

## Contrasting bobcat values

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**Abstract** Ecotourism enhances conservation management, promotes non-consumptive use of wildlife, and increases local community resources over that of select individuals when compared with consumptive uses such as hunting or trapping. The bobcat is a cryptic mesocarnivore widely exploited for pelts across North America, and a species increasingly contributing to ecotourism. Here, we report a conservative, non-consumptive economic value of US\$308,105 for a single bobcat in Yellowstone National Park in northwest Wyoming for the 2015–2016 winter season, a figure nearly 1000 times greater than exploitive values of US\$315.17 per bobcat trapped or hunted in Wyoming in the same season (US\$130.53 per bobcat harvested in revenue earned by the state of Wyoming in trapping license sales + US\$184.64 per pelt sold by successful trappers and hunters). In 2016, tourism was the second largest industry in Wyoming and generated US\$3.2 billion. Our case study emphasizes that current bobcat regulatory policies across North America do not reflect current cultural values, inclusive of both consumptive and non-consumptive use of wildlife. Therefore, we recommend range-wide regulatory changes to ensure bobcat management is not just sustainable in terms of harvest, but that all people have access to shared resources held in trust.

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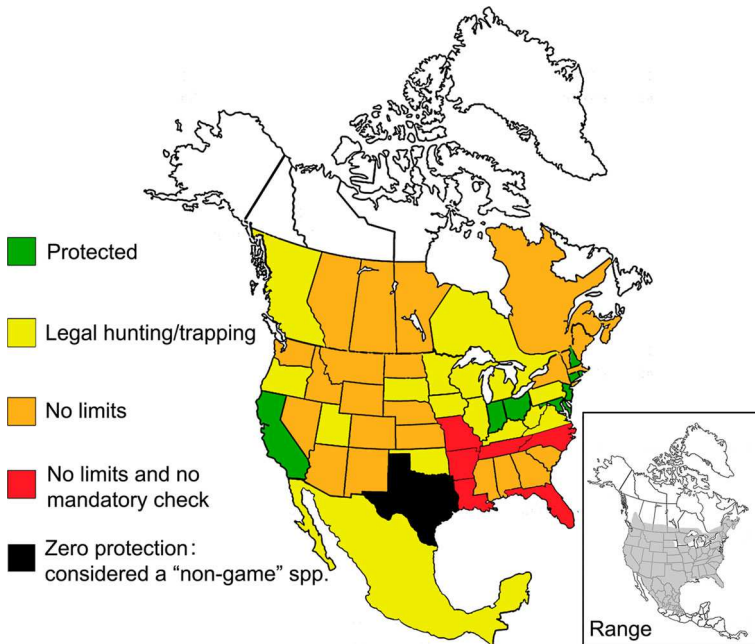
## Introduction

Ecotourism built around large charismatic species enhances conservation management, promotes non-consumptive use of wildlife, and increases local community resources over that of select individuals when compared with hunting or trapping (Lindsey et al. 2013; Selier and Di Minin 2015; Buckley et al. 2016). In many areas around the globe, ecotourism has replaced trophy hunting, ranching, and agriculture in terms of primary economic activities, offering greater protection to not just charismatic species, but additional diversity captured within the “umbrella” of such actions as well (Lindsey et al. 2013; Mossaz et al. 2015; Buckley et al. 2016). In fact, ecotourism is among the many reasons there is rising tolerance for and increasing abundance of large predators in North America and Europe (Bruskotter and Wilson 2014; Chapron et al. 2014; Penteriani et al. 2017). People are also exhibiting appreciation for less charismatic species, providing new opportunities for ecotourism to expand its influence on the conservation of species beyond the largest and most charismatic (Lemelin 2007; Lindsey et al. 2007; Hausmann et al. 2017).

The bobcat (*Lynx rufus*; Schreber 1777) is a cryptic mesocarnivore widespread in North America, and one increasingly contributing to ecotourism in Point Reyes National Seashore, Yellowstone National Park, and California’s southern coast range, USA. The bobcat is widely exploited for pelts, which are sourced to international markets for spotted furs. The demand for bobcat pelts in international markets grew slowly during the 1960s and 1970s, and then rose steeply when a void in the market was created after Convention on the International Trade of Endangered Species (CITES) enforcement made many of the world’s spotted cats illegal to trade (Nowell and Jackson 1996). Bobcats are legally hunted in 39 US states, eight Canadian provinces, and in Mexico (Fig. 1; OSM Table 1). Thirty-two states and six provinces require mandatory reporting of bobcats legally killed, and the remaining states and provinces require state- or province-issued CITES tags to export bobcat pelts, allowing for some harvest monitoring. Thirteen states and four provinces limit bobcat harvest, even if limits are generous. There is also trophy hunting for bobcats in some areas of Mexico, though their status there is largely unknown (Kelly et al. 2016).

