Chapter 30
Animal Welfare Issues Pertaining to the Trapping of Otters for Research, Conservation, and Fur

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30.1 Introduction

Legal trapping of otters is conducted for research (e.g., to equip individual animals with radio transmitters) and applied conservation (e.g., to obtain individuals for reintroduction projects) and for utilitarian purposes (i.e., the fur industry for some species). Until relatively recently, standards defining the most appropriate traps in relation to animal welfare for wildlife caught for utilitarian purposes (wildlife species killed for fur have become generically referred to as furbearers, a term that will be used hereafter) were poorly established. Trapping was usually subject to regulations imposed by individual wildlife management jurisdictions [e.g., state and provincial wildlife agencies in the United States of America (USA) and Canada, respectively]. Canada, Russia, the European Union (EU), and USA are involved in collaborative, ongoing efforts to develop and implement standards for what ostensibly constitutes "humane trapping." The motivation for developing trapping standards seems largely a response by Canada, Russia, and the USA (the three top wild fur-producing countries; Animal Legal and Historical Center 2010) to overcome

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legislation passed by the European Union in 1991 (Regulation 3254/91). This legislation bans the import of wild fur from countries allowing the use of leghold traps [now often referred to as "foothold trap," a semantical adjustment presumably adopted to depict trapping less harshly (i.e., more humanely) than "leghold trap." Leghold traps are banned in at least 80 countries (Fox 2004)].

Two agreements ratified by the EU council in 1998 [the first with Canada and Russia—"Agreement on International Humane Trapping Standards" (AIHTS)] and the other as a separate agreement with the USA [incorporating comparable standards as AIHTS, but in the form of "Best Management Practices for Trapping" (BMPs); Association of Fish and Wildlife Agencies (AFWA) 2006] through an agreed "Minute," which is nonbinding—i.e., apparently there are no penalties or enforcement to ensure standards are met) resulted in an exemption for Canada, Russia, and the USA. This enabled continued export of fur from wild-caught furbearers and use of leghold traps during an undefined evaluation period to assess humane issues pertaining to leghold and other traps (United States Department of Commerce 1997; Iossa et al. 2007; Proulx et al. 2012). These agreements brought about the first attempt to establish international standards [i.e., through the International Organization for Standardization (ISO)] to define what constitutes "humane" for traps within certain general trap-type categories (Harrop 2000; Princen 2004). Unanimity was not achieved on what constitutes key thresholds for traps regarding the extent of injuries caused by traps intended to restrain, but not kill, an animal and the time required for an animal to become unconscious when caught in traps designed for killing. However, a process was established to define performance of a trap (safety for the trapper and efficiency in capturing target species), to assess trauma related to physical injuries caused to animals caught in traps designed for restraint, and killing efficiency for traps designed to kill. Stress-induced trauma endured by a trapped animal currently is not a part of ISO welfare standards for trapping (Iossa et al. 2007). Fundamental to these agreements is that mandatory testing be conducted to determine if traps conform to standards established under AIHTS and BMPs for a particular species (i.e., become certified as acceptable under the agreement). Through the agreements, traps failing to meet agreed standards are expected to be phased from use. However, traps not meeting standards are permitted to remain in use if there are no alternative traps certified for the target species. This presumes that trap research continues with the intent of identifying a trap or traps that meet certification requirements. Trap standards are at various stages of completion (depending on species) (e.g., Fur Institute of Canada 2015), but design of trap testing protocols and evaluation of trap performance appear in some cases to be largely at the discretion of authorities responsible for managing furbearer trapping, with minimal external review. Specific details for outcomes of trap performance assessments are not readily available in the USA and have not been subjected to meaningful, external peer review. In contrast, Canada has published a variety of outcomes from trap testing and, along with Russia, has phased out the use of "traditional" leghold traps (Proulx 1999; AIHTS 2012).

The North American river otter (*Lontra canadensis*; hereafter river otter) serves particularly well for discussing traps and trapping systems in relation to animal welfare issues pertaining to otters in general for both research, and conservation and fur trapping—particularly in reference to populations in the USA. The river otter has received considerable conservation/research attention [predominantly in the USA where reintroduction projects involving live-trapping (i.e., the intention is for the trapped animal to be alive post-trapping event) and translocations of individuals from areas with viable populations have taken place in 22 states to restore extirpated populations]. The USA and Canada both kill substantial numbers of river otters each year for the fur trade, but Canadian populations did not suffer declines to the extent of those in the USA and have thus received less research/conservation attention based on live-trapping. The Eurasian otter (*Lutra lutra*) has received extensive research attention (see Kruuk 2006 for a review), but relatively few studies have been based on live-trapping (Fernandez-Moran et al. 2002; Ó Néill et al. 2007). Other species of otters generally have received little research attention or, as with the Eurasian otter, live-trapping has not been part of most studies. Paucity of live-trapping studies for otters outside of North America (NA) likely is related to greater concern for animal welfare regarding trapping and restrictions on the use of leghold traps. Hence, the following review of animal welfare issues pertaining to live-trapping for research and conservation focuses on the river otter in the USA, using examples from other species when applicable; those pertaining to fur trapping exclusively focus on the river otter in both the USA and Canada.

30.2 Types of Traps and Animal Welfare Standards

Traps considered for AIHTS agreements are placed in two general categories: (1) restraining traps and (2) killing traps. Restraining traps are designed to restrict a captured animal's movements and include leghold traps, modified leghold traps, powered and non-powered snares, and cage-type traps.

Among killing traps, rotating-jaw traps, which have spring-powered jaws that when triggered close forcibly across the body (the neck or chest is intended) of the trapped animal, have received considerable attention regarding animal welfare considerations pertaining to trapping (Proulx 1999; Proulx et al. 2012). However, restraining traps (leghold traps, and non-powered and powered snares) are also sometimes classified and used as killing traps, typically by setting the trap in a manner that will drown the captured animal (AFWA 2006). Drowning sets are typically used to kill semiaquatic mammals, including the river otter.

30.3 Restraining Traps

30.3.1 Leghold Traps

This type of trap is manufactured in a variety of configurations and sizes (Proulx 1999). The basic design of all leghold traps is the same, being comprised of two metal jaws that are held open at 180° by a triggering mechanism when set and clamp together (to grasp the trapped animal's limb) at 90° in reference to the set position

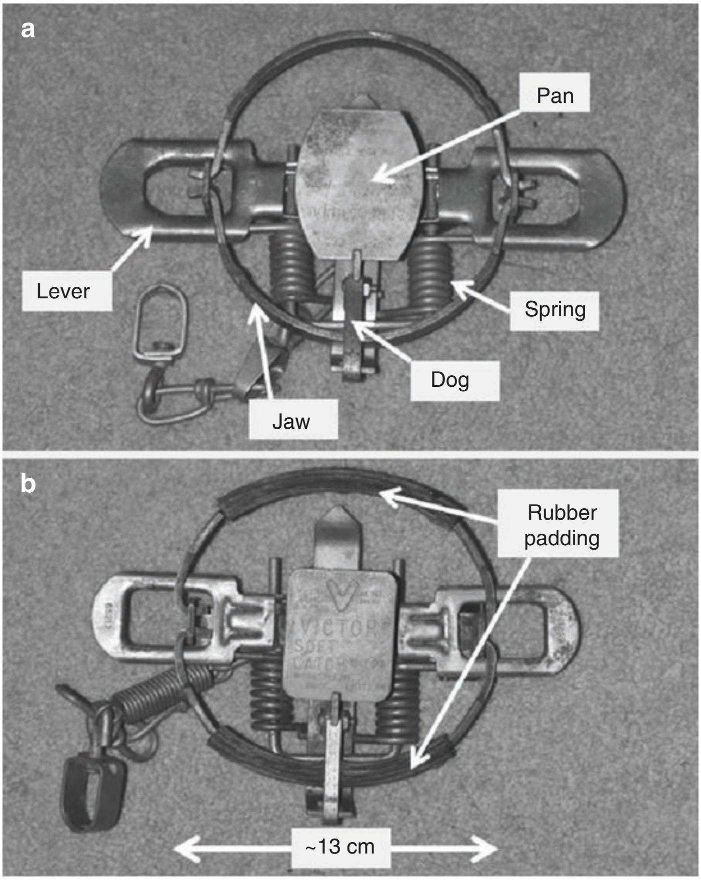

Fig. 30.1 Examples of coil spring leghold traps: (**a**) unmodified and (**b**) modified with rubber padding on inner surface of jaws ("padded jaw" or "Soft Catch™"). The traps are displayed in the "set" or "open" position. Primary components of a leghold trap are depicted on the image of the unmodified leghold trap (see AFWA 2006 for a review of the function of the trap components)

