5-YEAR REVIEW

Short Form Summary

Species Reviewed: Newcomb's tree snail (*Newcombia cumingi*)

Current Classification: Endangered

FR Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90):28031–28034.

Lead Region/Field Office: Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer(s):

Diane Sether, Ph.D., Invertebrate and Wildlife Biologist, PIFWO
John Vetter, Animal Recovery Coordinator, PIFWO
Megan Laut, Recovery Team Manager, PIFWO

Methodology used to complete this 5-year review: This review was conducted by staff of the PIFWO of the U.S. Fish and Wildlife Service (USFWS), beginning in February 2024. The review was based on a review of current, available information since the last 5-year review for the Newcomb's tree snail (*Newcombia cumingi*) (USFWS 2020, entire). The evaluation by Diane Sether, Ph.D., Invertebrate and Wildlife Biologist, was reviewed by John Vetter, the Animal Recovery Coordinator, and Megan Laut, the Recovery Program Manager.

Background:

For information regarding the species' listing history and other facts, please refer to the USFWS Environmental Conservation Online System database for threatened and endangered species at https://ecos.fws.gov/ecp/species/1529.

Review Analysis:

Please refer to the Recovery Plan for 44 Species from the Islands of Maui, Moloka‘i, Kaho‘olawe, and Lāna‘i (Maui Nui), Species Report, and the previous 5-year review for the Lāna‘i tree snail published on August 7, 2020 (available at https://ecos.fws.gov/ecp/species/1529) for a complete review of the species' status, threats, and management efforts. No new threats or no new information regarding the species biological status have come to light since listing to warrant a change in the Federal listing status of the Newcomb's tree snail as endangered.

Newcombia cumingi is an endangered tree snail species endemic only to Maui. Newcomb's tree snail habitat includes mesic and wet forests that, in general, receive greater than 75 in (190 cm) annual precipitation in the wet forest and slightly less in the mesic portions. Newcomb's tree snail has a sinistral (left-coiling) oblong, spindle-shaped

shell of five to seven whorls that is coarsely sculptured (Cooke and Kondo 1960, p. 9, 278). Its shell is modeled with shades of brown that blend with the bark of its host plants and reaches an adult length of approximately 0.8 inches (in) (21 millimeters [mm]; Pilsbry and Cooke 1912-1914, p 10 and plate 3). The exact life span of Newcomb's tree snail is unknown; but estimates for other Achatinellinae range from at least 9.25 years (Hadfield and Mountain 1980, p. 350) up to about 11 years (Hadfield et al. 1993 p. 610; Hadfield 1994, p. 330).

Newcomb's tree snails are simultaneous hermaphrodites, meaning they have both male and female reproductive organs, which are functional at the same time. Hermaphroditism is a form of sexual reproduction in which the snail can act as the female or male during mating. The species is not known to self-fertilize. After mating, the Hawaiian tree snails can store sperm and may produce live young for a year or more without breeding (Sischo 2019 in litt., entire). The species exhibits the late maturity and low reproductive rate characteristic of other Hawaiian tree snails belonging to the family Achatinellidae.

Distribution of *Newcombia cumingi* is clearly correlated with habitat quality (Thacker & Hadfield (1998, p. 9). Newcomb's tree snail has been documented living on small, older ʻōhiʻa primarily in areas with dense cover by *Dicranopterus linearis* (uluhe fern) (Thacker and Hadfield 1998, pp. 3, 9). The tree snail species has also been observed on *Notelaea sandwicensis* (olopua), *Antidesma* sp. (hame), *Freycinetia arborea* (ʻieʻie), *Psychotria* spp. (kōpiko), *Planchonella* spp. (ʻalaʻa), and other hosts (Bustamente 2022, in litt., p. 6) that provide suitable grazing.

