



Evaluating whether nature's intrinsic value is an axiom of or anathema to conservation

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Abstract: *That at least some aspects of nature possess intrinsic value is considered by some an axiom of conservation. Others consider nature's intrinsic value superfluous or anathema. This range of views among mainstream conservation professionals potentially threatens the foundation of conservation. One challenge in resolving this disparity is that disparaging portrayals of nature's intrinsic value appear rooted in misconceptions and unfounded presumptions about what it means to acknowledge nature's intrinsic value. That acknowledgment has been characterized as vacuous, misanthropic, of little practical consequence to conservation, adequately accommodated by economic valuation, and not widely accepted in society. We reviewed the philosophical basis for nature's intrinsic value and the implications for acknowledging that value. Our analysis is rooted to the notion that when something possesses intrinsic value it deserves to be treated with respect for what it is, with concern for its welfare or in a just manner. From this basis, one can only conclude that nature's intrinsic value is not a vacuous concept or adequately accommodated by economic valuation. Acknowledging nature's intrinsic value is not misanthropic because concern for nature's welfare (aside from its influence on human welfare) does not in any way preclude also being concerned for human welfare. The practical import of acknowledging nature's intrinsic value rises from recognizing all the objects of conservation concern (e.g., many endangered species) that offer little benefit to human welfare. Sociological and cultural evidence indicates the belief that at least some elements of nature possess intrinsic value is widespread in society. Our reasoning suggests the appropriateness of rejecting the assertion that nature's intrinsic value is anathema to conservation and accepting its role as an axiom.*

Keywords: anthropocentrism, economic valuation, environmental ethics, environmental values, non-anthropocentrism, value orientations

Evaluar si el Valor Intrínseco de la Naturaleza es un Axioma o un Anatema para la Conservación

Resumen: *Que algunos aspectos de la naturaleza poseen valor intrínseco es considerado por algunas personas como un axioma de la conservación. Otras personas consideran al valor intrínseco de la naturaleza como superfluo o como un anatema. Este rango de opiniones entre los principales profesionales de la conservación amenaza a los cimientos de la conservación. Un obstáculo en la resolución de esta disparidad es que las interpretaciones discrepantes del valor intrínseco de la naturaleza parecen estar enraizadas en las confusiones y presunciones sin fundamentos sobre lo que significa reconocer los valores intrínsecos de la naturaleza. Este reconocimiento se ha caracterizado como vacuo, misántropo, de poca consecuencia práctica para la conservación, acomodado adecuadamente por la valoración económica y no aceptado ampliamente en la sociedad. Revisamos las bases filosóficas para el valor intrínseco de la naturaleza y las implicaciones de reconocer ese valor. Nuestro análisis está basado en la noción de que cuando algo posee valor intrínseco merece ser tratado con respeto por lo que es, preocupándose por su bienestar o preocupándose por él de manera justa. A partir de esta base, uno sólo puede concluir que el valor intrínseco de la naturaleza no es un concepto vacío o uno acomodado por la valoración económica. El reconocer el valor intrínseco de la naturaleza no es misantrópico porque la preocupación por el bienestar de ella (además de su influencia sobre el bienestar humano) de ninguna forma excluye preocuparse también por el bienestar humano. La*

principal relevancia de reconocer el valor intrínseco de la naturaleza parte del reconocimiento de todos los objetos de importancia para la conservación (p. ej.: muchas especies en peligro de extinción) que ofrecen pocos beneficios para el bienestar humano. La evidencia sociológica y cultural indica que el creer que por lo menos algunos elementos de la naturaleza poseen valor intrínseco es muy común en la sociedad. Nuestro razonamiento sugiere que es apropiado rechazar la afirmación que el valor intrínseco de la naturaleza es un anatema para la conservación y aceptar su papel como un axioma.

Palabras Clave: antropocentrismo, éticas ambientales, no-antropocentrismo, orientaciones de valor, valoración económica, valores ambientales

Introduction

The origins of conservation biology as an academic discipline are explicitly rooted in the notion that nature possesses intrinsic value. For example, Soulé (1985) conceived of conservation biology as rising from the postulate that “*biotic diversity has intrinsic value*, irrespective of its instrumental or utilitarian value” (emphasis in original). Even at that time, the notion was neither radical nor cavalier, but explicitly justified by prominent scholarship (e.g., Naess 1973). Today, the importance of this notion is manifest in the first of five “organizational values” held by the Society for Conservation Biology: “There is intrinsic value in the natural diversity of organisms, the complexity of ecological systems, and the resilience created by evolutionary processes” (SCB 2011). Nature’s intrinsic value is also elemental to many mainstream endeavors extending far beyond academia.

For example, the United Nations (U.N.), governments, and nongovernmental organizations hold that nature has intrinsic value. The 1992 U.N. Convention on Biodiversity was explicitly premised on “the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components” The first of four principles of the Earth Charter asserts nature’s intrinsic value (Earth Charter Commission 2000): “Recognize that all beings are interdependent and every form of life has value regardless of its worth to human beings.” Some governments, including federal governments of Ecuador, Bolivia, and Switzerland and several cities in the United States, have legal and constitutional provisions asserting the intrinsic value of various aspects of nature (ECNH 2008; National Assembly Legislative and Oversight Committee 2008; Vidal 2011; ELC 2014). The intrinsic value of species is arguably a central underpinning of the U.S. Endangered Species Act and of the Convention on International Trade in Endangered Species (CITES) (Callicott 1989).

Aside from the importance of nature’s intrinsic value in organizational and legal documents, some scholars argue that it is an important justification for conservation (e.g., Collar 2003; McCauley 2006; Ehrenfeld 2008; Child 2009). Others dissent, arguing that the strongest justification for conserving nature is that doing so is vital to

human welfare (e.g., Costanza et al. 1997; Daily 1997; Shrader-Frechette 1998; Balmford et al. 2002; Kareiva & Marvier 2007; Maguire & Justus 2008; Tallis et al. 2008; Fisher et al. 2009; Justus et al. 2009). A third position is that debate over nature’s intrinsic value is superfluous because nature’s unquestioned instrumental value leads to the same conservation policies as would nature’s purported intrinsic value (e.g., Norton 1991, 2005; Light & Katz 1996).

We searched Web of Science for occurrences of *intrinsic value* in the ecology literature from 1989 to 2013 and had 39 hits (for details, see Supporting Information). Of these, 21 papers mentioned intrinsic value only in passing. The 18 papers offering a more substantive treatment were cited collectively 25.2 (SE 2.8) times per year, on average, over each of the past 5 years (2009–2013). That is, 1.4 citations per paper per year.

That so little attention is given to the topic in the scientific literature is peculiar given that intrinsic value appears to be fundamentally important to conservation and that conservation professionals are deeply divided about its relevance. This divide may be fueled by conceptual misunderstanding of intrinsic value and empirical presumptions related to people’s beliefs about intrinsic value. We reviewed the concept of intrinsic value and implications of acknowledging nature’s intrinsic value.

