

STATUS REPORT

ON

Heterotheca jonesii (Blake) Welsh and Atwood

Meiji Resource Consultants

1982

Taxon Name: Heterotheca jonesii (Blake) Welsh and Atwood

Common Name: Jones' golden aster

Family: Asteraceae

State Where Taxon Occurs: Utah

Current Federal Status: Under Review

Recommended Federal Status: Do Not List

Author of Report: Alyce M. Hreha

Original Date of Report: April 15, 1982

Agency to which further
information and comments
should be sent:

Endangered Species Office
U.S. Fish and Wildlife Service
Region 6
Denver, Colorado 80225
303/234-2496

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I. SPECIES INFORMATION

1. CLASSIFICATION AND NOMENCLATURE

A. Species

1. Scientific Name

a. Binomial

Heterotheca jonesii (Blake) Welsh and Atwood

b. Full Bibliographic Citation

Great Basin Naturalist 35:336. 1975.

c. Type Specimen

UTAH: Washington County, Springdale,
4000 feet, 16 May 1894, M.E. Jones
5249u(POM).

2. Pertinent Synonyms

"Chrysopsis jonesii Blake in Tidestrom, Contr. U.S.
Nat'l. Herb. 25:536. 1925, a substitute name for C.
caespitosa M.E. Jones. Proc. Calif. Acad. Sci. II,
5:694. 1895 " (Welsh et al., 1975).

3. Common Name

Jones' golden aster

B. Family Classification

1. Family Name

Asteraceae

2. Pertinent Family Synonym

Compositae

3. Common Name

Aster Family

C. Major Plant Group

Dicotyledonae

D. History of Knowledge of Taxon

Heterotheca jonesii was first collected and named Chrysopsis caespitosa by Marcus E. Jones in 1894. It was growing in red sandy soil at an altitude of 4000 feet (1213 m) near Springdale, Utah (Jones, 1895). He described the plant as "very striking" but thought it could "be an extreme form of C. villosa" (the common species of Chrysopsis now called Heterotheca villosa). Jones (1895) reported that the plant "seemed to be very scarce" and for many years (1894 - 1942) it was only known from the type location (Welsh, 1979). However, it "is not known to occur there now" (Welsh, 1978-Status Report).

S.F. Blake in Tidestrom (1925) created a synonym for Chrysopsis caespitosa by naming the species C. jonesii for its founder Marcus E. Jones.

Walter P. Cottom collected C. jonesii at Hell's Backbone on the Aquarius Plateau in Garfield County, Utah in 1942 (BRY and UT #18100) and 1952 (UT #46961-2). Both of these specimens were found in a yellow pine (Pinus ponderosa) association growing in sandy soil at 8000 (2427 m) and 9000 feet (2730 m) in elevation respectively. Since Cottom, a few other botanists have collected Jones' golden-aster from the Hell's Backbone area. The genus name was later changed to Heterotheca by Welsh and Atwood hence the present name Heterotheca jonesii (Welsh et al., 1975).

Buchanan and Graybosch (1981) reported a significant range extension for H. jonesii within Bryce Canyon National Park. One population was located on a sandy outcrop of the Kaiparowits Formation in Bridge Canyon at an elevation of 2438 m (8000 ft). Identical habitat is available throughout the southern half of the park; yet no other populations have been located.

- E. Current Alternative Taxonomic Treatments
None

2. PRESENT LEGAL OR OTHER FORMAL STATUS

- A. International
None

- B. National
1. United States

- a. Present designated or proposed legal protection
or regulation

Reviewed as a "Category 1" species,
December 15, 1980, Federal Register
45(242):82514.

- b. Other current formal status recommendations
Recommended as Endangered in Endangered and Threatened Plants of the United States
(Ayensu and DeFilipps, 1978 - Reprint of the
1975 Federal Register List).

Recommended as Endangered by Stanley Welsh,
Curator, Brigham Young University Herbarium,
Provo, Utah (Welsh et al., 1975; Welsh 1978).

- c. Review of past status
Proposed as Endangered, June 16, 1976,
Federal Register 41(117):24570.

- C. State
Utah

Recommended as a "High 2 Priority" species for listing at the Utah Native Plant Society's Annual Threatened and Endangered Status Review Meeting held at Brigham Young University on December 4, 1981.

3. DESCRIPTION

- A. General Nontechnical Description

Perennial; small, caespitose (about 10 cm high), yellow-flowered composite with grey tomentose spatula-shaped leaves forming a dense mat. (After Welsh, 1978-Status Report).

