Fish and Wildlife Board Meeting Minutes
Wednesday, Feb 15, 2023

The Vermont Fish and Wildlife Board held a meeting beginning at 5:00 pm on Wednesday, February 15, at the National Life Building in Montpelier. A recording of the meeting is available on the department's YouTube channel.

Board Members Present: Michael Bancroft, Nicholas Burnham, Jamie Dragon, Brad Ferland, Allison Frazier, Neal Hogan, Michael Kolsun, Robert Patterson, David Robillard, Jay Sweeny, and Martin Van Buren.

Present virtually: Bryan McCarthy, David Deen
Absent: Brian Bailey

Department Staff Present: Commissioner Christopher Herrick, Director of Wildlife Mark Scott, Director of Outreach Alison Thomas, Counsel Catherine Gjessing, Game Warden Major Sean Fowler, Wildlife Management Program Manager David Sausville, Furbearer Project Leader Brehan Furfey, Moose and Deer Project Leader Nick Fortin, Waterfowl Project Leader Andrew Bouton, Research Manager Katherina Gieder, and Public Information Officer Joshua Morse.

Staff Present Virtually: Principal Assistant Abigail Connolly, Information Specialist John Hall

Members of the Public Present: Bev Soycheck (Monkton), Anne Jamison (Marshfield), Rod Coronado (Orange), Bob Galvin (Richmond), and Sarah Gorselin (Grand Isle)

Member of the Public Present Virtually: Renee Seaccor (not stated), Brian O'Gorman (not stated), Jane Fitzwilliam (Putney)

Agenda items:
1. Approval of Previous Meeting Minutes (January 18, 2023)
2. Public Comments (Limited to 2 minutes per speaker)
3. Response to Wolf Coalition Petition on Canids
4. 2023 Migratory Game Bird Season Preview (Straw vote)
5. 2023 Moose Season Recommendation – Preliminary Approval
6. Commissioner's Update

The meeting was called to order at 5:00 pm

Chair Ferland called the meeting to order and invited Board Members to introduce themselves by County.

Commissioner Herrick introduced staff.

APPROVAL OF PREVIOUS MEETING MINUTES

Motion: Chair Ferland moved to table meeting minutes for January 18, 2023 until next month so all Board Members could review.

Discussion: NA

Vote: NA

PUBLIC COMMENTS (2 MINUTES PER SPEAKER)

Bev Soycheck, Monkton. Thanked the board for the opportunity to comment, asked all to keep an open mind. Stated that wolves are a top predator that can control other populations as coyotes have done with deer. Stated belief that we already have wolves passing through VT, and stated her support for coexistence.

Ann Jamison, Green Mountain Animal Defenders, Marshfield. Asked why there is still no limited, regulated hunting season for coyotes as there is for deer, moose, bear. Asked whether coyotes are not respected wildlife in VT. Stated that an NY 2022 coyote kill shows eastern coyotes share wolf DNA. Referenced 1996, 2006 2013 coyotes killed in VT as likely wolves. Stated that because we have little data on coyote DNA in VT, it is possible VT hunters are killing wolves. Stated the need to establish procedures so wolves are not killed by mistake. Recommended a season of Oct 1 – Dec 1 with checking procedures and criteria for data collection.

Rod Coronado, Wolf Patrol, Orange. Described Wolf Patrol, stated his experience shows most conflicts with wolves are not often preventable. Stated that he has been in many rooms with polarized groups. Stated the VT Furbearer survey shows great support for native species, and that restoring wolves to VT should be an area of common ground. Cited VTRANs beaver costs and that wolves would help address beaver numbers. Stated that bringing wolves back to VT should be a point of common ground, that Wolf Patrol is willing to support VFWD in its stated goal of restoring native species. Respectfully asked the VFWD to establish a wolf restoration working group.

Bob Galvin, Animal Wellness Action, Richmond. Introduced himself to the Board and gave background: prior to VT, worked for seven years conducting wildlife research across the US with a bird behavior focus, earned an MS in biology. Stated commitment to propagating the best science and working with the department. Stated there is an ethical dimension to wildlife management questions like "should the board be represented by other groups than hunters, fishers, trappers; are Vermonters willing to coexist with wolves in the future?" Stated that questions of value need to be considered.

Sarah Gorselin, Project Coyote, Grand Isle. Summarized PC's role, spoke in support of Northeast Wolf Recovery Alliance petition. Stated wolves and coyotes are key native predators

in our ecosystems. Stated that she sees the petition as "baby steps" towards determining whether federally protected wolves are being killed in VT. Stated that two, possibly three, wolves have been killed in VT since 1998. Asked the board how they will protect wolves that are already known to be in Vermont. Affirmed that Project Coyote has a qualified science advisory board. Also stated her wish to see a moratorium on canid hunting.

Renee Seaccor, Project Coyote and Rewilding Institute, (not stated). Stated her organizations' concern about the inevitability of wolves to disperse into VT and the lack of ways to track and protect the species. Stated support for a limited season, hunter reporting criteria, and DNA checking criteria. Stated that it is a department goal to assess large canids in Vermont per the 2015 SWAP, and there is no evidence the department is doing this.

Brian O'Gorman, (not stated). Stated that according to the VFWD website, trappers, hunters, and anglers pay for wildlife management. Stated that the proposed BMP trap setback is a solution to a non-existent problem. Stated that he does not think many individuals who oppose trapping have been on a trap line. Also asked when the coyote hounding moratorium will expire.

Jane Fitzwilliam, Vermont Coyote Coexistence Coalition, Putney. Referenced March 21, 2022 petition to introduce a regulated coyote season. Directed comment to Commissioner Herrick. Asked again when a regulated season will be brought up, reminded Herrick that he had said this was a worthwhile discussion along with other VFWD staff. VCCC asked for a timelier response to this petition, and asked when VFWD will respond.

Chair Ferland closed public comment window noting that in March VFWD will be presenting many measures including trapping and coyote seasons.

PETITIONS – Wolf Coalition Petition (Correction: Petitioner name is Northeast Wolf Recovery Alliance)

Board/Staff Introduction: Chair Ferland and Mark Scott introduced the petition letter from the Northeast Wolf Recovery Alliance.

Mark Scott stated he is glad to have received the letter and welcomes the petition, because it is concurrent with some existing petitions. March will see presentations on trapping BMPs, coyote hunting, etc. Mark Scott suggested that any action the Board would take to be tabled and to ask the department to work any petition requests be included into their presentation for next month.

Board Member Deen asked that Mark Scott move closer to a microphone. Mark Scott re-stated his response.

Board Member Deen voiced his understanding that requests for testing to establish whether wolf genetics are becoming present in the state's coyote population would not be part of the consideration about a season for coyotes. Board Member Deen stated he is anxious we put

measures for this into place – he wants to be clear this will be addressed. Commissioner Herrick clarified this will in fact be addressed.

Board Member Dragon asked Gorseline to send any information she has on wolves in the northeast to the Board.

Petitioner: Northeast Wolf Recovery Alliance

Petitioner Statement: N/A

Board Discussion: Board moved unanimously to include the petition in the department's recommendations presented in March 2023.

Motion: Unanimous

Vote: Unanimous

PROCEDURAL VOTES – Migratory Bird Season Recommendations

Staff Summary: Mark Scott prefaced the annual waterfowl proposal with an introduction for David Sausville. David Sausville introduced Brehan Furfey, the department's new furbearer biologist. Brehan Furfey's background includes a master's degree studying black skimmers from Arkansas, prior work with Oregon Department of Fish and Wildlife as a district biologist, and experience with diverse species including mountain lions and wolves. David Sausville also introduced Andrew Bouton, the department's new project leader for the migratory gamebird section. Bouton's background includes a master's degree studying scaup, prior work with North Dakota Fish and Wildlife's wetlands management district, and experience spanning multiple states with many waterfowl as well as bats.

Andrew Bouton presented the 2023 migratory gamebird management plan for VT, contextualizing the plan in the geography of the Atlantic flyway. He described that population surveys in the area were reinstated following the pandemic, that total national duck breeding population increased since the last survey in 2019, and is hovering around the long-term average. He described VT duck monitoring results and numbers of breeding waterfowl species in the state. Andrew Bouton also summarized waterfowl hunting trends in VT. Duck stamp sales held consistent at around 6,000 over the last decade, and active duck hunters consistent between 2000-3000 over the same period.

Andrew Bouton also described VT's recommended seasons and bag limits; two proposed controlled hunt areas in VT: Mud Creek and Dead Creek; VT's waterfowl hunting zones: Champlain Zone (VT control), Interior Zone (VT control), CT River Zone (NH control); and the timeline for our waterfowl season setting process. All season selections need to be submitted to

USFWS by April 30; Andrew Bouton will attend the Atlantic Flyway Technical Section meeting to make VT's season recommendations.

Andrew Bouton asked the Board for a straw vote on whether to accept these recommendations, stating that if the Board approves public hearings will be held in Ticonderoga and the Essex Office, with a final Board vote on season in April and VFWD recommendations to the Flyway Council later that month. Mark Scott explained that season setting is procedural, not a rule-making process as we will be undertaking with the furbearer process.

Board Discussion: Chair Ferland asked why resident and regular (migratory) goose seasons have multiple windows, what the difference between resident and regular are, and what the goal of the seasons would be. Andrew Bouton explained the early resident season is to target birds breeding here, and the resident late season is to target those that stick around all winter. Mark Scott asked how biologists know whether a bird is migratory or resident. Andrew Bouton explained that this knowledge comes from banding data from harvested birds that allow biologists to see when the birds are moving through, and local banding of resident breeding geese allows us to make population estimates. David Sausville added that in the 1990s there was a neck collar study to supplement banding data. Chair Ferland asked for clarity: if a hunter takes a bird during the regular season, is the hunter looking at the band or are the bands looked at post mortem? Andrew Bouton explained that hunters do not know if they are harvesting a resident or migratory bird at the time of take, but that year-to-year banding data gives biologists a clear sense of when resident versus migratory birds will be likely to occur in the state in future years. Mark Scott added that all states in the flyway are collaborating as part of the Flyway Council to make sure that seasons sync up across migratory corridors to ensure the populations are sustained. David Sausville added additional detail on the timeline of season setting across the flyway overseen by USFWS.

Board Member Robillard asked about the geese killed at Crystal Lake: cause of death and residency status. David Sausville confirmed these died due to HPAI, and that the geese were likely resident birds. Chair Ferland asked if there has been an increase in resident Canada goose numbers, noting anecdotal observation of nuisance issue. Andrew Bouton explained there has been a long-term increase, with a slight recent decrease since highs in 2013-2014. David Sausville added that the goal of resident seasons is partially to decrease resident numbers to reduce human conflict issues. Board Member Robillard then asked if HPAI applies to other birds, specifically turkey. David Sausville explained it is most influential in raptors and colonial nesting waterfowl (but less dabbling ducks) although it can occur in all species. Andrew Bouton added that it impacted nesting goose populations this year. Mark Scott added that mammals can get HPAI, and that many state agencies are putting more effort into monitoring wildlife diseases—an emergingly important field. He also cited monitoring for COVID in white-tailed deer.

Chair Ferland asked for main difference from last year's package; Andrew Bouton stated the limits for mallards are increasing from 2 to 4 birds per day, migrant geese from 1 to 3 birds per day, and brant going 2 to 1 bird per day.

Motion: Chair Ferland asked for a motion to begin the straw vote by grouping the items as a batch, Board Member Fraser moved and Board Member Robillard seconded. David Sausville clarified this vote is the Board giving permission for the department to present these dates at public hearings. Mark Scott and Board Member Deen further clarified.

Vote: Unanimous

The board broke at 6:11 for a 30-minute dinner. The board resumed at 6:40.

PROCEDURAL VOTES – Moose Season Recommendations

Staff Summary: Mark Scott introduced moose project staff and reminded the Board that there is both a biological and social component to herd management, prioritizing the herd's health but also building public understanding to support the necessary management. Mark Scott provided background for Nick Fortin, including his master's in cervid ecology and prior work experience in ungulate management in multiple states. Mark Scott also introduced Dr. Katherina Geider, mentioning her PhD and close collaboration with leading biologists at UVM and other research hubs.

Nick Fortin summarized last year's harvest data: 100 permits issued, and 51 moose taken – the lowest overall success rate in a moose hunt but still within the range of our predictions. He then introduced the goals and objectives for Vermont's moose population: to have a healthy, sustainable population. Nick Fortin explained the density objective for each WMU are how we gauge progress towards this. Current moose density objectives are under review, based on current work to map moose habitat extent and suitability. It is expected to go down from the current 0.5 moose/square mile in most WMUs—a historic number that is likely higher than ecological baseline. Northeastern VT WMUs have a goal of 1 moose/square mile. Numbers there are currently higher and bringing them down to 1 m/sqm should reduce the impact of winter ticks.

Nick Fortin then explained the department's process of setting hunting objectives for each WMU: to hunt moose in a WMU, we need to have two consecutive years of moose numbers above the target population density threshold. Only E1 and E2 meet this standard recently. Nick Fortin explained why we have fewer moose in the rest of VT than E1 and E2: 1) the brain worm parasite in areas with high deer density; and 2) the loss of young forest habitat. Nick Fortin explained that habitat loss is the main factor determining moose numbers. Most of VT's forests are even age and do not provide enough browse to support large moose numbers, but WMU E is the exception to this rule. The conditions there are significantly different from other parts of VT.

Nick Fortin elaborated on conditions in WMU E, which saw its moose population peak in the early 2000s with = 4-5 moose/square mile. VFWD intentionally reduced the population because

of the impact moose were having on their habitat by high permit allocations through 2010. Since 2011, the WMU E population has been relatively stable around 1.5 moose/square mile. This is still a very high density of moose historically, although peoples' experience of a recent past with much higher numbers makes this a difficult point to communicate. Nick Fortin cited recent peer reviewed literature that less than 7% of moose range in North America supports densities > 1 moose/square mile, making WMU E is a high density of moose at a range-wide scale. WMU E is part of the core moose range in New England and part of the coldest portion of the range, with low deer numbers, generally low parasite numbers low due to the cold, and a lot of early successional forest due to abundant commercial timberland. Because of this, habitat is not the limiting factor for moose numbers there.

