PART 2: The Human Element

Increasing the effectiveness of conservation in British Columbia through the use of Extension

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ABSTRACT

British Columbia (B.C.) is Canada's most biologically diverse province where a multitude of resource-use activities occur and are managed under a results-based framework. While most conservation biology programming has focused on the biological aspects of conservation, it is equally important that time and effort is spent on the human aspects of the conservation, such as management practices. Increasing the effectiveness of conservation efforts depends on our ability to change specific human behaviours that negatively impact our environment. The discipline of extension is a form of non-formal education that focuses on extending the best available information to specific stakeholder groups to improve practices that impact the environment. It benefits the field of conservation biology by improving the dissemination of knowledge, reducing the time from research to application, and by providing short- and medium-term evidence of change in human systems that will provide evidence of progress towards long-term changes in condition.

Currently there is a lack of capacity for planning extension programs that effectively contribute to overarching biological goals. Bennetts' Hierarchy and the Logic Model are outcome-planning tools that can be used by conservation practitioners to plan successful extension programs. Bennett's Hierarchy introduces the levels of change in human systems that a conservation program can affect, how those changes relate to one another and how these human-focused changes link to long-term changes in biological condition. The Logic Model then provides a planning framework for integrating desired changes in human systems with desired changes in biological conditions. Using these two tools for planning a conservation program will enable those involved to monitor the specific contribution of these extension activities to overarching goals. By identifying relevant indicators and setting targets, the success of these education and outreach activities can be monitored and improved where required. An increased focus on integrating the desired changes in human behaviour with the overarching conservation goals through the use of effective extension programs is recommended.

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Introduction

British Columbia (B.C.) is Canada's most biologically diverse province. Due to its topography, climate and geographical location, B.C. has more ecodomains (climatic regions) than any other jurisdiction in North America except Mexico (Bailey 1986).It also leads all other Canadian provinces and territories in species richness and is home to many unique species that do not occur elsewhere in Canada.

This biologically diverse land comprised of approximately 89.1 million hectares of Provincial crown lands, is also home to a multitude of resource uses that are guided by a host of legislation. Forestry, commercial fishing, resort development, oil and gas exploration, mining, hydro-electricity production, and tourism, are just some of the activities that put pressure on our environment. With competing demands made upon B.C.'s natural resources, it is critical that conservation efforts work in concert with these demands to ensure that the province's biological diversity is not diminished.

Recently, the provincial government in British Columbia has shifted away from an approach using rules and regulations pertaining to the management of natural resources and moved towards a more results-based strategy (B.C. Ministry of Forests 2004). This approach requires a greater reliance on resource-users being knowledgeable enough to implement best practices. It also requires a strong commitment from government agencies responsible for overseeing the attainment of desired results. Accessibility of relevant and timely information and availability of tools to empower the client to design innovative solutions need to be a priority in this atmosphere.

Sustainable behaviour is key to conserving biodiversity whether this behaviour relates to the way that we manage our forests, harvest our oceans, or recreate in our backcountry. RENEW, Canada's committee for the Recovery of Nationally Endangered Wildlife, supports this view in its guiding principles relating to the recovery of species at risk: "species recovery ultimately depends on changing human behaviour to allow species to maintain self-sustaining populations**" (**National Recovery Working Group 2004)**.** Thus our success in achieving sustainable environmental management and minimizing the impact of these management activities on biodiversity heavily depends upon on our ability to disseminate information effectively and to affect best practices.

This paper discusses the role of extension, a discipline of non-formal education that focuses on generating changes in human behaviour through the effective exchange of information, and its role in improving the effectiveness of conservation efforts. It will also introduce Bennett's Hierarchy and the Logic model as tools for defining desired human changes, "finding the extension" in a conservation program and linking that extension to higher-level biological objectives. Finally, it will offer suggestions for monitoring the success of extension activities.

What Is Extension?

Extension is a professional field of educational practice that focuses on *helping people learn* as opposed to *teaching people* (Knowles 1950). Boone (1989) outlines the three main steps that sum up effective extension; (1) "[helping] people learn in their own context and life situation, how to identify and assess their own needs and problems, (2) helping them acquire the knowledge and skills required to cope effectively with those needs and problems; and (3)

inspiring them to action." Extension is a successful way to improve knowledge and behaviours because the desire to change is initiated by the audience in response to an identified need, not by external factors. Thus information is valued by the audience and the audience is motivated to change. Those involved in delivering extension guide the process by aiding in problem and needs identification, facilitating the acquisition of relevant and timely information, and helping the learner(s) design contextually appropriate solutions and implement them. Each step relies heavily on the extension professionals' ability to stay current with emerging information and to build and maintain relationships that result in change. Extension differs from formal education systems often found in universities and colleges by presenting information in a context that is specific and familiar to the learner and relies on a two-way feedback loop between the keepers of knowledge and users of knowledge.