when sprung. The jaws of the trap and triggering components (the pan and dog) are comparable for all types of leghold traps (Fig. 30.1). Leghold traps are now manufactured as two types: coil spring traps (two coil springs each cause a lever to move upward, closing the trap's jaws) and longspring traps (depending on the style, either one or two longsprings close the jaws of the trap). When referring to a leghold trap, the type of trap (i.e., coil spring or longspring) is preceded with a number—usually from one to four—with smaller numbers indicating traps with smaller jaw spreads (i.e., distance between the inner sides of the jaws when the trap is set) (e.g., a No. 2 coil spring or No. 11 longspring). (Note: A No. 11 longspring trap and No. 1 longspring trap have the same jaw spread, with the No. 11 denoting the trap as having two longsprings and the No. 1 indicating the trap as having a single longspring, a convention applied to denote the use of one or two springs for all sizes of longspring traps.)

30.3.2 Modified Leghold Traps

These traps are configured and function identically to the leghold trap (see Proulx 1999), but the jaws are modified in a manner intended to increase efficiency (i.e., minimize the rate at which a captured animal pulls free of the trap) and minimize injury to the trapped appendage. Modifications to the jaws include the following: (1) laminated—an additional strip of metal is welded to the top and/or bottom of each jaw; (2) double jaws—each outer jaw (traditional jaw) is paired with a smaller, inner jaw; (3) offset jaws—the striking surface of the jaws is not in contact when closed [i.e., there is a space (offset) of 3–6 mm between the jaws of a closed trap]; and (4) padded jaws—rubber padding is inserted between the jaws (Fig. 30.1b).

30.3.3 Cage Traps

Traps constructed of wire-mesh framing with one or two doors. These traps are available in various dimensions, with the dimensions of a trap used dependent on the species intended to be trapped. Animals are captured in this trap by entering through doors and then stepping on a trigger, which causes the door(s) to close. These traps are analogous in design to *box traps*.

30.3.4 Snares

Snares are lengths of stranded steel cable configured into a loop that captures an animal by tightening over its neck, body, or limb. Tightening of the loop around the animal is accomplished either passively (i.e., non-powered snare—the loop is tightened by the movement of the animal) or actively (i.e., powered snare—tightening of the loop is initiated by a spring-powered device activated by contact with the animal). Snares used with the intent of restraining an animal by the neck should have "stops" designed to prevent excessive tightening of the cable to reduce the chance of asphyxiating captured individuals.

30.3.5 Suitcase-Type Traps

These are large traps originally designed for American beavers (*Castor canadensis*). The Hancock Live Trap (Fig. 30.2) and the Bailey Beaver Live Trap are specific types of traps within this category that have been evaluated for use in capturing river otters. Both traps have large movable metal frames covered in chain-link material that close around an animal [i.e., an animal is captured within, not between, the trap jaws—the Hancock trap has a single movable (closing) jaw, whereas both jaws of

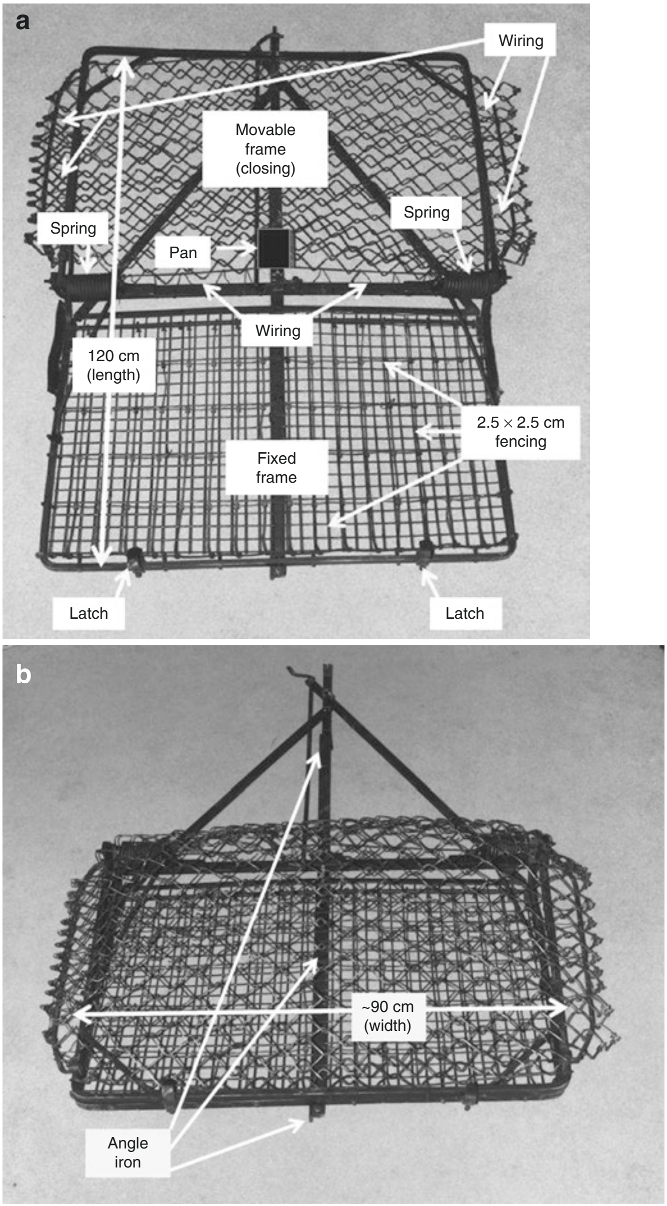

Fig. 30.2 A Hancock trap as modified by Serfass (1984) to lay flat in the "set" or "open" position (**a**) and the trap in the closed position (**b**). The trap is held flat in the open position by affixing a length of angle iron along the back of the trap [note: The movable frame (closing side) of an unmodified Hancock trap is at an angle of about 130° to the fixed frame (non-closing side) when the trap is in the set position]. To minimize chances of river otters escaping, Melquist and Hornocker (1979) recommended (1) adding springs on the inner side of "latches," which are intended to prevent a captured animal from forcing open the movable side of the opening (the springs better ensure that latches remain over the frame of the movable sides of a closed trap) and (2) using wire to close gaps along the margins of the trap frame. A further modification to prevent escape or injury of a captured river otter involves covering the 5 × 10-cm wire grid on the fixed side of the trap frame with vinyl coated 2.5 × 2.5-cm welded wire fencing (Serfass 1984)

the Bailey trap are movable and close simultaneously]. The Bailey trap has been shown to be ineffective in capturing river otters (Northcott and Slade 1976).

30.4 Killing Traps

30.4.1 Rotating-Jaw Traps

Also commonly referred to as bodygrip, bodygripping, or Conibear™-type traps, these traps have two rotating jaws powered by one or two springs (Fig. 30.3). As with leghold traps, numbering associated with these traps is a reference to the size (inner distance between jaws) of the trap, with a smaller number indicating less distance between the jaws (e.g., 110 Conibear, 220 Conibear, and 330 Conibear represent traps of progressively increasing distance between the jaws). Animals entering an open trap are intended to be killed when the jaws forcefully close and crush a vital region of the body—for the most humane death as possible, the preferred areas intended to be struck by the jaws are the neck or upper chest.

