Acanthomintha ilicifolia

INTRODUCTORY

AUTHORSHIP AND CITATION:
Sclafani, Christie. 2005. Acanthomintha ilicifolia. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2007, May 15].

FEIS ABBREVIATION:
ACAILI

SYNONYMS:
Calamintha ilicifolia Gray [22]

NRCS PLANT CODE [33]:
ACIL

COMMON NAMES:
San Diego thorn-mint

TAXONOMY:
The scientific name for San Diego thorn-mint is *Acanthomintha ilicifolia* (Gray) Gray (Lamiaceae) [15,16,22,37].

LIFE FORM:
Forb

FEDERAL LEGAL STATUS:
Threatened [35]

OTHER STATUS:
San Diego thorn-mint is state-listed endangered in California, with a conservation status of S1 [5,33]. It is critically imperiled across its range [5,23].

DISTRIBUTION AND OCCURRENCE

SPECIES: Acanthomintha ilicifolia

GENERAL DISTRIBUTION:
San Diego thorn-mint is an endemic species. It ranges from the southern portion of the South Coast and the southwest Peninsular ranges of California south to northern Baja California Norte, Mexico [15,37,38]. Its occurrence is limited to the mesas and foothills of San Diego County in California, and to the western slopes of the Sierra Juarez and the northwestern coast between Tijuana and Ensenada in Baja California Norte [1,2,6,31]. Historically, San Diego thorn-mint was also found in central California. Two herbaria specimens document its location in Fresno and San Mateo counties in the late 1800s and early 1900s [7]. There are 73 known occurrences of San Diego thorn-mint populations in California: 7 are extirpated and 10 are presumed extirpated [6]. The majority of San Diego thorn-mint populations are located on private lands, but they are also found on federal and local agency lands [32]. Two large populations of San Diego thorn-mint are located on the Cleveland National Forest: 1 on Viejas Mountain and the other on Poser Mountain [29,32]. In Baja California Norte, at least 9 locations are known to have supported San Diego thorn-mint, but the current status of those populations is unknown [35]. The Jepson Flora Project provides a distributional map of San Diego thorn-mint.

ECOSYSTEMS [10]:
FRES34 Chaparral-mountain shrub
FRES36 Mountain grasslands
FRES42 Annual grasslands

STATES/PROVINCES: (key to state/province abbreviations)

UNITED STATES

CA

MEXICO

B.C.N.

BLM PHYSIOGRAPHIC REGIONS [4]:
3 Southern Pacific Border

KUCHLER [16] PLANT ASSOCIATIONS:
K033 Chaparral
K035 Coastal sagebrush

SAF COVER TYPES [8]:
None

SRM (RANGELAND) COVER TYPES [27]:
205 Coastal sage shrub
206 Chamise chaparral
215 Valley grassland

HABITAT TYPES AND PLANT COMMUNITIES:
San Diego thorn-mint can be found in chaparral, coastal sage scrub, and California annual grassland habitats.

Chaparral shrub species associated with San Diego thorn-mint include chamise (*Adenostoma fasciculatum*), red shank (*Adenostoma sparsifolium*), manzanita (*Arctostaphylos* spp.), ceanothus (*Ceanothus* spp.), and sumac (*Rhus* spp.) [25]. California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and woolly sunflower (*Eriophyllum lanatum* var. *obovatum)* dominate southern coastal sage scrub communities where San Diego thorn-mint occurs. Black sage (*Salvia mellifera*), purple sage (*S. apiana*), chaparral yucca (*Yucca whipplei*), and golden yarrow (*Eriophylllum confertiflorum* var. *confertiflorum*) are also common shrub species associates [8,25].

Nonnative grasses such as oat (*Avena* spp.), brome (*Bromus* spp.) barley (*Hordeum* spp.), and rattail fescue (*Vulpia myuros)* dominate the annual grasslands of California where San Diego thorn-mint is located [19]. Common native grass associates are purple needlegrass (*Nassella pulchra*) and other needlegrass (*Nassella* spp.) species [2].

Herbaceous species often found with San Diego thorn-mint are wild celery (*Apiastrum agustifolium*), golden stars (*Bloomeria crocea*), lilies (*Calochortus* spp.), small flowered soap plant (*Chlorogalum parviflora*), fringed spine flower (*Choriznthe fimbriata* var *fimbriata*), and slender tarweed (*Hemizonia fasciculata*) [2].

Two uncommon native forbs, chocolate lily (*Fritillaria biflora*) and Palmer's grappling-hook (*Harpagonella palmeri*), co-occur with San Diego thorn-mint in chamise chaparral and at vernal pool edges [32].

BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: Acanthomintha ilicifolia

GENERAL BOTANICAL CHARACTERISTICS:
This description provides characteristics that may be relevant to fire ecology, and is not meant for identification. Keys for identification are available [15,22,37].

