Wildlife Summit III:
Safeguarding Wildlife and Ecosystems from the Effects of Climate Change

New Hampshire Fish and Game Department

Friday, June 11, 2010
8:30 a.m. – 4:00 p.m.
New Hampshire Technical Institute,
Concord

Facilitated and notes compiled by:

University of New Hampshire Cooperative Extension

Wildlife Summit III:
Safeguarding Wildlife and Ecosystems from the Effects of Climate Change

Wildlife Action Plan Revision
June 11, 2010
8 a.m. to 4 p.m.

Co-hosts
NH Fish and Game Department
National Wildlife Federation
NH Department of Environmental Services
NH Natural Heritage Bureau
NH Audubon
Society for the Protection of NH Forests
The Nature Conservancy – New Hampshire
UNH Cooperative Extension
NH Fish and Game Commission

Agenda

8:00 to 8:30 a.m. Registration

8:30 a.m. Welcome and Meeting Purpose – Glenn Normandeau, Executive Director, NH Fish and Game Department

8:45 a.m. Wildlife Action Plan: Past, Present and Future – John Kanter, Nongame Program Coordinator, NH Fish and Game Department

9:05 a.m. Connecting the WAP revision to the N.H. Energy and Climate Collaborative – Sherry Godlewski, Adaptation Coordinator, Department of Environmental Services

9:20 a.m. Northeast Region Fish and Wildlife Service Climate Change Initiative: Land Conservation Cooperatives – Rick Bennett, Regional Scientist, Northeast Region, US Fish and Wildlife Service

9:40 a.m. Status of National Climate Legislation and Adaptation Planning Throughout the Region– George Gay, Senior Manager, Climate Change Program, National Wildlife Federation

10 a.m. Break

10:20 a.m. Estimating Climate Change Resilience for Species and Habitats – Mark Anderson, Eastern Region Conservation Science Director, The Nature Conservancy

10:50 a.m. Using Vulnerability Assessment Results to Inform Agency Decisions – John O'Leary, State Wildlife Action Plan Coordinator, Massachusetts Division of Fisheries & Wildlife

11:10 a.m. Identify Issues to Safeguard New Hampshire's Wildlife and Ecosystems in a Changing Climate – Summit Participants with Charlie French facilitating

12:10 p.m. Lunch – Box lunch provided.

1:10 p.m. Breakout sessions based on issues identified in morning session

3:10 p.m. Break

3:25 p.m. Report of results of breakout discussions and wrap up

4:00 p.m. Adjourn

Wildlife Summit III: Safeguarding Wildlife and Ecosystems
Stakeholder Meeting

Group Process Elements

11:00 **Formation of Working Groups**

- Sticky Notes Activity:
  - Each participant to succinctly write on a 3" X 5" sticky note one key issue or concern they have regarding how climate change could impact wildlife or habitat (10 minutes)
  - Participants place sticky notes on table and begin grouping them into 4-6 common themes, with rough titles to be coined for each (25 minutes).
  - Facilitator to read off common themes with issues grouped under each for group consensus. The common themes will serve as basis for afternoon's breakout groups (15 minutes).
  - Participants select which group they want to work with for the post-lunch breakout.

12:00 **Lunch Break**

1:00 **Participants Break out into Work-Group Sessions:** Each theme that emerged from the morning session is associated with a breakout group number. Charlie will describe which theme is associated with which breakout group number. Facilitators will spread around the room, hold up their group's number, and guide participants to breakout rooms.

Breakout 1 – (facilitator: Charlie French, UNHCE, note taker: Liza Poinier)
Breakout 2 – (facilitator Dan Reidy, UNHCE, note taker: Marilyn Wyzga)
Breakout 3 – (facilitator Michele Gagne, UNHCE, note taker: Nick Solerno)
Breakout 4 – (facilitator Andy Fast, UNHCE, note taker: Lindsay Webb)
Breakout 5 – (facilitator Judy Stokes, NHF&G, note taker: Judy Silverberg)

1:10 **Introductions & Sign-in Sheet**

- Have each person give their name and briefly outline their interest with respect to the group's theme/breakout discussion topic.
- Pass around the sign-in sheet for names and phone numbers. Be sure that the session's theme is listed on the easel paper.
- Go over ground rules (from poster).

1:25 **Overview of Theme**

- Briefly review the issues/concerns that fall under the theme.
- Invite open discussion about issues/topics relevant to the theme.

1:45 **Issue/Problem Definition**

What is the overarching issue/problem/thread that the issues identified in the morning speak to?

