



Evaluation Report

Synthesizing Predictive Modeling of Forest
Insect Dynamics Across Spatial and
Temporal Scales Working Group
February 22-26, 2010

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Executive Summary

Brief Synopsis of Event

This report is an evaluation of a NIMBioS Working Group entitled “Synthesizing Predictive Modeling of Forest Insect Dynamics Across Spatial and Temporal Scales” (Forest Insects), which held its first meeting at NIMBioS February 22-26, 2009. NIMBioS Working Groups are chosen to focus on major scientific questions at the interface between biology and mathematics. NIMBioS is particularly interested in questions that integrate diverse fields, require synthesis at multiple scales, and/or make use of or require development of new mathematical/computational approaches. NIMBioS Working Groups are relatively small (10-15 participants), focus on a well-defined topic, and have well-defined goals and metrics of success. Working Groups will typically meet 2-3 times over a two-year period, with each meeting lasting 3-5 days; however, the number of participants, number of meetings, and duration of each meeting is flexible, depending on the needs and goals of the group.

The Forest Insects group comprised 14 participants, including organizers Mario Pineda-Krch and Mark Lewis (Centre for Mathematical Biology, Department of Mathematical and Statistical Sciences, University of Alberta, Canada) and Andrew Liebhold (Northern Research Station, USDA Forest Service). Participants came from the United States Forest Service and Canada’s Natural Resources agency as well as 12 universities in Canada, the United Kingdom, and the United States (See Appendix A).

The Modeling Forest Insects Working Group brought together agricultural scientists, ecologists, evolutionary biologists, mathematicians, and social scientists to synthesize cutting edge predictive modeling approaches for studying forest insect pest populations, global climate change scenarios, forest fire dynamics, and evolutionary dynamics of antagonistic ecological interactions. Four meetings are planned, each focusing on a specific theme mentioned above.

Evaluation Design

An electronic survey aligned to the following evaluation questions was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director and Deputy Director:

1. Were participants satisfied with the Working Group overall?
2. Did the meeting meet participant expectations?
3. Do participants feel the Working Group made adequate progress toward its stated goals?
4. Do participants feel they gained knowledge about the main issues related to the research problem?
5. Do participants feel they gained a better understanding of the research across disciplines related to the Working Group’s research problem?
6. What impact do participants feel the Working Group will have on their future research?
7. Were participants satisfied with the accommodations offered by NIMBioS?
8. What changes in accommodations, group format, and/or content would participants like to see at future meetings?

The final instrument was hosted online via the University of Tennessee’s secure online survey host mrInterview. Links to the survey were sent to nine Working Group participants on March 1, 2010 (organizers Andrew Liebhold, Mario Pineda-Krch, and Mark Lewis, along with NIMBioS affiliates Sharon Beckman and Will Godsoe were not included in the survey). Reminder emails were sent out on March 8 and 10, 2010. By March 17, 2010, eight participants had given their feedback, for a response rate of 89%.

An electronic demographic survey aligned to the reporting requirements of the National Science Foundation was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director. The final instrument was hosted online via the University of Tennessee’s online survey host mrInterview. Links to the survey were sent to the eleven working group participants for whom NIMBioS did not have complete information on February 5, 2010. Reminder emails were sent to non-responding participants on February 12, 2010. By February 19, 2010, nine participants had filled out the survey for a response rate of 82%. Demographics questions regarding gender, race, and ethnicity, and disability status were optional (disability status is not reported in this evaluation report). All demographic information is confidential, and results are reported only in the aggregate. When feasible, the evaluator filled in missing demographic data from other sources (e.g. address, institution, field of study). The evaluator did not assume race, ethnicity, or disability status for any participant who did not report this information.