New status information:

- There is a small population of Newcombʻs tree snails in the vicinity of Māhinahina Valley on the northwest slope of Mauna Kahalawai on Maui (Sischo 2022, pers. comm.). Because of the species' cryptic nature, the population size is not known (Sischo 2022, pers. comm). A snail exclosure was constructed in the area by Puʻu Kukui Watershed Partnership with funding assistance from the Service and technical and funding efforts from the State.
- In 2019, a population of Newcomb's tree snail was identified in the mesic forest between 2,500 and 3,000 ft (760-920 m) elevation in the Launiupoko Valley area in the Mauna Kahālāwai range. This population appears to be distributed across a 0.5 ac (0.17 ha) area. A population census has not been conducted for this population; total number of snails remaining and their age class structure in unknown at this time. Rat control with A24 traps is being implemented by the Snail Extinction Prevention Program (SEPP) at this wild population (Bustamente 2022 in litt., pp. 15, 17).
- A small population occurs in Ukumehame Valley (Bustamente 2022, in litt., pp. 15, 17). This population is under threat of extirpation from rosy wolf snails (*Euglandina* spp.) and, because of the small number of remaining Newcomb's tree snail individuals, a subset was brought into the captive rearing program. Rat control with A24 traps is being implemented by SEPP at the wild population (Bustamente 2022 in litt., pp. 15, 17).
- Representatives of a Newcomb's tree snail wild population have been brought into captive rearing to protect them from imminent threats including *Euglandina* spp. and

fire (Table 1) (Sischo 2019, p. 9; Sischo 2020, p. 8; 2022, p. 9, Sischo 2023, p. 8; Sischo 2024, p. 9). The remainder of the wild tree snail populations have been left in place (USFWS 2023, p. 20).

Table 1. Number, age, and population identifier for Newcomb's tree snails brought into captivity (Sischo 2019, p. 7; Sischo 2020, p. 7; Sischo 2021, p. 7; Sischo 2024, p. 8, entire).

Year	Juvenile	Sub-adult	Adult	Population Indentifier
May 2020	0	6	0	HON-A
December 2022	0	1	1	HON-A
February 2023	1	1	4	HON-A
May 2023	1	1	3	HON-A

- Newcomb's tree snail is maintained in captive rearing by the Snail Extinction Prevention Program (SEPP) (Table 2; Sischo 2019, p. 9; Sischo 2020, p. 8; 2022, p. 9, Sischo 2023, p. 8; Sischo 2024, p. 9). Captive populations have experienced several mortality events suspected to be associated with a parasite or pathogen on wild-collected vegetation used as a food source. In response, SEPP worked with staff and experts to refine their quarantine protocol (Sischo 2022, entire; Sischo 2023, entire; Sischo 2024, entire). Risk avoidance and minimizations include (1) snails in a cage experiencing a mortality event are quickly isolated to individual cups where they remain until no deaths in the population are observed for a period of three months; (2) snails brought into the facility from the wild undergo a similar quarantine period; and (3) SEPP has divided populations between multiple chambers, cages, and cleaning cycles to minimize risk of exposing all individuals of an entire population to an introduced threat.

Table 2. Population of Newcomb's tree snails in captive rearing.

Year	Total Births	Total Deaths	Juvenile	Sub-adult	Adult	Total Population
2019 [a]	53	65	13	8	2	23
2020	7	17	7	8	3	18
2021[a]	2	6	0	4	1	5
2022[a]	1	3	0	1	2	3
2023	4	23	2	6	4	12

[a]Populations were severely impacted by a mortality event suspected to be associated with a pathogen or parasite brought in from wild collected vegetation.

- Two predator-proof tree snail enclosures have been constructed for tree snails on Maui, one in West Maui and one in East Maui (USFWS 2020, p. 15; USFWS 2023, p. 18).

New threats:
There are no new threats known at this time that were not identified in the *Newcombia cumingi* 5-Year Review (USFWS 2020, entire), the draft recovery plan (USFWS 2021a,

entire), Draft Species Report (USFWS 2021b, entire), or Species Report Version 1.0 (USFWS 2023). Wild population(s) not protected by a predator-proof enclosures are highly vulnerable to predation from predatory rosy wolf snails, rats (*Ratus* spp.), Jackson's chameleons (*Trioceros jacksonii*), habitat destruction, as well as catastrophic and stochastic events, that threaten the existence of these populations. The risk of wildfire destroying wild popualtions and even those protected by enclosures continues to be a high risk. Wildlfires on Maui have occurred in the proximity of the wild populations and enclosures in 2022 and 2023 (Department of Land and Natural Resources 2023, entire., Maui News 2022, entire). Potential diseases from introduced pathogens and parasites pose a risk to wild and captive reared populations. Given the small numbers of individuals per population; each population is at risk of extirpation.

