APPENDIX F
AQUATIC INVERTEBRATE SGCN SPECIES ACCOUNTS

Contents

Freshwater Mussels

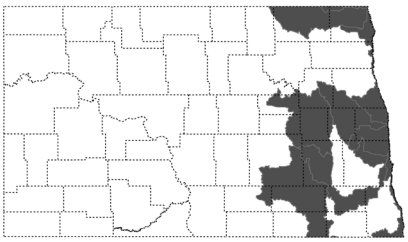
Aquatic Invertebrates

Aquatic invertebrate SGCN and SGIN categories.

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
Black Sandshell	X						
Creek Heelsplitter		X					
Creeper			X				
Deertoe		X					
Fragile Papershell			X				
Mapleleaf			X				
Pink Heelsplitter			X				
Pink Papershell		X					
Threeridge			X				
Wabash Pigtoe	X						
a mayfly *Raptoheptagenia cruentata*			X				
a mayfly *Apobaetis lakota*			X				
a mayfly *Cercobrachys cree*			X				
a mayfly *Traverella lewisi*			X				
a sand-dwelling mayfly *Lachlania saskatchewanensis*		X					
Dakota Stonefly		X					
Pawnee Stonefly			X				
Plains Emerald			X				
Plains Stripetail			X				
Subarctic Darner			X				
a giant case maker *Ptilostomis angustipennis*				X			
a sand-dwelling mayfly *Analetris eximia*				X			
a small square-gilled mayfly *Sparbarus lacustris*				X			
a small square-gilled mayfly *Caenis youngi*				X			
a spiny-headed burrowing mayfly *Pentagenia vittigera*				X			
Boreal Whiteface				X			
clubtails *Stylurus spp.*				X			
Flat-headed Mayfly				X			
Footed Micro Caddisfly				X			
Long-horned Caddisfly				X			

	Species of Greatest Conservation Need			Species of Greatest Information Need			
Name	**SGCN a. Regionally or globally imperiled**	**SGCN b. At-risk or declining, ND important**	**SGCN c. At-risk, expert review**	**SGIN d. Scientific knowledge deficient**	**SGIN e. Potentially stable in ND, declining in range**	**SGIN f. Potentially stable but life history trait vulnerability**	**SGIN g. Declining, ND significance uncertain**
long-horned case makers *Ceraclea spp.*				X			
Net-spinning Caddisfly				X			
Northern Caddisfly				X			
Northern Case Maker				X			
Ornate Fairy Shrimp					X		
Paiute Dancer				X			
Saskatoon Willowfly (winter stonefly)				X			
small minnow mayflies Camelobaetidius spp.				X			
spinylegs *Dromogomphus spp.*				X			
sprites Promenetus spp.					X		
Water Scorpion				X			
White Sand-river Mayfly				X			

Black Sandshell *Ligumia recta*



Black sandshell range in North Dakota.

Description/Identification: Mussel with elongated shell and generally flattened. The Black Sandshell can reach up to 4 ½ inches in length with a smooth, shiny shell and generally dark in color. The nacre is pink, purple, or white in color.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining and North Dakota represents an important portion of its range. Changes in land use in/around rivers including agriculture and impoundments have impacted this species, specifically related to their beds.

Habitat: Found in the in Red River north of the confluence with the Sheyenne River. Also found in the Sheyenne River from its confluence with the Red River to below Baldhill Dam.

Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for the Black Sandshell by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

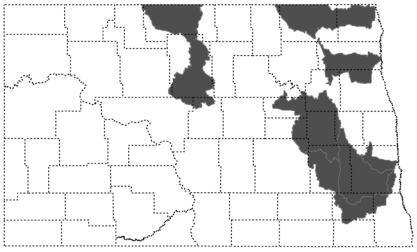
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Creek Heelsplitter *Lasmigona compressa*

Description/Identification: Mussel with relatively thin shell, flattened, and elongated up to 3 inches in length. Typically, Creek Heelsplitters are yellow in color with green rays extending from the top. Larger shells are typically darker in color.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining and North Dakota represents an important portion of its range. Changes in land use in/around rivers including agriculture and impoundments have impacted this species, specifically related to their beds.



Creek heelsplitter range in North Dakota.

