Received: 10 May 2023 | Accepted: 8 February 2024

DOI: 10.1002/2688-8319.12313

Ecological Solutions and Evidence | BRITISH ECOLOGICAL SOCIETY

PRACTICE INSIGHTS

Writing SMART objectives for natural resource and environmental management

Caleb A. Aldridge[1] | Michael E. Colvin[2]

[1]U.S. Fish and Wildlife Service, Lower Mississippi River Fish and Wildlife Conservation Office, Tupelo, Mississippi, USA

[2]U.S. Geological Survey, Columbia Environmental Research Center, Columbia, Missouri, USA

Correspondence
Caleb A. Aldridge
Email: caleb_aldridge@fws.gov and caleb.a.aldridge@gmail.com

Funding information
Mississippi Department of Wildlife, Fisheries, and Parks; Mississippi State University; U.S. Fish and Wildlife Service; U.S. Geological Survey

Handling Editor: John Murray-Bligh

Abstract

1. In natural resource and environmental management, well-written objectives are critical for effective decision-making and the achievement of desired outcomes. This article aims to improve practitioners' ability to identify and write SMART (*S*pecific, *M*easurable, *A*chievable, *R*elevant, *T*ime-bound) objectives for natural resource and environmental management.
2. We differentiate between research and management objectives, define each SMART criterion, and introduce a template to help write management objectives. We demonstrate the use of the SMART management objectives template with a hypothetical example and two recent applications.
3. The template simplifies the process of writing SMART management objectives. It is applicable to popular management frameworks like management by objectives and structured decision making.
4. The implementation of SMART criteria and the provided template can lead to better outcomes in natural resource and environmental management, benefiting current and future generations.

KEYWORDS
conservation planning, decision-making process, environmental planning, environmental quality management, natural resource management, objective setting, SMART criteria

1 | INTRODUCTION

The Public Trust Doctrine and similar policies mandate that local, regional and national government agencies steward natural resources and the environment for the benefit of present and future generations (Geer v. Connecticut, 1896; Illinois Central Railroad Company v. Illinois, 1892; Organ et al., 2012). Natural resource and environmental quality issues are complex, from biodiversity losses and impacts of invasive species to environmental degradation and climate change. Intertwining biological information, societal needs and cultural protection requires careful consideration of humankind and ecological systems, which involves developing and implementing plans at multiple scales to link high-level goals to actionable objectives (Berkes et al., 2000, 2002; Bryson, 2018; McMullin & Pert, 2010; Ostrom, 2007, 2009; Powell, 2020).

Plans typically fall into one of four general categories: strategic, operational, management, and logistical (Figure 1). Strategic plans state qualitative *goals* that reflect agency mandates and aspire to fulfil public values (Aldridge et al., 2021; Barber & Taylor, 1990). Operational plans govern *how* management planning and decision making is conducted (*processes*; Bryson, 2018; Gregory et al., 2012; Runge et al., 2013). Operational plans also define the roles and

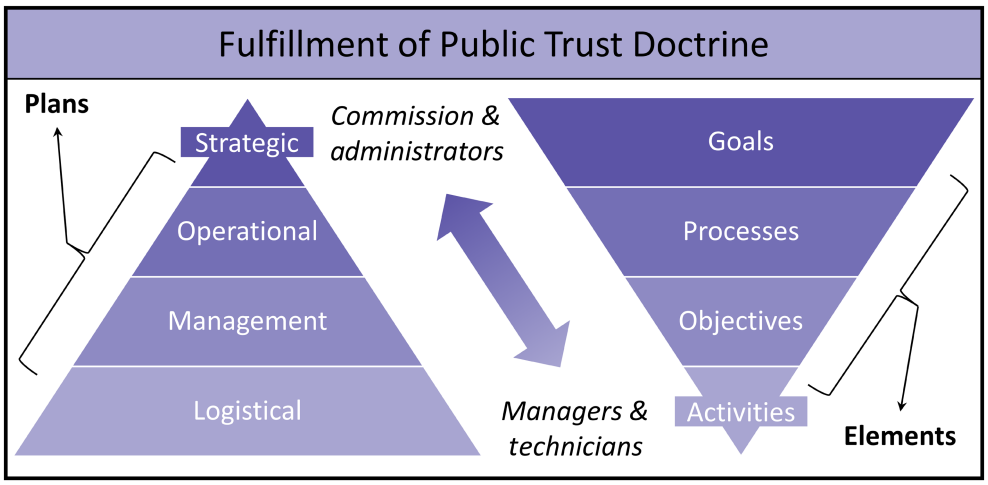

FIGURE 1 Relationships between types of plans (left), who typically develops each type of plan (center) and the primary elements of plans (right).

