July 25 Core Team Meeting Notes

Attendees

In Person

Andrew MacLachlan, USFWS, Science Applications
Andrew Milliken, USFWS, Science Applications
BJ Richardson, USFWS, Science Applications
Dave Perkins, USFWS, Fisheries
Georgia Basso, USFWS, South New England FO
Jeff Horan, USFWS, Refuges
Jenny Dickson, CT DEEP
John Warner, USFWS, New England Field Office
Katie Kennedy, The Nature Conservancy
Ken Elowe, USFWS, Science Applications
Lori Pelech, USFWS, Science Applications
Maritza Mallek, USFWS, Science Applications
Rachel Cliché, USFWS, Conte Refuge
Scott Schwenk, USFWS, Science Applications
Tim Wildman, CT DEEP
Catherine Doyle-Capitman, Cornell University
Rachel Katz, UMass/USGS

Phone

Bob Houston, USFWS, Gulf of Main FO
David Paulson, MassWildlife, NHESP
Emily Preston, NH Fish & Game
Eric Sorenson, VT Fish and Wildlife
Patrick Comins, Audubon CT/Friends of Conte Refuge
Kevin McGarigal, UMass
Mike Slattery, USFWS, Chesapeake Bay Field Office
Randy Dettmers, USFWS, Migratory Birds

Introduction
Nancy reviewed responses to survey.

August Core Team meeting - last Friday is Labor Day weekend. Nancy will send out a doodle poll to try to find a better date.

Terrestrial Subteam Update
Scott reminded us about the questions posed at the June meeting. Went back to earlier presentations and reminded us of the initial goals for this project. See terrestrial subteam handout and notes from that meeting (previously discussed at subteam meetings) for more details.

Fundamental objectives - our vision for preserving and protecting ecosystems
Means objectives - core areas, additional tiers of priority including corridors and networks; the final conservation design will include priorities for both management and restoration

Andrew asked about how the team was planning to address the need to plan for both management and restoration. Scott and Patrick agree that the core areas should incorporate the best part of the landscape for both management and restoration

Aquatics Subteam Update
The subteam has been focusing in on suites of species and specific objectives to use with the tools and approaches being developed by UMass. There has been a lot of discussion about how to implement core areas for aquatics, because it's not just about habitat quality. From a given area of good habitat, we've been trying to think about how far up or downstream to go within a network. The main challenge has been visualizing the consequences of a given decision

Questions
Ken: This question is for both the aquatic and terrestrial subteams. Have you identified the priorities that you are trying to sustain and the levels? Where are you in your discussions in each team, relative to what you are trying to sustain in the watershed.
Patrick: We started out with targets, but there hasn't been much discussion since the early stages.
Scott: On the ecosystem side, the document we circulated was trying to identify priorities. We were trying to give ecosystem objectives, say what we were shooting for, and connect that to our priorities. We don't necessarily have numerical objectives, like we want X amount of some ecosystem functioning. But we do have overall goals of diversity, of connectedness, of condition, that we're trying to shoot for and we're trying to use the core areas and tiers – the broader design – to prioritize among them. So I'd say it depends on your definition of endpoints. We have a conceptual model but we're not at the point of numerical targets on the ecosystem side. On the species side we're farther along. Randy has a new handout that we'll be discussing during the subteam meeting.
Dave Perkins: The aquatic side is similar. We're talking about how to use the input layers. We haven't developed specific targets – like how much of the landscape we need to protect to meet those broad ecosystem objectives. We don't have targets for temperature sensitivity or connectedness. The mechanisms are there to use those metrics and we're talking about how to integrate them into a prioritization. We haven't decided on relative weightings until we see the unweighted verison. So we're still working on the broad scale. On the species side we'll probably be talking about one or two species that will allow us to focus on the whole watershed. That's about where we're at.

Q&A session with UMASS (Kevin McGarigal) to address some frequently asked questions. At the end the floor will be open for any additional questions the team may have.

