MORRO SHOULDERBAND SNAIL
(*Helminthoglypta walkeriana*)

5-Year Review: Evaluation and Summary

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U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Ventura, California

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5-YEAR REVIEW

Morro Shoulderband Snail (*Helminthoglypta walkeriana*)

GENERAL INFORMATION

Species: Morro shoulderband snail (=banded dune snail, *Helminthoglypta walkeriana*)
Date listed: December 15, 1994 (Endangered)
FR citation(s): 59 Federal Register (FR) 64613–64623
Date downlisted: February 3, 2022 (Threatened)
FR citation(s): 87 FR 6063–6077

Critical Habitat Designation:
We, the U.S. Fish and Wildlife Service (Service) designated critical habitat for Morro shoulderband snail in 2001. We divided the total designated area of 1,039 hectares ([ha] or 2,566 acres [ac]) within San Luis Obispo County, California into three units. These include Unit 1 - Morro Spit and West Pecho, Unit 2 - South Los Osos, and Unit 3 - Northeast Los Osos. We identified the following primary constituent elements, which we now refer to as essential physical and biological features, of critical habitat for Morro shoulderband snail:

1. Sand or sandy soils needed for reproduction;
2. A slope not greater than 10 percent to facilitate movement of individuals; and
3. The presence of, or the capacity to develop, native coastal dune scrub vegetation.

We recognized these features as the essential biological needs of the species for foraging, sheltering, reproduction, and dispersal (Service 2001; 66 FR 9233–9246).

State Listing:
Morro shoulderband snail is not listed by the state of California and holds no other species status, such as Species of Special Concern, under current state regulations including the California Endangered Species Act, as amended in 1997 (California Natural Diversity Database [CNDDB] 2025a).

Recovery Plan:
[Service] U.S. Fish and Wildlife Service. 1998. Recovery Plan for the Morro shoulderband snail and four plants from western San Luis Obispo County. U.S. Fish and Wildlife Service. Portland, Oregon. 85 pp.

[Service] U.S. Fish and Wildlife Service. 2019b. Recovery Plan for the Morro shoulderband snail and four plants from western San Luis Obispo County. Clarification. U.S. Fish and Wildlife Service. Pacific Southwest Region. 2 pp.

BACKGROUND

Species Overview:

Morro shoulderband snail is a terrestrial, pulmonate mollusk, and gastropod, which is the taxonomic class of organisms that includes common slugs, snails, and nudibranchs. Its common name, shoulderband, refers to its distinct and prominent shell markings where the shells are brown to chestnut in color, and have a darker brown spiral band on the shoulder. This central, spiral band has distinct yellowish/brown margins above and below giving it a striped appearance (Roth 1985, p. 5). This shoulderband is the most distinguishing feature of the species.

Morro shoulderband snail shells are globose-shaped (spherical) and helicoid, with five to six whorls, that resemble a cinnamon roll. The shells have an umbilicus, which is a hole in the center of the shell on the bottom side. The umbilicus is at least partially occluded by the lip of the inner aperture. Other key distinguishing morphological characteristics include the sculptural features on the outer surface of the shells. These include well-defined, incised, diagonal spiral grooves, other perpendicular diagonal papillated lines, and additional dot-like papillae. Adult shells range in size from approximately 18–29 millimeters (mm) or 0.7–1.1 inches (in) in diameter and from 14–25 mm or 0.6–1.0 in in height (Andreano 2005, entire; Roth 1985, p. 5).

The species is adapted to the local Mediterranean microclimate where most of its activities occur during the wet season, and rainiest parts of the year. The wet season typically extends from October through April, but can vary with annual variations in precipitation, humidity, and coastal fog. Morro shoulderband snails are inactive during the dry season and individuals produce an epiphragm (mucus plug) across the shell aperture for aestivation. They aestivate directly on the ground or attach to the base of woody shrubs and other lower, outer branches of plants, and even wood, cement, and plastic debris piles (Service 2022; 87 FR 6065; Roth 1985, p. 13). We presume Morro shoulderband snail timing of life cycle stages and feeding preferences are similar to other *Helminthoglypta* species, based on studies from other species in the genus (Service 2022; 87 FR 6067; Service 2019a, pp. 11–13 and 75). These species emerge from aestivation soon after the first soaking rainfall event of the year and will begin mating when temperature and moisture regimes are conducive. They lay their eggs below the leaf litter and in shallow pits and holes. Fertile eggs typically hatch within six months of successful reproduction; the majority of snails hatch between the months of March and April. The species are selective herbivores that feed preferentially on plant detritus, leaf litter, and fungi. It takes them approximately three to four years to reach sexual maturity and the average life span is approximately six to ten years.

