

**Guidebook to cognitive mapping with diverse stakeholders in natural resource management
Section II**

Method 1: Using cognitive mapping to explore stakeholder perceptions of desired future conditions

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This document is a companion to a series of documents that serve to guide natural resource managers in the use of cognitive mapping techniques when a deeper level of stakeholder engagement is desired than offered through traditional public participation approaches. The overview document provides a more detailed explanation of cognitive mapping and provides an introduction to both methodologies. This document outlines step-by-step how to implement Method 1, while the last document in the series provides a detailed explanation of how to implement Method 2. All documents can be found on the Joint Fire Science Program project website¹: https://www.firescience.gov/JFSP_advanced_search.cfm.

Overview of Method 1:

The method of cognitive mapping introduced here is a broad, conceptual-level approach to begin finding common ground upon which to engage stakeholders in planning processes within a particular social-ecological system. Specifically, the approach produces a visual diagram of individual perspectives on current and desired future social, economic, and ecological conditions, as well as mechanisms to achieve desired conditions on the landscape. The method is flexible and different sets of participants can be included depending on the specific issue in question. In some cases, it may be appropriate to expand participation to include members of the public while in others participation may be limited to members of a team within a single agency.

This method has many possible applications, however the primary use we envisioned would be at the beginning of the formation of a multi-stakeholder group tasked to work together within a natural resource management context. This method can help the group develop a strong foundation for their ongoing work together by identifying individual perspectives on current conditions (problem identification) and desired future conditions (ideals and goals), as well as specific challenges that individuals perceive or experience and the ideas they have for overcoming those challenges. Using a process similar to the one described here may be particularly useful in these planning stages to help participants reflect on and more clearly articulate their understanding of the social, economic, and ecological components relevant to their topic area. Moreover, this approach provides a tangible way for participants to understand the perspectives of other stakeholders and may increase recognition of areas

¹ As specific web addresses may change, this link takes interested readers to the JFSP research projects search page where our project can be found by selecting "Toman, Eric L" as the researcher name. The full project name is: ["Managing Multi-Functional Landscapes at the Interface of Public Forests and Private Land: Advancing Understanding Through a Comparison of Experience in U.S. and Australia."](#)

of common ground that may not have otherwise been apparent, while also providing specific information about where differences that may exist among participants.

This methodology is conducted in three stages:

- 1) Interviews with individual stakeholders (for purposes of this document called participants) to build cognitive maps. These maps will outline how each individual views: a) the current ecological, economic and social conditions on the landscape in question; b) their ideal future conditions; and c) mechanisms to move from current to future conditions, or maintain current conditions, depending on the expressed goal. The maps also shed light on underlying values, worldviews, and attitudes, which form the basis of opinions and behaviors. Interview questions also contribute to identifying potential challenges to achieving desired future conditions and ways these can be overcome.
- 2) Analysis of maps to find areas of common ground between participants, areas of disagreement, as well as the range of challenges and potential solutions identified by interview participants.
- 3) An organized workshop to discuss findings with interview participants. This workshop offers an opportunity for participants to view and reflect on their own maps and those of others. The project team facilitates the meeting by presenting findings from analysis, developing activities that encourage reflection on the maps and underlying worldviews, values, and attitudes among participants, discuss paths forward to achieve common desired future conditions, and possible approaches to work through areas of disagreement.

Methodology:

Stage One: Interviews to build cognitive maps

Define the landscape: In order to be able to compare maps it is important everyone is talking about the same place, for instance forests in western Boulder County, forests in the Boulder Ranger District on the Arapaho and Roosevelt National Forests, or forests within a specific project area. It should be very clear throughout the interview process what the landscape in question is so that everyone is on the same page when building their maps.

Select participants: Whose perspectives do you want to understand? This depends on why you are interested in the perspectives in the first place. It could be that you need to better understand the underlying values and beliefs that shape the perspectives of colleagues within your agency, or perhaps you are considering a multi-agency project and want to assess how all the potential people that may be involved are currently thinking about the issue before formal planning begins. Or perhaps your agency is participating in a collaborative group with other agencies and citizen stakeholders and need a solid foundation from which to begin. In each of these examples the time spent upfront understanding worldviews, values, and attitudes, as well as gathering a wide range of perspectives on challenges and possible solutions can save a lot of time later in group meetings.

Schedule interviews: Each interview takes between one and a half to two hours, followed by four to five hours of data processing post-interview. Immediately following the interview, or as soon as possible thereafter, the research team will spend several hours debriefing the interview, typing the text from the map into a word processing document to make the data easily accessible and comparable, and filling in any details from the interview not fully captured on the map itself. No more than two interviews should be scheduled in one day. Each individual participant should be interviewed separately.