Highlights of Results

- Overall satisfaction with the Working Group was high among survey respondents, 88% of whom indicated they either agreed or strongly agreed that the Working Group was very productive and met their expectations.
- 88% of respondents thought the presentations were useful and all thought that the presenters were very knowledgeable about their presentation topics.
- All respondents either agreed or strongly agreed that they would recommend participating in NIMBioS Working Groups to their colleagues.
- Overall, respondents reported being satisfied with the accommodations provided by NIMBioS.
- Respondents overall reported high levels of learning, agreeing that they gained understanding in areas related the research problem of the Working Group.
- Most respondents said the multidisciplinary composition of the Working Group was its most useful aspect.
- 100% of respondents agreed that the Working Group format allowed the group to make adequate progress toward its goals, and that the working group made adequate progress toward finding a common language across disciplines for forest insect pest research.
- All respondents said they left this meeting with a good idea of what their contribution will be at the next meeting.
- All respondents said they planned to take the knowledge they gained during the Working Group and apply it to their own research.
- Seven respondents reported they developed solid plans for collaborative research with other Working Group participants.

Conclusions and Recommendations

Overall, the Working Group was very successful in making progress toward its goals. Working Group evaluation survey respondents were satisfied with the meeting, indicating that it was a productive experience that met their expectations. Respondents were also satisfied with the accommodations offered by NIMBioS.

Respondents overall reported high levels of learning, agreeing that they gained understanding in several areas related the research problem of the Working Group. All respondents agreed that the Working Group format allowed the group to make adequate progress toward its goals, and that the working group made adequate progress toward finding a common language across disciplines for forest insect pest research. All respondents also said they left this meeting with a good idea of what their contribution will be at the next meeting.

All respondents indicated they planned to take the knowledge they gained during the Working Group and apply it to their own research, and several said they had developed solid plans for collaborative research with other Working Group participants.

Overall, participants were highly satisfied with the content and format of the current meeting. One participant suggested adding a climatologist to the group.

Based on analysis of participant response data, the recommendations to NIMBioS and/or Working Group organizers are as follows:

- The Working Group content and format appear to be on track. No recommendations are made in these areas.
- Consider the request to add a climatologist to the Working Group, if organizers agree that this is an important perspective that is missing.

Modeling Forest Insects Working Group Evaluation Report

Background

Introduction

This report is an evaluation of a NIMBioS Working Group entitled “Synthesizing Predictive Modeling of Forest Insect Dynamics Across Spatial and Temporal Scales” (Forest Insects), which held its first meeting at NIMBioS February 22-26, 2010. The Modeling Forest Insects group comprised 14 participants, including organizers Mario Pineda-Krch and Mark Lewis (Centre for Mathematical Biology, Department of Mathematical and Statistical Sciences, University of Alberta, Canada) and Andrew Liebhold (Northern Research Station, USDA Forest Service). Participants came from the United States Forest Service and Canada’s Natural Resources agency as well as 12 universities in Canada, the United Kingdom, and the United States (See Appendix A).

The Forest Insects Working Group brought together agricultural scientists, ecologists, evolutionary biologists, mathematicians, and social scientists to synthesize cutting edge predictive modeling approaches for studying forest insect pest populations, global climate change scenarios, forest fire dynamics, and evolutionary dynamics of antagonistic ecological interactions.

Working Group Background

Many parts of the world are experiencing an unforeseen increase in the populations of dangerous insect breeds that pose a real threat to national forests (e.g. massive pine beetle outbreaks and the mass expansion of Gypsy moth populations in North America and Europe). Fortunately, several proven quantitative modeling methods can increase scientists’ ability to predict these outbreaks before they become disastrous to the natural landscape. The goal of the Forest Insects Working Group is to use these proven methods, along with data taken from past surges in insect numbers, and apply them to construct a reliable model for predicting future outbreaks before they accelerate.

Four meetings have been planned, including the February 22-26 working group, each focusing on a specific issues of concern. Various thematic experts have been invited to attend. The meetings will focus on synergistic activities promoting the improvement of existing models as well as the development of new approaches. Mathematical, statistical, and computational methods will be implemented using past case study data to aid in the formation of an innovative model that will predict species outbreaks before they become detrimental to the surrounding landscape.

Participant Demographics

The Forest Insects Working Group participants, who were college/university faculty (50%), postdoctoral researchers (22%), government employees (14%), or graduate students (14%), came from 12 universities and two government agencies in Canada, the United Kingdom, and the United States (See Appendix A). Primary fields of study for the 14 participants included agricultural sciences/natural resources, biological/biomedical sciences, mathematics, and social sciences (Table 1).

