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Oregon State Rank Assessment for Red Tree Vole (*Arborimus longicaudus*)

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Natural Heritage Ranking Form - Oregon State Rank

Oregon Ranking Form Red tree vole (*Arborimus longicaudus*)

Oregon Biodiversity Information Center

SPECIES ASSESSED

Scientific Name *Arborimus longicaudus*

ELCODE AMAFF23020

Common Name Red tree vole

Element ID 7069

Jones, C., R. S. Hoffman, D. W. Rice, M. D. Engstrom, R. D. Bradley, D. J. Schmidly, C. A. Jones, and R. J. Baker. 1997. Revised checklist of North American mammals north of Mexico, 1997. Occasional Papers, Museum of Texas Tech University 173:1-20.

CONSERVATION STATUS RANK

Assigned Rank **S2S3**

Rank Assignment Author Eleanor Gaines

Rank Review Date 10/19/2022

Rank Factors Author Eleanor Gaines

Rank Factors Date 10/19/2022

Calculated Rank S2S3

Rank Change Date 10/19/2022

Rank Methodology Used Rank calculation - Biotics v2

Assigned Rank Reasons

Limited range for a mammal, strong preference for older coniferous forests, appears to be declining. Distribution is increasingly patchy, with fragmentation of forest habitats (Verts and Carraway 1998, Thomas et al. 1993, E. Forsman p.c.). Population trend unknown, but distribution has been reduced because much of its preferred habitat has been lost and continues to decline due to logging (Verts and Carraway 1998, Thomas et al. 1993). Localized extirpations are known. (Corn and Bury 1988, Verts and Carraway 1998). Basic life history information and habitat requirements, including minimum patch size of suitable habitat to maintain colony, are not currently known (Verts and Carraway 1998). Species disperses slowly and with limited capabilities; low reproductive rate (C. Maser p.c.). Early seral stage forests may be a barrier to dispersal.

RANGE/DISTRIBUTION

Range Extent

Rating 20,000-200,000 square km (about 8000-80,000 square miles)

Estimate 35401

Unit Used for Estimate Square
Kilometers

Comments Range extent = 35,401 sq km per PODS data.

Area of Occupancy

Grid Cell Size 4 km² Grid Cells

Rating (as Number of 4 km² Grid Cells) G = 501-2,500

Comments Approximately 520 4km² grid cells based on PODs data. May be more records. Forsman et al. (2016) identified 15,000 sq km of remaining suitable habitat rangewide, though not all habitat is occupied.

ABUNDANCE AND CONDITION

Rating 81 - 300

Estimate 100

Comments

Approximately 100 Eos, based on 5 km separation distance. There are over 10,000 observation records of red tree voles since 2000 from Oregon alone, but many of these are repeat observations at the same locations and the true number of element occurrences is unknown (ORBIC 2022). USFWS (2019) identified 11 habitat clusters in the range of the North Oregon Coast distinct population segment (DPS) based on connected habitat patches large enough to accommodate >100 individuals.

Rating 10,000 - 100,000 individuals

Comments

Red tree voles occur at low densities and are patchily distributed across the landscape (Forsman et al. 2016, USFWS 2019). The species is difficult to capture, surveys are labor-intensive, and detection probability is low, thus population size is unknown (Price et al. 2015, Forsman et al. 2016, Marks-Fife 2016, USFWS 2019). Within the range of the North Oregon Coast DPS, USFWS imputed population estimates within the 11 habitat clusters between 20,370 and 40,739 individuals (USFWS 2019). Rangelwide population estimates for areas outside the North Oregon Coast DPS are not available.

Number of Occurrences with Good Viability/Ecological Integrity

Rating Some to many (13-125)

Comments

Red tree voles are still fairly common in old forests in much of their historic range, but have become uncommon or rare in some areas, particularly in the northern Coast Range of Oregon (Price et al. 2015, Forsman et al. 2016, USFWS 2019). The number of populations with good viability rangewide is unknown. In the North Oregon Coast DPS, populations are small and fragmented, and red tree voles are absent from areas of suitable habitat. Of the 11 habitat clusters identified by USFWS (2019) within the range of the North Oregon Coast DPS, only two scored as highly resilient and likely to persist (USFWS 2019).