Habitat: Creek Heelsplitters are found in the Pembina, Forest, Wintering and Sheyenne Rivers. Generally, they are found in headwater areas with sandy substrates.

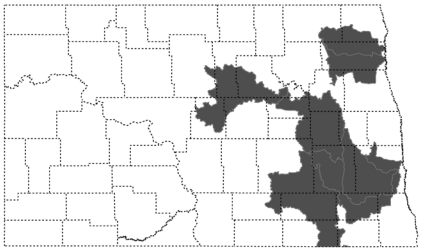
Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for Creek Heelsplitters by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Creeper *Strophitus undulatus*



Creeper range in North Dakota. Photo courtesy of Valley City State University

Description/Identification: The Creeper has an elliptical shell and is slightly compressed. The anterior of the shell is rounded and the posterior is pointed. The shell is generally smooth and shiny. Juvenile color begins as green with rays and darkens with age to brown or black.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species, specifically related to their beds.
Habitat: Creepers are found in the, Forest, South Branch of the Park, and Sheyenne Rivers. The Sheyenne River appears to have the largest population.

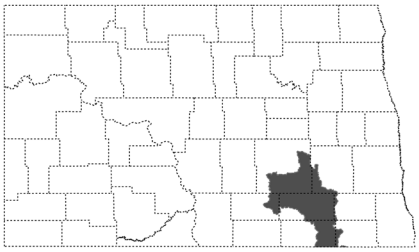
Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for Creepers by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Deertoe *Truncilla truncata*



Deertoe range in North Dakota. Photo courtesy of Valley City State University

Description/Identification: The smallest mussel in North Dakota, the Deertoe has a triangular shaped shell with a rounded anterior and bluntly pointed posterior. Their color is variable, ranging from yellow-green to dark brown with green rays present of varying widths.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining and North Dakota represents an important portion of its range. Changes in land use in/around rivers including agriculture and impoundments have impacted this species, specifically related to their beds.

Habitat: The Deertoe can be found in medium to large rivers with gravel, mud, or sand substrate. In North Dakota, the Deertoe is currently only found in the James River.

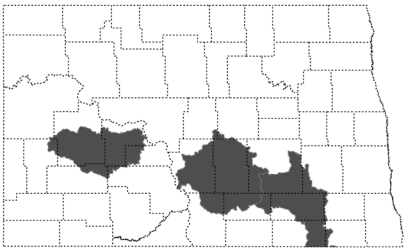
Threats: Impoundments of the James River has altered the flow regime creating unsuitable habitat for the Deertoe by increasing sediment deposition and blocking host fish movement. Agricultural practices, wetland drainage, and other land use practices continue to degrade water quality.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Fragile Papershell *Leptodea fragilis*



Fragile papershell range in North Dakota. Photo courtesy of Valley City State University

Description/Identification: Shell compressed and generally oblong. Both ends rounded except for females where posterior end is expanded. Shell is commonly yellow to yellow/green with light green rays.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: The Fragile Papershell can be found in medium to large rivers with gravel, mud, or sand substrate. In North Dakota, the Fragile Papershell is currently only found in the James River.

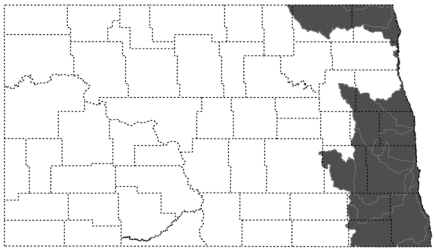
Threats: Impoundments of the James River has altered the flow regime creating unsuitable habitat for the Fragile Papershell by increasing sediment deposition and blocking host fish movement. Agricultural practices, wetland drainage, and other land use practices continue to degrade water quality.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Mapleleaf *Quadrula quadrula*



Mapleleaf range in North Dakota.

Description/Identification: Shell up to 4 inches in length. This species is a thick-shelled mussel. Tooth is well developed. Anterior rounded and posterior generally square. Two rows of raised nodules extending from hinge.

Status: Year-round resident but rare in abundance.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in rivers/streams with mud, sand, or gravel bottoms. The Red River is the only place where this species has ever been documented alive and may also be found in parts of the Sheyenne River.