Table 1. Participant fields of study and areas of concentration

Field of Study	Concentration	# Participants
Agricultural Sciences/Natural Resources	Forest Sciences and Biology	2
Biological/Biomedical Sciences	Ecology	6
	Evolutionary Biology	2
Mathematics	Mathematical Ecology	2
Social Sciences	Anthropology	1
	Economics	1

The five females and nine males (none of whom self-identified as being of Hispanic/Latino ethnicity) mostly self-identified racially as white (Figures 1 & 2).

Figure 1. Ethnic composition of program participants (n =14)

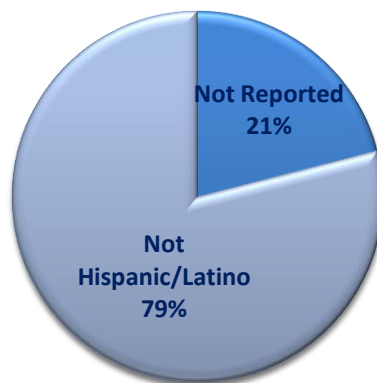
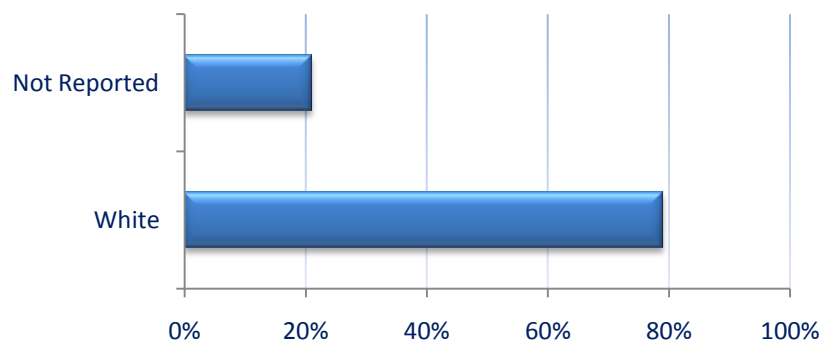


Figure 2. Racial composition of program participants (n = 14)



Two respondents indicated their work is currently supported by a National Science Foundation grant. (Table 2).

Table 2. NSF grants supporting participant research

Name of grant	Institution(s) at which grant is held
Phenological coupling and decoupling in a mutualism: Temperature effects on a bark beetle host and two fungal symbionts	Rocky Mountain Research Station
Collaborative Research: Assessing the use of paleorecords to understand beetle outbreaks in subalpine forests	Utah State University

Evaluation Design

Evaluation Questions

The evaluation of the Working Group was both formative and summative in nature, in that the data collected from participants was intended to both gain feedback from participants about the quality of the current Working Group and also to inform future meetings. The evaluation framework was guided by Kirkpatrick's Four Levels of Evaluation model for training and learning programs (Kirkpatrick, 1994¹). Several questions constituted the foundation for the evaluation:

1. Were participants satisfied with the Working Group overall?
2. Did the meeting meet participant expectations?
3. Do participants feel the Working Group made adequate progress toward its stated goals?
4. Do participants feel they gained knowledge about the main issues related to the research problem?
5. Do participants feel they gained a better understanding of the research across disciplines related to the Working Group's research problem?
6. What impact do participants feel the Working Group will have on their future research?
7. Were participants satisfied with the accommodations offered by NIMBioS?
8. What changes in accommodations, group format, and/or content would participants like to see at future meetings?

Evaluation Procedures

The final instrument was hosted online via the University of Tennessee's secure online survey host mrlInterview. Links to the survey were sent to nine Working Group participants on March 1, 2010

¹ From Kirkpatrick, D.L. (1994). *Evaluating Training Programs: The Four Levels*. San Francisco, CA: Berrett-Koehler.

(organizers Andrew Liebhold, Mario Pineda-Krch, and Mark Lewis, along with NIMBioS affiliates Sharon Beckman and Will Godsoe were not included in the survey). Reminder emails were sent out on March 8 and 10, 2010. By March 17, 2010, eight participants had given their feedback, for a response rate of 89%.

