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Dale Goble

*University of Idaho, College of Law, gobled@uidaho.edu*

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#### Recommended Citation

62(10) Biosci. 874 (2012)

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# Using Conservation Management Agreements to Secure Postrecovery Perpetuation of Conservation-Reliant Species: The Kirtland's Warbler as a Case Study

CAROL I. BOCETTI, DALE D. GOBLE, AND J. MICHAEL SCOTT

*Kirtland's warbler is one of many conservation-reliant species listed under the Endangered Species Act (ESA). This species has met recovery goals, but removing it from the protections of the ESA is problematic because of its reliance on ongoing conservation. We define conservation management agreements (CMAs) and describe how they may provide a mechanism to protect conservation-reliant species after delisting. We suggest that CMAs should include four major elements: (1) a conservation partnership capable of implementing management actions at conservation-relevant scales, (2) a conservation management plan based on the management actions in the species' successful recovery plan, (3) sufficient financial resources to provide the required conservation management, and (4) legal enforcement. We use the efforts of the Kirtland's Warbler Recovery Team as a case study of the application of CMAs to build and maintain public and private partnerships to ensure continuing management for this species after delisting.*

*Keywords: conservation management agreements, conservation partnership, endangered species, conservation-reliant species, Kirtland's warbler*

**T**he goal of the Endangered Species Act (ESA; [www.fws.gov/le/pdffiles/ESA.pdf](http://www.fws.gov/le/pdffiles/ESA.pdf)) is to recover species by bringing them to “the point at which the measures provided [by the] Act are no longer necessary” (ESA § 3(4)). The ESA's value has been questioned because of the nearly 1400 domestic species listed under it (USFWS 2012a), only 22 have been delisted as *recovered* (USFWS 2012b). When measured against other, more realistic metrics, the ESA has actually been extremely successful: Only seven species have been removed from the list because of extinction (Taylor et al. 2005), and more species have shown progress (e.g., have been downlisted or reclassified from *stable* to *improving*) than the converse since they were listed under the ESA (Schwartz 2008).

The reasons for the low number of delistings from species recovery are both real and numerous (Crouse et al. 2002, Taylor et al. 2005, Schwartz 2008), but the number is misleadingly low, because most listed species will require ongoing conservation actions for the foreseeable future

(Scott et al. 2005): Some of these species have met recovery goals but cannot be delisted because the maintenance of their recovered demographic status is dependent on the maintenance of one or more key recovery strategies under the ESA. These *conservation-reliant species* present not only conservation management challenges (Scott et al. 2005, 2010) but a public perception challenge that adds to the controversy surrounding the ESA and results in a strain on public funding for ESA programs (Kerkvliet and Langpap 2007).

The challenge of conservation-reliant species is that for most listed species, the ESA is the primary source of authority for the conservation actions that maintain their numbers (Goble 2009). When those management actions cease with delisting, the species will again be exposed to the threats that caused its endangerment. For such species, listing may be permanent (Doremus and Pagel 2001) if there is no mechanism to provide the needed conservation actions.

In this article, we discuss conservation-reliant species and suggest that conservation management agreements (CMAs) provide a potential mechanism to solve the delisting conundrum. We define CMAs; provide brief examples of the limited use of such agreements; and examine, in depth, a current attempt to employ a comprehensive CMA to delist and perpetually sustain a conservation-reliant species—the Kirtland's warbler (*Setophaga kirtlandii*). We suggest that the proposed CMA, in the form of a conservation partnership for this warbler, provides an example of one alternative for meeting the ESA's conservation objectives following delisting. The Kirtland's warbler's current recovery program offers an example of a conservation partnership that is tied together through multiple memoranda of agreement (MOAs) developed under the ESA. The collaborative effort is evolving into an independent conservation partnership that is preparing to assume responsibility for the continuing conservation of this species when it emerges from the protections of the ESA.

### Conservation management agreements

Scott and colleagues (2010) concluded that more than 80% of the species listed under the ESA have some degree of conservation reliance. The challenge of conservation reliance in the management of at-risk species is covered by the opening article of this special section (Goble et al. 2012 [in this issue]). Not all at-risk species exhibit the same degree of conservation reliance (Scott et al. 2010). For some species, such as the gray whale (*Eschrichtius robustus*), only one recovery strategy was considered conservation reliant (Scott et al. 2010). The species has been delisted because ongoing take monitoring and management was provided through international and federal regulatory mechanisms (Goble 2009). At the other end of the continuum, species such as the Kirtland's warbler are conservation reliant for every key aspect of their recovery. Regardless of the degree of reliance on continuing conservation, delisting is prohibited if any necessary recovery strategy will not be continued after delisting, because the delisting action will not pass the threat analysis required by the ESA for all listing, reclassification, and delisting decisions. The threat analysis requires an evaluation based on five criteria: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overuse for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; and (5) other natural or anthropogenic factors affecting its continued existence (ESA § 4(a)(1)). The problem with conservation-reliant species is that the threats are mitigated only with continued efforts under the ESA.