Materials needed: To conduct the interviews the following supplies are needed: interview guide (see Appendix A), 18" x 24" heavy weight drawing paper (3 sheets per interview), three separate colors of sticky notes in two sizes (3"x3" for definitions, 1 ½" x 2" for factors), white sticky notes or index cards, and an audio recorder (can use application on smart phones if other digital recorders are not available).

Interview procedure: It is best if the interviews are conducted by two people, one to ask the questions and converse with the participant (interviewer) and the other to build the map (notetaker) by recording concepts identified by participants (using sticky notes allows concepts to be rearranged if needed). If only one person is available allow for extra time to conduct the interview. With the permission of interview participants, interviews can also be audio-recorded so the project team can consult the recording where needed to fill in necessary information.

The interview process follows an interview guide (see Appendix A) that contains all of the questions and procedures. The interview starts by asking a series of introductory questions to help the participant to think about how they value and use the landscape, as well as help the interviewer understand the participant's role in the landscape. The rest of the interview covers three topics:

- 1) Current forest, economic, and social conditions
- 2) Desired future forest economic, and social conditions
- 3) Mechanisms to reach desired future conditions including, policies and overarching strategies, partners and stakeholders, and management actions

A separate map page using a different color of sticky notes is generated for each of the above topics. An example of a map generated in one of our projects is shown in Figure 1. Each of the three map sections contains three elements: 1) how the participant defines a certain category, such as current forest conditions (sticky notes include key variables included in that system); 2) any factors that influence that category (how the components interact as well as external influences to the system); and 3) whether the factor is a positive or negative influence and the strength of the influence.

The interviewer asks questions following the interview guide (Appendix A). In order to gain insights into the participant's perspective, the interviewer should refrain from talking as much as possible; any input by the interviewer has the potential to steer the conversation in a way that the participant would not have naturally gone, introducing new elements to the cognitive map that otherwise might not have been there. The interviewer also takes brief notes on the interview sheet to help in the post-interview debriefing, and to record any elements of the interview that are not part of the maps (e.g., what the participant values most about the landscape, time stamps during the interview).

The primary record of the interview is taken by the notetaker on sticky notes used to build the cognitive maps. Everything the participant says will not fit on a sticky note; responses must be condensed to the main point. Participants are given opportunities during the interview to review the notes to ensure accuracy in recording their viewpoints. Audio recordings of the interview can be referred to later to clarify confusing points or fill in gaps not captured on the sticky notes. The participant's name, or other identifier², should be written on the back of every map page.

² ***Should I use a participant's name or a less specific identifier?*** This depends on whether you want to maintain confidentiality around the specific things people share with you or not. An advantage of keeping things confidential is participants may be more forthright in their opinions. A disadvantage is once this agreement is made between the stakeholder and people gathering their perspectives then it is imperative that it is maintained in perpetuity. An advantage of using names is that it can be useful in developing common ground to know who

