Development of a Spatial Values-Based Recreation Planning Framework for Canadian Crown Lands

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Abstract: Managers of Canadian Crown lands are beginning to recognize that all values the public associates with forests should be given due consideration in management actions. Arguably, recreation and tourism are the least understood values of the resource and typically receive only secondary consideration in management decisions on an ad-hoc basis. This situation partly results from the lack of a systematic framework for recreation management in Crown lands outside of protected areas at either the provincial or the national level. This presentation discusses the development of a spatial recreation planning framework that uses recreation values to assess the effects of various forestry activities. The framework expands upon traditional planning approaches that are primarily supply driven to directly address core user values rather than traditional user preferences. A spatial GIS model was developed that incorporates interactive data layers of the study area including high resolution orthophoto mosaic, forest resource inventory, recreation facilities locations, ROS type classification, activity participation, spatial trip patterns, and recreation values. These data layers are overlaid on the forest management plan that details the harvesting and silvicultural treatments that are planned for the next 20 years. Operation of the interactive model is based on maintaining recreation portfolios, recreation class consistency, and sets of contextualized recreation values. A process is discussed as to how this new framework will provide managers with a tool to evaluate recreation related impacts a priori to resource management actions, and allow the public to ask "what if" scenarios in an interactive mode.

Introduction

Public forests, commonly referred to as Crown lands in Canada, are increasingly administered through integrated management approaches that acknowledge non-commodity resource values in addition to traditional wood products. Management of non-commodity resource values on Crown Lands in Canada has developed through a course of evolution. There is a resulting increase in pressure from the public that forest sustainability requires an integrated approach to management (Bull 1993). Central to this premise is that all values in a forest area should be given due consideration in management actions (Crockett 1993). As pressures increase for both commodity production and non-commodity uses of the same resource, there is a concomitant need to better understand the interrelationships among these competing values as it relates to sustainability.

Aplet and Olson (1993) state that a sustainable forest is one is which ecological sound, economically viable, and socially desirable. While the need to achieve a balance in achieving sustainability is acknowledged, Crown forests have sought sustainability through the concept of sustained yield of timber. However, sustained yield does not appropriately describe forest sustainability in the greater social, ecological and economic context (Cook and O'Laughlin 2000). The public discourse over how our resources should be managed has been defined by the value we place on the resource. Sustainability is defined by human values (Lele and Norgaard 1996). People place a range of values on the resource for many reasons and the importance of these values determines how sustainability is viewed. While describing the importance of forest values, it is apparent that people view many areas as special places (Galliano and Loeffler 1995). These special places give meaning to an area and drive the socially defined importance of the resource. The political process has repeatedly demonstrated that the civic debate over how publicly owned lands should be cared for ultimately centers around the 'meaning' of place and the reconciliation of competing values associated with them.

Decision making on Crown lands has been driven by a tradition that dictates reliance on natural-science experts that focus on commodity production. It is

only recently that managers realize that many production issues should not be addressed without examining social based factors associated with recreation. Concerns with visitor use cannot be appropriately addressed through traditional natural science driven processes (Machlis and Tichnell 1985). Many of these past management responses centered on the concept of maximizing benefits from the forest. In juxtaposing recreation benefits against timber benefits, it was easy for the public to value the quantifiable timber related benefits (jobs, wood products, etc.) over qualitative defined recreation related benefits (experiences, relaxation, etc.). Simply contrasting recreation and timber based on economic values did not articulate the real value of recreation and place it in a competitive position in resource use deliberations.

Much of the current debate on values and sustainability in Ontario has come out of the Lands for Life process that occurred in Ontario in 1998 (OMNR 1999). This publicly driven process resulted in the doubling of the amount of land in Ontario for parks and protected areas from the current six percent to twelve percent. As the amount of land being withdrawn from commodity production increases (to create new protected areas), there is acknowledgement that more wood fiber will have to be taken out of existing allowable cut areas to meet demand. The areas that will be most impacted will be lands closer to urban areas because of proximity to mills – these are the same areas that have the greatest demand for recreation and other non-commodity values (Cook and O'Laughlin 2000).