What are the key elements of this issue/problem/thread?
Craft an issue statement: A good issue statement concisely states who/what is impacted, what the basic elements or drivers of the issue/problem are, and what the consequences are (25-30 words is a general rule of thumb)

2:20 **Group's Purpose and Next Steps**

If a working group were to be formed to address this issue, what should this group's charter be? (i.e. ***what*** is it that the group is set out to do, ***why***, and generally speaking, ***how***?)

Who needs to be at the table?: What other individuals, organizations or other stakeholders have a stake in the problem and should be pulled in?

What are the next steps?: Before getting to the strategic level of how to address the problem, there are likely small steps that need to be taken, such as reaching out to other stakeholders, setting a next meeting date (and agenda), deciding how the group will communicate and share ideas, etc.

3:00 **Break**

3:15 **Report-Outs**

3:50 **Next Steps**

4:00 **Adjourn**

Wildlife Summit III – Issue Statements

1. Weather

Significant weather events and past (and forecasted) trends have and will continue to change habitats, wildlife populations, and their distribution on the landscape.

2. Education

As climate changes, habitats and wildlife are potentially shifting, all people – in all their roles (landowners, voter, consumer, etc) make decisions that directly and indirectly affect wildlife. We (all) need compelling, useful, current information to make informed decisions.

3. Sea Level Rise and Aquatics

Climate change will affect

- Hydrologic regime
- Water quality
- Physical habitat

These in turn will affect plant and wildlife communities. Human infrastructure (built environment) exacerbates these problems. Rethinking our approach to development to integrate future needs of aquatic ecosystems will alleviate some of these problems related to climate change. These sound practices help protect ecosystems and wildlife from existing threats.

4. Habitat Loss and Extinction

Habitat and species protection models and mapping is needed to focus funding and resource allocation decisions to ensure that New Hampshire invests wisely in conservation strategies that cope with climate change.

Society faces dramatic change in habitat and species diversity because of climate change. The potential consequences of climate change include shift in habitat and wildlife ranges. This in turn results in shifts in economic drivers, such as travel and tourism, forest products, and recreation.

5. Phenology

Changes in timing and intensity of meteorological events alter interaction among plants and animals resulting in enhanced or compromised reproduction and survival and affect the value of these resources to society.

Breakout Group 1
Weather

Facilitator: Charlie French (UNH Cooperative Extension)
Recorder: Liza Poinier (NH Fish & Game)
Participants: Meade Cadot, John O'Leary, Sherry Godlewski, Allison Briggaman, Pate Tate

Sticky Notes:

- How will extreme precipitation events affect wildlife habitat?
- Loss of highly vulnerable wetland habitat due to changes in precipitation and temperature.
- Flood control/mitigation will impact the most productive part of the landscape.
- How will changes in precipitation patterns, increased flashiness, longer periods of drought, decreased snow pack, etc. affect water quality and quantity and subsequently affect natural resources?
- Significant weather events are and will continue to change habitats, wildlife populations, and their distribution on the landscape.

Issues:

- Emergency planning for natural weather disaster – specifically, getting species out of harm's way.
- Climate = accumulation of weather….Would like to see understanding of relationship of weather to C.C. (climate change). What ability do we have to understand or predict what weather will be like in future under climate change?
- What's gone on in 10 yrs/what are trends? Will it get worse? Warmer, wetter, individual events that are more intense. Preparing for those trends if you can.
- Trends – What's trajectory and what will pacts be con different habitats??
  Precipitation
  Snowpack
  Temperature
- We only have what models tell us – do we need different kinds of data/what are info needs for us as planners?

- Effects of CC will be weather effects. What are examples from past weather events (ex. drought) that can help us predict impacts? What were ecosystem responses? Need to ID examples.
- If examples of placed in the world that look like we might look X years in the future…. Will New England become more like England/Ireland?..... and if so what can we learn?

- No $ for staff to do what needs to be done. Feds should be planning more to use (volunteer) monitors to "keep track of the environment" – need class of citizen scientist taking measurements, collecting data re: wildlife and other facets….. need a big increase in this.

- See problem statement. What are dimensions of problem/leverage points?

- Culvert study/THC: salamanders, fish passage – culverts are inadequate, under-sized, designed wrong. Design improvements improved conditions for critters and infrastructure, etc.

- "Co-benefits"

Weather Problem Statement:

Significant weather events and past (and forecasted) trends have and will continue to change habitats, wildlife populations, and their distribution on the landscape.

Leverage Points:

- Also need civilian engineer corps. – volunteers with knowledge/equipment to help.

