

Conservation hospice: a better metaphor for the conservation and care of terminal...

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Introduction

The existence of an unprecedented human-caused extinction event ([Barnosky et al., 2011](#) ; [Ceballos et al., 2015](#)) exacerbated in recent decades by climate change ([Thomas et al., 2004](#)) is well established. Considered in combination with insufficient resources ([McCarthy et al., 2012](#)), the rapidly accelerating extinctions highlight a need for hyper-efficient resource use. Unfortunately, conservation resources are often allocated through relatively inefficient processes ([Ando, 1999](#)) that can be driven by ideology ([Wallace, 2003](#)), values ([Karns et al., 2018](#)), and ultimately, voting. Some conservation experts see triage as a rational response to this context. Conservation triage borrows from triage in medicine to suggest rapid calculations (e. g., optimization and utility functions) about the likelihood of extinction, and sometimes, the value of a species can guide resource allocation toward saving species in the most efficient manner possible ([Bottrill et al., 2008](#)). The medical metaphor, however, extends beyond the uncontested idea of efficiency to imply a need for abandoning expensive and potentially doomed species as a means to provide adequate resources to species with better prognoses and less expensive treatments ([Jachowski and Kesler, 2009](#)). Decisions on how triage should be implemented are high stakes, but [Gerber's \(2016\)](#) research suggests this is precisely why they are useful. For example, although endangered species conservation funding in the United States is positively related to success in recovering many species ([Miller et al., 2002](#)), some more futile efforts spend well in excess of recovery plan targets without curbing population declines. Gerber found eliminating the budget surpluses (i. e., all spending in excess of recovery

plan recommendations) for 50 such species would fully fund conservation for more than 180 other endangered species.

Conservation triage, however, faces several criticisms from the conservation community. First, conservation triage simply is not used to allocate most conservation resources, so its impacts stem less from improving efficiency than from changing how people think about conservation funding and dying species. Regarding the latter, conservation triage suggests resource allocation is so urgent that decisions must be made before changes to resource availability are effected, and this erroneously implies current socioeconomic contexts are static sideboards for resource use ([Vucetich et al., 2017](#)). With sufficient political will, conservation funding could change by orders of magnitude in a relatively short time, thus providing sufficient resources for protecting all biodiversity ([Parr et al., 2009](#))—particularly if support is shifted from other domains (e. g., military spending). Further, the traditional conservation triage metaphor is biased against species that occur at low densities that inherently cost more to protect or recover than others ([Noss, 1996](#)), and efforts to protect those species may be precisely the ones that push innovation and public awareness forward in ways that promote additional resources for conservation in general ([Pimm, 2000](#)). The universality of equal and high value of human life undergirding the triage concept does not apply in wildlife conservation contexts in which no universally accepted valuation of species exists ([Vucetich et al., 2017](#)). Finally, and somewhat ironically, the pragmatic appeal of efficient resource use falls short. [Wilson and Law \(2016\)](#) convincingly argue that public dialog and debate over how resources are used to save species is essential for

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triage to be used within a “ wider system of care,” and we suggest conservation hospice intuitively provides insights for such a system of care.

Conservation hospice may provide a “ third way” for thinking about the management of terminal species. The construct may also provide crucial insight into the large number of conservation-dependent species ([Goble et al., 2012](#)) that will go extinct rapidly without perpetual anthropogenic interventions. We intentionally use the “ third way” label popularized by Bill Clinton and Tony Blair in reference to developing pragmatic solutions to left- and right-wing political gridlock because conservation hospice attempts to reconcile similarly divergent perspectives.

Dame Cicely Saunders is credited with creating the modern concept of hospice in the 1950s ([Clark, 1998](#)). Insights from the movement Saunders started may help conservation biologists think more constructively about classifying and caring for dying species. Although wildlife conservation differs from emergency medicine in key ways ([Vucetich et al., 2017](#)), conservation has striking similarities with more traditional medical care, and in both cases, those with terminal prognoses often receive less attention than they should. In this essay, we suggest hospice care may offer some valuable insight for wildlife conservation during the ongoing anthropogenic mass extinction. We begin by outlining ways wildlife conservation might learn from hospice. Prior application of hospice constructs to management of landscapes being lost to salinization provides a precedent for the extension from human medicine to care for nature ([Hobbs et al., 2003](#)).