- B. Technical Description

Perennial; caespitose from a woody, much branched root forming a dense mat; leaves spatulate, about 12 mm long clustered on short stems, 2.5-5 cm long, villous but not hispid, apiculate; heads about 6 mm high sessile; involucre bracts ashy green, linear, somewhat unequal, inner with hyaline margins and acute; yellow flowers (From Jones, 1895 in Welsh, 1978-Status Report).

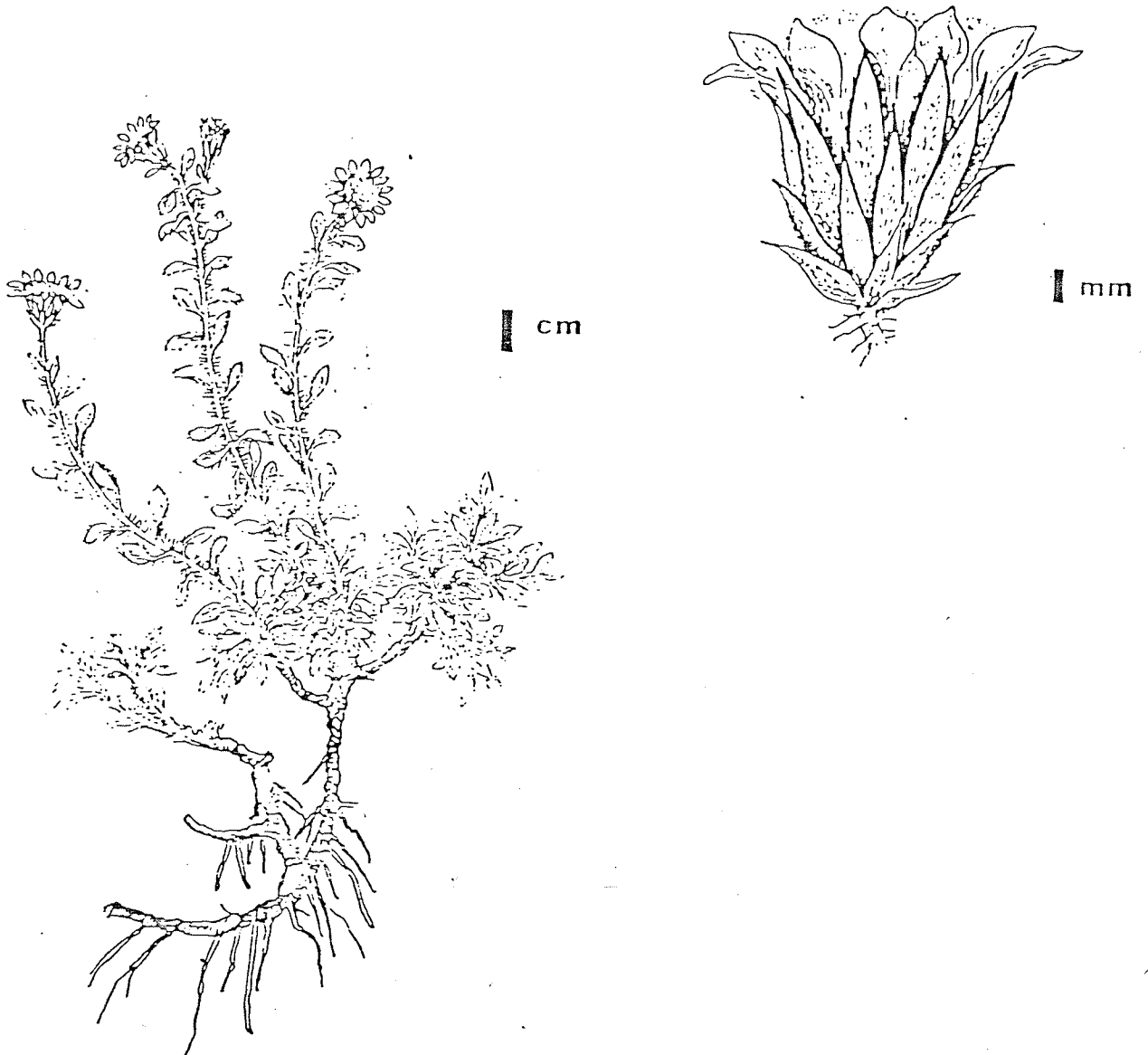
- C. Local Field Characters

Small yellow-flowered, mat-forming composite which is similar but smaller in all parts than Heterotheca villosa (Welsh, 1978-Status Report). Plant is usually found growing in the sandy soil of the Navajo and Kaiparowits Formations.

- D. Identifying characteristics of material which is in interstate or international commerce or trade.

Not Applicable

E. Photographs and/or line drawings



This line drawing of Helerotheca jonesii is available on page 38 of the Illustrated Manual of Proposed Endangered and Threatened Plants of Utah (Welsh, 1979).