- Aquatic systems are driven by groundwater or precipitation, so you need to understand those to create appropriate strategies.

- Use CC to involve landowners/managers more in land conservation/habitat

- Enviro review process – ex. Suncook/mussels need more thorough review process to protect known locations of species/habitats * Use WAP to inform e-review process.

- Conservation Commissions need education on e-reviews and WAP – esp. for wetland and other permit approvals, Zoning Boards, Planning and other town boards)

- Some towns are developing rapidly – there is board burn-out so we may need to do more frequent WAP reviews (invite ourselves)

- Circuit rider to provide tech. support in communities so that board turnover doesn't hurt continuity.

- Volunteers (see above) to gather data – better relationships/ppl could help with models.

- Tapping existing data/coordinating groups (ex. Maple growers phenology data)

- One central volunteer place to coordinate all natural resource volunteers (could we use volunteer NH for this?)

- FEMA/insurance companies must have data?

- See OEP database (not very up-to-date)

- Make use of exiting data on historic weather events – impacts and recovery

- Regulation changes to prevent land-use change loophole (wetland to cornfield to development)

- Another monitoring need: intermittent streams.

- Need education--common understanding that

    1. CC affects weather trends
    2. weather trends have habitat/wildlife impacts

- CC is a regional issue and this is an opportunity to take a regional approach. How can we fit state WAPs in?

- SWG $ can't be spent on education, so…… need outreach help – staff and volunteers – not SWG funded.

- What would the effort look like to move these things forward?

- Hook up with phenology folks on volunteer research/data collection (make regional if possible). Also tap GCM – what we need vs what they produce.

- e-reviews: review the process and regulations to make sure WAP (cc part) is a piece of it (moving beyond using WAP only to choose land to protect)

- WAP/CC outreach effort to (towns: town boards) stress the weather part – point up do-benefits: link ecosystem intactness to other improvements/benefits to town

- Coordinate with info/outreach/education people to help with marketing the volunteer opportunities.

- Coordinate info from past extreme weather events to help us predict probably future impacts.

- Funding for volunteer coordination, data gathering, galvanizing/marketing the effort.

- Funding for outreach/marketing

- Tap existing (NOAA?) weather volunteers.

(Note: Coop Ext. has a big volunteer database – how can we cross-reference?)

- CONTACT Volunteer NH

Who needs to be at the table?

- People who've been responsible for starting/managing volunteer date collectors

UNH	Breeding bird survey	Water Quality
Lakes monitoring	Christmas bird count	monitoring programs
program River	Winter severity index	USGS
assessment	NOAA	RAARP
Coverts		

- Need Steering Committee to guide the efforts – including body to guide what data is needed – who will collect it?

- Sewage; water treatment; water supply – should be involved – need to make case that they have anything to do with WAP

- Funders

- F&G and existing WAP implementers/partners

- Towns

- Regional counterparts (NEAFWA/LCC)

- Forest Service – Hubbard Brook

- Cold Regions Research Labs (CRRL) Hanover

- UNH/other research programs

- WMUR/meteorologists

Next Steps:

- Get agreement that weather is something to look at and that we understand difference between weather and CC

- Form Steering Committee

- Steering Committee looks at leverage points
  -Will guide efforts to coordinate and mobilize volunteers for monitoring, research, etc.
  -Engage implementing partners
  -Coordinate the incorporation of leverage points into WAP

Breakout Group 2
Engagement, Involvement, Education

Facilitator: Dan Reidy (UNH Cooperative Extension)
Recorder: Marilyn Wyzga (NH Fish & Game)
Participants: Tom Sintros, Rob Shanks, Kristine Rines, Ellen Snyder, Matt Tarr, Charles Williams, Chris Wells, Marilyn Wyzga, Eric Aldrich, Beth McGuinn

Sticky Notes:

- Public motivation to address (X Memory) beyond function cycle
- Maintaining public motivation (X Memory) regarding need to address climate changes beyond election year cycles
- Attitude/break political, personal, corporate paradigms and use science to inform policy now
- Policy – laws – regulation
- One key issue: Human response to extreme events
- Main Concern – could climate change our wildlife? Most comments made by speakers seemed to stress potential negative impacts on wildlife. Aren't there just as many possible good things that could happen to benefit some species?
- Lack of citizen landowner/community involvement, participation in climate change planning "adaptation" – lack of a land ethic.
- Of concern is how people who live in the state of NH will accept that there will be change and how we have to approach wildlife conservation differently.
- Key Issue/Concern: The cost of continued BAD ACTION (i.e., fossil fuel use… habitat conversion, etc.) remains too low.
- The reduction in species will bring about the loss of revenue for all Fish and Game department activities because it will lose its ability to draw in people to the activity.
- Key Issue: Develop a map of priority habitat areas for real estate acquisitions.
- Unknowing or apathetic public who don't take the implications of climate change seriously and don't take action.

