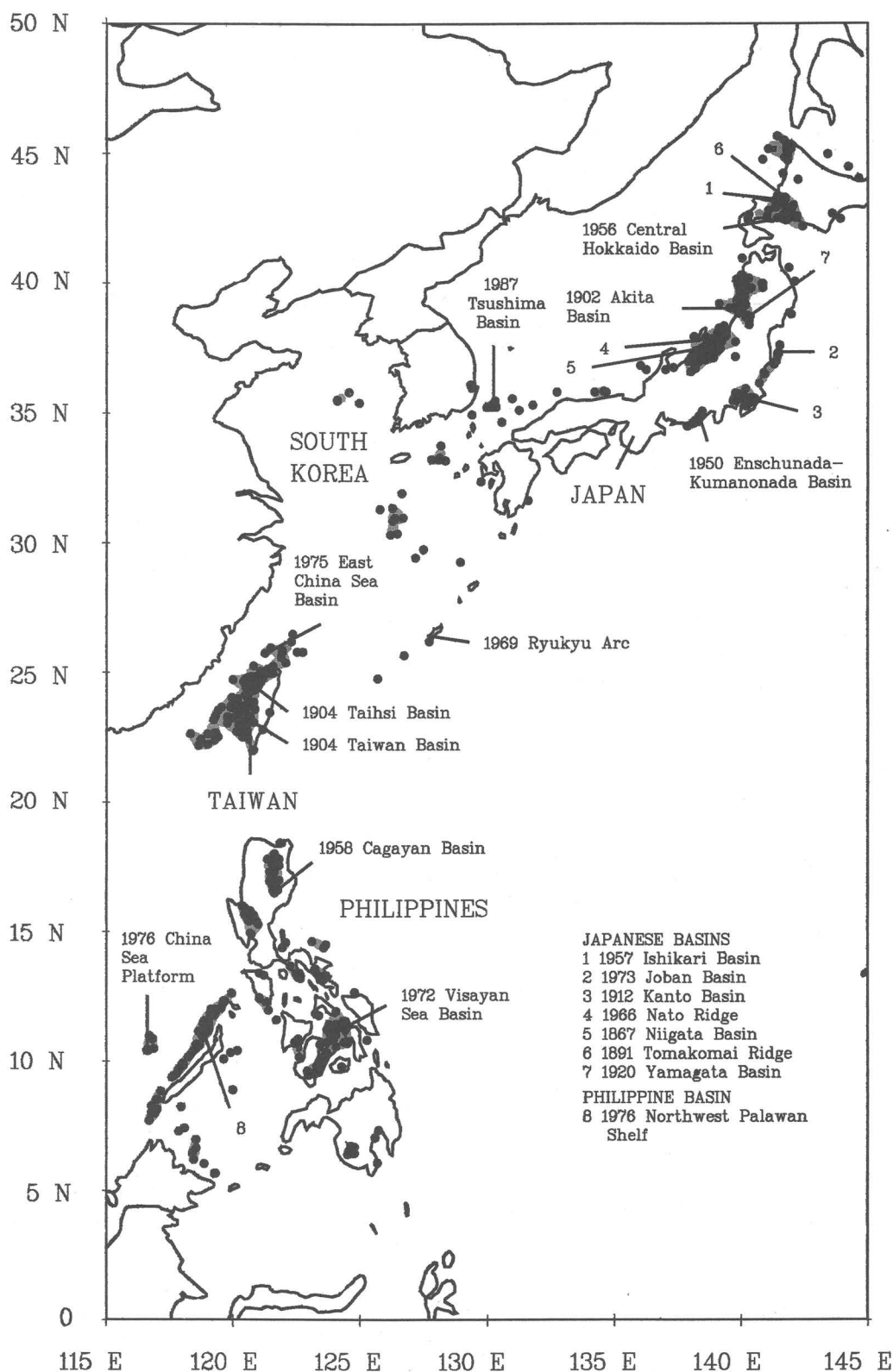
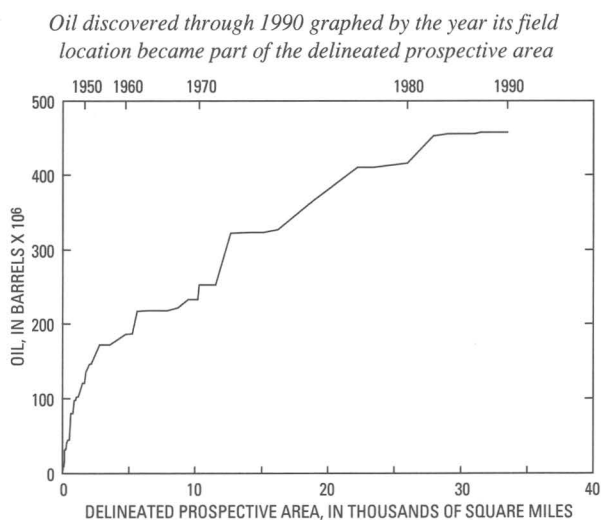
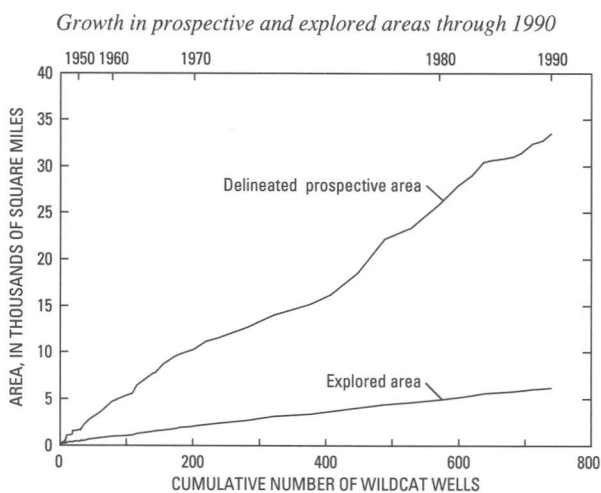


Figure 49. Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Taiwan, Philippines, Japan, and South Korea, Asia.