Within this context, Nick Fortin explained winter tick dynamics, specifically their unique dependence on moose as a single host species. Nick Fortin noted that moose accumulate huge numbers of winter ticks due because moose are poor groomers, having not evolved with external parasites. Nick Fortin then explained the history of winter tick research in VT: 2017-2019 UVM partnership with other study areas in NH and ME to capture and collar moose cows and calves (in VT, in WMU) E to monitor survival through the winter, birth rates and calf survival, and tick loads. The effort found that 50% of calves died over the winter, typically due to high tick loads, and that that ticks debilitated adult moose to the point of decreasing their health enough to impact the viability of calves. Nick Fortin noted that long-term monitoring cannot be done with remote sensing collars due to exoense; the next step with UVM and regional partners is to deploy permanent camera monitoring stations in the study area. This is planned to supplement harvest data in WMU E, and to provide some data on moose health and population trends in non-harvest areas.

Nick Fortin concluded that the relationship between moose and winter ticks has been very well studied since the 1970s, and across all studies it is confirmed that the abundance of winter ticks is directly related to the abundance of moose. The only place in Vermont where there are enough moose to allow ticks to reach debilitating numbers with a population-level impact on moose is in the core range: WMU E.

Nick Fortin then summarized the department's moose health metrics. Ovulation rate has declined from the 1990s and remained low since then, although we may be starting to see an uptick, we do not yet have the longitudinal data to look for a sustained upward trend. Yearling female bodyweight has shown a decline since the 1990s, again with a possible uptick over the 440 lbs. benchmark pending more longitudinal data to establish if there is a trend. Summer calf recruitment shows a general positive trend since 2017, with caveats (all data are gathered from the same maternal cohort). Percent of yearling in the annual cow harvest shows a decline from the 1990s and an uptick towards 30% in recent years, showing a higher likely yearling survival.

Returning to the goal of healthy moose (big, fat healthy condition cows producing large, good condition calves that can survive any stressors), Nick Fortin referenced surveys that show most Vermonters would prefer we hunt moose to prevent moose from dying from winter ticks. He

added that we cannot manage winter ticks directly with current technology although the department is working with UVM on a fungal pathogen that could kill winter ticks. He noted that even if the pathogen is viable in the field – uncertain and unlikely – it unlikely to be viable at a range-wide or WMU-wide scale.

In this context, Nick Fortin introduced the department's 180 permit recommendation for WMU E in the 2023 hunting season. This is an increase from last year, also with an increase in the number of cow permits, and with more of that permit increase in E2 than E1. This would be the highest number of permits in WMU E since 2010. Fortin explained this is justified because the population has been stable in WMU E since 2010, thus, we have not effectively reduced moose numbers with our current 100 moose permit allocation. Our projections support that if we harvest 50 moose per year, we will maintain a mostly stable population. 180 permits should result in about 100 moose harvested, resulting in a decline of 5% per year of the moose population. If this is sustained we should reach our target population in WMU E around 2030; the end of our current Big Game Plan. We will adjust our permit numbers and allocation year by year to achieve this target by 2030.

Commissioner Herrick asked how the moose population would increase if we were not hunting. Nick Fortin explained we would see at 2 or 2.5% increase per year and the population would likely double relative to current numbers within the next 10 years or until tick impacts limit growth.

Board Member Dragon asked whether the moose population could sustain an additional predator introduced into the area. Nick Fortin stated he would be hesitant to speculate, but as the only native predator of moose in WMU E would be wolves, we would expect less moose in WMU E than currently if wolves were reintroduced. Chair Ferland asked what a healthy calf's weight is, Nick Fortin explained 300-400 lbs. Chair Ferland asked if there is any benefit to a calf season. Nick Fortin explained this is not common in the U.S. but is used in some other countries. Nick Fortin would not trust most hunters to accurately ID a calf, however.

Dr. Katherina Gieder added that UVM research on moose habitat connectivity has recently been peer reviewed and supports the conclusion that there is good moose movement throughout VT, enough to maintain genetic health in VT. However, at a regional scale, moose in the Northeast as a whole are not genetically diverse and this is a long-term consideration for the VT population. With climate change and other anticipated stressors, lack of genetic diversity means moose health is essential to viability. Nick Fortin added that moose are using the existing habitat mosaic to operate in sub-par habitat.

Board Member Dragon asked about possible moose population growth and harvest in H as logging in the area has increased. Nick Fortin explained that we are not harvesting in H at present. Long term, our work estimating habitat and moose density at the sub-WMU scale is to allow us to evaluate harvests in places like WMU H. Board Member Hogan asked why we would not increase special opportunity permits. Mark Scott and Catherine Gjessing explained that

special opportunity allocations are limited by statute. Board Member Hogan also asked how many lottery applicants there are, Nick Fortin answered: 7,000+. Further discussion on moose age, size, archery crossbow/traditional take, etc.

Board Discussion: Nick Fortin described the process for setting the season, from tonight's vote through the open public comment period and public hearings for moose, to the final April 5th Board vote. Mark Scott added that good Board Member attendance at the hearings is important and clarified that the meetings will also collect public comment on deer. Chair Ferland and Board Member Deen had a further clarifying back and forth: the Board vote will be giving preliminary approval on moose now, the March meetings will collect both moose and deer public comments, and the Board will get a presentation on deer in April responsive to some of that data.

Motion: Board Member Sweeny moved to move forward with the moose recommendations as proposed, Board Member Frazier seconded.

Vote: Unanimous approval

COMMISSIONER'S UPDATE

Commissioner Herrick commended Nick Fortin's expertise and noted that no matter the issue, department staff exhibit this level of expertise.

Commissioner Herrick acknowledged the death of three ice anglers in Grand Isle, and noted the outreach division's work to share a safety message advising the public to stay off the ice on Lake Champlain. Commissioner Herrick acknowledged Director Alison Thomas' ongoing work to educate the public on ice safety.

Commissioner Herrick gave a prelude to next month's meeting with respect to trapping BMPs and coyote hounding. The BMP report has been issued to the legislature, and updates will be shared at the March meeting.

Commissioner Herrick acknowledged the three new warden trainees sworn in this year, concurrent with the promotion of last year's three trainees into full wardens. Highlighted the rigorous post-academy training wardens undergo.

OPEN DISCUSSION

Commissioner Herrick acknowledged Board Member Robillard's end of term and gave the floor to Board Member Robillard. Board Member Robillard acknowledged the amount he has learned the biologists over his six years with the board. Board Member Robillard thanked the department and board for the experience. Chair Ferland thanked Board Member Robillard for being a mentor to new Board Members, and especially for his guidance to Chair Ferland himself as chair. The

other Board Members shared memories of Board Member Robillard and thank him for his contributions.

Chair Ferland noted that next month's meeting will be significant and that the Board will be asked to respond to a years' worth of work by the department. He asked the department to share information (e.g. rule change redlines) as soon in advance of the Board Meeting as possible, to benefit discussion and allow Board Members to develop their questions. Chair Ferland also asked for a full list of the petitions that will be addressed in the package of changes being addressed in this package.

Board Member Deen brought up the advocacy working group for the Anti-degradation End Procedure for the State of Vermont to limit degradation of waters. He stated that ANR is passing judgement on the state's waters and VFWD is not at the table of the current working group. Board Member Deen states that he will make a statement that VFWD should be included in evaluating permitting decisions that would limits to activities that may degrade waters.

Motion To Adjourn: Meeting adjourned at 8:28 p.m., moved by Board Member Robillard seconded by Board Member Sweeny.

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)

Public Records Act Request - Sent by Renee Seacor on August 28th, 2022

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*

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                                                                      50
Dog             atgaccaaca ttcgaaaaac acacccacta gccaaaattg ttaataactc
Wolf-1          atgaccaaca ttcgaaaaac acacccacta gccaaaattg ttaataactc
Wolf-2          nngaccaaca ttcgaaaaac acacccacta gccaaaattg ttaataactc
NEWG-12         ATGACCAACA TTCGAAAAAC ACACCCACTA GCCAAAATTG TTAATAACTC
N_Hero                  A TTCGNAAAAC TCACCCACTA GCCAAAATTG TTAATAACTC
C rufus         atgaccaaca ttcgaaaaac acacccacta 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 gccaaaattg ttaataactc

                                                                     100
Dog             attcattgac ctcccagcgc cttctaacat ctctgcttga tggaattcg
Wolf-1          attcattgac ctcccagcgc cttctaacat ctctgcttga tggaattcg
Wolf-2          attcattgac ctcccagcgc cttctaacat ctctgcttga tggaattcg
NEWG-12         ATTCATTGAC CTCCCAGCGC CTTCTAACAT CTCTGCTTGA TGGAATTCG
N_Hero          ATTCATTGAC CTCCCAGCGC CATCTAACAT CTCTGCTTGA TGGAATTTCG
C rufus         attcattgac ctcccagcgc cttctaacat ctctgcttga tggaattcg
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 catctaacat ctctgcttga tggaatttcg

                                                                     150
Dog             gatccttact aggagtatgc ctgattctac agattctaac aggtttatt
Wolf-1          gatccttact aggagtatgc ctgattctac agattctaac aggtttatt
Wolf-2          gatccttact aggagtatgc ctgattctac agattctaac aggtttatt
NEWG-12         GATCCTTACT AGGAGTATGC CTGATTCTAC AGATTCTAAC AGGTTTATT
N_Hero          GATCCTTGCT AGGAGTATGC CTGATTCTAC AGATTCTAAC AGGTTTATTT
C rufus         gatccttact aggagtatgc ctgattctac agattctaac aggtttatt
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
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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  cgagacgtta actacggctg aattatccgc ta at ca g
Wolf-1          ccacatctg  cgagacgtta actacggctg aattatccgc ta at ca g
Wolf-2          ccacatctg  cgagacgtta actacggctg aattatccgc ta at ca g
NEWG-12         CCACATCTG  CGAGACGTTA ACTACGGCTG AATTATCCGC TA AT CA G
N_Hero          CCACATCTGT CGAGACGTTA ACTACGGCTG AATTATCCGC TACATACATG
C rufus         ccacatctg  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 tg c tattc taca tgt ggacga
Wolf-1          caaatggcgc ttccatattc tttat tg c tattc taca tgt ggacga
Wolf-2          caaatggcgc ttccatattc tttat tg c tattcataca tgt ggacga
NEWG-12         CAAATGGCGC TTCCATATTC TTTAT TG C TATTC TACA TGT GGACGA
N_Hero          CAAATGGCGC TTCCATATTC TTTATTTGTC TGTTCATACA TGTGGGACGA
C lycaon        caaatggcgc ttccatattc tttattgttc 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 t acggatccta tgtattcata gaaacatgaa acattggaat
Wolf-1          ggcctata t acggatccta tgtattcata gaaacatgaa acattggaat
Wolf-2          ggcctata t acggatccta tgtattcata gaaacatgaa acattggaat
NEWG-12         GGCCTATA 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
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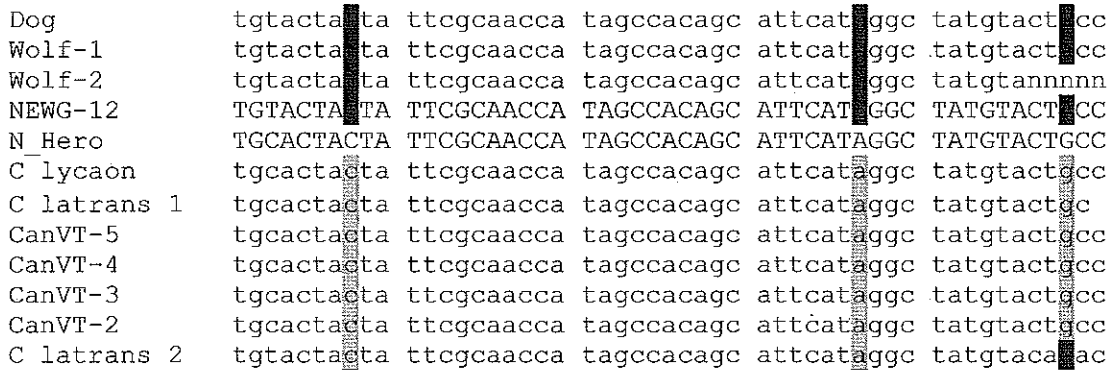

Reference Material (Cytochrome *b*):

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:

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2023
Migratory Game Bird Season Recommendations

to the

Vermont Fish and Wildlife Board

Vermont Fish and Wildlife Department
Agency of Natural Resources
1 National Life Drive, Davis 2
Montpelier, VT 05620-3208
802-828-1000

2023 MIGRATORY GAME BIRD SEASON PREVIEW

Summary of Issues for Consideration:

The majority of Vermont's waterfowl season is driven by the federal framework for the Atlantic Flyway. Below are a few issues that must be decided for the 2023 hunting season. The Department would like the Board to consider the following:

- Hold the liberal season allowed under the federal framework related to season lengths and daily bag limits.
- For the 2023 Duck Season.
    - Open the 2023 duck season on a Saturday, October 14.
    - Interior Zone: October 14 and run through December 12.
    - Lake Champlain Zone: October 14 – Oct. 18 and Oct. 28 - Dec. 21.
    - Increase the two-bird daily bag limit on Mallards to four-birds daily of which only two can be hens.
- For the 2023 Goose Seasons
    - Open the resident Canada goose season September 1st and continue through September 25.
    - Open the migratory Canada goose season on October 14 and run through November 27. Increasing the season to 45-days and the daily bag to three.
    - Open the late resident Canada goose on December 1, 2023. End the season on January 6, 2024. Allow a five-bird daily bag limit. Within the Lake Champlain and Interior zones.
    - Open the Snow goose season on October 1.
- Hold youth hunting weekend – September 23-24.
- Reduce the Atlantic Brant season from 50 to 30 days and reduce the daily bag from two to one.
- Hold woodcock/snipe season: September 23- November 6.