THREATS

<u>Threat Category</u>		<u>Calculated</u>				
<u>Code</u>	<u>Threat Category</u>	<u>Impact</u>	<u>Scope</u>	<u>Severity</u>	<u>Timing</u>	<u>Comments</u>
5	Biological resource use	B = High	Large: Affects most (31-70%) of the total population or occurrences or extent	Serious: Likely to seriously degrade/reduce affected occurrences or habitat, or reduce population 31-70%	High: Continuing	Logging removes older forests, preferred by this species, and increases population fragmentation.
5.3	Logging & wood harvesting	B = High	Large: Affects most (31-70%) of the total population or occurrences or extent	Serious: Likely to seriously degrade/reduce affected occurrences or habitat, or reduce population 31-70%	High: Continuing	
6	Human intrusions & disturbance	Negligible	Negligible (<1%)	Negligible or <1% pop. decline		Disturbed nests often abandoned. stand replacing fires remove suitable habitat
7	Natural system modifications	B = High	Large: Affects most (31-70%) of the total population or occurrences or extent	Serious: Likely to seriously degrade/reduce affected occurrences or habitat, or reduce population 31-70%	High: Continuing	
7.1	Fire & fire suppression	B = High	Large: Affects most (31-70%) of the total population or occurrences or extent	Serious: Likely to seriously degrade/reduce affected occurrences or habitat, or reduce population 31-70%	High: Continuing	
8	Invasive & other problematic species, genes & diseases	Not in timeframe	Restricted: Affects some (11-30%) of the total population or occurrences or extent	Slight: Likely to only slightly degrade/reduce affected occurrences or habitat, or reduce population 1-10%	Low: In the long-term future, or now suspended but could return in long term	
8.2	Problematic native species/diseases	Not in timeframe	Restricted: Affects some (11-30%) of the total population or occurrences or extent	Slight: Likely to only slightly degrade/reduce affected occurrences or habitat, or reduce population 1-10%	Low: In the long-term future, or now suspended but could return in long term	
11	Climate change & severe weather	C = Medium	Pervasive: Affects all or most (71-100%) of the total population or occurrences or extent	Moderate: Likely to moderately degrade/reduce affected occurrences or habitat, or reduce population 11-30%	Moderate: In the short-term future, or now suspended but could return in short term	

11.1	Habitat shifting & alteration	C = Medium	Pervasive: Affects all or most (71-100%) of the total population or occurrences or extent	Moderate: Likely to moderately degrade/reduce affected occurrences or habitat, or reduce population 11-30%	Moderate: In the short-term future, or now suspended but could return in short term
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Calculated Overall Threat Impact A = Very high

Assigned Overall Threat Impact A = Very high

Overall Threat Impact Comments

The primary threats to red tree vole populations include habitat loss and fragmentation due to forest management activities that reduce stand age, canopy interconnectedness, availability of nest structure, and increase stand fragmentation; wildfires; and climate change (Forsman et al. 2016, Huff 2016, Durham 2019, USFWS 2019). These widespread threats are ongoing. Red tree voles are old forest obligates, and younger forest habitats are considered suboptimal though they may provide connectivity between populations (Swingle 2005, Carroll et al. 2010, Price et al. 2015, Huff 2016). Timber harvest removes large trees that support red tree voles. Because they have small home ranges and low dispersal abilities (Forsman et al. 2016, Linnell et al. 2018), timber harvest can destroy habitat for this species and result in fragmented populations (Corn et al. 1988, Forsman et al. 2016, USFWS 2019). The species is extirpated in some areas. Vegetation management to reduce fuel loads can degrade habitat by reducing canopy interconnectedness (Huff 2016). Historically, wildfire has been the primary cause of habitat loss (Forsman et al. 2016, USFWS 2019). Wildfire is expected to increase under climate change and can further isolate already small populations (USFWS 2019). Catastrophic stand-replacing wildfires are expected to increase throughout the range of this species under climate change, degrading or further fragmenting habitat (Huff 2016, USFWS 2019). Other threats include disease, predation, and threats associated with small isolated populations (Hanselman 2016, Linnell and Lesmeister 2020).