Concept of Intrinsic Value

What *intrinsic value* means can be understood, in part, by distinguishing it from instrumental (use) value. For example, a hammer may possess only instrumental value for pounding nails, but a child might possess instrumental value for doing chores and also possess intrinsic value. That is, a child is intrinsically valuable even if he or she could do nothing useful. This example illustrates that these two kinds of value are not mutually exclusive; the presence of one does not preclude the presence of the other. Another way of describing intrinsic value is value beyond instrumental value. Instrumental value lies solely with the function of the object, not with the object itself. As such, an object’s instrumental value can, at least in principle, be replaced by some other objects. In contrast, intrinsic value is associated with the object itself, not

its function; an intrinsically valuable object cannot be substituted by another object.

Acknowledging an object's intrinsic value means valuing it for what it is, not only what it does. When something possesses intrinsic value it deserves to be treated with respect for what it is, with concern for its welfare or in a just manner. Philosophers have developed several accounts for how and why various aspects of nature possess intrinsic value (e.g., Regan 1983; Callicott 1989; Rolston 1989; Elliot 1992). See Sandler (2010) for a succinct review.

Intrinsic value has been treated as a formal concept for well over a century. The post-Enlightenment philosopher, Immanuel Kant (1785) wrote:

In the realm of ends everything has either a price or a dignity [but not both]. What has a price is such that something else can also be put in its place as its equivalent; by contrast, that which is elevated above all price, and admits of no equivalent, has a dignity. . . . Rational nature exists as an end in itself. Each human being necessarily represents his own existence in this way.

Although Kant argued that only humans possess intrinsic value, there is also a venerable history of articulating the reasons why at least some portions of the non-human world possesses intrinsic value (e.g., Salt 1894; Schweitzer 1923). Leopold (1949) articulated one of the most celebrated passages in conservation, explaining that ecosystems possess intrinsic value because "a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community" (Callicott 1989).

Although philosophical articulations of intrinsic value may require careful reflection and expression, intrinsic value is familiar and basic—it is reflected by what each of us feels viscerally and intuitively in regard to ourselves and others. Skeptics of nature's intrinsic value sometimes ask, what good is it? where *it* might refer to the giant burying beetle (*Nicrophorus americanus*), the devil's hole pupfish (*Cyprinodon diabolis*), the Dusky Seaside Sparrow (*Ammodramus maritimus nigrescens*), or any object in nature whose instrumental value is not appreciated. One response to such skeptics is, What good are you? the intent of which is to vividly reveal the person's own intuitive and visceral understanding of intrinsic value (Pister 1987).

Environmental philosophers recognize different views concerning what objects in nature may possess intrinsic value, depending on analysis of the several proposed bases for intrinsic value. They use particular terms to distinguish those views. For example, anthropocentrism is the view that only humans possess intrinsic value, and non-anthropocentrism is the view that humans and at least some of the nonhuman world possess intrinsic value. Non-anthropocentrism includes zoocentrism, the view that animals possess intrinsic value; biocentrism, the view that all living organisms possess intrinsic value;

and ecocentrism, the view that all forms of life, including organisms and ecological collectives such as populations, species, and ecosystems, possess intrinsic value (Callicott 1989). This summary distills a sophisticated body of literature and serves only as a springboard to further explain intrinsic value.

Why Intrinsic Value Is Not Arbitrary

Some claim that acknowledging nature's intrinsic value is an unwise basis for motivating conservation because the assignment of intrinsic value to nonhumans is arbitrary (e.g., Justus et al. 2009). Evaluating whether the acknowledgment of intrinsic value is arbitrary requires inspecting the reasons for such claims. One general line of reasoning involves two questions: what traits do humans possess that imbue us with intrinsic value and what kinds of objects in nature possess those traits? The acknowledgment of intrinsic value is well reasoned to the extent that these questions have well-reasoned answers.

To work through those questions, suppose that humans possess intrinsic value, meaning humans deserve to be considered morally and treated justly. It would be arbitrary to suppose humans possess intrinsic value for no other reason than merely being human. Avoiding arbitrariness requires connecting the intrinsic value of humans to some trait that is relevant to intrinsic value and not preselected with the purpose of including some and excluding others. An important candidate trait is the capacity to flourish. A closely related trait is the capacity to experience pain (Singer 1975). If so, the next step is to ask what kinds of organisms possess that capacity? Scientific evidence unequivocally indicates that mammals and birds possess that capacity (e.g., Criado 2010). By that reasoning, all individual organisms belonging to the class Mammalia and Aves possess intrinsic value. Nothing about the preceding argument is arbitrary.

The application of this reasoning to fish is complicated by physiological differences that create challenges, both empirically and conceptually, for evaluating claims that fish can experience pain (Chandross et al. 2004). Although those challenges affect scientific certainty in assigning intrinsic value to fish, they do not make such assignments arbitrary. Like other claims associated with scientific uncertainty, the precautionary principle is useful. That is, decisions depending on uncertain assignments of intrinsic value should be evaluated by harm that might be caused if the assignment is inappropriately granted or inappropriately dismissed (see also Bradshaw 1998).

What about the assignment of intrinsic value to various kinds of invertebrate organisms? Scientific evidence indicates that the physiology and anatomy of invertebrates differs even more greatly from that of birds and mammals; thus, to conclude that they have the capacity to experience pain in the way that is generally meant when that claim is made for those creatures is even less certain

than in the case of fish. Nevertheless, some suggest that possession of sensory consciousness is sufficient to imbue an organism with interests (which in turn imbue an organism with intrinsic value) on grounds that sensory consciousness is an evolutionary adaptation for realizing an organism's interests (Regan 1983). If so, one would likely be justified in assigning or acknowledging intrinsic value for organisms like octopi and fruit flies on the basis of evidence that they possess sensory consciousness (Mather 2008; van Swinderen 2011).

Plants, like all biological organisms, possess conation—the unconscious striving for growth and reproduction. When they achieve these goals they flourish; when their striving is interdicted they languish. Some argue that conation represents an intrinsic value-imbuing trait (Feinberg 1974). If so, then all organisms, including plants, possess intrinsic value. The preceding discussion indicates how the assignment of intrinsic value is determined by a conceptually straightforward and nonarbitrary reasoning.

What about the assignment or acknowledgment of intrinsic value for objects of conservation concern, such as populations, species, ecosystems, and biodiversity? Some suppose that such objects cannot possess intrinsic value because they do not possess traits that imbue individual organisms with intrinsic value (e.g., capacity to experience pain or have interests) (Sandler 2010). Nevertheless, others argue that the distinction between biological individuals (which possess interests) and biological collectives is arbitrary or at least blurry (Ghiselin 1974; Johnson 1991). That view has an important scientific basis (e.g., Gilbert et al. 2012).

So, populations and ecosystems may be different from other kinds of biological individuals, but a reasonable case can be made that they are individuals nonetheless (Keller & Golley 2000). Being a different kind of individual, it is important to ask whether they possess some other property that would imbue them with intrinsic value. For example, some regard ecosystems to be characterized by homeostasis, resilience, and interconnectedness and that those properties imbue them with intrinsic value (Leopold 1949). Nevertheless, some ecologists no longer believe those properties describe ecological collectives (e.g., Davis & Slobodkin 2004; cf. Winterhalder et al. 2004). That ecosystems possess properties that imbue them with intrinsic value certainly involves some scientific and conceptual uncertainty. Those uncertainties should be recognized and handled appropriately (e.g., with the precautionary principle). But those uncertainties do not make the claims arbitrary.