Until fairly recently though, Canada's Crown forests served foremost as commercial forest lease areas. This aspect is compounded by the fact that Crown lands are administered by provinces that have independent jurisdiction and governance. Recent developments towards more integrated, sustainable forest management practices have demonstrated the need to better understand the relationships between competing forest values in Canada. While the need for true multiple use of Crown forests is being publicly debated, its application at the planning and policy levels are still lacking. Because recreation does not have specific legal standing in Crown lands, it has been given little consideration in forest planning overall across Canada even though some provinces (such as British Columbia) do address recreation to a greater degree than others. Although this paper focuses on Crown lands in Ontario, it is suggested that its application may be applicable to Crown lands in other provinces.

Arguably, recreation and tourism are the least understood values of the resource and typically receive only secondary consideration in management decisions (Hawley et al. 1998). While certain recreation values may be considered on an ad-hoc basis, at present, there is no systematic framework for recreation management in Crown forests outside of protected areas at either the provincial or the national level. Recreation is peripherally addressed after major decisions toward timber harvesting decisions are already made. The lack of a scientifically defensible framework for recreation has made the forest planning process into an expert driven model. Public involvement is used only as a tool to mitigate perceived problems related to recreation after the forest plan is developed rather than to help develop the plan. The resultant forest management plan (FMP) treats recreation as a secondary concern.

This lack of focus for recreation may be problematic for resource managers since resource-based recreation use has had substantial yearly increases for the past 20 years (Cordell et al. 1995). For some resource-based activities such as bird watching, hiking, camping, mountain biking, hunting and fishing, an increase between 50–100 percent over a ten-year period has resulted in North America (Schuet 1995). Demand for recreation opportunities in Northern Ontario is especially strong given the nature of the region's resource base in defining its character and quality of life. Residents feel that resource-based recreation is one of the factors that determine their sense of place and attachment to the area (Dilley 1993, Suffling 2003). Indeed, communities such as Atikokan, Ontario (immediate to the project's study area) are planning their region's future based on tourism use of the surrounding crown lands. They are attempting to transition and diversify from a resource-based economy to a more tourism-based economy. Municipalities and businesses focusing on economic development are using tourism as the economic vehicle for growth. In turn, the tourism product is defined by the region's natural resources and the activities that occur on this land. The great majority of resource land is managed under the auspices of the Crown but surprisingly, recreation is often not seen by the Ministry of Natural Resources (agency which manages Crown lands) as being an important factor in the land's management. As demand for both commodity and non-commodity (such as recreation) resources increases on Crown lands, it becomes even more apparent that questions about allocating existing supplies will need to be answered.

The current planning system for Crown forest management in Ontario is based on the Strategic Forest Management Model (SFMM). The SFMM is a non-spatial simulation and optimization program that allows forest managers to principally optimize wood fiber production by forecasting future forest yields and compositions. Typically, the yields are set on a 20-year basis. The SFMM is overlaid on a forest resource inventory (FRI) to maximize yield efficiency. This information is then used to develop a Forest Management Plan (FMP) every five years. This model does take into account some non-commodity values such as those related to wildlife habitat supply. Recreation is not well integrated into the

SFMM-based forest management decisions, but is rather seen as a post-hoc decision evaluation factor. While producing wood fibre is acknowledged to be important, some resource managers recognize that there are many shortcomings of the current management system as it is lacking numerous components (such as recreation) considered important to the assessment of resource sustainability (Bull 1993). A primary reason for the lack of incorporating recreation in the FMP process is that no integrated recreation based decision-making framework exists on Ontario Crown Lands.

Critical to better understanding of forest sustainability is the development of a framework that is predictive of proposed management actions toward recreation (Payne and Graham 1993). This framework should (1) build on existing models, (2) incorporate behavioural indicators, (3) have extensive pubic input (4) be spatially driven, and, (5) able to be incorporated into existing management planning structures. As shown in Figure 1, the recreation planning framework should have public input at all stages of the decision making process – currently public involvement is simply used as a reactive response measure.

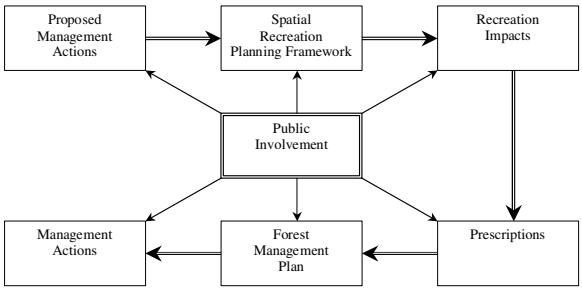

Figure 1. Use of Public Involvement in the Forest Management Planning Process.

