

Adaptive Management

Spring 1997

Newsletter

No. You Didn't Miss It.

You didn't miss the Winter issue. It's just that Spring better reflects the timing of this issue.

We hope to establish a regular schedule, with the third issue out June 1.

— Brenda Taylor, Editor

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Questions and Comments

The first issue of this newsletter included the working definition of adaptive management being used in the BC Forest Service (BCFS). Several readers had questions or comments. One of those comments and our thoughts are noted below; other comments will be addressed in future issues of the newsletter.

Q

How is an adaptive management study different from a typical field experiment conducted by the BCFS? If AM studies are just experiments, why use the fancy term? Experiments are conducted to gather information - so haven't we been doing AM studies all these years? This is a question I am often asked.

— V. Sit (Biometrician, Research Branch, BCFS)

A

The "fancy term" implies more than simply the use of experiments to gather information. It implies that managers recognize that in a complex, dynamic system, the outcomes of management interventions are uncertain, that information is a valuable product of management, and that improving forest

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Project Update

Management of Heavily-used Recreation Sites in the Merritt Forest District

In the first issue of the newsletter we included a brief description of the first pilot project specifically undertaken by the BCFS to demonstrate adaptive management. An update of this project is provided below.

Brian Nyberg, manager of the BCFS adaptive management initiative, says "the Merritt recreation project was a pleasant surprise, especially in a year when demands of implementing the new Forest

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Questions and Comments (continued from page 1)

management is an on-going process. Management experiments are tools that can contribute to effective learning, but they themselves are not adaptive management.

We point to three specific distinctions between “adaptive management studies” and the “field experiments” that are part of applied research.

1. Management experiments (sometimes called operational trials) are only one element of adaptive management - the other elements (e.g., assessing the problem from a systems perspective, adjusting practices and policies) are equally important. So, while the Forest Service may have been doing field experiments all along, we haven't necessarily been doing adaptive management.

2. Adaptive management projects are led by managers, or at least feature a close partnership between managers and researchers; whereas typical scientific field experiments are conceived and supervised by researchers. Thus, in adaptive management, managers are active participants in learning and are committed to using the results from trials to improve management, rather than passive recipients of information gained by others.

3. In adaptive management, treatments typically are tested at operational scales, in operational settings. This is in contrast to the smaller areas, more controlled experimental

settings, and more intensive measurements that characterise field experiments. Often the trade-off for increased applicability of results is some loss in experimental rigour.

Operational trials that are part of adaptive management should provide better information than small-scale field trials about the cumulative impacts of a suite of actions applied over a large scale.

“Trial and error,” adaptive management and applied research form a continuum of approaches to learning. As with any continuum, there are no distinct, universally-recognized boundaries that can be used to say “*this* is adaptive management and *that* is a field experiment”. It is easy to classify projects on the extremes of the continuum as either “adaptive management” or “research”, but it becomes increasingly difficult as you move closer to the point where the two merge. While it is useful to understand how they differ, attempts to pigeon-hole every project as either “adaptive management” or “field experiment” are futile and unproductive.

A final word: some managers have been applying elements of adaptive management already, but we can always do more, and do it better.

The goals of the BCFS are:

- to encourage *more* managers to apply adaptive management, so that it becomes the common way of managing forests on Crown land;

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The questions facing managers cannot be fully answered by small scale research trials.

“Individual treatments may have been found to be workable within experimental plots, but remain untested in an operational setting.”

— Kessler et al, 1992

Example

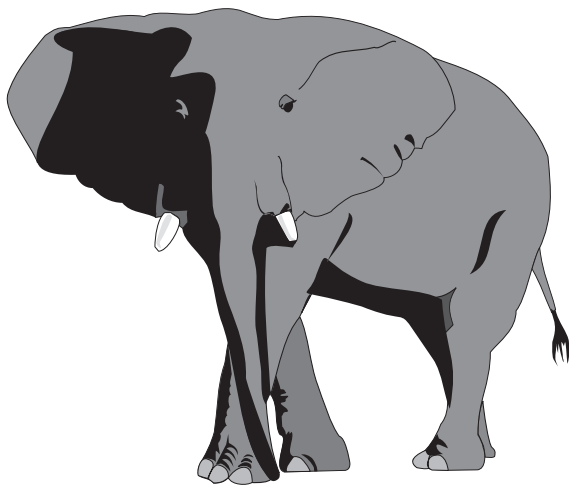
In a typical silvicultural systems field trial, treatments might be applied at a single study site, to 10 ha blocks. Researchers might make detailed measurements to better understand processes such as the relationship between microclimate and lichen growth. This would help in predicting impacts of forest harvesting on caribou (which forage on lichens) and developing prescriptions to minimise such impacts. However, some questions would inevitably remain about the applicability of such results at an operational scale. For example, a small scale (10-100 ha) trial would provide no information about the effects of increased road density or reduced lichen supply on a herd of caribou which uses thousands of hectares during any season. These impacts can only be evaluated by applying treatments over a much greater area, such as large proportions of several watersheds. Similar concerns apply to other values, such as hydrology and visual quality, that are best evaluated at large scales.