2023 Waterfowl and Migratory Game Bird Season Proposals:

The Department makes these 2023 recommendations based on findings from the Fall 2015 Waterfowl Hunter Survey, comments received from waterfowl hunters the past seven years, data collected on availability of various waterfowl species in Vermont, include eBird, internal discussions among Vermont Wildlife Biologists and State Game Wardens, and frameworks provided by the USFWS. **Survey responses from the 2015 scientific survey came from waterfowl hunters with a broad background that varied greatly by age, hunting experience, educational and economic background. The Department is confident that this survey represents the variation in the entire waterfowl hunting user group in Vermont.**

Table 1.

2023-2024 WATERFOWL SEASON RECOMMENDATION

LAKE CHAMPLAIN ZONE

	SEASON TYPE	SEASON LENGTH	INCLUSIVE DATES	DAILY LIMIT	POSSESSION LIMIT
DUCKS *	Split	60 Days	Oct. 14 – Oct. 18 & Oct. 28 - Dec. 21	6	18
SCAUP*	Split	20 Days	Oct.14–Oct. 18/Oct. 28–Nov.11	2	6
	Hybrid	40 Days	Nov. 12 – Dec. 21	1	3
MERGANSERS *	Split	60 Days	Oct. 14 - Oct. 18 & Oct. 28 - Dec. 21	6	18
COOTS	Split	60 Days	Oct. 14 - Oct. 18 & Oct. 28 - Dec. 21	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 – Jan. 6	5	15
Snow Geese *					
	Split	107 Days	Oct. 1 - Dec.31, 2023 Feb. 24 – Mar. 10, 2024	25	NONE
	Straight (CO)		Mar. 11 – Apr. 26, 2024	15	NONE
Brant	Straight	30 Days	Oct. 14 – Nov. 12	1	3

SHOOTING HOURS - All Waterfowl - All Days - ½ hour before sunrise to sunset

CO: Conservation Order

* Includes blue geese also.

Table 2.

2023-2024 WATERFOWL SEASON RECOMMENDATION

VERMONT INTERIOR ZONE

	SEASON TYPE	SEASON LENGTH	INCLUSIVE DATES	DAILY LIMIT	POSSESSION LIMIT
DUCKS *	Straight	60 Days	Oct. 14 - Dec. 12	6	18
SCAUP*	Straight	20 Days	Oct. 14 – Nov. 2	2	6
		40 Days	Nov. 3 – Dec. 12	1	3
MERGANSERS *	Straight	60 Days	Oct. 14 - Dec. 12	6	18
COOTS	Split	60 Days	Oct. 14 - Dec. 12	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 – Jan. 6	5	15
Snow Geese *					
	Straight	107 Days	Oct. 1 - Dec.31, 2023 Feb. 24 – Mar. 10, 2024	25	NONE
	Straight (CO)		Mar. 11 – Apr. 26, 2024	15	NONE
Brant	Straight	50 Days	Oct. 14 – Nov. 12	1	3

SHOOTING HOURS - All Waterfowl - All Days - ½ hour before sunrise to sunset

CO: Conservation Order
* Includes blue geese also.

Table 3.

2023-2024 VERMONT MIGRATORY GAME BIRD HUNTING SEASONS
(regulations in effect September 1, 2023 through April 26, 2024)

Species	Lake Champlain Zone	Interior Vermont Zone	Connecticut River Zone
Ducks, Coots and Mergansers	**Oct. 14 – Oct. 18** **Oct. 28 – Dec. 21**	**Oct. 14 – Dec. 12**	**Oct. ? – Nov. ?** **Nov. ? – Dec. ?**
Canada Geese	**Sept. 1 – Sept. 25** **Oct. 14 – Nov.27** **Dec. 1 – Jan. 6**	**Sept. 1 – Sept. 25** **Oct. 14 – Nov. 27** **Dec. 1 – Jan. 6**	**Sept. ? – Sept. ?** **Oct. ? – Nov. ?** **Nov. ? – Dec. ?**
Snow Geese **(includes blue geese)**	**Oct. 1 - Dec. 31, 2023** **Feb. 24 - Mar. 10, 2024** **Mar.11 – Apr 26, 2024**	**Oct. 1 - Dec. 31, 2023** **Feb. 24 - Mar. 10, 2024** **Mar.11 – Apr 26, 2024**	**Oct. ? – Dec. ?**
Brant	**Oct. 14 – Nov. 12**	**Oct. 14 – Nov. 12**	**Oct. ? – Oct. ?**
Woodcock	**Statewide**	**Sept. 23 – Nov. 6**	
Snipe	**Statewide**	**Sept. 23 – Nov. 6**	

Youth Waterfowl Hunting Weekend – September 23 & 24

BAG LIMITS

The daily bag limit is the maximum number of birds of each species that any person may take (or possess in the field) during any one day. The possession limit is three times the daily bag limit for all waterfowl species except snow geese.

Species	Daily Limit	Possession Limit
Ducks *	6	18
Mergansers	6	18
Coot	15	45
Canada Geese		
September season		
Lake Champlain Zone	8	24
Interior Vermont Zone	8	24
Connecticut River Zone	5	15
Oct. - Nov. season		
Lake Champlain Zone	3	9
Interior Vermont Zone	3	9
Connecticut River Zone	2	6
Dec. – Jan. season		
Lake Champlain Zone	5	15
Interior Vermont Zone	5	15
Snow Geese	25	No limit
Mar. 11 – Apr. 26, 2024	15	No limit
Brant	1	3
Woodcock	3	9
Snipe	8	24

* The daily limit of 6 ducks may include no harlequin, and no more than 4 mallards (only 2 of which may be hens), 2 black ducks, 3 wood ducks, 1 pintail, 2 canvasbacks, 2 redheads, 2 or 1 scaup depending on dates, 3 scoters, 3 eiders, and 3 long-tailed duck.

Background On Waterfowl Season Setting and Management:

Migratory game bird managers currently base the migratory bird population estimates and recommendations on predictions derived from long-term biological information and harvest strategies instead of current year surveys. In 2018 the Atlantic Flyway region implemented a Multi-Stock Adaptive Harvest Management Strategy based on a suite of four duck species that represent the population dynamics and various habitat types used by waterfowl throughout the flyway, in lieu of relying solely upon the status of eastern mallards. The four species include green-winged teal, common goldeneye, ring-necked duck, and wood ducks. These species compose more than 40% of the harvest within the flyway and supply a sufficient time series of estimates of annual abundance, harvest rates and harvest to monitor population trends. This was necessary because one species, the mallard, was driving all the seasons, which had an effect on multiple species. Within this system, species of concern such as mallard and black duck are evaluated separately with an assessment under the adaptive harvest management strategies developed for the target species. The objectives are to sustain duck populations for all and to allow harvest where appropriate. The estimates allow for a liberal season of 60 days with a 6-bird bag limit. Species specific bag limits follow their respective harvest strategies, with the majority of species bag limits being the same as last year.

Tables 4 and 5 provide background information on past migratory game bird hunting seasons. Table 4 shows the hunting seasons approved during 2022 and is provided as a reference while considering bag limits and the seasons frameworks for 2023. Appendix B provides the history, 1942-2022, of Vermont's waterfowl seasons broken down into season type, season length, dates, and bag limits. This may help one's understanding of how Vermont arrived at our current zones and season types.

Table 5 provides a historic look at waterfowl hunter participation and estimated harvest levels, Vermont waterfowl stamps sold, and the number of individuals that registered with the Harvest Information Program (HIP). HIP is a method used to generate more reliable estimates of hunting activity and number of all migratory birds harvested. The HIP program numbers include youth and adult waterfowl hunters, woodcock, and snipe hunters. Only adult waterfowl hunters, 16 years of age and older, are required to purchase the state waterfowl stamp. The Department will populate the remaining portions of the table this summer after the USFWS examines wings collected randomly from last season's hunters and harvest estimates are completed.

Vermont currently has three waterfowl zones (Figure 1):

- Lake Champlain Zone that we share with New York. Vermont sets the dates for this zone.
- Interior Zone that is entirely within Vermont.
- Connecticut River Zone that we share with New Hampshire. New Hampshire sets the dates for this zone as an extension of their inland zone.

Under Vermont's current three zones, Vermont can split any zone once to create two hunting segments. Vermont currently has sixty days to divide between the two segments in an effort to accommodate the diverse desires of the variety of Vermont waterfowl hunters. The zones were also set up to take into consideration the differences in the physiographic regions of the state and

the climatic differences each has. Federal regulations allow for zone and split changes every five years. Vermont's next opportunity to adjust zone boundaries and splits is in 2025. Any changes will take effect in the 2026-2031 season and be in effect for 5-years.

2023 Migratory Game Bird Seasons:

Tables 6 and 7 provide the expected USFWS season frameworks for the 2023 duck and goose seasons, respectively, the latter including other migratory game birds as well. Potential changes from 2022 hunting seasons shown on Table 4 includes increasing the daily bag limit on mallard from two to four with a two hen restriction, increasing the regular goose season from 30 to 45 days and the daily bag limit from one to three birds, and decreasing the brant season from 50 to 30 days and the bag limit from two to one daily.

2023 Duck Season: The 2023 duck season options allow the opportunity to utilize a 60-day season within the dates of September 23, 2023 to January 31, 2024. The allowed daily bag limit is six birds, with species specific limits listed on Table 6. Vermont may allow a possession limit of 18 ducks total. The Board may be more restrictive on the length of the season and bag limits if desired, but the Board cannot set regulations more liberal. The Department recommends taking the liberal hunting option allowed under the federal framework.

The Board has also traditionally held the youth waterfowl weekend the last weekend in September. The Department has withheld any fishing tournament permits for that weekend to reduce conflicts between anglers and youth waterfowlers. The youth weekend must be within 14 days of either end of the federal framework dates.

2023 Goose, Brant, Mergansers, Coots. Snipe, and Woodcock Seasons: Table 7 lays out the season options for geese, brant, mergansers, coots, snipe, and woodcock. The available season lengths, outside dates for the seasons, daily bag limits and possession limits are broken down by species.

We often receive requests to open the migratory Canada goose season in early October. We are not allowed to open the season on migratory Canada geese until October 10th to reduce hunting pressure on the Atlantic population that is flying through the state. Prior to 2010 we were unable to open the season until October 20th. This change came about because of efforts pursued by Vermont and some other New England states. Surveys on breeding grounds were reinstituted during the spring of 2022. The Atlantic population of Canada geese were last surveyed in 2019 prior to the COVID pandemic. Breeding pairs in 2022 totaled 164,000 increasing from 2019's total of 119,500. The integrated population model predicts that breeding pairs will increase to 180,500 in 2023. The increase in breeding pair numbers in 2022 allowed for the liberalization of the migrant Canada goose season.

The Brant Hunt Plan and Harvest Strategy were revised in 2020. The revised plan uses an Integrated Population Model (IPM) to generate a prediction of the brant population. This model prediction will be used in place of the mid-winter survey estimate to determine the annual hunting season recommendation. Advantages of the IPM are that the population estimate is available in the summer, prior to the regulatory flyway meeting and federal register framework

publication. In addition, estimates provided by the IPM are less variable than the MWS and will likely result in fewer changes to hunting packages over time. The model prediction for 2023 is 107,000 brant, and the harvest strategy recommends a 30-day season with a 1-bird daily bag limit, which is changed from last year.

2023 Youth Waterfowl Hunting Days: The Department and Board may select two days per duck-hunting zone, designated as ''Youth Waterfowl Hunting Days,'' in addition to the regular duck seasons. The days must be held outside any regular duck season on a weekend, holiday, or other non-school days when youth hunters would have the maximum opportunity to participate. The days may be held up to 14 days before or after any regular duck-season frameworks or within any split of a regular duck season, or within any other open season on migratory birds. The daily bag limits may include ducks, geese, mergansers, and coots, and would be the same as those allowed in the regular season. Flyway species and area restrictions would remain in effect.

States are allowed to use their established definition of age for youth hunters. However, youth hunters may not be 18 years of age or older. In addition, an adult at least 18 years of age must accompany the youth hunter into the field. This adult may not duck hunt but may participate in other seasons that are open on the special youth day. Youth hunters 16 years of age and older must possess a Federal Migratory Bird Hunting and Conservation Stamp (also known as Federal Duck Stamp). In 2016 Vermont changed the youth waterfowl hunters age to 17 and younger. Vermont also requires all hunters 16 years of age and older to have a state duck stamp. In some years, the end of the resident Canada goose season overlaps the youth waterfowl hunting weekend. This will occur in our proposal for 2023 Youth Hunting Weekend, Saturday and Sunday, September 23rd and 24th.

Special Falconry Regulations: Falconry is a permitted means of taking migratory game birds in any State meeting Federal falconry standards in 50 CFR 21.29. These States may select an extended season for taking migratory game birds in accordance with the following:
Extended Seasons: For all hunting methods combined, the combined length of the extended season, regular season, and any special or experimental seasons must not exceed 107 days for any species or group of species in a geographical area. Each extended season may be divided into a maximum of 3 segments. Framework Dates: Seasons must fall between September 1 and March 10.

Daily Bag Limits: Falconry daily bag limits for all permitted migratory game birds must not exceed 3 birds, singly or in the aggregate, during extended falconry seasons, any special or experimental seasons, and regular hunting seasons in all States, including those that do not select an extended falconry season.