1. How do IEI and TNC Resiliency compare and contrast? (slides 5-13)
Both of these are important inputs for the core area selection index, along with 2 other inputs (stream temperature and rare natural communities)

Important to have a fundamental understanding of ecological integrity, which is a challenging concept as you need to consider space, time and scale, where the scale can range from a single cell to a landscape.

Conceptual differences:
<u>Overview of ecological integrity and resiliency (slides 6-9)</u>

- Resiliency is a component of integrity, and includes similarity, diversity, connectedness (similarity and accessibility), and adaptive capacity (diversity and accessibility).
- Similarity and diversity are simple resiliency metrics. Connectedness and adaptive capacity add connectivity metrics to the resiliency metrics.
- Each of these components can be defined using multiple techniques.
- Similarity and connectedness are oriented to the short-term (and short-term changes), while diversity and adaptive capacity are oriented to the long-term (and long-term changes).
- The index also incorporates many metrics related to stressors in the environment that affect intactness.

<u>Index of Ecological Integrity</u>
Three critical components apply to a site: intactness, connectedness, and resiliency. Thus, resiliency is a contributing component of integrity, but not the only one. And, resiliency is multifaceted with four components: similarity, connectedness, ecosystem diversity, and adaptive capacity.

<u>Nature Conservancy</u>
-- Emphasizes ecosystem diversity and connectedness (2 components)

Technical differences (slide 10):

Both models use connectedness; however differences are:
<u>IEI (right column)</u>
<u>TNC (left column)</u>
-- differences exist in types of input data
-- biggest difference has to do with scale – this is most important distinction
-- TNC map includes 26 geographical classes displayed at 1000 acre hexagon resolution, while the IEI includes 44 classes (based on the macrogroups/ecological systems) displayed at 30m cell resolution. TNC map is coarser and the IEI is finer.

Overall differences:
Kevin:Are we double-counting? Yes, in one sense, because we're incorporating similar metrics. IEI and TNC's resiliency are two ways of thinking about this, and neither is more or less right than the other. I don't see a problem with having some redundancy. In fact, if there is consensus between the two that a given site is important or unimportant, then we may have more confidence in the relative importance of that site. So I think that the redundancy is positive and helps us refine and build a better product.

Additional questions on topic
Jeff: Which approach might take aquatic systems more into account? Is there a difference?
Kevin: TNC Resiliency (terrestrial) geographical data is not taking aquatics into account at all. It's based on geologic and topographic diversity, not ecological systems. There is an aquatic TNC resiliency map but the subteam has decided not to use it for several reasons. IEI uses ecosystems.

2. What does the top x% of the core area selection mean exactly? (slides 14-16)
Kevin: Remember the core selection index is using as its base layers: IEI, TNC Resiliency, stream temperature, and rare natural communities. Across macrogroups and geophysical settings, an x% slice gives you the top x%, represented across all of those strata. Example was using 20% as the slice to depict the top 20% of each strata. It is not a *precise* 20%, but it is close, and it is the reason that we used quantile scaling. The result is a highly fragmented set of patches - they can be, and are, all different sizes and shapes, and this persists at whatever "top x %" you choose. At whatever x% slice you choose, you guarantee that all of the macrogroups and ecological settings will be represented in your core areas. However, if you drop any resulting small patches after slicing, you may lose some macrogroups or ecological settings, especially if they are very small. So you lose that guarantee of minimal representation. This problem is the reason that we decided to design an algorithmic approach.

Additional questions on topic
Emily Preston: So you are slicing by macrogroups?
Kevin: Because of the way we scaled and combined the input layers to create this surface, the top 20% of any given macrogroup will be represented in the top 20% slice of the selection index. It guarantees equal representation.

Emily: In these analyses, the main stem of the Connecticut seems to disappear. I don't see it represented in your slides of the top 20%. I would like to be able to see what happens to the main stem, because I'm concerned that it will be left out of the design.
Kevin: Keep in mind that this approach guarantees that you represent the top 20% of the "large (river) cool (temp)" watercourse. But it doesn't privilege or demote any type of stream, or any type of macrogroup. Also, regarding my examples, the inset map does not include the CT River mainstem so you aren't seeing it.

