

Wood frog

Lithobates sylvaticus

Class: Amphibia

Order: Anura

Conservation Status

NatureServe: Agency:

G Rank: G5 BLM: IUCN: Least Concern Audubon AK:

S Rank: S5 USFWS: ADF&G: Species of Greatest Conservation Need

Final Rank		
Conservation category: V. Orange		
V = unknown status and either high biological vulnerability or high action need		
<u>Category</u>	<u>Range</u>	<u>Score</u>
Status:	-20 to 20	0
Biological:	-50 to 50	-30
Action:	-40 to 40	24
Higher numerical scores denote greater concern		

Status - variables measure the trend in a taxon’s population status or distribution. Higher status scores denote taxa with known declining trends. Status scores range from -20 (increasing) to 20 (decreasing).

	Score
<i>Population Trend (-10 to 10)</i>	0
Unknown.	
<i>Distribution Trend (-10 to 10)</i>	0
Unknown.	
Status Total:	0

Biological - variables measure aspects of a taxon’s distribution, abundance and life history. Higher biological scores suggest greater vulnerability to extirpation. Biological scores range from -50 (least vulnerable) to 50 (most vulnerable).

	Score
<i>Population Size (-10 to 10)</i>	-6
Unknown, but suspected large (Hodge 1976; MacDonald 2010).	
<i>Range Size (-10 to 10)</i>	-10
Widely distributed throughout Alaska, from southeast Alaska north to the Brooks Range, and from western Alaska east to Canada (Broderson and Tessler 2008; ARCTOS 2016; ACCS 2017a). Wood frogs have been reported as far north as Anaktuvuk Pass (Ream 2013; ARCTOS 2016). Estimated range size is >400,000 sq. km.	
<i>Population Concentration (-10 to 10)</i>	-10
Does not aggregate.	
<i>Reproductive Potential</i>	
<u>Age of First Reproduction (-5 to 5)</u>	0
Unknown for Alaska. Age at sexual maturity varies by population and ranges from 1 to 4 years (Bellis 1961; Berven 1990; Berven 1995). Because this range spans three categories (B, C, D), we rank this question as Unknown, per ranking manual guidelines.	
<u>Number of Young (-5 to 5)</u>	0

Females lay eggs in masses and can lay anywhere from 300 to 1500 eggs per season (Conant and Collins 1998; Dorcas and Gibbons 2008). However, survivorship is likely much lower than that, as evidenced by low recovery rates following chytrid die-offs (M. Spangler, UAF, pers. comm.; see also Murray et al. 2009; Pilliod et al. 2010). We therefore rank this question as 0- Unknown.

Ecological Specialization

Dietary (-5 to 5)

-5

Diet consists mainly of insects, arthropods, and gastropods, as well as other terrestrial invertebrates (Harding 1997).

Habitat (-5 to 5)

1

Largely terrestrial, except during early development and breeding (Broderson and Tessler 2008). Adults are often associated with wooded areas, especially closed-canopy habitats (deMaynadier and Hunter 1998; Guerry and Hunter 2002; Homan et al. 2004; Vasconcelos and Calhoun 2004). However, wood frogs in Alaska are found above the treeline (Hokit and Brown 2006; ARCTOS 2016). In Denali National Park, they have been found in shrubland tundra dominated by woody plants such as willow, birch, and alder (Hokit and Brown 2006). Wood frogs breed and grow in a variety of freshwater habitats, but seem to prefer small, shallow, ephemeral ponds with emergent vegetation (Hokit and Brown 2006; Brehaut 2012). In the winter, wood frogs hibernate under leaf litter and woody debris (Hokit and Brown 2006), especially in upland forest habitat (Regosin et al. 2003).

Biological Total: -30

Action - variables measure current state of knowledge or extent of conservation efforts directed toward a given taxon. Higher action scores denote greater information needs due of lack of knowledge or conservation action. Action scores range from -40 (lower needs) to 40 (greater needs).

