Threats to Aquatic Species of Greatest Conservation Need

From Michigan's Wildlife Action Plan

Habitat Conversion: Wetland modifications

Threat Susceptibility: 3

grey petaltail	*Tachopteryx thoreyi*	
spatterdock darner	*Aeshna mutata*	
muskeg darner	*Aeshna subarctica*	
Hine's emerald	*Somatochlora hineana*	
lake chubsucker	*Erimyzon sucetta*	draining
starhead topminnow	*Fundulus dispar*	
least darter	*Etheostoma microperca*	
eastern tiger salamander	*Ambystoma tigrinum tigrinum*	
Blanchard's cricket frog	*Acris crepitans blanchardi*	
boreal chorus frog	*Pseudacris triseriata maculata*	
western chorus frog	*Pseudacris triseriata triseriata*	
pickerel frog	*Rana palustris*	
northern leopard frog	*Rana pipiens*	
copperbelly watersnake	*Nerodia erythrogaster neglecta*	
spotted turtle	*Clemmys guttata*	
Blanding's turtle	*Emydoidea blandingii*	
water shrew	*Sorex palustris*	

Habitat Conversion: Riparian modifications

Threat Susceptibility: 3

grey petaltail	*Tachopteryx thoreyi*	
russet-tipped clubtail	*Stylurus plagiatus*	Adults rest at the top of the tallest trees
ringed boghaunter	*Williamsonia lintneri*	
Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	
redside dace	*Clinostomus elongatus*	
bigmouth shiner	*Notropis dorsalis*	
southern redbelly dace	*Phoxinus erythrogaster*	
least darter	*Etheostoma microperca*	
spotted turtle	*Clemmys guttata*	
wood turtle	*Glyptemys insculpta*	can withstand modest levels of riparian modifications
water shrew	*Sorex palustris*	

Threat Susceptibility: 1

blue-spotted salamander	*Ambystoma laterale*	fairly tolerant as long as critical parts of habitat remin intact

Habitat Conversion: Dredging & channelization

Threat Susceptibility: 99

silver shiner	*Notropis photogenis*	stated as possible threats
river darter	*Percina shumardi*	potential threats
spotted turtle	*Clemmys guttata*	

Threat Susceptibility Definitions:

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2: Medium - These species have a medium susceptibility to this threat.

1: Low - These species have a low susceptibility to this threat.

The comments included were drawn from scientific literature and communications with species experts.

Threat Susceptibility: 3

elktoe	*Alasmidonta marginata*	general mussel threats
slippershell mussel	*Alasmidonta viridis*	general mussel threats
scaleshell	*Leptodea leptodon*	general mussel threats
round pigtoe	*Pleurobema coccineum*	general mussel threats
ellipse	*Venustaconcha ellipsiformis*	general mussel threats
rainbow	*Villosa iris*	general mussel threats
purple wartyback	*Cyclonaias tuberculata*	general mussel threats
eastern elliptio	*Elliptio complanata*	general mussel threats
clubshell	*Pleurobema clava*	general mussel threats
pimpleback	*Quadrula pustulosa*	general mussel threats
cylindrical papershell	*Anodontoides ferussacianus*	general mussel threats
creek heelsplitter	*Lasmigona compressa*	general mussel threats
white catspaw	*Epioblasma obliquata perobliqua*	general mussel threats
northern riffleshell	*Epioblasma torulosa rangiana*	general mussel threats
snuffbox	*Epioblasma triquetra*	general mussel threats
wavy-rayed lampmussel	*Lampsilis fasciola*	general mussel threats
eastern pondmussel	*Ligumia nasuta*	general mussel threats
black sandshell	*Ligumia recta*	general mussel threats
threehorn wartyback	*Obliquaria reflexa*	general mussel threats
hickorynut	*Obovaria olivaria*	general mussel threats
round hickorynut	*Obovaria subrotunda*	general mussel threats
kidneyshell	*Ptychobranchus fasciolaris*	general mussel threats
purple lilliput	*Toxolasma lividus*	general mussel threats
lilliput	*Toxolasma parvus*	general mussel threats
fawnsfoot	*Truncilla donaciformis*	general mussel threats
rayed bean	*Villosa fabalis*	general mussel threats
grey petaltail	*Tachopteryx thoreyi*	
rapids clubtail	*Gomphus quadricolor*	
extra-striped snaketail	*Ophiogomphus anomalus*	
pygmy snaketail	*Ophiogomphus howei*	
riverine snaketail	*Stylurus amnicola*	
laura's snaketail	*Stylurus laurae*	
elusive snaketail	*Stylurus notatus*	
ringed boghaunter	*Williamsonia lintneri*	
Hungerford's crawling water beetle	*Brychius hungerfordi*	
Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	
lake sturgeon	*Acipenser fulvescens*	loss of spawning, nursery, and general habitats
southern redbelly dace	*Phoxinus erythrogaster*	channel modifications
stonecat	*Noturus flavus*	channelized sections of rivers may act as barriers to this species
tadpole madtom	*Noturus gyrinus*	
grass pickerel	*Esox americanus*	
starhead topminnow	*Fundulus dispar*	
eastern sand darter	*Ammocrypta pellucida*	
least darter	*Etheostoma microperca*	
copperbelly watersnake	*Nerodia erythrogaster neglecta*	
water shrew	*Sorex palustris*	

