

Prospectus for Synthesis and Assessment Product 4.4

Preliminary Review of Adaptation Options for Climate-Sensitive Ecosystems and Resources

Lead Agency: Environmental Protection Agency
Supporting Agencies: Department of Agriculture
Department of Energy
Department of Interior/U.S. Geological Survey
National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration

1. Overview: Description of Topic, Questions to be Addressed, and Audience

1.1 Introduction

The Strategic Plan of the U.S. Climate Change Science Program (CCSP) calls for the preparation of 21 synthesis and assessment products (SAPs) to support policy making and adaptation decisions across the range of issues addressed by the CCSP (CCSP, 2003). The SAPs are to be completed by 2007, and will be prepared through processes that are open and public. Stakeholder participation will be sought in order to provide an accurate and balanced presentation of the knowledge base for climate change decision support. The products are expected to follow guidelines issued publicly on December 2, 2004. These and subsequent guidelines require that the SAPs be prepared in conformance with applicable provisions of the Information Quality Act (IQA) and the Federal Advisory Committee Act (FACA).

This prospectus outlines the content and approach for completing Synthesis and Assessment Product (SAP) 4.4, entitled “*A preliminary review of adaptation options for climate-sensitive ecosystems and resources*”. “Preliminary review” in this context is the process of collecting and reviewing available information about known or potential adaptation options. The purpose of SAP 4.4 is to review management options for adapting to climate variability and change in the United States, and to identify characteristics of ecosystems and adaptation responses that promote successful implementation and meet resource managers’ needs.

SAP 4.4 addresses CCSP Goal 4: to understand the sensitivity and adaptability of different natural and managed ecosystems to climate and related global changes. SAP 4.4 also addresses a stated research need in Chapter 8 (section 8.3) of the CCSP Research Strategy: *How can climate-sensitive ecosystems and resources be managed to sustain ecosystem services in the context of multiple demands and changing environmental conditions?*

1.2 Topic and Content

Climate is a dominant factor influencing the distributions, structures, functions, and services of ecosystems. Changes in climate will interact with other environmental changes to affect biodiversity and the future condition of ecosystems (e.g., McCarthy et al. 2001; McCarty 2001; Parmesan and Yohe 2003). The extent to which ecosystem condition will be affected will depend on the degree of sensitivity of the ecosystem to changes in climate and the availability of adaptation options for effective ecosystem management.

1 Adaptation is defined as an adjustment in ecological, social, or economic systems in response to
2 climate stimuli and their effects (McCarthy et al. 2001). SAP 4.4 will focus on management
3 strategies for adapting to climate variability and change. The goal of these adaptation strategies
4 is to reduce the risk of adverse outcomes through activities that increase the resilience of
5 ecological systems to climate change (Turner et al. 2003; Tompkins and Adger 2004; Scheffer et
6 al. 2001). In this context, resilience refers to the amount of change or disturbance that can be
7 absorbed by a system before the system is redefined by a different set of processes and structures
8 (Holling, 1973; Gunderson, 2000; Bennett et al., 2005). Potential adverse outcomes of climate
9 variability and change will vary for different ecosystems. The “effectiveness” of an adaptation
10 option will thus be case-dependant and can only be measured against a desired ecosystem
11 condition or natural resource management goal. Because changes in the climate system are likely
12 to persist into the future regardless of emissions mitigation, adaptation is an essential response
13 for future protection of climate-sensitive ecosystems.

14
15 Adaptation options for enhancing ecosystem resilience include changes in processes, practices,
16 or structures to reduce anticipated damages or enhance beneficial responses associated with
17 climate variability and change. In some cases, opportunities for adaptation offer stakeholders
18 multiple benefit outcomes, such as the addition of riparian buffer strips that (1) manage pollution
19 loadings for water quality compliance in agricultural areas today and (2) establish a protective
20 barrier to increases in both pollution and sediment loadings associated with future climate
21 change.

22
23 A range of adaptation options are possible for many ecosystems, but a lack of information or
24 resources may impede successful implementation. In some cases, managers may not have the
25 knowledge or information available to them that they need to address climate change impacts. In
26 other instances, managers may understand the issues and have the relevant information but lack
27 resources to implement adaptation options. Furthermore, even with improvement in the
28 knowledge and communication of available and emerging adaptation strategies, the feasibility
29 and effectiveness of adaptation will depend on the adaptive capacity of the ecological system or
30 social entity. Adaptive capacity is defined as “the potential or ability of a system, region, or
31 community to adapt to the effects or impacts of climate change,” (McCarthy et al. 2001).
32 Depending on the management goals, there may be biological, physical, economic, social,
33 cultural, institutional, or technological conditions that enhance or hinder adaptation.

34
35 Thus, increasing adaptive capacity will require information and tools that aid in (1)
36 understanding the combined effects on ecosystems of climate changes and non-climate stressors,
37 and consequent implications for achieving specific management goals, (2) applying existing
38 management options or developing new adaptation approaches that reduce the risk of negative
39 outcomes, and (3) understanding the opportunities and barriers that affect successful
40 implementation of management strategies to address climate change impacts.

41
42 Synthesis and Assessment Product 4.4 will focus on ecosystems and resources in selected
43 federally protected and managed areas that are considered to be more climate sensitive than
44 others. Their protected status reflects the value placed on these ecosystems and resources by the
45 American public. The management goals of these areas are representative of the range of goals
46 and challenges faced by Federal and other resource management organizations across the United
47 States. Adaptation in these areas will require an array of responses to ensure the achievement of
48 management goals over a range of time scales.

