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U86MAR03WYUS

STATUS REPORT

Scientific Name of Taxon: ANTENNARIA ARCUATA Cronq.
Common Name(s) of Taxon: Meadow Pussytoes
Family: Asteraceae
State(s) Where Taxon Occurs: USA; Wyoming, Idaho, Nevada
Recommended Federal Status: Category 2 (additional inventory
and monitoring needed)
Author(s) of Report: Hollis Marriott
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3165 University Station
Laramie, WY 82071
Original Date of Report: 30 November 1986
Date of Most Recent Revision:

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I. SPECIES INFORMATION

1. Classification and Nomenclature

A. Taxon

1. Scientific Name:

a. Binomial:

Antennaria arcuata Cronq.

b. Bibliographic Citation:

Cronquist, A. 1950. Notes on the Compositae of the northwestern United States. Leaflet. West. Bot. 6:41-56.

c. Type Specimen(s):

USA, IDAHO, Blaine County: in wild hay meadow 9 miles east of Carey; 31 July 1946; Christ 16065 (WS).

2. Pertinent Synonyms: None

3. Common Names: Meadow Pussytoes

4. Taxon Codes:

RMHTF Code: PDASTOH050

5. Size of Genus:

25 or 30 species (Cronquist 1955)

B. Family Classification

1. Family Name: Asteraceae

2. Pertinent Synonyms: Compositae

3. Common Names: Sunflower

C. Major Plant Group: Dicotyledoneae

D. History of Knowledge of Taxon

This taxon was described by Cronquist (1950) from a 1946 collection by J. H. Christ (16065) from hayfields near Carey, Idaho (Blaine County). The type specimen is deposited in the Marion Ownbey Herbarium at Washing-

ton State University in Pullman, Washington (WS). A specimen from the Atlantic City-Sweetwater River area in Fremont County, Wyoming, dated 1905, was identified as Antennaria arcuata by Cronquist in 1952. The taxon was relocated in the Atlantic City area in 1977. Currently, there are 20 occurrences known from the state, all in Fremont County. In Nevada, the species is known from two sites in Elko County.

E. Current Alternative Taxonomic Treatments

None

2. Present Legal or Other Formal Status

A. International

1. Present Designated or Proposed Legal Protection or Regulation:

None

2. Other Current Formal Status Recommendations:

None

3. Review of Past Status:

None

B. National

1. United States

- a. Present Designated or Proposed Legal Protection or Regulation:

US Fish and Wildlife Service, Notice of Review, Category 2, FR 50(188):39525-39584, 27 September 1985.

- b. Other Current Formal Status Recommendations:

Heritage Program Ranking - G2S2 (RMHTF 1986)

- c. Review of Past Status:

Heritage Program Ranking - G1S1 (WNHP 1983)

C. State

1. Wyoming

- a. Present Designated or Proposed Legal Protection or Regulation:

No current legislated regulations or protection.

- b. Other Current Formal Status Recommendations:

Heritage Program Ranking - G2S2 (RMHTF 1986)

- c. Review of Past Status:

Heritage Program Ranking - G1S1 (WNHP 1983)

2. Idaho

- a. Present Designated or Proposed Legal Protection or Regulation:

No current legislated regulations or protection.

- b. Other Current Formal Status Recommendations:

Heritage Program Ranking - G2S1 (RMHTF, INHP)

- c. Review of Past Status:

Heritage Program Ranking - G1S1 (INHP)

3. Nevada

a. Present Designated or Proposed Legal Protection or Regulation:

No current legislated regulations or protection.

b. Other Current Formal Status Recommendations:

Heritage Program Ranking - G2S1 (RMHTF, NNHP)

c. Review of Past Status:

Heritage Program Ranking - G1S1 (NNHP)

3. Description

A. General Description

Plants loosely white-woolly, perennial by means of conspicuously arching stolons about 1 dm long or less, the stolons rooting at the end and giving rise to another short-lived plant with a single strict flowering stem 3-4 dm tall; basal leaves oblanceolate, several cm long, but few and not persistent; cauline leaves narrow but well developed, moderately numerous, gradually reduced upwards; heads rather many in a close terminal cluster; involucre about 5 mm high, tomentose below, the bracts whitish and minutely striate above; pappus bristles only slightly and irregularly united at the base (Cronquist 1950).

B. Local Field Characters

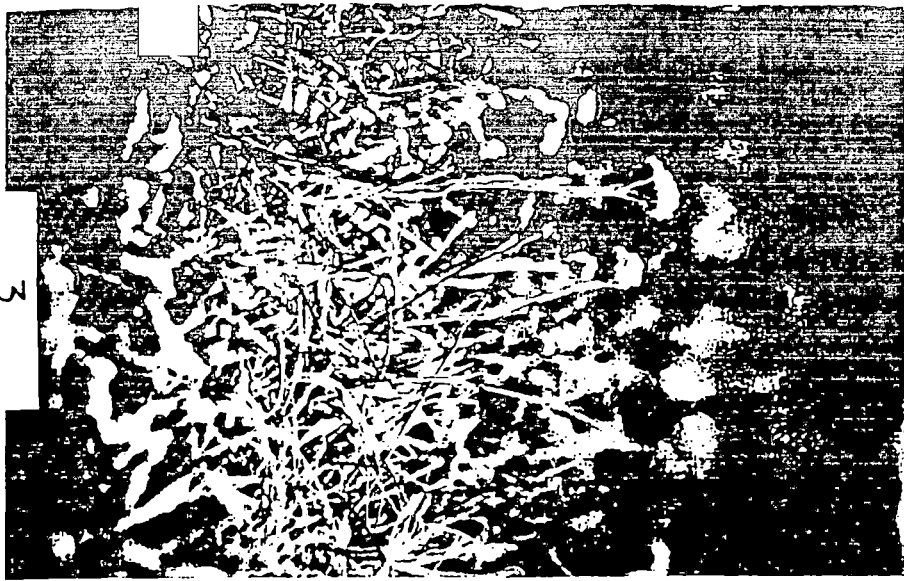
Although the flowering stems of Antennaria arcuata resemble those of A. microphylla from a distance, the stolons of meadow pussytoes exclude it from confusion with other taxa.

C. Identifying Characteristics of Material Which is in Interstate or International Trade or Commerce

No material is known to be or expected to be in interstate or international trade or commerce.

D. Photographs and/or Line Drawings

See following pages and slides in Appendix A.



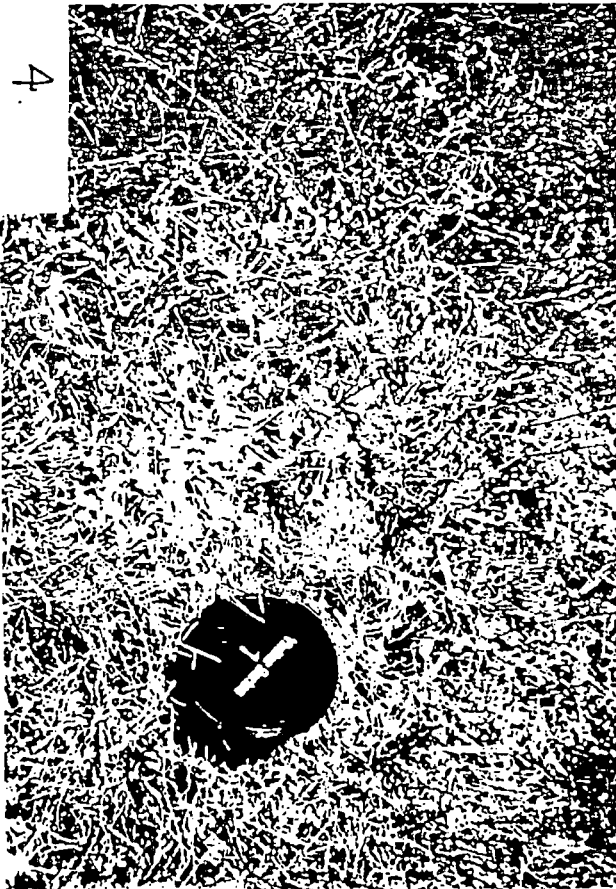
3.

1. Hummock meadow with Antennaria arcuata on dry hummocks in foreground; East Fork Long Creek Tributary looking south (Tin Cup Mountain in background); August 1986.

2. Antennaria arcuata on dry hummock, East Fork Long Creek Tributary; August 1986.

3. Antennaria arcuata; August 1986.

4. Antennaria arcuata, vegetative mat; August 1986.



4.



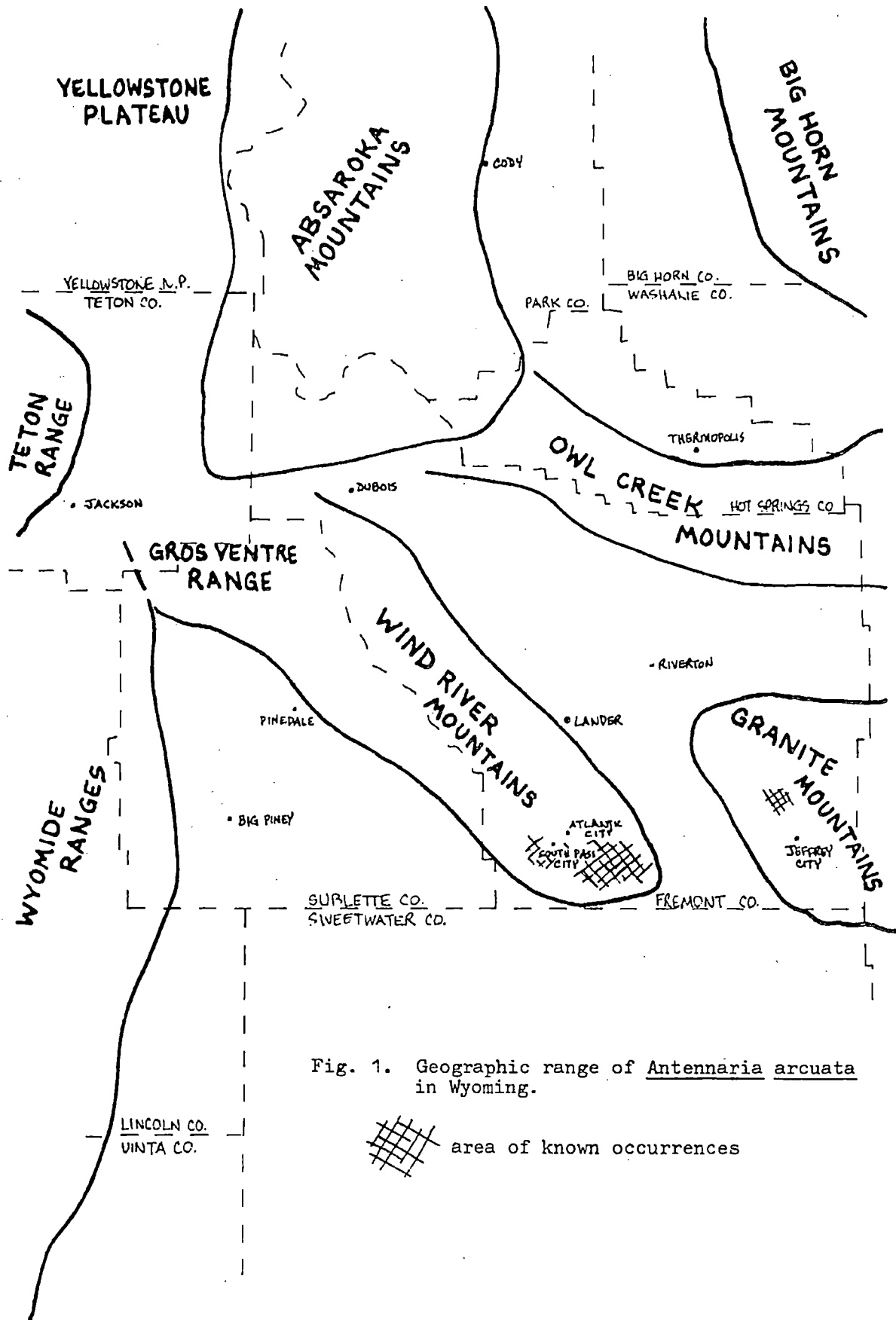



Fig. 1. Geographic range of *Antennaria arcuata* in Wyoming.