responsibilities of the agency, agency personnel and other interested parties (Bryson, 2018; Gregory et al., 2012; Runge et al., 2013). Management plans articulate *objectives* that are used to compare the expected outcomes of alternative management actions, evaluate progress towards the desired state of the system, and achieve strategic goals (Conroy & Peterson, 2013; Gregory et al., 2012; Powell, 2020; Runge et al., 2013). Logistical plans outline the steps to implement management actions and monitoring (*activities*), specifically, how, when, where and by whom they will be executed. Typically, agency commissioners and administrators produce strategic and operational plans, while field-based managers are responsible for developing and maintaining management and logistical plans (Figure 1; McMullin & Pert, 2010; Powell, 2020). Here, we are focused on management plans, specifically management objectives, but it is important to clarify that management plans are shaped by strategic and operational plans and are often accompanied by or include a logistical plan for implementing chosen actions and monitoring (Anderson, 2002; Powell, 2020). In addition, the comprehensibility of management objectives increases with the inclusion of background information, the management context (problem statement) and a synthesis of past management actions of the system being managed.

Developing objectives for management plans is an essential but challenging step in the planning process (Doran, 1981; Gregory et al., 2012). If management objectives are incomplete, wrong, or simply not stated, effort and other finite resources may be misdirected to the wrong problem, and new problems or conflicts can arise (Alexander, 2008; Bond et al., 2008; Gregory et al., 2012; Meadows, 2008; Montibeller & von Winterfeldt, 2015). This is a legitimate hurdle and concern for many natural resource and environmental managers, in part, because management and decision sciences tend to go underemphasized during university coursework and early career development, despite being able to provide conceptual and analytical tools to formally analyse decisions and cope with biases (Barber & Taylor, 1990; Colvin & Peterson, 2016; Johnson et al., 2015; Kahneman, 2011; Kelso & Murphy, 1988; Montibeller & von Winterfeldt, 2015; Nielsen, 1984; Powell et al., 2011). Therefore, it is useful to clarify how management objectives differ from research or analytical objectives, since the latter receives more attention during university training (Johnson et al., 2015). Research or analytical objectives are "active statement[s] about how the study [or analysis] is going to answer the specific research question[s]" (Farrugia et al., 2010). Management objectives, however, are "statements of the fundamental interests that could be affected by a decision—the 'things that matter' to people" or the things that have intrinsic social and cultural value (Gregory et al., 2012). Management actions and monitoring activities are often conflated with management objectives. For example, statements such as "better understand habitat effects on bobwhite quail reproduction" (research), "monitor water quality" (monitoring), or "develop crappie length limit recommendations" (management action) are not management objectives but describe activities that serve as means of achieving various ends (i.e. management objectives).

Several techniques exist for developing management objectives, from brainstorming and charette procedures to mind maps and influence diagrams (Anderson, 2002; Gregory et al., 2012; Kaner, 2014; Schwartz et al., 2018). A review of techniques for developing management objectives is beyond the scope of this article. Here, we focus on writing management objectives. Writing is a deceptively simple tool that accompanies other techniques. Like most writing exercises, writing to develop management objectives is an iterative process in which "things that matter" are explicitly stated and revised. Although iteration is key, guidance and templates can help expedite the writing process, thereby saving natural resource and environmental managers time and effort. However, the question becomes: How does one know if one's management objectives are written well?