1 Approximately one-third of the Nation's land base is managed by the Federal Government and
2 administered by different agencies through a variety of management systems. The climate-
3 sensitive systems examined in this report include ecosystems or resources in: National Parks,
4 National Wildlife Refuges, Wild and Scenic Rivers, marine protected areas, National Forest
5 Systems, and the National Estuary Program. Other federally owned or managed systems that
6 could qualify -- such as Wilderness Preservation Areas, Biosphere Reserves, Research Natural
7 Areas, Natural Estuarine Research Reserves, Public Lands -- were not selected because they are
8 either a sub-category of the federal systems already selected above, or because the primary
9 purpose of ownership is research, not resource management.

10
11 SAP 4.4 will begin with a review of (1) goals and practices for the selected federally protected
12 and managed systems, (2) potential effects of climate variability and change on the attainment of
13 those goals, and (3) adaptation options for increasing the resilience of natural resources to
14 climate variability and change. Our knowledge of potential adaptation options for responding to
15 climate variability and change may be informed by previous or current efforts to adapt to climate
16 variability. Climate variability is defined as "the variations in the mean state and other statistics
17 of climate on all temporal and spatial scales beyond that of individual weather events"
18 (Houghton, et al., 2001). Therefore, the review will draw on literature describing ecological and
19 human responses to climate variability – intra-annual, inter-annual and extreme events – in
20 addition to climate change, to inform managers of the variety of options available to respond to
21 climate variability and long-term climate change. Following the review will be a detailed
22 assessment of the issues and challenges associated with implementation of adaptation options for
23 six case studies within the selected management systems; these case studies will cover a variety
24 of ecosystem types such as coral reefs, wetlands, rivers and streams, forests, and estuaries.

25
26 The SAP Chapter Lead Authors, in consultation with the Lead Agency, will consider the
27 following criteria in evaluating and selecting potential case studies:

- 28
29 1.) Contains one or more ecosystem service or feature that is protected by a management goal
30 2.) The management goal is sensitive to climate variability and change, and the potential impacts
31 of climate variability and change are significant relative to the impacts of other changes
32 3.) Adaptation options are available to preserve a service or a physical or biological feature
33 4.) Adaptation options could be applied to other geographic regions or to other ecosystem types.

34
35 The report will also provide a synthesis of lessons learned from the case studies that are broadly
36 relevant across geographic areas, ecosystem types, and management goals and methods.
37 Therefore, when selecting the case studies, the Chapter Lead Authors and the Lead Agency will
38 also consider the following desirable characteristics of the group of case studies:

- 39
40 1.) Address a reasonable cross section of important, climate-sensitive ecosystems and/or
41 ecosystem services and features
42 2.) Address a range of adaptation responses (e.g., structural, policy, permitting)
43 3.) Distributed across the United States and have a national constituency
44 4.) Attributes of the individual case studies allow for comparison of adaptation approaches and
45 their effectiveness (e.g., lessons learned about research gaps and about factors that enhance
46 or impede implementation)

1 **1.3 General Approach**

2 Individuals and members of federal, state, tribal, and local governments and agencies, together
3 with non-governmental organizations (NGOs) are involved in managing ecosystems that may be
4 affected by climate variability and change. The goal of this CCSP product is to provide useful
5 information to these audiences on the state of knowledge regarding adaptation options for key,
6 representative ecosystems and resources. To ensure that we achieve this goal, we will engage
7 both stakeholders and researchers in shaping the content of this report. The Coordinating Author
8 and Chapter Lead and Contributing Authors will work with the lead and supporting agencies to
9 obtain stakeholder input throughout the writing process. When the first drafts of each Chapter are
10 completed, a series of workshops will be held with stakeholders to engage them in reviewing the
11 content and applicability of the information provided in SAP 4.4. A summary of the process for
12 drafting SAP 4.4 is described below and in Section 5 of this prospectus:
13

14 **I. Conduct literature review**

15 **II. Develop report outline including chapter content**

- 16 a. Authors develop framework for report and individual chapters
- 17 b. Authors propose case studies
- 18 c. Environmental Protection Agency (EPA) and supporting agencies consult with
19 each other and approve selected case studies

20 **III. Write first drafts of each chapter** - Authors draft individual chapters and respond to 21 the five key questions listed in this prospectus (section 1.5)

22 **IV. Hold stakeholder workshops**

- 23 a. Authors hold workshops with stakeholders to review and comment on report
- 24 b. Comments and authors' responses are recorded and made publicly available
- 25 c. Authors revise chapters based on stakeholder comments

26 **V. Submit completed chapters to EPA**

27 **VI. Complete draft final report** - EPA prepares the final report, including the executive 28 summary and preface

29 **VII. Submit report to FACA panel for review**

30

31 At the point that SAP 4.4 is submitted to the FACA panel, it enters the review phase described in
32 Section 6 of this prospectus. The review process for this report will be consistent with the
33 guidelines for preparing CCSP synthesis and assessment reports.
34

35 **1.4 Audience and Intended Use**

36 The primary audience for SAP 4.4 is resource and ecosystem managers at the federal, state, and
37 local level, tribes, non-governmental organizations, and others involved in protected area
38 management decisions. SAP 4.4 will inform resource/ecosystem managers on the types of
39 decisions that are sensitive to climate variability and change, the types of adaptation options
40 available for supporting resilience to climate variability and change, and approaches for
41 implementing adaptation options. Scientists, engineers and other technical specialists will be able
42 to use the information in SAP 4.4 to set priorities for future research and to identify decision
43 support needs and opportunities. SAP 4.4 will also support tribes and government agencies at the
44 federal, state and local level in the development of policy decisions that promote adaptation and
45 increase society's adaptive capacity for ecosystems and species within protected areas.
46
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1.5 Questions to be Addressed

