EntoGEM Stakeholder Engagement Plan (version 0.1.0)

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1. Stakeholder identification and selection

To identify stakeholders in the EntoGEM project, we came up with categories of stakeholders to which we will classify individual stakeholders. EMG and GAM discussed which categories of stakeholders likely have a role either in contributing to or using the results of the project and came up with the following list:

- Researchers in academic and non-academic settings (e.g. government) in entomology, conservation, ecology, and related fields

- Professionals working in related fields (e.g. professional entomologists, land managers)

- Natural history collection managers

- Graduate students conducting research in related fields

- Undergraduate students studying related fields

- Evidence synthesists (i.e. meta-analysts and systematic reviewers) interested in environmental or conservation topics

- Information specialists

- Entomological societies

- Student entomology clubs

- Non-governmental organizations and non-profits with a conservation focus (i.e. societies and organizations that aren't explicitly entomological societies but that are concerned with insect conservation)

- Nature centers, particularly those that do annual surveys or citizen science monitoring of insects (e.g. an annual BioBlitz)

- Insect enthusiasts

- Policy-makers

We used an interest-influence matrix to classify stakeholder groups based on their presumed level of interest in the topic/project and their power or ability to influence the outcome of the project because they hold a large stake in it or because they are essential to the process of conducting the review.

Influence			
High		NGOs Policy-makers	Researchers in related fields Entomological societies
	Information specialists	Evidence synthesists Professionals in related fields Natural history collection managers	Graduate students in related fields
Low	Nature centers	Student entomology clubs	Undergraduate students in related fields Insect enthusiasts
	Low	**Interest**	High

We will use a combination of stakeholder selection methods to bring together the community for the project and to reduce bias in how stakeholders are selected.

Stakeholder category	Identification and selection methods
Researchers in related fields	- Authors of recent commentaries and perspective papers on insect declines - Regionally influential authors identified with citation and co-occurrence network analysis and their collaborative networks - listservs
Professionals in related fields	- Indirectly through membership in entomological or conservation societies - Self-identification in response to word of mouth and passive presence campaigns
Graduate students in related fields	- Self-identification in response to word of mouth and passive presence campaigns - Indirectly through researchers contacting lab members
Evidence synthesists	- Identified indirectly through contact with CEE centres: - Centre for Evidence Informed Policy and Practice (Australia) - Centre in Evidence-Based Conservation and Environmental Management (Canada) - Fondation pour la Recherche sur la Biodiversité (France) - Stockholm Environment Institute - CEE Joburg - Mistra Council for Evidence-Based Environmental Management - Centre for Evidence-Based Conservation - Global Evidence Synthesis Initiative - Environmental Evidence for the Future
Information specialists	Recommendations from existing stakeholders
Nature centers	TBD
Undergraduate students in related fields	- Self-identification in response to word of mouth and passive presence campaigns - Indirectly through researchers contacting lab members - Indirectly through student clubs
Insect enthusiasts	Self-identification in response to word of mouth, passive presence, and forum posts
Student entomology clubs	Identified using the list maintained by the Entomological Society of America
Natural history collections managers	Internet searches
NGOs	Internet searches and recommendations from existing stakeholders
Entomological societies	Identified using the list maintained by the Entomological Society of America and internet searches
Policy makers	Recommendations from existing stakeholders

2. Project phases and stakeholder involvement

There are three main phases to the project at which stakeholders are involved, though some aspects of the project span across phases or are not constrained by order. These phases are described below and stakeholder involvement by stakeholder category in each phase is shown in the table; green indicates involvement in that phase and dark green indicates key players at that stage.

	Comment on protocol	Contextualize project	Suggest evidence sources	Submit articles or data sets	Participate in screening	Use review findings	Facilitate access	Read the review	Share the review	Endorsement	Provide funding
Researchers	dark green	green	green	green	dark green	green		green	green		
Professionals	green	green	green	green	green	green		green	green		
Grad students	green	green	green		dark green	green		green	green		
Evidence synthesists	dark green		green		dark green			green	green		
Information specialists	dark green		dark green								
Nature centers			green	green	green	green		green	green	green	
Undergrads					dark green			green	green		
Insect enthusiasts					dark green			green	green		
Student clubs					green			green	green		
Natural hist. collections		green	green	green	green			green	green	green	
NGOs			green			dark green	green	green	green	dark green	dark green
Entomological societies			green			green	green	green	green	dark green	dark green
Policy makers					dark green			green	green		

Planning. We are requesting input from stakeholders, especially members of the insect conservation and evidence synthesis communities, on the protocol for conducting the project. In particular, we are looking for comments on the planned structure of the community-driven map, contextualizing the project in the broader field of insect conservation, and knowing where to look for evidence.

Evidence gathering and assessment. After community comments are incorporated into the protocol, we are asking stakeholders to help gather and assess the evidence according to the what is established in the protocol. Stakeholders can submit articles or data sets that we may miss with the electronic searches because they are not indexed, are unpublished, or are otherwise difficult to find. We are also asking stakeholders to participate in screening the articles retrieved by the search and submitted by the community to assess whether or not they meet the eligibility criteria for the map. All articles will be screened in duplicate or triplicate by the community. After articles are screened, community members will code the articles according to the protocol so that knowledge clusters can be mapped.