Doran's (1981) SMART criteria are often cited as a benchmark to write good management objectives. SMART is an acronym that

stands for *S*pecific, *M*easurable, *A*chievable, *R*elevant and *T*ime-bound (McMullin & Pert, 2010; Powell, 2020). Although not a new concept in the natural resources and environmental literature, little guidance has been provided to natural resource and environmental managers beyond listing the criteria, but see Alexander (2008) for a more detailed discussion. Thus, many natural resource and environmental managers may be left wondering "what is actually meant by each of the SMART criteria," "are my management objectives SMART," and "is it essential that all criteria are met?" The purpose of this article is to improve the reader's ability to identify and write SMART objectives for natural resources and environmental management. To accomplish this, we define each SMART criterion, identify which of the criteria are essential to meet, and provide a template to streamline the process of writing SMART management objectives. We demonstrate the application of the template with a hypothetical example, relate two recent applications of our SMART management objectives template, and discuss how SMART management objectives can integrate with two popular management frameworks.

2 | CRITERIA FOR SMART MANAGEMENT OBJECTIVES

There are several definitions of SMART criteria that exist, with Doran's (1981) definitions originally created for use in business management. Other definitions have been adapted for specific fields including public health and healthcare (Centers for Disease Control and Prevention, 2018) and natural resources and environmental management (Alexander, 2008; McMullin & Pert, 2010; Powell, 2020; Rice et al., 2005). We summarize the definitions of the SMART management objective criteria as follows.

- *S*pecific. The management objective clearly identifies what is being managed, whether biotic, abiotic, sociocultural, or human resources. The direction of change towards the desired state of what is being managed is clearly indicated (e.g. increase or decrease), and the management objective is mutually exclusive, ensuring it does not overlap with other management objectives.
- *M*easurable. A quantifiable measure is associated with what is being managed. Measures can be quantified directly through sampling or monitoring (e.g. average fish weight, ungulate relative abundance, or area of culturally significant habitat). Alternatively, a management objective may be indirectly quantified using a proxy (e.g. Secchi depth for water transparency) or constructed measure (e.g. Likert scale for user satisfaction). Regardless of the type of scale, what is being measured must be quantifiable to satisfy the *M*easurable criteria.
- *A*chievable. The management objective considers the spatial and temporal context of what is being managed and how it has been monitored. The desired state of the system is within the realistic potential of the system (for example, the thermal regime is favourable to a year-round trout fishery), and there are sufficient resources to implement management actions linked to the management objective and to monitor the quantitative measure(s) of the management objective after implementation. Targets, if necessary and justified, are crafted with the historical, ecological, and sociocultural aspects of the resource in mind.
- *R*elevant. The desired state of what is being managed aligns with the agency's strategic goals and legal obligations. The measure of what is being managed is quantitatively mapped to the desires of the stakeholders (i.e. the value model or the utility function). For example, if managing average weight of fish, it is likely important to know the relative satisfaction of anglers for average fish weights of, for example, 0.34, 0.91 and 1.36 kg (0.75, 1.50 and 2.25 lbs).
- *T*ime-bound. The time scales for evaluating progress towards achieving the management objective and the time limit to achieve the management objective are defined. The time component may also act as a trigger to re-evaluate the full set of management objectives within the management plan and the actions and strategies designed to achieve them.

We note that sometimes *A*ttainable is used in place of *A*chievable. In such cases, we presume the definitions of *A*ttainable to be the same as what we have provided for *A*chievable. Likewise, *R*ealistic is sometimes used instead of *R*elevant. However, if *R*ealistic is used, there would be redundancy in meaning with *A*chievable or *A*ttainable and a neglecting of *R*elevance as we have defined it above. In any case, the particular words used for *A* and *R* may not be that important, as we will explain further.

Not all criteria are as easily fulfilled as others, nor must all criteria be met for management objectives to be useful (Doran, 1981). Of the five criteria, the *S*pecific, *M*easurable and *T*ime-bound are the more concrete and typically easily met when writing management objectives (Gregory et al., 2012). The *A*chievable and *R*elevant criteria are more abstract and require careful consideration of strategic plan goals, agency resources and constraints, the system's management history and the desired state of the system, including the perspectives of interested parties and decision makers. Even so, grappling with these considerations for each management objective within a management plan may outweigh simply considering them as constraints or trade-offs in a more formal analytical framework, like structured decision making (SDM). As such, we think that focusing first on the *S*pecific, *M*easurable, and *T*ime-bound criteria will likely result in useable, well-written management objectives, after which the *A*chievable and *R*elevant criteria can be considered to the extent necessary and justifiable for writing the management objective. Beyond writing management objectives, if one needs to

- determine the desirability of values for a management objective's *M*easure (value model or utility function),
- prioritize the importance of management objectives based on values (objective weights) and/or
- evaluate trade-offs among management objectives given consequences of actions (trade-off analysis),

as related to the *A*chievability and *R*elevance, we suggest using formal methods and point the reader to introductory techniques found in Gregory et al. (2012) and Hammond et al. (1999).