SAP 4.4 will summarize the present state of scientific understanding of the potential for adaptation interventions to help decision makers avoid adverse ecological outcomes associated with climate variability and change. The focus will be on the management of federally protected and managed lands and their resources, using case studies to illustrate how adaptation is or may be used to achieve management goals in the face of climate variability and change. The questions below describe the issues to be addressed in SAP 4.4:

1. *What are the management goals in the selected systems, upon what ecosystem characteristics do these goals depend, what are the stressors of concern, what are the management methods currently being used to address those stresses, and how could climate variability and change affect attainment of management goals?*

The SAP will begin with a literature review of specified management goals for the selected ecosystems on federally protected and managed lands and the management principles or frameworks employed to reach targeted goals. Natural resource management goals are commonly expressed in terms of maintaining ecosystem integrity, achieving restoration, preserving ecosystem services, and protecting wildlife and other ecosystem characteristics. The achievement of management goals is thus dependant on our ability to protect, support, and restore the structure and functioning of ecosystems.

Changes in climate may impact ecosystems such that management goals are not achieved. Thus the identified management goals from the literature review will be analyzed for their sensitivity to climate variability and change, and to other stressors present in the system that may interact with climate change.

Adaptive responses to climate variability and change reduce the risk of failing to achieve management goals. The review will describe adaptation theories and frameworks from the scientific and management literature. Adaptation theories may be based on studies that focus on climate variability or long-term climate change. Possible adaptation theories and frameworks will then be linked to the climate-sensitive goals identified in each system. Potential adaptive responses include modification of existing management actions and new approaches intended solely to address the impacts of climate variability and change.

2. *For selected case studies, what is the current state of knowledge about management options that could be used to adapt to the potential impacts of climate variability and change? Specifically, for each case study:*

- 2.1 *What are the specific management goals?*

- 2.2 *What is our current knowledge of the condition and stresses for the system?*

- 2.3 *What methods are currently used to meet management goals and how are they implemented?*

- 2.4 *If adaptation is used, to what is it adapting, and what new information is being incorporated into management plans?*

- 2.5 *What information about the natural adaptive capacity of the ecosystem is being used in the current management methods?*

- 2.6 *What are the opportunities or constraints that help or hinder the implementation of management strategies/methods?*

1 2.7 *How effective have those management methods been thus far in reaching stated*
2 *management goals?*

3 2.8 *How could climate variability and change alter the effectiveness of current*
4 *management practices?*

5 2.9 *How could management practices be altered or supplemented to address climate*
6 *variability and change impacts?*

7
8 These questions will be addressed using six case studies to demonstrate adaptation approaches
9 for ecosystems and resources on federally protected and managed lands. For the purposes of this
10 SAP, a case study is a place-based exemplary illustration of adaptation methods or approaches to
11 climate variability and change. Each case study will also discuss how recommended adaptation
12 concepts, frameworks, or specific approaches may be applied to other ecosystem types or
13 geographic regions with similar goals and climate change stresses. For example, if the resilience
14 of one ecosystem type such as coral reefs may be enhanced through establishing a network of
15 protected areas, a case study on coral reefs could enumerate how other types of ecosystems may
16 benefit from a similar approach.

17
18 3. *Looking across the case studies, what are the factors that affect the successful*
19 *implementation of management actions to address impacts from climate variability and*
20 *change?*

21
22 The case studies in this report will reflect a cross section of climate-sensitive ecosystems and
23 adaptation responses. This provides the opportunity to compare and contrast the different
24 approaches to adaptation and assess the factors that affect their successful implementation.
25 Factors affecting success may include ecosystem characteristics, management goals, and
26 technical and scientific limitations. Challenges to implementation may be associated with
27 different organizational scales, operational trade-offs, cost/benefit considerations, social/cultural
28 factors and planning requirements (i.e., elements that determine the human component of
29 adaptive capacity). An improved understanding of how these and other factors affect the success
30 of adaptation responses is required to ensure the future protection of climate-sensitive
31 ecosystems and resources.

32
33 The set of case studies will also provide an opportunity to identify and assess circumstances
34 under which adaptation options complement current management goals. Examples include win-
35 win strategies that improve current management systems and increase the resilience of ecological
36 systems to climate variability and change; bet-hedging strategies that reduce ecological risks
37 across a broad range of climate change scenarios; adaptive management plans that would
38 incorporate systematic monitoring and climate change information; and voluntary or incentive-
39 based programs that could involve public recognition, financial support, cost sharing, or cost
40 leveraging to encourage incorporating adaptation for climate change into multipurpose projects.
41 Understanding the potential applications and benefits of such strategies enhances their
42 attractiveness to decision makers and increases the likelihood of their implementation.

43
44 4. *For each case study, how should we define and measure the environmental outcomes of*
45 *management actions and their effect on the resilience of ecosystems to climate variability*
46 *and change?*

47

1 The set of case studies provides an opportunity to synthesize information and assess the
 2 effectiveness of different management actions for increasing the resilience of ecosystems to
 3 climate variability and change. At one level, the effectiveness of an adaptation action could be
 4 evaluated simply based on the success of implementing the management action. More
 5 importantly, however, the effectiveness of adaptation must reflect the longer term effect on the
 6 ecosystem. At this level, the measure of effectiveness will require not only the consideration of
 7 individual management actions, but also the cumulative effects of multiple actions on an
 8 environmental outcome or management goal of concern. Assessing the environmental outcomes
 9 of adaptation will require monitoring and assessment over potentially long periods of time as
 10 climate changes. For each case study, authors will propose a method or methods for monitoring
 11 and measuring environmental outcomes of the planned or implemented adaptation actions.
 12