San Diego thorn-mint is a low-growing, native annual herb. Stem height ranges from 2 to 8 inches (5-20 cm), with few to many branches [15,22,31,32,37]. The head-like inflorescence is terminal; the flowers are in whorls each having distinct spiny bracts below. The 0.47-inch (12 mm), funnel-shaped flowers have 2 lips, the upper lip smaller than the lower lip. The fruit is a schizocarp containing 4 smooth, ovoid nutlets. The nutlets remain in the flower calyx until the rainy season [1,15]. San Diego thorn-mint is distinguished from other species of thorn-mints by having sterile upper stamens and flowers with hairless anthers and styles [15,35].

RAUNKIAER [26] LIFE FORM:
Therophyte

REGENERATION PROCESSES:
San Diego thorn-mint reproduces sexually [32].

Breeding system: San Diego thorn-mint has bisexual flowers [15,22,37].

Pollination: San Diego thorn-mint appears to be insect-pollinated. Bauder and Sakrison [1,2] observed several insect species visiting San Diego thorn-mint. T>he most frequent visitors were bees and checkered beetles [1,2]. Two similar species of thorn-mint, San Mateo thorn-mint (*Acanthomintha duttonii*) and heartleaf thorn-mint (*A. obovata* ssp. *cordata*), are self-pollinating and insect-pollinated by medium to large-sized bees [28]. Because San Diego thorn-mint has sterile upper stamens, it probably does not rely on self-pollination as a breeding mechanism [15]. Additional studies are needed on the pollination biology of San Diego thorn-mint.

Seed production: San Diego thorn-mint has decreased seed production when invasive species are present [1,2].

Seed dispersal: No information is available on this topic.

Seed banking: Seed banking is documented for San Diego thorn-mint [1]. Population numbers fluctuate annually depending on environmental conditions (i.e. precipitation, insolation), indicating that seeds may remain dormant and viable for several years [32].

Germination: Optimal germinating conditions for San Diego thorn-mint require a long daily cool period of 50 °F (10 ° C). Bauder and Sakrison [1] found seed age was associated with germination. Older seeds showed an increase in mean percent germination and also germinated at warmer temperatures. Darkness inhibited germination, especially in younger seeds [1,2].

Seedling establishment/growth: Seedling survivorship was at least 80 % in a weeding study of San Diego thorn-mint. Weeding out nonnative species has a positive effect on fecundity. Plant size and fecundity are depressed by environmental stress and growth interference from invasive species [1,2].

SITE CHARACTERISTICS:
San Diego thorn-mint is an endemic species on the mesas and foothills of San Diego County and northern Baja California. San Diego thorn-mint occurs in open areas, clay depressions and vernal pools within chaparral, coastal sage scrub and annual grassland habitats below 2,953 feet (900 m) elevation [15,23,31]. San Diego thorn-mint is often associated with clay soils derived from gabbroic rock, which is uncommon in San Diego County and contributes to San Diego thorn-mint's rarity. Plants typically occur on gentle slopes of 15 to 20 degrees [32].

SUCCESSIONAL STATUS:
San Diego thorn-mint occurs in open areas [15,22,23,32], suggesting it thrives in early seral stages on disturbed sites.

SEASONAL DEVELOPMENT:
San Diego thorn-mint germinates in the winter, flowers from April through June, and sets seed in July. As an annual, it dies after seed set. Seeds disperse in the fall rainy season [1,31,32].

FIRE ECOLOGY

SPECIES: Acanthomintha ilicifolia

FIRE ECOLOGY OR ADAPTATIONS:
Fire adaptations: San Diego thorn-mint establishes from seed. Seeds of San Diego thorn-mint are stored in the soil seed bank [1,32].

Fire regimes: San Diego thorn-mint occurs in a mediterranean climate, with mild winters and hot, dry summers [18]. The summer drought generates low fuel moistures in habitats that typically experience stand-replacing fire.

Chaparral: The chaparral ecosystem with natural fire return intervals of 50 to 80 years usually experiences high-severity

fires [25]. In fall, southern California typically experiences hot, dry "Santa Ana" winds that drive chaparral fires. Such fires can easily burn thousands of hectares, killing most aboveground vegetation [4]. Coastal sage scrub experiences fires of similar severity, but with shorter frequency intervals of 20 to 25 years [36]. Abundant postfire growth of herbs and sprouting shrub species combined with a dry fire season can result in chaparral and coastal sage scrub reburns in only 1 to 2 postfire years. Short fire return intervals may convert shrublands to annual grasslands [29].