Why Is Extension Important to Conservation Biology Programs?

Extension is an important discipline that has the potential to contribute considerable value to the field of conservation biology. The following points discuss those potential benefits:

1. Improved dissemination of research
Currently a substantial investment is being made to generate knowledge through research that has the potential to inform natural resource decision-making and best practices. However, if the people that need the information are unaware of its existence or are unable to access it, the information will not result in the desired changes on the ground. (DeYoe and Hollstedt 2004) Extension is a key component in achieving this objective. By encouraging a two-way exchange of information between the users and producers of knowledge, extension not only provides timely information to users, but also informs researchers and others who generate knowledge of existing information needs. The end result is more focused and cost-effective research that is responsive to the needs of those who apply it.

2. Decreasing the time from knowledge generation to application
Time is critical to conservation programs and often beneficial change cannot occur quickly enough when compared to rate at which potential detrimental impacts from human activity occur. Decisions and practices are most effective when informed by current and relevant knowledge. By implementing a well-organized extension plan that links the best available information to information users, knowledge is applied much more rapidly. Extension thus reduces the time-lag that exists between research and application.

3. Improving the ability to monitor short and medium term outcomes
Monitoring most often focuses on changes in biological condition which can take many years or even decades to detect. So how can we provide evidence that change is occurring even if a biological change is not yet detectable? Changes in human systems occur at a much faster rate than in biological systems. Monitoring extension programs can provide strong evidence that changes in knowledge and behaviour are occurring in the human systems that will eventually result in changes in biological condition.

Building Extension Capacity

As documented above, there are many reasons for implementing extension plans that support higher-level conservation goals. Conservation groups need support for developing **effective** extension plans. Currently, many programs fulfill their outreach commitments by focusing on the

"general public" or school children to increase awareness or concern. Creating changes in awareness or knowledge in a broad audience type such as this will not generate the specific improvements in resource management or use. Thus their contribution to changes in environmental condition will not be as effective. Planning and implementing targeted extension is therefore critical, however the capacity of conservation programmers to develop extension plans that seek to create change in specific audiences such as natural resource planners, policy-makers, resort developers, or local outdoor clubs is often limited. Furthermore, if there are extension activities taking place, they are often not delivered in a way that is measurable or lends itself to effectiveness monitoring. The following section introduces a number of tools that can be used to design a successful extension plan that contributes to the overarching goals of a conservation program.

What Tools are Available to Improve the Performance of an Extension Program? Outcome planning - focus on results!

The field of extension is focused on creating change through education; therefore, it relies heavily on outcome or results-based planning. This focus is consistent with changes evolving in the field of program planning and evaluation. Program funders are now requiring that program managers be accountable for the changes that their programs generate, not just the activities employed to do so (Figure 1). Thus the focus is shifting from "what we do" to "what happens as a result of what we do."

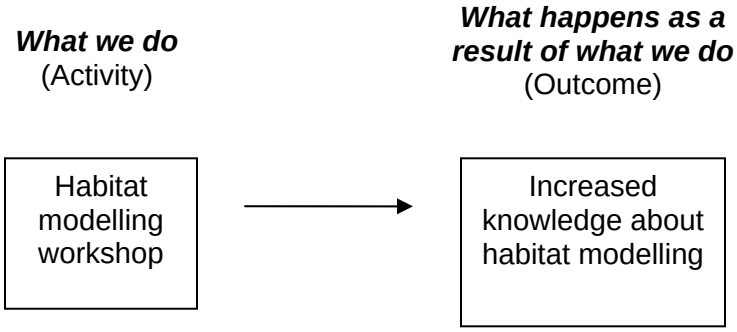

Figure 1: Illustration of the difference between an activity and an outcome.

Focusing on outcomes or results is an approach that is very relevant to conservation programs that are designed to generate change that results in a shift in the environmental condition from an *existing state* to a *desired state*. Increasing the chance that your program will successfully create change depends on defining clear outcomes and then creating activities that are most likely to result in that change.

