

ATTACHMENT SS2

REGION 2 SENSITIVE SPECIES EVALUATION FORM

Species: Plains topminnow <i>Fundulus sciadicus</i>			
Criteria	Rank	Rationale	Literature Citations
<p>1 Distribution within R2</p>	<p>A</p>	<p>The plains topminnow occurs in each state of the Rocky Mountain Region of the Forest Service (Rahel and Thel 2004); however, its distribution is limited to a relatively narrow band of elevations ranging from approximately 4000 to 5600 feet above sea level (Quist et al. 2004) in association primarily with the Great Plains ecosystem (Baxter and Stone 1995). While occurring within each state of the region, the species' native range is limited to isolated patches within the grassland areas of South Dakota, Wyoming, Nebraska, and Colorado and as such is likely to occur on only a portion of the National Forest System units in the region. Habitats occur in isolated patches and dispersal opportunities are often reliant upon the precipitation events that generate localized flooding (Rahel and Thel 2004).</p> <p>Confidence in Rank High or Medium or Low</p>	<p>See References</p>
<p>2 Distribution outside R2</p>	<p>B</p>	<p>Plains topminnow occurs in two major disjunct areas of the Missouri River Basin (Lee et al. 1980). The first area occurs in the Missouri, Platte, Republican, and Niobrara river basins in Nebraska including adjacent plains of northeastern Colorado, southeastern Wyoming, southern South Dakota, northeastern Iowa, and the extreme southwestern portions of Minnesota. The second area is the middle Missouri River Basin, including the Lamine, Gasconade, and Osage rivers of central Missouri, as well as portions of the Spring River drainage in southeastern Kansas and northwestern Oklahoma (Pflieger 1997; Lee et al. 1980). These disjunct distributions have rendered the regional populations genetically distinct as has been shown through recent genetic studies (see Li et al. 2009).</p> <p>Confidence in Rank High or Medium or Low</p>	<p>See References</p>

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<p>3 Dispersal Capability</p>	<p>A</p>	<p>Plains topminnows occur in Great Plains streams that exist in a continuous state of disequilibrium between flooding and drying (Fausch and Bestgen 1997, Dodds et al. 2004., Wohl et al. 2009). Known populations on National Forest System Lands exist in isolated refuge habitats or pools of exposed alluvial groundwater. While the species is considered to be vagile, only under certain environmental conditions (i.e., floods) does surface connectivity provide a vector for dispersal. Rapid dispersal following floods is not unique to the plains topminnow as other Great Plains fishes use this strategy to persist as refuge habitats either remain suitable or become desiccated due to local and regional weather patterns (Fausch and Bestgen 1997). The key to population persistence under this strategy is the ability of the plains topminnow and associated native prairie fishes to rapidly recolonize habitats, which is reliant upon stochastic precipitation events and unfragmented linear habitat networks. Although the species occurs across a large geographic area, recent genetic work indicates that populations are genetically distinct among river drainages (Li et al. 2009), which supports the current dispersal dynamics within, but not between river basins (Falke and Fausch 2009). For the isolated habitats on the Pawnee National Grassland and likely for occupied habitat on other National Forest units, dispersal likely occurs within specific stream/drainages, but not between drainages.</p> <p>Confidence in Rank High or Medium or Low</p>	<p>See References</p>

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<p>4 Abundance in R2</p>	<p>B</p>	<p>Specific abundance data for the plains topminnow is not widely available for this species, nor is it highly useful in determining the conservation status. As with other highly fecund and rapidly dispersing species, abundances can vary widely for the plains topminnow. Monitoring data from the Pawnee National Grassland indicates that the abundance of plains topminnow can range from 1 or 2 individuals to several hundred per isolated pool; however, due to interannual variation in pool permanency, abundance does not buffer against losses of individuals if pools dry up as has been repeatedly observed during monitoring efforts (USDA Forest Service, unpublished data). Rather, frequency of occurrence or number of occupied pools is the better measure on which to base “how many topminnows are extant”. Based on 2012 monitoring data, plains topminnows were collected from 2 of 5 drainages on the Pawnee N.G. where they were historically present.</p> <p>Data from large ichthyofaunal collections dating back four decades within the species primary range primarily consider the species to be uncommon to rare and rarely abundant, except within some specific habitats (see synopsis in Rahel and Thel 2004). In Nebraska, it is mostly known from the sandhill region, where it was locally abundant (Stasiak 1987). Lynch and Roh (1996) found the species to be widespread, but rare within the Nebraska portions of the North and South Platte River. More recently, Nebraska has identified the plains topminnow as declining in Nebraska’s State Wildlife Action Plan and stated concerns about the species’ vulnerability to the potential effects of climate change (Schneider et al. 2011). In Colorado, the species was never found to be common in the South Platte drainage (Propst and Carlson 1986) and occurred in isolated colonies (Woodling 1985).</p> <p>Confidence in Rank High or Medium or Low</p>	<p>See References</p>