Habitat Conversion: Dams

Threat Susceptibility: 99

silver shiner	*Notropis photogenis*	stated as possible threats

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river darter	*Percina shumardi*	potential threats

Threat Susceptibility: 3

elktoe	*Alasmidonta marginata*	not found in impoundments
slippershell mussel	*Alasmidonta viridis*	not found in impoundments
scaleshell	*Leptodea leptodon*	general mussel threats
round pigtoe	*Pleurobema coccineum*	general mussel threats
ellipse	*Venustaconcha ellipsiformis*	general mussel threats
rainbow	*Villosa iris*	general mussel threats
purple wartyback	*Cyclonaias tuberculata*	general mussel threats
eastern elliptio	*Elliptio complanata*	general mussel threats
clubshell	*Pleurobema clava*	general mussel threats
pimpleback	*Quadrula pustulosa*	general mussel threats
cylindrical papershell	*Anodontoides ferussacianus*	general mussel threats
creek heelsplitter	*Lasmigona compressa*	general mussel threats
white catspaw	*Epioblasma obliquata perobliqua*	general mussel threats
northern riffleshell	*Epioblasma torulosa rangiana*	
snuffbox	*Epioblasma triquetra*	general mussel threats
wavy-rayed lampmussel	*Lampsilis fasciola*	general mussel threats
eastern pondmussel	*Ligumia nasuta*	general mussel threats
black sandshell	*Ligumia recta*	general mussel threats
threehorn wartyback	*Obliquaria reflexa*	general mussel threats
hickorynut	*Obovaria olivaria*	general mussel threats
round hickorynut	*Obovaria subrotunda*	general mussel threats
kidneyshell	*Ptychobranchus fasciolaris*	general mussel threats
purple lilliput	*Toxolasma lividus*	general mussel threats
lilliput	*Toxolasma parvus*	general mussel threats
fawnsfoot	*Truncilla donaciformis*	general mussel threats
rayed bean	*Villosa fabalis*	general mussel threats
rapids clubtail	*Gomphus quadricolor*	
extra-striped snaketail	*Ophiogomphus anomalus*	
pygmy snaketail	*Ophiogomphus howei*	
riverine snaketail	*Stylurus amnicola*	
laura's snaketail	*Stylurus laurae*	
elusive snaketail	*Stylurus notatus*	
Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	impounded habitat loss; altered downstream function
river redhorse	*Moxostoma carinatum*	potential for large scale movements, dams can fragement habitats
stonecat	*Noturus flavus*	
eastern sand darter	*Ammocrypta pellucida*	
least darter	*Etheostoma microperca*	

Habitat Conversion: Incompatible natural resources management

Threat Susceptibility: 99

Hungerford's crawling water beetle	*Brychius hungerfordi*	removal of beaver dams, fish management
boreal chorus frog	*Pseudacris triseriata maculata*	

Threat Susceptibility: 3

spotted salamander	*Ambystoma maculatum*	
marbled salamander	*Ambystoma opacum*	
four-toed salamander	*Hemidactylium scutatum*	
western lesser siren	*Siren intermedia nettingi*	
wood turtle	*Glyptemys insculpta*	fisheries mgt practices such as bank stabilization, sand traps

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Consumptive Biological Resource Use: Mining practices

Threat Susceptibility: 99

water shrew	*Sorex palustris*	

Threat Susceptibility: 3

incurvate emerald	*Somatochlora incurvata*	peat harvesting
ebony boghaunter	*Williamsonia fletcheri*	peat moss harvesting
ringed boghaunter	*Williamsonia lintneri*	peat moss harvesting
eastern sand darter	*Ammocrypta pellucida*	

Consumptive Biological Resource Use: Forestry practices

Threat Susceptibility: 99

elusive snaketail	*Stylurus notatus*
ebony boghaunter	*Williamsonia fletcheri*
Hungerford's crawling water beetle	*Brychius hungerfordi*
blue-spotted salamander	*Ambystoma laterale*
marbled salamander	*Ambystoma opacum*
four-toed salamander	*Hemidactylium scutatum*

Threat Susceptibility: 3

riverine snaketail	*Stylurus amnicola*
laura's snaketail	*Stylurus laurae*
spotted salamander	*Ambystoma maculatum*

Threat Susceptibility: 2

water shrew	*Sorex palustris*

Threat Susceptibility: 1

wood turtle	*Glyptemys insculpta*

Consumptive Biological Resource Use: Removal of wildlife

Threat Susceptibility: 99

round pigtoe	*Pleurobema coccineum*	may be used in polished chip industry
Hungerford's crawling water beetle	*Brychius hungerfordi*	scientific collecting
river chub	*Nocomis micropogon*	used as fish bait
tadpole madtom	*Noturus gyrinus*	used for fish bait