Objectiveness and Universality of Intrinsic Value

Another concern about intrinsic value is whether it is subjective in the sense of being a fickle preference, whereby

each of us is free to accept or deny the obligations entailed by nature's intrinsic value. While acknowledging or attributing intrinsic value is certainly a subjective experience, it is not subjective in the sense of being a fickle preference. To understand the difference between subjective experiences and fickle preferences, a subclass of subjective experiences, consider Einstein's theories of relativity, which indicate how certain physical measurements depend on the subjective experience of the observer (i.e., their velocity). Being dependent on subjective experience does not, however, make the measurements a fickle preference. It only means that explaining the measurement requires accounting for the subjective experience of the observer.

Analogous distinctions between *subjective* and *arbitrary* also occur in ethics (Sen 2009). The relevance of acknowledging or attributing intrinsic value does not rise or fall on its being a subjective experience, but instead on whether any particular account of intrinsic value is well reasoned. Being well reasoned is what distinguishes nature's intrinsic value from fickle preferences.

In some cases, the acknowledgment of an object's intrinsic value is well reasoned for one person (or valuer) but not another. To see how, consider reasons for acknowledging a hammer's intrinsic value. If a hammer was handed down to you from your grandparents (a family heirloom), then you have a well-reasoned obligation to care for the hammer for what it is, not only what it does. While others have an obligation to acknowledge and ethically consider your interest in the hammer, they do not share your obligation to it. That limited scope of obligation does not, however, apply to reasons for acknowledging nature's intrinsic value. Consider answers to the questions raised previously: what traits do humans possess that imbue intrinsic value and what kinds of objects in nature possess those traits? If the answers are robust regardless of one's subjective perspective, then everyone is obligated to acknowledge that object's intrinsic value. Consider the following examples.

First, consider *capacity to experience pain* as an answer to the first question. All organisms in the class Mammalia undoubtedly possess that capacity. Your interest to avoid pain leads to a moral obligation to treat others with concern for their interest to avoid pain. The force and universality of that reasoning is indicated by the many variants of the principle of ethical consistency (e.g., Golden Rule) undergirding most human cultures (Gensler 2013). In this way, acknowledging the intrinsic value of individual organisms belonging to the class Mammalia is a universal obligation. That some mammals (e.g., human infants and tigers) cannot be concerned with your pain does not negate your obligation to be concerned for theirs.

Second, consider *community membership* as an answer to the first question. Populations and species (i.e., ecological collectives) are undoubtedly members of the

biotic communities to which we belong. Your interest to be treated with respect and concern for your welfare as a community member obligates you to treat other community members likewise. In this sense, acknowledging the intrinsic value of species is a universal obligation. This reasoning is what many conservation professionals celebrate as Leopold (1949) did: “All ethics evolved so far rest upon a single premise: that the individual is a member of a community of interdependent parts” and “[t]he land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.”

Why Intrinsic Value Is Not Vague

Two prominent reviews of nature’s intrinsic value argue against the role of intrinsic value in conservation and do so, in part, by asserting that “intrinsic value is a vaguely formulated concept” (Maguire & Justus 2008; Justus et al. 2009). The preceding section suggests this view represents a misreading of existing literature. Although individual papers may not treat intrinsic value with adequate precision or accuracy, it is a mistake to conclude that intrinsic value is ill defined or vague.

The philosophical analysis of intrinsic value is certainly complicated. But that is not tantamount to its being ill defined or vacuous. The philosophical complexities of intrinsic value are not unlike the scientific complexities associated with important concepts in evolutionary ecology, such as fitness (Dawkins 1982). In neither case does complexity make those concepts unimportant or unworkable. The complexity only elicits the need for considerable care in applying those concepts.

Intrinsic value is also an inherently qualitative idea—not easily or appropriately quantified. Being qualitative does not make an idea inappropriately vague. Many scholarly concepts, such as fairness, are qualitative, yet they are not considered vacuous (Miller 2003; Sen 2009).

Why Intrinsic Value Is Not Misanthropic

Some express concern that according intrinsic value to nature is misanthropic (Worster 1980; Reisman 2006). Misanthropy involves disparaging the intrinsic value of humans. Non-anthropocentrism involves acknowledging that humans possess intrinsic value in addition to at least some nonhuman elements of nature (Callicott 1989). Caring for nonhumans, for their own sake, does not preclude caring for humans. Humans are more than capable of caring for many more than one kind of thing. Reasoning to the contrary might also be used to support the belief that honoring one’s ethnicity is fundamentally incompatible with racial equality. These considerations indicate that nothing is inherently misanthropic about

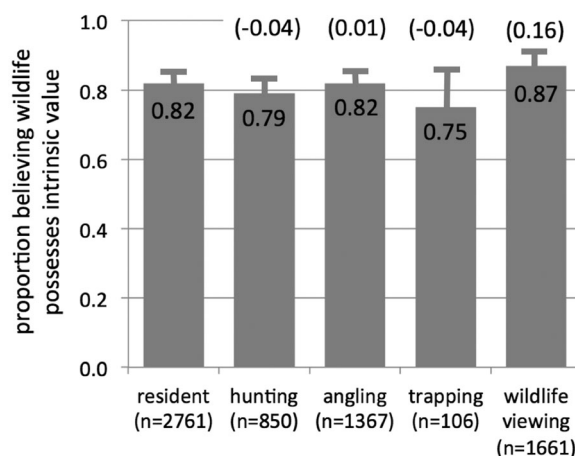


Figure 1. Results from a survey representing >2700 households in Ohio on their beliefs in intrinsic value based on participation in different forms of wildlife-related recreation (error bars, SE; numbers above bars, phi correlation coefficients). See Supporting Information for methodological details.

being non-anthropocentric. Of course, humans are capable of expressing care for nonhumans and disregarding humans. That is misanthropic and should be guarded against, but that attitude should not be characterized as non-anthropocentric.

Extent of Belief in Nature’s Intrinsic Value

Some are concerned that nature’s intrinsic value cannot be used to justify conservation because nature’s intrinsic value is not widely believed. For example, Justus et al. (2009) write: “Some nontraditional theories accord these entities [ecosystems and populations] intrinsic value, but such theories are not widely accepted and remain highly controversial.”

Such assertions merit empirical evaluation. A number of sociological research papers have assessed the association between believing in nature’s intrinsic value and various sociodemographic factors (e.g., Steel et al. 1994; Vaske & Donnelly 1999; Kaltenborn & Bjerke 2002). This research suggests that empirical evaluations of people’s belief in intrinsic values are challenging. Of the 42 response items appearing in those surveys, which were designed to distinguish anthropocentric and non-anthropocentric views, most are prone to misclassifying individuals (Tables 1 & 2; Supporting Information). The reasons for misclassification are, in large part, related to the theoretical complexities discussed earlier.