- How to identify specific practical actions to address change when a specific outcome is uncertain.
- How are people going to react to or handle/deal with the loss of and change to the biological communities they identify with their home/state.

- Conservation agencies and organizations are not designed and organized to rapidly respond to environmental catastrophes (i.e., oil spill in Gulf/white nosed syndrome in buds) that will likely increase as climate warms.

Engagement, Involvement, Education of People

- Land use decisions are local, not regional. This is a problem when developing/ adopting plans.

- Need to pass federal land international climate legislation. Without it we don't have the sideboards in which to plan and execute mitigation strategies. By sideboards I mean maximum concentration of CO2, and when we hit the peak.

- Key Issue: Complacency of the general public regarding climate change. Effects on wildlife; challenges to convincing them it's REAL.

Open Discussion:

- Changing paradigms (see relevant post-it); legislation and policy = also funding – need slush fund to help people with other choices to avoid bad choices (make better decisions), support good decision with policy.

- Educating landowners and legislators policy makers (current use legislation helpful, could be more) – by foundation funding? – mitigate loss of small local parcels in addition to on habitat/landscape level.

- First and foremost – make sure everyone is educated on what we do and do not know so people are not on their own; regional (NE) perhaps in morning session, message – involve every agency and division and disseminate through all.

- Channels – the info we saw/heard in morning session needs to be available more broadly; takes 3 years to get a message delivered/absorbed/accepted; even with our agencies people don't believe climate change is issue.

- We all learned something new this morning.

- Succinct well put together and delivered – in a way we can adapt to an educational presentation.

- Understanding climate change and combating it on individual level vs adaptation and scaled up and down between.

- Education needs to include involvement and engagement of public not just scientists; everyone has experience to contribute.

- Assume public complacency; need public awareness campaign; reach people in different ways – what are most compelling signs of climate change to wildlife that people can see? (because people relate to wildlife) in their daily lives?

- Who is "them"? What do we want them to do?

- Always couched in negative "don'ts" – we need positive messages – what you will get if you do x; needs to be on variety of scales.

- Hard to do – point to specifics (it's a slow, gradual change) – because people observe weather not climate, their world, close focus.

- When you have that opening – connect it (their experience) to the science of the bigger picture, what's documented.

- Questions of junk research/junk science; public more confused than complacent; We don't know for sure what is happening/will happen; is current apparent trend truly all man-made? (reference mini-ice-age within past 200 years) – not prepared to give unbiased facts and figures.

- Whether we believe or not in climate change, aren't proposed actions a good thing? (such as healthier forests)

- Reality – climate change is still a debate – surveys suggest number of those who don't believe is decreasing.

- Concern at using climate change as the issue will make it a political football – focus on civic involvement, being good stewards.

- Habitable planet program – teaching professors to teach climate change; do ourselves a disservice if we don't claim the issue.

- Need education for right now and what will be happening. These are issues and actions we should be promoting/taking whether or not there is real climate change. Resources are finite.

- Overarching Issue - problem – thread

- Do we address just those things that impact wildlife and habitats or energy/economy, etc. ? Other aspects of conservation climate change impacts?

- Expend to realm of ecosystems/habitats begins to encompass human communities and brings in these other issues, because humans are embedded in landscape – we are part of ecosystems.

- What can we do to make a better community? Some choices can be guided by climate change issues. Some people like turtles, some are driven by economics.

- DES promoting E efficient and economics on a flyer – how to relate this to wildlife?

- For some, the DES message does resonate – how do you connect with others for whom it doesn't? Choose a species or 3 they can relate to – to make it personal.

- Need regional message that resonates with a wide audience to include what we do and don't know; be specific so people can see there is a change; and positive things to do to make their lives better and things better for wildlife.

- Need different messages for different audiences. Do not lead with climate change. Include good science.

- Understanding there are different levels of facts, detail, etc., relevant to difference audiences – most want it simple.

- People are really busy – need different places to engage.

- No consequences for what is going on though we have information scientists who largely agree on it; because of our lifetimes/spans we can't grasp an issue/change that exceeds it, that level of change.

- Think more broadly at knowledge we do have and convey to people in way they can grasp within their life spans and locales.