The process used to make decisions about the provision of recreation opportunities in an area is key to the success of the overall forest planning effort. The social-political context of the planning effort suggests that plans and projects are likely to be controversial, since a variety of interest groups will be affected by proposed developments. Planners must therefore try to ensure that the investments made in the planning process itself will pay back returns, in terms of cooperation and coordination, between the Crown and stakeholders in the process.

In this context, the planning framework must encompass simultaneous processes. First, it must use an appropriate recreation planning process that not only represents the state-of-the-art in knowledge about recreation and visitor behavior, but can also be integrated into other resource planning activities. This provides not only technically correct resolutions, but will also be defensible if publicly challenged. Second, because of the social-political context, the process must include continuous involvement of affected publics. Early incorporation of the public and their concerns into the planning process will create "ownership" of the process and its outputs.

In order to better incorporate recreation in forest planning, this project has developed a Spatial Recreation Planning (SRP) framework for Crown Lands by combining the supply component of the Recreation Opportunity Spectrum (ROS) with a public defined values demand component, while focusing the framework on a working forest study area. This framework is GIS based and allows spatial interactions among the various components that define the resource. Prescriptive management parameters will be developed for areas that are to maintain ROS class consistency, valuation zones, and recreation portfolios thereby ensuring the continued availability of specific recreation opportunities. The SRP model would be able to predict the recreation related outcomes of resource modification including differing intensive forest management practices.

Study Goals

The goals of this study are to establish a Spatial Recreation Planning Framework that:

– Ensures that resource-based recreation opportunities on Crown lands are optimized to provide opportunities for satisfying experiences to current and future users, and
– Fits into the broader forest planning framework so that the effects of intensive forest management on recreation can be evaluated.

Study Area

The study area for this project encompasses the southern section of the Dog River-Mattawin Forest and the adjacent area of Quetico Provincial Park in Northwestern Ontario. The lower portion of the Dog River-Mattawin Forest is approximately 400,000 hectares in size while Quetico Park is approximately 475,000 hectares. The study area abuts the Boundary Waters Canoe Area and the Superior National Forest directly across the U.S. border. The Dog River-Mattawin Forest lease is held by Bowater Forest Products Incorporated. Bowater is in the process of revising its current FMP due in 2005.

The highly diversified forest, aquatic and wetland vegetation represents the convergence of three major ecosystems, the confluence of three major climate systems, the headwaters of three continental watersheds, and the continental north-south divide. This area also possesses the necessary variation in forest management and protection with significant demand for both timber and non-timber values (Lakehead University 2002).

The study area is very rural in nature with Atikokan (population, 1,000) being the only incorporated community in the immediate area. Upsula and Ignance are smaller unincorporated communities near

the study area. Thunder Bay (population, 120,000) is located about 75 kilometers east. The Loc La Croix First Nation is immediately southwest of Quetico Park. Within the Dog River-Mattawin area are a number of private inholdings, mainly around water bodies, that contain cottages and other seasonal use structures.

Framework Development

The Spatial Recreation Planning model is shown in Figure 2 with each phase explained in detail below. The input phase is based around the premise that appropriate valid and reliable data are necessary in any framework and decision making context. Data gained from the information input phase were analyzed to develop a spatial planning framework. This framework will be used to evaluate potential management actions and produce assessments that are used in the decision phase. The decision phase takes the assessments and the public evaluates them based on a set of management criteria including funding and political constraints. A recommended action will result in the output phase. These actions are then implemented and monitored to ensure that management objectives are met.

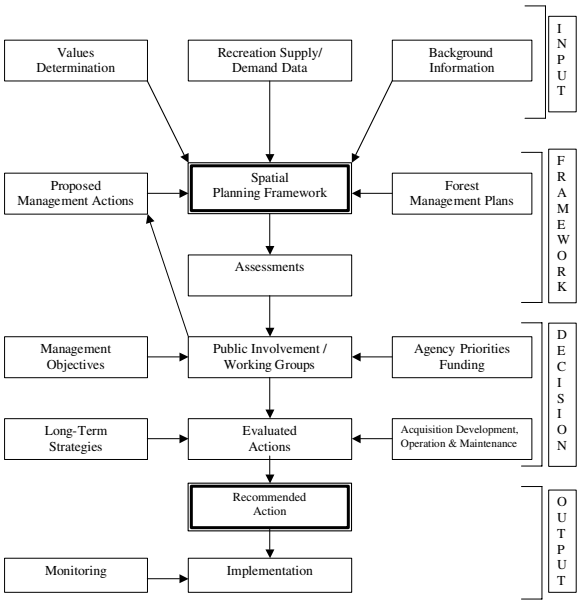

Figure 2. Spatial Recreation Planning Model.