Conservation Hospice

Conservation hospice avoids tacit acceptance of resource constraints as justification for abandoning species to extinction. Rather, the fundamental underlying principle of hospice care means even doomed species merit some level of care and associated resources. Those resources, however, would be allocated even in cases in which species extinction was acknowledged to be more likely than recovery. Although this model may seem radical, hospice is already applied to numerous species. Arguably, the list includes many species with high extinction risk and those defined as “conservation reliant,” including cheetah (*Acinonyx jubatus*) ([Ginsberg, 2017](#)), rhinoceros (Rhinocerotidae) ([Haas and Ferreira, 2015](#)), polar bear (*Ursus maritimus*) ([Hunter et al., 2010](#)), and snow leopard (*Panthera uncia*) ([Johansson et al., 2016](#)). Acceptance of resource scarcity has little bearing on conservation hospice because caring for species that our collective actions have harmed is a socially just response to those harms, especially in cases in which they cannot be reversed. Since its inception in medicine, the field of hospice evolved to provide a host of principles for selecting candidates for care, identifying their needs, and meeting them.

Given the disciplinary depth and clearly established three-stage process, it is unfortunate when hospice is erroneously equated to managing pain for a dying patient. As with the medical context of hospice, describing the population considered for care provides a first step for conservation of dying species. Common attributes used for patient selection by hospice experts include expected survival time, symptom burden, treatments, do-not-resuscitate status, quality of life, and wishes of patients ([Kaasa and Loge,](#)

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[2003](#) ; [Gómez-Batiste et al., 2012](#)). Although the latter two categories are difficult to apply in biodiversity conservation contexts, the previous four are directly relevant. Expected survival time certainly relates to wildlife conservation although time scales in conservation are longer than for human hospice, which uses categories ranging from weeks to a year ([Kaasa and Loge, 2003](#)). In wildlife conservation, time scales of concern may range from 1 year to 50 or more ([Brooks et al., 1999](#)). The relative place on this temporal continuum may provide practitioners guidance for how conservation “ treatments” should be applied. For example, species or populations with projected extirpation or extinction being evaluated on a decadal scale (vs. years) may warrant more expensive and labor-intensive treatments because longer persistence of the species may allow for political, economic, or technological innovations that could change a terminal prognosis. This dynamic may be evident in a comparison of the Northern white rhinoceros (*Ceratotherium simum cottoni*) and polar bear. The former was cared for with relatively small allocation of resources despite being functionally extinct; the remaining population consisted of two related females ([Groves et al., 2010](#)), whereas [Derocher \(2010\)](#) and others advocate large-scale resource use, policy change, and technological innovation to save the polar bear from longer term extinction threats posed by climate change.

The concept of symptom burden also relates to wildlife conservation. The ultimate symptoms of concern would be small and declining populations, and these symptoms derive from many causes, some of which are clearly treatable (e. g., poaching), whereas others are less so (e. g., sea level rise).

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Population levels relative to thresholds for genetic bottlenecks or long-term increases in extinction risk can help classify the symptom burden of a potentially dying species even if the thresholds are variable depending on attributes of populations, including how long-lived individuals are ([Flather et al., 2011](#) ; [Shoemaker et al., 2013](#)). Species on low-lying islands carry among the highest symptom burdens because they fill niches that do not exist on adjacent continental areas ([Raia and Meiri, 2006](#) ; [Losos and Ricklefs, 2009](#)) and face complete loss of habitat from sea level rise. Symptom burden for species, however, exists on a continuum. For example, the vaquita (*Phocoena sinus*) population decreased from approximately 150 in the early 2000s to <20 in a 15-year period ([Jaramillo-Legorreta et al., 2007](#)), and conservation solutions are relatively expensive because they require creating major changes in lucrative fisheries ([Dunch, 2019](#)). Conservation triage likely would not allocate resources to conservation in this context. A hospice model rooted in respect for the species' intrinsic value, however, would support the current model of allocating resources to managing the symptom burden, perhaps allowing solutions to the primary threat of by catch in nets to emerge soon enough to save the species.

Treatments also clearly relate to classifying and managing a dying species. Some treatments, such as prescribed fire, have well-defined impacts on endangered species persistence in a landscape and have clearly established costs ([James et al., 1997](#)). Other treatments, such as releasing sterile coyotes (*Canis latrans*) and red wolf-coyote hybrids as placeholders to buffer further red wolf (*Canis rufus*)-coyote hybridization ([Gese and Terletzky, 2015](#)), may be more experimental in nature ([Bohling et al., 2016](#)

) and only considered when delaying extirpation of a population or if the species is critical ecologically, economically, or culturally. Perhaps surprisingly, the do-not-resuscitate status is emerging as relevant to thinking about hospice for wildlife species in part because advances in biotechnology have made de-extinction possible ([Sherkow and Greely, 2013](#) ; [Shapiro, 2015](#)).