Using Bennett's Hierarchy to define change

Bennett's Hierarchy of Evidence (Figure 2) is a visual tool that illustrates the levels of change, in a stepwise progression that a program can affect. The strength of this laddered framework for conservation programs is that it clearly shows the link and fundamental importance of changes in people (ie knowledge and behaviour) to changes in environmental condition. This framework, developed by Claude Bennett (Bennett 1977) to support the evaluation of extension programs, formed the early foundation for the Logic Model which is discussed in the next section. The

footprints of logical thinking (cause and effect) are evident in the laddered presentation of the tool. Evidence of change becomes more meaningful as you move up the scale from resources used, activities generated and participation (levels 1,2 and 3 in Bennett's Hierarchy) which are largely ***internal*** to the program, through evidence of changes in reaction, knowledge, behaviours, and ultimately changes in condition (levels 4,5,6 and 7 in Bennett's Hierarchy) which are ***external*** to the program. The relationship between these two perspectives is illustrated in figure 2.

Often program evaluations focus on levels 1 through 3 in Bennett's Hierarchy, or "what they did," with measures of success focusing on the number of workshops held, the number of brochures distributed or the number of registrants for an event. Focusing on these lower 3 levels of evidence can provide information about the ***efficiency*** of your planned work or how much effort is required but not about its intended results or ***effectiveness*** (figure 3*)*. To measure the impact of conservation activities or the change that occurred as a *result* of actions, it is more significant to measure evidence further up the ladder of Bennett's Hierarchy.

	Level	
↑	7	**End Result/Changes in condition:** Changes in the **environmental, economic, civic, social condition** What is the long term impact of a program? (i.e., increased survivorship of species)
	6	**Action:** Changes in **behaviour, practice, decisions, policies** (i.e., Improved legislation around hunting of species)
	5	**KASA changes:** Changes in **Knowledge, Attitudes, Skills and Aspirations** (i.e., increased species-friendly land management skills)
	4	**Reactions:** How did stakeholders react to the program? Were they satisfied? Were their expectations met? Was the program appealing? Do they perceive any immediate benefits?
	3	**Involvement:** How many stakeholders participated? Who participated
	2	**Activities:** What activities were developed and delivered? (i.e., meetings, workshops, field tours, conferences, newsletters, training,…)
	1	**Inputs:** What is invested (i.e., staff, volunteers, time, funding, materials, equipment, technology, partners, stakeholders, research, data, …)

Figure 2: Bennett's Hierarchy of Evidence. Adapted from (Bennett 1977).

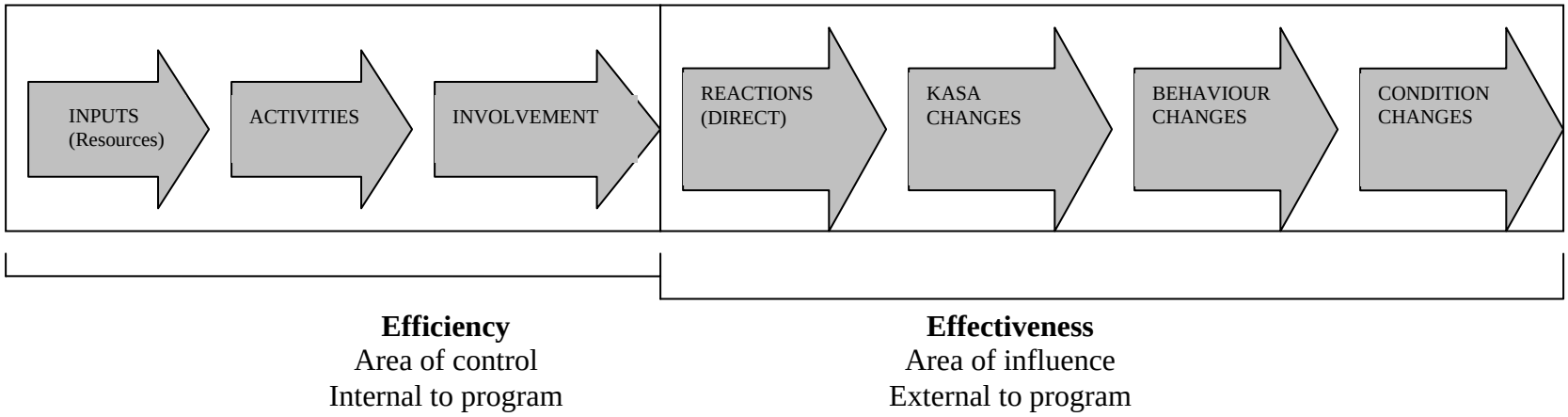

Figure 3: An illustration of the relationship between efficiency and effectiveness that exists in planning processes.

