



**ILLINOIS NATURAL
HISTORY SURVEY**
PRAIRIE RESEARCH INSTITUTE

Review and Update of Non-mollusk Invertebrate
Species in Greatest Need of Conservation:
Final Report

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Final Report

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Goals/ Objectives: (1) Review all SGNC listing criteria for currently listed non-mollusk invertebrate species using criteria in Illinois Wildlife Action Plan, (2) Assess current status of species populations, (3) Review criteria for additional species for potential listing as SGNC, (4) Assess stressors to species previously reviewed, (5) Complete draft updates and revisions of IWAP Appendix I and Appendix II for non-mollusk invertebrates.

**Project Title:
Review and Update of Non-mollusk Invertebrate
Species in Greatest Need of Conservation.**

Narrative:

This final report includes documentation of the approaches, methods, and results of our efforts to evaluate current and potential Species in Greatest Need of Conservation (IWAP Appendix I). We reviewed 563 taxa and provide draft updates and revisions of the Status, Conservation Objectives, and Stresses for non-mollusk invertebrate taxa in Illinois. We propose listing 166 of these as Species in Greatest Need of Conservation including 129 species from the 2005 list of 375 taxa and 36 of the 188 species newly evaluated in this project. Additionally, we propose a Watch-List of 245 invertebrate species which appear to be rare or declining but that have insufficient information to conduct a thorough conservation assessment at this time.

Job 1: Review all SGNC listing criteria for currently listed non-mollusk invertebrates (Update and Revise Appendix I including habitat association).

We reviewed 375 invertebrate taxa that were listed as SGNC in the 2005 IWAP. Some taxa in the current list were not recognized species or were listed at higher taxonomic resolutions (e.g., Family). Terrestrial taxa and Aquatic taxa were reviewed independently since the data available for these taxa differed in their extent and spatial and temporal coverage. Taxa listed that were not recognized species were dropped from further evaluation. Several species within these larger taxonomic groupings were evaluated for listing where higher taxonomic resolution was used in the original listing (e.g., Anostraca). Names for all species were revised where appropriate based on their current standing. Our review determined that 129 species had sufficient data to support maintaining their status as SGNC. Evidence to support 140 taxa was insufficient to support maintaining this status. An additional 106 species have insufficient data to evaluate many of the criteria for listing as SGNC. We recommend that these species are included on a Watch-List and be prioritized for additional surveys to assess their status in Illinois (Table 1).

We searched existing databases and the published literature for information related to Illinois records for each of the taxa reviewed. We were unable to document any existing records within Illinois for 60 species that are currently listed as SGNC. While most of these species have records from neighboring states (primarily Wisconsin and Indiana) we dropped these species from further analysis since the IWAP is designed for the management and conservation of species within Illinois. Should these species be later found within the state their status should be reevaluated.

Working with the 3I database (Internet-accessible Interactive Identification <http://imperialis.inhs.illinois.edu/dmitriev/ilinsects.asp>) dedicated to the list of SGNC

(Dietrich 2013) we updated the list of invertebrate species and reconciled it with an earlier version of the list and with the most recent list of Illinois Threatened and Endangered Species. The list of species is now hierarchically arranged by taxonomic rank (family, order, or higher levels). We then updated the taxonomic names and added additional records for species under review. The names of thirty-three species currently listed as SGNC were modified to reflect current taxonomic nomenclature.

Our review continued through the candidate list alphabetically, first by Class, then Order, Family, Genus, and species. We have updated their taxonomic names, author names, year of description, known distribution (see Job 2), habitat association, federal and state listing (IESPB (<http://www.dnr.illinois.gov/ESPB/Pages/default.aspx>)), Global Rank (NatureServe Explorer (<http://www.natureserve.org/explorer/>)), and potential target campaign.

We used existing databases (e.g., IDNR Natural Heritage and INHS Collections) and conducted literature reviews to assemble additional information for all species under review. Habitat Associations were assigned to correspond with those used by the Illinois Natural Areas Inventory as used in the IWAP. Where insufficient information existed for evaluation of Habitat Association, or any of the eight criteria, it was noted as an information gap (NMI [=Need More Information] in Tables and Appendices).

Criteria 1 and 2: We used information from the Illinois Endangered Species Protection Board (<http://www.dnr.illinois.gov/ESPB/Pages/default.aspx>) and NatureServe Explorer (<http://www.natureserve.org/explorer/>) to determine listing status and global ranking for all species that were reviewed.

Of the recommended species 7/245 [2.9%] of Watch-List and 38/166 [22.9%] of SGNC do not have Global Rankings from NatureServe. Thirty-eight percent [141/375 = 37.6%] of species from the 2005 SGNC list did not have Global Rankings, sixteen percent [30/184 = 16.3%] of the additional species reviewed did not have Global Rankings.

We recommend keeping all T&E listed species as SGNC even if we were unable to identify any recent confirmed records. The IESPB has a separate process for review and listing for these species. We also kept all G1 and G2 species unless they were considered extirpated within Illinois (SX).

Criterion 3: We assessed the status of each species under review separately for distributional rarity and for declines in distribution. To assess the rarity of each taxon we used distributional information based on the number of Illinois counties with verifiable records. If the taxa was known from 6 or fewer of Illinois 102 counties (<6% of counties) we considered it to be rare. In some cases this was expanded to 10 or fewer counties (<10% of counties) if records from several counties were >30 years old. A second measure of rarity was based on the date of the most recent record for each species. This measure was based on readily available information which included primarily collections material from INHS and the Illinois State Museum. Species with no records within the last 20 years were considered rare under this criterion.

Declines in distribution were assessed by looking at the change in the number of counties with verifiable records over time when sufficient information was available. This method was primarily restricted to aquatic taxa due to the number and availability of existing collection records for certain taxonomic groups (i.e., Ephemeroptera, Trichoptera, Plecoptera, and Odonata). Declining status was sometimes based on published literature that indicated a loss in range or population numbers (e.g., Cameron et al. 2011).

Criterion 4: With the exception of the Illinois Natural Areas Inventory that focuses on relatively undisturbed landscapes (<http://wx.inhs.illinois.edu/research/inai/>) habitat types have not been systematically inventoried or assessed in Illinois. The conservation status, extent, or vulnerability of virtually all habitat types has not been quantified statewide. We had hoped to use information from the Illinois Natural Areas Inventory Update and recent work on describing aquatic habitats from an ongoing SWG project (T-75-P-001) to estimate the approximate statewide availability of macrohabitat types. The relative abundance of the macrohabitat type associated with a species Habitat Association was to be used to evaluate this criterion. We quickly determined that we would be unable to complete these efforts within the project time period and still evaluate the number of species that may deserve listing as a SGNC. We prioritized the review of additional species. However, this type of effort would be worth conducting in the future to better assess the distribution and rarity of habitats in Illinois.

We considered a species to have met the criterion of having a rare or vulnerable habitat if the species is restricted to (1) remnant habitats (prairie/wetland), (2) a specific known host plant, (3) ephemeral ponds, (4) a habitat with a known specific threat, (5) caves, (6) springs/cool water streams, or (7) algalic slopes. If a species was restricted to a habitat associated with any of these conditions it was considered to meet Criterion 4.

Criteria 5 and 6: We used NatureServe Explorer Distribution Maps and other available information to examine endemism, disjunct population status, and the proportion of the species range that resides in Illinois. Based on this information species were considered to meet Criterion 5 if they were (1) true endemics (only within Illinois or a small regional area that includes part of Illinois), or (2) if the individuals in Illinois appeared to be disjunct on the NatureServe Maps. Species were considered to meet Criterion 6 if either of two conditions were met based on published information suggesting they were: (1) true keystone species, or (2) performed an important function for the maintenance of the ecosystem (e.g., pollinators).

Criterion 7: We used fidelity to the Habitat Association, and other information identified from the literature review to assess each species status as an indicator of other species with which they share habitat. Very little information is available to suggest that individual invertebrate species may function as surrogate species for particular habitat types. We suggest that this is an area of research that might prove beneficial to pursue in the future to assist with status assessments of specific habitats and associated fauna.

Criterion 8: The availability of information uncovered during the literature review and the number and distribution of known locations for each species within Illinois was used to inform the evaluation of this criterion. We identified five metrics that allowed for a

species to meet Criterion 8: (1) very few records in Illinois (<5), (2) local and limited distribution, (3) specific threat exists at known location(s) (e.g., water pollution), (4) known to be extirpated from some part of its historic range, (5) only historic records are known (>30 years since last record), (6) species has not been recently observed despite specific effort within the last 10 years.

Job 2. Assess the status of each species being reviewed (Appendix I, criterion 3).

Although most 2015 SGNC were assigned Criteria 3 (rare or significantly declined) the nature of this status was not well defined in the IWAP. One goal of this project was to assess the conservation status of SGNC given readily available data. Distribution records for each species that was previously entered into the database were examined, and when additional county records were available, additional records were added to the database. These records came from a variety of trusted sources, including specimens in the INHS Insect Collection, published literature, online records including from the Illinois State Museum (**Appendix IV**), and other documents (e.g., Bouseman & Sternburg 2001, DeLong 1948). About 1,000 additional distributional records were added to the database for terrestrial species. Records for aquatic species were held in a separate database and include records cataloged in the INHS Insect Collections and at the Illinois State Museum. Based on the records in these georeferenced databases, spreadsheets containing the county records for each species were prepared and used to generate distributional maps for each species reviewed in this project (for examples see Figure 1 and Figure 2). Rarity was evaluated based on the statewide distribution with the number of known locations (see **Job 1. Criterion 3**).

For species with sufficient number of records declines in distribution were assessed using collection records summarized by county and categorized by broad time intervals (recent vs. historical). This effort was restricted primarily to the assessment of Ephemeroptera, Plecoptera, Trichoptera, and Odonata as data for these taxa were more widely available (e.g., Figure 2).

Job 3. Review criteria for additional species for potential listing as SGNC

We reviewed an additional 188 invertebrate species for potential listing as SGNC (Table 2) using the methods described above (Jobs 1 -2) for currently listed SGNC. Species reviewed were selected based on the 2014 Illinois Endangered and Threatened Species list and NatureServe global ranking changes since 2005. We also included 21 species associated with subterranean and cave habits, 55 species that were suggested for evaluation by the 2008 Invertebrate Endangered Species Technical Advisory Committee for the Illinois Endangered Species Protection Board (Cashett et al. 2008), species nominated by the Invertebrate Working Group, and species identified during our literature review as potentially rare or declining within Illinois (e.g., Burkle et al. 2013, Cameron et al. 2011, Grixti et al. 2009, DeWalt et al. 2005, DeWalt and Grubbs 2011, IESTAC 2008).

Three species were added to the State of Illinois T&E list in 2011 (*Pygmarrhopalites madonnensis*, *Diploperla robusta*, *Prostoia completa*) and five species (*Papaipema eryngii*, *Hesperia metea*, *Caecidotea spatulata*, *Paraphlepsius lupalus*, *Atrytone arogos*) had status modifications during the 2014 update. These changes were included in our assessments of these species.

Job 4. Assess stressors of species previously reviewed.

Appendix II of the 2005 IWAP did not include any information on habitat stresses, community stresses, population stresses, or direct human stresses for invertebrates other than mussels. Information concerning stressors for species being evaluated was compiled from the scientific literature where available. Little information that directly assesses stressors is available for most of the species we evaluated. Our literature review and an online survey of the working group (Table 3) were used to identify statewide stressors for each of the species previously reviewed. Our survey requested independent evaluations of habitat stressors and of species specific stressors. Responses were summarized separately for stressors to invertebrates in various habitat types (Table 5) and stressors on evaluated species (Table 6). Where insufficient information was available to identify stressors with confidence this was noted as an information gap.

We had hoped to identify statewide conservation objectives for each reviewed species as part of our assessment. However, due to a lack of specific information concerning most evaluated species, and a strong emphasis from our survey respondents that the extent and connectivity of habitats were major limiting factors, we focused these efforts on identifying conservation objectives to providing appropriate and connected habitats.

We developed a list of suggested Conservation Actions that focus on invertebrate conservation (Table 4). The majority of these Actions were associated with additional surveys in undersampled habitats or areas in that have not been recently surveyed.

Job 5. Complete Final Report and draft revisions of Appendix I and Appendix II for non-mollusk invertebrates.

Required quarterly reports and this final report were submitted to the IDNR project manager. Draft Revisions of Appendix I and Appendix II for reviewed species were provided as spreadsheets to IDNR prior to the completion of this project report.

Most of the species that were reviewed during this project met our rarity criteria because of the low number of records available and the lack of recent statewide surveys. Therefore, we generally required at least two criteria be met before recommending listing of invertebrate taxa as SGNC during this review.

Many species were recommended to be dropped from the list of SGNC due to a lack of information about the species. This included, but was not limited to, a lack of recent observations, extremely limited number of confirmed observations (including zero records in Illinois for 60 species that were reviewed), no evidence of rarity or decline in numbers or distribution within Illinois, and in several cases being undescribed species.

Species that are considered extirpated (SX) or presumed extirpated (SH) within Illinois were generally moved onto the Watch-List unless they were Federal or State listed as T&E or had a Global Rank of G1. Some G3 or G3G4 species were moved to the Watch-List due to the low total number of Illinois records (<3) or a lack of recent Illinois records (no records since 1950).

We kept currently listed SGNC if there was little evidence to support changing their status. Newly reviewed species with similar evidence for listing were placed on the Watch-List. Assessments of declining range or abundance were weighted more heavily than assessments of distributional rarity when deciding between SGNC or Watch-List status. Distributionally rare species were more likely to be Watch-Listed rather than given full SGNC listing because of the scarcity of recent invertebrate surveys in much of the state.

Species with their type locality in Illinois and Illinois endemics maintained their listed status (or were proposed for listing) even if the assessment would normally suggest placing them on the Watch-List because of their historical and regional importance.

Subregional rankings (S ranks) for all Illinois taxa have not been updated since they were originally made. In addition many of the NatureServe distributional records are incomplete and do not include known locations for Illinois species. Updating these ranks for invertebrates, and other taxa, should be a priority for IDNR.

Records for invertebrates in Illinois are biased toward collections for certain taxa based on the taxonomic interest of individuals working in the state. Leafhoppers, planthoppers, mayflies, stoneflies, caddisflies, dragonflies, butterflies and moths have many more records than other groups that we reviewed in this project even if these other groups are more specious or abundant (e.g., Coleoptera, Diptera, Hymenoptera). This is not generally a problem for some taxonomic groups within the IWAP that contain large individuals that are regularly surveyed because standard sampling methods attempt to capture the whole community (e.g., fish or waterfowl surveys). However, these types of efforts are not generally conducted for invertebrates where taxonomic based sampling is the norm (e.g., butterfly surveys, dragonfly surveys).

Watch-List of Invertebrate Species in Illinois

Many species that met only criterion 8 or that were unable to be adequately assessed have been put on a “Watch-List” of species that require additional information prior to having their conservation assessment completed.