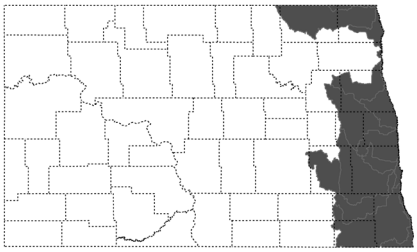
Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for the Black Sandshell by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase populations survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Pink Heelsplitter *Potamilus alatus*



Pink heelsplitter range in North Dakota.

Description/Identification: Large shell, up to 8 inches. Generally rectangular in shape. Posterior end flat and anterior end rounded. Shell dark green to brown.

Status: Year-round resident and can be locally abundant.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in rivers/streams with mud and sand substrate. Pink Heelsplitters are found in the Red and Sheyenne Rivers with the highest concentrations in the Argusville area of the Red River.

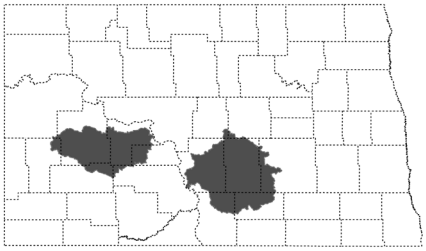
Threats: Impoundments of the Red River and its tributaries have altered the flow regime creating unsuitable habitat for the Black Sandshell by increasing sediment deposition and blocking host fish movement. Agricultural practices, along with wetland drainage, continue to degrade water quality. Also, increased flow and altered water chemistry in the Sheyenne River from the Devils Lake outlet may pose additional threats.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Pink Papershell *Potamilus ohiensis*



Pink papershell range in North Dakota.

Description/Identification: Large mussel with a maximum length of 7 inches. Shell is elongated and generally rectangular. Wing present near the umbos. Shell dark green to brown. Nacre is pink.

Status: Year-round resident and rare.

Reason for SGCN Designation: This species is regionally at risk or declining and North Dakota represents an important portion of its range. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in medium to large rivers/streams with mud and sand substrate. Pink Papershells are found only in the lower reaches of the Missouri River and tributaries below Garrison Dam in North Dakota.

Threats: Impoundments built on the Missouri River System have changed the flow regime of the river. Water released from the dam is cooler, cleaner, and moving faster. This has changed the historic habitat conditions of the river system. Impoundments in the system block movement of fish species used by the Pink Papershell as hosts for young. In this case, the most common host is the freshwater drum.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

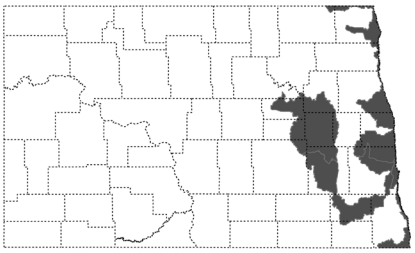
Threeridge *Amblema plicata*

Description/Identification: Large mussel with a maximum length of 7 inches. Shell is elongated and generally rectangular. Wing present near the umbos. Shell dark green to brown. Nacre is pink.

Status: Year-round resident and can be locally common.

Reason for SGCN Designation: This species is regionally at risk or declining based on expert review and feedback. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in medium to large rivers/streams with mud, sand, and gravel substrate. The Threeridge is Found only in the Red and Sheyenne rivers with the highest concentrations throughout the Sheyenne River in Ransom County.



Threeridge range in North Dakota.

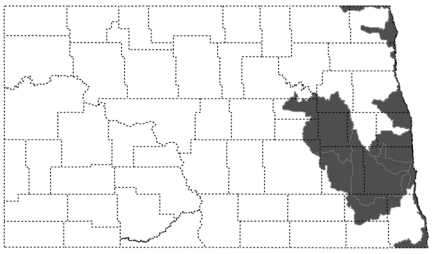
Threats: Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits making many areas in the river unsuitable for the Threeridge. Impoundments also block host fish movement necessary for this species' reproduction and dispersal. Agricultural practices within the basin have reduced suitable habitat in the river. Runoff from treated fields into the river decreases water quality. Ditches used to drain wetlands contribute agricultural run-off and sedimentation to the Red River and its tributaries. The Threeridge is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use in North Dakota, but this practice may occur in parts of its range, which may contribute to an already declining population. The release of water from Devils Lake changing the water chemistry of the Sheyenne River is a potential threat.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

Wabash Pigtoe *Fusconaia flava*



Wabash pigtoe range in North Dakota.