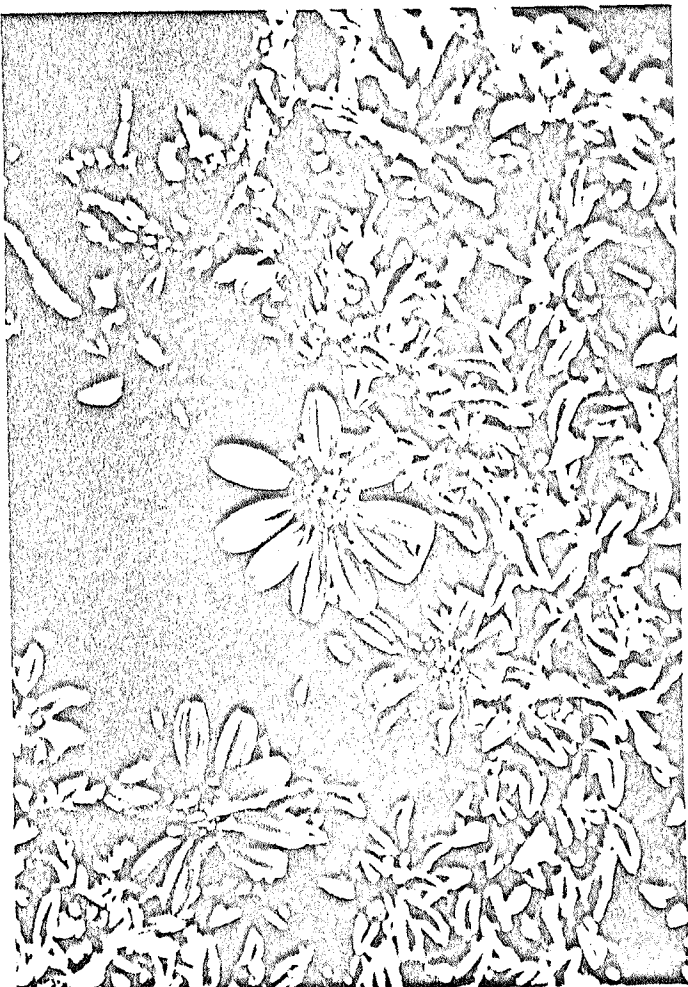


PHOTO: Heterotheca jonesii (close-up)

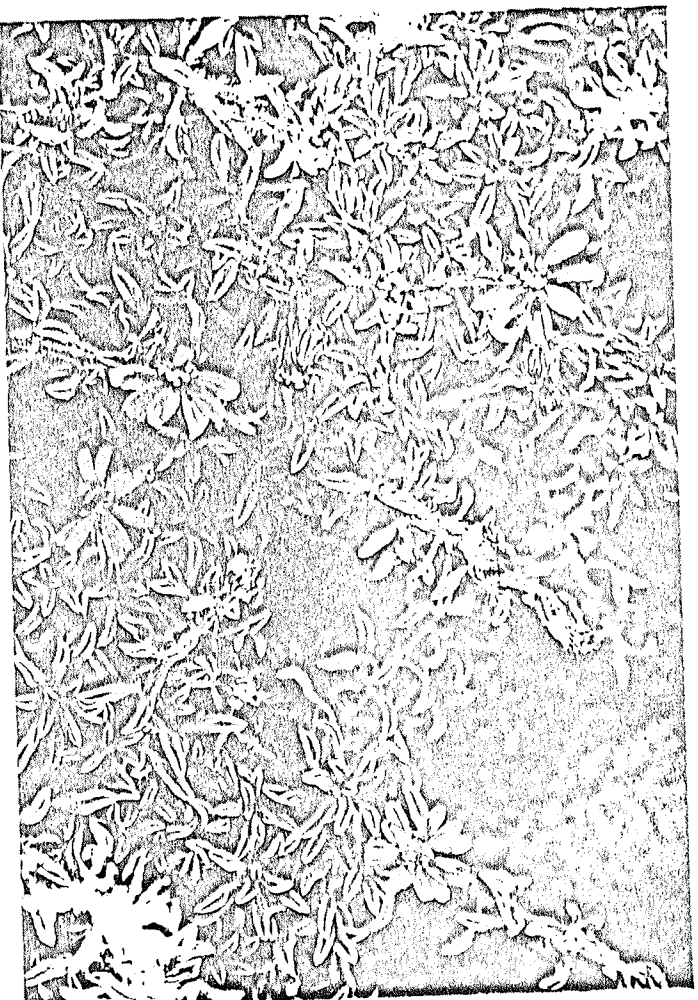


PHOTO: Heterotheca jonesii
notice tomentose leaves



PHOTO: Heterotheca jonesii (growth habit)
notice Navajo Sandstone rubble
that the plant is growing on



PHOTO: Heterotheca jonesii habitat
Ponderosa Pine/Manzanita Community
near Hell's Backbone Bridge (Dixie National Forest)

4. SIGNIFICANCE OF THE TAXON

A. Natural

Plants are ecologically important because they help stabilize the Navajo and Kaiparowits sandstone outcrops on which they occur.

