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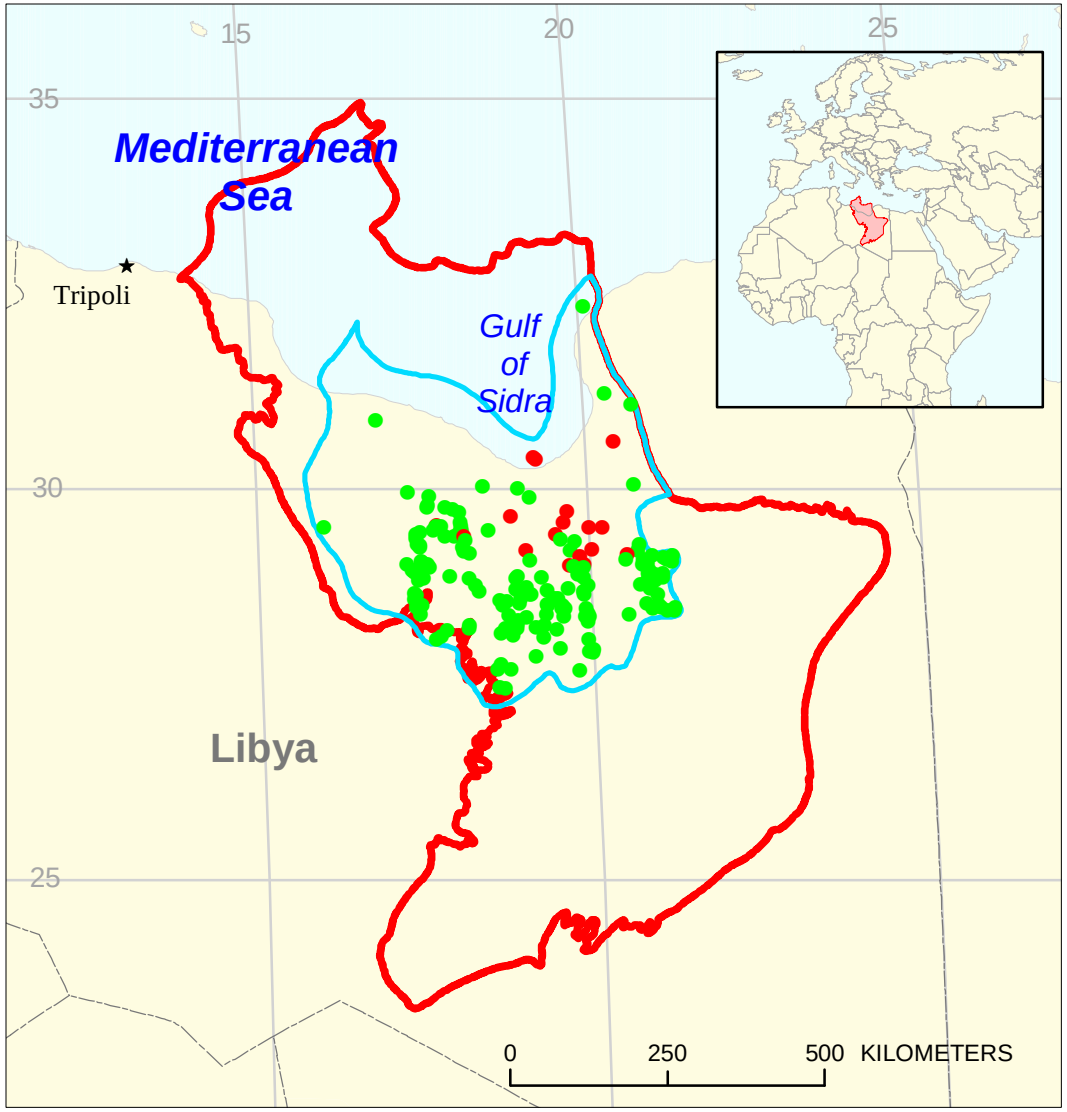
# Central Sirte Carbonates Assessment Unit 20430102