The Morro shoulderband snail is predominantly restricted to the vegetation communities overlaying Baywood Fine Sand soils, and to a much lesser extent Dune Land soils. We estimate that the current species range is approximately 2,394 hectares ([ha] or 5,915 ac), and located around the community of Baywood/Los Osos, the Morro Bay Sandspit, and the City of Morro Bay. Occupied native vegetation communities on these substrates include coastal dune scrub, coastal sage scrub, and maritime chaparral. Morro shoulderband snails also occur in nonnative vegetation types distributed across the range, often classified as ruderal or disturbed, dominated by perennial veldt grass (*Ehrharta calycina*), eucalyptus (*Eucalyptus* spp.), and ice plant (*Carpobrotus* spp.; *Conicosia pugioniformis*) (Service 2022, 87 FR 6065–6066 and 6070).

Most Recent Status Review:

[Service] U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Reclassification of Morro shoulderband snail (*Helminthoglypta walkeriana*) from

Endangered to Threatened With a 4(d) Rule. 85 FR 44821–44835.

[Service] U.S. Fish and Wildlife Service. 2022. Endangered and threatened wildlife and plants; Reclassification of Morro shoulderband snail from endangered to threatened with Section 4(d) Rule. 87 FR 6063–6077.

FR Notice Citation Announcing this Status Review:

[Service] U.S. Fish and Wildlife Service. 2024. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year status reviews of 59 Pacific Southwest species. 89 FR 83510–83514.

ASSESSMENT

Information Acquired Since the Last Status Review:

The Service's Ventura Fish and Wildlife Office (VFWO) conducted this 5-year review. We announced the review through a Federal Register (FR) notice on October 16, 2024 (Service 2024; 89 FR 83510–83514). We did not receive any information from the public in response to the FR notice. We also conducted a literature search and review of information in our files, and contacted other agencies, species experts, and stakeholders to request any data or additional information we should consider in our review. We have new information on the species' current distribution and range, its habitat usage, and Habitat Conservation Plans. We provide these updates below.

Distribution and Range:

At the time of listing, we considered the species range to be restricted to sandy soils of coastal dune and coastal sage scrub communities near Morro Bay in San Luis Obispo County, California. We stated that Morro shoulderband snail occupied approximately 8 kilometers (km) (5 miles [mi]) of dunes extending into the Morro spit, at Baywood Park, San Luis Obispo, sites between Morro Bay and Cayucos, and probably along Morro Bay in the vicinity of Cuesta-by-the-Sea (Service 1994; 59 Federal Register FR 64615, 64619). By 2022, we estimated the species range to be approximately 2,638 ha (6,520 ac) in size (Service 2022; 87 FR 6065).

For this review we compiled all available occurrence data for Morro shoulderband snails and the most recent Natural Resource Conservation Service (NRCS) web soil survey data for the Baywood fine sand (2–9% slopes and 9–15% slopes), and Dune land soil series in geographic information system to visualize the species historical and current range and distribution (NRCS 2025, website; Figure 1). We selected these slope classes because NRCS delineates the Baywood Fine Sand soil series on this scale (2–9% slopes and 9–15% slopes), and because a slope class not greater than 10 percent to facilitate movement of individuals, is one of the essential physical and biological features, identified as critical habitat for the Morro shoulderband snail (NRCS 2025, website; Service 2001; 66 FR 9233–9246). Occurrence data include CNDDB Element Occurrences (EOs) as well as survey data from partners at California State Parks, San Luis Obispo Coast District ([Parks] 2025, pers comm). Both data sources are mapped as discrete points. We note that CDFW separates EOs when there is at least 0.4-km or 0.25-mi distance between documented locations, but this same definition does not apply to the Parks data, thus these data types are not necessarily equivalent.