30.4.2 Killing Snares

Killing snares are configured in the same manner as snares used for restraint, and the loop likewise becomes tightened around an animal either passively or actively. However, snares designed to kill are intended to capture an animal around the neck

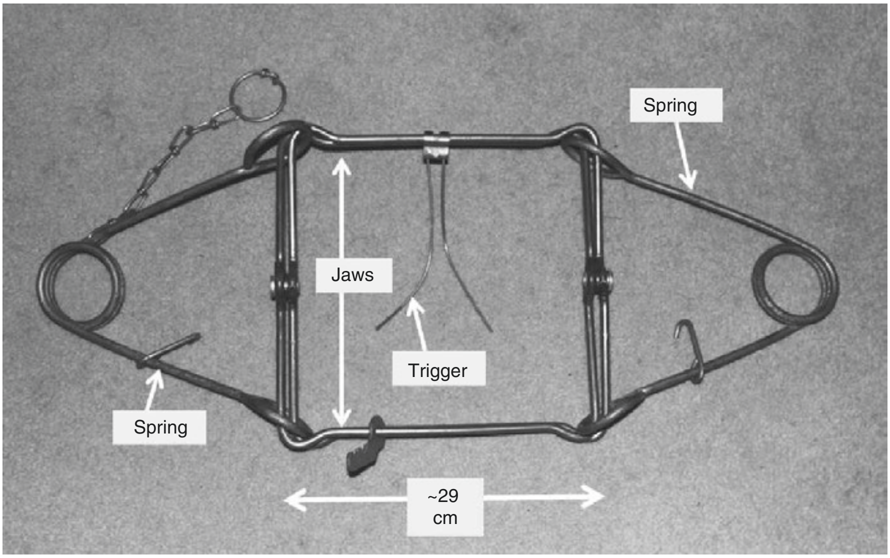

Fig. 30.3 A 330 rotating-jaw trap (also called bodygrip, bodygripping, or Conibear™-type traps) in the closed (not set) position. This type of trap is intended to quickly kill a captured animal and is frequently used by trappers to capture river otters for fur (Responsive Management 2015a)

and do not have stops to restrict tightening of the loop. Thus, the loop continues to tighten as the animal struggles until it is asphyxiated. Powered killing snares also kill by asphyxiation, but the snare tightens more quickly, ideally causing a quicker death. (Note: Stops can be used to limit closure of the loop to a circumference that minimizes capture or harm to smaller, nontarget species.)

30.4.3 Drowning (or Submersion) Traps/Sets

Leghold traps and snares can be set in a manner to drown animals captured in or near the water (AFWA 2006). Traps are either set underwater (at a depth that prevents the captured animal from reaching the surface) or along the shoreline (attached to a cable that leads the trapped animal into water deep enough to keep it from reaching the surface).

Note: Proulx (1999) and Iossa et al. (2007) provide extensive and detailed reviews of animal welfare for restraining and killing traps used to capture mammals. In BMPs for trapping in the USA (AFWA 2006), the AFWA explains trap components and trapping setting techniques for capturing furbearing animals. The information in these documents provides an important basis for developing insight necessary to inform discussion pertaining to animal welfare issues related to trapping wild mammals.

30.5 Animal Welfare and Trapping

Establishment of animal welfare standards for trapping has developed through the use of standardized scores for injuries sustained by individuals captured in restraining traps. These scores are based on the ISO trauma scale (ISO 10990-4 1999), which is categorized into four levels for each injury sustained:

Mild trauma (scores range from 2 to 10 points—injuries such as claw loss and abrasions)

Moderate trauma (scores range from 25 to 30 points—injuries such as loss of single digit and eye laceration)

Moderately severe trauma (a score of 50 points—injuries such as loss of two digits and a simple fracture below the carpus or tarsus)

Severe trauma (a score of 100 points—an injury such as loss of three or more digits to resulting in death)

A composite score of individual's injuries is used to assess if a trap meets appropriate welfare standards (see Iossa et al. 2007, for an extensive review of animal welfare standards based on scoring of trap-caused injuries following the ISO trauma scale). To achieve AIHTS, killing traps are expected to cause death in $\leq$5 min for 70% of trapped individuals for the species being evaluated. However, Proulx et al. (2012) and Proulx and Rodtka (2015) argue that $\leq$3 min should be applied as the minimum standard for time until death (irreversible unconsciousness). Time until death of animals caught in drowning sets is dependent on the onset of hypoxia, which typically will be a prolonged period (i.e., potentially much longer than the ≤5 min standard established for death of animals captured in killing traps) for the semiaquatic mammals typically targeted by trappers using this method of trapping (Gilbert and Gofton 1982; Iossa et al. 2007).

Animal welfare issues associated with fur trapping—especially the use of leg-hold traps—have been the primary motivation for the development of trapping standards. Nonetheless, projects that involve the live-trapping of wild animals for research and conservation purposes often involve the same types of traps used by fur trappers and likewise deserve scrutiny to understand, and mitigate, the effects on the animals during capture and handling. Outcomes of research and conservation projects likely will be enhanced when traps and trapping procedures are efficient and cause minimal injury to captured individuals (e.g., less time and expense associated with capturing an appropriate number of animals to fulfill project objectives and in rehabilitating injured animals). Hence, in addition to what should be direct concern based on animal welfare, project investigators are also motivated by practical issues related to ensuring the well-being of live-trapped animals in relation to intended research or conservation outcomes. In contrast, the intent of fur trappers is to kill trapped animals for the pelt or other products derived from the carcass—i.e., although there may be a humanitarian concern to reduce suffering to the trapped animal, there is no practical motivation for a fur trapper to be concerned about injuries incurred to an animal during trapping unless the injuries somehow impact the value of the fur or other products. In fact, in the absence of regulation, practical issues would dictate that fur trappers adopt the most efficient trapping methods—those yielding the highest capture rates at the least expense—in lieu of animal welfare concerns. This dichotomy in practical issues between live-trapping for research/conservation and trapping for fur serves to emphasize an important reason, in addition to the fact that live-trapping for research/conservation purposes is conducted much less frequently than trapping for fur, that establishing animal welfare standards for trapping has been focused on fur trapping.

30.6 Live-Trapping Otters for Research and Conservation

Although killing traps may be used to lethally collect specimens for research purposes, the focus of this section is directed toward the use of restraining traps to livetrap otters (animal welfare issues related to using kill traps are discussed in the ensuing Sect. 30.9 “Trapping River Otters for Fur”). A variety of restraining traps and associated trap-setting procedures have been assessed for use in live-trapping river otters, and sometimes these methods have subsequently been applied and refined to livetrap other otter species [e.g., for reintroducing the Eurasian otter into Spain (Fernandez-Moran et al. 2002) and reintroducing the Eurasian otter into the Netherlands (Koelewijn et al. 2009)]. Animal welfare concerns for live-trapping wild animals should necessarily apply not only to the traps used but to how traps are set, how procedures are used to restrain animals for removal from traps, and the immediate post-trapping handling of animals (hereafter this collective is referred to as the "trapping system"). Various leghold traps and Hancock™ traps have primarily been used for trapping river otters for research/conservation purposes, with results of the applications and outcomes (e.g., trap-setting procedures, review of injuries, and capture rates) published in various formats. In contrast, there are no peer-reviewed assessments of injury rates for other traps that could potentially be considered for use in live-trapping river otters (e.g., cage traps and snares), although cage traps have been used in studies requiring the live-capture Cape clawless otters (*Aonyx capensis*) (Van der Zee 1982; Arden-Clarke 1986) and spotted-necked otters (*Hydrictis maculicollis*) (Perrin and Carranza 1999). The following review focuses on published cases of various traps used to live-trap river otters, with respect to injuries and the trapping systems employed, but also includes mention of trap types that may theoretically be used but which have not been frequently used or evaluated for use with river otters or other otter species. This discussion of traps may have similar merits and/or liabilities for otters species other than river otters.