Central Sirte Carbonates Assessment Unit 20430102

Sirte Basin Geologic Province 2043

Geologic Summary

Detailed map of this assessment unit

Exploration/Discovery-History Data

- Plots of Known Field Sizes
- Plots of Grown Resources
- Tables

Assessment Input Data

Assessment Results

- Assessment Unit Summary
- Detailed Assessment Results
- Undiscovered Field-Size Distributions

**USGS PROVINCE:** Sirte Basin (2043) **GEOLOGIST:** T.S.Ahlbrandt

**TOTAL PETROLEUM SYSTEM:** Sirte-Zelten (204301)

**ASSESSMENT UNIT:** Central Sirte Carbonates (20430102)

**DESCRIPTION:** There is one dominant petroleum system in the Sirte Basin sourced by the Cretaceous (Campanian) Sirte Shale. In the Central Sirte Basin, carbonates of Upper Cretaceous, Paleocene and Eocene age produce in 150 fields on significant horst blocks or platforms (for example, the Beda and Zelten platforms). Reservoirs are largely carbonate build-ups and reefs mostly onshore with some established production offshore in the Gulf of Sirte to 200 m water depths. Carbonate reservoirs are largely related to two Upper Cretaceous and two Paleocene cycles of sedimentation in a syn-rift fill sequence; however, there is minor Mid-Cretaceous calcarenite production. There are many giant oil fields in this unit including Intistar, Beda, Defa, Waha, Haram, Zelten (Nasser), Hofra and Nafoora.

**SOURCE ROCKS:** The upper Cretaceous (Campanian) Sirte Shale of the Rakb Group is by far the dominant source rock. Geochemical data of 81 oils from the GeoMark database and published literature demonstrate that the Sirte Shale generates a low sulfur, high gravity oil with low gas oil ratios.

**MATURATION:** Generation is thought to have begun in Eocene time (variously timed at 50 Ma to 40 Ma) and continues to present. Onshore the petroleum generated is dominantly oil; however, offshore increased thermal gradients and deeper burial suggest higher gas oil ratios and natural gas potential.

**MIGRATION:** Petroleum commenced migration in the Eocene from regional grabens vertically into adjacent horsts particularly into carbonate buildups along the tops or margins of the major platforms.

**RESERVOIR ROCKS:** The Upper Cretaceous carbonate reservoirs are commonly dolomites whereas the lower Paleocene cycles include calcilutites, calcarenites, oolites and skeletal debris. The second Paleocene cycle has carbonate build-ups and reef reservoirs. The petroleum system is named for the Zelten Formation, which was deposited during this latter Paleocene transgression.

**TRAPS AND SEALS:** The Eocene (Ypresian) Gir Formation, particularly the Hon Evaporite Member is considered to be the dominant seal in the Sirte Basin. The section ranges is as thick as 1,305 m and halite forms 35 percent of the total section in some grabens.