One of the seven tenets of the North American Model of Wildlife Conservation is the elimination of markets that support the exploitation of wildlife, however, fur markets have long been considered an exception to this rule because we assume they are well-managed and operate sustainably (Organ et al. 2012). Roberts and Crimmins (2010) reported that as of 2008, North American bobcat populations were stable or increasing, and the authors supported continued harvest. Volatile markets, however, lead to unpredictable wildlife use, making the management of furbearers difficult and at times impossible. This is especially true for species like bobcats for which many states lack precise data to quantitatively track population trends (e.g., they rely upon hunter surveys, public sightings, or vehicle collision data to track trends; Roberts and Crimmins 2010).

There was a recent surge in bobcat pelt prices in 2013 due to economic development in China and Russia (Kelly et al. 2016). This surge in the spotted pelt market resulted in increased fur sales across North America and increased bobcat harvest (see Fig. 2 for an



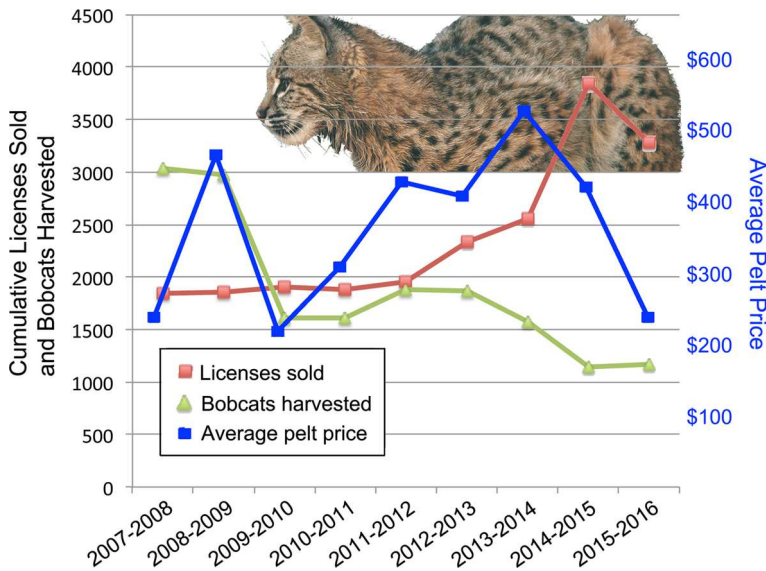
**Fig. 1** Trapping/hunting regulations across states and provinces; bobcat range in *inset*. The color scheme is cumulative: *green* is full protection; *yellow* is legal hunting/trapping but with mandatory checks and bag limits; *orange* removes bag limits; *red* removes bag limits and mandatory checks; *black* is no monitoring or protection at all

example in WY). Prime bobcat pelts sold for well over US\$1000 in 2013, igniting a renewed interest in trapping throughout the USA and Canada and a four-fold increase in bobcat pelt exports over the last several decades (Kelly et al. 2016). It may have also resulted in the over-exploitation of bobcats and localized declines (Fig. 2).

### Madison river bobcat: a case study in alternative values

Here, we report on the economic value of a single bobcat in Yellowstone National Park in northwest Wyoming, as a comparison to fluctuating pelt values. Bobcats are not common in Yellowstone NP, and deep winter snows relegate bobcats that survive there to river corridors where they appear to sustain themselves on waterfowl aggregated where hot springs keep ice flows from forming. One bobcat has been particularly visible along the Madison River, and has increasingly attracted tourists and photographers. We surveyed 20 outfitters (OSM Table 2) that bring tourists to the Madison River and 46 photographers known to have made a trip to look for the Madison bobcat in the winter of 2015–2016, 33 of which responded with data (OSM Table 3). Note that although we made every attempt to learn about photographers that made the trip, we were unable to query every photographer that traveled to the Madison River during this season.

