



**COREO Second Working Meeting**  
**April 19-21, 2005**  
**Westward Look Resort, Tucson Arizona**

Organized by *University of Arizona, Michigan State University, and Utah State University*  
Workshop Supported by the *National Science Foundation*  
Reception hosted by *The Institute for the Study of Planet Earth, University of Arizona*

**Tuesday April 19, 2005**

1:00 pm	Welcome, Introductions, and Agenda Approval	Breshears
1:15	NEON Update	Michener
2:30	Site Selection Criteria – Recap of Boston presentation	Hargrove
3:30	Break	
4:00	COREO Update	
	Overview/Governance/Funding/Relationship to NeonInc	Robertson
	NSF COREO grant status	Crowl
	Regional Status (2 minute reports from regions)	Regional rep (1/region)
5:00	An Approach for Thinking Beyond Regions	Breshears
5:30	Adjourn	
6:30	Reception with cash bar	

## Wednesday, April 20

- 7:00-8:00 Breakfast – Rooftop Terrace
- 8:00 Introduction and tasks for day Breshears
- 8:15 Site selection criteria – discussion of alternative models
- 9:15 COREO vision and integration discussion
- 9:45 Charge to breakouts
- 10:00 Breakout I Groups
- A. Region selection
  - B. Siting criteria input and procedure within regions
  - C. COREO continued integration and future support
- 10:30 Break (within breakout groups)
- 12:00 Lunch
- 1:00 Continue breakout group discussions
- 1:30 Breakout group – plenary reports and discussion
- 3:00 Break
- 3:30 Breakout II Groups
- A. Vision for COREO (Harmon chairs)
  - B. Common Minimum Model (Weltzin chairs)
  - C. Governance / Bylaws ()
- 5:30 Adjourn
- 7:00 Dinner
- 8:00 *“Working together for bigger things – an astronomer’s viewpoint”* – Nick Wolf

## Thursday, April 21

- 7:00-8:00 Breakfast – Rooftop Terrace
- 8:00 Agenda update
- 8:15 Breakout II Groups – Plenary reports and discussion
- 9:30 Adoption of vision, governance, and bylaws
- 10:30 Break
- 11:00 Wrap up
- Leadership selection / Next meeting date
  - Summary of key outcomes
  - Identification of followup tasks
  - Feedback from NEON Sr. Mgmt Team and NSF
- 12:00 Adjourn

Participant list - as of April 18, 2005

<b>Participant</b>	<b>NEON Affiliation</b>
Mike Allen (cancelled due to emergency)	CALEON
John Blair	CENTRUS
Dave Breshears	SWEON / COREO Chair Elect
Donie Bret-Harte	HLEO
Todd Crowl	IRON / COREO grant PI
Fancisco Dallmeier	MAREO
Nora Devoe	IRON
Jim Fourqurean	NeoNEON
Jim Gosz	SWEON
Bill Hargrove	Supporting the Sr. Management Team
Steve Harper	SEEON
Mark Harmon	PNW-REO
Bruce Hayden	Sr. Management Team
John Hobbie	MAREO
Ken Kaneshiro	Pac NEON
Katy Kavanagh	ROMEO
Knute Knadelhoffer	GLACEO
Jo-Ann Leong	Pac NEON
Art McKee	ROMEO
Bill Mitchener	Sr. Management Team
Pat Mulholland	SAPOZEO
Eric Nagy	MAREO
Jim Richards	CALEON
Phil Robertson (cancelled due to illness)	GLACEO / COREO Chair
Eric Shulenberger	PNW-REO
Mark Stromberg	CALEON
Maria Vernet	AREO
Jeff Welker	HLEO
Jake Weltzin	SAPOZEO

## **Minutes of the April Meeting of the Consortium of Regional Ecological Observatories (COREO), April 19-21, 2005, Tucson, Arizona**

Representatives from the Consortium of Regional Ecological Observatories (COREO) met April 19-21, 2005 in Tucson, AZ. Dave Breshears chaired the meeting. The meeting was supported by the University of Arizona and NSF grant DBI-0507925 to T. A. Crowl, P. Robertson and D. Breshears. The proposed agenda above was revised during the meeting to address evolving NEON issues, as detailed below.

1. Bill Michener gave an overview of where the National NEON planning process was and noted that the reports from the March meeting, held in Boston were now on the web and ready for community review. Michener reported that the infrastructure list was being developed and that the observatories were likely to be constructed layer-by-layer with the cyber infrastructure being the most obvious first layer. He also reported that NSF has suggested that once regional areas for observatories were defined and identified, NEON, inc. would ask for prospectuses from interested parties. It is unclear what the form these will take, when they will be announced or how they will be evaluated, although COREO has provided the Senior Management team with suggestions (see below). Bill Hargrove gave an invited presentation outlining his geographical clustering approach (<http://research.esd.ornl.gov/~hnw/neon/coreo/>). Hargrove's approach represents a reproducible, quantitative approach to assigning ecoregion boundaries at the 1-km<sup>2</sup> scale. The COREO representatives agreed that this was a viable approach to inform the expert-based system that has been used to identify ecoregions to date.
2. Following these presentations, it was decided that we would modify our agenda and break into groups to discuss the following questions:
  - a. What are the key elements that a NEON observatory must have?
  - b. What are the key elements that a NEON array must have to address national/continental issues?
  - c. What criteria should be used to define regional boundaries?
  - d. What are the objective criteria for sighting observatories?
  - e. What are the objective criteria for evaluating a prospectus?