As an additional note, targets are often set to fulfil the *A*chievable and *R*elevant criteria, but caution is needed. Targets can constrain thinking, hard-wire trade-offs, and lead to mis-calibrated targets due to equating the likelihood of achieving a target with the desirability of the target (Gregory et al., 2012; Keeney, 1992a, 1992b). For example, setting a high target for relative abundance of Bluegill fish measured by boat electrofishing may conflict with the desired population size structure, since higher population densities may slow or stunt growth. If target values are necessary and justifiable (e.g. legally mandated), they should clarify the desired state of what is being managed using techniques alluded to above and not constrain consideration of alternative management actions, deter comparisons and contrasts of actions, or be the ultimate determination of success.

We need to be clear, despite the risk of being redundant, that meeting the *S*pecific, *M*easurable and *T*ime-bound criteria are the most important and *A*chievable and *R*elevant are not required to have SMART management objectives.

3 | THE SMART MANAGEMENT OBJECTIVE TEMPLATE

We developed a template to help natural resource and environmental managers streamline the process of writing and revising SMART management objectives for their management plans. The template was designed to first fulfil the *S*pecific, *M*easurable and *T*ime-bound criteria (Conroy & Peterson, 2013; Doran, 1981; Gregory et al., 2012). Even so, the *T*ime-bound criterion may not always need to be included in the management objectives if it is already defined in the management plan and applies equally to all. The SMART management objectives template is a fill-in-the-blank or Mad Libs™ style tool that includes five components:

2nd or 3rdStep	1st Step	2nd or 3rd Step	5th Step (if needed)	4th Step (as needed)
Desired direction	What is being managed	Quantitative measure	Target with reference	Timeframe with reference

where each component is formulated in the order of steps indicated in the top row but written following structure in the bottom row and where:

- "What is being managed" depends on the system and the management problem (or opportunity). What is being managed is often an interacting system of biological, social, cultural, and abiotic features. For example, a wildlife management area in a temperate North American forest might include white-tailed deer abundance, hunter participation, non-hunting resource user safety, and water quality as features being managed. This should be formulated first. (Satisfies the remainder of the *S*pecific criterion).
- "Desired direction" indicates if the management objective's measure should change. The desired direction is a transitive verb like maximize, increase, decrease, or minimize. This should be formulated in the second or third step, whichever is easier. (Partially satisfies the *S*pecific criterion).
- "Quantitative measure" refers to the quantity of interest associated with what is being managed, serving to clarify the feature under management. Some examples include the average weight of harvested animals, catch per unit effort, or a five-point scale of boater satisfaction. Units of measure should be made explicit for quantitative measures, such as fish/angler/hour for anglers' catch rate. Qualitative measures, such as angler satisfaction, may be unitless values quantified from a point or a Likert scale. This should be formulated as the second or third, whichever is easier. (Satisfies the *M*easurable criterion).
- "Timeframe with reference" defines when progress towards the management objective will be assessed or when the management objective must be achieved. This should be formulated fourth. It may be excluded if it has already been specified elsewhere in the management plan and applies equally to all management objectives. (Satisfies the *T*ime-bound criterion).
- "Target with reference" indicates the quantitative change of a measure towards a desired value, referring to the current state and the target value. It is imperative that this component be considered meticulously and should only be included if necessary and justifiable. This should be formulated last. (Contributes to the satisfaction of the *R*elevant and *A*chievable criteria).

To demonstrate how the template works, we provide a contrived example that uses iterative revisions to build a management objective in a hypothetical management plan for "Lake XYZ." More than one step can be completed per iteration, and in our experience the first iteration typically includes at least two steps, "what is being managed" and either the "desired direction" or "quantitative measure". In our example, we start with what is being managed and its quantitative measure fulfilling the *S*pecific and *M*easurable criteria. We then take steps in the following iterations to meet *T*ime-bound, *R*elevant, and *A*chievable criteria. We assume in our example that the *T*ime-bound criterion was not included elsewhere in the management plan. In each iteration below, we used the SMART criteria definitions and template to form and draft the management objective.