An electronic demographic survey aligned to the reporting requirements of the National Science Foundation was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director. The final instrument was hosted online via the University of Tennessee's online survey host mrInterview. Links to the survey were sent to the eleven working group participants for whom NIMBioS did not have complete information on February 5, 2010. Reminder emails were sent to non-responding participants on February 12, 2010. By February 19, 2010, nine participants had filled out the survey for a response rate of 82%. Demographics questions regarding gender, race, and ethnicity, and disability status were optional (disability status is not reported in this evaluation report). All demographic information is confidential, and results are reported only in the aggregate. When feasible, the evaluator filled in missing demographic data from other sources (e.g. address, institution, field of study). The evaluator did not assume race, ethnicity, or disability status for any participant who did not report this information.

Data Analysis

Data from the electronic survey included both forced-response and supply-item questions. All data were downloaded from the online survey host into the statistical software package SPSS for analysis. Quantitative data were analyzed using SPSS, while qualitative data were analyzed in SPSS Text Analysis for Surveys. Qualitative responses were categorized by question and analyzed for trends.

Findings

Participant Satisfaction

Overall Satisfaction

Overall satisfaction with the Working Group was high among respondents, 88% of whom indicated they either agreed or strongly agreed that the Working Group was very productive and met their expectations. Some general participant comments:

"It was very good. As a junior contributor without much reference to these types of meetings I thought it was very collegial and productive. I also felt that my contributions were valued and that I was encouraged to actively participate. The facilities and organization were excellent and it was fantastic to be able to just focus on the research, ideas, and questions at hand."

"The working group is comprised of people who seem to have common goals."

"Mark, Sandy, and Mario did a great job of leading discussions."

Eighty-eight percent of respondents thought the presentations were useful, and all thought that the presenters were very knowledgeable about their presentation topics. Additionally, 100% of

respondents either agreed or strongly agreed that they would recommend participating in NIMBioS Working Groups to their colleagues (Table 3).

Table 3. Participant satisfaction with various aspects of the Working Group

	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I feel the Working Group was very productive.	8	75%*	13%	13%	0%	0%
The Working Group met my expectations.	8	50%	38%	13%	0%	0%
The presenters were very knowledgeable about their topics.	8	75%	25%	0%	0%	0%
The presentations were useful.	8	63%	25%	13%	0%	0%
The group discussions were useful.	8	75%	25%	0%	0%	0%
I would recommend participating in NIMBioS Working Groups to my colleagues.	8	75%	25%	0%	0%	0%

* Note: Percentages in tables may not add to 100% due to rounding

Satisfaction with Accommodations

Overall, respondents reported being satisfied with the accommodations provided by NIMBioS during the Working Group. The majority of participants also reported being satisfied with the comfort and resources of the NIMBioS facility, as well as the quality of meals provided (Table 4).

Table 4. Participant satisfaction with Working Group accommodations

Please indicate your level of satisfaction with the Working Group accommodations:	n	Very satisfied	Satisfied	Neutral	Dissatisfied	Strongly dissatisfied
Comfort of the facility in which the Working Group took place	8	63%	25%	13%	0%	0%
Resources of the facility in which the Working Group took place	8	63%	38%	0%	0%	0%
Quality of meals	8	38%	63%	0%	0%	0%
Quality of drinks and snacks provided	8	13%	88%	0%	0%	0%

Working Group Format and Content

Most Useful Aspect

Most respondents said the multidisciplinary composition of the Working Group was its most useful aspect, as they were able to learn from those in fields other than their own:

“The most useful aspect was the integration among several different areas of expertise on the common problem of forest insect pests. The diversity of approaches, questions, and systems represented really contributed to the success of the first meeting...”

“Math + Biology together = powerful synthesis. Geographically diverse representation (people you rarely get to meet). A focus on including young, energetic people with modern skill sets.”

“Bringing together talented modelers, entomologists, and beginning to assemble data sets in central locations.”

Other respondents felt the enthusiasm among participants for the research topic was the most useful aspect:

“Getting to know people who are enthusiastic about the topic area, and about collaborative, synthetic work.”

“A desire among all participants to better understand processes driving forest insect populations.”