There are currently 14 Morro shoulderband snail EOs documented in CNDDB (2025b, website). The species is also known from a total of 194 discrete point locations we received from Parks based on recent surveys, primarily on the Morro Sandspit (Parks 2025, pers comm). All of these locations are on either Baywood fine sand or Dune land soil series, except for EO number 26 (Figure 1). EO number 26 is located within Morro Bay State Park and occurs on Los Osos loam soils with slopes between 5–15 % (NRCS 2025, website). Based on our updated analysis, we currently estimate the distribution for Morro shoulderband snail to be approximately 2,394 ha (5,915 ac). The distribution decreased slightly from what we estimated in 2022 because the accuracy of our analysis improved by using the most recent NRCS web soil survey data (NRCS 2025, website; Service 2019a, pp. 25 and 27; Service 2022; 87 FR 6065).

In the 2019 SSA completed for the Morro shoulderband snail, we stated that its presence on the Morro Sandspit specifically, was largely informal and anecdotal, and not well-documented (Service 2019a, p. 28). Since 2019, Parks completed numerous Morro shoulderband snail surveys on the Morro Sandspit, as shown in Figure 1 (Parks 2025, pers comm). Therefore, we now know the species is abundant at this location and that it is consistently utilizing this area, which consists almost entirely of native dune and coastal dune scrub habitat types (Service 2019a, p. 28).