13 *5. What are the research priorities for adaptation that will provide decision makers with the*
 14 *information and tools they need to protect climate-sensitive ecosystems and resources?*
 15

16 Providing decision makers with the information and tools they need to protect ecosystems will
 17 require a diverse knowledge of how to improve adaptive capacity and resilience to climate
 18 variability and change. Given the breadth and complexity of this subject, it is important to
 19 identify and prioritize the need for new information, tools, models and approaches to adaptation
 20 to guide future research and theoretical adaptations to climate variability and change that could
 21 be analyzed or field-tested. This includes research to identify the information and type of
 22 decision support tools most useful to decision makers; to improve existing approaches and
 23 develop new approaches to adaptation in different ecosystems; to improve methods to evaluate
 24 the effectiveness of alternative adaptation options; and to understand and improve adaptive
 25 capacity of specific sensitive ecosystems and human communities.
 26
 27

28 **2. Contact Information and Role of Lead Agency**

29 **2.1 Contact Information**

30 The following table lists the designated contact person for each agency that is responsible for
 31 supporting this effort.
 32
 33

Agency/Participants	Contact	E-mail
Environmental Protection Agency (EPA) – Lead	Susan Julius Jordan West Britta Bierwagen Tom Johnson Chris Pyke	julius.susan@epa.gov west.jordan@epa.gov bierwagen.britta@epa.gov johnson.thomas@epa.gov pyke.chris@epa.gov
U.S. Department of Agriculture (USDA)	William Hohenstein Bryce Stokes	whohenst@mailoce.oce.usda.gov bstokes@fs.fed.us
Department of Energy (DOE)	Jeff Amthor	jeff.amthor@science.doe.gov
Department of the Interior (DOI)	Jack Waide	jwaide@usgs.gov
National Aeronautics and Space Administration (NASA)	Woody Turner Ed Sheffner	woody.turner@nasa.gov esheffne@hq.nasa.gov
National Oceanic and Atmospheric Administration (NOAA)	Kenric Osgood Ned Cyr	kenric.osgood@noaa.gov ned.cyr@noaa.gov

2.2 *Lead Agency Roles and Responsibilities*

EPA is the lead agency for this synthesis and assessment product. Other agencies committed to contributing to this product are DOE, DOI, NASA, NOAA and USDA. As the lead agency, EPA will use its guidelines for implementing the Information Quality Act and for meeting the requirements of the Federal Advisory Committee Act. EPA is also responsible for coordinating the acquisition of the authors' time as needed for this project, except for those authors that are employed by federal agencies.

3. Chapter Lead Authors, Coordinating Author, and Expert Reviewers: Required Expertise

As the lead Agency for SAP 4.4, the Environmental Protection Agency will also serve as the Lead Author, and will be responsible for compiling and synthesizing the contributions from the Chapter Lead Authors listed in this prospectus. This includes guiding the entire project, assembling the final report – including harmonizing all of the writing contributions and editing the document for consistency and clarity – preparing the Preface and Executive Summary, and responding to reviewer comments on the document for each round of reviews. When the report enters the review phase, EPA will work with the Coordinating Author and the Chapter Lead and Contributing Authors to develop responses to comments from public and scientific reviews and will formally document all responses.

The lead agency is also responsible for preparing a list of nominees for Chapter Lead Authors based on interest in this product and a record of accomplishments in the relevant fields of expertise. The final report will undergo a FACA committee review as well as all other reviews called for in the U.S. Climate Change Science Program guidelines.

3.1 *Role and Required Expertise of Chapter Lead Authors*

The writing team will include seven Chapter Lead Authors who will be responsible for directing the writing and content of specific chapters and ecosystem case studies described in section 1.2 of this prospectus. The Chapter Lead Authors will invite Contributing Authors, as necessary, to participate in the development of the chapters and ecosystem case studies. Contributing Authors will be responsible for pre-determined portions of the case studies relating to one or more of the topic areas to be addressed by the Chapter Lead Authors. The Chapter Lead Authors and their Contributing Authors will be responsible for preparing the initial draft of each chapter of the report. Chapter Lead Authors will be responsible for the quality and accuracy of all graphics and written contributions to EPA, including any information or analysis required to synthesize the underlying studies on which the product is based.

Chapter Lead Authors should be accomplished writers and have technical backgrounds in at least one field relevant to adaptation for, or restoration of ecosystems. Each Chapter Author must have produced or managed the production of a report or article that informs our understanding of adaptation for ecosystems to the impacts of climate change and climate variability, or have extensive experience managing or making decisions about responses of ecosystem to climate variability and change.

3.2 *Role and Required Expertise of Coordinating Author*

The Coordinating Author will work with EPA to organize and coordinate the activities of the seven Chapter Lead authors as they develop and draft the content of each chapter, as they design

1 and execute the six stakeholder meetings, and as they respond to stakeholder, public and expert
2 peer review comments. The Coordinating Author will serve as the facilitator in any meetings
3 with the Chapter Lead Authors and will be responsible for harmonizing the approach and content
4 of each chapter.

5
6 The Coordinating Author should be an accomplished writer and have a technical background in
7 at least one field relevant to adaptation for, or restoration of ecosystems. The Coordinating
8 Author should also have experience managing the production of a scientific synthesis report
9 involving authors from government and academic institutions, and engaging stakeholders in the
10 synthesis process.