Regular Seasons: General hunting regulations, including seasons and hunting hours, apply to falconry in each State listed in 50 CFR 21.29. Regular season bag limits do not apply to falconry. The falconry bag limit is not in addition to gun limits.

Vermont has traditionally run the falconry season during any open migratory game bird season. Last year falconers had the opportunity to begin on September 1st with the resident Canada goose season and hunt through January 21st. A three-bird daily bag limit was in effect.

In summary, the proposed 2023 waterfowl and migratory bird hunting regulations were made based on the following information:

- Decide when to place the majority of duck hunting days by month. Most hunters prefer October to have the most waterfowl hunting opportunity.
- Determine what day of the week to open the season. Regardless of hunting zone, few (< 12%) hunters do most of their hunting on weekdays. Hunters either hunt weekends or split their time equally between weekdays and weekend hunting.
- Determine what week to recommend opening the season. Vermont hunters chose the second week in October as their preferred opening week for ducks and geese.
- Decide which zones to propose for splits and in which seasons. "Goose hunters in the Lake Champlain zone, regardless of residency, chose straight season more than split seasons. For the Interior Vermont zone, Vermont residents chose straight seasons most commonly for duck and goose seasons".
- Decide on the length of the Lake Champlain Zone split. Vermont hunters preferred a two-week season split length if one is to be used.

Legal Framework for Hunting Season Decision

Beginning in 2015 the Board was given authority by Legislature to set the migratory bird hunting regulations by procedure instead of rule. Part of Title 10 § 4082 reads:

(b)(1) Except as provided for under subdivision (2) of this subsection, the Board annually may adopt rules relating to the management of migratory game birds and shall follow the procedures for rulemaking contained in 3 V.S.A. chapter 25. For each such rule, the Board shall conduct a hearing but, when necessary, may schedule the hearing for a day before the terms of the rule are expected to be determined.

(2) Beginning with the 2015 hunting season, the Board may set by procedure the daily bag and possession limits of migratory game birds that may be harvested in each Waterfowl Hunting Zone annually without following the procedures for rulemaking contained in 3 V.S.A. chapter 25. The annual daily bag and possession limits of migratory game birds shall be consistent with federal requirements. Prior to setting the migratory game bird daily bag and possession limits, the Board shall provide a period of not less than 30 days of public notice and shall conduct at least two public informational hearings. The final migratory game bird daily bag and possession limits shall be enforceable by the Department under its enforcement authority in part 4 of this title.

For your information, included below is the segment of the federal register that pertains to establishing zones and splits. The information below only applies to the regular duck season.

Federal Register** /Vol. 84, No. 199 /Tuesday, October 15, 2019 / Proposed Rules **55126-27

Guidelines for Duck Zones and Split Seasons

The following zone and split-season guidelines apply only for the regular duck season:

(1) A zone is a geographic area or portion of a State, with a contiguous boundary, for which independent dates may be selected for the regular duck season.

(2) Consideration of changes for management-unit boundaries is not subject to the guidelines and provisions governing the use of zones and split seasons for ducks.
(3) Only minor (less than a county in size) boundary changes will be allowed for any grandfathered arrangement and changes are limited to the open season.
(4) Once a zone and split option is selected during an open season, it must remain in place for the following 5 years.
Any State may continue the configuration used in the previous 5-year period. If changes are made, the zone and split-season configuration must conform to one of the following options:
(1) No more than four zones with no splits,
(2) Split seasons (no more than 3 segments) with no zones, or
(3) No more than three zones with the option for 2-way (2-segment) split seasons in one, two, or all zones.
Grandfathered Zone and Split Arrangements
When we first implemented the zone and split guidelines in 1991, several States had completed experiments with zone and split arrangements different from our original options. We offered those States a one-time opportunity to continue (''grandfather'') those arrangements, with the stipulation that only minor changes could be made to zone boundaries. If any of those States now wish to change their zone and split arrangement:
(1) The new arrangement must conform to one of the 3 options identified above; and
(2) The State cannot go back to the grandfathered arrangement that it previously had in place.
Management Units
We will continue to utilize the specific limitations previously established regarding the use of zones and split seasons in special management units, including the High Plains Mallard Management Unit. We note that the original justification and objectives established for the High Plains Mallard Management Unit provided for additional days of hunting opportunity at the end of the regular duck season. In order to maintain the integrity of the management unit, current guidelines prohibit simultaneous zoning and/or 3-way split seasons within a management unit and the remainder of the State. Removal of this limitation would allow additional proliferation of zone and split configurations and compromise the original objectives of the management unit.

Eastern Mallard Collaborative Research Project:

Atlantic Flyway states are conducting a regional study of the eastern mallard population. Vermont is participating and is deploying 12 GSM/GPS units and 15 geolocators in 2023, with the hopes to place out five a year over the remaining two-year period. The project aims to annually deploy 600 GSM/GPS units on female mallards in Eastern Canada and the Northeastern United States to answer several important questions about mallard movements, productivity, and biases within our banded sample. Specifically, the project proposes the following objectives:

1) Quantify and compare reproductive metrics such as reproductive attempts, full-term incubation, and brood-rearing between mallards in the Northeastern US and Eastern Canada, and the extent to which behavior and weather explains variation in reproductive metrics.
    a. Use proportion of stationary behavior from ACC data and daily displacement from GPS data to infer nesting attempts and success

   b. Develop detailed time activity budgets of mallard behavior throughout the annual cycle at the sub-population scale
   c. Explore the extent to which behavior and weather patterns (precipitation, temperature, winter severity) influence reproductive success both directly and through cross-seasonal effects
2) Estimate seasonal survival rates of female mallards in Eastern Canada vs. Northeastern US
3) Quantify and compare female mallard movements and habitat use and selection throughout the annual cycle in the Northeastern US and Eastern Canada
   a. Understand mallard movements during the pre-season banding window to better inform implications for pre-season banding data analyses.
4) Characterize habitat-use and selection of mallards and black ducks throughout the annual cycle.

New York and Pennsylvania have secured internal funding to support much of the project but solicited in-kind and financial support from other flyway states, federal and Canadian partners to reach marking sampling goals/distribution and fully fund the project. The project has begun deployments of GSM and geolocator units during the winter of 2022-2023, coinciding with the American black duck joint venture project.

During the 2021-2022 capture period Vermont placed out eight GSM/GPS units at three locations within the Champlain Valley from January 13th to February 15th. Three of the birds died during the winter months and tracking units were recovered for redeployment. Only two of the three units were redeployed prior to the migration and nesting period. During the nesting period seven of the eight units were functional.

Public Input and Outreach:

The Department, in conjunction with the Board, is currently planning to hold two public hearings in 2023. Meetings are tentatively planned for the evenings of March 14th (Ticonderoga, NY, in person only) and 16th (Essex Junction District office conference room, in person and recorded for posting on the Department website), beginning at 6:30pm. During the hearings, the Department will review the season options, recommendations, current biological information, answer questions, and record public comments for the Board. The public will be encouraged to submit comments through email or a recorded phone line. Hearing times and website posting locations will be advertised on the Department website and through news releases.

After the Board approves final season dates and bag limits (scheduled for April 5, 2023 Board meeting), the Department will submit selections to the U.S. Fish and Wildlife Service by April 30th and the information will be sent to a printer for production of the 2023 syllabus of state and federal hunting regulations. The early decision deadlines allow the Department to have the syllabus available to the public in print version by August 1st, a full month prior to any migratory bird hunting season. Approved seasons will be placed on the Department's website within days after the Board's vote.

Table 4. 2022 Migratory Bird Hunting Seasons

2022-2023 VERMONT MIGRATORY GAME BIRD HUNTING SEASONS
(regulations in effect September 1, 2022 through April 23, 2023)

Species	Lake Champlain Zone	Interior Vermont Zone	Connecticut River Zone
Ducks, Coots and Mergansers	**Oct. 15 – Oct. 23** **Oct. 29 – Dec. 18**	**Oct. 15 – Dec. 13**	**Oct. 4 – Nov. 6** **Nov. 23 – Dec. 18**
Canada Geese	**Sept. 1 – Sept. 25** **Oct. 15 – Nov. 13** **Dec. 1 – Jan. 21**	**Sept. 1 – Sept. 25** **Oct. 15 – Nov. 13** **Dec. 1 – Jan. 21**	**Sept. 1 – Sept. 25** **Oct. 4 – Nov. 6** **Nov. 23 – Dec. 18** **Dec. 19 – Jan. 21**
Snow Geese **(includes blue geese)**	**Oct. 1 - Dec. 31, 2022** **Feb. 26 - Mar. 10, 2023** **Mar.11 – Apr 23, 2023**	**Oct. 1 - Dec. 31, 2022** **Feb. 26 - Mar. 10, 2023** **Mar.11 – Apr 23, 2023**	**Oct. 4 – Dec. 18** **Mar.11 – Apr 23, 2023 (applies to land, not CT River waters)**
Brant	**Oct. 15 – Dec. 3**	**Oct. 15 – Dec. 3**	**Oct. 4 – Nov. 6** **Nov. 23 – Dec. 8**
Woodcock	**Statewide**	**Sept. 24 – Nov. 7**	
Common Snipe	**Statewide**	**Sept. 24 – Nov. 7**	

Youth Waterfowl Hunting Weekend – September 24 & 25

BAG LIMITS

The daily bag limit is the maximum number of birds of each species that any person may take (or possess in the field) during any one day. The possession limit is three times the daily bag limit for all waterfowl species except snow geese.

Species	Daily Limit	Possession Limit
Ducks *	6	18
Mergansers	5	15
Coot	15	45
Canada Geese		
September season		
Lake Champlain Zone	8	24
Interior Vermont Zone	8	24
Connecticut River Zone	5	15
Oct. - Nov. season		
Lake Champlain Zone	1	3
Interior Vermont Zone	1	3
Connecticut River Zone	2	6
Dec. – Jan. season		
Lake Champlain Zone	5	15
Interior Vermont Zone	5	15
Connecticut River Zone	5	15 (Vermont land portions only)
Snow Geese	25	No limit
Mar. 11 – Apr. 23, 2023	15	No limit
Brant	2	6
Scaup*		
Lake Champlain Zone		
Oct. 15 - Oct. 23 &		
Oct. 29 - Nov. 8	2	6
Nov. 9 - Dec. 18	1	3
Interior Vermont Zone		
Oct. 15 – Nov. 3	2	6
Nov. 4 - Dec. 13	1	3
Connecticut River Zone		
Oct. 4 - Nov. 6	1	3
Nov. 23 - Dec. 18	1	3
Woodcock	3	9
Common Snipe	8	24

* The daily limit of 6 ducks may include no harlequin, and no more than 2 mallards (only 1 of which may be hens), 2 black ducks, 3 wood ducks, 1 pintail, 2 canvasbacks, 2 redheads, 2 or 1 scaup depending on dates, 3 scoters, 3 eiders, and 3 long-tailed duck.

Table 5. Vermont Waterfowl Hunting and Harvest Data Comparisons (Lake Champlain and Interior Vermont Zones Combined)

	Federal Duck Stamp Sales	Vermont Duck Stamp Sales	Vermont HIP Registration	No. of Active Adult Duck Hunters	Average Seasonal Duck Bagged Per Hunter	Total Season Estimated Duck Harvest	Total Season Estimated Canada Goose Harvest	Total Season Estimated Snow Goose Harvest
1998	4,345	6,725		3,132	5.78	24,000	2,700	3,300
1999	4,542	6,320		1,600	11.9	25,000	4,100	1,700
2000	4,741	5,418		1,700	10.4	17,700	3,600	4,200
2001	4,824	5,685		1,700	10.4	17,600	4,300	2,200
2002	5,201	5,722		2,600	9.6	26,800	7,100	1,300
2003	5,242	6,012		1,300	12.6	16,300	3,600	3,400
2004	4,723	6,242		2,600	9.3	24,300	7,100	1,700
2005	4,956	5,682		2,400	10.6	25,400	9,300	400
2006	3,391	5,581		2,000	9.9	19,600	7,800	100
2007	3,193	6,137		2,300	9.2	16,700	6,300	500
2008	3,391	5,746	⇧ $5-$7.50	2,900	11.9	34,800	12,300	2,100
2009	not available	6,051		2,400	10.7	25,500	11,500	90
2010	not available	6,065 Last Stamp	5,404***	2,700	8.5	22,900	9,600	0
2011	not available	4,872 First Tag	4,949***	2,600	9.0	23,000	8,300	134
2012	not available	5,882	6,283***	2,100	10.0	20,500	8,600	34
2013	not available	6,436	8,719***	4,000	8.0	31,900	9,600	0
2014	not available	6,635	9,913***	2,600	6.8	17,800	12,300	46
2015	not available	6,244	11,122***	2,600	5.8	14,700	6,733	0
2016	not available	6,016	18,598***	3,400	5.2	17,600	8,800	0
2017	not available	5,954	7,006***	2,500	7.9	19,900	15,900	0
2018	not available	5,725	10,541***	2,100	7.8	16,200	7,400	0
2019	not available	5,620	10,359***	3,000	6.1	18,100	5,600	0
2020	not available	6,089	10,123***	2,200	9.0	19,900	11,800	116
2021	not available	6,111	10,236***	2,000	6.4	11,500	5,600	0
2022	not available	5,956	9,772***	To date not available	To date not available	To date not available	To date not available	To date not available