Level 4 identifies people's reaction to an activity and represents the level at which participants become engaged. If participants have a positive reaction to an activity, they will be interested in further learning. If not, a different activity will need to be developed that creates interest. Level 5 builds on the engagement of the previous level, and identifies changes in audiences' knowledge, attitudes, skills, and/or aspirations. Level 6 relates to changes in behaviour, practices, decisions, policies and social action. Improved habitat restoration practices, improved pesticide-use policy, or improved land-use decisions would all be examples of a level 6 change. Level 7 is the highest rung on the hierarchy of evidence and defines the impact of a program, including changes in environmental condition. It is at this level that human changes link to longer-term changes in biological systems. Once the progression of evidence relating to changes in human systems is understood and how it links to environmental change, an effectiveness evaluation of a new or existing conservation program can be implemented using the next tool, the Logic Model.

Using the Logic Model to find the extension in your conservation program

The term "logic model" was coined by Wholey (1979) in "Evaluation: Promise and Performance". It is an illustrative tool that provides a clear depiction of the cause-and-effect relationships that link resources and activities to the desired results or outcomes. It also considers the influence of the situation that gave rise to a particular program, the assumptions that are made during its implementation, and the influence from external factors. The logic model is most commonly used for enhancing program performance through outcome accountability. It was developed in response to the inability of evaluators to measure program impacts where goals and objectives were vague or when a program had been implemented in a way that would not likely achieve the desired results. As a result, the evaluation community developed a logical framework that enabled program managers to clearly document the cause-and-effect relationships within their program thus improving its measurability and its effectiveness. Figure 3 shows the main elements of an extension logic model, many of which it shares with Bennett's Hierarchy, and includes the element of "reach" (Reach describes the target audience of your implementation activities).

In the following discussion of the logic model, we have included examples of many of the elements to illustrate how this tool could be used in practice. These examples are based on the species recovery program of the American Badger (jeffersonii)". We hope that this example will increase understanding around the use of this tool.

The logic model is comprised of six linear elements and three influencing factors. The situation is the rationale on which your conservation program is built. It defines the problem that the conservation action addresses as well as the circumstances it exists in. This includes the complex set of sociopolitical, environmental, and economic conditions that helped create the problem. An example of a situation statement that was developed for a fictitious species is presented in Figure 5. Having this clear and commonly held understanding of the situation will minimize misunderstandings among stakeholders later during the implementation phase.

Once the situation is defined, the long-term outcomes of the program are identified. Most often in the context of conservation biology these will relate to changes in environmental condition that are attained by moving from an *existing state* to a *desired state*. After the desired long-term changes in condition have been defined, medium and short-term outcomes associated with human action and learning can be identified. This is where the extension part of your program is found.