#### Exploration data

| Country          | Land area<br>(mi <sup>2</sup> ) |
|------------------|---------------------------------|
| Taiwan.....      | 13,890                          |
| Philippines..... | 114,830                         |
| Japan.....       | 141,529                         |
| South Korea..... | 36,600                          |
| Total.....       | 306,849                         |

Delineated prospective area through 1990: 33,526 mi<sup>2</sup>

Explored area through 1990: 6,201 mi<sup>2</sup>

Wildcat wells through 1990: 739

Current growth in delineated prospective area per wildcat: 62 mi<sup>2</sup>

Reported discoveries of recoverable crude oil and gas through 1990:  
 $0.457 \times 10^9$  bbl oil and  $14.4 \times 10^{12}$  cubic feet gas

$$\text{Richness} = \frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.014 \times 10^6 \text{ bbl/mi}^2$$

Figure 49. Continued.

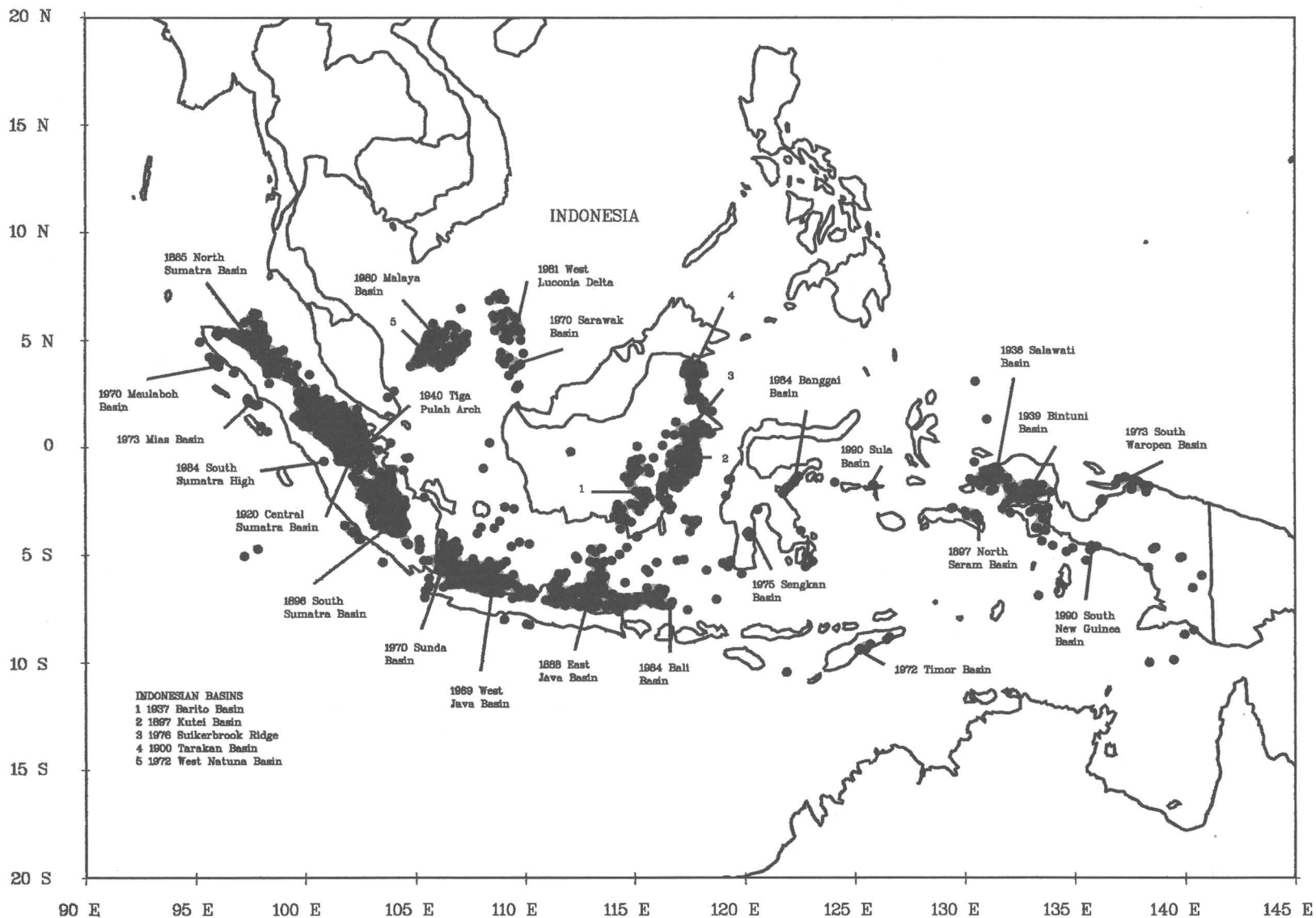
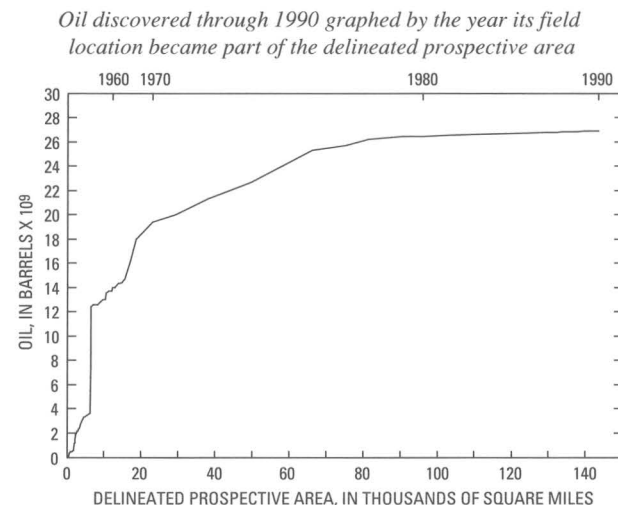
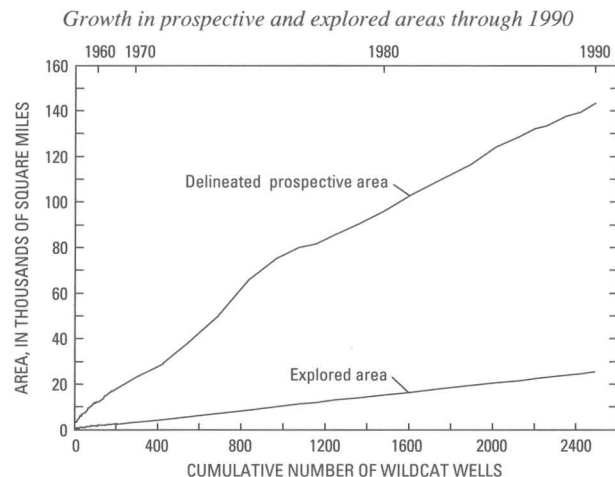