30.6.1 Leghold Traps

Serfass et al. (1996) compared injuries caused to teeth, feet, and legs of river otters captured using No. 1.5 coil spring traps with padded jaws (hereafter padded trap; Fig. 30.1b) with one factory spring replaced with a No. 2 spring (captured in Pennsylvania by authors and Maryland by personnel of the Maryland Department of Natural Resources; $n = 38$), No. 11 longspring traps (captured in Louisiana by a supplier licensed to capture and sell river otters; $n = 17$), and various unidentified types of leghold traps (captured in Michigan, New Hampshire, and New York by private trappers; $n = 29$) for a river otter reintroduction project. Trap-setting techniques were similar for No. 1.5 coil spring traps with padded jaws and No. 11 traps {traps were set and anchored in the water [anchor (i.e., the trap attachment)]}. Traps were attached with a segment of chain typically 1.5 m in length, enabling river otters to swim while captured (see Serfass et al. 1996, for details and precautions associated with this trap-setting technique to avoid drowning captured animals). In contrast, trap-setting procedures followed by private trappers are poorly reported, but traps were presumed to be primarily set and attached on the shoreline (i.e., not in the water as Serfass et al. 1996). Few severe injuries to limbs occurred among river otters captured in padded traps [1 (4%) had an injury requiring an amputation (a single digit) in comparison to amputations in 12 (71%; ≥1 digit) and 9 (37.5%; ≥1digit ($n = 7$), a foot, and a leg) river otters caught in No. 11 traps and by private trappers using unspecified traps/trap-setting techniques, respectively]. River otters caught in padded traps and No. 11 traps sustained fewer, and less severe, dental injuries than those obtained from private trappers. Regardless of trap type, injuries (to appendages and the teeth) sustained by juvenile river otters were much less than for adults (Serfass et al. 1996).

A study in coastal Alaska used No. 11 double-jaw longspring traps set on land (anchored with trap chains ≤70 cm in length) to live-capture 30 river otters (Blundell et al. 1999). This project used a trauma scale developed by Olsen et al. (1996) and Jotham and Phillips (1994) to score injuries to the teeth and appendages [scores for an individual could range from 0 (no injuries) to 100 (death)] but did not provide details of specific injuries contributing to scoring or the number of individuals acquiring injuries to the teeth and/or appendages. Traps were monitored a minimum of two to three times daily—a transmitter was attached to traps, and this was activated when traps were sprung. The scoring system and number of daily trap checks present a challenge for meaningful comparison with Serfass et al. (1996), who used different metrics to quantify injuries, and traps were checked once daily. More frequent trap checks may reduce frequency and extent of injuries by minimizing time an animal is restrained by a trap. Five (17%) of the river otters captured in No. 11 double-jaw traps by Blundell et al. (1999) attained serious injuries to appendages, whereas only one (3%) of those caught in padded traps by Serfass et al. (1996) would have been scored as having a serious injury. Injuries to the teeth considered serious were low in Blundell et al. (1999) and also likely to be low for Serfass et al. (1996), but actual comparison is not possible because of the different scoring systems followed by the respective projects. Melquist and Hornocker (1979) captured nine river otters in leghold traps [five captures in No. 2 coil spring traps and four captures in No. 3 jump traps (no longer manufactured to our knowledge)]. Injuries to river otters caught in No. 2 coil spring traps were described as minor (no details provided), but escape rates were reportedly high. Two of the river otters (both juveniles) caught in No. 3 jump traps sustained broken hind limbs (the bones broken were not reported).

30.6.2 Hancock Trap

The Hancock trap was originally designed for live-trapping American beavers. Northcott and Slade (1976) and Melquist and Hornocker (1979) described important modifications necessary for the trap to be suitable for river otters (i.e., to prevent escape). Two further modifications were made by Serfass (1984): the first enabled the trap to lay flat for concealment when set in shallow water (as manufactured the movable side of the trap is at an angle to the fixed side), and the second involved covering the fixed side of the trap (comprised wires spanning opposing sides of the trap frame to form a rigid 5 × 10-cm grid) with vinyl coated 2.5 × 2.5-cm welded wire fencing (Fig. 30.2a, b). When constrained, river otters often vigorously attempt to escape by scratching or biting to breach any perceived weak areas in a cage, cage-type trap, or other confinement, potentially causing injury to forepaws and teeth. The spacing of wires on the fixed side of the trap created a grid comprised of openings likely large enough to become the focus of escape efforts by river otters (the head of most river otters will fit through a 5 × 10-cm opening), which was overcome by the second modification. Also, when set flat in shallow water [made possible by the first modification suggested by Serfass (1984)], the fixed side of the trap is not exposed to a captured animal, and although exposed, the chain-link on the (closing) movable side of the trap compresses and is thus less likely to cause teeth damage if bitten (Fig. 30.2b). The chain-link of the movable side of a Hancock trap [the top of the trap when closed as configured by Serfass (1984)] can expand upward to about 30 cm from the bottom of the trap. Care must be taken to monitor changes in water levels to ensure that the top of the trap remains above the surface (i.e., to avoid drowning a trapped animal).

Melquist and Hornocker (1979) tested a variety of traps and considered a properly modified Hancock trap the most favorable for use with river otters—there was no mention of occurrence of injuries (or lack thereof) among 21 captures, which included 2 adult-sized river otters captured simultaneously. In Blundell et al.'s (1999) comparison of Hancock traps and No. 11 double-jaw leghold traps for capturing river otters ($n = 11$ for Hancock traps, and $n = 30$ for leghold traps), serious injuries to the teeth occurred much more frequently in Hancock traps, but serious injuries to appendages were higher for leghold trap (no injuries to appendages occurred in river otters caught in Hancock traps versus about 17% in those caught in leghold traps). In contrast, Serfass (1984) indicated no injuries to six river otters captured in Hancock traps modified as described by Melquist and Hornocker (1979) and Serfass (1984). Dental injuries reported by Blundell et al. (1999) may have occurred because modifications were not made to the fixed side of the Hancock trap.

In comparison to leghold traps, Hancock traps have received limited use and evaluation for live-trapping river otters, possibly fostered by the somewhat negative evaluation by Blundell et al. (1999). The much larger size, higher cost, and limited availability of the Hancock trap (in comparison to leghold traps) also present various practical limitations to its use. Another practical concern relates to the potential for larger animals (including people and pets) to accidentally trigger and be injured by being caught between the frames of the hard-closing trap. Likewise, there is potential for otters to be caught between the frames of this trap, especially if >1 otter visits the trap site. Regardless, the virtues of the Hancock trap for live-capturing river otters [e.g., no injuries when modified as reported by Serfass (1984) and good capture efficiency reported by Melquist and Hornocker (1979) and Blundell et al. (1999)] merit its further evaluation, particularly as an alternative for live-trapping river otters or other otter species in areas where use of leghold traps is limited or prohibited.

30.6.3 Other Traps

Various types of leghold traps and the Hancock trap are the only traps used with any regularity for live-capturing river otters. Other traps that have potential for use with river otters have either had limited or no evaluation. In addition to leghold and Hancock traps, Melquist and Hornocker (1979) also conducted brief evaluations of a powered foot snare and several cage-type traps (one from a trap manufacturer and three constructed specifically for the project: culvert, barrel, and floating traps) but reported little meaningful information on capture or injury rates. Cape clawless otters and spotted-necked otters have been successfully captured in what were described as "standard carnivore traps" (800 × 800 × 1400 mm cage traps with a single door) [Van der Zee (1982) and Arden-Clarke (1986)—capture of Cape class otters; Perrin and Carranza (1999)—capture of spotted-necked otters]. No information was provided on injuries or lack thereof to the captured animals. To our knowledge, body/neck snares have not been evaluated with live-capturing river otters. Severe injuries caused to wolves (*Canis lupus*) and coyotes (*Canis latrans*) caught in neck/body snares suggest that extreme caution should be used in developing protocols for evaluating the suitability of snares or any other untested traps to livetrap otters. Concerns for snaring these species have been raised by Proulx and Rodtka (2015) and Proulx et al. (2015), and general concerns for animals captured in snares were raised by Rochlitz (2010). Cage-type traps have been successfully used to capture a variety of carnivore species with minimal or no injury and deserve further research attention to determine if otters can be captured efficiently and relatively unharmed using this type of trap.