New management actions:

- Monitoring and surveys –
    - Rat control with A24's is being conducted by SEPP in West Maui to protect tree snails remaining in the wild.
- Habitat restoration:
    - Invasive plant species are periodically removed from inside enclosure areas. Plant material is inspected for tree snails before removal.
    - In 2022, a snail enclosure was completed on the slopes of Haleakalā near Olinda and Makawao. The enclosure is in the mesic forest near the 3,500 ft (1066 m) elevation. Unoccupied at the time of this review, the enclosure will provide a managed site for future translocation of snails, including Newcomb's tree snail.
- Reintroductions:
    - No reintroductions from the captive population have occurred.
    - In 2021, the Service awarded SEPP a Competitive State Wildlife Grant to expand rearing efforts to Bernice Pauahi Bishop Museum and Honolulu Zoo. This project will allow populations to be divided between the three facilities to lower the risk of extinction by increasing (1) population redundancy and (2) capacity to generate individuals for release into the wild (Sischo 2023, p. 4).

Table 1. Status and trends of *Newcombia cumingi* from listing through current 5-year review.

Date	No. Adult Wild Individuals	Downlisting Criteria Identified in Recovery Plan	Downlisting Criteria Completed?
2013 (listing)	1 population in the wild (1 individual)	No recovery plan developed yet.	N/A
2020 (5-Year Review)	2 populations (1 extant in the wild, with a subset in captive rearing; and 1 other	No recovery plan finalized.	No

	population solely in captive rearing (<100 individuals)		
2021 (Draft Species Report)	2 populations in the wild, 1 subset of wild population in captive rearing) <100 individuals)	No recovery plan finalized.	No
2021 (Draft Recovery Plan published February 15, 2022)	2 populations in the wild, 1 subset of wild population in captive rearing) <100 individuals)	Draft Downlisting Criterion 1: At least 6 stable populations (possibly actively managed) exist on Maui. To be considered stable, a population must number at least 300 individuals distributed across all size classes combined and must have a population growth curve or index trend that is stable or positive for at least 4 of the 5 years prior to consideration of downlisting. If multiple management units have been identified for the species based on genetic characters or geography, each unit must comprise one or more of these stable populations.	No
		Draft Downlisting Criterion 2: Each population in Downlisting Criterion 1 occurs on suitable habitat that is managed to protect native forest vegetation. Habitat must be capable of supporting natural dispersal, expansion of the occupied range, and positive population growth as determined by the best available scientific information.	No
		Draft Downlisting Criterion 3: All predation threats are controlled or absent around each population in Downlisting Criterion 1. Evaluation of predation risk for each	No

		population in Downlisting Criterion 1 indicate that nonnative predators are absent or that predation is unlikely to have significant short-term impacts on the population. Species-specific management actions may continue to be necessary. Measures are in place to prevent introduction of new predators or disease to the populations in Downlisting Criterion 1 and captive reared populations.	
2023 (Species Report)	3 populations in the wild, 1 subset of wild population in captive rearing) <100 individuals)	No recovery plan finalized. Draft Downlisting Criterion 1: At least 6 stable populations (possibly actively managed) exist on Maui. To be considered stable, a population must number at least 300 individuals distributed across all size classes combined and must have a population growth curve or index trend that is stable or positive for at least 4 of the 5 years prior to consideration of downlisting. If multiple management units have been identified for the species based on genetic characters or geography, each unit must comprise one or more of these stable populations. Draft Downlisting Criterion 2: Each population in Downlisting Criterion 1 occurs on suitable habitat that is managed to protect native forest vegetation. Habitat must be capable of supporting natural dispersal, expansion of the occupied range, and positive population growth as determined by the best available scientific information. Draft Downlisting Criterion 3:	No

