



Value-focused framework for defining landscape-scale conservation targets



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ABSTRACT

Conservation of natural resources can be challenging in a rapidly changing world and require collaborative efforts for success. Conservation planning is the process of deciding how to protect, conserve, and enhance or minimize loss of natural and cultural resources. Establishing conservation targets (also called indicators or endpoints), the measurable expressions of desired resource conditions, can help with site-specific up to landscape-scale conservation planning. Using conservation targets and tracking them through time can deliver benefits such as insight into ecosystem health and providing early warnings about undesirable trends. We describe an approach using value-focused thinking to develop statewide conservation targets for Florida. Using such an approach allowed us to first identify stakeholder objectives and then define conservation targets to meet those objectives. Stakeholders were able to see how their shared efforts fit into the broader conservation context, and also anticipate the benefits of multi-agency and -organization collaboration. We developed an iterative process for large-scale conservation planning that included defining a shared framework for the process, defining the conservation targets themselves, as well as developing management and monitoring strategies for evaluation of their effectiveness. The process we describe is applicable to other geographies where multiple parties are seeking to implement collaborative, large-scale biological planning.

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1. Introduction

Managing natural resources in an era of global change can be challenging and requires new conservation planning efforts (Hannah et al., 2002; Lawler, 2009). Many of these efforts have become increasingly collaborative and cross political, social, cultural, and conservation management boundaries (e.g., Bamford, Watkins, Bancroft, Tischler, & Wahl, 2008; Chester, 2003; Jodice and Suryan, 2010; Weeks, Hyman, & Need, 2011). Landscape-scale, collaborative conservation efforts have the ability to account for migration, wide-ranging species, seasonal habitat use, and inter-connected ecosystem processes. Collaborative efforts can increase conservation efficiency and success compared to what any single entity can achieve alone (e.g., Brick, Snow, & Van de Wetering, 2001; Lauber, Stedman, Decker, & Knuth, 2011; Mace et al., 2000). A recent

example of cross-boundary collaboration to meet landscape-scale conservation planning needs is the creation of twenty-two Landscape Conservation Cooperatives (LCCs) across the United States (Sec. Order No. 3289 Amendment 1, 2010). Landscape Conservation Cooperatives focus on work achieved through state and federal agencies and other organizations for collective action, to produce a combined effort that extends beyond the limits of any individual organization's efforts and capabilities. By operating at a landscape scale, LCCs work toward the idea of managing and protecting land as a network rather than as isolated areas (Lemoine and Böhning-Gaese, 2003).

Conservation targets, the measurable expressions of desired resource conditions, are an important component of biological planning and allow for directed implementation of conservation design that can improve the quality and quantity of natural resources (Groves et al., 2002; Parrish, Braun, & Unnasch, 2003). Conservation targets are also referred to using numerous terms, such as ecological, biological, environmental, or management indicators, measurement endpoints, measuring entities, or variables (Heink and Kowarik, 2010a). Examples of conservation targets include goals for land protection (e.g., Armesto, Rozzi, Smith-

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Ramírez, & Arroyo, 1998; McNeely and Miller, 1983; Noss, 1996) and biodiversity (e.g., Pressey, Cowling, & Rouget, 2003; Convention on Biological Diversity, 2010; Leadley et al., 2014). Conservation targets provide accountability and transparency about conservation objectives and can help to identify the necessary resources and time frames to achieve them (Noss et al., 2012). Monitoring the status of conservation targets is an effective means to evaluate the response of the ecosystem to management actions, and potentially provides an early warning about undesirable trends in ecosystem health (Cairns, McCormick, & Niederlehner, 1993; Dale and Beyeler, 2001; Noss, 1990). Additionally, defining and tracking conservation targets can assist in identifying knowledge gaps and increase understanding of natural resources (Louette, Adriaens, Paelinckx, & Hoffmann, 2015). However, to design an appropriate monitoring system, it is essential to describe a clear set of desired ecosystem objectives or outcomes, and select conservation targets that allow for the evaluation toward desired outcomes (Cairns et al., 1993).

Conservation targets should be rigorous and clearly-defined (Balmford et al., 2005) and evaluated against a set of criteria to reach desired outcomes (Heink and Kowarik, 2010b). A wealth of literature exists on how to select conservation targets (Dale and Beyeler, 2001; Donnelly, Jones, O'Mahony, & Byrne, 2007; Doren, Trexler, Gottlieb, & Harwell, 2009; Heink and Kowarik, 2010b; Kurtz, Jackson, & Fisher, 2001), and it is important to establish criteria that allow selection of the most effective and efficient conservation targets. Criteria can fall into different categories, such as feasibility, economic, or ecological criteria (Heink and Kowarik, 2010b). An example of feasibility criteria is highlighted in the debate regarding whether to set conservation targets that are biologically necessary or politically reasonable (Noss et al., 2012). Ecological criteria might focus on the ability of the conservation target to represent the function, health, or sensitivity to change of a specified ecosystem (Noss, 1990). Other criteria can relate to economic importance (Pearson, 1994) or public appeal (Mace and Baillie, 2007); for example, logged forests and low-intensity farm lands are socially and economically important lands that fit in both categories (Lindenmayer, 1999; Moreira, Queiroz, & Aronson, 2006).

