

4 November 2009 Land Use Group Notes:

Breakout group one:

Introductions.

S.H. How do we incorporate wildlife data into planning, ie subdivision developments? Need for scientific info to base decisions, on range of species

B.W. Landowner mitigations – behavior of people is important, i.e. how to live with bears. Turnover of owners, effect on education, behavior mitigation.

D.F. Habitat alteration, fragmentation, human disturbances all are impacts--
What does alteration mean, need to be specific

C.L. Wildlife migration corridors are important, but what are the problems? What does it mean for bison?

Is there an impact, what is it, what science do we need to make decision. Horse Butte example. Cluster houses, or spread them out—which has more impact on migration?

B.W. what is desired state? Base layer? pre 1870? Do we need to identify what the base is ?

A.H. Elk and mule deer changing use of landscape, based on irrigation (ag and houses) habituated wild life—elk expanding on private land, disease transmission etc. more elk, not fewer. How important are subtle changes? Not always an extinction problem.

TH—Hunting impacts on wildlife age/sex structure, and effect on diseases, not always a problem of overabundance. Rocky mtn decreasing, due to boundary harvest. Hunting is a big hammer, with huge effect and somewhat driven by what public/ land owners desire.

JG two types of change :

Subdivision, conversion from traditional agriculture to amenity based communities—
hunting access effected, conservation ranches.

SH conservation ranches, still may desire hunting to reduce damage, may cycle around. Good collaborative working group in Madison valley. Contrast to lack of collaboration in Paradise valley. Expansion of bears, wolves to carnivores, don't want to create land use patterns that limits expansion of key species.

CL what are these patterns that limit?

TH conflicts that lead to being shot are major limiters.

TH what is feedback to damage control/hunting—how does landuse change feed back to regulation. Land use effects who shows up at meetings to set hunting regulations, can have big wildlife effects.

CL importance of social science .

JG haven't looked at history to look at how management has changed/ been effective, with changing land use patterns

CL Development effects are species specific—pronghorn and bison are impacted differently by fences.

JG public satisfaction important, but what public?

RR do we need to go about this from a different direction?– what information does the county commissioner need to make development decisions?

TH This is still poorly understood science. Basic science V needs of policy makers.

TH Not just ecological changes: social , economic, effects.

RR what is tipping point? How big will Bozeman get?

CL what are limits, how much buffer do we need around park?

RC water is limiting factor. Closed basin may not have any more water rights. This may be tipping point.

Social changes poorly understood

SH economics as a driver of land use. Economics drive what people do.

CL Economics of wildlife watching compared to hunting fishing etc. What land use is tied to effects on the ecology of wildlife?

RC What are the impacts of landuse on policy? Limiting homesites does not necessary limit value of land. Less is more.

BM Are we assuming that a healthy ecosystem is desired state? Assume that a healthy ecosystem is a big economic driver? How do we define limits of impacts? Do 30 ATVs on a ridge in the Gallatin impact Yellowstone?

JG desired state, for whom?

RR how much can you degrade the environment before it becomes a repellent rather than an attractant?

TH Need to distinguish between the effect of houses/structures versus the effect of people and their attitudes/behaviors.

How many social and economic questions should we be asking in this context.

Why do some places grow and some do not?

TH this is not just a natural system problem.

CL ecology is being impacted, what is impacting?—mostly human changes and factors

RR social and economics are the drivers of landscape change in the GYA—

Should social changes be listed in the header with ecological changes?

(Social change added to table header)

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Land Use Change Breakout 2:

CL- How to define management challenges?
(some confusion about the question in the third column header)

TH land use change effects who show up at public meeting and sets targets, also effect implementation—access, how many people are hunting? What is effect on wildlife? How do different settlement patterns effect hunting and how does hunting in these landscape impact wildlife demographics

DF What standards help set desired conditions ?

Need to specify uncertainties—what is model accuracy? Model not based on facts is just a fancy opinion. Managers need to know the limits of the information they are given.

In questions after presentation:

need to account for CO₂ storage, injection.

Can we sell people on development patterns that reduce their own exposure to uncertainties like water supply, etc?

Look at patterns of inhabitation—may actually be beneficial.

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Land Use Change,
Break out 3.
Setting priorities:

CL What is critical to managers? Need and want, not merely useful.
JG how do you decided what is critical?

CL Lots of science is available – need to have dialogue at front end. What kinds of data is critically needed by managers. Collect data mangers need, not just look to apply existing data.

AH how do you determine priorities? What are most important aspects of the system? from Yellowstone perspective? from FWP perspective? From county commissioner perspective?

Data sets need to have multiple uses and be relevant to what can be effected – Climate change won't impact immediate decisions and much as invasive species.