Jeff: What went into the aquatic classification?
Kevin: All the different levels of riverine systems, plus ponds and lakes. Remember that the riverine has classes that include size, temperature, and grade.

3. What are the tradeoffs between using a top x % slice of the core area selection index versus an algorithmic approach to create core areas? (slides 17-18)

Option 1 (slicing approach): When you "slice", you are literally slicing the core selection index surface at that % level and are done. Slicing leads to fragmented and many small core areas. You can get rid of the fragments, but you are at risk of losing some ecological settings.

Option 2 (algorithmic approach): The kernel algorithmic approach solves the problem above by creating larger, less fragmented core areas. The kernel algorthim works by taking the top 5% (or some small fraction of the index in order to ensure that guaranteed representation of macrogroups and settings) and growing core areas out from them. In other words, you build out from the slice trying to pick up high value areas nearby, growing them into larger, smoother core areas. This necessarily subsumes some lower value stuff within it.

Scott's "tradeoffs document" does a nice job of detailing the differences in the two options.

One confusing thing is that it looks like we're dropping a lot of good stuff. This is one of the main tradeoffs. However, we still get representation across all the macrogroups, just not as much representation. We could also build the cores from the top 10%, instead of the top 5%, as pictured. This top X% becomes the minimum representation. Some macrogroups will be represented more heavily, perhaps at 15 or 20%. The goal is for the core areas to be more practical from a management and planning standpoint.

Additional questions on topic
Emily: Can you explain more about the algorithm? Or at least list the elements? It looks like just a buffer, but obviously it's not.
Kevin: It will take more than a couple of minutes and perhaps getting too much in the weeds for today.

Eric: When you expand in the algorithm approach, does it encompass roads or barriers, or does it only include a certain level of connectedness?
Kevin: That is one decision for the group to make. In my presentation, the only barriers to growth were expressways and highways. Otherwise, core areas were allowed to spread across local roads and development. The June 2014 core team presentation has some illustrations of the differences in outcomes based on how you parameterize this particular component of the algorithm.

Maritza: As the core areas grow, do they grow preferentially in areas with higher values in the index?
Kevin: Yes, the expansion utilizes the selection index and will expand more in a direction with higher values in the selection index.

Andrew Mac: The percent refers to the highest score, correct? (Kevin: Yes)
Kevin: Let's say we take the top 5%. We'll have fewer seeds than if we used a larger slice. But we can also vary how we grow the kernels. Right now the slides show growth occurring until 30% of the landscape is in a core area. In the image on screen (Q3), then the areas in red and blue are the top 30% exclusive of the top 5%. So there are 2 parameters we're talking about here - the proportion used as seeds for the kernel, and the proportion of the landscape in core areas.

Dave: I feel like as a land manager I would want to look at the selection index scores across the watershed, rather than just looking at these core areas. What is the utility of the core areas?
Kevin: We want to have that product available, and it will be available separately from the design. Jumping ahead to the Q6 slide. The core areas will serve as a way to direct and prioritize

conservation actions to a specific place. Generally resources are limited so we want to proactively and strategically direct conservation. Of course the boundaries are somewhat arbitrary. It doesn't mean that land outside the core is not worth conserving. It's for when we don't know where to start; it helps prioritize, but is not necessarily a means to confirm that existing areas that are conserved should be or not. Just because an area isn't in the core doesn't mean it's not important ecologically for a species, for connectivity, or some other purpose. But the core areas will direct, inform, and guide conservation planning, and are something that people have expressed a desire to have.

BJ: If the goal is one design map, eventually, then how does the species get factored into the selection index?
Kevin: At a minimum, there will be at least 3 maps. Core area network and connectivity based on: 1) ecosystem approach, 2) species approach, and 3) both ecosystem and species. It is my expectation that we will end up using the latter, but we wanted to go through these separately so we can compare them and understand how each method contributes to the final product (this is not unlike using TNC Resiliency and the UMass IEI). There will be many maps and data products available for viewing and use.

