The Case for Watchful Waiting with Isle Royale's Wolf Population

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Introduction

In "Should Isle Royale Wolves be Reintroduced? A Case Study on Wilderness Management in a Changing World," Vucetich et al. concluded with the hope that their analysis "motivates broader discussion that deepens understanding of the specifics on Isle Royale and the underlying principles" (2012: 137). This article represents an attempt to continue that discussion.

The authors traced the history of the Isle Royale National Park (IRNP) wolf (*Canis lupus*) population, emphasized the possible effect of canine parvovirus (CPV) on the wolf population, reported a recent decline in the wolf population, discussed the effect of climate warming on possible natural recolonization, and laid out a rationale for genetically rescuing the wolf population. In a follow-up article, the same authors advocated "conservation or reintroduction" without specifying what they meant by "conservation" (Vucetich et al. 2013).

To best understand the current status of the IRNP wolf population, an updating is necessary. In early 2012, researchers found only nine wolves (Vucetich et al. 2012), and in early 2013, eight, including at least four females, most four years old or younger (Mlot 2013; Vucetich and Peterson 2013). The research team observed courtship behavior in one pair but not in another, although the team indicated its observation time was low. However, many female wolves in northeastern Minnesota do not breed in any given year before five years of age (Mech and Seal 1987; Mech and Barber-Meyer, unpublished). Wolf litters average six at birth (Mech 1970), and litters of pups surviving in summer on IRNP have averaged 3.4 (Peterson and Page 1988). Food conditions in 2013 appear to be excellent for pup production and survival. The wolves were well-fed in winter 2012–2013, just before and during the breeding season. The wolf kill rate of moose (*Alces alces*) was three times that of 2011–2012, calf recruitment was one of the highest ever recorded on IRNP, and the moose-to-wolf ratio was well above average (Vucetich and Peterson 2013). Thus, potentially in 2013 or 2014, the IRNP wolf population could increase by over 60%, as it has done before.

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Table 1. Publications featuring warnings about the perceived demise of Isle Royale wolves.

If the IRNP population does rebound, the event will be just the latest in a long series of recoveries from perceived crises (Table 1).

I agree with Vucetich et al. (2012; 2013) that any decision made about intervening in the natural course of the IRNP wolf population will be momentous, so the issue deserves a great deal of pondering and discussion. Implications of intervention or non-intervention are relevant to (1) wilderness policy, (2) scientific research, and (3) island ecology. Vucetich et al. (2012: 131) discussed all three and, regarding wilderness policy, concluded that "intervention would enhance and honor wilderness values of Isle Royale." They prefaced that conclusion by explaining that disease (CPV) and climate warming had anthropogenic causes, so presumably human intervention would be justified. According to Vucetich et al., "The salient point is that the recent decline in wolf abundance is associated with a chain of events that began with the introduction of CPV by humans in the early 1980s" (2012: 129).

Thus the roles of both CPV and climate change bear special scrutiny. Evidence that CPV had reached IRNP wolves was discovered in 1988 when two of four wolves were positive for exposure to the disease (Peterson et al. 1998). The next year, two of four IRNP wolves were marginally positive, but no sign of the disease was found again for about two decades (Vucetich et al. 2012). CPV kills primarily pups (Eugster and Nairn 1977; Meunier et al. 1981), so the presence of its antibodies in non-pups only indicates exposure to the disease, not anything about its population effect.

It is true that the IRNP wolf population crashed from 50 wolves in 1980 to 14 in 1982, but that crash was well documented to be caused by malnutrition and intraspecific strife. "In this study, cause of death was determined for nine additional wolves, including seven that were killed by other wolves and two that succumbed to malnutrition" (Peterson and Page 1988: 94). The only possible evidence for CPV having a population effect at that time was the lack of pups observed in winter 1981–1982 (Peterson et al. 1998). However, that was the year following the two years of abnormal highs of 33–50 wolves (or 61–92 wolves/1,000 sq km; Fuller et al. 2003), when food shortage and intraspecific strife prevailed. Lack of pup production and/or survival during those years would not be surprising in any wolf population (Mech 1977; Mech et al. 1998).

Other evidence against CPV being the cause of the 1981–1982 pup failure is that during the next several years pups survived each year, as many as 13 surviving during the period 1982–1983 (Peterson and Page 1988). Nor was evidence of CPV found in any of the six IRNP wolves sampled from 1990 to 1994. Thus there is not even any evidence that CPV caused apparent pup failure during that period (Peterson et al. 1998). In addition, the highest CPV seroprevalence found on IRNP was 50%, whereas in the nearby Minnesota wolf population CPV was not associated with a negative population change until seroprevalence increased to 80% (Mech and Goyal 1995). Therefore, despite the emphasis on CPV as the cause of a major disruption of the IRNP wolf–moose system beginning in 1980 (Wilmers et al. 2006; Vucetich et al. 2012), the evidence for CPV involvement is very sparse, and a more cogent explanation is malnutrition and intraspecific strife (Peterson and Page 1988).

Regarding climate change, Vucetich et al. (2012) attributed two adverse influences on the IRNP wolf–moose system to it: (1) a recent moose decline, and (2) reducing chances of wolves immigrating to the island.

Although Vucetich and Peterson (Michigan Technological University 2007) and Vucetich et al. (2012) cited evidence that climate warming might have played a role in recent moose decline in Minnesota, they fail to mention the contradictory evidence that in North Dakota, at the same latitude as Isle Royale and Minnesota, moose are expanding their range despite higher temperatures than in Minnesota or IRNP (http://www.nrri.umn.edu/moose/information/NDmoose.html). In addition, IRNP moose numbers have doubled in the past two years (Vucetich and Peterson 2013). Thus evidence for climate warming adversely affecting moose is equivocal.