30.7 Restraint of Captured Otters for Release from Traps

Development and refinement of protocols for efficiently reducing stress and injury to captured animals being released from traps are sometimes overlooked as a component of the trapping system. Restraining an animal for release from a trap is accomplished either by physical or chemical restraint (delivery of a drug, i.e., a chemical immobilant) to enable handling of an animal. Physical restraint is any approach that confines the movement of an animal—a trap represents a physical restraint, but the term is most often applied to devices used to further restrict the movement of an animal restrained in a trap. Physical restraint should facilitate either the direct release of a trapped animal or delivery of a chemical restraint to immobilize the animal for release from the trap and to enable subsequent evaluations (e.g., physical examination, ear tagging, or transport to a captive facility). Methods to physically restrain river otters while captured in live traps will be the focus of the ensuing discussion.

30.7.1 Leghold Traps

Techniques for physically restraining river otters captured in leghold traps necessarily vary by trap-setting technique. Shirley et al. (1983) and Serfass et al. (1996) describe the use of long-handled nets to restrain river otters captured in leghold traps attached to chains (typically 0.6–1.25 m in length, but potentially longer) anchored in the water. River otters had limited access to the shoreline but were able to swim within the radius of trap chains and the captured animals were netted while in the water. The use of nets for physical restraint necessitates evaluation as to whether the structure of netting will cause the trap restraining an animal to become entangled in

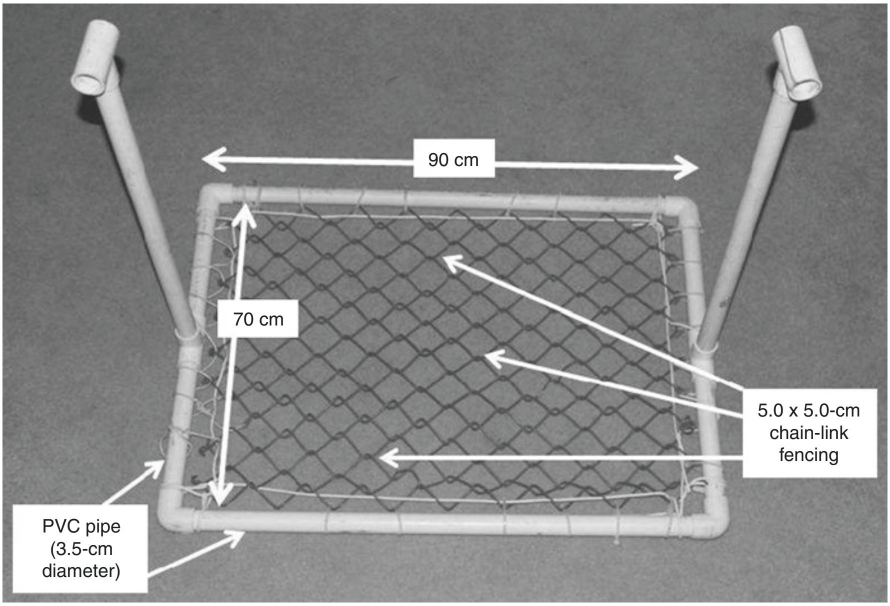

Fig. 30.4 Hold-down device used to physically restrain river otters captured in leghold traps. Trapped river otters initially are restrained in nets the netted river otter is further restrained with the hold-down device to better enable delivery of chemical restraint (see Serfass 1984; Serfass et al. 1996). The hold-down device is constructed of polyvinyl chloride (PVC) pipe (wood and metal framing also have been used) surrounding vinyl coated chain-link fencing. Handles of hold-down device detach for transport

the net. Such entanglement may result in injury and additional stress to a captured animal. The likelihood of a trapped animal becoming entangled in a net will vary based on construction of nets (e.g., fibers used, the thickness of those fibers, and mesh size—an assessment is easily accomplished by placing leghold traps inside various netting to determine if entanglement occurs). Serfass et al. (1996) describes a process for bringing the netted animal to the shoreline and application of a second form of physical restraint (use of a hold-down device; Fig. 30.4), for quick, efficient, and safe (for the animal and investigator) delivery of a chemical immobilant.

The use of capture poles (e.g., Ketch-All™ poles, San Luis Obispo, California 93401, USA) is common for restraining animals captured in leghold traps but has limited application for river otters—the circumference of a river otter's neck tends to be larger than that of the head (particularly in adults) and, unless excessively tightened, the noose of the capture pole generally will slip off the head. In lieu of physical restraint, Blundell et al. (1999) successfully delivered darts with chemical restraint through a blow gun, and Fernandez-Moran et al. (2002) also used such an approach for delivering chemical immobilants to Eurasian otters captured in No. 1.5 padded traps. Remote delivery of chemical immobilants reduces stress and potential injury that could be contributed by physical restraint, but consideration should be given for the possibility for an animal becoming free of the trap following delivery but before being restrained by the chemical immobilant. Such scenarios were not reported by either Blundell et al. (1999) or Fernandez-Moran et al. (2002), but should be considered, and would be of particular concern for otters, which if escaping the trap would likely enter the water and potentially drown after the drug takes effect.

30.7.2 Hancock Live Traps

Chemical immobilants can easily be delivered to animals captured in Hancock traps by injecting with a hand syringe (hand injection) through the chain-link mesh on the movable side of trap (Serfass 1984; Blundell et al. 1999). Movement of a trapped animal can be further restricted to better facilitate injection by compressing the chain-link comprising the movable side of the trap (i.e., the investigator will stand on the chain-link on opposing sides to the animal in a manner that confines but does not exert excessive downforce). Serfass (1984) set Hancock traps exclusively in shallow water and recommends that traps be pulled from the water prior to delivering chemical restraint to the captured animal to prevent it from ingesting water during induction.

30.8 Concluding Comments: Live Traps

Meaningful comparisons of outcomes of the relatively few reports of live-trapping river otters are a challenge. There seldom have been direct comparisons of traps where associated trapping systems have been controlled, including periods between trap checking. For example, the live-trapping study conducted by Blundell et al. (1999) occurred in an area (coastal Alaska) that enabled use of transmitters to remotely determine if traps were sprung, which facilitated monitoring each trap site at least two or three times a day. In contrast, Serfass et al. (1996) conducted their live-trapping study in northeastern Pennsylvania where trapping sites were widely distributed across the landscape, which logistically limited checking traps sites to once every 24 h. In such cases disparities in trap-check frequency may have influenced outcomes as much or more than the trap and trapping system applied. For example, longer times between the checking of traps could correlate positively with more injuries. Regional difference in environmental conditions and associated difference in trapping conditions could likewise compromise meaningful comparisons of traps and trapping systems.

Because of the large number of wild river otters captured for reintroduction projects in the USA (>4000; Bricker et al. 2016), there may be an impression that techniques for live-trapping the species are well established. However, the majority of the animals used for reintroduction projects were captured in southern Louisiana through arrangements with an individual licensed to trap and sell river otters. Hence, there were no assessments of mortality rates, injuries that prevented sale of otters for reintroduction, or, with the exceptions of Serfass et al. (1996), assessments of injuries sustained by animals that were reintroduced. Hancock traps have been used infrequently, even though a few assessments of this trap indicated its potential for use in live-trapping river otters. Clearly more rigorous studies are needed for assessing both practical and animal welfare issues for traps and trapping systems most appropriate for use in live-trapping river otters.

Outcomes of live-trapping studies conducted in the USA and the few studies conducted elsewhere (e.g., Fernandez-Moran et al. 2002; Koelewijn et al. 2009) can serve as a basis for assessing best methods to livetrap other species of otters. However, researchers should understand that physical and behavioral differences of other otter species could affect responses to being trapped and be open to investigating potentially new and more innovative approaches for live-trapping otters. Researchers investigating other species of otters also should be certain that live-trapping studies are designed in a manner that enables meaningful comparisons of the traps and trapping systems being evaluated.

The development of noninvasive techniques for otters [e.g., camera trapping (Stevens and Serfass 2008) and extraction of DNA from feces (Fike et al. 2004; Beheler et al. 2005) and hair (Depue and Ben-David 2010)] has limited the need for more invasive field techniques that may cause physical harm and stress to animals, such as live-trapping. Regardless, the use of radiotelemetry remains an important part of many studies of wild animals and provides insight about animal behaviors and movement patterns not always assessable by noninvasive techniques. Conducting radiotelemetry studies is inherently dependent on capturing and handling individual animals to attach transmitters, which argues for the continued use of live-trapping of wild animals (including otters) for some field investigations. In the case of otters, live-trapping is in need of further refinement (for species that previously have been livetrapped) and development through appropriately designed studies for species that have not been the focus of studies involving live-trapping.