A total of 246 species are recommended for an Invertebrate Watch-List based on the reviews performed (Table 1). The majority of these species met the distributional rarity criterion (recorded in six or fewer of the 102 Counties in Illinois) but have few, if any, verified records from Illinois in the past 30 years. Further review of these species by the Illinois Endangered Species Protection Board is suggested as some may have become extirpated within the State of Illinois. In a few cases, species have only recently been

identified from Illinois and there is no historical distribution information available. Watch-List status is recommended for these species as we learn more about them.

Note on Invertebrate Focal Species

Focal Species are designed to drive monitoring, assessment, and research priorities within the IWAP Campaigns during the implementation phase for the next ten years. Therefore, Action Items identified within the Campaigns should have performance measures associated with these Focal Species.

Suggested Non-mollusk Invertebrate Focal Species Groups for each Campaign:

1. Streams: Ephemeroptera, Plecoptera, Trichoptera, Odonata, crayfish
2. Farmland & Prairies: leafhoppers & planthoppers, Orthoptera, pollinators (Lepidoptera, Bees)
3. Wetlands: Odonata, Lepidoptera
4. Forests & Woodlands: Orthoptera, pollinators (Lepidoptera, Bees)
5. Invasive Species: none identified
6. Green Cities [Natural Areas]: pollinators (Lepidoptera, Bees)
7. Land & Stewardship: pollinators (Lepidoptera, Bees)

Special Note on Subterranean Habitats

Subterranean habitats, including caves, contain a distinct fauna that has been, and continues to be, undersampled. These habitats are rare, relatively unprotected, and are therefore vulnerable. Because of these factors all cave fauna could be considered rare (Criterion 3), restricted to rare and vulnerable habitats (Criterion 4) and of possible conservation concern (Criterion 8) even though we have little available information about them. However, not all subterranean species can be listed as SGNC despite their habitats being in great need of conservation. Most subterranean species that were reviewed in this assessment have been added as SGNC or added to the Watch-List to indicate that more information is needed to appropriately assess their status. However, because of the vulnerability and rarity of most subterranean species, especially those that reside in isolated caves, these habitats should be prioritized for protection while we learn more about the status of their inhabitants.

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Table 1. Illinois Invertebrate Species Watch-List. Available information suggests these species may meet one or more criteria sufficient for listing as a Species in Greatest Conservation Need. However, these invertebrate species do not currently have sufficient information available to fully evaluate their conservation status. List is generally ordered by insect Family within Orders.

EPHEMEROPTERA (Mayflies)

Scientific Name	Common Name
<i>Baetis tricaudatus</i>	Springbrook Small Minnow Mayfly
<i>Baetisca laurentina</i>	Laurentian Armored Mayfly
<i>Baetisca obesa</i>	Obese Armored Mayfly
<i>Centroptilum bifurcatum</i>	small minnow mayfly
<i>Cercobrachys winnebago</i>	Sand-Loving Caenid Mayfly
<i>Ephemerella dorothea</i>	spiny crawler mayfly
<i>Ephemerella excrucians</i>	spiny crawler mayfly
<i>Ephemerella invaria</i>	spiny crawler mayfly
<i>Ephemerella needhami</i>	spiny crawler mayfly
<i>Eurylophella funeralis</i>	spiny crawler mayfly
<i>Eurylophella lutulenta</i>	spiny crawler mayfly
<i>Eurylophella temporalis</i>	spiny crawler mayfly
<i>Habrophlebiodes americana</i>	fork gilled mayfly
<i>Heptagenia patoka</i>	flatheaded mayfly
<i>Hexagenia atrocaudata</i>	Burrowing Mayfly
<i>Homoeoneuria ammophila</i>	Sand-Loving Large Minnow Mayfly
<i>Maccaffertium pudicum</i>	flatheaded mayfly
<i>Macdunnoa persimplex</i>	flatheaded mayfly
<i>Paraleptophlebia moerens</i>	fork gilled mayfly
<i>Paraleptophlebia sticta</i>	fork gilled mayfly
<i>Plauditus veteris</i>	small minnow mayfly
<i>Procloeon simplex</i>	small minnow mayfly
<i>Procloeon viridoculare</i>	small minnow mayfly
<i>Serratella frisoni</i>	Frison's Serratellan Mayfly
<i>Siphloplecton interlineatum</i>	Sand Minnow Mayfly
<i>Sparbarus lacustris</i>	Horned Caenid Mayfly
<i>Spinadis simplex</i>	Wallace's Deepwater Mayfly
<i>Stenacron candidum</i>	flatheaded mayfly
<i>Stenacron gildersleevei</i>	Gildersleeve's <i>Stenacron</i> Mayfly
<i>Teloganopsis deficiens</i>	spiny crawler mayfly

Table 1. HEMIPTERA (True Bugs) continued from above

Scientific Name	Common Name
<i>Auridius helvus</i>	a leafhopper
<i>Bruchomorpha jocosus</i>	a planthopper
<i>Chlorotettix dentatus</i>	a leafhopper
<i>Chlorotettix limosus</i>	a leafhopper
<i>Commellus colon</i>	a leafhopper
<i>Cosmotettix beirnei</i>	a leafhopper
<i>Cosmotettix luteocephalus</i>	a leafhopper
<i>Daltonia estacada</i>	a leafhopper
<i>Delphacodes sagae</i>	a planthopper
<i>Diceroprocta vitripennis</i>	Green-Winged Scrub Cicada
<i>Draeculacephala paludosa</i>	a leafhopper
<i>Extrusanus oryssus</i>	a leafhopper
<i>Fitchiella robertsoni</i>	a planthopper
<i>Graminella oquaka</i>	a leafhopper
<i>Hebecephalus signatifrons</i>	a leafhopper
<i>Limotettix elegans</i>	a leafhopper
<i>Mesamia straminea</i>	Helianthus Leafhopper
<i>Okanagana balli</i>	Prairie Cicada
<i>Paraphilaenus parallelus</i>	a froghopper
<i>Paraphlepsius altus</i>	a leafhopper
<i>Paraphlepsius humidus</i>	a leafhopper
<i>Paraphlepsius incisus</i>	a leafhopper
<i>Paraphlepsius lobatus</i>	a leafhopper
<i>Paraphlepsius maculosus</i>	Peppered Paraphlepsius Leafhopper
<i>Paraphlepsius rossi</i>	a leafhopper
<i>Paraphlepsius umbellatus</i>	a leafhopper
<i>Pendarus punctiscriptus</i>	a leafhopper
<i>Prairiana cinerea</i>	a leafhopper

HYMENOPTERA (Bees & Wasps)

Scientific Name	Common Name
<i>Bombus borealis</i>	Northern Amber Bumble Bee
<i>Bombus ternarius</i>	Tri-Colored Bumble Bee
<i>Bombus terricola</i>	Yellowbanded Bumble Bee
<i>Bombus variabilis</i>	Variable Cuckoo Bumble Bee

Table 1. LEPIDOPTERA (Butterflies & Moths) continued from above

Scientific Name	Common Name
<i>Agonopterix lythrella</i>	an oecophorid moth
<i>Apamea lignicolora</i>	Wood-colored Apamea Moth
<i>Archanara laeta</i>	Red Sedge Borer
<i>Argyria auratella</i>	Curve-lined Argyria Moth
<i>Aristotelia elegantella</i>	a moth
<i>Atascosa glareosella</i>	a pyralid moth
<i>Aterpia approximana</i>	Sparkling Aterpia Moth
<i>Atrytonopsis hianna</i>	Dusted Skipper
<i>Callophrys irus</i>	Frosted Elfin
<i>Calyptra canadensis</i>	Canadian Owlet Moth
<i>Carectocultus perstitialis</i>	Reed-Boring Crambid Moth
<i>Catocala amestris</i>	Three-Staff Underwing
<i>Catocala atocala</i>	Brou's Underwing
<i>Catocala dulciola</i>	Quiet Or Sweet Underwing
<i>Catocala marmorata</i>	Marbled Underwing
<i>Catocala praeclara</i>	Praeclara Underwing
<i>Catocala similis</i>	Similar Underwing Moth
<i>Chlosyne harrisii</i>	Harris' Checkerspot
<i>Crambus girardellus</i>	Girard's Grass-Veneer Moth
<i>Cyclophora pendulinaria</i>	Sweetfern Geometer
<i>Digrammia eremiata</i>	Three-Lined Angle Moth
<i>Elaphria chalcedonia</i>	Chalcedony Midget Moth
<i>Erastria coloraria</i>	an inch worm moth
<i>Eremobina leucoscelis</i>	a noctuid moth
<i>Erynnis icelus</i>	Dreamy Duskywing
<i>Erynnis lucilius</i>	Columbine Duskywing
<i>Erynnis martialis</i>	Mottled Duskywing
<i>Erynnis persius</i>	Perseus Duskywing
<i>Eucloptocnemis fimbriaris</i>	Fringed Dart Moth
<i>Eucosma palabundana</i>	a tortricid moth
<i>Eucosma pandana</i>	a tortricid moth
<i>Eucosma rusticana</i>	a tortricid moth
<i>Eucosma sombreana</i>	a tortricid moth
<i>Euphyes bimacula</i>	Two-Spotted Skipper
<i>Euphyes dukesi</i>	Duke's Skipper
<i>Euxoa aurulenta</i>	Dune Cutworm
<i>Euxoa immixta</i>	Mixed Dart Moth
<i>Euxoa manitobana</i>	a moth
<i>Euxoa scandens</i>	White Cutworm Moth

Table 1. LEPIDOPTERA (Butterflies & Moths) continued from above

Scientific Name	Common Name
<i>Evora hemidesma</i>	Spirea Leaf-tier Moth
<i>Fagitana littera</i>	Marsh Fern Moth
<i>Feltia manifesta</i>	a moth
<i>Glaucopsyche lygdamus</i>	Silvery Blue
<i>Grapholita tristrigana</i>	Three-Lined Grapholita Moth
<i>Hadena capsularis</i>	a noctuid moth
<i>Hemileuca maia</i>	Buck Moth
<i>Hemileuca nevadensis</i>	Nevada Buck Moth
<i>Hesperia leonardus</i>	Leonard's Skipper
<i>Hesperia sassacus</i>	Indian Skipper
<i>Hyparpax aurora</i>	Pink Prominent
<i>Hypocoena inquinata</i>	Tufted Sedge Moth or Sordid Wainscot Moth
<i>Iodopepla u-album</i>	White-Eyed Borer Moth
<i>Lemmeria digitalis</i>	Fingered Lemmeria Moth
<i>Leucania extincta</i>	Sand Prairie Wainscot Moth
<i>Lycaena helloides</i>	Purplish Copper
<i>Lycaena xanthoides</i>	Great Copper
<i>Macrochilo (Hormisa) bivittata</i>	Two-Striped Cordgrass Moth
<i>Macrochilo (Hormisa) litophora</i>	Brown-Lined Owlet
<i>Macrochilo (Hormisa) louisiana</i>	Louisiana Macrochilo Moth
<i>Olethreutes comandranum</i>	a tortricid moth
<i>Oligia obtusa</i>	a noctuid moth
<i>Pachypolia atricornis</i>	Three-Horned Moth
<i>Paectes abrostolella</i>	Barrens Paectes
<i>Papaipema araliae</i>	Aralia Shoot Borer Moth
<i>Papaipema beeriana</i>	Blazing Star Stem Borer
<i>Papaipema leucostigma</i>	a borer moth
<i>Papaipema lysimachiae</i>	a borer moth
<i>Papaipema maritima</i>	Maritime Sunflower Borer
<i>Papaipema necopina</i>	Sunflower Borer Moth
<i>Papaipema nelita</i>	a borer moth
<i>Papaipema nepheleptena</i>	a borer moth
<i>Papaipema pterisii</i>	Braken Borer Moth
<i>Papaipema rigida</i>	a borer moth
<i>Papaipema rutila</i>	Mayapple Borer Moth
<i>Papaipema silphii</i>	Silphium Borer Moth
<i>Papaipema speciosissima</i>	Osmunda Borer or Regal Fern Borer
<i>Papaipema unimoda</i>	Meadow Rue Borer
<i>Parapoynx maculalis</i>	Polymorphic Pondweed Moth

Table 1. LEPIDOPTERA (Butterflies & Moths) continued from above

Scientific Name	Common Name
<i>Phalaenostola hanhami</i>	Hanham's Owlet
<i>Photodes panatela</i>	Northern Cordgrass Borer
<i>Plagiomimicus (Stibadium) spumosum</i>	Frothy Moth
<i>Plagiomimicus heitzmani</i>	a noctuid moth
<i>Platytes vobisne</i>	a pyralid moth
<i>Pococera baptisiella</i>	a moth
<i>Ponometia binocula</i>	Prairie Bird-Lime Moth
<i>Prionapteryx achatina</i>	a pyralid moth
<i>Prionapteryx nebulifera</i>	Clouded Veneer Moth
<i>Protorthodes incincta</i>	Banded Quaker
<i>Pseudeva purpurigera</i>	Straight-Lined Looper
<i>Pyrausta laticlavata</i>	Southern Purple Mint Moth
<i>Rhodoecia aurantiago</i>	Orange Sallow Moth
<i>Satyrium edwardsii</i>	a butterfly
<i>Schinia gaurae</i>	Clouded Crimson Moth
<i>Schinia gracilentia</i>	Slender Flower Moth or Iva Flower Moth
<i>Schinia indiana</i>	Phlox Moth
<i>Schinia jaguarina</i>	Jaguar Flower Moth
<i>Schinia lucens</i>	Leadplant Flower Moth
<i>Schinia nundina</i>	Goldenrod Flower Moth
<i>Schinia oleagina</i>	a noctuid moth
<i>Schinia sanguinea</i>	Bleeding Flower Moth
<i>Schizura apicalis</i>	Plain Schizura
<i>Speranza amboflava</i>	an inch worm moth
<i>Suleima helianthana</i>	Sunflower Bud Moth
<i>Sympistis riparia</i>	Dune Noctuid
<i>Tebenna silphiella</i>	Rosinweed Moth
<i>Triclonella determinatella</i>	a moth
<i>Ulolonche modesta</i>	a noctuid moth