Wildlife conservation introduces hospice issues that are different from human contexts. Foremost among these is the complex context for determining who decides whether a species merits hospice and what criteria are used in said decisions. Although society generally accepts intrinsic worth of all humans, that judgment is less universal for other species ([Bruskotter et al., 2019](#)). If, however, we adopt the idea that unique species have intrinsic value, then it follows that those species have a right to be treated with respect for their welfare regardless of their future viability or values they provide to ecosystems and people ([Vucetich et al., 2015](#)). Whether one chooses to intervene with hospice care depends upon the criteria one adopts for intervention, and these are likely to differ from the criteria used in human cases, but conservation hospice would highlight the need to publicly consider and debate the criteria rather than relegate their determination to modelers and the principle of efficiency ([Wilson and Law, 2016](#)). Another unique attribute of hospice care decisions for wildlife conservation is that, unlike dying people, dying species can be preserved after they are extinct in the wild via captive breeding facilities, and genetic engineering seems likely to render de-extinction more pragmatic in the near future ([Valdez et al., 2019](#)). Gene banking might be seen as one form of conservation hospice,

but likely not a pragmatic one because the practice may render losing the *in situ* conservation battle more psychologically acceptable ([Valdez et al., 2019](#)).

In human hospice contexts, admission for hospice is followed by identification of outcomes of care. Such outcomes typically focus on quality of life and patient wishes, which include but are not limited to the ability to stay in the home, symptom relief, building and maintaining support systems for individuals and their families, respecting cultural context, and developing synergies with therapies designed to prolong life ([Kaasa and Loge, 2003](#) ; [Connor, 2008](#) ; [WHO, n. d.](#)). In the conservation context, this requires identifying outcomes other than perpetual persistence of the species for which to manage. For example, “ promoting staying at home ” reflects the priority given to *in situ* conservation or conserving species in natural habitats as long as possible ([Primack, 2012](#)) and suggests, among other things, that species maintained through assisted migration are not likely to be managed with hospice care. Building support systems for individuals and their families has equally intuitive applications to hospice care for dying species. Species are given hospice care because they have intrinsic value, but the impacts of their losses on ecological and social structures will affect the well-being of remaining species after the dying species becomes extinct. Working to maintain or restore the integrity of ecosystems upon which a dying species relies could both delay its extinction as well as benefit other intrinsically valuable species, including humans. Thus, protection of ecosystem functions needed to care for a dying species represents a therapy with synergies linked to persistence of other species relying on the same ecosystems. If the

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dying species provides important ecosystem functions, however, hospice care providers considering impacts on “family” must also consider replacement of populations (when possible) that fill the same ecological niche previously occupied by a dying species.

In medical contexts, practitioners are guided by care for the patient, understanding conditions for withholding and withdrawing treatment, maintaining communication and trust, and understanding and respecting cultural contexts ([Danis et al., 1999](#)). In contexts of species management, understanding and respecting cultural contexts may be critical yet overlooked. Local people valuing species for historic, religious, or other cultural reasons may justify continuing hospice treatments longer than would be dictated by models rooted in economic efficiency. In addition to understanding human reliance on such species ([Joint Secretariat, 2015](#)), study of local traditional knowledge of tribal nations, for example, could provide a better understanding of the threats faced by these species and, thus, help delay extinctions. For example, First Nations in Canada act as stewards and advocates for conservation of species that have high cultural value, such as the eulachon (*Thaleichthys pacificus* ; [Moody, 2008](#) ; [Eckert et al., 2018](#)). When species are culturally significant, local populations might be motivated to act as caregivers for these populations, thus providing benefits to both the species facing low survival probability as well as the human populations with the strongest connections to the species in question.

Conclusion

Perhaps the most valuable attribute of a conservation hospice construct is providing a framework for constructive thinking about conservation of dying species. Triage advocates often claim a severe form of conservation pragmatism is both necessary and realistic, but we suggest assuming resources saved by abandoning doomed species will be allocated to the easiest-to-save species in an efficient manner is neither pragmatic nor realistic. People will demand resources to save tigers and polar bears until the last one disappears independent of any optimization function generated by scientists. Why squander that demand in the name of efficiently allocating declining resources? Caring for charismatic species, even when they appear doomed, may prove essential to turning the tide of declining conservation funding. Just as hospice care demonstrates reverence for life, caring for doomed species demonstrates respect for the intrinsic value of wildlife and reflects the importance of welfare considerations in conservation. Adopting a conservation hospice approach would require more practitioners interested and engaged in ethical, cultural, and social dynamics of conservation, just as hospice required new kinds of healthcare workers ([Connor, 2008](#)), but this need is well established within the conservation community already ([Bennett et al., 2017](#)). Hospice patients live longer than others with similar symptoms ([Connor et al., 2007](#)), so caring for doomed species might even allow them to persist until “miracle cures,” such as reasonable levels of conservation funding emerge.

Author Contributions

All authors contributed to developing this perspective piece, and did so with contributions reflecting author order.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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