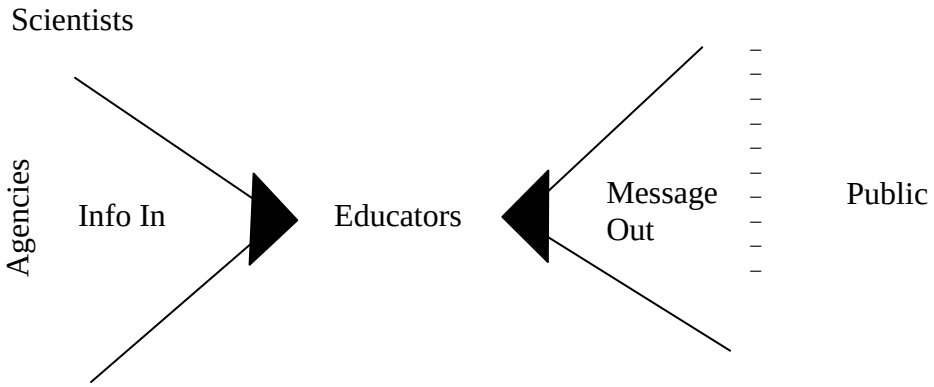
- Overlay of understanding wildlife/natural systems makes it more complex; need to build on this knowledge – more informed people – or we're just telling people what to do.

- We have seen improvements in wildlife populations, conservation success stories, contact with wildlife we never had before – people believe it's all hunky-dory, do not believe warnings about projected changes/loss; need to put climate change in perspective, go beyond bumper sticker mentality.

- Are birds and mammals the right indicators? They are what people see, but are not as affected.

- Average person not going to be convinced to change because of our message – our role to make sure wildlife professionals have best info to educate their constituents.

- Our agency role to bring back wildlife due to change humans caused (gross over-hunting and habitat loss) – with climate changes we will be perceived as failing because we cannot save all these species.



Other Summit Groups:

- Recommended actions won't stop, only slow global warming. Some actions create new problems (mercury in compact fluorescents).

- We have tools and know-how to get info/message out – ability to educate is there – need right info., scientifically backed, not just emotional or political.

- Re: Wildlife Action Plan – global warming could seriously impact habitats we work with regardless of lack of public knowledge – don't have specific science to show what impact will be.

- We want to protect habitats as best we can for resilience and adaptation. Need for everyone to be concerned, involved and help us.

- So many things beyond our control; our work focused on habitats.

- Conserve larger blocks of land where natural processes can take place and animals can adapt – can have consistent action message without pointing to climate change.

- CORE MESSAGE – Preserving and enhancing habitat

- These are the things to protect to allow life processes to change, things to grow and maintain.

- Our job is not to suggest solutions – working group will address.
- So many things beyond our control; our work focused on habitats.
- Conserve larger blocks of land where natural processes can take place and animals can adapt – can have consistent action message without pointing to climate change.
- Make connections to/with other groups in the state also addressing climate change, natural resources education, etc; fit our role in within those – shared outreach.
- Wildlife incredibly touching and moving subject for people – real opportunity to bring the message to people via wildlife (polar bears on ice flows; oil soaked pelicans, tick covered moose); can change behaviors.
- Impact – wildlife and habitat
- Driver – A changing climate which is affecting the above
- As climate changes, habitats and wildlife are potentially shifting.
- All people make decisions that directly and indirectly affect wildlife and habitats – in all their roles (landowners, voter, consumers, etc.).
- Because things are changing, we all need info (compelling, accurate, useful, current) to make informed decisions.
- Poster child – moose/tick example – possible NH example

Who at the table?

- Public Affairs, NHFG – DES
- NHFG non-game
- Carbon Coalition
- NH Environmental Educators
- Weather monitors at UNH – Earth Oceans & Space
- Land Trusts
- Cooperative Extension
- Foresters
- Center for whole communities – retreat group (see Beth McGuinn)
- Wildlife Orgs
    - Grouse Society
    - Ducks Unlimited
    - Turkey Federation

- Etc.

Issue Statement:

As climate changes, habitats and wildlife are potentially shifting, all people – in all their roles (landowners, voter, consumer, etc) make decisions that directly and indirectly affect wildlife. We (all) need compelling, useful, current information to make informed decisions.