Table 1. ODONATA (Dragonflies & Damselflies) continued from above

Scientific Name	Common Name
<i>Aeshna verticalis</i>	Green-Striped Darner
<i>Argia translata</i>	Dusky Dancer
<i>Arigomphus cornutus</i>	Horned Clubtail
<i>Arigomphus lentulus</i>	Stillwater Clubtail
<i>Arigomphus maxwelli</i>	Bayou Clubtail
<i>Calopteryx aequabilis</i>	River Jewelwing
<i>Celithemis verna</i>	Double-Ringed Pennant
<i>Chromagrion conditum</i>	Aurora Damsel
<i>Cordulegaster bilineata</i>	Brown Spiketail
<i>Cordulegaster erronea</i>	Tiger Spiketail
<i>Gomphus hybridus</i>	Cocoa Clubtail
<i>Gomphus spicatus</i>	Dusky Clubtail
<i>Gomphus ventricosus</i>	Skillet Clubtail
<i>Ischnura kellicotti</i>	Lilypad Forktail
<i>Ischnura ramburii</i>	Rambur's Forktail
<i>Leucorrhinia frigida</i>	Frosted Whiteface
<i>Macromia alleghaniensis</i>	Allegheny River Cruiser
<i>Neurocordulia xanthosoma</i>	Orange Shadowdragon
<i>Neurocordulia yamaskanensis</i>	Stygian Shadowdragon
<i>Sympetrum danae</i>	Black Meadowhalf
<i>Tachopteryx thoreyi</i>	Gray Petaltail
<i>Telebasis byersi</i>	Duckweed Forktail or Duckweed Firetail

ORTHOPTERA (Grasshoppers, Katydid, Crickets)

Scientific Name	Common Name
<i>Camnula pellucida</i>	Clear-Winged Grasshopper
<i>Gryllotalpa major</i>	Prairie Mole Cricket
<i>Hadrotettix trifasciatus</i>	Three-Banded Range Grasshopper
<i>Melanoplus dawsoni</i>	Dawson's Spur-Throat Grasshopper
<i>Neoconocephalus lyristes</i>	Bog Conehead Katydid
<i>Paratylotropidia brunneri</i>	Two-Lined Short-Winged Grasshopper

Table 1. TRICHOPTERA (Caddisflies) continued from above

Scientific Name	Common Name
<i>Brachycentrus numerosus</i>	brachycentrid caddisfly
<i>Cheumatopsyche speciosa</i>	net-spinning caddisfly
<i>Chimarra aterrima</i>	net-spinning caddisfly
<i>Diplectrona metequi</i>	Seep Inhabiting Net-Spinning Caddisfly
<i>Glossosoma intermedium</i>	saddle-case caddisfly
<i>Hesperophylax designatus</i>	coldwater stonecase caddisfly
<i>Hydatophylax argus</i>	coldwater stonecase caddisfly
<i>Hydropsyche arinale</i>	large river net-spinning caddisfly
<i>Hydropsyche cuanis</i>	net-spinning caddisfly
<i>Hydropsyche hageni</i>	large river net-spinning caddisfly
<i>Ironoquia lyrata</i>	stick-case caddis
<i>Lepidostoma griseum</i>	stick-case caddis
<i>Lepidostoma sommermanae</i>	stick-case caddis
<i>Micrasema rusticum</i>	brachycentrid Caddisfly
<i>Nyctiophylax serratus</i>	net-spinning caddisfly
<i>Polycentropus pentus</i>	net-spinning caddisfly
<i>Pseudostenophylax uniformis</i>	coldwater stickcase caddisfly
<i>Rhyacophila fuscula</i>	predaceous caddisfly
<i>Wormaldia moesta</i>	net-spinning caddisfly

Non-Insect Invertebrates

Scientific Name	Common Name
<i>Pygmarrhopalites fransjanssens</i>	a cave springtail
<i>Pygmarrhopalites incantator</i>	a cave springtail
<i>Pygmarrhopalites salemensis</i>	a cave springtail
<i>Rhyacodrilus subterraneus</i>	an aquatic worm

Table 2. Additional Non-mollusk Invertebrate Taxa reviewed for possible listing as SGNC in the 2015 IWAP update and revision.

ARACHNIDS	
Scientific Name	Common Name
<i>Porrhomma cavernicola</i>	Appalachian Cave Spider
CRUSTACEANS	
Scientific Name	Common Name
<i>Diporeia hoyi</i>	Great Lakes Amphipod
<i>Eubbranchipus bundyi</i>	Knobbed Lip Fairy Shrimp
<i>Eubbranchipus neglectus</i>	Neglected Fairy Shrimp
<i>Orconectes illinoiensis</i>	Illinois Crayfish
<i>Streptocephalus sealii</i>	Spinytail Fairy Shrimp
<i>Stygobromus lucifugus</i>	Rubious Cave Amphipod

OTHER Non-Insect	
Scientific Name	Common Name
<i>Onychiurus pipistrellae</i>	A Springtail
<i>Pygmarrhopalites fransjanssens</i>	A Cave Springtail
<i>Pygmarrhopalites incantator</i>	A Cave Springtail
<i>Pygmarrhopalites madonnensis</i>	Madonna Cave Springtail
<i>Pygmarrhopalites salemensis</i>	A Cave Springtail
<i>Rhyacodrilus subterraneus</i>	An aquatic worm

Table 2. INSECTS continued from above	
EPHEMEROPTERA (Mayflies)	
Scientific Name	Common Name
<i>Baetis tricaudatus</i>	Springbrook Small Minnow Mayfly
<i>Baetisca laurentina</i>	Laurentian Armored Mayfly
<i>Baetisca obesa</i>	Obese Armored Mayfly
<i>Centroptilum bifurcatum</i>	small minnow mayfly
<i>Cercobrachys winnebago</i>	sand-loving caenid mayfly
<i>Choroterpes basalis</i>	fork gilled mayfly
<i>Dannella lita</i>	spiny crawler mayfly
<i>Dannella simplex</i>	spiny crawler mayfly
<i>Ephemerella dorothea</i>	spiny crawler mayfly
<i>Ephemerella excrucians</i>	spiny crawler mayfly
<i>Ephemerella invaria</i>	spiny crawler mayfly
<i>Ephemerella needhami</i>	spiny crawler mayfly
<i>Eurylophella funeralis</i>	spiny crawler mayfly
<i>Eurylophella lutulenta</i>	spiny crawler mayfly
<i>Eurylophella temporalis</i>	spiny crawler mayfly
<i>Habrophlebiodes americana</i>	fork gilled mayfly
<i>Hexagenia atrocaudata</i>	burrowing mayfly
<i>Hexagenia rigida</i>	burrowing mayfly
<i>Isonychia arida</i>	large minnow mayfly
<i>Isonychia sayi</i>	Say's Large Minnow Mayfly
<i>Maccaffertium pudicum</i>	flatheaded mayfly
<i>Macdunnoa persimplex</i>	flatheaded mayfly
<i>Paraleptophlebia moerens</i>	fork gilled mayfly
<i>Paraleptophlebia ontario</i>	fork gilled mayfly
<i>Pentagenia vittigera</i>	Clay Burrowing Mayfly
<i>Pseudiron centralis</i>	White Sand-River Mayfly
<i>Raptoheptagenia cruentata</i>	flatheaded mayfly
<i>Rhithrogena manifesta</i>	flatheaded mayfly
<i>Serratella frisoni</i>	Frison's Serratellan Mayfly
<i>Siphloplecton interlineatum</i>	sand minnow mayfly
<i>Sparbarus lacustris</i>	Horned Caenid Mayfly
<i>Spinadis simplex</i>	Wallace's Deepwater Mayfly
<i>Stenacron candidum</i>	flatheaded mayfly
<i>Stenacron gildersleevei</i>	Gildersleeve's <i>Stenacron</i> Mayfly
<i>Stenacron minnetonka</i>	Minnetonka Flatheaded Mayfly
<i>Teloganopsis deficiens</i>	spiny crawler mayfly
<i>Tortopus primus</i>	burrowing mayfly

Table 2. HEMIPTERA (True Bugs) continued from above	
Scientific Name	Common Name
<i>Athysanella incongrua</i>	a leafhopper
<i>Bruchomorpha jocosa</i>	a planthopper
<i>Bruchomorpha tristis</i>	a planthopper
<i>Commellus cedilla</i>	a leafhopper
<i>Commellus comma</i>	a leafhopper
<i>Cuerna alpina</i>	a leafhopper
<i>Daltonia estacada</i>	a leafhopper
<i>Delphacodes sagae</i>	a planthopper
<i>Deltella decisa</i>	a leafhopper
<i>Diceroprocta vitripennis</i>	Green-winged Scrub Cicada
<i>Draeculacephala inscripta</i>	a leafhopper
<i>Draeculacephala paludosa</i>	a leafhopper
<i>Extrusanus oryssus</i>	a leafhopper
<i>Flexamia pectinata</i>	a leafhopper
<i>Graminella aureovittata</i>	a leafhopper
<i>Paraphlepsius lobatus</i>	a leafhopper
<i>Paraphlepsius truncatus</i>	a leafhopper
<i>Pendarus magnus</i>	a leafhopper
<i>Pendarus punctiscriptus</i>	a leafhopper
<i>Phylloscelis pallescens</i>	a planthopper
<i>Spangbergiella quadripunctata</i>	a leafhopper
<i>Tibicen dorsatus</i>	Giant Grassland Cicada or Bush Cicada
HYMENOPTERA (Bees & Wasps)	
Scientific Name	Common Name
<i>Bombus affinis</i>	Rusty-patched Bumble Bee
<i>Bombus borealis</i>	Northern Amber Bumble Bee
<i>Bombus pensylvanicus</i>	American Bumble Bee
<i>Bombus ternarius</i>	Tri-colored Bumble Bee
<i>Bombus terricola</i>	Yellowbanded Bumble Bee
<i>Bombus vagans</i>	Half-black Bumble Bee
<i>Bombus variabilis</i>	Variable Cuckoo Bumble Bee
LEPIDOPTERA (Butterflies & Moths)	
Scientific Name	Common Name
<i>Anacamptis wikeri</i>	a moth
<i>Danaus plexippus</i>	Monarch Butterfly

Table 2. ODONATA (Dragonflies & Damselflies) continued from above	
Scientific Name	Common Name
<i>Aeshna canadensis</i>	Canada darner
<i>Aeshna verticalis</i>	Green-striped Darner
<i>Argia translata</i>	Dusky Dancer
<i>Arigomphus cornutus</i>	Horned Clubtail
<i>Arigomphus lentulus</i>	Stillwater Clubtail
<i>Arigomphus maxwelli</i>	Bayou Clubtail
<i>Calopteryx aequabilis</i>	River Jewelwing
<i>Celithemis verna</i>	Double-ringed Pennant
<i>Chromagrion conditum</i>	Aurora Damsel
<i>Cordulegaster bilineata</i>	Brown Spiketail
<i>Cordulegaster erronea</i>	Tiger Spiketail
<i>Enallagma divagans</i>	Turquoise Bluet
<i>Epiptera spinigera</i>	Spiny Baskettail
<i>Gomphus hybridus</i>	Cocoa Clubtail
<i>Gomphus spicatus</i>	Dusky Clubtail
<i>Ischnura kellicotti</i>	Lilypad Forktail
<i>Ischnura ramburii</i>	Rambur's Forktail
<i>Ladona julia</i>	Chalk-fronted Corporal
<i>Leucorrhinia frigida</i>	Frosted Whiteface
<i>Macromia alleghaniensis</i>	Allegheny River Cruiser
<i>Neurocordulia xanthosoma</i>	Orange Shadowdragon
<i>Neurocordulia yamaskanensis</i>	Stygian Shadowdragon
<i>Sympetrum danae</i>	Black Meadowhalf
<i>Tachopteryx thoreyi</i>	Gray Petaltail
<i>Telebasis byersi</i>	Duckweed Forktail or Duckweed Firetail
ORTHOPTERA (Grasshoppers, Katydid, Crickets)	
Scientific Name	Common Name
<i>Camnula pellucida</i>	Clear-winged Grasshopper
<i>Hadrotettix trifasciatus</i>	Three-banded Range Grasshopper
<i>Paratylotropidia brunneri</i>	Two-lined Short-winged Grasshopper

Table 2. PLECOPTERA (Stoneflies) continued from above	
Scientific Name	Common Name
<i>Acroneuria abnormis</i>	Common Stone
<i>Acroneuria evoluta</i>	Constricted Stone
<i>Acroneuria filicis</i>	Illinois Stone
<i>Acroneuria frisoni</i>	Central Stone
<i>Acroneuria internata</i>	Lobed Stone
<i>Acroneuria perplexa</i>	Enigmatic Stone
<i>Agnatina capitata</i>	Northern Stone
<i>Agnatina flavescens</i>	Midwestern Stone
<i>Allocaupnia nivicola</i>	Brook Snowfly
<i>Allocaupnia smithi</i>	Three-lobed Snowfly
<i>Alloperla roberti</i>	Illinois Sallfly
<i>Attaneuria ruralis</i>	giant Stone
<i>Diploperla robusta</i>	Robust Springfly
<i>Isoperla burksi</i>	Banded Stripetail
<i>Isoperla conspicua</i>	Rare Stripetail
<i>Isoperla longiseta</i>	Plains Stripetail
<i>Isoperla marlynia</i>	Midwestern Stripetail
<i>Isoperla mohri</i>	Texas Stripetail
<i>Isoperla richardsoni</i>	Sterling Stripetail
<i>Leuctra alta</i>	Alta Needlefly
<i>Leuctra sibleyi</i>	Brook Needlefly
<i>Leuctra tenuis</i>	Narrow-lobed Needlefly
<i>Nemocaupnia carolina</i>	Southern Snowfly
<i>Nemoura trispinosa</i>	Three-spined Forestfly
<i>Neoperla catharae</i>	Slippery Stone
<i>Neoperla clymene</i>	Coastal Stone
<i>Neoperla harpi</i>	Arkansas Stone
<i>Neoperla mainensis</i>	Maine Stone
<i>Neoperla occipitalis</i>	Atlantic Stone
<i>Neoperla robisoni</i>	Slender Stone
<i>Neoperla stewarti</i>	Multispine Stone
<i>Paracaupnia angulata</i>	Angulate Snowfly
<i>Paragnetina kansensis</i>	Pallid Stone
<i>Paragnetina media</i>	Embossed Stone
<i>Perlesta cinctipes</i>	Plains Stone
<i>Perlesta ephelida</i>	Freckled Stone
<i>Perlesta ouabache</i>	Wabash Stone

Table 2. PLECOPTERA (Stoneflies) continued from above	
Scientific Name	Common Name
<i>Perlesta teaysia</i>	Teays Stone
<i>Prostoia hallasi</i>	Swamp forestfly
<i>Prostoia ozarkensis</i>	Ozark Forestfly
<i>Prostoia similis</i>	Longhorn Forestfly
<i>Shipsa rotunda</i>	Intrepid Forestfly
<i>Soyedina vallicularia</i>	Valley Forestfly
<i>Strophopteryx fasciata</i>	Mottled Willowfly
<i>Taeniopteryx lita</i>	Small Willowfly
<i>Taeniopteryx metequi</i>	Shortwing Willowfly
<i>Taeniopteryx parvula</i>	Hooked Willowfly
<i>Zealeuctra fraxina</i>	Ash Cave Needlefly
<i>Zealeuctra narfi</i>	Northern Needlefly