Figure 50. Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Indonesia, Asia.



#### *Exploration data*

Land area: 587,330 mi<sup>2</sup>

Delineated prospective area through 1990: 143,351 mi<sup>2</sup>

Explored area through 1990: 25,800 mi<sup>2</sup>

Wildcat wells through 1990: 2,489

Current growth in delineated prospective area per wildcat: 51.7 mi<sup>2</sup>

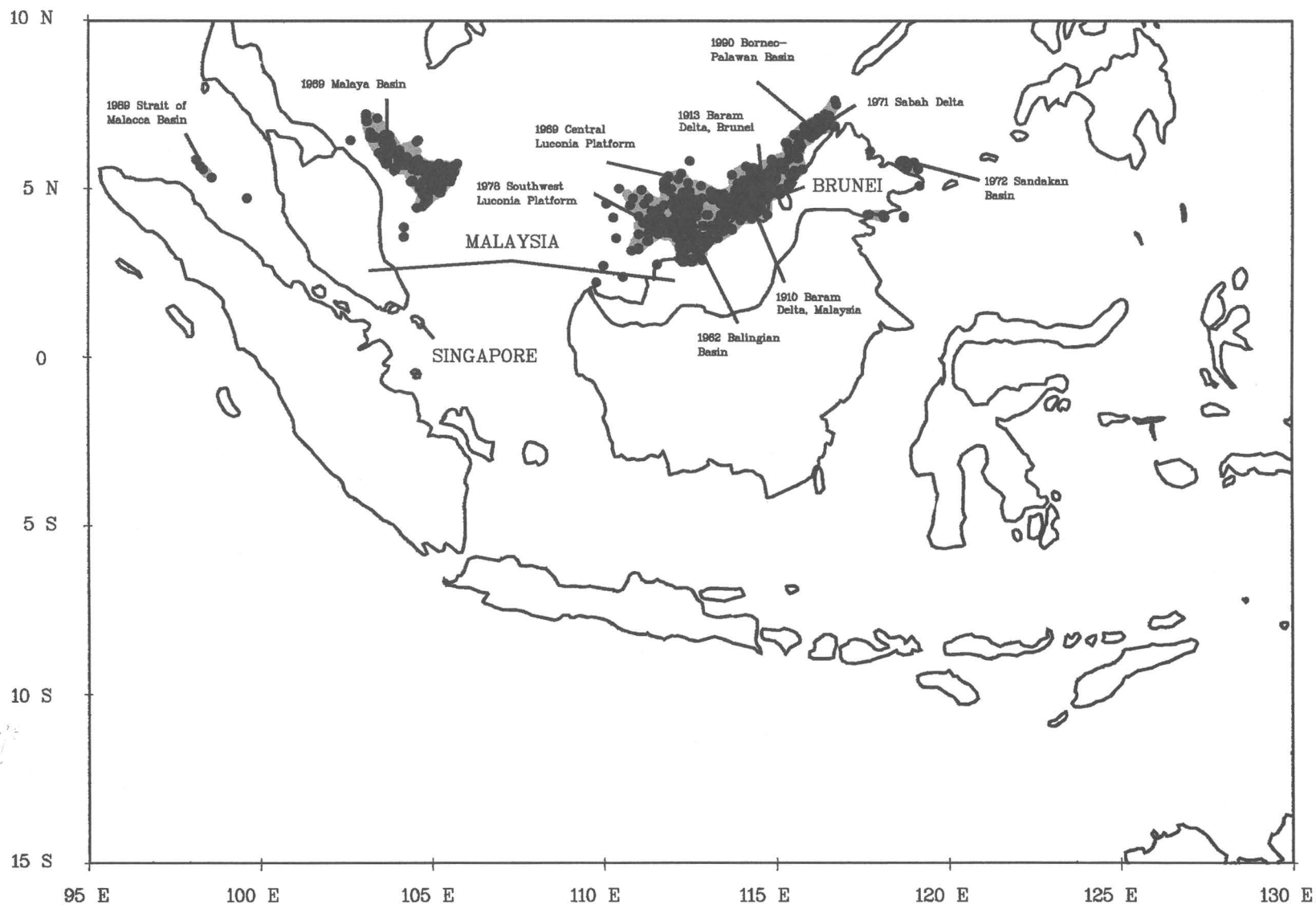
Reported discoveries of recoverable crude oil and gas through 1990:  
26.9 × 10<sup>9</sup> bbl oil and 154.0 × 10<sup>12</sup> cubic feet gas

$$\text{Richness} = \frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.188 \times 10^6 \text{ bbl/mi}^2$$

