

# Threats to Terrestrial Species of Greatest Conservation Need

*From Michigan's Wildlife Action Plan*



## Land Snails

### eastern flat-whorl (Planogyra asteriscus)

*Threat Susceptibility:* 3  
Lack of scientific knowledge no information available on threats

### a land snail (Vallonia gracilicosta albula)

*Threat Susceptibility:* 3  
Forestry Practices clearcutting  
Lack of scientific knowledge No information available

### lambda snaggletooth (Gastrocopta holzingeri)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Lack of scientific knowledge

### widespread column (Pupilla muscorum)

*Threat Susceptibility:* 3  
Wetland modifications  
Conversion to agriculture  
Forestry Practices  
Other biological interactions habitat alterations due to excessive deer browsing  
Lack of scientific knowledge Little information on threats available

### delicate vertigo (Vertigo bollesiana)

*Threat Susceptibility:* 99  
Pesticides & herbicides  
Grazing & mowing patterns grazing  
*Threat Susceptibility:* 3  
Wetland modifications filling of upland sinks  
Removal of non-timber flora  
Mining practices  
Non-consumptive recreation human traffic; rock climbing has caused at least one extirpation

### a land snail (Vertigo cristata)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

### tapered vertigo (Vertigo elatior)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

### Hubricht's vertigo (Vertigo hubrichti)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

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

cross vertigo (Vertigo modesta)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

a land snail (Vertigo modesta parietalis)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

six-whorl vertigo (Vertigo morsei)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development road construction; other development  
Conversion to agriculture  
Incompatible natural resource management forest management  
Forestry Practices removal of canopy warms and dries the soil  
Non-consumptive recreation ORVs  
Altered hydrologic regimes

deep-throat vertigo (Vertigo nylanderi)

*Threat Susceptibility:* 99  
Altered fire regime excessive fire  
*Threat Susceptibility:* 3  
Lack of scientific knowledge very little information available

a land snail (Vertigo paradoxa)

*Threat Susceptibility:* 99  
Urban, municipal & industrial pollution acid rain  
*Threat Susceptibility:* 3  
Industrial, residential & recreational development road construction, recreational development  
Forestry Practices canopy removal warms and dries the leaf litter  
Mining practices  
Non-consumptive recreation ATVs, hiking, trail construction  
Grazing & mowing patterns  
*Threat Susceptibility:* 2  
Dredging & channelization  
Pesticides & herbicides herbicide use  
Altered fire regime

crested vertigo (Vertigo pygmaea)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

pleistocene catinella (Catinella exile)

*Threat Susceptibility:* 99  
Urban, municipal & industrial pollution acid rain  
*Threat Susceptibility:* 3  
Industrial, residential & recreational development road construction; development; road maintenance (e.g. salt)  
Conversion to agriculture  
Incompatible natural resource management forest management  
Forestry Practices  
Altered hydrologic regimes

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pale mantleslug (Pallifera dorsalis)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

Foster mantleslug (Pallifera fosteri)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

redfoot mantleslug (Pallifera ohioensis)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

Carolina mantleslug (Philomycus carolinianus)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

banded globe (Anguispira kochi)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

domed disc (Discus patulus)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

a land snail (Euconulus alderi)

*Threat Susceptibility:* 99  
Urban, municipal & industrial pollution

acid rain

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Conversion to agriculture  
Incompatible natural resource management  
Forestry Practices

road construction, residential development

forest management

require cool, moist condition; canopy removal heats and dries the soil

a land snail (Guppya sterkii)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Forestry Practices  
Social attitudes

residential development

canopy removal warms and dries the soil; require moist conditions

landowners are throwing yard debris over slope

spike-lip crater (Appalachina sayana)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Incompatible natural resource management  
Forestry Practices  
Lack of scientific knowledge

residential development

forest management

canopy reduction warms and dries the soil

proud globe (Mesodon elevatus)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

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velvet wedge (Xolotrema denotatum)

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available

copper button (Mesomphix cupreus)

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available

## **Insects: Dragonflies and Damselflies**

grey petaltail (Tachopteryx thoreyi)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Forestry Practices

Altered hydrologic regimes

sedge darner (Aeshna juncea)

*Threat Susceptibility:* 2

Wetland modifications

Forestry Practices

spatterdock darner (Aeshna mutata)

*Threat Susceptibility:* 99

Invasive plants & animals

zigzag darner (Aeshna sitchensis)

*Threat Susceptibility:* 3

Wetland modifications

Altered hydrologic regimes

muskeg darner (Aeshna subarctica)

*Threat Susceptibility:* 99

Lack of scientific knowledge

*Threat Susceptibility:* 3

Wetland modifications

russet-tipped clubtail (Stylurus plagiatus)

*Threat Susceptibility:* 99

Lack of scientific knowledge

arrowhead spiketail (Cordulegaster obliqua)

*Threat Susceptibility:* 99

Lack of scientific knowledge

*Threat Susceptibility:* 3

Altered hydrologic regimes

Hine's emerald (Somatochlora hineana)

*Threat Susceptibility:* 99

Pesticides & herbicides

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*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Wetland modifications  
Urban, municipal & industrial pollution Ground Water  
Altered hydrologic regimes  
Fragmentation

*Threat Susceptibility:* 2  
Non-consumptive recreation  
Scientific research  
Invasive plants & animals

incurvate emerald (*Somatochlora incurvata*)

*Threat Susceptibility:* 3  
Altered hydrologic regimes

ebony boghaunter (*Williamsonia fletcheri*)

*Threat Susceptibility:* 99  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Wetland modifications  
Dredging & channelization  
Urban, municipal & industrial pollution  
Altered hydrologic regimes  
Lack of scientific knowledge

*Threat Susceptibility:* 2  
Invasive plants & animals

ringed boghaunter (*Williamsonia lintneri*)

*Threat Susceptibility:* 3  
Wetland modifications  
Dredging & channelization  
Removal of wildlife  
Forestry Practices  
Urban, municipal & industrial pollution  
Pesticides & herbicides  
Altered hydrologic regimes

subarctic bluet (*Coenagrion interrogatum*)

*Threat Susceptibility:* 99  
Lack of scientific knowledge

## Insects: Grasshoppers and Crickets

barrens locust (*Orphulella pelidna pelidna*)

*Threat Susceptibility:* 99  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Lack of scientific knowledge No information available on threats

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a spur-throat grasshopper (*Melanoplus eurycercus*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available on threats

blue-legged locust (*Melanoplus flavidus*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Altered fire regime

fire suppression

Lack of scientific knowledge

very little information available

*Threat Susceptibility:* 1

Incompatible natural resource management

excessive prescribed burns; lower densities in recently burned areas, but recover quickly if colonization areas nearby

Hebard's green-legged locust (*Melanoplus viridipes*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available on threats

Hoosier locust (*Paroxya hoosieri*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Wetland modifications

Non-consumptive recreation

ORVs

Altered fire regime

Altered hydrologic regimes

Lack of scientific knowledge

Little information available on threats

Atlantic-coast locust (*Psinidia fenestralis fenestralis*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available on threats

Lake Huron locust (*Trimerotropis huroniana*)

*Threat Susceptibility:* 99

Fragmentation

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Invasive plants & animals

*Threat Susceptibility:* 2

Non-consumptive recreation

off road vehicles

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secretive locust (*Appalachia arcana*)

*Threat Susceptibility:* 99

- Industrial, residential & recreational development
- Incompatible natural resource management
- Forestry Practices
- Pesticides & herbicides
- Altered fire regime
- Fragmentation

*Threat Susceptibility:* 3

- Lack of scientific knowledge

post-oak grasshopper (*Dendrotettix quercus*)

*Threat Susceptibility:* 3

- Lack of scientific knowledge
- no information on threats available

woodland camel cricket (*Ceuthophilus silvestris*)

*Threat Susceptibility:* 3

- Lack of scientific knowledge
- No information available on threats

woodland camel cricket (*Ceuthophilus uhleri*)

*Threat Susceptibility:* 3

- Lack of scientific knowledge
- no information available on threats

woodland meadow katydid (*Conocephalus nemoralis*)

*Threat Susceptibility:* 3

- Lack of scientific knowledge
- No information available on threats

bog conehead (*Neoconocephalus lyristes*)

*Threat Susceptibility:* 3

- Industrial, residential & recreational development
- Wetland modifications
- Conversion to agriculture
- Invasive plants & animals
- Altered fire regime
- Lack of scientific knowledge
- fire suppression
- little information available on threats

conehead grasshopper (*Neoconocephalus retusus*)

*Threat Susceptibility:* 99

- Pesticides & herbicides

*Threat Susceptibility:* 3

- Lack of scientific knowledge
- No information available on threats

red-faced meadow katydid (*Orchelimum concinnum*)

*Threat Susceptibility:* 99

- Pesticides & herbicides

*Threat Susceptibility:* 3

- Industrial, residential & recreational development
- Wetland modifications
- Conversion to agriculture
- Invasive plants & animals
- Altered fire regime
- fire suppression

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Lack of scientific knowledge

little information available on threats

delicate meadow katydid (Orchelimum delicatum)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Conversion to agriculture

Altered fire regime

Altered hydrologic regimes

Lack of scientific knowledge

Little information is available on threats

pine katydid (Scudderia fasciata)

*Threat Susceptibility:* 99

Incompatible natural resource management

Pesticides & herbicides

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available on threats

Davis's shield-bearer (Atlantius davisii)

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available on threats

melodious ground cricket (Eunemobius melodius)

*Threat Susceptibility:* 99

Dredging & channelization

*Threat Susceptibility:* 3

Invasive plants & animals

Altered hydrologic regimes

Lack of scientific knowledge

Little information available on threats

tamarack tree cricket (Oecanthus laricis)

*Threat Susceptibility:* 99

Pesticides & herbicides

Altered fire regime

Fragmentation

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Conversion to agriculture

Invasive plants & animals

Altered hydrologic regimes

*Threat Susceptibility:* 2

Wetland modifications

Incompatible natural resource management

pine tree cricket (Oecanthus pini)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available on threats

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## Insects: Cicadas and Hoppers

### angular spittlebug (*Lepyronia angulifera*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Incompatible natural resource management excessive prescribed fire

Invasive plants & animals

Other biological interactions decline in host plants, especially *Eleocharis*

Altered fire regime

Lack of scientific knowledge little info on this species

### great plains spittlebug (*Lepyronia gibbosa*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Conversion to agriculture

Non-consumptive recreation ORVs

Invasive plants & animals

Fragmentation

Lack of scientific knowledge

*Threat Susceptibility:* 2

Incompatible natural resource management

forest management, prescribed burn timing and extent

Altered fire regime

*Threat Susceptibility:* 1

Climate change

catastrophic disturbance

### a spittlebug (*Philaenarcys killa*)

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available

### red-legged spittlebug (*Prosapia ignipectus*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Incompatible natural resource management excessive prescribed burning