Annual grassland: The presettlement fire frequency for California grasslands is assumed to be similar to present fire frequency, although fire size may have been larger. Historically, California grasslands consisted of perennial grasses and forbs, but most have been converted to annual nonnative grass species [14]. Nonnative grass dominants may influence the fire regime [13]. California annual grasslands characteristically support fast-moving wildfires. Annual grasses germinate, set seed, and die in a single season, quickly curing into flashy fuels. Grassland fire return intervals range from 4 to 20 years, depending on local climate and ignition sources [25].

The following table provides fire return intervals for plant communities and ecosystems where San Diego thorn-mint is found. For further information, see the FEIS review of the dominant species listed below.

Community or Ecosystem	Dominant Species	Fire Return Interval Range (years)
California chaparral	*Adenostoma* and/or *Arctostaphylos* spp.	< 35 to < 100 [25]
coastal sagebrush	*Artemisia californica*	20-25 [22,36]
California annual grasslands	*Avena, Bromus*. and/or *Hordeum* spp.	4-20 [25]

POSTFIRE REGENERATION STRATEGY [30]:
Ground residual colonizer (on-site, initial community)

FIRE EFFECTS

SPECIES: Acanthomintha ilicifolia

IMMEDIATE FIRE EFFECT ON PLANT:
As of this writing (2005), the immediate fire effect on San Diego thorn-mint is not documented. Because San Diego thorn-mint is an annual, fires from mid-summer to fall probably kill mature to nearly mature plants that are developing or setting seed [1]. Low-severity spring and early summer fires may only top-kill San Diego thorn-mint, allowing for some postfire regeneration, flowering, and seed set [17]. Based on seed bank studies indicating that San Diego thorn-mint stores seeds in the soil [1,32], some seed may be protected from fire. Research is needed on fire effects on San Diego thorn-mint.

DISCUSSION AND QUALIFICATION OF FIRE EFFECT:

No information is available on this topic.

PLANT RESPONSE TO FIRE:
San Diego thorn-mint establishes from seed after fire [32]. Postfire establishment most likely occurs shortly after fire. Research is needed on the postfire response of the San Diego thorn-mint.

Darkness has been shown to inhibit germination [1], and San Diego thorn-mint is apparently an early seral species [15,22,23,32]. Therefore, fire may benefit San Diego thorn-mint by creating open spaces in shrub canopies, which increases light availability for germination and early successional establishment.

DISCUSSION AND QUALIFICATION OF PLANT RESPONSE:
It has been documented that San Diego thorn-mint can re-establish after fire. An herbarium specimen from the Rancho Santa Ana Botanic Gardens documents that San Diego thorn-mint is present after fire. The plant specimen was collected in 1995 and reported near the Cuyamaca/Laguna Mountains region in a "burned area" [7].

During the October 2003 Cedar and Paradise wildfires on the Cleveland National Forest, chamise chaparral populations of San Diego thorn-mint on Viejas Mountain experienced high-severity fire. Soon after the fires (November 2003), San Diego thorn-mint plants were not located, but San Diego thorn-mint was expected to regenerate from the soil seed bank [32]. No further monitoring results were available as of this write-up (2005).

FIRE MANAGEMENT CONSIDERATIONS:
According to the U.S. Forest Service Species Management Guide for San Diego thorn-mint [38], wildland and prescribed fires should be allowed to burn freely where San Diego thorn-mint occurs. Fire suppression activities should be minimized (e.g. firelines created using handlines and confined to ridge tops) [38]. Increased human disturbance and nonnative invasive species can negatively affect the recovery of San Diego thorn-mint after a fire [32].

Late summer or early fall fires could have a detrimental affect on San Diego thorn-mint populations. Seeds generally remain in the flower calyces until the rainy season. Fires occurring before seed dispersal could kill the aboveground seed [1].

MANAGEMENT CONSIDERATIONS

SPECIES: Acanthomintha ilicifolia

IMPORTANCE TO LIVESTOCK AND WILDLIFE:
Information on San Diego thorn-mint's use as a forage species, its nutritional value, and arthropod use for cover, is nearly absent as of this writing (2005). If typical of many species in the mint family, San Diego thorn-mint is probably unpalatable and little grazed by mammalian herbivores. It is a source of pollen and nectar for bees, bee-flies, and checkered beetles [1,2]. Research is needed on possible plant-animal relationships for San Diego thorn-mint.

VALUE FOR REHABILITATION OF DISTURBED SITES:

No information is available on this topic.

OTHER USES:
No information is available on this topic.

OTHER MANAGEMENT CONSIDERATIONS:
Livestock grazing in and around areas where San Diego thorn-mint is located may have detrimental effects on San Diego thorn-mint populations. Grazing can increase erosion and soil compaction, which degrades suitable habitat for San Diego thorn-mint. Cattle may introduce nonnative grasses that compete with seedling establishment of San Diego thorn-mint and other native species. Human activities such as illegal off-highway vehicles and dumping can harm San Diego thorn-mint populations and their habitat [38].

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