B. Human

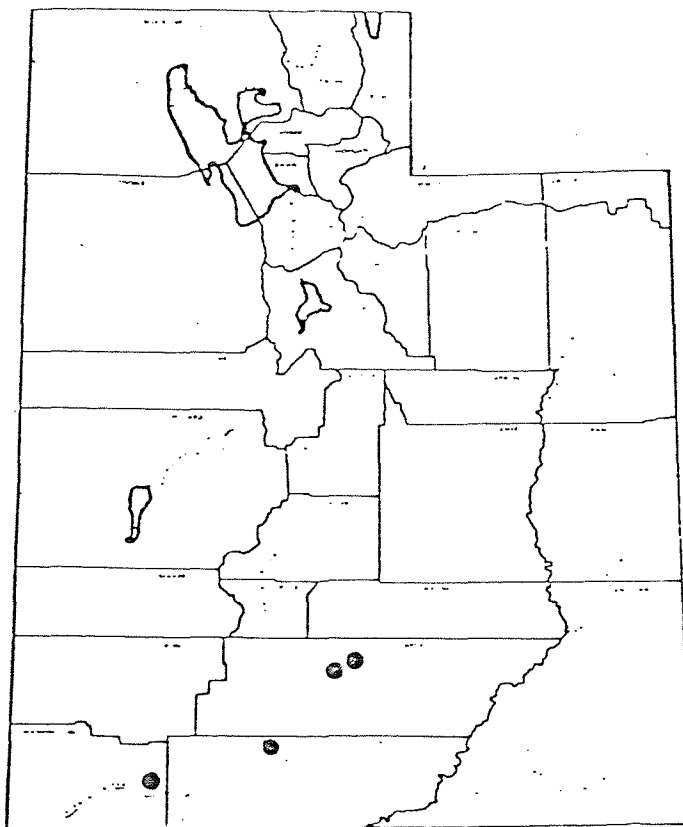
"This rare Utah endemic is valuable in determining speciation in Heterotheca which has only a small number of species in the west, and those are widely distributed" (Welsh, 1978-Status Report).

5. GEOGRAPHICAL DISTRIBUTION

A. Geographical Range

United States

Garfield, Kane and Washington Counties, southern Utah.



This map reflects present distribution of Heterotheca jonesii in Utah (From Welsh, 1979).

B. Precise Occurrences

1. Extant Populations

Hell's Backbone

- i. Utah, Garfield County, USA.
- ii. Approximately 38° 58' N, 111° 36' W, 9000'.
- iii. T. 33 S., R. 3 E., Section 5.
- iv. Roger Peak, Utah 7½' Quadrangle, 1964.
- v. Plants first collected by W.P. Cottom in 1942.
- vi. Most recent collection by A.M. Hreha (1981).
- vii. .2 mi. northwest of Hell's Backbone Bridge.
- viii. Roger Peak Area.

Bridge Canyon

- i. Utah, Kane County, USA.
- ii. Approximately 37° 32' N, 112° 4' 30" W, 8400'.
- iii. T. 38 S., R. 4 W., Section 5.
- iv. Bryce Point, Utah 7½' Quadrangle, 1966.
- v. Plants first collected by Buchanan and Graybosch (1980).
- vi. No plants collected since 1980.
- vii. On the trail under the canyon rim from Farview Point to Bridge Canyon.
- viii. Bryce Canyon National Park (Under-the-Rim Trail).

2. Extirpated Populations

Springdale (Type Location)

- i. Utah, Washington County, USA.
- ii. Approximately 37° N, 113° W, ca. 5000'.
- iii. T. 41 S., R. 10½ W.

- iv. Hilldale (Springdale SW), Utah 7½' Quadrangle, 1981.
- v. Plants first collected by M.E. Jones in 1894.
- vi. Plant has not been collected recently.
- vii. Exact location not known.
- viii. Near the southern entrance to Zion National Park on State Highway 9.

3. Historically Known Populations of Uncertain Status
None

4. Potential Locations
Southern Utah, especially in Garfield and Kane Counties, where outcrops of Navajo and Kaiparowitz Sandstone are prevalent.

5. Reports Having Ambiguous Locality Information
The herbarium label location information is very scant on Jones' type specimen. It merely reads "Springdale, Utah." Perhaps this could be the reason recent efforts to locate the species in Washington County have been unsuccessful.

