Ecological Economics 114 (2015) 159–167

Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Analysis

Using tradeable permits to improve efficiency, equity and animal protection in the commercial kangaroo harvest

Louise Boronyak-Vasco [a], Neil Perry [b,*]

[a] Institute for Sustainable Futures and the Centre for Compassionate Conservation, University of Technology, Sydney, PO BOX 123 Broadway, NSW 2007, Australia
[b] School of Business, University of Western Sydney, Locked Bag 1797, Penrith, NSW 2751, Australia

ARTICLE INFO

Article history:
Received 29 August 2014
Received in revised form 26 February 2015
Accepted 23 March 2015
Available online 10 April 2015

JEL classification:
Q20
Q15

Keywords:
Kangaroos
Wildlife utilisation
Animal welfare
Open access resources
Externalities
Tradeable permits

ABSTRACT

The utilisation of wildlife creates conflicts between commercial operators, landholders, traditional owners of the land, conservationists and animal protection advocates. Such conflicts are evident in Australia's utilisation of the iconic kangaroo (*Macropus*) species for their meat and hides. Like many wild animal industries, kangaroos are an open access resource, although restrictions built into the management regime ensure that rents are, approximately, maximised. However, resource allocation decisions and the distribution of rents reflect the values and objectives of the economically powerful stakeholders and particularly commercial processors. Thus, rents are not distributed equitably and the management regime excludes animal protection advocates from adequate participation. Thus, an external cost occurs when kangaroos are harvested that must be internalised for economic efficiency to be achieved. We propose a tradeable permit system where landholders, shooters and processors compete with ordinary citizens for the right to harvest kangaroos. This increases the private cost of harvest and internalises the external cost. It also improves the equity of rent distribution with landholders able to earn a return from kangaroos on their land. As similar issues arise in the utilisation of other wild animals, the research provides an important contribution to the literature on the economics of animal welfare.

1. A History of Contested Objectives

The harvesting of wild animals for commercial purposes creates conflicts between commercial operators, landholders, traditional owners of the land, conservationists and animal protection advocates. For example, ethical concerns conflict with economic returns in the industries harvesting harp, grey and hooded seals (Fink, 2007; Livernois, 2010; Wenzel, 1978), crocodiles (Choquenot et al., 1998), turtles (Haitao et al., 2008), wild boar (Takahaski and Tisdell, 1989) and whales (Kuronuma and Tisdell, 1994). These conflicts are evident in the Australian commercial kangaroo industry which has grown to be the largest consumptive mammalian wildlife industry in the world (Boom et al., 2012). The commercial kangaroo industry provides economic benefits for shooters, chiller operators and meat and hide processors and, arguably, indirect benefits for landowners. Yet these benefits come with a cost to the adult kangaroos and their young, humans advocating for animal protection and humans who attach existence values to the individual animals of an iconic species (Ben-Ami et al., 2014; Ramp, 2013). As with open access fisheries, the efficient allocation of resources to the commercial harvest of kangaroos requires some form of regulated access. However, given the unequal distribution of market and political power amongst stakeholders, economic resources are unlikely to be allocated efficiently and economic rents are unlikely to be distributed equitably. In particular, animal protection advocates have little ability to express their preferences with respect to the industry, aside from the implementation of humane killing regulations which are often poorly enforced (Boom et al., 2013). We analyse the commercial kangaroo industry from an economic perspective and argue that a more efficient and equitable management system would arise if all concerned citizens could purchase rights to the commercial harvest.

Kangaroo harvesting is controversial with diverse objectives and values influencing policy and incomplete knowledge about the conservation and productivity benefits of the harvest. For example, from a processor's perspective, the industry's objective is assumed to be profit or growth maximisation, whereas a local government or business association is more concerned with regional employment sustainability, a conservationist desires ecological sustainability and an animal protection advocate would like to minimise animal suffering. Landholders have a long history of perceiving kangaroos as pests while others view them as a valuable commercial or ecological resource or a sentient species with a right to exist without pain or interference. It is claimed by some that kangaroos reduce the productivity of traditional agriculture due to competition with livestock (Gibson and Young, 1988; Grigg, 2002; Hacker et al., 2004). Others suggest that competition occurs only as drought intensifies (Ben-Ami et al., 2011; Dawson and Ellis,

* Corresponding author.
E-mail address: neil.perry@uws.edu.au (N. Perry).

http://dx.doi.org/10.1016/j.ecolecon.2015.03.023
0921-8009/

1996; Edwards et al., 1996; Thomsen and Davies, 2006) and point out that the rearing of livestock damages ecosystems and reduces native biodiversity (MacLeod and McIvor, 2006; McIntyre et al., 2003).

Despite the extensive range of objectives, values and knowledge, the current utilisation of kangaroos reflects the relative power of different stakeholders and the specific values the powerful stakeholders adhere to and knowledge they choose to promote. In general, the quantity of economic resources devoted to the industry has been determined by two objectives. The first is the mitigation of damage to traditional agriculture, an objective deriving from the historical perception that kangaroos are pests to landholders. The second major objective is to maximise the profits or growth potential of kangaroo processors. Other objectives, such as ecological sustainability and the humane treatment of animals have been addressed using piecemeal add-ons to the harvesting regime. For example the *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes* (herein, 'the Code') was developed to protect the welfare of kangaroos and their young (NRMMC, 2008). However, enforcement of the Code is difficult and inhumane treatment of kangaroos and breaches of the Code have been documented (Boom et al, 2013; RSPCA, 2002, sec. 5.2).