 area of known occurrences

- 03 FREMONT Granite Creek II
Radium Spring Quadrangle
T28N R98W S22 W1/2
- 04 FREMONT Upper Mormon Creek
Lewiston Lakes Quadrangle
T28N R98W S24 NW, S13 SW
- 05 FREMONT Willow Creek Tributary E
Atlantic City Quadrangle
T28N R99W S4 SW SW, S5 SE SE
- 06 FREMONT Long Slough
Atlantic City Quadrangle
T28N R99W S22 SW, S27 NW
- 07 FREMONT Harris Slough
Radium Springs Quadrangle
T28N R99W S13 SW, S24 NW
- 08 FREMONT Harris Slough Tributary E
Circle Bar Lake Quadrangle
T28N R99W S25 SW
- 09 FREMONT McLean Meadows
Lewiston Lakes Quadrangle
T29N R97W S31 NW
- 10 FREMONT Level Meadows Creek
Radium Springs Quadrangle
T29N R98W S14 W1/2, SE1/4
- 11 FREMONT Deep Creek Tributary N
Radium Springs Quadrangle
T29N R98W S22 SW SW, S27 NW NW, S28 NE NE
- 12 FREMONT Gillespie Place
Radium Springs Quadrangle
T29N R98W S26 W1/2, S35 NW
- 13 FREMONT Strawberry Creek Tributary NE
Radium Springs Quadrangle
T29N R98W S29 SW, S30 SE
- 14 FREMONT Sweetwater Canyon N
Lewiston Lakes Quadrangle
T29N R98W S36 SE, T29N R97W S31 SW, T28N R98W S2 NE
- 15 FREMONT Strawberry Creek-Crows Nest
Radium Springs Quadrangle
T29N R99W S13 SW

- 16 FREMONT Rock Creek
Radium Springs Quadrangle
T29N R99W S35 E1/2
- 17 FREMONT Pine Creek S
South Pass City Quadrangle
T28N R101W S1 NW NW NW
- 18 FREMONT Fish Creek Outcrops
Anderson Ridge, South Pass City Quadrangles
T29N R101W S34 CTR NE, SE SE
- 19 FREMONT Buffalo Creek Tributary
Muskrat Basin Quadrangle
T31N R92W S17 NE NE, S8 SW SE SE
- 20 FREMONT East Fork Long Creek Tributary
Tin Cup Mountain Quadrangle
T31N R93W S1 NW SW, S2 NE SE

NEVADA:

- 21 ELKO Belcher Meadow
Mountain City Quadrangle (NV-ID)
T45N R55E S32
- 22 ELKO Saval Ranch
Mahala Creek West
T39N R54E S13

IDAHO:

- 23 BLAINE Huff Creek Meadow
Paddleford Flat Quadrangle
T01S R22E S01 SW

2. Populations Known or Assumed Extirpated:

None

3. Sites Where Present Status Not Known:

None

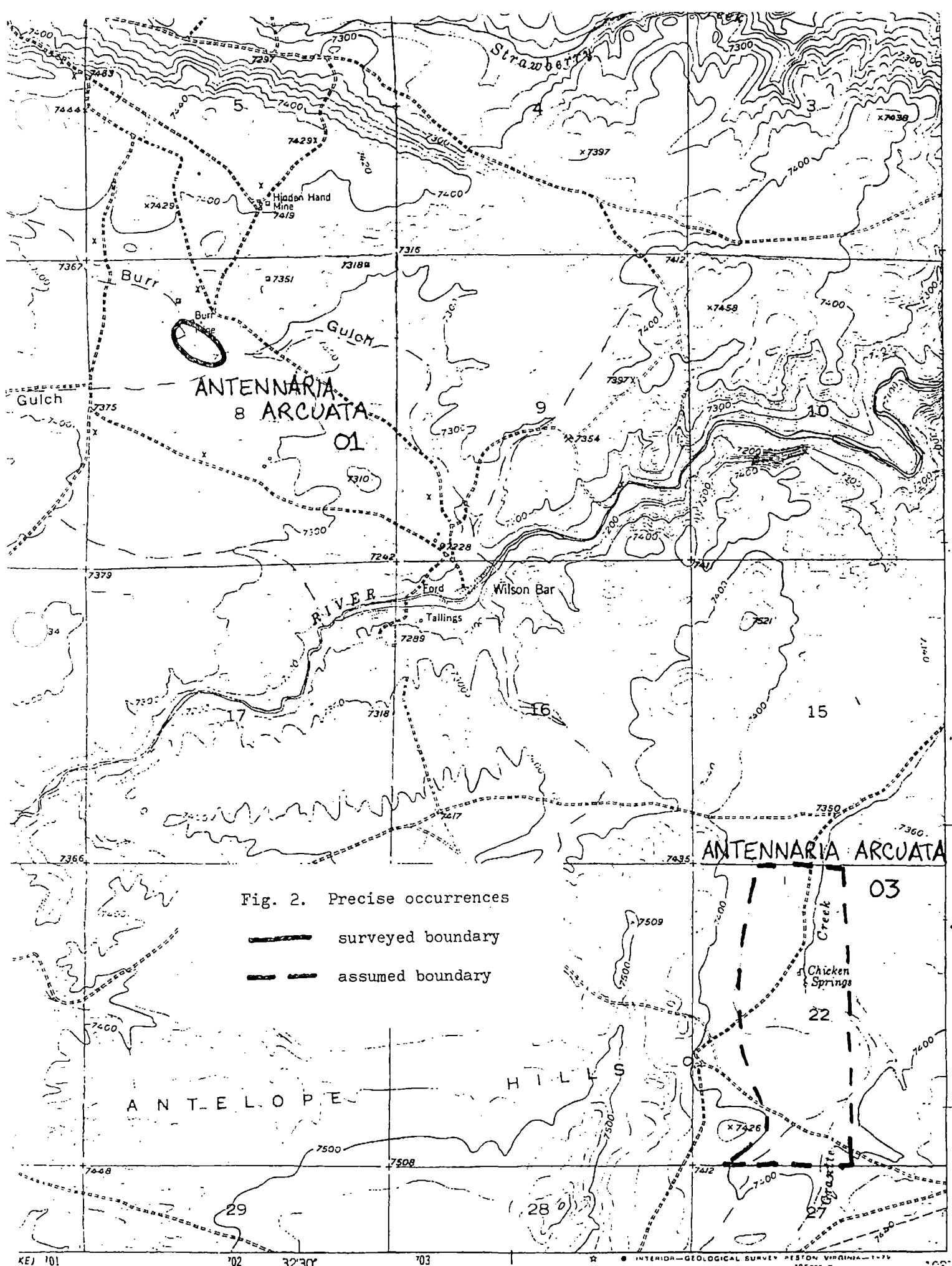




Fig. 2. Precise occurrences

-  surveyed boundary
-  assumed boundary

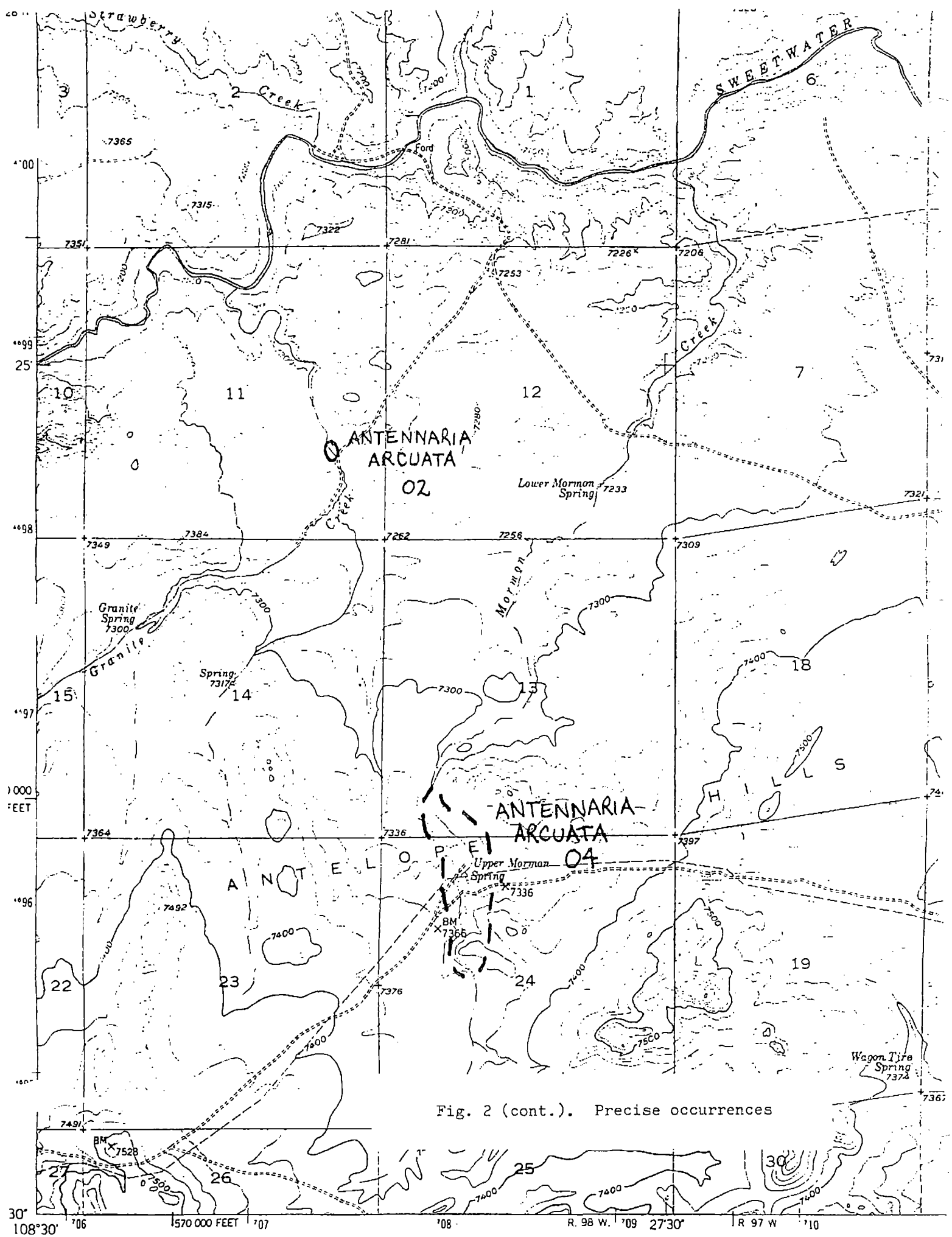


Fig. 2 (cont.). Precise occurrences

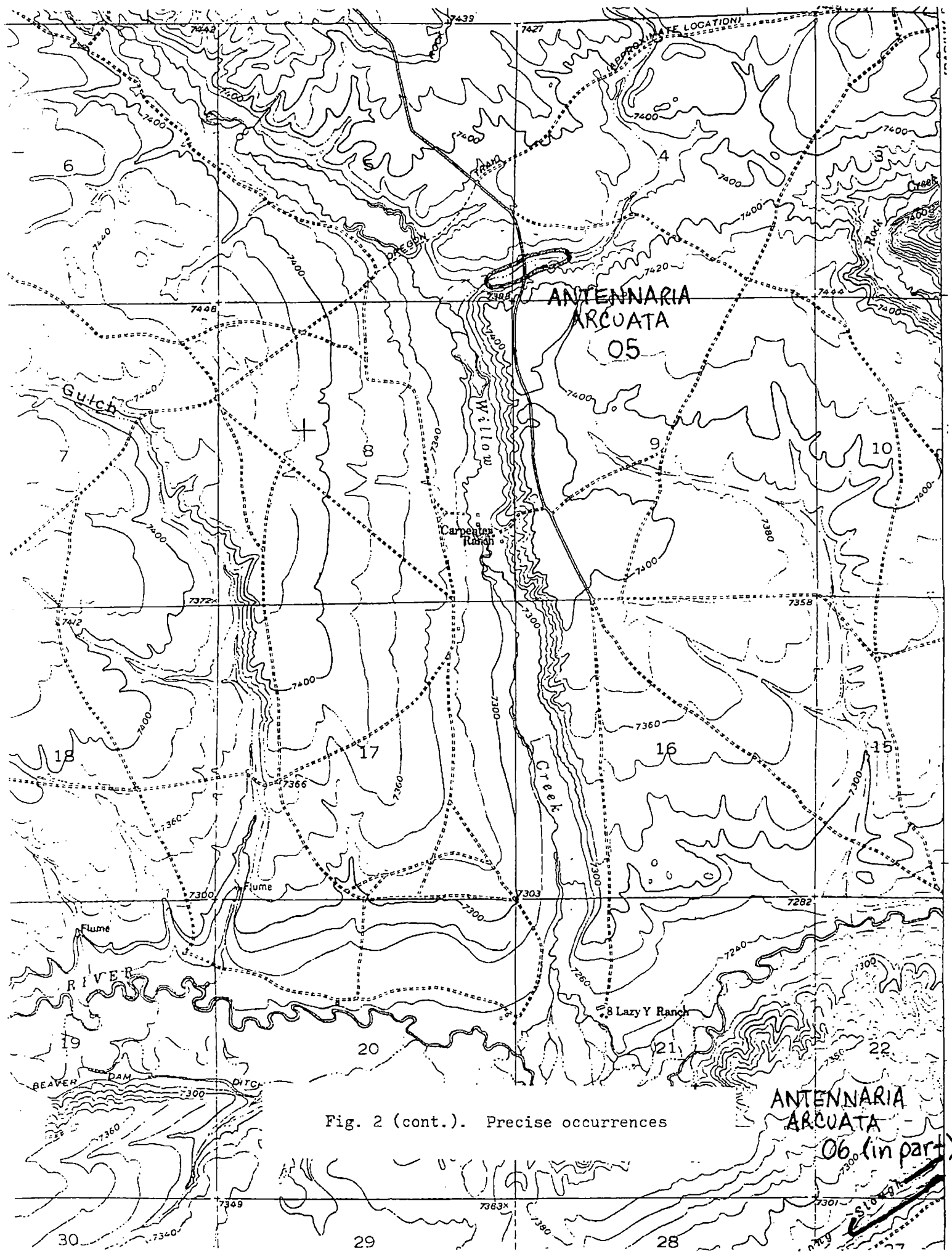


Fig. 2 (cont.). Precise occurrences

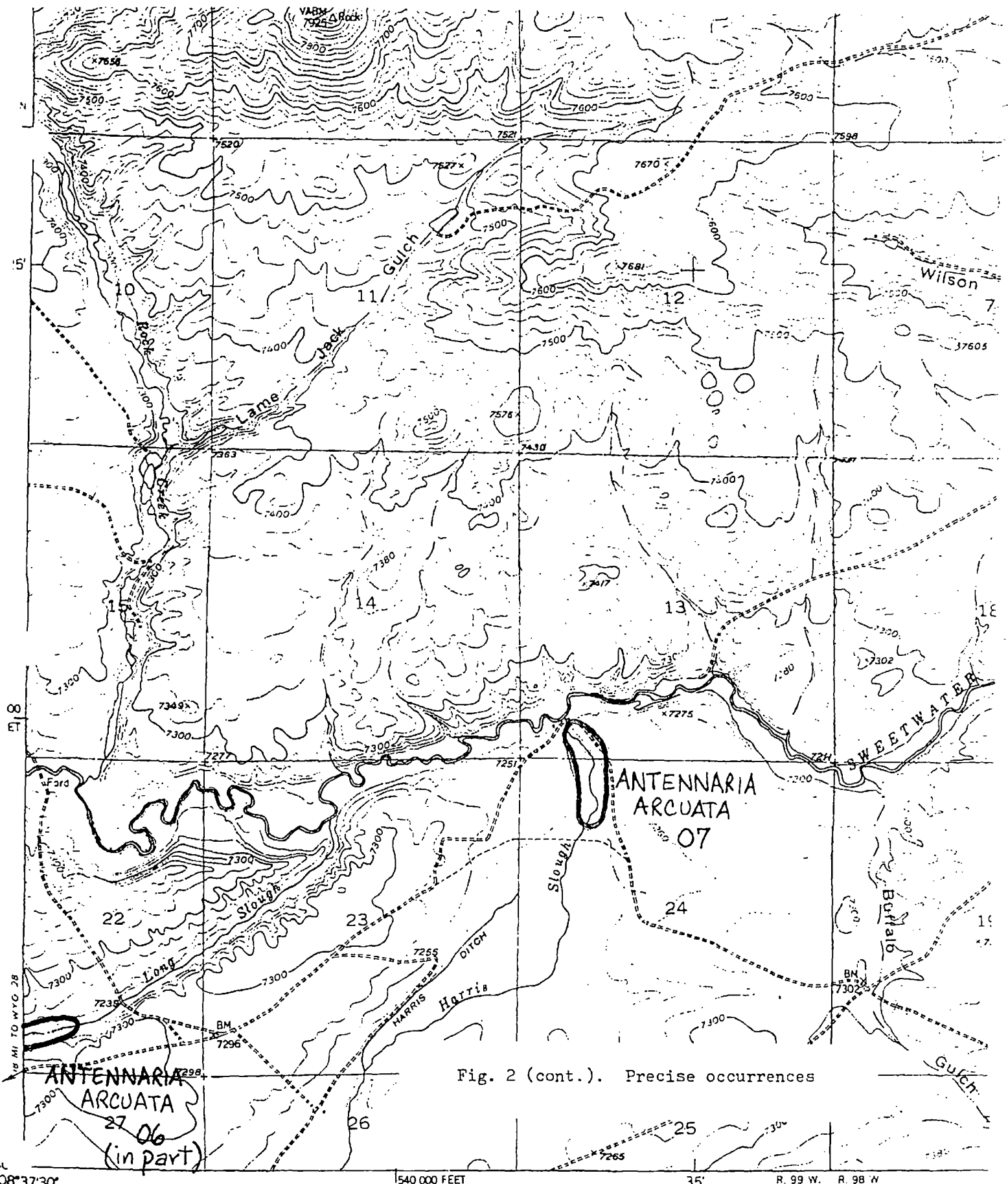
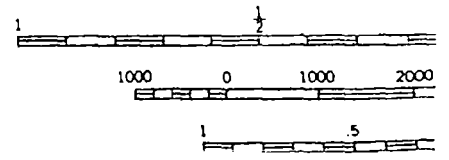


Fig. 2 (cont.). Precise occurrences

38°37'30"
 Mapped, edited, and published by the Geological Survey
 as part of the Department of the Interior program
 for the development of the Missouri River Basin
 Control by USGS and USC&GS
 Topography from aerial photographs by multiplex methods
 Aerial photographs taken 1940. Field check 1953