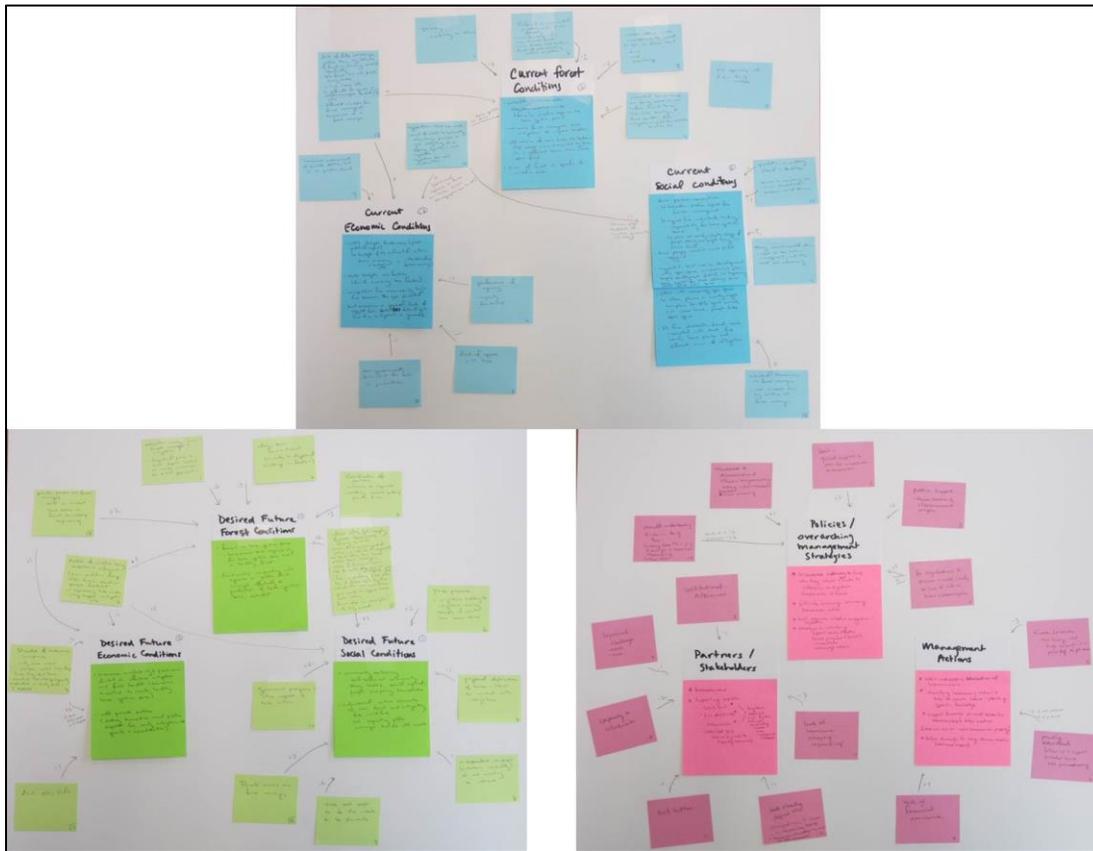


Figure 1. Example of a completed cognitive map. The top portion (with blue sticky notes) covers current forest, economic, and social conditions. The bottom left (green sticky notes) covers desired future forest, economic, and social conditions. The bottom right (pink sticky notes) covers mechanisms to get from current to future conditions, including policies/overarching management strategies, partners/stakeholders, and management actions. For each section the larger sticky notes are how the participant defines that particular concept, the smaller sticky notes are factors the participant identifies as influencing the concept, and the arrows with writing next to them indicate the strength of the influence and whether it is positive or negative.

Data entry: As soon as possible after the interview the notetaker should start filling out the concept map portion of the digital interview data file (Appendix B). If it is not possible to type the data up right away, we suggest you quickly review the map to ensure it is legible and there are no hanging thoughts present (e.g., ask yourself if it will make sense when you return to read it several hours or days later?).

Following the notetaker’s typing up of the sticky notes on the cognitive map into the interview data file, the interviewer should fill in the introductory questions and time stamps. Then they carefully review the

said what: people often make assumptions about who holds which perspectives and if names are revealed they may be surprised. This does not mean that participant IDs cannot be used or that names always have to be associated with particular pieces of information, however it does leave the option of utilizing names or not depending on what is most beneficial to the project. The interview guide is currently written assuming names will be used. Whichever way you choose, you will need to clearly communicate with participants from the beginning on whether the perspectives they share with you will be presented along with their names or not.

concept map portion of the data, looking for areas that may not make sense or others where they think the participant meant something different than what is included. If there is a discrepancy in what the interviewer and notetaker recall the participant saying, they should discuss it, and if needed, the concept should be flagged to be reviewed with the recording. It may take several iterations between the notetaker and interviewer to develop a digital copy of the map that both feel represent an accurate reflection of the interview.

Stage Two: Analysis of Cognitive Maps

The goal with analysis is to find areas of common ground and potential conflict, identify challenges that participants are experiencing or envision in reaching goals on the landscape, identify facilitators that are already in play that can help reach goals, and collect ideas for how to address challenges that were brought up.

Read through the interview files: The first step of analysis is to read through the entire set of interview files (or review all of the physical cognitive maps) in their entirety. While doing this start a list of things that stand out: these might be points of interest, common themes, absence of expected perspectives, etc.

Develop a code manual: A code manual is a key, or guide, to how you are organizing the main ideas of the interview responses. Developing the code manual allows you to more consistently categorize interview responses within the digital interview file, and then all interview responses that are related to a specific idea (e.g., prescribed burning) can be examined together. After reading through the interviews for the first time expand on the list that was started for themes that you want to keep track of and compare across interviews. In qualitative research these are called codes. How many codes you need or want depends on how comprehensive you need or want your analysis to be. If you just need a general overview keep the codes broad, if you only need to understand a few aspects of the maps prior to the first stakeholder group meeting focus on those. For instance, perhaps you are planning on using the maps to launch a multi-stakeholder group project and first want to see if there is a common vision for desired future conditions, current barriers, and identify ideas to overcome the barriers. You might have codes to highlight desired future conditions, barriers, and mechanisms, with sub-codes under them to organize more specific ideas. However many codes and sub-codes you have, they need to be clearly defined so that another person who was reading the same interview notes would categorize the same comments with the same codes. The list of codes and their definitions is called a code manual.