Description/Identification: The shell is up to 3 inches in length and the shape is variable, but generally thick, compressed, and triangular. Younger individuals are yellow in color with faint green rays, becoming dark brown with age.

Status: Year-round resident and can be locally common.

Reason for SGCN Designation: This species is regionally or globally imperiled. Changes in land use in/around rivers including agriculture and impoundments have impacted this species.

Habitat: Primarily found in medium to large rivers with gravel substrate. The Wabash Pigtoe is found only in the Red and Sheyenne River drainages with the highest concentrations throughout the Sheyenne River in Ransom County.

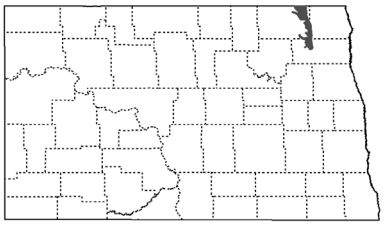
Threats: Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits making many areas in the river unsuitable for the Wabash Pigtoe. Impoundments also block host fish movement necessary for this species' reproduction and dispersal. Agricultural practices, wetland drainage, runoff, and erosion within the basin have reduced suitable habitat and degraded water quality. The Wabash Pigtoe is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use in North Dakota, but this practice may occur in parts of its range, which may contribute to an already declining population. The release of water from Devils Lake changing the water chemistry of the Sheyenne River is a potential threat.

Research and Monitoring: A monitoring protocol for mussels has been developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with increased implementation as a future goal. Additionally, the North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Valley City State University (VCSU) conducted a two-phase population survey of mussels in 2008-2010 and began another evaluation in 2024.

Management Recommendations:

- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Continue partnering with local, state, and federal entities to maintain instream flows.
- Continue partnering with local, state, and federal entities to reduce wetland drainage.
- Remove river impoundments where possible.
- Encourage efficient use of pesticides.

A mayfly *Apobaetis lakota*



Apobaetis lakota potential range in North Dakota. Photo credit to Valley City State University

Description/Identification: A member of the family Baetidae, the small minnow mayflies. The larval stage is relatively small with long antenna. Typically, the lateral gills present on the abdomen are oval shaped. This species has very long claws on the ends of its legs compared to most other members of Baetidae. They are primarily found in the sand dominated (psammophilous) river and stream systems within the northern Red River drainage of eastern North Dakota. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage, which is short-lived.

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A Midwest regional species of high concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c), documented in Cavalier County. *Apobaetis* is thought to be rare throughout its range and is endemic to North Dakota. *Apobaetis lakota* is known to occur in North Dakota, Nebraska, and Kansas. According to NatureServe, it is considered imperiled in Kansas.

Habitat: Occurs in medium sized sand dominated river systems such as the Little South Pembina River. However, the potential exists for *Apobaetis lakota* to be present throughout the Red River drainage system.

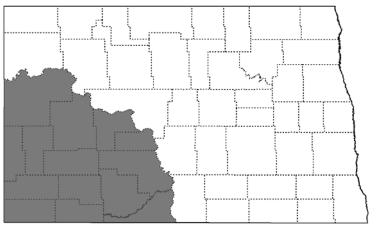
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices, habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development project. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas near waterbodies.
- Develop/maintain buffers along and within riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

A mayfly *Cercobrachys cree*



Cercobrachys cree potential range in North Dakota. Photo credit to Valley City State University

Description/Identification: A member of the family Caenidae, the square-gilled mayflies, named for the square shaped gills on their abdomen. Their short forelegs are a notable characteristic. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage, which is short-lived.

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A Midwest regional species of very high concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c). Documented records in western North Dakota. *Cercobrachys cree* is known to occur in eastern Montana, western North and South Dakota, Alberta and Saskatchewan.

Habitat: Occurs in medium to large, sand dominated river systems such as the Little Missouri, Cannonball and Heart Rivers.

Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices, habitat modification and inundation due to damming of river systems.