Nevertheless, response items that are not prone to misclassification provide at least a sense that a large majority believe that at least some element of nature possesses intrinsic value (Fig. 1 & Supporting Information) (Butler & Acott 2007). Moreover, evidence we provide in the

Table 1. Statements used in sociological surveys to classify respondents as anthropocentric or non-anthropocentric and the propensity for those statement to misclassify respondents according to those categories.*

<i>Statements intended to describe non-anthropocentrists</i>	<i>Misclassification</i>		<i>comment</i>
	<i>A</i>	<i>B</i>	
Forests give us a sense of peace and well-being.	x	x	These statements risk both misclassifications, A and B. An anthropocentrist could disagree with each, but still only believe nature only serves human values, just these. A non-anthropocentrist could agree that nature is valuable to humans for any or all of these reasons, but also believe that nature is not only valuable with regard to how it might serve humans.
Forests rejuvenate the human spirit.	x	x	
Forests let us feel close to nature.	x	x	
I need time in nature to be happy.	x	x	
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans.	x	x	Anthropocentrists who believe that the instrumental value of a forest is best manifest when they are not managed would agree. A non-anthropocentrists who did not believe that management by humans was necessarily detrimental to the forest's welfare would not necessarily agree.
Humans should have more respect and admiration for the forests.		x	Anthropocentrists who believe the instrumental value of forests is underappreciated would agree.
One of the worst things about overpopulation is that natural areas are getting destroyed for development.		x	Anthropocentrists who believe that natural areas are important to human welfare and that overpopulation threatens human welfare would agree.
It makes me sad to see natural environments destroyed.		x	Anthropocentrists who believe natural environments are important for human welfare would agree.
Forests have as much right to exist as people.	x		Non-anthropocentrists concerned with welfare or respect, rather than rights, would disagree.
Nature has as much right to exist as people.	x		
Wildlife, plants, and people have equal rights to live and develop.	x		
Wildlife would have value even if there were no people around to enjoy them.	x		Non-anthropocentrists who believe that wildlife possesses subjective intrinsic value would disagree.
Wildlife have inherent value, above and beyond their utility to people.			Non-anthropocentrists would agree and anthropocentrists would disagree with this statement.

*Agreeing with the statements in column one is taken to be an expression of non-anthropocentrism; disagreeing is taken to be an expression of anthropocentrism. All but one statement is prone to either or both of two kinds of misclassification: A, a non-anthropocentrist could reasonably disagree, and B, an anthropocentrist could agree. For sources of statements and an evaluation of additional statements, see Supporting Information.

Introduction indicates that concern for nature's intrinsic value is widespread.

Implications of the Belief that Nature has Intrinsic Value

Recognizing nature's intrinsic value is taken to be important because of its presumed effect on attitudes and behaviors as they relate to conservation. However, psychological theory and research indicate that such basic beliefs influence higher-order attitudes and behaviors only indirectly (e.g., Rokeach 1973; Homer & Kahle 1988). Moreover, a variety of external factors also influence attitudes and behavior (Ajzen & Fishbein 1974; Heberlein 2012). Consequently, basic beliefs—such as the belief in nature's intrinsic value—have considerable limitations in predicting specific attitudes and behaviors (e.g., Fulton et al. 1996).

For example, a survey of Ohio residents indicates that the belief that at least some aspects of nature possess intrinsic value was only weakly related to participation in specific kinds of outdoor recreation (Fig. 1) or judgments regarding the acceptability of lethal management (Fig. 2; Supporting Information). In particular, all of the phi values in Fig. 1 are small (<0.17), indicating that belief in intrinsic value is only weakly associated with whether a person participates in various activities. That is, belief in intrinsic value is widely held among all of those groups of people. In Fig. 2, the effect size of belief in intrinsic value is relatively small for all scenarios and insignificant for scenario 3.

Results of this nature are consistent with ethical theory, which supposes that acknowledging intrinsic value beyond humans requires the adjudication of competing values. The complexity of that adjudication precludes general prescriptions for how we should behave toward

Table 2. Statements used in sociological surveys to classify respondents as anthropocentric or non-anthropocentric and the propensity for those statements to misclassify respondents according to those categories.*

<i>Statements intended to describe anthropocentrists</i>	<i>Misclassification</i>		<i>explanation</i>
	<i>C</i>	<i>D</i>	
Nature is important because of what it can contribute to the pleasure and welfare of humans.	x	x	Nothing about anthropocentrism requires an anthropocentrist to hold this belief. Nothing about non-anthropocentrism precludes holding this belief. Presuming otherwise is to mistake non-anthropocentrism with misanthropy.
The worst thing about the loss of the rain forest is that it will restrict the development of new medicines.	x	x	Nothing about anthropocentrism requires an anthropocentrist to hold this belief. Because non-anthropocentrists can also appreciate the instrumental value of nature to humans, a non-anthropocentrist can certainly agree that "The worst thing (for humans) about the loss of rainforests . . ."
The best thing about camping is that it is a cheap vacation.	x	x	Nothing about anthropocentrism requires an anthropocentrist to hold this belief. Because non-anthropocentrists can also appreciate the instrumental value of nature to a human, a non-anthropocentrist can certainly agree "The best thing (for me) about camping is that it is a cheap vacation."
One of the most important reasons to keep rivers and lakes clean is so that people can have a place to enjoy water sports.	x		An anthropocentrist could reasonably disagree with this statement, believing, instead that this is relatively minor anthropocentric importance as compared to some other value. A non-anthropocentrist would very likely disagree with this statement.
The primary function of forests should be for products and services that are useful to humans.			An anthropocentrist should agree and a non-anthropocentrist should disagree with this statement.
Forests should exist mainly to serve human needs.			
Wildlife are only valuable if people get to utilize them in some way.			

*Agreeing with the statements in column one is taken as an expression of anthropocentrism; disagreeing is taken as an expression of non-anthropocentrism. Most statements are prone to either or both of two kinds of misclassification: C, an anthropocentrist could reasonably disagree, and D, a non-anthropocentrist could agree. For sources of these statements and an evaluation of additional statements see Supporting Information.

various aspects of nature, given a belief in nature's intrinsic value (Naess 1973; VanDeVeer 1979; Birch 1993). In the simplest of terms, believing that a bear, for example, possesses intrinsic value does not mean killing a bear is always or necessarily wrong, but it does mean one would have to provide a compelling reason for doing so.

The complicated relationships among basic beliefs, attitudes, and behaviors do not, however, justify another potentially important attitude held by some conservation writers (e.g., Soulé 1993): If most people believe in nature's intrinsic value, that belief is apparently insufficient to motivate behaviors that are essential for conservation. Such sentiments need to be modulated by three considerations. First, little empirical research has been conducted on how beliefs concerning nature's intrinsic value affect attitudes and behaviors related to specific aspects of conservation. Second, an alternative explanation is that conservation-related actions are constrained by other competing values (Rokeach 1973) or by institutional frameworks (e.g., laws) and social norms (e.g., Heberlein 2012). The third perspective is discussed next.

Burden of Proof and Adjudication

A significant implication of acknowledging nature's intrinsic value is its effect on burden of proof (e.g., Fox 1993). It would seem acceptable to harm or exploit a creature (or any aspect of nature) that did not possess intrinsic value unless there is a compelling reason not to—the burden is on a person wishing to prevent harm or exploitation. By contrast, it would be unacceptable to harm or exploit an aspect of nature possessing intrinsic value unless there is compelling reason to do so—the burden of proof is on one wishing to harm or exploit. The contrast is as sharp as a justice system where an accused is guilty until proven innocent versus innocent until proven guilty.