Threat Susceptibility: 3

ringed boghaunter	*Williamsonia lintneri*	
lake sturgeon	*Acipenser fulvescens*	mainly historic problem
brassy minnow	*Hybognathus hankinsoni*	collected for fish bait
striped shiner	*Luxilus chrysocephalus*	used as fish bait
silver chub	*Macrhybopsis storeriana*	used as fish bait
southern redbelly dace	*Phoxinus erythrogaster*	used for fish bait
cisco or lake herring	*Coregonus artedi*	early declines due to exploitation
kiyi	*Coregonus kiyi*	over exploitation by commercial fishing - historic?
shortjaw cisco	*Coregonus zenithicus*	over exploitation - historic
northern leopard frog	*Rana pipiens*	biological supply and fish bait
spotted turtle	*Clemmys guttata*	pet trade collecting
wood turtle	*Glyptemys insculpta*	pet trade

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Threat Susceptibility: 2

spotted salamander	*Ambystoma maculatum*	
eastern tiger salamander	*Ambystoma tigrinum tigrinum*	sometimes used for fish bait
copperbelly watersnake	*Nerodia erythrogaster neglecta*	illegal collection
Blanding's turtle	*Emydoidea blandingii*	so far have attracted minimal attention from pet trade, however in

Non-consumptive Biological Resource Use: Macrophyte removal

Threat Susceptibility: 3

pugnose shiner	*Notropis anogenus*	
least darter	*Etheostoma microperca*	
spotted turtle	*Clemmys guttata*	require macrophytes

Non-consumptive Biological Resource Use: Non-consumptive recreat

Threat Susceptibility: 1

wood turtle	*Glyptemys insculpta*	

Pollution: Altered sediment loads

Threat Susceptibility: 3

elktoe	*Alasmidonta marginata*	general mussel threats
slippershell mussel	*Alasmidonta viridis*	general mussel threats
scaleshell	*Leptodea leptodon*	general mussel threats
round pigtoe	*Pleurobema coccineum*	general mussel threats
ellipse	*Venustaconcha ellipsiformis*	general mussel threats
rainbow	*Villosa iris*	general mussel threats
purple wartyback	*Cyclonaias tuberculata*	general mussel threats
eastern elliptio	*Elliptio complanata*	general mussel threats
clubshell	*Pleurobema clava*	general mussel threats
pimpleback	*Quadrula pustulosa*	general mussel threats
cylindrical papershell	*Anodontoides ferussacianus*	general mussel threats
creek heelsplitter	*Lasmigona compressa*	general mussel threats
white catspaw	*Epioblasma obliquata perobliqua*	general mussel threats
northern riffleshell	*Epioblasma torulosa rangiana*	general mussel threats
snuffbox	*Epioblasma triquetra*	general mussel threats
wavy-rayed lampmussel	*Lampsilis fasciola*	general mussel threats
eastern pondmussel	*Ligumia nasuta*	general mussel threats
black sandshell	*Ligumia recta*	general mussel threats
threehorn wartyback	*Obliquaria reflexa*	general mussel threats
hickorynut	*Obovaria olivaria*	general mussel threats
round hickorynut	*Obovaria subrotunda*	general mussel threats
kidneyshell	*Ptychobranchus fasciolaris*	general mussel threats
purple lilliput	*Toxolasma lividus*	general mussel threats
lilliput	*Toxolasma parvus*	general mussel threats
fawnsfoot	*Truncilla donaciformis*	general mussel threats
rayed bean	*Villosa fabalis*	general mussel threats
brown walker	*Pomatiopsis cincinnatiensis*	
extra-striped snaketail	*Ophiogomphus anomalus*	
laura's snaketail	*Stylurus laurae*	
Hungerford's crawling water beetle	*Brychius hungerfordi*	
Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	
lake sturgeon	*Acipenser fulvescens*	siltation

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mooneye	*Hiodon tergisus*	siltation a problem for spawning
redside dace	*Clinostomus elongatus*	turbidity, siltation
striped shiner	*Luxilus chrysocephalus*	siltation, extreme turbidity
silver chub	*Macrhybopsis storeriana*	siltation
river chub	*Nocomis micropogon*	siltation and turbidity
pugnose shiner	*Notropis anogenus*	extremely sensitive to turbidity
silver shiner	*Notropis photogenis*	siltation and turbidity
pugnose minnow	*Opsopoeodus emiliae*	turbidity, siltation
southern redbelly dace	*Phoxinus erythrogaster*	siltation
western creek chubsucker	*Erimyzon claviformis*	silt
lake chubsucker	*Erimyzon sucetta*	turbidity, siltation
spotted sucker	*Minytrema melanops*	
river redhorse	*Moxostoma carinatum*	
black redhorse	*Moxostoma duquesnei*	siltation, turbidity
stonecat	*Noturus flavus*	
tadpole madtom	*Noturus gyrinus*	turbidity and siltation
brindled madtom	*Noturus miurus*	siltation
northern madtom	*Noturus stigmosus*	siltation
grass pickerel	*Esox americanus*	
spoonhead sculpin	*Cottus ricei*	
eastern sand darter	*Ammocrypta pellucida*	siltation
least darter	*Etheostoma microperca*	turbidity
orangethroat darter	*Etheostoma spectabile*	
channel darter	*Percina copelandi*	siltation
mudpuppy	*Necturus maculosus maculosus*	siltation
queen snake	*Regina septemvittata*	siltation, anything that reduces crayfish populations (main prey)
water shrew	*Sorex palustris*	

