Fish and Wildlife Board Meeting Minutes
Wednesday, April 5, 2023

The Vermont Fish and Wildlife Board held an in-person meeting at 5:00 pm on Wednesday, April 5, 2023, at the Dill Building, Room 135, 2178 Airport Rd, Berlin, VT 05641. A recording of the meeting is available on the department's YouTube channel.

Agenda

1. Approval of Previous Meeting Minutes (March 15, 2023)
2. Public Comments (Limited to 2-minutes per speaker)
3. Migratory Game Bird Hunting Seasons – Final Vote
4. 2023 Moose Hunting Season – Final Vote
5. Review of Amendments to the Furbearing Species Rule
6. Board Votes on Petitions Relating to Furbearing Species
7. Amendments to the Furbearing Species Rule – Tentative First Vote
8. Commissioner's Update

Board Members Present: Michael Bancroft (Acting Chair), Brian Bailey, Nicholas Burnham, David Deen, Jamie Dragon, Neal Hogan, Michael Kolsun, Paul Noel, Robert Patterson, Martin Van Buren

Virtual: Brad Ferland, Allison Frazier, Bryan McCarthy, Jay Sweeny

Department Staff Present: Commissioner Christopher Herrick, Wildlife Director Mark Scott, Game Warden Colonel Justin Stedman, Counsel Catherine Gjessing, Game Warden Major Sean Fowler, Deer & Moose Project Leader Nick Fortin, Project Coordinator Christopher Saunders, Wildlife Management Program Manager David Sausville, Retired Furbearer Biologist and Part-Time Fish & Wildlife Employee Kim Royar, Public Information Officer Joshua Morse, Principal Assistant Abigail Connolly

Virtual: Wildlife Technician Mary Beth Adler, Game Warden John Truong, Outreach Coordinator Megan Duni, Information Specialist John Hall

Members of the Public Present: Bob Galvin, Butch Spear, Ann Smith, Bill Pickens

Virtual: Jane Fitzwilliam, Sarah Gorsline, Tupper, Michael Quinn, Tyler B., Abagael Giles, Renee Seacor, Randy Barrows, Bubba, Anne Jameson, Anne McKinsey, Anne Donna

The meeting was called to order at 5:00 pm

APPROVAL OF PREVIOUS MEETING MINUTES

Board Member Kolsun said that Board Member Noel's comment about the use of drags on traps was missing in the minutes and should be added. Board Member Bailey moved to approve the minutes from March 15, 2023 as amended. Board Member Van Buren seconded the motion. The Board voted to approve the minutes unanimously.

PUBLIC COMMENT PERIOD

Bob Galvin, Richmond
Ann Smith, Westminster
Sarah Gorsline, Grand Isle
Renee Seacor, Project Coyote & Rewilding Inst.
Jane Fitzwilliam, Vermont Coyote Coexistence Coalition

The recording of the public comments can be viewed here.

Migratory Game Bird Hunting Seasons – Final Vote

Mark Scott discussed the public comments received regarding the 2023-2024 waterfowl season recommendations and asked David Sausville to detail subsequent revisions. David Sausville presented the details of the twelve waterfowl season recommendations, which are included below. Board Members asked questions on the federal guidelines, the conservation method of a three-shot limit for woodcock, the difference between resident and migratory geese, the rationale for the dates of the seasons, and the process for establishing the recommendations. Board Member Bailey moved to approve the migratory bird hunting season as presented by the department. Board Member Van Buren seconded the motion. The Board voted by roll call to approve the motion (13-0), with Board Member Ferland absent.

2023 Moose Hunting Season – Final Vote

Mark Scott discussed the public comment received regarding the 2023 moose hunting season and that there were no changes to the department's recommendations. Nick Fortin reviewed the details of the department's 2023 moose hunting season recommendations, which is included below. Acting Chair Bancroft asked Nick Fortin questions that came up in public comment. Nick Fortin explained that hunters are not targeting healthy moose over moose suffering from ticks. In the fall hunting season, there are no ticks and thus no visibly sick or infected moose to target. He also emphasized that bulls tend to carry significantly more ticks than cows. Moose are the primary host of winter ticks, so targeting other animals would not be effective. Board Members asked questions about why there are more cows than bulls being targeted and whether information is sent to hunters about winter ticks when they receive their permit. Board Member Deen moved to approve the 2023 moose hunting season as recommended by the department. Board Member Bailey seconded the motion. The Board voted by roll call to approve the motion (13-0), with Board Member Ferland absent.

The Board recessed the meeting at 5:58 pm.

The Board resumed the meeting at 6:22 pm.

Review of Amendments to the Furbearing Species Rule

Catherine Gjessing reviewed the details of the draft furbearing species rule recommended by the department. The draft furbearing species rule is included below. Board Members asked questions and commented on whether lures were included in the definitions, the control of dogs with GPS collars, whether there are requirements for privately owned land and federal land, the requirement of traps including lamination, the exemption for Wildlife Management Areas (WMAs), the requirements of where to set a body gripping trap, the inclusion of edible meat in the language, that a landowner can ask to see a hounder's permit, that there is no cap on permits for hunting bears with dogs, the legal means for taking a coyote, the number of four dogs allowed to hunt coyotes with dogs, whether you can switch collars between dogs, that the rule does not establish a season for hunting all coyotes just hunting coyotes with dogs, the dates of the hunting coyotes with dogs season and the possible effect on the training of dogs, what is considered a hunt, and the humane dispatch of trapped animals and input from the Association of Fish & Wildlife Agencies (AWFA).

Board Votes on Petitions Relating to Furbearing Species

Catherine Gjessing reviewed the open petitions before the Board and if and how recommendations from the petitions were integrated into the department's proposal for the furbearer rule. The petitions were from Vermont Coyote Coexistence Coalition, Vermont Traditions Coalition, Northeast Wolf Recovery Alliance, Vermont Trappers Association, and Vermont Wildlife Coalition. Catherine Gjessing also reviewed the stakeholder and public comments on best management practices for trapping and hunting with dogs. The summary and the petitions are included below. The Board discussed accepting the petitions as a whole but not adopting each point of the petitions and that the department will respond to the petitioners about what points were adopted by the Board.

The Board recessed the meeting at 7:59 pm.

The Board resume the meeting at 8:08 pm.

Board Member Sweeny moved to accept the petitions (Vermont Coyote Coexistence Coalition, Vermont Traditions Coalition, Northeast Wolf Recovery Alliance, Vermont Trappers Association, Vermont Wildlife Coalition) with the understanding that changes may be made to the furbearer rule before it is finalized. Board Member Deen seconded the motion. The Board voted by roll call to approve the motion (12-0), with Board Members Frazier and Ferland not present.

Amendments to the Furbearing Species Rule – Tentative First Vote

Commissioner Herrick explained that the Board vote would begin the rulemaking process for amending the furbearer rule. The next steps for the rulemaking process are included below. The Board discussed whether to vote to approve the furbearer rule as presented by the Board and what types of amendments could be made further along in the process.

Board Member Dragon moved to approve the furbearer rule as presented by the department. Board Member McCarthy seconded the motion.

Board Member Deen moved to amend the furbearer rule by adding a section that specifies the methods of dispatch of trapped animals. Board Member Hogan seconded the motion. The Board discussed safety concerns with dispatching implements and limitations of town ordinances. Board Member Deen withdrew the motion. The Board discussed waiting for input from the Association of Fish & Wildlife Agencies (AFWA) on methods of dispatch and the timing and process of the rulemaking process.

The Board discussed what a drag is in trapping and how it works. Board Member Kolsun moved to amend section 4.5 of the furbearer rule to include the use of drags in addition to anchored traps. Board Member Dragon seconded the motion. The Board discussed the features of drags. The Board voted by roll call to approve the motion (11-0), with Board Members McCarthy, Frazier, and Ferland absent.

Board Member Deen moved to amend the furbearer rule by adding dispatch of a live trapped animal must be quick, final, and as respectful as possible for the animal, and the provision will be reviewed when recommendations are issued by AFWA. Board Member Kolsun seconded the motion. The Board discussed how to enforce the amendment. Board Member Deen then amended his motion regarding dispatch to state: that trappers shall immediately dispatch a live trapped animal with a gun, muzzle loader, bow and arrow, or a crossbow, and this provision will be reviewed when recommendations for dispatch are issued by AWFA. Board Member Kolsun agreed to the amendment. The Board voted by roll call to approve the motion (11-0), with Board Members McCarthy, Frazier, and Ferland absent.

Board Member Noel moved to amend the furbearer rule by including double jaw traps as an option to the criteria needed in laying foothold traps. Board Member Kolsun seconded the motion. Catherine Gjessing explained that section 4.5 already allows this trap. Board Member Noel withdrew his amendment.

The Board voted by roll call to approve the furbearer rule as presented by the department (11-0), with Board Members McCarthy, Frazier, and Ferland absent.

COMMISSIONER'S UPDATE

Commissioner Herrick commended the hard work done by department staff on the furbearer rule amendments and the dedicated decision making based on the best available science. Commissioner Herrick responded to Acting Chair Bancroft's question about if there is a difference between regulated and recreational trapping.

Motion To Adjourn:

The Board moved and approved to adjourn the meeting at approximately 9:28 pm.

Waterfowl Season Recommendations 2023 - 2024

Recommendation 1 - 2023 Lake Champlain Zone Duck, Merganser and Coot Seasons: That the 2023-2024 duck, mergansers, and coot seasons of the Lake Champlain zone run from October 7 to October 11 and November 4 to December 28, 2023. Within the chosen dates, we recommend the 60-day season with a daily bag limit of no more than 6 ducks (with species restrictions) and 15 coots.

Recommendation 2 – 2023 Interior Vermont Zone Duck, Merganser and Coot Seasons: That the 2023-2024 duck, mergansers, and coot seasons of the Interior Vermont zone run from October 7 to December 5, 2023. Within the chosen dates, we recommend the 60-day season with a daily bag limit of no more than 6 -ducks (with species restrictions) and 15 coots.

Recommendation 3 – 2023 September Resident Canada Goose Season: That the September resident Canada goose season run from September 1-25, 2023, with a daily bag limit of 8 birds per day and a possession limit of 24 birds within the Lake Champlain and Interior Vermont zones. New Hampshire plans to offer the same dates within the Connecticut River zone, but with a daily bag limit of 5 birds per day and a possession limit of 15 birds.

Recommendation 4 – 2023 Lake Champlain and Interior Vermont Zones Migrant Canada Goose Season: That the Lake Champlain and Interior Vermont zones be set for the migrant Canada goose season to run from October 14 to November 27, 2023, with a daily bag limit of 3 bird per day and a possession limit of 9 birds.

Recommendation 5 – 2023 Lake Champlain and Interior Vermont Zones Snow Goose Season: That the Lake Champlain and Interior Vermont zones be set for the snow goose season to run from October 1st to December 31, 2023 and February 24 to March 10, 2024, with a daily bag limit of 25 birds per day and no possession limit.

Recommendation 6 – 2023 Lake Champlain and Interior Vermont Zones Brant Season: That the Lake Champlain and Interior Vermont zones be set for the brant season to run from October 14 to November 12, 2023, with a daily bag limit of 1 bird per day and a possession limit of 3 birds.

Recommendation 7 - 2023 Youth Waterfowl Hunting Days: That the youth waterfowl hunting weekend occur on Saturday and Sunday, September 23 & 24, 2023, within all Vermont zones.

Recommendation 8- 2023 Falconry Season: A person possessing a valid falconry permit may take migratory game birds only during open seasons and within designated shooting times. The daily bag limit shall be a maximum of three legal migratory game birds, singly or in the aggregate, not to exceed restrictive daily bag limits for certain species as listed herein. Possession limit shall be equal to three times the daily limit.

Recommendation 9 – 2023 Woodcock Season: That the woodcock season run from September 30 to November 13, 2023, with a daily bag limit of 3 birds per day and a possession limit of 9 birds, statewide.

Recommendation 10 – 2023 Snipe Season: That the snipe season run from September 30 to November 13, 2023, with a daily bag limit of 8 birds per day and a possession limit of 24 birds, statewide.

Recommendation 11 – Hybrid Scaup Season: Provide a hybrid season on scaup that allows for a 20-day segment with a two-bird daily bag limit and a 40-day segment that allows for a one bird daily bag limit. The 20-day and two bird daily limit should be placed on the last twenty days within the Lake Champlain and Interior Zone seasons of Vermont. All remaining days of the seasons will be a one bird daily limit.

Recommendation 12 – December Resident Canada Goose Season: That the December resident Canada goose season run from December 1, 2023 to January 6, 2024, with a daily bag limit of 5 birds per day and a possession limit of 15 birds, statewide.

2023 WATERFOWL SEASON RECOMMENDATION

LAKE CHAMPLAIN ZONE

	SEASON TYPE	SEASON LENGTH	INCLUSIVE DATES	DAILY LIMIT	POSSESSION LIMIT
DUCKS	Split	60 Days	Oct. 7 – Oct. 11 & Nov. 4 – Dec. 28	6	18
MERGANSERS	Split	60 Days	Oct. 7 – Oct. 11 & Nov. 4 – Dec. 28	5	15
Scaup	Split	40 Days	Oct. 7 – Oct. 11 & Nov. 4 – Dec. 8	1	3
	Hybrid	20 Days	Dec. 9 – Dec. 28	2	6
COOTS	Split	60 Days	Oct. 7 – Oct. 11 & Nov. 4 – Dec. 28	15	45
GEESE					
Canada Geese	Straight	25 Days	Sept. 1 – Sept. 25	8	24
	Straight	45 Days	Oct. 14 – Nov. 27	3	9
	Straight	37 Days	Dec. 1, 2023 – Jan. 6, 2024	5	15
Snow Geese	Split	107 Days	Oct. 1 – Dec.31, 2023	25	NONE
			Feb. 24 – Mar. 10, 2024	25	NONE
		(CO)	Mar. 11 – Apr. 26, 2024	15	NONE
Brant	Straight	30 Days	Oct. 14 – Nov. 12	1	3

2023 WATERFOWL SEASON RECOMMENDATION

VERMONT INTERIOR ZONE

	SEASON TYPE	SEASON LENGTH	INCLUSIVE DATES	DAILY LIMIT	POSSESSION LIMIT
DUCKS	Straight	60 Days	Oct. 7 – Dec. 5	6	18
MERGANSERS	Straight	60 Days	Oct. 7 – Dec. 5	5	15
Scaup	Split	40 Days	Oct. 7 – Nov. 15	1	3
	Hybrid	20 Days	Nov. 16 – Dec. 5	2	6
COOTS	Straight	60 Days	Oct. 7 – Dec. 5	15	45
GEESE					
Canada Geese	Straight	25 Days	Sept. 1 – Sept. 25	8	24
	Straight	45 Days	Oct. 14 – Nov. 27	3	9
	Straight	37 Days	Dec. 1, 2023 – Jan. 6, 2024	5	15
Snow Geese	Split	107 Days	Oct. 1 – Dec.31, 2023	25	NONE
			Feb. 24 – Mar. 10, 2024	25	NONE
		(CO)	Mar. 11 – Apr. 26, 2024	15	NONE
Brant	Straight	30 Days	Oct. 14 – Nov. 12	1	3

2023 Moose Permit Recommendation

	E1	E2	Total
Archery Season			
Either-sex	11	9	20
Regular Season			
Either-sex	29	25	54
Antlerless-only	55	45	100
Auction	*choice*		3
Special Opportunity	*choice*		3
TOTAL			**180**

§ 44. Furbearing species

1.0 Authority

1.1 This rule is promulgated pursuant to 10 V.S.A. §§ 4081, 4082, 4084, 4828, and 4861. In promulgating this rule, the Fish and Wildlife Board is following the policy established by the General Assembly that the protection, propagation, control, management, and conservation of fish, wildlife, and fur-bearing animals in this State is in the interest of the public welfare and that the safeguarding of these valuable resources for the people of the State requires a constant and continual vigilance.

1.2 In accordance with 10 V.S.A. §§ 4082 and 4084, this rule is designed to maintain the best health, population, and utilization levels of the regulated species.

1.3 This rule shall apply to all persons who take or attempt to take fur-bearing animals by ~~trapping or hunting~~ any method.

2.0 Purpose

The purpose of this rule is to regulate the taking of fur-bearing animals.

3.0 Definitions

3.1 "Accompany" for the purpose of pursuing coyote with hounds means that:

a) Any person engaged in the control, handling, transporting, or intercepting of dogs used for taking coyote with the aid of dogs shall be under the direct supervision of the permit holder and shall be considered a "Sub-permittee", and

b) A Sub-permittee who is in any way involved in the use or handling of taking coyotes with the aid of dogs shall be under the direct control and supervision of the coyote dog permit holder, including the ability to see and communicate with each other without the aid of artificial devices such as radios or binoculars, except for medically necessary devices such as hearing aids or eyeglasses.

3.2 "Bait" means any animal, vegetable, fruit, mineral matter, or any other substance capable of luring or attracting coyotes or any other wildlife.

3.3 "Board" means the Vermont Fish and Wildlife Board.

3.4 "Commissioner" shall mean the Commissioner of the Vermont Department of Fish and Wildlife.

3.5 "Compensation" shall mean money.

3.6 “Control of dog/dogs” means the transportation, loading, or unloading of dogs from vehicle(s); and the handling, catching, restraining, or releasing dogs to take coyote with the aid of dogs. GPS collars with track log and training/control functions or separate GPS and training/control collars shall be required to locate and track dogs at all times while taking coyote with the aid of dogs. At no time shall dogs be in pursuit of coyote without a GPS track log being maintained by the permit holder.

3.7 “Coyote Dog Permit” means a permit issued by the Commissioner to a person who wishes to hunt, pursue or take coyote with the aid of dogs.

3.8 "Department" means the Vermont Department of Fish and Wildlife.

3.9 “Department Registered Dog” means a dog bearing a numbered identification dog-tag (Department Registration Dog-Tag) approved or issued by the Vermont Fish and Wildlife Department, with the permit holder's coyote dog permit number and a number one through four.

3.10 "Fur-bearing animal" means beaver, otter, marten, mink, raccoon, fisher, fox, skunk, coyote, bobcat, weasel, opossum, lynx, wolf, and muskrat or as amended pursuant to 10 V.S.A. § 4001.

3.11 “Pack of dogs” means one to four dogs, acting as a unit during taking coyote with the aid of dogs.

3.12 “Public Highway for the purposes of this rule, means roads, including Class 4 roads, shown on the highway maps of the respective towns, made by the Agency of Transportation, but does not include foot trails or private roads.

3.13 “Public Trail” for the purposes of this rule, means a pedestrian foot path on Vermont state-owned public land, open to the public, and designated and mapped by the managing agency or department.

3.14 “Relaying packs and dogs” means the removal and replacement of one or more dog or dogs, during taking coyote with the aid of dogs, to the original pack of dogs once the pursuit has begun.

3.15 “Taking Coyote with the aid of dogs” for the purposes of this rule means that one or more dog(s) with Department Registered Dog-Tags are on the ground whether in pursuit of a coyote or not.

3.16 Training/control” collar is any family of collars that deliver electrical stimulation of varying intensity and duration to the neck of a dog via a radio-controlled electronic device incorporated into the collar.

3.17 “Sub-Permittee” means any person with a valid Vermont hunting license designated by the coyote dog permit holder to assist or take coyote with the aid of dogs, in accordance with the permit issued by the Commissioner.

3.18 A "tanned" pelt is one that has been treated to turn the skin into leather.

3.19 "Trapping" means to hunt, take or attempt to take fur-bearing animals with traps including the dispatching of such lawfully trapped fur-bearing animals.

3.20 A "trap" means a mechanical device used to capture, kill and/or restrain fur-bearing animals excluding firearms, muzzleloaders and archery equipment.

3.21 “Unregistered dog” means a dog that does not have a valid numbered Department Registration dog tag as described in 3.9

4.0 Restrictions

4.1 A person trapping for fur-bearing animals under this rule shall visit his/her traps at least once every calendar day, except as provided in paragraph 4.2, and dispatch or release any animal caught therein.

4.2 A person who sets body gripping traps in the water or under the ice, colony/cage traps underwater or foothold traps under the ice shall visit his/her traps at least once every three calendar days and remove any animal caught therein.

4.3 A person shall not set a trap on lands other than his/her own which does not have his/her name and address permanently and legibly stamped or engraved thereon, or on a tag of rustless material securely attached thereto.

4.4 All traps under ice will be marked with a tag visible above the ice.

4.5 All foothold traps set on land must:

a) Have base plates that feature a center chain mount with swivel, with free moving chain and at least one additional swivel that allow mobility for a captured animal;

b) Be anchored with a maximum of 18” chain length. Extra swivels and/or shock springs can be added to the chaining system;

c) Be padded or offset and laminated with a minimum jaw thickness of 5/16th of an inch or fully encapsulate the foot;

d) Have a spread of no more than 6¼ inches measured inside the widest expanse of the jaws; and

e) If a foothold trap is triggered by downward pressure, it must be adjustable for pan tension.

4.6 A person shall not set a body gripping trap with a jaw spread opening greater than 60 square ~~over eight~~ inches measured inside the widest expanse of the jaws unless the trap is set five feet or more above the ground, or in the water.

4.7 No meat-based baited, body-gripping traps shall be set on the ground unless placed within an anchored enclosure with openings no greater than 60 square inches and with a trap trigger that is recessed at least 12” from all openings.

4.8 Meat based baited body-gripping traps with a jaw spread up to and including 60 square inches can be used on land if the trap is placed at least 5’ above the ground.

4.9 All meat-based bait shall be covered at the time that a trap is set. Coverings shall include, but are not limited to, brush, branches, leaves, soil, snow, water, or enclosures constructed of wood, metal, wire, plastic, or natural materials.

4.10 A person shall not use toothed foothold traps or snares when trapping under this section.

4.11 A person shall not set a trap between December 31 and the following fourth Saturday in October unless the trap is in the water, under the ice, or on a float in the water.

4.12 A person shall not possess a living fur-bearing animal, except as provided by rules of the board or 10 V.S.A. part 4.

4.13 A person shall not possess a fur-bearing animal trapped outside of its legal season without the written authorization of the Department, not to include animals taken pursuant to 10 V.S.A. § 4828.

4.14 A person shall not possess fur or skin of a fur-bearing animal unlawfully taken.

4.15 A person shall not take a fur-bearing animal by use of any poisonous mixture.

4.16 A person shall not take a fur-bearing animal from dens by cutting, digging, smoking, by the use of chemicals, explosives, or by the use of mechanical devices.

4.17 Trapping Set-backs

a) No foothold traps can be set on or within 25’ of the traveled portion of a public trail or highway, unless set in a culvert, in the water, or at least 5’ above the ground. This setback requirement shall not apply to public trails and Class IV highways located in Wildlife Management Areas.

b) No body-gripping traps can be set on or within 50’ of the traveled portion of a public trail or highway, unless set in a culvert, in the water, at least 5’ above the ground, or in a set as described above in 4.7. This setback requirement shall not apply to public trails and Class IV highways located in Wildlife Management Areas.

4.18 Beaver Muskrat

a) When trapping muskrat between March 1 and March 31, body gripping traps are restricted to 5 inches or less.

b) A person shall not disturb or destroy a beaver or muskrat house or den or place a trap therein, thereon, or in the entrance thereof.

c) ~~A person may set a trap within 10 feet of the nearest point, above the water, of a beaver house or dam only from the 4th Saturday in October through the last day of February, all dates inclusive.~~ A person shall not set a trap within 10 feet of the nearest point, above the water, of a beaver house or dam during the month of March.

d) ~~Except for the setting of traps as provided under 4.183b and 4.18c, a~~ A person shall not interfere in any manner with dams, dens, or houses of beaver except upon prior written approval from the Commissioner.

4.19 Bobcat; Otter; Fisher.

a) From December 17 to December 31, both dates inclusive, ~~in order to minimize incidental bobcat harvest during the remainder of the fisher season~~, a person shall not set a body gripping trap with a jaw spread opening greater than ~~over~~ 36 square inches measured inside the widest expanse of the jaws unless the trap is set 5 or more feet above the ground, or in the water.

b) The skins of bobcat, otter, and fisher legally taken may be possessed, transported, bought and sold only when tagged and marked as hereinafter provided.

c) A person who takes bobcats, otter, or fisher during these seasons shall notify authorized Department staff within 48 hours of the close of the season. Pelts shall be presented to authorized Department staff for tagging. Such tags shall remain affixed to the pelts until tanned. Carcasses shall be surrendered to authorized Department staff at the time of tagging.

d) A person who legally takes bobcat, otter, or fisher may keep the edible meat.

e) No bobcat, otter, or fisher pelts or carcasses taken during these seasons shall be transported out of the State of Vermont prior to being tagged by authorized Department staff.

f) A person who takes bobcat, fisher, and otter pursuant to 10 V.S.A. § 4828 and who desires to keep the pelt shall notify authorized Department staff with 84 hours of the taking. Pelts shall be presented to authorized Department staff for tagging. Such tags shall remain affixed to the pelts until tanned. Carcasses shall be surrendered to authorized Department staff at the time of tagging.

4.20 Raccoons

a) A person shooting raccoons during the raccoon hunting season shall use a 0.22 caliber rimfire firearm or a shotgun with #2 shot or smaller.

b) A light may be used to illuminate and shoot a raccoon once treed by a dog, or dogs, during the raccoon hunting season. A light may also be used to illuminate a raccoon once treed by a dog, or dogs, during the training season.

4.21 Taking Coyote with the Aid of Dogs

4.21.1 Authority - In accordance with 10 V.S.A. § 5008 and § 5009 (b), this rule establishes a process and standards for the issuance of a permit to take coyote with the aid of dogs, either for the training of dogs or for the taking of coyote.

4.21.2 Purpose. The purpose of this subsection is to establish a process and standards for the issuance of permits to pursue coyote with dogs, establish training and hunting seasons for the taking of coyote with the aid of dogs, and to define legal methods of take.

4.21.3 The Taking of Coyote with Aid of Dogs.

a) Licenses and permits.

(1) Any person who intends to train, hunt, pursue, harvest, or in any manner take a coyote with the aid of dogs shall apply for a permit from the Commissioner on an application form provided by the Commissioner.

(2) Only applications received by the Department's central office during the official application period will be considered. Applications must be received prior to the deadline established by the Commissioner.

(3) The Commissioner will consider only complete applications. For an application to be complete it must be legible, must contain all the information requested by the Department, must bear the applicant's original signature, or, in the case of electronic or facsimile applications, attestation under the pains and penalties of perjury. To be considered complete the form must be accompanied by any required application fee, or means of payment, such as a valid credit card payment.

(4) The Commissioner may deny any person a permit in their sole discretion.

(5) Any person training, hunting, pursuing, harvesting, or in any manner involved in the taking of a coyote with the aid of dogs must hold a valid Coyote Dog Permit issued by the Department, or accompany a Coyote Dog Permit holder. The Permit

shall be carried at all times by the permittee while taking coyote with the aid of dogs, and exhibited to a game warden, landowner, or law enforcement officer upon demand.

(6) Any person hunting, pursuing, harvesting, or in any manner involved in the taking of a coyote with the aid of dogs must hold a valid Vermont Hunting License, and use only Department Registered Dogs.

(7) Ten (10) percent of the Coyote Dog Permits issued annually may be issued to non-resident hunters. In any given year, the number of permits available to non-resident hunters shall not exceed ten (10) percent of the total number of permits issued to resident hunters the previous year.

b) Lottery – In the event that more than 100 permit applications are received, the Department shall also hold a transparent, random drawing to ensure that up to 10% of permits issued by the Department are issued to Vermont residents who either have served on active duty in any branch of the U.S. Armed Forces provided that they have not received a dishonorable discharge (eligible veterans) or, are certified citizens of a Native American Indian tribe and any that has been recognized by the State pursuant to 1 V.S.A. chapter 23.

c) Legal Methods

(1) A person shall not take a coyote into their possession except by killing the coyote by legal means or methods. Legal means includes utilizing a muzzleloader, gun, bow and arrow or crossbow.

(2) A person taking coyote with the use of a bow and arrow or crossbow shall, upon demand of a game warden or other law enforcement personnel, show proof of having a prior archery license, or of having passed a bow hunter education course in Vermont, another state or a province of Canada approved by the Commissioner.

d) Dogs and Packs

(1) A person shall not take coyote with the aid of dogs unless the person is in control of the dog or dogs.

(2) No person shall take a coyote with the aid of dogs by using any Unregistered Dog. No person shall have an Unregistered Dog in their possession while hunting, pursuing, or taking a coyote.

(3) A person hunting with dogs, pursuing, and taking coyote with the aid of dogs shall attach a Department Registration Dog-Tag and a metal identification name plate with the person's name, address and telephone number to the dog's collar.

(4) A person taking a coyote with the aid of dogs shall only take a coyote with a Pack of Dogs as defined in this rule. No person shall pursue, hunt, or take coyote by Relaying any Dog or Pack of Dogs.

(5) Two or more permit holders may hunt together and combine Department Registered dog(s) to form a Pack of Dogs. The combined Coyote Dog Permit holders shall not take coyote with the aid of more than four dogs combined forming a single pack of dogs. Once hunting with dogs commences, dogs not on the hunt shall be restrained in the dog box or inside the vehicle. The combined Coyote Dog Permit holders shall not possess any Unregistered Dogs while hunting, pursuing, or taking coyote with the aid of dogs.

4.21.4 Seasons and Shooting Hours for Taking Coyote with the Aid of Dogs.

a) Coyote Dog Training Season: For Vermont Resident and Nonresident Permit Holder: June 1 through September 15, all dates inclusive, except that a nonresident may train dogs to pursue coyote only while the training season is in effect in the nonresident’s home state and subject to the requirements of these rules.

b) Coyote Dog Hunting Season December 15 through March 31, all dates inclusive.

c) Legal hours for taking coyote with the aid of dogs: One half hour before sunrise until one half hour after sunset.

4.21.5 Prohibitions applicable to Taking Coyote with the Aid of Dogs

a) A person shall not advertise, barter, exchange goods or services, or otherwise sell the use of a dog or dogs for the purpose of taking coyote with the aid of dogs.

b) While taking coyote with the aid of dogs, no person shall have in their possession an Unregistered Dog while possessing Department Registered dogs.

c) It shall be a violation for a Vermont resident to apply for a coyote dog permit for the purpose of allowing a nonresident coyote dog owner to take coyote in Vermont with the aid of dogs.

4.21.6 Reporting - A person taking coyote with the aid of dogs shall, no later than 48 hours after the close of season, report the taking of all coyotes during the season in a manner required by the Commissioner.

4.22 Taking Coyote by Bow and Arrow and Crossbow

4.22.1 No person shall take coyote with or without the aid of dogs, with a bow and arrow or crossbow if the arrow or bolt has an arrowhead that measures less than seven-eighths of an inch at its widest point or that has less than two sharp cutting edges.

4.23 Lynx

~~a) This subsection shall be effective on January 1, 2014.~~

a) Any person who incidentally captures a lynx shall notify the Department immediately.

b) The following regulations on traps and trapping shall apply within the Wildlife Management Unit E.

(1) Foothold traps set on land must be anchored using a chain or cable no longer than 18” that is center-mounted to the trap using a swivel connection and must have at least one in-line swivel along the chain or cable.

(2) From the fourth Saturday in October to December 31, both dates inclusive, all body gripping traps must be set:

i. In the water, or;

ii. Within a Canada lynx exclusion device as described below and as depicted in Diagram 1:

a. the trap jaws shall be completely within the device;

b. the trap springs may extend outside of device through openings no larger than 7.5” wide by 1.5” high;

c. the device shall not have an opening greater than 6” by 8”;

d. the opening shall not be directly in front of the trap but shall instead be either on the top or side of the device;

e. the trap set within the device shall be a minimum of 18” from the closest edge of the opening to the trap;

f. there shall be at least two attachment points for each side of the device where there is a joint or where panels come together;

g. the device shall be constructed of wood or of wire mesh of 16 gauge or less wire (.05” diameter wire or greater) and having a mesh size with openings no greater than 1.5” X 1.5” or 1” X 2”; and,

h. the trap shall be anchored outside of the device; or

iii. Off the ground as described below and as depicted in Diagram 2:

a. at least 5’ above the ground or if snow is on the ground at least 5 feet above snow level with the exception of the 24-hour period immediately following a snowstorm;

b. affixed to a standing tree which is free of branches below the trap or to a leaning section of pole that has not been planed or otherwise altered except for the removal of branches and is less than 4” in diameter at the trap and is angled at least 45° along its entire length from the ground to the trap; and

c. in an area that is free of any object within 4’ of the trap.

(3) From the fourth Saturday in October to December 31, both dates inclusive, body gripping traps no larger than a typical 160 (inside jaw spread up to 6.5”) may also be set on the ground if placed:

i. Under overhanging stream banks, or;

ii. In blind sets without the aid of bait, lure or visual attractants, or;

iii. Within a cubby constructed of artificial materials with the trap inserted at least 7” from the front and with an opening no greater than 50 square inches as depicted in Diagram 3.

