

## CURRENT DISTRIBUTION AND STATUS OF SHARP-TAILED SNAKES (*CONTIA TENUIS*) IN OREGON

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**ABSTRACT**—Many reptile species are rarely encountered and are thus assumed to be rare in the absence of evidence to the contrary. The sharp-tailed snake (*Contia tenuis*) is a species about which little is known due to its secretive behavior. This species has been classified as “Vulnerable” in Oregon based on scant data about its distribution and status. We searched extensively for published and unpublished records of its occurrence and conducted field searches for the species to clarify its current distribution and status in Oregon. The information reported here expands the known range and increases the number of reported sightings of this species by almost a factor of ten. We conclude that, contrary to some reports, *C. tenuis* is not rare in Oregon. The secretive behavior of *C. tenuis* may have resulted in the species being unnecessarily listed as “vulnerable” as it appears to be more widespread than previously thought.

**Key words:** sharp-tailed snake, *Contia tenuis*, distribution, range, management, Oregon

Species rarity and secrecy can complicate the proper management of populations. Both rarity and secrecy can lead to a shortage of observations and to a paucity of basic distribution and life history information. Rare species that are considered secretive can be overlooked during conservation efforts, and secretive animals that are considered rare can become unnecessary targets for conservation resources at the expense of species in greater need. In these ways, the confounding effects of rarity and secrecy can directly result in management decisions that are based on a lack of information (Gibbons and others 1997). Management of rare or secretive species is further complicated because it is difficult to conduct additional research on such species to improve management strategies.

The sharp-tailed snake, *Contia tenuis*, is a small, obscure species about which little is known. Hence, it has been assumed to be rare over much of its distribution. Its range is lim-

ited to parts of California, Oregon, Washington, and extreme southwestern British Columbia.

*C. tenuis* in Oregon has never been the subject of systematic research, and up through the 1960s, only a small number of notes and reports included Oregon specimens (Fitch 1936; Gordon 1939; Darling 1947; Storm 1948; Cook 1960; Brattstrom 1965; Storm 1966; Brodie and others 1969). As recently as 1966, the species was known from only 3 Oregon counties (Storm 1966). In 1971, the Oregon Game Commission classified *C. tenuis* as “endangered” and listed it as “protected” (Mace 1971). In 1997, this species was classified by the Oregon Department of Fish and Wildlife (ODFW) as “Vulnerable” (ODFW 1997). It has recently been removed from listing in the state (ONHIC 2004).

In the 1980s, ODFW commissioned herpetofauna surveys in western Oregon, which resulted in documentation of approximately 59

locality records of *C. tenuis* in the previously known counties and in 5 additional counties (St. John 1982, 1984, 1985, 1987). Despite this substantial increase in locality data, it has recently been suggested that *C. tenuis* may no longer occur in counties where originally found, that it is rare and declining in the Willamette Valley, and that only isolated populations occur in the southern part of the state (Marshall and others 1996).

We conducted a 2-part study to assist in the determination of the current status and distribution of *C. tenuis* in Oregon. First, we compiled updated sight records of *C. tenuis* in Oregon from published and unpublished records and from personal communications. We rely heavily on 2nd-hand reports until a more comprehensive survey can be performed, because no systematic study of *C. tenuis* has been conducted in Oregon. Second, we searched for *C. tenuis* in appropriate habitats to document additional localities within Oregon. We compared current and historically known distributions of *C. tenuis* in an effort to detect trends in distribution patterns and known populations. We also provide the first detailed distribution data for a proposed new species of *Contia*, which is believed to exist in Oregon and California (Hoyer 2001; Feldman and Spicer 2002). We refer to this proposed new species here as "*Contia* sp. A".

## METHODS

### *Compilation of Sight Records*

From late December 1997 to late January 1999, we solicited locality records and sightings of *Contia* in Oregon from various state and federal agencies, museums, universities, and individuals familiar with the species. We obtained 1) written records in the form of field notes, published accounts, governmental reports, and museum and university collection catalogues, and 2) recalled observations. In cases where the number of individual snakes observed could not be determined due to missing detail in verbal or written reports, we assumed only a single snake was observed. We defined a locality as a site where  $\geq 1$  *Contia* was found that was  $\geq 1$  km from the nearest known locality. We report the latitude and longitude of localities to the nearest second, but some coordinates are generated from imprecise records

and therefore should be considered approximate.