c. and d. were subsequently combined

Alan Knapp suggested that we independently provide the senior management team with our input on these questions for their upcoming meeting Monday, April 25. Three independent groups met for 4 h and presented their reports (Attachments 1-3). In general, we did not deviate significantly from the information compiled to date by NEON, Inc. Therefore, COREO endorses and supports the direction and progress made thus far by the process used by the Senior Management Team. Below, we outline a few specific suggestions to add to the gathered information regarding the above questions.

### ***What are the key elements that a NEON observatory must have?***

1. Overriding Criteria

- expandable and flexible
- able to quickly respond to calls for natural experiments
- 2. Experimental Capacity
  - ability to establish large scale manipulations (100 ha+)
  - ability to provide future experimental needs
  - ability to establish capacity for long-term use (50 yrs +)
  - strong environmental gradients
    - a. abiotic (human-wildland, land use, etc)
    - b. biotic
    - c. contains multiple ecotones
  - definable ecological space, size and attributes
  - Inclusion and input of a strong social sciences component
- 3. Physical infrastructure requirements
  - accessibility and accommodations for visiting scientists
  - connectedness to ether-space (e.g. V-sat technology)
  - proximity to power grid
  - capacity to add sensor arrays
  - laboratory/sample processing capabilities
  - education and outreach facilities
- 4. Access considerations
  - Efficiency of access
  - Proximity to scientific community
  - Access to legacy data
  - Facilitates 'citizen science'

***What are the key elements that a NEON array must have to address national/continental issues?***

1. Diversity of ecological characteristics or “conditions” (biotic and abiotic, human activity); they should represent the full suite of this diversity that exists at the national level (for maximum generalizability). For example, this may be based on biome-types, or ecoregions, crossed with human activities. (Broadening)
2. The array should have some capacity for replication; e.g., an observatory should be sited or arranged to create replication of “conditions.” (Generalizing)
3. Representativeness; should adequately represent primary “conditions” or classes of conditions across continental (Narrowing or subdividing)
4. Standardization and comparability: standardized measurements or capabilities (e.g., everyone measures temperature); base-line measurements (Standardizing)
5. Array should be designed to facilitate cross-observatory experimental manipulations (e.g., the array itself creates environmental gradients). The array creates a natural experiment; moreover, we should consider a standardized set of experiments (nutrients, moisture, common garden). (Nesting)

***What criteria should be used to define regional boundaries?***

1. Use the current expert model provided by COREO
2. Apply statistical modeling to adjust the current model
3. Hydrological characterization (e.g., surface area of water per unit area or length of stream per unit area)
4. Climate
5. Biogeography (biogeographic provinces, ecological zonations)
6. Geological/topographical characterization (e.g. soil type)
7. Rate of recent change in human population density (county census data)
8. Relationship to other networks and data-generating entities (to enhance regional data coverage)

***What are the objective criteria for choosing and placing observatories?***

1. National coverage based on biome delineations
2. Epi-centers of data/sensor infrastructure
3. Susceptibility to change
4. The social importance of an ecosystem in terms of the ecological goods and services provided
5. the ability to provide the spatial resolution needed to answer the relevant ecological questions
6. Disturbance regime
7. Productivity
8. Land use characteristics
9. Variability within region versus variability within nation
10. Maximizing contributions to knowledge at national scale
11. Since every potential region will be important, we must classify an optimum number of nodes that we can represent, paying careful attention to the tradeoffs between fewer large, expensive sensors vs. many smaller, less expensive sensors..

The challenge here will be to define the most important factors for which data are available. Another factor that must be considered is that not all important data layers will be available in linear databases (e.g., they may be binary, or we may need to construct indices such as proportion of species that are non-native)

Choosing region or sub-regions representative of important conditions classes:

(SWEON) Chihuahuan, Sonoran, Mojave; IRON (Columbia Basin, Great Basin, Colorado Plateau). But, a key issue is importance in the larger perspective (e.g., Columbia Basin influences Columbia River, Colorado Plateau influences Colorado River). Note to Regional meetings (minimum model) – define the key landscape components/conditions within your region, and their importance to the national level.

We'll need to balance between approaches that are transformational and infrastructural with monetary limitations; can we have 25 observatories, or can we have only 20? We need to make sure that we maintain the appearance of big science. Further consideration

is needed with respect to determining the tradeoff between many small vs. few large sensors.