Managers of conservation-reliant species must face this dilemma and reach beyond the management mechanisms provided by the ESA. Because the ESA provides or motivates the management tools needed to maintain the species, the threats to that species will return without an alternative plan to sustain the species after delisting. The difficulty

therefore lies in crafting a regulatory mechanism to adequately replace the ESA after delisting and to provide the needed species-specific conservation management (Goble 2009). We suggest that a CMA could serve as this mechanism. Although we focus on delisting in this article, CMAs are a general class of management agreement that may be used not only to facilitate delisting but also to prevent listing in the first place (e.g., candidate conservation agreements) and to promote conservation actions while the species is listed (e.g., habitat conservation plans).

A CMA has at least four general elements: (1) a partnership that makes management possible, (2) a management plan based on the species' successful recovery, (3) sufficient funding, and (4) legal enforcement.

The agreement must entail a conservation partnership that is capable of carrying out the necessary management actions for the foreseeable future. The partners could be from a federal, state, tribal, or local government agency; a nongovernmental conservation organization; or an entity created specifically to provide the conservation management activities required by the species. The partners must have legal authority to implement the management plan. Many potential conservation partners have a broader range of authority than the federal agencies charged with implementing the ESA. Federal land-managing agencies such as the US Forest Service (USFS), the Bureau of Land Management, and the Department of Defense, for example, have the authority to control land uses to protect landscapes and species. State and local governments have the power to zone land uses and to protect plant and animal species located on private property. Conservation landowners have the powers that society gives all landowners to use their land as they see fit and to exclude others from using it.

The agreement must include a conservation management plan based on the management actions that allowed the species' population to recover. Tying the CMA to, for example, a recovery plan will ensure continuation of management actions that have demonstrated conservation benefits. The conservation plan must be designed to operate at the appropriate conservation scale. This plan must also include monitoring and research components and provide for periodic reviews of the effectiveness of the management actions.

Sufficient financial resources must be available to maintain the required conservation actions. One potential model is the habitat conservation planning (HCP) management process. For example, the San Bruno Mountain Habitat Conservation Plan, the first HCP, created a permanent institutional structure to manage the habitat within the HCP area and established an endowment to ensure funding (USFWS 1982).

The agreement must be legally enforceable. The CMA must be either an enforceable contract or an interest (such as a conservation easement) in the lands that are the habitat of the conservation-reliant species. Given the laws on contracting with the federal government, this element may present the thorniest legal problems, but they are surmountable through patient crafting of appropriate MOAs.

CMA will be different for each species. The creation of the management organization—and the managerial, educational, research, and funding structures that it will oversee—demonstrates an approach that allows the delisting of conservation-reliant species. This is not to suggest that only a single approach is available. The complexity of conservation management mechanisms is likely to vary. On one hand, the simplest efforts will be those involving species endemic to the property of a single land manager. Species that occur over a matrix of public and private lands and multiple political jurisdictions, on the other hand, will present greater challenges. In addition, the scale of the management area and the degree of conservation reliance will also affect the complexity of the CMA.

Robbins' cinquefoil (*Potentilla robbinsiana*) is a relatively simple example of the use of CMAs to delist a conservation-reliant species. The species—a dwarf member of the rose family—occurs only on national forest land and, therefore, did not require the creation of a substantial institutional mechanism (Goble 2009) in its CMA. It had been imperiled by trampling and habitat destruction caused by hikers on the Appalachian Trail. To manage this threat, the US Fish and Wildlife Service (USFWS), the USFS, and a conservation organization (the Appalachian Mountain Club) entered into a series of CMAs that provided for ongoing monitoring of and risk management for the species. A Club naturalist is present during the hiking season to monitor the population and to provide ongoing educational activities. The USFWS and the USFS created a memorandum of understanding in which the USFS agreed to continue to monitor and manage the habitat to maintain its biological value to the species after delisting (USFWS 2002). Thus, the conservation partnership agreed to monitor the species and its habitat and to provide continuing education about the species. These activities were reinforced by the USFS's legal authority to manage the species' habitat.

The Columbian white-tailed deer (*Odocoileus virginianus leucurus*) is managed under a diverse group of conservation documents that protect the species' habitat on a range of public and private lands (Goble 2009). These, and other species such as Eggert's sunflower (*Helianthus eggertii*), have been delisted pursuant to CMAs similar to those proposed for the Kirtland's warbler.