Non-consumptive recreation ORVs

Invasive plants & animals

Altered fire regime

Altered hydrologic regimes

Lack of scientific knowledge

### a leafhopper (*Dorydiella kansana*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Conversion to agriculture

Incompatible natural resource management

Lack of scientific knowledge no information available

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a leafhopper (Flexamia delongi)

*Threat Susceptibility:* 99  
Incompatible natural resource management prescribed fire; other  
Altered hydrologic regimes

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Wetland modifications  
Conversion to agriculture  
Non-consumptive recreation ORVs, trampling  
Invasive plants & animals  
Altered fire regime  
Lack of scientific knowledge very little threat information available

*Threat Susceptibility:* 2  
Fragmentation

Huron River leafhopper (Flexamia huroni)

*Threat Susceptibility:* 99  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Wetland modifications  
Conversion to agriculture  
Invasive plants & animals  
Other biological interactions loss of host plant (Muhlenbergia richardsonis)  
Altered fire regime  
Altered hydrologic regimes  
Lack of scientific knowledge Very little info available

*Threat Susceptibility:* 1  
Non-consumptive recreation

a leafhopper (Flexamia reflexus)

*Threat Susceptibility:* 99  
Incompatible natural resource management

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Wetland modifications  
Conversion to agriculture  
Invasive plants & animals  
Altered fire regime  
Altered hydrologic regimes  
Lack of scientific knowledge very little information available on threats

**Insects: Beetles**

a tiger beetle (Cicindela hirticollis rhodensis)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Non-consumptive recreation ORVs, trampling

*Threat Susceptibility:* 2  
Invasive plants & animals

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little white tiger beetle (Cicindela lepida)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Non-consumptive recreation ORVs  
Invasive plants & animals

a tiger beetle (Cicindela limbalis)

*Threat Susceptibility:* 99  
Dredging & channelization

*Threat Susceptibility:* 3  
Lack of scientific knowledge

a tiger beetle (Cicindela macra)

*Threat Susceptibility:* 99  
Dams impoundments  
Dredging & channelization  
Grazing & mowing patterns  
Altered hydrologic regimes  
Fragmentation

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Non-consumptive recreation ORVs, trampling

American burying beetle (Nicrophorus americanus)

*Threat Susceptibility:* 99  
Industrial, residential & recreational development  
Conversion to agriculture  
Removal of wildlife loss of passenger pigeon (ideal carrion size)  
Urban, municipal & industrial pollution artificial lighting  
Pesticides & herbicides  
Disease, pathogens & parasites possible explanation for massive decline  
Other biological interactions increased vertebrate competition (raccoons, rats, crow, coyotes, cats, fox, etc.);  
possible congener competition

*Threat Susceptibility:* 3  
Lack of scientific knowledge

black lordithon rove beetle (Lordithon niger)

*Threat Susceptibility:* 99  
Removal of non-timber flora

*Threat Susceptibility:* 3  
Incompatible natural resource management loss of climax forest  
Forestry Practices  
Lack of scientific knowledge

six-banded longhorn beetle (Dryobius sexnotatus)

*Threat Susceptibility:* 99  
Mining practices its listed, but the mechanism is unknown  
Pesticides & herbicides Gypsy moth spraying  
Disease, pathogens & parasites

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*Threat Susceptibility:* 3  
 Incompatible natural resource management  
 Forestry Practices silviculture

## Insects: Butterflies and Moths

### wild indigo duskywing (*Erynnis baptisiae*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Conversion to agriculture

Altered fire regime

Fragmentation

Lack of scientific knowledge

found no info on threats

*Threat Susceptibility:* 1

Invasive plants & animals

### persius duskywing (*Erynnis persius persius*)

*Threat Susceptibility:* 99

Incompatible natural resource management

Pesticides & herbicides

Prescribed burning

DDT use coincident with a massive decline; gypsy moth spraying may also pose serious threat

Other biological interactions

deer browse of host plant

*Threat Susceptibility:* 3

Conversion to agriculture

Altered fire regime

Fragmentation

*Threat Susceptibility:* 2

Industrial, residential & recreational development

Grazing & mowing patterns

succession

Lack of scientific knowledge

*Threat Susceptibility:* 1

Invasive plants & animals

### grizzled skipper (*Pyrgus wyandot*)

*Threat Susceptibility:* 3

Incompatible natural resource management

excessive prescribed fire

Pesticides & herbicides

range-wide decline correlated with gypsy moth spraying

Altered fire regime

Lack of scientific knowledge

very little species specific information

*Threat Susceptibility:* 2

Industrial, residential & recreational development

Grazing & mowing patterns

Succession

### poweshiek skipperling (*Oarisma poweshiek*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Conversion to agriculture

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Altered fire regime fire suppression

Fragmentation

*Threat Susceptibility:* 2

Other biological interactions

Loss of host plant - *Eleocharis* spp.

Altered hydrologic regimes

Lack of scientific knowledge

ottoo skipper (*Hesperia ottoe*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Conversion to agriculture

Incompatible natural resource management

fire suppression; excessive prescribed burning, tree planting

Non-consumptive recreation

Altered fire regime

*Threat Susceptibility:* 2

Forestry Practices

Invasive plants & animals

Fragmentation

*Threat Susceptibility:* 1

Grazing & mowing patterns

Dukes' skipper (*Euphyes dukesi*)

*Threat Susceptibility:* 99

Invasive plants & animals

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Conversion to agriculture

Pesticides & herbicides

herbicide of host plants; mosquito spraying also a possible threat

Other biological interactions

decline of host plants - sedges

Grazing & mowing patterns

Altered hydrologic regimes

*Threat Susceptibility:* 2

Fragmentation

dusted skipper (*Atrytonopsis hianna*)

*Threat Susceptibility:* 99

Military maneuvers

Pesticides & herbicides

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Conversion to agriculture

Incompatible natural resource management

Altered fire regime

Fragmentation

*Threat Susceptibility:* 2

Non-consumptive recreation

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pipevine swallowtail (Battus philenor)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Invasive plants & animals  
Lack of scientific knowledge

*Threat Susceptibility:* 2

Removal of non-timber flora  
Non-consumptive recreation  
Other biological interactions

loss of host plant - Aristolochia spp.

large marble (Euchloe ausonides)

*Threat Susceptibility:* 3

Lack of scientific knowledge

no information available on threats

northern hairstreak (Fixsenia favonius ontario)

*Threat Susceptibility:* 99

Industrial, residential & recreational development  
Incompatible natural resource management  
Pesticides & herbicides  
Invasive plants & animals

*Threat Susceptibility:* 3

Conversion to agriculture  
Lack of scientific knowledge

no information available

early hairstreak (Erora laeta)

*Threat Susceptibility:* 99

Pesticides & herbicides  
Disease, pathogens & parasites

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
Forestry Practices  
Other biological interactions  
Lack of scientific knowledge

decline of nectar sources  
very little species specific information

northern blue (Lycaeides idas nabokovi)

*Threat Susceptibility:* 99

Forestry Practices  
Pesticides & herbicides  
Fragmentation

*Threat Susceptibility:* 3

Incompatible natural resource management  
Altered fire regime  
Lack of scientific knowledge

excessive prescribed fire  
loss of fire to maintain habitat

Karner blue (Lycaeides melissa samuelis)

*Threat Susceptibility:* 99

Disease, pathogens & parasites  
Climate change

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*Threat Susceptibility:* 3  
 Conversion to agriculture including plantations  
 Incompatible natural resource management non-management, tree plantings, game management, recreation, excessive prescribed fire  
 Pesticides & herbicides spraying of lupine known threat, gypsy moth spraying perhaps also  
 Grazing & mowing patterns  
 Altered fire regime  
 Fragmentation

*Threat Susceptibility:* 2  
 Industrial, residential & recreational development given medium level because it is not as big a threat in Michigan  
 Non-consumptive recreation  
 Invasive plants & animals  
 Other biological interactions habitat alterations due to excessive deer browsing

*Threat Susceptibility:* 1  
 Removal of wildlife

Henry's elfin (*Callophrys henrici*)

*Threat Susceptibility:* 99  
 Incompatible natural resource management  
 Pesticides & herbicides  
 Invasive plants & animals

*Threat Susceptibility:* 3  
 Fragmentation  
 Lack of scientific knowledge very little species specific information

*Threat Susceptibility:* 2  
 Industrial, residential & recreational development  
 Conversion to agriculture  
 Altered fire regime

frosted elfin (*Callophrys irus*)

*Threat Susceptibility:* 99  
 Pesticides & herbicides gypsy moth spraying

*Threat Susceptibility:* 3  
 Conversion to agriculture plantations  
 Incompatible natural resource management excessive prescribed fire, tree planting, fire suppression  
 Non-consumptive recreation ORVs  
 Other biological interactions loss of host plant; deer browse of host plant  
 Fragmentation

*Threat Susceptibility:* 2  
 Industrial, residential & recreational development  
 Invasive plants & animals  
 Altered fire regime succession

*Threat Susceptibility:* 1  
 Forestry Practices

swamp metalmark (*Calephelis mutica*)

*Threat Susceptibility:* 99  
 Removal of wildlife overcollection  
 Pesticides & herbicides  
 Grazing & mowing patterns

**Threat Susceptibility Definitions:**

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

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Wetland modifications  
 Conversion to agriculture  
 Dams impoundments can inundate habitat  
 Invasive plants & animals  
 Altered fire regime  
 Altered hydrologic regimes  
 Fragmentation  
 Lack of scientific knowledge

regal fritillary (*Speyeria idalia*)

*Threat Susceptibility:* 99

Disease, pathogens & parasites

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
 Conversion to agriculture  
 Pesticides & herbicides  
 Invasive plants & animals  
 Altered fire regime  
 Fragmentation  
 Lack of scientific knowledge

*Threat Susceptibility:* 2

Incompatible natural resource management excessive prescribed burning

frigga fritillary (*Boloria frigga*)

*Threat Susceptibility:* 99

Other biological interactions decline in larval host plant and nectar sources  
 Climate change

*Threat Susceptibility:* 3

Lack of scientific knowledge

*Threat Susceptibility:* 2

Fragmentation

*Threat Susceptibility:* 1

Mining practices peat mining

freiija fritillary (*Boloria freiija*)

*Threat Susceptibility:* 99

Other biological interactions decline in host plant populations (dwarf birch)

*Threat Susceptibility:* 3

Climate change Boreal spp. Not sure how it will react to global warming  
 Lack of scientific knowledge

gorgone checkerspot (*Chlosyne gorgone carlota*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Lack of scientific knowledge

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tawny crescent (Phyciodes batesii)

*Threat Susceptibility:* 99

Pesticides & herbicides gypsy moth spraying

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
Conversion to agriculture  
Invasive plants & animals  
Other biological interactions

decline in host plant populations (*Aster undulatus*); habitat alterations due to excessive deer browsing

Altered fire regime

Altered hydrologic regimes

hoary comma (Polygonia gracilis)