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<p>5 Population Trend in R2</p>	<p>A</p>	<p>Plains topminnow is overall considered “apparently secure” by Nature Serve (2012); however, a persistent downward trend in occurrence is a common theme throughout the species’ range. All states within the native range, except Oklahoma, have at one point recognized some level of conservation concern for the species. The species is presumed extirpated from Iowa, critically imperiled in Kansas and Oklahoma, vulnerable in Minnesota, Missouri, South Dakota, and Wyoming, imperiled in Nebraska, and apparently secure in Colorado (Nature Serve 2012). The recent range-wide distributional synopsis by Pasbrig and others (2012) documented a 65% to 70% decline in observed occurrences of plains topminnow, with the greatest reductions occurring in the Platte and Republican River basins. Others (Fischer and Paukert 2008b) have documented similar declines from known historic occurrences in the Platte basin of Nebraska. Even 20 years ago the species was considered historically (i.e., pre-1980) more abundant than at the time Lynch and Roh (1996) made their collections in Nebraska. In Kansas, the species has been presumed extirpated from Kansas by some (Pasbrig et al. 2012); however, the only known occurrence of plains topminnow in Kansas is from a 1963 collection in Shoal Creek and those fish were considered more of an incidental collection rather than a representation of the native fish assemblage (Haslouer et al. 2005, Haslouer 2013, personal communication). Pasbrig and others (2012) also reported significant declines (~ 90%) within the species native range of Colorado based data supplied Colorado Parks and Wildlife; however, Colorado Parks and Wildlife (CPW) responded to the reported reduction in occurrence in a letter to the U.S Fish & Wildlife Service, noting that CPW has observed some declines in the species, but “nowhere near the losses reported by Pasbrig” (Crockett 2012). The population trend in South Dakota is declining (Hoagstrom et al. 2006). Results from local population monitoring on the Pawnee National Grassland are mixed: some drainages have seen reduced occurrences of plains topminnow associated with higher incidence of green sunfish; and plains topminnows in some drainages have remained a consistently recurring species.</p> <p>Confidence in Rank High or Medium or Low</p>	<p>See References</p>

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<p>6 Habitat Trend in R2</p>	<p>A</p>	<p>The shortgrass prairie and the streams that drain them in the western Great Plains have long been considered one of the most endangered ecosystems in North American (e.g., Manning 1995). While there are both major rivers and minor tributaries across the Great Plains, the plains topminnows occupies habitats within the intermittent streams and backwaters of larger rivers, where isolated pools with little flow and dense submerged vegetation occurs (Rahel and Thel 2004). The small intermittent and ephemeral streams that head on the plains contain the principal habitats where the plains topminnow occurs on the Pawnee National Grassland (Wohl et al. 2009). Trends in habitat conditions for plains topminnow have been characterized as declining due to habitat loss (i.e., destruction or desiccation), habitat degradation, habitat fragmentation, and loss of suitability due to introduced non-native fish species (Rahel and Thel 2004). Agricultural and urban development has caused the degradation and loss of prairie stream habitat. Diversions, water withdrawals, and groundwater pumping have dried up several Great Plains streams. The construction of dams, reservoirs, diversions, and culverts has reduced the connectivity of the stream networks in which these fish live. Green sunfish, western mosquitofish, and other non-native fish species that have become more common in western Great Plains streams rendering many refuge habitats historically occupied by plains topminnow uninhabitable (Lynch and Roh 1996, Rahel and Thel 2004, Fischer and Paukert 2008a, 2008b, Pasbrig et al. 2012).</p> <p>Anticipated trends in climate conditions for the western Great Plains region indicate warmer temperatures will occur, which could lead to higher rates of drying for the isolated pools occupied by plains topminnow. In the streams of the south Great Plains and southwest, Matthews and Zimmerman (1990) have predicted that species occupying intermittent streams would be increasingly vulnerable to more frequent extirpations as habitats dry. While no direct link to climate change has been made for stream drying, increased consumption of groundwater and higher incidence of drought conditions have resulted in habitat losses that have completely dried many Great Plains streams (Dodds et al. 2004). Anticipated droughts and future water withdrawals are predicted to cause severe reductions in the amount of baseflow refugia habitats in portions of the western Great Plains (Covich et al. 1997, Falke et al. 2010).</p> <p>Confidence in Rank High or Medium or Low</p>	<p>See References</p>