### *Field Searches*

We conducted field searches from 6 March to 30 December 1998. Most searches were made in open grassland or at the edge of brush and grassy habitats in association with deciduous tree stands. We searched by lifting cover in the form of woody debris, rocks, leaf litter, or anthropogenic cover such as roofing tin and plywood (Hoyer 1974; Fitch 1975, 1992; Engelstoft and Ovaska 2000; Hoyer and Stewart 2000). Data from these 1st-hand searches were combined with those from the 2nd-hand sources above for analysis to provide as complete a summary as possible.

Sex, weight, tail and total lengths, and age-size class were recorded for each sharp-tailed snake captured. Specimens were individually marked by clipping ventral scales to identify recaptured specimens and to avoid inflating estimates of abundance. However, 2 problems with this method surfaced in the course of this study. First, although snakes marked in March could still be identified in October, we found that regrowth of the ventral scales made identification impossible in time (Hoyer, unpubl. data). Thus, the method is suitable only for the short term, probably  $< 2$  y. Secondly, juvenile snakes are too small to be accurately and safely clipped numerically. We clipped 2 left-side ventral scales below the neck for each juvenile snake. These juveniles could only be identified as having been previously captured. To aid identification of individual snakes, we devised a method that relied on a combination of head and body scalation unique to each snake, similar to the method used for  $> 40$  y in field studies of the rubber boa, *Charina bottae* (Nussbaum and Hoyer 1974; Hoyer and Storm 1992; Hoyer and Stewart 2000). Features used were the number, relative size, and arrangement of scales bordering the perimeter of the left and right parietals, relative lengths of left and right upper and lower chin shields, configuration and the number and fraction of scales bordering the infralabials, black spotting or blotches on infralabials and chin shields, number and size of less-than-full-length ventrals at the neck, anomalous upper and lower labials or other head plates, and any anomalous ventral and/or caudal scales. This identification system

was used for juveniles and as a backup for the scale-clipped adults.

In analyzing the majority of these data we have considered *Contia* sp. A together with *C. tenuis*. We have, however, determined the relative contribution of each species to the present study by reviewing all locality records and sightings in conjunction with associated habitat and with body measurements and scalation, if available.

## RESULTS

### Locality Records

We identified 625 unique observations of *Contia* from 282 localities in Oregon from museum records (Appendix), our field surveys, and 2nd-hand reports (sight records that were deemed reliable). Of these 282 localities, 12 come from our field searches. For the 585 entries in which the year of discovery was specified, there was a significant increase in the number of new sightings each year from the 1st records in the 1920s to 1998 (linear regression of  $\log_{10}$ -transformed data;  $R^2 = 0.80$ ,  $P < 0.0001$ ).

### Distribution

Information compiled for this study has extended the range of *Contia* in some parts of the state (Fig. 1). East of the Cascades in Wasco County, from early 1970 sightings at Rock Creek Reservoir and Tygh Valley, the species' range has been extended approximately 64 km N to The Dalles, Oregon, along the Columbia River ( $45^{\circ}36'26''N$ ,  $121^{\circ}12'55''W$ ). We believe that the extent of the species' E-W and S range limits E of the Cascade Mountains is yet to be determined.

West of the Cascade Mountains, the farthest E and N sighting is at Lake Oswego in Clackamas County ( $45^{\circ}21'09''N$ ,  $122^{\circ}38'20''W$ ). In the north half of the state, the farthest W sightings are 24 km W of Junction City (just W of the Coast Range summit) in Lane County ( $44^{\circ}12'58''N$ ,  $123^{\circ}32'09''W$ ). Near the center of the state, the farthest E and W occurrences are slightly E of the Hills Creek Reservoir Dam SE of Oakridge in Lane County ( $43^{\circ}40'40''N$ ,  $122^{\circ}22'55''W$ ) and W of Kellogg and S of Elkton, Douglas County ( $43^{\circ}32'14''N$ ,  $123^{\circ}39'51''W$ ), respectively. In the south half of the state, the farthest SW sighting remains 12 km E of Brookings in Curry County ( $42^{\circ}06'03''N$ ,  $124^{\circ}11'46''W$ ), and the farthest SE