*Threat Susceptibility:* 99

Forestry Practices  
Pesticides & herbicides

*Threat Susceptibility:* 3

Lack of scientific knowledge

red-disked alpine (Erebia discoidalis)

*Threat Susceptibility:* 99

Pesticides & herbicides  
Climate change

*Threat Susceptibility:* 3

Lack of scientific knowledge

Mitchell's satyr (Neonympha mitchellii mitchellii)

*Threat Susceptibility:* 99

Pesticides & herbicides mosquito spraying

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
Wetland modifications  
Conversion to agriculture  
Incompatible natural resource management  
Invasive plants & animals  
Altered fire regime  
Altered hydrologic regimes  
Fragmentation

loss of beaver, fire suppression, excessive prescribed fire

*Threat Susceptibility:* 2

Removal of wildlife overcollecting  
Lack of scientific knowledge where does larve overwinter

*Threat Susceptibility:* 1

Non-consumptive recreation ORVs  
Grazing & mowing patterns

Macoun's arctic (Oeneis macounii)

*Threat Susceptibility:* 99

Forestry Practices  
Altered fire regime

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*Threat Susceptibility:* 3

Lack of scientific knowledge

pine imperial moth (*Eacles imperialis pini*)

*Threat Susceptibility:* 99

Forestry Practices  
Pesticides & herbicides

*Threat Susceptibility:* 3

Lack of scientific knowledge

barrens buckmoth (*Hemileuca maia*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
Conversion to agriculture plantations  
Incompatible natural resource management tree planting  
Altered fire regime  
Lack of scientific knowledge surveys needed

yellow-banded day-sphinx (*Proserpinus flavofasciata*)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Altered fire regime  
Lack of scientific knowledge

Sprague's pygarctia (*Pygarctia spraguei*)

*Threat Susceptibility:* 99

Forestry Practices  
Mining practices sand mining  
Non-consumptive recreation ORVs  
Pesticides & herbicides  
Grazing & mowing patterns

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
Conversion to agriculture  
Incompatible natural resource management fire suppression, excessive prescribed burns  
Invasive plants & animals  
Lack of scientific knowledge very little info on the species

*Threat Susceptibility:* 2

Altered fire regime succession

corylus dagger moth (*Acronicta falcata*)

*Threat Susceptibility:* 3

Lack of scientific knowledge no information available

gold moth (*Basilodes pepita*)

*Threat Susceptibility:* 3

Lack of scientific knowledge No information available on threats

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boreal fan moth (Brachionycha borealis)

*Threat Susceptibility:* 99  
Incompatible natural resource management  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Lack of scientific knowledge no information available

three-staff underwing (Catocala amestris)

*Threat Susceptibility:* 3  
Conversion to agriculture  
Incompatible natural resource management excessive prescribed fire  
Removal of wildlife collecting  
Invasive plants & animals e.g. autumn olive  
Altered fire regime fire suppression  
Fragmentation  
Lack of scientific knowledge very little species specific information

quiet underwing (Catocala dulciola)

*Threat Susceptibility:* 99  
Pesticides & herbicides  
Altered fire regime

*Threat Susceptibility:* 3  
Lack of scientific knowledge

magdalen underwing (Catocala illecta)

*Threat Susceptibility:* 99  
Incompatible natural resource management  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Lack of scientific knowledge

Robinson's underwing (Catocala robinsoni)

*Threat Susceptibility:* 3  
Lack of scientific knowledge

dune cutworm (Euxoa aurulenta)

*Threat Susceptibility:* 99  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Non-consumptive recreation  
Invasive plants & animals  
Lack of scientific knowledge very little species specific information

Doll's merolonche (Merolonche doli)

*Threat Susceptibility:* 99  
Incompatible natural resource management  
Forestry Practices  
Pesticides & herbicides gypsy moth spraying

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*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Wetland modifications  
 Altered fire regime  
 Altered hydrologic regimes  
 Lack of scientific knowledge

Newman's brocade (*Meropleon ambifusca*)

*Threat Susceptibility:* 3  
 Lack of scientific knowledge Very little information on this species

3-striped oncocnemis (*Oncocnemis piffardi*)

*Threat Susceptibility:* 3  
 Lack of scientific knowledge very little available information

three-horned moth (*Pachypolia atricornis*)

*Threat Susceptibility:* 99  
 Industrial, residential & recreational development likely lost habitat  
 Pesticides & herbicides

*Threat Susceptibility:* 3  
 Lack of scientific knowledge very little information available

aweme borer (*Papaipema aweme*)

*Threat Susceptibility:* 99  
 Invasive plants & animals  
 Other biological interactions alterations to habitat due to excessive deer browsing

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Lack of scientific knowledge

blazing star borer (*Papaipema beeriana*)

*Threat Susceptibility:* 99  
 Pesticides & herbicides

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Conversion to agriculture  
 Dams impoundment threat at Calhoun Co. EO  
 Incompatible natural resource management excessive prescribed burns

Invasive plants & animals  
 Altered fire regime  
 Altered hydrologic regimes  
 Fragmentation  
 Lack of scientific knowledge very little species specific information

golden borer (*Papaipema cerina*)

*Threat Susceptibility:* 99  
 Pesticides & herbicides

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Wetland modifications  
 Conversion to agriculture

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Forestry Practices  
 Invasive plants & animals  
 Grazing & mowing patterns  
 Fragmentation  
 Lack of scientific knowledge

poor fliers  
 very little species specific information

maritime sunflower borer (Papaipema maritima)

*Threat Susceptibility:* 99  
 Pesticides & herbicides

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Conversion to agriculture  
 Invasive plants & animals  
 Altered fire regime  
 Altered hydrologic regimes  
 Lack of scientific knowledge  
 very little species specific information

*Threat Susceptibility:* 2  
 Incompatible natural resource management

Culvers root borer (Papaipema sciata)

*Threat Susceptibility:* 99  
 Pesticides & herbicides  
 Other biological interactions  
 deer browse of host plant

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Conversion to agriculture  
 Incompatible natural resource management  
 excessive prescribed burns  
 Invasive plants & animals  
 Altered fire regime  
 Altered hydrologic regimes  
 Fragmentation  
 Lack of scientific knowledge  
 very little species specific information

silphium borer moth (Papaipema silphii)

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Wetland modifications  
 Conversion to agriculture  
 Incompatible natural resource management  
 improper fire management; right-of-way maintenance  
 Pesticides & herbicides  
 herbicide of host  
 Invasive plants & animals  
 Other biological interactions  
 decline in host plant  
 Altered fire regime  
 Fragmentation  
 Lack of scientific knowledge

regal fern borer (Papaipema speciosissima)

*Threat Susceptibility:* 99  
 Pesticides & herbicides

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development

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Conversion to agriculture  
 Invasive plants & animals  
 Altered fire regime  
 Altered hydrologic regimes  
 Lack of scientific knowledge

very little species-specific information

phlox moth (Schinia indiana)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Conversion to agriculture  
 Incompatible natural resource management  
 Forestry Practices  
 Grazing & mowing patterns  
 Altered fire regime  
 Fragmentation  
 Lack of scientific knowledge

tree planting for plantations  
 untimely prescribed burns (or mowing)  
 generally historical  
 untimely mowing and grazing  
 suppression  
 poor dispersal ability

leadplant flower moth (Schinia lucens)

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
 Conversion to agriculture  
 Incompatible natural resource management  
 Removal of wildlife  
 Pesticides & herbicides  
 Invasive plants & animals  
 Other biological interactions  
 Altered fire regime  
 Fragmentation

excessive burns, suppression, mechanical disturbance  
 collection  
 host plant and insecticide  
  
 decline in host plant (leadplant) populations  
 suppression

spartina borer moth (Spartiniphaga inops)

*Threat Susceptibility:* 3

Conversion to agriculture  
 Incompatible natural resource management  
 Altered fire regime  
 Fragmentation  
 Lack of scientific knowledge

excessive prescribed fire

*Threat Susceptibility:* 2

Invasive plants & animals

Phragmites invasion

riley's lappet moth (Heteropacha rileyana)

*Threat Susceptibility:* 3

Lack of scientific knowledge

No information available

small heterocampa (Heterocampa subrotata)

*Threat Susceptibility:* 3

Lack of scientific knowledge

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## Amphibians

### blue-spotted salamander (Ambystoma laterale)

*Threat Susceptibility:* 99

Dredging & channelization  
Incompatible natural resource management  
Pesticides & herbicides  
Other biological interactions Hybridization

*Threat Susceptibility:* 3

Fragmentation roads are issues

*Threat Susceptibility:* 2

Industrial, residential & recreational development fairly tolerant as long as critical parts of habitat remain intact

Wetland modifications

Conversion to agriculture

Forestry Practices

fairly tolerant as long as critical parts of habitat remain intact

Altered hydrologic regimes

Lack of scientific knowledge

*Threat Susceptibility:* 1

Removal of wildlife

### spotted salamander (Ambystoma maculatum)

*Threat Susceptibility:* 99

Urban, municipal & industrial pollution  
Other biological interactions Inbreeding

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
Wetland modifications  
Conversion to agriculture  
Forestry Practices  
Grazing & mowing patterns  
Fragmentation road mortality major issue

*Threat Susceptibility:* 2

Removal of wildlife pet trade collection  
Lack of scientific knowledge

### marbled salamander (Ambystoma opacum)

*Threat Susceptibility:* 99

Industrial, residential & recreational development

*Threat Susceptibility:* 3

Wetland modifications  
Forestry Practices  
Climate change  
Altered hydrologic regimes  
Lack of scientific knowledge

*Threat Susceptibility:* 2

Conversion to agriculture  
Fragmentation

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smallmouth salamander (Ambystoma texanum)

<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		
Other biological interactions		Hybridization
Altered hydrologic regimes		
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		
Wetland modifications		
Conversion to agriculture		
Fragmentation		road mortality
<i>Threat Susceptibility:</i>	2	
Forestry Practices		
Removal of non-timber flora		
Lack of scientific knowledge		

eastern tiger salamander (Ambystoma tigrinum tigrinum)

<i>Threat Susceptibility:</i>	99	
Urban, municipal & industrial pollution		
Pesticides & herbicides		
Invasive plants & animals		
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		
Wetland modifications		
Fragmentation		road mortalities- major issue
<i>Threat Susceptibility:</i>	2	
Removal of wildlife		sometimes used for fish bait
Altered hydrologic regimes		
<i>Threat Susceptibility:</i>	1	
Conversion to agriculture		

four-toed salamander (Hemidactylium scutatum)

<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		
Wetland modifications		
Conversion to agriculture		
Forestry Practices		
Altered hydrologic regimes		
<i>Threat Susceptibility:</i>	2	
Lack of scientific knowledge		

Fowler's toad (Bufo fowleri)

<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		
Non-consumptive recreation		intensive recreational use of beaches and dunes
Pesticides & herbicides		
Fragmentation		