Table 2. TRICHOPTERA (Caddisflies) continued from above	
Scientific Name	Common Name
<i>Banksiola crotchi</i>	giant-case caddis
<i>Brachycentrus lateralis</i>	brachycentrid caddisfly
<i>Brachycentrus nigrosoma</i>	brachycentrid caddisfly
<i>Brachycentrus numerosus</i>	brachycentrid caddisfly
<i>Cheumatopsyche speciosa</i>	net-spinning caddisfly
<i>Chimarra aterrima</i>	net-spinning caddisfly
<i>Chimarra aterrima</i>	net-spinning caddisfly
<i>Diplectrona metequi</i>	Seep Inhabiting Net-spinning Caddisfly
<i>Fabria inornata</i>	giant-case caddis
<i>Frenesia missa</i>	Sandboil Caddisfly
<i>Glossosoma intermedium</i>	saddle-case caddisfly
<i>Hesperophylax designatus</i>	coldwater stonecase caddisfly
<i>Hydatophylax argus</i>	coldwater stickcase caddisfly
<i>Hydropsyche arinale</i>	large river net-spinning caddisfly
<i>Hydropsyche arinale</i>	large river net-spinning caddisfly
<i>Hydropsyche cuanis</i>	net-spinning caddisfly
<i>Hydropsyche cuanis</i>	net-spinning caddisfly
<i>Hydropsyche hageni</i>	large river net-spinning caddisfly
<i>Hydropsyche placoda</i>	large river net-spinning caddisfly
<i>Ironoquia lyrata</i>	stick-case caddis
<i>Lepidostoma griseum</i>	stick-case caddis
<i>Lepidostoma sommermanae</i>	stick-case caddis
<i>Leucotrichia pictipes</i>	microcaddisfly
<i>Micrasema rusticum</i>	brachycentrid caddisfly
<i>Nyctiophylax serratus</i>	net-spinning caddisfly
<i>Polycentropus pentus</i>	net-spinning caddisfly
<i>Pseudostenophylax uniformis</i>	coldwater stickcase caddisfly
<i>Rhyacophila fuscula</i>	predaceous caddisfly
<i>Rhyacophila ledra</i>	predaceous caddisfly
<i>Wormaldia moesta</i>	net-spinning caddisfly

Table 3. List of respondents to online Habitat and Taxa Surveys.Habitat Survey

<u>Name</u>	<u>Affiliation</u>	<u>Expertise</u>
Sydney Cameron	Entomology Department; UIUC	Hymenoptera, specifically Bees
Chris Dietrich	Illinois Natural History Survey	Insecta
Chris Grinter	Illinois Natural History Survey	Lepidoptera/Microlepidoptera
Sam Heads	Illinois Natural History Survey	Insecta: Orthoptera
Michael Jeffords	Illinois Natural History Survey	Butterflies and other Lepidoptera
Matthew L. Niemiller	Illinois Natural History Survey	Cave fauna
Jason Robinson	Illinois Natural History Survey	Aquatic Insects
Steven J Taylor	Illinois Natural History Survey	Cave Invertebrates
James R. Wiker	Illinois State Museum, INHS	Lepidoptera

Taxa Survey

<u>Name</u>	<u>Affiliation</u>	<u>Expertise</u>
Sydney Cameron	Entomology Department; UIUC	Hymenoptera, specifically Bees
Tim Cashett	Illinois State Museum	Odonata
Ed DeWalt	Illinois Natural History Survey	Aquatic Insects
Chris Dietrich	Illinois Natural History Survey	Insecta
Chris Grinter	Illinois Natural History Survey	Lepidoptera/Microlepidoptera
Sam Heads	Illinois Natural History Survey	Insecta: Orthoptera
Michael Jeffords	Illinois Natural History Survey	Butterflies and other Lepidoptera
Matthew L Niemiller	Illinois Natural History Survey	Cave fauna
Jason Robinson	Illinois Natural History Survey	Aquatic Insects
Steven J. Taylor	Illinois Natural History Survey	Cave Invertebrates
James R. Wiker	Illinois State Museum, INHS	Lepidoptera

Table 4. List of recommended Conservation Actions to assist with the conservation of invertebrates in Illinois.

1. Resurvey Lepidoptera in Putnam County at locations associated with the Glenn collection at INHS.
2. Resurvey Lepidoptera in Cook and Lake Counties for species with very few records (i.e., Panzer collections from Illinois Beach State Park).
3. Begin evaluations for underrepresented groups including basic statewide surveys for Coleoptera and Diptera in Illinois.
4. Continue efforts to assess the status of invertebrates in subterranean habitats.
5. Conduct targeted surveys and other efforts to assess the status of Watch-List species.
6. Focus stewardship actions toward maintaining host species for SGNC invertebrates.
7. Work with partners and on public lands to improve stewardship of native pollinators and their host plants (including CRP/CREP to enhance pollinator habitat, schoolyard and backyard habitat programs).
8. Springs and springbrooks should be surveyed for rare invertebrate taxa.
9. Certain habitat types that have been historically undersampled should be systematically surveyed to assess their status and that of associated fauna (e.g., caves, deep water habitats, headwater streams, large rivers).
10. Begin and continue to collect appropriate information to conduct status assessments for invertebrate SGNC.
11. Begin to collect information needed for Adaptive Management of invertebrate SGNC and their habitats (P/A is not sufficient).
12. Develop a process for systematically evaluating the status of species that have not been observed in Illinois in decades. How are species declared SX or SH in Illinois?
13. Conduct surveys at all Nature Preserves for rare invertebrate species.
14. Many of the species that are known in Illinois from only a small number of records should be evaluated, or reevaluated, by the Illinois Endangered Species Protection Board. SGNC status would be achieved by state listing as Threatened or Endangered and then these species could be managed appropriately under the correct program (i.e., Endangered Species Program rather than SWAP).
15. School yard, backyard, and roadside initiatives to enhance pollinator habitat.
16. Consider impacts to invertebrate conservation when planning stewardship activities (especially when developing burn plans and the use of herbicides or pesticides).
17. Establish a sentinel monitoring program for invertebrates in all major habitat types.
18. Conduct surveys at historic locations of T&E species to evaluate their status.

Table 5. Proportion of survey respondents commenting on the stressor that indicated it negatively impacts habitat utilization by non-mollusk invertebrates. Ten individuals responded to our survey request. Stressors are described below the Table.

Habitat Type	Stressor						number of respondents
	Extent	Fragmentation	Composition/ Structure	Disturbance/ Hydrology	Invasives/ Exotics	Pollutants/ Sediment	
Upland Forest	0.50	1	0.67	1	0.83	0.17	6
Sand Forest	0.83	1	0.50	1	0.67	0.33	6
Floodplain	0.50	0.50	0.67	1	0.83	0.67	6
Flatwoods	0.40	0.60	0.20	0.80	1	0.20	5
Successional	0.33	0	0.33	0	0.67	0.67	3
Coniferous Plantation	0	0	0.50	0	0	0.50	2
Savanna	0.80	1	0.80	1	0.80	0.40	5
Sand Savanna	1	1	0.60	1	0.60	0.40	5
Barren	0.75	0.50	0.50	0.50	1	0.25	4
Prairie	1	1	0.83	0.67	0.50	0.50	6
Sand Prairie	1	1	0.80	1	0.60	0.80	5
Gravel Prairie	1	0.75	0.50	0.75	0.75	0.50	4
Dolomite Prairie	1	0.75	0.25	1	1	0.50	4
Hill Prairie	1	0.80	0.80	0.80	0.60	0.40	5
Shrub Prairie	1	0.75	0.75	1	1	0.50	4
Pasture	0	0	0.50	0.25	0.75	0.75	4
Idle-Introduced	0	0	1	0.50	0.50	0.50	2
Early Successional	0.25	0.25	0.50	0.25	0.75	0.50	4
Hay	0	0	0.50	0.25	0.75	0.75	4
Marsh	0.83	0.83	0.67	1	0.83	0.83	6
Swamp	1	0.67	0.50	0.83	0.67	0.83	6
Bog	1	0.83	0.67	0.67	0.83	0.83	6
Fen	1	0.67	0.67	0.67	0.83	0.83	6
Sedge Meadow	0.80	0.80	0.80	1	1	0.60	5
Panne	1	0.50	0	0.50	0.50	1	2
Seep and Spring	0.75	0.50	0.75	0.75	0.75	0.75	4
Vernal Pool or Flat	0.67	0.67	0.33	1	0.67	1	3
Natural Pond	0.75	0.50	0.75	0.75	0.75	1	4
Natural Glacial or Inland Lake	0.60	0.20	0.60	0.80	1	1	5
Floodplain Lake, Slough or Backwater	0.80	0.60	0.20	0.80	1	1	5
Lake Michigan	0.20	0	0.20	0.40	1	1	5

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Small Impoundment	0.20	0.20	0.40	0.80	1	1	5
Large Reservoir	0	0	0.25	0.75	1	1	4
Headwater Stream	0.60	0.60	0.40	0.80	0.80	1	5
Coolwater Stream	0.60	0.60	0.40	0.80	0.40	1	5
Creek	0.50	0.50	0.25	0.75	0.75	1	4
River	0	0.40	0.40	0.60	1	1	5
Major River	0	0.50	0.50	0.50	1	1	4
Glade	0.33	0.33	0.67	0.33	1	0.33	3
Cliff	0.33	0.33	0.67	0.67	0.67	0	3
Lake Shore	1	1	0.67	1	0.67	1	3
Cave (Aquatic)	0.75	0.50	0.75	1	0.50	1	4
Cave (Terrestrial)	0.80	0.40	0.60	1	0.40	1	5
Cropland	0	0	0	0.50	0	1	2
Urban, Suburban or Exurban Land	0	0	0.67	0.67	0.67	1	3

Stressor descriptions:

Extent: Amount of habitat available for use by invertebrates.

Fragmentation: The breakup of large habitat patches into smaller, separate pieces. Includes degree of isolation, position of fragments relative to one another, fragment size and edge effects.

Composition/Structure: The elements contained within or characteristics of a habitat (e.g., vegetative composition, soil characteristics).

Disturbance/Hydrology: Frequency, timing and intensity of natural and anthropogenic disturbances (e.g., fire, flooding, water withdrawal).

Invasives/Exotics: Novel species that physically or chemically alter the habitat.

Pollution/Sedimentation: Chemical, thermal and physical materials that alter the habitat.

Table 6. Summarized responses for species stressor survey. Values are proportion of respondents (of those that commented on the stressor) indicating a stressor negatively impacts the species. Ten respondents participated in the survey. Stressors are described below the Table.

Taxon	No Information	Competitors	Predators	Parasites/ Disease	Prey/Food	Hosts	Genetics	Dispersal	Recruitment	Mortality	Non-Targeted Killing	Number of Respondents
Phyla Annelida and Platyhelminthes												
<i>Sphalloplana hubrichti</i>	0.8	0	0	0	0.2	0	0	0.4	0	0	0.2	5
<i>Rhyacodrilus subterraneus</i>	0.8	0	0	0	0.2	0	0	0.4	0	0	0.2	5
Classes												
Arachnida and Entognatha												
<i>Centruroides vittatus</i>	0.2	0	0	0	0	0	0.2	0.6	0.4	0.2	0.8	5
<i>Mundochthonius cavernicola</i>	0.6	0	0	0	0	0	0.2	0.4	0.2	0	0	5
<i>Porrhomma cavernicola</i>	0.6	0	0	0	0.2	0	0.2	0.4	0.2	0	0	5
<i>Onychiurus pipistrellae</i>	0.6	0	0	0	0.2	0	0.2	0.4	0.2	0	0.2	5
<i>Oncopodura iowae</i>	0.6	0	0	0	0.2	0	0.2	0.4	0.2	0	0.2	5
<i>Pygmarhopalites fransjanssens</i>	0.6	0	0	0	0.2	0	0.2	0.4	0.2	0	0.2	5
<i>Pygmarhopalites incantator</i>	0.6	0	0	0	0.2	0	0.2	0.4	0.2	0	0.2	5
<i>Pygmarhopalites madonnensis</i>	0.6	0	0	0	0.2	0	0.2	0.4	0.2	0	0.2	5
<i>Pygmarhopalites salemensis</i>	0.6	0	0	0	0.2	0	0.2	0.4	0.2	0	0.2	5
Class Crustacea												
<i>Eubbranchipus bundyi</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Eubbranchipus neglectus</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Streptocephalus sealii</i>	1	0	0	0	0	0	0	0	0	0	0	3

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<i>Caecidotea beattyi</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Caecidotea bicrenata</i>	0.7	0	0	0	0.2	0	0.2	0.2	0	0	0.2	4
<i>Caecidotea lesliei</i>	5				5		5	5			5	
<i>Caecidotea packardi</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Caecidotea spatulata</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Caecidotea tridentata</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Cambarus tenebrosus</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Orconectes illinoiensis</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Orconectes indianensis</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Orconectes kentuckiensis</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Orconectes lancifer</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Orconectes placidus</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Orconectes stannardi</i>	1	0	0	0	0	0	0	0	0	0	0	3
<i>Bactrurus brachycaudus</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Crangonyx anomalus</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Crangonyx packardi</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Stygobromus iowae</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Stygobromus lucifigus</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Stygobromus subtilis</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Diacyclops yeatmani</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Gammarus acherondytes</i>	0.6	0	0	0	0.2	0	0.2	0.4	0	0	0.2	5
<i>Gammarus bousfieldi</i>	1	0	0	0	0	0	0	0	0	0	0	3
Orders Coleoptera and Ephemeroptera												
<i>Pseudanophthalmus illinoisensis</i>	0.5	0.2	0	0	0.2	0	0.2	0.5	0.25	0	0.2	4
	0	5			5		5	0			5	

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<i>Cicindela ancocisconensis</i>	0.67	0	0	0	0	0	0	0	0.33	0.33	0	0	3
<i>Dicranopselaphus veriegatus</i>	1	0	0	0	0	0	0	0	0	0	0	0	2
<i>Nicrophorus americanus</i>	0.5	0	0	0	0.5	0.5	0	0	0.5	0	0.5	0	2
<i>Rimulicola divalis</i>	1	0	0	0	0	0	0	0	0	0	0	0	2
<i>Acanthametropus pecatonica</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Camelobaetidius waltzi</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Centroptilum walshi</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Cloeon cognatum</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Plauditus veteris</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Procloeon irrubrum</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Procloeon mendax</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Procloeon quaesitum</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Procloeon simplex</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Serratella frisoni</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Heptagenia patoka</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Paraleptophlebia sticta</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Homoeoneuria ammophila</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
<i>Siphonurus marshalli</i>	1	0	0	0	0	0	0	0	0	0	0	0	3
Taxon	No Information	Competitors	Predators	Parasites/Disease	Prey/Food	Hosts	Genetics	Dispersal	Recruitment	Mortality	Non-Targeted	Number of Respondents	
Order Hemiptera													