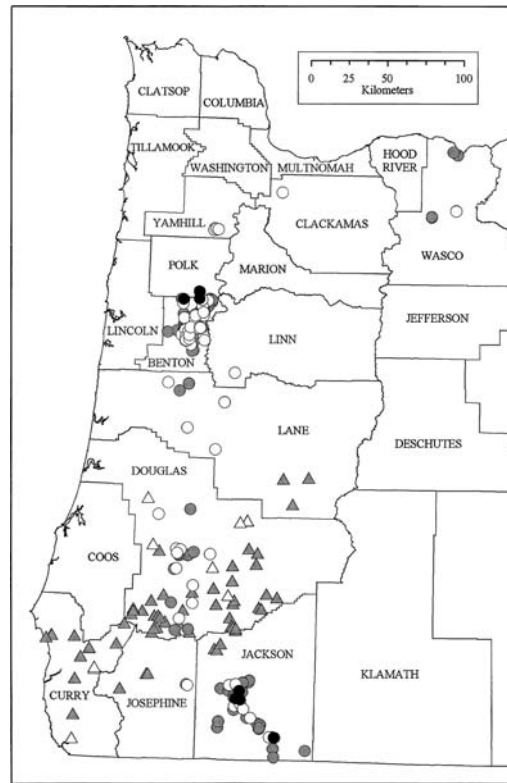


FIGURE 1. Locality records of *Contia* in Oregon. Black symbols are new records from our field searches. Grey symbols represent museum records and personal communications that have not been previously published. Open symbols represent previously published records from Fitch (1936), Darling (1947), Brodie and others (1969), St. John (1982, 1984, 1985, 1987), and Nussbaum and others (1983). Circles represent *C. tenuis*, and triangles represent the proposed new species of *Contia*. Observations that were within 1 km of each other or that were not described adequately to distinguish from each other were combined for clarity. Localities represent only the locations where *Contia* has been found and not abundance at those locations; single symbols may represent multiple observations over multiple years.

locality is in the SE corner of Jackson County within about 8 km of Klamath County ( $42^{\circ}03'55''N$ ,  $122^{\circ}20'58''W$ ). The most southerly sighting is near the California border on the S slope of the Siskiyou Mountains ( $42^{\circ}01'23''N$ ,  $122^{\circ}35'48''W$ ).

Since the 1st published records in 1930, there has been a consistent increase in the known range of *Contia* in Oregon. The change in the known distribution over time can be summa-

rized by reviewing the counties in which the snakes have been found. In the mid 1920's, *C. tenuis* was observed near Talent in Jackson County (HS Fitch, University of Kansas, Lawrence, KS; pers. comm.). The 1st published records are from the 1930s in Jackson and Benton Counties (Fitch 1936; Gordon 1939). Through 1969, *C. tenuis* had been documented from only Benton, Douglas, and Jackson Counties (Storm 1966; Oregon State University collection records). Through 1994, confirmed sightings of *Contia* were noted from Benton, Curry, Douglas, Jackson, Lane, Josephine, Wasco, and Yamhill Counties (St. John 1982, 1984, 1985, 1987; Nussbaum and others 1983; Applegarth 1994). Records from Clackamas and Linn Counties were reported by St. John (1987) but were not mentioned specifically by county and were subsequently overlooked (for example, Marshall and others 1996). Polk County had been listed from two 2nd-hand sources (St. John 1987; Marshall and others 1996). The species was first verified in Polk County during our 1998 field searches. We have also added Coos County to the list of counties where *Contia* has been found (UTA 27192).

*Contia* sp. A has a distribution that is sympatric with *C. tenuis* in parts of SW Oregon (Fig. 1), but occupies different habitats (Hoyer 2001). Of the 625 sightings reported, 73 (11.7%) represent *Contia* sp. A, 544 (87.0%) represent *C. tenuis*, and 8 (1.3%) could not be confidently assigned into either species and were conservatively considered *C. tenuis*. *Contia tenuis* currently occurs in all counties where the genus *Contia* is found except for Curry and Coos. Voucher specimens of *Contia* sp. A exist for Curry, Coos, and Douglas counties, and this species is suspected to occur in Jackson, Josephine, Lane, and Benton counties.