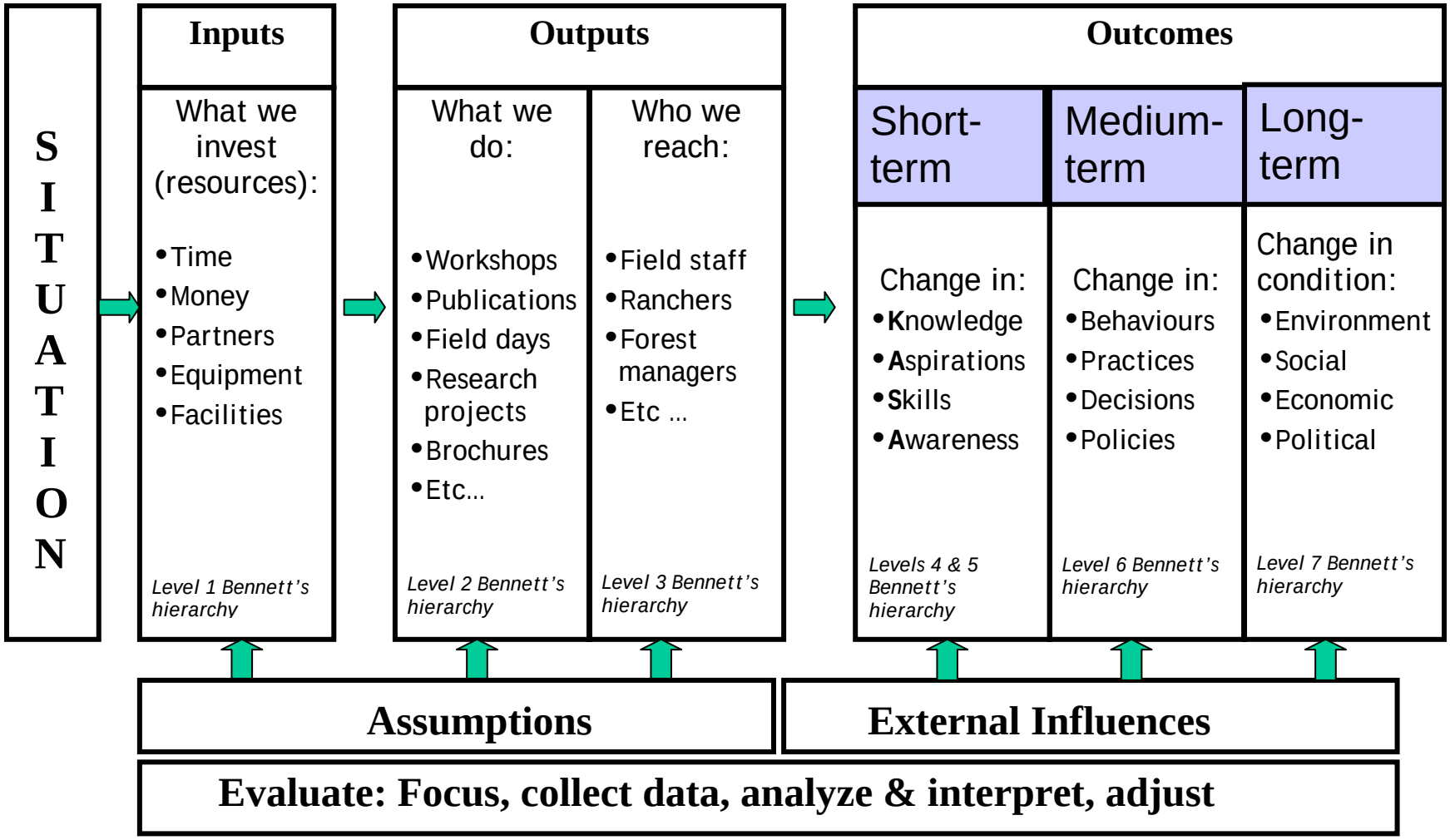

Figure 4: Main elements of a logic model developed for extension programming. Adapted from University of Wisconsin – Extension (2002)

Situation Statement for the American Badger *jeffersonii* subspecies[1]

British Columbia (BC) represents the north-western limit of American badger (*Taxidea taxus*) range. In Canada, the subspecies *T.T. jeffersonii* occurs only in BC (all badgers in BC are *T.T. jeffersonii*) where they range throughout the dry Southern Interior of BC, north to the Cariboo region. The Global Rank for the entire badger species is G-5. In BC, badgers are ranked S1 by NatureServe, "red-listed" by the BC Conservation Data Centre, and recognized as "endangered" by COSEWIC. Government agencies at both the federal and provincial level have created new legislation to protect species at risk, including the badger. This legislation has resulted in the creation of a National Recovery Team that is charged with developing a recovery strategy and recovery action plan for the badger.

Badgers are carnivorous mammals that live in the grasslands and dry forests of the Interior of British Columbia. Although they were likely widespread up to the late 1800s, it is believed that probably less than 300 badgers live here now. The grasslands and dry forests of the Thompson, Okanagan, Boundary, Nicola, Cariboo, and East Kootenay regions are home to most of the remaining badgers in BC.

There are numerous proximate threats to badger populations and habitats include: trapping, persecution, urban development, cultivation, viticulture and orchards, poor range management, forest in-growth and encroachment, reservoir flooding, road mortality, loss of prey, and secondary poisoning via prey.

Within the context of *jeffersonii* badger, the main groups that have a role to play in the recovery of the subspecies are:

Urban developers;
Ranchers;
First Nations;
Hunters;
Road maintenance and construction crews; and
Forest companies harvesting within the IDF (Interior Douglas-fir).

While much is known about badgers, the Science Recovery Implementation Group has identified the following areas in which additional information is needed to effectively recover *jeffersonii* badger populations:

- Diet
- Prey ecology
- Mortality factors
- Distribution and abundance
- Inventory development and methodology
- Metapopulation structure and genetics
- Stewardship
- Atypical Habitat
- Monitoring

Recovery of badgers in British Columbia is ecologically and technically feasible provided habitat loss is reduced, adequate protection is provided to individuals from extermination killing, and populations are augmented or re-introduced when required. Anticipated challenges include: mitigating highway mortality; maintaining large tracts of well-connected high quality habitat; and ongoing efforts to eliminate needless killing of badgers on private land.