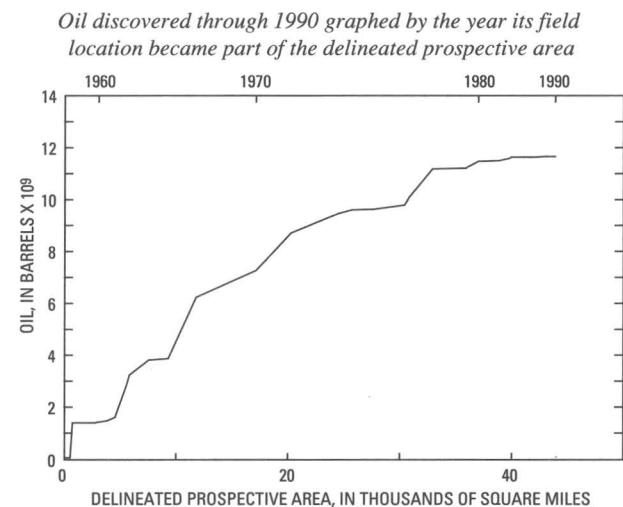
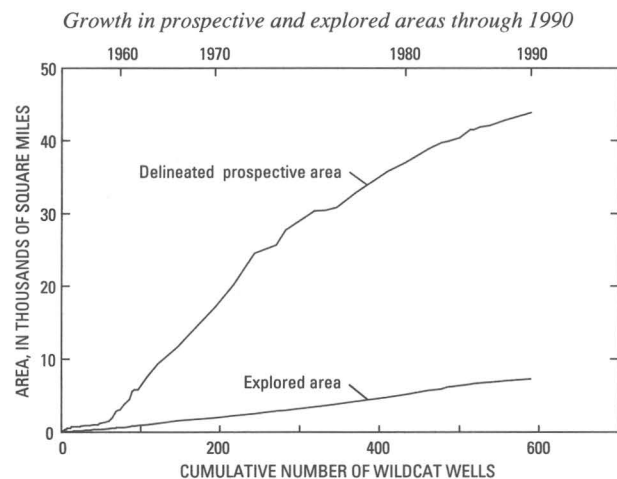
#### *Significant petroleum provinces*

| Significant petroleum province  | Year of first discovery in this province in Indonesia | Cumulative discoveries in this province in Indonesia through 1990 |                                     |  |
|---------------------------------|---|---|-------------------------------------|--|
|                                 |   | Crude oil   |                                     | Gas  |
|                                 |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)                | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| North Sumatra Basin . . . . .   | 1885  | 260   | 711                                 | 25,927   |
| East Java Basin . . . . .       | 1888  | 100   | 386                                 | 7,697  |
| South Sumatra Basin . . . . .   | 1896  | 1,421   | 2,915                               | 5,386  |
| Kutei Basin . . . . .           | 1897  | 2,655   | 3,349                               | 29,540   |
| Tarakan Basin . . . . .         | 1900  | 325   | 447                                 | 1,502  |
| Central Sumatra Basin . . . . . | 1920  | 11,397  | 13,399                              | 2,060  |
| Salawati Basin . . . . .        | 1936  | 351   | 724                                 | 493  |
| Barito Basin . . . . .          | 1937  | 137   | 180                                 | 66   |
| Tiga Pulau Arch . . . . .       | 1940  | 122   | 137                                 | 0  |
| West Java Basin . . . . .       | 1969  | 1,812   | 2,915                               | 6,641  |
| Sunda Basin . . . . .           | 1970  | 662   | 1,141                               | 639  |
| West Natuna Basin . . . . .     | 1972  | 215   | 396                                 | 2,329  |
| Malaya Basin . . . . .          | 1980  | 0   | 138                                 | 95   |
| Total . . . . .                 |   | 19,457  | 26,838                              | 82,375   |