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*Threat Susceptibility:* 2  
Wetland modifications  
Conversion to agriculture  
Altered hydrologic regimes

Blanchard's cricket frog (*Acris crepitans blanchardi*)

*Threat Susceptibility:* 99  
Pesticides & herbicides  
Invasive plants & animals  
Grazing & mowing patterns  
Altered fire regime

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Wetland modifications  
Conversion to agriculture  
Altered hydrologic regimes

boreal chorus frog (*Pseudacris triseriata maculata*)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Urban, municipal & industrial pollution  
Pesticides & herbicides

western chorus frog (*Pseudacris triseriata triseriata*)

*Threat Susceptibility:* 99  
Climate change

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Wetland modifications  
Conversion to agriculture  
Urban, municipal & industrial pollution  
Pesticides & herbicides  
Altered hydrologic regimes  
Fragmentation

pickereel frog (*Rana palustris*)

*Threat Susceptibility:* 99  
Incompatible natural resource management  
Pesticides & herbicides  
Invasive plants & animals  
Climate change

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Wetland modifications  
Conversion to agriculture  
Urban, municipal & industrial pollution

*Threat Susceptibility:* 2  
Non-consumptive recreation  
Disease, pathogens & parasites  
Fragmentation

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*Threat Susceptibility:* 1

Altered hydrologic regimes

northern leopard frog (*Rana pipiens*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Conversion to agriculture

Removal of wildlife

Urban, municipal & industrial pollution

Pesticides & herbicides

Disease, pathogens & parasites

Fragmentation

biological supply and fish bait

acid rain

massive die-offs attributed to disease

## Reptiles

Kirtland's snake (*Clonophis kirtlandii*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Conversion to agriculture

Removal of wildlife

Pesticides & herbicides

Fragmentation

Lack of scientific knowledge

Social attitudes

pet trade

due to reduction of prey (earthworms)

persecution

blue racer (*Coluber constrictor foxii*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Conversion to agriculture

Pesticides & herbicides

Fragmentation

Social attitudes

road mortality, farm machinery, needs large areas of habitat

persecution

*Threat Susceptibility:* 2

Grazing & mowing patterns

northern ringneck snake (*Diadophis punctatus edwardsii*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Conversion to agriculture

Forestry Practices

Pesticides & herbicides

Fragmentation

road mortality

eastern fox snake (*Elaphe gloydi*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Conversion to agriculture

Social attitudes

fear killing

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*Threat Susceptibility:* 2  
Removal of wildlife collection for pet trade  
Fragmentation

black rat snake (Elaphe obsoleta obsoleta)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Conversion to agriculture  
Fragmentation road mortality  
Social attitudes

*Threat Susceptibility:* 2  
Removal of wildlife collection by hobbyists  
Forestry Practices

western fox snake (Elaphe vulpina)

*Threat Susceptibility:* 3  
Removal of wildlife  
Fragmentation road mortality  
Social attitudes

eastern hognose snake (Heterodon platirhinos)

*Threat Susceptibility:* 99  
Other biological interactions

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Fragmentation road mortality  
Social attitudes

*Threat Susceptibility:* 2  
Non-consumptive recreation

smooth green snake (Liochlorophis vernalis)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Conversion to agriculture  
Pesticides & herbicides eliminates prey

copperbelly watersnake (Nerodia erythrogaster neglecta)

*Threat Susceptibility:* 99  
Scientific research  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Industrial, residential & recreational development residential development  
Wetland modifications  
Conversion to agriculture  
Dredging & channelization  
Incompatible natural resource management  
Forestry Practices  
Grazing & mowing patterns  
Altered hydrologic regimes  
Fragmentation road mortality  
Social attitudes persecution / fear killing

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*Threat Susceptibility:* 2  
 Dams  
 Removal of wildlife illegal collection  
 Invasive plants & animals  
 Altered fire regime  
 Lack of scientific knowledge

*Threat Susceptibility:* 1  
 Non-consumptive recreation

queen snake (Regina septemvittata)

*Threat Susceptibility:* 99  
 Dredging & channelization  
 Pesticides & herbicides

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Conversion to agriculture  
 Urban, municipal & industrial pollution  
 Invasive plants & animals introduction of rusty crayfish hypothetically could cause decline in native prey species.  
 Lack of scientific knowledge  
 Social attitudes fear killing

six-lined racerunner (Apidoscelis sexlineatus)

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Conversion to agriculture  
 Incompatible natural resource management succession  
 Pesticides & herbicides  
 Invasive plants & animals

*Threat Susceptibility:* 2  
 Lack of scientific knowledge

eastern massasauga (Sistrurus catenatus catenatus)

*Threat Susceptibility:* 99  
 Military maneuvers

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Wetland modifications  
 Conversion to agriculture  
 Incompatible natural resource management vegetation succession  
 Removal of wildlife  
 Disease, pathogens & parasites  
 Grazing & mowing patterns Hogs, mowing  
 Altered fire regime  
 Altered hydrologic regimes  
 Fragmentation  
 Social attitudes fear killing

*Threat Susceptibility:* 2  
 Forestry Practices  
 Lack of scientific knowledge

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spotted turtle (Clemmys guttata)

*Threat Susceptibility:* 99

Pesticides & herbicides

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Conversion to agriculture

Dredging & channelization

Incompatible natural resource management

Removal of wildlife

pet trade collecting

Urban, municipal & industrial pollution

Invasive plants & animals

Grazing & mowing patterns

Altered fire regime

Fragmentation

road mortality

Social attitudes

vandalistic shooting

Blanding's turtle (Emydoidea blandingii)

*Threat Susceptibility:* 99

Dredging & channelization

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Wetland modifications

Dams

Pesticides & herbicides

Invasive plants & animals

Altered hydrologic regimes

Fragmentation

road mortality

Social attitudes

used for target practice

*Threat Susceptibility:* 2

Removal of wildlife

so far have attracted minimal attention from pet trade, however in past have been exploited for biological supply and for food

wood turtle (Glyptemys insculpta)

*Threat Susceptibility:* 3

Incompatible natural resource management

Removal of wildlife

pet trade

Invasive plants & animals

Fragmentation

roads big issue

Social attitudes

*Threat Susceptibility:* 1

Industrial, residential & recreational development

Forestry Practices

can withstand modest timber harvest

Non-consumptive recreation

Urban, municipal & industrial pollution

Grazing & mowing patterns

can withstand light grazing and low-intensity agriculture

eastern box turtle (Terrapene carolina carolina)

*Threat Susceptibility:* 99

Non-consumptive recreation

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Disease, pathogens & parasites

*Threat Susceptibility:* 3

Industrial, residential & recreational development      suburban development fragments habitats  
Conversion to agriculture  
Removal of wildlife      pet trade and collection  
Invasive plants & animals  
Grazing & mowing patterns      Hogs and farm machinery  
Fragmentation      bulldozers and car worst enemies

*Threat Susceptibility:* 2

Incompatible natural resource management

*Threat Susceptibility:* 1

Forestry Practices

## Birds

### Trumpeter Swan (Cygnus buccinator)

*Threat Susceptibility:* 3

Non-consumptive recreation      human disturbance from boats and jet skis; birdwatching, photography, boating, floatplanes, and pedestrian traffic have detrimental impacts to nesting swans  
  
Disease, pathogens & parasites      lack of migratory behaviors causes birds to congregate in a few isolated areas, leaving them vulnerable to disease spread, starvation, and catastrophic events

*Threat Susceptibility:* 2

Industrial, residential & recreational development      powerline collisions are known to occur  
Urban, municipal & industrial pollution      lead poisoning is known to occur  
Social attitudes      feeding by humans leading to acclimation

*Threat Susceptibility:* 1

Removal of wildlife      human-caused mortality or harassment (illegal shooting)  
Invasive plants & animals      possible competition from Mute Swans

### American Black Duck (Anas rubripes)

*Threat Susceptibility:* 99

Incompatible natural resource management

*Threat Susceptibility:* 3

Fragmentation

*Threat Susceptibility:* 2

Removal of wildlife      hunting  
Invasive plants & animals      competition and hybridization with Mallards

*Threat Susceptibility:* 1

Wetland modifications  
Urban, municipal & industrial pollution      possible effect of acid rain on production  
Altered hydrologic regimes

### Blue-winged Teal (Anas discors)

*Threat Susceptibility:* 99

Urban, municipal & industrial pollution  
Pesticides & herbicides

*Threat Susceptibility:* 3

Wetland modifications      significant wetland loss

*Threat Susceptibility:* 2

Conversion to agriculture

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

Incompatible natural resource management  
 Invasive plants & animals  
 Other biological interactions  
 Grazing & mowing patterns  
 Altered hydrologic regimes  
 Fragmentation

predation by cats & dogs  
 predation by mammals including red foxes and raccoons  
 nest disruption

Spruce Grouse (*Falcapennis canadensis*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
 Forestry Practices  
 Altered fire regime  
 Fragmentation

recreational development in spruce-jack pine areas along lake shores  
 replacement of jack pine and spruce by pine plantations; clearcutting large tracts of jack pine and spruce  
 in some areas, the problem is overmature forest structure (jack pine-spruce)

*Threat Susceptibility:* 2

Incompatible natural resource management  
 Other biological interactions

Tied to logging practices  
 predation by birds and mammals

*Threat Susceptibility:* 1

Removal of wildlife

accidental harvest

Sharp-tailed Grouse (*Tympanuchus phasianellus*)

*Threat Susceptibility:* 99

Removal of wildlife

the limited harvest in the UP appears to be compensatory

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
 Incompatible natural resource management  
 Altered fire regime  
 Fragmentation

urban sprawl  
 intensive forest plantings  
 fire suppression leading to habitat succession

*Threat Susceptibility:* 2

Forestry Practices  
 Non-consumptive recreation  
 Pesticides & herbicides

males not tolerant of human presence during breeding  
 possible mortality due to insecticides and rodenticides (Compound 1080, Malathion, Dieldrin, zinc phosphide grain bait, toxaphene); possible reduction of food base due to pesticide use

Other biological interactions  
 Grazing & mowing patterns

predation by birds and mammals  
 intensive livestock overgrazing

*Threat Susceptibility:* 1

Conversion to agriculture  
 Social attitudes

Northern Bobwhite (*Colinus virginianus*)

*Threat Susceptibility:* 3

Industrial, residential & recreational development  
 Conversion to agriculture

changing land use including clean farming, single crop production, plantation forestry, fire suppression, replacement of native grass pasture with fescue, and overgrazing

Incompatible natural resource management

changing land use including clean farming, single crop production, plantation forestry, fire suppression, replacement of native grass pasture with fescue, and overgrazing  
 predation; reduction of vegetative cover due to deer browsing

Other biological interactions  
 Grazing & mowing patterns

changing land use including clean farming, single crop production, plantation forestry, fire suppression, replacement of native grass pasture with fescue, and overgrazing