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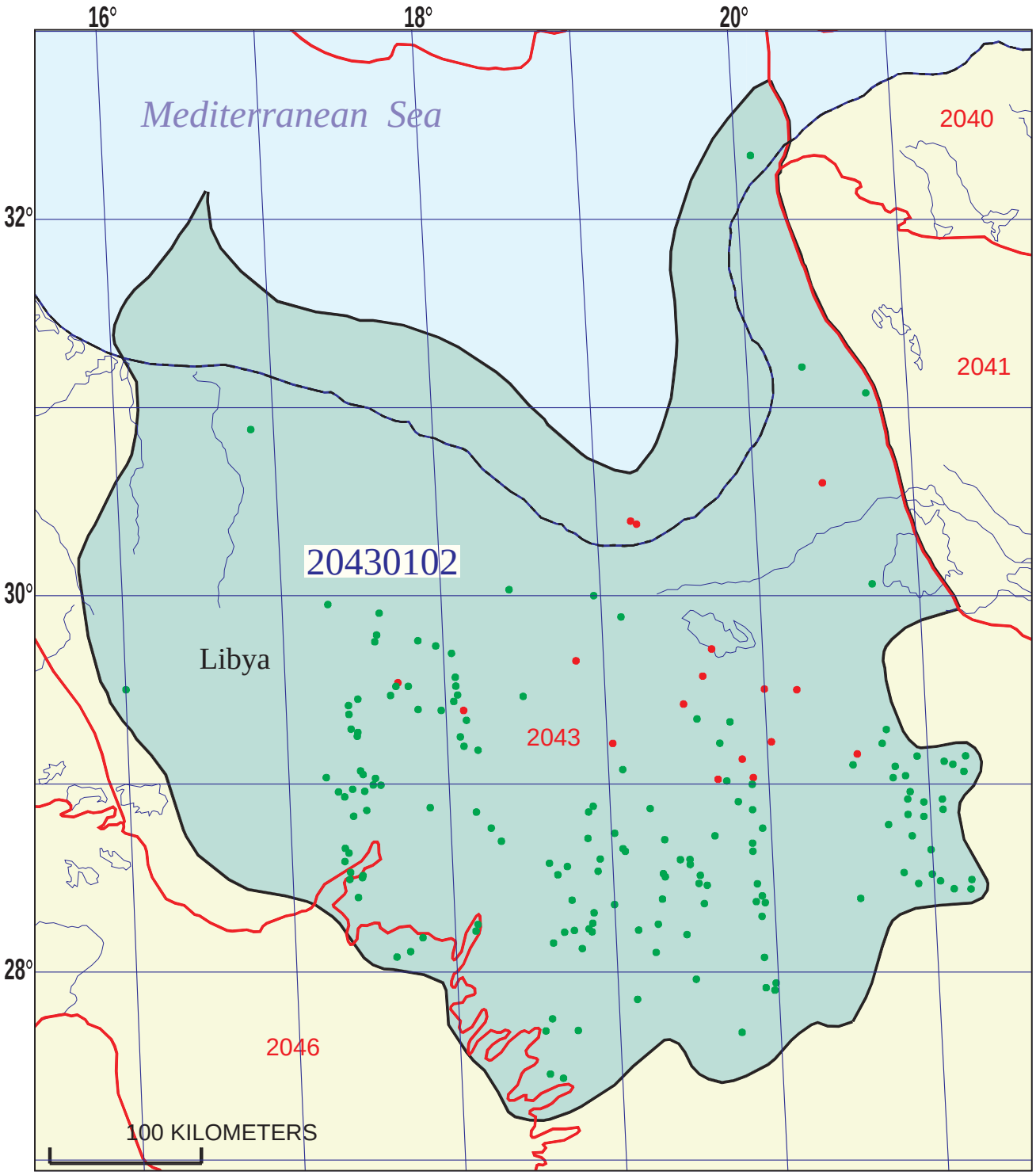
U.S. GEOLOGICAL SURVEY WORLD PETROLEUM ASSESSMENT 2000— DESCRIPTION AND RESULTS
U.S. Geological Survey World Energy Assessment Team




# Central Sirte Carbonates Assessment Unit - 20430102

EXPLANATION

- Hydrography
- Shoreline
- 2043 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 20430102 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

USGS science for a changing world

**SEVENTH APPROXIMATION**
**NEW MILLENNIUM WORLD PETROLEUM ASSESSMENT**
**DATA FORM FOR CONVENTIONAL ASSESSMENT UNITS**

| | | | |
|---|---|---|---|
| Date:…….. | 6/19/98 | | |
| Assessment Geologist:…….. | T.S. Ahlbrandt | | |
| Region:…….. | Middle East and North Africa | Number: | 2 |
| Province:…….. | Sirte Basin | Number: | 2043 |
| Priority or Boutique…… | Priority | | |
| Total Petroleum System:…… | Sirte-Zelten | Number: | 204301 |
| Assessment Unit:…… | Central Sirte Carbonates | Number: | 20430102 |
| * Notes from Assessor | Lower 48 growth factor. | | |