Possible NH example (poster child) – moose/ticks

Breakout Group 3
Sea Rise and Aquatic

Facilitator: Michele Gagne (UNH Cooperative Extension)
Recorder: Nicholas Salerno (Grad Student Intern with UNH Cooperative Extension)
Participants: Ethan Nedeau, Matthew Carpenter, Sandi Mattfeldt, Rob Calvert, Sam Demeritt, Emily Brunkhurst, Glenn Normandeau

Sticky Notes:

- Relate sea level change (and impacts on coastal habitats and wildlife) to current land acquisition prioritization
- Key Issue or Concern – Sea level increases
- The affect of sea level rise on the seacoast of NH
- Additional thermal stress to aquatic ecosystems due to poorly designed storm water management
- Climate change will exacerbate the adverse ecological effects of past and future human disturbance on stream corridors/aquatic ecosystem health.

Issues:

- Species ….. based on rising sea level – nesting
- Managing storm water
- How we can design built environment
- Quality and quantity of water
- Fragmentation of aquatic habitat
- Hydroperiod of wetlands
- Changing of vegetation type
- Loss of shade trees
- Changing in the times of spring flooding and ice melt
- Human response to climate change that causes future problems

- Proactively keeping current environment, e.g., wetlands
- Ground water recharge/protection
- Identifying natural flood storage area
- Rapid changes in where streams bed course flow
- Undoing the structural controls (dams, burns, undersized, rip rap)
- Prioritizing the structures
- Loss of dunes, salt marshes—takes a long time to be built for essential coastal islands
- Lack of room for salt marsh migration
- Invasive species

Issue Statement:

Climate change will affect
- Hydrologic regime
- Water quality
- Physical habitat

These in turn will affect plant and wildlife communities. Human infrastructure (built environment) exacerbates these problems. Rethinking our approach to development to integrate future needs of aquatic ecosystems will alleviate some of these problems related to climate change. These sound practices help protect ecosystems and wildlife from existing threats.

Note: consider whether sea level rise and aquatic ecosystems should be combined or two separate groups

<u>Existing Groups</u>

- Stream crossing guidelines group:
  1. Expand Oyster River culvert assessment model;
  2. Develop standardized methodology for road stream crossings assessment;
  3. Expand outside NH.

- River Restoration Task Force – currently working on dam removals. Future goal: provide more resources, e.g., staff

- Coastal Adaptation Group (coordinate with existing)

Add/Develop Groups or Expertise

- Wetland effects
- Reach out to municipalities and DOT
- Coastal wildlife/islands
- Talk with neighboring states
- RPC's
- DES; wetlands; alteration of terrain watershed; rivers; GS

Actions Needed:

1. Form sub-groups/identify topics; i.e., stream crossing, dams, coastal, stormwater
2. Bring in other expertise
3. Sub-groups research their issues and make recommendations
4. Whole group develops objectives and actions – assessing species and habitat vulnerability; prioritizing

Breakout Group 4
Habitat Loss and Extinction

Facilitator: Andy Fast (UNH Cooperative Extension)
Recorder: Lindsay Webb (NH Fish & Game)
Participants: Mike Marchand, Brendan Clifford, Paul Nickerson, Ed Boyle, Dan Dockham, Beth McGuinn, Don Kent, Ken Kimball, Roger Simmons, Kim Tuttle, Andy Whitman, J.T. Horn, Steve Weber, Charlie Bridges

Sticky Notes:

- What one key issue/concern regarding how climate change would impact wildlife or habitat?
- Conservation easements have purposes that describe important habitats, typically. How satisfactory are legal requirements re: easement.? What's the status today and is there flexibility for new habitats in the future? What future habitat is no longer "high-value"?
- Loss of species diversity, resulting in less stability and therefore large fluctuations in undesirable effects (e.g. insect pests, disease outbreaks, habitat loss, etc.)
- What is one key issue or concern with regard to climate change/wildlife or habitat?
- Ability of non-native invasive species to out-compete native species. Need identification, mapping and control strategies to deal with nni species.
- When to give up on an area overrun with invasive?
- Connectivity of critical habitat
- Concern: Highest (alpine) and Lowest (coastal) elevation. Habitat loss,
- Species extinctions at the local/regional level

Issues:

- Increased warming eliminating many of our current cover types and dependent species.
- How the assemblage of plants and animals is expected to change in major ecosystem community types.

- Increase in (prevalence and diversity of) invasive plant species, change to/of native plant communities and subsequent impact on native wildlife habitats (loss of native foods, changes in hydrology, etc.).

- The impact of evolving alternative energy sources (biomass, co-ind power, hydro) to further stress or reduce the resilience of habitats that currently are least influenced by other human activities.

- Extinction

- Key issue or concern re: climate change affecting wildlife/habitat

- Increase in insects such as ticks, mosquitoes; leading to more cases of Lyme disease, EEE, etc.