Score

Management Plans and Regulations (-10 to 10)

10

Not managed or protected in the state of Alaska. A permit is required to collect specimens for scientific or educational purposes (ADFG 2004).

Knowledge of Distribution and Habitat (-10 to 10)

2

The northern limit of its range warrants further study (Anderson 2004; Ream 2013; ARCTOS 2016). As well, it is uncertain whether this species is absent from Prince William Sound (MacDonald 2010). Species distribution models have been developed for the wood frog in Alaska and have identified potential key habitat associations (Gotthardt et al. 2012; Spangler 2017), but these models have not been validated by field surveys (Spangler 2017). Breeding habitat was studied by Hokit and Brown (2006) in Denali National Park.

Knowledge of Population Trends (-10 to 10)

2

Overall, monitoring efforts are localized and are not conducted every year. Few sites have been surveyed relative to its distribution, and survey efforts are inadequate for detecting population trends. Current monitoring efforts include the Central Alaska Network (part of the National Park Service), which has been monitoring wood frog populations in interior Alaska since 2011. As well, the Alaska Herpetological Society conducts regional citizen science monitoring projects (<http://www.akherpsociety.org/citizenscience.htm>). A citizen science program was also spearheaded by ADF&G; although observations can still be submitted online, the program is no longer active. An environmental DNA detection protocol was recently developed to complement monitoring efforts in Alaska (Spangler et al. 2017). This protocol was tested in Fairbanks (Spangler 2017), but has not yet been implemented at a broader scale.

Knowledge of Factors Limiting Populations (-10 to 10)

10

Little is known about the biology and ecology of this species in Alaska. Climate change, disease, and water pollution are thought to be the main factors affecting wood frog populations in North America, but their effects on population dynamics are not well understood, and these factors are not well studied in Alaska. Climate change will likely affect many aspects of wood frog ecology, including predators (Reeves et al. 2010), habitat, phenology (Benard 2015), individual fitness (Benard 2015; Hayden et al. 2015; Davenport et al. 2017), population dynamics (Amburgey et al. 2018), and the production of cryoprotectants (Larson and Barnes 2016). Temperature and precipitation are likely to affect wood frog populations differently across their wide North American range (Amburgey et al. 2018), and the effect of these variables is complex and interactive. For example, while increased

water temperatures had a positive effect on tadpole survival and growth, the advantages afforded by higher temperatures may be outweighed by the strong, negative effect of wetland drying on survival (Davenport et al. 2017). Similarly, warmer winter temperatures can lead to earlier breeding, but also to reduced fecundity and slower larval development (Benard 2015).

The chytrid fungus *Batrachochytrium dendrobatidis* (Bd) is responsible for declines in amphibian populations worldwide. Mortality caused by Bd, as well as a "perkinsus-like" protozoan have been reported on the Kenai Peninsula (Reeves and Trust 2008). Bd was not detected in Denali National Park (Chestnut et al. 2008). Ranavirus is likely present in the state, but remains very poorly studied (M. K. Reeves, USFWS, pers. comm.). Wood frogs in Alaska, and particularly in southcentral and eastern Alaska, suffer higher rates of growth abnormalities (e.g. missing or deformed limbs) than they do in other U.S. states (Reeves et al. 2013). The factors responsible for these abnormalities are not fully known, but may include heavy metal contamination and predation (Reeves et al. 2010). Although Reeves et al. (2008) reported a correlation between distance to roads and frog abnormalities, further surveys are needed to validate these findings (Reeves and Trust 2008).

Action Total: 24

Supplemental Information - variables do not receive numerical scores. Instead, they that are used to sort taxa to answer specific biological or management questions.

Harvest:	None or Prohibited
Seasonal Occurrence:	Year-round
Taxonomic Significance:	Monotypic species
% Global Range in Alaska:	>10%
% Global Population in Alaska:	<25%
Peripheral:	No

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