The Kirtland's warbler is therefore one of several species that either have reached or are approaching their recovery goals in a landscape where the threats facing the species may be controlled but not eliminated. The CMA outlined here for Kirtland's warbler offers an alternative structure to leaving species forever listed (Doremus and Pagel 2001) under the ESA. It is an approach that engages a broad coalition of conservation partners by recognizing where their interests intersect with those of the imperiled warbler.

### Kirtland's warbler case study

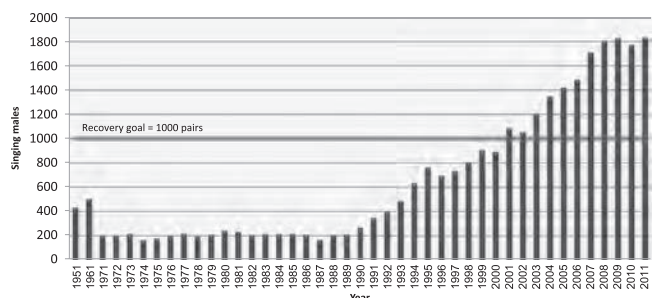
Kirtland's warbler is a ground-nesting, Neotropical migrant that breeds in the early-successional jack pine (*Pinus*

*banksiana*) forests of Michigan. The species winters throughout the archipelago of the Bahamas, but every spring, it returns to densely stocked, large stands of jack pine on the excessively well-drained, glacial outwash sands of Michigan (Byelich et al. 1976). This specialized habitat was historically created by wildfires that burned at a natural disturbance frequency of approximately 60–80 years (Whitney 1986, Cleland et al. 2004). The availability of this habitat has declined because of anthropogenic landscape alterations such as forest fragmentation and fire suppression (Mayfield 1960, Byelich et al. 1976, Cleland et al. 2004). In addition, the human-altered, open landscape invited the invasion of a nest parasite, the brown-headed cowbird (*Molothrus ater*), to which this ground-nesting warbler is particularly vulnerable (Byelich et al. 1976, Walkinshaw 1983). As a consequence, the warbler's population crashed, and the estimated total of only 201 singing males during a third decennial census (1971) represented a 57% decline from the average number of males in the first two censuses (Mayfield 1972). In addition, the range of the species had declined by 1975 to less than half the counties in which it was historically found (Byelich et al. 1976).

The Kirtland's warbler was included on the first list of endangered species promulgated in 1967 under the Endangered Species Conservation Act (Office of the Secretary 1967). Following the enactment of the ESA in 1973, the USFWS created the Kirtland's Warbler Recovery Team, which produced a recovery plan in 1976 (Byelich et al. 1976). The plan established a recovery goal of 1000 breeding pairs distributed across the original range of the species and identified and prioritized several recovery strategies to achieve this goal.

The recovery strategies included the control of brown-headed cowbird populations, habitat management, annual monitoring of the population, research, and public education (Byelich et al. 1976, Kepler et al. 1996). Each strategy has played an important role in the eventual tenfold increase in Kirtland's warbler population size since 1971 (see figure 1) and the 350% increase in the range of the species since 1975 (Probst et al. 2003).

From 1972 to 2009, annual cowbird control near Kirtland's warbler breeding sites removed on average 3897 cowbirds



**Figure 1.** Number of singing male Kirtland's warblers detected in decennial then annual censuses conducted throughout the species' range.

(USFWS 2009). Subsequently, Kirtland's warbler reproduction increased from 0.8 to 3.5 young fledged per nest (Kelly and DeCapita 1982, Walkinshaw 1983, Bocetti 1994). With continuing cowbird control, warbler populations are now producing surplus individuals in managed areas (Bocetti 1994).

Habitat management occurs on about 77,000 hectares (ha) of public land included in 14 Kirtland's warbler management areas on lands owned by the USFS, the Michigan Department of Natural Resources (MI DNR), the Michigan Department of Military Affairs, and the USFWS. These agencies cooperate under several signed MOAs. One is to implement the habitat management strategy that is described in the revised recovery plan (Byelich et al. 1985). The strategy prescribes harvesting and replanting jack pine at a density of 3500–4175 trees per hectare in stands larger than 250 ha with a patchy distribution that leaves openings that contain shrubby understory species such as blueberry (*Vaccinium angustifolium*), bearberry (*Arctostaphylos uva-ursi*), cherry (*Prunus* spp.), and sweet fern (*Comptonia peregrina*). The Kirtland's warbler population responded by increasing (see figure 1) as soon as this habitat management program began to provide suitably aged, densely stocked, patchy habitat (Probst et al. 2003).