11 12 **3.3 Role and Required Expertise of FACA Review Committee**

13 The Environmental Protection Agency will convene a Federal Advisory Committee comprised of
14 10 independent reviewers. This committee will function under the requirements of the Federal
15 Advisory Committee Act. As a FACA committee, the Review Committee's deliberations related
16 to substantive matters will take place in an open public forum. Meetings of the FACA Review
17 Committee (including conference calls and face to face meetings) will be announced in the
18 Federal Register Notice no less than 15 days in advance of the meeting. The FACA Review
19 Committee will represent the interests of the scientific community and other members of the
20 intended audience, both in terms of reviewing the substance of the material included in the
21 product and the quality of the writing. The Committee will provide an independent scientific
22 review to ensure that the report accurately represents the state of the science and conveys the
23 interests and needs of the environmental/natural resource and ecosystems management
24 communities in preventing and responding to environmental impacts on the nation's climate-
25 sensitive ecosystems.

26
27 The expert reviewers will have experience in studying, managing, and implementing ecosystem
28 protection strategies. In selecting FACA members, EPA will consider candidates with experience
29 in ecological/ecosystem science, wildlife ecology, landscape ecology, systems ecology,
30 biogeography, environmental sciences, social sciences, forestry, fisheries, land and water
31 management, watershed science, and marine ecology. To ensure independence and avoid
32 conflicts of interest, reviewers will not be employees or recent contractors or grantees of the lead
33 agency. In addition, no member of the FACA Review Committee will participate on any part of
34 this Product's writing team.

35 36 **3.4 Nominees for Chapter Lead Author and Coordinating Author**

37 Chapter Lead Authors and Coordinating Author have been nominated by the sponsoring agency
38 to participate in the overall coordination of Product 4.4 preparation. These nominees were
39 identified based on past records of interest and accomplishments in conducting research and
40 advising academic and government panels on one or more of the following areas: climate
41 variability and change impacts on ecosystems (including on federally owned or managed lands);
42 management methods (including on federally owned or managed lands and waters); ecosystem
43 restoration; large scale syntheses of scientific research and management responses for
44 environmental impacts to sensitive ecosystems and resources; guidance documents on managing
45 for resilience; collaboration with resource managers to produce scientific publications and
46 translate them into popular publications that connect the science with its application, and; social
47 dimensions of managing ecological resources. Past contributions to relevant scientific
48 assessments, success in peer-reviewed proposal funding competitions, and publication records in

1 refereed journals are additional measures used in the selection process. The Chapter Lead
 2 Authors selected on the basis of these criteria are listed below. Biographical information is
 3 presented in Appendix A.

4
 5 Chapter Lead Author Nominees

6

<i>Jill Baron</i>	<i>USGS and Colorado State University</i>	<i>National Parks</i>
<i>Linda Joyce</i>	<i>USDA Forest Service and Colorado State University</i>	<i>National Forests</i>
<i>Brian Keller</i>	<i>NOAA</i>	<i>Marine Protected Areas</i>
<i>Margaret Palmer</i>	<i>University of Maryland</i>	<i>Wild and Scenic Rivers</i>
<i>Charles (Pete) Peterson</i>	<i>University of North Carolina</i>	<i>National Estuaries</i>
<i>TBD</i>		<i>National Wildlife Refuges</i>
<i>Peter Kareiva</i>	<i>The Nature Conservancy</i>	<i>Synthesis</i>

7
 8 Coordinating Author Nominee

9
 10 *Bill Dennison, University of Maryland*

11
 12 Comments on any of the Lead Authors above are welcome. These Lead Authors will be assisted
 13 by Contributing Authors who will have specific assignments based on their scientific expertise.
 14 Contributing Authors may be nominated on or before July 10, 2006. To do so, please contact
 15 Susan Julius at the Environmental Protection Agency, 1200 Pennsylvania Ave, NW, Mail Code
 16 8601N, Washington, DC 20460, 202-564-3394 (julius.susan@epa.gov). Nominations should
 17 include a current CV and a list of publications.

18
 19
 20 **4. Stakeholder Interactions**

21
 22 Individuals, tribes, and members of federal, state, and local governments and agencies, together
 23 with non-governmental organizations (NGOs) and individuals are involved in research and the
 24 management of ecosystems that may be affected by climate variability and change. These
 25 stakeholders include: (1) those who wish to consider options for reducing the risk of negative
 26 ecological outcomes associated with climate variability and change; (2) researchers who study
 27 global change impacts on ecosystems and topics relevant for adaptation to climate variability and
 28 change impacts (e.g., ecosystem restoration, sustainability); (3) science managers from the
 29 physical and social sciences who develop long term research plans based on the information
 30 needs and decisions at hand; and (4) tribes and government agencies at federal, state, and local
 31 levels who develop and evaluate policies, guidelines, procedures, technologies and other
 32 mechanisms to improve adaptive capacity for specific types of adaptation options.

33
 34 The goal of this CCSP product is to provide useful information on the state of knowledge
 35 regarding adaptation options for key, representative ecosystems and resources. To ensure that we
 36 achieve this goal, we will engage both stakeholders and researchers in shaping the content of this
 37 report. EPA, the Coordinating Author, and the Chapter Lead and Contributing Authors will work
 38 with the lead and sponsoring agencies to obtain stakeholder input throughout the writing process
 39 using a variety of means (e.g., email, phone calls, face-to-face meetings, etc.). When the first
 40 drafts of each Chapter are completed, a series of workshops will be held with stakeholders to

1 engage them in reviewing the content and applicability of the information provided in SAP 4.4.
2 Chapter Lead and Contributing Authors will incorporate stakeholder comments in the revisions
3 of their chapters before the drafts are submitted to EPA.
4