6. Possibly Erroneous Reports
None

C. Biogeographic and Phylogenetic History of the Taxon
Jones' golder aster is distributed in three counties in southern Utah. The southern-most population was located in Springdale (Washington County) by Marcus Jones. The northern most population is found at Hell's Backbone in the Dixie National Forest on the Aquarius Plateau (Garfield County). A third population has been found recently in Bridge Canyon within Bryce Canyon National Park (Kane County) by Buchanan and Graybosch (1981) which is intermediate between the other two locations. The possibility exists that other Heterotheca populations occur on the extensive Navajo and Kaiparowits Formations in southern Utah. Information concerning the phylogenetic history of the taxon is limited.

6. GENERAL ENVIRONMENT AND HABITAT DESCRIPTION

A. Concise Statement of General Environment and Habitat

The habitat of the small yellow composite is characterized by dry, yellow, sandstone outcrops within the Ponderosa

Pine Zone. Bristlecone pine is also found in the overstory, whereas manzanita, mountain mahogany, bitterbrush and common juniper are the major components of the understory vegetation. The species is found between 8000 - 9000 ft. (2427 - 2730 m) in elevation on south and west-facing slopes.

B. Physical Characteristics

1. Climate

The golder aster populations occupy a semi-arid or steppe climate (BSk) according to Köppen (1931).

Springdale (Extirpated Population)

Zion National Park, the closest weather station to the north of Springdale, receives 14.4 inches (36 cm) of precipitation annually. The mean temperatures range from lows of 40.2° in January to highs of 84.2° in July. The highest temperature recorded during 1980 was 106° and the lowest was 17°. There is an average of 182 frost free days per year. (U.S. Dept. of Commerce, 1980).

Hell's Backbone (Extant Population)

Boulder, the closest weather station with conditions most similar to the Hell's Backbone area, measures 13.6 inches (34.5 cm) of precipitation annually. The mean temperatures range from lows of 29.3° in January to highs of 72.2° in July. The highest temperature recorded in Boulder during 1980 was 94° and the lowest was 7°. There is an average of 139 frost free days per year (U.S. Dept. of Commerce, 1980).

Bridge Canyon (Extant Population)

Bridge Canyon probably receives less than the 15.8 inches (40.2 cm) of precipitation which Bryce Canyon National Park receives annually because it is below the rim. The mean temperatures at Bryce range from lows of 27.2° in January to highs of 63.4° in July. The highest temperature recorded during 1980 was 88° and the lowest was -5°. There are an average of 59 frost free days per year (U.S. Dept. of Commerce, 1980).

2. Air and Water Quality Requirements
Unknown

3. Physiographic Province

The Heterotheca populations are located within the High Plateaus subdivision of the Colorado Plateau Province (Fennemann, 1931).

4. Physiographic and Topographic Characteristics

This area of central Utah is composed of three longitudinal strips of plateaus generally separated from one another by escarpments or valleys. Structurally, these plateaus are true plateaus. The rocks from which they were formed are horizontal and have broad undulating surfaces. Many of these plateau rims have been notched by erosion (Fennemann, 1931).

Hell's Backbone Population

This population is located on the Aquarius plateau 9000 ft (2730 m) in elevation. The Aquarius Plateau belongs to the eastern strip of plateaus which includes: the Wasatch, Fish Lake and Awapa. This eastern line of plateaus ends at the south in the Aquarius Plateau which is 35 miles long by 10-18 miles wide. The Aquarius "the highest (10,500 - 11,600 ft or 3185-3520 m), most beautiful and interesting of all (in the group); is a great lava-covered remnant bounded by lofty retreating cliffs throughout more than three-fourths of its circumference." (Fennemann, 1931). The descent from its eastern rim is close to 6000 ft (1820 m).

Roger Peak (10,115 ft) is about 1.5 miles northwest of the population and Sand Creek lies to the east of it. A deep precipitous canyon of Navajo Sandstone lies below the Hell's Backbone Bridge and descends 1500 ft to the canyon bottom. The plateau is relatively flat with craggy side canyons cut into its rim.

Bryce Canyon Population

The Bryce Canyon population is located on the "Paunsagunt Plateau which crests along the Pink Cliffs, in which Bryce Canyon is carved" (Cronquist et al., 1972). The Pink Cliffs are composed of the pink limestone member of the Wasatch Formation. The elevation at Fairview Point on the rim of the canyon above the trail to the golden aster population is 8000 ft (2426 m). Hiking the trail to the bottom of Bridge Canyon one descends 1500 feet. Bridge Canyon is formed from sandstone outcrops common to the strata of the Kaiparowits Formation (below the Wasatch).