- to encourage managers to apply *all six* steps of adaptive management that are essential for effective learning (problem assessment, project design, implementation, monitoring, evaluation and adjustment);
- to encourage the application of adaptive management to a *wider range* of management issues;
- to encourage and support more operational trials that investigate *cumulative, emergent, and large-scale* impacts of management actions.

Any other views on the difference between adaptive management studies and field experiments?

We welcome your responses, explanations or questions about this or any other issue in adaptive management.

We would like to thank those who contributed their comments, more of which will be included in the next issue of this newsletter. "Adaptive management" is a deceptively simple term for an approach that encompasses numerous principles and that can be challenging to implement. It is a bit like the proverbial elephant described by the blind men: how you describe it depends on which part you grab hold of (and your previous experience affects how you describe even that part). Short definitions inevitably miss something, but hopefully are adequate for people to understand what you are talking about. Your comments and discussion will help all of us see the "whole elephant."



Kicking Down the Barriers

Given that adaptive management promises substantial benefits and has been around for over 20 years, why isn't it more widely practiced? There are a number of barriers, some institutional (e.g., regulations that make it difficult for people to try new things); some economic (e.g., cost of monitoring) and some technical (e.g., finding controls for large geographic areas). In each issue of this newsletter we will highlight a potential barrier that people practicing adaptive management might face, and suggest some potential solutions. We would also like to hear your ideas and experiences about how to "kick down the barriers".

Barrier #1: The Forest Practices Code

We have frequently been told that the Forest Practices Code, by its very nature, may impede adaptive management. Among the reasons offered are these:

- the Code's regulations and guidelines are too restrictive;
- the emphasis on compliance and enforcement may deter people from taking advantage of any flexibility that does exist;
- those developing plans and prescriptions may avoid doing anything "different" in order to avoid delays in getting plans and prescriptions approved; and
- managers may "play it safe" in order to reduce the risk of incurring the substantial penalties associated with non-compliance.

Solutions:

- 1** Recognize that the Code does allow flexibility in plans and prescriptions. The Code may emphasize compliance with

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regulations, but the Guidebooks that support the regulations explicitly recognize the need for flexibility and professional judgement in their application. The Preface to each guidebook states:

The information provided in each guidebook is to help users exercise their professional judgment in developing site-specific management strategies and prescriptions to accommodate resource management objectives. Some guidebook recommendations provide a range of options or outcomes considered acceptable under varying circumstances.

Where ranges are not specified, flexibility in the application of guidebook recommendations may be required to adequately achieve land use and resource management objectives specified in higher level plans. A recommended practice may also be modified when an alternative could provide better results for forest resource stewardship.

In addition, exceptions to even the legislated standards are possible through higher level plans (as defined in “Higher Level Plans - Policy and Procedures”, June 1996), which can promote the application of adaptive management at lower levels in the planning hierarchy.

The next issue, then, is how to take advantage of that flexibility without incurring penalties and delays.

2 Build trust and common understanding between those who develop and those who approve plans. The value of trust and communication is illustrated by a recent example involving an Silviculture Prescription (SP) for a strip shelterwood that included free growing standards that were longer than “normal”. By mutual agreement of the licensee and District staff, the SP included a clause that explicitly noted the uncertainty around regeneration delay, and stated that the standards in the SP could be changed upon joint Ministry/licensee review. The consultant responsible for writing the SP felt that involving agency staff early on, building trust between agency and licensee staff, and ensuring good communication were integral to gaining approval for this SP. Time spent early on in building trust can save time later by minimizing delays in approval.