Phase I – Input

The objectives of this phase are to understand how recreation was managed in the past, develop a sensitivity to both public and private sector needs, and better understand how recreation can play a more integrated role in future resource management. The input phase is based on three types of information sources: values determination data, recreation supply and demand data, and background information (Figure 3). Because the development of the SRP necessitates a substantial amount of data, much effort was given to this phase.

Existing research on recreation in the study area was reviewed and showed incompatibility and inconsistency in methodology among studies. As such, baseline data on recreation had to be established for the study area through extensive public input. Existing resource agencies' recreation data were incorporated as much as possible into the larger data collection efforts while keeping in mind the potential inconsistency among existing datasets.

To determine baseline standards, recreation studies were conducted for 12 months at developed and dispersed recreation sites in the study region encompassing Northwest Ontario during winter 2002 through fall 2003 (for more details, refer to Payne et al. 2004, this Proceedings). Data were collected based on winter and non-winter use and by resident and non-residents groups. A map of the region was given out to visitor to record their travel routes. In addition, visitors indicated on the map where they spent the night and activities participated in. All of this information was subsequently digitized into a GIS system.

Recreation supply was determined through an existing inventory of facilities and resources conducted by the Ministry of Natural Resources (MNR). Information from field verification and activity location data from the recreation surveys were used to supplement the MNR's data. Bowater, Inc. provided the transportation supply inventory database.

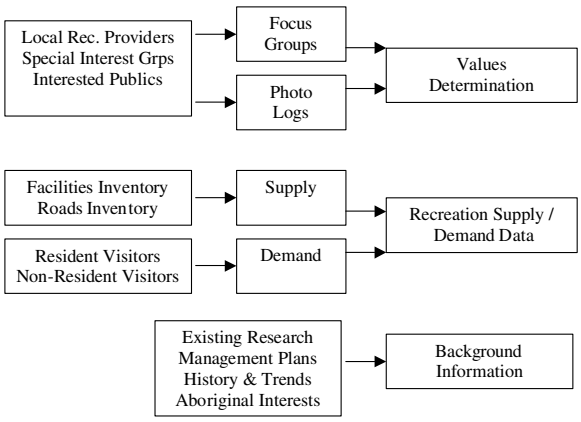

Figure 3. Input Information Sources.

Data on user values were collected so that their preferences and needs for specific resource attributes are better understood (for more details, refer to McIntyre et al. 2004, this Proceedings). A series of 11 focus groups were used to elicit data on the special places visited in the study area. Individuals then described the values they associated with these places. A mapping exercise was used to gather specific locations on the special places and their associated values. The focus groups included repre-

sentatives from local recreation providers, special interest groups, and the interested public.

Values data were also gathered through the use of photo-logs and daily diaries. Visitors were given cameras and asked to take photographs of their trip and record details about their experience. A sample of visitors was also given diaries in which they recorded the details about the most memorable event of the day. Statements were analyzed for value expressions. All activity and value location points were digitized into a GIS database.

Phase II – Framework

The values-based approach in designing the SRP is shown in Figure 4. The framework is a systematic means to evaluate proposed management actions for final decision-making. This framework must be sensitive to public needs and, at the same time, respect the inherent natural setting of the area. A hybrid evaluation framework was developed to achieve this goal. The framework uses the components of the ROS to define recreation supply as expressed by the inherent characteristics of the land. Demand is defined by the public's expression of values contextually and spatially, and activity participation.

The ROS was developed as a response to better understand recreation opportunities on resource lands and has been adopted by many resource agencies in the world (Yuan and McEwen 1989) (although not widely applied in Canada). The ROS is a supply driven model stating that the inherent characteristics of the resource should dictate the best type of recreation opportunity to provide to the public, and certain management actions based on set prescriptions are required to achieve these results (Janten and Driver 1998). As long as the resource is managed based on established parameters (termed ROS class consistency), then the opportunity for certain types of experiences will be optimized. The study area was typed into ROS classes based on size, naturalness, and access.