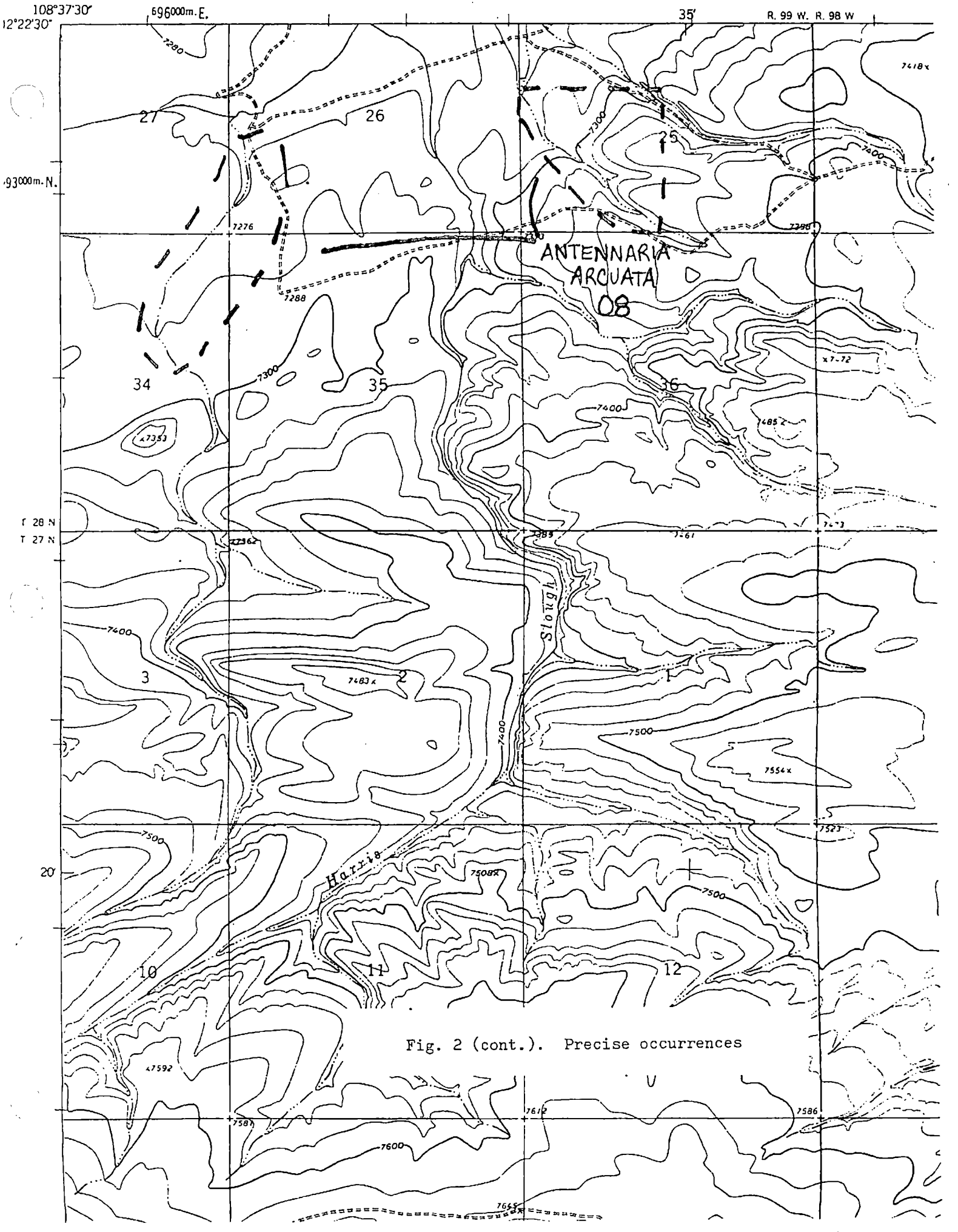


Fig. 2 (cont.). Precise occurrences

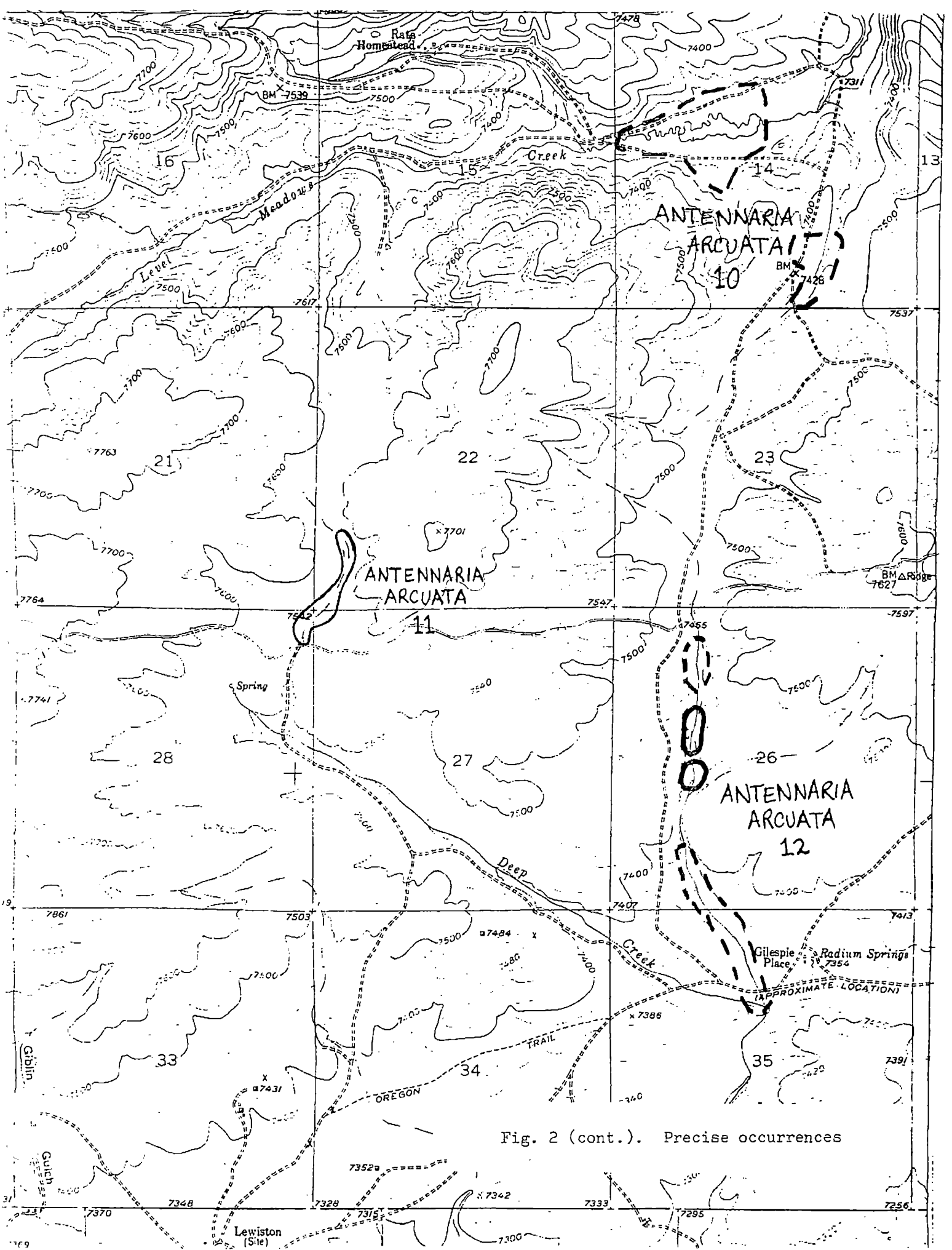


Fig. 2 (cont.). Precise occurrences

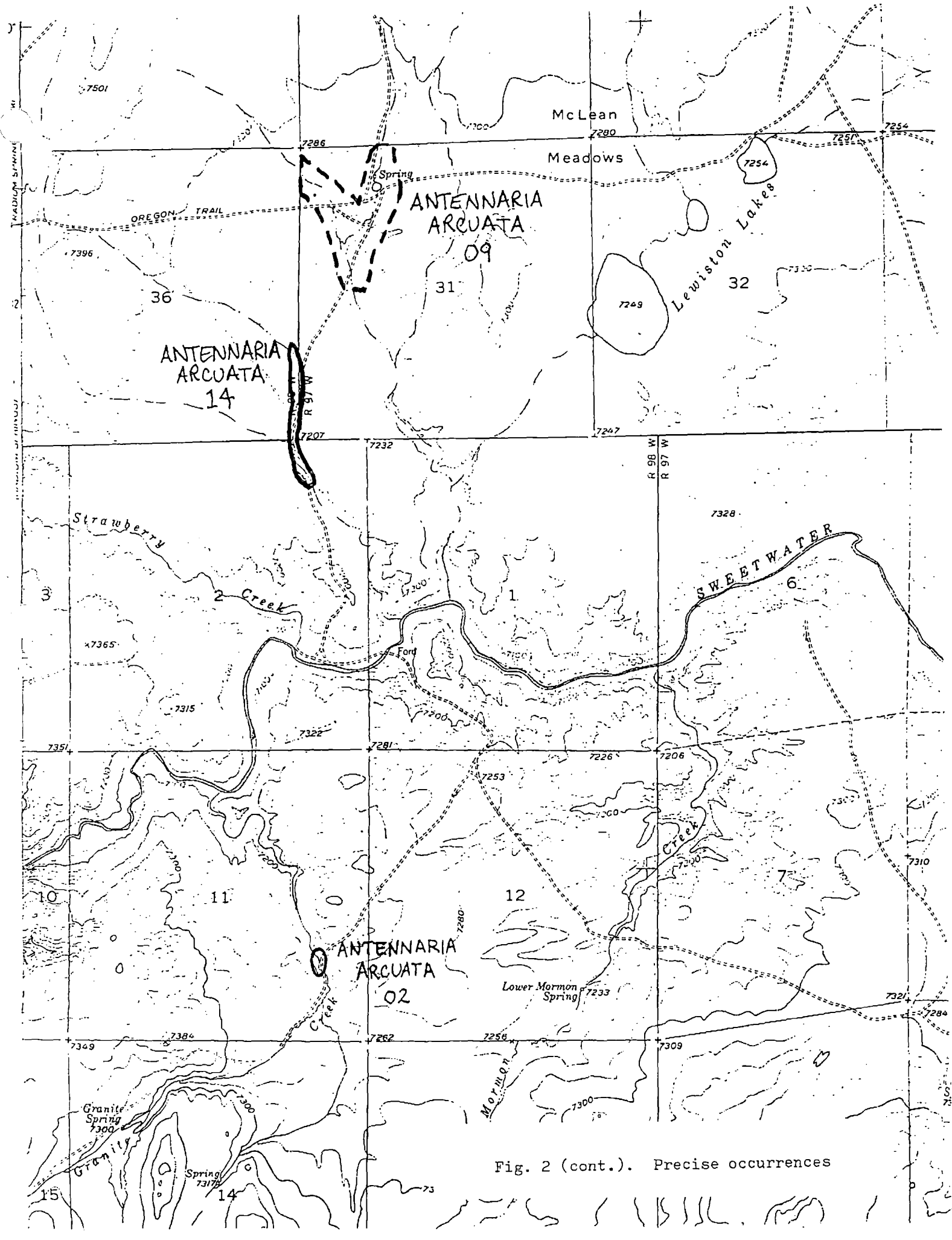


Fig. 2 (cont.). Precise occurrences

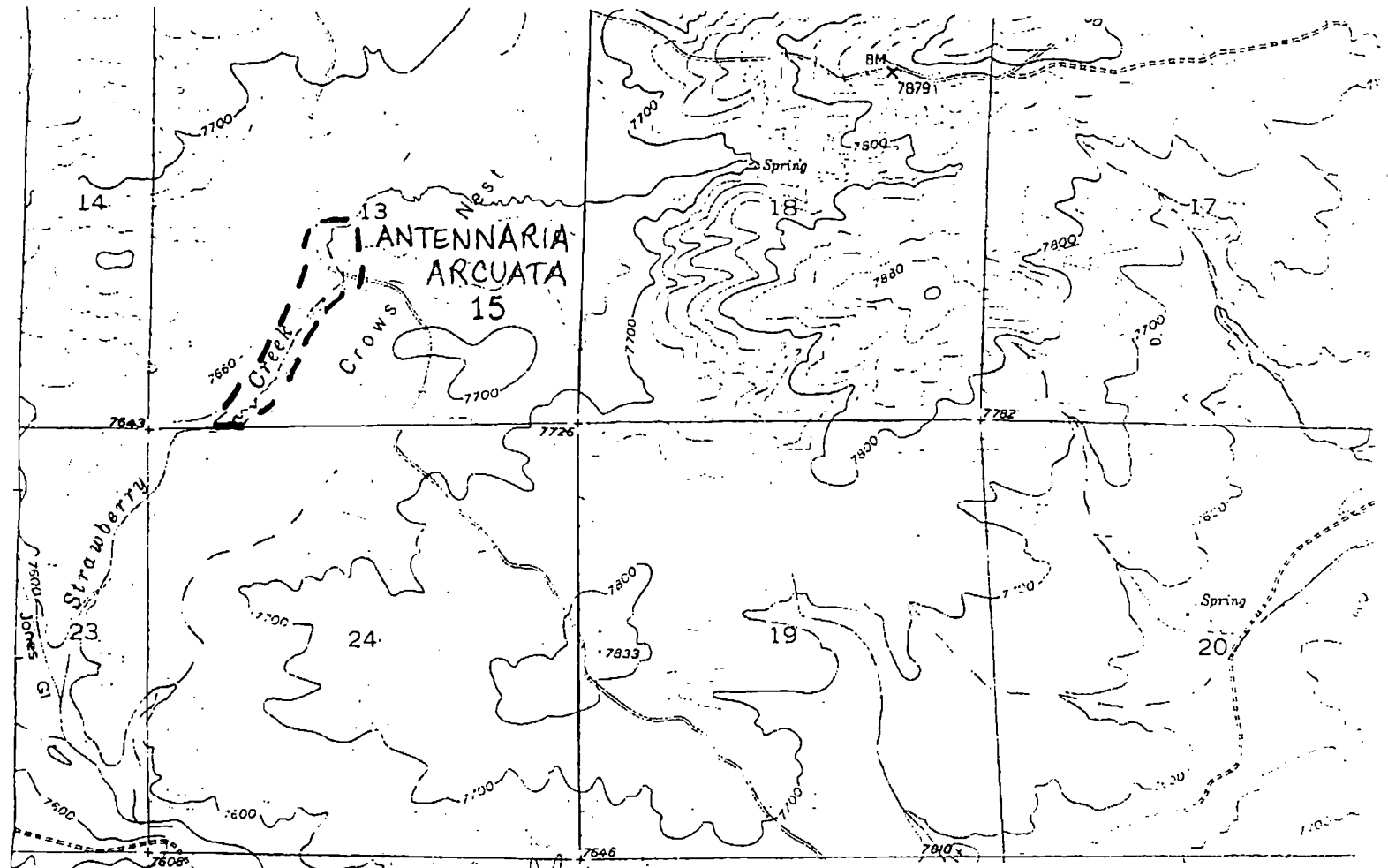
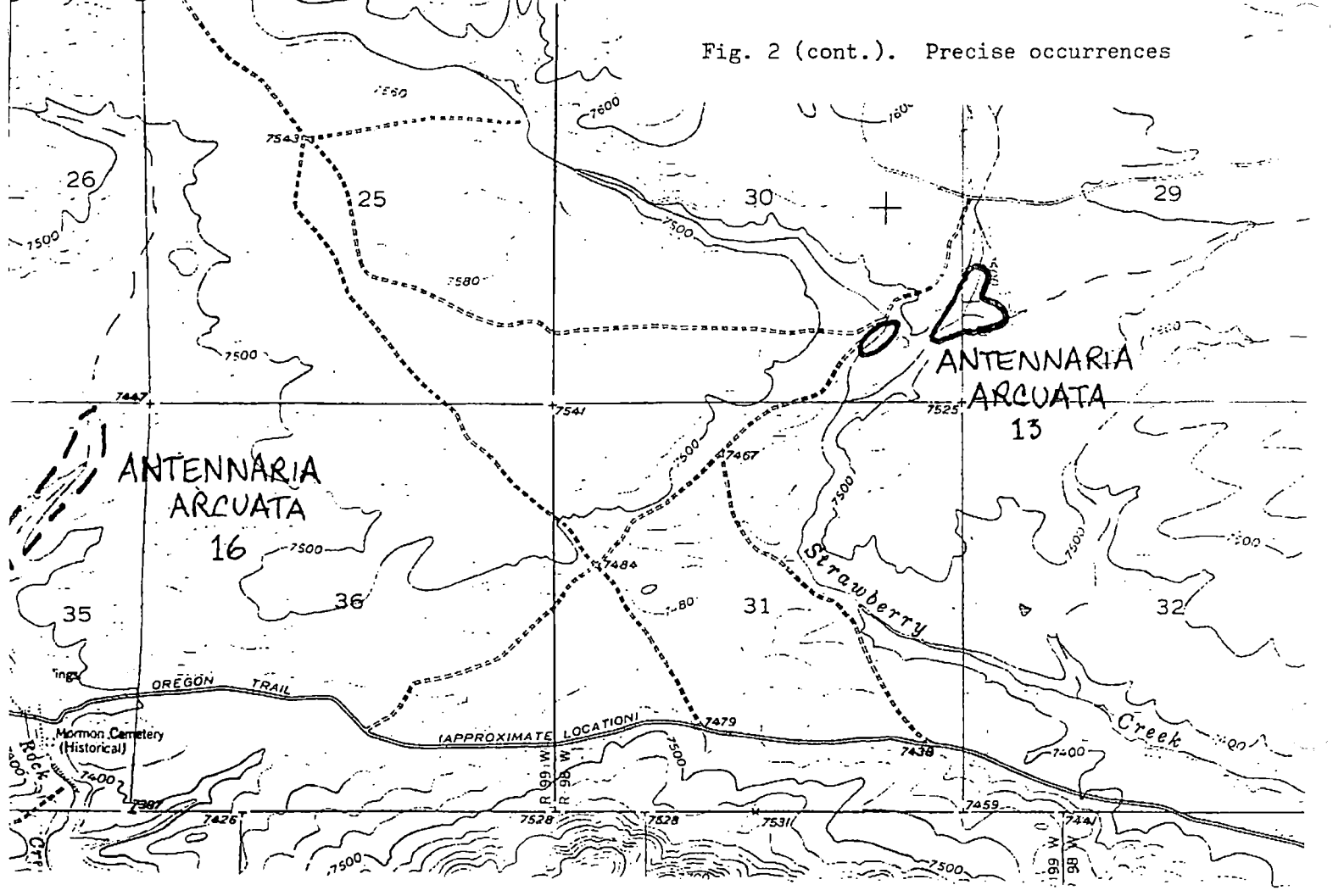