Altered fire regime

changing land use including clean farming, single crop production, plantation forestry, fire suppression, replacement of native grass pasture with fescue, and overgrazing

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<i>Threat Susceptibility:</i>	2	
Invasive plants & animals		predation by dogs and cats
<b><u>Common Loon (<i>Gavia immer</i>)</u></b>		
<i>Threat Susceptibility:</i>	99	
Removal of wildlife		mortality from fishing nets and traps
Altered hydrologic regimes		fluctuating water levels at nest sites
Social attitudes		illegal shooting by anglers/commercial fishermen
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		human development along shorelines
Non-consumptive recreation		disturbance by boaters and fishermen
Urban, municipal & industrial pollution		lead and mercury poisoning, acid rain
Pesticides & herbicides		possible impacts due to pesticide use
Disease, pathogens & parasites		West Nile Virus, Type E botulism
Other biological interactions		intraspecific competition due to territoriality; predation by fish, birds, mammals, and turtles
<b><u>Pied-billed Grebe (<i>Podilymbus podiceps</i>)</u></b>		
<i>Threat Susceptibility:</i>	99	
Incompatible natural resource management		
Removal of wildlife		shooting by duck hunters
Non-consumptive recreation		human disturbance may affect nesting
Urban, municipal & industrial pollution		degradation of habitat
Pesticides & herbicides		possible mortality due to pesticide use
Invasive plants & animals		
Disease, pathogens & parasites		
Other biological interactions		intraspecifically aggressive and territorial
Climate change		
<i>Threat Susceptibility:</i>	3	
Wetland modifications		wetland destruction, siltation from erosion from farmlands
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		
Altered hydrologic regimes		
<i>Threat Susceptibility:</i>	1	
Conversion to agriculture		
Dams		
Social attitudes		
<b><u>American White Pelican (<i>Pelecanus erythrorhynchos</i>)</u></b>		
<i>Threat Susceptibility:</i>	99	
Removal of wildlife		shooting is a problem in some areas
Non-consumptive recreation		low tolerance for disturbance
Other biological interactions		susceptible to predation
<b><u>American Bittern (<i>Botaurus lentiginosus</i>)</u></b>		
<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		impacts of pesticides on prey base
Disease, pathogens & parasites		West Nile Virus
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		

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Wetland modifications  
 Conversion to agriculture  
 Altered hydrologic regimes encroachment of woody vegetation into herbaceous wetlands  
*Threat Susceptibility:* 1  
 Non-consumptive recreation sensitive to human disturbance

Least Bittern (*Ixobrychus exilis*)

*Threat Susceptibility:* 99  
 Industrial, residential & recreational development because they fly low to the ground, collisions with vehicles, barbed wire fences, and transmission lines may be a factor  
 Urban, municipal & industrial pollution unknown impact of heavy metals, PCBs, acid rain  
 Pesticides & herbicides unknown impact of pesticides  
 Invasive plants & animals  
 Disease, pathogens & parasites  
 Other biological interactions predation by crows, mammals, snakes, snapping turtles, and bullfrogs  
 Altered hydrologic regimes along the Great Lakes, nesting sites were destroyed by high water levels in the 1980's  
 Social attitudes  
*Threat Susceptibility:* 3  
 Wetland modifications  
*Threat Susceptibility:* 2  
 Lack of scientific knowledge  
*Threat Susceptibility:* 1  
 Conversion to agriculture  
 Dredging & channelization  
 Scientific research

Great Blue Heron (*Ardea herodias*)

*Threat Susceptibility:* 99  
 Industrial, residential & recreational development construction of homes, boating, fishing, camping, and hunting in or near heronries  
 Wetland modifications inland heronries prone to filling  
 Forestry Practices inland heronries prone to logging  
 Non-consumptive recreation boating, sport fishing, camping, hunting in or near heronries

Green Heron (*Butorides virescens*)

*Threat Susceptibility:* 99  
 Invasive plants & animals  
 Disease, pathogens & parasites  
*Threat Susceptibility:* 3  
 Wetland modifications  
*Threat Susceptibility:* 2  
 Altered hydrologic regimes  
*Threat Susceptibility:* 1  
 Industrial, residential & recreational development  
 Conversion to agriculture  
 Incompatible natural resource management  
 Removal of wildlife  
 Forestry Practices  
 Non-consumptive recreation  
 Scientific research  
 Fragmentation

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Black-crowned Night-heron (Nycticorax nycticorax)

*Threat Susceptibility:* 99  
Industrial, residential & recreational development development along shorelines  
Wetland modifications  
Invasive plants & animals  
Disease, pathogens & parasites

*Threat Susceptibility:* 2  
Non-consumptive recreation sensitive to disturbance during and before egg laying  
Urban, municipal & industrial pollution

*Threat Susceptibility:* 1  
Dams  
Dredging & channelization  
Incompatible natural resource management  
Removal of wildlife  
Forestry Practices  
Pesticides & herbicides sensitive to DDT

Osprey (Pandion haliaetus)

*Threat Susceptibility:* 99  
Removal of wildlife accidental/purposeful shooting and capture in steel traps

*Threat Susceptibility:* 2  
Industrial, residential & recreational development steel traps, impact/electrocution by high-tension wires, being caught and drowned in nets  
Wetland modifications  
Urban, municipal & industrial pollution vulnerable to bioaccumulation of pollutants  
Pesticides & herbicides bioaccumulation of pollutants, historic  
Altered hydrologic regimes

*Threat Susceptibility:* 1  
Dams  
Dredging & channelization  
Incompatible natural resource management  
Non-consumptive recreation  
Military maneuvers  
Disease, pathogens & parasites

Bald Eagle (Haliaeetus leucocephalus)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development loss of shoreline due to development; motor vehicle collisions  
Urban, municipal & industrial pollution heavy metals  
Pesticides & herbicides carbamate pesticides, organophosphorus

*Threat Susceptibility:* 2  
Forestry Practices  
Non-consumptive recreation highly sensitive to foot traffic  
Altered hydrologic regimes

*Threat Susceptibility:* 1  
Conversion to agriculture  
Dams  
Dredging & channelization  
Mining practices

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Scientific research  
Military maneuvers  
Disease, pathogens & parasites  
Fragmentation

human presence may disturb breeding birds

West Nile Virus

Northern Harrier (Circus cyaneus)

*Threat Susceptibility:* 99

Invasive plants & animals  
Disease, pathogens & parasites

Other biological interactions

West Nile Virus; documented mortality from ingestion of mice contaminated with the fowl cholera bacterium *Pasteurella multocida*  
mammal and bird nest predators, trampling of nests by deer

*Threat Susceptibility:* 2

Wetland modifications  
Conversion to agriculture  
Incompatible natural resource management  
Removal of non-timber flora  
Urban, municipal & industrial pollution  
Fragmentation

contributes to human disturbance  
encroachment of woody vegetation into openings via succession

*Threat Susceptibility:* 1

Industrial, residential & recreational development  
Mining practices  
Non-consumptive recreation  
Pesticides & herbicides  
Grazing & mowing patterns  
Altered fire regime  
Altered hydrologic regimes

urban and industrial development  
  
ORV use  
biocides may cause eggshell thinning and lowered productivity  
nests may be trampled by cattle or be abandoned due to mowing

Cooper's Hawk (Accipiter cooperii)

*Threat Susceptibility:* 99

Industrial, residential & recreational development  
Removal of wildlife  
Pesticides & herbicides  
Disease, pathogens & parasites  
Other biological interactions  
Social attitudes

collection by falconers  
DDT poisoning  
West Nile Virus  
nest predation by raccoons and crows  
persecution by hunters and irate farmers

*Threat Susceptibility:* 2

Conversion to agriculture  
Incompatible natural resource management  
Forestry Practices  
Fragmentation

forest product harvest

Northern Goshawk (Accipiter gentilis)

*Threat Susceptibility:* 99

Pesticides & herbicides  
Disease, pathogens & parasites

possible impact of pesticides  
West Nile Virus

*Threat Susceptibility:* 3

Fragmentation

creation of openings favor competitors (red-tailed hawks, great horned owls)

*Threat Susceptibility:* 2

Forestry Practices

clearcutting of mature stands; creation of openings; shorter rotation cycles

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*Threat Susceptibility:* 1  
 Conversion to agriculture  
 Removal of wildlife falconry  
 Non-consumptive recreation  
 Other biological interactions great horned owl predation; mammal predation

Red-shouldered Hawk (*Buteo lineatus*)

*Threat Susceptibility:* 99  
 Dredging & channelization destruction of forested wetlands  
 Disease, pathogens & parasites West Nile Virus

*Threat Susceptibility:* 3  
 Incompatible natural resource management  
 Forestry Practices complete removal of forest cover and selective cutting of valuable hardwoods or firewood  
 Fragmentation

*Threat Susceptibility:* 2  
 Industrial, residential & recreational development  
 Wetland modifications  
 Conversion to agriculture  
 Dams destruction of forested wetlands  
 Non-consumptive recreation human disturbance pushes individuals into forest interior  
 Urban, municipal & industrial pollution  
 Pesticides & herbicides contaminants may reduce prey base (amphibians)  
 Invasive plants & animals dispersal of competitors and predators (red-tailed hawk and great horned owl) into degraded habitat

*Threat Susceptibility:* 1  
 Removal of wildlife historic incidence of shooting  
 Altered hydrologic regimes

Merlin (*Falco columbarius*)

*Threat Susceptibility:* 99  
 Industrial, residential & recreational development habitat loss on wintering grounds (Central/South America)  
 Conversion to agriculture habitat loss on wintering grounds (Central/South America)  
 Pesticides & herbicides biocide use on wintering grounds (Central/South America)

Peregrine Falcon (*Falco peregrinus*)

*Threat Susceptibility:* 1  
 Industrial, residential & recreational development  
 Mining practices  
 Urban, municipal & industrial pollution  
 Pesticides & herbicides food chain contamination  
 Disease, pathogens & parasites

Yellow Rail (*Coturnicops noveboracensis*)

*Threat Susceptibility:* 99  
 Disease, pathogens & parasites West Nile Virus  
 Other biological interactions invasion of purple loosestrife; mammal, bird, and herp predators

*Threat Susceptibility:* 2  
 Wetland modifications  
 Altered fire regime encroachment of woody vegetation on breeding sites  
 Altered hydrologic regimes encroachment of woody vegetation on breeding sites

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*Threat Susceptibility:* 1  
Industrial, residential & recreational development collisions with tv towers during migration

King Rail (*Rallus elegans*)

*Threat Susceptibility:* 99  
Disease, pathogens & parasites West Nile Virus  
Altered hydrologic regimes during times of rising lake levels, coastal wetland communities may be absent due to flooding

*Threat Susceptibility:* 3  
Wetland modifications

*Threat Susceptibility:* 2  
Industrial, residential & recreational development collisions with structures (towers, etc.) during migration, struck by vehicles during high water conditions  
Pesticides & herbicides