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<i>Paraphilaenus parallelus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Aphelonema (Nenema) histrionica</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Bruchomorpha extensa</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Bruchomorpha jocosa</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Bruchomorpha oculata</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Bruchomorpha tristis</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Fitchiella robertsoni</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Aflexia rubranura</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Amblysellus acuerus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Athysanella balli</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Athysanella incongrua</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Attenuipyga vanduzeei</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Auridius helvus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Chlorotettix dentatus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Chlorotettix fumidus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Chlorotettix limosus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Chlorotettix nudatus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Cicadula cyperacea</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Cicadula ornata</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Cicadula straminea</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Commellus cedilla</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Commellus colon</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Commellus comma</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	

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<i>Cosmotettix beirnei</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Cosmotettix bilineatus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Cosmotettix delector</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Cosmotettix luteocephalus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Daltonia estacada</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Deltocephalus gnarus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Destria fumida</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Extrusanus oryssus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Flexamia abbreviata</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Flexamia albida</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Flexamia areolata</i>	0.6	0	0	0	0	0	0	0	0	0	0.3	3
	7										3	
<i>Flexamia atlantica</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Flexamia grammica</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Flexamia pectinata</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Flexamia pyrops</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Graminella aureovittata</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Graminella oquaka</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Hebecephalus signatifrons</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Kansendria kansiensis</i>	0.6	0	0	0	0	0.3	0	0	0	0	0	3
	7					3						
<i>Laevicephalus minimus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Laevicephalus peronatus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Limotettix elegans</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Limotettix nigrax</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
	7					3		3			3	
<i>Limotettix</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3

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<i>parallelus</i>	7					3		3			3	
<i>Limotettix</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>pseudosphagneticus</i>	7					3		3			3	
<i>Limotettix truncatus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Lonatura catalina</i>	7					3		3			3	
<i>Macrosteles pоторius</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Memnonia panzeri</i>	7					3		3			3	
<i>Mesamia straminea</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Paraphlepsius altus</i>	7					3		3			3	
<i>Paraphlepsius carolinus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Paraphlepsius electus</i>	7					3		3			3	
<i>Paraphlepsius humidus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Paraphlepsius incisus</i>	7					3		3			3	
<i>Paraphlepsius lascivius</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Paraphlepsius lobatus</i>	7					3		3			3	
<i>Paraphlepsius lupalus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Paraphlepsius maculosus</i>	7					3		3			3	
<i>Paraphlepsius nebulosus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Paraphlepsius rossi</i>	7					3		3			3	
<i>Paraphlepsius solidaginis</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Paraphlepsius texanus</i>	7					3		3			3	
<i>Paraphlepsius truncatus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Paraphlepsius umbellatus</i>	7					3		3			3	
<i>Paraphlepsius umbrosus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Pendarus</i>	7					3		3			3	
<i>Pendarus</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3

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<i>punctiscriptus</i>	7					3		3			3		
Taxon	No	Information	Competitors	Predators	Parasites/ Diseases	Prey/Food	Hosts	Genetics	Dispersal	Recruitment	Mortality	Non-Targeted	Number of Respondents
<i>Polyamia compacta</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Polyamia dilata</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Polyamia herbida</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Polyamia interrupta</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Polyamia obtecta</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Polyamia rossi</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Polyamia similaris</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Prairiana cinerea</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Rosenus cruciatus</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Scaphytopius abbreviatus</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Scaphytopius cinereus</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Scaphytopius dorsalis</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Scaphytopius magdalensis</i>	1	7	0	0	0	0	0	0	0	0	0	0	2
<i>Scaphytopius rubellus</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Spangbergiella quadripunctata</i>	1	7	0	0	0	0	0	0	0	0	0	0	2
<i>Streptanus aemulans</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Stroggylocephalus mixtus</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Texananus cumulatus</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Texananus decorus</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>Xerophloea major</i>	0.6	7	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3

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<i>Xerophloea</i>	0.6	0	0	0	0	0	0	0.3	0.33	0	0.3	3
<i>peltata</i>	7							3			3	
<i>Diceroprocta</i>	0.6	0	0	0	0	0	0	0.3	0.33	0	0	3
<i>vitripennis</i>	7							3				
<i>Okanagana balli</i>	0.6	0	0	0	0	0	0	0.3	0.33	0	0	3
	7							3				
<i>Delphacodes</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>sagae</i>	7					3		3			3	
<i>Phylloscelis</i>	0.6	0	0	0	0	0.3	0	0.3	0.33	0	0.3	3
<i>pallescens</i>	7					3		3			3	
Order Lepidoptera												
<i>Acrolepiopsis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>leucoscia</i>	0					0		0		0	0	
<i>Pygarctia</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0	2
<i>spraguei</i>	0					0		0		0		
<i>Tebenna silphiella</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
	0					0		0		0	0	
<i>Triclonella</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>determinatella</i>	0					0		0		0	0	
<i>Anacampsis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>wikeri</i>	0					0		0		0	0	
<i>Aristotelia</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>elegantella</i>	0					0		0		0	0	
<i>Stegasta</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>bosqueella</i>	0					0		0		0	0	
<i>Apodrepanulatrix</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>liberaria</i>	0					0		0		0	0	
<i>Cyclophora</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>pendulinaria</i>	0					0		0		0	0	
<i>Digrammia</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>eremiata</i>	0					0		0		0	0	
<i>Digrammia</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>ordinata</i>	0					0		0		0	0	
<i>Erastria coloraria</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
	0					0		0		0	0	
<i>Euchlaena milnei</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
	0					0		0		0	0	
<i>Petrophora</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>subaequaria</i>	0					0		0		0	0	
<i>Amblyscirtes</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>aesculapius</i>												
<i>Amblyscirtes</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>carolina</i>												
<i>Amblyscirtes linda</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Amblyscirtes</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>reversa</i>												
<i>Atrytone arogos</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3

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	7										3	
<i>Atrytonopsis</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
<i>hianna</i>	7										3	
<i>Erynnis icelus</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Erynnis lucilius</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Erynnis martialis</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Erynnis persius</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Euphyes bimacula</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Euphyes dion</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Euphyes dukesi</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Euphyes</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
<i>niveilinea</i>	7										3	
<i>Hesperia attalus</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Hesperia dacotae</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Hesperia</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
<i>leonardus</i>	7										3	
<i>Hesperia metea</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Hesperia ottoe</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Hesperia sassacus</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Oarisma</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
<i>powesheik</i>	7										3	
<i>Poanes viator</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Problema byssus</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
	7										3	
<i>Callophrys irus</i>	0.3	0	0	0	0	0.3	0	0.3	0.67	0	0.6	3
	3					3		3			7	
<i>Callophrys polios</i>	0.3	0	0	0	0	0.3	0	0.3	0.67	0.3	0.6	3
	3					3		3		3	7	
<i>Glaucopsyche</i>	0.3	0	0	0	0	0.3	0	0.3	0.33	0.3	0.6	3
<i>lydamus</i>	3					3		3		3	7	
<i>Lycaeides melissa</i>	0.3	0	0	0	0	0.3	0.3	0.3	0.67	0.3	0.6	3
<i>samuelis</i>	3					3	3	3		3	7	
<i>Lycaena helloides</i>	0.3	0	0	0	0	0.3	0.3	0.3	0.67	0.3	0.6	3
	3					3	3	3		3	7	

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<i>Lycaena xanthoides</i>	0.6	0	0	0	0	0	0	0	0.33	0	0.3	3
<i>Satyrrium edwardsii</i>	0.3	0	0	0	0	0	0	0.3	0.67	0.3	0.6	3
<i>Abagrotis orbis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Acontia lactipennis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Acronicta tritona</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Agrotis stigmosa</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Apamea (Agroperina) lutosa</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Apamea (Crymodes) relicina</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
Taxon	No Information	Competitors	Predators	Parasites/Disease	Prey/Food	Hosts	Genetics	Dispersal	Recruitment	Mortality	Non-Targeted	Number of Respondents
<i>Apamea alia</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Apamea impulsa</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Apamea indocilis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Apamea lignicolora</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Archanara laeta</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Archanara subflava</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Bagisara gulnare</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Calyptra canadensis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Capis curvata</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Caradrina meralis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala abbreviatella</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala amestris</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2

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<i>Catocala antinympha</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala atocala</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala dulciola</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala gracilis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala marmorata</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala praeclara</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala relictata</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala similis</i>	0.5	0	0	0	0	0.5	0	0.5	0	0.5	0.5	2
<i>Catocala sordida</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
<i>Catocala whitneyi</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
<i>Cryptocala acadensis</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
<i>Derrima stellata</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
<i>Dichagyris grotei</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
<i>Elaphria chalcedonia</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
<i>Eremobina jocasta</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
<i>Eucoptocnemis fimbriaris</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
<i>Euxoa albipennis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Euxoa aurulenta</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Euxoa immixta</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Euxoa manitobana</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Euxoa scandens</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Fagitana littera</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Feltia manifesta</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Gabara subnivosella</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Hadena capsularis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Hadena ectypa</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Homorthodes furfurata</i>	1	0	0	0	0	0	0	0	0	0	0	2

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<i>Hydraecia</i> (<i>Hydroecia</i>) <i>immanis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Hydraecia</i> <i>stramentosa</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Hypocoena</i> <i>inquinata</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Iodopepla</i> <i>ualbum</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Lemmeria</i> <i>digitalis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Leucania</i> <i>extincta</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Lycophotia</i> <i>phyllophora</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Macrochilo</i> (<i>Hormisa</i>) <i>bivittata</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Macrochilo</i> (<i>Hormisa</i>) <i>litophora</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Macrochilo</i> (<i>Hormisa</i>) <i>louisiana</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Melanchra</i> <i>assimilis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Melanomma</i> <i>auricinctaria</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Meropleon</i> <i>diversicolor</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Oligia</i> <i>obtusa</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Pachypolia</i> <i>atricornis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Paectes</i> <i>abrostolella</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Pangrapta</i> <i>decoralis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Papaipema</i> <i>aerata</i>	0.6 7	0	0	0	0	0.3 3	0	0	0	0.3 3	0.3 3	3
<i>Papaipema</i> <i>araliae</i>	0.6 7	0	0	0	0	0.3 3	0	0	0	0.3 3	0.3 3	3
<i>Papaipema</i> <i>beeriana</i>	0.6 7	0	0	0	0	0.3 3	0	0	0	0.3 3	0.3 3	3
<i>Papaipema</i> <i>birdi</i>	0.6 7	0	0	0	0	0.3 3	0	0	0	0.3 3	0.3 3	3
<i>Papaipema</i> <i>cerina</i>	0.6 7	0	0	0	0	0.3 3	0	0	0	0.3 3	0.3 3	3
<i>Papaipema</i> <i>cerussata</i>	0.6 7	0	0	0	0	0.3 3	0	0	0	0.3 3	0.3 3	3

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<i>Papaipema eryngii</i>	0.3	0	0	0	0	0.3	0	0.3	0.33	0.3	0.6	3	
	3					3		3		3	7		
<i>Papaipema eupatorii</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema harrisii</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema inquaesita</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema leucostigma</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema limpida</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema lysimachiae</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema maritima</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema necopina</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema nelita</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema nepheleptena</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema pterisii</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema rigida</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema rutila</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
Taxon													
	No	Information	Competitors	Predators	Parasites/ Disease	Prey/Food	Hosts	Genetics	Dispersal	Recruitment	Mortality	Non-Targeted	Number of Respondents
<i>Papaipema sciata</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema silphii</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema speciosissima</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Papaipema unimoda</i>	0.6	0	0	0	0	0.3	0	0	0	0.3	0.3	3	
	7					3				3	3		
<i>Phalaenostola hanhami</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Photedes defecta</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Photedes enervata</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Photedes includens</i>	1	0	0	0	0	0	0	0	0	0	0	2	

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<i>Photedes inops</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Photedes panatela</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Phytometra ernestinana</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Plagiomimicus (Stibadium) spumosum</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Plagiomimicus heitzmani</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Plusia venusta</i>	1	0	0	0	0	0	0	0	0	0.5	0.5	2
										0	0	
<i>Ponometia binocula</i>	1	0	0	0	0	0	0	0	0	0.5	0.5	2
										0	0	
<i>Protorthodes incincta</i>	1	0	0	0	0	0	0	0	0	0.5	0.5	2
										0	0	
<i>Psectraglaea carnosa</i>	1	0	0	0	0	0	0	0	0	0.5	0.5	2
										0	0	
<i>Pseudeva purpurigera</i>	1	0	0	0	0	0	0	0	0	0.5	0.5	2
										0	0	
<i>Rhodoecia aurantiago</i>	1	0	0	0	0	0	0	0	0	0.5	0.5	2
										0	0	
<i>Schinia gaurae</i>	0	0	0	0	0	0.5	0	0.5	0.50	1	1	2
						0		0				
<i>Schinia gracilentata</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Schinia indiana</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Schinia jaguarina</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Schinia lucens</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Schinia nundina</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Schinia oleagina</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Schinia sanguinea</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Schinia saturata</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Schinia septentrionalis</i>	0.5	0	0	0	0	0.5	0	0	0	0.5	0.5	2
	0					0				0	0	
<i>Speranza amboflava</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Sympistis riparia</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Sympistis saundersiana</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Sympistis</i>	1	0	0	0	0	0	0	0	0	0	0	2

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<i>viriditincta</i>												
<i>Tricholita notata</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Ulonche</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>modesta</i>												
<i>Hyparpax aurora</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Schizura apicalis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Boloria (Selene)</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>myrina</i>												
<i>Chlosyne</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>(Gorgone) carlota</i>												
<i>Chlosyne harrisii</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Speyeria</i>	0.5	0	0	0	0.5	0.5	0.5	0.5	0.50	0	0.5	2
<i>aphrodite</i>	0				0	0	0	0			0	
<i>Speyeria diana</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Speyeria idalia</i>	0.5	0	0	0	0.5	0.5	0.5	0.5	0.50	0	0.5	2
	0				0	0	0	0			0	
<i>Agonopterix</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>hyperella</i>												
<i>Agonopterix</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>lythrella</i>												
<i>Aterpia</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>approximana</i>												
<i>Euchloe olympia</i>	0.5	0.5	0	0	0	0	0.5	0.5	0.50	0	0.5	2
	0	0					0	0			0	
<i>Pieris virginiensis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Ambesa laetella</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Argyria auratella</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Argyria critica</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Atascosa</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>glareosella</i>												
<i>Carectocultus</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>perstrialis</i>												
<i>Crambus</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>girardellus</i>												
<i>Crambus</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>watsonellus</i>												
<i>Loxocrambus</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>awemensis</i>												
<i>Neodactria</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>murellus</i>												
<i>Parapoynx</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>maculalis</i>												
<i>Pediasia abnaki</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Platytes vobisne</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Pococera</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>baptisiella</i>												