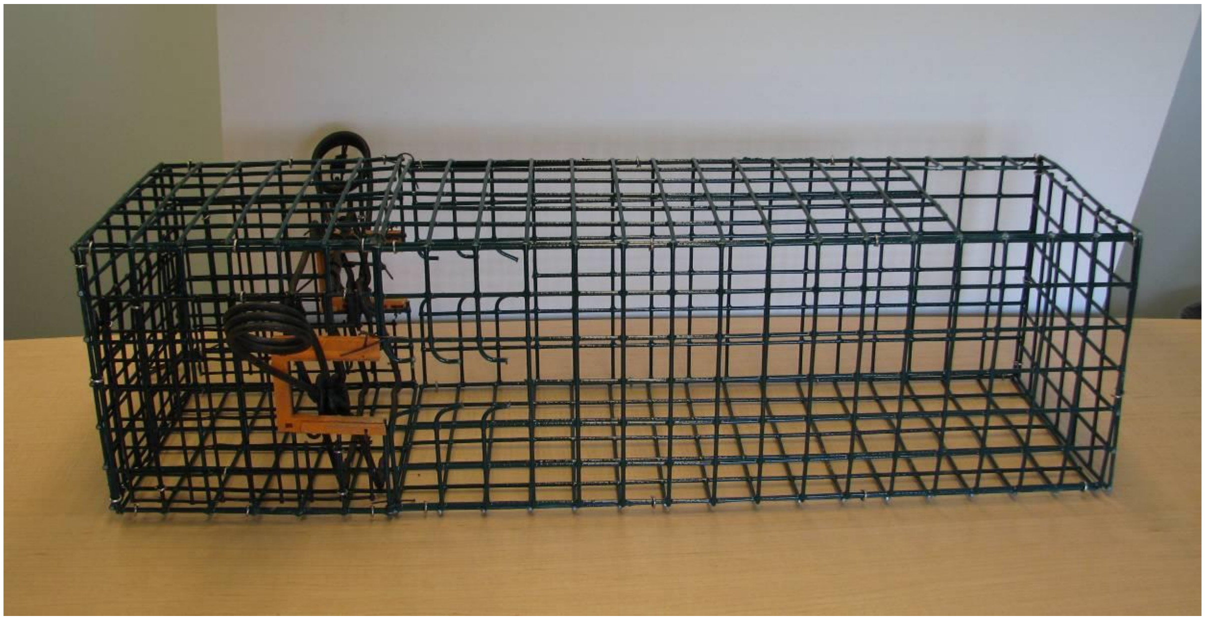
(d) ~~The establishment of a ten-year “Lynx Study Period” shall commence on the effective date of this subsection. The Department will assess the status of lynx in Vermont, identify and evaluate additional techniques and devices for avoiding incidental capture of lynx, and develop revisions to these rules in accordance with the findings of such studies and all current information.~~ The rules set forth in this subsection 4.22 shall expire on January 1, 2027 ~~2024~~ unless such rules are either extended or amended by the Fish and Wildlife Board. The decision to extend or amend these rules shall be based on an evaluation of the following key criteria:

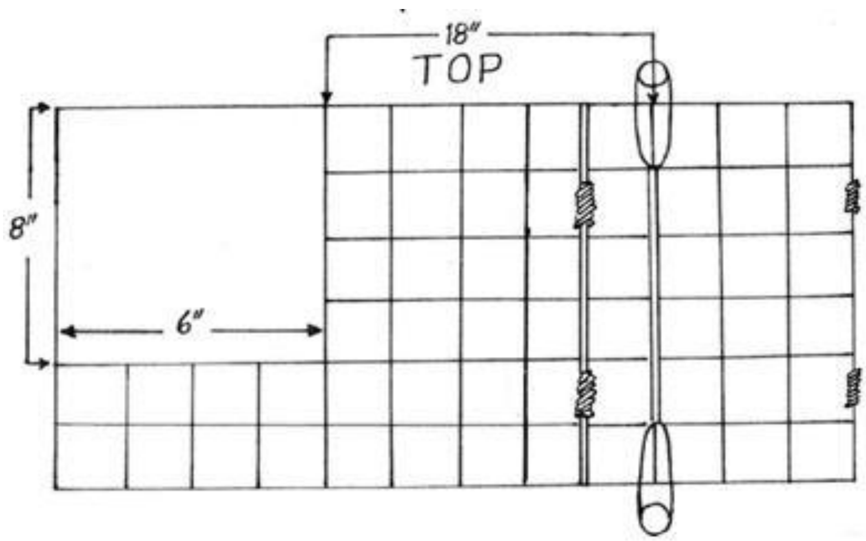
(1) Reliable evidence of the presence or absence of a resident, breeding population of Canada lynx;

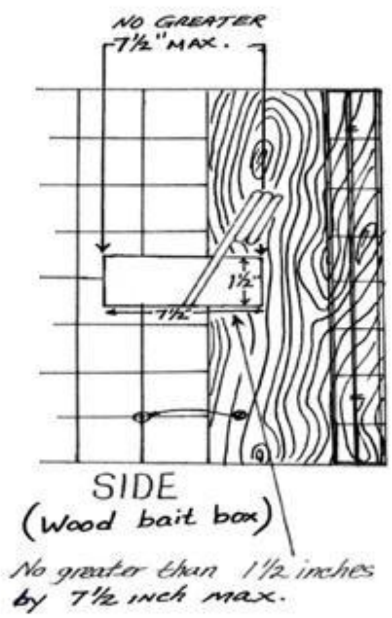
(2) The availability of more effective and/or practical alternatives for avoiding the incidental capture of lynx; and

(3) The outcome of Maine’s Incidental Take Permit application process.

Diagram 1. Canada lynx exclusion device for body gripping traps.







e

Diagram 2. Off the ground sets for body gripping traps.

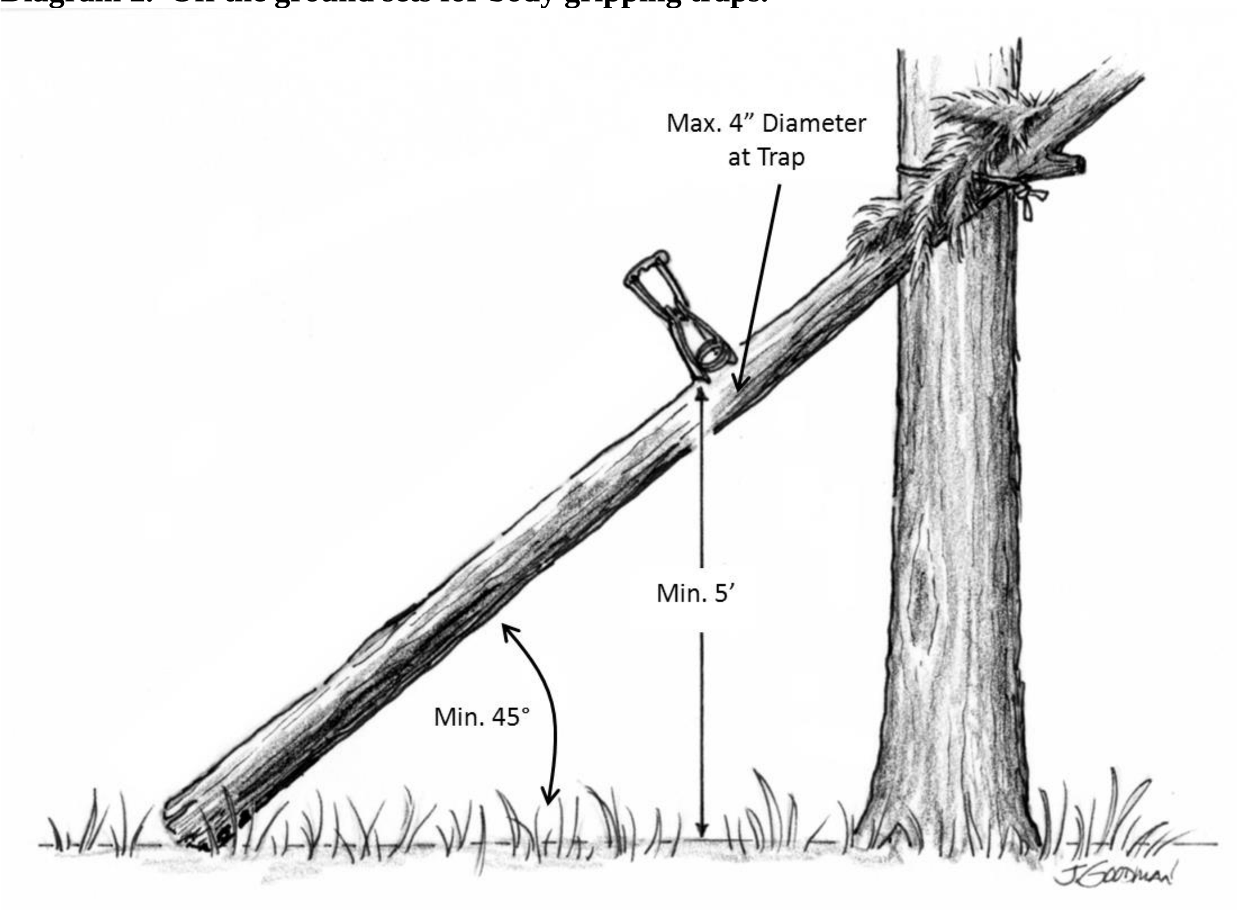
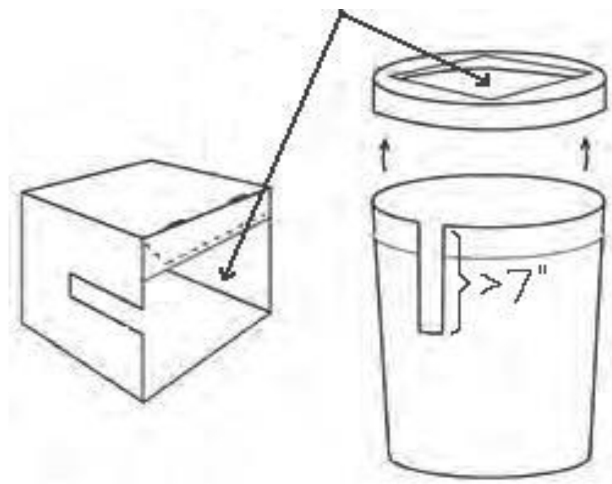


Diagram 3. Cubby sets for body gripping traps no larger than a typical 160.

Opening not to exceed 50 square inches



4.24 Biological Collection

a) Any person who obtains a trapping license shall complete and submit an annual biological collection trapper survey for the license season to the Department, within the timeline specified by the Commissioner.

b) The failure to complete and submit a biological collection survey to the Department shall be a nonpoint violation under 10 V.S.A. § 4502.

5.0 Seasons, Bag Limits

The following seasons, methods and bag limits are hereby established for the species listed. All hunting seasons will be with or without dogs, except as otherwise provided. Below is the exclusive, exhaustive list of season and means of take of fur-bearing animals. The taking of fur-bearing animals at other times or by other means, except where otherwise provided by law, is prohibited. All dates are inclusive.

Seasons	Dates	Bag Limit
5.1 Beaver		
By trapping	Fourth Sat. in Oct. through March 31	No Limit
By hunting	No open season	Zero

5.2	Otter		
	By trapping	Fourth Sat. in Oct.- last day of March	No limit
	By hunting	No open season	Zero
5.3	Marten	No open season	Zero
5.4	Mink		
	By trapping	Fourth Sat in Oct.-Dec. 31	No limit
	By hunting	No open season	Zero
5.5	Raccoon		
	By trapping	Fourth Sat. in Oct.-Dec. 31	No limit
	By hunting	Second Sat. in Oct.-Dec. 31	No limit
5.6	Bobcat		
	By trapping	December 1-December 16	No limit
	By hunting	January 10-February 7	No limit
5.7	Fox (red or grey)		
	By trapping	Fourth Sat. in Oct.-Dec. 31	No limit
	By hunting	Fourth Sat. in Oct. through the second Sun. in Feb.	No limit
5.8	Skunk		
	By trapping	Fourth Sat. in Oct.-Dec. 31	No limit
	By hunting	No closed Season	No limit
5.9	Muskrat		
	By trapping	Fourth Sat. in Oct.-March 31	No limit
	By hunting	March 20-April 19	No limit
5.10	Coyote		
	By trapping	Fourth Sat. in Oct.-Dec. 31	No limit
	Hunting/Taking Coyote without the Aid of Dogs	No closed season	No limit
	Hunting/Taking with the Aid of Dogs	December 15 through March 31	No limit
5.14	Fisher		
	By trapping	December 1-December 31	No limit
	By hunting	No open season	Zero
5.15	Weasel		
	By trapping	Fourth Sat. in Oct.-Dec. 31	No limit

By hunting	No closed season	No limit
5.16 Opossum		
By trapping	Fourth Sat. in Oct.-Dec. 31	No limit
By hunting	No closed season	No limit
5.17 Wolf	No open season	Zero
5.18 Lynx	No open season	Zero

5.20 With the exception of state and federally listed threatened and endangered species, seasons shall not be applicable to any person, who takes a furbearing animal in defense of persons or property for compensation, in accordance with 10 V.S.A. § 4828.

6.0 Trapping Rabbits and Furbearers in Defense of Property for a Fee

6.1 In accordance with Sec. 11 of Act 170 from the 2017-2018 Adj Session, the following sections and subsections of Board rules set forth in Title 10, Appendix § 44 are applicable to trapping rabbits and fur-bearing animals in defense of property for compensation: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4,10, 4.12~~1~~(however, possession is allowed for the purpose of moving the animal to a more appropriate place for dispatch), ~~4.10, 4.11~~4.14, 4.15(unless the animal has already been trapped), ~~4.14~~ 4.19 (f~~e~~), 4.23~~16~~ (a~~b~~), 4.24~~17~~ (a) and (b).

Green: The department incorporated concepts of the request into proposed rule.

Yellow: The department addressed concepts but with modifications to the specific request into the proposed rule.

Red: The department did not include the request into the proposed rule.

Blue: Requests that are in progress.

CANID PETITIONS

Open Petition	Request	Department Proposal
Vermont Coyote Coexistence Coalition (Jane Fitzwilliam March 2022)	• We request that Vermont establish a regulated coyote hunting season from October 1st – December 31st.	• No Seasons and shooting hours for taking coyote without the aid of dogs. • Seasons and shooting hours set for taking coyote with the aid of dogs December 15 to March 31, Page 8 Section 4.21.4 b) (training season is specified in a) and runs June 1 to September 15). Section c) sets the time of day – daylight hours. See also Page 14, Seasons Section 5.10.
Vermont Traditions Coalition (Mike Covey May 2022)	• Regulate the use of hounds for hunting coyotes	• See Pages 6-8, all of section 4.21, and Page 14, Section 5.10 relating to taking coyotes with the aid of dogs
Northeast Wolf Recovery Alliance (Renee Seacor Dec. 2022)	• Regulate and limit current open season from Oct 1st-Dec. 31st • All canids killed in Vermont should be checked- in, similar to the check-in requirement that currently exists for	• No Seasons and shooting hours for taking coyote without the aid of dogs. • Seasons and shooting

	deer and bear. Canids taken by hunting or trapping should be tagged and possession of untagged canids should be prohibited and penalized. • Checked-in canids that meet certain regulatory criteria (e.g., weight, size, canine spread, head, and ear size) should be subjected to a DNA analysis to assess the genetic composition of the animal. Work with canid experts to use reputable labs. • A two-year canid hunting moratorium should be imposed as soon as possible within the geographic area where a wolf kill has been documented. • Night hunting of "coyotes" should be prohibited due to the fact that hunting in nighttime conditions makes field identification of canid size exceptionally difficult. • The coyote hunting season should be shortened, and bag limits should be established. • Vermont's new wanton-waste law should be strictly enforced for all canids, similar to other animals, to ensure that their bodies are being used after being checked in.	hours set for taking coyote with the aid of dogs December 15 to March 31 – see above response to Vermont Coyote Coexistence Coalition • Reporting – Page 8, Section 4.21.6 Any person harvesting coyote with the aid of dogs shall report within 48 hours at the end of the season. • Note that 10 VSA sec 4923 exempts coyotes taken by lawful means other than trapping from wanton waste laws except that a coyote carcass cannot be left along a public ROW or highway, private property without permission, or any place prohibited by law. The Board cannot change statutory laws.

TRAPPING BMP PETITIONS SUMMARY

Open Petition	Request	Department Proposal
Vermont Trappers Association (Bruce Martin, ~4/2022)	• Foothold traps on land must have these characteristics: • Jaws are padded, off-set, laminated, or have jaws with a minimum thickness of 5/16".	• See page 3, Section 4.5 – changes are that base plates must have a center chain mount with swivel, with free moving chain and at

	• Base plates feature a center chain attachment. • The trap can be adjusted for pan tension. • There are at least two swiveling devices in the chain. • An anchored trap has a minimum of 12" and a maximum of 18" of chain from the point where it exits the ground once an animal is caught. • No foothold trap shall be set on land with a spread more than 6 -1/4'" as measured inside the jaws.	least one additional swivel to allow mobility for a captured animal; and a maximum of 18" chain length.
Vermont Wildlife Coalition (Rob Mullen, May 2022)	• Eliminate drowning sets. • Restore the exclusion of traps within 10 feet of beaver lodge entrances. • Return the end of the otter trapping season to February 28. [also addressed in 2021 petition]	• None included in the Department Proposal

PETITIONS DENIED BY BOARD		
Petition	**Request**	**Key issues that petition addressing**
VT Wildlife Coalition Petition (2021)	• Ban trapping	• Department provided an in-depth response and the petition was denied.
Vt Wildlife Coalition (2021)	• Shorten the otter season from the end of March to the end of February	• Department provided an in-depth response and the petition was denied.
Protect our Wildlife Petition (2021)	• Ban fisher trapping	• Department provided an in-depth response and the

		petition was denied.
The greater good animal rescue petition (2022)	• Ban leghold, foothold, and underwater pocket traps	• The board opted not to act on the petition due to the comprehensive work done by the department in June.

STAKEHOLDER COMMENTS ON TRAPPING AND BMPS

Comments on Trapping & BMPs	**Requests**	**Department Proposal**
Protect our Wildlife (POW), Green Mountain Animal Defenders (GMAD), and Humane Society of the Northeast (HSUS), May 2022	• Resubmitting the 2019 Petition for Trail setbacks (see below for detail). • Prohibit the recreational and commercial trapping of bobcats, river otters, fisher, and coyotes. • VFWD must determine the maximum number of traps on a trapline, to better allow trappers to adhere to the daily trap check requirements and to properly tend to the trapped animal(s). • Gunshot should be the only allowable method for killing animals in leghold and cage traps set on land. Bludgeoning; stomping on the chest; drowning of trapped and caged animals; choking; strangling and other non-gunshot methods are prohibited. Special considerations may be made for nuisance wildlife control operators who sometimes kill animals offsite in CO_2 chambers. [pending position statement from AFWA]	• Page 4, Sections 4.6, 4.7, and 4.8. No body gripping trap on the ground, with a jaw spread opening greater than 60 square inches measured inside the widest expanse of the jaws, unless 5 feet or more above ground, or in water. No meat-based baited, body-gripping traps on the ground unless in an enclosure with trigger recessed at least 12" from all openings. • Note that section 4861 requires the Department to report on 1/1/24 every year – the species and

	• Body-gripping, or so-called "quick kill" Conibear™ style traps, may only be set underwater in order to avoid killing non-targeted animals like bobcats, dogs, and other animals. • Prohibit the drowning of animals in submersion sets, including cage traps and leghold traps that are attached with a one-way sliding lock to a cable anchored in deep water. • "Quick kill" body-gripping traps must be fully submerged under water. • Mandatory reporting of all incidental takes (e.g., black bear, bobcat, deer) to VFWD within 24 hours. Trapped animals covered under • the Migratory Bird Treaty Act (e.g., raven, owl, eagle) must be reported immediately upon capture and guidance provided by a veterinarian or other qualified professional on how to proceed if the animal is still alive. • Require trap sensors on all land traps. • We'd also like VFWD to consider the concern that landowners trapping in defense of property, under the dangerously broad title 10 V.S.A. §4828, would be exempt from any meaningful changes.	number of nontarget animals killed or injured in the preceding year. • See Page 15, Section 6.0. Applies the new provisions regarding BMPs for foothold traps to trappers who trap in defense of property for compensation – Section 4.5; for meat-based baited body gripping traps – Sections 4.7, 4.8, and 4.9. See Page 4 for these sections. • Note, however, that any further application of rules to individuals who are exempt from trapping regulations under 10 VSA sec 4828 will require legislative action.
POW – December 6, 2019 petition (incorporated into the May 2022 Request)	• Set back requirements for traps (No traps may be set on public land): – Within 150 feet of any public trail – Within 500 feet of any trailhead that is accessible to vehicular traffic – Within 1000 feet of any public campground or picnic area) – Within 500 feet of the inside	• See Page 4, Section 4.17. Foothold traps must be setback 25 feet from a public trail or highway, unless set in a culvert, in the water, or at least 5' above the ground. Does not apply to public trails and Class IV highways in WMAs.

	or entry points of designated wildlife crossing areas • Standard signage erected at trailheads on public land warning the public that trapping is allowed on the land. • Prohibit baiting a trap with meat or other animal derived products if the bait is visible from the air on both public and private lands in an effort to reduce the incidental take of bald eagles and other raptors.	• Also in same Section, no body-gripping traps 50 feet from a public trail or highway, unless set in a culvert, in the water, or at least 5' above the ground. Does not apply to public trails and Class IV highways in WMAs. • Page 4, Section 4.9. Meat-based bait shall be covered. (Lures are not prohibited and do not need to be covered).

Nov 2022 Post Stakeholder Mtgs	STAKEHOLDER BMP TRAPPING COMMENTS
POW/HSUS/VWC	• No objections to VTA petition changes but changes will not improve animal welfare. • AFWA BMPs are floor for S-159. Numerous deficiencies: serious injuries, including death, to up to 30% of trapped animals; fail to consider behavioral or physiological responses, compounding effect of injuries, long-term impact to escaped animals, etc.; Doesn't protect unintended captures; Unenforceable (i.e. warden can't check for pan tension without triggering trap); • POW's 2019 petition on setback requirements recommended for all public land including federal lands and WMAs. Legislative mandate is for "all public locations." Trapping equipment does not fund Pittman Robertson or help pay for WMA costs and bird dog hunters and hunters who fund WMAs via excise tax might appreciate trap setbacks, especially with overlap in trapping and certain bird seasons (i.e. partridge). 500 foot or more setback rule for public trails, class 4 roads, playgrounds, parks and other public locations where persons may reasonably be expected to recreate should be a minimum set back. Department proposal does not meet legislative mandate. • Prohibit baiting a trap with meat or other animal-derived products if the bait is visible from the air to reduce the incidental takes of bald

	eagles and other raptors, cover or bury bait 50 feet away from trap. Maine bait restrictions - "Foothold or killer-type traps must not be set within 50 yards of bait that is visible from above. Bait may be used for trapping if it is completely covered to prevent it from being seen from above, and it must be covered in such a way as to withstand wind action and other normal environmental conditions. Animal matter (e.g., feathers, bone, and fur) meet the definition of bait and visible attractor and must be covered or not visible from above if less than 50 yards from a foothold or killer-type trap." • Biden restored rolled backs to the Migratory Bird Treaty Act in 2021, which makes incidental take of birds illegal and USFWS may provide guidance to state F&W agencies on BPs under the restored MBTA regulations. • Body gripping kill traps should be fully submerged underwater because: hunters and hikers wouldn't have to avoid these riparian areas, and trappers avoid the emotional and legal conflict of killing a hunting or companion dog – often with the owner struggling to rescue their pet without the proper equipment. No logical justification to allow body gripping on dryland or partially submerged. Their non-selectivity and "non-releasability" (of both targets and non-targets) make them a liability that is eliminated by mandating full submersion underwater. • Department proposal regarding body gripping traps and meat-based bait will not prevent non-target capture. • Not taking away trapping opportunities–can still trap fisher, bobcat, raccoons etc. with leghold traps; can still use conibears underwater for beaver, muskrat, river otters, etc. No more incidental kills of bobcats during fisher season. • Prohibit the drowning of animals in submersion sets, including cage traps and leghold traps that are attached with a one-way sliding lock to a cable anchored in deep water; the AVMA does not consider drowning a form of euthanasia. • Reporting of incidental takes is limited since not all reporting is required, especially prior to 2018, but we do have VT-specific examples of non-targeted animals being trapped in body gripping kills traps. • No recommendation on humane methods of killing trapped animals despite the legislative mandate. Gunshot only. Currently, trapped animals are drowned, bludgeoned, stomped on to crush the heart and lungs (referred to as "chest compression") and choked. VFWD was unwilling to accept our recommendation and has asked for more time to deliberate. American Veterinary Medical Association recommendation on wildlife euthanasia.

Vermont Wildlife Coalition	• Opposed to recreational trapping. • Working Group Composition: polarized and overwhelmingly pro trapping • While enjoined to not use the group as a referendum on trapping, pro-trapping bias evident by 1st meeting presentation from AFWA BMP researchers, statement that most wildlife experts support trapping. • 5 bullet points proposed taken verbatim from the Vermont Trappers Association (VTA) - little if any improvement in trapping systems. Theoretical improvement, since AFWA BMPs already employed by 80% of trappers in Vermont. • AFWA BMPs = inadequate, over-hyped, and totally missing the larger point of gratuitous cruelty. • Baits and Lures - The Department proposal sides completely with the VTA because it only requires meat-based baits to be covered from sight at the time a trap is set. Biologically, restricting the proposal to "meat-based" bait is puzzling since raptors are sight hunters and any other visible bait (e.g., feathers) would still put raptors at risk. • Except for not agreeing to try to change current law and legalize cable restraint snares, the FWD gave the VTA all they asked for and more. Currently, all body-gripping traps with up to an 8"x8" spread are allowed to be set on the ground (larger if 5' above the ground or in water). This proposal does not allow meat-based baited body-gripping traps on land unless 5' off the ground or if they are in an enclosure with up to an opening of 60 square inches (7.75" x 7.75" – one quarter-inch smaller than currently allowed). All other traps, including scent-baited traps are allowed on ground where dogs can easily reach them and, many dogs and any cat can get 5' into a tree, especially driven by bait. Such noodly, nibbling measures are not effective attempts to solve the problem of "by-catch" of non-target species or family pets. • "*Department's position that the capture of domestic pets is a relatively uncommon occurrence."* Minimizes the issue, is callous and inappropriate given the trauma and grief suffered by families, however, few, balanced against the lack of benefit from trapping to ecosystems or society at large. Bear in mind that a pet "captured" in a body-gripping trap will likely die if not released within minutes. The data for this "position" of the FWD is thin. • No reporting was even required until 2018 – and that, by the legislature, not the FWD or the FWB - not a priority issue for the FWD. Given the cost/benefit ratio, it should be. [As this was being completed, there has been tragic news of a woman's dog dying as she desperately tried to release it from a body-gripping trap during a walk

	in Corinth, Vermont. Her emotional agony and her dog's physical agony can only be imagined as she had to carry her dying pet, still in the trap, back to her car. "Relatively uncommon?" How common does it have to be to become a priority, and for what?] • The language of A.159 on this issue directs that rules be made for, "… *the placing of traps for purposes other than nuisance trapping at a safe distance, from public trails, class 4 roads, playgrounds, parks, and other public locations where persons may reasonably be expected to recreate*." This is an issue of pet safety with the goal of reducing the chances of mainly dogs being caught in traps while recreating with their owners. • The VTA proposal was **"No traps on designated hiking or walking trail beds on any public land."** Contrary to A.159, these draft proposals, in clear violation of the legislative charge, contain no setback rules for foothold traps on most public trails or public areas in the state. The restriction of foothold traps on or with 25 ft of a trail on state-owned land excluding WMAs is arbitrary and extreme to the point of rendering any setback useless. Applying to only 3.66% of land in Vermont and only 25% of public lands, becomes almost an "attractive nuisance" by creating a false and misleading sense of security by being publicized. 25 feet is insufficient. Even a well mannered dog will take a second or two to travel 25 feet to check out a scent-baited trap – some leads extend 26 feet. (*Vermont has no leash law, though such regulations would arguably create de facto leash laws for hundreds of thousands of Vermonters for the sake of the recreation of a few hundred trappers)*. • "**No body-gripping trap set 50' from a road or trail unless it is in the water or more than 5' off the ground or in a dog-proof set (described above)."** A tenth of our proposed 500-foot setback and 5X the VTA's proposed 10' setback so there is something to dislike for everyone – a sure sign of a compromise in the offing! 100-foot setback (which is not that far; only 30 – 40 strides for a six-foot human). That might have flown – IF, the "***…road or trail…***" applies to all public trails, Class-4 roads, and public areas per A.159. As it is written, that is vague and would need to be clarified –and made to comply with A.159. • **"Department agrees to develop brochures for trail kiosks and a video link that will address the release of dogs from a foot old or body–gripping trap."** VWC agrees completely. • **"We will also recommend that this will be added to trapper education courses."** Fine. • "**Humane Dispatch"** Tabled. While the characterization of this action in the draft proposals as having been "unanimous" is technically

	correct, it ignores the written objections/reservations made by VWC immediately after the meeting in which the vote on this was taken. • **Conclusion:** VWC entered this Working Group effort with guarded hope for some positive movement toward common ground. Meeting people and talking to them had some positive effects and maybe, in the future, some progress can yet result from those personal contacts. However, regarding the specific charge of A. 159, we found a biased structure, a biased presentation, biased meeting procedures, and biased draft proposals, purportedly distilled from the WG meetings. These biaseswere exclusively in favor of recreational trapping. As first steps go, this effort resulted in uselessly small baby steps and failed to meet the charge and intent of Act 159.

COMMENTOR	COMMENT
Vermont Wildlife Coalition: Rob Mullen and Dave Kelley May 2022 response to coyote hound hunting petition	When using hounds for bear or coyote: • Hounders must be in control of their animals (if they are miles away and attack a person or pet, then a GPS or shock collar is not control). • Bait should not be used to attract hunted animals. • Reporting should be mandatory. • The hunted animal should be killed humanely (shot - not bludgeoned, stomped, or killed by the hounds). • The use of "kill dogs" should not be allowed. • Hounds should be identifiable, similar to any service dog. • There should be a limit to the number of dogs, no relaying or replacements • Impose a October – December season for all coyote hunting
Anne McKinsey, Jan 2023	• Require trappers to post signs when trapping. • Increase public awareness about trapping. • Increase penalties for violations. • Limit the use of body-gripping traps. • Post trapping regulations information on the department's website instead of on the eRegulations.com website

Next Steps

- FW Board 1st Vote (April 5th)
    - Furbearer Rule Amendments
- ICAR (May 8th)
- File with Secretary of State (May 12th)
- Public Comment Period Begins (May 17th)
- Two In-Person and One Virtual Public Hearings (June 19th to 23rd)
- Public Comments End (June 30th)
- FW Board 2nd Vote (July 19th)
- LCAR (August 19th)
- FW Board 3rd Vote (Sept. 20th or Oct. 18th)

December 13, 2022

Commissioner Christopher Herrick Christopher.Herrick@vermont.gov
Vermont Fish & Wildlife Department
1 National Life Drive
Montpelier, VT 05620

CC:

Wildlife Director Mark Scott (Mark.Scott@vermont.gov)
Program Manager David Sausville (David.Sausville@vermont.gov)
Governor Phil Scott (Sent via online contact form)

Re: Protecting Wild Canids in Vermont

Dear Commissioner Herrick,

We are writing on behalf of the Northeast Wolf Recovery Alliance, a newly created alliance of individuals and professional organizations who have been working for decades to facilitate the recovery of wolves throughout the Northeastern U.S. and eastern Canada. We recently received public records from your agency in response to a Public Records Act request regarding wolves in Vermont (see attached request dated August 28th, 2022 for reference). Thank you for the information.

We are now aware of at least two and likely three or more wolves killed in Vermont based on morphology and limited DNA data. They include a 72-pound male killed in 1998 in Glover, a 91-pound male killed in 2006 in North Troy, and possibly a 78-pound large canid (sex unknown) killed in 2013 in North Hero (see Endnotes 1, 2, and 3). In addition, a fourth possible wolf was reportedly killed by Vermont resident and hunter Steven Kimball. On August 16, 2022, John Glowa submitted a Public Records Act request regarding this animal (for details on this animal, please see this article in the footnote from VT Digger (Endnote 4). The alleged hunter acknowledged killing the animal and stated that a state biologist took samples of the animal for analysis. In her August 23rd, 2022 response to the Public Records Act request, Catherine Gjessing stated that the Department "…has no records responsive to the request."