Code the interviews: After the code manual has been developed read through the interviews again, this time writing the appropriate codes in the margins. Through this process the code manual will likely be updated several times by adding, deleting, and combining codes, and clarifying definitions. Now read through the interviews a third time, this time assigning codes to data points in some kind of digital format. If you have access to a qualitative data analysis software (e.g., MAXQDA, NVIVO, Atlas-Ti) use that. If not, you can use Microsoft Word or Excel and cut and paste passages into lists of codes; just be sure if you use the cut/paste method that you keep track of who said what.

Read through codes: Once interviews are coded the codes themselves can be analyzed to find patterns, areas of common ground between and within stakeholder groups, areas of differences, and unique perspectives.

Time required: Time requirements for analysis are extremely variable, depending on how much analysis the research team wants to do, how much staff time is allotted, and how many interviews were conducted. Minimal analysis would only take a few weeks, more detailed analysis would take several months of dedicated effort.

Stage Three: Workshop to Share Findings with Participants

This methodology was designed to help participants more fully consider and articulate their understanding of a particular social-ecological system and their preferences for future conditions with the goal of facilitating more effective management decisions. However there can be any number of other goals that can be accomplished with the cognitive maps; the meeting layout can be adapted to meet specific project goals.

Review of maps: One of the most powerful aspects of the cognitive maps is to allow others to see the perspectives shared by others in the group. Names can be affiliated with the maps or not; they can also be hidden at first and revealed later. One way to facilitate review of the maps is to provide a worksheet to guide thinking while looking at the maps (an example is provided in Appendix C).

Present general findings from analysis: Which findings are presented will depend on goals for the meeting. One suggestion is to allow participants the opportunity to study the maps and look for similar topic areas through a guided activity, then build on the group discussion of the activity with a broader presentation of findings.

Identify next steps: All activities and discussions should lead to an avenue for the next steps to be taken by the group, either as the group as a whole or in sub-groups.

Summary:

Using cognitive maps to engage stakeholders can be undertaken to explore both broad and specific management dilemmas. In this methodology, cognitive mapping can be used as an approach to initiate and develop rapport among stakeholders. Further, it can be used to facilitate the articulation of stakeholder views, build shared language and understandings, and provide a blueprint for stakeholder engagement to inform planning or decision-making processes. While the specific topics explored here focused on current and future forest conditions as they relate to wildfire, the approach can be applied to a wide range of settings and management dilemmas. Creating a visual representation of stakeholder conceptualizations of selected systems and desired future conditions can help participants better understand and articulate their own perspectives as well as those of other stakeholder groups. This approach can facilitate decision-making by helping identify areas of consensus that may not be well recognized between stakeholder groups as well as identifying specific areas where additional attention may be needed to address existing differences.

APPENDIX A: Interview Guide

Individual conceptualizations of social-ecological systems
Interview guide

Date: TIME:
Participant name/ID:
Participant stakeholder group:
Interviewer and notetaker names:

Thank you for agreeing to participate in this project. The goal of this project is to develop a better understanding of how different people think about managing forests to meet a broad range of goals and uses of the landscape both today and in the future.

I would like to remind you that there are no right or wrong answers; we are simply interested in your thoughts and ideas. During this conversation we will cover a range of topics, including your perspectives on current conditions on the landscape, your visions for how the landscape should look like in the future, and mechanisms to either maintain current conditions or get from current to future conditions.

With your permission we would like to audiotape our conversation to accompany notes that we take during the interview. If this is okay, please say “yes.”

Finally, I would like to emphasize that information you share with us will not be held as confidential. We will be using it within our own agency and with our partners in order to develop understandings of different perspectives in the area. Please do not share anything with us that is sensitive or that you are uncomfortable sharing. Do you have any questions before we begin?

A: GENERAL BACKGROUND – this section will take approximately 10 MINUTES

I WILL BE TRACKING TIME PERIODICALLY TO MAKE SURE WE DON'T TAKE TOO MUCH OF YOUR TIME

We'd like to start with some background information about yourself and the forests in your area.

How long have you lived in the area?

What is your occupation? How long have you been in that position?

What do you appreciate most about this landscape?

What are the primary uses of this landscape?