We suspect that maximum elevations of *Contia* sp. A and *C. tenuis* differ. Elevation records for *C. tenuis* remain at 670 m in Wasco County and 1220 m near the summit of Siskiyou Pass. We suspect the snakes observed at about 1100 m on Mary's Peak and at 1370 m or above in SE Douglas County represent *Contia* sp. A.

#### *Continued Occurrences*

*Contia tenuis* is still found at all 3 Willamette Valley localities and the Jackson County locality where the species was originally observed

in the 1930s. Searches are yet to be made at the early sightings near Talent, Oregon.

Of the 59 sites identified in ODFW herpetofauna surveys and reviews of the Oregon State University records in the 1980s (St. John 1982, 1984, 1985, 1987), 16 were included in the reports we gathered, and sharp-tailed snakes were found at each of these sites. We searched 2 additional sites from among those 59 (at Rock Creek Reservoir in Wasco County and Amity Hills in Yamhill County) and found that sharp-tailed snakes continue to occur at both sites. The other 41 historical sites were not searched as part of this project due to financial and time constraints.

## DISCUSSION

### *Distribution*

The sharp-tailed snake is characterized as having a distribution that is "spotty" (Nussbaum and others 1983), "patchy" (Leonard and Ovaska 1998) in the Northwest, or "spotty" throughout its range (Stebbins 2003). ODFW's "Species at Risk" document (Marshall and others 1996) mentions "isolated populations" and shows 5 widely separated populations on their range map for the species in Oregon. These assessments were apparently based on low numbers of distribution records available at the time for the species and relatively large distances between some of the records. Instead of having a distribution that is "spotty", we propose that due to the species' biology and the nature of observations, only the discovery of the species has been spotty. Observations of *C. tenuis* in recent years have continually closed the gaps in its previously known distribution. We expect this trend will continue as more localities are discovered.

### *Continued Occurrences*

The species was shown to persist in excess of 20 y at all 17 of the 59 historical localities where searches were conducted (Table 1). Thirteen of those 17 sites occurred in the Willamette Valley, where the species has been described as "rare and declining" (Marshall and others 1996). Admittedly, our method of soliciting only sightings (and not absences) of *Contia* does not allow us to detect a decline in occupation of these localities, with the minor exception of the 2 sites searched by us. However, because *C. tenuis* persists in at least 4 of the 5 oldest localities and at

TABLE 1. Continued occurrence of *Contia* at various localities in Oregon in excess of 20 y from the original observation.

Latitude (N)	Longitude (W)	Original sighting		Resighting	
		Year	Source	Year	Source
44°33'47"	123°17'17"	1935	OS 282	1995	R Mason (OSU)
44°32'41"	123°23'51"	1946	OS 285-286	1997	R Kiester (OSU)
44°27'54"	123°22'03"	1948	OS 1525	1969	R Hoyer
44°35'54"	123°25'23"	1950	OS 5262	1996	R Mason (OSU)
44°26'31"	123°21'38"	1951	OS 6113, 6381	1998	P M de Laubenfels
44°40'13"	123°16'34"	1965	OS 10079	1993	D Bilsland
44°32'29"	123°17'41"	late 1930's	K Gordon	1997	R & D Brokken
44°36'46"	123°19'52"	late 1940's	R Storm (in St. John 1987)	1998	C Trainer (ODFW)
44°34'20"	123°25'12"	1970	CM 88728/31819	1998	R Hoyer
44°32'54"	123°23'43"	1969	R Hoyer	1997	R Hoyer
45°07'32"	123°09'52"	1976	A St. John	1998	R Hoyer
44°40'59"	123°26'09"	1951	OS 5973-5974	1998	R Hoyer
44°31'50"	123°24'20"	1939	CPS 3777	1997	R Hoyer
45°13'20"	121°23'21"	1970	R Hoyer	1998	R Hoyer
45°35'23"	121°10'44"	1975	B Castillo (ODFW)	1996	J Torland (ODFW)
42°20'28"	122°52'25"	1969	SOU 583	1995	S Wray (ODFW)
42°15'13"	122°49'06"	1936	H Fitch	1982	A St. John 1984

many of the Willamette Valley locations, we consider evidence for a decline to be weak. Systematic repetition of the 1980s surveys by St. John (1982; 1984; 1985; 1987), under similar environmental conditions, would be informative.

