

Paddlefish (*Polyodon spathula*) Conservation Status Rank Summary

March 6, 2024

For details on assessment and ranking methodology, see: [Conservation Status Assessment Definitions, Process, Rank Factors, and Calculation of State Ranks for Montana Species](#)

Rarity and Trends

Rank Factor	Date Assessed	Value	Score	Data Source	Comments
Rarity					
Range Extent	2024-01-25	Y: 28837.5 km ²	3.930	MTNHP Range Maps	None
Area of Occupancy	2024-03-06	20332 1km ² cells	4.810	MTFWP Fish Distribution Layer	From MT Fish distribution layer
Number of Occurrences	2024-02-20	11	1.380	MTNHP Databases	None
Population Size			-		Factor not used in ranking.
# of Occurrences in Good Condition			-		Factor not used in ranking.
% of Area Occupied in Good Condition			-		Factor not used in ranking.
Environmental Specificity			-		Factor not used in ranking.
Rarity is calculated by averaging weighted factor scores: $((3.93 \times 1) + (4.81 \times 2) + (1.38 \times 1)) / 4 = 3.73$					
Trends					
Short-term Trend	2024-01-25	100.0%	0.000	Glassic et al 2020, Scarnecchia et al 2021 (unpublished)	Population is managed and stable
Long-term Trend	2024-01-25		[0.000, 0.070]	MT AFS SOC assesemtn	MT AFS SOC-species status webpage, describes well how the PF population was modest prior to the completion of the Missouri River Dams (Fort Peck and Garrison), nutrient upsurge led to a boom in the population. The populations have since declined from that peak due to reservoir aging and total mortality but population levels appear stable over the short term trend (see works by Glassic and Scarnecchia)
Trends score is calculated by summing weighted short and long-term trend scores: $((0.00 \times 2) + ([0.00, 0.07] \times 1)) = [0.00, 0.07]$					



Threats

Rank Factor	Date Assessed	Value	Score	Data Source	Comments
Threats					
Overall Threat Impact		Medium	3.670		None
Intrinsic Vulnerability			-		Factor not used in ranking.
Threat score is calculated from Overall Threat Impact when available or Intrinsic Vulnerability if not: (3.67) = 3.67					

Individual Threats Data

Threat Category	Date Assessed	Impact Score	Scope	Severity	Immediacy	Comments
Energy Production & Mining	2024-01-25	Low	Large	Slight	High	Gerken and Paukert 2009, this study describes how paddlefish life history makes them sensitive to habitat alteration/degradation. Critical rearing habitats in the headwaters of Lake Sakakawea are subject to oil field impacts. The Missouri River below Fort Peck dam has altered temperature, sediment, and flow regimes as a result of Fort Peck Dam.
Natural System Modifications	2024-01-25	Low	Pervasive	Slight	High	Scarnecchia et al 1996, Scarnecchia et al 2009, the paddlefish population was modest prior to Fort Peck and Garrison Dam creating abundant lentic shallow water habitat the population boomed in 1960's and 1970's as a result of high levels of recruitment during this trophic upsurge. As the headwaters of these reservoirs fill with silt and gradually have become less productive recruitment has been more episodic and infrequent. Scarnecchia et al 2009, successful recruitment in this population has been correlated with the combination of high flows in riverine habitat while reservoir pool levels are also high. Water withdrawal for irrigated agriculture has a substantial impact on Yellowstone River stream flow during drought years. There are substantial reserved water rights that have not yet been but could be developed that if fully developed would increase the frequency of water shortage for both irrigation and in-stream flow. Instream flow in the Lower

						Yellowstone is junior to these undeveloped reserved water rights.
Invasive & Other Problematic Species, Genes & Diseases	2024-01-25	Low	Small	Moderate-Slight	High	Parken and Scarnecchia 2002, this study demonstrated sauger, walleye and northern pike prey on young of the year paddlefish. While the rates found in the study appear modest the interaction between these species is greater in recent years than what would have been expected during the boom in paddlefish population. This is because walleye abundance has increased in recent decades due to popularity in the fishery prompting consistent stocking to augment natural recruitment of walleye.
Climate Change & Severe Weather	2024-01-25	Low	Pervasive	Slight	High	successful recruitment in this population has been correlated with the combination of high flows in riverine habitat while reservoir pool levels are also high. Drought periods have seen few strong year classes.
Threat Tally: 0 - Very High, 0 - High, 0 - Medium, 4 - Low Overall Threat Impact* = Medium						

*See [Conservation Status Assessment Definitions, Process, Rank Factors, and Calculation of State Ranks for Montana Species](#) for calculation of Overall Threat Impact based on the number and impact of individual threats.

Conservation Status Rank Calculation

Raw score

Rarity: $(3.73 \times 70\%)$ + Threats: $(3.67 \times 30\%)$ + Trends: $([0.00, 0.07]) = [3.71, 3.78]$

Calculated Rank: S4

Accepted Rank	S3S4
Date Approved	2024-09-30
Approval Authority	Montana Species of Concern Committee
Rank Justification	Species is widely distributed is managed and stable and faces a number of low level threats

Supplementary Information

Montana Natural Heritage Program. 2021. Conservation Status Assessment Definitions, Process, Rank Factors, and Calculation of State Ranks for Montana Species. 18 p.

https://mtnhp.mt.gov/docs/Montana_State_Rank_Criteria_20211201.pdf

Montana Field Guide Species Account:

<https://fieldguide.mt.gov/speciesDetail.aspx?elcode=AFCAB01010>

Predicted Suitable Habitat Model:

<https://mtnhp.mt.gov/resources/models/?elcode=AFCAB01010>

Information Needs

Information needs are assessed by considering the availability of factors used to assess species status as well as the quality of these assessments. Current information availability and quality to inform Conservation Status Rank for this species are highlighted.