*** Includes youth hunters and woodcock/snipe hunters

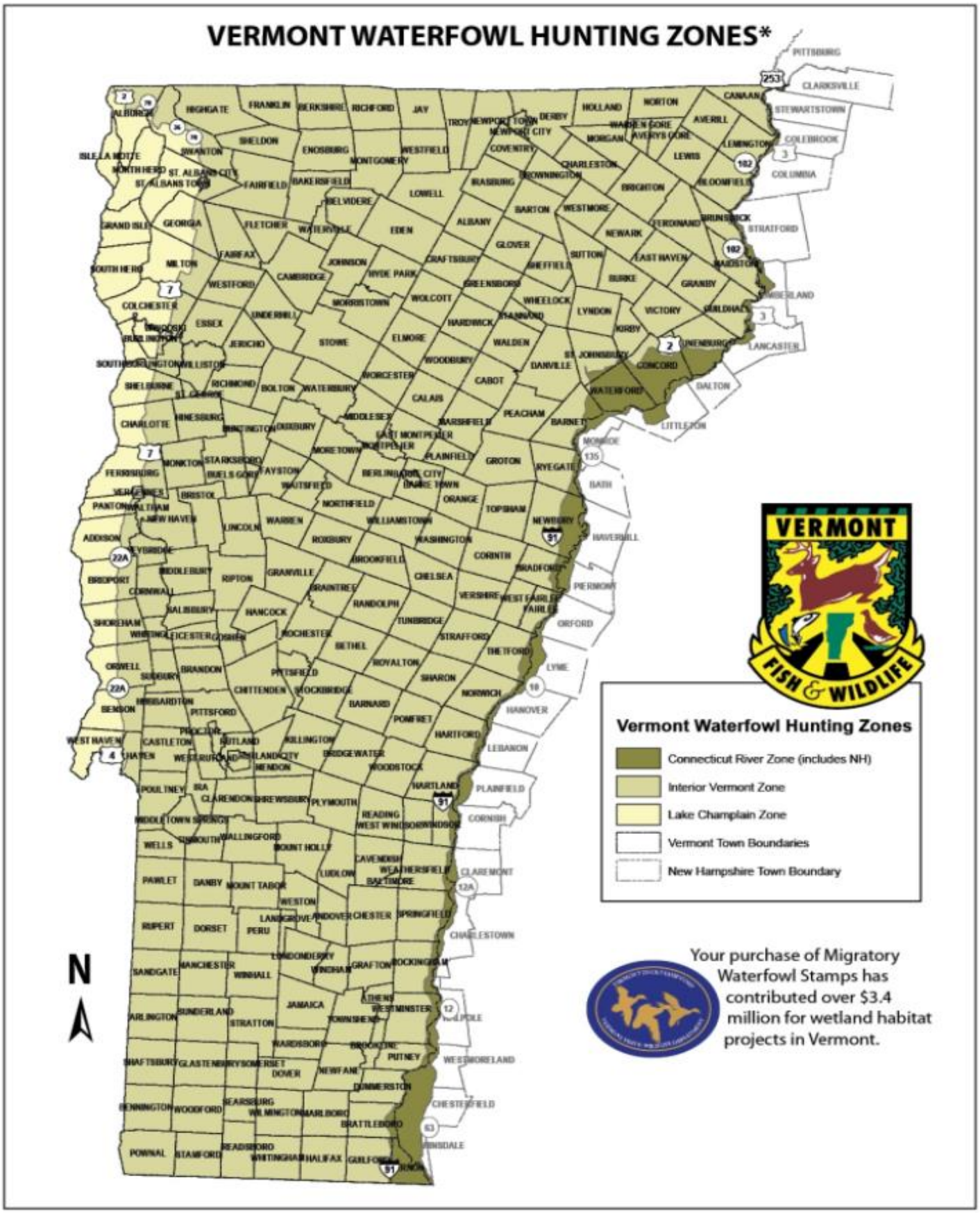

Figure 1. Vermont waterfowl hunting zones

Table 6. USFWS Framework for 2023 Duck Seasons*

LENGTH	OUTSIDE DATES	DAILY BAG	POSSESSION LIMIT**
60 Days	Sept. 23 – Jan. 31	6	18

SPECIES RESTRICTIONS -	Daily Bag
MALLARD	4 (only 2 hens)
WOOD DUCK	3
BLACK DUCK	2
PINTAIL	1
REDHEAD	2
SCAUP	2/day for 20-days 1/day for 40-days
SCOTER	3
EIDERS	3
LONG-TAILED DUCK	3
CANVASBACK	2
HARLEQUIN	CLOSED
MOTTLED DUCK	1
FULVOUS WHISTLING DUCK	1
HOODED MERGANSER	6

* Apply to Lake Champlain, Interior Vermont, and Connecticut River Zones.

** Possession limit is equal to three times the daily bag limit for these species.

*** Four total sea ducks in aggregate, with species specific limits, (no more than 3-scoters, 3-eiders (1hen), or 3-long tailed ducks)

SHOOTING HOURS - ½ HOUR BEFORE SUNRISE TO SUNSET (all days – all species)

Table 7. USFWS Framework for 2023 Geese, Brant, Merganser, Coot, Snipe, and Woodcock Seasons

SPECIES	SEASON LENGTH	OUTSIDE DATES	DAILY BAG	POSSESSION LIMIT**
Canada Geese (No more than 107 days combined)				
Resident	25 days	Sept. 1 – Sept. 25	15	45
Regular	45 days	Oct. 10 – Feb. 5	3	9
Resident	77 days	Dec. 1 – Feb. 15	5	15
Snow & Blue Geese	107 days	Oct. 1 – Mar. 10	25	NONE
Brant	30 days	Sept. 23 – Jan. 31	1	3
Mergansers*	60 days	Sept. 23 – Jan. 31	6	18
(Hooded Mergansers)			(6)	(18)
Coots**	60 days	Sept. 23 – Jan. 31	15	45
Snipe	107 days	Sept. 1 – Jan. 31	8	24
Woodcock	45 days	Sept. 13 – Jan. 31	3	9

* Season length for mergansers equals season option chosen for ducks. Mergansers may be included as part of the daily duck bag, in which case the limit would be 6 mergansers/day.

** Season length for coots equals season option chosen for ducks.

SHOOTING HOURS - ½ HOUR BEFORE SUNRISE TO SUNSET (all days – all species)

APPENDIX A

2023 FALL CALENDAR

	SUN	MON	TUES	WED	THUR	FRI	SAT
SEPTEMBER						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
OCTOBER							
	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				
NOVEMBER				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30		
DECEMBER						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31						

APPENDIX B

Vermont Waterfowl Seasons				
YEAR	**SEASON TYPE**	**SEASON LENGTH**	**SEASON DATES**	**GENERAL BAG LIMIT**
1942	Straight	70	Sept. 26 – Dec. 4	10-20
1943	Straight	70	Sept. 25 – Dec. 3	10-20
1944	Straight	80	Sept. 20 – Dec. 8	10-20
1945	Straight	80	Sept. 20 – Dec. 8	7-14
1946	Straight	45	Oct. 5 – Nov. 18	7-14
1947	Straight	30	Oct. 21 – Nov. 19	3-6
1948	Straight	30	Oct. 15 – Nov. 13	3-6
1949	Straight	40	Oct. 21 – Nov. 29	3-6
1950	Straight	40	Oct. 20 – Nov. 28	3-6
1951	Straight	45	Oct. 12 – Nov. 25	3-6
1952	Straight	55	Oct. 7 – Nov. 11	3-6
1953	Straight	60	Oct. 5 – Dec. 3	3-6
1954	Straight	60	Oct. 10 – Dec. 8	3-6
1955	Straight	70	Oct. 5 – Dec. 13	3-6
1956	Straight	70	Oct. 5 – Dec. 13	3-6
1957	Straight	70	Oct. 10 – Dec. 18	3-6
1958	Straight	60	Oct. 10 – Dec. 8	3-6
1959	Straight	50	Oct. 10 – Nov. 28	3-6
1960	Straight	50	Oct. 7 – Nov. 25	3-6
1961	Straight	40	Oct. 14 – Nov. 22	3-6
1962	Straight	40	Oct. 12 – Nov. 20	3-6
1963	Split	45	Oct. 11 – Oct. 27 / Nov. 11 – Dec. 8	3-6
1964	Straight	50	Oct. 10 – Nov. 28	3-6
1965	Straight	50	Oct. 16 – Dec. 4	3-6
1966	Straight	55	Oct. 8 – Dec. 1	3-6
1967	Split	45	Oct. 7 – Nov. 4 / Nov. 25 – Dec. 10	3-6
1968	Straight	50	Oct. 12 – Nov. 30	3-6
1969	Straight	50	Oct. 11 – Nov. 29	3-6
1970	Straight	50	Oct. 10 – Nov. 28	4-8
1971	Straight	50	Oct. 9 – Nov. 27	4-8
1972	Split	50	Oct. 7 – Oct. 15 / Oct. 28 – Dec. 7	4-8
1973	Split	45	Oct. 6 – Oct. 21 / Nov. 3 – Dec. 1	4-8
1974	Straight	50	Oct. 9 – Nov. 27*	4-8
1975	Straight	50	Oct. 8 – Nov. 26*	4-8
1976	Straight	50	Oct. 6 – Nov. 24*	4-8
1977	Straight	50	Oct. 5 – Nov. 23*	4-8
1978	Straight	50	Oct. 4 – Nov. 22*	4-8
1979	Split	50	Oct. 3 – Oct. 14 / Oct. 27 – Dec. 3*	4-8
1980	Straight	50	Oct. 8 – Nov. 26*	4-8
1981	Straight	50	Oct. 10 – Nov. 28*	4-8

Vermont Waterfowl Seasons – Page 2

YEAR	SEASON TYPE	SEASON LENGTH	SEASON DATES	GENERAL BAG LIMIT
1982	Split	50	Oct. 2 – Oct. 10 / Oct. 16 – Nov. 25*	5-10
1983	Split	50	Oct. 8 – Oct. 16 / Oct. 22 – Dec. 1*	5-10
1984	Straight	50	Oct. 10 – Nov. 28*	5-10
1985	Zoned**	40	Oct. 9 – Oct. 13 / Oct. 26 – Nov. 29 (LCZ)* Oct. 9 – Nov. 17 (IVZ)	5-10 5-10
1986	Zoned**	40	Oct. 8 – Oct. 12 / Oct. 25 – Nov. 28 (LCZ)* Oct. 8 – Nov. 16 (IVZ)	5-10 5-10
1987	Zoned**	40	Oct. 7 – Oct. 11 / Oct. 24 – Nov. 27 (LCZ)* Oct. 7 – Nov. 15 (IVZ)	4-8 4-8
1988	Zoned/Split	30	Oct. 8 – Oct. 23 / Nov. 24 – Dec. 7 (LCZ)* Oct. 8 – Oct. 30 / Nov. 24 – Nov. 30 (IVZ)	3-6 3-6
1989	Zoned/Split	30	Oct. 11 – Oct. 29 / Nov. 23 – Dec. 3 (LCZ) Oct. 11 – Nov. 5 / Nov. 23 – Nov. 26 (IVZ)	3-6 3-6
1990	Zoned/Split	30	Oct. 10 – Oct. 21 / Nov. 15 – Dec. 2 (LCZ) Oct. 10 – Nov. 4 / Nov. 22 – Nov. 25 (IVZ)	3-6 3-6
1991	Zoned/Split	30	Oct. 12 – Oct. 27 / Nov. 23 – Dec. 6 (LCZ) Oct. 12 – Nov. 3 / Nov. 25 – Dec. 1 (IVZ)	3-6 3-6
1992	Zoned/Split	30	Oct. 7 – Oct. 11 / Nov. 7 – Dec. 1 (LCZ) Oct. 7 – Nov. 1 / Nov. 26 – Nov. 29 (IVZ)	3-6 3-6
1993	Zoned/Split	30	Oct. 20 – Nov. 7 / Nov. 25 – Dec. 5 (LCZ) Oct. 13 – Nov. 7 / Nov. 25 – Nov. 28 (IVZ)	3-6 3-6
1994	Zoned/Split	40	Oct. 15 – Nov. 6 / Nov. 19 – Dec. 5 (LCZ) Oct. 8 – Nov. 9 / Nov. 21 – Nov. 27 (IVZ)	3-6 3-6
1995	Zoned/Split	50	Oct. 11 – Oct. 22 / Nov. 4 – Dec. 11 (LCZ) Oct. 4 – Nov. 12 / Nov. 18 – Nov. 27 (IVZ)	4-8 4-8
1996	Zoned/Split	50	Oct. 9 – Oct. 20 / Nov. 2 – Dec. 9 (LCZ) Oct. 2 – Nov. 11 / Nov. 23 – Dec. 1 (IVZ)	5-10 5-10
1997	Zoned**	60	Oct. 4 – Oct. 19 / Oct. 25 – Dec. 7 (LCZ) Oct. 4 – Dec. 2 (IVZ)	4-8*** 4-8***
1998	Zoned**	60	Oct. 7 – Oct. 11 / Oct. 17 – Dec. 10 (LCZ) Oct. 7 – Dec. 5 (IVZ)	6-12 6-12
1999	Zoned**	60	Oct. 6 – Oct. 11 / Oct. 23 – Dec. 15 (LCZ) Oct. 6 – Dec. 4 (IVZ)	6-12 6-12
2000	Zoned/Split	60	Oct. 7 – Oct. 9 / Oct. 21 – Dec. 16 (LCZ) Oct. 7 – Nov. 12 / Nov. 18 – Dec. 10 (IVZ)	6-12 6-12
2001	Zoned/Split	60	Oct. 10 – Oct. 14 / Oct. 20 – Dec. 13 (LCZ) Oct. 10 – Dec. 8 (IVZ) Oct. 2 – Nov. 4 / Nov. 21 – Dec. 16 (CRZ)****	6-12 6-12 6-12
2002	Zoned/Split	60	Oct. 9 – Oct. 13 / Oct. 22 – Dec. 15 (LCZ) Oct. 9 – Nov. 14 / Nov. 23 – Dec. 15 (IVZ) Oct. 2 – Nov. 5 / Nov. 27 – Dec. 21 (CRZ)****	6-12 6-12 6-12