		All predation threats are controlled or absent around each population in Downlisting Criterion 1. Evaluation of predation risk for each population in Downlisting Criterion 1 indicate that nonnative predators are absent or that predation is unlikely to have significant short-term impacts on the population. Species-specific management actions may continue to be necessary. Measures are in place to prevent introduction of new predators or disease to the populations in Downlisting Criterion 1 and captive reared populations.	
2024 (5-yr review)	3 populations in the wild, 1 subset of wild population in captive rearing) <100 individuals)	No recovery plan finalized. Draft Downlisting Criterion 1: At least 6 stable populations (possibly actively managed) exist on Maui. To be considered stable, a population must number at least 300 individuals distributed across all size classes combined and must have a population growth curve or index trend that is stable or positive for at least 4 of the 5 years prior to consideration of downlisting. If multiple management units have been identified for the species based on genetic characters or geography, each unit must comprise one or more of these stable populations. Draft Downlisting Criterion 2: Each population in Downlisting Criterion 1 occurs on suitable habitat that is managed to protect native forest vegetation. Habitat must be capable of supporting natural dispersal, expansion of the occupied range,	No

		and positive population growth as determined by the best available scientific information.	
		Draft Downlisting Criterion 3: All predation threats are controlled or absent around each population in Downlisting Criterion 1. Evaluation of predation risk for each population in Downlisting Criterion 1 indicate that nonnative predators are absent or that predation is unlikely to have significant short-term impacts on the population. Species-specific management actions may continue to be necessary. Measures are in place to prevent introduction of new predators or disease to the populations in Downlisting Criterion 1 and captive reared populations.	

Table 2. Threats to *Newcombia cumingi* and ongoing conservation efforts.

Threat	Listing Factor	Current Status	Conservation/Management Efforts
Agriculture and urban development	A	Ongoing	Partial—land management has reduced the threat of development
Ungulates	A	Ongoing	Partial— some strategic fencing is in place and maintained; some ungulate removal has occurred
Invasive nonnative plants	A	Ongoing	Partial—land management and invasive plant removal by Pu‘u Kukui Watershed Partnership
Fire	A	Ongoing	Partial— general fire management plans developed by the State of Hawai‘i are in place
Stochastic events (drought, hurricane)	A	Ongoing	None
Disease	C	Ongoing	Partial—Snail Extinction Prevention Program has implemented safeguards against introduction of disease and parasites to captive-reared tree snails; captive population may be split across

Threat	Listing Factor	Current Status	Conservation/Management Efforts
			multiple instituitions to provide redundancy
Predation by rats	C	Ongoing	Partial—two predator-proof snail enclosures are built; one by Pu‘u Kukui Watershed Partnership and one by SEPP and partners; SEPP is maintaining A24 traps at extant tree ensail populations in West Maui
Predation by Jackson’s chameleon	C	Ongoing	Partial—predator-proof snail enclosure built on private land and one on State land in East Maui in the tree snails habitat; Newcomb‘s tree snail population in captivity is not at risk of Jackson‘s chameleon
Predation by predatory snails	C	Ongoing	Partial—predator-proof snail enclosure built on private land and one on State land in East Maui in the tree snails habitat; Newcomb’s tree snail population in captivity is not at risk of predatory snails
Predation by flatworms	C	Ongoing	Partial—predator-proof snail enclosure built on private land and one on State land in East Maui in the tree snails habitat; Newcomb’s tree snail population in captivity is not at risk of flatworm predation
Inadequate existing regulatory mechanisms	D	Ongoing	Partial— restrictions on transport of invasive species to the island and inspections at the dock and airport are conducted
Loss of plant hosts	E	Ongoing	Partial—some landscape-scale plant and pathogen management
Limited numbers	E	Ongoing	Partial— Snail Extinction Prevention Program has the species in captivity
Low population number	E	Ongoing	Establishing new populations outside of predator-proof enclosures is not occurring because other threats in those appropriate habitats are not manageable with the current technology available to ensure success.
Treefall	E	Ongoing	None
Climate change	E	Ongoing	None