30.9 Trapping River Otters for Fur

Killing otters to obtain their pelts for the fur trade is an international venture undertaken legally and illegally, depending on species and geopolitical jurisdiction. Illegal methods of killing otters will vary based on what is most expedient for perpetrators. Illegally killing of otters in some parts of the world is considered to be severely impacting populations of some species [e.g., populations of otter species inhabiting southeastern Asia are believed to be declining because of intense demand for their pelts in China (Foster-Turley and Santiapillai 1990; Gomez et al. 2016)]; but few details are available regarding the extent of the illegal trade or approaches used to kill otters. Regardless, individuals involved in the illegal killing of otters (or any wildlife) are not going to adhere to any prescribed standards of animal welfare.

Legal killing of otters presumes some standards are in place to limit depletion of populations [e.g., regulations for periods when killing can occur (closed seasons) and number of individuals that can be killed (quotas)] and to limit pain and suffering. Of the world's 13 species of otters, all are listed as Convention on International Trade in

Endangered Species of Wild Fauna and Flora (CITES) Appendix I or II because of respective concerns of endangered or threatened conservation statues, except for the river otter, which is listed under Appendix II as a "look-alike species" (*A designation for a species legally part of international trade that is of similar appearance to one or more species not legally traded. Hence, the designation serves as a precaution against inclusion of specimens or parts of a protected species from being illegally exported by being posed as those of a similar species that is legally traded.*). However, trade of Appendix II (non-look-alike) species is permissible if conditions are met demonstrating that there will be no detriment to the survival of the species in the wild.

Among the world's otter species, the river otter is the only species possessing a population status considered suitable for meeting conditions that will enable sustainable killing of individuals for the pelt trade throughout large portions of its range. As an otter species legally trapped throughout much of its range for pelts that are frequently traded internationally, the river otter is thus of predominant concern regarding the humaneness of techniques and equipment used to capture and kill individuals. Prior to European settlement, the river otter occupied aquatic habitat throughout the Continental USA and Canada (Hall 1981). By the early to mid-1900s, the species had experienced substantial population declines, or complete extirpations in some areas. These declines occurred throughout large portions of the river otter's historic range in the USA but to a lesser extent in Canada. These losses resulted from the combined detrimental effects of overkilling by trappers, disturbances to riparian habitats (e.g., deforestation), and water pollution (Bricker et al. 2016). The combination of more restrictive trapping regulations including prohibition of trapping river otters in some USA states, successful reintroduction projects in 22 states, and improvements in the conditions of riparian and aquatic habitats contributed to the recovery of river otter populations in many areas of NA (Bricker et al. 2016). Legal trapping of river otters has expanded as populations have recovered. About 171,000 river otters in the USA and about 83,000 river otters in Canada were trapped for their pelts between 2006 and 2012. River otters are a primary target species for about 9% of trappers in the USA (Responsive Management 2015a).

Trappers use a variety of devices to capture river otters. Trapping devices are selected for various reasons, including practical (e.g., cost of traps and associated equipment), social (e.g., personal preference, influence of peers, and tradition), habitat conditions, regulations imposed by a particular jurisdiction within a country, and international agreements, including the AIHTS in Canada (Fur Institute of Canada 2015) and BMPs in the USA (AFWA 2014). Growing public concern over animal welfare issues have raised specific attention to the ethics and humaneness of trapping wildlife for fur, and this has come alongside a realization that minimizing injury to a trapped animal should also be a consideration when selecting a trapping device. AIHTS and BMPs focus on physical injuries in assessing animal welfare issues regarding trapping. Iossa et al. (2007) make a compelling argument that stress and various other physiological indices should be used in such assessments. Rothschild et al. (2008) and Taylor et al. (2016) assessed stress (glucocorticoid) levels, and Kimber and Kollias (2005) evaluated biochemistry values of blood in river otters following their live-capture and placement into captivity as part of reintroduction projects. These studies demonstrated no long-term adverse stress responses and also concluded that blood values were not a good indicator of the level of physical injury. No such studies have been undertaken for river otters as part of the AIHTS and BMP trap certification processes in relation to fur trapping.

30.9.1 Restraining Traps

Leghold traps, which are the most common type of restraining trap used by trappers to capture river otters, have received extensive review through the process of developing BMPs and are thus the focus of this discussion on restraining traps. An adequate critique of leghold traps in relation to animal welfare issues requires including an assessment of various trapping systems that may be employed. For example, methods used to attach [anchor] traps at trap sites should be included in critiques. Other often overlooked factors for such critiques include trapper willingness to implement recommendations (especially when formal regulations are not in place to mandate use of a particular trap and trapping system, as with BMPs), variation in regulations for legal trap types and trapping systems imposed by wildlife management authorities (for the USA, wildlife management for most species, including river otters, is at the state-wildlife-agency level), the capabilities and effort put forth by the various management authorities to enforce regulations, and variation in response to being restrained in a trap among species and by individuals of a species.

Coil spring traps (unmodified only) with jaw spreads ≥5 in. (13 cm) and long-spring traps (either unmodified or modified to have double jaws) with jaw spreads of ≥3 7/8 × 3 7/16 in. (10 × 9 cm) meet BMP criteria for river otter (AFWA 2014). However, AFWA (2014) also states “Many currently-used trap models meet specifications.” Details about testing of approved traps are not provided or description of the criteria used to establish the suitability of “many currently used trap models.” Likewise, no reasons are provided for not specifically listing certain types of traps as acceptable (e.g., modified coil spring traps). These omissions may be related to a trap not yet having been tested, the trap having been tested and failed humane requirements, or having been tested and failed other BMP criteria (e.g., efficiency—a trap is not judged to be efficient if <60% of individuals for the target species remain captured after activating the trap).

30.9.1.1 Physical Injury

Other than published reports of river otters captured for research and conservation purposes (see Sect. 30.6), we were unable to find published descriptions of injuries sustained by river otters captured in leghold traps. Review of the published studies of river otters captured in leghold traps as part of conservation and/or research projects indicated considerable variation in injuries caused among various leghold traps (see Sect. 30.6.1). This contrasts with portrayals in BMP recommendations for leghold traps as being suitable for river otters. In fact, virtually all of the styles and sizes of leghold traps considered efficient in trapping river otters prior to development of BMPs are now approved as meeting BMP criteria. BMP evaluations to determine a trap as suitable appear to be based on controlling other factors related to trapping (e.g., how a trap is set and the time required to check traps). Review of the published reports on live-trapping river otters suggests that such factors (in addition to the type of trap used) are likely to influence injuries to a trapped animal. Such variations appear to be discounted in assessments for determining BMPs, where participating trappers are monitored to ensure compliance with prescribed trapping procedures. There is no evidence, for example, that the trapping procedures followed by trappers participating in BMP evaluations will become expectations (i.e., in the form of regulations) for fur trapping. Objective evaluation to determine if BMPs will be useful in enhancing welfare standards for animals caught in leghold traps is virtually impossible from published information related to the development of BMPs for river otters or other furbearers.

30.9.2 Killing Captured Animals

Methods for killing an animal captured by trappers using restraining traps are often overlooked in humane assessments of trapping. Generally, trappers are recommended to shoot the trapped animals between the eyes with a .22 caliber gun (International Association of Fish and Wildlife Agencies [IAFWA] 2005). However, trapper's magazines often recommend drowning, suffocation (standing or kneeling on the animal's chest), or hitting on the head with clubs as a way to minimize damage to the fur (i.e., avoid the blood that would get on the pelt if the animal is shot) (Fox and Papouchis 2004). The IAFWA (2005) also recommends these methods as humane forms of killing trapped animals.