Fig. 2 (cont.). Precise occurrences



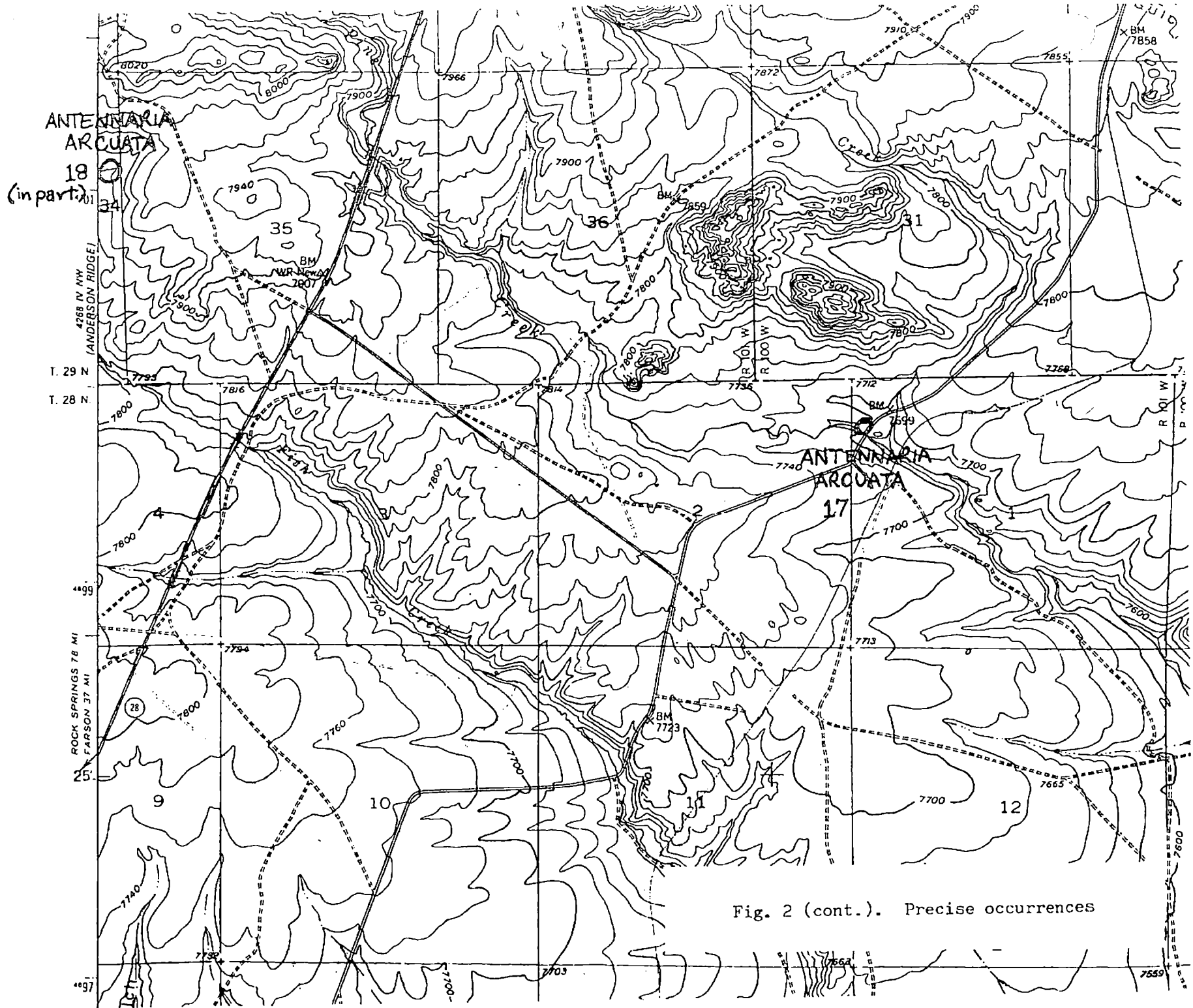


Fig. 2 (cont.). Precise occurrences

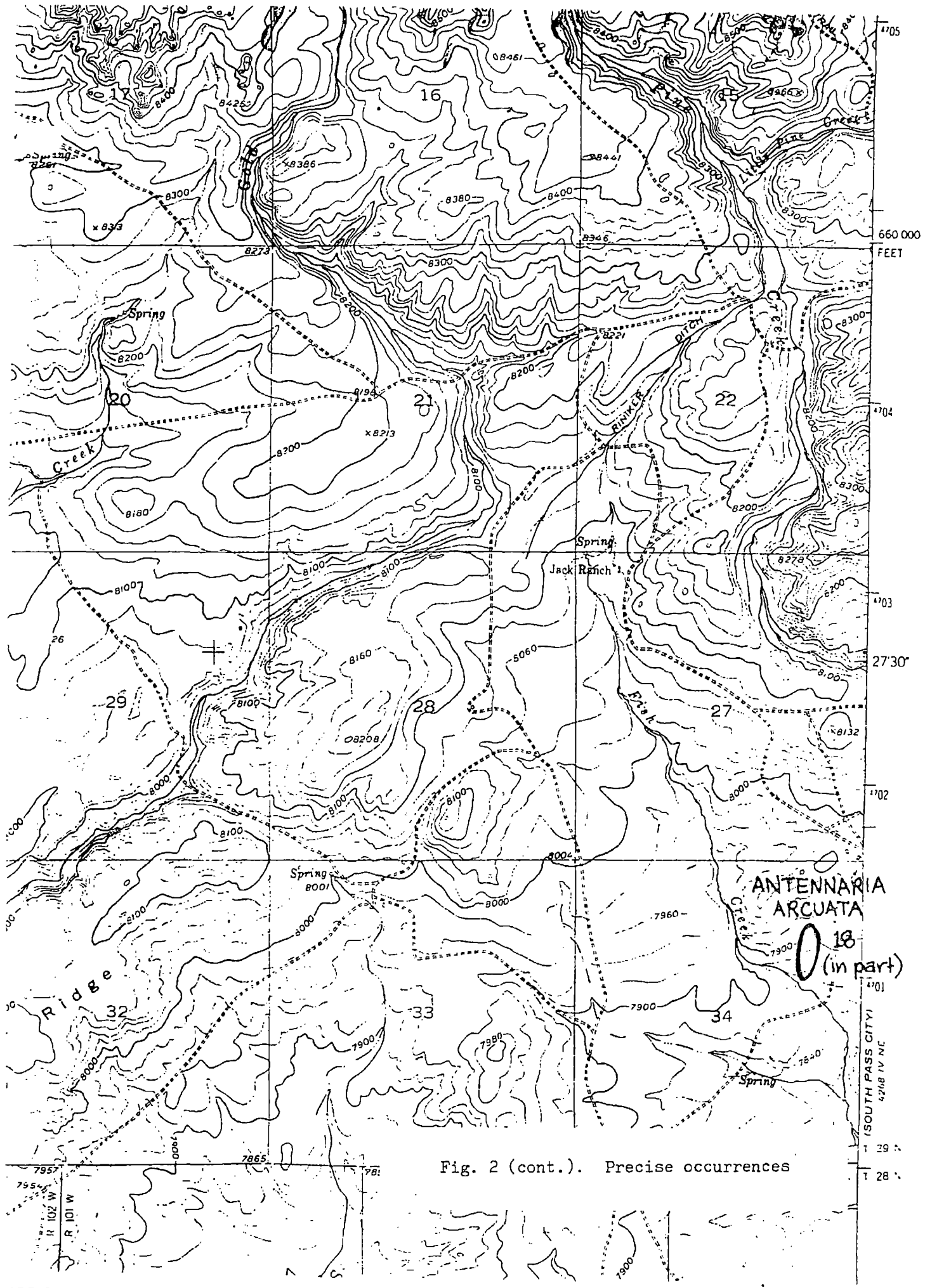


Fig. 2 (cont.). Precise occurrences

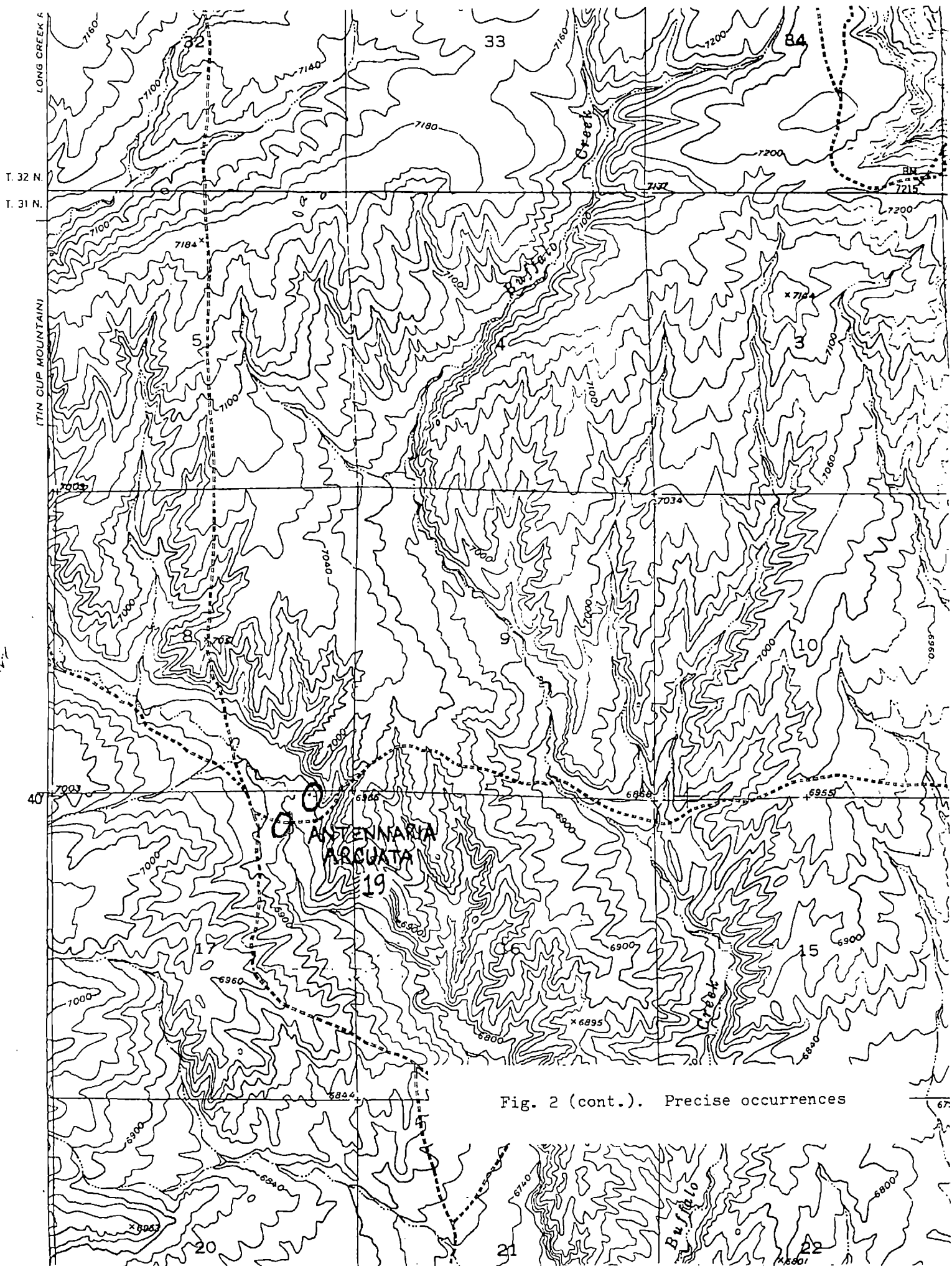


Fig. 2 (cont.). Precise occurrences

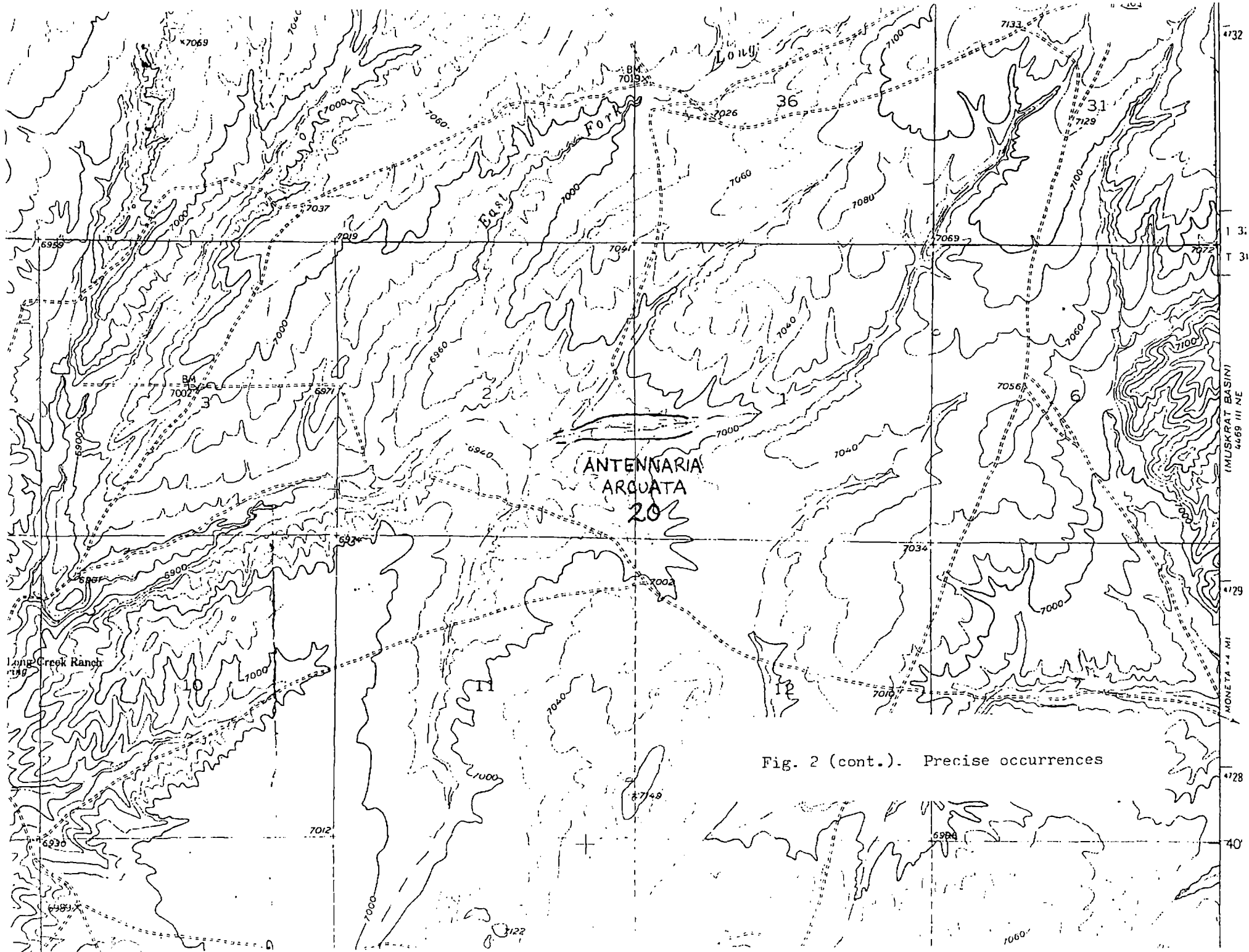


Fig. 2 (cont.). Precise occurrences

4. Sites Not Yet Investigated and Believed Likely to Support Other Possibly Extant Natural Occurrences:

The Granite Mountains north of Jeffrey City, WY, need to be more thoroughly searched for hummock meadows. The time restrictions imposed on 1986 fieldwork allowed only a brief survey of the area. Possible Antennaria arcuata habitat (hummock meadows) has been reported also for the Green Mountain area south of Jeffrey City (Dueholm pers. comm.). More extensive field inventory is needed in Nevada and Idaho as well.

5. Sites Having Ambiguous or Incomplete Locality Data:

WYOMING, Fremont County, T28N R99W S4 SE SE, Atlantic City Quadrangle (Lichvar 1930). (No drainage occurs within the sixteenth section given; the legal description perhaps should read SW SW (equivalent to Occ. No. 05).)

WYOMING, Fremont County, T29N R99W S29 NW, Atlantic City Quadrangle (Lichvar 5543). (No drainage occurs within the quarter section given nor does the WNHP map indicate an occurrence there.)

6. Locations Known or suspected to be Erroneous Reports:

OREGON, Harney County, Steens Mountain (Neidert 186). This specimen was cited (Henderson et al. 1977) as Antennaria arcuata, but subsequently was correctly identified as Antennaria luzuloides (Shultz and Shultz 1978).

C. Status and Location of Presently Cultivated Material

None

D. Biogeographical and Phylogenetic History

The phylogenetic relationships of Antennaria arcuata are unclear (Cronquist 1950). Bayer (1984) reported chromosome counts of $2n=28$ (diploid) for material from Nevada. No chromosome studies have been done on the Idaho nor Wyoming populations.

6. Environment and Habitat

A. Concise Statement of General Habitat

Moist (often hummocky) meadows and near seeps and

springs, often surrounded by sagebrush grasslands; southern Wind River Range and Granite Mountains, Fremont County, Wyoming, Blaine County, Idaho, and Elko County, Nevada; 4950 to 7900 ft asl.

B. Physical Characteristics

1. Climate:

a. Macroclimate:

Transition

b. Microclimate: Unknown

2. Air And Water Quality Requirements:

Unknown

3. Physiographic Provinces:

Middle Rocky Mountain Province (Wyoming)
Great Basin Province (Nevada)
Snake River Plains Province (Idaho)