Much of the information contained in the Department's Public Records Act in response to our request dated August 28th, 2022 has generated a number of questions and concerns. These include:

1) Does the U.S. Fish and Wildlife Service have a protocol for state agencies to respond to reports of possible live or dead wolves? If yes, what is this protocol and is Vermont following it?
2) Are there any federal standards for the DNA analysis of possible dead wolves? If yes, is Vermont adhering to these standards?

3) Did your agency report the 2013 North Hero canid to the U.S. Fish and Wildlife Service? If not, why?
4) Does the State of Vermont have a protocol for dealing with wolf sighting reports and possible dead wolves? If yes, what is that protocol?
5) Will Vermont consider resubmitting samples from the above named canids to another lab or labs capable of identifying these canids? A case in point is the 2013 North Hero canid, samples of which were sent to Northeastern Wildlife Genetics, Inc. Their report indicated that they analyzed only mitochondrial DNA and subsequently they were unable to identify the canid.
6) What is the status of implementation of Vermont's 2015 Wildlife Action Plan with regard to wolves?

At your earliest convenience, we request a meeting with your agency to discuss wolves and how Vermont can institute new policies relating to large wild canids in an effort to work towards wolf recovery in the Northeast United States. Multiple instances where hunters kill animals they claim they thought were very large coyotes, but which turn out to be wolves, suggest that one new policy should be to regulate coyote hunting with a limited season and required reporting.

The Northeast Wolf Recovery Alliance also recommends the following regulatory actions to ensure the future of wolf recovery in Vermont, including the full enforcement of legal protections for wolves provided by the federal Endangered Species Act and constructive participation in a national wolf recovery plan.

Regulatory Actions

In order to reach a middle ground between complete legal protection for all wild canids—which would provide the greatest protection for wolves—and current regulations allowing an open coyote season with no bag limit or reporting, we ask that Vermont Fish and Wildlife Department amend its regulations to institute the following protective procedures:

1. Regulate and limit the current open season on coyotes by establishing a limited hunting season from October 1st – December 31st.
2. All canids killed in Vermont should be checked-in, similar to the check-in requirement that currently exists for deer and bear. Canids taken by hunting or trapping should be tagged and possession of untagged canids should be prohibited and penalized. This requirement will provide better regulation and needed data on the numbers, sizes and characteristics of canids being taken in Vermont.
3. Checked-in canids that meet certain regulatory criteria (e.g., weight, size, canine spread, head and ear size) should be subjected to a DNA analysis to assess the genetic composition of the animal. This will provide critical data concerning the genetic makeup of large canids in Vermont and will identify wolves that are taken. The results of all DNA analyses performed on checked-in canids should be made available to the public annually

on the Department's website. The state should work with canid experts to use reputable labs that have prior experience genotyping hybridized canids in the eastern United States.

4. A two-year canid hunting moratorium should be imposed as soon as possible within the geographic area where a wolf kill has been documented. This measure is critical to protect other wolf pack members that may be present in the area. It may also deter hunters from taking large wolf-like canids in order to avoid the possibility that the take of a wolf will trigger a canid hunting moratorium.
5. Night hunting of "coyotes" should be prohibited due to the fact that hunting in nighttime conditions makes field identification of canid size exceptionally difficult. Additionally, the coyote hunting season should be shortened, and bag limits should be established. It should be recognized that eastern coyotes are already >25% wolf and this can confuse the general public in differentiating existing hybridized canids (aka eastern "coyotes") from wolves. Essentially, this similarity can create situations where people kill a small wolf (e.g., 60-65 pounds) thinking it was a large coyote.
6. Vermont's new wanton-waste law should be strictly enforced for all canids, similar to other animals, to ensure that their bodies are being used after being checked in (see #2). This requirement will ensure minimal waste of ecologically important predators, and will better adhere to the North American Model of Wildlife Management.

Wolves are federally protected under the Endangered Species Act throughout most of the lower 48 United States, including Vermont. Recently, the Center for Biological Diversity filed legal action against the U.S. Fish and Wildlife Service to seek a national wolf recovery plan; the lawsuit specifically notes the Northeastern U.S. as being one of several regions of the country where suitable wolf habitat exists and where wolves could thrive if protections are enforced and recovery measures undertaken. (See Endnote 5). In addition to the wolves we have described that were killed in Vermont in the past 25 years, there is growing evidence of wolf recolonization attempts in other states across the Northeast. Similar documented events have occurred in New York, Maine, Massachusetts, and south of the St. Lawrence River only 20 miles from the Maine/New Hampshire border. (See Endnote 6). Wolves are attempting to reestablish in the Northeast. But without state and federal actions to protect these dispersers, the killing of individual wolves will continue, and wolves will not be able to gain a toehold here, especially considering our existing canid is a coyote-wolf hybrid that can look very similar to full-bodied wolves. It is time to begin a collaborative effort to facilitate wolf recovery and its concomitant ecological and social benefits. We look forward to hearing from you in the very near future.

Sincerely,

Renee Seacor, JD
Northeast Wolf Recovery Alliance, Lead
Carnivore Conservation Advocate
Project Coyote & The Rewilding Institute

Sent on behalf of the Northeast Wolf Recovery Alliance Members:

Chris Amato
Conservation Director and Counsel
Protect the Adirondacks

Joseph S. Butera,
President & Co-founder
Northeast Ecological Recovery Society

Tom Butler,
Senior Fellow
Northeast Wilderness Trust

Jackie Bowen
Conservation Director
Adirondack Council

Brenna Galdenzi
President
Protect Our Wildlife, Vermont

Adam DeParolesa
President/Founder
Northeast Wolf Refuge

David Gibson
Managing Partner
Adirondack Wild: Friends of the Forest Preserve

John M. Glowa, Sr.,
President
The Maine Wolf Coalition, Inc.

Michelle Lute, PhD
Carnivore Conservation Director
Project Coyote

Jennifer Rosado, MS
Biological Field Technician
Maine Wolf Coalition

Christine Schadler, MS
Project Coyote Representative, Vermont & New Hampshire
Founder, New Hampshire Wildlife Coalition

Christopher Spatz
Coordinator, Wolf Species Conservation Report
2015 Vermont Wildlife Action Plan

Zee Soffron
Director
North American Wolf Foundation

Amaroq Weiss, MS, JD
Senior Wolf Advocate
Center for Biological Diversity

Jonathan Way, Ph.D.
Founder, Eastern Coyote/Coywolf Research
Author of *Coywolf: Eastern Coyote Genetics, Ecology, Management, and Politics*

ENDNOTES

Endnote 1 - In November 1998, Eric Potter shot and killed an apparent 72-pound male wolf in Glover, Vermont (Zimmerman 2005). This animal was killed approximately twenty miles southeast of where a possible wolf was killed in Vermont in October 2006 (see below, #8). An analysis of its mitochondrial DNA conducted at the University of California at Los Angeles (UCLA) as noted in an undated letter from Jennifer Leonard of UCLA to Thomas Decker of the Vermont Dept. of Fish and Wildlife concluded, "…the control region of the mitochondria was amplified and 6 sequenced…(and the)…sequence matches that of the wolf (Canis lupus lycaon) endemic to the north east of the United States, and the south east of Canada…." The DNA of this animal was later analyzed by the USFWS. In a letter dated January 16, 2002 from Dyan J. Straughan, Forensic Specialist at the National Fish and Wildlife Forensics Laboratory, to Thomas Decker, Ms. Straughan stated, "The mitochondrial DNA type of this canid is most similar to that of coyote standards, but has also been observed in grey wolves in Southeastern Canada and Northeastern United States." The actual examination results (Genetics Examination Report dated January 16, 2002) for mitochondrial DNA were as follows, " The mtDNA sequence of item LAB-2 differed significantly from reference mtDNAs of domestic dogs, red wolf (Canis rufus), grey wolf and fox, but was most similar to the mtDNA of coyote reference standards." The results for Nuclear DNA were as follows, "The STR genotype of LAB-2 was intermediate between the coyote and Alaskan malamute reference samples included in the analysis." We, the petitioners, respectfully disagree with and hereby challenge the USFWS' interpretation of its DNA data regarding this animal. We refer to a November 26, 2001 email from Dr. Paul Wilson of the Natural Resources DNA Profiling & Forensic Center at Trent University in Ontario, Canada to Walter Jakubas, wildlife biologist with the Maine Dept. of Inland Fisheries and Wildlife. In his email, Dr. Wilson wrote, "The interpretation of the data depends on what evolutionary model one uses as a framework. All of the laboratories may generate exactly the same DNA sequence (sic). A mtDNA from lycaon will be interpreted as a coyote if the facility does not consider the newly proposed evolution of the eastern timber wolf/red wolf. The USFWS may not have classified their DNA sequences with a second North American wolf species in mind. The UCLA and USFWS results are entirely consistent with each other. We can all have the same databases and standardized approaches but the interpretation will always be laboratory-dependent.” To our knowledge, the State of Vermont has never officially acknowledged that the subject canid was not a wolf and they continue to question the DNA assessment generated by the USFWS. We refer to an October 24, 2003 email from Kim Royar, wildlife biologist with the Vermont Department of Fish and Wildlife, to Michael Amaral, a USFWS biologist in Concord, New Hampshire. Ms. Royar writes, “As far as we are concerned the genetic background of this animal is still unclear. We did send samples to 3 labs: UCLA, Ashland (USFWS), and Ontario (Wilson). UCLA extracted mitochondrial DNA and determined that the sequence matched that of “Canis lupus lycaon”. The mitochondrial results from Ashland suggested coyote but they only used 1 coyote reference and I’m not sure if any of their wolf references were from Canis lycaon (or from eastern Canada). Their nuclear DNA test suggested coyote and Alaskan malamute. I did review these results with a geneticist from UVM who felt their reference sizes were pretty low and suggested I ask for log likelihood scores…. They were not able to supply me with this information. I have yet to hear from Wilson.” “Anyway, you can see why we are still holding off regarding the labeling of this animal.” We, the petitioners, encourage additional DNA analyses of this animal and we maintain that the animal was a wolf, consistent with the aforementioned legal precedent for wolves in the Western Great Lakes DPS and known morphometric ranges for wolves.

Endnote 2 - On or about October 1, 2006, Charles L. Hammond of Newport Center, Vermont shot and killed a 91-pound male wolf in North Troy, Vermont. The animal was killed within twenty miles of a wolf pack that was being monitored by “wildlife workers” in Quebec, just north of the Vermont border (Harrigan 2005). We know of no evidence that the Vermont Fish & Wildlife Department, the USFWS, or the government of Quebec took actions to protect these animals. According to the Veterinary Medical Examination Report dated June 29, 2007, “The large canid carcass is a gray wolf according to both morphological and genetic studies.” Furthermore, according to a September 18, 2007 email from Dr. Roland Kays of the New York State Museum, this animal had “…the exact same mtDNA sequence…” as the the wolf killed by Russell Lawrence in 2001. The fact that both animals had the same mtDNA sequence may be evidence of a breeding population of wolves south of the St. Lawrence River. On October 9, 2007, the Vermont Agency of Natural Resources issued a press release which falsely claimed that, “The lab concluded that this animal was of captive origin.” In fact, the National Fish and Wildlife Forensics Laboratory concluded in its June 27, 2007, Genetics Examination Report that this “…male gray wolf is most likely of domestic origin.” A cover letter from the laboratory dated June 29, 2007, stated that, “…the animal is a gray wolf but perhaps from a domesticated origin.” The Vermont press release made no mention of the mtDNA match of the Vermont wolf with the 2001 New York wolf. It also made no mention of the October 5, 2006, email from Canadian Field Research Scientist Brent Patterson of Ontario’s Trent University that the face of the animal had “clear features of eastern wolves (but the over-all size and mass more typical of gray wolves).” The June 27, 2007 Genetics Examination Report from the Service stated that the mtDNA sequence was “…identical to the mtDNA of gray wolf reference standards found…in the western Great Lakes States DPS….” It also stated that the “…STR genotype…is most similar to gray wolf reference standards from the northern Rocky Mountain DPS” and that the “…Y-STR haplotype…is similar to that observed among gray wolves from…the Western Great Lakes DPS…(h)owever, the…haplotype is unique and has not been observed in our database.” We question and challenge any opinion/conclusion that this animal was “most likely of domestic origin" given its morphology, DNA, and diet (whitetailed deer) and we disagree with this opinion, given the animal's matrilineal relationship to the wolf killed in New York in 2001. As noted in the Service's Report of Investigation, INV #: 2006505308 Report #3, "If the animal is determined to be a wolf it seems unlikely under the circumstances that federal prosecution would be sought pursuant to United States v. McKittrick. The subject indicated (he) believed the animal to be a coyote at the time (he) was pursuing it." This is precisely why the commerce or taking of coyotes and wolf/coyote hybrids needs to be regulated due to their similarity of appearance to wolves, especially given the documented large body size of eastern coyotes (Way and Proietto 2005, Way 2007). Simply saying that you "thought the animal was a coyote" serves as a blank check when it comes to killing wolves. Mr. Hammond was subsequently not prosecuted for killing the animal. The McKittrick Instruction itself needs to be re-visited. It mistakenly requires that the killer of an endangered species must have known its biological identity before prosecution can take place.

Endnote 3 – In the Fall of 2013, a 78-pound canid was killed in North Hero, Vermont by Ray Beavolin. The Vermont Fish and Wildlife Department sent tissue samples of this animal to Northeastern Wildlife Genetics, Inc. of Fairfax, Vermont. Only the animal's mitochondrial DNA was analyzed. Further analysis is required to determine the identity of the animal. Morphologically eastern coyotes weigh between 30-50lbs and 78-pound coyote is highly unlikely. (See attachment of report from Northeastern Wildlife Genetics, Inc.)

Endnote 4 - https://vtdigger.org/2022/07/26/dna-test-identifies-wolf-in-new-york-raises-questions-about-presence-of-population-in-northeast/

Endnote 5 - https://www.biologicaldiversity.org/campaigns/gray_wolves/pdfs/Wolf-National-Recovery-Plan-Status-Review-Complaint-11-28-2022.pdf

Endnote 6 - ESApetition2009final.pdf (easterncoyoteresearch.com)

We are seeking all agency records, from January 1, 2000, to the present date of this request, within the agency and with any party or entity external to the agency regarding and relating to:

(1) any sightings or killings of canid species including eastern coyotes, wolves, and hybrids that were reported to the Vermont Department of Fish and Wildlife (VT DFW) because of large size, wolf like appearance, or thought or believed to be a wolf;
(2) any canid genetic samples taken by VT DFW as a result of these reports or agency field surveys;
(3) VT DFW's assessment of canid genetics within the state of Vermont, including but not limited to the hybridization of eastern coyote populations with wolves
(4) any VT DFW scientific analyses, field studies, and modeling of potential population recovery regarding wolf species.

"Records" refers to, but is not limited to, documents, correspondence (including, but not limited to, inter and/or intra-agency correspondence as well as correspondence with entities or individuals outside the state government), emails, letters, notes, recordings, telephone records, voicemails, telephone notes, telephone logs, text messages, chat messages, minutes, memoranda, comments, files, presentations, consultations, biological opinions, assessments, species assessments, DNA analysis, genetic analysis, forensic analysis, evaluations, schedules, papers published and/or unpublished, reports, studies, photographs and other images, data (including raw data, GPS or GIS data, UTM, LiDAR, etc.), maps, and/or all other responsive records, in draft or final form.

Please provide all records in a readily accessible, electronic .pdf format. "Readily accessible" means text-searchable and OCR-formatted. We hereby request that you produce all records in an electronic format and in their native file formats. Additionally, please provide the records in a load-ready format with a CSV file index or Excel spreadsheet. If you produce files in .PDF format, then please omit any "portfolios" or "embedded files." Portfolios and embedded files within files are not readily accessible. Please do not provide the records in a single, or "batched," .PDF file. We appreciate the inclusion of an index.

To the extent any of the requests are deemed burdensome, vague, or ambiguous, please feel free to contact me, or have your attorney contact me, and I will be happy to discuss any such issues in hopes of facilitating these requests. Thank you for your prompt consideration and attention to this request. Please contact me if you need to discuss this request further.

Fee Waiver Requested. Project Coyote is a non-profit 501(c)(3) organization that disseminates and uses information to advance the interests of animals through science, education, and advocacy. Disclosure of the requested information is in the public interest and is not being sought for commercial purposes. In the event that the fee waiver request is denied, please inform me if the cost for searching or copying these records will exceed $50 before incurring such costs; otherwise please forward an invoice to me for payment of the actual costs and we will pay it promptly.

If you deny any or all of this request, please cite each specific exemption you rely upon to justify the refusal to release the information and notify me of the appeal procedures available to Project Coyote under the law.

To the extent any of the requests are deemed burdensome, vague, or ambiguous, please feel free to contact me, or have your attorney contact me, and I will be happy to discuss any such issues in hopes of facilitating these requests.

Thank you for your prompt consideration and attention to this request. Please contact me if you need to discuss this request further.

Northeastern Wildlife Genetics, Inc.

C. William Kilpatrick, Ph.D
763 Goose Pond Rd.
Fairfax, VT 05454

Genetic Analysis Report

Tissue (skin) from a large canid (78 lbs) shot in North Hero, Vermont by Ray Beavolin in the fall of 2013 was provided to the lab by Chris Bernier (VFWD) and was catalogued as sample NEWG-31. DNA (NEWG-31) was extracted from a small portion of the tissue sample using a Gentra DNA extraction kit and produced a yield of 44.98 ng/ul. The first part of the cytochrome *b* gene was amplified (78-F13) with primers L-14115 and H-14541 and sequenced with the forward primer (L-14115).

Comparison of the cytochrome *b* sequence (401 bases) amplified (78-F13) from DNA (NEWG-31) with sequences of several species of Canids, including the North Troy canid (NEWG-12) is shown below. Note: Blast search initially identified unknown (NEWG-31) as either a sequence from a coyote (*Canis latrans*) or a small Canadian wolf (*Canis lycaon*). The Blast search resulted in matches (100% identical) of the cytochrome *b* sequence from NEWG-31 with 5 sequences from coyotes available in GenBank (KF662096, DQ480509, DQ480510, DQ480511, & EU789789) provided by Bjornerfeldt et al. (2006), Pang et al. (2009) and Thalmann et al. (2013) and a single sequence reported to be from a small Canadian wolf (JF342907) from an unpublished submission. Aligned sequences below show mismatches highlighted in red and matches at those sites highlighted in blue:

Conclusion: The cytochrome b sequence amplified (78-F13) from the DNA (NEWG-31) extracted from the skin collected from a 78 pound canid shot in North Hero produced a 100% match with reference sequences from five coyotes (*C. latrans*) obtained from GenBank and four coyotes from Vermont (unpublished data). In addition, this sequence provided a 100% match with a sequence reported to be from a small Canadian wolf (C. lycaon) from GenBank (JF342097) from an unpublished submission. At present this is the

Cytochrome *b*

```
                                                                      50
Dog            atgaccaaca ttcgaaaaac [illegible]cacccacta gccaaaattg ttaataactc
Wolf-1         atgaccaaca ttcgaaaaac [illegible]cacccacta gccaaaattg ttaataactc
Wolf-2         nngaccaaca ttcgaaaaac [illegible]cacccacta gccaaaattg ttaataactc
NEWG-12        ATGACCAACA TTCGAAAAAÇ [illegible]CACCCACTA GCCAAAATTG TTAATAACTC
N_Hero                  A TTCGNAAAAC TCACCCACTA GCCAAAATTG TTAATAACTC
C_rufus        atgaccaaca ttcgaaaaac [illegible]cacccacta gccaaaattg ttaataactc
C_rufus        atgaccaaca ttcgaaaaac tcacccacta gccaaaattg ttaataactc
C_lycaon       atgaccaaca ttcgaaaaac tcacccacta gccaaaattg tcaataactc
C_latrans_1    atgaccaaca ttcgaaaaac tcacccacta gccaaaattg tcaataactc
CanVT-5        atgaccaaca ttcgaaaaac tcacccacta gccaaaattg ttaataactc
CanVT-4        atgaccaaca ttcgaaaaac tcacccacta gccaaaattg tcaataactc
CanVT-3        atgaccatca ttcgaaaaac tcacccactn gccaaaattg tcaataactc
CanVT-2        atgaccaaca ttcgaaaaac tcacccacta gccaaaattg ttaataactc
C_latrans_2    atgaccaaca ttcgaaaaac tcacccacta g[illegible]caaaattg ttaataactc

                                                                     100
Dog            attcattgac ctcccagcgc c[illegible]tctaacat ctctgcttga tggaa[illegible]ttcg
Wolf-1         attcattgac ctcccagcgc c[illegible]tctaacat ctctgcttga tggaa[illegible]ttcg
Wolf-2         attcattgac ctcccagcgc c[illegible]tctaacat ctctgcttga tggaa[illegible]ttcg
NEWG-12        ATTCATTGAC CTCCCAGCGC C[illegible]TCTAACAT CTCTGCTTGA TGGAA[illegible]TTCG
N_Hero         ATTCATTGAC CTCCCAGCGC CATCTAACAT CTCTGCTTGA TGGAATTTCG
C_rufus        attcattgac ctcccagcgc c[illegible]tctaacat ctctgcttga tggaa[illegible]ttcg
C_rufus        attcattgac ctcccagcgc catctaacat ctctgcttga tggaatttcg
C_lycaon       attcattgac ctcccagcgc catctaacat ctctgcttga tggaatttcg
C_latrans_1    attcattgac ctcccagcgc catctaacat ctctgcttga tggaatttcg
CanVT-5        attcattgac ctcccagcgc catctaacat ctctgcttga tggaatttcg
CanVT-4        attcattgac ctcccagcgc catctaacat ctctgcttga tggaatttcg
CanVT-3        attcattgac ctcccagcgc catctaacat ctctgcttga tggaatttcg
CanVT-2        attcattgac ctcccagcgc catctaacat ctctgcttga tggaatttcg
C_latrans_2    attcattgac ctcccagcgc catc[illegible]aacat ctctgcttga tggaatttcg

                                                                     150
Dog            gatccttact aggagtatgc [illegible]tgattctac agattctaac aggtttatt[illegible]
Wolf-1         gatccttact aggagtatgc [illegible]tgattctac agattctaac aggtttatt[illegible]
Wolf-2         gatccttact aggagtatgc [illegible]tgattctac agattctaac aggtttatt[illegible]
NEWG-12        GATCCTTACT AGGAGTATGC [illegible]TGATTCTAC AGATTCTAAC AGGTTTATT[illegible]
N_Hero         GATCCTTGCT AGGAGTATGC CTGATTCTAC AGATTCTAAC AGGTTTATTT
C_rufus        gatccttact aggagtatgc [illegible]tgattctac agattctaac aggtttatt[illegible]
C_rufus        gatccttgct aggagtatgc ctgattctac agattctaac aggtttattt
C_lycaon       gatccttgct aggagtatgc ctgattctac agattctaac aggtttattt
C_latrans_1    gatccttgct aggagtatgc ctgattctac agattctaac aggtttattt
CanVT-5        gatccttgct aggagtatgc ctgattctac agattctaac aggtttattt
CanVT-4        gatccttgct aggagtatgc ctgattctac agattctaac aggtttattt
CanVT-3        gatccttgct aggagtatgc ctgattctac agattctaac aggtttattt
CanVT-2        gatccttgct aggagtatgc ctgattctac agattctaac aggtttattt
C_latrans_2    gatccttact aggagtatgc ctgattctac agattctaac aggtttattt

                                                                     200
Dog            ttagctatgc actatacatc ggacacagcc acagcttttt catcagtcac
Wolf-1         ttagctatgc actatacatc ggacacagcc acagcttttt catcagtcac
Wolf-2         ttagctatgc actatacatc ggacacagcc acagcttttt catcagtcac
NEWG-12        TTAGCTATGC ACTATACATC GGACACAGCC ACAGCTTTTT CATCAGTCAC
```

```
N_Hero         TTAGCTATAC ACTATACATC GGACACAGCC ACAGCTTTTT CATCAGTCAC
C rufus        ttagctatgc actatacatc ggacacagcc acagcttttt catcagtcac
C rufus        ttagctatac actatacatc ggacacagcc acagcttttt catcagtcac
C lycaon       ttagctatac actatacatc ggacacagcc acagcttttt catcagtcac
C latrans 1    ttagctatac actatacatc ggacacagcc acagcttttt catcagtcac
CanVT-5        ttagctatac actatacatc ggacacagcc acagcttttt catcagtcac
CanVT-4        ttagctatac actatacatc ggacacagcc acagcttttt catcagtcac
CanVT-3        ttagctatac actatacatc ggacacagcc acagcttttt catcagtcac
CanVT-2        ttagctatac actatacatc ggacacagcc acagcttttt catcagtcac
Coyote         ttagctatac actatacatc ggacacagcc acagcttttt catcagtcac

                                                                 250
Dog            ccacatctg[redacted] cgagacgtta actacggctg aattatccgc ta[redacted]at[redacted]ca[redacted]g
Wolf-1         ccacatctg[redacted] cgagacgtta actacggctg aattatccgc ta[redacted]at[redacted]ca[redacted]g
Wolf-2         ccacatctg[redacted] cgagacgtta actacggctg aattatccgc ta[redacted]at[redacted]ca[redacted]g
NEWG-12        CCACATCTG[redacted] CGAGACGTTA ACTACGGCTG AATTATCCGC TA[redacted]AT[redacted]CA[redacted]G
N_Hero         CCACATCTGT CGAGACGTTA ACTACGGCTG AATTATCCGC TACATACATG
C rufus        ccacatctg[redacted] cgagacgtta actacggctg aa
C rufus        ccacatctgt cgagacgtta actacggctg aa
C lycaon       ccacatctgt cgagacgtta actacggctg aattatccgc tacatacatg
C latrans 1    ccacatctgt cgagacgtta actacggctg aattatccgc tacatacatg
CanVT-5        ccacatctgt cgagacgtta actacggctg aattatccgc tacatacatg
CanVT-4        ccacatctgt cgagacgtta actacggctg aattatccgc tacatacatg
CanVT-3        ccacatctgt cgagacgtta actacggctg aattatccgc tacatacatg
CanVT-2        ccacatctgt cgagacgtta actacggctg aattatccgc tacatacatg
C latrans 2    ccacatctgt cgagacgtta actacggctg aattatccgc tacatacatg

                                                                 300
Dog            caaatggcgc ttccatattc tttat[redacted]tg[redacted]c tattc[redacted]taca tgt[redacted]ggacga
Wolf-1         caaatggcgc ttccatattc tttat[redacted]tg[redacted]c tattc[redacted]taca tgt[redacted]ggacga
Wolf-2         caaatggcgc ttccatattc tttat[redacted]tg[redacted]c tattcataca tgt[redacted]ggacga
NEWG-12        CAAATGGCGC TTCCATATTC TTTAT[redacted]TG[redacted]C TATTC[redacted]TACA TGT[redacted]GGACGA
N_Hero         CAAATGGCGC TTCCATATTC TTTATTTGTC TGTTCATACA TGTGGACGA
C lycaon       caaatggcgc ttccatattc tttatttgtc tgttcataca tgtgggacga
C latrans 1    caaatggcgc ttccatattc tttatttgtc tgttcataca tgtgggacga
CanVT-5        caaatggcgc ttccatattc tttatttgtc tgttcataca tgtgggacga
CanVT-4        caaatggcgc ttccatattc tttatttgtc tgttcataca tgtgggacga
CanVT-3        caaatggcgc ttccatattc tttatttgtc tgttcataca tgtgggacga
CanVT-2        caaatggcgc ttccatattc tttatttgtc tgttcataca tgtgggacga
C latrans 2    caaatggcgc ttccatattc tttatttgtc tgttcataca tgtgggacga

                                                                 350
Dog            ggcctata[redacted]t acggatccta tgtattcata gaaacatgaa acattggaat
Wolf-1         ggcctata[redacted]t acggatccta tgtattcata gaaacatgaa acattggaat
Wolf-2         ggcctata[redacted]t acggatccta tgtattcata gaaacatgaa acattggaat
NEWG-12        GGCCTATA[redacted]T ACGGATCCTA TGTATTCATA GAAACATGAA ACATTGGAAT
N_Hero         GGCCTATACT ACGGATCCTA TGTATTCATA GAAACATGAA ACATTGGAAT
C lycaon       ggcctatact acggatccta tgtattcata gaaacatgaa acattggaat
C latrans 1    ggcctatact acggatccta tgtattcata gaaacatgaa acattggaat
CanVT-5        ggcctatact acggatccta tgtattcata gaaacatgaa acattggaat
CanVT-4        ggcctatact acggatccta tgtattcata gaaacatgaa acattggaat
CanVT-3        ggcctatact acggatccta tgtattcata gaaacatgaa acattggaat
CanVT-2        ggcctatact acggatccta tgtattcata gaaacatgaa acattggaat
C latrans 2    ggcttatact acggatccta tgtattcata gaaacatgaa acattggaat

                                                                 400
```

Dog	tgtacta[redacted]ta ttcgcaacca tagccacagc attcat[redacted]ggc tatgtact[redacted]cc
Wolf-1	tgtacta[redacted]ta ttcgcaacca tagccacagc attcat[redacted]ggc tatgtact[redacted]cc
Wolf-2	tgtacta[redacted]ta ttcgcaacca tagccacagc attcat[redacted]ggc tatgtannnnn
NEWG-12	TGTACTA[redacted]TA TTCGCAACCA TAGCCACAGC ATTCAT[redacted]GGC TATGTACT[redacted]CC
N Hero	TGCACTACTA TTCGCAACCA TAGCCACAGC ATTCATAGGC TATGTACTGCC
C lycaon	tgcactacta ttcgcaacca tagccacagc attcataggc tatgtactgcc
C latrans 1	tgcactacta ttcgcaacca tagccacagc attcataggc tatgtactgc
CanVT-5	tgcactacta ttcgcaacca tagccacagc attcataggc tatgtactgcc
CanVT-4	tgcactacta ttcgcaacca tagccacagc attcataggc tatgtactgcc
CanVT-3	tgcactacta ttcgcaacca tagccacagc attcataggc tatgtactgcc
CanVT-2	tgcactacta ttcgcaacca tagccacagc attcataggc tatgtactgcc
C latrans 2	tgtactacta ttcgcaacca tagccacagc attcataggc tatgtaca[redacted]ac

Reference Material (Cytochrome *b*):

Canis familiaris (Dog)	GenBank X94920
Canis lupus (Wolf-1)	GenBank DQ480505 (Old World)
Canis lupus (Wolf-2)	GenBank AF028141 (Canada)[1]
Canis rufus-1 (Red wolf)	GenBank U47042 (Pre-1940)[2]
Canis rufus-2 (Red wolf)	GenBank U47047
Canis lycaon (small Canadian Wolf)	GenBank JF342907 (unpub.)[3]
Canis latrans -1 (Coyote)	GenBank KF661096 (USA)[4]
Canis latrans -2 (Coyote)	GenBank AF028140 (396 bp)[1]
CanVT-2 through CanVT-5	Vermont Coyotes (unpub. data)

1. Wayne et al. (1997)
2. Roy et al. (1996) Cru-1 clusters with *C. lupus* & Cru-2 clusters with *C. latrans*
3. D. L. Imes and N. B. Sacks
4. Thalmann et al. (2013)

only sequence available from a small Canadian wolf and it is not clear that northeastern coyotes and small Canadian wolves can be differentiated on the basis of this genetic marker. It is clear, however, that the sequence of the large canid shot in North Hero is from a canid from the coyote-red wolf-small Canadian wolf lineage and not from the traditional wolf lineage. The cytochrome *b* sequence examined from this large canid shows about a 4% (16/401) sequence divergence from the taxa of the wolf lineage (*C. lupus* and *C. familiaris*) and only a 0% - 2.6% (6/232) from taxa of the coyote lineage (*C. latrans*, *C.rufus*, and *C. lycaon*). This cytochrome *b* sequence is the sequence commonly found in coyotes sampled from Vermont and at this point there is no evidence to indicate that this large canid represents anything other than a large northeastern coyote.

I have compared the entire mitochondrial genomes (16,500 bases) taken from GenBank among a couple of coyotes (*C. latrans*) and a small Canadian wolf (*C. lycaon*) and there appears to be several difference in a couple of mtDNA genes that might be useful in differentiating these two taxa. Future work could include comparison of sequences from one of these genes (ND2) to determine it utility in differentiating these two taxa.

C. William Kilpatrick, Director
Northeastern Wildlife Genetics, Inc.

Literature cited:

BJORNERFRLDT, S., M. T. WEBSTER, AND C. VILA. 2006. Relaxation of selective constraint on dog mitochondrial DNA following domestication. Genome Research 16:990-994.

PANG, J-F., C. KLUETSCH, X-J. ZOU, ET AL. 2009. mtDNA data indicate a single origin for dogs south of Yangtze River, less than 16,300 years ago, from numerous wolves. Molecular Biology and Evolution 26:2849-2864.