The annual Kirtland's warbler singing male census is an essential monitoring tool. Given the species' restricted range, nearly all potential habitats can be monitored each year, which allows both temporal and spatial evaluation of management efforts, including cowbird control and habitat management. Census data are essential to allow researchers to inform land managers about the efficacy of their treatments and to give the recovery team population-trend data with which to assess the full suite of recovery strategies. The monitoring provides a consistent and reliable description of the long-term trends of Kirtland's warbler population size (Probst et al. 2005).

Research has provided critical information to the Kirtland's Warbler Recovery Team and managing agencies that is necessary in order to evaluate and improve management actions. Research has demonstrated the species' positive demographic response to management on the landscape (Probst and Hayes 1987, Bocetti 1994, Kepler et al. 1996). Research has also improved the efficacy of management efforts through recommendations of larger plantation sizes and greater adjacency (Probst and Weinrich 1993, Donner et al. 2008, 2009). Site-selection and site-preparation recommendations have improved species composition and habitat structure in warbler habitats (Kashian et al. 2001, Houseman and Anderson 2002, Probst and DonnerWright 2003). On the wintering grounds, research has improved the understanding of habitat use and the management of that habitat (Wunderle et al. 2010). The success of the recovery program has depended on a strong interaction between applied research and species' management that allowed for dynamic management responses to stochasticity in the environment.

Public education contributes to the recovery of Kirtland's warblers by minimizing the public opposition to other recovery strategies such as cowbird control and habitat management. The public, as well as new agency personnel, have learned about the economic benefits of the warbler recovery program, including the creation of jobs in the timber and ecotourism industries (Solomon 1998). They have learned that many other wildlife species, including game species, also benefit from the management program. In addition, they have learned that the habitat management program protects warblers from wildfires because the jack-pine fuel load is controlled. Once the program's landscape ecosystem approach is explained, most people approve of the conservation management actions (Solomon 1998). However, the effectiveness of the information and education program is short term, and the effort must be continually repeated.

### Facing the species' conservation reliance

The Kirtland's warbler recovery plan recommends that the species "will be removed from the endangered species list" when a self-sustaining population of at least 1000 breeding pairs has been established (Byelich et al. 1976, 1985). The annual census has yielded an estimate of more than 1000 breeding pairs since 2001 (figure 1; Petrucha and Carlson 2006). Even though the species has exceeded the recovery goal for over 10 years, the recovery team has not recommended delisting, because this would lead to a decrease in funding and priority within the managing agencies, which would cause a reduction in or the loss of the implementation of the recovery strategies. The most recent threats analysis (completed by the USFWS as part of a 5-year status review) concludes that the loss of cowbird control and the loss of habitat management are the greatest threats to the species. The team believes that all five recovery strategies are still essential, which makes the species completely conservation reliant. If the species is to be delisted, a legally binding mechanism to replace the ESA must be put in place that will assure the continuation of these strategies at the scale needed to maintain or increase the species' numbers and distribution.

The Kirtland's Warbler Recovery Team is beginning the process of creating a complex CMA that will provide the needed institutional structures and mechanisms to permit the delisting of the warbler and to guide its postdelisting management. The National Fish and Wildlife Foundation (NFWF) has designated Kirtland's warbler as a *keystone species* (NFWF 2009), and it will assist the recovery team in developing the infrastructure necessary to build a strong conservation partnership, to establish an endowed trust fund and secure an enforceable CMA. After delisting, the USFWS will monitor the success of this CMA, including its institutional structure and mechanisms for continuing the recovery strategies, over an extended postdelisting monitoring period. The CMA will initially concentrate on the breeding grounds of the species, because that is where the current limiting factors occur (Probst et al. 2003), but monitoring

and research will be incorporated into the CMA to detect the need for expansion of management actions on the wintering and migratory habitats, if necessary. The CMA is not complete, but the details of the general elements of this delisting mechanism are shared below.