4. Physiographic and Topographic Characteristics and Elevational Range:

Level to gently sloping sites in drainage bottoms, generally associated with wet meadows, springs or seeps; often on drier hummocks along margins of wet hummock meadows; 4950 to 7900 ft asl (6200 to 6500 ft in Nevada, 4950 ft in Idaho, 6900 to 7900 ft in Wyoming).

5. Edaphic Factors:

On alluvium associated with drainages, often on otherwise bare soil (see discussion in I.6.B.6. below).

6. Dependence on Dynamic Aspects:

Unknown; casual observation suggests that Antennaria arcuata prefers bare soil. In Wyoming, it is most often found on drier hummocks at the margins of wet hummock meadows. These hummocks are characterized by bare soil on their sides. Vegetative mats of A. arcuata have been observed on otherwise bare soil on the margins of wet meadows (see photograph on page 6). In Idaho, the taxon grows on small, bare or moss-covered spots of soil

among grasses (Caicco, pers. comm.). Periodic disturbance (such as frost heaving) may be necessary to maintain A. arcuata habitat.

C. Biological Characteristics

1. Vegetation Physiognomy and Community Structure:

Wyoming: moist meadows in drainage bottoms in sagebrush-grasslands

Idaho: wild "hay meadow" with grasses

Nevada: meadow

2. Regional Vegetation Type:

Kuchler type: Sagebrush-steppe

3. Frequently Associated Species:

Deschampsia caespitosa

Carex spp.

Antennaria microphylla

7. Population Biology/Ecology

A. General Summary

No data are available concerning population trends at the known Antennaria arcuata sites. Most occurrences appear healthy in that numerous individuals are present. However, many sites are heavily grazed, and on some, individuals of A. arcuata show evidence of grazing. The effect of grazing on the taxon is not known.

B. Demography

1. Known Populations

Population estimates below are based on 1986 observations by the RMHTF, 1979-1982 observations by the Wyoming Natural Heritage Program (WNHP), 1979 and 1982 observations by the Nevada Natural Heritage Program (NNHP) and 1985 observations by the Idaho Natural Heritage Program (INHP).

<u>Occ. No.</u>	<u>Eat. No. Individ.</u>
01	
02	50-100 (RMHTF)
03	
04	
05	
06	
07	
08	
09	
10	100-200 (WNHP)
11	100+ (RMHTF)
12	1000-1500 (WNHP)
13	400-800 (WNHP)
14	
15	100-200 (RMHTF)
16	
17	100-150 (RMHTF)
18	300-500 (RMHTF)
19	200-400 (RMHTF)
20	500+ (RMHTF)
21	unknown; less than one acre (NNHP)
22	unknown; less than one acre (NNHP)
23	100-1000 (INHP)

C. Phenology

Flowering/fruitleing: July through September.