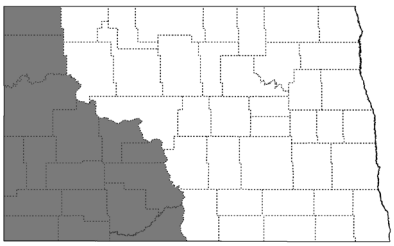
Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development project. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas near waterbodies.
- Develop/maintain buffers along and within riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

A mayfly *Lachlania saskatchewanensis*

Photo not available



Lachlania saskatchewanensis potential range in North Dakota.

Description/Identification: A burrowing mayfly and member of the family Oligoneuriidae, the brush-legged mayflies. They are named for the brush-like hairs on their front legs. They are primarily found in the large, sand dominated (psammophilous), turbid river systems within the Missouri River drainage of western North Dakota. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage, which is short-lived.

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A regional species of concern with limited species level data in North Dakota. Also, an at-risk or declining species with North Dakota representing and important portion of its habitat (SGCN b). Historic records in Montana and Saskatchewan are also limited indicating the rare presence of this sand-dwelling species. Also considered a species of concern in Montana. *Lachlania saskatchewanensis* is known to occur in North Dakota, Montana, and Saskatchewan and is rare throughout its range.

Habitat: Occurs in large, sand dominated river systems such as the Missouri River and Little Missouri River.

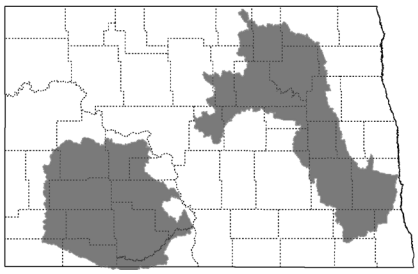
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Dakota stonefly *Perlesta dakota*



Perlesta dakota range in North Dakota. Photo of larval (top) and adult (bottom) life stages. Photo credit to Valley City State University

Description/Identification: A stonefly and member of the family Perlidae, the most common and species rich family of stoneflies which cling to rocks and other hard substrates in well oxygenated areas or rivers/streams such as riffles. The larval stage is relatively large but only have two tails (cerci). They are typically speckled throughout the body, with chewing mouthparts to suit their predatory diet. Larval stage present throughout the open water season with adults emerging in mid-July.

Status: Year-round resident of North Dakota waterbodies. Depending on environmental conditions, life cycle can take 1 to 3 years to complete.

Reason for SGCN Designation: A regional species of concern with limited data in North Dakota. Based on limited information in the northern great plains, *Perlesta dakota* is at-risk or declining and endemic to North and South Dakota (SGCN b). It's considered to be very rare throughout its range. The Dakota stonefly has a limited distribution in the state, with the only documented records occurring in the Cannonball, Heart, Green, and Sheyenne Rivers, along with Clausen Springs. However, the potential exists for this species to be present throughout the Missouri River and Red River drainages. *Perlesta dakota* is also considered a species of conservation need in South Dakota.

Habitat: Primarily located in low gradient, medium sized rivers in central North Dakota such as the Cannonball, Heart and Sheyenne Rivers.

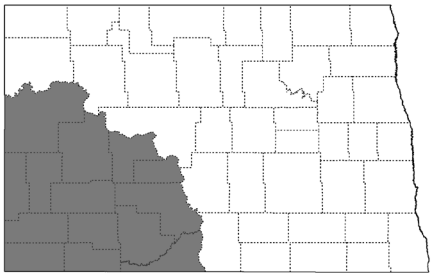
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Deepwater mayfly *Raptoheptagenia cruentata*



Deepwater mayfly potential range in North Dakota. Photo is not the species of interest but rather a representative specimen of the family Heptageniidae. Photo credit to Valley City State University

Description/Identification: A member of the family Heptageniidae, the flat headed mayflies. The larval stage has a flattened body shape and head. Typically, the lateral margin of the head is visible behind the eyes. They are primarily found in the sand dominated (psammophilous) river and stream systems within the Missouri River drainage of western North Dakota and eastern Montana. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A Midwest regional species of concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c). Documented in Billings, Bowman, Dunn, McKenzie, Morton, and Slope counties but is likely present in other areas of western North Dakota. *Raptoheptagenia cruentata* is considered a species of concern in Montana. They can be locally abundant in suitable habitat, but limited or declining records create large-scale population concerns across much of its range.