- How climate change could impact wildlife or habitat.

- Loss of species because of climate change when “habitat” for that species was specifically protected.

- Species extinction due to loss or change in habitat.

- Facilitating wildlife movement across the landscape.

- Reduction in wildlife species diversity distribution and abundance.

- Loss of current habitat types in NH to a shift in habitats and wildlife currently found in the south.

- Habitat conversion – change from one community type to another (includes aquatic species).

- The future of both wildlife and its habitat.

- Increase risk to diseases that are unplanned for.

- Key concern: loss or large decline in habitat for common (not-species of greatest conservation concern) species (e.g., s4 and s5 species).

- Reduction or disappearance of rare habitats.

- Shifting of plant and habitat distributions.

- What is the one key issue or concern with regard to climate change and wildlife and habitats
    - Easements and legal requirements (habitats)

- Loss of species (# of species and abundance) diversity/extinction/extirpation.
- Increase vulnerability to invasives, disease, pests (wildlife and human).
- Connectivity of critical habitats in facilitating movement
- Habitat loss (types and amount)
- Functional suitability of habitat (habitat value)
- Uncertainty of future community assemblages
- Access to scientific data
- Changes in hydrology
- Loss of native foods
- Impact of alternative energy (negative)
- Changes in flora and fauna
- Recognition of policy implications
- Elevate the WAP in state planning and policy

Overarching Issues:

- Direct and indirect threats
- Impacts
- Management issues
- Time scale (WAP – present day); how fast will climate change come? How far out do we plan?
- WAP as a guide for managing for uncertainty (state climate plan)
- Products – maps easily accessible and interpreted habitat and conservation focus areas
- WAP needs to link in with state climate/adaptation plan
- Scale – micro habitats vs. macro habitats regional groups of species or individual species

Assumptions

- Low emissions profile – high emissions 2025 – 2050

Issue Statement

Human dominance of the land and climate has greatly reduced natural habitat and species diversity. NH has a strong SWAP that identifies many critical areas. The SWAP needs to have legal recognition as important criteria in NH's climate action plan to protect ecosystems for their important climate adaptation role.

Issue:

Changing climate could by increasing CO2 emissions worldwide will affect species diversity and habitat suitability in NH. The WAP must recognize and plan for these effects to protect species resiliency and habitat on a landscape scale.

Issue Statement:

Habitat and species protection models and mapping is needed to focus funding and resource allocation decisions to ensure that New Hampshire invests wisely in conservation strategies that cope with climate change.

Society faces dramatic change in habitat and species diversity because of climate change. The potential consequences of climate change include shift in habitat and wildlife ranges. This in turn results in shifts in economic drivers, such as travel and tourism, forest products, and recreation.

Actions Needed:

Charter:

- Develop key issues – refine issue statements; refine issues
- Describe impacts
- Identify strategies to address impacts

Work Groups (Different Charter for each)

- Technical Groups
- Policy
- Communication

Working groups inform WAP and State Climate Adaptation Plan

- Using current use model, created added (financial) incentive to encourage long-term ownership (20 years) higher penalty for leaving current use

Breakout Group 5
Phenology

Facilitator: Judy Stokes (NH Fish & Game)
Recorder: Judy Silverberg (NH Fish & Game)
Participants: Steve Fuller, Mark Ellingwood, Eric Orff, Cathy Goodmen, Pete Bowman, Pam Hunt, Chris Hilke

Sticky Notes:

- Plant phenology will change impacting tree survival and fruit production
- How do we address phonological mis-matches?
- Being able to monitor for this potential change throughout the state.
- Change in seasonal lengths – e.g. earlier spring, promotes earlier plant growth and doesn't coincide with the feeding cycle of the animals eating that food (disconnect between plant & animal cycles)
- Conserving cold tolerant plant and wildlife species on habitats as best possible and publicly accepted and supported.
- Timing of various life stages of plants and animals in relation to seasons.