Vermont Waterfowl Seasons – Page 3

YEAR	SEASON TYPE	SEASON LENGTH	SEASON DATES	GENERAL BAG LIMIT
2003	Zoned**	60	Oct. 11 - Oct. 13 / Oct. 25 - Dec. 20 (LCZ)	6-12
			Oct. 11 - Dec. 9 (IVZ)	6-12
			Oct. 7 - Nov. 9 / Nov. 26 - Dec. 21 (CRZ)****	6-12
2004	Zoned**	60	Oct. 6 - Oct. 10 / Oct. 23 - Dec. 16 (LCZ)	6-12
			Oct. 6 - Dec. 4 (IVZ)	6-12
			Oct. 5 - Nov. 14 / Nov. 24 - Dec. 12 (CRZ)****	6-12
2005	Zoned**	60	Oct. 5 – Oct. 10 / Oct. 26 – Dec. 18 (LCZ)	6-12
			Oct. 5 – Dec. 3 (IVZ)	6-12
			Oct. 4 – Nov.13/ Nov. 23 - Dec. 11 (CRZ)****	6-12
2006	Zoned**	60	Oct. 7- Oct. 15/ Oct. 25 - Dec. 14 (LCZ)	6-12
			Oct. 7 - Dec. 5 (IVZ)	6-12
			Oct. 3 - Nov. 5/ Nov. 22 - Dec. 17 (CRZ)****	6-12
2007	Zoned**	60	Oct. 10- Oct. 14/ Oct. 27 - Dec. 20 (LCZ)	6-12
			Oct. 10- Dec. 8 (IVZ)	6-12
			Oct. 3- Nov. 4/ Nov. 21 - Dec. 17 (CRZ)****	6-12
2008	Zoned**	60	Oct. 8- Oct. 12/ Oct. 25 - Dec. 18 (LCZ)	6-12
			Oct. 8- Dec. 6 (IVZ)	6-12
			Oct. 2- Nov. 2/ Nov. 23 - Dec. 20 (CRZ)****	6-12
2009	Zoned**	60	Oct. 10- Oct. 13/ Oct. 24 - Dec. 18 (LCZ)	6-12
			Oct. 10- Dec. 8 (IVZ)	6-12
			Oct. 6- Nov. 8/ Nov. 25 - Dec. 20 (CRZ)****	6-12
2010	Zoned**	60	Oct. 6-Oct. 10/Oct. 23 - Dec. 16 (LCZ)	6-12
			Oct. 6-Dec. 4 (IVZ)	6-12
			Oct. 5-Nov. 7/ Nov. 24 – Dec. 19 (CRZ)	6-12
2011	Zoned**	60	Oct. 12-Oct. 16/Oct. 29 - Dec. 22 (LCZ)	6-12
			Oct. 12-Dec 10 (IVZ)	6-12
			Oct. 4-Nov. 6/Nov. 23- Dec. 18 (CRZ)****	6-12
2012	Zoned**	60	Oct. 13-Oct. 17/Oct. 27 - Dec. 20 (LCZ)	6-12
			Oct. 13-Dec 11 (IVZ)	6-12
			Oct. 2-Nov. 4/Nov. 21- Dec. 16 (CRZ)****	6-12
2013	Zoned**	60	Oct. 9-Oct. 13/Oct. 26 - Dec. 19 (LCZ)	6-18
			Oct. 9-Dec 7 (IVZ)	6-18
			Oct. 2-Nov. 3/Nov. 19- Dec. 15 (CRZ)****	6-18
2014	Zoned**	60	Oct. 8-Oct. 12/Oct. 25- Dec. 18 (LCZ)	6-18
			Oct. 8-Dec. 6 (IVZ)	6-18
			Oct. 2-Nov. 2/Nov. 16- Dec. 13 (CRZ)****	6-18
2015	Zoned**	60	Oct. 10-Oct. 14/Oct. 24- Dec. 17 (LCZ)	6-18
			Oct. 10-Dec. 8 (IVZ)	6-18
			Oct. 6-Nov. 5/Nov. 15- Dec. 13 (CRZ)****	6-18
2016	Zoned**	60	Oct. 12-Oct. 16/Oct. 29- Dec. 22 (LCZ)	6-18
			Oct. 12-Dec. 10 (IVZ)	6-18
			Oct. 4-Nov. 6/Nov. 22- Dec. 22 (CRZ)****	6-18
2017	Zoned**	60	Oct. 11-Oct. 15/Nov. 7 - Dec. 31 (LCZ)	6-18
			Oct. 11-Dec. 9 (IVZ)	6-18
			Oct. 3-Nov. 5/Nov. 22- Dec. 17 (CRZ)****	6-18

2018	Zoned**	60	Oct. 13-Oct. 21/Nov. 10 - Dec. 30 (LCZ)	6-18
			Oct. 13-Dec. 11 (IVZ)	6-18
			Oct. 2-Nov. 4/Nov. 21- Dec. 16 (CRZ)****	6-18
2019	Zoned**	60	Oct. 10-Nov. 1/Nov. 23 - Dec. 29 (LCZ)	6-18
			Oct. 10-Dec. 8 (IVZ)	6-18
			Oct. 2-Nov. 3/Nov. 20- Dec. 16 (CRZ)****	6-18
2020	Zoned**	60	Oct. 10-Nov. 1/Nov. 21 - Dec. 27 (LCZ)	6-18
			Oct. 10-Dec. 8 (IVZ)	6-18
			Oct. 6-Nov. 8/Nov. 17- Dec. 12 (CRZ)****	6-18
2021	Zoned**	60	Oct. 13-Oct. 17/Oct. 30 - Dec. 23 (LCZ)	6-18
			Oct. 13-Dec. 11 (IVZ)	6-18
			Oct. 5-Nov. 7/Nov. 24- Dec. 19 (CRZ)****	6-18
2022	Zoned**	60	Oct. 15-Oct. 23/Oct. 29 – Dec. 18 (LCZ)	6-18
			Oct. 15-Dec. 13 (IVZ)	6-18
			Oct. 4-Nov. 6/Nov. 23 – Dec. 8 (CRZ)****	6-18

* Regular season was followed by a 16-day special goldeneye/scaup season – 3-bird bag

** Lake Champlain Zone – Split Season
Interior Vermont Zone – Straight Season

*** Two teal (either blue-winged or green-winged) allowed in addition to regular bag limit

**** Connecticut River Zone set by New Hampshire Fish and Game Commission, same as NH Inland Zone

2023
Moose Harvest Recommendation

to the
Vermont Fish and Wildlife Board

Vermont Fish and Wildlife Department
Agency of Natural Resources
1 National Life Drive, Davis 2
Montpelier, VT 05620-3208
802-828-1000

The Department's goal is to improve the health of moose in northeastern Vermont by reducing winter tick abundance and their impacts on moose health, survival, and birth rate. The Department recommends issuing 180 moose hunting permits between WMUs E1 and E2 to reduce the moose population and thereby reduce winter tick abundance. See the table below for specific permit allocations.

The current number of moose in WMU E has been sufficient to sustain winter ticks at high levels that are negatively affecting moose health and survival. Winter ticks are a host-dependent parasite with moose being the primary host responsible for major fluctuations in winter tick densities. Therefore, reduction in moose population density decreases the number of available hosts which in turn decreases the number of winter ticks on the landscape. Moose population reduction will be necessary to break the winter tick cycle and improve the health of moose in this region.

Reducing winter tick numbers directly, either by treating moose or the landscape with some form of acaricide or fungal pathogen, is not currently a viable option. Research in this area is ongoing, but the realities of treating an entire landscape or a sufficient portion of the moose population make it unlikely that this will be a practical option soon.

Failure to reduce moose population density will perpetuate the current, unhealthy state of moose in WMU E for decades and would be inconsistent with the Department's established objective of managing for a healthy moose population. Importantly, 65% of Vermont residents support maintaining a smaller moose population through hunting if it reduces the number of moose that die each year from winter ticks. Only 15% oppose this approach (Responsive Management 2019).

Although winter ticks can be found on moose throughout the northeast, they do not significantly impact moose populations across the more-peripheral parts of their range, including the rest of Vermont, due to lower moose population densities that limit tick abundance.

Recommended 2023 moose hunting permit allocations by season, permit type, and WMU.

	E1	E2	Total
Archery Season			
Either-sex	11	9	20
Regular Season[1]			
Either-sex	29	25	54
Antlerless-only	55	45	100
Auction[2]		choice	3
Special Opportunity[2]		choice	3
TOTAL			**180**

[1] *Veteran permits are a priority draw for the first 5 regular season permits.*

[2] *Auction and Special Opportunity Permits are either sex and allow choice of season and WMU.*

Summary of Key Points

- The moose population is stable in most of Vermont, including WMU E (E1 & E2).

- Moose density in WMU E remains above the objective of 1 moose/square mile established in the *2020-2030 Big Game Management Plan*.
    - No WMU outside of the Northeast Kingdom ever had a moose density of 1/mi^2.
    - Moose densities greater than 1/mi^2 support high numbers of winter ticks that negatively impact the health of moose.
    - Moose densities below 0.75/mi^2 support relatively few winter ticks that do not impact moose populations. This is the case in most of Vermont – winter ticks are present, but do not cause population level impacts.

- Results of moose research in WMU E indicate health of moose is poor in that region.
    - Adult survival remains relatively good, but detrimental health impacts of winter ticks have caused birth rates to be very low.
    - Heavy winter tick loads can cause more than half of moose calves to die in late winter.

- The Department recommends 180 moose hunting permits (80 either sex and 100 antlerless only) be allocated in WMU E to reduce moose numbers and thereby reduce the impacts of winter ticks on the health of moose and help maintain a sustainable moose population.
    - This would result in the harvest of approximately 100 moose, or about 10% of the current estimated population in WMU E.
    - Recent harvests have been insufficient to effectively reduce moose numbers to achieve management objectives and promote a healthy moose population.

- No permits are recommended for the other 19 WMUs, which cover 93% of Vermont, because moose densities remain below objectives and hunting thresholds established in the *2020-2030 Big Game Management Plan*.

Goals

This recommendation aims to improve the health of moose in WMUs E1 and E2 by reducing the impact of winter ticks and to achieve moose population objectives established in the *2020-2030 Big Game Management Plan*.

Management Objectives

Moose population objectives for each WMU were established in Vermont's *2020-2030 Big Game Management Plan*. These objectives aim to maintain healthy regional moose populations at levels that are socially acceptable and ecologically sustainable.

In WMUs D2, E1, and E2, density objectives reflect the impact of winter ticks on the size and health of the region's moose population. Research has found reduced frequency of tick epizootics (where more than 50% of calves die from winter tick infestations) at moose densities below 1.06/mi^2 and no tick epizootics at densities below 0.75/mi^2 (Samuel 2007, Jones 2016). The Department will initially try to maintain moose densities at or below 1/mi^2 to reduce winter tick abundance and the frequency of epizootics and improve the health of the moose population. However, if tick impacts are not reduced, the moose density may need to be reduced to 0.75/mi^2. Ultimately, the goal is to have healthy moose, with fewer calves dying each year from heavy winter tick loads and healthier cows with higher birth rates.

Moose density objectives throughout the rest of moose range in Vermont have been set at 0.5 moose/mi^2 (**Figure 1**). This lower objective reflects ecological limitations on moose densities in these regions due to limited young forest habitat, higher deer densities, and a warming climate. Moose densities in these WMUs have never reached 1/mi^2.

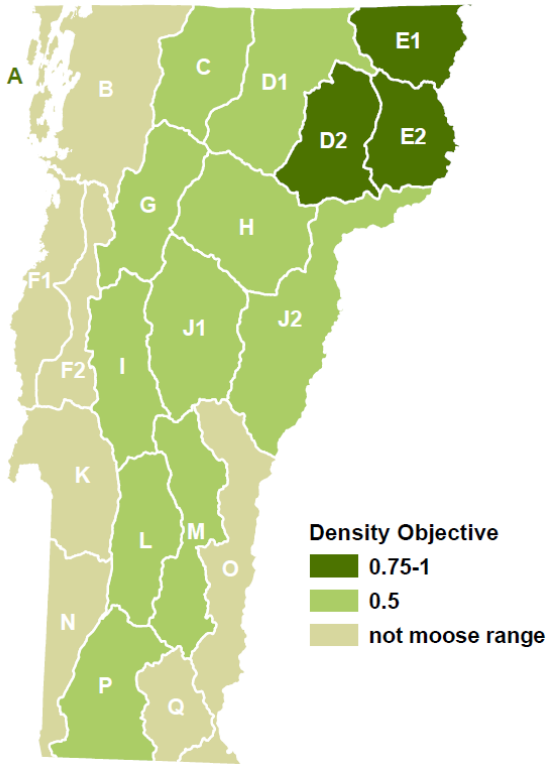

Figure 1. Moose density objectives (moose per square mile of moose habitat) established in Vermont's *2020-2030 Big Game Management Plan*.

Hunting thresholds have also been established for each WMU at 75% of the density objective. The Department will only consider hunting moose when densities exceed this threshold for two consecutive years. This ensures the other values of moose are maximized at these lower densities.

Population Status

Moose and Winter Ticks

Studies in Vermont, New Hampshire, and Maine have concluded that winter ticks are the primary cause of moose mortality across their core range in New England (Musante et al. 2007, 2010, Bergeron et al. 2013, Dunfey-Ball 2017, Jones et al. 2017, Ellingwood et al. 2019, Jones et al. 2019, DeBow et al. 2021), with some moose hosting an astonishingly high number of ticks (>50,000/individual; Jones et al. 2019).

Core moose range (continuous red/brown area in **Figure 2**) in New England extends from northeastern Vermont through northern New Hampshire and western and northern Maine. This part of the region has a colder climate with longer winters, low deer densities, large blocks of forest, and an abundance of young forest created by commercial timber management which allows it to sustain higher densities of moose than more peripheral parts of their range. Importantly, population-level effects of winter ticks have only been observed in the region's core moose range, where moose densities have been high enough to support large numbers of winter ticks.