***What are the objective criteria for evaluating a prospectus?***

Conformity to criteria for the first 4 questions above. Once a list of desired characteristics are compiled, a scoring methodology could be employed to rank prospectuses.

**These suggestions were forwarded to James MacMahon for consideration at the National Design Team meeting next Monday.**

3. On Thursday afternoon, three breakout groups were convened to discuss:
  1. Governance of COREO. Report attached (*Attachment 4*).
  2. Content of the NSF grant renewal. Report is attached (*Attachment 5*).
  3. COREO mission/vision statement. Draft statement attached (*Attachment 6*).
  
4. On Thursday evening, Dr. Nick Woolf, an astronomer with the University of Arizona, presented a talk “Working together for bigger and better things-and astronomer’s perspective”. Notably, he suggested that perhaps only 25% of the astronomy community are behind a big science project at a given time, and that there is constant tension with small groups attempting to break off and start something they hope will be bigger.
  
5. **ACTION ITEMS:**
  1. COREO passed the draft mission statement (*Attachment 6*).
  2. We decided to hold our next meeting in conjunction with the ESA meeting in Montreal. COREO representatives will attend the Wednesday symposium to hear presentations by the senior management team regarding the science and management plan. We will then meet for one day following ESA to vet the draft plan.
  3. Todd Crowl was elected chair for the next meeting.
  4. We reviewed the minimum model requirements for the regional NEON’s (*Attachment 7*). The draft requirements were passed unanimously.
  5. We discussed the need to adopt by-laws that specify our official standing within NEON, Inc. It is unclear at this time how to proceed with specific by-laws. We passed a motion to ‘request the senior management team modify the organizational structure to include a COREO advisory committee that advises the CEO; and that an elected COREO representative sits on the advisory board.’
  6. A motion was passed to appoint Dave Breshears, current chair of COREO, to act as a liaison between COREO and the Senior Management Team.
  7. COREO leadership (Robertson – Past Chair, Breshears - Chair & Crowl – Chair Elect) will email regional reps urging them to provide feedback on the national NEON reports
  8. Crowl will send regional representatives the current NSF project description

and the requirements that each region needs to supply for the final NSF report

9. Thursday morning, a final, smaller working group evaluated the approach presented in detail by Hargrove. It is noteworthy that the regions are much smaller and more spatially heterogeneous in the western conterminous U.S. than in the east. Also note that the Hargrove analyses are currently limited to the conterminous U.S. The working group identified data resolution as a key issue that needs to be evaluated when considering the applicability of the Hargrove approach (e.g., high resolution climate data vs. rough estimations and large data gaps on soil data). This should be considered as regional issues are further discussed, which begins the following week.

## 6. SUMMARY:

1. COREO commends the progress and direction that the National Design Team has made and provided Bruce Hayden with a list of additional considerations.
2. Our next meeting will be held at ESA, at which time we will review and vet the draft science/management plan. Todd Crawl will act as chair.
3. We adopted a mission statement, the minimum requirements for regions, and a motion to request formal representation within NEON, Inc. (*Attachment 6*)
4. An NSF resubmission grant will be crafted to continue funding COREO activities (*Attachment 5*).
5. COREO offers the following comments regarding the impending call for observatory 'prospectuses':
  1. We are concerned that the timing of these is prohibitive;
  2. We seek clarification on the content of the prospectuses;
  3. Although we appreciate that the process is transparent, it is currently too amorphous to allow for adequate preparation and response

Meeting minutes were taken by Jake Weltzin and are attached (*Attachment 7*).

Immediately following the meeting, Todd Crawl, Dave Breshears and Bill Michener had a conference call with Liz Blood (NSF) to report meeting results.

### Working Group Questions

What are the key elements that a NEON observatory must have?

What are the key elements that a NEON array must have to address national/continental issues?

What criteria should be used to determine regional boundaries?

What are the objective criteria for siting observatories within a region? (What are the objective criteria for evaluating a prospectus?)

What questions could be addressed with such an observatory?

What are the key elements that a NEON array must have to address national/continental issues?

Need a series of major "nodes" with broad geographic distribution, coupled with higher density of "lower cost" sites to provide the higher resolution needed to address national-scale questions (could be tied to mobile capabilities or use of wide-spread sensor networks between "nodes")

Some considerations for locating observatories:

1. Biomes / biophysical drivers – addresses need for broad geographic coverage and distribution across major biophysical gradients
2. Susceptibility to change – sensitive sites for detecting environmental change and *biotic responses*
3. Societal importance – ties to ecosystem services and societal benefits
4. High biodiversity ("hotspots")

What are the key elements of a NEON observatory?

1. Wildland-to-managed/disturbed gradient (+ other gradients as appropriate)
2. Long-term site security
3. Accessibility and accommodations for visiting scientists
4. Ability to establish large-scale manipulative experiments (100 ha+)
5. Ability to quantify movement of energy, materials and biota (e.g., hierarchical arrangement of watersheds or airsheds)
6. Capacity to add sensor arrays
7. Modeling/synthesis facility/capabilities associated with each observatory
8. Education/outreach facility/capabilities
9. Availability of legacy data and concentration of expertise
10. Facilitates citizen science

What (additional) criteria should be used to determine regional boundaries?