Habitat: Occurs in large sand dominated river systems such as the Missouri River and Little Missouri River.

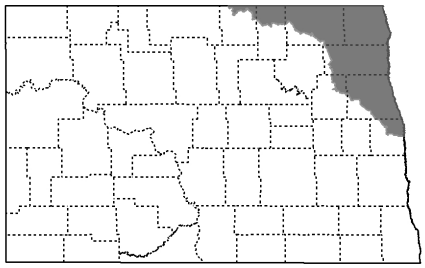
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Pawnee stonefly *Perlesta xube*



Perlesta xube potential range in North Dakota. Photo is not the species of interest but rather a representative specimen of the family Perlidae. Photo credit to Valley City State University

Description/Identification: A stonefly and member of the family Perlidae, the most common and species rich family of stoneflies which cling to rocks and other hard substrates in well oxygenated areas of rivers/streams such as riffles. The larval stage is relatively large and like mayflies but only have two tails (cerci) rather than three, are typically speckled throughout the body, with chewing mouthparts to suit their predatory diet. Larval stage present throughout the open water season with adults emerging in spring or early summer.

Status: Year-round resident of North Dakota waterbodies. Depending on environmental conditions, life cycle can take 1 to 3 years to complete.

Reason for SGCN Designation: A regional species of concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c). It's considered to be rare throughout its range. The Pawnee stonefly has a limited distribution in the state, with the only documented records occurring in the Forest River. However, the potential exists for this species to be present throughout the Red River drainage.

Habitat: Primarily located in low gradient, medium sized rivers in northeast North Dakota such as the Forest River.

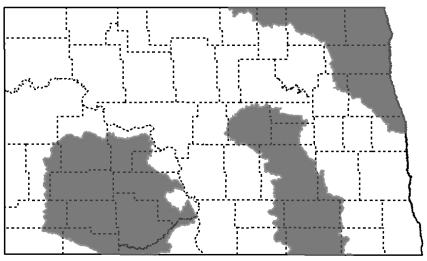
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Plains emerald *Somatochlora ensigera*



Somatochlora ensigera potential range in North Dakota. Photo credit to Valley City State University

Description/Identification: A dragonfly and member of the family Corduliidae. Larval stage has 5 short appendages on posterior, two pairs of wing pads, large eyes, and mouthparts in the shape of a spoon. Keying to the species level based on larval stage is very difficult. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage.

Status: Year-round resident of North Dakota waterbodies as larvae. Larval stage can last 2-4 years with the adult stage typically lasting around one month.

Reason for SGCN Designation: A regional species of concern with limited data in North Dakota and an at-risk species based on expert review (SGCN c). This species has a spotty distribution across North Dakota with documented adults in Adams, Grand Forks, Lamoure, Logan, Sheridan, Stark and Walsh counties but could likely be present throughout the state.

Habitat: Occurs in small rivers and streams with well defined, forested riparian zones such as the Tongue River and North Branch Park River.

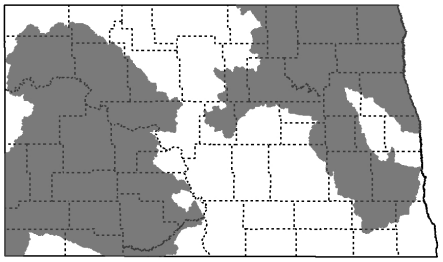
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development and agricultural practices.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Plains stripetail *Isoperla longiseta*



Isoperla longiseta potential range in North Dakota. Photo courtesy of Valley City State University

Description/Identification: A stonefly and member of the family Perlodidae. The larval stage at maturity is up to 16 mm with a long, cylindrical body. They are known as stripetails due to the distinctive coloration on the dorsal side of the abdomen. They are typically found in well-oxygenated areas, such as riffles, where they cling to smooth rocks and prey on other small invertebrates.

Status: Year-round resident of North Dakota waterbodies in the larval stage. Adults typically emerge in early summer.

Reason for SGCN Designation: A regional species of very high concern with limited species level data in North Dakota and an at-risk species based on expert review (SGCN c). The Plains stripetail is known to occur throughout much of the upper Midwest and Canada, but North Dakota data is not well understood. It's considered to be rare throughout its range. Their primary distribution across North Dakota includes the Sheyenne, Pembina Rivers. However, the potential exists for this species to be present throughout the Missouri River drainage as it has been documented in eastern Montana's prairie rivers.