Finally, some respondents felt the number of datasets available and group discussions were very useful:

“The fact that a number of different datasets will be available. This will allow us to develop a synthesis of important problems in forest insect population dynamics.”

“Having discussions about the mechanisms that have the biggest effect on forest-insect cycles, and discussing ways to extend existing models.”

Participant Learning

Respondents were asked several questions to gauge their levels of learning about the main issues related to the research problem, including understanding what research data are available on forest insect pest populations, the modeling techniques available for research on forest insect pest populations, and how to adapt existing models to fully use available data. Respondents overall reported high levels of learning, agreeing that they gained understanding in these areas as they relate the research problem of the Working Group (Table 5).

Table 5. Participant learning about issues related to the Working Group’s research problem

As a result of participating in this Working Group, I have a better understanding of:	<i>n</i>	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The research data available on forest insect pest populations	8	25%	75%	0%	0%	0%
The modeling techniques available for research on forest insect pest populations	8	13%	88%	0%	0%	0%
How to adapt existing models to fully use available data	8	38%	50%	13%	0%	0%
The types of data needed to better inform existing models	8	38%	50%	13%	0%	0%
New modeling techniques that need to be developed	8	25%	50%	25%	0%	0%

Progress Toward Goals

All respondents agreed that the Working Group format allowed the group to make adequate progress toward its goals, and that the working group made adequate progress toward finding a common language across disciplines for forest insect pest research. Participant comments:

“We first presented our research ideas, then brainstormed, then produced focused working subgroups with clearly defined goals.”

“We have agreed on topic areas and goals to achieve before our second meeting. We have also made significant progress in working out how empirical and theoretical approaches can complement one another.”

“There is a good balance of skills and knowledge in the group with enough commonalities to further understanding of forest insects through a synthesis of math and existing biological information.”

All respondents said they had a good idea of what their contribution will be at the next meeting, although one participant felt the expectations were “overly ambitious.” Some participant comments:

“I will be developing and writing up a plan for analyzing datasets and will be collecting and organizing datasets.”

“Everybody has put together work plans, so it is just a matter of reading these to know who is doing what for next October.”

“Expectations are clear, but currently overambitious.”

Impact on Future Research Plans

All respondents said they felt that the exchange of ideas that took place during the Working Group would initiate and/or influence their future research. Some participant comments:

“I will lead a collaborative project from this group. More generally, knowing what others are working on helps me to understand where I can best contribute.”

“I spent some time talking to people whose major modeling efforts are aimed at statistical analyses of defoliation data, whereas most of my modeling efforts are aimed at mechanistic modeling. These discussions have already led to a new, productive collaboration.”

“There are always pressures to (a) specialize in just one system and (b) employ the few analytic approaches with which one is most comfortable. I am renewing my efforts to work across systems and to employ multiple methods.”

In addition to new ideas for research, seven respondents said that they developed unanticipated plans for collaborative research with other Working Group participants.

“Most of the collaborative plans coming out of the focused subgroups were unanticipated.”

“Work on optimal pest control has always been appealing; never had the chance to collaborate with the right types...I always thought a centralized database for insect dendroecology was needed; never [before] had the opportunity to forge a consensus...”

Suggestions for Future Working Group Meetings

Respondents were asked several questions soliciting suggestions for future Working Group meetings. Overall, participants were highly satisfied with the content and format of the current meeting. One participant suggested adding a climatologist to the group:

“It is clear from our multi-day discussions that climate variability and climate change are important topics that the group wishes to grapple with for some objectives. Indeed, it may be one of the main rationales for the group, i.e., to help move mathematical modeling of insect population dynamics forward to a position where understanding is improved, and perhaps predicting insect outbreaks in the context of climate variability and change is possible. Given this strong interest and rationale of the group, it is unfortunate that we have no trained climatologists or climate modelers (to my knowledge) in the group.”

Conclusions and Recommendations

Overall, the Working Group was very successful in making progress toward its goals. Working Group evaluation survey respondents were satisfied with the meeting, indicating that it was a productive experience that met their expectations. Respondents were also satisfied with the accommodations offered by NIMBioS.