TRENDS

Short-Term Trend

Rating F = Decline of 10-30%

Comments

Although red tree vole habitat continues to decline and become more fragmented on private and state-owned forest land in Oregon, habitat on federal lands is being maintained and is expected to continue to support red tree voles under current management regimes (Forsman et al. 2016, USFWS 2019). Most remaining red tree vole habitat is on federal land (Forsman et al. 2016). Between 1993 and 2012, 541,900 acres of spotted owl habitat have been lost to timber harvest, which overlaps broadly with red tree vole habitat (Davis et al. 2016, Forsman et al. 2016). Restoration of habitat through succession has not been sufficient to compensate for habitat lost to logging (Davis et al. 2016). Populations in NW OR have declined more seriously due to habitat loss.

Long-Term Trend

Rating EF = Decline of 10-50%

Comments

Forsman et al. (2016) estimated red tree vole distribution in Oregon had contracted by 23% between 1914 and 2006 due to habitat loss. Rangewide habitat loss was estimated at 65% (Forsman et al. 2016). Declines were particularly severe on private lands and in the northern portion of the species range (Forsman et al. 2016). Within the range of the North Oregon Coast DPS, old forests have been greatly reduced over the previous century (>80%), resulting in elimination and isolation of red tree voles in many areas (Linnell et al. 2017, Linnell and Lesmeister 2019, USFWS 2019). Red tree voles were once common in northwest Oregon. They are now virtually absent from large portions of the region, and where they remain, populations are small and isolated (Forsman and Swingle 2010, Price et al. 2015). Populations outside of the North Oregon Coast DPS are more stable (Forsman et al. 2016).

OTHER FACTORS

Intrinsic Vulnerability Rating Moderately vulnerable

Comments

Limited dispersal ability, strongly prefers older forests.

Environmental Specificity Rating Very narrow to narrow.

Comments

Red tree voles are arboreal conifer obligates most often associated with older forests, although they will utilize younger forests (USFWS 2019). Older forested habitat remains relatively common in the central part of the species' range, but has declined, is fragmented, and is not being replaced in the northern portion of the range (Huff 2016, USFWS 2019).

ADDITIONAL SPECIES INFORMATION**Oregon Habitat Comments**

Found in dense, moist coniferous forests that contain sufficient numbers of Douglas-fir trees. Some habitat requirements, including minimum patch size of suitable habitat to maintain colonies, are not currently known. Occur in both old growth and second growth forests. Nests used for many generations in tree tops.

RANKING REFERENCES

<u>Short Citation</u>	<u>Author</u>	<u>Year</u>	<u>Full Citation</u>
Corn and Bury		1988	Corn, P. S., and R. B. Bury. 1988. Distribution of the voles <i>Arborimus longicaudus</i> and <i>Phenacomys intermedius</i> in the central Oregon Cascades. <i>Journal of Mammalogy</i> 69:427-429.
Hayes		1996	Hayes, J. P. 1996. <i>Arborimus longicaudus</i> . <i>Mammalian Species</i> 532:1-5.
NatureServe		2013	NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer .
ORBIC		2019	Oregon Biodiversity Information Center. 2019. Oregon Biotics Rare Species Database. Maintained by ORBIC at Portland State University, Portland, OR.
Thomas et al.		1993	Thomas, J. W., Ward, J., Raphael, M.G., Anthony, R.G., Forsman, E.D., Gunderson, A.G., Holthausen, R.S., Marcot, B.G., Reeves, G.H., Sedell, J.R. and Solis, D.M. 1993. Viability assessments and management considerations for species associated with late-successional and old-growth forests of the Pacific Northwest. The report of the Scientific Analysis Team. USDA Forest Service, Spotted Owl EIS Team, Portland Oregon. 530 pp.
Verts		1998	Verts, B.J. and L.N. Carraway. 1998. Land mammals of Oregon. University of California Press. 668 pp.

RESOURCES

Oregon Biodiversity Information Center, Institute for Natural Resources
Portland State University, Mail Stop: INR, PO Box 751, Portland, OR 97207-0751 Phone: 503-725-9950

Additional ORBIC species ranking forms posted at
<https://inr.oregonstate.edu/orbic/rare-species/ranking-documentation>

Information on Natural Heritage ranking methodology is available at
<http://www.natureserve.org/biodiversity-science/publications/natureserve-conservation-status-assessments-methodology-assign>

The Conservation Rank Calculator is developed and maintained by NatureServe and is available from
<http://www.natureserve.org/conservation-tools/conservation-rank-calculator>

ASSESSMENT CITATION

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