Virginia Rail (*Rallus limicola*)

*Threat Susceptibility:* 99  
Wetland modifications

*Threat Susceptibility:* 1  
Lack of scientific knowledge

Sora (*Porzana carolina*)

*Threat Susceptibility:* 99  
Conversion to agriculture agricultural development in the Thumb and southeast Michigan have eliminated much habitat  
Removal of non-timber flora disturbance and destruction due to harvest of wild and planted rice

*Threat Susceptibility:* 2  
Wetland modifications

*Threat Susceptibility:* 1  
Lack of scientific knowledge

Common Moorhen (*Gallinula chloropus*)

*Threat Susceptibility:* 99  
Wetland modifications

*Threat Susceptibility:* 1  
Incompatible natural resource management  
Lack of scientific knowledge

American Coot (*Fulica americana*)

*Threat Susceptibility:* 99  
Wetland modifications  
Removal of wildlife shooting during migration due to nuisance impacts  
Pesticides & herbicides

Social attitudes shooting during migration due to nuisance impacts (congregating and defecating at golf courses and other public areas)

Piping Plover (*Charadrius melodus*)

*Threat Susceptibility:* 99  
Disease, pathogens & parasites West Nile Virus

*Threat Susceptibility:* 3  
Non-consumptive recreation disturbance of breeding pairs by people, pets, recreational vehicles

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Other biological interactions		nest predation
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		human development along shorelines
Altered hydrologic regimes		high Great Lakes water levels reduce breeding habitat due to flooding
Fragmentation		
<i>Threat Susceptibility:</i>	1	
Pesticides & herbicides		
<u>Killdeer (<i>Charadrius vociferus</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		
<u>Spotted Sandpiper (<i>Actitis macularia</i>)</u>		
<i>Threat Susceptibility:</i>	1	
Conversion to agriculture		
Dredging & channelization		
Altered hydrologic regimes		
<u>Upland Sandpiper (<i>Bartramia longicauda</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Grazing & mowing patterns		mowing makes hayfields unproductive as nesting areas; livestock may trample nests
Fragmentation		
<i>Threat Susceptibility:</i>	3	
Other biological interactions		predation
Altered fire regime		reforestation/succession of pastures and fields can be a threat
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		
Conversion to agriculture		changes in farming practices
<u>Wilson's Snipe (<i>Gallinago delicata</i>)</u>		
<i>Threat Susceptibility:</i>	3	
Wetland modifications		
<u>American Woodcock (<i>Scolopax minor</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Urban, municipal & industrial pollution		acid rain and impacts on soil pH and earthworms, lead contamination due to lead shot ingestion or ingestion via the food chain as it dissolves and contaminates earthworms
Grazing & mowing patterns		possible impacts of mowing on nests
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		urbanization; collisions with communications towers
Incompatible natural resource management		changes in forest mgmt practices and loss of aspen as forests mature
<i>Threat Susceptibility:</i>	2	
Conversion to agriculture		
Altered fire regime		loss of habitat due to succession
<u>Wilson's Phalarope (<i>Phalaropus tricolor</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Wetland modifications		

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Caspian Tern (*Sterna caspia*)

*Threat Susceptibility:* 3

Removal of wildlife

Urban, municipal & industrial pollution

Other biological interactions

entanglement in fishing lines; shooting, trapping, and collecting

PCB or mercury contamination may cause colony abandonment

competition with gulls and cormorants for nest sites; predation by owls and gulls

*Threat Susceptibility:* 2

Invasive plants & animals

gulls

Common Tern (*Sterna hirundo*)

*Threat Susceptibility:* 99

Pesticides & herbicides

Disease, pathogens & parasites

Altered hydrologic regimes

possible impacts of organochlorines

West Nile Virus

rising water levels inundate colony sites

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Invasive plants & animals

Other biological interactions

shoreline and island development

gulls

competition with gulls for nest sites; predation by gulls, mammals, reptiles, and other birds

*Threat Susceptibility:* 2

Non-consumptive recreation

Urban, municipal & industrial pollution

heavy metal pollution

Forster's Tern (*Sterna forsteri*)

*Threat Susceptibility:* 99

Urban, municipal & industrial pollution

concern about impacts of toxic chemicals

*Threat Susceptibility:* 2

Industrial, residential & recreational development

Non-consumptive recreation

development of nesting areas

recreational boating wakes appear to have a detrimental impact on aquatic vegetation used for nesting

*Threat Susceptibility:* 1

Dams

Black Tern (*Chlidonias niger*)

*Threat Susceptibility:* 99

Dredging & channelization

Invasive plants & animals

Disease, pathogens & parasites

stream dredging degrades marshes used for breeding

purple loosestrife

West Nile Virus

*Threat Susceptibility:* 2

Non-consumptive recreation

disturbance due to recreational activities

*Threat Susceptibility:* 1

Industrial, residential & recreational development

Wetland modifications

Conversion to agriculture

Dams

Scientific research

Urban, municipal & industrial pollution

Other biological interactions

heavy metal pollution, acid rain

possible competition from mute swans; predation of nests and young

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Black-billed Cuckoo (Coccyzus erythrophthalmus)

<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		reduction or elimination of prey base
Invasive plants & animals		
Other biological interactions		fluctuations in population with tent caterpillar outbreaks
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		urbanization; collisions with tv towers and other structures
Incompatible natural resource management		

Yellow-billed Cuckoo (Coccyzus americanus)

<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		reduction of prey base
Other biological interactions		predation of adult and nests/young by raptors, other birds, snakes, and mammals
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		
Fragmentation		fragmentation of riparian habitat
<i>Threat Susceptibility:</i>	1	
Urban, municipal & industrial pollution		
Altered hydrologic regimes		

Barn Owl (Tyto alba)

<i>Threat Susceptibility:</i>	99	
Incompatible natural resource management		
Pesticides & herbicides		secondary poisoning by rodenticides
Climate change		
<i>Threat Susceptibility:</i>	3	
Conversion to agriculture		decreases in hay and pasture and increases in row crops; reduction in crop rotations involving 1-2 years of meadow
Fragmentation		needs large herbacious landscapes
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		many killed in collisions with vehicles (may be attracted to roadside grassland habitat)
Other biological interactions		predation by great horned owl
Altered fire regime		succession of grasslands to brushland
<i>Threat Susceptibility:</i>	1	
Wetland modifications		

Long-eared Owl (Asio otus)

<i>Threat Susceptibility:</i>	99	
Removal of wildlife		shooting
Pesticides & herbicides		
Other biological interactions		competition with great horned owl
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		loss of old fields to development
Conversion to agriculture		intensive farming
Urban, municipal & industrial pollution		

Short-eared Owl (Asio flammeus)

<i>Threat Susceptibility:</i>	99	
Disease, pathogens & parasites		West Nile Virus

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Grazing & mowing patterns		mid-April through mid-July mowing/burning may destroy nests and kill young
<i>Threat Susceptibility:</i>	3	
Fragmentation		Secondary succession
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		
Conversion to agriculture		intensive agriculture
Other biological interactions		nest predation by mammals
Altered fire regime		successional changes to habitat
<i>Threat Susceptibility:</i>	1	
Wetland modifications		
Removal of wildlife		shooting
Altered hydrologic regimes		

Common Nighthawk (*Chordeiles minor*)

<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		insecticide use may result in reduction of prey base
<i>Threat Susceptibility:</i>	2	
Altered fire regime		successional changes to habitat
<i>Threat Susceptibility:</i>	1	
Incompatible natural resource management		

Chuck-will's-widow (*Caprimulgus carolinensis*)

<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		insecticide use may result in reduction of prey base
Grazing & mowing patterns		possible trampling of nests or reduction in insect populations
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		paving of rural roads results in increased speeds and higher likelihood of collisions with foraging individuals

Whip-poor-will (*Caprimulgus vociferus*)

<i>Threat Susceptibility:</i>	99	
Lack of scientific knowledge		
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		paving of rural roads results in increased speeds and higher likelihood of collisions with foraging individuals; residential development
Conversion to agriculture		
<i>Threat Susceptibility:</i>	2	
Pesticides & herbicides		insecticide use may result in reduction of prey base; industrial pollution
Other biological interactions		food competition with bats and small owls
<i>Threat Susceptibility:</i>	1	
Social attitudes		

Red-headed Woodpecker (*Melanerpes erythrocephalus*)

<i>Threat Susceptibility:</i>	99	
Other biological interactions		competition with starlings for nest sites
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		increased automobile traffic (collisions while feeding); development of habitat
Conversion to agriculture		"clean farming" practices

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<i>Threat Susceptibility:</i>	2	
Altered fire regime		loss of snags
<b><u>Black-backed Woodpecker (Picoides arcticus)</u></b>		
<i>Threat Susceptibility:</i>	3	
Altered fire regime		significant temporary increases in numbers after burns in response to presence of wood-boring insects
<i>Threat Susceptibility:</i>	2	
Incompatible natural resource management		conversion of mature forests to young stands
Forestry Practices		timber harvest in mature forest, salvage logging, cutting of snags, removal of fire-killed or insect-infested trees
<b><u>Northern Flicker (Colaptes auratus)</u></b>		
<i>Threat Susceptibility:</i>	2	
Other biological interactions		competition with starlings for nest sites
<b><u>Olive-sided Flycatcher (Contopus cooperi)</u></b>		
<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		
Other biological interactions		beaver control may reduce available habitat
Altered fire regime		
<i>Threat Susceptibility:</i>	3	
Conversion to agriculture		loss of wintering habitat in South America
<b><u>Acadian Flycatcher (Empidonax virescens)</u></b>		
<i>Threat Susceptibility:</i>	3	
Fragmentation		area sensitive species which is much less common in woodlots below the 90-250 acre class
<i>Threat Susceptibility:</i>	2	
Incompatible natural resource management		
Invasive plants & animals		cowbird nest parasitism
<b><u>Least Flycatcher (Empidonax minimus)</u></b>		
<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		cowbird nest parasitism
<b><u>Eastern Kingbird (Tyrannus tyrannus)</u></b>		
<i>Threat Susceptibility:</i>	1	
Pesticides & herbicides		
<b><u>Migrant Loggerhead Shrike (Lanius ludovicianus migrans)</u></b>		
<i>Threat Susceptibility:</i>	99	
Other biological interactions		competition on the wintering grounds
Grazing & mowing patterns		loss of habitat due to succession
Lack of scientific knowledge		
<i>Threat Susceptibility:</i>	3	
Altered fire regime		loss of habitat due to succession
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		urban development; changes in roadside mgmt practices (herbicide use, removal of shrubs); collisions with vehicles
Conversion to agriculture		conversion of small fields with fencerows to larger intensive farms with fewer fencerows and trees