Synthesis:
Downlisting and delisting objectives are provided in the draft recovery plan for 44 species from the islands of Maui, Molokaʻi, Kahoʻolawe, and Lānaʻi (Maui Nui) (USFWS 2021a). Based on the recovery plan, at least 6 stable populations of at least 300 individuals with a population growth curve that are stable or positive for at least 4 to 5 years must occur before the downlisting Criterion 1 can be met; Criteria 2 and 3 are predicated on Criterion 1 being met. There are fewer than six populations of Newcomb's tree snail, based on observations of only three populations in West Maui. The number of total individuals is estimated at <100. The species is represented in captive rearing, though past mortality events have reduced the number of individuals in the population. The Snail Extinction Prevention Program has modified procedures to minimize the threat to the species maintained in captivity. SEPP has also obtained funding through a competitive grant from the Service to expand the captive rearing program to two additional institutes, Bernice Pauahi Bishop Museum and Honolulu Zoo. This project will allow the tree snail populations to be split among the three facilities to lower the risk of extinction should a mortality event occur. In addition, there are two existing predator-proof enclosures for Newcomb's tree snails on Maui. Population(s) in the wild continue to be at risk of predation from rats, predatory snails, Jackson's chameleons, habitat-related threats, and catastrophic and stochastic events. A tree snail population within an enclosure is also at risk should the barriers fail or catastrophic or stochastic events damage the enclosure or habitat inside. With only three small populations of Newcomb's tree snail known within the natural landscape, a low number of individuals in those populations, one population in captive rearing, and most threats still unmanaged across the landscape, this species continues to meet the definition of endangered.

Recommendations for Future Actions:

- Finalize the draft recovery plan with measurable downlisting and delisting criteria for the recovery of Newcomb's tree snail.
- Conduct surveys for extant populations throughout the range of Newcomb's tree snail.
- Monitor and assess abundance of individuals and growth trend of populations.
- Monitor populations to detect disease, assess impacts, and control outbreaks as soon as possible, if needed.
- Protect existing populations in the wild from threats.
- Identify pathogens or parasites causing disease in captive populations and develop and implement control measures.
- Expand the capacity of the captive rearing program and increase the number of captive-reared individuals and populations.
- Develop microclimate models and identify suitable habitat based on historical and existing species' distributions and potential future climate conditions.
- Establish additional populations of Newcomb's tree snail in captive rearing to preserve genetic variability.

- Establish subsets of populations of Newcomb's tree snail in captive rearing at multiple institutions to increase redundancy and decrease risk of extinction.
- Construct and maintain tree snail predator-proof enclosures to protect extant populations or to protect translocated Newcomb's tree snails.
- Increase numbers of populations and individuals in suitable habitat through translocation to build resilient populations with redundancy and representation.
- Identify species suitable for translocation and develop and implement translocation plans.
- Monitor management and use results to adaptively manage recovery actions.
- Control invasive, nonnative plant species that degrade the wet and mesic forest habitat of Newcomb's tree snail.
- Develop and implement effective control methods for nonnative predatory snails at all Newcomb's tree snail populations in habitats.
- Expand and continue to implement effective control methods for rats in all Newcomb's tree snail populations.
- Develop and implement effective control methods for Jackson's chameleon at all Newcomb's tree snail populations.
- Control any new threats to Newcomb's tree snail before they become widespread.
- Develop tools to enhance habitat and species survival and reproduction.
- Develop tools to inform actions that will improve species viability in situ and ex situ.
- Conduct Population Viability Analyses (PVA) for each species.
- Ensure long-term protection of all populations.
- Identify, develop, and support alliances and partnerships to plan and implement Newcomb's tree snail habitat restoration, protection from predators, and management to benefit and recover the species.
- Conduct studies on the optimization of conservation translocation survival and success.
- Implement the Hawai‘i interagency biosecurity plan to prevent the influx of new pests and invasive species into Hawai‘i and more specifically the islands of Maui Nui.
- Implement public outreach and education and enforce policies that prohibit species collection and harassment.