As for climate change possibly affecting wolf immigration to IRNP, it is true that increasing mean temperatures could reduce chances of Lake Superior freezing between IRNP and the mainland. However, it is also true that climate warming could actually increase those chances. One of the effects of climate change is increased variability, including more extreme local weather conditions (Gitay et al. 2002; Fraser 2004). Such extremes could increase the usually rare, several-week-long cold and calm conditions that foster ice formation on Lake Superior. Therefore, whether climate change will restrict natural recolonization of wolves to IRNP is unknown. Certainly the number of nearby mainland wolves available to disperse to IRNP has greatly increased during the past three decades (Erb and Don Carlos 2009). As recently as 1997 a wolf crossed to the island (Adams et al. 2011).

Scientific research is a second major issue critically affected by any decision about possible intervention in the IRNP wolf population. The history of wolf research on IRNP beginning in the late 1950s (Mech 1966) is rich, varied, and well-detailed by Vucetich et al. (2012). The question for the future is what kind of follow-up study will be possible with various scenarios of intervention or non-intervention. Although the IRNP studies have produced many important scientific discoveries, one of the most significant findings, especially for wolf recovery and conservation, involves the documentation of the ability of the island's small wolf population to persist and to sustain high levels of inbreeding.

Founded by a single female and two males (Adams et al. 2011), the IRNP wolf population was thoroughly inbred yet persisted from 1949 through 2013 at densities at least as high as on the mainland (Mech 1966; Jordan et al. 1967; Peterson 1995; Vucetich et al. 2012). The IRNP wolves were as closely related as siblings (Wayne et al. 1991), and in the late 1990s the population's inbreeding coefficient was 0.81 (Adams et al. 2011). A single male immigrant contributed to the population starting in 1998, and in four years the inbreeding coefficient was 0.22 and rising (Adams et al. 2011).

Despite the high level of inbreeding, the wolves seem to have behaved and functioned ecologically like any outbred population and their ecology has been valuable to compare with that of other populations in areas such as Yellowstone National Park (Smith et al. 2003). Some evidence indicates that inbreeding has caused skeletal abnormalities in IRNP wolves, although those conditions have not translated into demographic abnormalities (Raikkonen et al. 2009). There is still some question about whether the skeletal abnormalities are truly a result of inbreeding, however, because similar abnormalities have been found in other wolf populations on the mainland surrounding IRNP (Ware and Holahan 2010). However, if these abnormalities are a result of inbreeding, that finding will add significantly to the information accumulating about the persistence of this small, isolated wolf population. "Persistence to the present does not reliably indicate future performance" (Vucetich et al. 2010: 533), so any future information the unique IRNP wolf population can provide about the effect of inbreeding on population persistence will add immeasurably to what we know so far.

This wealth of information about the most-inbred, wild population of wolves ever is invaluable not only to understanding basic wolf genetics and behavior, but also to the entire field of conservation genetics. In addition, the future demographic dynamics of the IRNP wolf population and its interactions with moose will also be highly informative.

The IRNP moose population recently reached a nadir along with that of the wolves, but in 2012–2013, the moose population achieved one of its highest recruitments, and the moose-to-wolf ratio increased from its all-time low of 15 in 2006 to 122 in 2013 (Vucetich and Peterson 2013). If the wolf population performs as expected in the next several years, how long will it take before its predation overtakes the non-burgeoning and youthful moose herd? If wolf numbers fail to increase, how high will moose numbers grow? Much concern has surrounded the fate of the IRNP moose because of hypothesized climate change effects (Vucetich and Peterson 2007; Flesher 2008). How will these effects play out if wolves increase again? What if wolves decrease? These and so many other questions can be answered in the next several years.

A third realm that would be influenced by any decision regarding intervention into the IRNP wolf population relates to the effects of wolves on natural ecosystems. Although the existence and importance of such effects are somewhat controversial and might have been overemphasized in some areas (Mech 2012; Marshall et al. 2013), wolves have influenced IRNP vegetation via their predation on moose (McLaren and Peterson 1994). The question of whether such effects are positive or negative is a matter of judgment, and Vucetich et al. (2012) presented pro and con arguments pertaining to wolf-generated "ecosystem health" and "moral value" on IRNP. Suffice it to say here that any such concerns are premature at this time because IRNP still harbors a functioning wolf population that could well persist for many years with or without human intervention.

In summary, then, although the subject of possible human intervention in the IRNP wolf population has been raised (Vucetich et al. 2012; 2013), weaknesses are apparent in the rationale presented (anthropogenic influences already impinging on the IRNP population). In addition, a strong argument can be made that the scientific value of non-intervention is greater than that of intervention, and the question of IRNP ecosystem health will not be relevant for an unknown, but possibly long, period—the time it takes for the wolf population to become extinct.

In the medical field, when a threatening condition is detected that is not immediately causing distress, physicians often counsel "watchful waiting." We have been watchfully waiting for the IRNP wolf population's demise for almost 25 years (Peterson and Krumenaker 1989). Had we intervened at the first alarm, much of the island's most revealing and scientifically significant discoveries would never have been made. In any case, the precautionary principle would weigh heavily in favor of non-intervention because once intervention is imposed, that condition can never be undone, whereas non-intervention can always be countered by intervention.

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