**Figure 50.** Continued.



**Figure 51.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Malaysia, Brunei, and Singapore, Asia.



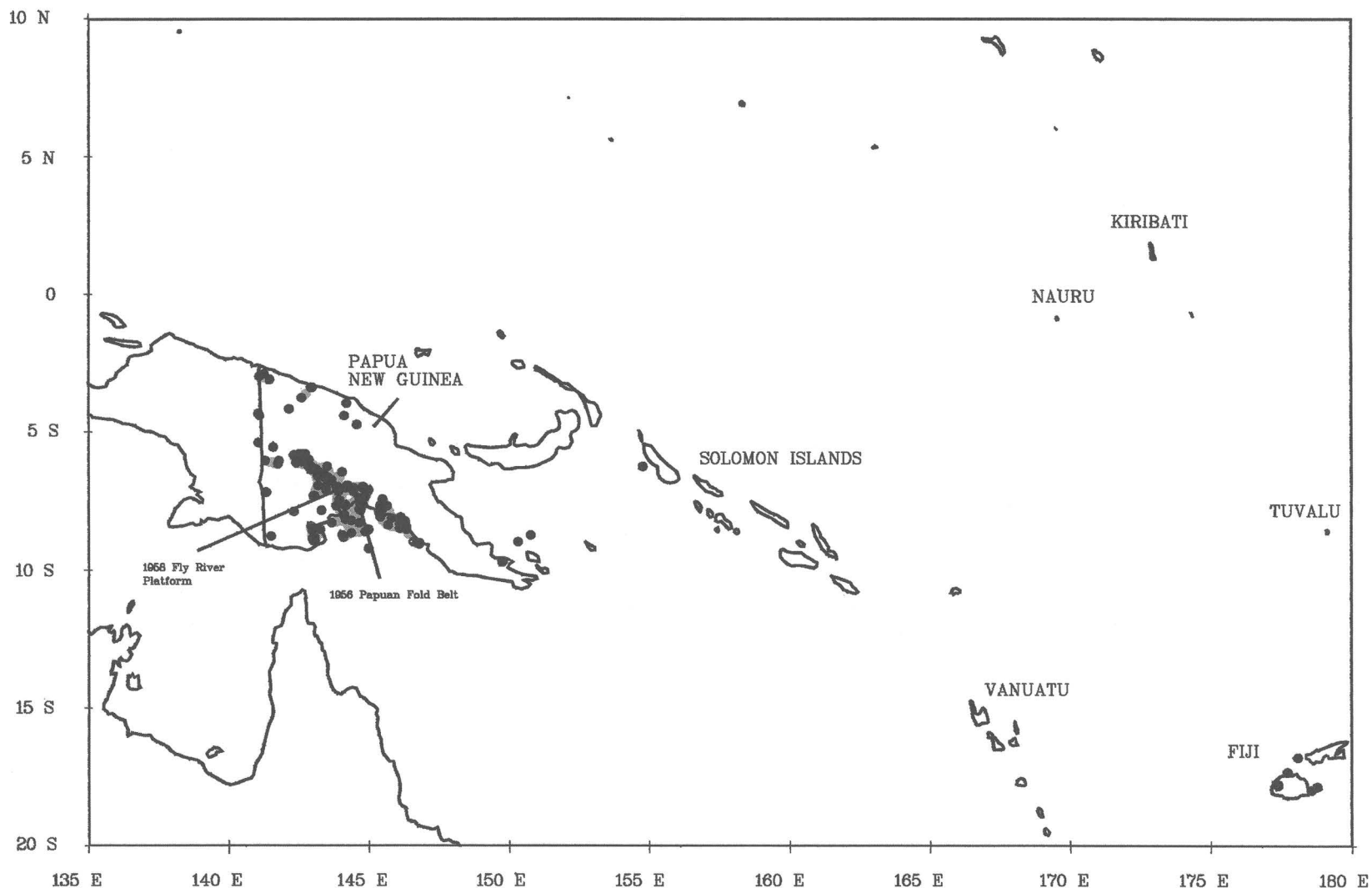
#### Exploration data

| Country        | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990: 43,847 mi <sup>2</sup>  |
|----------------|------------------------------|---|
| Malaysia.....  | 126,310                      | Explored area through 1990: 7,283 mi <sup>2</sup>   |
| Brunei.....    | 2,220                        | Wildcat wells through 1990: 589   |
| Singapore..... | 220                          |   |
| Total.....     | 128,750                      | Current growth in delineated prospective area per wildcat: 39 mi <sup>2</sup>   |
|                |                              | Reported discoveries of recoverable crude oil and gas through 1990: 11.7 × 10 <sup>9</sup> bbl oil and 65.3 × 10 <sup>12</sup> cubic feet gas |
|                |                              | Richness = $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$  |
|                |                              | = 0.266 × 10 <sup>6</sup> bbl/mi <sup>2</sup>   |

#### Significant petroleum provinces

| Significant petroleum province | Year of first discovery in this province in this country | Cumulative discoveries in this province in this country through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  |                                     | Gas  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                   | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Malaysia                       |  |  |                                     |  |
| Baram Delta.....               | 1910   | 1,977  | 2,173                               | 5,775  |
| Balingian Basin.....           | 1962   | 100  | 470                                 | 808  |
| Malaya Basin.....              | 1969   | 3,916  | 4,559                               | 18,392   |
| Total .....                    |  | 5,993  | 7,202                               | 24,975   |
| Brunei                         |  |  |                                     |  |
| Baram Delta.....               | 1913   | 3,482  | 3,901                               | 19,787   |

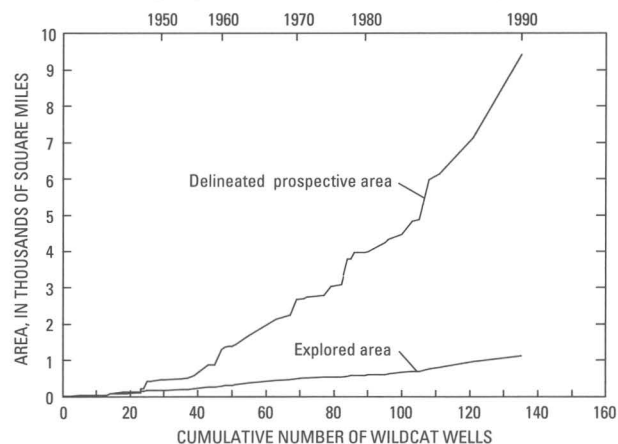
Figure 51. Continued.



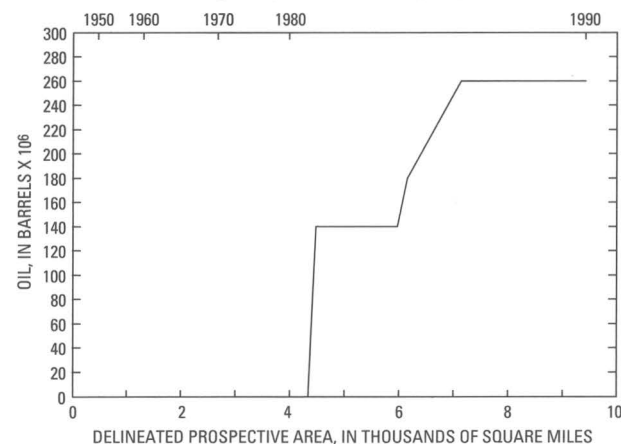
**Figure 52.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Papua New Guinea and Oceania, southwestern Pacific. For this report, Oceania is considered to consist of Vanuatu (formerly New Hebrides), Tonga, Solomon Islands, Fiji, Nauru, Kiribati, Tuvalu, and Western Samoa. Because Tonga and Western Samoa are east of the area mapped and have no reported wells, they are not shown.