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<p>7 Habitat Vulnerability or Modification</p>	<p>A</p>	<p>Most of the streams in the Great Plains have been anthropogenically altered (e.g., Fausch and Bestgen 1997, Dodds et al. 2004, Rahel and Thel 2004) and those alterations are believed related to current losses of endemic prairie fishes, such as the plains topminnow (e.g., Fischer and Paukert 2008). Substantial modifications to prairie streams have occurred over a large portion of the species range. The conversion of grasslands from prairies to agricultural production and intense livestock grazing has degraded and simplified riparian systems, resulting in altered stream morphologies, the loss of complex stream habitats, and the loss of native fishes from prairie streams (Fausch and Bestgen 1997). Reservoirs constructed for irrigation and municipal uses have dramatically altered fish communities on the prairie landscape (e.g., Falke and Gido 2006), rendering vast stretches of streams uninhabitable to most native prairie stream fishes (e.g., Patton and Hubert 1993) while also permanently fragmenting prairie streams and markedly reducing the ability for prairie stream fishes to recolonize streams following droughts and floods (Fausch and Bestgen 1997, Rahel and Thel 2004). Road infrastructure has expanded on the prairie landscape as well and has increased habitat fragmentation as more road culverts have been constructed over the Great Plains streams. Fragmentation of habitat has critically limited dispersal opportunities, which is fundamental to both the community dynamics and persistence of prairie fish species (Falke and Faush 2009). Water withdrawals and increased rates of water withdrawals have reduced the amount of habitat available and the degree of isolation among population sources for prairie fishes, including the plains topminnow (Dodds et al. 2004, Falke et al. 2010). Reductions in the occurrence of plains topminnow have been associated with current expansions of non-native predator and competitor fish species, such as green sunfish and western mosquitofish (Lynch and Roh 1996, Fischer and Paukert 2008). Competitive interactions with the introduced western mosquitofish have led to marked reductions in survivorship of plains topminnow (Haas 2005). In sum, the primary threats or habitat vulnerabilities for the plains topminnow are (1) habitat degradation, (2) habitat loss, (3) habitat fragmentation, and (4) negative interactions with introduced, non-native fish species (Rahel and Thel 2004, Crockett – personal communication).</p> <p>Confidence in Rank High or Medium or Low</p>	<p>See References</p>

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<p>8 Life History and Demographics</p>	<p>B</p>	<p>Rahel and Thel (2004) provide a thorough review of the life history of the plains topminnow. The species is relatively short-lived, surviving approximately 4 years on average. Plains topminnows are moderately fecund, with females producing an average of 40 eggs per year for the three years of reproductive potential. Individuals can reproduce at 1 year of age and populations appear to have high rates of population growth (within a pond/pothole/pool). However, persistence on prairie landscape has always been inextricably linked to dispersal and the ability to easily disperse and recolonize extirpated areas during and shortly following floods that link isolated pools and neighboring stream networks. Recent genetic evaluations of plains topminnow populations from both primary distribution centers shows that each population (i.e., drainage) has relatively low mitochondrial genetic variation when compared to other <i>Fundulus</i> species. Low genetic variation is most easily explained by the frequent genetic bottlenecks experienced by the plains topminnow (Li et al. 2009), a plausible explanation given the species' precarious existence in refuge pools that dry and reconnect only in association with the stochasticity of large thunderstorms on the Great Plains.</p> <p>Confidence in Rank High or Medium or Low</p>	<p>See References</p>
<p>Evaluator(s): Prepared by Matthew P. Fairchild; Reviews provided by Jeff Abegglen and Kelly Larkin-McKim</p>			<p>Date: January 14, 2013</p>

National Forests in the Rocky Mountain Region where species is KNOWN (K) or LIKELY (L)¹ to occur:

¹ Likely is defined as more likely to occur than not occur on the National Forest or Grassland. This generally can be thought of as having a 50% chance or greater of appearing on NFS lands.

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Species Name:											
<u>Colorado NF/NG</u>		<u>Kansas NF/NG</u>		<u>Nebraska NF/NG</u>		<u>South Dakota NF/NG</u>		<u>Wyoming NF/NG</u>			
Known	Likely	Known	Likely	Known	Likely	Known	Likely	Known	Likely	Known	Likely
	L	Cimarron NG		Samuel R. McKelvie NF	K	Black Hills NF		Shoshone NF			
				Halsey NF	K	Buffalo Gap NG	L	Bighorn NF			
				Nebraska NF		Ft. Pierre NG		Black Hills NF			
				Ogalala NG	L			Medicine Bow NF			
								Thunder Basin NG [†]			L
	K										

† Plains topminnow are known to occur on the Thunder Basin N.G. within the Cheyenne River basin; however, those areas are not considered part of the species native range and thus as an introduced species, these populations hold little conservation value.

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