30.9.3 Killing Traps: Bodygrip Traps

The published BMPs for otters list any bodygrip trap within sizes designated as 220, 280, and 330 as acceptable for use with river otters. Traps of this type are considered to meet humane standards if 70% of the animals are dead within 5 min after being captured (Iossa et al. 2007; Proulx et al. 2012; Proulx and Rodtka 2015). Such standards omit discussion of humane considerations for the 30% of animals potentially not dead after 5 min or the suffering that occurs to those that do meet the 5 min standard. Testing to assess these standards has in some cases taken place in captive settings where anesthetized animals are positioned between the jaws of a set trap and then the trap is sprung. Such an approach does not necessarily represent conditions seen in natural settings, where the trap is less likely to close on the preferred part of the body (to expedite the time until death). We were unable to find published details of testing outcomes for assessments of bodygrip traps for river otters.

30.9.4 Drowning Traps/Sets

Trappers commonly use “drowning traps/sets” when capturing semiaquatic furbearers, such as river otters. River otters reportedly have the capacity to remain underwater for up to 8 min (Smithsonian n.d.), exceeding the acceptable time established for death using bodygrip traps to meet humane requirements. However, BMPs make no mention of any evaluations conducted to assess animal welfare standards for this type of trapping of river otters, but the BMP does state that performance standards are comparable to killing devices for other aquatic furbearers (AFWA 2014). In fact, this type of trapping system is recommended for river otters, with the only BMP standard being that the trapping system must not allow the animal to reach the surface after being submerged.

30.9.5 Killing Snares

Trappers legally use snares to capture river otters in some USA states and Canadian provinces. However, there are no published evaluations of the humaneness of capturing river otters in snares nor are these devices considered in AIHTS or BMP evaluations of trap performance criteria. Proulx et al. (2015) reviewed issues pertaining to the use of snares to kill canids [gray wolves (*Canis lupus*), coyotes (*C. latrans*), and red foxes (*Vulpes vulpes*)] in Canada, concluding that death to the animals was prolonged or some animals remained alive (i.e., did not meet humane standards for death applied to other killing traps), injuries were sometimes severe (e.g., deep lacerations where the snare tightened around the neck), and killing snares are nonselective—often capturing a variety of nontarget animals. From these outcomes, Proulx et al. (2015) recommended that use of killing snares be disallowed unless modifications can be achieved that improve the humaneness of this trapping system. In contrast, use of snares is being promoted in the USA (e.g., Vantassel et al. 2010). Given a well-developed musculature in the neck, river otters, like canids, are unlikely to be killed quickly or at all when caught in a snare. Snares, incorporated into drowning sets, would eventually cause death by asphyxiation. In the absence of contrary evidence, the evaluation of killing snares by Proulx et al. (2015) for canids establishes an important basis for regarding this trapping system as likely to be inhumane (by any standards) for capturing river otters.

30.9.6 Unintended Captures

River otters are sometimes caught accidentally by trappers intending to catch other semiaquatic furbearers or those that frequent riparian habitats. Responsive Management (2015a) conducted an extensive survey of trapping in the USA, which included assessment of species captured, types of traps used for a particular species, and furbearing species captured unintentionally (i.e., not the primary target of the trapper). Unintentional capture of river otters was reported by 29.5% of trappers targeting American beavers. Large bodygrip traps, various leghold traps, and snares are used for beavers, with the No. 330 bodygrip trap predominating (about 78% of beaver trappers reported using that trap). Traps and trap sets used for beavers are in some ways comparable to what would be expected for use with river otters and, thus, represent similar issues pertaining to a humane death—time to death caused by closure and/or drowning in bodygrip traps, time until drowning in drowning sets, and potential injuries from snares. River otters also were reported to be unintentionally caught by trappers primarily pursuing American mink (*Neovison vison*), muskrat (*Ondatra zibethicus*), and raccoon (*Procyon lotor*), but less frequently than by beaver trappers (<6% for each of these species). However, trappers trapping American mink and muskrat in leghold traps often may not anchor the trap sufficiently (either by using stakes or weight) to retain a trapped river otter at the capture site (i.e., the river otter escapes with the trap attached to its leg), contributing to both humane concerns and potential for underrepresenting the extent of unintentional captures. Also, many trappers included in the Responsive Management (2015a) survey undoubtedly were not trapping in areas occupied by river otters. Expected rates of unintentional captures would thus be higher if not diluted by inclusion of trappers trapping in areas unoccupied by river otters. Realistic insight on expectations for the extent of unintentional captures is needed and could be gained by focusing only on the subset of trappers trapping in areas occupied by river otters.

30.10 Concluding Thoughts: Trapping for Fur

Trapping river otters for pelts appears to be "maintainable" (i.e., local populations appear to be able to withstand the numeric impacts) at the landscape-level scale in NA—although local, trapping-induced extirpations likely occur in marginal habitats and reintroduction projects may have been unnecessary in some areas of the USA if trapping had not limited expansion of natural populations. We note, for example, that there has been rapid post-release expansion of reintroduced populations, which initially were legally protected from trapping [see Bricker et al. 2016) for a detailed review of trapping and reintroductions of river otters], whereas native populations remained stationary or expanded slowly where trapping was permitted. Regardless, debate over trapping river otters is largely based on opposing values pertaining to what is appropriate and "ethical use of wildlife" and specific animal welfare concerns pertaining to the capture of animals in traps. However, those involved in supporting trapping in NA comprise a large, integrated wildlife management system that includes governmental wildlife agencies (and associated wildlife professionals), nongovernmental organizations representing these agencies [e.g., AFWA (http://www.fishwildlife.org/)], some university wildlife researchers, manufacturers of hunting and trapping-related equipment, and supporting political entities—a set of interactions referred to by Gill (2004) as an "Iron Triangle," whereby those not within the "Iron Triangle" have a limited voice in wildlife policy decision-making. These relationships constitute a "conservation-industrial complex," which collectively offers considerable financial, political, and organizational resources to promote a value system based on sustainably killing wild animals.

The so-called North American Model of Wildlife Conservation [NAM; first articulated by Geist et al. (2001)] demonstrates the promotional capabilities of the wildlife management system in NA. The NAM is comprised of seven primary elements (Geist et al. 2001; Organ et al. 2012), each repeatedly depicted by various media in a manner that supports and justifies consumptive use of wildlife, managed by public, state-level conservation agencies, as the "cornerstone" of wildlife conservation in NA. Two of the primary elements of NAM: wildlife products should not be commercialized (i.e., sold as part of a market-based system) and the Public Trust Doctrine (PTD) are particularly relevant to discussions of trapping and the management of furbearing animals in the USA. Trapping for fur is a large, international, commercial enterprise of which trade in furbearers captured in the USA is a prominent part, an obvious contradiction to the primary element of NAM opposing commercialization of wildlife. The PTD is based on the concept that certain natural resources, including wildlife, cannot be owned by individuals but are instead to be conserved by the government in a manner that benefits current and future generations of citizens. An implicit assumption of the PTD is that the values and interests of all citizens be considered in approaches used to conserve and manage PTD-based natural resources (Treves et al. 2015). However, the values and interests of those engaged in hunting and trapping have been disproportionately favored in wildlife management decision-making at the state-agency level.

Over about the last 15 years, NAM has been widely portrayed as both a historical account of how wildlife were conserved in NA in the past and a prescriptive model for how wildlife should be conserved in the future (Peterson and Nelson 2016). Without question progenitors of NAM clearly endorse recreational, regulated killing of wildlife (the focus is on hunting, but trapping also has been established within the framework) of certain species of wildlife (i.e., those defined as game species, which includes "furbearing" animals such as the river otter) as the fundamental aspect of wildlife conservation. The repetitiveness by which NAM has been portrayed in numerous and varied forums (e.g., Mahoney 2004; Prukop and Regan 2005; Geist 2006; Mahoney et al. 2008; Organ et al. 2010, 2012) has aspects suggesting a marketing effort to promote fundamental concepts of NAM to both conservation professionals and the general public, an approach seemingly designed to homogenize acceptance of consumptive use as fundamental to properly managing wildlife. Foundations for such marketing efforts are anchored in social-science surveys conducted by private organizations that conduct public opinion surveys for state wildlife agencies about hunting and trapping and include investigations providing outcomes such as "How to Talk to the Public About Hunting: Research-Based Communication Strategies" (Responsive Management 2015b).