BJ: In the integrated approach, do you combine 2 core maps?
Kevin: We haven't discussed or presented that yet. But the plan is to combine the ecosystems and species approaches into one core selection index.

4. How will we ensure well-distributed core areas across the watershed? (HUC 8s are recommended) (slides 19-20)
The default would be to use the entire CT watershed. Two other methods have been proposed for stratifying: TNC ecoregions (there are 3 in the CT watershed), and the other is a subwatershed (HUC 8 proposed).

There are more HUC 8 watersheds and they are more finely resolved. They are the smallest watershed we're comfortable using for scaling results while still retaining a gradient of diversity within a given area. The index is still meaningfully scaled low to high. The HUC 8 also guarantees the broadest cover across our project landscape. If you go smaller, too few areas are represented for each macrogroup. Also HUC 8s capture the N-S and E-W gradient.

Scott's document describes the tradeoffs pretty well. We're advocating for HUC 8 scaling.

Additional questions on topic
Emily: I have a third suggestion. TNC has subsections for those ecoregions. It would be an intermediate step between the ecoregions and the HUC 8s. New Hampshire is using that with success.
Kevin: The subsections tend to be very convoluted in shape and long linear features. I prefer to use a more compact, less complex shape when rescaling in order to avoid boundary effects. This is more of landscape ecological perspective - we generally avoid shapes like this.
Emily: My map of subsection is different.
Kevin: Does it have linear convoluted shapes? Generally we don't like to use highly linear and convoluted shapes
Emily: They are much less linear than the slides you showed.

Eric: One advantage of the subsection is that they're based on other factors we're looking at, like similarity in bedrock, vegetation, geophysical settings, etc. Then the index would be more homogenous.
Kevin: That's actually a great point, because we want to rescale across a heterogeneous area. If the subsections are similar, using them won't add new information. We actually want to break up the geophysical settings, we are already scaling by geographical settings, and want to make sure we represent the macrogroups. In my opinion, HUC 8's thereby offer the broadest distribution, and are the right size and shape.

5. How are we going to combine/display/represent both the aquatic and terrestrial/wetlands core areas? (slides 21-22)
Kevin: The main reason to combine them would be to produce a single map. However, in general, I don't want to combine them, because the process to create each type of buffered core area is different. An aquatic core area and a terrestrial core area are different things. So unless someone really wants to merge them, we probably won't. I recommend the core areas stay separate; but we will still portray them on a map together as part of a single design. Essentially we would have 2 products with 2 different networks, but have them in one design.

Additional questions on topic
Emily: I was hoping to merge them for land protection purposes because I think they will overlap or connect cores in a meaningful way.
Kevin: Part of the issue is that the connectivity assessment will be done after the cores are generated, and we don't want to do that using the aquatic buffers (which don't necessarily include high value land).
Emily: I agree. I was referring to combining them for display, especially for different users. I am thinking ahead to working with Land Trusts, who often don't think about land for aquatic protection purposes.

Dave: I'm thinking about a future situation where you would want to prioritize areas where the index for aquatics and index for terrestrial were both high.
Kevin: I would have to think about that.
Dave: If we can get a two-fer, that's ideal.
Kevin: The difference between building it into the algorithm and just overlaying the end output products may not be that big, but the latter option is much simpler to implement. For working purposes, in my opinion, I think we should keep them separate but the final product design would combine them.

Jeff: Have we ranked or classified any of the aquatic systems beyond the macrogroups? So we don't have a mechanism to build cores?
Kevin: We have done that. The classification is complete. Those macrogroups are evaluated in the same way as for terrestrial and the same method is used for creating the index. The difference is that the algorithm for creating kernel-generated cores is different for aquatics than for terrestrial.

The last two questions were skipped due to lack of time.