Threat Susceptibility: 1

golden redhorse	*Moxostoma erythrurum*	

Pollution: Altered nutrient inflows

Threat Susceptibility: 99

Hungerford's crawling water beetle	*Brychius hungerfordi*	site have low phosphorous
silver chub	*Macrhybopsis storeriana*	low DO levels

Threat Susceptibility: 3

Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	organic impacts on oxygen
bigmouth shiner	*Notropis dorsalis*	sensitive to eutrophications
cisco or lake herring	*Coregonus artedi*	enrichment of waters
kiyi	*Coregonus kiyi*	eutrophication

Pollution: Pesticides & herbicides

Threat Susceptibility: 99

sedge darner	*Aeshna juncea*	likely problem for this species
Hungerford's crawling water beetle	*Brychius hungerfordi*	
Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	
silver shiner	*Notropis photogenis*	stated as possible threats
spoonhead sculpin	*Cottus ricei*	
river darter	*Percina shumardi*	potenital threats
blue-spotted salamander	*Ambystoma laterale*	
spotted salamander	*Ambystoma maculatum*	

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marbled salamander	*Ambystoma opacum*	
smallmouth salamander	*Ambystoma texanum*	
eastern tiger salamander	*Ambystoma tigrinum tigrinum*	
four-toed salamander	*Hemidactylium scutatum*	
spotted turtle	*Clemmys guttata*	
water shrew	*Sorex palustris*	

Threat Susceptibility: 3

elktoe	*Alasmidonta marginata*	general mussel threats
slippershell mussel	*Alasmidonta viridis*	general mussel threats
scaleshell	*Leptodea leptodon*	general mussel threats
round pigtoe	*Pleurobema coccineum*	general mussel threats
ellipse	*Venustaconcha ellipsiformis*	general mussel threats
rainbow	*Villosa iris*	general mussel threats
purple wartyback	*Cyclonaias tuberculata*	general mussel threats
eastern elliptio	*Elliptio complanata*	general mussel threats
clubshell	*Pleurobema clava*	general mussel threats
pimpleback	*Quadrula pustulosa*	general mussel threats
cylindrical papershell	*Anodontoides ferussacianus*	general mussel threats
creek heelsplitter	*Lasmigona compressa*	general mussel threats
white catspaw	*Epioblasma obliquata perobliqua*	general mussel threats
northern riffleshell	*Epioblasma torulosa rangiana*	
snuffbox	*Epioblasma triquetra*	general mussel threats
wavy-rayed lampmussel	*Lampsilis fasciola*	general mussel threats
eastern pondmussel	*Ligumia nasuta*	general mussel threats
black sandshell	*Ligumia recta*	general mussel threats
threehorn wartyback	*Obliquaria reflexa*	general mussel threats
hickorynut	*Obovaria olivaria*	general mussel threats
round hickorynut	*Obovaria subrotunda*	general mussel threats
kidneyshell	*Ptychobranchus fasciolaris*	general mussel threats
purple lilliput	*Toxolasma lividus*	general mussel threats
lilliput	*Toxolasma parvus*	general mussel threats
fawnsfoot	*Truncilla donaciformis*	general mussel threats
rayed bean	*Villosa fabalis*	general mussel threats
brown walker	*Pomatiopsis cincinnatiensis*	
extra-striped snaketail	*Ophiogomphus anomalus*	
riverine snaketail	*Stylurus amnicola*	
laura's snaketail	*Stylurus laurae*	
elusive snaketail	*Stylurus notatus*	
incurvate emerald	*Somatochlora incurvata*	
ebony boghaunter	*Williamsonia fletcheri*	
ringed boghaunter	*Williamsonia lintneri*	
striped shiner	*Luxilus chrysocephalus*	
golden redhorse	*Moxostoma erythrurum*	
brindled madtom	*Noturus miurus*	
northern madtom	*Noturus stigmosus*	
deepwater sculpin	*Myoxocephalus thompsonii*	
eastern sand darter	*Ammocrypta pellucida*	sea lamprey control chemicals
least darter	*Etheostoma microperca*	chemicals used to kill carp suggested problem, likely vulnerable to
orangethroat darter	*Etheostoma spectabile*	
mudpuppy	*Necturus maculosus maculosus*	reported to be sensitive to lampricides
western lesser siren	*Siren intermedia nettingi*	Rotenone
Blanchard's cricket frog	*Acris crepitans blanchardi*	

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boreal chorus frog	*Pseudacris triseriata maculata*	
western chorus frog	*Pseudacris triseriata triseriata*	
pickerel frog	*Rana palustris*	
northern leopard frog	*Rana pipiens*	
queen snake	*Regina septemvittata*	anything that reduces crayfish populations (main prey)
wood turtle	*Glyptemys insculpta*	surface water pollution