1. Hydrological characterization (e.g., surface area of water per unit area or length of stream per unit area)
2. Biogeography (but difficult to envision this at 1 km scale)
3. Rate of recent change in human population density (county census data)
4. Relationship to other networks and data-generating entities (to enhance regional data coverage)

What questions could be addressed (*or not addressed*) with such an observatory?

- NEON "nodes" with constrained spatial footprints would be good at addressing large- and fine-scale questions (across a coarse-grained national network or within a constrained observatory footprint)
- but... such a network will have limited spatial coverage (difficult to extrapolate from sites to regions) and miss important intermediate-scale phenomena (i.e., origin and spread of emerging diseases, invasion fronts, hydrologic connectivity, spatial pattern of atmospheric nutrient flux, etc.)

What can be done to minimize this constraint on the scale of phenomena addressed by NEON?

- Use of data collected within NEON footprints to develop and parameterize models that could be used for spatial extrapolation (with ancillary data collected to validate model predictions)
- Augment site-based data with remotely sensed data on a national scale (provide broad geographic coverage beyond NEON footprint sites; e.g., vegetation and land-use change)
- Addition of fixed sampling sites outside of the NEON "node" footprint, to provide broader geographic coverage and provide data to complement "node" sites (allow greater extrapolation and "regionalization" of NEON data); could involve periodic resampling (e.g., a 5-yr intervals) or mobile sampling units

What can be done to minimize this constraint on the scale of phenomena addressed by NEON?

- Ties to existing sampling networks and programs (Ameriflux, USGS, NOAA, NPS, etc.); will require high degree of interagency collaboration
- Data repository/synthesis facilities to collate, standardize and archive relevant data within each of the regions; may also form "super-regional facilities" to address common science themes across regions

## Attachment 2

### Key elements of a NEON observatory

What is an observatory? Footprint: an area that includes gradients, monitoring, etc., with a variety of habitats, capabilities, and attributes you'd want to understand. *Traits* might include:

- Large land areas
- Variety of habitats
- Gradients (environment, management, land-use, aquatic-terrestrial, disturbance)
- Access for 50-years (permanence) (using MOUs, purchases, etc.)
- Control of access
- Proximity to a scientific community
- Access to collections and museums (for archiving samples, vouchers, etc.)
- Proximity to citizenry and education
- Power-grid
- Data depth already present
- Contrasting management/land use
- Physical infrastructure
- Capability for intensive study/surveys

Existing sites, existing data, flexibility

### Key elements of a NEON array

- Diversity of ecological characteristics or "conditions" (biotic and abiotic, human activity) characteristic of national level (for maximum generalizability). (Broadening)
- Capacity for replication; e.g., sited to create replication of "conditions." (Generalizing)
- Representativeness; should adequately represent primary "conditions" or classes of conditions across continent (Narrowing or subdividing)
- Standardization and comparability: standardized measurements or capabilities (e.g. base-line measurements) (Standardizing)
- Facilitate cross-observatory experimental manipulations (e.g., array creates natural experiment coupled to standardized set of experiments (nutrients, moisture, common garden). (Nesting)

### Objective criteria for choosing sites

- Variability within region versus variability within nation
- Maximizing contributions to knowledge at national scale
- Since every potential region will be important, we must classify an optimum number of nodes that we can represent
- Devise a way to map areas for NEON based on:
  - Climate
  - Vegetation type
  - Watershed type
  - Soil
  - Topography
  - Human population
  - Land-use

### Proposed terminology for NEON hierarchy

- **Network** (everything within continental US and protectorates)
- **Region** (10-20 or so across the Network)
- **Observatory** (0, 1, or 2 per region)
- **Installation** (several to many per observatory; a location where data are collected, experiments are conducted, or facilities are constructed, installed, and maintained)
- **Site** (a four-letter word)

### Objective criteria for siting

Defining **regions** or **observatories**:

- Climate (macro vs. microclimate)
- Vegetation type (how should we define – biomes, assemblages)
- Soil
- Topography
- Human population
- Land-use/land-cover class
- Disturbance (e.g., fire frequency, livestock grazing, extreme events, disease, prevalence and impacts of invasions [gypsy moth, fire ants])
- Fluvial (hydrologic) characteristics
- Productivity
- Variability (e.g., precipitation regimes)

Challenge: defining the most important factors for which data are available

Challenge: availability and characteristics of data layers (continuous vs binary; linear vs non-linear; indices such as N:P ratio or proportion of non-native species; land-cover classes)