Respondents overall reported high levels of learning, agreeing that they gained understanding in several areas related the research problem of the Working Group. All respondents agreed that the Working Group format allowed the group to make adequate progress toward its goals, and that the working group made adequate progress toward finding a common language across disciplines for forest insect pest research. All respondents also said they left this meeting with a good idea of what their contribution will be at the next meeting.

All respondents indicated they planned to take the knowledge they gained during the Working Group and apply it to their own research, and several said they had developed solid plans for collaborative research with other Working Group participants.

Overall, participants were highly satisfied with the content and format of the current meeting. One participant suggested adding a climatologist to the group.

Based on analysis of participant response data, the recommendations to NIMBioS and/or Working Group organizers are as follows:

- The Working Group content and format appear to be on track. No recommendations are made in these areas.
- Consider the request to add a climatologist to the Working Group, if organizers agree that this is an important perspective that is missing.

Appendix A

List of Participants

Participants

Last name	First name	Institution
Bentz	Barbara	United States Forest Service, Rocky Mountain Research Station
Bewick	Sharon	NIMBioS
Cobbold	Christina	University of Glasgow
Cooke	Bary	Natural Resources, Canada
Dwyer	Gregory	University of Chicago
Godsoe	William	NIMBioS
Haynes	Kyle	University of Virginia
Hughes	Josie	University of Toronto
James	Patrick	University of Alberta
*Lewis	Mark	University of Alberta
*Liebhold	Andrew	United States Forest Service, Northern Research Station
*Pineda-Krch	Mario	Centre for Mathematical Biology, University of Alberta
Swetnam	Tom	University of Arizona
Yang	Xi	Cornell University

*** Organizer of Working Group**

Appendix B

Modeling Forest Insects Working Group Survey

Modeling Forest Insects Working Group Survey

Thank you for taking a moment to complete this survey. Your responses will be used to improve the Working Groups hosted by the National Institute for Mathematical and Biological Synthesis. Information supplied on the survey will be confidential, and results will be reported only in the aggregate.

Please check the appropriate box to indicate your level of agreement with the following statements about this Working Group: (Very satisfied, Satisfied, Neutral, Dissatisfied, Very dissatisfied)

I feel the Working Group was very productive.

The Working Group met my expectations.

The presenters were very knowledgeable about their topics.

The presentations were useful.

The group discussions were useful

I would recommend participating in NIMBioS Working Groups to my colleagues.

Please check the appropriate box to indicate your level of agreement with the following statements.

As a result of participating in this Working Group, I have a better understanding of:

(Strongly agree, Agree, Neutral, Disagree, Strongly disagree)

the research data available on forest insect pest population

the modeling techniques available for research on forest insect pest populations

how to adapt existing models to fully use available data

Do you feel the working group made adequate progress toward its goal of finding a common language across disciplines for forest insect pest research?

Yes

No

Comments:

Do you feel the expectations for the next Working Group are clear (in the sense that you are leaving this meeting with a good idea of what your contribution will be at the next meeting)?

Yes

No

Comments:

Do you feel that the exchange of ideas that took place during the Working Group will initiate or influence your future research? Please explain:

Did you develop unanticipated plans for collaborative research with other Working Group participants? Please explain:

What do you feel was the most useful aspect of the Working Group?

What would you have changed about the Working Group?

How do you feel about the format of the Working Group?

This was a very effective format for achieving our goals

This was not a very effective format for achieving our goals ->

The Working Group format would have been more effective if:

Is your work currently supported by an NSF grant?

Yes

No

Name of NSF grant:

Institution at which NSF grant is held:

Please indicate your level of satisfaction with the Working Group accommodations:

(Very satisfied, Satisfied, Neutral, Dissatisfied, Very dissatisfied)

Comfort of the facility in which the Working Group took place

Resources of the facility in which the Working Group took place

Quality of meals

Quality of drinks and snacks provided

Please indicate any changes NIMBioS can make to improve the resources and/or accommodations available to working group participants:

Please provide any additional comments about your overall experience with the Working Group:

NIMBioS is creating a web page with links to blogs written by participants. If you have a blog and would like to be included on our website, please provide the URL and a brief description of the blog.