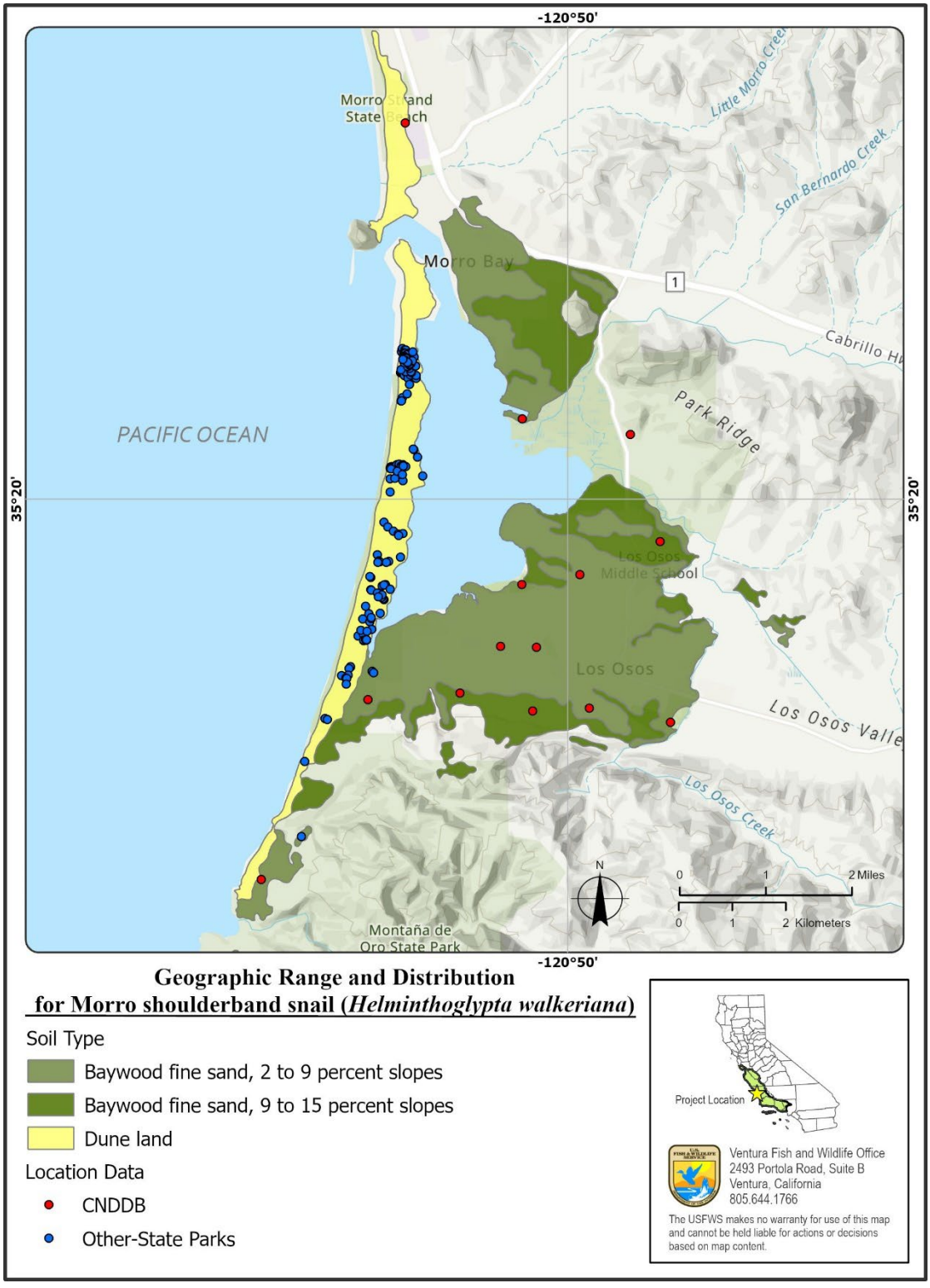

Figure 1. Geographic range and distribution of Morro shoulderband snail, San Luis Obispo County, California. Mapping based on data from the CNDDB, NRCS web soil survey, and other partners (CNDDBb 2025, website; NRCS 2025, website; Parks 2025, pers comm).

Habitat Use:
We partnered with EcoVision Partners, LLC (EcoVision) to conduct a descriptive study designed in part to increase our understanding of Morro shoulderband snail habitat use. Funding for the project came from an established in-lieu fee program associated with approved Habitat Conservation Plans that we administer in cooperation with the National Fish and Wildlife Foundation to complete recovery tasks for the species. One of the recognized limitations in the species' Recovery Plan is the lack of information available on habitat use by the Morro shoulderband snail (Service 1998, p. 36; EcoVision 2019, pp. 7–8). The primary objectives of the study included data collection on the occupancy, population densities, population demographics, and habitat use indicated by vegetation associations of the Morro shoulderband snail within conserved lands (EcoVision 2019, p. 5 and 8–9).

To coordinate recovery, we established Conservation Planning Areas (CPA) for the Morro shoulderband snail, and two other co-occurring, federally listed plant species in the Recovery Plan: federally threatened Morro manzanita (*Arctostaphylos morroensis*) and federally endangered Indian Knob mountainbalm (*Eriodictyon altissimum*). The CPAs include: 1. Morro Spit, 2. West Pecho, 3. South Los Osos, and 4. Northeast Los Osos. They are specific, delineated areas that support the three species and are the largest, remaining tracts available throughout the range for conservation (Service 1998, pp. 35–39). In their habitat use study, EcoVision surveyed parcels within the West Pecho and Northeast Los Osos CPAs (EcoVision 2019, p. 8). The EcoVision study parcels occur within two of the three critical habitat units including, Unit 1 - Morro Spit and West Pecho and Unit 3 - Northeast Los Osos (EcoVision 2019, p. 8). They also surveyed one additional parcel located outside the CPAs and designated critical habitat units.

EcoVision surveyed a total of 79 circular plots within nine conserved parcels, which totaled 61.5 ha ([152 ac]; EcoVision 2019, pp. 2 and 11–12). They found live Morro shoulderband snails on eight of the nine parcels and 36 of the 79 plots (45.6 %). EcoVision also found empty Morro shoulderband snail shells on 64 of the 79 plots (81%). They found two different, co-occurring snail species on seven of the nine parcels including native Big Sur shoulderband snail (*H. umbilicata*) and nonnative European garden snail (*Cornu aspersum*; EcoVision 2019, pp. 13–14).

EcoVision evaluated the individual plant species associated with the live Morro shoulderband snail occurrences and found that the snail was associated with a total of 11 native species and three nonnative, invasive species. Morro shoulderband snails were most frequently associated with nonnative, invasive perennial veldt grass, with 48 out of 162 (30%) of the live occurrences being associated with this single plant species. The next most frequently associated plant species were native mock heather (*Ericameria ericoides*), with 30 out of 162 (18.5%) of the live occurrences being associated with this plant, and then native deerweed (*Acmispon glaber*), with 28 out of 162 total (17.3 %) associated with this species. In addition to live plant species, EcoVision also examined dead plant species associated with the live Morro shoulderband snail occurrences and found it on or immediately near the following species, ordered from most frequently associated to least: native deerweed, native California sagebrush (*Artemisia californica*), nonnative, invasive ice plant (*Carpobrotus* spp.), nonnative, invasive perennial veldt grass, and native rush-rose (*Crocanthemum scoparium*; EcoVision 2019, pp. 14–15).