Review dissemination and use. Once the systematic map is complete, stakeholders will help with disseminating the results and sharing the review with stakeholders that were not already identified with snowballing.

Throughout. Lastly, some stakeholders will be involved throughout the project or may become involved at any stage. For example, organizations that endorse the project, share it with their members, or provide funding could become involved at any stage.

3. Plans to address potential conflicts and biases

Stakeholder selection and engagement bias. To limit bias when identifying stakeholders, we will use a combination of methods (e.g. searching, open calls, snowballing, and purposive selection) to select stakeholders. We will make a concerted effort to balance purposive selection

of stakeholders, especially for researchers in related fields, to reach a diverse group of stakeholders. For identifying researchers, we will use spatially explicit co-occurrence and citation networks to determine regionally influential researchers to expand the number of networks included in selecting stakeholders by snowballing.

Access to technology is a limitation of this project. Because our stakeholder engagement methods rely on internet access for communication and making decisions, this project is biased to only engage stakeholders with reliable access to technology.

Confirmation bias. Because of the topic of the review, almost all stakeholders are subject to confirmation bias. Given media coverage on "insectageddon" and the "insect apocalypse", stakeholders are primed to anticipate studies finding insect declines and may not be open to evidence that indicates increases or no changes in insects. Similarly, some individual stakeholders across all categories may hold opinions that influence how they perceive and interpret studies (e.g. implicating pesticides as a driver of declines even though the study authors indicate habitat conversion).

To address both of these potential biases, we will consistently refer to insect population and biodiversity trends instead of insect declines, unless all possible population trends are listed along with declines. To avoid potential biases influencing how articles are coded and interpreted, all stakeholders will follow the pre-established protocol when coding articles. Articles will also be coded in duplicate to catch discrepancies which will be resolved by a third party.

Conflicts of interest with decisions on studies. Many of the researchers and other stakeholders will have direct connections to studies that are retrieved by the search which presents a conflict of interest when making decisions about whether or not a study meets inclusion criteria. No one will be allowed to make decisions pertaining to a study for which they have a conflict of interest, whether it arises from being a co-author or editor of the paper, having a personal or institutional connection to any of the authors on the paper, or having a financial stake in it. All stakeholders are expected to declare conflicts of interest and recuse themselves when it comes to making decisions regarding those papers. In the case where a conflict of interest is not declared and is later discovered, other stakeholders who are blind to the original decision and who do not have conflicts of interest made will be asked to make the decision on the study.

Bias introduced by untrained reviewers. This project is community-driven, which means that stakeholders may or may not be familiar with evidence synthesis conventions and standards. This unfamiliarity can introduce bias during the screening process if inclusion and exclusion criteria are not properly applied or if stakeholders deviate from the protocol without documenting why or when changes were made. To reduce this bias, all stakeholders who participate in the screening process will receive training to ensure complete understanding of the inclusion and exclusion criteria and agreement with the protocol.

If discrepancies or inconsistent patterns of applying inclusion/exclusion criteria arise, we will add a third or fourth reviewer to studies screened by inconsistent reviewers. To minimize the chance of two inexperienced reviewers being assigned to make a decision on the same study, we will pair less experienced reviewers (e.g. insect enthusiasts who have not participated in a

systematic map) with more experienced reviewers (e.g. evidence synthesists) as the duplicate screeners for a study. These categorizations are adjustable as the process continues, and reviewers who begin in the less experienced category may transition into the more experienced category after consistently and reliably reaching consensus with other screeners.

Conflicts of interest due to funding sources. Currently, this project is unfunded so there are no conflicts of interest arising due to funding sources. If, however, funding is secured, the project coordinators will ensure that funders do not have undue influence on the project or its mission. Because the protocol will be registered prior to undertaking the project, we anticipate that there will be minimal chance for funding to contribute to mission creep or bias the project findings.

4. Subject-specific terminology and methodological detail

This project brings together entomologists and conservation biologists with evidence synthesis specialists, which could lead to conflicts due to misunderstanding of methods and terminology used. To reduce the possibility of misunderstanding, we will clarify the meaning of terms and methods used, especially when describing systematic maps. For stakeholders who are unfamiliar with evidence synthesis methods, we will prepare materials that go into different levels of detail depending on how much the stakeholder group needs or wants to know.

For example, some stakeholder groups may want a broad overview of systematic maps in the form of an infographic depicting the different stages and outputs, some groups may only want a 1-2 sentence summary of the method and why it is used, and other groups may want in-depth

information on quality and reporting standards for systematic maps. EMG will prepare materials for stakeholders who want abridged and/or superficial descriptions of systematic mapping methods; for the latter group, we will direct them to existing materials like the CEE guidelines and ROSES reporting standards.

5. Acknowledging stakeholder contributions

A community-driven map cannot happen without the support of stakeholders in the community. To acknowledge stakeholder contributions to the project, we will publicly acknowledge community members on the EntoGEM project website (if stakeholders consent to be acknowledged) if they contribute to the planning phase or evidence gathering and assessment. Supporting organizations who endorse or fund the project will be acknowledged on the project website as well.