As with the seemingly overarching purpose of NAM, furbearer trapping also has been promoted to gain acceptance among wildlife professionals and the public. Muth et al. (2006) provided evidence that the majority of conservation professionals supported outlawing the use of the leghold trap and expressed concern that new recruits into the wildlife profession with "…non-traditional wildlife management backgrounds, such as women, ethnic minorities, non-hunters and non-trappers, and urban residents may possess a different value system regarding consumptive use of wildlife than their older counterparts." One mechanism that evolved concurrently with NAM is "Conservation Leaders for Tomorrow"—a program designed to instill NAM's principles by instructing both nonhunting/trapping university students (enrolled in wildlife-related degree programs) and natural resource professionals about the virtues of hunting and trapping in conservation (Conservation Leaders for Tomorrow 2015).

Likewise, seminars at various conferences sponsored by AFWA and The Wildlife Society (TWS) promote the importance of fur trapping in modern wildlife management to students interested in careers in wildlife conservation as well as practicing wildlife professionals [e.g., Trapping Matters Workshop 2016; AFWA Trapping Matters Workshop 2015) and an IAFWA-produced video (see IAFWA 2015)]. The AFWA provides "quick tips" for supporters of trapping on how best to communicate the role and benefits of regulated trapping in wildlife management. These "quick tips" encourage discussions to promote trapping by focusing on the following themes (AFWA 2015):

1. Regulated trapping does not cause wildlife to become threatened or endangered.
2. Trapping is managed through scientifically based regulations enforced by conservation officers.
3. State wildlife agencies continue to refine approaches to trapping methods that include issues pertaining to animal welfare [e.g., Best Management Practices (BMPs)].
4. Regulated trapping provides many benefits to the public (e.g., reducing wildlife damage to crops and minimizing threats to human health and safety).
5. Trapped animals are used for clothing and food.

These themes are mimicked with more elaboration in various publications authored by individuals actively engaged in promoting support for trapping and BMPs—e.g., "Trapping and furbearer management in North American wildlife conservation" appearing in various editions as a standalone publication of the Northeast (USA) Furbearer Technical Committee (Organ et al. 2015) and under the same title but different text as part of a special issue of the *International Journal of Environmental Studies* featuring NAM (White et al. 2015). Recommendations of strategies to gain public acceptance of specific aspects of trapping occur unabashedly in scientific publications of TWS (e.g., use of snares: *"In states where cable-traps are currently prohibited, a drastic regulatory change would likely result in immediate protest from anti-trapping organizations. For example, focusing on regulatory liberalization of snaring in water where beavers are causing damage would likely be more successful than an immediate regulatory change that allowed all forms of cable-trapping."*; Vantassel et al. (2010)). These and other examples raise ethical questions about public employees (many of whom are involved in the articulation of NAM and BMPs) promoting personal values to the public being represented, the role of science versus personal values in formulating wildlife management policy, and, most importantly for this discussion, whether BMPs are focused on improving the welfare of trapped animals or as an opportunity to promote trapping, both in the USA and internationally.

Science is referred to as the basis for developing and implementing furbearer management policy in the USA. However, the process of developing BMPs and promoting the process of fur trapping also includes considerable emphasis on the economic and cultural values of trapping furbearers to some local communities (e.g., Organ et al. 2015; White et al. 2015); topics having practical and emotional relevance but little to do with science in addressing concerns about animal welfare. Traps recommended under the BMP for river otters include virtually all of those used prior to BMPs, and no traps are recommended as inappropriate for the species. Although the BMP for river otters has been recently updated and available on the AFWA web site, no specific details of trap testing outcomes are provided on the site or are readily available for critique. Review and interpretation of outcomes used to establish BMPs are thus seemingly conducted primarily by those involved with the BMP initiative, implying that the public should accept unquestioningly the process and outcomes (a "good faith" approach) associated with selecting traps that adequately meet humane expectations for the public's furbearers. Organ et al. (2014) seemingly support the PTD (as applied in NAM) as being in congruence with this "good faith" management scheme by citing the following statement from Scott (1999): *"Additionally, if a trustee has special skills or expertise (e.g., wildlife professional), they have a duty to use these heightened capacities to enhance the conservation of resources under their management in the interests of trust beneficiaries."* Such a statement seemingly implies that wildlife professionals employed by state wildlife agencies will act in an unbiased manner and objectively represent the interests of all stakeholders in decision-making related to trapping wildlife for fur, a process that is not in evidence when considering promotional efforts to gain public acceptance of fur trapping nor by the system of wildlife conservation championed by proponents of NAM. Treves et al. (2015) effectively identify and review concerns pertinent to the application of public trust responsibilities by state wildlife agencies—specifically pertaining to the conservation of predators. Preeminent among these concerns is the narrow and preferential focus on consumptive use of wildlife embedded in the version of PTD portrayed by proponents of NAM (Batcheller et al. 2010). In contrast, Sax (1970) interpreted proper application of PTD as incorporating interests from a broad constituent base, advocating preserving public, environmental assets for future generations and defending society from undemocratic allocations of environmental assets (modified from Treves et al. 2015). Treves et al. (2015) define undemocratic allocation in part as those that "… reflect tyranny of minority or majority,…," a situation indicative of the wildlife conservation system advocated by NAM whereby consumptive users (who represent a fraction of the overall population in NA) have the predominate voice in decision-making pertaining to wildlife policy. Although humane issues have not received specific attention in discussions of PTD, application of PTD in the narrow sense promoted by Batcheller et al. (2010) and Organ et al. (2012) may nonetheless diminish attention and action in addressing humane concerns pertaining to trapping (or other consumptive uses of wildlife), especially if such concerns collide with entrenched values systems and interests associated with the NA system of wildlife conservation.

The number of states allowing legal trapping of river otters has expanded in recent years (Bricker et al. 2016). Prior to initiation of trapping seasons, strikingly similar negative media portrayals of river otters occurred in several states (Serfass et al. 2014), characteristically beginning with praise for implementation of progressive wildlife conservation policies by state wildlife agencies (i.e., implementing successful river otter reintroduction projects) and ending by proposing that a trapping season may be necessary to alleviate conflict associated with rapidly growing numbers of river otters. Conflict was portrayed as river otters predating on fish in private ponds, and being harmful to gamefish populations, thus causing complaints by anglers (Serfass et al. 2014). However, the extent of these conflicts was seldom quantified by state wildlife agencies or exaggerated in states portrayed as having public resentment toward river otters (Bricker et al. 2016). These negative portrayals appeared to have the intent of lessening public opposition for proposed plans to initiate river otter trapping seasons. State wildlife agencies appear to have allied with some media in the negative messaging. Fostering an acrimonious situation to achieve a wildlife management outcome (i.e., a trapping season on river otters) to benefit a particular constituency (i.e., trappers) would breach PTD obligations of state wildlife agencies to conserve wildlife in a manner that considers the interest of all citizens, not to manipulate public opinion through a marketing effort to achieve a management outcome. Further, labelling an animal as a pest or problem lessens public concern for its welfare (Rochlitz 2010). The marketing approaches seemingly being followed to promote support for fur trapping in general and river otters specifically cast doubt on the objectivity of decision-makers involved in the development of BMPs in placing animal welfare at a level equivalent to traditional wildlife management practices in the USA.

Trapping wild animals for fur is a contentious issue in the USA and elsewhere and will not be accepted by most animal welfare groups, regardless of approaches used to enhance the humaneness of a trap or trapping system. Nonetheless, opposition to fur trapping (especially when using leghold traps) from animal welfare groups in Europe and NA provided the primary impetus for developing universally standardized approaches in defining animal welfare standards for trapping animals with restraining and killing traps (i.e., standards established by the ISO). Establishment of ISO criteria provides a basis for evaluating the humanness of restraining and killing traps used for both research and fur trapping. Although this appeared to be a positive step in recognizing the need to address welfare concerns for trapped animals, the process of trap testing to define traps meeting ISO standards and, more importantly, the actual humaneness of the traps and associated trapping systems and the evaluative process are in need of further scrutiny, particularly in the USA.

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