In areas undergoing rapid environmental change, it is of critical importance to define conservation targets to determine the severity of change and identify means to protect natural and cultural resources over an appropriate time scale. Florida has a high density of species and ecosystems of conservation concern (Knight, Oetting, & Cross, 2011; Stein, Kutner, & Adams, 2000), as well as many threats to the persistence of native species and their habitats, including high human population growth and urbanization (Mackun and Wilson, 2011), habitat fragmentation (Brooks et al., 2002), climate change (IPCC, 2007; Von Holle, Wei, & Nickerson, 2010), sea level rise (Noss, 2011), and invasive species (Dorcas et al., 2012; McCleery et al., 2015). Mitigating these threats to promote persistence of intact ecological systems in the twenty-first century will require substantial effort, and the identification of clear, attainable conservation targets on a landscape scale. The three LCCs within Florida are working on conservation planning at large, landscape scales (Fig. 1). The LCCs were given a national mandate to define conservation targets for their geography, but were not given direction on how to arrive at a set of conservation targets, largely because although guidance is available (e.g., Cairns et al., 1993; Groves et al., 2002; Parrish et al., 2003; Salafsky, Margoluis, Redford, & Robinson, 2002), a process has not been described.

In this paper we describe a value-focused approach to defining conservation targets across the landscape of the Peninsular Florida LCC (PFLCC, Fig. 1). Though collaborative processes can yield great success for conservation planning, they are not without pitfalls including contrasting cultures and norms and conflicting missions

(Clark et al., 1998; Layzer 2008; Yaffee, 1996). Value-focused thinking starts with setting objectives for a decision by examining values of stakeholders involved in the decision (i.e., what they want) and allows for incorporation of multiple, even conflicting objectives (Keeney, 1992). A value-focused approach allows for selection among alternative options by evaluating how well each potential option meets the objectives of stakeholders (Nicholson and Possingham, 2006). This approach differs from the more commonly employed action-focused approach, in which options are weighed without explicitly identifying stakeholder values and objectives (Johnson, Eaton, Williams, Jensen, & Madsen, 2015). Implementation of value-focused approaches is on the increase in conservation planning and natural resource management, for example, in setting of limits for sustainable use of natural resources (Johnson, 2011; Milner-Gulland, 1997), control of invasive pests (Sells, 1995), and endangered species conservation (Johnson et al., 2011; Runge, Converse, & Lyons, 2011). The purpose of this paper is to describe a value-based process for defining conservation targets for use in collaborative, landscape-scale conservation. As such, the contribution of this paper is primarily methodological. The specific conservation targets resulting from this process are still being refined. The process we present is applicable to similar efforts in other geographies for setting conservation targets using collaborative, landscape-scale conservation planning.

2. Iterative process for defining conservation targets

Defining conservation targets is part of a larger, iterative process we developed to achieve landscape-scale conservation in the collaborative framework of the PFLCC. Within that context it is important to develop shared goals, foster collaboration, and link conservation targets to implementation. Our iterative process (Fig. 2) draws from the extensive literature on conservation planning (e.g., Groves et al., 2002; Knight, Cowling, & Campbell, 2006; Mace et al., 2000) with explicit recognition of the need for individuals and institutions to feel empowered (Knight et al., 2006) through a participatory process. Our six main steps are: 1) Describe the background information, the focus geography, and the process, 2) Describe the structural framework for defining conservation targets, and the objectives and values of the partners involved, 3) Define conservation targets; this is achieved iteratively through drafts, refinements, and eventual approval; it may require several iterations to reach a set of conservation targets, 4) Identify and implement management strategies that will aid in reaching the conservation targets, 5) Monitor conservation targets to determine their status and trends, 6) Evaluate the effectiveness of the conservation targets at reaching their purpose and fulfilling the values of the partners in the focus geography; and identify gaps to improve future efforts, similar to other conservation planning frameworks that have a step that requires an articulation of goals, objectives, or valued elements. In this paper, we focus on our steps 1–3, which can be applied to similar efforts for setting conservation targets. Steps 4–6 are beyond the scope of this paper and require commitments from PFLCC partners and continued work into future years. The latter steps have a greater likelihood to succeed with the engagement of PLFCC partners in steps 1–3.

2.1. Step 1: describe the background information, the focus geography, and the process

Florida has three LCCs within its boundary. The Peninsular Florida LCC PFLCC covers the bulk of the state, with the remaining northern portion of the state covered by the South Atlantic LCC and the Gulf Coastal Plains and Ozarks LCC (Fig. 1). Each LCC is guided in decision making by a Steering Committee of

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