ROY, M. S., E. GEFFEN, D. SMITH, AND R. K. WAYNE. 1996. Molecular genetics of pre-1940 red wolves. Conservation Biology 10:1413-1424.

THALMANN, O., B. SHAPIRO, P. CUI, ET AL. 2013. Complete mitochondrial genomes of ancient canids suggest a European origin of domestic dogs. Science 342:871-874.

WAYNE, R. K., E. GEFFEN, D. J. GIRMAN, K. P. KOEPFLI, L. M. LAU, AND C. R. MARSHALL. 1997. Molecular systematics of the Canidae. Systematic Biology 46:622-653.

May 16, 2022

Re: Trapping rule changes per S.201

Vermont Wildlife Coalition

"Ensuring a public voice in decisions affecting Vermont's wildlife"

To Chairman Beibel, members of the Vermont Fish & Wildlife Board, and Commissioner Herrick:

VWC did not support or oppose this bill. Our general support of hunting does not extend to trapping in Vermont because trapping is almost unavoidably cruel and, in our view, has little if any ecological or societal benefit here. While the AFWA's BMPs and efforts coming out of this new law to make trapping *more* humane may make marginal improvements in animal welfare, it is hard to imagine how body-gripping, drowning, and foothold traps can ever be made simply humane as directed in Section 1 a. (2): "*criteria for adjusting or maintaining trapping devices so that they operate correctly and humanely*;"

Obviously, eliminating all cruelty is not possible, life is commonly cruel, and trapping can have specific and narrow applications in conservation, research, and public safety. However, we cannot countenance the cruelties of trapping when, as is often the case in Vermont, it amounts to little more than a hobby, thin rationalizations of how it serves conservation etc. notwithstanding.

From VWC's perspective, the goal of making trapping humane is well-intentioned but most likely doomed to frustration (*see attached 2, pages 8 -14, times to unconsciousness for various species in different traps, none of which even approach humane*). Others doubtlessly have other objections to S.201. However, all varied reservations aside, S.201 is what we all must work with. To that end, in the spirit of more humane treatment, VWC respectfully asks that you consider:

1. **Eliminating drowning sets.** Possibly the most evidence-backed, proven <u>inhumane</u> death is drowning. Ironic since drowning has often been (and still is) used as "euthanasia," but the common and rationalizing myth of a peaceful death by carbon dioxide narcosis was thoroughly debunked in Ludders et. al. 1999. In brief, the CO^2 concentration in the blood does not rise to the level necessary for narcosis until well after the animals (beavers, dogs, mink, otter etc.) become unconscious from hypoxia (oxygen depletion) – after a few to many minutes of suffering. As the authors wrote in their summary,

   "*… the concept of euthanasia is independent of traditions and convenience … any technique that requires minutes rather than seconds to produce death can not be considered euthanasia*." Nor would VWC contend, humane.

2. **Restore the exclusion of traps within 10 feet of beaver lodge entrances.** Prior to 2018, this exclusion was sometimes cited as an example of trappers' concern and respect for beavers. It has also been contended that the adult, parent beavers were at less risk from traps than inexperienced juveniles. With those contentions in mind, it was surprising to

read not only that the rule had been abolished, but the celebratory tone to the announcement from the FWD project leader in the 2018 Furbearers Newsletter. Given the previously touted merits of the exclusion and that a conibear 330 in the entrance of a beaver lodge puts all residents of the lodge at high risk, regardless of their age or experience (rather like shooting fish in a barrel), we ask you to restore the exclusion of traps within 10 feet of a lodge entrance.

3. **Return the end of the otter trapping season to February 28.** None of the rationales for the season extension have borne out. The principal reason given in 2017 by the then Commissioner was animal welfare. It was contended that offsetting the triggers on Conibear 330s to lessen the chances of otters being caught during March while the beaver season continued past the end of the otter season, caused the traps to sometimes fire late and not catch beavers properly, causing them to drown. It was claimed by the Commissioner at the time (not Commissioner Herrick), that properly caught, beavers died of carbon dioxide narcosis. This claim has been debunked for over 20 years. They nearly all drown or asphyxiate. The Department's estimate of the number of extra otters that would be killed in March was off by an order of magnitude. These points were not addressed when we petitioned the Board on this same issue last year. Instead, our concerns were dismissed with the assurance that the otter population was not threatened by the extended season. That the original stated reasons for the season extension turned out to not be true were treated as irrelevant.

Thank you,

Robert Mullen

Board Chair, Vermont Wildlife Coalition

Attached:

1. Ludders et. al. 1999
2. IAFWA research summary on trap performance for developing BMPs to maximize animal welfare.

Drowning is not euthanasia

John W. Ludders, Robert H. Schmidt, F. Joshua Dein, and Patrice N. Klein

Historically, there has been considerable discussion within the nuisance wildlife control and trapping communities as to whether drowning is a humane method for killing animals. The issue received more attention in 1993, when the American Veterinary Medical Association's Panel on Euthanasia reaffirmed its position that drowning is an unacceptable method (Andrews et al. 1993). For this article, we make a distinction between euthanasia, a "good death" that occurs without pain or distress (Andrews et al. 1993), and death due to killing by other methods. The central issue in this debate is whether drowning animals are rendered unconscious by great levels of carbon dioxide (CO_2, carbon-dioxide-induced narcosis) early in the drowning process and thus are insensitive to the distress and pain associated with drowning.

Proponents of drowning cite an article by Gilbert and Gofton (1982) in which the authors stated that drowning animals die from carbon-dioxide-induced narcosis. However, Gilbert and Gofton (1982) did not report any information on levels of carbon dioxide in blood, which is needed before a determination can be made about the acceptability of drowning as a method of euthanasia. We wish to introduce and clarify information concerning effects of carbon dioxide that have been absent in the debate on drowning.

In their laboratory investigations, Gilbert and Gofton (1982) determined time to death by drowning in mink (*Mustela vison*), muskrat (*Ondatra zibethica*), and beaver (*Castor canadensis*). Readings of the electrical activity of the brain (electroencephalograph, EEG) and of the heart (electrocardiograph, ECG) were recorded from each animal during drowning, and time of death was taken to be the moment when electrical activity of the brain ceased (EEG signal became flat). On average, the EEG signal became flat in mink after 4 minutes, 37 seconds; in muskrats after 4 minutes, 3 seconds; and in beaver after 9 minutes, 11 seconds. However, neither arterial nor venous blood samples were collected before, during, or after the animals drowned, so the partial pressures of carbon dioxide (PCO_2) or oxygen (PO_2) in blood from these animals were not measured. The authors stated that "[d]eath by CO_2 induced narcosis (submersion asphyxia) was evident in beaver, about 50% of muskrats, but 'wet' drowning (defined below) occurred in mink" (Gilbert and Gofton 1982:835). A review article written by Timperman (1972) was referenced to corroborate their conclusion. Timperman's (1972) paper discussed the forensic diagnosis of drowning through identification of diatoms in the lungs of victims. The author mentioned that carbon-dioxide-induced narcosis could be a possible cause of death during drowning, but he also acknowledged that death could be from anoxia. However, he did not provide substantiating data, such as blood gas analyses, to support either factor as the cause of death by drowning.

Proponents of drowning make a distinction between "wet" or "dry" drowning, the former occurring when water enters the lungs and the latter when the lungs remain relatively dry. To some, "dry" drowning implies that because the animal does not inhale water, then death is from CO_2-induced narcosis, although this is most likely incorrect. According to reports of incidents involving human drownings, 2 events may occur following submersion: 1) during the ensuing panic and struggle, water is swallowed and aspiration occurs in

Address for John W. Ludders: College of Veterinary Medicine, Cornell University, Ithaca, NY 14853, USA. Address for Robert H. Schmidt: Department of Fisheries and Wildlife, Utah State University, Logan UT 84322-5210, USA. Address for F. Joshua Dein: USGS-BRD National Wildlife Health Center, Madison, WI 53711, USA. Address for Patrice N. Klein: Humane Society of the United States, 700 Professional Drive, Gaithersburg, MD 20879, USA.

Key words: animals, carbon dioxide, drowning, euthanasia, killing

85% of the victims, which leads to "wet" drowning, i.e., the lungs fill with water (Newman and Stewart 1995) and hypoxia and cardiac arrest occur rapidly, the latter probably because the vagal nerve, in response to water contacting the mucous membranes of the larynx or trachea, causes a reflex slowing and arrest of the heart (Suzuki 1996); or 2) during drowning, the act of swallowing water may lead to laryngospasm (an involuntary closure of the glottis or entrance to the airway), thus sealing the airway and preventing water from being aspirated into the lungs (Yagil et al. 1983, Suzuki 1996). Approximately 15% of human drowning victims experience "dry" drowning, in which the lungs remain relatively free of water (Newman and Stewart 1995). Hypoxia and cardiac arrest develop, but often this process is protracted compared to the victims experiencing "wet" drowning. In fact, current research strongly suggests that death occurs more rapidly when water is inhaled because it initiates a reflex vagal inhibition of the heart (Suzuki 1996). Thus, a longer period of consciousness may be associated with "dry" drowning than with "wet" drowning. The accumulated evidence (as discussed below) indicates that the cause of death during drowning is hypoxia and anoxia, not CO_2-induced narcosis.

Stedman's Medical Dictionary (1995:1176) defines narcosis as a "[g]eneral and nonspecific reversible depression of neuronal excitability, produced by a number of physical and chemical agents, usually resulting in stupor rather than in anesthesia." Hypercarbia, or an excess of carbon dioxide (CO_2) in blood, can cause narcosis. In animals, CO_2 is a normal byproduct of oxygen (O_2) metabolism, and it is eliminated from the body through the lungs and the process of pulmonary ventilation (Guyton 1991). The relationship of CO_2 production to O_2 utilization is expressed as the respiratory exchange ratio, generally accepted to be around 0.8; it indicates that in general, less CO_2 is produced for a given amount of metabolized O_2 (Guyton 1991).

Several studies, involving numerous animal species in which blood gases were measured, indicate that carbon-dioxide narcosis does not occur until the partial pressure of carbon dioxide in arterial blood ($PaCO_2$) exceeds 95 millimeters of mercury (mm Hg) and true anesthesia occurs only when $PaCO_2$ exceeds 200 mm Hg. For example, laboratory rats exposed to 100% CO_2 at various chamber fill rates started to show evidence of CO_2 narcosis (they became uncoordinated) after $PaCO_2$ exceeded 123 mm Hg (Hewett et al. 1993). The same rats became immobile only after $PaCO_2$ exceeded 212 mm Hg, and they finally lost the pedal reflex to painful stimulation (toe pinch) after $PaCO_2$ exceeded 332 mm Hg (Hewett et al. 1993).

A study of the narcotic properties of carbon dioxide in dogs sheds more light on the issue of CO_2-induced narcosis (Eisele et al. 1967). In this study, the narcotic and anesthetic properties of CO_2 were determined in 2 ways: 1) by determining the MAC (the minimum alveolar concentration of an inhalant anesthetic that prevents purposeful movement by an animal exposed to a painful stimulus) for the inhalant anesthetic halothane (2-bromo-2-chloro-1,1,1-trifluoroethane), and then, in a step-wise manner, replacing the halothane with CO_2 while maintaining a constant plane of anesthesia; and 2) by administering only CO_2 to dogs and recording the $PaCO_2$ when each dog was anesthetized and unresponsive to a painful stimulus. The results indicated that increasing levels of $PaCO_2$ above 95 mm Hg were increasingly narcotic. At a $PaCO_2$ of 95 mm Hg the narcotic effect of CO_2 was minimal as it reduced the MAC of halothane by only 0.08%. In this study, anesthesia was produced at an average $PaCO_2$ of 222 mm Hg.

Drowning animals, of course, are not breathing 100% CO_2, let alone air; in fact, they are not breathing at all. Because the drowning animal cannot breathe, it uses all of the O_2 available in its blood, and CO_2 accumulates because of oxygen metabolism. As previously noted, the respiratory exchange ratio indicates that the rate of O_2 utilization is greater than the rate of CO_2 production (Guyton 1991), and this fact is demonstrated by numerous animal studies. In dogs that were drowned with either cold salt water (CSW) or cold fresh water (CFW), $PaCO_2$ increased significantly, but after 10 minutes of immersion it never exceeded 64.8±4.9 mm Hg in either group (Conn et al. 1995). However, PaO_2 significantly decreased in both groups; after 4 minutes of immersion, PaO_2 was 16.4±1.5 mm Hg in the CFW group and 18.8±21.6 mm Hg in the CSW group, and after 10 minutes of immersion it was 9.6±3.8 and 8.8±1.9 in the CFW and CSW groups, respectively. Similar results were found in another study involving anesthetized, intubated dogs that inhaled a fixed quantity (20 ml/kg) of fresh water (Rai et al. 1980). Prior to inhaling water, the PaO_2 and $PaCO_2$ were 100 mm Hg and 35 mm Hg, respectively. Five minutes after inhaling water, the PaO_2 and $PaCO_2$ were 35 mm Hg and 52 mm Hg, respectively. During 40 minutes of observation, $PaCO_2$ never exceeded 60±0.5 mm Hg (mean ± SEM) and the PaO_2 did not exceed 47±5.5 mm Hg. The results from these 2 studies show that $PaCO_2$ levels were well below those necessary to induce CO_2 narcosis and that the dogs were hypoxemic (inadequate oxygen in blood).

In a study that measured cerebral blood flow and arterial blood gases in ducks (*Anas platyrhynchos*) held under water for more than 4 minutes, the average PaO_2 was 52 mm Hg (minimum recorded was 37 mm Hg) at 4.61 minutes, while the average $PaCO_2$ was 51 mm Hg (Stephenson et al. 1994). These numbers indicate that the ducks were hypoxemic and hypercarbic and that $PaCO_2$ was not at levels known to produce narcosis. However, PaO_2 had decreased to hypoxemic levels, and had the ducks not been killed by decapitation, the PaO_2 would have continued to decrease to levels incompatible with life, i.e., the ducks would have died from anoxic asphyxiation.

A study in which blood gases were measured in beaver during submersion sheds more light on the drowning issue, especially as it relates to furbearers. After venous and arterial catheterization to sample blood, European beaver (*Castor fiber*) were forcefully submerged in water for up to 10 minutes (Clausen and Ersland 1970). From the authors' figures, the following conclusions can be drawn. Throughout the period of submersion, $PaCO_2$ increased but never exceeded 100 mm Hg; it took 7.5 minutes of submersion before $PaCO_2$ exceeded 95 mm Hg. The PaO_2 rapidly decreased during the first 7 minutes of submersion, but both PaO_2 and arterial hemoglobin saturation with oxygen were at hypoxemic levels (PaO_2<50 mm Hg and saturation<50%) within 5 minutes from the start of submersion. Thus the beavers were hypoxemic 2-3 minutes before $PaCO_2$ reached 95 mm Hg.

The method by which great CO_2 concentrations kill animals is anesthesia-induced respiratory arrest and the ensuing tissue hypoxia-anoxia (Mullenax and Dougherty 1963, Andrews et al. 1993). In fact, the time to death is prolonged when oxygen is used with CO_2. When a gas mixture consisting of approximately 70% CO_2, 24% N_2, and 6% O_2 was used to kill mink, for example, the 5 test animals survived for at least 15 minutes in the gas mixture (Hansen et al. 1991). One animal died 6 minutes after being removed from the gas mixture, but the 4 other animals fully recovered.

The preceding evidence demonstrates that in drowning animals, hypercarbia lags behind hypoxia and anoxia and that drowning animals die from hypoxia and anoxia. All of this suggests that drowning animals experience hypoxemia-induced discomfort and distress before CO_2 narcosis occurs, if narcosis occurs at all. This raises the question: do animals experience distress during drowning? For the following reasons, we believe that the answer is yes. The classic stress response consists of changes in heart rate and increases in blood pressures and circulating blood levels of epinephrine and norepinephrine and other stress-related hormones (Moberg 1985). In rats breathing 100% CO_2 (CO_2 anoxia), plasma norepinephrine increased significantly and was released from the sympathetic nervous system and not the adrenal medulla (Borovsky et al. 1998). The authors concluded that the response was mainly from hypoxia, not from CO_2 in and of itself (Borovsky et al. 1998).

In a model of asphyxia in which rats were strangled (anoxic asphyxia), mean serum norepinephrine and epinephrine concentrations were significantly greater in the strangled group compared to the non-strangled group (norepinephrine=5.4±2.6 ng/mL vs. 2.8±0.1 ng/mL, P<0.001 and epinephrine=6.0±3.4 ng/mL vs. 3.8±3.0 ng/mL, P<0.05; Hirvonen et al. 1997). The author concluded that the data supported the idea that catecholamine concentrations increased in blood upon suffocation and could be used as indicators of hypoxia (Hirvonen et al. 1997).

In dogs that were drowned with either cold salt water (CSW) or cold fresh water (CFW), epinephrine and norepinephrine concentrations (pg/mL) increased significantly after immersion and continued to rise throughout the experimental period (Conn et al. 1995). Prior to immersion, epinephrine was 206±25 in the CFW group and 133±67 in the CSW group. After 10 minutes of immersion, it had risen to 174,650±1,750 in the CFW group and 153,250±4,585 in the CSF group. Prior to immersion, norepinephrine was 224±46 in the CFW group and 374±182 in the CSW group, and by 10 minutes it had reached 63,025±4,946 in the CFW group and 50,400±1,796 in the CSF group. The authors noted that though the greater values reported in their study could be partly attributed to sudden cold stress that has been described after cold-water immersion, a more important etiological factor is likely to be anoxic-ischemic stress producing a catecholamine surge (Conn et al. 1995).

Thus, the accumulated data indicate that hypoxia-anoxia readily elicit the stress response in a variety of animal species.

To summarize, data from several studies and a variety of animal species indicate that CO_2 can produce narcosis, but only at partial pressures in arterial blood exceeding 95 mm Hg. Furthermore, data from rats and dogs suggest that a level of CO_2-induced narcosis sufficient to render an animal insensible to the discomfort, anxiety, and stress associated with hypoxemia is probably above 123 mm Hg; true CO_2-induced anesthesia, and thus insensibility, does not occur until $PaCO_2$ exceeds 200 mm Hg.

We recognize that drowning has been a traditional wildlife management technique, especially for trapping aquatic mammals such as beaver, muskrat, nutria (*Myocastor coypus*), mink, and river otters (*Lontra canadensis*). In some states, trappers have been encouraged to drown non-aquatic mammals captured in cage traps, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), and opossums (*Didelphis virginiana*). Drowning is a method of killing animals that is convenient for humans. However, the concept of euthanasia is independent of traditions and convenience, and drowning can not be considered euthanasia. As we noted at the beginning of this article, euthanasia is a "good death" that occurs without pain or distress. Time is an important element in euthanasia, and any technique that requires minutes rather than seconds to produce death can not be considered euthanasia. We encourage wildlife administrators, researchers, animal care and use committees, managers, and trappers to consider these findings as they develop wildlife euthanasia technique guidelines and Best Management Practices for Trapping (Proulx and Barrett 1989, Friend et al. 1994, Hamilton et al. 1998).

Literature cited

ANDREWS, E. J., B. T. BENNETT, J. D. CLARK, K. A. HOUPT, P. J. PASCOE, G. W. ROBINSON, AND J. R. BOYCE. 1993. Report of the AVMA panel on euthanasia. Journal of the American Veterinary Medical Association 202: 229-249.

BOROVSKY, V., M. HERMAN, G. DUNPHY, A. CAPLEA, AND D. ELY. 1998. CO2 asphyxia increases plasma norepinephrine in rats via sympathetic nerves. American Journal of Physiology 274: R19-22.

CLAUSEN, G., AND A. ERSLAND. 1970. Blood O2 and acid-base changes in the beaver during submersion. Respiration Physiology 11: 104-112.

CONN, A. W., K. MIYASAKA, M. KATAYAMA, M. FUJITA, H. ORIMA, G. BARKER, AND D. BOHN. 1995. A canine study of cold water drowning in fresh versus salt water. Critical Care Medicine 23: 2029-2037.

EISELE, J. H., E. I. EGER, AND M. MUALLEM. 1967. Narcotic properties of carbon dioxide in the dog. Anesthesiology 28: 856-865.

FRIEND, M., D. E. TOWEILL, R. L. BROWNELL, V. F. NETTLES, D. S. DAVIS, AND W. J. FOREYT. 1994. Guidelines for proper care and use of wildlife in field research. Pages 96-105 in T. A. Bookhout, editor. Research and Management Techniques for Wildlife and Habitats. The Wildlife Society, Bethesda, Maryland.

GILBERT, F. F., AND N. GOFTON. 1982. Terminal dives in mink, muskrat, and beaver. Physiology and Behavior 28:835-840.

GUYTON, A. C. 1991. Textbook of medical physiology. W.B. Saunders, Philadelphia, Pennsylvania.

HAMILTON, D. A., B. ROBERTS, G. LINSCOMBE, N. R. JOTHAM, H. NOSEWORTHY, AND J. L. STONE. 1998. The European Union's wild fur regulation: A battle of politics, cultures, animal rights, international trade and North America's wildlife policy. Transactions of the North American Wildlife and Natural Resources Conference 63: 572-588.

HANSEN, N. E., A. CREUTZBERG, AND H. B. SIMONSEN. 1991. Euthanasia of mink (Mustela vison) by means of carbon dioxide (CO2), carbon monoxide (CO) and nitrogen (N2). British Veterinary Journal 147: 140-146.

HEWETT, T. A., M. S. KOVACS, J. E. ARTWOHL, AND B. T. BENNETT. 1993. A comparison of euthanasia methods in rats, using carbon dioxide in prefilled and fixed flow rate filled chambers. Laboratory Animal Science 43: 579-582.

HIRVONEN, J., M. L. KORTELAINEN, AND P. HUTTUNEN. 1997. Pulmonary and serum surfactant phospholipids and serum catecholamines in strangulation. An experimental study on rats. Forensic Science International 90: 17-24.

MOBERG, G. P. 1985. Biological response to stress: Key to assessment of animal well-being? Pages 27-49 in G. P. Moberg, editor. Animal Stress. American Physiological Society, Bethesda, Maryland.

MULLENAX, C. H., AND R. W. DOUGHERTY. 1963. Physiologic responses of swine to high concentrations of inhaled carbon dioxide. American Journal of Veterinary Research 24: 329-332.

NEWMAN, A. B., AND R. D. STEWART. 1995. Submersion Incidents. Pages 1209-1233 in P. S. Auerbach, editor. Wilderness Medicine: Management of Wilderness and Environmental Emergencies, Mosby, St. Louis, Missouri.

PROULX, G., AND M. W. BARRETT. 1989. Animal welfare concerns and wildlife trapping: Ethics, standards and commitments. Transactions of the Western Section of the Wildlife Society 25: 1-6.

RAI, U. C., P. K. BHARDWAJ, AND M. MOHAN. 1980. Effects of aspirated and swallowed water in mongrel dogs subjected to freshwater drowning. Indian Journal of Physiology and Pharmacology 24: 197-204.

STEDMAN'S MEDICAL DICTIONARY. 1995. Twenty-sixth Edition. Williams and Wilkins, Baltimore, Maryland.

STEPHENSON, R., D. R. JONES, AND R. M. BRYAN, JR. 1994. Regional cerebral blood flow during submergence asphyxia in Pekin duck. American Journal of Physiology 266: R1162-1168.

SUZUKI, T. 1996. Suffocation and related problems. Forensic Science International 80: 71-78.

TIMPERMAN, J. 1972. The diagnosis of drowning. A review. Forensic Science 1:397-409.

YAGIL, R., Z. ETZION, AND A. OREN. 1983. The physiology of drowning. Comparative Biochemistry and Physiology 74A: 189-193.

John W. Ludders (top photo) is an associate professor and chief of section in anesthesiology in the Department of Clinical Sciences at the College of Veterinary Medicine, Cornell University. He received his B.S. (zoology) and his D.V.M. from Washington State University and did his residency in veterinary anesthesiology at the University of California, Davis. His research interests are in analgesia and anesthesia for birds.

Robert H. Schmidt (bottom photo) is an associate professor in the Department of Fisheries and Wildlife at Utah State University. He received his B.S. in natural resources from Ohio State University; an M.S. in forestry, fisheries, and wildlife from the University of Nebraska, Lincoln; and an M.S. and Ph.D. in biological ecology from the University of California, Davis. His interests cover the spectrum of wildlife policy, ecology, and management. Robert was president of the Western Section of The Wildlife Society in 1989 and currently serves as president of the National Animal Damage Control Association and as an Executive Board member of the Wildlife Damage Management Working Group of TWS.

F. Joshua Dein is animal welfare officer at the United States Geological Service-Biological Research Division, National Wildlife Health Center. Trained as a biologist and a veterinarian, he is responsible for providing technical assistance to managers and researchers in areas such as captive animal management, capture and immobilization of wildlife, biological sample collection, telemetry implantation, euthanasia, and disease monitoring. He also has interests in electronic information resources, moderating the Wildlife Health mailing list and the Wildlife Health information Partnership. ***Patrice M. Klein*** is the wildlife veterinarian for the Humane Society of the United States (HSUS) and the veterinary director of the HSUS Wildlife Rehabilitation Training Center, Cape Cod, Massachusetts. She received her B.A. in biology from Hofstra University in 1976, an M.S. in pharmacology-toxicology from St. John's University, New York in 1983, and her V.M.D. from the University of Pennsylvania School of Veterinary Medicine in 1988. She has extensive training and experience in pathology and is a diplomate in the American College of Poultry Veterinarians. From 1990 to 1995, Pat was the center veterinarian at the United States Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland, where she was responsible for the health management of endangered species of birds such as whooping cranes and Mississippi sandhill cranes and evaluated the effects of environmental pollutants on avian species. She is currently working with Humane Society International on international wildlife rehabilitation programs in Central and South America.

Improving Animal Welfare in U.S. Trapping Programs:

Process Recommendations and Summaries of Existing Data

International Association of Fish and Wildlife Agencies (IAFWA)

Improving Animal Welfare in U.S. Trapping Programs: Process Recommendations and Summaries of Existing Data

International Association of Fish and Wildlife Agencies Fur Resources Technical Subcommittee (FRTS) and Trapping Work Group

Greg Linscombe
Fur Resources Committee Chair
Louisiana Department of Wildlife and Fisheries
New Iberia, LA 70560

Ed Boggess
Technical Subcommittee Chair
Minnesota Department of Natural Resources
St. Paul, MN 55155

Buddy Baker
South Carolina Department of Natural Resources
Columbia, SC 29202

Gordon Batcheller
New York Division of Fish, Wildlife, and Marine Resources
Delmar, NY 12054

Tom Decker
Massachusetts Division of Fish and Wildlife
Westboro, MA 01581

Dave Hamilton
Missouri Department of Conservation
Columbia, MO 65201

George Hubert, Jr.
Illinois Division of Wildlife Resources
Hinckley, IL 60520

Noel Kinler
Louisiana Department of Wildlife and Fisheries
New Iberia, LA 70560

Steve Peterson
Alaska Department of Fish and Game
Juneau, AK 99802

John S. Phelps
Arizona Game and Fish Department
Phoenix, AZ 85203

Christiane Roy
Kansas Wildlife and Parks
Emporia, KS 66801

Don MacLauchlan
International Association of Fish and Wildlife Agencies
Washington, DC 20001

Bob Phillips
USDA, APHIS, Animal Damage Control
National Wildlife Research Center
Ft. Collins, CO 80524-2719

Jim Beers
U.S. Fish and Wildlife Service
Division of Federal Aid
Arlington, VA 22203

Scott Hartman
National Trappers Association
New Martinsville, WV 26155

Tom Krause
National Trappers Association
Riverton, WY 82501

International Association of Fish and Wildlife Agencies

Hall of the States

444 North Capitol Street, N.W., Suite 544

Washington, D.C. 20001

I.A.F.W.A.

WILDLIFE RESTORATION

Your purchase of hunting equipment supports Wildlife Restoration

March 1997

Contents

Executive Summary

Over the past 18 months, the IAFWA Fur Resources Technical Subcommittee and trapping work group participants from USDA/APHIS Animal Damage Control, U.S. Fish and Wildlife Service, and the National Trappers Association have been working to:

1) develop and compile existing data on trap research and testing;

2) identify priority species and trapping systems for additional work;

3) recommend common and consistent protocols for use by agencies or researchers conducting trap testing so that usefulness and comparability of results are maximized;

4) identify appropriate processes and procedures that could be developed to allow state wildlife agencies to systematically and objectively improve trapping within their jurisdictions, including the development of regionally based Best Management Practices (BMPs) for trapping; and

5) identify public information and education needs to improve the understanding and acceptance of trapping programs.

This report summarizes the results of the "first steps" of efforts of the Subcommittee and the working group to identify, compile, and synthesize data and to conceptualize and design processes for improving trapping and the welfare of trapped animals in the U.S.

Next steps in this process will require the commitment of agencies and organizations at the state, regional, and national levels to aggressively move forward in the development of data and guidelines that can be applied to the improvement of trapping programs and that can be incorporated into programs of public and trapper education.

Acknowledgments

The work group wishes to thank the U.S. Fish and Wildlife Service Office of Federal Aid for financial support. We also want to thank our respective state wildlife agencies, the U.S. Department of Agriculture APHIS/ADC program, and the National Trappers Association for supporting the involvement of the group members in developing the information in this report. We would also like to express our appreciation to Ken Gruver, USDA/APHIS/ADC, Fort Collins who helped to compile information on trap testing for some of the species.

V. Summary of Existing Data on Trap Performance and Use

The work group reviewed existing literature on trap performance and use and summarized available information. A review of all of the trap literature by species is included in Appendix A. No data was found for trapping bassarisk or for swift and kit foxes. This section summarizes the general findings by species for the information contained in Appendix A. It will be used by the work group in the future to 1) determine whether information is adequate to proceed with BMP development without additional testing; and 2) determine the best performing traps for each species or species group.

A species by species summary of trap testing literature follows:

Arctic Fox. Two studies conducted in Canada have focused on Sauvageau 2001-8 (a killing trap) and the standard No. 1½ Victor coil spring foothold trap. Compound testing demonstrated that the Sauvageau trap quickly killed 9 of 9 foxes. Most foxes captured in the 1½ coil spring trap had only minor injuries when traps were checked daily. (Appendix A).

Badger. Limited research in the western United States indicates #1½ coil spring traps with unpadded, laminated, or padded jaws can be used to capture badgers with only minor injuries. Also, 78% of 45 badgers captured for telemetry research in Illinois using #3 Victor Soft Catch™ traps had no visible injuries. (Appendix A).

Beaver. Research in Canada, performed under controlled conditions, has shown that beaver can be killed in ≤6 minutes on land using standard Conibear 330 and modified (jaws bent inward) Conibear 280 and 330 traps. When captured underwater in locking snares or in drowning sets using #3 and #4 Victor foothold traps, beaver die in 5 to 10 minutes due to CO_2 narcosis or asphyxiation. Five beaver trapped underwater in modified Conibear 330 traps were killed in ≤9 minutes 15 seconds. Lab tests on anesthetized animals have determined the minimum energy forces required to cause death when delivered via a blow to the head, neck, thorax, abdomen, or chest. (Appendix A).

Bobcat. Research in the western United States and Michigan has shown that the No. 3 Victor Soft Catch is effective in capturing bobcats with minimal injuries compared to unpadded traps. Replacement of stock 1.75 springs on Soft Catch traps with No. 3 springs and modification of pans, linkage, and jaws reduced injury scores and improved trapping success. (Appendix A).

Coyote. More trap research has been conducted on coyotes than any other furbearer species. This research has focused primarily on comparing the rate and injuries associated with different trap types. Additionally, there has been work to evaluate pan tension systems, trap jaw modifications, swiveling systems, chain length, shock springs, and jaw closure speed. (Appendix A).

Much of the field testing was done in the western United States and Canada, with only a few studies in the East. Many of the trap studies compared the performance of the No. 3 Victor Soft Catch to other types of unpadded traps.

The most significant conclusion from these studies is that coyotes captured in padded traps have fewer and less severe injuries than those captured in unpadded traps. Reduction in injury is exemplified by fewer broken bones, cut tendons and ligaments, and periosteal abrasions. Recent research suggests that capture rates for padded traps are similar to those for unpadded models. Several types of pan tension devices have been evaluated on a variety of coyote traps and all have been effective in reducing nontarget captures. A summary of the major research findings on injury and capture rates for seven types of traps tested by USDA's National Wildlife Research Center is shown in Table 1:

Table 1. Summary of trap testing results for coyotes for seven traps tested by the USDA National Wildlife Research Center.

Trap Type	Test States	N[1]	Median Injury Score[2]	Capture Rate[3]
Sterling MJ600	CA,TX,ID	68	80.0	94
No. 3 Northwoods	CA,TX,ID	59	80.0	95
Victor 3NM	TX	33	60.0	95
Heimbrock Special	CA, TX	30	80.0	94
Standard No. 3 Soft Catch	CA,OR,NV,MT, WY,OK,NM,TX	53	15.0	95
Modified No, 3 Soft Catch	CA	60	15.0	97
No. 3½ EZ Grip	CA,TX,CO	65	10.0	88

[1] N = sample size for calculating injury score using ISO (International Organization for Standardization) Trauma Scale.
[2] Median score for trap related injuries, based on standardized point scale for injuries.
[3] Capture rate = percent of animals captured of potential captures (target animals captured plus identifiable escapes).