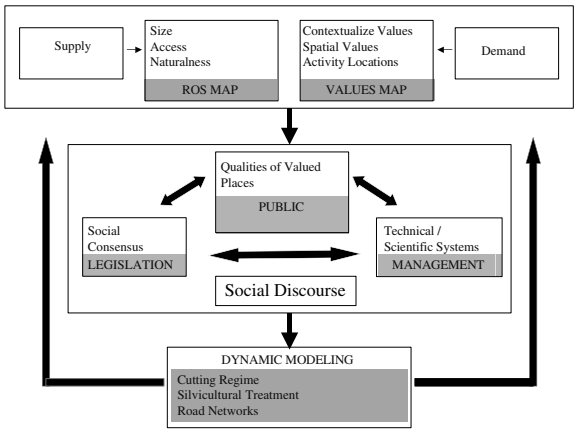

Figure 4. Values-Based Framework.

While the ROS has shown to be useful in a broad macro landscape level context, it has not worked as well toward the developed end of the spectrum and toward site or area specific uses (Driver et al. 1987). This weakness is primarily due to the constraints of the model and that the framework is resource supply driven. No demand information is directly used in traditional ROS exercises but only inferred through the supply. This hybrid framework defines demand as a spatial distribution of values that have contextualized meanings (for more details, refer to McIntyre et al. 2004, this Proceedings). These values will determine what is important to the visitor independent of the ROS based supply and addresses the inherent limitation of the ROS's supply based design.

The recreation supply and demand are then involved in dynamic modelling (Figure 4). Based on the current forest resource inventory and proposed forest management plan, resource decisions such as cutting regimes, silviculture treatments and road network development will be evaluated. A social discourse approach is used in the modelling that utilizes social consensus as defined through legislation, social utility as reflected through management objectives, and public involvement as viewed from assessments of valued places. In this manner, appropriate decisions are reached through negotiations among the many affected parties. The results of these assessments are used in the decision- making matrix in the next phase.

The data layers (Figure 5) used in the framework were mapped into Patchworks, a GIS software program. Patchworks is a spatial and visual GIS system which can be used in simulations of future conditions. The interactive system can be used to address "what if" types of questions and provide realistic real-time results.

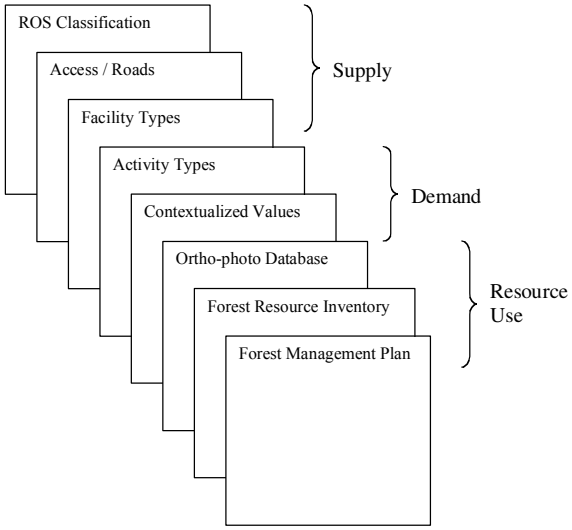

Figure 5. GIS Map Layers.

Phase III – Decision

The decision-making phase takes the assessments from the planning framework and evaluates them for potential implementation (Figure 6). The goals of the decision matrix are to maintain recreation diversity

and stability. In this manner, diversity of opportunities will be encouraged leading to a greater range of opportunities for visitors to choose from, and stability of opportunities over time will result in producing more realistic expectations and higher levels of satisfaction. In addition, the matrix encourages the maintenance and enhancement of the ROS classes at the primitive end of the spectrum that are highly sensitive and not very common.