Although winter ticks can be found on moose throughout the region, they are not impacting moose populations across the more-peripheral parts of their range in the northeast, including the rest of Vermont, due to lower moose densities which limit tick abundance. Moose numbers outside of the Northeast Kingdom have declined, but the main cause of that decline was not winter ticks. It was likely due to a combination of declining quantity of young forest, increased parasite loads (particularly brainworm linked to increasing deer densities), and fewer moose in core moose range to migrate out to these other regions.

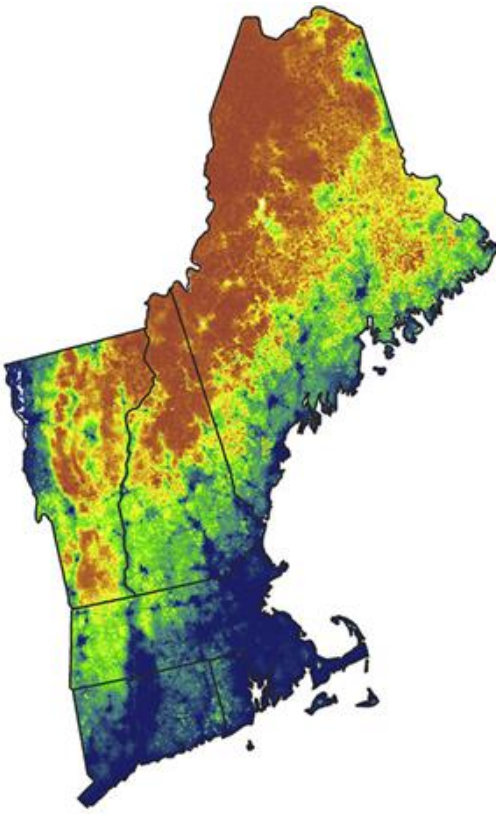

Figure 2. Estimated probability of occurrence of moose in the New England region from Pearman-Gilman et al. 2020.

Vermont Research

During 2017–2019, 126 moose (36 adult cows and 90 calves) were fitted with GPS radio collars in WMU E to monitor survival and birth rates. Results of this research clearly showed that chronic, high winter tick loads caused the health of moose in WMU E to be poor. Birth rates were low and overwinter calf survival was poor (49%; DeBow et al. 2021). Although adult female survival remained relatively good, it was lower than expected for a population without major predators. Survival of breeding age females has significant influence on population trends in long-lived species like moose.

Ongoing and Future Research

Fieldwork associated with the survival study concluded in 2019; however, the Department continues to monitor survival and calf recruitment in the remaining collared cows. Additionally, the large amounts of data collected during this study allowed University of Vermont researchers to analyze other aspects of moose and winter tick ecology. This related research focused on understanding 1) How winter tick impacts on moose relate to habitat use and quality (*see* Blouin et al. 2021*a* and Blouin et al. 2021*b*), 2) How winter ticks affect moose nutritional condition and stress levels (*see* Rosenblatt et al. 2021), and 3) Moose genetic diversity and connectivity (*see* Rosenblatt et al. 2023).

Other ongoing research at UVM is assessing the effect of various fungal pathogens on survival of winter tick larvae (*see* Sullivan et al. 2021 and Sullivan et al. 2022). While some of these fungi have resulted in high mortality of winter tick larvae in the lab, an important next step is to determine the effectiveness and feasibility of using these pathogens to control winter ticks in the field.

The Department is currently partnering with UVM, the University of Massachusetts, New Hampshire Fish and Game, Maine Department of Inland Fisheries and Wildlife, Massachusetts Division of Fisheries and Wildlife, New York Department of Environmental Conservation, the US Forest Service, and several other partners on a large, regional research effort focused on non-invasive monitoring of moose and winter ticks. A major focus of this project involves deployment of more than 500 long-term camera monitoring stations across the five states. The current project also involves collection and analysis of urine and feces, winter tick surveys, and development of an integrated population model that can incorporate all these data.

For more information about moose research in Vermont and New England, visit vtfishandwildlife.com/conserve/conservation-planning/animal-inventory/mammals/moose-research

Population Health

Many factors affect the health of individual moose and the overall population. These include diseases and parasites (e.g., winter ticks and brainworm), habitat quality, and environmental conditions. Ultimately, how fast a population grows and how resilient it is to additional sources of mortality is determined by how long individuals can be expected to live (i.e., the survival rate) and how many new individuals are added to the population each year (i.e., the birth rate).

In the early 2000s, moose were overabundant in WMU E. They were causing significant damage to forest regeneration and their physical condition was declining as habitat quality declined. The Department actively reduced the moose population in this area to bring it into balance with the habitat and to improve the health of moose. By 2011, the population had been reduced to a level the habitat could support; however, health measures did not improve (**Figures 3** and **4**).

Moose health and reproductive rates have remained poor since 2011 due to the impacts of chronic high winter tick loads. Moose are not currently limited by habitat in the core part of their range, including WMU E (Dunfey-Ball 2017). There is enough available habitat and adequate forage to support the current population. However, habitat quality can influence the distribution of moose on the landscape (i.e., higher densities of moose in areas with the highest quality habitat), which can influence local winter tick abundance and impacts on moose health (Healy et al. 2019, Blouin et al. 2021*a* and *b*).

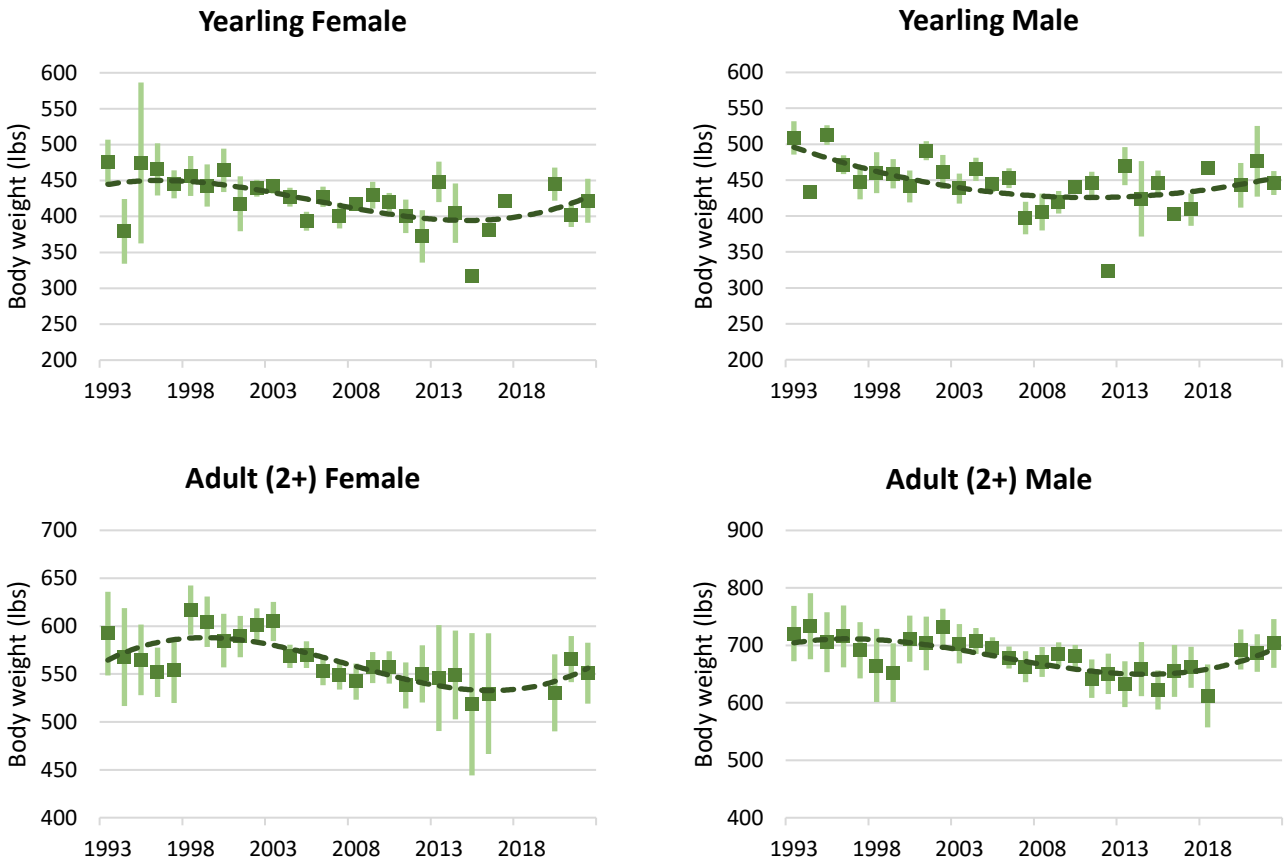

Figure 3. Field-dressed body weights of harvested moose in Wildlife Management Unit E, 1993–2022.

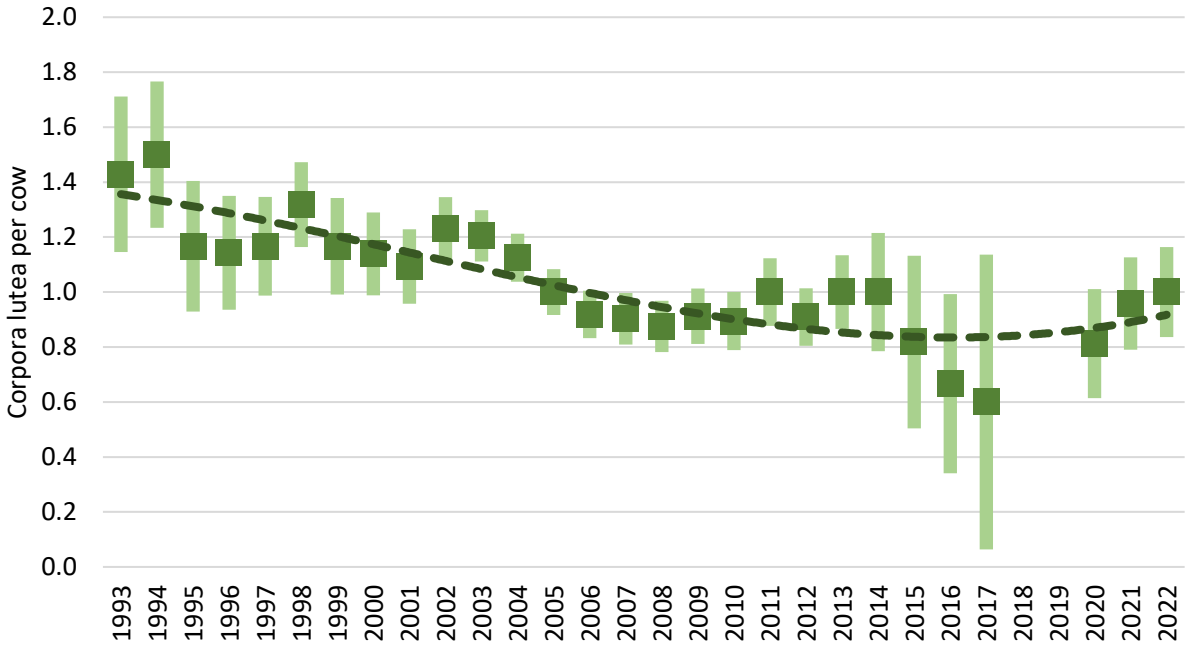

Figure 4. Ovulation rate of prime-aged (≥3 years old) cow moose in WMU E, 1993-2022. Data are 3-year rolling averages from counts of corpora lutea in ovaries collected from hunter-harvested moose.

Recent Winter Tick Impacts

The severity of annual tick infestations is not only dependent on moose density, but also on climate, including temperature, humidity, wind, and snow. Annual variation in climate conditions results in variation in winter tick loads on moose. As long as climate conditions periodically result in reduced winter tick infestations, moose densities can remain at levels that perpetuate heavy tick loads and unhealthy moose for the foreseeable future.

Vermont has not collared moose calves since 2019. As a result, the Department relies on other sources of information to estimate winter tick impacts since that time. Summer calf recruitment of collared cow moose was better during 2020-2022 than during 2017-2019 (**Figure 5**). Additionally, small improvements in health measures for all age classes (**Figures 3 and 4**), the proportion of yearlings in the moose harvest, and anecdotal evidence (e.g., reports of dead moose, bloody beds, engorged ticks in snowmobile trails) suggest that tick impacts were lower during the past 3 years, and particularly during 2020 and 2021.

While reduced winter tick impacts are encouraging, they are likely the result of unfavorable climate conditions for winter ticks in recent years. Fluctuations in winter tick impacts are expected, and current moose densities in WMU E will allow winter tick abundance and impacts on moose to increase again when climate conditions are more favorable for ticks.

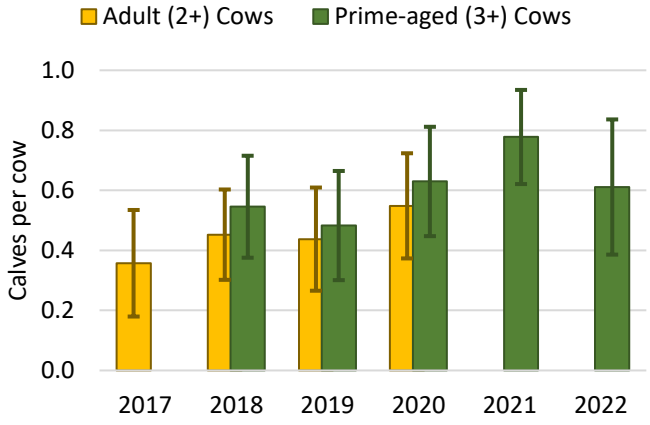

Figure 5. Summer calf recruitment of collared cow moose in Wildlife Management Unit E, 2017–2022.