Growth in prospective and explored areas through 1990



Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area



#### Exploration data

| Country                                 | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990:<br>9,415 mi <sup>2</sup>   |
|---|------------------------------|--|
| Papua New Guinea <sup>1</sup> . . . . . | 182,700                      | Explored area through 1990: 1,117 mi <sup>2</sup>  |
| Vanuatu . . . . .                       | 5,700                        | Wildcat wells through 1990: 135  |
| Tonga (not shown) . . . . .             | 270                          |  |
| Solomon Islands . . . . .               | 11,458                       | Current growth in delineated prospective area per<br>wildcat: 136 mi <sup>2</sup>  |
| Fiji . . . . .                          | 7,040                        |  |
| Nauru . . . . .                         | 8                            |  |
| Kiribati . . . . .                      | 266                          | Reported discoveries of recoverable crude oil and<br>gas through 1990: $0.260 \times 10^9$ bbl oil and<br>$7.89 \times 10^{12}$ cubic feet gas |
| Tuvalu . . . . .                        | 10                           |  |
| Western Samoa (not shown). . . . .      | 1,133                        |  |
| Total . . . . .                         | 208,585                      |  |

$$\text{Richness} = \frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$$

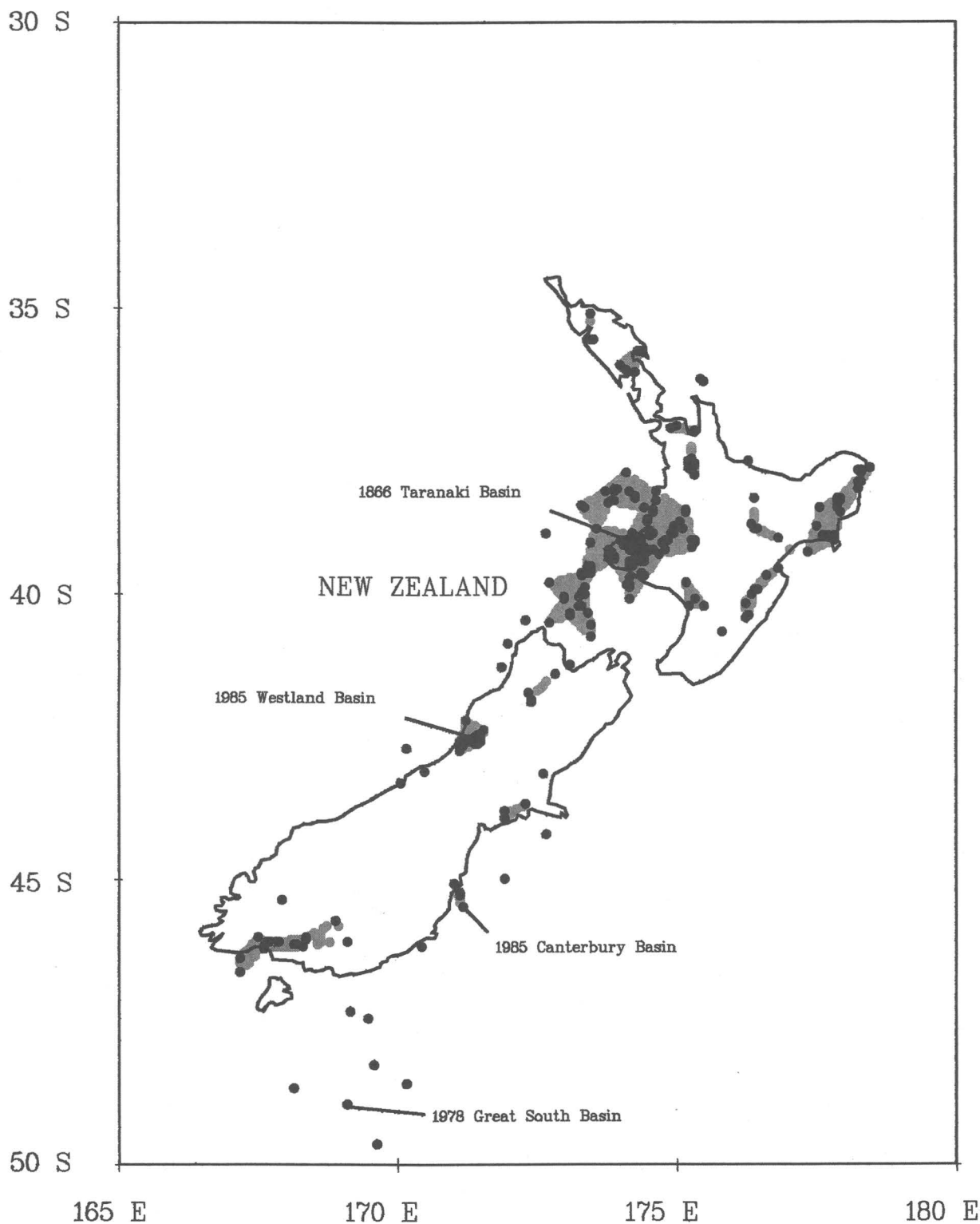
$$= 0.028 \times 10^6 \text{ bbl/mi}^2$$

<sup>1</sup>Land area for Papua New Guinea is from *Webster's New Collegiate Dictionary* (G. & C. Merriam Company, 1975).