### What would this array of sites (i.e., this approach) do that we can't already do?

- 1) Observatories and regions represent large-scale gradients
- 2) It would allow us to take a macroscopic view (i.e., the big picture), and couple it to a microscopic view (collected at a site)
- 3) Develop inferences about movement and flux between **observatories** and **regions** (we're probably OK at the level of the **installation**, which mimics current approaches)
- 4) Rapid implementation of new technologies and new data collection in a nationwide and coherent manner
- 5) A role of COREO in this case would be to help optimize research at the level of the **region** to the **observatory**; COREO would be the governing body for defining the research questions, implementing those questions and infrastructure, and facilitating modifications to the design as we progress

## **Governance and By-laws breakout group**

### **Current status of governance OK for now**

- Implementation of new governance elements is sequential as outlined below; some basic things needed now but more formal changes need to be implemented a later stages as role of COREO develops

### **Regions**

- Representatives need authority to represent regions at COREO
- Regional groups could help facilitate the preparation of prospecti and develop consensus on priority of observatories within region if the number needs to be reduced/combined
- Regional groups can help with validation of models developed at observatories by testing on other sites within region; this will help with extrapolation to broader spatial (meso) scales than will be possible with NEON alone.
- MAREO draft bylaws should be made available to all regions

### **COREO**

- Elect new chair (Thur am)
- Appoint working group to work on regional boundaries
- Next meeting August (after ESA)? Need to have formal governance item on agenda for next meeting to consider by-laws to facilitate the representation suggested below.

### **View on proposed governance structure and representation**

- COREO can provide expertise for evaluation of prospecti
- COREO advisory group to CEO; at that time will need formal development of by-laws; the role of this advisory group would include the following three functions
  - Information exchange from observatories and observatory users to CEO
  - Represent needs of regions to NEON CEO; e.g. regional needs for data, linkages with other regional efforts, education, etc.
  - Develop buy-in by researchers and use of data and perhaps also political, in kind, or matching support.
- Also one COREO leader should be appointed as a member of BOD.

## Attachment 5

NSF Renewal Grant

What we have: each region can have one meeting + two coreo meetings

Draft science/education & network and informatics plan - Oct. 15, 2005

Draft PEP -

Final PEP – jan 15

Perhaps second coreo meeting should be wed of ESA and the day after  
We can hear the report at symposium  
Can vet plan day after esa

What do we want as a group:

Get money to write prospectuses (if timing permits)  
Re-organize around funded prospectuses – reconcile boundaries  
Continue with development of regionally based science/education activities  
Post funding – local info and construction needed  
Populate the observatories  
    Design and implement national level experiments  
Regional networking for user oversight to observatories  
    Continued coordination and collaboration with state and federal agencies  
    Scientific questions, data needs and user groups are bigger than  
    observatory footprint

Other demands:

Official membership in oversight board

An additional scientific advisory council

## **Proposed Resolution for COREO**

The mission of the Consortium of Regional Ecological Observatories (COREO) is to advance ecological science and education that is spatially coordinated at the continental scale. Thus COREO accepts the following roles of providing coordination and cooperation among regional ecological observatories and to provide advice and support for the creation and implementation of the National Ecological Observatory Network (NEON):

1. Provide advice and representation to the NEON Senior Management Team and eventually NEON, Inc. with respect to regional issues in the formation, implementation, and operation of NEON.
2. Build community awareness of and participation in NEON from scientists, resource managers, educators, and other stakeholders within regions.
3. Identify expertise, research programs, and facilities within regions critical to the successful implementation of NEON.
4. Promote coordination of NEON-related activities among and within regions.
5. Assist with implementation, operation, and maintenance of NEON infrastructure among and within regions.
6. Assist in the spread of knowledge and information generated by NEON to regional educators, resource managers, and other stakeholders.
7. Promote region-specific research that complements and adds value to the NEON mission.

This resolution was passed by a vote of COREO regional representatives on April 21, 2005 in Tucson, Arizona.

## Background and Rationale

NEON is a national-level, centralized program that includes prioritization of research questions, selection of suitable infrastructure to answer these questions, development of data sharing protocols, and overall program goals. It is essential that NEON be powered by strengths within the many regions that are expected to participate in the program.

Regions should therefore play a major role in translating overall national goals and priorities into a program with broad participation by the research, educational, resource management, and policy-making communities. Regional organizations are closer to the individuals, programs, institutions, and field stations that are needed to implement, operate, and maintain NEON, and these same organizations are also closer to many of the potential users of NEON-generated data, particularly educators, resource managers, and policy-makers within regions.

The successful implementation of NEON will require that detailed knowledge of the environment, facilities, expertise, problems, and opportunities specific to each region. The development and organization of this information is best performed at the regional level, as are several important aspects of NEON implementation. In particular, operation and maintenance of the NEON facilities will be most efficiently undertaken at the regional level because of both cost and time considerations (e.g., local staffing can identify and fix problems on the ground faster than a centrally located staff). Training in use of NEON facilities is best conducted at a regional level because of regional expertise and accessibility.

Finally, regional efforts can complement national efforts by addressing regional level questions that are of national importance, but vary among regions. We thus expect that regional perspectives will add considerable value to the NEON program in terms of research and education support for as well as application of its findings.