Rank Factor	Assessment Category	Value	Criteria
General Status	Status Quality	Adequate	Calculated rank has low uncertainty and is represented by a single rank (e.g. S3); accepted rank may be adjusted to a range rank (e.g. S2S3)
		Poor	Rank assessed as SU or calculated rank has notable uncertainty and corresponds to a range rank with 2 or more values (e.g. S2?, S1S3, or S4S5)
Rarity	Range Quality	Adequate	Range polygon adequately represents area of probable occupancy and does not include substantial unoccupied areas; range may be adequately defined and still include areas of unsuitable habitat (e.g. mountain ranges for plains species)
		Marginal	Range polygon defined, but may include or exclude notable areas where the species may or may not occur on the landscape
		Poor	Range polygon not defined
	Habitat Quality	Adequate	Species-habitat relationship is well-defined (e.g. relevant literature or robust habitat model available)
		Marginal	Understanding of species-habitat relationship is adequate among some but not all habitats (e.g. literature covers similar habitats outside of Montana or habitat model performance is only somewhat adequate)
		Poor	Species-habitat relationship is not well understood
Threats	Threat Quality	Adequate	Threat Impact is a single value (including "Unthreatened")
		Marginal	Threat Impact assessed at more than one value (e.g. "High - Medium")
		Poor	Threat Impact is Unknown but Intrinsic Vulnerability is assessed
		Unknown	Threat Impact is Unknown and Intrinsic Vulnerability is not assessed
Trends	Recency	Current	Short-term Trend assessment date less than 10 years old
		Out of Date but Adequate	Short-term Trend assessment date is more than 10 years old or Unknown, but species is Unthreatened
		Out of Date	Short-term Trend assessment date more than 10 years old
		Not Available	Short-term Trend data are not available
	Trend Quality	Sufficient	Short-term Trend assessed at a single value or multiple values with a minimum trend greater than -10% (stable or increasing)
		Unknown but Sufficient	Short-term Trend is Unknown, but species is Unthreatened
		Poor	Short-term Trend is less than -10% (in decline) with two or more values selected
		Unknown	Short-term Trend is Unknown

Summary of Information Availability

Information to assess status is available

Summary of Information Needs

No further information is needed.

Additional Threat Details

The table below contains the complete threats assessment for this species. While the Conservation Status Rank Calculation is based on cumulative, broadly categorized (Level 1) threats data, threats are assessed and tracked for more specifically categorized (Level 2) threats when available.

Threat Category	Date Assessed	Assessed By	Data Source	Scope	Severity	Immediacy	Comments
Energy Production & Mining - 3.1 - Oil & Gas Drilling	2024-01-25	Bollman, Caleb	Gerken and Paukert 2009	Large	Slight	High	Gerken and Paukert 2009, this study describes how paddlefish life history makes them sensitive to habitat alteration/degradation. Critical rearing habitats in the headwaters of Lake Sakakawea are subject to oil field impacts. The Missouri River below Fort Peck dam has altered temperature, sediment, and flow regimes as a result of Fort Peck Dam.
Natural System Modifications - 7.2 - Dams & Water Management/Use	2024-01-25	Bollman, Caleb	Scarnecchia et al 1996, Scarnecchia et al 2009	Pervasive	Slight	High	Scarnecchia et al 1996, Scarnecchia et al 2009, the paddlefish population was modest prior to Fort Peck and Garrison Dam creating abundant lentic shallow water habitat the population boomed in 1960's and 1970's as a result of high levels of recruitment during this trophic upsurge. As the headwaters of these reservoirs fill with silt and gradually have become less productive recruitment has been more episodic and infrequent. Scarnecchia et al 2009, successful recruitment in this population has been correlated with the combination of high flows in riverine habitat while reservoir pool levels are also high. Water withdrawal for irrigated agriculture has a substantial impact on Yellowstone River stream flow during drought years. There are substantial reserved water rights that have not yet been but could be developed that if fully developed would increase the frequency of water shortage for both irrigation and in-stream flow. Instream flow in the Lower Yellowstone is junior to these undeveloped reserved water rights.
Invasive & Other Problematic Species, Genes & Diseases - 8.1 - Invasive Non-Native/Alien Species/Diseases	2024-01-25	Bollman, Caleb	Parken and Scarnecchia 2002	Small	Moderate-Slight	High	Parken and Scarnecchia 2002, this study demonstrated sauger, walleye and northern pike prey on young of the year paddlefish. While the rates found in the study appear modest the interaction between these species is greater in recent years than what would have been expected during the boom in paddlefish population. This is because walleye abundance has increased in recent decades due to popularity in the fishery prompting consistent stocking to augment natural recruitment of walleye.
Climate Change & Severe Weather - 11	2024-01-25	Bollman, Caleb	Scarnecchia et al 2009	Pervasive	Slight	High	successful recruitment in this population has been correlated with the combination of high flows in riverine habitat while reservoir pool

							levels are also high. Drought periods have seen few strong year classes.
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