Fisher. Various killing traps have been evaluated for capturing fisher in Canada. Compound testing has shown that the Bionic trap cocked to 8 notches consistently kills fisher in <1 minute. The mechanical characteristics of modified (stronger springs) Conibear 220 and Sauvageau 2001-8 traps exceed the kill threshold established for fisher, but the standard Conibear 220 and AFK Kania traps do not. Double strikes (head/neck and thorax) with a modified Conibear 220 trap equipped with 280 springs killed 5 of 6 fishers (avg. time to unconsciousness = 51 ± 13 sec.). Cage traps were used to capture 35-95% of the fishers trapped annually in Massachusetts from 1980-1988. (Appendix A).

Gray Fox. Limited research has been done in the eastern United States comparing the standard No. 1½ Victor coil-spring with the No. 1½ Soft Catch. Results of these studies indicate no difference in capture efficiency between trap type and reduced injuries for foxes captured in padded traps. (Appendix A).

Gray Wolf. Wolf traps have been evaluated in Alaska, Minnesota, and Wisconsin. Custom-made No. 14 Newhouse long spring traps with offset, toothed jaws were effective and caused the least injuries compared to other trap types. Suggested methods for reducing injury included shortened chains, center-mounting of the chain, and the use of tranquilizer tabs. (Appendix A).

Lynx. Footsnares, foothold traps, and kill traps have been evaluated for capturing lynx in Canada. Compound testing has shown that the modified 330 Conibear can consistently kill lynx in ≤3 minutes. Modified Fremont footsnares caused less injury when compared to Soft Catch traps. (Appendix A).

Marten. Several studies have been conducted in Canada to evaluate the performance of killing traps for capturing marten. Compound testing has shown that the standard Conibear 110 and 120 traps fail to consistently kill marten in <5 minutes. In comparison, 13 of 14 marten caught in the C120 Magnum trap equipped with a pitchfork trigger had an average time to unconsciousness of ≤68 sec. Field tests indicated the C120 Magnum placed in elevated box sets was as efficient as foothold traps for harvesting marten. In Ontario, wire box traps and the Conibear 120 had similar selectivity, but box traps were less efficient. The most efficient and selective set for marten utilized a killing trap placed in a "Trapper's Box" on a horizontal pole. (Appendix A).

Mink. Research in Canada performed under controlled conditions has shown that mink can be killed in ≤3 minutes on land using the C120 Magnum trap with a pan trigger, the Bionic trap with a 6 cm bait cone, or the C180 trap with a pan trigger. However, terrestrial sets employing the standard Conibear 110 and 120 fail to consistently kill mink in <5 minutes. Lab tests on anesthetized animals have determined the minimum energy forces required to cause death when delivered via a blow to the head, neck, thorax, and abdomen. When captured in drowning sets using foothold traps, mink die in <4 minutes, but most wet drown. During field tests in British Columbia and Newfoundland, the C120 Magnum with a pan trigger was as efficient for capturing mink as the Conibear 120 and standard foothold traps. (Appendix A).

Muskrat. Muskrat traps have been evaluated in Louisiana, New Jersey, and Canada. Lab tests on anesthetized animals have determined the minimum energy forces required to cause death when delivered via a blow to the head, neck, thorax, and abdomen. Death occurs in ≤4 minutes if Conibear 110 traps are used underwater, but standard Conibear 110 and 120 traps fail to consistently kill muskrats in <5 minutes when used on land. Muskrats caught in modified (18 kg springs) Conibear 110 traps on land died in ≤3 minutes 20 seconds. Controlled experiments have shown muskrats taken in drowning sets using #1½ long spring traps die in ≤5 minutes 15 seconds, and about half have no injuries. A New Jersey field study determined the Victor #1 VG Stoploss with padded jaws caused significantly less damage to limbs of trapped muskrats compared to the unpadded #1 VG Stoploss; both traps captured and held muskrats equally well in drowning sets. Other studies have found that Conibear traps are usually more efficient and selective for harvesting muskrats than standard footholds. (Appendix A).

Nutria. Field tests have been conducted in Louisiana and Great Britain to evaluate the efficiency of nutria traps. In the marshes of Louisiana, the #1½ and #2 Victor long spring traps proved to be more efficient for capturing nutria than the Conibear 220. Also, 69-91% of the animals caught in foothold traps were alive at the time of trap check and could be released. In Great Britain, large cage traps set on rafts caught significantly more nutria and about half the number of non-target animals compared with those set on land. (Appendix A).

Opossum. Restraining traps for the opossum have been evaluated on a limited basis in the eastern United States, Washington, and Alabama. Research indicates: 1) no difference in efficiency between the #1½ Victor coil spring and the #1½ Victor Soft Catch, 2) significantly lower injury scores for opossums captured in padded foothold traps compared with unpadded models, and 3) offset jaws can reduce the frequency of bone fractures compared with non-offset versions. Several types of pan tension devices have been evaluated on a variety of coyote traps and all have been effective in reducing accidental opossum captures. Killing traps (e.g. Conibear 120 and 220) appear to be more efficient for capturing opossums when placed in boxes on the ground rather than above ground level. (Appendix A).

Raccoon. Killing and restraining traps for raccoons have been extensively researched in the United States and Canada. Controlled lab tests have been conducted on anesthetized animals to determine the minimum energy forces a killing trap must deliver to cause death via a blow to the head, neck, and chest. Also, limited data about the effects of clamping force have been obtained. (Appendix A).

Research on various killing traps conducted in enclosures indicates raccoons can not be consistently killed in <5 minutes using standard Conibear 220, 280 (with pan trigger), and 330 traps. However, about 60% of the animals captured in the 220 and 280 die in <4 minutes. Investigations on immobilized raccoons have shown that the Sauvageau 2001-8 and a modified (extra clamping bar) Conibear 280 have the potential to consistently render animals irreversibly unconscious in $\leq$4 minutes, but not in $\leq$3 minutes. In a separate lab study the average time to unconsciousness for 4 of 5 immobilized raccoons caught in the BMI™ 160 (a rotating-jaw trap similar to Conibear) was 172 $\pm$ 16 seconds; the remaining animal was euthanized after 5 minutes. The raccoon capture efficiency of the Conibear 220 may be comparable to or better than some restraining traps under certain environmental conditions, but in other instances it may not.

Results from 1 enclosure and 13 field studies of restraining traps for raccoons are available. This research has focused on comparing the capture rate and injuries associated with different trap types. The majority of the field testing was done in the eastern United States with only a few studies in the west and Canada.

Injury data from these investigations are difficult to compare because scoring systems have varied and several studies report only on injuries to the trapped limb. A significant conclusion has been that most of the serious injuries observed are due to self-mutilation. Results are somewhat mixed, but the available information indicates padded traps fail to preclude this behavior in raccoons and thus do not significantly reduce injury scores compared with unpadded traps. Padded traps also appear to be less efficient for capturing raccoons than unpadded versions. However, #1 size jaw traps (both padded and unpadded) do reduce the frequency of self-mutilation and are as efficient as comparable #1½ size models. Foot snares have been used to trap raccoons with some reduction in injuries, but their efficiency is significantly lower than standard foothold traps.

The only restraining trap tested to date that significantly reduces the frequency of self-mutilation and the severity of injuries to trapped raccoons compared with padded and unpadded jaw traps is the EGG™. The mean total injury score (based on a modified Olsen scale) assigned to raccoons caught in the EGG in an Illinois field study was 68 compared with 116 for those trapped with the #1 coil spring. The EGG has a raccoon capture efficiency which exceeds that of the unpadded #1 coil spring and at least equals that of box traps.

River Otter. Various restraining traps for the live-capture of otters have been evaluated in Newfoundland, Idaho, Minnesota, Louisiana, and the eastern United States. Capture success with Hancock traps has varied depending on the season and setting techniques. In Newfoundland, Bailey traps proved ineffective. A recent study compared unpadded Victor #11 double long spring and modified (heavier spring added) Victor #1½ Soft Catch traps for catching otters for relocation. Fewer severe injuries were noted in animals captured with the Soft Catch trap, but there was no difference in frequency or severity of dental injuries between trap types. No published research on killing traps for river otter is available. (Appendix A).

Red Fox. Numerous studies have been conducted in the United States, Canada, Sweden, and Australia to evaluate the performance of leghold traps and snares for capturing red fox under a variety of environmental conditions.

The No. 1½ Victor coil spring is the most common trap used to capture foxes in North America. Several studies have compared the performance of this trap to the No. 1½ Soft Catch. In general, the padded No. 1½ Soft Catch has proved to be as effective as its unpadded counterparts. Also, padded traps cause fewer and less serious injuries. Foot snares have proved to be effective devices for capturing foxes in the powder snow conditions of northern Sweden. Plastic footsnares were also effective in reducing trap-relate injuries. Limited testing of power snares indicates that foxes can be rendered unconscious within six minutes. (Appendix A).

Striped Skunk. Three studies (2 in the United States and 1 in Canada) indicate leg injuries to striped skunks captured in standard and padded foothold traps are extensive due to a high frequency of self-mutilation. A field study in Ontario revealed skunks can be captured with few injuries using the Novak foot snare, but this trap has a low capture rate and an unacceptable level of efficiency. Several types of pan tension devices have been evaluated on a variety of coyote traps and all have been effective in reducing accidental skunk captures. (Appendix A).

Weasel. Research data on traps commonly used for harvesting weasels in North America are not available. One killing trap (the Fenn) has been used successfully to capture weasels in New Zealand. (Appendix A).

Wolverine. Only one study is published on a technique for capturing wolverines. This study evaluated the log traps which captured 12 Idaho wolverines with no reported injuries. (Appendix A).

VI. Priority species and trapping systems for research and testing

The trap testing needs for twenty-three species of furbearers were prioritized and assessed, considering criteria for the species such as: 1) the type and proportion of trapping systems predominantly used; 2) the total harvest in this country; 3) the importance to trappers; 4) the amount and type of economic damage caused; 5) the urgency and opportunity for additional work from the biologists' perspective; and 6) and the availability and quality of data from past trap research programs.

First, a systematic approach to ranking furbearer species' priority for trap research was used that incorporated some of the variables suggested by Todd (1987), as further developed by the FRTS (Table 2.). This process required the relative ranking and scoring of these criteria using available data and professional judgements. These sources of data included the trap use and ownership study from 1992, the fur harvest summaries compiled annually by the FRTS, data collected by the FRTS regarding furbearer nuisance and damage problems, and the assessment of existing data on trap performance.

These species were then placed in one of three priority categories: high, medium, and low, based on their relative rankings and the need to accomplish critical research in the next three to five years (Table 3.).

The relative sense of urgency or opportunity to accomplish this research was based on several considerations, such as whether or not the species was listed on the EU fur regulation, the amount of environmental damage at risk if the species is not controlled in the future, and whether the trapping systems currently used are particularly troublesome due to unique habitat conditions, or where it appears that a superior trap is now widely available. For example, the relative ranking for pine marten was relatively low based on scores alone, but because a widely available killing trap appears to be at least as efficient and likely more humane, the committee felt that immediate testing was necessary prior to making the recommendation in a BMP. Species that received high marks for urgency or opportunity include raccoon, nutria, gray fox, beaver, mink, wolf, pine marten, swift fox, and fisher. Also, the committee gave additional weight to species that had very little existing data on trap performance. For this reason, nutria, opossum, muskrat, striped skunk, gray fox, mink, fisher, bassarisk, wolverine, and weasel were given extra consideration.

This prioritized list of trap research needs for the United States along with existing information on performance of traps will be used to identify gaps in trapping data for the various regions and for specific traps, especially new technology.

Table 2. Priority rankings based only on composite species scores (CSS) using a variation of the method developed by Todd (1987). CSS scores were calculated from data on type of traps most commonly used (system), total harvest, trapper preference (presumed to be based on a combination of pelt value, abundance, ease of capture), and amount of damage to property and the need for damage control.

Priority	Species	Trapping System [1]	Total Harvest [2]	Trapper Preference [3]	Damage [4]	Composite Species Score (CSS) [5]
1	Raccoon	4	5	5	5	19
2	Coyote	5	4	4	5	18
3	Fox, Red	5	4	5	3	17
4	Nutria	5	5	2	4	16
5	Opossum	4	5	3	3	15
6	Muskrat	1	5	5	4	15
7	Beaver	1	4	4	5	14
8	Bobcat	5	3	4	2	14
9	Fox, Gray	5	4	4	1	14
10	Skunk	5	3	2	4	14
11	Mink	3	4	5	1	13
12	Badger	5	3	2	2	12
13	Marten	3	3	3	1	10
14	Bassarisk	5	3	1	1	10
15	Wolf	5	1	2	2	10
16	Otter	3	2	3	2	10
17	Lynx	5	2	2	1	10
18	Fox, Swift/Kit	5	2	1	1	9
19	Fisher	3	2	3	1	9
20	Fox, Arctic	5	1	1	1	8
21	Wolverine	3	1	2	1	7
22	Weasel	1	2	1	1	5

[1] "Trapping System" ratings (on a 5-point scale) were from: 1 = primarily captured in killing or submersion sets, up to: 5 = primarily captured in standard leghold traps on land, based on the judgement of the IAFWA Fur Resources Technical Subcommittee

[2] "Harvest" = ranking of total U.S. harvest for 1976-77, 1981-82, 1986-87, and 1991-92, where 1 = lowest harvest and 5 = highest harvest

[3] "Trapper Preference" = % of trappers listing species as one of four most important (1 = 0%; 2 = >0<5%; 3 = >5<20%; 4 = >20<30%; 5 = > 30%)

[4] "Damage" = ranking of relative damage to property as judged by IAFWA Fur Resources Technical Subcommittee on a 5-point scale, with 1 = lowest damage and 5 = greatest damage

[5] "Composite Species Score" (CSS) based on a method described by Todd (1987). In this exercise, all criteria were given equal weight in calculating the composite score.

Table 3. Recommended trap testing priorities from the trapping work group based on the CSS scores summarized in Table 1, and on a more subjective analysis by the work group of the amount and quality of existing data and the urgency or opportunity for additional work.

Recommended Trap Testing Priorities, by Species		
High Priority	**Medium Priority**	**Low Priority**
Raccoon	Beaver	Canada Lynx
Coyote	Bobcat	Bassarisk (Ring-tailed Cat)
Red Fox	Opossum	Arctic Fox
Nutria	Striped Skunk	Wolverine
Muskrat	Gray Wolf	Weasels
Gray Fox	Badger	
Mink	River Otter	
Pine Marten	Swift/Kit Fox	
	Fisher	

VII. Recommended trap testing protocols

The work group recognized the need to recommend appropriate and consistent trap testing protocols so that results of trap testing would be scientifically and statistically valid, as well as directly comparable from study to study.

After reviewing trap testing protocols proposed by the International Organization for Standardization (ISO), the Canadian General Standards Board (CGSB), and the EU/Canada/Russia/United States quadrilateral process, the work group recommends that the ISO approach (which is the basis for the other efforts) be followed by those testing traps in the U.S.

The ISO standards for trap testing are currently Draft International Standards in the form of approved Committee Drafts (CDs). ISO/CD 10990-5, entitled *Animal (Mammal) Traps - Part 5. Methods for Testing Restraining Traps*, is a standard to provide test methods for performance evaluation of restraining traps in the areas of animal welfare, capture efficiency, selectivity, and user safety. ISO/CD 10990-4, entitled *Animal (Mammal) Traps - Part 4. Methods for Testing Killing Traps*, is a similar document relating to killing traps.

Both documents have been approved by consensus by the 15 Participating countries involved in this standard, including the U.S., and will be circulated for review and approval by all member countries of ISO later this year.

These documents set forth appropriate trap testing protocols to ensure uniformity throughout the world in how animal trap performance is tested for capture efficiency, selectivity, user safety, and animal welfare. The testing protocols include standard definitions, sampling and replication guidelines, laboratory and field testing procedures, pathological examination procedures, selectivity testing, capture efficiency testing, user safety evaluation, and standardized reporting formats.

Threshold values are not identified in an ISO Testing Methodology Standard. However, informative scales related to physical trauma are included in these Committee Drafts as examples of scientifically measurable criteria that might be useful to those involved with trap testing.

These ISO CDs have considerable support from the nations involved in this work. It is expected that these CDs will be approved by ISO in 1997.

VIII. Public education needs and strategies: Summary

The trapping work group discussed public knowledge and understanding of trapping programs and how problems of the public's lack of knowledge, misconceptions, and misinformation could be addressed. The discussion was facilitated by Brian Hay of Paragon Corporation, a Reputation Management Consultant based in Toronto, Ontario, who has had considerable experience with this issue. Following is a brief summary of that discussion:

Demographic population changes within the United States since the Second World War, including increasing urbanization, have resulted in less direct personal contact and experience with the land for an increasing majority of American residents. This has translated into a lack of understanding and appreciation of natural habitats and of rural lifestyles, including trapping, hunting, and fishing.

Lack of public awareness, appreciation, or understanding of natural habitats and wildlife populations, and of the encroachment of humanity on wild areas and encounters with resurging populations of many wild animal species, have contributed to public misunderstanding of trapping as a management tool. Increased distancing of human populations from a direct and visible reliance on "the land" have also reduced public understanding of trapping as a lifestyle choice or an economic contribution to many rural families or those who retain close ties to the land.

In addition, there has been a dramatic change in the role of government agencies regarding the decisions made about the use of natural resources. No longer are agencies able to use scientific/practical experience alone to justify decisions, especially those that increase public access to and use of wildlife populations. In the public arena, input from the public has become nearly as important in the decision-making process on some issues as professional expertise. In some states with initiative petition processes, the authority of wildlife agencies has been completely usurped at the ballot box, completely by-passing the traditional role of government agencies.

Given the importance of trapping to management programs and to individuals, it is appropriate and necessary to increase the level of public understanding of wildlife populations and habitats, wildlife interactions with human populations, outdoor lifestyles, and the role and utilization of hunting and trapping therein. The work group will work with other committees of the IAFWA, as well as other agencies and organizations with an interest in wildlife management, to achieve this goal.

A program of information and education must be developed to reach key audiences within the general population. There is no integrated plan by government agencies to provide timely, useful, accurate public information and education on fur resource or wildlife management and use issues. Opinions and knowledge of key publics must be assessed on a regular basis to monitor changes and measure effectiveness of programs and messages. Key audiences must be identified, and their interests, positions and concerns defined, addressed, and monitored. Key themes and messages need to be developed for each audience group.

Selected agency and organization personnel should be provided with effective media and public communications training. Results of research and BMP development efforts should be included as available in communications materials. The program should use synergy with other related programs to multiply benefits and increase effectiveness while reducing costs.

IX. Next steps

Trapping programs continue to be essential wildlife management tools in most countries of the world. This includes the U. S., but also includes Europe where much of the opposition to trapping is strongest, yet where considerable trapping is done to control damage to agriculture, and to dikes, dams and water control structures

Management agencies and trappers must be responsible about addressing legitimate issues involving the welfare of captured animals wherever possible, and must be willing to develop and adopt scientifically proven improvements in trapping devices and methods. Unless management agencies quickly take the initiative to advance the understanding and application of improvements in trapping, national and world opinion will result in actions that take away the opportunity and the option to use these important tools in management programs.

Specific recommendations from the work group include:

1) **Aggressively pursue the highest priority trap testing**, by species, to scientifically establish what methods and devices will and will not be effective, efficient, safe, and selective while improving the welfare of trapped animals;

2) **Begin immediately to use the best available information and the results of testing to develop a set of trapping Best Management Practices (BMPs)** that can be regionally adapted to the diversity of species, climate, and terrain present in this country;

3) **Facilitate the understanding and adoption of BMPs by members of the public who use traps** so that the welfare of animals captured in trapping programs is improved while human safety, trapping efficiency, and selectivity are also maintainde; and

4) **Effectively involve, communicate with, and educate the public** so that information and cultural gaps are identified and a more thorough understanding and acceptance of trapping is developed.

Effective accomplishment of these recommendations will require a significant commitment of financial and human resources; they cannot be accomplished by any individual state or federal agency alone. The Technical Subcommittee and Trapping Work Group intend to pursue options to form partnerships and to develop financial support for pursuing these recommendations.

Literature Cited (see Appendix for trap testing literature cited)

Todd, A.W. 1987. A method of prioritizing furbearer species for research and development in humane capture methods as applied in Canada. Wildl. Soc. Bull. 15:372-380

Appendix A

Summary of Trap Research and

Testing Data, by Species

ARCTIC FOX *(Alopex lagopus)* *December 2, 1996*

Reference	Trap	Results
Proulx et al. (1993)	Sauvageau 2001-8	Compound testing at Vegreville testing facility. The Sauvageau 2001-8 rotating jaw trap set in a portable 3-sided wire mesh cubby quickly killed 9 of 9 arctic foxes. Average times to loss of consciousness and heartbeat were estimated at <73.4 and 213.6 seconds, respectively. These averages did not differ ($P>0.05$) from those of the preselection tests.
Proulx et al. (1994)	1½ Victor Sauvageau 2001-8	Field test on 2 traplines in Northwest Territories. Sixty-two arctic foxes were captured and killed in the Sauvageau 2001-8 using a baited trigger; all animals received head/neck strikes; trap judged to be humane. One hundred fifty-five foxes were captured on traplines using the 1½ Victor foothold trap. On traplines visited an average of 1.4 days, most foxes were held with only minor injuries. On traplines visited at an average interval of 8 days, 21 of 53 animals had injury scores >50. On daily check the No. 1½ was found to be humane and more successful than the Sauvageau trap.

LITERATURE CITED

Proulx, G., A. J. Kolenosky, M. J. Badry, P. J. Cole, and R. K. Drescher. 1993. Assessment of the Sauvageau 2001-8 trap to effectively kill arctic fox. Wildl. Soc. Bull. 21:132-135.

Proulx, G., I. M. Paulina, D. K. Onderka, M. J. Badry, and K. Seidel. 1994. Field evaluation of the number 1½ steel-jawed leghold and the Sauvageau 2001-8 traps to humanely capture arctic fox. Wildl. Soc. Bull. 22:179-183.

Prepared by: Robert L. Phillips, USDA/APHIS/ADC/NWRC, 1716 Heath Parkway, Fort Collins, CO 80524-2719

IAFWA - FRTS
TRAP RESEARCH AND PERFORMANCE DATA SUMMARY

Reference	Trap	Results
Kern et al. (1994)	Victor #1½ Coil Spring (CS); plus 3 prototypes: Victor #1½ with laminated jaws Butera #1½ with offset jaws Victor #1½ with padded jaws	Field study in Wyoming. The median Olsen injury scale scores for the offset jaw trap (5.0, n=6), laminated jaw trap (5.0, n=6), padded jaw trap (5.0, n=4), and standard trap (7.5, n=8) were not significantly different (P=0.40).
Warner, R. (Univ. of Illinois, Urbana, unpubl. data)	Victor #3 Soft Catch	Field study in Illinois. No injuries observed for 78% of badgers (n=45)captured for radio-telemetry study. Injuries recorded in other 22% were minor (claw loss, edema, small lacerations, etc.).

LITERATURE CITED

Kern, J. W., L. L. McDonald, M. D. Strickland, and E. Williams. 1994. Field evaluation and comparison of four foothold traps for terrestrial furbearers in Wyoming. Tech. Res. Work Order, Furbearers Unlimited, Bloomington, Ill. 29pp.

Prepared by: George Hubert, Jr., Illinois DNR

BEAVER *(Castor canadensis)* *February 14, 1997*

Reference	Trap	Results
Novak (1975)	Carbon monoxide (CO)	Lab test. CO not effective; adverse reactions.
Gilbert (1976)	Simulated "Killing"	Lab tests on anesthetized beavers (n=6) to determine the minimum energy forces necessary to cause immediate death when delivered to the neck. Threshold value = 805 cm kg for a neck blow. The threshold value for a chest strike was 780 cm kg(n=10). No clamping force applied.
Gilbert (1981)	#3 Victor Double Long Spring #4 Victor Double Long Spring	Lab test. Evidence suggested death due to CO_2 narcosis (n=25). Isoelectric EEG at 9 min. 30 sec.
Novak (1981)	1/16" locking snare w/ 10"dia. loop Mohawk (large) Conibear 220, 280, 330 #4 Victor Double Long Spring	Controlled field test in Ontario. Beaver (n=8) died in 5.5 to 10.5 minutes when caught in underwater locking snares. Death occurred in 7.5 to 9.0 minutes in drowning sets using #4 Victor DLS (n=5). Five beaver captured in modified Conibear 330 were killed in 7.0 to 9.25 minutes in underwater sets. All 4 beaver trapped with large Mohawk escaped from trap. When used in land sets, Conibear 330 killed beaver in 2.5 to 5.5 minutes (n=6), but only 3/5 beavers caught in Conibear 220 died in 3.0 to 5.3 minutes (2/5 were released). Beaver (n=6) caught in modified (jaws bent inward) Conibear 330 traps on land were killed in 1.0 to 5.5 minutes. Three beaver caught in land sets with modified Conibear 280 traps that had pan triggers were killed in 2.0 to 6.1 minutes. Recommended all Conibear traps should have jaws bent inward and be supplied with safety releases.

Gilbert and Gofton (1982)	#3 Victor Double Long Spring #4 Victor Double Long Spring	Controlled lab tests in aquatic tank using a drowning set. The average time to cessation of struggling was 8 min. 11 sec. (n=20); EEG loss occurred in an average of 9 min. 11 sec. (n=16). EKG loss took place after an average of 16 min. 27 sec. (n=14). Death occurred due to anoxia (asphyxiation).
Zelin et al. (1983)	Simulated "Killing"	Controlled lab tests on anesthetized animals; determined mean kill thresholds using 335-g striking bar; 10-minute time to death test period employed. With no holding force, the thresholds for head (n=8), neck (n=6), and thorax (n=8) hits of beavers were 3.7, 3.0, and 5.9 kg.m/sec, respectively. For abdominal hits of beaver, the impact momentum required to kill the animals (n=3) was beyond the capability of the test equipment (>13.9 kg.m/sec).

LITERATURE CITED

Gilbert, F. F. 1976. Impact energy thresholds for anesthetized raccoons, mink, muskrats, and beavers. J. Wildl. Manage. 40:669-676.

Gilbert, F. F. 1981. Aquatic study. Phase I-Beaver in leghold traps ("drowning sets"). Rep. submitted to Federal Provincial Committee for Humane Trapping. 10pp.

Gilbert, F. F., and N. Gofton. 1982. Terminal dives in mink, muskrat and beaver. Phys. and Behav. 28:835-840.

Novak, M. 1975. Harvesting beaver with carbon monoxide. Unpub. rep., Ontario Minist. Nat. Resour., Toronto. 8pp.

Novak, M. 1981. Capture tests with underwater snares, leg-hold, Conibear, and Mohawk traps. Canadian Trapper, April, pp. 18-23.

Zelin, S., J. C. Jofriet, K. Percival, and D. J. Abdinoor. 1983. Evaluation of humane traps: momentum thresholds for four furbearers. J. Wildl. Manage. 47:863-868.

Prepared by: George Hubert, Jr., Illinois DNR

Reference	Trap	Results
Linscombe and Wright (1988)	No. 1½ Victor padded No. 1½ standard coil spring	This was part of a 9-state study to compare the capture efficiency of padded jaw foothold traps with standard steel jaw traps. Thirty-nine bobcats were captured during this study. The No. 1½ Victor "fox" trap caught fewer bobcats ($P<0.01$) than the standard unpadded model.
Olsen et al. (1988)	No. 1½ Victor padded No. 1½ standard coil spring No. 3 Victor Soft Catch No. 3 Victor coil spring	Necropsies were performed on 59 bobcats as part of the 9-state trap study. Seven bobcats were caught in the "fox" padded trap and 14 in standard traps. There was no difference in the level of injury between trap types. Bobcats captured with the No. 3 Victor Soft Catch in the western United States had less leg damage than those captured in unpadded traps; only 13% had injuries that scored ≥ 50 points. Twenty-four percent captured in the No. 3 standard trap (No. 3 coil spring) had ≥ 50 points damage.
Earle et al. (1996)	No. 3 Victor Soft Catch (standard & modified)	One hundred twenty-six bobcat (*Felis rufus*) were live-trapped in Roscommon County, Michigan, during the period 1991-95 using standard and modified No. 3 Victor Soft Catch traps. Injuries were described in detail when each bobcat was handled and an injury score was assigned based on the most severe injury. Bobcats caught in double coil spring traps were injured more frequently and severely than those held in standard Soft Catch traps ($P<0.05$). Replacement of stock 1.75 springs on Soft Catch traps with No. 3 springs and modification of the pans, linkage, and jaws reduced injury scores and improved trapping success.

LITERATURE CITED

Earle, R., D. Lunning, and V. Tuovila. 1996. Assessing injuries to Michigan bobcats held by No. 3 Soft Catch™ traps. (Abstract). Proc. 14th Midwest Furbearer Workshop. Ironwood, MI, April 2-4, 1996.

Linscombe, R. G. and V. L. Wright. 1988. Efficiency of padded foothold traps for capturing terrestrial furbearers. Wildl. Soc. Bull. 16;307-309.

Olsen, G. H., R. G. Linscombe, V. L. Wright, R. A. Holmes. 1988. Reducing injuries to terrestrial furbearers by using padded foothold traps. Wildl. Soc. Bull. 16:303-307.

Prepared by: Robert L. Phillips, USDA/APHIS/ADC/NWRC, 1716 Heath Parkway, Fort Collins, CO 80524-2719

Reference	Trap	Results
Linhart et al (1981)	No. 3 Victor NM	Two hundred sixty-seven coyotes were captured in Texas, New Mexico, and Nevada using Victor 3NM traps affixed with tranquilizer tabs containing propiopromazine HCl, or a mixture of propiopromazine HCl and chlordiazepoxide HCl. Foot injuries were reduced up to 90% when compared to 41 control coyotes captured in the same trap type in which no tranquilizer tabs were used. Sixty-two coyotes captured in traps with shortened chains or chains with coil springs did not reduce foot injury when compared to 21 coyotes captured in unmodified traps. While the pan tension testing was incomplete at the time of this writing, nearly 90% of the gray fox, swift fox, striped skunks, opossums, and jackrabbits were excluded as compared with an average of 24% exclusion rate for standard traps.
Novak (1981)	Novak leg snare No. 4 Victor long spring No. 2 Victor coil spring	The Novak footsnare was compared with 2 types of leghold traps under field conditions in southern Ontario. No differences were found between the 2 traps in frequency in which animals discharged traps, capture rate, and escape rate. Eight coyotes were captured in the footsnare and 1 in a leghold trap. Two percent of all animals captured in the legsnare sustained injuries, compared to 52% of all animals captured in leghold traps.
Saunders and Rowsell (1984)	No. 1 coil spring padded No. 1 coil spring unpadded No. 3 coil spring padded No. 3 coil spring unpadded	Padded and unpadded traps were tested on 25 coyotes captured in British Columbia during autumn and winter. X-ray analysis and post mortem examination of trapped limbs were conducted and foot damage was assessed and compared to other studies. Results indicate padded traps reduce physical injury by 80-85% compared to unpadded traps used during Canadian trapping conditions.

Turkowski et al (1984)	No. 3Victor NM	Data was collected on the numbers of coyotes and nontarget animals that stepped on standard traps and traps equipped with shear-pin, curved leaf spring, or steel tape tension devices and were captured or excluded. Exclusion rates for designated nontarget animals were 92, 100, 95, and 6% for shear-pin, leaf spring, steel tape, and standard traps, respectively. Coyote capture rates were 87, 92, 84, and 98% for shear-pin, leaf spring, steel tape, and standard traps respectively. The pan tension devices functioned adequately for use in coyote trapping activities.
Linhart et al (1986)	No. 3 Victor NM No. 3 Victor NR No. 3 Victor OS coil spring No. 3 Victor NR padded jaw	Six trappers caught 111 coyotes from Colorado, Idaho, Nebraska, Nevada ,New Mexico, and Oklahoma during this study. The catch rate for unpadded traps was higher than for either the padded No.3 Victor NR or the Soft Catch. Unpadded traps sprung more frequently than padded traps when coyotes stepped on trap pans. More coyotes pulled out of padded 3NR traps (12.3%) and Soft Catch traps (15.7%) than unpadded traps (12.3%), and the number of toe-caught coyotes was higher for the padded 3 NR (18.2%) than for the Soft Catch (5.9%) or unpadded traps (4.5%). While the padded-jaw traps were somewhat less efficient, they were able to capture and hold coyotes under moderate trapping conditions.
Olsen et al (1986)	No. 3 Victor NR No. 3 Victor NR padded-91 cm chain No. 3 Victor NR padded-15 cm chain No. 3 Victor Soft Catch	Twenty coyotes were captured in each type of device in eastern Colorado and south Texas during this study. Traps were checked every 24 hours, but coyotes were left in traps until the following day to simulate a maximum time period under a 48-hour trap law. Coyotes caught in unpadded traps had more injuries than legs from coyotes taken in 3 types of padded-jaw traps. Tendon or ligament damage occurred in 95% of legs from unpadded traps. Coyotes caught in the unpadded Victor 3NR had a 91% fracture rate. Tendon and ligament damage occurred in only 5 (30%) and fractures in only 15 (25%) of the legs from padded-jaw traps. No statistical differences in extent of leg injury were found among the 3 types of padded foothold traps, but injuries were reduced by 71% with the padded traps compared to the unpadded traps.