### **Minimum Model – Required Regional Elements**

1. Open science meetings that are
  - Diverse in terms of participants (gender, ethnicity, age), disciplines, and institutions (size, mission)
  - Visible (widely promoted/advertised among scientists and educators in region)
  - Accessible (location, time, cost)
  - Documented (list of participants, minutes, meeting notes)
2. Strengths within region should be catalogued
  - people (a complete list of interested parties)
  - existing networks
  - institutions (academic, museums and collections, governmental and non-governmental organizations, field stations, field sites, centers of instrumentation)
  - existing research or infrastructure partnerships
  - databases
  - information management infrastructure
  - existing experiments or research efforts
  - remote sensing data
3. Operational website with links to COREO and NEON
4. Defined geographic extent (physical boundaries)
5. Governance structure with identified leadership

Minutes - 2<sup>nd</sup> COREO meeting, 19-21 April 2005, Westward Look, Arizona  
Recorder for April 20 and 21: Jake Weltzin

**Wednesday, 20 April 2005**

**Todd Crowl** – brief description of tasks and management (COREO, regions)

Regions – bring each of the regions up to a minimum standard (e.g., web site, linkages to COREO), some kind of (documented) governance structure, organize and hold a meeting using USU monies (which does not cover travel) requiring a 1:1 match. Deliverables: a copy of agenda, a report from the meeting (e.g., posted on web-site), have web-sites linked to COREO, provide a total participant list (the bigger the number the better), a list of existing infrastructure within each of the regions.

Role of COREO – make ourselves available to national committee, and ensure that regional science perspective be transmitted to national NEON CDC. Deliverables: governance structure, and mission statement (in the form of a one-page white-paper).

**Mark Harmon** – discusses the proposed Mission resolution for COREO. Seven proposed roles (that we will discuss later in the meeting during a break-out group; we will vote on this as a group on Thursday):

- 1) Provide advice to senior management team
- 2) Build political support from scientists
- 3) Recruit expertise and research programs and facilities
- 4) Coordination of NEON-related activities
- 5) Implement, operate and maintain infrastructure
- 6) Outlets for knowledge and information to regional users
- 7) Promote region-specific research (developed from regional groups)

**Alan Knapp** – proposed revised agenda and approach for today. How might we best provide information to senior management team vis-à-vis the existing short time-frame? In short, if we were the senior management team, what would we do? What are the elements we would incorporate? Ultimately, we will break into three working groups this morning to tackle these questions. First, Alan provided an example of how he and a colleague brainstormed on an approach to a draft design.

The draft design developed by Knapp and colleague centered on an experimental approach (designed to answer questions about global change impacts on communities). Their experimental approach included core experimental plots and a large-scale experimental array facility (replicated in landscapes or habitats) coupled with observation plots. This could be spread across the country. This could also include wildland-urban gradients (linked to local manipulations), although the experimental arrays could be sited in the wildland system. But, each node would include three important elements: (1) a large experimental array, (2) a coupled environmental gradient, and (3) a pristine (wildland)-urban gradient. Each node would have to be quite flexible; with these three elements, one could be flexible (e.g., up mountains, across temperature and precipitation

gradients, in parallel or in series). NEON nodes could be combined with gap-filling plots, or integrated with ongoing data-collection networks (e.g., CUAHSI, ATBI). General deployment would be establishment of nodes and filler across the continental US.

Note – we broke into 3 working groups, each of which was charged with the following questions:

- 1) What are the key elements that a NEON observatory must have? (Need to define key elements.)
- 2) What are the key elements that a NEON array must address in terms of national/continental issues (i.e., deployment of infrastructure across continent)?
- 3) What are the objective criteria for siting observatories?
- 4) What are the objective criteria for evaluating a prospectus?
- 5) What questions could be addressed with such an observatory?

Each group reported with a Powerpoint presentation; most groups completed elements 1 and 2; one group completed element 3. We noted substantial overlap (e.g., on the order of 80%) between the findings of each group; particular information from each group are available on the Powerpoint presentations. We found substantial overlap between #3 and #4.

Jim Fourquean noted there were four unique aspects that weren't in all groups:

- (1) Observatory must be capable of observing fluxes
- (2) Modeling and synthesis is done at the national level, and needs to be incorporated somehow
- (3) Perhaps we should concentrate on regions that are likely to change
- (4) Perhaps we should concentrate on sites (within region) that are likely to change

Eric Nagy : There are two points that should be of interest to the group:

- (1) Overreplication of sites (?)
- (2) Distributed elements should be driven by the national NEON questions, whereas the observatories would be designed to coordinate the distributed elements. Moreover, a region could site an observatory where it would serve both the elements and the regional needs (e.g., facilitate regional interaction).

We redefined the Working Group questions for clarity and direction, and will revisit them after lunch; they are:

What are the key elements that a NEON observatory must have?

What are the key elements that a NEON array must have to address national/continental issues?