TH How do we avoid a fragmented research agenda? This is an opportunity to make important progress on a very important science question: how do natural and human systems interact?

Yellowstone has values for more than just wilderness. Can make basic science progress on the human natural system interactions.

Questions such as?
RR tools to describe extractive economy exist, but theses describe a shrinking piece of the pie. Tools don't exist for other types of development.

Climate change is also a huge gap—how it effects interaction between people and natural systems, and how people live on the landscape.

AH- ecosystem is the response variable—what are the most vital parts of ecosystem at risk? What are the feedbacks that influence management and impacts on ecosystem. Ecosystem protection is end point, but requires understanding of human system.

TH Importance of hydrology – showcases linked impacts.

AH what are the changes? Has the system eroded in the face of this population growth? Weeds as effect of historic horse use in the park. As population doubles again what are the highest priority aspects of the system? What has been degraded? What will degrade? Example of white bark pine. What things are just aesthetic and which are really important—some weeds are critical, some not so bad.

BM What are we trying to protect, and what is the baseline? Need to have a goal. Refine goal of “do good things” to what is a healthy elk herd.... Not just subdivisions. Are we assuming that pop doubling is OK?

Need mission statement and objectives.

JG definition of objectives is a big source of conflict between agencies – different agencies support different publics from local to national, and these publics have different objectives.

AH Need prioritized objectives that cut across agencies.

White bark pine – may effect all

Abundant huntable game – may primarily be a goal of the Montana FWP

What is the information we all need to have?

TH goal is healthy ecosystems characterized by ecological processes operating within range of natural variability. Yellowstone is different because most processes are operating with in natural range—some can be maintained, some can not – Fire and climate change.

Processes of importance to all agencies :

Biodiversity :

Movement of wildlife

Predator prey relationships

Keystone species

Processes

Hydrology

Fire

Pests/ disease

Thermal features

Nutrient cycling dynamics

Air quality

Maintenance of evolutionary processes

AH biological diversity based versus process based thinking(Reed Noss)

Fire regime itself is not as critical as the services it provides.

AH (research goal) **Ecological objectives need to be set and prioritized. What are we managing for?**

SH Is setting priorities a management function or a research function?

BM Idaho falls and snowmobiles—start with organic act and go from there

Research

AH With fire, system can be manipulated to achieve desired seral stages. Flooding requires keeping houses out of flood plain—keep houses out, don't manipulate river. Maintaining range of natural processes may require different tools.

Priority setting

1) Does research question meet immediate need of managers?

2) Does question enhance understanding of impacts of land use change of the operation of key natural processes?

3) Does it provide better understanding of basic principals of interactions of human and natural systems?

What about surprises?

AH Who is setting agenda across entire system? GYA wide objectives and priorities—

SH GYCC group may need to work here.

RC what impact of last doubling of population? Is there data on this impact on ecological processes?

CL risky to set wide priorities – different denominators. Ecological objective with integrity are hard.

AH need to integrate even outside GYCC, cities, states, tribes

Research priorities and approaches to address these science questions:

How can development be managed to minimize impacts on natural process?

What is natural range of variability for natural processes?

Wildland urban interface question:

What will be the fire regime under different climate change scenarios? Under development scenarios? Invasive species scenarios?)

How will wildland urban interface(WUI) change based on climate change? Development patterns?

| Key changes: Ecological changes, Social Changes | Key science questions that address the expected management challenges resulting from these changes. | Criteria needed to identify science priorities for land use change | Research priorities and approaches to address these science questions | |
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| 1 | <p>Habitat alteration:</p> <p>A) Exurban development B) Amenity ownership. C) Energy Development D) Logging, grazing, mining (other extractive) E) Clean energy infrastructure</p> | <p>What kinds of development and activities limit wildlife expansion/migration? These need to be species specific. Bison v antelope How do you measure trade offs between species effects?</p> <p>What criteria are key factors determining the effects of development type, density, design distribution? What information is needed to set guidelines ? What impacts (migration, distribution) are developments having on ecology/on different species including invaders? (with or without planning).</p> <p>How do you design development to have the least impact? How do you approach this question? How does development policy effect ability to manage wildlife effectively (hunting opportunity harvest, wildlife damage/conflict)</p> <p>How do you determine the effects of existing subdivision designs? Do we have enough information on pre development conditions?Use projections on areas likely to be developed to get better pre-development data.</p> <p>What policies are effective in bringing development into cities? (increasing high density development)</p> <p>What is role of conservation easements? Do they attract development around the edges?</p> <p>How do changes from extractive(inc mining, agriculture, grazing, logging) uses to settlement influence the operation of ecological processes: – nutrient process, community changes. (key dynamic, and actually testable)</p> | <p>1)Does research question meet immediate need of managers?</p> <p>2)Does question enhance understanding of impacts of land use change of the operation of key natural processes?</p> <p>3)Does research question provide better understanding of basic principals of interactions between human and natural systems?</p> <p>4) Can the research question help a manger deal with surprises?</p> | <p>How can development be managed to minimize impacts on natural process?</p> |