[1] Excerpts are taken from: Draft *jeffersonii* Badger Recovery Team. 2004. National recovery strategy for American Badger, *jeffersonii* subspecies (*Taxidea taxus jeffersonii)*. Recovery of Nationally Endangered Wildlife (RENEW). Ottawa, ON. 53pp.

Figure 5: Sample Situation Statement for American Badger (*Taxidea taxus*) *jeffersonii*, a species designated as "endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

What changes in human behaviour are required that will contribute to achieving the desired long-term environmental outcomes? Are there required changes in policy, practices, or decision-making? Identify all the medium-term changes needed to generate each desired biological outcome. The same process is followed in identifying short-term learning outcomes, think about what type of changes in knowledge, awareness and skills are required to attain the required changes in behaviour. Do decision-makers require better information and improved knowledge to alter their decision-making processes to a more favourable condition? Is the same required for policy-makers? Is an improvement in skills required to create change among practitioners? These contributing short-term changes are commonly referred to as "KASA" changes or modifications in knowledge, aspirations, skills and awareness. Changes relating to motivation and attitudes are also included at this level. The flow of outcomes through short-, medium- and long-term timelines for our fictitious species are highlighted in figure 6.

<table>
<tr><th>Short-term outcomes</th><th>Medium-term outcomes</th><th colspan="3">Long-term outcomes</th><th>Overall Recovery Goal</th></tr>
<tr><td>Increased knowledge among drivers of where badger crossings are and appropriate driving practices in those areas</td><td><u>Decreased speeding of drivers in Badger high-use areas</u></td><td rowspan="3">Decreased traffic speed in areas of high badger use.</td><td rowspan="3">Decreased road mortality</td><td rowspan="3">Increased survivorship</td><td rowspan="3"></td></tr>
<tr><td>Increased knowledge among police about the importance of speed zone enforcement in areas of high wildlife use</td><td><u>Increased enforcement of speed zones</u></td></tr>
<tr><td>Increased knowledge among highway planners of the value of lower speed zones in areas of high badger use</td><td><u>Increased incidence of speed zones in areas of high badger use</u></td></tr>
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Increased knowledge about the value of deactivating roads to certain species at risk.	**Increased deactivation of roads (logging, mining roads)**	Decreased traffic volume in areas of high Badger use			**Achieve and maintain a viable population of badgers throughout their historic range in B.C. and to increase the badger population to at least 400 individuals within 5 years.**
Increased awareness among drivers about the value of reduced traffic volume to Badger survivorship	**Increased car-pooling on active roads**				
Increased level of understanding among highway planners about the value of safe crossing structures for species at risk	**Increased crossing structures on new highways (ie. Tunnels)**	Increased safe crossings in areas of high Badger use			
Increased level of understanding among highway planners about the threat of linear barriers along highways	**Decreased use of long stretches of solid concrete barriers on one side of highway**				
Increased knowledge among highway planners about the value of wildlife detection systems	**Increased use of wildlife detection systems along highways**				

Figure 6: An example of a partial Logic Model for the American Badger (*Taxidea taxus*) *jeffersonii* subspecies addressing one identified threat.

Once the short-, medium- and long-term outcomes are mapped out, it is appropriate to consider activities and the reach of those activities. All activities should link to the desired outcomes that were identified originally (Table 1). If you want to include an activity that does not contribute to a previously identified outcome, it is important to consider whether the activity achieves a result that is important to the overall conservation goal. If it is, the desired outcomes should be revised to amend this omission.

Short-term outcomes	**Potential Activities**
Increased knowledge among highway planners about the value of lower speed zones in areas of high badger use	Develop a strategy for educating highway planners about why more speed control is needed in areas of high Badger use and how it is effective.
Increased knowledge about the value of deactivating roads to certain species at risk.	Feedback to government re: the critical need for road deactivation in areas of high Badger use.
Increased awareness among drivers about the value of reduced traffic volume to Badger survivorship	Work with car-pooling promotion groups to inform them about the need for reduced traffic volume to Badger conservation and where areas of high sensitivity are.
Increased level of understanding among highway planners about the value of safe crossing structures for species at risk	Develop a strategy for educating highway planners about the value of safe crossing structures for species at risk and identify areas of high need to them
Increased level of understanding among highway planners about the threat of linear barriers along highways	Develop and deliver education strategy that informs highway planners about the threat of solid linear barriers along highways
Increased knowledge among highway planners about the value of wildlife detection systems	Develop education program to increase knowledge about how wildlife detection systems work and the effectiveness of those systems.
	Partner with other organizations to facilitate funding around the use of wildlife detection systems.