What types of ecosystem services are provided here that are most valued by stakeholders?

B: CURRENT CONDITIONS

TIME: _____

We are going to structure the remainder of our conversation around some white cards that have central ideas on them that will be arranged on this paper. We have some specific questions and activities related to each of these cards that we will walk you through. As we step through this process we will be creating a map of the topics that we discuss – a conceptual map of your ideas. If you feel like we have put things in the wrong place, we can rearrange things, this is your map..

To give you a preview, through this process we will talk about current conditions on the landscape, desired or ideal future conditions, and ways to get from the current conditions to future conditions. We'll start by discussing current conditions.

In this section we have three broad concepts we are going to talk about: current forest conditions, current economic conditions, and current social conditions as they relate to the forests of the landscape in question.

Current Forest Conditions – Definitions

How would you describe the **current forest conditions**? [Examples if needed: description of forest and/or landscape, disturbance regime, historic/natural range of variability, provision of wildlife habitat, water quality, etc.] [While they answer the question the notetaker writes key points on a large, blue sticky note.]

Okay. We've written these concepts [list them] on a sticky note; is there anything you would like to add? [Once answer is complete, place sticky note under "current forest conditions."]

Current Forest Conditions – Factors

What are the primary factors or influences that are contributing to how you have described the current forest conditions? [While they answer the question, notetaker writes key points on separate small, blue sticky notes, numbers them in order they came up, and places them on paper near "current forest conditions".]

Current Forest Conditions – Relationships

So now we are going to draw some arrows from each of these factors to the broader concept. [Draw arrows on paper.] For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. [Show them the scale. Notetaker writes the corresponding number to each response next to the arrow. If influences have both positive and negative components, write both numbers.]

Negative Influence				Positive Influence		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Current Economic Conditions – Definitions

TIME: _____

Moving onto the next card, how would you describe the **current economic conditions** as they relate to the forests we discussed earlier? *[Examples if needed: management costs, access to local jobs, presence and vitality of local industries, wealth or poverty of local residents, etc.] [While they answer the question the notetaker writes key points on a large, blue sticky note.]*

Okay. We’ve written these concepts [list them] on a sticky note; is there anything you would like to add? *[Once answer is complete, place sticky note under “current economic conditions.”]*

Current Economic Conditions – Factors

What are the primary factors or influences that are contributing to how you have described the current economic conditions? *[While they answer the question, notetaker writes key points on separate small, blue sticky notes, numbers them in order they came up, and places them on paper near “current economic conditions.”]*

Current Economic Conditions – Relationships

So now we are going to draw some arrows from each of these factors to the broader concept. *[Draw arrows on paper.]* For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. *[Show them the scale. Notetaker writes the corresponding number to each response next to the arrow. If influences have both positive and negative components, write both numbers.]*

Negative Influence				Positive Influence		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Current Social Conditions – Definitions

TIME: _____

The final concept in this section covers **current social conditions**. How would you describe the current social conditions as they relate to the forests we have been discussing? *[Examples if needed: current management policies/management strategies, presence of active interest groups and residents in regards to forest management, conflict, people working together, community structure, part-time vs. full-time residents, uses of the landscape, etc.] [While they answer the question the notetaker writes key points on a large, blue sticky note.]*

Okay. We’ve written these concepts [list them] on a sticky note; is there anything you would like to add? *[Once answer is complete, place sticky note under “current social conditions.”]*

Current Social Conditions – Factors

What are the primary factors or influences that are contributing to how you have described current social conditions? *[While they answer the question, notetaker writes key points on separate small, blue sticky notes, numbers them in order they came up, and places them on paper near “current social conditions.”]*

Current Social Conditions – Relationships

So now we are going to draw some arrows from each of these factors to the index card. *[Draw arrows on paper.]* For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. *[Show them the scale. Notetaker writes the corresponding number to each response next to the arrow. If influences have both positive and negative components, write both numbers.]*

Negative Influence				Positive Influence		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Review

TIME: _____

Looking at all three of these cards covering current landscape conditions in this area and the factors influencing these conditions, is there anything that is missing? *[If participant says yes ask them to elaborate. If the additional item fits into the broad concepts already presented (e.g., regulations likely go under social, lack of funds likely goes under economic, wildfire risk likely goes under forest), add additional definitional items to the appropriate existing sticky note and write new factors on new sticky notes, however use a running alphabetical labeling scheme for factors rather than numeric to distinguish concepts that came up in review vs. the original concept map.]*

Ranking the big three

I'd like to now move onto thinking about how each of these categories of current conditions fit together in relation to management of the forests in this area. Using a simple numeric ranking system (1, 2, 3, etc.), how would you rank the influence of ecological, economic, and social conditions on management decisions? *[Notetaker writes number beside each concept; if they believe all are of equal priority, assign #1 to all.]*

C: DESIRED FUTURE CONDITIONS

TIME: _____

We are going to follow a very similar process as before, but in this case we will be talking about your desired or ideal future conditions for this area. We would like you to think about what you would like to see, not necessarily what is likely to happen. As before we will be covering forest, economic and social conditions.