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<i>Prionapteryx achatina</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Prionapteryx nebulifera</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Pyla arenaeola</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Pyrausta laticlavata</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Pyrausta orphisalis</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Sciota dammersi</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Sitochroa dasconalis</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Thaumatopsis pectinifer</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Calephelis borealis</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Calephelis muticum</i>	0.5 0	0	0	0	0.5 0	0.5 0	0.5 0	0.5 0	0.50	0	0.5 0	2	
<i>Hemileuca maia</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Hemileuca nevadensis</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Lethe appalachia</i>	0.5 0	0	0	0	0.5 0	0.5 0	0.5 0	0.5 0	0.50	0	0.5 0	2	
<i>Lethe creola</i>	0.5 0	0	0	0	0.5 0	0.5 0	0.5 0	0.5 0	0.50	0	0.5 0	2	
<i>Carmenta anthracipennis</i>	1	0	0	0	0	0	0	0	0	0	0	2	
Taxon													
	No	Information	Competitors	Predators	Parasites/ Diseases	Prey/Food	Hosts	Genetics	Dispersal	Recruitment	Mortality	Non-Targeted	Number of Respondents
<i>Hemaris gracilis</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Lintneria eremitus</i>	0.5 0	0	0	0	0	0	0.5 0	0	0	0	0.5 0	0.5 0	2
<i>Proserpinus gaurae</i>	0.5 0	0	0	0	0	0	0.5 0	0	0	0	0.5 0	0.5 0	2
<i>Sphinx luscitiosa</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Ancylis semiovana</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Eucosma bipunctella</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Eucosma fulminana</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Eucosma palabundana</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Eucosma pandana</i>	1	0	0	0	0	0	0	0	0	0	0	2	
<i>Eucosma</i>	1	0	0	0	0	0	0	0	0	0	0	2	

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<i>rusticana</i>												
<i>Eucosma</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>sombreana</i>												
<i>Evora hemidesma</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Grapholita</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>tristrigana</i>												
<i>Olethreutes</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>comandranum</i>												
<i>Olethreutes</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>osmundana</i>												
<i>Pseudexentera</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>vaccinii</i>												
<i>Suleima</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>helianthana</i>												
<i>Zomaria</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>interruptolineana</i>												
Orders Hymenoptera, Odonata, Orthoptera, Phasmida and Plecoptera												
<i>Bombus affinis</i>	0.5	0	0	0.5	0	0	0.5	0	0	0	0	2
	0			0			0					
<i>Bombus borealis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Bombus fraternus</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Bombus</i>	0.5	0	0	0.5	0	0	0.5	0	0	0	0	2
<i>pennsylvanicus</i>	0			0			0					
<i>Bombus ternarius</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Bombus terricola</i>	0.5	0	0	0.5	0	0	0.5	0	0	0	0	2
	0			0			0					
<i>Bombus vagans</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Bombus variabilis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Rhionaeschna</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>mutata</i>												
<i>Somatochlora</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>hineana</i>												
<i>Gomphus</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>ventricosus</i>												
<i>Stylurus notatus</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>Nannothemis</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>bella</i>												
<i>Arphia</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>pseudonietana</i>												
<i>Eritettix simplex</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>Melanoplus</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>dawsoni</i>												
<i>Stethophyma</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>lineatum</i>												
<i>Trimerotropis</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>maritima</i>												

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<i>Trimerotropis saxatilis</i>	0	0	0	0	1	0	1	1	1	0	1	1
<i>Grylotalpa major</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>Nomotettix parvus</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>Neoconocephalus lyristes</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>Scudderia pistillata</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>Diapheromera velii</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>Allocaupnia illinoensis</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Prostoia completa</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Perlesta golconda</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Diploperla robusta</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Hydroperla fugitans</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Isogenoides varians</i>	1	0	0	0	0	0	0	0	0	0	0	2
<i>Tingupa pallida</i>	0.5	0.5	0	0	0.5	0.5	0.5	0.5	0.50	0.0	0.5	2
	0	0			0	0	0	0		0	0	
<i>Semionellus placidus</i>	1	0	0	0	0	0	0	0	0	0	0	1
<i>Zosteractis interminata</i>	1	0	0	0	0	0	0	0	0	0	0	1

Stressor

descriptions:

No Information: Insufficient information to complete an evaluation of stressors to this species

Competitors: Competition for resources

Predators: Consumption of the species by another organism

Parasites/Disease: Resulting in decreased survival or condition

Prey/Food: Availability or quality of energy sources

Hosts: Availability of plant or animal hosts

Genetics: Genetic problems such as inbreeding and outbreeding depression

Dispersal: Movement of individuals amongst habitat patches and/or subpopulations

Recruitment: Addition of individuals to breeding populations

Mortality: Naturally high death rates

Non-Targeted Killing: Direct killing or removal by humans (e.g., pesticides, burn practices, dewatering, structures)

Appendix I. Draft non-mollusk invertebrate Species in Greatest Need of Conservation for Illinois as identified by eight qualifying criteria.

Abbreviations used: FE - Federally Endangered; FT - Federally Threatened; XN - experimental, nonessential population of a federally-listed species; SE - State Endangered; ST - State Threatened; RR - recent recovery/delisted within 10 years; G1, G2, G3, G4, G5, GU, GNR, T3, T5 - Global Conservation Ranks from NatureServe Explorer (<http://www.natureserve.org/explorer/> Accessed August 2014).

Criteria for Selecting Illinois' Species in Greatest need of Conservation:

Listed species:

1. All species listed as threatened or endangered in Illinois, including federally listed species that occur within the State.
2. Species with a global conservation rank indicator of G1, G2, or G3.

Rare of declining species (Rare Populations, Declining Populations):

3. Species is rare (small or low population size, density or range) or has significantly declined in abundance or distribution from historical levels.

Dependent on rare or vulnerable habitat or habitat has known threat:

4. Species is dependent upon a rare or vulnerable habitat for one or more life history needs (breeding, migration, wintering).

Illinois populations have regional or global significance (Vulnerable Characteristics)

5. Species is endemic to Illinois, or the Illinois population is disjunct from the rest of the species' range.
6. Illinois' population of a species represents a significant proportion of the species' global population.
7. Species is representative of broad array of other species found in a particular habitat.

Illinois populations are unable to be effectively assessed (placed on Watch-List; see Table 1 of this report)

8. Species' status is poorly known, but available evidence suggests conservation concern. More information would be helpful in confirming the conservation status of all invertebrate species that have been assessed.

Appendix I. Draft non-mollusk invertebrate Species in Greatest Need of Conservation for Illinois identified by eight qualifying criteria (non-insects).

Scientific Name	Common Name	Habitat Association	Listed Species (Criteria 1, 2)	Rare Populations (Criterion 3)	Declining Populations (Criterion 3)	Vulnerable Habitat (Criterion 4)	Vulnerable Characteristics (Criteria 5, 6, 7)
ARACHNIDS							
<i>Centruroides vittatus</i>	Striped Scorpion	Talus slopes, glades	SE, GNR	Yes	No	No	Disjunct
<i>Mundochthonius cavernicola</i>	A Troglolithic Pseudoscorpion	Caves	G1G2	Yes	No	Caves	Endemic
<i>Parthomma cavernicola</i>	Appalachian Cave Spider	Caves	G5	Yes	No	Caves	No
MILLIPEDES							
<i>Seminellus placidus</i>	a millipede	Leaf Litter	G3	Yes	No	NMI	Disjunct
<i>Tingupa pallida</i>	a cave obligate millipede	Caves	G4	Yes	No	Caves	No
<i>Zosteractis interminata</i>	a cave millipede	Caves	G2G3	Yes	No	Caves	Endemic
CRUSTACEANS							
<i>Bacturus brachycaudus</i>	Short-tailed Bacturid	Caves	G4	Yes	No	Caves	Endemic
<i>Cacidiotea beattyi</i>	a cave obligate isopod	Caves	G3G4	Yes	No	Caves	Endemic
<i>Cacidiotea bicrenata</i>	a cave obligate isopod	Caves	G5	Yes	No	Caves	No
<i>Cacidiotea leslei</i>	an isopod	Groundwater	SE, G1G2	Yes	No	No	Endemic
<i>Cacidiotea packardii</i>	Packard's Cave Isopod	Caves	G2G4	Yes	No	Caves	Endemic
<i>Cacidiotea tridentata</i>	a subterranean isopod	Subterranean	G1G2	Yes	No	Caves	Disjunct
<i>Cambiarus tenebrosus</i>	Cavespring Crayfish	Rocky streams and springs; caves	G5	Yes	No	No	No
<i>Crangonyx anomalous</i>	Anomalous Spring Amphipod	Rocky streams and springs; caves	SE, G4G5	Yes	No	Springs	No
<i>Crangonyx packardii</i>	Packard's Cave Amphipod	Groundwater, Seeps, springs, caves	SE, G4	Yes	No	Caves	No
<i>Diacyclops yeatmani</i>	Yeatman's Groundwater Copepod	Caves	G2G3	Yes	No	Caves	No
<i>Diporeia hoyi</i>	Great Lakes Amphipod	Lake Michigan	GNR	Yes	No	Yes	No
<i>Eubranchipus neglectus</i>	Neglected Fairy Shrimp	Ephemeral wetlands	G5	Yes	No	Ephemeral ponds	No
<i>Gammarus acherondytes</i>	Illinois Cave Amphipod	Caves	FE SE, G2G3	Yes	No	Caves	Endemic
<i>Gammarus bousfieldi</i>	Bousfield's Amphipod	Gravel shoals of Ohio River	G1	Yes	No	Known threat	Endemic
<i>Orconectes illinoensis</i>	Illinois Crayfish	Streams	G3	Yes	No	No	Endemic
<i>Orconectes indianensis</i>	Indiana Crayfish	Rocky streams	SE, G3	Yes	Yes	Known threat	Endemic
<i>Orconectes kentuckiensis</i>	Kentucky Crayfish	Rocky streams	SE, G4	Yes	No	Known threat	Yes
<i>Orconectes lancifer</i>	Shrimp Crayfish	Deep water at Horseshoe Lake	SE, G5	Yes	No	No	No
<i>Orconectes placidus</i>	Bigdaw Crayfish	Gravel, rocky streams & rivers	SE, G5	Yes	No	Known threat	Disjunct
<i>Orconectes stannardi</i>	Little Wabash Crayfish	Creeks, Riffles	G2G3	No	Yes	Known threat	Endemic
<i>Stygobromus lawae</i>	Iowa Amphipod	Alfific slopes	SE, G2G3	Yes	No	Alfific Slopes	Endemic
<i>Stygobromus subtilis</i>	Subtle Cave Amphipod	Caves	G2	Yes	No	Caves	Endemic
Other Non-Insects							
<i>Oncopodura iowae</i>	a cave springtail	Caves	G3G4	Yes	No	Caves	No
<i>Pygarrhopalites madonnensis</i>	Madonna Cave Springtail	Caves	SE, GNR	Yes	No	Caves	Endemic
<i>Sphalaplana hubrichti</i>	a cave obligate planarian	Caves	G2G4	Yes	No	Caves	Endemic

Appendix I. Draft non-mollusk invertebrate Species in Greatest Need of Conservation for Illinois identified by eight qualifying criteria (Insects).

Scientific Name	Common Name	Habitat Association	Listed Species (Criteria 1, 2)	Rare Populations (Criterion 3)	Declining Populations (Criterion 3)	Vulnerable Habitat (Criterion 4)	Vulnerable Characteristics (Criteria 5, 6, 7)
INSECTS							
COLEOPTERA (Beetles)							
<i>Dicranopselaphus variegatus</i>	Variegated False Water Penny Beetle	Creeks (larvae), riparian (adults)	G1G3	Yes	No	No	Endemic
<i>Nicrophorus americanus</i>	American Burying Beetle	Grasslands, Forests	FE, G2G3	No	Yes	No	No
<i>Pseudanophthalmus illinoisensis</i>	Illinois Cave Beetle	Caves	G1	Yes	No	Caves	Endemic
EPHERMEROPTERA (Mayflies)							
<i>Acanthametropus pecatonica</i>	Pecatonica River Mayfly	Large Sandy Rivers	G2G4	Yes	No	Yes	No
<i>Anafronitulum album</i>	a mayfly	Medium to large rivers	G5	Yes	Yes	No	No
<i>Camebaetis waltzi</i>	Small Innova Mayfly	Medium to large rivers	G5	Yes	Yes	No	No
<i>Dannella lita</i>	Spiny Crawler Mayfly	small to large rivers	G5	Yes	No	NMI	No
<i>Dannella simplex</i>	Spiny Crawler Mayfly	small to large rivers	G5	Yes	Yes	NMI	No
<i>Isonychia arida</i>	Large Minnow Mayfly	large rivers	G5	Yes	No	NMI	Disjunct
<i>Isonychia savi</i>	Sav's Large Minnow Mayfly	large rivers	G5	Yes	Yes	NMI	Disjunct
<i>Paraleptophlebia ontario</i>	Fork Gillied Mayfly	small, wooded streams	G4	Yes	Yes	NMI	No
<i>Pentagenia vittigera</i>	Clay Burrowing Mayfly	large rivers	G5	No	Yes	NMI	No
<i>Pseudiron centralis</i>	White Sand-River Mayfly	large rivers	G5	Yes	Yes	NMI	No
<i>Raptoheptagenia cruentata</i>	Flatheaded Mayfly	large rivers	G4	Yes	Yes	NMI	No
<i>Siphonurus marshalli</i>	Large Minnow Mayfly	small streams	G5	Yes	Yes	NMI	No
<i>Stenacron minnetonka</i>	Minnetonka Flatheaded Mayfly	small to large rivers	G4	Yes	No	NMI	No
HEMIPTERA (True Bugs)							
<i>Aflexia rubranura</i>	Redveined Prairie Leafhopper	Xeric/mesic prairie	ST, G2	Yes	No	Remnant, Host Specific	No
<i>Athysanella incongrua</i>	a leafhopper	Hill prairie	SE, GNR	Yes	Yes	Remnants	No
<i>Cosmotettix delector</i>	a leafhopper	Wet prairie	GNR	Yes	No	No	No
<i>Cuerna alpina</i>	a leafhopper	Prairie	GNR	Yes	No	Remnant, Host Specific	Disjunct
<i>Destria fumida</i>	a leafhopper	Wet prairie	GNR	Yes	No	No	No
<i>Draeculacephala inscripta</i>	a leafhopper	swamp / marsh	GNR	Yes	No	No	No
<i>Flexamia abbreviata</i>	a leafhopper	Dry prairie	GNR	Yes	No	Host specific	No
<i>Flexamia albida</i>	a leafhopper	Hill prairie	GNR	Yes	No	Host specific	No
<i>Flexamia grammica</i>	a leafhopper	Sand prairie	GNR	Yes	No	Remnant, Host Specific	No
<i>Flexamia pectinata</i>	a leafhopper	prairie and Mesic Grasslands	GNR	Yes	No	Remnant, Host Specific	No
<i>Limotettix parallelus</i>	a leafhopper	Wet prairie/ Freshwater Marsh	GNR	Yes	No	Remnants	No
<i>Limotettix truncatus</i>	a leafhopper	Wet prairie	GNR	Yes	No	Host specific	No
<i>Lonatura catalina</i>	a leafhopper	Xeric prairie	GNR	Yes	No	Host specific	No
<i>Memnonia panzeri</i>	a leafhopper	wet dolomite prairie	GNR	Yes	No	Host specific	No
<i>Paraphlepsius carolinus</i>	a leafhopper	Sand prairie	GNR	Yes	No	Remnants	No
<i>Paraphlepsius nebulosus</i>	a leafhopper	Prairie	GNR	Yes	No	No	No
<i>Paraphlepsius umbellatus</i>	a leafhopper	Prairie	GNR	Yes	No	No	No
<i>Pendarus magnus</i>	a leafhopper	Wet Prairie, Marsh	GNR	Yes	Yes	Host specific	No
<i>Polyamia dilatata</i>	a leafhopper	Hill prairie	GNR	Yes	No	Remnants	No
<i>Polyamia herbida</i>	a leafhopper	Sand savanna	GNR	Yes	No	Remnants	Endemic
<i>Polyamia interrupta</i>	a leafhopper	Sand savanna	GNR	Yes	No	Remnants	No
<i>Polyamia rossii</i>	a leafhopper	Sand prairie	GNR	No	No	Host specific	No
<i>Polyamia similis</i>	a leafhopper	Xeric prairie	GNR	No	Yes	Remnants	No
<i>Scaphytopius dorsalis</i>	a leafhopper	Xeric prairie	GNR	Yes	No	No	No
<i>Tibicen dorsatus</i>	Giant Grassland Cicada or Bush Cicada	Prairie	GNR	Yes	No	Remnants	No

Appendix I. Draft non-mollusk invertebrate species in Greatest Need of Conservation for Illinois identified by eight qualifying criteria (Insects ... continued).