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| 2 | Changes in land cover impermeable surfaces, etc | How do these shape ecological processes? | (is this covered by 2/3? anticipate uncertainty) | |
| | Peoples attitudes/ behaviors | <p>How do you measure what people want?</p> <p>Opportunity cost of wildlife biologists managing human wildlife conflict/ education.</p> <p>Changes in people attitudes. impact political/management process.</p> <p>Human behaviors (ie bear proofing) have big effects on impact level/type. How do we increase desired behaviors?</p> <p>What are peoples attitudes about where they live? How does this effect impact? How do they resolve their own disproportional impacts?</p> <p>How are peoples attitudes toward wildlife effected by land use change? Need real scientific data on these values – on a local scale.</p> | 5) Cost benefit (Cost, Timeliness, Legal factors: Legal requirements to act.) | |
| | <p>Hunting: A) Change in harvest around park boundary.</p> <p>B)Changes in attitudes toward hunting. Hunter participation.</p> | <p>A) What are effects of boundary harvest on population demography diseases transmission, migration patterns. (large mammals)</p> <p>What is the interaction between objectives/ hunter participation and effects in parks?</p> | | |
| | How much degradation before the perceived use changes ? | At what point does landscape become a repellent? What are the attractants | | |
| 4 | Population change. | Are there any limits to growth? | | |
| 5 | Creation of fast growing small cities. 50-10,000 people. | | | |
| 6 | Invasive Species: | <p>What patterns lead to better management practices ?</p> <p>What patterns are particularly prone to invasive species</p> | | |

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| | | establishment? (20 acre lots?) | | |
| 7 | Effect of economics | Effect on demographic/ economic trends. i.e. energy costs. Will market drive development back into cities? How is human dispersal effected by economic factors ? How do land use policy effect private land values? | | |
| 8 | What is the desired state of GYA? Who defines it? | For what communities? | | |
| 10 | Impact on thermal features? | How much impact can thermal features take— What is connectivity between features? What are cumulative impacts? Size of impact area? What is extant of ground water vulnerabilitiy in the GYA . What are impacts on hydro resources. What are effect of ground water development outside the park on the park? | | |
| 11 | Impacts on water resources. A)Quantity and quality. B)Water availability for Domestic, ag, and stream flow. C) Dams: effect on riparian veg, flooding, dam removal. | What are the impacts up and down stream. Impacts on ground water? (group feels it is lacking a hydrologist who may be able to help here) | | |
| 12 | Stream dynamic fish passages, e | | | |
| 13 | Reductions to riparian habitats. Conversion or alteration. | There is good scientific literature here. | | |
| 14 | Air quality-vehicle emissions- Inversions. Global warming impacts. Ozone issue: from a distance(larger than | What are effects of varying development patterns on auto emissions? Particulates? | | |

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| | regional) | | | |
| 16 | Transportation: Wildlife automobile interaction | What is effect of paving roads on development patterns? (What is impact of exurban sprawl v concentrated development on taxpayers?) | | |
| 17 | Changes in backcountry recreation. Changes in rates, types: Dogs, ATV, Car, Bike snowmobiles | How do changes in backcountry rec effect distribution and abundance of wildlife? Plant communities? | | |
| 19 | Predator prey changes— Introduction of new (human associated) predators, changes in dynamics | | | |
| | Interference in natural processes :wildfire, flooding- wildland urban interface, Habituation of wildlife. | | | |
| 20 | Lack of social tolerance for large scale change—ie fire, flooding | What happens when these changes do not occur? What are ecological consequences of not allowing large disturbances? We don't know what we don't know | | |
| 21 | Fragmentation effects: A) on migrations. B) Genetic isolation | What kinds of fence are most appropriate? What kinds of development can be undone – effects of fish barriers? Need for the assimilation of data for managers. What are simple ways to mitigate effects of development? | | |
| 22 | Climate change | Impacts on recreation- ski area lead to airport expansion leads to population expansion. How will people be effected by climate change? What is cost of inaction to the people of the GYA? | | |
| | Fire: Frequency, wildland urban interface, impact on | What is cost to agencies to protect homes? What will be/ is the effect of climate change? What is opportunity cost to agency of fire fighting? | | |

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| | budgets | | | |
| 23 | Change in species community composition —shift to human related species | Need for studies like the cowbird/warbler example. Concrete examples of effects. | | |

Breakout session 1

Breakout session 2

Breakout session 3