Linhart et al (1988)	No. 3 Victor Soft Catch No. 1.75 Victor Soft Catch No. 3 Victor NR padded No. 3 Victor NM	Eighty coyotes were captured in California, Colorado, Nevada, New Mexico, Oklahoma and Texas during this study. Coyotes taken in padded traps, sustained less injury than those taken in unpadded traps. The Soft Catch trap with the stronger size No. 3 springs had a significantly lower injury score than the same trap with smaller 1.75 springs. Both Soft Catch traps caused less injury than padded long-spring traps. The 3NM trap with unpadded malleable jaws caused less injury than the unpadded 3NR having stamped jaws. Data showed that the use of padded traps resulted in lower capture efficacy, but significantly reduced injury to captured animals.
Linscombe and Wright (1988)	No. 3 Victor coil spring No. 3 Victor Soft Catch No. 1 ½ Victor coil spring No. 1 ½ Victor Soft Catch	Fifty-one trappers from Georgia, Louisiana, Minnesota, Mississippi, New York, and Texas participated in this study. Fifty-three coyotes were captured in the No. 3 Soft Catch and 100 were captured in the No. 3 coil spring. This study found that padded traps might be expected to catch about 66% of the coyotes that could be captured with standard traps.
Olsen et al (1988)	No. 3 Victor Soft Catch No. 3 Victor standard coil spring	Sixty-seven coyotes were caught in Arizona, Georgia, Idaho, Kansas, Louisiana, and Texas. The difference in injuries associated with trap types was striking for coyotes; 53% had >50 point damage with the standard trap, while only 16% had this much damage with the padded trap. Results indicated that padded jaw traps can substantially reduce limb injuries to coyotes when compared to injuries from standard foothold traps.

Skinner and Todd (1990)	No. 3 Victor standard coil spring No. 3 Victor Soft Catch Novak footsnare Fremont footsnare	Ninety coyotes were captured during a 2 year study in the agricultural lands of Alberta. The proportion of sets approached by coyotes differed among the devices. The number of coyotes approaching sets was highest for padded traps (53% of 314), intermediate for unpadded traps (45% of 358), and lowest for the 2 footsnares (40% of 257 and 42% of 294 for the Novak and Fremont, respectively). Capture efficiency of foothold traps was 3 times ($P<0.001$) that of the footsnares (4.3 vs.1.5 / 1000 TN)($P>0.30$ in all cases) . Capture rates were higher ($P<0.001$) for foothold traps than footsnares, however, capture rates were similar between types of foothold traps and types of foot snares (9-11 / 1000 TN). In this study, the foothold trap was found to be superior to footsnares in terms of performance.
Onderka et al (1990)	No. 3 Victor standard coil spring No. 3 Victor Soft Catch Novak footsnare Fremont footsnare	Eighty-two coyotes were captured during winter conditions in Alberta, Canada. Maceration of soft tissue occurred far less frequently in coyotes taken in Fremont snares (25%) and padded traps (21%), than unpadded traps (60%) and Novak snares (80%). Limbs of coyotes captured in the Fremont snare or padded trap were never fractured, but fractures commonly occurred in the Novak snare (50%) and unpadded trap (48%). This study showed that padded foothold traps reduce limb injuries. Fremont snares caused minimal injuries, but injuries produced by the Novak snare were similar to those of the unpadded foothold trap.
Phillips et al (1990)	Hopkins S hook Pederson fastener pin Lucero hand crimped Gregerson leg snare Gregerson neck snare McKinney notched lock	Seven types of breakaway snares were evaluated for breaking strength and variability using a universal testing machine. Maximum tension before breakage for individual snares ranged from 142 to 486 pounds. Sheet metal lock which ripped out, and S-hooks which straightened, provided the least variable results. Coyotes, mule deer, domestic calves and lambs were tested to determine the tension loads they applied to snares.

Goodrich (1991)	No. 3 Victor Soft Catch	Five coyotes were captured and then recaptured 6 more times and all trap related injuries were noted. All injuries to coyotes were considered minor.
Linhart and Dasch (1992)	No. 3 Victor NM No. 3 Victor coil spring No. 3 Victor Soft Catch	Sixty-three coyotes were captured during this study in south Texas. Capture rates did not differ among long-spring, coil-spring and Soft Catch traps. Capture rate for the 3NM was 83% while the Soft Catch trap was 79%. Results indicated that the fourth generation Soft Catch trap was improved from previous studies.
Phillips et al (1992)	No. 3 Victor Soft Catch No. 3 Victor NM No. 4 Newhouse	Sixty-one coyotes were captured in south Texas during this study. Little difference was noted in the capture rates among the 3 trap types. In 52 of 60 instances, trap jaws were positioned above the foot pads. Soft Catch traps caused the least visible injury. The 3NM caused the most evident foot injury with 80% of the animals having moderate to severe injuries. The Newhouse was intermediate with 55% of the animals having slight or no visible injury and 45% having moderate to severe injury. Pan tension devices on all traps were successful in excluding most of the small nontarget species.
Houben et al (1993)	No. 3 Victor Soft Catch No. 3 Northwoods coil spring	Legs from 20 coyotes captured in Mississippi were examined and there was no significant difference in mean scores between limbs of coyotes held in modified Soft Catch and laminated Northwoods traps. Results indicate that laminated Northwoods traps substantially reduce limb injury to coyotes (n=10) compared to other types of unpadded traps. Data also suggest that increasing the spring tension in the Victor padded coil spring trap can be done without increasing the injury rate.
Kern et al (1994)	No. 1 ½ Victor coil spring No. 1 ½ Victor laminated No. 1 ½ Butera offset No. 1 ½ Victor Soft Catch	Twenty-five coyotes were caught in northeastern Wyoming and southwestern Montana. Traps were evaluated for the potential of passing the draft ISO trap standards. All traps had similar efficiency and catch rate, except for Soft Catch traps on one trapline where more precipitation and heavier soil types were present.

Hubert et al (1996)	No. 3 Bridger standard coil spring No. 3 Bridger modified coil spring	Forty-eight coyotes were captured in Illinois using standard No. 3 Bridger coil-spring traps and the same trap modified with laminated jaws. The standard No. 3 Bridger trap was modified with offset, laminated jaws, 2 additional coil springs, and center-mount chain. Whole bodied necropsies were performed on captured coyotes. The mean total (whole body) injury score for the standard trap was 97 (n=19) compared with 80 for the modified trap (n=29). The total (whole body), trapped limb only, and oral injury scores assigned to coyotes captured in the standard trap failed to differ from those trapped in the modified traps. Minor injuries totaling <50 points were observed in approximately one-half of the animals examined. Most coyotes (85%) showed no oral injuries. The frequency of oral injuries and the proportion of coyotes with serious and severe injuries also failed to differ between trap types.
Phillips (1996)	DWRC neck snare Gregerson neck snare Kelley neck snare	Three hundred seventy-four coyotes, 91 deer, and 6 domestic cows were captured in 3 types of snares in Montana, North Dakota, and South Dakota. Capture rates were 87% for the Gregerson, 89% for the DWRC and 97% for the Kelley snare. The Kelley, DWRC, and Gregerson snares released 67, 48, and 30% of the captured deer. All domestic cows were captured in the DWRC snares and successfully escaped. This study suggests that snare locks can be developed to hold all coyotes and release nearly all livestock.
Gruver et al (1996)	No. 3 Victor Soft Catch No. 3 Victor modified Soft Catch	Leg injuries of coyotes captured in standard No. 3 Soft Catch traps were compared with those captured in the same trap type modified with 2 additional coil springs. One hundred-thirteen coyotes were trapped in southern California, 53 in standard traps and 60 in modified traps. Observed injuries were similar in both trap types. Most frequent injuries were edematous hemorrhages and small cutaneous lacerations. Injuries, such as joint luxation and bone fractures, were noted more frequently for coyotes trapped in standard Soft Catch traps.

Phillips et al (1996)	Sterling MJ600 No. 3 Northwoods laminated No. 3 ½ E Z Grip padded	One hundred ninety-two coyotes were captured by 9 experienced trappers in California, Colorado, Idaho and Texas. Some level of edematous swelling was noted on nearly all the legs (95%) with no apparent difference among trap types. Lacerations were observed in 87% of the legs from unpadded traps while only 31% of the coyotes captured in the E Z Grip received cuts. A higher frequency of more serious injuries were noted in the 2 unpadded traps. Even though the E Z Grip padded trap was much larger and stronger than the No. 3 Victor Soft Catch , injury patterns observed appeared to be similar for the 2 traps.
Phillips and Gruver (1996)	No. 3 Victor Soft Catch No. 3 Victor NM No. 4 Newhouse	Three types of traps were equipped with Paws-I-Trip (PIT) pan tension devices and tested in California, Idaho, Montana, Nevada, North Dakota, Oklahoma, Oregon, and Texas. Eight hundred twenty-six nontarget animals and 902 coyotes visited the PIT-equipped traps resulting in the capture of 22 nontargets. The PIT pan tension device used on 3 types of coyote traps effectively reduced nontarget captures without adversely affecting performance of the traps for capturing coyotes. Because of a high rate of exclusion of nontargets, more traps were functional for coyotes and the trapline efficiency increased.
Phillips and Mullis (1996)	No. 3 Victor Soft Catch No. 4 Newhouse No. 3 Victor NM Sterling MJ600	Four hundred-twelve coyotes were caught in California, Montana, Nevada, New Mexico, Oklahoma, Oregon, and Wyoming. Capture rates ranged from 83% in the Newhouse to 100% in the Sterling MJ600. This study found that the No. 3 Victor Soft Catch trap was as effective as other unpadded traps used for capturing coyotes under a variety of field conditions.

LITERATURE CITED

Goodrich, J. M. 1991. Trap related injuries in badgers and coyotes captured in Woodstream Soft Catch coyote traps. Unpubl. Rep. Univ. of Wyoming, Laramie. 7 pp.

Gruver, K. S., R. L. Phillips, and E. A. Williams. 1996. Leg injuries to coyotes captured in standard and modified Soft Catch traps. Proc. Vertebr. Pest Conf. 17:(in press).

Houben, J. M., M Holland, S. W. Jack, and C. R. Boyle. 1993. An evaluation of laminated offset jawed traps for reducing injuries to coyotes. Proc. Great Plains Wildl. Damage Control Workshop 11:148-155.

Hubert, G. F., L. L. Hungerford, and R. D. Bluett. 1996. Injuries to coyotes captured in modified foothold traps. Paper presented at 14th Midwest Furbearer Workshop, Ironwood, Michigan, April 1996.

Kern, J. W., L. L. McDonald, M. D. Strickland, and E. Williams. 1994. Field evaluation and comparison of four foothold traps for terrestrial furbearers in Wyoming. Tech. Rept. for Furbearers Unlimited. Bloomington, Illinois. 29 pp.

Linhart, S. B., F. S. Blom, G. J. Dasch, R. M. Engeman, and G. H. Olsen. 1988. Field evaluation of padded jaw coyote traps: Effectiveness and foot injury. Proc. Vertebr. Pest Conf. 13:226-229.

Linhart, S. B. and G. J. Dasch. 1992. Improved performance of padded jaw traps for capturing coyotes. Wildl. Soc. Bull. 20:63-66.

Linhart, S. B., G. J. Dasch, C. B. Male, and R. M. Engeman. 1986. Efficiency of unpadded and padded steel foothold traps for capturing coyotes. Wild. Soc. Bull. 14:212-218.

Linhart, S. B., G. J. Dasch, and F. J. Turkowski. 1981. The steel leghold trap: Techniques for reducing foot injury and increasing selectivity. Proc. Worldwide Furbearer Conf., pp. 1560-1578.

Linscombe, R. G. and V. L. Wright. 1988. Efficiency of padded foothold traps for capturing terrestrial furbearers. Wildl. Soc. Bull. 16:307-309.

Novak, M. 1981. The footsnare and the leghold traps: A comparison. Worldwide Furbearer Conf. Proc. pp. 1671-1685.

Olsen, G. H., S. B. Linhart, R. A. Holmes, G. J. Dasch, and C. B. Male. 1986. Injuries to coyotes caught in padded and unpadded steel foothold traps. Wildl. Soc. Bull. 14:219-223.

Olsen, G. H., R. G. Linscombe, V. L. Wright, and R. A. Holmes. 1988. Reducing injuries to terrestrial furbearers by using padded foothold traps. Wildl. Soc. Bull. 16:303-307.

Onderka, D. K., D. L. Skinner, and A. W. Todd. 1990. Injuries to coyotes and other species caused by four models of footholding devices. Wildl. Soc. Bull. 18:175-182.

Phillips, R. L. 1996. Evaluation of 3 types of snares for capturing coyotes. Wildl. Soc. Bull. 24:107-110.

Phillips, R. L., F. S. Blom, G. J. Dasch, and J. W. Guthrie. 1992. Field evaluation of three types of coyote traps. Proc. Vertebr. Pest Conf. 15:393-395.

Phillips, R. L., F. S. Blom, and R. E. Johnson. 1990. An evaluation of breakaway snares for use in coyote control. Proc. Vertebr. Pest Conf. 14:255-259.

Phillips, R. L. and K. S. Gruver. 1996. Performance of the Paws-I-Trip pan tension device on 3 types of traps. Wildl. Soc Bull. 24:119-122.

Phillips, R. L., K. S. Gruver, and E. S. Williams. 1996. Leg injuries to coyotes captured in three types of foothold traps. Wildl. Soc. Bull. 24:260-263.

Phillips, R. L. and C. Mullis. 1996. Expanded field testing of the No. 3 Victor Soft Catch trap. Wildl. Soc. Bull. 24:128-131.

Saunders, B. P. and H. C. Rowsell. 1984. Padded trap testing in British Columbia. Proc. Western Assoc. Fish Wildl. Agencies 64:136-142.

Skinner, D. L. and A. W. Todd. 1990. Evaluating efficiency of footholding devices for coyote capture. Wildl. Soc. Bull 18:166-175.

Turkowski, F. J., A. R. Armistead, and S. B. Linhart. 1984. Selectivity and effectiveness of pan tension devices for coyote foothold traps. J. Wildl. Manage. 48:700-708.

Prepared by: Ken Gruver, USDA/APHIS/ADC/NWRC, 1716 Heath Parkway, Fort Collins, CO 80524-2719

FISHER *(Martes pennanti)* *February 18, 1997*

Reference	Trap	Results
Gilbert (1981)	Conibear 220 Gabry Bionic	Compound test in Ontario. Approach tests showed fisher could be effectively trapped with Conibear 220 in baited cubby sets when bait was tied to pronged trigger. Fisher also well-positioned by Gabry, but strike would be on forepart of skull.
Proulx (1990)	Conibear 220 Sauvageau 2001-8 Modified Conibear 220 AFK Kania	Lab test in Alberta. Mechanical characteristics of Sauvageau 2001-8 and Conibear 220 with 330 springs exceeded kill threshold for fisher. AFK Kania and Conibear 220 did not.
Mahaney et al. (1991)	Cage	Field data from Massachusetts. Cage traps used to harvest ca. 35-95% of the fishers trapped annually from 1980-1988.
Proulx and Barrett (1993a)	Modified Conibear 220	Compound test in Alberta using Conibear 220 with 330 springs. When equipped with a pan trigger, this trap killed 4 of 6 fisher (avg. time to unconsciousness [ATTU] = 107 sec $\pm$ 12 sec) via a double strike. Single strikes from the same trap killed 5 of 5 fisher (ATTU = 11 $\pm$ 4 sec). Also, 5 of 6 fisher killed by double strike (head/neck and thorax) with Conibear 220 with 280 springs (ATTU = 51 $\pm$ 13 sec).
Proulx and Barrett (1993b)	Bionic	Compound test in Alberta using Bionic trap with 10 cm bait cone. Trap killed 9 of 9 fisher when cocked to 8 notches (avg. time to unconsciousness [ATTU] = $\leq$ 55 sec). When cocked to 7 notches and set on a tree, 5 of 6 fisher killed (ATTU = $\leq$ 65 sec).

Gilbert, F. F. 1981. Assessment of furbearer responses to trapping devices. Pp. 1599-1611 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Mahaney, T. J., II, T. A. Decker, and T. K. Fuller. 1991. Cage traps and fisher harvest in Massachusetts.

Poster presented at Symposium on the Biology and Manage. of Martens and Fishers. Univ. of Wyoming, Laramie. 8pp.

Proulx, G. 1990. Humane trapping program annual report 1989/90. Alberta Research Council. 15pp.

Proulx, G., and M. W. Barrett. 1993a. Evaluation of mechanically improved Conibear 220 traps to quickly kill fisher (Martes pennanti) in simulated natural environments. J. Wildl. Dis. 29:317-323.

Proulx, G., and M. W. Barrett. 1993b. Evaluation of the Bionic trap to quickly kill fisher (Martes pennanti) in simulated natural environments. J. Wildl. Dis. 29:310-316.

Prepared by: George Hubert, Jr., Illinois DNR

GRAY FOX *(Urocyon cinereoargenteus)* *December 2, 1996*

Reference	Trap	Results
Berchielli and Tullar (1980)	No. 1½ Victor double coil Ezyonem leg snare	Field study conducted in New York state to compare efficiency of No. 1½ coil spring trap with the Ezyonem leg snare. Thirteen gray foxes were captured in the 1½ coil spring versus 1 in the leg snare. There was no significant difference between the 2 devices in the incidence of trap related injuries. However, the leg snare was significantly less effective in capturing foxes than the leg-gripping trap.
Tullar (1984)	No. 1½ Victor soft catch No. 1½ Victor standard coil spring	Field study conducted in New York state comparing efficiency and leg injuries of padded and unpadded No. 1½ coil spring traps. Seventeen foxes were captured (species were not separated). Padded traps caused less damage to trapped feet and were not significantly different in terms of capture efficiency.
Linscombe and Wright (1988)	No. 1½ Victor soft catch No. 1½ Victor standard coil spring	This was part of a 9-state field study to compare the capture efficiency of padded jaw foothold traps with standard steel jaw traps. One hundred eight gray fox were captured. No difference was found between the numbers of foxes caught in different trap types ($P>0.70$).
Olsen et al. (1988)	No. 1½ Victor soft catch No. 1½ Victor standard coil spring	Necropsies were performed on 65 gray foxes taken during 9-state study. Thirty-three percent of the gray foxes caught in padded traps had ≥ 50 points damage, while 61% of those caught in standard traps had this much or more damage.

LITERATURE CITED

Berchielli, L. T. Jr. and B. F. Tullar, Jr. 1980. Comparison of a leg snare with a standard leg gripping trap. New York Fish and Game J.:63-71.

Linscombe, R. G. and V. L. Wright. 1988. Efficiency of padded foothold traps for capturing terrestrial furbearers. Wildl. Soc. Bull 16:307-309.

Olsen, G. H., R. G. Linscombe, V. L. Wright, and R. Holmes. 1988. Reducing injuries to terrestrial furbearers by using padded traps. Wildl. Soc. Bull. 16:303-307.

Tullar, B. F., Jr. 1984. Evaluation of a padded leghold trap for capturing foxes and raccoons. NY Fish and Game J. 31:97-103.

Prepared by: Robert L. Phillips, USDA/APHIS/ADC/NWRC, 1716 Heath Parkway, Fort Collins, CO 80524-2719

GRAY WOLF *(Canis lupus)* *December 2, 1996*

Reference	Trap	Results
Van Ballenberghe (1984)	No. 3 Newhouse long spring No. 4 Newhouse long spring No. 14 Newhouse (with teeth and offset jaws) Aldrich foot snare	Comparisons of injuries in wolves caught by trapping and helicopter darting in Alaska and Minnesota were made. Wolves were trapped with foothold traps (No. 3 or 4 double longspring, No. 14 double longspring with teeth and offset jaws), foot snares, and leg snares: injuries were rated from minor (class I) to severe (class IV). No distinction between foothold trap types was made in the injury data due to small sample sizes. Class III and IV injuries occurred in 41% of 109 foothold trap captures; severe injuries were seen in 11% of all captures. Tooth, lip, and gum injuries occurred in 46% of the wolves caught in foothold traps. No class III or IV injuries or oral damage resulted from foot snares (n=14). Small sample sizes precluded a comparison of injuries caused by snares and foothold traps. Suggested methods of reducing damage include shortened chains, center-mounting of the chain, and the use of drug trap tabs.
Kuehn et al. (1986)	No. 4 Newhouse (smooth jaws) No. 4 Newhouse (smooth jaws, offset) No. 4 Newhouse (tooth jaws, offset) No. 4 Newhouse (tooth jaws, custom)	During 1968-85, 375 adult gray wolves and 175 juvenile wolves were captured in northern Minnesota for radio-telemetry studies. Gray wolves captured in a custom-made foothold trap (No. 14 longspring) with offset, toothed jaws had fewer injuries than those caught in three other trap types (including another toothed-trap jaw but with a smaller offset). Dental injury in all three trap types was usually restricted to premolars; damage to canines and carnassials was uncommon.

Schultz et al. (1996)	No. 4 and No. 14 Newhouse, with modifications	During 1979-1995, 116 live-captures of 107 wolves were made in central and northern Wisconsin. Traps were checked every 24 hours or more often depending on weather conditions. All traps were equipped with drags and some were modified with the Paws-I-Trip pan tension system. Traps with modified No. 14 jaws caused the least amount of injury to adult wolves, with only 15% of captured animals having moderate to severe injuries. The No. 4 Newhouse with modified jaws was recommended for capturing wolf pups. The Paws-I-Trip system proved to be effective in reducing the capture of nontarget species.

LITERATURE CITED

Kuehn, D. W., T. K. Fuller, L. D. Mech, W. J. Paul, S. H. Fritts, and W. E. Berg. 1986. Trap related injuries to gray wolves in Minnesota. J. Wildl Manage. 50:90-91.

Schultz, R., A. Wydevent, and R. Megown. 1996. Injury levels with five types of leghold traps in Wisconsin. (Abstract) Proc. 14th Midwest Furbearer Workshop, Ironwood, MI, April 2-4, 1996.

Van Ballenberghe, V. 1984. Injuries to wolves sustained during live-capture. J. Wildl. Manage. 48:1425-1429.

Prepared by: Robert L. Phillips, USDA/APHIS/ADC/NWRC, 1716 Heath Parkway, Fort Collins, CO 80524-2719

LYNX *(Felis lynx)* *December 2, 1996* *Page 1 of 1*

Reference	Trap	Results
Proulx et al. (1995)	Modified 330	The standard 330 Conibear was compared to the same device equipped with 2 clamping bars in a compound test. The standard 330 failed to render 3 of 8 captured animals irreversibly unconscious in ≤ 3 minutes. The modified Conibear killed 8 of 8 lynx in ≤ 3 minutes and was considered a humane device for trapping lynx. This modified 330 Conibear can be expected to render ≥ 70% of captured lynx irreversibly unconscious in ≤ 3 min ($P<0.05$).
Mowat et al. (1994)	Box trap Fremont foot snare No. 3 Victor soft catch	Field tests in -40 - 0°C in southwest Yukon; 205 lynx captures were made in 3 devices. Capture efficiency did not vary significantly among trap types. Freezing limbs were a problem with padded traps. Modified Fremont foot snares caused least injury and is recommended for live capture of lynx.

LITERATURE CITED

Mowat, G. B. G. Slough, and R. Rivard. 1994. A comparison of three live capturing devices for lynx: capture efficiency and injuries. Wildl. Soc. Bull. 22:644-650.

Proulx, G., A. J. Kolenosky, P. J. Cole, and R. K. Drescher. 1995. A humane killing trap for lynx (*Felis lynx*): the Conibear 330 with clamping bars. J. Wildl. Dis. 1:57-61.

Prepared by: Robert L. Phillips, USDA/APHIS/ADC/NWRC, 1716 Heath Parkway, Fort Collins, CO 80524-2719

Reference	Trap	Results
Gilbert (1981a)	Conibear 120 Gabry Bionic Gabry Challenger Vital	Controlled tests conducted in Ontario in indoor and outdoor pens. Any type of set can be effective for this species (not trap shy). Marten should be struck within 10 cm of front of head. Conibear trigger should be placed on top for effective strike location. Vital trap killed marten quickly in runway sets, but was less effective in cubby sets because animals entered cubby with their heads and/or necks held higher than nimals entering runway sets.
Gilbert (1981b)	Vital	Controlled tests conducted in Ontario in indoor and outdoor pens. Vital passed approach test; in runway sets, corneal reflex gone in ≤17 sec. (n=3). Vital proved unsatisfactory in cubby sets (n=3); all animals were euthanized.
Novak (1981)	Conibear 110 Conibear 120 modified Conibear 110 modified Conibear 120	Controlled tests conducted in Ontario using enclosures. Two marten caught in Conibear 110 and 1 caught in Conibear 120 on land were released from traps after 5 minutes. One marten caught in modified Conibear 110 (jaws bent inward) was released after 5 minutes; 1 marten caught in modified Conibear 120 (jaws bent inward and 18kg springs) killed in 3 min. 40 sec.
Barrett et al. (1989)	C120 Magnum	Field test in northern Alberta using elevated box sets. 87% of marten had single head/neck strike; 12% received double strikes. C120 Magnum as efficient as standard traps for harvesting marten. C120 Magnum also suitable for muskrats, mink, weasels, and red squirrels.

Proulx et al. (1989a)	C120 Magnum	Compound test at Vegreville, Alberta. Thirteen of 14 marten caught in C120 Magnum had an average time to unconsciousness of ≤68 sec.; the remaining animal was euthanized after 3 minutes. 77% of the animals were unconscious before observer arrived. Double strikes recorded for 6 of 14 animals.
Proulx et al. (1989b)	Standard Conibear 120 C120 Mark IV	Compound test at Vegreville, Alberta. Time to unconsciousness in preselection tests using anaesthetized animals was ≤40 sec. for 5 of 6 marten. In actual kill tests 4 out of 6 marten lost consciousness in ≤162 sec.; 2 were euthanized after 5 min. Test results also reported for C120 Mark IV trap (extra bars welded on trap jaws). 4-prong pitchfork trigger design was best for properly positioning marten in trap.
Rowsell (1989)	LDL	Field test on trapline in Ontario. Trap consistently inflicted serious trauma resulting in rapid death (<3 min) (n=4).
Novak (1990)	LDL Kania C120 M trap boxes of various designs	Field test on traplines in Ontario to compare efficiency and incidental catch rates for various types of sets using a variety of traps. "Trapper's box" on a horizontal pole was the best set, i.e. most efficient with fewest non-targets which were mostly flying squirrels.
Naylor and Novak (1994)	Conibear 120 C120 MAX Havahart Model 1079 (wire box)	Field test on traplines in Ontario to compare efficiency and selectivity of traps for marten. Conibear 120 set in wooden boxes caught the greatest number of martens/100 trap nights (TN). Conibear 120 set in wire boxes caught fewer incidentals/100 TN,but also caught fewer martens/100 TN. Sets on ground were more selective than sets in trees and had a similar capture efficiency, but marten pelts taken from ground sets were >3 times as likely to be damaged by mice. C120 and C120 MAX exhibited similar selectivity, but C120 caught about twice as many martens/100 TN. Problem with C120 MAX trigger configuration noted. Wire box trap and C120 had similar selectivity, but box traps were less efficient for catching martens.

LITERATURE CITED

Barrett, M. W., G. Proulx, D. Hobson, D. Nelson, and J. W. Nolan. 1989. Field evaluation of the C120 magnum trap for marten. Wildl. Soc. Bull. 17:299-306.

Gilbert, F. F. 1981a. Assessment of furbearer response to trapping devices. Pp. 1599-1611 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Gilbert, F. F. 1981b. Maximizing the humane potential of traps - the Vital and the Conibear 120. Pp. 1630-1646 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Naylor, B. J., and M. Novak. 1994. Catch efficiency and selectivity of varius traps and sets used for capturing American martens. Wildl. Soc. Bull. 22:489-496.

Novak, M. 1981. Capture tests with underwater snares, leg-hold, Conibear, and Mohawk traps. Canadian Trapper, April issue, pp. 18-23.

Novak, M. 1990. Evaluation of LDL, Kania and modified Conibear 120 traps in trapping martens. Progress report. 18pp.

Proulx, G., M. W. Barrett, and S. R. Cook. 1989a. The C120 Magnum: An effective quick-kill trap for marten. Wildl. Soc. Bull. 17:294-298.

Proulx, G., S. R. Cook, and M. W. Barrett. 1989b. Assessment and preliminary development of the rotating-jaw Conibear 120 trap to effectively kill marten (Martes americana). Can. J. Zool. 67:1074-1079.

Rowsell, H. C. 1989. Field test of the LDL trap.

Prepared by: George Hubert, Jr., Illinois DNR

Reference	Trap	Results
Gilbert (1976)	Simulated "Killing"	Lab tests on anesthetized mink (n=12) to determine the minimum energy forces necessary to cause immediate death when delivered to the neck. Threshold value = 430 cm kg for a neck blow. The threshold value for a chest strike was 520 cm kg (n=6). No clamping force applied. Mink killed by a chest strike appeared to succumb quicker than those hit on the neck.
Benn (1981)	Killing trap simulator	Lab tests on anesthetized animals. Mink neck area killing force = 1.9 kg m/sec. Time to death increased as testing proceeded caudally along the neck. No animals died when a 4.0 kg m/sec impact force struck C7 - T1. Holding force of 150 N resulted in suffocation in all animals struck on C1, C2 area. The addition of holding force together with impact force seems to promote faster death.
Gilbert (1981a)	Conibear 120 Gabry Bionic Gabry Challenger Vital	Controlled tests conducted in Ontario in indoor and outdoor pens to determine probable strike locations; traps wired in set position so that they could be triggered, but not closed. Runway or blind sets most effective for mink.

Gilbert (1981b)	Vital Improved Vital Conibear 120 Askins 1 version of C120 Askins 2 version of C120	Controlled tests conducted in Ontario in indoor and outdoor pens. Best strike location with Vital was 10 cm from nose, behind ears. Vital did not have enough energy to kill mink. Improved Vital (n=5) resulted in an avg. time to unconsciousness (ATTU) of 69 ± 43 sec. for 4 mink (1 was euthanized after 180 sec.). Conibear 120 had clamping force of 275 N; the 2 mink caught were euthanized after 180 sec. Three mink caught in Askins 1/C120. All were double strike, but 2 animals euthanized after 180 sec. One mink unconscious after 96 sec. Three mink caught in Askins 2/C120. One was euthanized after 180 sec.; ATTU for the other 2 was 70 sec. Ten percent of the strikes with this trap expected to be unsatisfactory.
Novak (1981)	#1½ Victor Long Spring, Mohawk (small), Conibear 110, 120, modified C110, modified C180 with pan trigger	Controlled tests conducted in Ontario using enclosures. Mink (n=4) died in 1.75 to 3.5 minutes when caught in drowning sets using #1½ Victor LS. Of the 5 mink trapped with the small Mohawk, 1 died in 30 sec., and 4 were released after 5 min. All 6 mink trapped with Conibear 110 on land were released after 5 minutes. Four of 7 mink caught in Conibear 120 set on land were killed in 15 - 20 sec.; 3 were released after 5 min. One of 5 mink caught in modified Conibear 110 (jaws bent inward) on land died in 1.5 min.; 4 were released after 5 min. One mink (n=2) caught in modified (jaws bent inward and 18 kg spring) Conibear 110 trap on land was killed in 2.0 minutes; the other was released after 5 min. Seven mink caught in land sets with modified C180 traps that had pan triggers and jaws bent inward were killed in ≤6 sec. Recommended all Conibear traps should have jaws bent inward and be supplied with safety releases.
Gilbert and Gofton (1982)	#1½ Victor Long Spring #2 Victor Long Spring	Controlled lab tests in aquatic tank using a drowning set. The average time to cessation of struggling was 2 min. 3 sec. (n=13); EEG loss occurred in an average of 4 min. 27 sec. (n=12). EKG loss took place after an average of 8 min. 27 sec. (n=9). Only 1/13 showed injury (minor laceration). 9/13 wet drowned; 3 did not; 1 unknown.