#### Dubious Records

A few previously reported records of *C. tenuis* localities are somewhat questionable and deserve special mention here. The earliest report of *C. tenuis* from "Oregon" is the paratype of *Contia mitis* (*C. tenuis*) at the Smithsonian Institute collected in the early 1840s. This specimen was not included in our data due to the lack of more precise collection information.

A sharp-tailed snake in the OSU collection (OS 10574) was found in 1969 near the coast in Tillamook County. AD St. John (Bend, OR; pers. comm.) investigated this sighting and believes the snake was inadvertently transported in a load of mulch from near Philomath in Benton County. The collection site is a considerable distance from the nearest known localities of *C. tenuis* or of other egg-laying reptiles. The specimen is included in our totals but is assigned to Benton County from which we believe it originated. However, it is possible that future searches will confirm the presence of this species in Tillamook County.

Three sightings reported to us are not included in the compiled data as they remain unverified, but are mentioned because they would

represent significant range extensions, if later verified. Two of these sightings are from Polk County that includes a USFWS checklist indicating the (supposed) presence of *C. tenuis* at the Basket Slough National Wildlife Refuge and a 3rd-hand report for the same county mentioned by St. John (1987). A sighting near Harlan in SE Lincoln County that was reported in a 1979 BLM survey could not be confirmed as the discoverers could not be contacted.

Finally, the single record from Clackamas County is based on an anecdotal report from C Rahr to AD St. John, where the county was not named but detailed locality information was given (St. John 1987). Based on both St. John's report and on our own conversations with C Rahr, we are confident that this record is accurate, but no specimens are available to confirm this sighting.

#### Aggregations and Disturbed Habitats

Cook (1960) mentioned that the perceived rarity of the species was probably misleading as there had been a number of instances where large numbers of *C. tenuis* had been found in relatively small areas. Leonard and others (1996) also reported aggregations of this species. Two additional accounts support the suggestion that *C. tenuis* may form relatively large aggregations. In March 1998, M Fuller (Central Point, OR; unpubl. data) collected 54 specimens beneath some black plastic covering a rose-lilac

bed in urban Central Point, Oregon. Furthermore, Hoyer (unpubl. data) has found 238 individuals in 2 d within a 1 km stretch of gravel road bordering an active tree farm near Corvallis, Oregon. In addition to providing evidence for high local abundance, these records and many other records of *C. tenuis* from urban areas indicate that the species seems to tolerate disturbed habitats. While this may seem contrary to Marshal and others' (1996) contention that this species is sensitive to urban development, doing well near and in urban areas is not equivalent to being capable of tolerating total loss of habitat.

For species with relatively stable distributions, we would expect an increase in reported sightings filling in distribution gaps or even an enlargement in known distribution over time as knowledge of the species increases and more localities are discovered (Gibbons and others 1997). Given the extent of continuous, suitable habitat in western Oregon, the continued expansion of the known range of *Contia* in Oregon, and the steady increase in the number of observations per year, we conclude that *Contia* is more widely distributed in Oregon than previously thought. We hope that the results from this study will encourage more systematic surveys to ascertain the distribution and abundance of *Contia*.

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APPENDIX. Museum specimens of *Contia* examined. Museum codes are: CM = Carnegie Museum; CPS = University of Puget Sound; DCM = Douglas County Museum (Oregon); KU = University of Kansas Museum of Natural History; LACM = Los Angeles County Museum of Natural History; MVZ = University of California at Berkeley Museum of Vertebrate Zoology; OS = Oregon State University Museum of Natural History; POR = Portland State University; SOU = Southern Oregon University; UMMZ = University of Michigan Museum of Zoology; USNM = National Museum of Natural History, Smithsonian Institution; and UTA = University of Texas at Arlington, Merriam Museum.