What criteria should be used to determine regional boundaries?

What are the objective criteria for siting observatories within a region? (What are the objective criteria for evaluating a prospectus?)

What questions could be addressed with such an observatory?

Considerations: How can we strike a balance between defining regions vis-à-vis their natural resources and their human and infrastructural resources (e.g., it is important that a given region include a university or some other research infrastructure).

Note - In the afternoon, the working groups reconvened, and we discussed the findings of the groups. Details on the results of the working groups were provided to Todd Crowl.

### **After our afternoon coffee break, 20 April 2005**

Consideration - What representation do we want COREO to have at the national NEON level (could be covered here or in the governance structure).

We broke into break-out groups on COREO Vision/Mission statement and Regional Minimum model, Governance structure, and NSF requests.

Report from Harmon on Proposed Resolution for COREO (i.e., Vision/Mission; Weltzin will speak briefly on Regional Minimum model tomorrow). Discussion. We will revisit the details of the resolution Thursday morning, and vote on the resolution as appropriate.

Report from Jim Richards – Governance structure: Identified issues/concerns and action items for Regions (e.g., regional representatives need authority to represent region, development of prospecti), COREO (need a new chair, need to appoint working group on regional boundaries, need to schedule next meeting), and “view on proposed governance structure and representation.” These will be discussed and voted on as appropriate on Thursday morning.

Report from Jo-Ann Leong - NSF request – Item 1: what do we want to have funded in the future that would enable COREO to support NEON development? Jan 31 2006 is end of grant; Jan 2006 is when NEON project identification is due...But, draft science plan should be vetted by COREO. How will we do this given the timing? Item 2: what could COREO do to participate in and enable NEON development. Possible ideas: expert panels, planning grants, etc. Item 3: Future NSF funding, including regional development structure, on-the-ground relationship, liaison and coordination with state and local agencies, regional meetings configured to include everyone in the region. These issues will be discussed further on Thursday morning.

### **Report on Wednesday late-afternoon breakout group – Vision, Minimum model, Role of regions (Chair: Mark Harmon)**

We went over the one-page handout that Mark Harmon had prepared and distributed earlier in the day. One person asked about how the regions themselves might carry on as autonomous entities (irregardless of the fate or scope of NEON). We decided that we'd

like to keep the focus on the relationship between COREO and NEON (whereas some regions will be more or less independent).

Items 1, 2, 3, and 7 in the original Vision/Mission statement are those that relate most closely to NEON, and should be moved up to the top of the list. In contrast, items 4, 5, and 6 are more related to the regions themselves (independent of COREO or NEON). We discussed rewording of several of the items. We discussed the need for a single-sentence mission statement that could or should be developed at some point. We revised the text of each of the original lines in the resolution.

**Thursday, 21 April 2005.**

**COREO mission/vision statement:** Paper copies of revised version distributed. As a group, we provide minor modifications to the text. Jim F. proposed a specific modification to the preamble text, seconded by J. Leong, with discussion on the floor. J. Weltzin moved we accept the text as a whole, as written, seconded from the floor, some discussion, vote was unanimous.

**Next meeting:** Jim Fourqurean moved, seconded by Todd Crowl, to have our next COREO meeting at the Ecological Society of America Annual meeting in the first week of August 2005, in Montreal, Canada. This would enable us to hear a report from the design team in a timely fashion; COREO group will meet one day during or after meeting. This will probably save on travel costs, too. Vote was unanimous.

**Structure for COREO chair:** Todd Crowl moved we keep the same chair structure, seconded by Jo-Ann Leong, no discussion, no dissent.

**Next chair for COREO:** moved and seconded from the floor that Todd Crowl be our next Chair, Todd accepts nomination, no discussion, no dissent.

**Minimum Model – Required Regional Elements;** projected slide with text developed at the 2004 Portland COREO meeting; Jake outlines history and background. Only minor modifications had been made to the text (to clarify that lists of participants should be provided to COREO leadership). After minor discussion, it was moved by Todd Crowl, seconded from floor, that we accept the text on the slide with minor modifications of wording (to be accomplished in a breakout session this morning); no discussion, no dissent.

Brief discussion of how to determine who represents the regional groups in the COREO meetings. We recognized that most participants at this meeting were regional representatives; Jim Fourqurean suggested we didn't need to pursue this discussion much more, and there was general assent.

**Discussion of how COREO should contribute to the NDC and NEON, Inc. leadership.** The goal would be to facilitate communication between COREO and the design committee (especially after the June meeting when the 160-member science team

is disbanded). We decided that the best approach might be to approach the leadership with the recommendation that NEON explicitly include a means for getting information from COREO. Jim Fourqurean moved that “COREO requests that the organizational structure of NEON, Inc. be modified to include a COREO advisory committee that advises the CEO, and that an elected COREO representative serves on the board of directors of NEON, Inc.” Seconded from the floor. Discussion: Jim Richards projected a slide of the NEON organization structure, showing how this proposal would create a fourth standing committee to advise the CEO. Advantages of the proposal: COREO would represent regional issues, and would be a separate and “unbiased” addition to the design and operations committees. Moreover, this facilitates two-way communication. Jim Richards indicated that the “governance” breakout group discussed several of these points yesterday, and this was part of a break-out group report. Jim Gosz and Eric Shulenberg agreed to present the text and motion to the national committee. Motion prevails, with one dissenting region (with the comment that COREO needs to formalize its structure to increase its legitimacy).