We explain that resources are overallocated to the industry and propose a change to the management regime that would improve economic efficiency, equity and animal protection and that could be applied to the commercial harvesting of wildlife in other parts of the world. In Section 2 we provide a background to the commercial kangaroo industry including the products sold, the regulatory regime and the estimated value of the industry to the Australian economy. In Section 3 we describe the economics of the industry in the context of a regulated open-access resource. In Section 4, we discuss two externalities that work in opposing directions, and we argue that resources are overallocated. Given the overallocation, we describe in Section 5 how the existing regulatory requirements could be adjusted to ensure a more efficient allocation of resources and a more equitable distribution of rents.

2. Background to the Commercial Kangaroo Industry

Four species of kangaroos are commercially harvested from wild populations in four States on mainland Australia (see Fig. 1) — *Macropus rufus* (Red kangaroo), *Macropus giganteus* (Eastern grey kangaroo), *Macropus fuliginosus* (Western grey kangaroo) and *Macropus robustus* (Common Wallaroo) (DSEWPAC, 2012). In addition, the commercial harvesting of *Macropus rufogriseus* (Bennetts Wallaby) and *Thylogale billardierii* (Tasmanian Pademelon) takes place on both Flinders and King Islands under the Tasmanian government jurisdiction (Foster, 2009, p. 29). Over the last decade more than 28.5 million adult kangaroos were killed for commercial purposes (DSEWPAC, 2013) with a 'by catch' of approximately 8 million joeys (Boom et al., 2013, p. 1).[1] The harvest fluctuates each year due to supply and demand conditions but in 2012 approximately 1.61 million kangaroos were killed (DSEWPAC, 2013).

Fig. 1. Map of the commercial harvest zones in mainland Australia in different States (WA — Western Australia; SA — South Australia; QLD — Queensland; NSW — New South Wales; VIC — Victoria; TAS — Tasmania).
Source: Pople and Grigg (1999).

The main kangaroo products are meat for human or animal consumption and skins for use as leather or fur. Traditionally, the majority of kangaroo meat was used as pet food in Australia with the remaining meat sold domestically or exported for human consumption (Foster, 2009, p. 29). More recently, there has been a shift from low-grade pet-meat production to higher-grade cuts of meat for human consumption with 70% of kangaroo meat production in 2011–12 used for human consumption purposes (MPIG and NFIS, 2013, p. 266). There has also been a shift from export to domestic markets. Kangaroo meat for human consumption has generally been exported to the Russian Federation, Germany, Netherlands, Belgium and France with considerably smaller markets in North America and Asia (Foster, 2009, p. 29). Since 2009, international consumption has fallen significantly due to the cessation of exports to the Russian Federation as a result of hygiene and animal welfare concerns (Rural and Regional Affairs Committee, 2012, p. 57). This is indicated in Fig. 2 which describes domestic and international kangaroo meat production for human purposes. Fig. 2 also indicates that the domestic market in Australia has risen by 200% from 2005–6 to 2011–12 (MPIG and NFIS, 2013, p. 266).[2] Despite the rise in domestic consumption, kangaroo meat is still considered a niche market in Australia with a mere 0.35 kg of kangaroo meat consumed per capita in 2011 compared to 43.3 kg of poultry and 32.8 kg beef and veal (ABARES, 2012, p. 141; MPIG and NFIS, 2013, p. 266).[3] Kangaroo skins are either sourced as a by-product of the meat industry or kangaroos are killed specifically for their skins. Kangaroo skins, furs and leather are mostly exported for footwear industries in Europe and Asia (Kelly, 2005, p. 2).

The industry supply chain starts with landholders who grant property access to licenced shooters. Shooters hunt at night when kangaroos are most active and generally operate as an independent small business on a part time basis to supplement other income, although some are employed by processors. Once a kangaroo has been shot, the shooter is required under the Code to check for an in-pouch or at-foot young which must also be killed according to the Code (NRMMC, 2008). The adult kangaroo is then partly eviscerated and dressed in the open field. The carcasses are taken to cold storage containers referred to as 'field chillers' — free-standing refrigerated buildings located in rural areas where commercial harvesting takes place. The kangaroo carcasses are later transported to a kangaroo processor or 'licenced fauna dealer' who manufactures products for domestic and international markets. Shooters negotiate a contract with a field chiller operator to store kangaroo carcasses. Shooters are paid on a per kilogram basis when they deliver kangaroo carcasses to the chiller and chiller operators are

[1] However, this figure does not include the additional kangaroos that were killed and not processed due to an incorrect shooting method (see Boom et al., 2013).

[2] We sourced the original data from the author of Foster (2009) and MPIG and NFIS (2013, p. 266) to produce Fig. 2. The original data source uses the residual between total meat production and meat exports to determine the apparent domestic meat consumption which we used for Fig. 2.

[3] Thus, the consumption of kangaroo meat accounts for less than 0.5% of total red meat consumed in Australia. The figure for kangaroo meat consumption per person (0.35 kg) was derived by dividing the apparent domestic consumption figure for 2011–12 (7825 tonnes) by the Australian population.