In that way, acknowledging nature's intrinsic value is practically important because it should influence decision-making processes. Acknowledging nature's intrinsic value seems to demand decision processes guided by questions such as How should we adjudicate competing claims among objects in nature that possess intrinsic

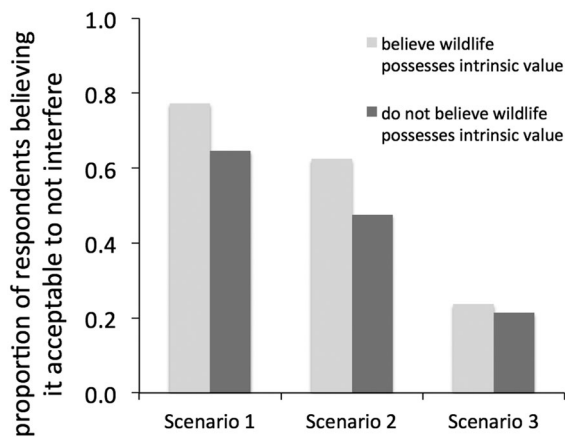


Figure 2. Proportion of respondents believing it is acceptable to not interfere with a bear (e.g., kill it) given their belief about whether wildlife possesses intrinsic value and given each of 3 scenarios: (1) “a bear has been sighted in your neighborhood near homes and yards where children and pets are playing”; (2) “a bear has eaten and scattered the contents of a garbage can and birdfeeder near a home in your neighborhood”; and (3) “a bear has broken into some area homes, causing significant damage.” For statistical details, see Supporting Information.

value (i.e., objects that should be treated with justice or concern for their welfare), especially when some of the objects are human and some are nonhuman? A decision-making process founded on that question would differ greatly from one concerned only with instrumental value.

Such considerations suggest a strong connection between conservation and basic principles of social justice. One such principle is judicious balance among three virtues: fairness, need, and equality (Miller 2003). The role for these virtues can be illustrated by heuristic questions such as: Is it fair to kill cowbirds to save warblers when humans are an important reason why cowbirds are so abundant? Is it just to destroy habitat that is vital to (needed by) certain wildlife for the purpose of a shopping center that may be important to humans but not vital (not needed)? In what sense are we obligated to have equal concern for all forms of intrinsically valuable life? This last question does not imply that all forms of life should be treated equally or that acting against some form of life is forbidden (the same conditions apply to social justice among humans). Nevertheless, the extent to which we are to have equal concern is the extent to which decisions harming one organism in favor of another (e.g., using animals in medical research) must be viewed as moral dilemmas. The need to address these concerns is indicated, for example, by conservation professionals writing under the umbrella of compassionate conservation (e.g., Bekoff 2013).

This broader sense of adjudication highlights important points of connection between conservation and contemporary theories of democracy, which emphasize that democracy is as secure as its citizens are committed to providing robust and honest reasons for supporting any particular adjudication (Sen 2009). That we live in a society with limited interest in discourse characterized by robust and honest reason does not make such discourse any less essential for democracy or conservation.

Why Intrinsic Value of Nature Is Not Infinite

Some express concern that conservation should not be motivated by nature's intrinsic value because intrinsic value is infinite and therefore unworkable in conservation, which requires trade-offs (e.g., Maguire & Justus 2008; Colyvan et al. 2010). The preceding section indicates how this concern is misplaced.

That misconception may be generated by language sometimes used to distinguish intrinsic value from instrumental value, such as pricelessness—which does not indicate infinite monetary value, but rather the inappropriateness of expressing its value in monetary terms. Objects having intrinsic value are also nonsubstitutable, whereas those with instrumental value are substitutable. For example, a water treatment plant should not be substituted for an intrinsically valuable wetland ecosystem based solely on a benefit-cost analysis of the instrumental value of either object. But this is not to say that the intrinsic value of a wetland ecosystem is infinite.

The nonsubstitutability of objects with intrinsic value does not mean they cannot be traded off for those with only instrumental value. Such trade-offs are routine in human affairs. The intrinsic value of a human does not preclude trading a human's interest for some other interest. Examples include imminent domain, decisions to increase highway speed limits (which trades risk of life for speed of transport), and just-war theory.

Pragmatic Relevance of Nature's Intrinsic Value

Some argue that motivating conservation actions among people through focused appeals to the instrumental value of nature for human welfare is pragmatic because such reasoning is far more persuasive than reasoning that invokes the intrinsic value of nature (Marvier & Wong 2012). This argument invites three responses.

First, the various motivations for conservation are not a zero sum game. That is, appreciating the persuasiveness of an argument based on intrinsic value does not detract from the persuasiveness of an argument associated with human welfare and vice versa. Both arguments together are more persuasive than either by itself. Second, when robust reasoning is unpersuasive, the appropriate

response is not the abandonment of robust reasoning; rather, it is working to communicate that reasoning in a persuasive manner (Meadows et al. 2005). Third, arguments focused on intrinsic value may be more persuasive than they are made out to be. It is plausible that many are persuaded by intrinsic-value arguments but mistakenly believe they are among the few who are persuaded. Consequently, intrinsic-value arguments are de-emphasized in public discourse. Sociological research required to understand these claims has not yet been conducted.

Why Intrinsic Value Is Not Superfluous, Distracting, or Moot

Some argue that nature's intrinsic value is superfluous, distracting, and moot because nature's instrumental value to human welfare will adequately motivate conservation (e.g., Norton 1991; Marvier & Wong 2012). Points raised in preceding sections—especially those regarding burden of proof—indicate otherwise.

Further insight emerges from considering rarity. Most rare species provide negligible or dubious benefit to human welfare because they are rare. Other objects of conservation concern may once have contributed substantially to human welfare (e.g., American chestnut [*Castanea dentata*]) but no longer do because their abundance is low. Because perception of what is normal and healthy is importantly influenced by shifting baselines, the loss of those objects formerly contributing to human welfare may be unappreciated (Pauly 1995).

Finally, many objects of conservation concern could be valued because they might serve human welfare in some as yet unknown capacity. But that seems a weak rationale for conservation. The uncertain and unlikely value of many species to human welfare would almost certainly be outweighed by the utility of exploiting habitats upon which those species depend.

The real consequences of neglecting nature's intrinsic value are further indicated by attempts to understand the meaning of *sustainability*. Sustainability is usefully taken to mean meeting human needs in a socially just manner without depriving ecosystems of their health (e.g., Callicott & Mumford 1997; NRC 1999). Depending on how concepts such as human need and ecosystem health are interpreted, sustainability could mean anything from "exploit as much as desired without infringing on future ability to exploit as much as desired" or to "exploit as little as necessary to maintain a meaningful life" (Vucetich & Nelson 2010). There is little reason to think that the manifestation of these visions of sustainability would result in the same outcome (McShane 2007a, 2007b).

Economic Valuation of Nature

Kant's account of intrinsic value (see Concept of Intrinsic Value) indicates the straightforward manner in which intrinsic value cannot be reduced to economic valuation (see also Lele et al. 2013). Nevertheless, a basic principle is that economic valuation can, in general, appropriately apprehend any use value. That principle is significant because several scholars have implied, presumed, or concluded from what seem to be overly simple considerations that intrinsic value is a kind of use value (e.g., Justus et al. 2009; Gee & Burkhard 2010; Kumar 2010). Our search of Web of Science identified five substantive evaluations of whether intrinsic value is a kind of use value (i.e., Aldred 1994; Lockwood 1997; Attfield 1998; Spash 2000; Davidson 2013). Four of those conclude that intrinsic value differs significantly from the kinds of value that are appropriately handled by economic valuation.