**Discussion of COREO bylaws.** We discussed establishing a committee to develop our bylaws for presentation at the next COREO meeting; Jo-Ann Leong moved we establish a committee, seconded from floor, friendly amendment from Jim Fourqurean to have the committee present the bylaws (which define the COREO governance structure) at the next COREO meeting, accepted. John Hobbie pointed out that Becky was head of a committee investigating regional models for bylaws (e.g., CUASHI). We discussed committee membership: Jim Gosz, John Hobbie, and Jeff Welker will serve on the committee, and will report during the August COREO meeting.

Discussed the development of a report from this meeting and a report for NSF. Most important, we have to prepare a report to give to the NDC by next Monday. We also discussed how we might approach NSF for future funding. We agreed this is a bit difficult, because NEON itself is a fast-moving target; one approach would be to inform Liz Blood and NSF of COREO activities. No action.

**COREO response to issues that arise between COREO meetings.** Regional boundaries will soon be firmed up, and we’ll be getting information on the prospectus and how that will be moving through the system. How will we respond between now and August if there are emergent issues? Bruce Hayden indicated he and the team would be open to suggestions from COREO as to what the prospectus would embody. Bruce Hayden noted that the design team will meet next week, and there are deadlines in place. After the June meeting and before the October meeting, they will need to decide the structure of the prospectus. Discussion about costing and how this dovetails into the number of regions; the design team will develop a preliminary/interim cost estimate by the end of August. Discussion of how monies might be allocated to the regions as a result of the prospectus. Bruce Hayden urged that contributions be made between now and June; after June, the design team will solidify the content of the prospectus. What if COREO were to submit a prospectus with 13 observatories? Reply: The process is open to any entity that would like to submit a prospectus. A clarification was made that

entities will submit prospecti for observatories, which would be evaluated and woven into a single network prospectus to go to NSF.

Jake Weltzin moved that the COREO chair serve as a liaison between COREO and the senior management team, after consultation with the COREO membership, on issues that may emerge prior to the next COREO meeting. Seconded by Jo-Ann Leong. Some discussion: Bruce Hayden indicated he'd be pleased to entertain suggestions, but that at this point they couldn't add a new formal avenue. Motion passed unanimously.

**Development of prospecti.** Should we as COREO develop a prospectus? This would be an enormous task, but would have many advantages. The process is vague and general at this point, so it's difficult to envision what it should look like. But, regions are well-organized, and we've been attending these meeting and talking to each other. A COREO-level approach might be advantageous relative to other less-involved organizations who might submit prospecti, though all involved recognize that the process is open and transparent. No action.

There was a request for a timeline, which we worked out as follows: National design team (NNDC) meeting next Monday where comments from the working groups from this meeting will be discussed. The last national science committee meeting will be in early June (7-9); the outputs of that meeting will be the final science reports. At ESA in August there will be symposium to report and outline the (draft?) decisions in the science plan. There will be a COREO meeting at the ESA meeting. We don't know when the number of observatories will be decided, and won't until we know what each observatory should embody. Work within a region to develop a prospectus would probably take place between June and September; the question now is when will we know what needs to go into them. Eric Shulenberger has asked the NNDC to issue a half-page synopsis that provides some structure to prospective groups. There's the concern that details that will need to be in a prospectus will not be available until basically the time that the prospectus will be due. Jim Gosz sees the prospecti as focused more on structure and installation (e.g., 50-year, site, buildings, where, and when) of the individual observatories.

We discussed how COREO could contribute to the science reports; NEON has expressed frustration that few comments have been provided. Some people have provided some comments; but, the question arose as to how those comments being incorporated. Mitchner indicated that comments are assigned to various committees (from ad-hoc to science to full NNDC) where they are read and incorporated as appropriate. Mitchner projects NEON web page to discuss latest NEON design consortium committee reports, and how one would provide on-line comments and review. We discussed making a more formal request to the regions for comments on the science plans, but did not agree on a specific approach or protocol (beside urging scientists to comment).

Working groups for late-morning breakout sessions.

- Reconciliation of reports from three Wednesday working groups

- Discussion of rationale, approach, and modification of regional boundaries

- Minor revisions to Minimum Model – Required Regional Elements

Todd Crawl reconciles reports, minor revisions to minimum model are agreed upon, and boundaries of regions are discussed (in particular, we discuss the pros and cons of using an algorithm approach to inform the existing ecological/sociopolitical boundaries).

Adjourn at Noon.