## CHARACTERISTICS OF ASSESSMENT UNIT

Oil (<20,000 cfg/bo overall) **or** Gas (≥20,000 cfg/bo overall):… Oil

What is the minimum field size?……. 5 mmboe grown (≥1mmboe)
(the smallest field that has potential to be added to reserves in the next 30 years)

Number of discovered fields exceeding minimum size:…… Oil: 123 Gas: 14
Established (>13 fields) _____ Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 44.0 2nd 3rd 28.7 3rd 3rd 28.7
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 523.6 2nd 3rd 347.8 3rd 3rd 185.5

**Assessment-Unit Probabilities:**

| Attribute | Probability of occurrence (0-1.0) |
|---|---|
| 1. **CHARGE:** Adequate petroleum charge for an undiscovered field ≥ minimum size…… | 1.0 |
| 2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size…… | 1.0 |
| 3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size | 1.0 |

***Assessment-Unit GEOLOGIC Probability*** (Product of 1, 2, and 3):…….. 1.0

4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field ≥ minimum size…… 1.0

## UNDISCOVERED FIELDS

**Number of Undiscovered Fields:** How many undiscovered fields exist that are ≥ minimum size?:
(uncertainty of fixed but unknown values)

| | | | | | |
|---|---|---|---|---|---|
| Oil fields:……min. no. (>0) | 20 | median no. | 80 | max no. | 140 |
| Gas fields:……min. no. (>0) | 10 | median no. | 20 | max no. | 40 |

**Size of Undiscovered Fields:** What are the anticipated sizes (**grown**) of the above fields?:
(variations in the sizes of undiscovered fields)

| | | | | | | |
|---|---|---|---|---|---|---|
| Oil in oil fields (mmbo)…… | min. size | 5 | median size | 25 | max. size | 1000 |
| Gas in gas fields (bcfg):…… | min. size | 30 | median size | 150 | max. size | 6000 |

Assessment Unit (name, no.)
Central Sirte Carbonates, 20430102

## AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

| Oil Fields: | minimum | median | maximum |
|---|---|---|---|
| Gas/oil ratio (cfg/bo)…… | 400 | 1000 | 1600 |
| NGL/gas ratio (bngl/mmcfg)…… | 50 | 60 | 70 |

| Gas fields: | minimum | median | maximum |
|---|---|---|---|
| Liquids/gas ratio (bngl/mmcfg)…… | 20 | 30 | 40 |
| Oil/gas ratio (bo/mmcfg)…… | | | |

## SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS

(variations in the properties of undiscovered fields)

| Oil Fields: | minimum | median | maximum |
|---|---|---|---|
| API gravity (degrees)…… | 26.9 | 38 | 55 |
| Sulfur content of oil (%)…… | 0.09 | 0.45 | 1.31 |
| Drilling Depth (m) …… | 1000 | 2000 | 3500 |
| Depth (m) of water (if applicable)…… | 0 | 150 | 300 |

| Gas Fields: | minimum | median | maximum |
|---|---|---|---|
| Inert gas content (%)…… | | | |
| $CO_2$ content (%)…… | | | |
| Hydrogen-sulfide content (%)…… | | | |
| Drilling Depth (m)…… | 2000 | | 4500 |
| Depth (m) of water (if applicable)…… | 0 | 150 | 300 |