3 Ensure that the rationale for the plan is well thought-out and explained. Not only will this build trust (since agency staff and stakeholders will recognize that you aren’t simply doing and “end-run” around the Code), but it

can lead to more constructive discussion of different prescriptions. Usually, disagreements over prescriptions arise from uncertainty and different assumptions about how the system will respond. Such disagreements are unlikely to be resolved by continued argument, but could be resolved by implementing a plan that will test assumptions. Resolving uncertainty about which assumption is correct can reduce future arguments over prescriptions.

4 Build common understanding of key issues, uncertainties, and possible solutions through the use of facilitated workshops. Workshop participants, who could include agency and licensee staff, specialists from various disciplines, and local stakeholders, are not expected to reach consensus on “the answer” or the “best” practice, but instead to reach consensus on a plan that will allow them to discover how to best meet objectives over the long term. The workshop process and its benefits are described by Holling (1978), Walters (1986), and Lee (1993). Private consulting expertise may be of great value to local project teams.

Impediments to adaptive management are more fundamental than the Code. They arise from individual attitudes, which in turn form and are formed by social and organizational culture. For example, as individuals and organisations, most of us are reluctant to make mistakes and uncomfortable with change; instead we seek stability and concrete answers. Concerns about the Forest Practices Code are only a manifestation of these more fundamental barriers. Holling and Meffe (1996) describe the “pathology” of such attempts to control ecosystems.

Update on USFS AM Areas

We received a number of corrections to the list of USFS AMA co-ordinators that was included in the first issue of this newsletter. We suggest that your best option for current information on AMAs and AMA co-ordinators is via the central AMA network home page:

<http://www.teleport.com/~amanet>.

The USFS co-ordinator for the AMA network is: Dr. Tim Tolle (503-326-5296); the BLM co-ordinator is Jerry Magee (503-952-6021).

Case Study

Many people we have talked with about adaptive management want real-life examples. In each issue of the newsletter we will summarise a case study that illustrates one or more key aspects of adaptive management. As much as possible we will select case studies dealing with forest management issues, but we will also use case studies from other areas of resource management that illustrate key aspects particularly well. We hope these case studies will both enlighten and challenge you.

Experimental management of an Australian multi-species fishery

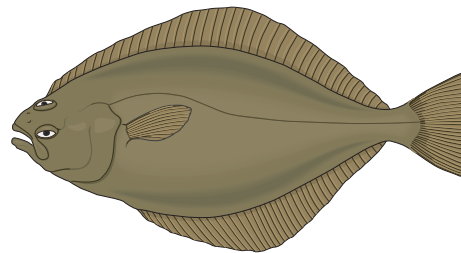
This case study of a multi-species fishery in Australia is one of the best examples of "active" adaptive management (i.e., testing several policy alternatives) and one of the few where results directed subsequent management decisions. It also illustrates the use of decision analysis to evaluate alternative strategies. The following summary of the project is structured to follow the six key steps we use to describe adaptive management.

1. Assess problem

Commercially undesirable changes in fish species composition were observed on the North West Shelf of Australia following the introduction of commercial trawl fishing in the 1970's. The populations (and catches) of commercially valuable species were declining, while the populations of less valuable fish were increasing. Managers faced uncertainty about the harvest method and intensity that would generate the highest economic return over the long term. Was it a) feasible and b) worthwhile to restore the historic species composition? If so, which management regime would be most effective?

Uncertainty about the best management regime arose from uncertainty about the reasons underlying the declines. There were four plausible hypotheses for the observed changes in species

composition: intra-specific competition, two different inter-specific mechanisms, one of which was influenced by harvesting, and trawl-induced changes in benthic (sea bottom) habitat that affect the commercially-valuable species. The first two hypotheses imply inherently low productivity, in which case the best management regime would be to keep catches low to rebuild stocks and prevent future declines. The other two hypotheses imply relatively high productivity under the right conditions, in which case the best management regime would be selective fishing or use of gear that would minimize habitat damage. More information was needed to discriminate between these hypotheses and identify the best long-term management regime. Implementing the "wrong" regime would limit the economic return from the fishery and could damage stocks further.



2. Design

A decision analysis framework was used to compare the expected economic value of a number of experimental designs and of maintaining the status quo (i.e., continued trawl fishing). The analysis indicated that maintaining the status quo would be "uninformative" - that is, it would not reduce uncertainty about the cause of the decline or the best long-term strategy. The analysis helped managers come up with the most informative and cost-effective design. The management area was divided into three zones. Two zones were closed to foreign trawl fishing, with the first closure initiated in 1985, and the second in 1987. The third zone remained open to foreign trawl fishing throughout the experiment, as a control.