D. Reproductive Ecology

1. Type of Reproduction:

Unclear. The presence of stolons suggests that vegetative reproduction takes place. Bayer (1984) found the Nevada material to be diploid ($2n=28$), stating that diploid populations generally reproduce by sexual means. According to Cronquist (1950), no staminate individuals were known from the Idaho site.

2. Pollination

a. Mechanisms: Unknown

3. Propagule Dispersal: Unknown

4. Propagule Ecology: Unknown

5. Seedling Ecology and Morphology: Unknown

6. Survivorship: Unknown

7. Overall Assessment of Reproductive Success:

Most populations observed contain at least several hundred individuals. However, there are no data available concerning population trends, nor is the effect of grazing on reproduction known.

E. Population Ecology

1. General Summary: Unknown

2. Interactions/Competition: Unknown

3. Hybridization:

Unknown. Antennaria arcuata often is found with A. microphylla (A. rosea).

8. Current Land Ownership and Management Responsibility

A. General Nature of Ownership

Bureau of Land Management
US Forest Service
State
Private

B. Specific Landowner(s)

Bureau of Land Management
Rawlins District
Lander Resource Area
Box 589
Lander, WY 82520

Bureau of Land Management
Rock Springs District
Green River Resource Area
Box 1170
Rock Springs, WY 82902-1170

Milford Sweat
Huff Meadow
Idaho

other private landowners in Wyoming, Nevada

C. Management Responsibility

The majority of the known Antennaria arcuata habitat in the Atlantic City area and Granite Mountains (Wyoming) is administered by the BLM, Rawlins District, Lander Resource Area. Occ. No. 17 is managed by the Rock Springs District, Green River Resource Area. The state of Wyoming owns parts of Occ. Nos. 04, 19 and 20. Some of the occurrences in the Atlantic City area are privately owned, at least in part. The Idaho and Nevada sites are under private ownership.

9. Management Practices and Experience

A. Management and Land Use

In Wyoming, most occurrences of Antennaria arcuata are included in BLM grazing allotments (allotment information is summarized in Appendix I). Many of these sites are heavily grazed due to the concentration of livestock near water sources. Some placer mining has been done in potential habitat in the Atlantic City area. Uranium mining takes place in the Granite Mountains roughly 12 air miles south southeast of the known occurrences of A. arcuata (the mine is presently closed); field inventory in that area is not sufficiently complete to say whether or not mining would affect potential habitat.

The Huff Creek Meadow site in Idaho is grazed (INHP, Survey Form 1985). The Belcher Meadow site in Nevada is regularly mowed late in the summer (NNHP, Sighting Report 1979).

B. Future Land Use

The majority of the known occurrences of Antennaria arcuata are managed by the BLM, Lander Resource Area. According to the preferred alternative of that area's Resource Management Plan (USDI 1986) there would be little change in management of Antennaria arcuata habitat. In the Beaver Creek Management Unit (which contains all Antennaria arcuata occurrences managed by the Lander Resource Area) most known habitat would be open to exploration and development of oil and gas, locatable minerals and phosphates with standard requirements. In areas of high oil and gas potential a no-surface-occupancy stipulation would not be automatically applied to protect water quality, riparian areas nor threatened and endangered species. This stipulation would be added to leases only when necessary to avoid a significant adverse impact on another resource

"Significant" is not defined. The only site affected by the plan-of-operations restriction for locatable mineral exploration and development is Occ. No. 12 (the southern part is included in the Gilespie Place Historic Site). Phosphate exploration and leasing will include no-surface-occupancy restrictions when needed to protect water quality, riparian areas and threatened and endangered species, for example. Occ. Nos. 09 and 14 (in part) will be under wilderness management if the Sweetwater Canyon Wilderness Study Area is given wilderness designation.

C. Disease, Predation or Grazing

Unknown; on some sites there is evidence of grazing of Antennaria arcuata, probably by livestock (cattle or wild horses).

D. Inadequacy of Existing Regulatory Mechanisms

If listed, Antennaria arcuata would be protected on federal land under the Endangered Species Act. There is at present no mandatory protection from disturbance by oil and gas, locatable mineral and phosphate exploration and development on land administered by the BLM, Lander Resource Area (which manages most of the known occurrences).

10. Evidence of Threats to Survival

A. Present or Threatened Destruction, Modification or Curtailment of Habitat or Range

Much of the known Antennaria arcuata habitat in Wyoming (drier margins of moist meadows and seeps in sagebrush grassland) is heavily grazed, for livestock tend to concentrate near water sources. However, the effect of grazing on the taxon is not known. On some sites, individuals of meadow pussytoes are grazed. It is possible that disturbance through grazing and trampling opens up habitat as well. In 1983, the Lander Resource Area of the BLM began a 20-year enclosure monitoring project in the Atlantic City area to gather data on the effect of grazing on A. arcuata population trends. Placer mining and construction of stockponds and reservoirs on some drainages may have eliminated populations and potential habitat.

B. Potential Threats

Overgrazing, stockpond construction and other water development, placer mining (Atlantic City area),

uranium mining (Granite Mountains).

C. Overutilization for Commercial, Sporting, Scientific or Educational Use

None apparent at this time.

D. Easements, Conservation Restrictions, etc.

None at this time.

II. ASSESSMENT AND RECOMMENDATIONS

11. General Assessment of Vigor, Trends and Status

Most of the known occurrences of Antennaria arcuata appear vigorous in that many individuals are present. However, no data are available concerning population trends. Many sites are heavily grazed by livestock, and on some, individuals of A. arcuata have been grazed. The impact of grazing on meadow pussytoes is not known.

The taxon is more widespread than was previously thought, although its range is still quite restricted and only 23 occurrences are known. Additional field inventory in the Granite Mountains-Green Mountain area of Wyoming, and in Nevada and Idaho may yield enough new sites to result in Category 3C status.

12. Priority of Listing or Status Change

A. Recommendation to U. S. Fish and Wildlife Service

This taxon should be maintained as a Category 2 candidate.

B. Recommendation to Other U. S. Federal Agencies

The Bureau of Land Management should recognize Antennaria arcuata as a Sensitive plant species.

C. State/County Recommendations

In the event that the states of Wyoming, Nevada and Idaho pass rare plant legislation, this species should be given state status.

D. International Recommendations

None are called for as this taxon does not appear in trade.

13. Recommended Critical Habitat

A. Concise Statement

Moist meadows, seeps and springs in drainage bottoms; Atlantic City-South Pass City-Sweetwater Canyon area and Granite Mountains (Fremont County), Wyoming; Huff Creek Meadow (between Carey and Craters of the Moon National Monument, Blaine County), Idaho; Saval Ranch (east flank Independence Mountains, Elko County) and Belcher Meadow (south of Sunflower Flat in Warm Creek Drainage, north central Elko County), Nevada.

B. Legal Description

WYOMING:

- 01 Radium Springs Quadrangle
T28N R98W S8 NE NW
- 02 Lewiston Lakes Quadrangle
T28N R98W S11 CTR SE
- 03 Radium Springs Quadrangle
T28N R98W S22 W1/2
- 04 Lewiston Lakes Quadrangle
T28N R98W S24 NW, S13 SW
- 05 Atlantic City Quadrangle
T28N R99W S4 SW SW, S5 SE SE
- 06 Atlantic City Quadrangle
T28N R99W S22 SW, S27 NW
- 07 Radium Springs Quadrangle
T28N R99W S13 SW, S24 NW
- 08 Circle Bar Lake Quadrangle
T28N R99W S25 SW
- 09 Lewiston Lakes Quadrangle
T29N R97W S31 NW
- 10 Radium Springs Quadrangle
T29N R98W S14 W1/2, SE1/4
- 11 Radium Springs Quadrangle
T29N R98W S22 SW SW, S27 NW NW, S28 NE NE
- 12 Radium Springs Quadrangle
T29N R98W S26 W1/2, S35 NW

- 13 Radium Springs Quadrangle
T29N R98W S29 SW, S30 SE
- 14 Lewiston Lakes Quadrangle
T29N R98W S36 SE, T29N R97W S31 SW, T28N R98W S2 NE
- 15 Radium Springs Quadrangle
T29N R99W S13 SW
- 16 Radium Springs Quadrangle
T29N R99W S35 E1/2
- 17 South Pass City Quadrangle
T28N R101W S1 NW NW NW
- 18 Anderson Ridge, South Pass City Quadrangles
T29N R101W S34 CTR NE, SE SE
- 19 Muskrat Basin Quadrangle
T31N R92W S17 NE NE, S8 SW SE SE
- 20 Tin Cup Mountain Quadrangle
T31N R93W S1 NW SW, S2 NE SE

NEVADA:

- 21 Mountain City Quadrangle (NV-ID)
T45N R55E S3
- 22 Mahala Creek West Quadrangle
T39N R45E S13

IDAHO:

- 23 Paddleford Flat Quadrangle
T01S R22E S01 SW

C. Latitude and Longitude

See Appendix III.

D. Publicity-sensitivity of Suggested Critical Habitat

This taxon is not known to be collected or utilized by the horticultural trade, and publicizing the known sites might assist in protecting them from accidental extirpation, as well as providing information for project planning.

14. Conservation/Recovery Recommendations

A. General

1. The taxon should be maintained as a Category 2 candidate taxon by the USFWS.
2. The Bureau of Land Management should recognize Antennaria arcuata as a Sensitive plant species and administer their lands to conserve its habitat.
3. No-surface-occupancy restrictions should automatically be applied to oil and gas and phosphates permits and leases for areas including known habitat for the taxon.
4. Areas of critical habitat (see II.13) should be withdrawn from mineral exploration and development.
5. Management of grazing allotments should take into consideration impacts on the taxon (e.g. construction of stockponds, establishment of protective enclosures if necessary).

B. Monitoring Activities and Recommended Further Studies

1. Additional inventory for the taxon is needed in the Granite Mountains-Green Mountain area, Wyoming, and in Nevada and Idaho.
2. Grazing enclosure studies (such as those of the Lander RA) should be carried out to determine the effect of grazing on Antennaria arcuata populations over time (at least 20 years).
3. Research on the biology and ecology of the taxon should be funded to better understand its habitat and biological requirements.
4. Known occurrences should be monitored.

15. Interested Parties

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Bureau of Land Management
Green River Resource Area
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III. INFORMATION SOURCES

16. Sources of Information

A. Publications

Bayer, R. J. 1984. Chromosome numbers and taxonomy notes for North American species of Antennaria (Asteraceae: Inuleae). Amer. J. Bot. 68:1342-1349.

Cronquist, A. 1950. Notes on the Compositae of the northwestern United States. Leaflet. Western Bot. 6:41-50.

----- . 1955. Vascular Plants of the Pacific Northwest. Part 5: Compositae. Seattle: Univ. of Washington Press.

Henderson, D. M., F. D. Hohnson, P. Packard and R. Steele. 1977. Endangered and threatened plants of Idaho. Univ. of Idaho, College of Forestry, Wildlife and Range Sciences Bulletin 21.

Shultz, J. S. and L. M. Shultz. 1978. Report on the botanical survey of endangered and threatened plants, Caribou National Forest. Contract No. 53-84M8-8-410, US Forest Service, Ogden, Utah.

USDI, Bureau of Land Management. 1986. Resource Management Plan/Final Environmental Impact Statement for the Lander Resource Area, Lander, Wyoming.