Pollution: Urban, municipal & industrial pollution

Threat Susceptibility: 99

Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	
silver shiner	*Notropis photogenis*	stated as possible threats
river darter	*Percina shumardi*	potential threats
blue-spotted salamander	*Ambystoma laterale*	acid deposition
Blanding's turtle	*Emydoidea blandingii*	

Threat Susceptibility: 3

slippershell mussel	*Alasmidonta viridis*	general mussel threats
scaleshell	*Leptodea leptodon*	general mussel threats
round pigtoe	*Pleurobema coccineum*	general mussel threats
ellipse	*Venustaconcha ellipsiformis*	general mussel threats
rainbow	*Villosa iris*	general mussel threats
purple wartyback	*Cyclonaias tuberculata*	general mussel threats
eastern elliptio	*Elliptio complanata*	general mussel threats
clubshell	*Pleurobema clava*	general mussel threats
pimpleback	*Quadrula pustulosa*	general mussel threats
cylindrical papershell	*Anodontoides ferussacianus*	general mussel threats
creek heelsplitter	*Lasmigona compressa*	general mussel threats
white catspaw	*Epioblasma obliquata perobliqua*	general mussel threats
northern riffleshell	*Epioblasma torulosa rangiana*	
snuffbox	*Epioblasma triquetra*	general mussel threats
wavy-rayed lampmussel	*Lampsilis fasciola*	general mussel threats
eastern pondmussel	*Ligumia nasuta*	general mussel threats
black sandshell	*Ligumia recta*	general mussel threats
threehorn wartyback	*Obliquaria reflexa*	general mussel threats
hickorynut	*Obovaria olivaria*	general mussel threats
round hickorynut	*Obovaria subrotunda*	general mussel threats
kidneyshell	*Ptychobranchus fasciolaris*	general mussel threats
purple lilliput	*Toxolasma lividus*	general mussel threats
lilliput	*Toxolasma parvus*	general mussel threats
fawnsfoot	*Truncilla donaciformis*	general mussel threats
rayed bean	*Villosa fabalis*	general mussel threats
brown walker	*Pomatiopsis cincinnatiensis*	
rapids clubtail	*Gomphus quadricolor*	
extra-striped snaketail	*Ophiogomphus anomalus*	
pygmy snaketail	*Ophiogomphus howei*	
riverine snaketail	*Stylurus amnicola*	
laura's snaketail	*Stylurus laurae*	
elusive snaketail	*Stylurus notatus*	
Hine's emerald	*Somatochlora hineana*	
incurvate emerald	*Somatochlora incurvata*	
ebony boghaunter	*Williamsonia fletcheri*	
lake sturgeon	*Acipenser fulvescens*	

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river chub	*Nocomis micropogon*	coal mine pollution specifically mentioned
bigmouth shiner	*Notropis dorsalis*	
spotted sucker	*Minytrema melanops*	
river redhorse	*Moxostoma carinatum*	
golden redhorse	*Moxostoma erythrurum*	
brindled madtom	*Noturus miurus*	
northern madtom	*Noturus stigmosus*	
shortjaw cisco	*Coregonus zenithicus*	
deepwater sculpin	*Myoxocephalus thompsonii*	
eastern sand darter	*Ammocrypta pellucida*	
least darter	*Etheostoma microperca*	
orangethroat darter	*Etheostoma spectabile*	
spotted salamander	*Ambystoma maculatum*	acid rain
eastern tiger salamander	*Ambystoma tigrinum tigrinum*	
mudpuppy	*Necturus maculosus maculosus*	
Blanchard's cricket frog	*Acris crepitans blanchardi*	
boreal chorus frog	*Pseudacris triseriata maculata*	
western chorus frog	*Pseudacris triseriata triseriata*	
pickerel frog	*Rana palustris*	
northern leopard frog	*Rana pipiens*	acidification
queen snake	*Regina septemvittata*	anything that reduces crayfish populations (main prey)
spotted turtle	*Clemmys guttata*	
wood turtle	*Glyptemys insculpta*	surface water pollution

Pollution: Thermal changes

Threat Susceptibility: 99

Hungerford's crawling water beetle	*Brychius hungerfordi*	
water shrew	*Sorex palustris*	prefer cold water; uncertain of the importance of alteration though

Threat Susceptibility: 3

golden redhorse	*Moxostoma erythrurum*	intolerant of warm and cold waters
channel darter	*Percina copelandi*	

Biological Interactions: Invasive plants & animals

Threat Susceptibility: 99

northern madtom	*Noturus stigmosus*	likely competes with round goby for spawning sites
kiyi	*Coregonus kiyi*	alewife and smelt are suspected of declines
deepwater sculpin	*Myoxocephalus thompsonii*	may compete with and be preyed upon by alewife
spotted turtle	*Clemmys guttata*	
Blanding's turtle	*Emydoidea blandingii*	