5. Edaphic Factors

The soil in which the Heterotheca was collected is derived from the weathered limestone outcrops characteristic of the Navajo and Kaiparowits Formations (Buchanan & Graybosch, 1981; Welsh, 1978-Status Report). It has a sandy texture much like beach sand and is yellowish in color.

6. Dependence of the taxon on dynamic aspects of climate, landforms and other features of physical habitat
The species is probably closely tied to its sandy limestone substrate but there has not been any research to document this association.

7. Unusual Physical Features
Unknown

C. Biological Characteristics

1. Vegetation Physiognomy and Community Structure
Heterotheca jonesii is part of the understory complex that is characteristic of the Ponderosa Pine Zone. Ponderosa pine (Pinus ponderosa) is the dominant overstory species in the habitat area. Shrubs such as Manzanita (Arctostaphylos), mountain mahogany (Cercocarpus ledifolius), Bitterbrush (Purshia tridentata), shrubby cinquefoil (Potentilla fruticosa) and juniper (Juniperus communis) are commonly associated with ponderosa pine forests.

2. Regional Vegetation Type
Küchler (1966) describes the potential natural vegetation (PNV) type of the region as Arizona Pine Forest (Pinus).

3. Frequently Associated Species

OVERSTORY

<u>Trees:</u>	<u>Pinus ponderosa</u> (dominant)
	<u>P. longaeva</u>
	<u>P. flexilis</u>
	<u>Pseudotsuga menziesii</u>

UNDERSTORY

<u>Shrubs:</u>	<u>Amelanchier</u> sp.
	<u>Arctostaphylos</u> sp.
	<u>Cercocarpus intricatus</u>
	<u>C. ledifolius</u>
	<u>C. montanus</u>
	<u>Cowania mexicana</u>

<u>Forbs:</u>	<u>Arenaria</u> sp.
	<u>Hymenoxys acaulis</u>
	<u>Penstemon</u> sp.
	<u>Petradoria pumila</u>

<u>Grasses:</u>	<u>Oryzopsis hymenoides</u>
	<u>Poa secunda</u>
	<u>Sitanion</u> sp.

4. Dominance and Frequency of the Taxon

Hell's Backbone Population

There are between 100-200 plants in the vicinity of the Hell's Backbone Bridge (Dixie National Forest). The percentage this species contributes to the forb cover on the Navajo Sandstone outcrops near the bridge is difficult to estimate but is probably about 10 percent (Personal Observation - Alyce Hreha, Meiji, 1982).

Bridge Canyon Population

Bob Graybosch, who found the Bridge Canyon (Bryce Canyon National Park), population estimates that there are between 50-100 plants near the Under-the-Rim Trail.

The trail runs from Bryce Point in the northern part of the Park to Yovimpa Point in the southern part.

5. Successional Phenomena

The Heterotheca plant community appears to be in an early successional stage however there is no data to support this observation. The small golden aster, like many endemics, acts as a pioneer species and is colonizing the sandstone outcrops on which it grows. In a biological time frame, it is difficult to speculate if the populations will remain because there are many species that grow on the sandstone substrates with this plant.

6. Other Endangered or Threatened Species Occuring in Habitat of This Taxon

Cymopterus minimus was collected near Hell's Backbone Bridge (Dixie National Forest) by Alyce Hreha in 1981.

7. POPULATION BIOLOGY

Little is known of the population dynamics or mechanisms of this taxon.

8. POPULATION ECOLOGY

The relationship of this taxon to other species and to its environment is poorly known. Plants tend to occur intermixed with other common understory forbs. Plants are located in the sandy soil in the clearings between associated overstory trees and shrubs or on exposed sandstone outcrops. The golden aster begins flowering in late July and continues through August when the fruits mature.

9. CURRENT LAND OWNERSHIP AND MANAGEMENT RESPONSIBILITY

Both Heterotheca populations are on federal land. Management of the plants habitat is the responsibility of the U.S. Forest Service (Dixie National Forest - Escalante Ranger District) and the National Park Service (Bryce Canyon National Park).

10. MANAGEMENT PRACTICES AND EXPERIENCE

A. Habitat Management

USFS

Dixie National Forest

The Hell's Backbone Bridge area is mainly managed for recreational and sightseeing purposes. Timber is harvested on the Aquarius Plateau in the vicinity.

NPS

Bryce Canyon National Park

The park is primarily managed for recreational and tourist activities. A hiking trail transects the Bridge Canyon habitat but does not receive heavy use (about 200 hikers/year).

Because this species is under review by the U.S. Fish & Wildlife Service, it is considered a "sensitive" species by both USFS and NPS management personnel. U.S. Forest Service Title 2600 protects "sensitive" species that occur on lands within the National Forest. All plants endangered or otherwise are protected from picking and destruction by park visitors that are within National Park boundaries.