On average, outfitters charged US\$800/day, which included snowmobiles or a snow-coach required to reach the Madison River in winter. Photographers that responded



**Fig. 2** Trapping data from Wyoming from 2007 to 2016 (Sheridan et al. 2016), as an example of what might have occurred throughout North America during a recent fur market surge, and as a comparison to revenues associated with ecotourism and the Madison bobcat in Yellowstone National Park in northwest Wyoming. Note that as pelt prices soared (*blue*), cumulative licenses sold (trapping is during winter and straddles two years, requiring two separate licenses) followed in *red*, even while bobcat harvest declined in *green*, perhaps reflective of the availability of bobcats on the landscape

invested a combined US\$155,706 ( $\bar{X} = \text{US}\$4718 \pm \text{US}\$4625 \text{ SD}$ ) in food, travel and lodging to photograph the Madison bobcat. Of the 13 photographers that shared data on sales of photographs captured during their trips, they reported a total revenue of US\$152,419 thus far, or US\$11,725 (US\$35,629 SD) per photographer. In combining revenues invested by photographers in travel and local communities bordering Yellowstone NP with revenues earned by photographers through print sales, we estimated an impressive, conservative non-consumptive value of US\$308,105 for the Madison bobcat for a single winter.

Tourism is the second largest industry in Wyoming, and disproportionately occurs in the northwest of the state near Yellowstone NP and Grand Teton National Park (Wyoming Office of Tourism 2017). Tourism generated US\$3.2 billion in 2016, US\$170 million of which was invested in local and state tax revenues. Tourism also supported 32,000 jobs in Wyoming in 2016. In comparison, 2015–2016 trapping license sales netted US\$151,954 for the state of Wyoming (3089 resident licenses at US\$44 each, 60 non-resident licenses at US\$242 each, and 253 youth licenses at US\$6 each), or US\$130.54 per bobcat harvested in that season (Sheridan et al. 2016). Additionally, the 284 individual trappers and hunters that successfully harvested bobcats during the 2015–2016 season earned an average US\$184.64 per pelt (Sheridan et al. 2016; Upper Snake River Trappers of Idaho 2017). In summary, we calculated a conservative, non-consumptive economic value of the Madison bobcat that was nearly three orders of magnitude greater than the exploitive value of bobcats legally harvested and sold in Wyoming during the same season.

## A call for regulatory policy change

Current bobcat regulatory policies, including those of Wyoming, do not reflect current North American values, which are diverse and include both consumptive and non-consumptive use of wildlife (Selier and Di Minin 2015; Wildlife Management Institute 2016; Feldpausch-Parker et al. 2017). In fact, the Wildlife Management Institute conducted a programmatic evaluation of the Wyoming Game and Fish Department in 2016, and concluded that the State wildlife agency “should recognize the contributions of hunters and anglers but also consider the benefits of...all Wyoming residents and non-resident visitors to the state” (Wildlife Management Institute 2016).

Given the volatility of international fur markets, increased tolerance for predators around the globe, increased appreciation for non-consumptive users by wildlife managers, and increasing interest surrounding bobcats that suggests that they may support ecotourism and its associated conservation measures and community development, we argue it is time to review current bobcat regulatory policies and management across their range. Specifically, we call for three regulations to be consistent across every state and province in which bobcats are hunted or trapped: (1) mandatory reporting for bobcats legally killed, in addition to CITES permits for export and sales; (2) range-wide seasonal bag limits for licensed hunters and trappers. Limits must vary from state to state to match local bobcat abundances, but should not threaten the ecological contributions of bobcats to ecosystems or their potential to act as stewards supporting ecotourism; and (3) for bobcats to be managed as either furbearers or game species, with associated protection. We call on Texas, the only state that considers bobcats as “non-game,” to change the status of bobcats in their state so that they may initiate management of the species. Further, we would encourage greater research and monitoring in Mexico, to improve our understanding of the status of bobcats in that country.

There is mixed evidence that harvest data can be used to effectively monitor population trends (Gese 2001; Wolfe et al. 2016). Nevertheless, with mandatory harvest reporting in place, managers can pursue quantitative harvest analysis accounting for gender and age-class covariates to ensure that bobcat populations remain stable when surging fur markets see greater license sales and harvest. These are important first steps to ensure sustainable recreation, inclusive of trappers and tourists that want the opportunity to photograph and watch wild bobcats.

## Conclusions

Bobcats hold tremendous value to the non-consumptive public as well as fur traders, as shown very clearly by the Madison bobcat. Cultures around the world are changing, and wildlife managers need to think beyond the North American Model of Wildlife Conservation, which prioritizes hunting and trapping constituents over non-consumptive users (Feldpausch-Parker et al. 2017). We need to ensure bobcat management is not just sustainable in terms of harvest, but that all people have access to shared resources held in trust (Selier and Di Minin 2015). Through the implementation of our proposed regulatory changes, wildlife managers will also help spread financial resources and ensure that local communities, rather than select individuals, reap the benefits of healthy bobcat populations through revenues invested by tourists over trappers (Selier and Di Minin 2015; Wildlife Management Institute 2016).

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