EcoVision observed the highest densities of Morro shoulderband snails, approximately 13 individuals per ac, in the Central Los Osos parcel. This property does not occur within any of the delineated CPAs or the designated critical habitat units. It is generally located between the South Los Osos and Northeast Los Osos CPAs, in northwestern Los Osos. The individuals observed in the Central Los Osos parcel had smaller mean shell sizes, so they were generally younger in age, and there were fewer reproductively mature individuals encountered. The Central Los Osos parcel is characterized by disturbed habitat, supports mostly nonnative, invasive species, and was consistently mowed until 2010. Perennial veldt grass was the dominant plant species observed at this location in all 20 of the sampled plots and the site had approximately 70% cover (EcoVision 2019, pp. 79–80).

EcoVision observed the next highest Morro shoulderband snail densities (approximately 5 individuals per ac, approximately 4 individuals per ac, and approximately 2 individuals per ac, respectively) on the three surveyed parcels within the Northeast Los Osos region of the study. These three surveyed parcels occur within the Northeast Los Osos CPA, within designated critical habitat Unit 3 - Northeast Los Osos. The individuals observed within this region had variable mean shell sizes, and the number of reproductively mature individuals encountered was also variable. The parcels within the Northeast Los Osos region support predominantly native vegetation communities including coastal dune scrub, maritime chapparal, and coast live oak (*Quercus agrifolia*) woodland. These three parcels had relatively low nonnative, perennial veldt grass cover. It was the dominant plant species observed in only 3 of 17 surveyed plots, and the site had a mean perennial veldt grass percent cover of approximately 11% (EcoVision 2019, pp. 16, 23, 60, and 80).

Conversely, EcoVision observed the lowest densities of Morro shoulderband snails (less than one individual per ac) in the two West Pecho parcels they surveyed. The two surveyed parcels occur within the West Pecho CPA and designated critical habitat Unit 1 - Morro Spit and West Pecho. The Morro shoulderband snail individuals observed within this region had the largest mean shell sizes, and the highest number of reproductively mature individuals encountered in the study. The parcels within the West Pecho region support some native vegetation communities including coastal dune scrub and maritime chapparal. However, they were heavily invaded by nonnative, invasive perennial veldt grass with relatively high percent cover. Perennial veldt grass was the dominant or co-dominant plant species observed in many of the 29 surveyed plots. The mean percent cover of perennial veldt grass was 31% and 61% in the two parcels (EcoVision 2019, pp. 29–30, 37–40, and 79–80).

The EcoVision study demonstrates that Morro shoulderband snails use both native and nonnative vegetation and that they occur in a wider range of different plant community types than originally thought. Occurrence of the species in this study was more frequently associated with nonnative, invasive perennial veldt grass than a native plant species (EcoVision 2019, p. 79). EcoVision did not assess whether the distribution of snails is different from random, and their results do not necessarily indicate habitat preference. We do not know if the snails prefer perennial veldt grass over other native plant species, or if they found snails more often in veldt-dominated habitats because these habitat types have become more abundant throughout the range. We still consider Morro shoulderband snail to be a narrow endemic, restricted to the Baywood fine sand soils, and to a lesser extent Dune land soils, surrounding Morro Bay.

However, the results of this study suggest that Morro shoulderband snail abundance may be increasing within the current range because it is able to utilize plant communities dominated by nonnative, invasive plant species that are proliferating within the occupied range.

We've typically regarded suitable habitat for Morro shoulderband snail to be those native plant communities edaphically derived from the Baywood fine Sand soils and Dune land substrates, such as coastal beach strand, coastal dune scrub, coastal sage scrub, and maritime chaparral. These vegetation types occur on sandy soils and have at least some component of open, bare ground. These plant communities support many other special status, rare, and endemic species including, but not limited to Morro manzanita and Indian Knob mountainbalm. However, we now know that Morro shoulderband snails also utilize disturbed areas dominated by nonnative, invasive species and many other partners have observed it in ruderal, disturbed plant communities over the last several years (EcoVision 2019, pp. 14–15).

We do not know precisely when nonnative, invasive perennial veldt grass arrived in San Luis Obispo County (County). The earliest perennial veldt grass specimens collected from the County are from 1956 (Consortium of California Herbaria Data Portal 2025, website). Agriculturalists and other land managers promoted the species as a forage for cattle ranchers, and for erosion control, in the area and it was endorsed and commercially available for this purpose during the early 1960s (Love 1963, entire; Whitaker 2016, p. 33). Therefore, we presume the proliferation and spread of perennial veldt grass started in the County during the 1950s. Perennial veldt grass rapidly fills gaps and interstitial spaces between shrubs and other plants within the native vegetation community types, alters the plant community structure and soil composition, and detrimentally stabilizes the characteristic sandy soils. In particular, coastal beach strand, coastal dune scrub, coastal sage scrub vegetation types are rapidly disappearing as a result of displacement by perennial veldt grass, and the species is strongly implicated in reduction of native biodiversity and alteration of ecosystem functions (Keil 2022, p. 27; Whitaker 2016, pp. 32–33).