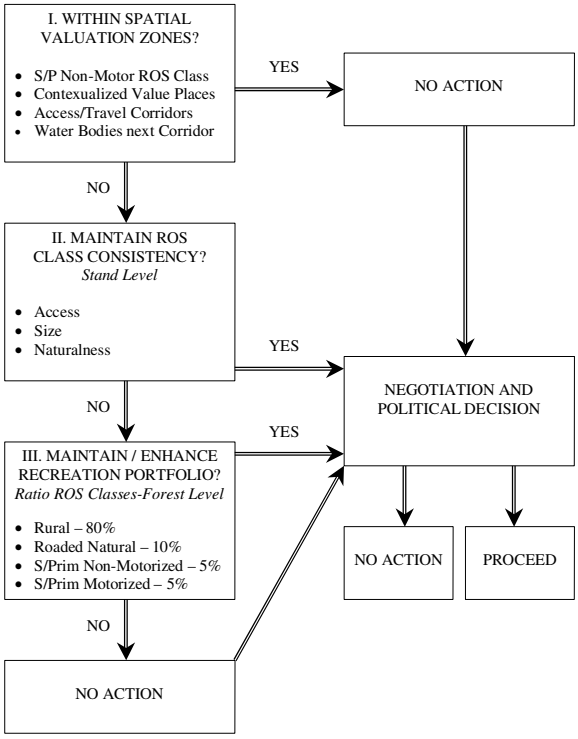

Figure 6. Decision Making Matrix.

Three decision components are assessed in the matrix: spatial valuation zones, ROS class consistency, and recreation portfolios. Spatial valuation zones are places that visitors have expressed as having high value through actual visitation or place association. Because these zones reflect actual demand, the objective is to protect these areas to maintain recreation stability. ROS class consistency is defined as maintaining the class indicators of access, size, and naturalness within the prescribed values for that class at the stand level. If the ROS class indicators are within the range for that class, then the ROS class is considered to be consistent. The current conditions of the resource are defined as the baseline conditions that should be maintained. The recreation portfolio is a concept of providing a combination of preferred recreation opportunities at the forest level in much the same manner as a timber portfolio maintains a preferred combination of species in certain age classes. In this manner, recreation diversity is encouraged. The recreation portfolio is defined by the ratio or percentage of ROS classes on a forest-wide basis. Because the forest is dynamic, the ROS characteristics at different stand level areas will change to compensate and maintain the overall portfolio of the forest. It is this dynamic interaction that is important as the resources goes through various modification scenarios.

Although it is acknowledged that the decision-making matrix attempts to provide evaluations based on an established framework, alternative decisions may also result through changes in management objectives or external political decisions. Once a decision is made to proceed with an action, the process continues to the next phase.

Phase IV – Output and Action

The output and action phase takes the list of recommended management actions at the various site or stand levels and develops a plan for implementation at the forest level. Forest working groups (including local citizens committees, special interest groups, affected publics) along with agency and industry personnel will negotiate on implementation procedures. The results of these negotiations will be incorporated in the forest management plan. A monitoring process will also take place to ensure that implemented management actions meet the goals and objectives set out in the evaluation process

Application of Spatial Framework

Decision making on Crown lands related to recreation has been limited by the lack of public involvement and a framework to base decisions on. Decisions are usually static and do not examine the interrelational impacts that occur. This spatial framework addresses the fact that a resource modification in one area will potentially affect the recreation opportunities in a different area (Figure 4). Only when effects are known at the contextualized local level (defined as stand level) and its spatial interrelationship at the broader forest level, will the overall impacts be known.

When combined with the ROS system, the framework can be used to model change and its effect on opportunity class consistency. The amount and effect of spatial redistribution related to the recreation portfolio will determine the amount of resulting inconsistency at the forest level. The GIS can also be used to predict potential recreation displacement and social succession. When sites and facilities are spatially linked, a new development's effect on existing opportunities can be estimated before actual development. For example, if a new development is proposed to change the character of a fishing access area from low to high user density, the framework may predict that the existing users of the area will be displaced and then potentially affect other areas negatively. These changes, in turn, may change the desired opportunity class in the development area and in the area where the users are displaced. These interactions and linkages provide an indication of what may occur when a management action causes significant change in the area.

Another advantage of using a spatial framework of this type is its visual capabilities. The public can visually see the spatial distribution of recreation supply through computer simulations and understand the resultant impact of a proposed change. Public input can be obtained at various stages of decision making using the framework, thus giving ownership of the process to the people who will be most affected. Instead of totally relying on charts, figures, and expert opinion, the public can visually see resulting changes from proposed actions. Because of the high detail orthophoto maps of the area, the resulting simulated changes can be contrasted to current conditions in a realistic depiction. The ability to predict potential impacts is a powerful tool and gives the public and decision makers additional information to prioritize management actions.

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