3.1 | Iteration 1

Anglers' catch rate of black basses (*Micropterus* spp.)	(Fish/angler/hour)
What is being managed	Quantitative measure

Management objective: Anglers' catch rate (fish/angler/hour) of black basses (*Micropterus* spp.) in Lake XYZ.

Iteration 1 identifies what is being managed and a quantitative measure making it *M*easurable but not fully *S*pecific because the desired direction for anglers' catch rate (fish/angler/hour) is missing.

3.2 | Iteration 2

Increase	Anglers' catch rate of black basses (*Micropterus* spp.)	(Fish/angler/hour)
Desired direction	What is being managed	Quantitative measure

Management objective: Increase anglers' catch rate (fish/angler/hour) of black basses (*Micropterus* spp.) at lake XYZ.

Iteration 2 is now *S*pecific and *M*easurable but is not *T*ime-bound. A consequence of an unstated timeframe is that management actions can be implemented to achieve a management objective for longer than is necessary, and management becomes cost inefficient. While the management objective may be achieved in a relatively short time (1–5 years), specifying a time boundary to achieve the management objective forces a timely evaluation of management actions and may trigger a need to reevaluate the management objectives set. Iteration 3 adds the *T*ime-bound criterion to Iteration 2.

3.3 | Iteration 3

Increase	Anglers' catch rate of black basses (*Micropterus* spp.)	(Fish/angler/hour)	Within 3 years (2023–2026)
Desired direction	What is being managed	Quantitative measure	Timeframe with reference

Management objective: Increase anglers' catch rate (fish/angler/hour) of black basses (*Micropterus* spp.) at Lake XYZ within 3 years (2023–2026).

Iteration 3 now sets a timeframe to achieve an increase in the anglers' catch rate (fish/angler/hour) of black bass. As is, this management objective is a suitable SMART management objective. Managers may, however, know and want to express how much of an increase in anglers' catch rate (fish/angler/hour) of black basses within 3 years would achieve the management objective. Adding a target value for the quantitative measure, based on a good understanding of what catch rate is satisfactory to anglers, can help when evaluating whether the management objective has been achieved. Iteration 4 adds a target to Iteration 3.

3.4 | Iteration 4

Increase	Anglers' catch rate of black basses (*Micropterus* spp.)	(Fish/angler/hour)	By 10% or more (from 0.49 to ≥0.54)	Within 3 years (2023–2026)
Desired direction	What is being managed	Quantitative measure	Target with reference	Timeframe with reference

Management objective: Increase anglers' catch rate (fish/angler/hour) of black basses (*Micropterus* spp.) in Lake XYZ by 10% or more (from 0.49 to at least 0.54) within 3 years (2023–2026).

Iteration 4 helps managers and administrators track progress towards achievement over time (Figure 2). One shortcoming of a target is that it simplifies the desirability (value or utility) of a measure to a threshold, which may not accurately reflect values. Even a simple linear relationship is not captured by a target, let alone nonlinear relationships. Therefore, caution is needed when applying targets and