The first element of the Kirtland's warbler CMA is the creation of a nonprofit conservation management organization that will be able to assume the responsibility for managing the warbler. It will be guided by an advisory board made up of both public and private experts drawn from the existing recovery team (or other members of the core managing agencies) and core partners. Together, the board of directors of the nonprofit organization and the advisory board will be the conservation partnership that will provide the institutional mechanism for future conservation management. Partners have been essential to the recovery program, particularly in recent years, because funding for the implementation of recovery strategies has been waning as a result of budgetary constraints. The Audubon Society has provided volunteers to conduct tours and assist with cowbird control. The Nature Conservancy and The Bahamas National Trust have assisted with research and education programs. The Arbor Day Foundation has provided trees for habitat regeneration. Trout Unlimited managed streamside acreage for Kirtland's warblers, and Plum Creek Timber has recently committed some of its acreage in the Upper Peninsula of Michigan and Wisconsin to the high stocking density required for Kirtland's warbler use. In addition to these nonprofit and for-profit private partners, the program has expanded to include other government agencies, such as Marquette County in Michigan's Upper Peninsula and the Wisconsin Department of Natural Resources. Environment Canada now oversees a Kirtland's warbler recovery plan under their Species at Risk Act, and Canadian Forces Base at Petawawa, Canada, is monitoring existing pairs of Kirtland's warblers and managing additional acreage for the species. The Bahamas Ministry of the Environment has considered Kirtland's warblers in the designation of the commonwealth's first national park, which is on Andros Island. Together, the NFWF and the current core partners will continue to reach out to new partners to build the partnership to oversee the management of the species following its delisting.

The second element of the Kirtland's warbler CMA is the development of the conservation management plan. A recent memorandum of understanding (signed in May 2011) among the core managing agencies (MI DNR, USFWS, and USFS) commits to the development of a conservation plan. A small group of experts from these agencies, advised by the current recovery team and selected experts from core partners, is preparing a draft Kirtland's warbler conservation plan that will address the five management strategies employed under the current recovery plan (including key elements of the habitat strategy). All five strategies must continue; the cowbird control and habitat management are critical components that sustain the species, and the

monitoring, research, and education programs support those critical components. Monitoring and research must continue in order for environmental stochasticity and the efficacy of management to be evaluated, as well as for potential future limiting factors such as wintering ground or migratory habitat availability to be identified. Research and education is necessary to detect and respond to changes in public perception of the program.

The third element of the Kirtland's warbler CMA is the establishment of adequate funding to meet the costs of the conservation plan. As the warbler population increased over the past 20 years and state and federal funding decreased, the recovery team was able to reach out to additional conservation partners. The inclusion of these important partners helped to fill the gap in management capability that resulted from agencies having to do more with less. Even before the species' delisting, the Kirtland's warbler recovery program experienced decreased funding as the species increased in numbers and other competing conservation priorities emerged. The existing substantial partnership, however, will not be sufficient to meet the species' needs once it is delisted. Therefore, the work of the conservation partnership will need to be funded with a privately built trust fund that can cover the unmet needs of each partner over time after delisting.

The fourth element of the Kirtland's warbler CMA is the enforceability of the agreement. The conservation plan will set out the roles and responsibilities of each partner. The USFWS must have confidence in the conservation partnership and the strength of the conservation plan before a delisting decision can be made. To meet this requirement, it is expected that the conservation partners will sign binding MOAs to implement the conservation plan. The USFWS will monitor the success of the conservation partnership's ability to implement the conservation plan during an extended postdelisting monitoring period.

With the delisting of the species, the Kirtland's warbler conservation plan will replace the recovery plan, and the advisory board to the nonprofit organization's board of directors will replace the Kirtland's Warbler Recovery Team. At that point, the conservation partnership will assume the role of perpetual protector of Kirtland's warblers in the absence of ESA listing.

The Kirtland's Warbler Recovery Team has always attempted to recover this species within an ecosystem context (Byelich et al. 1985), and this CMA will attempt to do the same. Other state-listed species, game species, and pine-barren associates have been considered in the development of the Kirtland's warbler recovery program. As the team embarks on this effort to develop a strong, complex CMA for the Kirtland's warbler, their vision is to expand to include the appropriate partners (such as private landowners) to achieve the species' management within broader pine-barren ecosystem management. The ultimate goal would be to achieve ecological recovery: to restore pine-barren ecological processes and to achieve population stability that allows evolutionary

potential in the system for pine-barren species, including Kirtland's warblers.

We understand that the Kirtland's warbler CMA is in its beginning stages, but if it is successful, it will provide a model for delisting many conservation-reliant species. This would be a welcome sign of progress for the ESA.

### Acknowledgments

We would like to thank three anonymous reviewers for very helpful comments on this manuscript. The Burton Ellis Fund provided partial funding for DDG. We thank Philip Huber for his contribution to figure 1.

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Carol I. Bocetti ([bocetti@calu.edu](mailto:bocetti@calu.edu)) is the Kirtland's Warbler Recovery Team leader and is an associate professor at California University of Pennsylvania, in California, Pennsylvania. Dale D. Goble is the Margaret Wilson Schimke Distinguished Professor of Law in the College of Law and J. Michael Scott is a university distinguished professor in the College of Natural Resources at the University of Idaho, in Moscow.