Table 1: An illustration of potential activities to address short-term outcomes for the American Badger *jeffersonii* subspecies.

When defining activities, their reach should be included. Think about “in whom” the change generated by this activity needs to occur. For example is it forest managers, guide outfitters, commercial fishers, hikers, or scuba divers that need to change their behaviour? A general description of the target audience is appropriate for each activity.

The final linear element to be documented is the inputs element. This is the point at which all of the assets available to your group are listed, including staff, funding, data, research, etc. Often conservation programs have to work with a limited budget when implementing their program. For this reason, it is a valuable undertaking to do an asset mapping exercise that identifies assets directly available to the effort or indirectly through the in-kind contributions of partnering organizations. As discussed, the linear elements of

the logic model are connected through a series of cause-and-effect or "IF-THEN" relationships known as an outcome chain. An example of the progression of these cause-and-effect associations is provided in Figure 7.

Situation: Highway planners are designing roads in a way that renders Badgers susceptible to road-kill; a solution is found that works for the audience.

Desired Long Term Outcome: Increased Badger *jeffersonii* survivorship
IF, we invest some staff time and funding into this program (INPUTS), **THEN**, we will hold series of workshops for highway planners describing road designs that decrease risk to Badgers (ACTIVITIES).
IF, we deliver these workshops (ACTIVITIES), **THEN** highway planners will know how to design roads more appropriately (SHORT TERM OUTCOME).
IF highway planners know how to design roads more appropriately (SHORT TERM OUTCOME), **THEN** highway planners will design roads more appropriately (MEDIUM TERM OUTCOME).
IF, highway planners design their roads better (MEDIUM TERM OUTCOME), **THEN**, Badger mortality resulting from road-kill will decrease (LONG TERM OUTCOME).

Figure 7: An example of an "if-then" outcome chain.

Two other aspects need to be considered to confirm the effectiveness of a program; assumptions and external factors. There are a number of assumptions made when developing a logic model. They represent the beliefs and values we have about a program and an expectation about how we think the program will work. They are validated through research and experience and should be re-evaluated often. Assumptions are either acceptable to the group, require more information to be sure, or are inappropriate and the relationship needs to be redefined.

External factors are often referred to as the environment that the program exists in. These variables, over which the program normally has little control, can often have a positive or negative on the success of a program. They include factors such as socio-economics, the climate, the biophysical environment, the political environment, global markets, the background and experience of stakeholders, media influence, and changing policies and priorities. Documenting these factors will help program leaders understand how external sources influence the outcomes of the program.

It is important to remember that the logic model is a valuable tool at any stage of program development, and can be used to organize goals, outcome objectives and activities, and identify activities which are most likely to achieve program goals. It is useful as an effectiveness evaluation tool early in the planning stages or later in the program implementation phase to assess whether the results of activities are meeting expectations. The many benefits of using the logic model include:

- Bringing detail to broad goals
- Identifying gaps in knowledge/informs research needs
- Identifying breaches in logic
- Visually communicating a roadmap to stakeholders and funding agencies
- Building stakeholder consensus
- Linking extension outcomes to higher-level biological outcomes
- Signaling what and when to evaluate

A key reason for undertaking a logic modelling process is that it provides programmers with focused outcomes that are measurable. Evaluation, is of course, paramount to ensuring the effectiveness of your program. Monitoring is a form of evaluation that measures progress towards desired outcomes over time. In the field of conservation biology, monitoring is most often described in relation to biological change. It is equally important in tracking changes in human behaviour. To monitor progress towards desired extension outcomes involves a simple process of developing a set of indicators and targets for each outcome and documenting progress towards those outcomes. Indicators help you know if you have achieved something, they are measurable or observable. (e.g., seen, heard, read, etc.). Targets document how much change is required to achieve success. Table 2 provides examples of indicators and there corresponding targets relating to extension outcomes. Pairing the on-going monitoring of changes in biological condition with the monitoring of extension-focused outcomes will demonstrate the effectiveness of the program as a whole, and provide short-, medium- and long-term evidence of change.

Table 2: Examples of indicators and potential targets.

Evaluation question	**Indicator**	**Target**
Do highway planners have increased knowledge about the threat of solid linear barriers along highways ?	% change in the # of knowledge testing questions answered correctly in pre and post workshop surveys.	50% more questions answered correctly in post-event survey, than pre-event survey.
Have drivers decreased their speed in areas of high badger use?	% change in the number of drivers exceeding posted speed limit in areas of high Badger use with a lower posted speed	20% decrease in the number of drivers speeding over the previous year.
Are the participants using the information they learned in the workshop?	Number of plans that adequately protect habitat.	20% increase over previous 5 years.