3. Implement

The experimental strategy was implemented, although departures from the initial design oc-

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curred due to institutional and jurisdictional changes, an unanticipated, short-term drop in foreign trawling, and unexpected growth in domestic trawling. For example, no annual surveys were conducted between 1992 and 1994, and the contrast between treatments in trawl and no-trawl zones was less than anticipated.

4. Monitor

Abundance of small and large benthic organisms and was surveyed annually from 1986-1991. A modified plan calls for surveys every three years, beginning in 1995. A video camera mounted on the survey trawl net provided direct evidence that trawling damaged benthic habitat.

5. Evaluate

Data from the first 5 years of the experiment were used to update the probability placed on each hypothesis; results suggest that habitat modification, combined with interspecific competition, is the most likely cause of the declines. In addition, recovery of benthic habitat after trawling (and therefore fisheries recovery) is slower than previously assumed.

6. Adjust

The results of this management experiment suggest that a high value fishery is possible, provided it can be done in a way that minimizes habitat damage. Management actions under consideration include modified trawl gear and designation of no-trawl zones. Fishery assessment models have been updated and further research efforts are focussed on habitat modification. The adaptive approach to managing the fishery is continuing, albeit with some modifications in experimental design and monitoring.



Please let us know about any projects you are aware of or involved in that illustrate the concepts, tools, or steps in adaptive management. We would particularly like to know about proposals for adaptive management projects that have been submitted to Forest Renewal BC.

Project Update (continued from page 1)

Practices Code were stressing most field offices to the limit. In just a few months, the project team was able to design and carry out an experimental approach that generated some useful information for the Merritt district and the provincial recreation program. Even though it should really be looked on as a "pilot" study because the statistical design had some shortcomings, it was a success in several ways. I was especially pleased about the district staff's acceptance of the value of testing alternative management techniques experimentally; and the way headquarters and district staff worked together to make sure the treatments, monitoring and reporting were all carefully and thoroughly done."

This initial pilot project evaluated two alternatives (on-site campground hosts and enforcement patrols) for managing three heavily-used BCFS recreation sites in the Merritt Forest District. Results from 1996 suggest that:

- users are strongly opposed to having no supervision at recreation sites;
- site hosts are more effective than patrols in improving user satisfaction with management of specific problems, and in particular with control of ATVs;
- enforcement (e.g., police) authority may not be essential for effectively managing some high-use sites - user education and the presence of hosts may encourage an adequate level of compliance;
- the total costs of the two treatments were similar, although treatment costs will vary with the number of hosts and patrols used.

Local residents and ranchers supported the program. They appreciated being involved in developing management objectives, and identifying and exploring some concrete solutions.

A number of questions remain: Are problems displaced to other sites? Do site hosts remain effective when use is heavier than in 1996, or at sites dominated by rowdy users? The BCFS hopes to continue the evaluation in 1997, extending it to other interested Districts and to

more sites, and refining the study design. Because of reorganization in the BCFS, which has led to staff and funding reductions, it is still uncertain whether Districts will continue with active management of heavily-used sites in 1997. At the very least, if hosts or patrols are not used, staff can monitor impacts and user response to lack of supervision.

This pilot project provided valuable experience in how to do adaptive management. For example, we learned that it is critical that those analysing data be involved in the process from the beginning, so that they understand and can contribute their expertise to the study design. We also learned that despite flaws in the study design and absence of baseline data, it is nonetheless possible to gain useful information on some issues in a single summer season. Finally, the success of this project was in large part due to the personal commitment of those involved, particularly Graham Seefeldt, Recreation specialist in the Merritt Forest District, who led and implemented the project, and Ward Trotter, Recreation Planning and Practices Specialist in Victoria. The support of the Operations Managers, Jay Nichols, was also critical.

More details on this project are available in the project plan and a January 1997 progress report. Check them out on our Web site, or write us for copies.



"Active learning involves taking management actions deliberately designed to be informative. . . . Rather than just taking the management action that is expected to produce the greatest yield, active learning systems explicitly analyze the uncertainties and design management experiments to try to resolve them."

— Hilborn 1992

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New Internet Address

The Adaptive Management Homepage has moved to the BC Forest Service's new Forest Practices Branch:

www.for.gov.bc.ca/hfp/amhome/amhome.htm

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