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<i>Threat Susceptibility:</i>	1	
Incompatible natural resource management		transportation departments should be encouraged to leave some shrubs along roadsides for foraging habitat
Pesticides & herbicides		metabolization of pesticides and reductions to prey base
<u>White-eyed Vireo (Vireo griseus)</u>		
<i>Threat Susceptibility:</i>	99	
Other biological interactions		nest predation by birds, snakes, and mammals
<i>Threat Susceptibility:</i>	2	
Invasive plants & animals		nest parasitism by cowbirds
<u>Purple Martin (Progne subis)</u>		
<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		competition with house sparrows and starlings for nest sites; destruction of nests and young by house sparrows
<i>Threat Susceptibility:</i>	2	
Other biological interactions		Highly dependent on humans to provide secure, weather-tight cavities
<u>Sedge Wren (Cistothorus platensis)</u>		
<i>Threat Susceptibility:</i>	3	
Grazing & mowing patterns		livestock grazing
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		
Wetland modifications		
Conversion to agriculture		
Altered fire regime		loss of wetlands to natural succession
<i>Threat Susceptibility:</i>	1	
Altered hydrologic regimes		loss of wetlands to natural succession
Fragmentation		
<u>Marsh Wren (Cistothorus palustris)</u>		
<i>Threat Susceptibility:</i>	2	
Wetland modifications		
Altered hydrologic regimes		
<i>Threat Susceptibility:</i>	1	
Conversion to agriculture		
Grazing & mowing patterns		
<u>Wood Thrush (Hylocichla mustelina)</u>		
<i>Threat Susceptibility:</i>	3	
Invasive plants & animals		nest parasitism by cowbirds
Fragmentation		
<i>Threat Susceptibility:</i>	2	
Incompatible natural resource management		
<u>Brown Thrasher (Toxostoma rufum)</u>		
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		
Other biological interactions		competition with catbirds and cardinals for nesting territories
Altered fire regime		loss of habitat due to succession

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Blue-winged Warbler (Vermivora pinus)

*Threat Susceptibility:* 2  
Incompatible natural resource management  
Invasive plants & animals nest parasitism by cowbird

Golden-winged Warbler (Vermivora chrysoptera)

*Threat Susceptibility:* 99  
Altered fire regime loss of habitat due to succession

*Threat Susceptibility:* 2  
Industrial, residential & recreational development urban/suburban development  
Conversion to agriculture intensive agriculture  
Incompatible natural resource management encroachment of autumn olive  
Forestry Practices loss of wintering habitat due to deforestation  
Invasive plants & animals competition and hybridization with blue-winged warbler; nest parasitism by cowbird

Northern Parula (Parula americana)

*Threat Susceptibility:* 99  
Conversion to agriculture loss of habitat on wintering grounds in the Yucatan  
Urban, municipal & industrial pollution destruction of Usnea lichen by acid rain

*Threat Susceptibility:* 2  
Industrial, residential & recreational development development of forest land; collisions with towers and other man-made structures

Black-throated Blue Warbler (Dendroica caerulescens)

*Threat Susceptibility:* 99  
Invasive plants & animals nest parasitism by cowbirds  
Other biological interactions overbrowsing by deer reduces understory habitat

*Threat Susceptibility:* 2  
Industrial, residential & recreational development industrial and urban development  
Conversion to agriculture susceptible on the wintering range  
Pesticides & herbicides reduction of prey base  
Fragmentation

Blackburnian Warbler (Dendroica fusca)

*Threat Susceptibility:* 2  
Forestry Practices accelerated timber harvest with increased emphasis on even-aged management

Yellow-throated Warbler (Dendroica dominica)

*Threat Susceptibility:* 99  
Forestry Practices cutting of floodplain forest  
Invasive plants & animals nest parasitism by cowbirds

Kirtland's Warbler (Dendroica kirtlandii)

*Threat Susceptibility:* 99  
Disease, pathogens & parasites West Nile Virus

*Threat Susceptibility:* 3  
Forestry Practices replacement of jack pine with red pine or hardwoods  
Invasive plants & animals nest parasitism by cowbirds  
Altered fire regime habitat change due to succession/forest maturation

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*Threat Susceptibility:* 2

Fragmentation

*Threat Susceptibility:* 1

Military maneuvers

Pesticides & herbicides

Prairie Warbler (*Dendroica discolor*)

*Threat Susceptibility:* 99

Disease, pathogens & parasites

Other biological interactions

West Nile Virus

nest predation by snakes

*Threat Susceptibility:* 3

Altered fire regime

lack of disturbance resulting in succession

*Threat Susceptibility:* 2

Industrial, residential & recreational development

development in dunes and pine barrens

Incompatible natural resource management

Invasive plants & animals

nest parasitism by cowbirds

Palm Warbler (*Dendroica palmarum*)

*Threat Susceptibility:* 3

Altered fire regime

*Threat Susceptibility:* 1

Forestry Practices

Cerulean Warbler (*Dendroica cerulea*)

*Threat Susceptibility:* 99

Disease, pathogens & parasites

West Nile Virus; loss of tree species (oaks, sycamores, chestnut) to disease and pests

*Threat Susceptibility:* 2

Industrial, residential & recreational development

collisions with towers; construction of roads

Conversion to agriculture

Forestry Practices

even aged forest mgmt and shorter rotation cycles

Invasive plants & animals

nest parasitism by cowbird

*Threat Susceptibility:* 1

Fragmentation

Prothonotary Warbler (*Protonotaria citrea*)

*Threat Susceptibility:* 2

Wetland modifications

Invasive plants & animals

nest parasitism by cowbirds

Other biological interactions

predation; competition with house wrens

Worm-eating Warbler (*Helmitheros vermivorus*)

*Threat Susceptibility:* 99

Fragmentation

Louisiana Waterthrush (*Seiurus motacilla*)

*Threat Susceptibility:* 99

Forestry Practices

stream degradation due to siltation, erosion, transportation of sawlogs

Urban, municipal & industrial pollution

acid rain

*Threat Susceptibility:* 2

Industrial, residential & recreational development

development in riparian zones

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Wetland modifications  
Fragmentation

Kentucky Warbler (*Oporornis formosus*)

*Threat Susceptibility:* 99  
Fragmentation

*Threat Susceptibility:* 1  
Invasive plants & animals nest parasitism by cowbirds

Connecticut Warbler (*Oporornis agilis*)

*Threat Susceptibility:* 99  
Industrial, residential & recreational development collisions with towers during migration

Conversion to agriculture

Forestry Practices red pine conversion

Mining practices peat mining

Altered fire regime fire suppression in barrens

Lack of scientific knowledge distribution and abundance are not fully known

Hooded Warbler (*Wilsonia citrina*)

*Threat Susceptibility:* 99

Dredging & channelization

Forestry Practices conversions of diverse forests to plantations

Invasive plants & animals nest parasitism by cowbirds

*Threat Susceptibility:* 3

Fragmentation

Canada Warbler (*Wilsonia canadensis*)

*Threat Susceptibility:* 99

Conversion to agriculture

Invasive plants & animals nest parasitism by cowbirds

Other biological interactions overbrowsing by deer reduces understory habitat

*Threat Susceptibility:* 3

Fragmentation

*Threat Susceptibility:* 2

Industrial, residential & recreational development urban development; collisions with towers during migration

Altered fire regime lack of disturbance prevents creation of forest openings and growth of thickets

Yellow-breasted Chat (*Icteria virens*)

*Threat Susceptibility:* 99

Invasive plants & animals nest parasitism by cowbirds

*Threat Susceptibility:* 2

Industrial, residential & recreational development residential development

Conversion to agriculture

Altered fire regime habitat loss due to succession

Eastern Towhee (*Pipilo erythrophthalmus*)

*Threat Susceptibility:* 99

Industrial, residential & recreational development

Invasive plants & animals nest parasitism by cowbirds

Other biological interactions habitat alterations due to overgrazing by deer

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<i>Threat Susceptibility:</i>	2	
Conversion to agriculture		
Altered fire regime		loss of habitat due to succession
<u>Field Sparrow (<i>Spizella pusilla</i>)</u>		
<i>Threat Susceptibility:</i>	2	
Industrial, residential & recreational development		residential developments
Invasive plants & animals		nest parasitism by cowbirds
Other biological interactions		nest predation by snakes, mammals, and birds
Grazing & mowing patterns		Secondary succession on farms
<i>Threat Susceptibility:</i>	1	
Altered fire regime		
<u>Vesper Sparrow (<i>Pooecetes gramineus</i>)</u>		
<i>Threat Susceptibility:</i>	2	
Conversion to agriculture		intensive farming using chemicals and large-scale tillage
Pesticides & herbicides		agricultural chemicals
Grazing & mowing patterns		Secondary succession
<u>Savannah Sparrow (<i>Passerculus sandwichensis</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		nest parasitism by cowbirds
<i>Threat Susceptibility:</i>	2	
Grazing & mowing patterns		Secondary succession of farms
<u>Grasshopper Sparrow (<i>Ammodramus savannarum</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Grazing & mowing patterns		poorly timed mowing
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		urbanization
Conversion to agriculture		intensive farming on good soils
Altered fire regime		habitat loss due to succession
<i>Threat Susceptibility:</i>	1	
Invasive plants & animals		nest parasitism by cowbirds
<u>Henslow's Sparrow (<i>Ammodramus henslowii</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Other biological interactions		nest predation
Grazing & mowing patterns		annual mowing reduces attractiveness of hayfields; earlier and more frequent cutting of hayfields; nest destruction due to mowing
<i>Threat Susceptibility:</i>	2	
Conversion to agriculture		
Altered fire regime		loss of habitat due to succession
Fragmentation		
<i>Threat Susceptibility:</i>	1	
Industrial, residential & recreational development		
Wetland modifications		

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Le Conte's Sparrow (Ammodramus leconteii)

*Threat Susceptibility:* 99

Dams

Invasive plants & animals

nest parasitism by cowbirds

Altered hydrologic regimes

flooding can cause large numbers of nest losses

*Threat Susceptibility:* 2

Wetland modifications

Grazing & mowing patterns

haying during the breeding season may destroy nests

Altered fire regime

habitat loss due to succession; undesirable ground litter density due to burning too frequently

Lack of scientific knowledge

Dickcissel (Spiza americana)

*Threat Susceptibility:* 99

Invasive plants & animals

nest parasitism by cowbirds

Grazing & mowing patterns

loss of nests due to mowing

*Threat Susceptibility:* 3

Pesticides & herbicides

poisoning of roosting birds on the wintering grounds in Venezuela by pesticide application

Bobolink (Dolichonyx oryzivorus)

*Threat Susceptibility:* 3

Grazing & mowing patterns

earlier and more frequent hay-cropping

Altered fire regime

loss of habitat due to succession

*Threat Susceptibility:* 1

Invasive plants & animals

nest parasitism by cowbirds

Fragmentation

Eastern Meadowlark (Sturnella magna)

*Threat Susceptibility:* 99

Pesticides & herbicides

mortality due to ingestion of poisoned grain (rodenticides/insecticides)