Zelin et al. (1983)	Simulated "Killing"	Controlled lab tests on anesthetized animals; determined mean kill thresholds using 335-g striking bar; 10-minute time to death test period employed. With no holding force, the thresholds for head (n=6), neck (n=8), thorax (n=16), and abdomen (n=6) strikes on mink were 1.3, 1.9, 2.4, and 4.3 kg•m/sec, respectively. For thorax strikes, the mean threshold obtained was much less with a holding force of 100-300 N than without it. The impact momentum threshold to kill mink struck on the head within 10 minutes was zero with holding forces of 100-300N. The presence of holding forces as high as 300 N had little effect on the magnitude of the mean threshold for neck strikes. The mean threshold for head strikes of mink was relatively unaffected by the use of striking bars of different masses (236 g vs. 335 g).
Proulx et al. (1990)	C120 Magnum with pan trigger (66 x 69 mm)	Compound test at Vegreville, Alberta. Passed kill test for 3-minute threshold. Avg. time to unconsciousness <72 $\pm$ 24 sec. (n=9).
Proulx and Barrett (1991)	Bionic with 6 cm bait cone (bait on top of spring)	Compound test at Vegreville, Alberta. Passed kill test for 3-minute threshold. Avg. time to unconsciousness <60 $\pm$ 26 sec. (n=9).
Proulx and Barrett (1993)	C120 Magnum with pan trigger Conibear 120 a variety of #1 and #1½ legholds (long spring, coil spring, Soft Catch)	Field test on traplines in B.C. and Newfoundland. C120 Magnum (C120M) captured as many mink as the Conibear 120 (C120) and standard legholds. In B.C., the C120M and C120 captured similar numbers of mink and non-target animals. In Newfoundland, C120M and leghholds caught a similar number of mink, but legholds caught more non-targets. C120M recommended as humane device for mink. Need to experiment with pan tension for C120M expressed. Double strikes occurred for 29 of 30 mink caught in C120M.

LITERATURE CITED

Benn, D. M. 1981. The importance of holding force in humane trap development. Pp. 1588-1598 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Gilbert, F. F. 1976. Impact energy thresholds for anesthetized raccoons, mink, muskrats, and beavers. J. Wildl. Manage. 40:669-676.

Gilbert, F. F. 1981a. Assessment of furbearer response to trapping devices. Pp. 1599-1611 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Gilbert, F. F. 1981b. Maximizing the humane potential of traps - the Vital and the Conibear 120. Pp. 1630-1646 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Gilbert, F. F., and N. Gofton. 1982. Terminal dives in mink, muskrat and beaver. Phys. and Behav. 28:835-840.

Novak, M. 1981. Capture tests with underwater snares, leg-hold, Conibear, and Mohawk traps. Canadian Trapper, April issue, pp. 18-23.

Proulx, G., M. W. Barrett, and S. R. Cook. 1990. The C120 Magnum with pan trigger: A humane trap for mink (Mustela vison). J. Wildl. Dis. 26:511-517.

Proulx, G., and M. W. Barrett. 1991. Evaluation of the Bionic trap to quickly kill mink (Mustela vison) in simulated natural environments. J. Wildl. Dis. 27:276-280.

Proulx, G., and M. W. Barrett. 1993. Field testing the C120 Magnum trap for mink. Wildl. Soc. Bull. 21:421-426.

Zelin, S., J. C. Jofriet, K. Percival, and D. J. Abdinoor. 1983. Evaluation of humane traps: momentum thresholds for four furbearers. J. Wildl. Manage. 47:863-868.

Prepared by: George Hubert, Jr., Illinois DNR

MUSKRAT *(Ondatra zibethicus)* *February 19, 1997*

Reference	Trap	Results
Palmisano and Dupuie (1975)	Victor #1½ Long Spring (LS) Victor #2 LS Conibear 220	Field test in Louisiana. Conibear appeared superior to footholds for taking muskrats in flooded marshes. 5.3 muskrats/100 trap nights (TN) with Conibear compared with 1.5 muskrats/100 TN for footholds.
Gilbert (1976)	Simulated "Killing"	Lab tests on anesthetized muskrats (n=23) to determine the minimum energy forces necessary to cause immediate death when delivered to the neck. Threshold value = 58-63 cm kg for a neck blow. The threshold value for a chest strike was 155 cm kg (n=9).
Linscombe (1976)	Victor #2 LS Conibear 220	Field test in Louisiana. No difference between number of muskrats caught with #2 LS and Conibear 220 in either fresh or brackish marsh.
Penkala (1978)	#1 LS #1 Jump #1 Stoploss Conibear 110 modified Conibear 110 (jaws bent inward 1/2")	A total of 1,402 trap nights (TN) expended during this field study in New Jersey. Overall capture rate = 1 muskrat/21 TN. Conibear 110 had highest efficiency. Modified Conibear 110 slightly less efficient. Footholds sig. less efficient than Conibears. All traps set at den entrances.

Novak (1981)	Conibear 110 Conibear 120 Victor #1½ LS	Controlled tests conducted in Ontario using enclosures. Muskrats (n=10) died in 2 min.-5 min. 15 sec. when trapped in drowning sets with the #1½ LS. Death occurred in 1 min. 30 sec.-4 min. using Conibear 110 set underwater (n=4). 3/5 muskrats caught in Conibear 110 on land died in 3 min. 15 sec.-6 min. 30 sec.; the remaining 2 were released after 5 min. 4/7 muskrats caught in Conibear 120 on land died in 1 min. 15-sec.-3 min.; the remaining 3 were released after 5 min. 6/6 muskrats caught in modified Conibear 110 (18 kg spring) on land died in 50 sec.-3 min. 20 sec.
Gilbert and Gofton (1982)	#1½ Victor Long Spring (LS) Submarine	Controlled lab tests in aquatic tank. Of the 11 muskrats caught in #1½ LS using a platform drowning set, 6 had no injuries, 1 had a broken humerus, and 4 had lacerations and abrasions. The average time to cessation of struggling was 3 min. 34 sec.; EEG loss occurred in an average of 4 min. 3 sec. The two muskrats trapped in floating log sets and the 3 caught in submarine traps took longer to cease struggling and lose their EEG ($P<0.05$). A total of 9 muskrats "wet" drowned, and 7 did not.
Parker (1983)	#1 Victor Stoploss (SL) #1½ Victor Long Spring (LS) Conibear 110	Field study in New Brunswick. A total of 810 muskrats caught in 5,938 trap nights (TN). Foothold traps more productive in autumn than in spring ($P<0.05$); productivity of Conibear did not differ between seasons. A higher percentage of muskrats were dead in Conibear traps (98%, n=227) versus foothold traps (88%, n=583). No nontarget catches with Conibear used in underwater burrow and runway sets.
Zelin et al. (1983)	Simulated "Killing"	Controlled lab tests on anesthetized animals; determined mean kill thresholds using 335-g striking bar; 10-minute time to death test period employed. With no holding force, the thresholds for head (n=7), neck (n=7), thorax (n=8), and abdomen (n=9) hits of muskrats were 0.58, 1.4, 0.49, and 3.7 kg.m/sec, respectively. With a holding force of 100 N, no momentum was necessary to kill muskrats (n=4) within 10 min.

McConnell et al. (1985)	Victor #1 VG Stoploss Victor #1 VG Stoploss Soft Catch (SC) (w/ padded jaws)	Field test in New Jersey using float/house sets with stakes placed in deep water to drown muskrats. SC trap caused sig. less (P=0.08) damage to limbs of trapped muskrats than SL. No sig. diff. (P=0.05) in ability of SC (n=49) trap versus SL (n=48) trap to capture and hold muskrats.
HTRDC (1988)	Cosey Davies Snare Northwoods (Fenn)	Field test in Canada. Eleven percent of muskrats taken in Cosey (n=38) were alive (inefficient); may be useful if made more powerful. Davies took 6 animals in 65 trap nights (TN); needs work. Northwoods 50-75% as effective as stop loss trap; 11 catches, 29 sprung traps in 178 TN. Recommended further testing and development of all 3 traps.
Lacki et al. (1990)	Havahart Tomahawk (both w/ double doors)	Field test in Canada. A total of 16 muskrats caught in Havahart compared with 60 in Tomahawk; Tomahawk sig. more effective.

LITERATURE CITED

Gilbert, F. F. 1976. Impact energy thresholds for anesthetized raccoons, mink, muskrats, and bevers. J. Wildl. Manage. 40:669-676.

Gilbert, F. F., and N. Gofton. 1982. Terminal dives in mink, muskrat and beaver. Phys. and Behav. 28:835-840.

Humane Trap Research and Development Committee. 1988. Evaluation of the effectiveness of several trapping devices in capturing muskrat. Fur Inst. of Canada, Toronto, Ontario. Unpub. rep. 24pp.

Lacki, M. J., W. T. Peneston, and F. D. Vogt. 1990. A comparison of the efficacy of two types of live traps for capturing muskrat (Ondatra zibethicus). Can. Field Nat. 104:594-596.

Linscombe, G. 1976. An evaluation of the No. 2 Victor and 220 Conibear traps in coastal Louisiana. Proc. Annu. Conf. Southeast Assoc. Game and Fish Comm. 30:560-568.

McConnell, P. A., D. M. Ferrigno, and D. E. Roscoe. 1985. An evaluation of muskrat trapping systems and new techniques. New Jersey Div. of Fish, Game and Wildl. P-R Proj. Rep. W-59-R-7, Study I, Job I-C. 20pp.

Novak, M. 1981. Capture tests with underwater snares, leg-hold, Conibear, and Mohawk traps. Canadian Trapper, April issue, pp. 18-23.

Palmisano, A. W., and H. H. Dupuie. 1975. An evaluation of steel traps for taking fur animals in coastal Louisiana. Proc. Annu. Conf. Southeastn Assoc. Game and Fish Comm. 29:342-347.

Parker, G. R. 1983. An evaluation of trap types for harvesting muskrats in New Brunswick. Wildl. Soc. Bull. 11:339-343.

Penkala, J. M. 1978. An evaluation of muskrat trapping systems and new techniques. New Jersey Div. of Fish, Game and Wildl. P-R Proj. Rep. W-59-R-1, Study I, Job I-C. 9pp.

Zelin, S., J. C. Jofriet, K. Percival, and D. J. Abdinoor. 1983. Evaluation of humane traps: momentum thresholds for four furbearers. J. Wildl. Manage. 47:863-868.

Prepared by: George Hubert, Jr., Illinois DNR

Reference	Trap	Results
Palmisano and Dupuie (1975)	Victor #1½ Long Spring (LS) Victor #2 LS Conibear 220	Field study in Louisiana. Victor #2 LS caught significantly more nutria than Conibear 220 (P<0.01). Overall catch rate for Conibear = 2.4 nutira/100 trap nights (TN) compared with 4.8/100 TN for #2. No diff. between #2 and #1½ LS for catching nutria. Of the nutria taken in #1½ and #2 traps (n=67), 91% remained alive and 29.9% were released. 21/23 (91.3%) of the nutria caught in Conibear 220 were dead, 2 (8.7%) were alive, and none was released. Nutria apparently avoided Conibear 220 when used in trail sets.
Linscombe (1976)	Victor #2 LS Conibear 220	Field study in Louisiana. Trail sets used in fresh and brackish marsh. #2 LS caught significantly more nutria in fresh (P<0.01) and brackish (P<0.05) marsh. Trigger positioned on top for Conibear. Total trap nights (TN) = 10,671 for #2 LS and 7,567 for Conibear 220. Overall average catch rate = 18.5 nutria/100 TN for #2 LS and 12.29 nutria/100 TN for Conibear 220. Of the nutria caught in the Conibear 220, 9.7% of the adults and 10.7% of the immatures were alive when the traps were checked. An average of 69% of the immature nutria caught in #2 LS were alive and most could be released.
Robicheaux and Linscombe (1978)	Victor #1½ LS Victor #2 LS Conibear 220 Tomahawk #206	Field study in Louisiana. Leghold traps were most efficient for capturing nutria (8/100 trap nights [TN]).
Baker and Clarke (1988)	Cage trap (85 x 25 x 25 cm) with single drop door	Field study in Great Britain. Traps set on rafts (1 x 2 m or 1.5 x 0.6 m) caught significantly more nutria than traps set on land; raft traps caught about half the number of non-target animals per unit effort compared with land traps.

LITERATURE CITED

Baker, S. J., and C. N. Clarke. 1988. Cage trapping coypus (Myocaster coypus) on baited rafts. J. Appl. Ecol. 25:41-48.

Linscombe, G. 1976. An evaluation of the no. 2 Victor and 220 Conibear traps in coastal Louisiana. Proc. Annu. Conf. Southeast Assoc. Game and Fish Comm. 30:560-568.

Palmisano, A. W., and H. H. Dupuie. 1975. An evaluation of steel traps for taking fur animals in coastal Louisiana. Proc. Annu. Conf. Southeast Assoc. Game and Fish Comm. 29:342-347.

Robicheaux, B., and G. Linscombe. 1978. Effectiveness of live-traps for capturing furbearers in a Louisiana coastal marsh. Proc. Annu. Conf. Southeast Assoc. Fish and Wildl. Agencies 32:208-212.

Prepared by: George Hubert, Jr., Illinois DNR

OPOSSUM *(Didelphis virginiana)* *February 19, 1997*

Reference	Trap	Results
Berchielli and Tullar (1980)	Blake & Lamb #1½ Coil Spring (CS) Ezyonem leg snare	Field test in New York. #1½ CS caught 15 opossums in 19 visits compared with 1 capture in 6 visits for the Ezyonem; this difference was significant ($P>0.05$). No self-mutilation observed in any of the opossums caught in #1½ CS (n=15). Injuries between trap types were not compared due to lack of captures in Ezyonem (n=1). No injuries observed in 67% of the opossums caught in the #1½ CS; fractures recorded in 20% of the opossums examined (n=15).
Turkowski et al. (1984)	Victor #3 NM (with and without prototype pan tension devices)	Field test in California, New Mexico, Oregon, Texas, and Utah. Shear-pin device (n=27) and leaf spring (n=32) excluded 100% of opossums from traps compared with a 0% exclusion rate when no pan tension device was used (n=39). Improved pan tension devices performed better than prototypes. Coyote capture efficiency for traps equipped with improved pan tension devices varied from 86-94% that of the standard trap.
Linscombe and Wright (1988)	Victor #1½ Soft Catch (SC) Victor #1½ CS	Field study in Georgia, Louisiana, Minnesota, Mississippi, New York, and Texas. No difference in numbers of opossums caught in different trap types ($P=0.70$; n=148 for SC and n=138 for CS.
Nettles et al. (1990)	Victor #2 CS Victor #2 CS with padded jaws	Field test in Washington. Significantly less leg damage ($P<0.01$) observed in opossums caught in padded jaw trap (n=14) compared with those caught in standard #2 trap (n=13). Average injury scores were 36 and 220 points, respectively, for the padded and the standard trap. Leg amputations and compound fractures occurred more often in unpadded trap.

Phillips and Gruver (1996)	Victor #3 Soft Catch (SC) Victor #3 NM #4 Newhouse (all equipped with Paws-I-Trip pan tension device)	Field study in 8 western states. Paws-I-Trip device successfully excluded 100% (n=2) of opossums that visited SC traps, and 75% (n=20) of those that visited #4 Newhouse traps. Coyote capture rates for Paws-I-Trip equipped traps were: #3 SC = 81.8%, #3 NM = 91.0%, and #4 Newhouse = 87.2%.
Hill (no date)	#2 CS #2 CS w/ offset jaws Conibear 120 Conibear 220	Field test in Alabama. Standard #2 CS more efficient than #2 CS with offset jaws. Bone fractures observed in 44% of opossums caught in #2 CS (n=18) compared with 16% of those caught in #2 CS offset (n=19). Similar numbers of opossums caught in Conibear 220 and Conibear 120 traps when placed in boxes on ground (1/17.5 trap nights [TN], n=37, 648 TN for Conibear 220; 1/19.4 TN, n=26, 508 TN for Conibear 120). Conibear 220 trap box caught fewer opossums (1/18.6 TN, n=22, 410 TN) when set 1 meter above ground (open end down) compared with Conibear 220 trap box set on ground (1/7.4 TN, n=34, 320 TN). Conibear 220 trap boxes set on ground caught more opossums (1/9.4 TN, n=34, 320 TN) compared with #2 CS used in dirt-hole sets (1/14.2 TN, n=23, 327 TN).

LITERATURE CITED

Berchielli, L. T., Jr., and B. F. Tullar, Jr. 1980. Comparison of a leg snare with a standard leg-gripping trap. N.Y. Fish and Game J. 27:63-71.

Hill, E. P. No date. Evaluation of improved traps and trapping techniques. Alabama Dept. of Conserv. and Nat. Res. P-R Proj. Rep. W-44-5, Job IV-B. 19pp.

Linscombe, R. G., and V. L. Wright. 1988. Efficiency of padded foothold traps for capturing terrestrial furbearers. Wildl. Soc. Bull. 16:307-309.

Nettles, V. F., F. A. Hayes, and R. A. Holmes. 1990. Comparison of trap-related leg injuries caused by leghold traps with rubber-shod jaws and standard steel-jawed leghold traps. Southeastern Coop. Wildl. Dis. Study, unpubl. rep. 16pp.

Phillips, R. L., and K. S. Gruver. 1996. Performance of the Paws-I-Trip™ pan tension device on 3 types of traps. Wildl. Soc. Bull. 24:119-122.

Turkowski, F. J., A. R. Armistead, and S. B. Linhart. 1984. Selectivity and effectiveness of pan tension devices for coyote foothold traps. J. Wildl. Manage. 48:700-708.

ADDITIONAL LITERATURE ABOUT TRAPS FOR THE BRUSH-TAILED POSSUM (Trichosurus vulpecula)

Warburton, B. 1982. Evaluation of seven trap models as humane and catch-efficient possum traps. New Zealand J. Zool. 9:409-418.

Warburton, B. 1992. Victor foot-hold traps for catching Australian brush-tailed possums in New Zealand: capture efficiency and injuries. Wildl. Soc. Bull. 20:67-73.

Prepared by: George Hubert, Jr., Illinois DNR

Reference	Trap	Results
Gilbert (1976)	Simulated "Killing"	Lab tests on anesthetized raccoons (n=11) to determine the minimum energy forces necessary to cause immediate death when delivered to the neck. Threshold value = 575 cm kg for a neck blow. No pelt damage occurred at 1,037 cm kg. The threshold value was ca. 1,150 cm kg for a chest strike (n=8).
Linscombe (1976)	Victor #2 Long Spring (LS) Conibear 220	Field test in Louisiana in fresh and brackish marsh habitat. #2 Victor more efficient than Conibear 220 in brackish marsh for capturing raccoons, but no difference in efficiency in fresh marsh was detected.
Berchielli and Tullar (1980)	Blake & Lamb #1½ Coil Spring (CS) Ezyonem leg snare	Field study in New York. #1½ CS caught 17 raccoons in 28 visits compared with 1 capture in 22 visits for the Ezyonem and was more efficient (P<0.01). Self-mutilation observed in 37% of raccoons caught in #1½ CS (n=30). Injuries between trap types were not compared due to small sample size for Ezyonem (n=1). Raccoons caught in CS had fewer injuries when traps were covered with sifted soil.
Gilbert (1981)	Conibear 220 Vital Gabry Bionic Gabry Challenger	Controlled tests conducted in Ontario in indoor and outdoor pens. Approach tests only; n=2 for each trap; raccoons consistently placed forefeet into ground level sets at the same time or before their heads; most traps triggered by the feet. Conibear 220 used in dog-proof box with trigger prongs separated by 7 cm and joined by monofilament line ensured good strike location.

Novak (1981a)	Novak foot snare #2 coil spring w/ offset jaws #4 double long spring (DLS) with offset jaws	Field study in Ontario. Capture rate = 57% for foot snare (64/113), 76% for footholds (26/34); no injuries to 40/49 raccoons caught in foot snare compared with 11/22 raccoons taken in foothold traps.
Novak (1981b)	Conibear 220 Conibear 330 Mohawk modified Conibear 280	Controlled tests conducted in Ontario using enclosures. 3/5 raccoons caught in Mohawk trap escaped; the other 2 died in 4-5 minutes. 5/5 raccoons caught in 330 Conibear were removed from trap after 5 minutes; none died because trap jaws remained 3-4 cm apart after trap was fired. 3/5 raccoons caught in 220 Conibear died in 90-210 seconds, and 2 were released after 5 minutes. 3/5 raccoons caught in modified 280 Conibear with pan trigger died in 75-175 seconds, and 2 were released after 5 minutes. The pan trigger proved ineffective for catching raccoons because traps discharged prematurely due to the animals' walking pattern.
Zelin et al. (1983)	Simulated "Killing"	Controlled lab tests on anesthetized animals; determined mean kill thresholds using 335-g and 807-g striking bars; 10-minute time-to-death test period employed. With no holding force, the thresholds for head (n=8) and neck (n=7) hits of raccoons were 3.4 and 3.3 kg.m/sec, respectively, using the 335-g striking bar. The effect of a 100-N holding (clamping) force (n=10 for head and n=3 for neck catches) was sufficient to eliminate the need for an impact momentum. Mean kill thresholds using the 807-g striking bar with no holding force were 4.6 and 5.7 kg.m/sec for head (n=6) and neck (n=6) hits, respectively.

Tullar (1984)	Victor #1½ CS Victor #1½ prototype padded CS (both models had light springs - 40 lbs. vs. 70 lbs. std.)	Field study in New York. Injury scores did not differ between trap types; 8 of 9 raccoons caught in padded trap had injury score ≤15; 7 of 14 raccoons caught in unpadded trap had injury score ≤15; 23.5% (n=17) of the raccoons caught in unpadded trap had injuries due to self-mutilation. Dirt-hole set used.
Moore and Kennedy (1985)	Tomahawk wire cage Havahart wire cage	Field investigation. Capture success (n=57) highest in autumn/winter; success higher with higher temperature; negative correlation with precipitation.
Linscombe and Wright (1988)	Victor #1½ CS Victor #1½ Soft Catch (SC)	Field study in Georgia, Louisiana, Minnesota, Mississippi, New York, and Texas. The SC trap caught fewer raccoons than the CS (n=339, P=0.05). Data from trappers setting primarily for foxes and bobcats indicated no diff. in raccoon captures (n=63 SC, n=62 CS) with the 2 trap types (P=0.92).
Olsen et al. (1988)	Victor #1½ CS Victor #1½ SC	Field study in Georgia, Louisiana, Minnesota, Mississippi, New York, and Texas. Raccoons in NE U.S. showed no difference in amount of damage between traps (n=25 SC, n=35 CS). Raccoons in SE U.S. had sig. less damage in SC; 35/75 (47%) caught in SC had an injury score ≤15 compared with 22/98 (22%) caught in CS.
Saunders et al. (1988)	Victor #1½ SC Victor #1 SC prototype	Field test in British Columbia during September using flat, shallow water, and cubby sets. Sig. less damage to raccoons (P<0.05) with the #1 SC (n=12) compared to raccoons caught in the #1½ SC (n=10) in a 24-hr. period or less. Mean 24-hr. damage score for #1 SC = 5 compared to 10 for #1½ SC.

Nettles et al. (1990)	Victor #1½ CS Victor #1½ CS with padded jaws (spring mechanism identical)	Field study in Maryland conducted during winter. A total of 20 raccoons captured in each trap type; no sig. difference in injury scores between trap types; self-mutilation occurred in both traps. Mean leg damage scores for raccoons alive at time of trap check were 164 (standard CS, n=7) and 202 (padded CS, n=12).
Tullar and Phillips (1990)	Victor #1 CS Victor #1 SC prototype Victor #1½ CS Victor #1½ SC	Field study in New York using land sets. The catch per visit rate for the #1 CS was not sig. different from that of the #1½ CS. Padded traps of both sizes were sig. less effective for catching raccoons than standard traps. #1 CS traps (n=90) caused sig. less injury than #1½ CS (n=51); padded traps of both sizes failed to sig. reduce injury to trapped raccoons (#1 SC n=17; #1½ SC n=30). #1 size traps sig. reduced the incidence of self-mutilation compared with #1½ size.
Hubert et al. (1991)	Victor #1½ SC Montgomery #11 DLS	Two-year field study in Illinois using non-drowning water sets. Capture rate with #11 DLS was sig. higher than with #1½ SC (147 versus 96/1,000 trap nights). Mean injury score for raccoons captured in #11 DLS (n=108) averaged 1.2 times that for those caught in the #1½ SC (n=67); this difference approached significance (P=0.054). Self-mutilation of trapped limb was observed in 29% (n=99) of the raccoons examined, and was not influenced by trap type (P=0.22).
Proulx (1991)	EGG Conibear 220 Box	Field test in Quebec and British Columbia; 251 raccoons captured. EGG (n=98) held >79% of raccoons for ≤24 hours without serious injury. Capture efficiency of EGG trap similar to that of box trap (n=36) in British Columbia. EGG trap was as capture-efficient as Conibear 220 (n=117) early in season in Quebec, but later in season its efficiency declined.
Heydon et al. (1993)	Standard #1½ Padded #1½	Field study in Ontario. Raccoons caught in unpadded trap (n=20) had sig. more injuries to legs than those taken in padded traps (n=10).

Proulx et al. (1993)	EGG Victor #1½ SC	Compound test conducted in Alberta. 9/9 raccoons captured in EGG trap held without serious injury for 12 and 24 hours (range of injury scores = 0-20); 9/9 raccoons captured in SC held without serious injury for 12 hours (range of injury scores = 0-40; 8/9 raccoons captured in SC sustained minor injuries over a 24 hour period, but 1 self-mutilated the captured limb (injury score = 120).
Kern et al. (1994)	Victor #1½ CS Victor #1½ w/ laminated jaws Butera #1½ w/ offset jaws Victor #1½ w/ padded jaws	Field test in Wyoming using terrestrial sets and 24-hr. trap check interval. The median injury scores for the offset jaw trap (5.0, n=4), laminated jaw trap (5.0, n=2), padded jaw trap (5.0, n=7), and standard trap (35.0, n=8) were not significantly different (P=0.41). Only leg injuries evaluated.
Proulx and Drescher (1994)	Conibear 280 (in standard and modified versions), Sauvageau 2001-8	Controlled lab tests on immobilized animals in Alberta. Conibear 280 (n=6) rendered 3 raccoons struck in neck region irreversibly unconscious in ≤3 minutes; 2 others lost consciousness in 194 and 195 sec.; 1 was euthanized after 5 minutes. Sauvageau 2001-8 (n=3) rendered 1 raccoon struck in the neck unconscious in 58 sec.; 2 others were euthanized after 5 minutes. A modified Conibear 280 with a clamping bar on the top striking jaw rendered 6/6 raccoons struck in neck region irreversibly unconscious in 182 to 270 sec. All traps would fail preselection test unless the minimum time to loss of consciousness was increased to 4 min.
Sabean and Mills (1994)	Conibear 160 (BMI)	Average time to unconsciousness for 4/5 raccoons was 172 sec ± 16 sec.; 1 animal was euthanized; trap would have failed 1994 draft ISO test standard. Lab test performed in Nova Scotia on raccoons immobilized with ketamine.

Hubert et al. (1996)	EGG Victor #1 CS	Field test in Illinois using non-drowning water sets and 24-hour trap check interval. EGG (n=63) captured raccoons more efficiently than #1 CS (n=37); 94% of raccoons showed no oral injuries; whole body injury scores for raccoons caught in CS (n=40) were sig. higher than EGG and averaged 116 compared to an average of 68 for the EGG (n=62). Incidence of self-mutilation sig. lower with EGG.
Hill (no date)	#2 CS #2 CS w/ offset jaws Conibear 120 Conibear 220	Field test in Alabama. Efficiency of standard #2 CS similar to #2 CS with offset jaws. Bone fractures observed in 62% of raccoons caught in #2 CS (n=13) compared with 40% of those caught in #2 CS offset (n=5). More raccoons caught in Conibear 120 compared with Conibear 220 when placed in boxes on ground (1/14.4 trap nights [TN], n=35, 508 TN for Conibear 120; 1/30.8 TN, n=21, 648 TN for Conibear 220). Conibear 220 trap boxes set on ground caught more raccoons (1/64 TN, n=5, 320 TN) compared with Conibear 220 trap box set 1 meter above ground (open end down) (1/137 TN, n=3, 410 TN). Conibear 220 trap boxes set on ground caught a similar number of raccoons (1/64 TN, n=5, 320 TN) compared with #2 CS used in dirt-hole sets (1/54 TN, n=6, 327 TN).

LITERATURE CITED

Berchielli, L. T., Jr., and B. F. Tullar, Jr. 1980. Comparison of a leg snare with a standard leg-gripping trap. N.Y. Fish and Game J. 27:63-71.

Gilbert, F. F. 1976. Impact energy thresholds for anesthetized raccoons, mink, muskrats, and beavers. J. Wildl. Manage. 40:669-676.

Gilbert, F. F. 1981. Assessment of furbearer response to trapping devices. Pp. 1599-1611 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Heydon, C., M. Novak, and H. Rowsell. 1993. Humane attributes of three types of legholding traps. Ontario Ministry of Nat. Resources Rep. 24pp.

Hill, E. P. No date. Evaluation of improved traps and trapping techniques. Alabama Dept. of Conserv. and Nat. Res. P-R Proj. Rep. W-44-5, Job IV-B. 19pp.

Hubert, G. F., Jr., R. D. Bluett, and G. A. Dumonceaux. 1991. Field evaluation of two footholding devices for capturing raccoons in non-drowning water sets. Pages 23-24 in L. Fredrickson and B. Coonrod, eds. Proceedings of the 9th Midwest furbearer workshop. South Dakota Dep. Game, Fish and Parks, Pierre. 112pp.

Hubert, G. F., Jr., L. L. Hungerford, G. Proulx, R. D. Bluett, and L. Bowman. 1996. Evaluation of two restraining traps to capture raccoons. Wildl. Soc. Bull. 24:699-708.

Kern, J. W., L. L. McDonald, M. D. Strickland, and E. Williams. 1994. Field evaluation and comparison of four foothold traps for terrestrial furbearers in Wyoming. Tech. Res. Work Order, Furbearers Unlimited, Bloomington, Ill. 29pp.

Linscombe, G. 1976. An evaluation of the No. 2 Victor and 220 Conibear traps in coastal Louisiana. Proc. of the Ann. Conf. Southeast Game and Fish Comm. 30:560-568.

Linscombe, R. G., and V. L. Wright. 1988. Efficiency of padded foothold traps for capturing terrestrial furbearers. Wildl. Soc. Bull. 16:307-309.

Moore, D. W., and M. L. Kennedy. 1985. Factors affecting the response of raccoons to traps and population size estimation. Am. Mid. Nat. 114:192-197.

Nettles, V. F., F. A. Hayes, and R. A. Holmes. 1990. Comparison of trap-related leg injuries caused by leghold traps with rubber-shod jaws and standard steel-jawed leghold traps. Southeastern Coop. Wildl. Dis. Study, unpubl. rep. 16pp.

Novak, M. 1981a. The foot-snare and the leg-hold traps: a comparison. Pp. 1671-1685 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Novak, M. 1981b. Capture tests with underwater snares, leg-hold, Conibear, and Mohawk traps. Canadian Trapper, April, pp. 18-23.

Olsen, G. H., R. G. Linscombe, V. L. Wright, and R. A. Holmes. 1988. Reducing injuries to terrestrial furbearers by using padded foothold traps. Wildl. Soc. Bull. 16:303-307.

Proulx, G. 1991. Humane trapping program annual report 1990-91. Alberta Research Council. 16pp.

Proulx, G., D. K. Onderka, A. J. Kolenosky, P. J. Cole, R. K. Drescher, and M. J. Badry. 1993. Injuries and behavior of raccoons (Procyon lotor) captured in the Soft Catch™ and the EGG™ traps in simulated natural environments. J. Wildl. Dis. 29:447-452.

Proulx, G., and R. K. Drescher. 1994. Assessment of rotating-jaw traps to humanely kill raccoons (Procyon lotor). J. Wildl. Dis. 30:335-339.

Sabean, B., and J. Mills. 1994. Raccoon - 6" X 6" body gripping trap study. Nova Scotia Dep. Nat. Resources Rep. 3pp.

Saunders, B. P., H. C. Rowsell, and I. W. Homer. 1988. A better trap, the search continues. Canadian Trapper, Winter, pp. 8, 16.

Tullar, B. F., Jr. 1984. Evaluation of a padded leghold trap for trapping foxes and raccoons. N. Y. Fish and Game J. 31:97-103.

Tullar, B. F., Jr., and F. J. Phillips, Jr. 1990. A comparative evaluation of two sizes of padded and standard foothold traps for capturing raccoons. N.Y. State Dep. of Environ. Conserv., Delmar. Unpub. rep. 14pp.

Zelin, S., J. C. Jofriet, K. Percival, and D. J. Abdinoor. 1983. Evaluation of humane traps: momentum thresholds for four furbearers. J. Wildl. Manage. 47:863-868.