Scientific Name	Common Name	Habitat Association	Listed Species (Criteria 1, 2)	Rare Populations (Criterion 3)	Declining Populations (Criterion 3)	Vulnerable Habitat (Criterion 4)	Vulnerable Characteristics (Criteria 5, 6, 7)
HYMENOPTERA (Bees & Wasps)							
<i>Bombus affinis</i>	Rusty-Patched Bumble Bee	Prairie	G1	Yes	Yes	No	No
<i>Bombus fraternus</i>	Southern Plains Bumble Bee	Prairie	G4	No	Yes	No	No
<i>Bombus pensylvanicus</i>	American Bumble Bee	Prairie	G3G4	No	Yes	No	No
<i>Bombus vagans</i>	Half-black Bumble Bee	Prairie	G4	No	Yes	No	No
LEPIDOPTERA (Butterflies & Moths)							
<i>Agrotis stigmata</i>	Spotted Dart Moth	Sand savanna	G4	Yes	No	Host specific	No
<i>Amblyscirtes aesculapius</i>	Lace-winged Roadside-Skipper	forests/ cane stands	G3G4	Yes	No	Host specific	No
<i>Amblyscirtes carolina</i>	Carolina Roadside-Skipper	moist forest, near stream or swamps; cane	G3G4	Yes	No	Host specific	Disjunct
<i>Amblyscirtes linda</i>	Linda's Roadside-Skipper	forests streams/ cane stands	G2G3	Yes	No	Host specific	No
<i>Amblyscirtes reversa</i>	Revered Roadside-Skipper	forest streams / cane stands	G3G4	Yes	No	Host specific	Disjunct
<i>Anacamptis wikeri</i>	a moth	Prairie	GNR	Yes	No	Remnant, Host Specific	Endemic
<i>Ancylis semivana</i>	a tortricid moth	Sand savanna	GNR	Yes	No	Host specific	No
<i>Apodrepanulatrix liberaria</i>	an inch worm moth	Sand savanna	G3	Yes	No	Host specific	No
<i>Archonara subflava</i>	Yellow Sedge Borer	Prairie	G4	Yes	No	Host specific	No
<i>Argyria critica</i>	Straight-Lined Argynria Moth	Wet prairie	GNR	Yes	No	No	No
<i>Bagisara gulnare</i>	an owl moth	wet prairie, openings in floodplain forests, along streams.	GU	No	No	Host specific	No
<i>Calophelis muticum</i>	Swamp Metalmark	Fen / marsh	SE, G3	Yes	No	Host specific	No
<i>Callophrys pollos</i>	Hoary Elfin	Sand prairie / Woodlands	SE, G5	Yes	No	Host specific	No
<i>Carmentis anthracipennis</i>	Blazing Star Clearwing Moth	Mesic/wet prairie	GNR	Yes	No	Host specific	No
<i>Catocala abbreviatella</i>	Abbreviated Underwing Moth	Xeric prairie/savanna	G4	Yes	No	Host specific	No
<i>Catocala whitneyi</i>	Whitney's Underwing	Hill prairie	G3G4	Yes	No	Host specific	No
<i>Chlosyne gorgone carlota</i>	Gorgone Checkerspot	Xeric prairie	G5T5	No	Yes	Host specific	No
<i>Danaus plexippus</i>	Monarch Butterfly	Prairie / Meadows	G4T3	No	Yes	Host specific	No
<i>Dichagyris grotei</i>	Grote's Black-tipped Quaker	Xeric prairie	G4	Yes	No	Host specific	No
<i>Digrammia ordinata</i>	an inch worm moth	Prairie	GNR	Yes	No	Host specific	No
<i>Erastris coloraria</i>	an inch worm moth	Sand savanna	G3G4	Yes	No	Host specific	No
<i>Erynnis martialis</i>	Mottled Duskywing	Prairie/savanna / woodland	G3	No	No	Host specific	No
<i>Euchlaena milnei</i>	a geometrid moth	forests	G2G4	Yes	No	No	Disjunct
<i>Eucosma bipunctella</i>	a tortricid moth	Sand savanna / Open woodland	G4	Yes	No	Host specific	No
<i>Eucosma fulminana</i>	a tortricid moth	Mesic prairie	GNR	No	Yes	Host specific	No
<i>Euphyes bimacla</i>	Two-Spotted Skipper	Mesic/wet prairie	GNR	Yes	No	Host specific	No
<i>Euphyes dukesi</i>	Duke's Skipper	bog / fen / forested wetland	G4	No	No	Host specific	No
<i>Evora hemidesma</i>	Spirea Leaf-tier Moth	Prairie	G3	Yes	No	Host specific	No
<i>Hadena ectypa</i>	a noctuid moth	Sand savanna	GNR	Yes	No	Host specific	No
<i>Hadena ectypa</i>	a noctuid moth	Sand savanna / Scrub oak-pine sand barrens / oak forest	G3G4	Yes	No	Host specific	No
<i>Hemileuca maia</i>	Buck Moth	Sand savanna / Scrub oak-pine sand barrens / oak forest	G5	No	Yes	Host specific	No
<i>Hesperia dacotae</i>	Dakota Skipper	Xeric prairie	FT, G2	Yes	Yes	Host specific	No
<i>Hesperia metea</i>	Cobweb Skipper	Sand prairie	SE, G4	Yes	No	Host specific	No
<i>Hesperia ottoe</i>	Ottoe Skipper	Xeric prairie	SE, G3G4	Yes	No	Host specific	No
<i>Lethe appalachia</i>	Appalachian Eyed Brown	Wooded Swamps / Forest Edge	G4	Yes	No	Host specific	No
<i>Lethe creola</i>	Creole Pearly-Eye	Forests with Cane	G3G4	No	Yes	Host specific	No
<i>Lycaeides melissa samuelis</i>	Kamer Blue Butterfly	Sand savanna	FE SE, G5T2	Yes	No	Host specific	No
<i>Melanomma auricinctaria</i>	Gold-lined Melanomma	Savanna	G4	Yes	No	No	No
<i>Neodactria murellus</i>	Prairie Sedge Moth	Xeric prairie	GNR	Yes	No	No	No
<i>Oarisma poweshiek</i>	Poweshiek Skipperling	Wet prairie	FT, G1	Yes	Yes	Remnant, Host Specific	No

Appendix I. Draft non-mollusk invertebrate Species in Greatest Need of Conservation for Illinois identified by eight qualifying criteria (Insects).

LEPIDOPTERA (Butterflies & Moths) ... continued							
	<i>Papaipema beeriana</i>	Blazing Star Stem Borer	Prairie/fen	G2G3	Yes	No	Host specific
	<i>Papaipema birdi</i>	Umbellifer Borer Moth	Wet prairie/fen	G5	Yes	No	Host specific
	<i>Papaipema cerina</i>	Golden Borer Moth	Savanna / Hardwood Forests	G2G4	Yes	No	Host specific
	<i>Papaipema cerussata</i>	Ironweed Borer Moth	Wet prairie/fen	G5	Yes	No	Host specific
	<i>Papaipema erynigi</i>	Rattlesnake-Master Borer Moth or Eryngium Stem Borer	Wet/mesic prairie	ST, G1G2	Yes	No	Remnant, Host Specific
	<i>Papaipema inquaesita</i>	Sensitive Fern Borer Moth	Wet prairie	G5	Yes	No	Host specific
	<i>Papaipema limpida</i>	a borer moth	Mesic/wet prairie	G4	Yes	No	Host specific
	<i>Papaipema sciata</i>	Cluvers Root Borer	Prairie/fen	G3	Yes	No	Host specific
	<i>Papaipema silphii</i>	Stiphium Borer Moth	Prairie	G3G4	Yes	No	Host specific
	<i>Photodes enervata</i>	a noctuid moth	Wet Prairie	G4	Yes	No	Host specific
	<i>Photodes inops</i>	Spartina Borer Moth	Wet prairie	G3G4	Yes	No	Host specific
	<i>Phytometra ernestinana</i>	Ernestine's Moth	Prairie	G4	Yes	No	No
	<i>Problema byssus</i>	Byssus Skipper	Mesic/wet prairie	G3G4	NMI	NMI	Host specific
	<i>Pygarctia spraguei</i>	Sprague's Pygarctic	Sand savanna	G5	Yes	No	Host specific
	<i>Pyrausta orphisalis</i>	Orange Mint Moth	Prairie	GNR	Yes	No	Host specific
	<i>Rhododactia aurantiago</i>	Orange Sallow Moth	Mesic prairie	G3G4	Yes	No	Host specific
	<i>Schinia gracilentia</i>	Slender Flower Moth or Iva Flower Moth	Wet prairie	G4Q	Yes	No	Host specific
	<i>Schinia saturata</i>	Brown Flower Moth	Sand prairie	G5	Yes	No	Host specific
	<i>Schinia septentrionalis</i>	Northern Flower Moth	Mesic-xeric prairie	G3G4	No	No	Host specific
	<i>Sciota dammersi</i>	Leadplant Leafwebber Moth	Xeric prairie	GNR	No	No	Host specific
	<i>Sitochroa dasconalis</i>	Pearly Indigo Borer	unknown	GNR	Yes	No	Host specific
	<i>Speyeria idylla</i>	Regal Fritillary	Xeric/mesic prairie	FC ST, G3	No	Yes	Host specific
	<i>Sphinx luscitosa</i>	Canadian Sphinx Moth; Clemens' Hawkmoth	Meadows / Boreal Forest / Riparian	G4	Yes	Yes	Host specific
	<i>Tricholita notata</i>	Marked Noctuid Moth	Mesic prairie	G5	Yes	No	Host specific
	ODONATA (Dragonflies & Damselflies)						
	<i>Aeschna canadensis</i>	Canada damer	lake margins, sluggish streams	G5	Yes	No	NMI
	<i>Nannothemis bella</i>	Elfin Skimmer	Fen/seeep	ST, G4	Yes	No	Fen
	<i>Rhionaeschna mutata</i>	Spatterdock Damer	ponds/ swamps	G4	Yes	No	Ephemeral ponds
	<i>Somatochlora hineana</i>	Hine's Emerald Dragonfly	Fen/seeep	FE SE, G2G3	Yes	No	Fen
	<i>Stylurus notatus</i>	Elusive Clubtail	Large Rivers	G3	Yes	Yes	Large rivers
	<i>Erettix simplex</i>	Velvet-Striped Grasshopper	Sand prairie	G5	Yes	No	No
	<i>Gryllotalpa major</i>	Prairie Mole Cricket	Tallgrass Prairie	FC2, G3	Yes	Yes	No
	<i>Nomotetix parvus</i>	Low-Ridged Pygmy Grasshopper	Wet Groundcover	G3G4	Yes	No	Remnants
	<i>Scudderina pistillata</i>	Broad-Winged Bush Katydid	Wet/mesic prairie	GNR	Yes	No	No
	<i>Trimerotropis maritima</i>	Seaside Grasshopper	Dunes	G5	No	Yes	No
	<i>Trimerotropis saxatilis</i>	Lichen Grasshopper	Bare rock surfaces / woodland	G3	Yes	No	No
	PLECOPTERA (Stoneflies)						
	<i>Acroneturia abnormis</i>	Common Stone	large rivers	G5	Yes	Yes	NMI
	<i>Acroneturia frisoni</i>	Central Stone	small to medium permanent streams	G5	Yes	Yes	NMI
	<i>Allocapnia illinoensis</i>	Illinois Winter Stonefly	small, wooded streams	G3	Yes	Yes	NMI
	<i>Diploperla robusta</i>	Robust Springfly	small, permanent streams	SE, G5	Yes	No	NMI
	<i>Hydroperla fugitans</i>	Austin Springfly	Large Rivers	G3	Yes	Yes	NMI
	<i>Perlستا galconada</i>	Two-Lined Stone	Medium to large rivers	G2G3	Yes	No	NMI
	<i>Prostata ozarkensis</i>	Ozark Forestfly	small wooded streams	SE, G5	Yes	No	NMI
	<i>Strophopteryx fasciata</i>	Mottled Willowfly	small to large rivers	G4	No	Yes	NMI
	<i>Taeniopteryx lita</i>	Small Willowfly	large rivers	G5	Yes	Yes	NMI
	TRICHOPTERA (Caddisflies)						
	<i>Cheumatopsyche speciosa</i>	Net-Spinning Caddisfly	medium to large rivers	G5	Yes	Yes	NMI
	<i>Chimarra aterrima</i>	Net-Spinning Caddisfly	springs and springbrooks	G5	Yes	Yes	Springs
	<i>Diplectrana metequl</i>	Seep Inhabiting Net-Spinning Caddisfly	seeps	G5	Yes	No	NMI
	<i>Frenesia missa</i>	Sandhill Caddisfly	springs and springbrooks	G5	Yes	Yes	Springs
	<i>Hydropsyche arnale</i>	Large River Net-Spinning Caddisfly	medium to large rivers	G4G5	Yes	Yes	NMI
	<i>Hydropsyche cuanis</i>	Net-Spinning Caddisfly	medium to large rivers	G5	Yes	Yes	NMI

Appendix II. Status and Stresses to Illinois' non-mollusk Species in Greatest Need of Conservation.