References:

See previous 5-year reviews for additional references.

Department of Land and Natural Resources. 2023. 10/06/23-Two-Month Long Upcountry Maui Fire Watch Continues. Department of Land and Natural Resources | 10/06/23-TWO-MONTH LONG UPCOUNTRY MAUI FIRE WATCH CONTINUES (hawaii.gov) (Accessed 6-23-2024).

Maui News. 2022. West Maui wildlfire grows to 2,100 acres. West Maui wildfire grows to 2,100 acres | News, Sports, Jobs - Maui News. (Accessed 6/24/2024)

Sischo, D. 2022. Report to the U.S. Fish and Wildlife Service for native endangered species recovery permit, Permit: ES19045-3, tree snail section: Reporting period: January 1, 2021, to December 31, 2021. Department of Land and Natural Resources, Division of Forestry and Wildlife. Honolulu, Hawaii. 11 pp.

Sischo, D. 2023. Report to the U.S. Fish and Wildlife Service for native endangered species recovery permit, Permit: ES19045-3, tree snail section: Reporting period: January 1, 2022, to December 31, 2022. Department of Land and Natural Resources, Division of Forestry and Wildlife. Honolulu, Hawaii. 28 pp.

Sischo, D. 2024. Report to the U.S. Fish and Wildlife Service for native endangered species recovery permit, Permit: ES19045-3, tree snail section: Reporting period: January 1, 2023, to December 31, 2023. Department of Land and Natural Resources, Division of Forestry and Wildlife. Honolulu, Hawaii. 40 pp.

[USFWS] U.S. Fish and Wildlife Service. 2020. 5-Year Review for *Newcombia cumingi* (Newcomb's tree snail). U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, HI. 24 pp.

[USFWS] U.S. Fish and Wildlife Service. 2021a. Draft recovery plan for 44 species from the islands of Maui, Molokaʻi, Kahoʻolawe, and Lānaʻi (Maui Nui). Portland, Oregon. xvi + 77 pages. https://ecos.fws.gov/docs/recovery_plan/Maui_Nui_Draft_RP_20211217_Signed.pdf

[USFWS] U.S. Fish and Wildlife Service. 2021b. Draft species report for *Newcombia cumingi* (Newcombʻs tree snail). Pacific Islands Fish and Wildlife Office, Pacific Islands Interior Region 12, Portland, Oregon. 29 pp.

[USFWS] U.S. Fish and Wildlife Service. 2023. Species report for Newcomb's tree snail, *Newcombia cumingi*. Version 1.0. Pacific Islands Fish and Wildlife Office, Pacific Islands Interior Region 12, Portland OR. i–v + 24 pp

In Litt

Bustamente, K. 2022. Peer review comments on the draft Species Report for *Newcombia cumingi* by Keahi Bustamente of the Snail Extinction Prevention Program. Comments received by the U.S. Fish and Wildlife Service, Pacific Islands Wildlife Office, Honolulu, Hawaiʻi. 27 pp.

Personal Communications

Sischo, D. 2022. Phone call between Drs. David Sischo and Diane Sether on the current status of *Newcombia cumingi* populations in the wild and in captive rearing. November 17, 2022.

U.S. FISH AND WILDLIFE SERVICE

SIGNATURE PAGE for 5-YEAR REVIEW on Newcomb's tree snail (*Newcombia cumingi*)

Pre-1996 DPS listing still considered a listable entity? ___N/A____

Recommendation resulting from the 5-year review:

_____	Delisting
_____	Reclassify from Endangered to Threatened status
_____	Reclassify from Threatened to Endangered status
____X____	No Change in listing status

Review Conducted By:

Diane Sether, Ph.D., Invertebrate and Wildlife Biologist, USFWS
John Vetter, Animal Recovery Coordinator, USFWS
Megan Laut, Recovery Team Manager, USFWS

For **Field Supervisor, Pacific Islands Fish and Wildlife Office**

MEGAN LAUT Digitally signed by MEGAN LAUT
Date: 2024.07.23 12:05:20 -10'00'