Prepared by: George Hubert, Jr., Illinois DNR

RIVER OTTER *(Lontra canadensis)* *February 19, 1997* *Page 1 of 2*

Reference	Trap	Results
Northcott and Slade (1976)	Bailey live trap Hancock live trap	Field study in Newfoundland. Bailey ineffective for live-trapping animals; catch rate = 0.17 otters/100 trap nights (TN). Hancock set unbaited in slides; catch rate = 0.6 - 1.3 otters/100 TN. Control of human scent important.
Melquist and Hornocker (1979)	#2 Coil Spring (CS) #3 Jump Hancock various others	Field study in Idaho. Little injury to otters captured in #2 CS (n=5), but at least 35 escapes were recorded. Otters captured in #3 Jump (n=5) had injuries ranging from slight swelling in toes to broken legs. Hancock trap found to be effective (captures=21) when minor modifications were made.
Shirley et al. (1983)	Victor #11 Double Long Spring (DLS)	Field study in Louisiana.
Route and Peterson (1988)	Hancock	A total of 41 otters captured in 1,686 trap nights in Minnesota using Hancock traps. Few injuries recorded. Trap nights/otter captured = 13.9 in spring (n=22) compared with 72.6 in fall.
Serfass et al. (1996)	Modified Victor #1½ Soft Catch (SC) Victor #11 Double Long Spring (DLS)	Field study in eastern United States (Pennsylvania and Maryland). Modified SC traps used to capture 29 otters. Capture rate = 0.57, 60.3 trap nights/otter). Among adult otters, 1 (3.7%) caught in SC sustained injuries requiring an amputation (a single digit) in comparison to 12/17 (70.6%) taken in #11 DLS. No difference in frequency or severity of dental injuries to otters between trap types. SC traps modified by replacing 1 factory installed spring with a #2 spring and adding a segment of anchor chain ranging from 0.5 to 1.25 m in length. Traps checked daily.

LITERATURE CITED

Melquist, W. E., and M. G. Hornocker. 1979. Methods and techniques for studying and censusing river otter populations. Univ. Idaho For., Wildl. and Range Exp. Sta. Tech. Rep. 8., Moscow. 17pp.

Northcott, T. H., and D. Slade. 1976. A livetrapping technique for river otters. J. Wildl. Manage. 40:163-164.

Route, W. T., and R. O. Peterson. 1988. Distribution and abundance of river otters in Voyageurs National Park, Minnesota. U. S. Dep. of Int., Nat. Park Serv., Res./Resour. Manage. Rep. MWR-10. Midwest Reg. Office, Omaha, Nebraska. 62pp.

Serfass, T. L., R. P. Brooks, T. J. Swimley, L. M. Rymon, and A. H. Hayden. 1996. Considerations for capturing, handling, and translocating river otters. Wildl. Soc. Bull. 24:25-31.

Shirley, M. G., R. G. Linscombe, and L. R. Sevin. 1983. A live trapping and handling technique for river otter. Proc. Annu. Conf. Southeast Assoc. Fish and Wildl. Agencies 37:182-189.

Prepared by: George Hubert, Jr., Illinois DNR

Reference	Trap	Results
Novak (1981)	Novak leg snare No. 4 Victor long spring No. 2 Victor coil spring	The Novak leg snare was compared with 2 types of leghold traps under field conditions in southern Ontario. One hundred-eleven red foxes were captured. The capture rate was 89% for the foot snare and 85% for the leghold traps. No differences were found among animals which discharged traps, capture rate or escape rate. Ninety-eight percent of the animals captured in foot snares had either no marks or just rubbed skin or nicks on their legs as compared to 48 percent of animals caught in leghold traps. Animals caught in either foot snares or legholds did not damage their teeth by biting on the traps. Results indicated that the foot snare was as effective as the leghold trap in capturing furbearers, and greatly reduced injuries.
Rowsell et al. (1981)	Power snare Non power snare	Eighteen foxes were studied in the laboratory to see if snares could produce a humane death. The power snares appeared to have the only potential to produce rapid death in foxes. It is possible that the more rigid cartilage in the trachea of foxes may make them more difficult to constrict under pressure. This study questioned the effectiveness of producing a humane death to foxes using snares.
Englund (1982)	Swedish leg snare No. 2 Victor long spring No. 3 Victor long spring	During the study, 1,374 red foxes were trapped in Sweden using standard No. 2 and No. 3 long spring traps while 154 were trapped in traps coated with plastic and 123 in leg snares. The frequency and severity of dental injuries from leghold traps was less for foxes captured in plastic-coated traps, while leg injuries remained the same. The plastic legsnare was able to virtually eliminate all trap-related injuries.

McConnell (1982)	No. 1 ½ coil spring No. 2 coil spring Box trap	Total of 9 red foxes were captured during 181 trap nights. Leghold devices were found to be more efficient, more selective, and cost less than box traps which were determined to be inefficient. The standard No. 2 coil spring was found more productive than the No. 2 coil spring with offset jaws.
Tullar (1984)	No. 1 ½ Victor coil spring	Sixteen red foxes were captured in Columbia County, New York. The foot-damage scores indicated that the padded traps caused significantly less damage than the unpadded traps.
Stevens (1986)	Treadle snare Bow snare Gin trap	Twenty-one foxes were captured in Australia using snares and traps. Foxes caught in the snares suffered bruising in the area where the cable was located, while gin-trapped foxes suffered lacerations, swelling and disjointed bones. Traps were more efficient during this study, but produced more damage to trapped legs.
Berchielli and Tullar (1988)	Ezyonem leg snare No. 1 ½ coil spring	Fifteen red foxes were trapped using coil spring traps and 2 were captured in the leg snares. The leg snare was less effective than the coil spring trap. The leg snare did not appear to be more humane than the coil spring trap since both produced similar trap-related injuries.

Kreeger et al. (1990)	No. 1 ½ Victor Soft Catch No. 1 ½ standard coil spring	Objectives of the study were to examine the behavioral, physiological, endocrine, biochemical and pathological responses of both free-ranging and captive North Dakota red foxes caught in unpadded and padded-jaw foothold traps as well as to compare such responses with those of untrapped foxes. Foxes caught in unpadded traps (n=10) had higher physical injury scores to the trapped limbs than foxes caught in padded traps (n=11) (P<0.005). Heart rate and body temperature increased rapidly after foxes were caught, but returned to mean pretrapped levels after 80 minutes. Mean time spent physically resisting the trap in an 8-hour period was 17.8 +/- 6.7 (SE) and 13.3 +/- 0.3% for foxes caught in unpadded and padded traps, respectively (P=.033). Trapped foxes generally had higher levels of adrenocorticotropin, *B*-endorphin, and cortisol and lower levels of thyroxine and insulin compared to control foxes (P<0.05). Foxes caught in unpadded traps had higher cortisol, but lower *B*-endorphin values than foxes caught in padded traps (P=0.05). Trapped foxes also had higher levels of bilirubin, lactate dehydrogenase, alkaline phosphatase (ALP), and aspartate aminotransferase (AST) than control foxes (P<0.05). Foxes caught in unpadded traps had higher values for ALP, AST, and gamma-glutamyl transpeptidase than foxes caught in padded traps (P<0.05). Trapped foxes also had higher leukocyte counts than nontrapped foxes with a significant neutrophilia and leukopenia (P<0.05). Trapped foxes had higher incidences of adrenal gland and kidney congestion as well as adrenal gland, lung, and heart hemorrhage relative to control foxes (P<0.05). Most of the changes were consistent with the physical exertion of resisting the trap, and none appeared life-threatening. Overall, padded-jawed traps causes less trauma to red foxes than unpadded traps.

Linscombe and Wright (1988)	No. 1 ½ Victor Soft Catch No. 1 ½ standard coil spring	Total of 10,586 trap nights showed no difference between visitation rates between the padded and unpadded traps. Ninety-eight red foxes were captured in Arizona, Georgia, Kansas, Louisiana, Minnesota, Mississippi, New York, and Texas during this study. Unpadded traps were more efficient in the northern states, but no difference was detected in the southern states.
Olsen et al (1988)	No. 1 ½ Victor Soft Catch No. 1 ½ standard coil spring	Thirty red foxes were captured in the padded trap, while 48 were captured in the standard trap. The padded trap caused less foot damage than the standard trap. Only 7% had ≥ 50 points of damage with the padded trap, but 38% had ≥ 50 points of damage from the standard trap.
Proulx and Barrett (1990)	King power snare Mosher power snare Olecko power snare	Fifteen red foxes were tested with killing snares in a pen situation at Vegreville, Alberta. This study showed that power snares have the potential to render neck-captured red foxes irreversibly unconscious within 6 minutes. With more powerful springs and different types of cables and locks, this time period may be reduced to 5 minutes.
Kern et al. (1994)	No. 1 ½ Victor coil spring No. 1 ½ Victor laminated No. 1 ½ Butera offset No. 1 ½ Victor Soft Catch	Four models of 1½ size traps were field tested during [illegible]4 trap nights on 4 traplines to capture furbearers in northeastern Wyoming and southeastern Montana. Two hundred forty-three red foxes were captured using the traps tested. Selectivity, efficiency, and catch rate were all found to be similar on 3 of 4 trap lines. Efficiency and catch rates were significantly lower for the padded trap on one trapline where more precipitation and heavier soil types were present. Traps were evaluated using the draft ISO trap standards and all traps, except the standard 1½ Victor, passed for red fox. The Soft Catch, Butera offset and laminated traps caused significantly less injury than the standard trap.

White et al (1991)	No. 1 ½ Victor Soft Catch No. 1 ½ standard coil spring Box (live) trap	This study documented the physiological responses of captive-raised red foxes to capture in box (live) traps. The behavior of captured foxes was video recorded, and heart rate and body temperature were monitored via radio telemetry throughout an 8-hour restraint period. Endocrine, biochemical, hematological, and pathological samples were collected. Responses of foxes caught in box traps were compared to the responses reported by Kreeger et al. (1990) for untrapped foxes and foxes caught in padded and unpadded-jaw traps. Heart rate and body temperature increased after foxes were caught in box traps, but never significantly exceeded mean pretrapped levels. Foxes caught in box traps were physically active for 35.7 +/- 8.8 (SE)% of the restraint period. The majority of this activity consisted of pacing in the trap. Foxes caught in box traps had higher ($P<0.03$) adrenocorticotropin and cortisol values than untrapped foxes, and lower ($P<0.001$) *B*-endorphin and cortisol levels than foxes caught in foothold traps. Bilirubin, alkaline phosphatase, lactate dehydrogenase, and aspartate aminotransferase levels for foxes caught in box traps were elevated ($P<0.01$) above levels of untrapped foxes. Foxes caught in box traps had lower ($P<0.004$) alkaline phosphatase, lactate dehydrogenase, creatine kinase, and aspartate aminotransferase levels than foxes caught in foothold traps. We conclude that factors associated with limb restraint directly contribute to the trauma experienced by trapped red foxes and, therefore, foxes caught in box traps undergo less trauma than foxes that are restrained by a limb in a padded- or unpadded foothold trap.

LITERATURE CITED

Berchielli, L. T. and B. F. Tullar. 1988. Comparison of a leg snare with a standard leg-gripping trap. NY Fish and Game J. 27:63-71.

Englund, J. 1982. A comparison of injuries to leghold trapped and footsnared red foxes. J. Wildl. Manage. 46:1113-1120.

Kern, J. W., L. L. Mc Donald, M. D. Strickland, and E. Williams. 1994. Field evaluation and comparison of four foothold traps for terrestrial furbearers in Wyoming. Tech rept. For Furbearers Unlimited. Bloomington, Illinois. 29pp.

Kreeger, T.J., P. J. White, U. S. Seal, and J. R. Tester. 1990. Pathological responses of red foxes to foothold traps. J. Wildl. Manage. 54:147-160.

Linscombe, R. G. And V. L. Wright. 1988. Efficiency of padded foothold traps for capturing terrestrial furbearers. Wildl. Soc. Bull 16:307-309.

McConnell, P. A. 1982. To Quantitatively evaluate the efficiency, selectivity, and effect of target species of various trapping systems. NJ Div of Fish, Game, and Wildlife. P-R Project W-59-R-5. pp. 7.

Novak, M. 1981. The footsnare and the leghold traps: A comparison. Worldwide Furbearer Conf. Proc. pp. 1671-1685.

Olsen, G. H., R. G. Linscombe, V. L. Wright, and R. A. Holmes. 1988. Reducing injuries to terrestrial furbearers by using padded foothold traps. Wildl. Soc. Bull. 16:303-307.

Proulx, G. and M. W. Barrett. 1990. Assessment of power snares to effectively kill red fox. Wildl. Soc. Bull. 18:27-30.

Rowsell, H. C., J. Ritcey, and F. Cox. 1981. Assessment of effectiveness of trapping methods in the production of a humane death. Proc. Worldwide Furbearer Conf., pp. 1647-1670.

Saunders, B. P. and H. C. Rowsell. 1984. Padded trap testing in British Columbia. British Columbia Ministry of Environment. Unpubl. Rep. 7 pp.

Stevens, P. L. 1986. A report on the first field trials of alternative leghold devices. Keith Turnball Research Institute. 14 pp.

Tullar, B. F. 1984. Evaluation of padded leghold trap for capturing foxes and raccoons. NY Fish and Game J. 31:97-103.

White, P. J., T. J. Kreeger, U. S. Seal, and J. R. Tester. 1991. Pathological responses of red foxes to capture in box traps. J. Wildl. Manage. 55(1):75-80

Prepared by: Ken Gruver, USDA/APHIS/ADC/NWRC, 1716 Heath Parkway, Fort Collins, CO 80524-2719

STRIPED SKUNK *(Mephitis mephitis)* *February 20, 1997*

Reference	Trap	Results
Berchielli and Tullar (1980)	Blake & Lamb #1½ Coil Spring (CS), Ezyonem leg snare	Field study in New York. #1½ CS caught 6 skunks in 20 visits compared with 0 captures in 13 visits for the Ezyonem, but the difference was not significant (P>0.05). Self-mutilation observed in 100% of skunks caught in #1½ CS (n=6). Injuries between trap types not compared due to 0 captures in Ezyonem.
Novak (1981)	Novak foot snare #2 coil spring w/ offset jaws #4 double long spring (DLS) w/ offset jaws	Field study in Ontario. Capture rate = 34% for foot snare (16/47), 97% for footholds (35/36); no injuries to 12/12 skunks caught in foot snare compared with 12/30 skunks taken in foothold traps. Self-multilation of trapped foot observed in 47% (n=30) of the skunks taken in foothold traps.
Turkowski et al. (1984)	Victor #3 NM (w/ and w/out prototype pan tension devices)	Field study in California, New Mexico, Oregon, Texas, and Utah. Shear-pin device excluded 96% of skunks (n=74) from traps compared with a 91% exclusion rate for a leaf spring device (n=96). Exclusion rate without any pan tension device was 31% (n=71). Improved pan tension devices performed even better than prototypes. Coyote capture efficiency for traps equipped with improved pan tension devices varied from 86-94% that of the standard trap.

Phillips and Gruver (1996)	Victor #3 Soft Catch (SC) Victor #3 NM #4 Newhouse (all equipped w/ Paws-I-Trip pan tension device)	Field study in 8 western states. Paws-I-Trip device successfully excluded 100% (n=34)of skunks that visited SC traps, 69.2% (n=13) that visited #3 NM traps, and 91.4% (n=35) of those that visited #4 Newhouse traps. Coyote capture rates for Paws-I-Trip equipped traps were: #3 SC = 81.8%, #3 NM = 91.0%, and #4 Newhouse = 87.2%.
Nettles et al. (1990)	Victor #2 CS Victor #2 CS with padded jaws	Field test in Washington. Leg damage scores for 31 skunks caught with padded jaw trap and 34 skunks caught with standard #2 CS did not differ (P>0.05), and averaged 197 and 171, respectively. Several high scores in both groups due to self-mutilation.

LITERATURE CITED

Berchielli, L. T., Jr., and B. F. Tullar, Jr. 1980. Comparison of a leg snare with a standard leg-gripping trap. N.Y. Fish and Game J. 27:63-71.

Nettles, V. F., F. A. Hayes, and R. A. Holmes. 1990. Comparison of trap-related leg injuries caused by leghold traps with rubber-shod jaws and standard steel-jawed leghold traps. Southeastern Coop. Wildl. Dis. Study, unpubl. rep. 16pp.

Novak, M. 1981. The foot-snare and the leg-hold traps: a comparison. Pp. 1671-1685 in Chapman, J. A., and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Frostburg, Maryland. 2056pp.

Phillips, R. L., and K. S. Gruver. 1996. Performance of the Paws-I-Trip™ pan tension device on 3 types of traps. Wildl. Soc. Bull. 24:119-122.

Turkowski, F. J., A. R. Armistead, and S. B. Linhart. 1984. Selectivity and effectiveness of pan tension devices for coyote foothold traps. J. Wildl. Manage. 48:700-708.

Prepared by: George Hubert, Jr., Illinois DNR

WEASEL *(Mustela erminea)* *February 19, 1997*

Reference	Trap	Results
King (1981)	Gin (leghold type) Fenn (killing trap)	Field study in New Zealand. A total of 336 weasels captured with Gin trap. Of these, 41% had extensive injuries and 32% were alive when the traps were checked (?daily). Self-mutilation of trapped limb observed in 21 weasels caught in Gin trap. About 8% of 966 weasels caught in Fenn traps had extensive injuries, and only 4% were alive at time of check. Author concluded correctly set Fenn traps kill weasels more humanely than Gin traps.
Belant (1992)	"Live" traps	

LITERATURE CITED

Belant, J. L. 1992. Efficacy of three types of live traps for capturing weasels, Mustela spp. Can. Field-Nat. 106:394-397.

King, C. M. 1981. The effects of two types of steel traps upon captured stoats (Mustela erminea). J. Zool. (London) 195:553-554.

Prepared by: George Hubert, Jr., Illinois DNR

WOLVERINE *(Gulo gulo)* *December 2, 1996*

Reference	Trap	Results
Copeland et al. (1995)	Log trap	During the winters of 1992-93 and 1993-94, 12 wolverines were captured 37 times in 1,255 trapnights in central Idaho; 3 animals escaped by chewing holes in traps; no injuries noted on captured animals.

LITERATURE CITED

Copeland, J. P., E. Cesar, J. M. Peek, C. Harris, C. D. Long, and D. Hunter. 1995. A live trap for wolverine and other forest carnivores. Wildl. Soc. Bull. 23:535-538.

Prepared by: Robert L. Phillips, USDA/APHIS/ADC/NWRC, 1716 Heath Parkway, Fort Collins, CO 80524-2719.

From: Bradley Ferland
To: Mike Covey
Cc: ANR.FWBoard@list.vermont.gov
Subject: Re: [ANR.FWBoard] Petition to regulate the hunting of coyotes with hounds
Date: Thursday, May 5, 2022 8:47:19 AM
Attachments: ATT00001.txt

Thank you Mike. Please consider this request received.

Brad Ferland
Caledonia County

On Wed, May 4, 2022 at 5:17 PM Mike Covey <mcovey802@gmail.com> wrote:

> Hello Members of the Fish and Wildlife Board,
>
> I am writing to petition you to regulate the use of hounds for the hunting of coyotes. We feel this is a valuable practice, but we do see the need for regulation. We look forward to helping you facilitate the development of thoughtful rules surrounding this practice.
>
> My Best Regards,
>
> Mike Covey
> Executive Director
> Vermont Traditions Coalition
> (802) 461-3786
>
>

VERMONT COYOTE

COEXISTENCE COALITION

March 22, 2022
Re: Petition for a regulated coyote hunting season

Dear Chairman Biebel,
This petition and supporting data will serve as follow up on testimony on January 19, 2022 before the House Committee on Natural Resources, Fish and Wildlife from VT Fish & Wildlife Department (FWD), Commissioner Herrick and Furbearer Biologist Kim Royar regarding H.411, a bill seeking to address wanton waste of wildlife in Vermont. The bill was written in part to address the concerns of a retired game warden with 25 years of experience. In 2018, he submitted a petition in the form of an email to the Fish & Wildlife Board (FWB) asking for a ban on wanton waste, but the Board failed to act. The warden showed graphic evidence of wanton waste,

specifically involving coyotes and also referenced the wanton waste he witnessed of deer, bear and turkey. Since the FWB took no action, the issue was brought to the legislature and after three years of efforts by multiple parties, a wanton waste bill was voted out of committee and has since been passed by the full House.

The current bill language includes a carve out exempting coyotes that are hunted, at the behest of Commissioner Herrick and a minority of members in the committee who felt that including coyotes would be creating a de facto season. Commissioner Herrick, along with Ms. Royar, spoke very specifically that the committee was not the appropriate venue to address a season on coyotes. Chair Sheldon agreed and indicated that such authority was indeed granted to the FWB. **Commissioner Herrick stated that any discussion around a season needed due deliberation, and that such a discussion would merit our time and**

effort. His comment about a coyote season, "Let's have that discussion," couldn't have been any clearer. Biologist Royar indicated that she, too, supported a robust and respectful conversation around the establishment of a coyote season.

Therefore, this letter will serve as a direct follow up of Commissioner Herrick's and Ms. Royar's support for that discussion to begin. And in order to formally expedite that discussion, we have prepared this petition on behalf of our 5,500 + followers from across the state to establish

a regulated season on coyotes that takes pup rearing into consideration. I am copying members of the House Natural Resources, Fish and Wildlife Committee and the Senate Committee on Natural Resources because of their interest in this issue, as expressed during this legislative session. Because of the substantive legislative interest in this issue we would respectfully ask that the FWB reply to the petition and include a written commentary in support of whatever position it takes that addresses each of the points we raise. This commentary will serve to update legislators and guide future steps and decision-making if necessary.

FWD would likely agree with this statement:

Lethal attempts at coyote control don’t work.

Approximately 2/3 of coyotes live in packs. 1/3 roam, waiting for an opportunity to join a pack. A stable pack consists of a monogamous breeding pair that only mates once a year. Other pack members do not breed. The self-regulated pack requires about 4-8 miles, which it guards against other coyotes. Left to their own, coyotes self-regulate. The majority of females don't ever breed!

Indiscriminate killing of a breeding male or female, forces the mate to leave to find a new mate. A roamer (or disperser) comes in and breeds with as many females as he can causing a 'burst' in the local population. This means MORE coyotes on the landscape.

Without the leadership of the alpha pack members, the other pack members are likely unskilled at hunting and may cause problems with humans where there weren't any before.

The current open season is not rooted in sound science.

VCC's Petition: We request that Vermont establish a regulated coyote hunting season from October 1st – December 31st. This season would allow for a recreational hunting opportunity and optimizes utilization of the animals killed.

We believe there is more than ample data and reason to establish a season at this time as follows:

1. FWD supports the initiation of a coyote season discussion

Commissioner Herrick and Biologist Royar have testified that we should begin the conversation about establishing a season on coyotes and the **FWB is the venue for this process.**

2. Long Standing Evidence of Wanton Waste

A retired Vermont state game warden's 25 years of experience and first-hand account of the wanton waste of coyotes objectively establishes that Vermont has a long-standing problem that has not been addressed by FWD or FWB. The longer we fail to address this situation, the greater spread of the subculture of hunters who kill solely for the sake of killing, often by using bait piles. Not only is this antithetical to sound science, but it also violates all standards of ethical hunting practices and damages the overall image of hunting. We believe further that the FWB, as the arbiters of Vermont's public policy on game, have a duty to address and correct this wasteful behavior that is not rooted in sound science and fundamentally is contrary to ecological principles.

3. Damage to the Standing of Vermont 's Wildlife Governance Infrastructure

The failure to address this long-standing issue undermines the credibility of Vermont's wildlife governance infrastructure and erodes public confidence in our conservation stewards. Further**,** the state- sanctioned wanton killing of a public "resource" simply for the sake of killing, is at odds with Fish & Wildlife's duty to protect and conserve wildlife—to include coyotes—under title 10 §4081.

4. Contradictory and Confusing Public Policy

Vermont's public policy towards coyotes is at best confusing and clearly paradoxical. On the one hand, FWD states the following on their website, "We believe, however, that coyotes are important members of the ecosystem and have evolved together with many of nature's existing prey species; Conservation of the coyote is important to maintaining ecosystem integrity because of the vital role they play as predators; Coyotes fill the role of a natural predator, a role that is important for maintaining the dynamics and health of our ecosystems." These statements reflect an ecological and scientific understanding of the species. However, at the same time, FWD references the ecological benefits of coyotes, they and the FWB have established a public policy of treating coyotes as vermin in that they may be killed year-round, day and night, with or without dogs, with the use of bait, and with the use of high-tech weaponry, including thermal scopes for night hunting and game- calling devices.

It is ecologically and intellectually impossible to hold those opposing views at the same time, yet this tortured logic serves as the public policy FWD has endorsed. The FWB now has an opportunity to address FWD's "split personality" public policy muddle by establishing a season consistent with how we manage other game species. It's time for the double standard to end.

5. State Sanctioned Violations of the North American Model Wildlife Conservation as Public Policy

The FWB's current policy on coyotes is a clear violation of at least one principle of the North American Model of Wildlife Conservation (NAM), which establishes the following value: ***Wildlife can only be killed for a legitimate purpose***. It should be noted that FWD's report to the legislature on coyotes in January, 2018, stated that current public policy treating coyotes as vermin, did not violate NAM, yet the Department offered no data on what legitimate purpose was served in the public policy of sanctioning the wanton waste of coyotes. Digging deeper into this issue, we find that the Department has an extreme institutional bias favoring ungulates (89%) over carnivores (11%) as documented in an internal survey (https://content.warnercnr.colostate.edu/AWV/VT-AgencyCultureMemo.pdf) This extreme institutional bias is reflected in the Department's support for the wanton waste of Vermont's apex predator, a position that cannot be supported by science yet is fully supported by the documented political agenda of FWD. We find the FWB and FWD's support of this gross disrespect for the coyote an abject failure of our wildlife governance standards in putting politics above science.

6. Board Policy that Chooses Wildlife Winners and Losers

Establishing a season would serve to change the message that coyotes are a "bad" species while deer are a "good" species. This emotional basis for establishing attitudes towards wildlife has no place in sound ecological science. An established season would help defuse the emotional and irrational basis for considering coyotes "bad." Along with the notion that coyotes are a bad species, is a belief out there that coyotes are an invasive species. This notion, too, is not based on an understanding of ecology, natural systems, or species range expansions and contractions. If coyotes are invasive, then so too are cardinals, Carolina wrens, opossums, and black vultures, to name a few. Public policy solely established on the basis of emotions is bad public policy. The FWB can serve to reinforce rational and science-based understanding of species like the coyote. Shouldn't that be one of your important jobs to take steps to undermine the mythology held by the subculture within the hunting community?

7. The Other Big Lie: Coyotes impact Deer Populations

Establishing a season would also address the other big myth around coyote impacts on deer populations. FWD states the following on their website, "We are not aware of any scientific evidence from studies done in the Northeast that indicate coyotes either control or limit the numbers of deer. Although coyotes and people, both predators, do vie for deer and other prey, in almost all cases, study results suggest that coyotes have no long term negative impact on these populations." Changing public policy is the most effective step we can take. All the education programs won't impact attitudes when public policy condones the idea of coyotes as vermin.

8. The Folly of Too Many Coyotes

It should also be noted that the Department states, "....coyotes are density dependent breeder. As the number of coyotes in an area decreases, their reproductive rates increase. Coyote control efforts are therefore often unsuccessful because they tend to stimulate reproduction."

(https://vtfishandwildlife.com/learn-more/vermont-critters/mammals/coyote). If our concern is too many coyotes, establishing a season would actually help to reduce the disruption of packs, dampen reproduction and stabilize or reduce the population. Establishing a season on coyotes would impact the notion that actively seeking out and killing coyotes is somehow a good deed. Obviously science does not support that subculture mythology. You can read more from Project Coyote's carnivore biologist here.

---

9. Perceived Threats to Humans

One of the justifications for the current public policy is that a 365/day/night season is that such a season creates a wariness in coyotes thus helping to reduce negative interactions with humans. This is not supported by any independent peer review science. Randomly killing coyotes does nothing to instill fear. As well- respected coyote expert, and former sheep farmer, Chris Schadler has said, "A dead coyote learns nothing."

If there is a specific coyote that is causing problems, then the law already allows the public to kill coyotes under title 10 §4828. Prevention — not killing — is the best method for minimizing conflicts with wildlife in both urban and rural settings. Eliminating access to easy food sources, such as bird seed and garbage, supervising pets while outside, and keeping cats indoors reduces conflicts with pets and humans. Practicing good animal husbandry and using strategic, nonlethal methods to protect livestock (such as electric fences, guard animals, fladry, and removing dead livestock) are more effective than lethal control at preventing conflicts and reducing associated costs over time.

And to play devil's advocate, even ***if*** FWD's position was accurate, a limited hunting season would still accomplish the purpose of "keeping coyotes wary of people." In short, coyotes may become problematic when they are habituated to people and that can be solved by prevention and also by killing problem coyotes under title 10 §4828.

10. A Very, Very Low Bar Justifying An Open Session

FWD's justification for the 365 day/night season is that the population is not at risk so allowing an open season will not impact population. Is that the standard of wildlife professionals at FWD for managing wildlife now?

11. Coyote Killing Contests

FWD's report to the legislature stated this, "Unlike its counterparts in some states, Vermont's Fish and Wildlife Department does not sponsor or promote or encourage coyote hunting tournaments and we do not believe that such short-term hunts will have any measurable impact on prey such as deer." Vermont now has a law prohibiting coyote killing contests, yet FWD took no position on the bill when actually standing up for its beliefs would have mattered. We find FWD's documented inconsistency a distinct revelation that its political agenda is always paramount.

12. Wildlife Congress-Building Bridges

FWD's coyote report to the legislature stated the following, "Therefore, bringing disparate groups together to work on common threats is critical to our future. To that end, the Department has sponsored two "Wildlife Congresses" in an attempt to find and agree on common issues that can be tackled together to maintain wildlife populations into the future." We applaud the FWD for sponsoring this attempt at building bridges between groups that see wildlife in starkly different ways. The second Wildlife Congress resulted in the establishment of a working group to wrestle with the issues of finding common ground. Regretfully, FWD failed to nominate a representative from staff to serve on the working group causing the group to dissolve having never met even once.

13. Valuing the role of Predators

The following statement is in FWD's coyote report to the legislature, "Regardless, the Department values the role predators play in maintaining healthy and dynamic ecosystems and endeavors to promote management strategies for these species, including coyotes, that foster a broad public understanding of, and appreciation for, their intrinsic values while ensuring the sustainability and health of their populations.” We applaud this clear ecologically based statement very much, on the mark. But once again, it is impossible to embrace that statement while embracing public policy that treats Vermont’s apex predator as vermin. No one can square that circle.

Thank you for your consideration of this petition and the background in support of it.

Jane Fitzwilliam

Coalition Lead

http://vermontcoyote.org

Putney VT 802.376.9449

Link to DFW Coyote Report to legislature

https://vtfishandwildlife.com/sites/fishandwildlife/files/documents/Hunt/trapping/Vermont%20Coyote%20Population%20Report%20to%20Legislature-2018.pdf

Commissioner Herrick and members of the Fish and Wildlife Board,

The Vermont Trappers Association (VTA) encourages that specific criteria be adopted for the design of foothold traps when trapping terrestrial furbearers in Vermont. All of the research partners chosen in Vermont to test the different restraining devices used as part of the Northeast Best Management Practices (BMP) program were members of the VTA, so we are very familiar with the devices tested and the process of testing them. These suggestions are an amalgam of both experience developing the BMPs and several decades (perhaps centuries) of collective experience in the field, and we are confident that these are the best features to ensure the welfare of trapped animals.

A wide variety of devices were tested in this thirty-year research project, however, not every device in current use was available at that time. For that reason, the VTA cannot endorse one brand of trap over another just because it was tested, but we can reliably endorse certain features that are proven to improve animal welfare. It is the position of the VTA that any device from any manufacturer should be approved for use so long as it has been manufactured with, or modified to include, the following features.

On behalf of the Vermont Trappers Association, I would like to submit a petition to the Fish and Wildlife Board that foothold traps set on land require the following:

1) Jaws are padded, off-set, laminated, or have jaws with a minimum thickness of 5/16".

2) Base plates feature a center chain attachment.

3) The trap can be adjusted for pan tension.

4) There are at least two swiveling devices in the chain.

5) An anchored trap has a minimum of 12" and a maximum of 18" of chain from the point where it exits the ground once an animal is caught.

6) No foothold trap shall be set on land with a spread of more than 6-1/4 inches as measured inside the jaws.

If you have any questions or would like to discuss this further, please feel free to contact me via email or at (914) 610-0650.

Thank you for your consideration.

Bruce Martin
VTA Vice-President
Montpelier, VT