B. Cultivation

Unknown

11. EVIDENCE OF THREATS TO SURVIVAL

A. Present or Threatened Destruction of Habitat

Road Construction

Past: Expansion of the Hell's Backbone Rd. from Escalante to Boulder was cited as a threat to the species by Welsh (1978, Status Report).

Present: However, this project does not include the Hell's Backbone Bridge. Road widening comes within 2 miles of the bridge on the Escalante side and within 3 miles on the Boulder side (Letter - Ed Fournier, Dixie National Forest, 1981).

Future: An expansion project in the future could severely damage the present population's habitat and destroy a significant number of these plants near the bridge.

Damage from Truck Tires:

Present: The Hell's Backbone Road is quite heavily traveled compared to other USFS roads because it is one of the main thoroughfares from Escalante to Boulder. Some plants close to the road near the bridge have been run over by truck tires. The damage to the golden aster population is minimal and unintentional.

Trampling by National Park Visitors:

Present: Bryce Canyon National Park (Bridge Canyon) gets about 200 visitors on the hiking trail through the population per year. The plant grows on the Under-the-Rim Trail that runs from Bryce Point in the north to Yovimpa Point in the South of the Park. Bob Graybosch does not consider this a threat to the species.

- B. Overutilization
None
- C. Disease or Predation
None
- D. Inadequacy of Existing Regulatory Mechanisms
There are no State or Federal laws to protect this species at present.
- E. Other Natural or Manmade Factors
None

II. ASSESSMENT AND RECOMMENDATIONS

12. GENERAL ASSESSMENT OF VIGOR, TRENDS AND STATUS

The vigor of the Heterotheca jonesii populations is good. Many healthy plants were observed at the Hell's Backbone site this past summer. Mature plants were producing many flowers and a viable seed crop is expected. The population is probably increasing but no data is available to support this observation.

Upon investigation, none of the threats listed in the initial Status Report by Welsh (1978) or observed by Meiji botanists are currently threatening the survival of Jones' golden aster. This species does not warrant listing at this time because there are no current threats to the species and because the discovery of the Bryce Canyon population has extended its range.

13. PRIORITY OF LISTING OR STATUS CHANGE

A. Recommendation to Director, U.S. Fish and Wildlife Service,
Department of Interior

Recommend that species not be listed at this time but that population density and future threats to the species be monitored. Draw up a Memorandum of understanding (MOU) between USF&WS and USFS and between USF&WS and NPS to protect species.

B. Recommendations to Other U.S. Federal Agencies

Recommend that USFS list this species as "sensitive" and monitor population density and future threats in the habitat area.

Inform the botanist at Bryce Canyon National Park of this species' location and have him notify the U.S. Fish and Wildlife Service if over-use of the species' habitat by park visitors (hikers) becomes a problem.

C. Other Status Recommendations

Include this species on the Utah Native Plant Society's State Watch List.

14. RECOMMENDED CRITICAL HABITAT

Utah. Garfield County

Hell's Backbone

T. 33 S., R. 3 E., Section 5

Sandy limestone outcrops between 8000 - 9000 ft. (2427 - 2730 m) in elevation in the Ponderosa Pine Zone with Arctostaphylos understory.

15. CONSERVATION/RECOVERY RECOMMENDATIONS

No change in management of the area is recommended at the present time. Monitor population vigor, density and trends. Protect area, especially critical habitat, from destruction by future threats (i.e., road construction, over-use of habitat by Bryce Canyon National Park visitors and development). More distribution and biological data should be gathered for this species.

16. INTERESTED PARTIES

Lois Arnow, Curator
Garrett Herbarium
University of Utah
Salt Lake City, Utah 84112
801/581/6520

Bob Graybosch
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Bessey Hall
Iowa State University
Ames, Iowa 50011
515/294-4035

Duane Atwood
U.S. Forest Service
Federal Building
Provo, Utah 84601
801/377-5780

Alyce M. Hreha
Meiji Resource Consultants
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Layton, Utah 84041
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Hayle Buchanan
Botany Dept.
Weber State College
Ogden, Utah 84408
801/626-6178

Leila Shultz, Curator
Intermountain Herbarium
Utah State University
Logan, Utah 84321
801/750-1586

Tony Frates, President
Utah Native Plant Society
P.O. Box 6257
Salt Lake City, UT 84106
801/532-1922

Stanley Welsh, Curator
Brigham Young Univ. Herbarium
Rm. 375 MLBM
Provo, Utah 84601
801/378-2289

17. SOURCES OF INFORMATION

A. Publications

1. Botanical Publications Specific to This Taxon and the Genus:
Jones, M.E. 1895. Contributions to Western botany,
No. VII. Proc. Calif. Acad. Sci. II, 5:611-733.