Habitat: Occurs in large, cool, sand dominated river systems such as the Missouri, Pembina, and Sheyenne Rivers.

Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

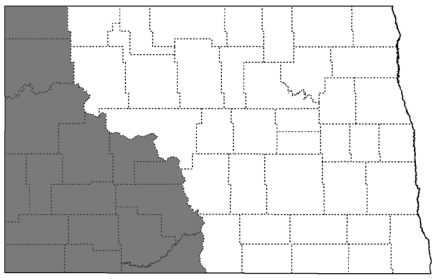
- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Prong-gilled mayfly *Traverella lewisi*

Description/Identification: A mayfly and member of the family Leptophlebiidae, the prong-gilled mayflies. The larval stage is a relatively small with a wide labrum and oval gills. They are primarily found in the large, sand dominated (psammophilous) river systems within the Missouri River drainage of western North Dakota. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage.

Status: Year-round resident of North Dakota waterbodies in the larval stage with a short-lived adult form following emergence.

Reason for SGCN Designation: A regional species of concern with limited species level data in North Dakota and an at-risk species based on expert review (SGCN c). *Traverella lewisi* seems to have a limited distribution in the state, primarily found in the Little Missouri River system. However, the potential exists for this species to be present throughout the Missouri River drainage. It's considered to be rare throughout its range and is known to occur in North Dakota, Montana, and Saskatchewan.



Traverella lewisi potential range in North Dakota. Photo credit to Valley City State University

Habitat: Occurs in large, sand dominated river systems such as the Little Missouri River.

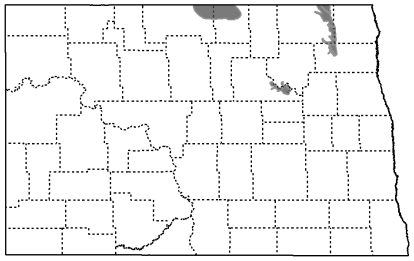
Threats: Limited habitat availability, land development, climate change, sedimentation, energy development, agricultural practices and habitat modification and inundation due to damming of river systems.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Partner with local, state, and federal entities to remove dams where logically feasible.
- Encourage efficient use of pesticides.

Subarctic darner *Aeshna subarctica*



Aeshna subarctica potential range in North Dakota. Aeshna spp. photo credit to Valley City State University

Description/Identification: Larval stage has long abdomen, large eyes and mouthparts that lie flat under the head. The last four abdominal segments have spines. Larval stage present throughout the open water season but most abundant through July-August when they typically emerge into the adult stage.

Status: Year-round resident of North Dakota waterbodies as larvae. Nymphs become adults in late summer with the adult stage lasting a few weeks to months.

Reason for SGCN Designation: A regional species of concern with limited data in North Dakota but the most likely range includes the Turtle Mountains, Pembina Gorge, and Devils Lake Hills. Also, an at-risk species based on expert review (SGCN c). *Aeshna subarctica* has a sparse distribution across the United States but more discoveries due to increased survey effort in recent years have their range expanding.

Habitat: Occurs in swamps, fens, and bogs with a clearly defined vegetative boundary.

Threats: Extremely limited habitat availability, wetland drainage, land development, climate change, energy development, eutrophication, and agricultural practices.

Research and Monitoring: Limited research has been conducted. The North Dakota Department of Environmental Quality (NDDEQ) conducts biological monitoring surveys on State waters as part of their Index of Biotic Integrity (IBI) development. Additionally, a monitoring protocol for aquatic invertebrates is being developed by the North Dakota Game and Fish Department (NDGF) under the State Wildlife Grant Program with implementation as a future goal. Additionally, a survey of aquatic invertebrates in cooperation with Valley City State University is currently underway to gain additional baseline information on SGCN's.

Management Recommendations:

- Protect and conserve large, intact tracks of native/unbroken forested areas.
- Develop/maintain buffers along riparian areas.
- Partner with local, state, and federal entities to limit chemical use in/near aquatic habitats.
- Encourage efficient use of pesticides.