Invasive plants & animals

predation by cats and dogs; nest parasitism by cowbirds

Other biological interactions

predation by mammals and snakes

*Threat Susceptibility:* 2

Grazing & mowing patterns

frequent mowing has adverse effects; mowing and grazing may destroy nests

Altered fire regime

loss of habitat due to succession

*Threat Susceptibility:* 1

Fragmentation

Western Meadowlark (Sturnella neglecta)

*Threat Susceptibility:* 99

Invasive plants & animals

nest parasitism by cowbirds

Other biological interactions

predation by raptors, crows, and mammals

*Threat Susceptibility:* 1

Fragmentation

Yellow-headed Blackbird (Xanthocephalus xanthocephalus)

*Threat Susceptibility:* 99

Industrial, residential & recreational development

Wetland modifications

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Altered hydrologic regimes

habitat loss due to succession toward closed marsh communities

Red Crossbill (Loxia curvirostra)

*Threat Susceptibility:* 3

Forestry Practices

*Threat Susceptibility:* 1

Incompatible natural resource management  
Altered fire regime

White-winged Crossbill (Loxia leucoptera)

*Threat Susceptibility:* 2

Forestry Practices

*Threat Susceptibility:* 1

Incompatible natural resource management  
Grazing & mowing patterns

**Mammals**

least shrew (Cryptotis parva)

*Threat Susceptibility:* 99

Invasive plants & animals

house cats

*Threat Susceptibility:* 3

Lack of scientific knowledge

no information in literature except that house cats prey upon them

arctic shrew (Sorex arcticus)

*Threat Susceptibility:* 3

Altered hydrologic regimes  
Lack of scientific knowledge

little information out there

smoky shrew (Sorex fumeus)

*Threat Susceptibility:* 3

Lack of scientific knowledge

pygmy shrew (Sorex hoyi)

*Threat Susceptibility:* 99

Invasive plants & animals

house cats

*Threat Susceptibility:* 3

Lack of scientific knowledge

little information exists on threats

water shrew (Sorex palustris)

*Threat Susceptibility:* 99

Mining practices  
Pesticides & herbicides  
Altered hydrologic regimes  
Fragmentation

prefer high flow; uncertain of the importance of alteration though naturally fragmented populations

*Threat Susceptibility:* 3

Wetland modifications  
Dredging & channelization  
Urban, municipal & industrial pollution

road building and others

*Threat Susceptibility:* 2

Conversion to agriculture

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Forestry Practices

silver-haired bat (*Lasionycteris noctivagans*)

*Threat Susceptibility:* 3  
Industrial, residential & recreational development  
Conversion to agriculture  
Incompatible natural resource management lack of snag retention  
Urban, municipal & industrial pollution  
Social attitudes persecution

*Threat Susceptibility:* 2  
Forestry Practices

*Threat Susceptibility:* 1  
Removal of non-timber flora  
Pesticides & herbicides  
Altered fire regime

red bat (*Lasiurus borealis*)

*Threat Susceptibility:* 99  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Industrial, residential & recreational development collisions w/ towers, buildings, cars, etc.  
Incompatible natural resource management  
Forestry Practices  
Social attitudes

*Threat Susceptibility:* 1  
Conversion to agriculture  
Removal of non-timber flora  
Altered fire regime  
Lack of scientific knowledge

hoary bat (*Lasiurus cinereus*)

*Threat Susceptibility:* 99  
Pesticides & herbicides

*Threat Susceptibility:* 3  
Industrial, residential & recreational development high collision from wind turbines  
Incompatible natural resource management forest management  
Social attitudes

*Threat Susceptibility:* 2  
Forestry Practices

*Threat Susceptibility:* 1  
Removal of non-timber flora  
Urban, municipal & industrial pollution  
Lack of scientific knowledge

northern bat or northern myotis (*Myotis septentrionalis*)

*Threat Susceptibility:* 99  
Wetland modifications  
Mining practices

*Threat Susceptibility:* 3  
Conversion to agriculture

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Incompatible natural resource management forest management  
 Forestry Practices  
 Lack of scientific knowledge  
 Social attitudes

*Threat Susceptibility:* 2

Non-consumptive recreation hiking, exploring caves; not sure this is an issue in the UP

Indiana bat or Indiana myotis (Myotis sodalis)

*Threat Susceptibility:* 99

Industrial, residential & recreational development Habitat loss has been a problem, but uncertain on specific contributions; probably less important than agriculture

Conversion to agriculture Habitat loss has been a problem, but uncertain on specific contributions

Non-consumptive recreation

Pesticides & herbicides

Altered fire regime

Fragmentation

*Threat Susceptibility:* 3

Wetland modifications

Dredging & channelization

reduction in riparian and stream area; reduced roost sites and lower prey productivity

Incompatible natural resource management

forest and riparian management; removal of snags

Forestry Practices

removal of snags; much of riparian "logging" is small scale and agriculturally related

Mining practices

Lack of scientific knowledge

Social attitudes

*Threat Susceptibility:* 2

Dams

known sites have been inundated by impoundments in the past, probably a historical threat

*Threat Susceptibility:* 1

Removal of non-timber flora

Urban, municipal & industrial pollution

evening bat (Nycticeius humeralis)

*Threat Susceptibility:* 99

Pesticides & herbicides

Other biological interactions

declining in barns with the increase in big brown bats

*Threat Susceptibility:* 3

Industrial, residential & recreational development

Conversion to agriculture

Dredging & channelization

Incompatible natural resource management

Invasive plants & animals

house cats

Lack of scientific knowledge

Social attitudes

*Threat Susceptibility:* 1

Forestry Practices

Removal of non-timber flora

Altered fire regime

eastern pipistrelle (Pipistrellus subflavus)

*Threat Susceptibility:* 99

Pesticides & herbicides

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*Threat Susceptibility:* 3  
 Non-consumptive recreation mine exploration; resolved by gating  
 Lack of scientific knowledge  
 Social attitudes

*Threat Susceptibility:* 2  
 Incompatible natural resource management  
 Forestry Practices

*Threat Susceptibility:* 1  
 Industrial, residential & recreational development  
 Wetland modifications  
 Conversion to agriculture  
 Removal of non-timber flora  
 Mining practices  
 Urban, municipal & industrial pollution  
 Altered fire regime  
 Fragmentation

gray wolf (Canis lupus)

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development  
 Removal of wildlife  
 Fragmentation  
 Social attitudes

cougar (Puma concolor)

*Threat Susceptibility:* 3  
 Conversion to agriculture  
 Removal of wildlife  
 Climate change  
 Fragmentation  
 Social attitudes persecution

lynx (Lynx canadensis)

*Threat Susceptibility:* 3  
 Industrial, residential & recreational development roadbuilding, etc.  
 Incompatible natural resource management  
 Removal of wildlife  
 Forestry Practices clearcuts  
 Altered fire regime fire suppression resulting in large devastating fires  
 Fragmentation

*Threat Susceptibility:* 1  
 Non-consumptive recreation ATVs, skiing

American marten (Martes americana)

*Threat Susceptibility:* 3  
 Incompatible natural resource management timber management  
 Removal of wildlife  
 Forestry Practices  
 Fragmentation

*Threat Susceptibility:* 2  
 Altered fire regime Fire suppression w/ resulting severe fires

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<i>Threat Susceptibility:</i>	1	
Industrial, residential & recreational development		
Conversion to agriculture		
<u>least weasel (<i>Mustela nivalis</i>)</u>		
<i>Threat Susceptibility:</i>	3	
Lack of scientific knowledge		
<i>Threat Susceptibility:</i>	2	
Invasive plants & animals		cats
<u>moose (<i>Alces alces</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Wetland modifications		
Non-consumptive recreation		
Disease, pathogens & parasites		brainworm
Climate change		
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		increased roads/traffic; recreational or home development along lakes;
Incompatible natural resource management		configuration of timber management practices across a landscape
Forestry Practices		
Fragmentation		
<u>least chipmunk (<i>Tamias minimus</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		cats, dogs
Climate change		potential increase in abundance of the Eastern chipmunk due to temperature increase
<i>Threat Susceptibility:</i>	3	
Lack of scientific knowledge		threats are generally unknown
<u>northern flying squirrel (<i>Glaucomys sabrinus</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		predation by house cats
Other biological interactions		competition with southern flying squirrel
Climate change		increase and range expansion of southern flying squirrel, due to warmer climatic conditions
<i>Threat Susceptibility:</i>	3	
Incompatible natural resource management		forest management
Forestry Practices		
Fragmentation		weak dispersal ability
<i>Threat Susceptibility:</i>	1	
Altered fire regime		fire suppression
<u>woodland jumping mouse (<i>Napaeozapus insignis</i>)</u>		
<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		house cat predation
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		
Lack of scientific knowledge		very little information available on threats

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southern red-backed vole (Clethrionomys gapperi)

<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		
Incompatible natural resource management		forest management
Forestry Practices		
Fragmentation		
<i>Threat Susceptibility:</i>	2	
Conversion to agriculture		don't use plantations
<i>Threat Susceptibility:</i>	1	
Invasive plants & animals		dogs and cats

prairie vole (Microtus ochrogaster)

<i>Threat Susceptibility:</i>	99	
Pesticides & herbicides		
Invasive plants & animals		house cats
Grazing & mowing patterns		
Altered fire regime		
<i>Threat Susceptibility:</i>	3	
Conversion to agriculture		

woodland vole (Microtus pinetorum)

<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		house cat predation
Other biological interactions		increase predation from higher densities of coyote, raccoon, fox, opossum, crow)
Social attitudes		poisoning by humans
<i>Threat Susceptibility:</i>	2	
Fragmentation		

southern bog lemming (Synaptomys cooperi)

<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		cats and dogs
Other biological interactions		coyote predation; displacement by meadow voles if they are increasing
<i>Threat Susceptibility:</i>	3	
Industrial, residential & recreational development		avoid roads
Forestry Practices		
Non-consumptive recreation		avoid trail areas

deer mouse (Peromyscus maniculatus gracilis)

<i>Threat Susceptibility:</i>	99	
Invasive plants & animals		cats, dogs
Climate change		increase and range expansion of white-footed mouse, likely due to warmer climatic conditions
<i>Threat Susceptibility:</i>	3	
Lack of scientific knowledge		threats are generally unknown

snowshoe hare (Lepus americanus)

<i>Threat Susceptibility:</i>	99	
Other biological interactions		high densities of coyote and fox; high deer browse

**Threat Susceptibility Definitions:**

- 99: Unknown - A threat, but susceptibility of this species to the threat is unknown.
- 3: High - This species has a high susceptibility to this threat.
- 2: Medium - This species has a medium susceptibility to this threat.
- 1: Low - This species has a low susceptibility to this threat.

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

*Threat Susceptibility:* 3  
Incompatible natural resource management configuration of timber management units

*Threat Susceptibility:* 2  
Forestry Practices

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