Appendix C

Open-ended Survey Responses

Open-ended responses

Do you feel the working group made adequate progress, for its first meeting, toward its goal of finding a common language across disciplines for forest insect pest research? (n=6)

Exciting. Thanks.

We first presented our research ideas, then brainstormed, then produced focused working subgroups with clearly defined goals.

We have agreed on topic areas and goals to achieve before our second meeting. We have also made significant progress in working out how empirical and theoretical approaches can complement one another.

There is a good balance of skills and knowledge in the group with enough commonalities to further understanding of forest insects through a synthesis of math and existing biological information.

The first meeting went incredibly well and I now have even higher hopes for future meetings.

First, I think this is an excellent group of scientists and the topic is extremely interesting and important. I am excited to be involved and I am confident that a number of good products will develop from our interactions. Moreover, I am grateful for the leadership of Mario, Mark, Sandy and others for pulling this group together and NIMBioS for the support, venue, etc.

I do have a few concerns about possible limitations that I perceive in the range of expertise in the group and prior collaborations, and perhaps as a consequence of this, some possible narrowness of perspective on some aspects of our endeavors.

It is clear from our multi-day discussions that climate variability and climate change are important topics that the group wishes to grapple with for some objectives. Indeed, it may be one of the main rationales for the group, i.e., to help move mathematical modeling of insect population dynamics forward to a position where understanding is improved, and perhaps predicting insect outbreaks in the context of climate variability and change is possible. Given this strong interest and rationale of the group, it is unfortunate that we have no trained climatologists or climate modelers (to my knowledge) in the group. In my view, this lack of expertise and perspective was reflected in some of the discussions and thinking. Climatologists and climate modelers have a diverse and rich set of concepts and tools that are naturally designed to evaluate and understand complex dynamical systems at the appropriate spatial and temporal scales (seasons to decades and longer, regions to continents to the planet). I believe there is a great deal that ecological modelers could draw from these fields. These topics are also of central importance to our group because of relatively recent improvements in knowledge about oscillatory behaviors of the ocean-atmosphere system, and the effects on regional climates and ecosystems.

One of the examples of where methods and concepts from atmospheric sciences (and in some ecological modeling) is “data-model-assimilation”. This approach, which is increasingly formalized, described and applied in the literature in the context of modeling complex systems (and particularly in forecasting/predicting) came up only a couple of times in our discussions (when I mentioned it) but I did

not get the sense that anyone was very aware of this developing field or really grasped the need or potential of these approaches for our group. I could be mistaken, and some in our group do in fact “get it” about data model assimilation, but I could not tell. Again, I use data model assimilation as just one example of where conceptually, we may be missing out as a group on some powerful tools and perspectives.

Overall, I do think the group has plenty of expertise in forest insects and forest insect modeling, and there is sufficient diversity of expertise and perspectives in these areas to make some good headway on some objectives and goals. My concern about the lack of climatology expertise is not a huge problem, but it is a real limitation, I think. Although the group does represent a range of experience and expertise, my guess is that a network analyses of the academic, scientific and other professional links among the group would show it be highly interlinked already, with only a few exceptions among the participants being mostly outside of this loop. By this I mean, I think a majority of the group know each fairly well from previous interactions; many have worked and published together before, advised or mentored each other, etc. As a consequence, there may be a bit of a hurdle to introduce truly novel ideas, concepts, and perspectives that are far outside of the language and usual perspectives of a semi-established culture of forest insect dynamics and modeling that is fairly well represented in the group.

Finally, I am optimistic about successful outcomes and good products from the group. I offer these comments in a constructive sense, in hopes that we can move the group in some way to some truly novel perspectives and interactions

Do you feel that the exchange of ideas that took place during the working group will influence your future research? (n=6)

I will lead a collaborative project from this group. More generally, knowing what others are working on helps me to understand where I can best contribute.

Very inspirational

I think that new collaborative research with other participants will result from our meeting.

I spent some time talking to people whose major modeling efforts are aimed at statistical analyses of defoliation data, whereas most of my modeling efforts are aimed at mechanistic modeling. These discussions have already led to a new, productive collaboration.