In general, resilient populations are better able to withstand stochastic events. Resilient populations have high abundance of individuals that occupy adequately sized habitat areas and have a wide range of demographic ages of individuals, spread among the different life stages of the species (Service 2016, p. 12). Sites dominated by perennial veldt grass had smaller mean shell sizes of Morro shoulderband snails and lower numbers of reproductively mature individuals compared to sites with predominantly native vegetation communities, which had the most demographic variability (variable mean shell sizes and variable number reproductively mature individuals; EcoVision 2019, pp. 79–81). Further study is needed to assess how the species is using habitats dominated by perennial veldt grass. For example, perennial veldt grass habitats may function as nursery or other refugia sites for smaller individuals, while sites with native plant communities such as coastal dune scrub or maritime chaparral may represent the most desirable plant community structure for the species (EcoVision 2019, pp. 80–82).

Habitat Conservation Plans:
The Service recently finalized the Los Osos Habitat Conservation Plan ([LOHCP]; McGraw 2024, entire). We anticipate conservation of additional lands within the CPAs resulting from implementation of the LOHCP. Implementation of the LOHCP has not yet begun. However,

provisions of the LOHCP provide for permanent protection of Morro shoulderband snail habitats through secure fee title or establishment of permanent conservation easements strategically designed to expand and connect existing protected areas within the CPAs. It also includes requirements for habitat restoration, habitat management, and long-term monitoring. Lack of funding continues to preclude adequate, permanent management needed to ameliorate threats, particularly from nonnative, invasive weeds on conserved lands.

Threats:
When we listed the Morro shoulderband snail in 1994, we included destruction of habitat from urban development and other anthropogenic activities such as recreation (including off-road vehicle activities), grazing, and utility construction as threats to the species. We also mentioned competition with nonnative European garden snail, stochastic extinction, invasive species, vegetation management/controlled burns, parasitoids, agriculture, and senescence of dune scrub vegetation as potential threats (Service 1994; 59 FR 64613 and 64619–64620). In 2006, we determined that several of the threats identified at listing were no longer impacting Morro shoulderband snails. These included competition with nonnative European garden snail, vegetation management/controlled burns, parasitoids, and off-road activities. However, all the other previously identified threats continued to affect the species (Service 2006, pp. 11–15). In the 2019 SSA, we evaluated potential Morro shoulderband snail threats resulting from development, agriculture, vegetation management (mowing), predation, invasive species, and climate change effects. We determined that the primary threats to the species were development, invasive species, increased wildfire and other climate change effects. We determined that agriculture, vegetation management (mowing), and predation were not threats to the species (Service 2019a, pp. 22–24; Service 2022; 87 FR 6069–6071).

All the threats we described in the SSA and 2022 final downlisting rule for Morro shoulderband snail continue to act on the species and its habitat. Although we now know that the species is using areas dominated by nonnative, invasive plant species, we still consider invasive species to be a threat because we do not understand how the snails use these habitats and the effects on their population resiliency and demographics (e.g., why these sites had smaller mean shell sizes and lower numbers of reproductively mature individuals). Nonnative, invasive habitats may not provide optimal, suitable habitat quality and structure for the species, even though the species is able to occur within these types of plant communities.

Evaluation of Recovery Criteria:
In the 1998 Recovery Plan, we stated that the Morro shoulderband snail may be considered for delisting when habitat from all CPAs (1. Morro Spit, 2. West Pecho, 3. South Los Osos, and 4. Northeast Los Osos), and if necessary, any newly located populations, are successfully managed to maintain the desired community structure and secured from threats of development, nonnative, invasive plants, structural changes due to senescence of dune vegetation, recreational use, pesticides (including slug and snail baits), parasites, and competition or predation from nonnative snail species. Results of recovery tasks must continue to a low medium-to-long term risk of extinction from any of the four CPAs (Service 1998, p. 40).