Issues:

- Lack of fruit production, (i.e., apples/high bush cranberry)
- Wide early fluctuations are deadly to a wide variety of plants and insects
- Early spring blooms timing with pollinators food supply for insects
- Insect emergence not lining up with key peaks of migratory birds
- Most of lupine flowers affected by frost so not producing seeds not just season affect.
- Frosts when trees were sending out of leaves (i.e., oak trees, horn beam, pepper bush)
    - May affect acorns for two years
    - Killed new leaves
    - May be high mortality of plants within a short period of time

- Potential discord between shed timing of big mammals
- Warm weather could cause expansion of bear population – problems
- Winter tick caused mortality of moose
- Longer growing seasons facilitating invasive species occurring, i.e., wooly adelgid
- Longer growing season affecting above and below ground interactions i.e., soil bacteria which could affect plant production.
- Peat lowlands – warmer weather will cause peat soils to decompose faster – so may change wetland type
- Vernal pools this year have dried up more quickly with shortened time with water presence.
- Peak nutritional quality of plant can affect productivity of larger herbivore population.
- Changes in time of leaf out affecting ground cover communities
- Thank God we are not VT
- Extra generations (broods) for many species
- Disease vector cycles shifting effecting both wildlife and humans, i.e., allergies
- Lake eutrophication/turnover time.
- Ski later, golf earlier…. Effect of those management on wildlife
- Less hunting opportunity because of shift in season, i.e., turkey hunting
- Management perspective may change
- Ability of turkey to change nesting habitats may be less plastic then environmental change
- Spring melt and stream condition, i.e., bass nesting – timing
- Length of snow-cover and affect on species i.e., show-shoe have weasels increased predation?
- Can natural selection keep up with environmental changes?

- Soft selection will have a lesser effect. Hard selection will kill off more.
- Some species will benefit, i.e., insect availability
- Deer will survive – with milder winter, deer yards will be devalued.
- No ice – some businesses can't survive – spring floods
- Sporting goods store, snow-machine dealers, human impacts
- Growing different crops – less use of heating oil
- # of species will benefit in human population
- Disruption of relationship between species
- Unknown Interactions
- Mgt., issues for disruptions such as monitoring, acquisition

Key Elements:

- Change in seasonality and weather
- Timing of snow/ice melt
- Timing of plant/animal life cycles, length of growing season
- Variability and intensity of temp and precipitation
- Sudden change

Issue Statement:

Changes in timing and intensity of meteorological events alter interaction among plants and animals resulting in enhanced or compromised reproduction and survival and affect the value of these resources to society.

Fish, wildlife their habitats and life cycles interrupted by changes in phenology.

Next Steps:

<u>Economically – WHO</u>

- Affecting economics of the state

- Changes in timing of meteorological events alter interaction among plants and animals, resulting in enhanced or compromised reproduction and survival and affecting value of these resources.

- Niche

WHAT

- Working Group – Charter

  -Relocate the issue statement to the wildlife action plan
  -Take the possible meteorological scenarios and assess responses of species to identify vulnerability of species
  -Knowing phenology is changing which species are likely to fill in the niche

- What is the capacity through management to affect the impacts of phenology – metrics that we now have in WAP that we can use to take action at a higher levels – so public will act.

- Need to educate

- If we can ID doomed species take them to zoos and to big outreach actions so public will act to preserve/prevent others.

- Support basic ecological concept education to classrooms…..get students involved with collecting phonological data; monitoring system……show actual change – documenting change and magnitude

- To see if we can investigate and see if feasible – anything we can do about it.

- Have to quantify in order to educate and compel political action and identify potential management actions, i.e., if you know water temp is problematic in trout stream could create shade.

HOW

- Have to monitor and have long term data. Need to drop other things to monitor.

- Organize information so can ID cause/effect

- Compiling existing data

- Monitoring may need to shift to time of various events: courtship, reproduction.

- What is state of phenology in a particular area covering a whole suite of things – ecological services.

WHY

- Quantify the problem in order to educate and compel management and political action

- How:
  -Monitor
  -Compiling data
  -Educate.

Who needs to be at the table:

Phenologists

Foresters
Botanists
Population ecologists
Mammalogists
Ornithologists
Ichthyologist
Agricultural
Horticulturist
Meteorologists/climatologists

Administrators

Land Manager
Recorders
Facilitators
Biometricians
Educators
Cons. Historians
Funders
Communicator

Next Steps:

- Connect to other working groups

- Set a meeting date

- Identify who players are by name that should be on this working group

- Come to a meeting with suggestions about what kinds of things could be done
- Check to see what others have done – don’t reinvent wheels
- Compile data sources
- Steering committee that is updating WAP should convene the first meeting
- Working Group Charter
- Relate the issue statement to the wildlife action plan.
- Vulnerability assessment
- Developing appropriate strategies

Final Activity – Common Themes

- Piggy backing on other work already done.
- Including broad base of partners
- Taking a regional approach
- Great deal of uncertainty of ability to impact problems
- Need to coordinate with state climate change collaborative
- Need for more data
- Need to compel political change
- Time Scale – short or long – term
- Ability to react quickly as things change (fluid method)
- Missing today: mitigating impact