Threat Susceptibility: 3

elktoe	*Alasmidonta marginata*	general mussel threats, zebra mussels
slippershell mussel	*Alasmidonta viridis*	general mussel threats, zebra mussels
scaleshell	*Leptodea leptodon*	general mussel threats, zebra mussels
round pigtoe	*Pleurobema coccineum*	general mussel threats - zebra mussels
ellipse	*Venustaconcha ellipsiformis*	general mussel threats, zebra mussels
rainbow	*Villosa iris*	general mussel threats, zebra mussels
purple wartyback	*Cyclonaias tuberculata*	zebra mussels
eastern elliptio	*Elliptio complanata*	general mussel threats, zebra mussels
clubshell	*Pleurobema clava*	general mussel threats - zebra mussels
pimpleback	*Quadrula pustulosa*	zebra mussels

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cylindrical papershell	*Anodontoides ferussacianus*	general mussel threats - zebra mussels
creek heelsplitter	*Lasmigona compressa*	general mussel threats, zebra mussels
white catspaw	*Epioblasma obliquata perobliqua*	general mussel threats
northern riffleshell	*Epioblasma torulosa rangiana*	general mussel threats
snuffbox	*Epioblasma triquetra*	general mussel threats
wavy-rayed lampmussel	*Lampsilis fasciola*	general mussel threats
eastern pondmussel	*Ligumia nasuta*	general mussel threats, zebra mussels
black sandshell	*Ligumia recta*	general mussel threats, zebra mussels
threehorn wartyback	*Obliquaria reflexa*	general mussel threats, zebra mussels
hickorynut	*Obovaria olivaria*	general mussel threats, zebra mussels
round hickorynut	*Obovaria subrotunda*	general mussel threats, zebra mussels
kidneyshell	*Ptychobranchus fasciolaris*	general mussel threats, zebra mussels
purple lilliput	*Toxolasma lividus*	general mussel threats, zebra mussels
lilliput	*Toxolasma parvus*	general mussel threats, zebra mussels
fawnsfoot	*Truncilla donaciformis*	general mussel threats, zebra mussels
rayed bean	*Villosa fabalis*	general mussel threats, zebra mussels
spatterdock darner	*Aeshna mutata*	introduction of fish likely detrimental to this species
rapids clubtail	*Gomphus quadricolor*	
pygmy snaketail	*Ophiogomphus howei*	
riverine snaketail	*Stylurus amnicola*	
elusive snaketail	*Stylurus notatus*	
Hine's emerald	*Somatochlora hineana*	
ringed boghaunter	*Williamsonia lintneri*	introduced fish
subarctic bluet	*Coenagrion interrogatum*	fish are a threats
brassy minnow	*Hybognathus hankinsoni*	do best without predatory fish
cisco or lake herring	*Coregonus artedi*	smelt and alewife likely cause of declines
shortjaw cisco	*Coregonus zenithicus*	competition with alewife and rainbow smelt
slimy sculpin	*Cottus cognatus*	gobies
spoonhead sculpin	*Cottus ricei*	gobies
blue-spotted salamander	*Ambystoma laterale*	needs fishless waters
smallmouth salamander	*Ambystoma texanum*	introduction of fish
eastern tiger salamander	*Ambystoma tigrinum tigrinum*	introduction of fish
queen snake	*Regina septemvittata*	

Threat Susceptibility: 2

Blanchard's cricket frog	*Acris crepitans blanchardi*	

Biological Interactions: Disease, pathogens & parasites

Threat Susceptibility: 99

Hungerford's crawling water beetle	*Brychius hungerfordi*	
boreal chorus frog	*Pseudacris triseriata maculata*	

Threat Susceptibility: 3

black redhorse	*Moxostoma duquesnei*	
channel darter	*Percina copelandi*	increasing susceptibility to parasites
northern leopard frog	*Rana pipiens*	massive die-offs attributed to disease

Biological Interactions: Other biological interactions

Threat Susceptibility: 99

Hungerford's crawling water beetle	*Brychius hungerfordi*	decline in beavers; increase in predators
redside dace	*Clinostomus elongatus*	hybridization
river chub	*Nocomis micropogon*	hybridization

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bigmouth shiner	*Notropis dorsalis*	hybridization, competition with silverjaw minnow
southern redbelly dace	*Phoxinus erythrogaster*	hybridization
finescale dace	*Phoxinus neogaeus*	hybridization
river redhorse	*Moxostoma carinatum*	mainly feeds on mollusks
brown bullhead	*Ameiurus nebulosus*	hybridization
tadpole madtom	*Noturus gyrinus*	hybridization
brindled madtom	*Noturus miurus*	hybridization
shortjaw cisco	*Coregonus zenithicus*	hybridization with bloater
spoonhead sculpin	*Cottus ricei*	predation by or competition with alewife
banded darter	*Etheostoma zonale*	hybridization with rainbow darter
channel darter	*Percina copelandi*	hybridizes with logperch
sauger	*Sander canadensis*	hybridization - with walleye
blue-spotted salamander	*Ambystoma laterale*	potential hybridization problems
marbled salamander	*Ambystoma opacum*	shows density-dependent regulation during larval stage
eastern tiger salamander	*Ambystoma tigrinum tigrinum*	hybridization