We provided clarification in 2019 to ensure that these delisting criteria are articulated clearly and consistently and amending the following clarification to the existing recovery plan. This

amendment does not represent a revision of the delisting criteria, it simply provides more consistent, specific terminology.

The Morro shoulderband snail may be considered for delisting when the downlisting criteria have been met and:

1. Sufficient populations and suitable habitats (as shown by life history studies) to ensure long-term persistence in each of the four CPAs must be secured from the threat of development.
2. These sites must be under permanent management to maintain the desired vegetation structure and to ameliorate negative impacts of structural changes due to senescence of dune vegetation.
3. Other threats, including invasion of nonnative plants, competition or predation from nonnative snails, impacts from recreational use and the use of pesticides, have been assessed and effectively controlled or removed (Service 2019b, p. 2).

We have not yet made any appreciable progress in achieving the Morro shoulderband snail delisting criteria since downlisting (Service 2022; 87 FR 6063–6077). However, as discussed in the downlisting rule, all of CPA 1, and portions of CPAs 2, 3, and 4 are largely secure under various ownerships and management, with 85% of the CPAs conserved (Service 2022; 87 FR 6067–6068). Therefore, delisting criterion 1 is largely met. Additional progress is needed on criteria numbers 2 and 3. Adequate threats management on most of these lands is lacking.

Summary:
The Morro shoulderband snail is a narrow endemic species that occurs around Morro Bay, in San Luis Obispo County, California. We currently estimate the species distribution be approximately 2,394 ha (5,915 ac). There are currently 14 Morro shoulderband snail EOs documented in CNDDB (2025b, website). The species is also known from a total of 194 discrete point locations received from our partners at Parks based on recent surveys. The recent Parks data substantiates presence of Morro shoulderband snail on the Morro Bay Sandspit, which was previously not well-documented. We also have new information about Morro shoulderband snail habitat usage that demonstrates that the species is able to use areas heavily infested with nonnative, invasive perennial veldt grass, where native vegetation is predominantly absent. The study also showed that when infestation is relatively low to moderate, the Morro shoulderband snail most frequently associates with native plant species. Based on the information obtained in the study, we presume that vegetation community structure likely influences Morro shoulderband snail distribution, abundance, and other demographic variables of populations. However, further study is needed to better understand these dynamics and the species' specific habitat proclivities. All of the previously identified threats continue to act on Morro shoulderband snails and their habitat, including development, invasive species, increased wildfire and other climate change effects. We have not made any new, substantial progress towards achievement of the delisting criteria outlined in the species' Recovery Plan beyond what we described in our downlisting rule. However, we do expect additional lands that support Morro shoulderband snail and its' habitat to be conserved, restored, and managed once the newly approved LOHCP is implemented.

Conclusion:
After reviewing the best available scientific information, evaluating threats affecting the species, and analyzing its recovery criteria, we conclude that the Morro shoulderband snail remains a threatened species and recommend no change in status at this time.

RECOMMENDATIONS FOR FUTURE ACTIONS

1. Conduct both field and laboratory studies to increase our understanding of Morro shoulderband snails' basic biology and life history, including life stages, growth patterns, fecundity, food preferences, preferred habitat and vegetation community structure, optimal climatic conditions and thresholds, movement patterns and dispersal, aestivation periods, triggers, and mortality sources.
2. Implement threat abatement and management efforts designed to maintain the native plant community composition and optimal vegetative structure within conserved properties that support Morro shoulderband snail populations.
3. Conduct additional studies to define and quantify the effects of habitat restoration and habitat type on the species' distribution, abundance, and demographics.
4. Conduct consistent annual monitoring of Morro shoulderband snail populations. Collect data on population distribution, abundance, density, demographics, and habitat usage using a uniform and standardized methodology, to allow for evaluation of population trends.

APPROVAL

Lead Field Supervisor, Ventura Fish and Wildlife Office, U.S. Fish and Wildlife Service

Approved CATHERINE DARST Digitally signed by CATHERINE DARST Date: 2025.07.30 14:46:35 -07'00'

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Personal Communication

California State Parks, San Luis Obispo Coast District [Parks]. 2025. Email from Katie Drexhage, Senior Environmental Scientist, San Luis Obispo Coast District, California State Parks, to Kristie Scarazzo, Senior Biologist/Botanist: Listing and Recovery, Ventura Fish and Wildlife Office, U.S. Fish and Wildlife Office regarding Morro shoulderband snail FY25, 5-year review, request for information. July 8, 2025.