Specimen number(s)	Year(s)	Latitude (N)	Longitude (W)	County
CM 88728/31819	1970	44°34'20"	123°25'12"	Benton
CPS 3777	1939	44°31'50"	123°24'20"	Benton
DCM 1991.45	1991	43°07'15"	123°25'55"	Douglas
KU 153280	1973	44°33'19"	123°21'53"	Benton
LACM 20514-15	1956	44°32'38"	123°17'05"	Benton
MVZ 146142	1972	42°20'27"	122°52'32"	Jackson
MVZ 146141	1971	42°27'42"	122°51'24"	Jackson
OS 282	1935	44°33'47"	123°17'17"	Benton
OS 283	1941	44°29'29"	123°23'10"	Benton
OS 284	1942	44°29'52"	123°26'30"	Benton
OS 285-286	1946	44°32'41"	123°23'51"	Benton
OS 287	1946	44°31'40"	123°24'40"	Benton
OS 288, 290	1946, 1947	44°29'23"	123°24'19"	Benton
OS 289	1947	44°31'07"	123°23'10"	Benton
OS 363	1948	44°28'11"	123°14'59"	Benton
OS 752-753	1948	44°42'07"	123°13'55"	Benton
OS 1525	1949	44°27'54"	123°22'03"	Benton
OS 1526	1948	44°32'16"	123°18'21"	Benton
OS 5262	1950	44°35'54"	123°25'23"	Benton
OS 5263	1950	44°28'08"	123°15'05"	Benton
OS 5919-5921, 6560, 6568	1951	44°32'31"	123°17'11"	Benton
OS 5973-5974	1951	44°40'59"	123°26'09"	Benton
OS 6090	1951	44°27'55"	123°24'27"	Benton
OS 6113, 6381	1951	44°26'31"	123°21'38"	Benton
OS 6186-6187	1951	44°27'48"	123°23'37"	Benton
OS 6225	1951	44°35'47"	123°18'50"	Benton
OS 6245	1951	44°32'46"	123°17'42"	Benton
OS 6247	1951	44°28'05"	123°24'10"	Benton
OS 6481	1951	44°28'34"	123°22'34"	Benton
OS 6486	1951	44°34'42"	123°17'35"	Benton
OS 7159	1951	43°01'40"	123°16'43"	Douglas
OS 8708-8711	1953	42°19'28"	122°53'32"	Jackson
OS 8739	1953	43°12'57"	123°08'44"	Douglas
OS 9117	1953	42°19'20"	122°55'07"	Jackson
OS 9199	1953	44°37'32"	123°15'44"	Benton
OS 9220	1953	44°36'55"	123°15'48"	Benton
OS 9241	1953	42°49'43"	123°22'49"	Douglas
OS 9291	1953	44°35'44"	123°20'06"	Benton
OS 9869	1953	44°29'47"	123°22'35"	Benton
OS 10079	1965	44°40'13"	123°16'34"	Benton
OS 10113	1961	43°14'27"	123°25'21"	Douglas
OS 10574	1969	44°32'37"	123°22'07"	Benton
POR 2923	1953	44°37'05"	123°15'46"	Benton
SOU 583	1969	42°20'28"	122°52'25"	Jackson
SOU 1142	1973	42°20'28"	122°52'39"	Jackson
UMMZ 133498, 137401	1968, 1969	44°32'32"	123°17'16"	Benton
UMMZ 133499	1969	44°40'05"	123°13'47"	Benton
UMMZ 133500	1969	44°42'06"	123°13'34"	Benton
UMMZ 133555	1970	44°33'51"	123°25'27"	Benton
UMMZ 133557	1970	44°32'40"	123°17'19"	Benton
UMMZ 133558, 133559	1970	44°38'12"	123°17'47"	Benton
UMMZ 183496	1969	44°32'19"	123°17'25"	Benton
UMMZ 133556	1970	44°10'10"	123°26'22"	Lane
USNM 8075	early 1840s	unknown	unknown	unknown
UTA 17127, 17128, 17131	~1966	44°34'44"	123°18'08"	Benton
UTA 19353	1986	42°42'26"	124°23'25"	Curry
UTA 24545, 24546	1988	42°42'23"	124°23'13"	Curry
UTA 24547, 24548	1988	42°42'21"	124°12'29"	Curry
UTA 27192	1990	42°47'28"	123°48'55"	Coos
UTA 32515	1968	44°35'48"	123°18'36"	Benton