#### Significant petroleum province

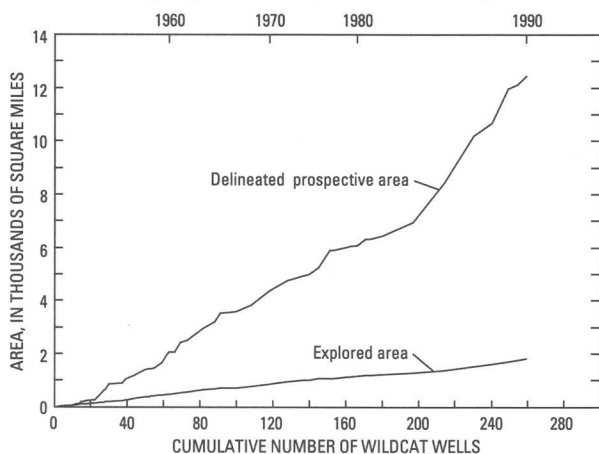
| Significant petroleum province | Year of first discovery in this province in Papua New Guinea | Cumulative discoveries in this province in Papua New Guinea through 1990 |                                     |  |
|--------------------------------|--|--|-------------------------------------|--|
|                                |  | Crude oil  | Gas                                 |  |
|                                |  | in 100-million-barrel fields (10 <sup>6</sup> bbl)                       | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Papuan Fold Belt . . . . .     | 1956   | 140  | 260                                 | 3,975  |

Figure 52. Continued.

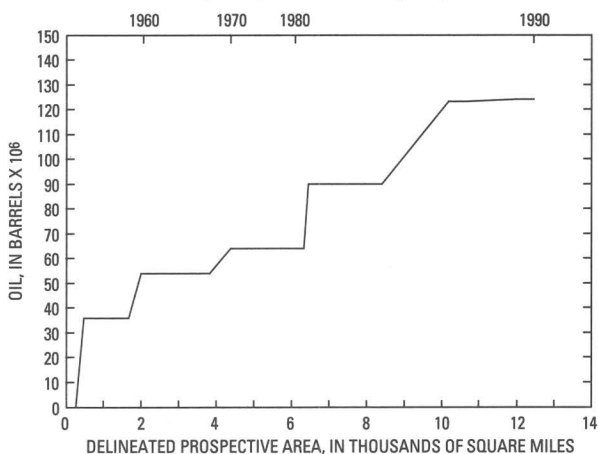


**Figure 53.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of New Zealand, southwestern Pacific.

*Growth in prospective and explored areas through 1990*



*Oil discovered through 1990 graphed by the year its field location became part of the delineated prospective area*