The exception is Davidson (2013), who concludes "the concept of intrinsic value is *not necessarily incompatible* with economic valuation [emphasis added]." That conclusion depends on viewing intrinsic value from the exclusive perspective of a narrow form of utilitarian ethical theory. In particular, Davidson (2013) implicitly presupposes that economic valuation is generally the most appropriate way to weigh and adjudicate competing values involved with ethical decision making.

Davidson (2013) defends this view by reminding the reader that corporations and governments routinely assign economic value to humans who are intrinsically valuable. In particular, he notes that the "value of a statistical life" is approximately US\$7 million if you live in a developed country. That same logic leads to the conclusion that human life in a developing country has about one-seventh of that value (Viscusi & Aldy 2003). That the concept of value of a statistical life may have some appropriate application does not mean that all (or even most) ethical decisions involving human life are appropriately determined by economic valuation.

Nations sometimes go to war on the basis of (implicit) economic valuation, and economic valuation often explains the actions of corporations that pollute the environment at significant risk to human health and safety. Davidson (2013) implies that those decisions are appropriate. The concern is that many inappropriate decisions (e.g., child labor, commodification of human organs) could be favored by economic valuation if determined solely by economic valuation.

Some assert that economic valuation of an intrinsically valuable object is appropriate to account for some of the object's value, which is better than not accounting for any of its value (e.g., Daily 1999; MEA 2005; Burkhard et al. 2009; Raymond et al. 2009; Chan et al. 2012; Reyers et al. 2012). This perspective entirely misses the obligation that intrinsic value entails—to be truly concerned

with treating an intrinsically valuable object in a just manner or with concern for its welfare.

Similarly, some assert that economic valuation is not intended to replace concern for intrinsic value, but rather to stand beside it (e.g., Costanza et al. 1997; Costanza 2006; Fisher et al. 2009). Because concern for intrinsic value is not typically voiced with equal fervor to concern for economic valuation, this belief also misses the obligation that intrinsic value entails. This circumstance reveals a fault, not with the expressed belief of those researchers, but with a community of scholars who call for two kinds of valuation but tend to only one kind.

Can intrinsic value be made the subject of economic valuation? Yes, but that is the wrong question. The critical question is, what is the best way to weigh and adjudicate competing values that involve intrinsic values? Few citizens are likely to agree that economic valuation is generally the only or best tool for such decisions. Their views are supported by basic principles of social justice (Putnam 2004; Aldred 2009; Sen 2009).

Conclusion

Many conservation professionals may agree with us that a scholarly understanding of intrinsic value is important but tangential to their focused interest to better understand the ecological dimensions of conservation. That view is shortsighted. Without intrinsic value, the justification for conservation relies entirely on defending scientific claims about the ecosystem service or function (use value) of various objects of conservation concern. And, that reliance is an obstacle to good science, as illustrated by controversies over concern for exaggerating the ecosystem function of large carnivores (Mech 2012; Middleton 2014) and biodiversity (Kaiser 2000). If conservation scientists had a scholarly understanding of how intrinsic value represents a well-reasoned justification for conservation and could articulate that understanding to others, then they might be less tempted to defend dubious scientific claims about the ecological function of objects of conservation concern and would not readily be accused of doing so. In this way, a better understanding of nature's intrinsic value would benefit both conservation ethics and conservation science.

Much interdisciplinary research is required to adequately understand what people believe regarding intrinsic value—who believes what, why, and to what extent those beliefs affect attitudes and behaviors related to various aspects of conservation. Particularly important research in this area may concern the proportion of humans characterized by various kinds of zoocentrism and biocentrism versus those characterized as ecocentrists. Also important is research concerning the hidden biases in subverting attitudes and behaviors inconsistent with the acknowledgment of nature's intrinsic value. The value of such research is suggested by analogous research in the

context of gender and race relations (Banaji & Greenwald 2013).

The principles of social justice are a fundamentally important means of weighing and adjudicating competing claims among humans. The need for such principles is rooted in recognizing that humans possess intrinsic value and recognizing that not every interest of every human is sufficiently equal in importance, sufficiently fair to others, or sufficiently cognizant of other humans' needs. Although the principles of social justice were developed with humans in mind, social justice's roots in intrinsic value suggests that it might be expanded and adapted to better understand what constitutes appropriate relationships between humans and the rest of the natural world.

Some believe that nature's intrinsic value is anathema to conservation because it is a flimsy notion. Our arguments challenge this allegation. We show through logical argument that nature's intrinsic value is not arbitrarily affirmed and is widely acknowledged. From this arises a demand for a certain kind of relationship with nature—a relationship that might be called conservation. In this way intrinsic value is axiomatic to conservation.

Acknowledgments

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Supporting Information

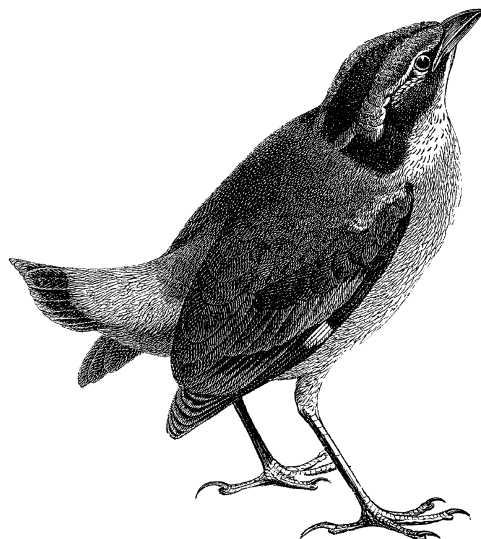
Details of the literature search (Appendix S1), evaluation of survey response items (Appendix S2), and empirical analysis (Appendix S3) are available online. The authors are solely responsible for the content of these materials. Queries (other than the absence of material) should be directed to the corresponding author.

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SUPPLEMENTARY MATERIALS

Appendix A: Literature Search

Of the 39 papers captured by the literature search, 23% use the term in a sense unrelated to environmental ethics or values. Examples of such include Scurlock et al. (1999):

"The resulting NPP database will also have intrinsic value: global data are important for many ecological problems, and NPP is a kind of "pathfinder" for other ecological data sets."

10 and Villalba et al. 2004:

"We often assume the intrinsic value of a food or habitat is similar for individuals of a species and above a certain threshold density more profitable foods should always be preferred over less profitable foods."