Threat Susceptibility: 3

salamander mussel	*Simpsonaias ambigua*	host species (mudpuppy) also species of greatest conservation ne
lake sturgeon	*Acipenser fulvescens*	loss of mussels and gastropods for food
pygmy whitefish	*Prosopium coulterii*	isoloated population

Threat Susceptibility: 2

grass pickerel	*Esox americanus*	interspecific competition with other pikes

Modification of Natural Processes: Climate change

Threat Susceptibility: 99

marbled salamander	*Ambystoma opacum*

Modification of Natural Processes: Altered hydrologic regimes

Threat Susceptibility: 99

brassy minnow	*Hybognathus hankinsoni*	due to use of temporary wet/flooded areas
water shrew	*Sorex palustris*	prefer high flow; uncertain of the importance of alteration though

Threat Susceptibility: 3

elktoe	*Alasmidonta marginata*	general mussel threats
slippershell mussel	*Alasmidonta viridis*	general mussel threats
scaleshell	*Leptodea leptodon*	general mussel threats
round pigtoe	*Pleurobema coccineum*	general mussel threats
ellipse	*Venustaconcha ellipsiformis*	general mussel threats
rainbow	*Villosa iris*	general mussel threats
purple wartyback	*Cyclonaias tuberculata*	general mussel threats
eastern elliptio	*Elliptio complanata*	general mussel threats
clubshell	*Pleurobema clava*	general mussel threats
pimpleback	*Quadrula pustulosa*	general mussel threats
cylindrical papershell	*Anodontoides ferussacianus*	general mussel threats
creek heelsplitter	*Lasmigona compressa*	general mussel threats
white catspaw	*Epioblasma obliquata perobliqua*	general mussel threats
northern riffleshell	*Epioblasma torulosa rangiana*	general mussel threats
snuffbox	*Epioblasma triquetra*	general mussel threats
wavy-rayed lampmussel	*Lampsilis fasciola*	general mussel threats
eastern pondmussel	*Ligumia nasuta*	general mussel threats
black sandshell	*Ligumia recta*	general mussel threats

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threehorn wartyback	*Obliquaria reflexa*	general mussel threats
hickorynut	*Obovaria olivaria*	general mussel threats
round hickorynut	*Obovaria subrotunda*	general mussel threats
kidneyshell	*Ptychobranchus fasciolaris*	general mussel threats
purple lilliput	*Toxolasma lividus*	general mussel threats
lilliput	*Toxolasma parvus*	general mussel threats
fawnsfoot	*Truncilla donaciformis*	general mussel threats
rayed bean	*Villosa fabalis*	general mussel threats
brown walker	*Pomatiopsis cincinnatiensis*	
Hine's emerald	*Somatochlora hineana*	
incurvate emerald	*Somatochlora incurvata*	
ebony boghaunter	*Williamsonia fletcheri*	
ringed boghaunter	*Williamsonia lintneri*	
Hungerford's crawling water beetle	*Brychius hungerfordi*	
Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	
lake sturgeon	*Acipenser fulvescens*	
striped shiner	*Luxilus chrysocephalus*	
western creek chubsucker	*Erimyzon claviformis*	
golden redhorse	*Moxostoma erythrurum*	
grass pickerel	*Esox americanus*	
starhead topminnow	*Fundulus dispar*	
fantail darter	*Etheostoma flabellare*	
least darter	*Etheostoma microperca*	
channel darter	*Percina copelandi*	
boreal chorus frog	*Pseudacris triseriata maculata*	
western chorus frog	*Pseudacris triseriata triseriata*	
pickerel frog	*Rana palustris*	

Threat Susceptibility: 2

wood turtle	*Glyptemys insculpta*	

Modification of Natural Processes: Fragmentation

Threat Susceptibility: 99

Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	
water shrew	*Sorex palustris*	populations are naturally fragmented

Threat Susceptibility: 3

elktoe	*Alasmidonta marginata*	general mussel threats
slippershell mussel	*Alasmidonta viridis*	general mussel threats
scaleshell	*Leptodea leptodon*	general mussel threats
round pigtoe	*Pleurobema coccineum*	general mussel threats
ellipse	*Venustaconcha ellipsiformis*	general mussel threats
rainbow	*Villosa iris*	general mussel threats
purple wartyback	*Cyclonaias tuberculata*	general mussel threats
eastern elliptio	*Elliptio complanata*	general mussel threats
clubshell	*Pleurobema clava*	general mussel threats
pimpleback	*Quadrula pustulosa*	general mussel threats
cylindrical papershell	*Anodontoides ferussacianus*	general mussel threats
creek heelsplitter	*Lasmigona compressa*	general mussel threats
white catspaw	*Epioblasma obliquata perobliqua*	general mussel threats
northern rifflesheIl	*Epioblasma torulosa rangiana*	general mussel threats
snuffbox	*Epioblasma triquetra*	general mussel threats
wavy-rayed lampmussel	*Lampsilis fasciola*	general mussel threats