#### *Exploration data*

Land area: 103,416 mi<sup>2</sup>

Delineated prospective area through 1990: 12,442 mi<sup>2</sup>

Explored area through 1990: 1,816 mi<sup>2</sup>

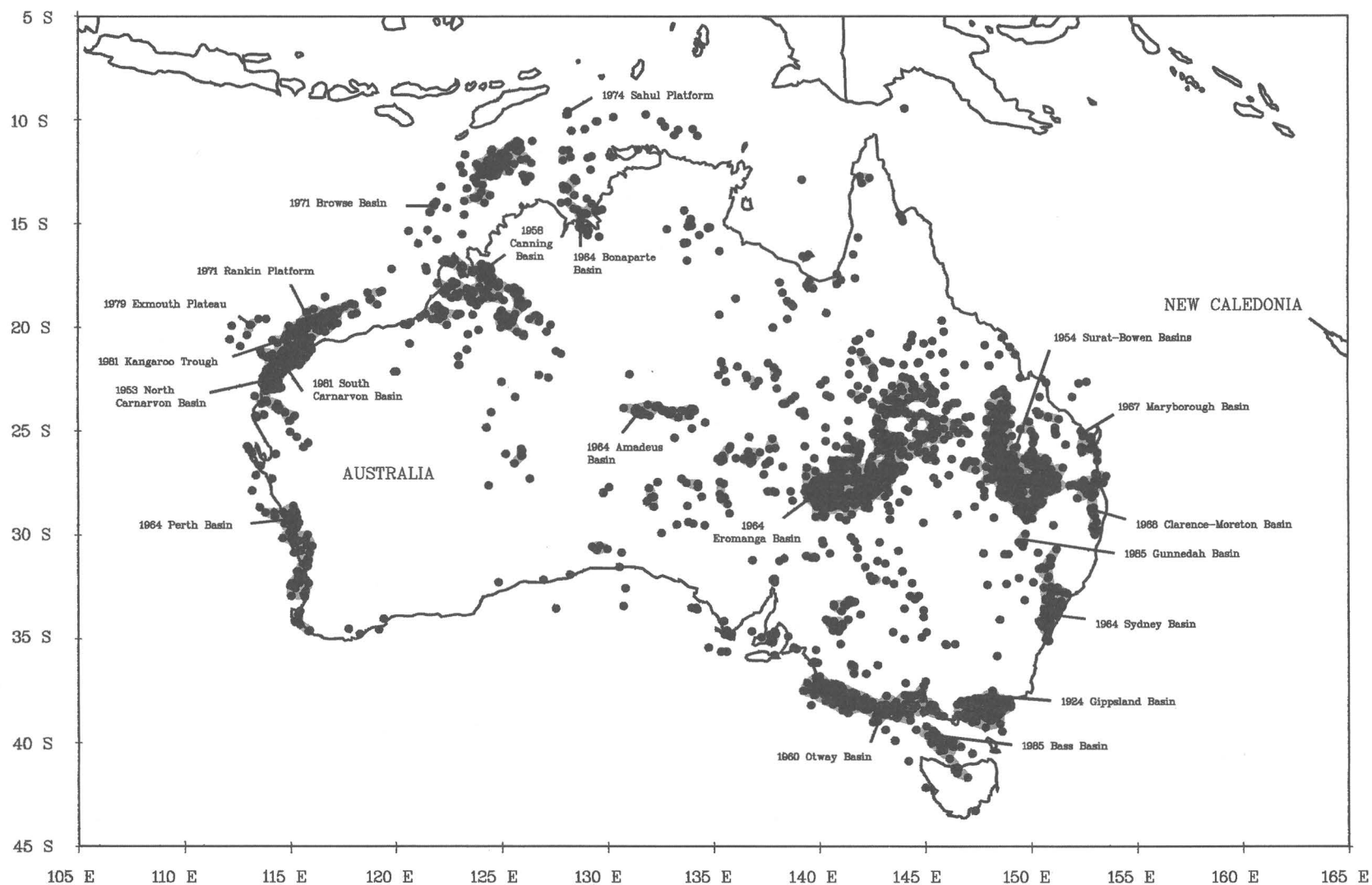
Wildcat wells through 1990: 259

Current growth in delineated prospective area per wildcat: 69 mi<sup>2</sup>

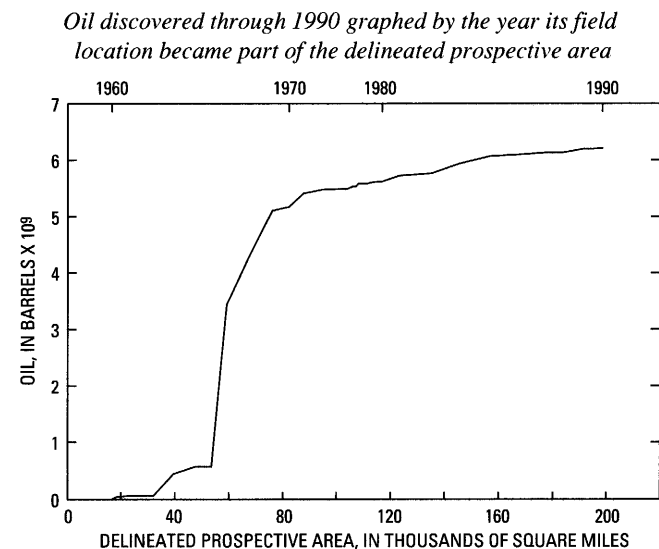
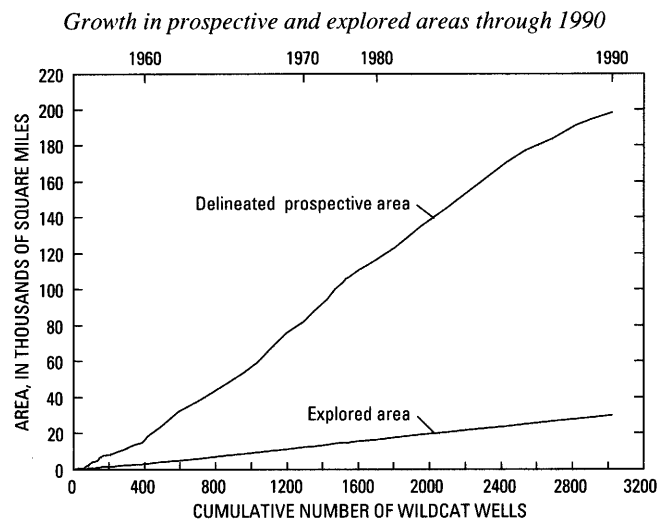
Reported discoveries of recoverable crude oil and gas through 1990:  
 $0.124 \times 10^9$  bbl oil and  $7.08 \times 10^{12}$  cubic feet gas

$$\text{Richness} = \frac{\text{total oil discoveries}}{\text{total delineated prospective area}} = 0.010 \times 10^6 \text{ bbl/mi}^2$$

**Figure 53.** Continued.



**Figure 54.** Delineated prospective areas (gray circles), explored areas (black circles), and known petroleum provinces of Australia and New Caledonia, southwestern Pacific. New Caledonia is an overseas territory of France.



*Exploration data*

| Country                 | Land area (mi <sup>2</sup> ) | Delineated prospective area through 1990: 198,354 mi <sup>2</sup>   |
|-------------------------|------------------------------|---|
| Australia . . . . .     | 2,974,581                    | Explored area through 1990: 29,921 mi <sup>2</sup>  |
| New Caledonia . . . . . | 7,200                        | Wildcat wells through 1990: 3,022   |
| Total . . . . .         | 2,981,781                    | Current growth in delineated prospective area per wildcat: 33 mi <sup>2</sup>   |
|                         |                              | Reported discoveries of recoverable crude oil and gas through 1990: 6.20 × 10 <sup>9</sup> bbl oil and 83.7 × 10 <sup>12</sup> cubic feet gas |
|                         |                              | Richness = $\frac{\text{total oil discoveries}}{\text{total delineated prospective area}}$  |
|                         |                              | = 0.031 × 10 <sup>6</sup> bbl/mi <sup>2</sup>   |

*Significant petroleum provinces*

| Significant petroleum province  | Year of first discovery in this province in Australia | Cumulative discoveries in this province in Australia through 1990 |                                     |  |
|---------------------------------|---|---|-------------------------------------|--|
|                                 |   | Crude oil   |                                     | Gas  |
|                                 |   | in 100-million-barrel fields (10 <sup>6</sup> bbl)                | in all fields (10 <sup>6</sup> bbl) | in all fields (10 <sup>9</sup> ft <sup>3</sup> ) |
| Gippsland Basin . . . . .       | 1924  | 4,185   | 4,546                               | 10,844   |
| North Carnarvon Basin . . . . . | 1953  | 454   | 695                                 | 2,773  |
| Bonaparte Basin . . . . .       | 1964  | 176   | 375                                 | 6,779  |
| Total . . . . .                 |   | 4,815   | 5,616                               | 20,396   |

Figure 54. Continued.



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