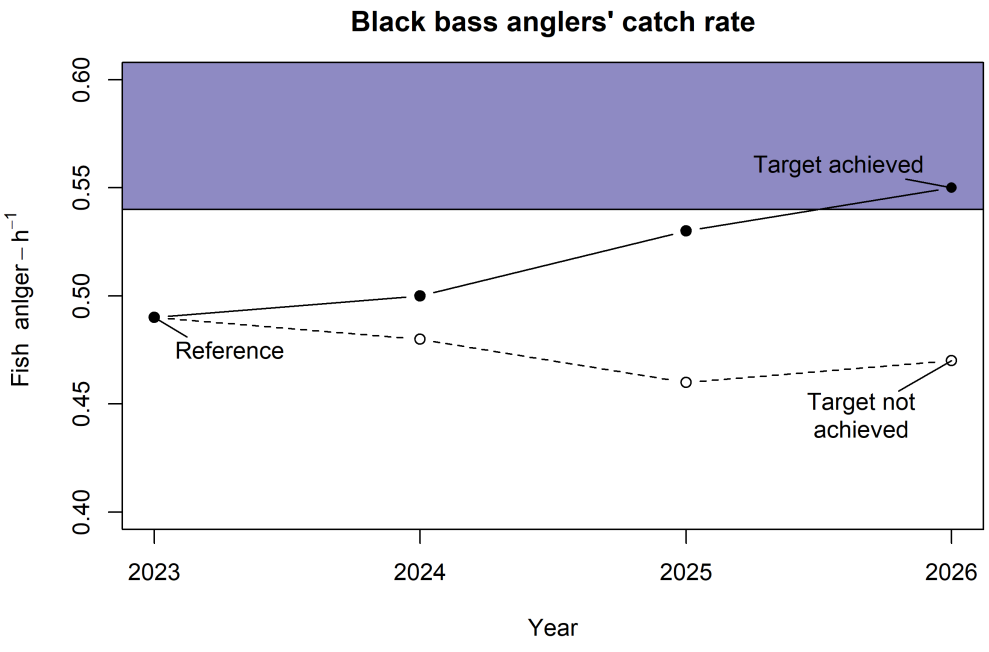

FIGURE 2 Illustration of monitoring a measure to evaluate if a target has been achieved.

we favour the use of more suitable methods, such as direct rating or bisection methods, as they help managers construct a preference across the range of a management objective's quantitative measure (Conroy & Peterson, 2013; Goodwin & Wright, 2004; Gregory et al., 2012; Hammond et al., 1999; Runge et al., 2013; Schwartz et al., 2018).

Writing and revising, that is, iteration, is the primary way to successfully use the SMART management objectives template. Working through the template in the suggested order and using caution and sound judgement when including a target are also key. In addition to the template above, we have included a digital version in the Supporting Information S1.

4 | EXPERIENCES USING THE SMART MANAGEMENT OBJECTIVE TEMPLATE

In the following, we share two applications using the SMART management objective template. We provide overviews of the benefits encountered when constructing or revising management plans and improvements in communication provided by using the SMART management objective template.

4.1 | Application 1: Streamlining construction and revision of lake management plans

In 2015, the Fisheries Bureau of the Mississippi Department of Wildlife, Fisheries, and Parks and its collaborators (including the authors) began to formulate ways to increase efficiency in the construction or revision of fisheries management plans for public water bodies in the state. One way the team decided to increase efficiency was to standardize the language for fisheries management objectives. The "buffet" of standardized fisheries management objectives would be used by the Fisheries Bureau in a computer application that links the management objectives to quantitative measures (i.e. monitoring data) and management actions (i.e. predictive modelling).

The team began standardizing the management objectives by reviewing and documenting statements in past fisheries management plans. The Fisheries Bureau's collaborators then used the SMART management objective template to group and revise 325 objectives from 64 fisheries management plans into 76 SMART management objectives. For example, "monitor crappie angler catch rate to evaluate trends as the reservoir ages and to evaluate the effects of management inputs" became "maximize crappie anglers' catch rate (fish/angler/hour)," shifting an active statement related to answering a research question to a statement about one of the fundamental interests of the system. Under the revised SMART management objective, the desired direction (maximize) of the quantitative measure (fish/angler/hour) for what is being managed (crappie anglers' catch rate) is clear. Additionally, the original desire to analyse the effects of system variables (i.e. reservoir age) and management actions (e.g. implement or modify length regulations) can still be accomplished through monitoring the quantitative measure. However, the focus now shifts to comparing the performance of alternative management actions, given system variation, in order to select the action(s) that best achieve(s) the management objective(s). Finally, using the SMART management objectives template in this project allowed us to easily identify and separate the fundamental management objectives from means management objectives (those that serve as means to achieve fundamental management objectives), monitoring activities, research inputs and management actions.