Threat Susceptibility Definitions:

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eastern pondmussel	*Ligumia nasuta*	general mussel threats
black sandshell	*Ligumia recta*	general mussel threats
threehorn wartyback	*Obliquaria reflexa*	general mussel threats
hickorynut	*Obovaria olivaria*	general mussel threats
round hickorynut	*Obovaria subrotunda*	general mussel threats
kidneyshell	*Ptychobranchus fasciolaris*	general mussel threats
purple lilliput	*Toxolasma lividus*	general mussel threats
lilliput	*Toxolasma parvus*	general mussel threats
fawnsfoot	*Truncilla donaciformis*	general mussel threats
rayed bean	*Villosa fabalis*	general mussel threats
lake sturgeon	*Acipenser fulvescens*	thru dams
striped shiner	*Luxilus chrysocephalus*	dams as barriers to spawning sites
river redhorse	*Moxostoma carinatum*	potential for large scale movements, dams can fragement habitats
golden redhorse	*Moxostoma erythrurum*	due to dams - separation of spawning areas
eastern sand darter	*Ammocrypta pellucida*	
spotted salamander	*Ambystoma maculatum*	
marbled salamander	*Ambystoma opacum*	
smallmouth salamander	*Ambystoma texanum*	
four-toed salamander	*Hemidactylium scutatum*	
northern leopard frog	*Rana pipiens*	
copperbelly watersnake	*Nerodia erythrogaster neglecta*	
spotted turtle	*Clemmys guttata*	
Blanding's turtle	*Emydoidea blandingii*	

Education: Lack of scientific knowledge

Threat Susceptibility: 99

a stonefly	*Perlesta shubuta*	
mooneye	*Hiodon tergisus*	
pugnose minnow	*Opsopoeodus emiliae*	This threat added based on research and knowledge needs identif
pygmy whitefish	*Prosopium coulterii*	
pirate perch	*Aphredoderus sayanus*	
banded darter	*Etheostoma zonale*	
western lesser siren	*Siren intermedia nettingi*	

Threat Susceptibility: 3

scaleshell	*Leptodea leptodon*	only one host species has been identified thru lab experiments
round pigtoe	*Pleurobema coccineum*	
ellipse	*Venustaconcha ellipsiformis*	hosts have only been identified in lab - not under natural condition
rainbow	*Villosa iris*	host species only known from lab
clubshell	*Pleurobema clava*	likely for this species
white catspaw	*Epioblasma obliquata perobliqua*	little known about habitat requirements and host species unknown
northern riffleshell	*Epioblasma torulosa rangiana*	hosts have only been identified in laboratory
eastern pondmussel	*Ligumia nasuta*	host species unknown
threehorn wartyback	*Obliquaria reflexa*	Host species only known from lab exp., not confirmed in natural se
round hickorynut	*Obovaria subrotunda*	host species unknown
kidneyshell	*Ptychobranchus fasciolaris*	No host species known
rayed bean	*Villosa fabalis*	host species unknown
spindle lymnaea	*Acella haldemani*	
deepwater pondsnail	*Stagnicola contracta*	
Petoskey pondsnail	*Stagnicola petoskeyensis*	
acorn ramshorn	*Planorbella multivolvis*	
watercress snail	*Fontigens nickliniana*	little known about this species

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gravel pyrg	*Pyrgulopsis letsoni*	Virturally nothing known about this species
brown walker	*Pomatiopsis cincinnatiensis*	
devil crawfish	*Cambarus diogenes*	
digger crayfish	*Fallicambarus fodiens*	
a mayfly	*Epeorus suffusus*	
a mayfly	*Habrophlebiodes americana*	
a mayfly	*Ameletus lineatus*	
a sand minnow mayfly	*Siphloplecton basale*	
a stonefly	*Ostrocerca albidipennis*	
a stonefly	*Oemopteryx glacialis*	
eastern willowfly	*Taeniopteryx burksi*	
spinyleg willowfly	*Taeniopteryx maura*	
Canadian willowfly	*Capnia vernalis*	
a stonefly	*Paracapnia opis*	
a stonefly	*Arcynopteryx compacta*	
a stonefly	*Helopicus nalatus*	
a stonefly	*Isogenoides doratus*	
Hungerford's crawling water beetle	*Brychius hungerfordi*	
Cantrall's bog beetle	*Liodessus cantralli*	
Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	
a caddisfly	*Wormaldia moesta*	
a caddisfly	*Rhyacophila sp.*	
a caddisfly	*Limnephilus sp.*	
a belostoman bug	*Belostoma lutarium*	No information available on threats
a dobsonfly	*Neohermes sp.*	
a dobsonfly	*Nigronia fasciatus*	

Education: Social attitudes

Threat Susceptibility: 3

mudpuppy	*Necturus maculosus maculosus*	
western lesser siren	*Siren intermedia nettingi*	
copperbelly watersnake	*Nerodia erythrogaster neglecta*	persecution / fear killing
queen snake	*Regina septemvittata*	fear killing
Blanding's turtle	*Emydoidea blandingii*	used for target practice

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