Assessment Unit (name, no.)
Central Sirte Carbonates, 20430102

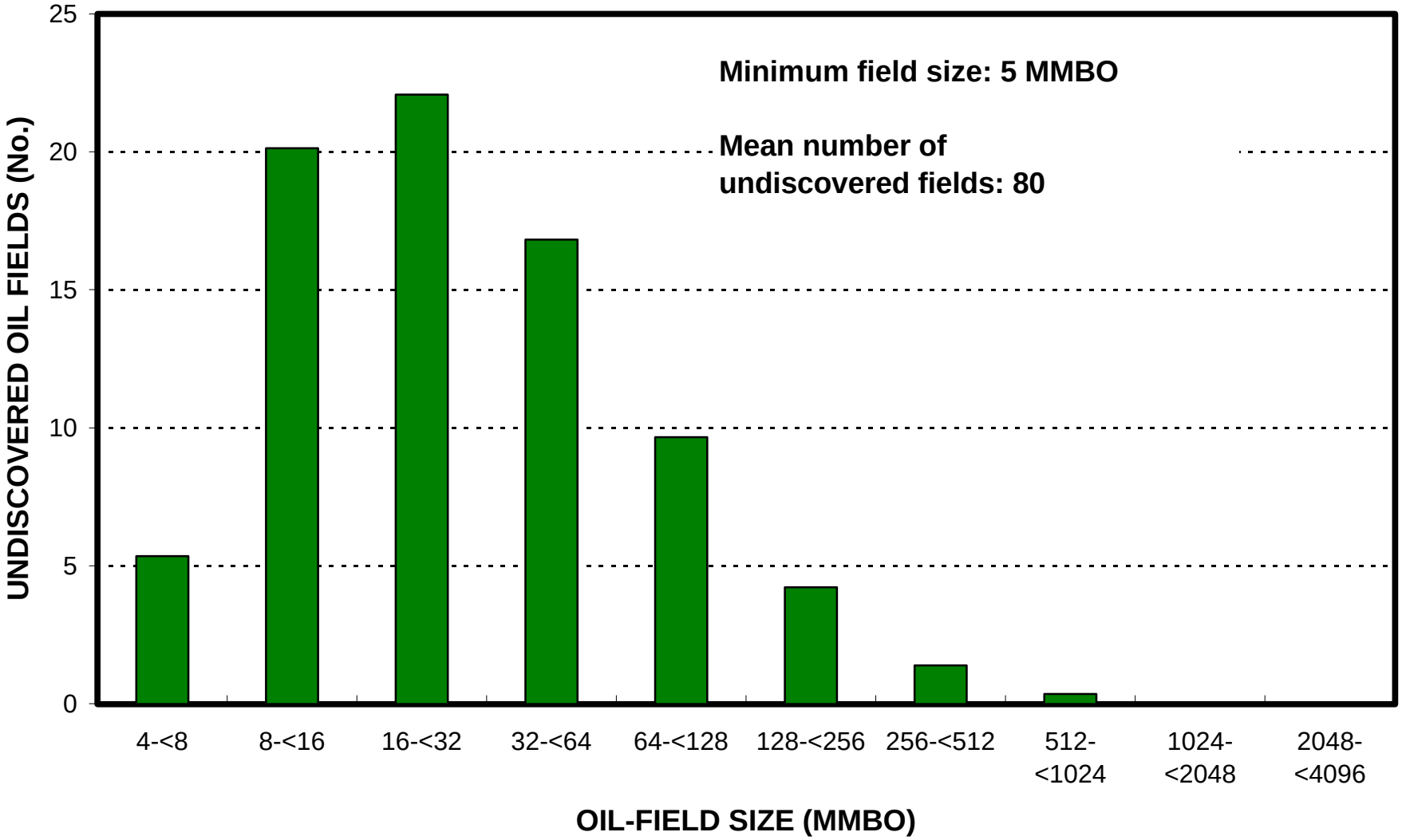
**ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS** (uncertainty of fixed but unknown values)

1. Libya represents 100 areal % of the total assessment unit

| Oil in Oil Fields: | minimum | median | maximum |
|---|---|---|---|
| Richness factor (unitless multiplier):…… | | | |
| Volume % in parcel (areal % x richness factor):… | | 100 | |
| Portion of volume % that is offshore (0-100%)…… | | 25 | |

| Gas in Gas Fields: | minimum | median | maximum |
|---|---|---|---|
| Richness factor (unitless multiplier):…… | | | |
| Volume % in parcel (areal % x richness factor):… | | 100 | |
| Portion of volume % that is offshore (0-100%)…… | | 25 | |

# Central Sirte Carbonates, AU 20430102
## Undiscovered Field-Size Distribution



# Central Sirte Carbonates, AU 20430102
# Undiscovered Field-Size Distribution