Winter tick counts on bull moose harvested in October 2022 were comparable to those observed in recent years (**Figure 6**). The long-term trend in this index is encouraging, but there has been no change since 2016.

This measure provides an indication of tick abundance on the landscape, but final tick loads on moose will be largely determined by the length of the questing period. The questing period is typically ended by weather conditions (e.g., persistent snow or freezing conditions) that kill questing winter tick larvae. Persistent snow did not arrive in WMU E until mid-November 2022, which may result in more severe winter tick impacts in 2023 than harvest tick counts would suggest.

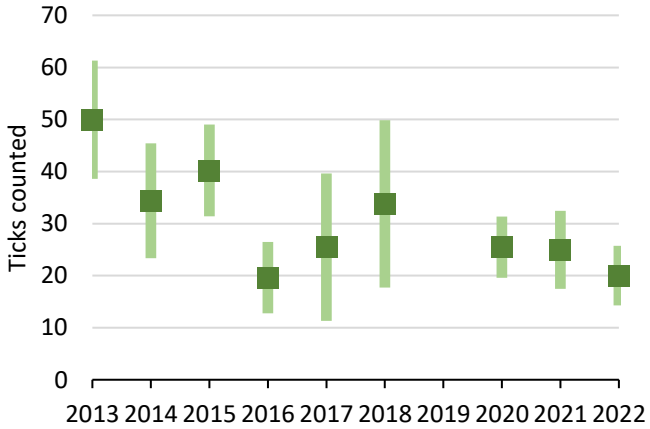

Figure 6. Winter tick counts on bull moose harvested in Wildlife Management Unit E, 2013–2022.

Population Estimates

Regional moose densities in Vermont are estimated from moose sighting rates reported by deer hunters during the November rifle season. This approach, originally developed by the New Hampshire Fish and Game Department, relates sighting rates to moose densities determined by aerial surveys (Bontaites et al. 2000). Aerial surveys conducted in Vermont allowed the Department to modify this model to better fit Vermont sighting data. Sighting rates often vary from year to year due to factors other than the number of moose (e.g., weather conditions), so a 3-year rolling average is used to smooth out some of this variation.

Using this approach, the 2022 (2020–2022 rolling average) density estimates for WMUs E1 and E2 are 1.68 and 1.54 moose/mi^2, respectively, which are well above the upper density objectives established in the *2020-2030 Big Game Management Plan* (1 moose/mi^2; **Table 1**). Importantly, following the intentional population reduction that ended in 2010, it appears that moose numbers have been relatively stable at this level in WMU E over the past 10 years (**Figure 7**).

The Department continues to receive interest in moose hunting in areas outside WMU E. While some of these local areas could sustain a limited moose harvest, the moose population density in all WMUs except E1 and E2 remains below established hunting thresholds (**Table 1**).

The uneven distribution of functional moose habitat (and therefore moose) in parts of Vermont is a challenge for management. The Department will be reevaluating moose habitat mapping, taking advantage of recent research efforts (e.g., Pearman-Gilman et al. 2020, Blouin et al. 2021*a*) to better reflect the area of functional habitat in each WMU. This should allow for more meaningful estimates of moose density in WMUs with less homogeneous moose habitat.

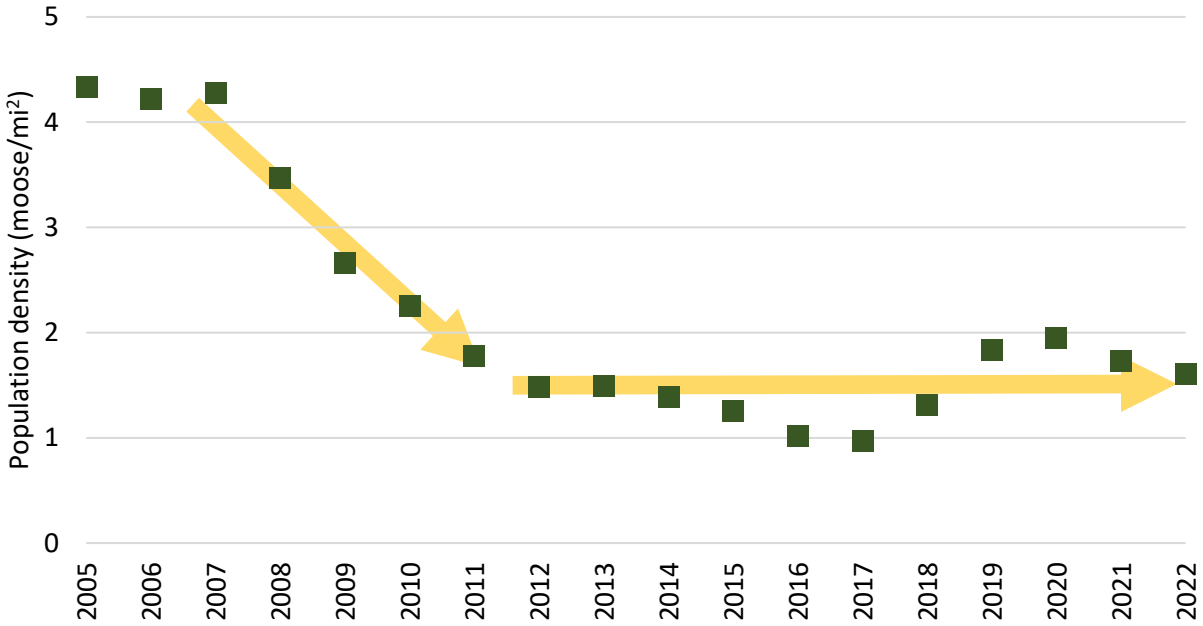

Figure 7. Moose density estimates (green squares) and major trends (yellow arrows) in WMU E during 2005–2022. Density estimates are based on moose sighting rates reported by deer hunters.

Table 1. Moose density estimates based on sighting rates by deer hunters and density objectives and hunting thresholds established in the *2020-2030 Big Game Management Plan*, by WMU. Density estimates are based on average sighting rates during 2020–2022.

WMU	Habitat (mi^2)	Density (moose/mi^2)			Population Estimate	
		Objective	Hunting Threshold	Current Estimate	N	(80% CI)
A	35	n/a	n/a	0.02	1	(1–1)
B	420	n/a	n/a	0.05	23	(16–29)
C	351	0.5	0.38	0.30	104	(85–124)
D1	449	0.5	0.38	0.21	94	(75–114)
D2	346	0.75-1	0.56	0.41	141	(115–168)
E1	306	0.75-1	0.56	1.68	514	(455–574)
E2	326	0.75-1	0.56	1.54	501	(426–577)
F1	108	n/a	n/a	0.03	3	(2–5)
F2	158	n/a	n/a	0.02	4	(3–5)
G	363	0.5	0.38	0.08	29	(20–38)
H	466	0.5	0.38	0.23	105	(86–125)
I	407	0.5	0.38	0.08	32	(23–40)
J1	464	0.5	0.38	0.07	32	(21–43)
J2	633	0.5	0.38	0.31	198	(166–230)
K	359	n/a	n/a	0.05	16	(11–22)
L	346	0.5	0.38	0.17	57	(42–72)
M	424	0.5	0.38	0.22	92	(71–113)
N	275	n/a	n/a	0.04	12	(6–18)
O	478	n/a	n/a	0.03	13	(10–15)
P	447	0.5	0.38	0.15	66	(48–84)
Q	219	n/a	n/a	0.06	14	(7–20)
STATE	**7380**				**2051**	**(1689–2417)**

Population Projections

Based on survival rates and calf recruitment observed from collared moose during 2018–2022, the moose population in WMU E is expected to remain stable with a harvest of 25 adult cows annually. This is a change from projections provided in recent harvest recommendations that suggested this cow harvest would result in a population reduction. Those projections were based on lower survival and reproductive rates observed during 2017-2019, which were relatively severe tick impact years, and may have underrepresented potential population growth. The current projection is consistent with the observed stable population over the past 11 years (**Figure 7**), when the average annual moose harvest in WMU E has been 41 moose (range: 0-75).

Harvest Recommendation

The Department recommends harvesting approximately 50 adult cow moose (~10% of the cow population) in WMU E during the 2023 moose hunting seasons. The Department further recommends that this be accomplished through the issuance of 80 either-sex hunting permits and 100 antlerless-only hunting permits. Given historical success rates and sex-age composition of the harvest for each permit type, this allocation is expected to result in the harvest of approximately 103 moose (range: 86–118) with an expected breakdown of 42 bulls (range: 34–47), 53 cows (45–63), and 8 calves (6–10).

Approximately 55% of permits are recommended to be allocated to WMU E1 due to higher moose densities in that WMU. Approximately 25% of either-sex permits are allocated to the archery season, based on the percentage of total applications that were for this season in recent years and the need to obtain sufficient biological data during the regular season. Allocations to the auction, special opportunity, and veterans are set by statute. Permit breakdown by season, type, WMU, and special allocation is provided below in **Table 2**.

Table 2. Recommended 2023 moose hunting permit allocations by season, permit type, and WMU.

	E1	E2	Total
Archery Season			
Either-sex	11	9	20
Regular Season[1]			
Either-sex	29	25	54
Antlerless-only	55	45	100
Auction[2]		choice	3
Special Opportunity[2]		choice	3
TOTAL			**180**

[1] *Veteran permits are a priority draw for the first 5 regular season permits.*

[2] *Auction and Special Opportunity Permits are either sex and allow choice of season and WMU.*

The results of the moose study and continued monitoring of moose clearly show that the current density of moose in WMU E has been sufficient to sustain winter ticks at high levels that are negatively affecting moose health and survival. Research has shown that winter tick abundance is directly related to moose population density. Reducing the density of moose decreases the number of available hosts which in turn decreases the number of winter ticks on the landscape. Moose population reduction will be necessary to break the winter tick cycle and improve the health of moose in this region.

Reducing winter tick numbers directly, either by treating moose or the landscape with some form of acaricide or fungal pathogen, is not currently a viable option. Research in this area is ongoing, but the realities of treating an entire landscape or a sufficient portion of the moose population make it unlikely that this will be a practical option soon.

The Department is committed to achieving a healthy moose population in WMU E by meeting the population objectives established in the *2020-2030 Big Game Management Plan*. The proposed permit allocation and resulting cow harvest would reduce the population by 5% per year and reach the objective of 1 moose/mi^2 (632 moose in WMU E) in 2030 or 2031 (**Figure 8**).

In a worst-case scenario, where tick impacts are relatively severe every year, it would still take several years for the population to reach the target level. Importantly, the Department is confident that such a steep decline could be detected and that reducing the cow harvest would halt that decline.

These projections assume constant harvest each year and no change in moose survival or reproductive rates. In practice, the moose population and winter tick impacts are dynamic, and management must remain adaptive. Actual permit allocations and harvest will be adjusted annually based on new information as it becomes available.

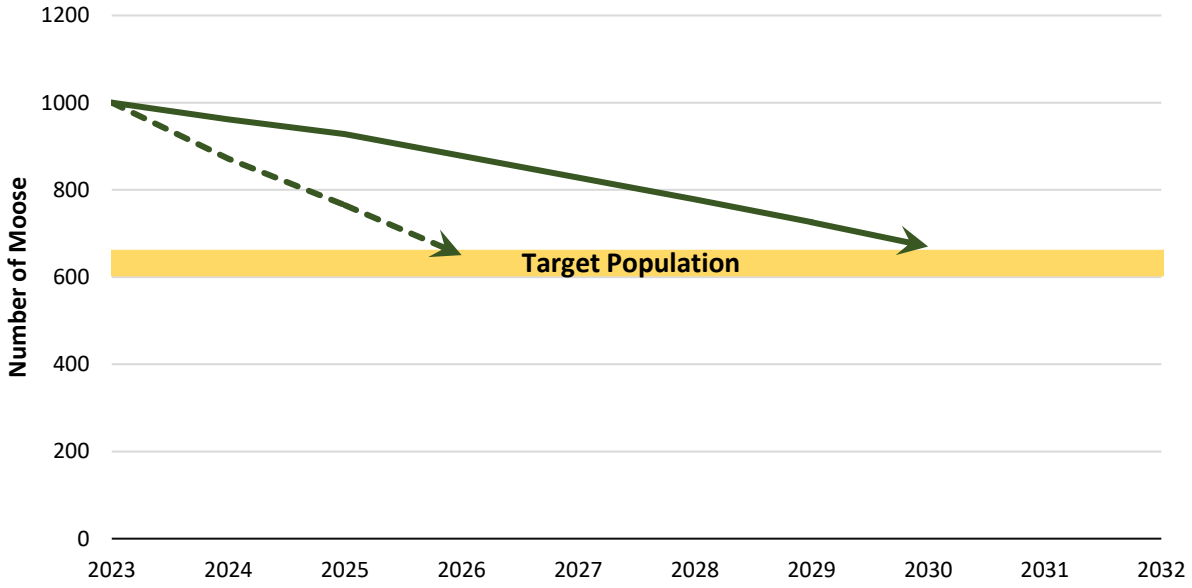

Figure 8. Moose population projections in WMU E at the proposed cow harvest given expected (solid line) and worst-case (dotted line) winter tick impacts. Projections assume consistent harvest each year and no change in survival or birth rates.

Maintaining the 2021 and 2022 harvest objective of 25 adult cows annually may not result in any population reduction, and certainly would not achieve population objectives within a reasonable timeframe. Without management action to reduce the moose population, high tick loads will continue to impact the health of moose in WMU E for the next decade and beyond. The resulting chronic stress, low birth rates, and high calf mortality will make the population less resilient to diseases, parasites, and environmental variation, which could cause the population to destabilize. Maintaining a healthy, stable, and sustainable moose population requires action to improve moose health. Importantly, 65% of Vermont residents support maintaining a smaller moose population through hunting if it reduces the number of moose that die each year from winter ticks. Only 15% oppose this approach (Responsive Management 2019).

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