5 In preparing this draft prospectus, careful consideration has been given to the feedback received
6 from stakeholders at the December 2002 Climate Change Science Program Planning Workshop
7 for Scientists and Stakeholders. In addition, other recent developments have been reflected. For
8 example, comments on research priorities received from the scientific community at the
9 February 2004 CCSP Ecosystems Interagency Working Group Conference guided the selection
10 of questions to address in this product. This community will also be used to obtain reviews of the
11 product outline and draft report. Additional reviews may be sought from other academics and
12 practitioners from state and local governments, non-governmental organizations, and other
13 stakeholder groups who are not represented by the February 2004 Workshop participants or the
14 workshops referenced above.
15

16

17 **5. Drafting Process**

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19 A comprehensive literature review will be conducted to provide background material and to help
20 guide the selection of case studies. EPA and the Coordinating and Chapter Lead Authors will
21 review and comment on the results and receive copies of all articles, reports, and other materials
22 covered in the literature review. Then Chapter Lead Authors will develop a framework for each
23 of the chapters and propose case studies based on the selection criteria and characteristics
24 described in section 1.2 of this prospectus. The proposed case studies will be vetted with EPA
25 and collaborating agencies. These chapters and case studies will respond to the five key
26 questions listed in this prospectus (section 1.5). Chapter Lead Authors and Contributing Authors
27 will draft individual chapters using their chosen method for communication (e.g., face to face,
28 email, teleconference, etc.).
29

30 Once the chapters have been drafted, a series of workshops will be held with the Coordinating
31 Author and the Chapter Lead and Contributing Authors, EPA, and stakeholders to review and
32 comment on the structure and content of each chapter. These comments will be recorded and
33 provided to the authors to help in any required re-drafting of the chapters. Authors will also
34 record their responses to comments from the workshop participants. Plans and assignments for
35 producing the final versions of each chapter will be made before the end of the workshop.
36

37 Authors will submit their finished chapters to EPA. EPA will then prepare the final report using
38 contractor support for graphics and editing. EPA will also write the executive summary and
39 preface to the report. Once EPA completes the report, it will be submitted to an independent
40 FACA panel for review. The process for this report will be consistent with the guidelines for
41 preparing CCSP synthesis and assessment reports.
42

43

44 **6. Review Process**

45

46 There will be a number of opportunities for both expert peer review and public comment. The
47 timetable for these reviews appears in section 9 of this prospectus. Product 4.4 will be reviewed
48 according to the process outlined in the *Guidelines for Producing CCSP Synthesis and*

1 *Assessment Products:* (1) a first draft, upon clearance by CCSP, will be released publicly and
2 will undergo a public review and an expert, scientific review by an independent FACA review
3 panel convened by EPA (public review comments will be provided to the FACA panel prior to
4 their review); (2) a second draft, reflecting the comments received from the FACA review panel
5 and the public, will be made available on the CCSP website, along with a document describing
6 the disposition of comments; (3) this second draft will undergo a second FACA peer review; (4)
7 a third draft will be prepared in response to comments received from the FACA peer review,
8 along with a document describing the disposition of comments, and will undergo final review
9 and approval through the CCSP and the National Science and Technology Council. This will
10 constitute the final report.

11
12 The expert peer review process will engage the independent scientific reviewers formed as a
13 FACA committee by EPA. The public is invited to nominate independent scientific reviewers to
14 the FACA review committee. Nominations should be emailed or sent to Susan Julius at the
15 Environmental Protection Agency (julius.susan@epa.gov), 1200 Pennsylvania Ave NW, Mail
16 Code 8601N, Washington DC, 20460) on or before July 10, 2006. Nominations must include
17 CVs and publications listings. The expert review process will involve one or more face to face
18 meetings of the FACA Review Committee in compliance with the Federal Advisory Committee
19 Act and with the requirements for peer review from the Office of Management and Budget Final
20 Information Quality Bulletin for Peer Review (“OMB Peer Review Bulletin”), issued 16
21 December 2004. Each Expert FACA Reviewer will review the document as a whole.

22
23 The major objectives of this FACA Committee are to provide advice and recommendations on:
24 (1) the scope of the report; (2) the methods used to synthesize the results and conclusions; (3) the
25 veracity of the literature cited; and (4) determination of whether the report’s conclusions are
26 supported by the literature. Specific and detailed review charges will be developed and provided
27 to the Committee to guide the review process.

28
29 When the first draft report is released to the FACA committee, the report will also be released for
30 public comment. The public comment period will last at least 45 days. Notice of the public
31 comment period will be disseminated on the CCSP web page, in the Federal Register, and
32 through other publications, web sites, and means as appropriate to the product to encourage wide
33 public participation in the review. At the conclusion of the public review period, comments will
34 be submitted to the FACA review panel for their consideration. Following the public and expert
35 review, EPA and the Coordinating Author and Chapter Lead and Contributing Authors will
36 revise the draft product by incorporating comments and suggestions from the reviewers, as
37 deemed appropriate. EPA and the Coordinating and Chapter Lead Authors will prepare a
38 document detailing the disposition of all comments. This second draft report and document
39 detailing the disposition of all comments will be submitted to the FACA expert panel for a
40 second review.