4.2 | Application 2: Adopting a common group lexicon

Carp species invasive to the Mississippi River Basin, specifically Silver Carp (*Hypophthalmichthys molitrix*), Bighead Carp (*H. nobilis*), Grass Carp (*Ctenopharyngodon idella*) and Black Carp (*Mylopharyngodon piceus*), have proliferated due to aquaculture escapes and intentional releases. Evidence indicates that these species adversely affect ecosystems by causing habitat disturbances and reducing native species biomass, impacting recreational and commercial fisheries (Chick et al., 2020; Kramer et al., 2019). To manage these threats, natural resource agencies apply removal and deterrence management strategies, that is, combinations of management actions, to control populations and prevent their spread to uncolonised water bodies. Decision-analytic methods offer an approach to navigate the complexities of deciding which, where and when management strategies should be implemented. However, decisions are complex, as they commonly involve multiple decision makers from different agencies and interested parties with multiple potentially competing management objectives. Minimizing linguistic uncertainty in stated management objectives can help reduce confusion and help participants organize their management objectives clearly.

We, the authors, were part of a facilitation team that guided decision makers and interested parties through a decision analysis to evaluate alternative sites for deterrents in combination with removal actions in a Mississippi River sub-basin located in the Southeast United States. During the process, we conducted brainstorming sessions on desired outcomes, concerns and questions related to the system and the impacts of invasive carps. To reduce potential confusion and linguistic uncertainty, we used the SMART management objectives template to clarify and transform the group's questions, concerns and desired state of the system into management objectives. For example, concerns that "deterrents and removals might impact native fish species" was reformulated into multiple related management objectives which include "maximize native fish passage," "minimize lethal effects of deterrents on native fish" and "minimize impacts of invasive carp removal methods on non-target native fishes" (similar to the process in the section on *Streamlining construction and revision of lake management plans*). At present, we are working iteratively with the group to continue identifying what is being managed and the desired direction of what is being managed

from questions, concerns and desired system states. Future iterations will identify quantitative measures and fulfil other SMART criteria as necessary.

Adopting the SMART management objectives template has enabled the group to converse clearly and concisely about what they are trying to achieve, or avoid, in the context of invasive carp management. It also helped the group distinguish between information needs (monitoring and research) and management actions. According to the group members, this has helped save time and reduce frustration compared to their previous planning experiences. Furthermore, stating management objectives using the SMART management objectives template helped the group structure the relationships between different types of management objectives (means vs. fundamental) since some serve as a means to others (for example, the three management objectives above are means to "minimize impacts to native fish species").

5 | USING THE SMART MANAGEMENT OBJECTIVES TEMPLATE IN MBO AND SDM

Writing SMART natural resources and environmental management objectives can contribute to sound management. However, only a tried-and-true management (i.e. decision-making) framework can ensure a process for making good choices (Schwartz et al., 2018). Having SMART management objectives as described and illustrated above helps to efficiently communicate resource issues, to express the desired state of the managed system, and to frame management objectives so that quantitative results can be evaluated (Doran, 1981; Ogbeiwi, 2017). These characteristics fit well within two common management frameworks in natural resources and environmental management: Management by Objectives (MBO; Anderson, 2002; Drucker, 1954; Follet, 1926) and SDM (Conroy & Peterson, 2013; Gregory et al., 2012; Hammond et al., 1999). In MBO, the management objectives are developed, prioritized and sequentially achieved through dedicated actions. In SDM, management objectives are organized hierarchically, with multiple "means" objectives helping to achieve one or more "fundamental" objectives (Conroy & Peterson, 2013; Gregory et al., 2012; Runge et al., 2013). Management objectives can be considered and achieved simultaneously in SDM, with actions or strategies developed intentionally to achieve all management objectives and trade-offs analysed explicitly.

For MBO and SDM, or any other management approach, it is essential that management objectives are *S*pecific and *M*easurable. As Wheelan (2013) states, "'You can't manage what you can't measure.' *True. But you had better be darn sure that what you are measuring is really what you are trying to manage*." Drawing on this insight, it is further recommended that management objectives are also *R*elevant and *T*ime-bound. These two criteria can sometimes be 'built in' as features of the management plan. For instance, objective hierarchies are commonly used in SDM to arrange means management objectives so that their *R*elevancy is apparent by the fundamental management objectives under which they are nested. Similarly, prioritizing management objectives in MBO underscores that the *R*elevancy of management objectives can be clarified by deliberating and justifying why a management objective was given its particular ranking. The *T*ime-bound criterion establishes times for evaluation and limits for achievement of management objectives in both SDM and MBO, and for MBO it ensures that low-priority management objectives are not overshadowed or forgotten. The final, yet equally significant aspect, is checking that management objectives are *A*chievable. Within SDM, constraints and uncertainty related to *A*chievability (e.g. budget fluctuations and mandates) are evaluated during trade-offs analysis, whereas in MBO, such considerations are addressed in a less formalized manner.