Tidestrom, I. 1925. Flora of Utah and Nevada. Contr.
U.S. Natl. Herb. 25:1-665.

2. Status References :

Ayensu, E.S. and R.A. DeFilipps. 1978. Endangered
and Threatened Plants of the United States.
Smithsonian Institution and World Wildlife Fund, Inc.
Washington, DC., 403 p.

Welsh, S.L. 1978. Status Report-Heterotheca jonesii.
Submitted to the U.S. Fish & Wildlife Service, Denver,
Colorado.

Welsh, S.L. 1978. Endangered and Threatened Plants of
Utah: a reevaluation. Great Basin Naturalist 38:1-18.

Welsh, S.L. 1979. Illustrated Manual of Proposed Endangered and Threatened Plants of Utah. Submitted to U.S. Fish & Wildlife Service, Denver, Colorado. 318 p.

Welsh, S.L., N.D. Atwood and J.L. Reveal. 1975. Endangered, threatened, extinct, endemic and rare or restricted Utah vascular plants. Great Basin Naturalist 35:327-376.

3. General Botanical References:

Cronquist, A., A.H. Holmgren, N.H. Holmgren and J.L. Reveal. 1972. Intermountain Flora, Volume I. Hafner Press, New York, 270 P.

Küchler, A.W. 1966. Potential Natural Vegetation, in United States Dept. of Interior. 1970. The National Atlas of the United States of America. U.S. Government Printing Office, Washington, D.C.

4. General References:

Fenneman, Nevin M. 1931. Physiography of Western United States. New York: McGraw-Hill Book Co. 534 p.

Köppen, W. 1931. Classification of Climates, in Trewartha, Glenn T. 1968. An Introduction to Climate, 4th ed. New York: McGraw-Hill Book Co.

U.S. Department of Commerce. 1980. Journal of Climatological Data. Utah.

B. Museum Collections Consulted

The following herbarium collections were consulted or have specimens of this species:

BRY - Brigham Young University Herbarium
Provo, Utah 84601

Ut - Garrett Herbarium
University of Utah
Salt Lake City, Utah 84112

UTC - Intermountain Herbarium
Utah State University
Logan, Utah 84321

Voucher specimens of Heterotheca jonesii were deposited at Garrett Herbarium (3/15/82).

C. Fieldwork

Alyce M. Hreha visited the population on August 5, 1981 to map the population, collect specimens, take photographs and collect biological data (Field Report and Map Attached).

D. Knowledgeable Individuals

Duane Atwood
USFS - Zone Botanist
Federal Building
Provo, Utah 84601
801/377-5780

Dr. Atwood is knowledgeable about the species on USFS land.

Hayle Buchanan
Botany Dept.
Weber State College
Ogden, Utah 84408
801/626-6178

Dr. Buchanan wrote the 1981 journal article which reported the range extension of the species with Bob Graybosch.

Bob Graybosch
Dept. of Botany
Bessey Hall
Iowa State University
Ames, Iowa 50011
515/294-4035

Bob discovered the Bryce Canyon population in Bridge Canyon on the Under-the-Rim Trail.

Alyce M. Hreha
Meiji Resource Consultants
P.O. Box 250
Layton, Utah 84041
801/544-4041

Ms. Hreha revised the Status Report (1982) and has done field work on the species.

Stanley Welsh, Curator
Brigham Young Univ. Herb.
Rm. 375 MLBM
Provo, Utah 84601
801/378-2289

Dr. Welsh wrote the initial Status Report (1978) and is an authority on Utah's Flora.

E. Other Information Sources

Memoranda, letters and notes to state and federal agency personnel on file at Endangered Species Office, U.S. Fish and Wildlife Service, Region 6, Denver, Colorado.

18. SUMMARY OF MATERIALS ON FILE

- 1978 Status Report by Stanley Welsh, Curator, Brigham Young University Herbarium, Provo, Utah 84601
- Botanical publications specific to the taxon
- Memos, letters and personal communication records to/from knowledgeable individuals

- Topographic maps with the Heterotheca population located
- Photos and slides of the Heterotheca's habitat and close-ups of the plants
- Voucher collection records
- Field report

IV. AUTHORSHIP

19. INITIAL AUTHORSHIP

Alyce M. Hreha
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20. MAINTENANCE OF STATUS REPORT

U.S. Fish and Wildlife Service
Endangered Species Office
Region 6
P.O. Box 25486
Denver Federal Center
Denver, Colorado 80225
(303) 234-2496

21. RECORD OF REVISIONS

V. NEW INFORMATION

22. FIELD REPORT AND MAPS (ATTACHED)