41
42 The EPA and the Chapter Lead and Contributing Authors will prepare a third draft of the
43 product, taking into consideration the FACA expert panel’s comments. EPA and the Chapter
44 Lead and Contributing Authors will also prepare a document detailing the disposition of all
45 comments from the second FACA review. Once revisions are complete, EPA will determine that
46 the product has been prepared in accordance with the Information Quality Act (including
47 ensuring objectivity, utility and integrity as defined in 67 FR 8452), and will submit the synthesis
48 and assessment product to the CCSP Interagency Committee for approval. If the CCSP

1 Interagency Committee determines that further revisions are necessary, their comments will be
2 sent to the lead agency for consideration and resolution by the lead and sponsoring agencies and
3 the Coordinating and Chapter Lead Authors.
4

5 If the CCSP Interagency Committee review determines that no further revisions are needed and
6 that the product has been prepared in conformance with the Guidelines for Producing CCSP
7 Synthesis and Assessment Products (see [http://www.climate-science.gov/library/sap/sap-](http://www.climate-science.gov/library/sap/sap-guidelines.htm)
8 [guidelines.htm](http://www.climate-science.gov/library/sap/sap-guidelines.htm)), they will submit the product to the National Science and Technology Council
9 (NSTC) for clearance. Clearance will require the concurrence of all members of the Committee
10 on Environment and Natural Resources. Comments generated during the NSTC review will be
11 addressed by the CCSP Interagency Committee in consultation with the lead and sponsoring
12 agencies and the Chapter Lead and Contributing Authors.
13
14

15 **7. Related Activities, Including Other National and International Assessment Processes**

16 This CCSP product will build on previous Intergovernmental Panel on Climate Change (IPCC)
17 assessments (e.g., First, Second, and Third Assessment Reports), the Millennium Ecosystem
18 Assessment, the Arctic Climate Impact Assessment, and NRC reports (e.g., Global
19 Environmental Change: Research Pathways for the Next Decade (1999), Science Priorities for
20 the Human Dimensions of Global Change (1994), Hydrologic Science Priorities for the U.S.
21 Global Change Research Program: An Initial Assessment (1999)). It is expected that this CCSP
22 product will provide input to future IPCC assessments, the UN Framework Convention on
23 Climate Change National Communication on vulnerability and adaptation assessments, and the
24 UN Convention on Biological Diversity.
25
26
27

28 **8. Communications: Proposed Method of Publication and Dissemination of the Product**

29 The lead agency will produce and release the completed product using the standard format for all
30 CCSP synthesis and assessment products. The final product and the comments received during
31 the expert review and public comment period will be posted on the CCSP web site. Once NSTC
32 has cleared the document, the product will be prepared for both web and hardcopy dissemination.
33 Final report production and layout will be managed by professional and technical editors and
34 writers. The number of hardcopies and the distribution process will be determined as part of the
35 development of this product.
36
37

38 A communications plan will be developed by the lead and supporting agencies along with the
39 Coordinating Author and the Chapter Lead and Contributing Authors. This plan will cover the
40 review and distribution of the product. Venues will be pursued -- such as professional
41 conferences and workshops for ecosystems and environmental resource managers -- to alert
42 stakeholders to the assessment process and findings, and invite them to participate in the public
43 comment period.
44

9. Proposed Timeline

The following schedule is proposed for the development of CCSP Product 4.4, with the final product completed by December 2007. Maintaining this schedule is contingent on approval of the prospectus as well as the various review processes described above.

2006

June - Prospectus posted on the CCSP web site for public comment (30 days)

July - Final (revised) prospectus posted on the CCSP web site

Aug- Author teams begin preparation of draft report

Oct - All stakeholder workshops completed

2007

Jan - EPA completes the first draft report, it is released publicly (45 day review period) and submitted to FACA review panel

Apr - FACA review panel meets to consider first draft

Aug - EPA completes response to review panel and public comments and prepares second draft. This second draft is submitted to FACA review panel and made available to the public along with the documentation of the disposition of comments

Oct - FACA review panel meets to consider second draft

Dec - EPA completes response to review panel and prepares third (final) draft to submit to CCSP and NSTC

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10 (*London*) **414**: 65-69.

Appendix A—Biographical Information for Nominated Authors*Jill Baron, USGS and Colorado State University*

Dr. Jill S. Baron is an ecosystem ecologist with the U.S. Geological Survey, and a Senior Research Ecologist with the Natural Resource Ecology Laboratory at Colorado State University. Her recent interests include applying ecosystem concepts to management of human-dominated regions, and understanding the biogeochemical and ecological effects of climate change and atmospheric nitrogen deposition to mountain ecosystems. Dr. Baron has numerous publications and awards, including achievement awards for her work from the National Park Service, U.S. Geological Survey, and USDA Forest Service, and the Department of Interior Meritorious Service Award in 2002. She has been a member of the Governing Board of the Ecological Society of America, serves on several Science Advisory Boards, has given testimony to Congress on western acid rain, and is an associate editor for Ecological Applications.

Linda Joyce, USDA Forest Service and Colorado State University

Dr. Joyce is Research Project Leader with the USDA Forest Service Rocky Mountain Research Station. She supervises a team of scientists who conduct research on the impact of terrestrial and atmospheric disturbances on alpine and forest ecosystems. She is also an affiliate faculty member in the Graduate Degree Program in Ecology and in the Rangeland Ecosystem Sciences Department, both programs at Colorado State University. Her research interests include modeling vegetation and ecosystem dynamics to assess the impact of climate change on ecosystem structure and function, quantifying the impacts of management on natural resources, linking ecological and economic analyses, and spatially optimizing natural resource production. Dr. Joyce serves as the Climate Change Specialist for the USDA Forest Service. She has contributed to the forestry and rangeland sections of the Intergovernmental Panel on Climate Change assessments. She received a bachelor's degree in mathematics from Grand Valley State University, a Master's in Environmental Science from Miami University of Ohio, and a Ph.D. in range ecology from Colorado State University.