We are more familiar with and favour SDM as a management framework and provide additional advice about using the SMART management objectives template within SDM. First, the SMART management objectives template should be used in concert with objectives elicitation, classification and structuring methods (Runge et al., 2013). This recommendation stems from the recognition that using the SMART management objectives template alone may pose challenges in identifying all pertinent management objectives, understanding their tractability within the scope of the management decision, and discerning whether they serve as means of more fundamental management objectives. In the digital SMART management objectives template (Supporting Information S1), we include columns to help structure, labelled "Feeds *X* objective(s)" and "Fed by *X* objective(s)," but advocate the use of techniques such as objective hierarchies or influence diagrams to clarify the relationships between management objectives. Second, SMART management objectives do not inherently constitute a formal approach to learning-by-doing (i.e. adaptive management). Indeed, exemplifications of adaptive management, as delineated by Williams (2011), are seldom encountered. However, the SMART management objectives template can help set up formal learning by specifying which monitoring measurements inform management objectives (Figure 2; Williams & Brown, 2012). Then, as management actions are implemented, one can leverage formal learning methods (e.g. Bayesian updating) to gain a better understanding of how management actions influence the system and ascertain which management actions or strategies are most likely to achieve management objectives (Conroy & Peterson, 2013; Williams, 2011).

6 | CONCLUSIONS

Creating good management objectives can be challenging, but SMART management objectives help to communicate management issues more clearly, express what is desired by the agency and the public more explicitly, and enable a quantitative evaluation of progress towards achieving management objectives (Alexander, 2008). Providing definitions for the SMART criteria is a

great step forward from just listing the criteria (Alexander, 2008), but we go even further to provide managers with a template to help streamline the process for writing SMART management objectives. Perhaps, as a higher frequency of SMART management objectives are stated in management plans, they will serve as a means in helping close the research–implementation gap (Knight et al., 2008). Similarly, as professionals adopt SMART management objectives and other tools from management and decision sciences, universities will respond by equipping students with the necessary skills to be successful, thus helping close an "education–conservation" gap. Fundamentally, however, our aim herein is to help managers improve the effectiveness of their natural resource management.

AUTHOR CONTRIBUTIONS

Caleb A. Aldridge and Michael E. Colvin conceived the ideas and designed the template; Caleb A. Aldridge led the writing of the manuscript. All authors critically contributed to the drafts and gave their final approval for publication. Our team, although from a single country, actively incorporated insights from local scientists and managers and sought diverse perspectives on our research questions and methodologies. We prioritized the inclusion and citation of literature from various regions to ensure a comprehensive and representative approach.

ACKNOWLEDGEMENTS

Part of this research was conducted while both authors were affiliated with Mississippi State University, Department of Wildlife, Fisheries and Aquaculture. This research was supported by the Mississippi Department of Wildlife, Fisheries, and Parks; Mississippi State University; the U.S. Fish and Wildlife Service; and the U.S. Geological Survey. This publication is a contribution of the Forest and Wildlife Research Center. The authors thank their colleagues Neal Jackson (USFWS) and Logan Sleezer (USGS) for their recommendations that helped improve the readability of this manuscript. The findings and conclusions in this article are those of the author(s) and do not necessarily represent the views of the U.S. Fish and Wildlife Service. This article has been peer reviewed and approved for publication consistent with USGS Fundamental Science Practices. Any use of trade, firm or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare.

PEER REVIEW

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1002/2688-8319.12313.

DATA AVAILABILITY STATEMENT

Empirical data were not used for this research.

ORCID

Caleb A. Aldridge https://orcid.org/0000-0002-7655-9535

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Supporting Information S1. A digital spreadsheet version of the SMART management objectives template.

How to cite this article: Aldridge, C. A., & Colvin, M. E. (2024). Writing SMART objectives for natural resource and environmental management. *Ecological Solutions and Evidence*, *5*, e12313. https://doi.org/10.1002/2688-8319.12313