Desired or Ideal Forest Conditions – Definitions

How would you describe the **desired or ideal future forest conditions**? *[While they answer the question the notetaker writes key points on a large, green sticky note.]*

Okay. We've written these concepts [list them] on a sticky note; is there anything you would like to add? *[Once answer is complete, place sticky note under "desired future forest conditions."]*

Desired or Ideal Forest Conditions – Factors

What are the influences that may facilitate or prevent arriving at the desired forest conditions that you described? *[While they answer the question, notetaker writes key points on separate small, green sticky notes, numbers them in order they came up, and places them on paper near the "desired future forest conditions."]*

Desired or Ideal Forest Conditions – Relationships

So now we are going to draw some arrows from each of these factors to the index card. *[Draw arrows on paper.]* For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. *[Show them the scale. Notetaker writes the corresponding number to each response next to the arrow. If influences have both positive and negative components, write both numbers.]*

Negative Influence (BARRIERS)				Positive Influence (FACILITATORS)		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Desired or Ideal Economic Conditions – Definitions

TIME: ____

Moving onto the next concept, how would you describe your **desired or ideal future economic conditions**, as they relate to the forests we have been discussing? *[While they answer the question the notetaker writes key points on a large, green sticky note.]*

Okay. We’ve written these concepts [list them] on a sticky note; is there anything you would like to add? *[Once answer is complete, place sticky note at the bottom of the “desired future economic conditions” index card.]*

Desired or Ideal Economic Conditions – Factors

What are the influences that may facilitate or prevent arriving at the desired or ideal economic conditions you described? *[While they answer the question, notetaker writes key points on separate small, green sticky notes, numbers them in order they came up, and places them on paper near “desired future economic conditions.”]*

Desired or Ideal Economic Conditions – Relationships

So now we are going to draw some arrows from each of these factors to broader concept. *[Draw arrows on paper.]* For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. *[Show them the scale. Notetaker writes the corresponding number to each response next to the arrow. If influences have both positive and negative components, write both numbers.]*

Negative Influence (BARRIERS)				Positive Influence (FACILITATORS)		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Desired or Ideal Future Social Conditions – Definitions

TIME: _____

The final card in this section covers **your desired or ideal future social conditions**. How would you describe your vision for future social conditions as they relate to forests in this area? *[While they answer the question the notetaker writes key points on a large, green sticky note.]*

Okay. We’ve written these concepts [list them] on a sticky note; is there anything you would like to add? *[Once answer is complete, place sticky note under “desired future social conditions.”]*

Desired or Ideal Future Social Conditions – Factors

What are the influences that may facilitate or prevent arriving at the desired social conditions you described? *[While they answer the question, notetaker writes key points on separate small, green sticky notes, numbers them in order they came up, and places them on paper near “desired future social conditions.”]*

Desired or Ideal Future Social Conditions – Relationships

So now we are going to draw some arrows from each of these factors to the index card. *[Draw arrows on paper.]* For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. *[Show them the scale. Notetaker writes the corresponding number to each response next to the arrow. If influences have both positive and negative components, write both numbers.]*

Negative Influence (BARRIERS)				Positive Influence (FACILITATORS)		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Review

Looking at all three of these cards covering desired or ideal future landscape conditions in this area, is there anything that is missing? *[If participant says yes ask them to elaborate. If the additional item fits into the broad concepts already presented (e.g., regulations likely go under social, lack of funds likely goes under economic, wildfire risk likely goes under forest), add additional definitional items to the appropriate existing sticky note and write new factors on new sticky notes, however use a running alphabetical labeling scheme for factors rather than numeric to distinguish concepts that came up in review vs. the original concept map.]*

Rank the big three

I'd like to now move onto thinking about how each of these categories of desired future conditions fit together in relation to your vision of future management of the forests. Using a simple numeric ranking system (1, 2, 3, etc.), how would you rank the influence of ecological, economic, and social desired future conditions on management decisions? *[Notetaker writes number beside each concept; if they believe all are of equal importance, assign #1 to all.]*

D. PROCESS OF MOVING FROM CURRENT TO DESIRED CONDITIONS

TIME: ____

Our final topic area is the process of getting from point A to point B. But before we begin would you like to take a short break?