Peter Kareiva, The Nature Conservancy

Dr. Kareiva received his Ph.D. from Cornell University in 1981. He has been on the faculty at Brown University, University of Virginia, University of Washington, Santa Clara University, and University of California at Santa Barbara. He has also taught and done research in Asia, Latin America, and Europe. Peter's interests span agriculture, conservation, ecology, and the interface of science and policy. In addition to a long academic career, he worked for NOAA Fisheries for three years, and was Director of the Northwest Fisheries Science Center Conservation Biology Division. Scientifically Peter is best known for contributions to insect ecology, landscape ecology, risk analysis, mathematical biology, and conservation. But what he is most proud of is the fact students from his lab have faculty positions at over twenty different universities, as well as leadership positions in governmental agencies and international organizations throughout the world. His current projects emphasize the interplay of human land-use and biodiversity, resilience in the face of global change, and marine conservation.

Brian Keller, NOAA

Brian Keller is the Science Coordinator of the Florida Keys National Marine Sanctuary, where he is responsible for the Sanctuary's research and monitoring program. He has a B.S. in biochemistry from Michigan State University (1970) and a Ph.D. in ecology and evolution from the Johns Hopkins University (1976). He was a postdoctoral associate at the Scripps Institution

1 of Oceanography (1976-1979) and Yale University (1980-1984). His research has included sea
2 urchin population ecology in Jamaican seagrass communities (advisor: Jeremy B.C. Jackson);
3 kelp forest dynamics in central California (with Paul Dayton and David Ven Tresca); snapping
4 shrimp behavior, larval dispersal, and taxonomy (with Nancy Knowlton); and the collapse of
5 staghorn coral populations along the north coast of Jamaica (with Nancy Knowlton and Judy
6 Lang). He served as Acting Head and Research Fellow at the Discovery Bay Marine Laboratory,
7 University of the West Indies, Jamaica (1984-1986), and was the Project Manager of an oil spill
8 study at the Smithsonian Tropical Research Institute in Panama (1987-1994). He has authored or
9 edited more than 30 papers, chapters, and technical reports. Brian was the first Executive
10 Director of the Ecological Society of America (1994-1997) and then moved to the Florida Keys
11 as a marine ecologist for The Nature Conservancy prior to being hired by the Florida Keys
12 National Marine Sanctuary in 2000. He also is serving as the Regional Science Coordinator for
13 the Southeast, Gulf of Mexico, and Caribbean Region of the National Marine Sanctuary
14 Program.

15

16 *Margaret Palmer, University of Maryland*

17 Dr. Palmer is Laboratory Director of the Chesapeake Biological Laboratory in the University of
18 Maryland Center for Environmental Sciences. She is also a Professor of Biology and
19 Entomology at the University of Maryland, College Park. She received her Ph.D. in
20 oceanography, but in the last 20 years has turned her attention to freshwater systems. The broad
21 objective of Palmer's research is to understand what controls stream ecosystem structure and
22 function. She specifically focuses on how land use and urbanization influence stream ecosystems
23 and on producing the best science to guide ecologically effective restoration of rivers and
24 streams. Palmer has more than 90 peer reviewed publications with numerous awards from the
25 National Science Foundation, the Environmental Protection Agency, the C.S. Mott Foundation,
26 and the David and Lucile Packard Foundation. She currently is leading the National River
27 Restoration Science Synthesis project (www.nrrss.umd.edu), has an active research lab of 12
28 graduate students, postdocs, and research technicians working on various aspects of stream
29 ecosystem science (www.palmerlab.umd.edu). Palmer has served on numerous advisory boards
30 and scientific panels and led the Ecological Society of America's committee to develop an action
31 plan for the ecological sciences for the 21st century. Palmer was Director of Biological Sciences
32 at the University of Maryland from 1997-1999 and Program Director of Ecology at the National
33 Science Foundation from 1999-2000.

34

35 *Charles (Pete) Peterson, University of North Carolina*

36 Dr. Peterson is an expert on the organization of soft-sediment benthic communities in estuaries
37 and lagoons. His interests include predation and intra-and inter-specific competition, the
38 influence of hydrodynamics on ecological processes, and the role of resource limitation in
39 suspension-feeding bivalve populations. Though best known for his experimental approach to
40 testing hypotheses concerning benthic systems, he also conducts research in paleoecology,
41 invertebrate fisheries management, estuarine habitat evaluation, and barrier island ecology. Dr.
42 Peterson has also contributed to environmental science as chair of the Global Ocean Ecosystems
43 Dynamics program, which addressed how global change may be expected to affect marine
44 ecosystems. He was the recipient of a Pew Fellowship, which he used to develop environmental
45 regulations for coastal water quality and estuarine fisheries management in North Carolina. Dr.
46 Peterson employed an active adaptive management approach and developed management
47 schemes for the preservation of seagrass habitat and dependent biodiversity, and to restore oyster
48 habitat and production.

1 Coordinating Author Nominee
2

3 *Bill Dennison, University of Maryland*

4 Dr. Dennison is a Professor of Marine Science and Vice President for Science Applications at the
5 University of Maryland Center for Environmental Science (UMCES). Dr. Dennison coordinates
6 the Integration and Application Network. The focus of this program is on integrating science
7 with its potential uses by seeking input from a variety of disciplines and engaging stakeholders to
8 develop direct applications for resource management. Bill Dennison is a marine ecologist, with a
9 specialty in ecophysiology of marine plants, who has conducted coastal marine research in all of
10 the world's oceans. He has published papers on a diversity of topics: seagrasses, corals,
11 macroalgae, microalgae, bacteria and viruses, effects of toxicants, nutrients and sediments on
12 marine ecosystems, harmful algal blooms, water quality and ecosystem health. He has also
13 produced a variety of science communication products: books, newsletters, posters, video/DVDs,
14 web sites. He has organized national and international scientific conferences in the U.S. and
15 Australia. His research focus has been on the ecophysiology of marine plants and the
16 development of tools and techniques to solve environmental problems associated with the land-
17 sea interface.
18
19