Of the 39 papers captured by that literature search, 18% use the term intrinsic value in reference to the idea developed by environmental ethicists, but treat the topic so briefly that one cannot critique its usage. In most cases a simple assertion is made that some aspect of nature possesses intrinsic value, without any further discussion or explanation. A representative example is Coulter (1993), which makes a single reference to intrinsic value: *"Lake Tanganyika is outstanding*
20 *among lakes because of the intrinsic value of its fauna and the significance of its natural resources."*

Four papers make on passing reference to intrinsic value, but communicate enough to indicate the authors presume some aspect of intrinsic value that should not be taken for granted. A representative example is Cohen et al. (2006), whose only reference to intrinsic value is: *"The intrinsic value of soil to national, regional and local agroecological and economic productivity in sub-Saharan Africa is not adequately manifest in financial planning and decision making... Without quantifying the intrinsic value of these services in the context of the resource basis of the economy, decision makers have no way to evaluate problem severity."* That statement supposes
30 that the primary means of evaluating intrinsic value is to quantify it and compare it with various instrumental values. The other three papers in this category are Boson et al. (2012), MacLeod et al. (2008), and Zisenis (2006). For emphasis, none of these papers are focused on the idea of intrinsic value. They only make reference to the idea in a subsidiary manner.

The remaining papers are discussed in the main body of this article.

Reference for Appendix A

40 Bosson, J.B. and E. Reynard. 2012. Geomorphological heritage, conservation and promotion in high-alpine protected areas. *Eco Mont-Journal On Protected Mountain Areas Research And Management* 4:13-22.

Coulter, G. W. and R. Mubamba. 1993. Conservation in lake Tanganyika, with special reference to underwater parks. *Conservation Biology* 7:678-685.

Cohen, M.J., Brown, M.T. and K. D. Shepherd. 2006. Estimating the environmental costs of soil erosion at multiple scales in Kenya using emergy synthesis. *Agriculture Ecosystems & Environment* **114**:249-269

50 MacLeod, C.J., Blackwell, G., Moller, H., Innes, J., and R. Powlesland. 2008. The forgotten 60%: bird ecology and management in New Zealand's agricultural landscape. *New Zealand Journal of Ecology* **32**:240-255.

Scurlock, J.M.O., Cramer, W., Olson, R.J., W. J. Parton, and S. D. Prince. 1999. Terrestrial NPP: Toward a consistent data set for global model evaluation. *Ecological Applications* **9**:913-919

Villalba, J.J., F. D. Provenza, and G. D. Han. 2004. Experience influences diet mixing by herbivores: implications for plant biochemical diversity. *Oikos* **107**:100-109.

60 Zisenis, M. 2009 To which extent is the interdisciplinary evaluation approach of the CBD reflected in European and international biodiversity-related regulations? *Biodiversity and Conservation* **18**:639-648

Appendix B: Evaluation of survey response items related to intrinsic value

We used a consensus-based (Trochim 2001) inductive approach (Thomas 2003) to analyze response items for their ability to distinguish between anthropocentrism and non-anthropocentrism. We based our analysis on a scan, order, review, and compare methodology (LeCompte & Goetz 1983); and we used a purposive, expert-based sample (Trochim 2001) of extant literature directed at capturing commonly used response items (Manfredo et al. 2003, Manfredo & Zinn 1996). More specifically, we applied this analysis to a convenience sample (Trochim 2001) representing response items designed by social scientists to distinguish between anthropocentrism and biocentrism, as those terms are used in social science, which correspond approximately to the distinction between anthropocentrism and non-anthropocentrism, as those terms are used in this paper. Specifically, we assessed the items appearing in five representative papers (i.e., Kaltborn & Bjerke 2002; McFarlane & Boxall 2003; Steel et al. 1994; Vaske et al. 2001; Vaske & Donnelly 1999) and the three items described in Appendix C. They included 43 unique statements that appeared 53 times (several items occurred in more than one survey). Most of those statements are presented in Tables 1 and 2. The remainder are presented Tables B1 and B2 (next page).

Figure B1 summarizes the results of Tables 1, 2, B1, and B2. In particular, only 16% of those items would avoid misclassifying individuals. Forty-six percent of the items will either misclassify some non-anthropocentrists as anthropocentrists, or misclassify some anthropocentrists as non-anthropocentrists. The remaining 42% of the items will misclassify some non-anthropocentrists as anthropocentrists *and* some anthropocentrists as non-anthropocentrists.

90 References for Appendix B

LeCompte, M. D., and J. P. Goetz. 1983. Playing with ideas: analysis of qualitative data. Paper presented at the Annual Meeting of the American Educational Research Association.

Thomas, D. R. 2003. A general inductive approach to qualitative analysis. University of Auckland, New Zealand, School of Population Health.

Trochim, W. M. K. 2001. The research methods knowledge base. Originating: Atomic Dog Publishing.

100

Manfredo, M.J., Teel, T.L., and A. D. Bright. 2003. Why are public values toward wildlife changing? *Human Dimensions of Wildlife* **8**:287-306.

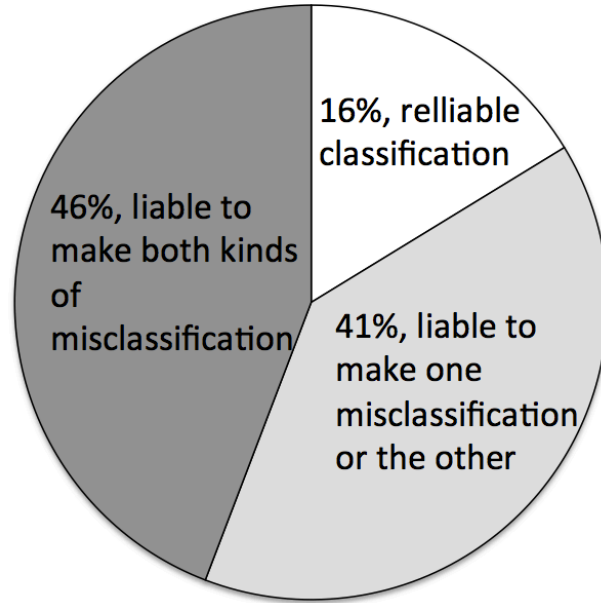
Manfredo, M. J., and H. C. Zinn. 1996. Population Change and Its Implications for Wildlife Management in the New West: A Case Study of Colorado. *Human Dimensions of Wildlife* **1**:62-74.

Table B1. Statements used in sociological surveys to classify respondents as anthropocentric or non-anthropocentric. Agreeing with these statements is taken to be as an expression of a non-anthropocentrism; disagreeing is taken to be an anthropocentric expression. However, each statement below is prone to either or both of two kinds of misclassification: [A] a non-anthropocentrist could reasonably disagree and [B] an anthropocentrist could agree.			
Statements intended to describe non-anthropocentrists	Misclassification		Explanation
	A	B	
Being out in nature is a great stress reducer for me	X	X	The shortcomings of these statements are illustrated by the shortcoming of the first statement listed in Table 1.
I can enjoy spending time in natural settings just for the sake of being out in nature	X	X	
Sometimes when I am unhappy I find comfort in nature	X	X	
One of the most important reasons to conserve is to preserve wild areas	X	X	Anthropocentrists who believe preservation of wild areas is important for the welfare of humans would agree. Non-anthropocentrists who believe nature's welfare can be respected outside of protected areas would disagree.
Sometimes it makes me sad to see forests cleared for agriculture		X	Anthropocentrists who believe that forests are important for human welfare are liable to feel sad at the clearing of a forest.
Whether or not I get to visit the forest as much as I like, it is important for me to know that forests exist in Alberta		X	Anthropocentrists who derive instrumental value from the existence of a forest would agree.
I prefer wildlife reserves to zoos		X	Nothing about anthropocentrism precludes preferring wildlife reserves to zoos.
Forests have value, whether people are present or not [2].	X		A non-anthropocentric would believe that nature possesses the subjective conceptualization of intrinsic value would disagree.
Forests should have the right to exist for their own sake, regardless of human concerns and uses	X		A non-anthropocentric concerned with welfare or respect, rather than rights, would disagree. Rights can imply a duty-boundness, which cannot be overridden.
Sometimes animals seem almost human to me.	X?	X?	If most respondents would understand "seeming almost human" as necessary and sufficient for possessing intrinsic value, then this statement is useful for distinguishing anthropocentrism and non-anthropocentrism. It is not obvious that this condition holds.