We’ve discussed the current conditions in the area [point to cards on paper] and your visions for the future over here [point to appropriate cards on paper]. Now we would like to discuss processes for getting from here to here [point to paper], or to maintain the current conditions, factors that present challenges, and factors that facilitate the process.

In this section we have three broad concepts we are going to talk about: policies or overarching management strategies, management actions, and partners and stakeholders.

Policies and Overarching Management Strategies – Definitions

What are some policies or management strategies that exist or could be implemented to move from current to future conditions (or to maintain current desired conditions)? *[Examples if needed: Forest Plan, National Forest Management Act, National Environmental Policy Act, etc.] [While they answer the question the notetaker writes key points on a large, pink sticky note.]*

Okay. We’ve written these concepts [list them] on a sticky note; is there anything you would like to add? *[Once answer is complete, place sticky note at the bottom of the “policies or overarching management strategies” index card.]*

Policies and Overarching Management Strategies – Factors

Are there any specific factors or influences that contribute to being able to implement or develop (or continue) the policies and strategies you have described? *[While they answer the question, notetaker writes key points on separate small, pink sticky notes, numbers them in order they came up, and places them on paper near “policies and overarching management strategies.”]*

Policies and Overarching Management Strategies – Relationships

We’re now going to draw arrows from each of these factors to the white card. *[Draw arrows on paper.]* For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. *[Show them the scale. Notetaker writes the corresponding number to each response next to the arrow, negative numbers written on the left side of the arrow, positive numbers written on the right. If influences have both positive and negative components, write both numbers.]*

Negative Influence (BARRIERS)				Positive Influence (FACILITATORS)		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Management Actions – Definitions

TIME: _____

Are there specific management actions that can be taken to move from current to desired future conditions (or maintain current desired conditions)? *[Examples if needed: thinning, prescribed fire, wildland fire use, outreach etc.] [While they answer the question the notetaker writes key points on a large, pink sticky note.]*

Okay. We’ve written these concepts [list them] on a sticky note; is there anything you would like to add? *[Once answer is complete, place sticky note under “management actions.”]*

Management Actions – Factors

What are the primary factors or influences that are contributing to being able to implement the management actions you have described it? *[While they answer the question, notetaker writes the key points on separate small, pink sticky notes, numbers them in order they came up, and places them on paper near “management actions.”]*

Management Actions – Relationships

We’re now going to draw arrows from each of these factors to the white card. *[Draw arrows on paper.]* For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. *[Show them the scale. Notetaker writes the corresponding number to each response next to the arrow, negative numbers written on the left side of the arrow, positive numbers written on the right. If influences have both positive and negative components, write both numbers.]*

Negative Influence (BARRIERS)				Positive Influence (FACILITATORS)		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Partners and Stakeholders – Definitions

TIME: _____

Who (individuals or organizations) would be the key players needed to help move from the current to future conditions you described (or to maintain current conditions)? *[While they answer the question notetaker writes key points on a large, pink sticky note, leaving room on the right hand side for yes/no responses to next question.]*

Do you currently work with all of those entities? *[Write yes/no next to entity on the large, pink sticky note.]*

Okay. We’ve written these responses [list them] on a sticky note; is there anything you would like to add? *[Once answer is complete, place sticky note under “partners and stakeholders.”]*

Partners and Stakeholders – Factors

Are there any significant facilitators or barriers that enable or prevent the partners and stakeholders that you have mentioned in working together towards the desired future conditions that we have been discussing? *[While they answer the question, notetaker writes key points on separate small, pink sticky notes, numbers them in order they came up, and places them on paper near “partners and stakeholders.”]*

Partners and Stakeholders – Relationships

We’re now going to draw arrows from each of these factors to the broader concept. *[Draw arrows on paper.]* For each arrow we will briefly discuss whether the factor has a positive or negative influence on the broader concept and how strong that influence is. The scale is printed here and ranges from slightly to very influential. *[Show them the scale. Notetaker writes the corresponding number to each response next to the arrow, negative numbers written on the left side of the arrow, positive numbers written on the right. If influences have both positive and negative components, write both numbers.]*

Negative Influence (BARRIERS)				Positive Influence (FACILITATORS)		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