B. Herbarium Collections Consulted

Rocky Mountain Herbarium (RM)
University of Wyoming, Laramie, WY

Central Wyoming College (CWC)
Riverton, WY

C. List of Known Herbarium Specimens

USA, WYOMING, Fremont County: Atlantic City near Sweetwater River; 6 July 1905; Johnson s. n. (NY). (det. A. Cronquist 1952)

USA, NEVADA, Elko County: Belcher Meadow; silt loam; 6000 ft; moderately abundant; 17 July 1937; Walts 21 (NY). (Occ. No. 21) ("Ertter says 'the label is freshly typed, and plant also looks new enough that I expect a typo and that this is really a 1973 collection.'" (P. L. Packard, USFWS status report, 1979)

USA, IDAHO, Blaine County: 9 miles east of Carey in wild hay meadow; 31 July 1946; Christ 16065 (NY; ISOTYPE). (Occ. No. 23)

USA, IDAHO, Blaine County: T1S R22E S13; 14 miles west of the Craters of the Moon National Monument; natural grass meadow; 1% slope; 5250 ft; 30 July 1973; Steele 397 (IDF, BOIS). (Occ. No. 23)

USA, WYOMING, Fremont County: T28N R99W S5 SE SE; moist sedge-rush meadow in bottom of gully draining into Willow Creek, 2.6 air miles N of its confluence with Sweetwater River, ca. 6 mi SE of Atlantic City; growing immersed in rather tall sedges & rushes in moist soil; not grazed for 2-3 years; 7345 ft; 5 August 1977; Johnston 1419 (RM). (Occ. No. 05)

USA, WYOMING, Fremont County: T28N R99W S5 SE SE; sedge meadow mostly on mounds with Juncus balticus, Potentilla, Deschampsia; corolla white, stolon not arching; 7350 ft; 16 August 1978; Dorn 3185 (RM). (Occ. No. 05)

USA, WYOMING, Fremont County: T28N R99W S4 SW SW; sedge meadow mostly on hummocks with Juncus balticus, Potentilla, Deschampsia; corolla white; stolons not arching; 7350 ft; 16 August 1978; Dorn 3186 (RM). (Occ. No. 05)

USA, WYOMING, Fremont County: T28N R992 S4 SE SE; frequent in hummocky area in drainage; plants collected and still no flowers; 7300 ft; 30 June 1979; Lichvar 1930 (RM). (Occ. No. 05?)

USA, WYOMING, Fremont County: T28N R99W S5 SE SE; ca 5 miles SE of Atlantic City; frequent in sedge hummocks; associates: Carex, Potentilla, Deschampsia; 7350 ft; 22 July 1979; Lichvar 2116 (RM). (Occ. No. 05)

USA, WYOMING, Sweetwater (SIC) (Fremont) County: T29N R98W S29 NW SW; ca 27 air mi SSE of Lander near Strawberry Creek; moist to wet meadow near streams; 7500 ft; 1 September 1979; Saulmon 5 (RM). (Occ. No. 13)

USA, WYOMING, Sweetwater (SIC) (Fremont) County: T29N R98W S14 SW SE; ca 27 air mi SSE of Lander; plants in moist to wet meadow; 7500 ft; 2 September 1979; Saulmon 6 (RM). (Occ. No. 10)

USA, WYOMING, Sweetwater (SIC) (Fremont) County: T29N R98W S26 W1/2; ca 28 air mi SSE of Lander, Gillespie Place and Radium Springs; moist to wet meadow; 7500 ft; 1 September 1979; Saulmon 7 (RM). (Occ. No. 12)

USA, WYOMING, Fremont County: T29N R98W S26 NW; Diamond Creek; open, wet bottom; associates: Deschampsia, Potentilla; 7200 ft; 11 August 1980; Lichvar 3411 (RM). (Occ. No. 12)

USA, WYOMING, Fremont County: T29N R98W S26 W1/2; ca 1/2 mile N of Radium Springs; not on hummocks; associates: Iris, Potentilla; 7200 ft; 11 August 1980; Lichvar 3412 (RM). (Occ. No. 12)

USA, WYOMING, Fremont County: T29N R98W S22 SW; Deep Creek; on hummocks; associates: Potentilla, Antennaria; 7500 ft; 12 August 1980; Lichvar 3413 (RM). (Occ. No. 11)

USA, WYOMING, Fremont County: T28N R98W S8 NE NE; Burr Mine; not on hummocks; associates: Iris, Potentilla; 7300 ft; 12 August 1980; Lichvar 3414 (RM). (Occ. No. 01)

USA, WYOMING, Fremont County: T29N R98W S14 SW; Meadow Creek; on hummocks; associates: Deschampsia, Potentilla; 7200 ft; 12 August 1980; Lichvar 3415 (RM). (Occ. No. 10)

USA, WYOMING, Fremont County: T29N R98W S14 NW; Meadow Creek; on hummocks; associates: Deschampsia, Potentilla; 7200 ft; 12 August 1980; Lichvar 3416 (RM). (Occ. No. 10)

USA, WYOMING, Fremont County: T28N R99W S4 SW; E of Atlantic City, wet meadow; associates: Carex, Cirsium; 7200 ft; 29 August 1982; Lichvar 5534 (RM). (Occ. No. 05)

USA, WYOMING, Fremont County: T28N R99W S22 SW; E of Atlantic City, wet meadow; associates: Deschampsia, Haplopappus; 7200 ft; 29 August 1982; Lichvar 5536 (RM). (Occ. No. 06)

USA, WYOMING, Fremont County: T28N R99W S25 SW; E of Atlantic City; wet meadow; associates: Deschampsia, Carex; 7300 ft; 29 August 1982; Lichvar 5537 (RM). (Occ. No. 08)

USA, WYOMING, Fremont County: T28N R99W S13 SW; E of Atlantic City, wet meadow; associates: Cirsium, Carex; 7200 ft; 29 August 1982; Lichvar 5538 (RM). (Occ. No. 07)

USA, WYOMING, Fremont County: T28N R98W S22 W1/2; E of Atlantic City, wet meadow; associates: Carex, Deschampsia; 7200 ft; 29 August 1982; Lichvar 5534 (RM). (Occ. No. 03)

USA, WYOMING, Fremont County: T28N R98W S24 SW; E of Atlantic City, wet meadow; associates: Antennaria rosea, Carex; 7400 ft; 29 August 1982; Lichvar 5540 (RM). (Occ. No. 04)

USA, WYOMING, Fremont County: T29N R98W S35 NW; E of Atlantic City, wet meadow; associates: Juncus, Deschampsia; 7200 ft; 29 August 1982; Lichvar 5547 (RM). (Occ. No. 12)

USA, WYOMING, Fremont County: T29N R99W S35 E1/2; E of Atlantic City, wet meadow; associates: Deschampsia, Juncus; 7300 ft; 30 August 1982; Lichvar 5541 (RM). (Occ. No. 16)

USA, WYOMING, Fremont County: T29N R99W S13 SW; E of Atlantic City, wet meadow; associates: Deschampsia, Agrostis; 7300 ft; 30 August 1982; Lichvar 5542 (RM). (Occ. No. 15)

USA, WYOMING, Fremont County: T29N R99W S29 NW; E of Atlantic City, wet meadow; associates: Deschampsia, Potentilla; 7400 ft; 30 August 1982; Lichvar 5543 (RM). (Occ. No. ?)

13

USA, WYOMING, Fremont County: T29N R98W S22 SW; E of Atlantic City, wet meadow; associates: Deschampsia, Carex; 7300 ft; 30 August 1982; Lichvar 5545 (RM). (Occ. No. 11)

USA, WYOMING, Fremont County: T29N R98W S26 SW; E of Atlantic City, wet meadow; associates: Deschampsia, Carex; 7300 ft; 30 August 1982; Lichvar 5546 (RM). (Occ. No. 12)

USA, WYOMING, Fremont County: T29N R98W S36 SE; E of Atlantic City, wet meadow; associates: Cirsium, Potentilla; 7300 ft; 30 August 1982; Lichvar 5548 (RM, 2 sheets). (Occ. No. 14)

USA, WYOMING, Fremont County: T29N R97W S31 NW; E of Atlantic City, wet meadow; associates: Deschampsia, Potentilla; 7200 ft; 30 August 1982; Lichvar 5549 (RM). (Occ. No. 09)

USA, WYOMING, Fremont County: T31N R92W S8,17; tributary of Buffalo Creek; ca 12 air miles ENE of Jeffrey City; meadow beside creek and seep on slope above creek; 6840-6900 ft; 22 August 1985; Haines 5724 (RM) (Occ. No. 19)

USA, WYOMING, Fremont County: T29N R98W S22 SW SW; Deep Creek just N of Atlantic City-Sweetwater Station Rd; ca 10.5 air mi ESE of Atlantic City; sedge hummock meadow - on margins; 7560 ft; 21 August 1986; Marriott 10590 (RM). (Occ. No. 11)

USA, WYOMING, Fremont County: T28N R101W S1 NW NW; Pine Creek next to gravel road between South Pass City and WY Hwy 28, ca 2.7 air mi SSW of South Pass City; with sagebrush on margin of (dried) marshy area; 7700 ft; 21 August 1986; Marriott 10591 (RM). (Occ. No. 17)

USA, WYOMING, Fremont County: T28N R98W S11 SE SE; Granite Creek ca 1 mi upstream from Sweetwater River, ca 13.5 air mi ESE of Atlantic City; Carex-Poa community in creek bottom (no standing water); 7230; 21 August 1986; Marriott 10593 (RM). (Occ. No. 02)

USA, WYOMING, Fremont County: T29N R101W S34 SE; Fish Creek ca. 1 mi upstream from WY Hwy 28, granite outcrops just E of creek, ca 8.5 air mi WSW of Atlantic City; set meadow below Salix thicket; 7900 ft; 22 August 1986; Marriott 10594 (RM). (Occ. No. 18)

USA, WYOMING, Fremont County: T31N R93W S1 NW SW, S2 NE SE; Granite Mountains, east fork of East Fork Long Creek, ca 14 air mi NNW of Jeffrey City; sedge hummock meadow - on margins; 6960 ft; 24 August 1986; Marriott 10595 (RM). (Occ. No. 20)

D. Specimen Record

<u>Year</u>	<u>No. Specimens</u>	<u>Year</u>	<u>No. Specimens</u>
2000		1980	11
1998		1978	4 (5?)
1996		1970	
1994		1960	
1992		1950	1
1990		1940	1?
1988		1930	
1986	6	1910	1
1984		1890	
1982	14	pre-1880	

E. Recent Fieldwork

Fieldwork was conducted on this taxon during August of 1986 by the RMHTF. Approximately five person-days were spent in the field (see Appendix III for survey routes), as well as additional time for planning and report-writing.

F. Knowledgeable Individuals

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G. Other Information Sources and References

From Cronquist (1950):

Antennaria arcuata Cronquist, spec. nov. Herba 3-4 dm. alta, laxe tomentosa, per stolones arcuatos usque ad 1 dm. longos perennans; foliis imis oblanceolatis aliquot cm. longis demum deciduis, caulinis angustatis moderate numerosis gradatim reductis inferioribus usque ad 10 cm. longis 1 cm. latis; capitulis femineis moderate numerosis conferte aggregatis, involucre circa 5 mm. alto basi tomentoso apice striatulo et albido-scarioso; pappo basi vix connato; capitulis masculinis ignotis.

17. Summary of Materials on File

- A. All publications listed in Section 16A.
- B. Original maps.
- C. 35 mm slides of the taxon and its habitat.
- D. Original copy of this report.
- E. Computer and manual files on each known occurrence.
- F. Field notes on areas covered during 1986 season.
- G. First specimen of all numbers collected is deposited at the Rocky Mountain Herbarium (RM), University of Wyoming.

IV. AUTHORSHIP

18. Initial Authorship

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ed. J. Scott Peterson

19. Maintenance of Status Report

Should this taxon be listed as an Endangered or Threatened Species by the US Fish & Wildlife Service, the Service, through its Office of Endangered Species (Region 6), should maintain the primary file of information on it, encourage others to provide new information, and distribute new findings, as received, to the Interested Parties.

V. NEW INFORMATION

20. Record of Revisions