Table B2. Statements used in sociological surveys to classify respondents as anthropocentric or non-anthropocentric. Agreeing with these statements is taken to be an expression of anthropocentrism; disagreeing is taken to be a non-anthropocentric expression. However, each statement below is prone to either or both of two kinds of misclassification: [C] an anthropocentrist could reasonably disagree and [D] a non-anthropocentrist could agree.

Statements intended to describe anthropocentrists.	Misclassification		Explanation
	C	D	
The thing that concerns me about deforestation is that there will not be enough lumber for future generations	x	x	Nothing about anthropocentrism <i>requires</i> an anthropocentrist to hold this belief. Nothing about non-anthropocentrism <i>precludes</i> having this belief. Presuming otherwise is to mistake non-anthropocentrism with misanthropy.
It is important to maintain the forests for future generations	x	x	
Forests can be improved through management by humans	x	x	Shortcomings of this statement are similar to previous.
One of the best things about recycling is that it saves money	x	x	Nothing about anthropocentrism <i>requires</i> an anthropocentrist to hold this belief. Because non-anthropocentrists can also appreciate the instrumental value of nature to a human, nothing about non-anthropocentrism <i>precludes</i> believing that "One of the best things about recycling (for me) is that it..."
The primary value of forests is to generate money and economic self-reliance for communities.	x	x	An anthropocentrist who thought, for example, that the primary value of a forest was emotional well being would disagree with these statements. Also, non-anthropocentrist can still think the primary value of a forest <i>to people</i> is its consumptive uses.
Nature's primary value is to provide products useful to people.	x	x	
The primary value of forests is to provide timber, grazing land, and minerals for people who depend on them for their way of life.	x	x	
One of the most important reasons to conserve is to ensure a continued high standard of living	x	x	
The value of forests exists only in the human mind. Without people forests have no value.		x	A non-anthropocentrist believing that forests possess subjective intrinsic value would agree, but a non-anthropocentrist believing in objective intrinsic value would disagree.
The most important reason for conservation is human survival.		X	Because only a misanthrope would certainly disagree with this statement, some non-anthropocentrists (who believe humans and non-humans both have intrinsic value) might agree.
Forests that are not used for the benefit of humans are a waste of our natural resources			These statements are useful for classification because a person holding those beliefs would be considered an anthropocentrist, and a person who disagreed would be considered a non-anthropocentrists.
Forests are valuable only if they produce jobs and income for people.			

Continued land development is a good idea as long as a high quality of Life can be preserved.			
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Figure B1. Proportion of 43 survey items liable to misclassify respondents. The survey items were designed to distinguish anthropocentrists and non-anthropocentrists. The two kinds of misclassification are: misclassifying anthropocentrists as non-anthropocentrists and misclassifying non-anthropocentrists as anthropocentrists. This chart is a summary of the information presented in Tables 1, 2, B1, and B2.

Appendix C: Empirical Analysis

We used data from a recent study of Ohioans that explicitly measured *belief in intrinsic value* (of wildlife), as well as judgments regarding a variety of wildlife policies. Data were gathered through the use of a mailed survey conducted in 2009. Briefly, a random sample of ~9,400 households, stratified across eight regions, was drawn by a private sampling firm (Survey Sampling Inc., Shelton, CT), and a modified version of Dillman's (2007) tailored design method was used to structure contacts with the sample. Data collection methods are described in detail in Zajac et al. (2012).

Respondents were asked a series of questions about the value of wildlife designed to contrast instrument value with intrinsic value. Two response items were used to determine the extent to which respondents believe that wildlife possesses intrinsic value: (1) Wildlife have inherent value, above and beyond their utility to people; and (2) Wildlife are only valuable if people get to utilize them in some way. Respondents indicated to what extent they agreed or disagreed with each item based upon a 7-point scale that ranged from strongly disagree (-3) to strongly agree (+3). A composite measure was created by reverse-coding the second item and averaging across the two items.

We also asked respondents to identify wildlife-related recreational activities in which they participate (i.e., hunting, fishing, trapping, wildlife viewing). Finally, we asked respondents to indicate their level of support for lethal management action in response to a series of nuisance scenarios that ranged in severity.

We analyzed data with SPSS v. 19 for Windows. Initial item analyses indicated that both items designed to assess intrinsic value exhibited unacceptable levels of skewness and kurtosis (Noar 2003). Consequently, we dichotomized the combined measure of intrinsic value such that 1 indicated a belief in the intrinsic value of wildlife, and 0 indicated either disbelief or ambivalence. We used the cross-tabulations function to estimate the percentage of respondents who believe wildlife possess intrinsic value for each group of interest (e.g., hunters, anglers). Chi-square tests were then used to determine if belief in intrinsic value varied across groups, and correlation coefficients were used to determine the relationship of group membership with belief in intrinsic value. We conducted binary logistic regression to determine the influence of this suite of social and demographic variables on respondent's odds of believing in intrinsic value. Finally, to determine if belief in intrinsic value is associated with judgments about lethal management, actions we correlated three items designed to assess judgments about the acceptability of lethal bear management with our dichotomized measure of belief in intrinsic value.

Key results of this survey are summarized in Figures 1 and 2 and Table C1 (next page).

References for Appendix C

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Table C1. Percentage of respondents believing that destroying a black bear (or not intervening) is unacceptable or acceptable given each of three scenarios about the bear and whether the respondent reported believing that wildlife do or do not possess intrinsic value (IV).					
	respondent's judgment	No intervention		Destroy bear	
		believe in IV	do not believe in IV	believe in IV	do not believe in IV
<i>(1) Bear has been sighted in your neighborhood...near homes and yards where children and pets are playing</i>	unacceptable	26.2%	18.8%	66.0%	86.6%
	neutral	9.2%	4.0%	18.1%	6.6%
	acceptable	64.6%	77.3%	15.8%	6.8%
		R = 0.14*		R = -0.25*	
<i>(2) Bear has eaten and scattered the contents of a garbage can and birdfeeder near a home in your neighborhood.</i>	unacceptable	42.4%	32.6%	64.1%	85.4%
	neutral	10.0%	5.0%	18.4%	6.8%
	acceptable	47.6%	62.4%	17.5%	7.8%
		R = 0.12*		R = -0.25*	
<i>(3) Bear has broken into some area homes, causing significant damage</i>	unacceptable	71.6%	70.3%	47.4%	65.7%
	neutral	7.0%	6.0%	12.0%	7.4%
	acceptable	21.4%	23.7%	40.6%	26.9%
		R = 0.02 (ns)		R = -0.18*	