There are always pressures to (a) specialize in just one system and (b) employ the few analytic approaches with which one is most comfortable. I am renewing my efforts to work across systems and to employ multiple methods.

Yes, future in the sense of the next year or two when I will be collaborating with the group. Over the long term who knows? I hope that, yes, we come up with some new frameworks, models, etc. that my students and I will be using for years to come. Too early to say this will be the case for sure.

Did you develop unanticipated plans for collaborative research with other working group participants? (n=3)

Most of the collaborative plans coming out of the focused subgroups were unanticipated

-work on optimal pest control has always been appealing; never had the chance to collaborate with the right types (Xi, Mark), -always thought a centralized database for insect dendroecology was needed; never had the opportunity to forge a consensus (Tom),

Pretty much what I expected on the near term products that I am engaged in with the group.

Do you feel the expectations for the next working group are clear? (n=3)

Expectations are clear, but currently overambitious.

I will be developing and writing up a plan for analyzing datasets and will be collecting and organizing datasets.

Everybody has put together work plans, so it is just a matter of reading these to know who is doing what for next October.

What do you feel was the most useful aspect of the working group? (n=8)

The most useful aspect was the integration among several different areas of expertise on the common problem of forest insect pests. The diversity of approaches, questions, and systems represented really contributed to the success of the first meeting.

Getting to know people who are enthusiastic about the topic area, and about collaborative, synthetic work.

Good group dynamics. Diversity of different backgrounds/perspectives.

The fact that a number of different datasets will be available. This will allow us to develop a synthesis of important problems in forest insect population dynamics.

A desire among all participants to better understand processes driving forest insect populations.

Having discussions about the mechanisms that have the biggest effect on forest-insect cycles, and discussing ways to extend existing models.

-Math + Biology together = powerful synthesis, -Geographically diverse representation (people you rarely get to meet), -A focus on including young, energetic people with modern skill sets

Bring together talented modelers, entomologists, and beginning to assemble data sets in central locations.

What, if anything, would you change about the working group? (n=5)

Hard to say until I see what comes out of the collaborative work.

Nothing as of yet

Can't think of anything.

Can't think of anything, it was a great experience.

-I wish that Tony Ives and Ottar Bjornstad and Subhash Lele could have attended the first meeting. I hope they are able to contribute in future meetings - that the agenda did not get tilted too far away from their primary interests.

The working group format would have been more effective if: (n=0)

Name of NSF grant (n=1)

Phenological coupling and decoupling in a mutualism: Temperature effects on a bark beetle host and two fungal Symbionts. Collaborative Research: Assessing the use of paleorecords to understand beetle outbreaks in subalpine forests.

Grant institute (n=1)

Rocky Mountain Research Station, Utah State University.

Please indicate any changes NIMBioS can make to improve the resources and/or accommodations available to working group participants: (n=7)

This is just a small thing... it may be worthwhile to indicate in the welcome package some local food and drink opportunities on and near campus (e.g., coffee shops, restaurants).

Access to a swimming pool or larger fitness facility.

Better coffee is the only improvement. Plus lighter snacks would be good as an option.

Can't think of any.

Better tasting coffee.

There weren't enough plugs for laptops in the room that we were in, and in general it would've been helpful to have more small rooms.

-I hate to be picky, as the overall experience was wonderful. But better coffee would be good. (OTOH it is not a very far walk to the Starbucks.), -For international participants who are sports fans it would be great to be able to see a Volunteers basketball game

Please provide any additional comments about your overall experience with the working group: (n=5)

It was very good. As a junior contributor without much reference to these types of meetings I thought it was very collegial and productive. I also felt that my contributions were valued and that I was encouraged to actively participate. The facilities and organization were excellent and it was fantastic to be able to just focus on the research, ideas, and questions at hand.

Thanks again.

Great. Thanks for hosting us.

The working group is comprised of people who seem to have common goals.

Mark, Sandy, and Mario did a great job of leading discussions.

NIMBioS is creating a web page with links to blogs written by participants. If you have a blog and would like to be included on our website, please provide the URL and a brief description of the blog (n=0)

Brief description of blog: (n=0)