Conclusion

The Society for Conservation Biology (2005) identifies four ways to best protect biodiversity "(1) stop overharvesting species (2) stop destroying habitats (3) stop polluting and otherwise disturbing habitats and (4) stop spreading non-native species". Since detrimental human activity is the cause of most threats to biodiversity, we need to improve our ability to change human behaviours that negatively impact our environment if we want to increase the effectiveness of conservation efforts.

The field of extension has the potential to improve conservation efforts by providing a framework for generating change in human behaviours. It offers an effective process for developing, implementing and evaluating extension activities that meet desired outcomes relating to human systems and providing a link to and evidence for progress towards higher-level biological goals. It also functions to improve the dissemination of information, decrease the time span from research to application and inform the

research community of the information needs of practitioners involved in resource-use or management. Extension is a discipline that is results-focused and relies heavily on outcome planning. This focus on “what happens as a result of what we do” as opposed to “what we do”, improves the ability of planners to create change.

Bennett’s Hierarchy of Evidence provides a framework for identifying change relating to human systems and thinking about how those changes relate to one another. It also illustrates the pivotal link between short- and medium-term changes in human systems and long-term changes in biological systems. The Logic Model framework builds on this approach and provides a process for reviewing the effectiveness of your program as a whole. By considering the problem your program is addressing, the external factors that influence it and the assumptions you make about how you expect the program to work, potential pitfalls can be avoided or planned for. The further process of linking inputs, activities and audiences to desired outcomes, identifies points of uncertain logic and knowledge gaps where additional research is required. Understanding the levels of change illustrated in Bennett’s Hierarchy and using the Logic Model framework to review your program effectiveness will add to the success of your conservation program.

Extension plans that are effectively linked to higher-level biological outcomes become the source of valuable short- and medium-term evidence for long-term results. Monitoring is an activity that is equally as valuable for measuring progress towards outcomes associated with extension as it is for progress towards biological changes. Developing and monitoring the appropriate indicators and targets for extension outcomes will add to the success of conservation programs.

Although we know that extension is a valuable tool in conservation biology, there are challenges to integrating ***effective*** extension programs. Most conservation programming is planned by individuals that have a strong background in scientific research relating to biology but are not trained in the realm of social science. Often the importance of integrating outcomes associated with behavioural changes in humans is not recognized as a priority. The tendency is to separate the extension component of their program from the main planning framework and fulfill education and outreach commitments by focusing on the “general public” or school children to increase awareness or concern for conservation problems. Creating changes in awareness or knowledge in a broad audience type such as this will not generate the specific improvements in resource management or use. Furthermore, extension programs and activities are rarely monitored to provide evidence for their contribution to higher-level goals. Without this evidence, the contribution of extension activities and their corresponding results, to changes in environmental condition become undervalued.

We recommend increasing capacity relating to the planning, implementation and evaluation of extension that results in integrated conservation programs targeting specific stakeholder groups. To be truly successful, **all** results associated with extension activities should clearly benefit the higher-level biological goals and the human and biological aspects of the effort should be closely integrated. We recommend that groups use Bennett’s Hierarchy and the Logic Model to assess the effectiveness of their programs. This framework can then be used to build a monitoring program for the extension component of the plan, to provide short-and medium-term evidence of progress towards long-term outcomes.

When focused extension is implemented and targets specific stakeholder groups whose actions influence the environment, improvements in human practice occur. Once human practices improve, positive changes in our environment will begin to take place. By including extension in your conservation program and using the appropriate tools to ensure that it is implemented in a way that provides measures of success and strong links to higher level biological objectives, conservation goals will be attained in a more efficient and effective manner.

On-line resources are available to assist groups with outcome-planning:

- Targeting outcomes of Programs (TOP): http://citnews.unl.edu/TOP/index.html
- University of Wisconsin on-line logic model course: http://www.uwex.edu/ces/lmcourse/
- W.K. Kellogg Foundation-Logic Model Development Guide
- The Innovation Network: http://www.innonet.org/
- FORREX extension specialists are also developing an extension basics manual for Species at Risk Recovery Teams (Sutherland *et al*. In Prep.), which will be available at: http://www.forrex.org/program/con_bio/ecosys_cons.asp?AreaPkey=17

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