Stresses were assessed as described in the Illinois Comprehensive Wildlife Conservation Plan 2005 (Appendix II) except that the stresses were not scored on a 3-point scale and color coding was not used. We indicated if the information provided suggested that the stressor was, or has, impacted the species by indicating “Yes” in the Table. If there was information suggesting that the stressor was not, or has not, impacted the species we added “No” to the Table. If we had little certainty about a stressor impacting the species due to a lack of information we coded this case as NMI (Need More Information).

Appendix II. Stressors on non-mollusk SGNC based on literature review and survey of experts (Non-Insects).																															
Taxa	Scientific Name	Historic Status	Current Status	Trend	Habitat Stresses							Community Stresses					Population Stresses					Direct Human Stresses									
					Extent	Fragmentation	Composition-structure	Distribution/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Disease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure							
ARACHNIDS	<i>Centruroides vittatus</i>	NMI	2	NMI	No	No	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI		
	<i>Mundochitonius cavernicola</i>	NMI	1	NMI	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Parthamima cavernicola</i>	NMI	3	NMI	Yes	No	Yes	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI	
MILLIPEDES	<i>Semionellus placidus</i>	NMI	NMI	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI	
	<i>Tringupa pallida</i>	NMI	3	NMI	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes	Yes	Yes	No	No	No	NMI	NMI	NMI	
	<i>Zosteractis interminata</i>	NMI	1	NMI	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI	
CRUSTACEANS	<i>Bactrurus brachycaudus</i>	NMI	NMI	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Caecidotea beattyi</i>	NMI	5	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Caecidotea bicrenata</i>	NMI	2	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Caecidotea lesliei</i>	NMI	1	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Caecidotea packardii</i>	NMI	4	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Caecidotea tridentata</i>	NMI	NMI	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Cambarus tenebrosus</i>	NMI	5	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Crangonyx anomalous</i>	NMI	1	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Crangonyx packardii</i>	NMI	5	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Diporeia yeatmani</i>	NMI	NMI	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Diporeia hoyi</i>	NMI	2	NMI	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Eubranchipus neglectus</i>	NMI	3	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Gammarus acherandytes</i>	NMI	2	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Gammarus bousfieldi</i>	NMI	3	NMI	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Orconectes illinoensis</i>	NMI	9	NMI	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Orconectes indianensis</i>	NMI	NMI	NMI	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Orconectes kentuckiensis</i>	NMI	1	NMI	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Orconectes lancifer</i>	NMI	1	NMI	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Orconectes placidus</i>	NMI	4	NMI	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Orconectes stannardi</i>	NMI	NMI	NMI	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Stygobromus iowae</i>	NMI	2	NMI	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	<i>Stygobromus subtilis</i>	NMI	2	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
	Other Non-Insects																														
<i>Oncopodura iowae</i>		NMI	2	NMI	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
<i>Pygmarthopalites madonnensis</i>		NMI	1	NMI	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI
<i>Sphalloplana hubrichti</i>		NMI	4	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	NMI	NMI	NMI

Appendix II. Stressors on non-mollusk SGNC based on literature review and survey of experts (Insects ... continued).

Taxa	Scientific Name	Historic Status	Current Status	Trend	Habitat Stressors					Community Stressors											Population Stressors				Direct Human Stressors										
					Fragmentation	Composition-structure	Distribution/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Disease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure												
TRICHOPTERA (Caddisflies)																																			
	<i>Cheumatopsyche speciosa</i>	22	12	NMI	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI			
	<i>Chimarra aterrima</i>	2	6	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI			
	<i>Dipteronia metequi</i>	NMI	3	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI			
	<i>Frenesia missa</i>	9	7	NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI		
	<i>Hydropsyche arinale</i>	11	5	NMI	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	
	<i>Hydropsyche cuanis</i>	9	4	NMI	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI

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Appendix III. Files provided to IDNR associated with T-88 project work.

Invertebratescolor.xlsx	initial list of non-mollusk invertebrate SGNC species
ILinsectSGNC.mdb	3I database used to gather information
ILInvertSGNC.xlsx	final spreadsheet of non-mollusk invertebrate SGNC species
Recommendations&Changes_SGNC.xlsx	lists of all changes made to Invertebratescolor.xlsx, including species added and species recommended for removal from the list
Localities.xlsx	spreadsheet of locality data included in database
Taxon.xlsx	spreadsheet of Taxon table, including most information gathered, from the database
SGNC Species Review Methods.docx	this file; summarizes methods and resources used to update the list
T-88 R-1 GS Review and Update of Non-mollusk Invertebrate Spec.pdf and T-88_Proposal_NB.docx	Proposal: Review and Update of Non-mollusk Invertebrate Species in Greatest Need of Conservation (Hinz)

Appendix IV. Online Resources used to review species for listing as SGNC.

NatureServe: provided information on species names, global and state rankings, distribution, ecology, and conservation	http://explorer.natureserve.org/
INHS Insect Collection database: provided specimen records at the collection	http://inhsinsectcollection.speciesfile.org/InsectCollection.aspx
Illinois Wildlife Action Plan: provided information on the goals and structure of the project	http://www.dnr.illinois.gov/conservation/IWAP/Pages/default.aspx
Previous online tools made possible by 3I database (not currently available at this address)	http://imperialis.inhs.illinois.edu/dmitriev/search.asp?key=ILinsectSGNC&lng=En
Previous online tools made possible by 3I database (not currently available at this address)	http://imperialis.inhs.illinois.edu/dmitriev/tree.asp?key=ILinsectSGNC&b=Insecta&t=Illinois+Insect+Species+in+Greatest+Need+of+Conservation
Ron Panzer's sites on threatened invertebrates in Illinois; sites not currently active but available from Internet Archive (https://archive.org/index.php)	http://www.neiu.edu/~cwinsect/
ButterfliesandMoths.org: provided some information including a few recent sightings of Lepidoptera	http://www.butterfliesandmoths.org/
Moth Photographers Group: extremely useful site providing distributional information and images of moths	http://mothphotographersgroup.msstate.edu/
Illinois State Museum site: provided some county records of Lepidoptera	http://www.museum.state.il.us/research/entomology/leps_db.html
University of Delaware (Charles Bartlett): provided information on planthoppers	http://ag.udel.edu/research/planthoppers/index.html
Deltocephalinae (J.N. Zahniser): provided information and images of deltocephaline leafhoppers	http://zahniser.speciesfile.org/search.asp?key=Delt&lng=En
BugGuide.net: provided information and images for many species	http://bugguide.net/node/view/15740
WikiPedia: provided information for some species	https://www.wikipedia.org/
Moths of the Pacific Northwest: very detailed site with useful information on some moths	http://pnwmoths.biol.wvu.edu/
Global Biodiversity Information Facility: provided distribution information	http://www.gbif.org/
Another GBIF site	http://www.gbif.org/species
Web of Science: bibliographical database to search for primary literature	http://apps.webofknowledge.com/ZOORECGeneralSearch_input.do?product=ZOOREC&search_mode=GeneralSearch&SID=1BS1whHiHihTHZ23eKe&preferencesSaved=
Xerces Society for Invertebrate Conservation: provided useful information for some species	http://www.xerces.org/
Internet Archive: provided access to Ron Panzer's site after they were deactivated	https://archive.org/index.php

Bombus affinis county occurrence

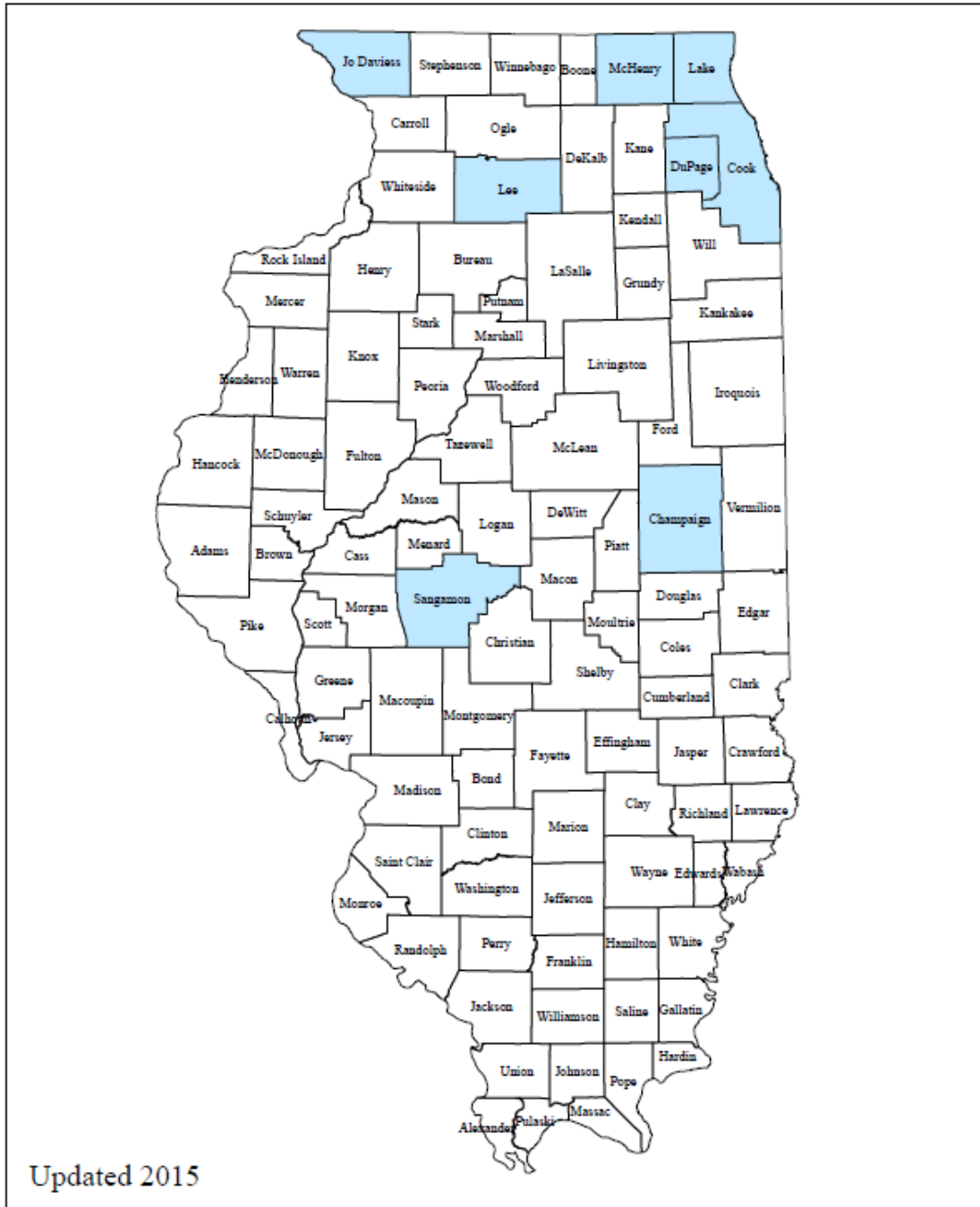


Figure 1. Occurrence of *Bombus affinis* in the Counties of Illinois based on records available for conservation status updates.

Acroneuria abnormis county occurrence

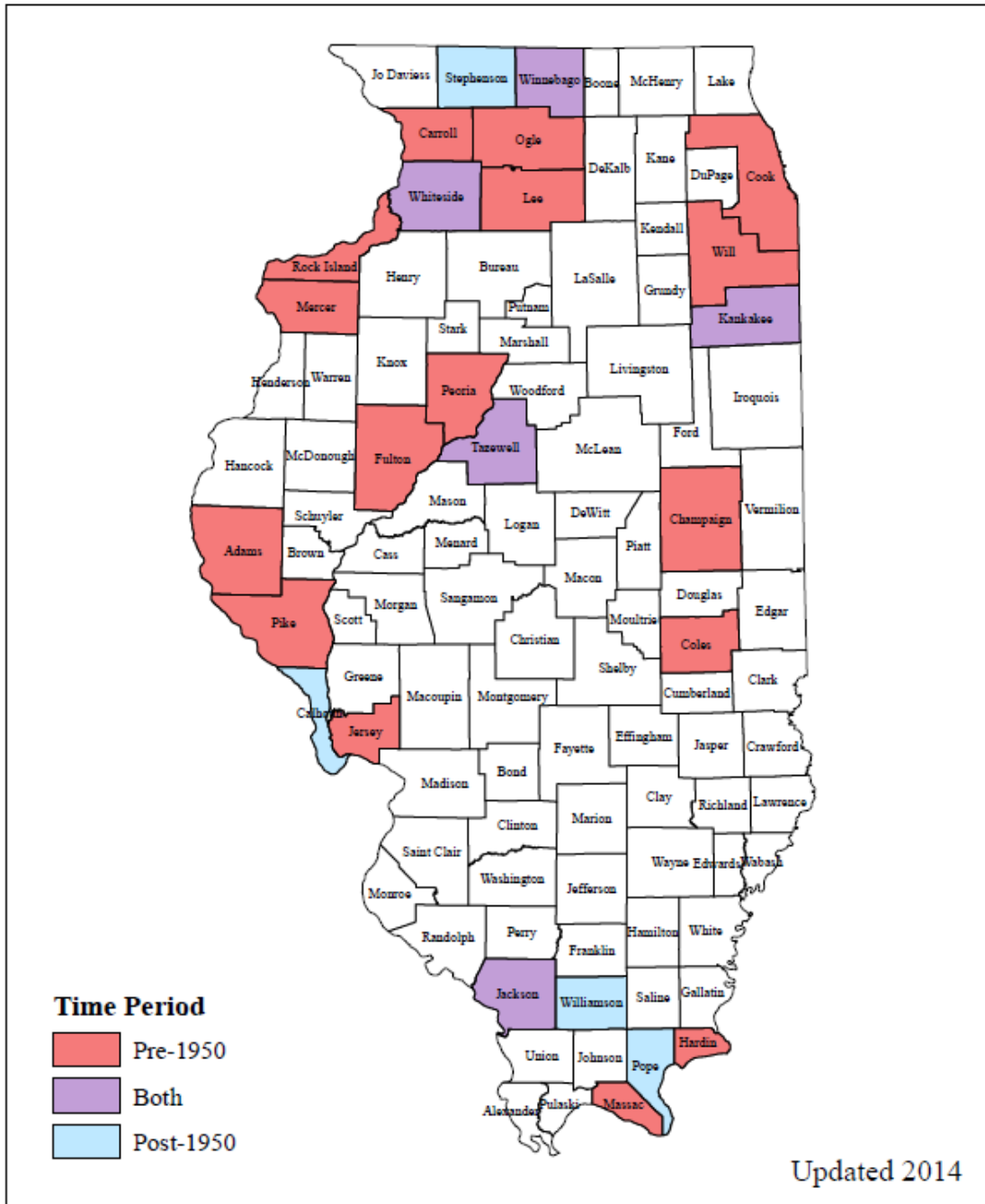


Figure 2. Occurrence of *Acroneuria abnormis* in the Counties of Illinois based on records available for conservation status updates.