Review

Looking at all three of these cards covering the process of getting from point A to point B, is there anything that is missing? *[If participant says yes ask them to elaborate. If the additional item fits into the broad concepts already presented (e.g., regulations likely go under social, lack of funds likely goes under economic, wildfire risk likely goes under forest), add additional definitional items to the appropriate existing sticky note and write new factors on new sticky notes, however use a running alphabetical labeling scheme for factors rather than numeric to distinguish concepts that came up in review vs. the original concept map.]*

Rank the big three

I'd like to now move onto thinking about how each of these categories of ways to get from Point A to B and how they fit together in relation to your vision of future management of the forests in this area. Using a simple numeric ranking system (1, 2, 3, etc.), how would you rank the influence of policies and overarching management strategies, management actions, and partners and stakeholders on management decisions? *[Notetaker writes number beside each concept; if they believe all are of equal importance, assign #1 to all.]*

E: OVERARCHING RELATIONSHIPS

As our final exercise, I'd like you to take a few minutes to look at what we have created here. In particular I'd like you to look for overarching relationships between concepts or factors that are within or between pages.

Missing items that come up:

Are there any additional connections that are important that we should add? *[Draw arrows and assess strength of relationship as before. If connection crosses to another page, create a duplicate of the concept/factor (including the number) and place this sticky note next to factor it relates to; draw arrow and assess the strength.]*

Negative Influence				Positive Influence		
Very influential	Influential	Slightly influential	Neutral	Slightly influential	Influential	Very influential
-3	-2	-1	0	1	2	3

That is all that we have prepared for today. Is there anything else that you would like to add that we haven't covered, or do you have any questions for us?

Thank you so much for your time!

APPENDIX B: Data Entry Template

Participant:	Cognitive Map Data	Interviewer:
Date:		Notetaker:

Individual conceptualizations of social-ecological systems

A: GENERAL BACKGROUND

TIME:

How long have you lived in the area?

What is your occupation? How long have you been in that position?

What do you appreciate most about this landscape?

What are the primary uses of this landscape?

What types of ecosystem services are provided here that are most valued by stakeholders?

B: CURRENT CONDITIONS

TIME:

Current Forest Conditions – Definitions

Rank:

-

Current Forest Conditions – Factors and Relationships

Example:

- # 1 = factor description
 - + 3; notes regarding assessment

- # =
 -

Participant:	Cognitive Map Data	Interviewer:
Date:		Notetaker:

Current Economic Conditions – Definitions

TIME:

Rank:

-

Current Economic Conditions – Factors and Relationships

- # =
○

Current Social Conditions – Definitions

TIME:

Rank:

-

Current Social Conditions – Factors and Relationships

- # =
○

C: DESIRED FUTURE CONDITIONS

TIME:

Desired Future Forest Conditions – Definitions

Rank:

-

Desired Future Forest Conditions – Factors and Relationships

- # =
○

Desired Future Economic Conditions – Definitions

TIME:

Rank:

-

Desired Future Economic Conditions – Factors and Relationships

- # =

Participant:	Cognitive Map Data	Interviewer:
Date:		Notetaker:

○

Desired Future Social Conditions – Definitions

TIME:

Rank:

•

Desired Future Social Conditions – Factors and Relationships

• # =

○

D. PROCESS OF MOVING FROM CURRENT TO DESIRED CONDITIONS

TIME:

Policies and Overarching Management Strategies – Definitions

Rank:

•

Policies and Overarching Management Strategies – Factors and Relationships

• # =

○

Management Actions – Definitions

TIME:

Rank:

•

Management Actions – Factors and Relationships

• # =

○

Partners and Stakeholders – Definitions

TIME:

Rank:

Example:

- *Organization; Y or N (as noted)*

Participant:	Cognitive Map Data	Interviewer:
Date:		Notetaker:

-

Partners and Stakeholders – Factors and Relationships

- # =
 -

E: OVERARCHING RELATIONSHIPS

TIME:

Example:

#C1. INFLUENCING CONCEPT → INFLUENCED CONCEPT

- *Explanation for connection*
 - *Strength and direction of relationship; notes regarding assessment*

APPENDIX C: Worksheet for Desired Future Conditions Activity at the Workshop

Worksheet: Desired Future Conditions

Please walk around the room and consider the “desired future conditions” included in the cognitive maps created through our earlier discussions (green sticky notes). As you review these maps, please consider the questions below.

- **What similarities do you notice between the maps?**
- **What differences do you notice between the maps?**
- **How would you describe the general themes expressed in these maps?**
- **Please note any specific points from these maps that you think are particularly interesting or merit additional discussion.**
- **Specifically considering your own map, what are some areas of overlap with the concepts described by other participants?**
- **Are there areas where your map differed from the other maps?**