Recommendation Related to a Petition to Implement a Moratorium on Fisher Trapping

to the

Vermont Fish and Wildlife Board

Vermont Fish and Wildlife Department
Agency of Natural Resources
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December 18, 2024

EXECUTIVE SUMMARY

Recommendation: Based on evidence that Vermont's fisher population is healthy and not at risk from trapping, department biologists recommend that the board deny a petition to place a moratorium on fisher trapping.

Summary: Petitioners requested a moratorium on regulated fisher trapping based on the argument that the fisher population is declining and at risk from trapping, habitat loss, and the presence of anti-coagulant rodenticides (ARs) in fishers. **Department biologists presented evidence to the board that the fisher population in Vermont is not declining and not at risk from trapping.**

Each bullet below briefly describes one important consideration from the department's recommendation and provides a page number where a more complete analysis can be found.

- Wildlife biologists track the population health of species like fisher using a comprehensive approach with multiple, complementary sources of data (p. 2). The petition relies on only one measure of population health (CPUE) and bases its argument on an incorrect statistical analysis (p. 4).

- The department uses trail camera data to build a statistical model of how likely fishers are to occupy habitat in Vermont. Raw data shows fishers are commonly detected throughout the study area. Our model shows fishers are making good use of available habitat. Much of this habitat is already conserved. This is evidence that fishers are abundant in our state and have a base of protected land to sustain them (p. 14).

What Is CPUE?

Catch per unit of effort, or CPUE, is the number of animals caught relative to the amount of effort expended to catch them (in this case, the number of nights traps were set and how many traps were used). CPUE is an index of the status of a population and is not a direct population estimate. If effort stays the same or increases while catch declines, that can indicate a possible change in furbearer populations. CPUE needs to be interpreted with appropriate statistical analyses and in the context of other measures of population health to be most useful to biologists (p. 3).

- Age and sex ratios of fishers taken by trappers show the expected balance of more young fishers being harvested than older fishers. This is evidence that reproduction and juvenile survival are in line with what we would expect for a healthy population (p. 8).

- CPUE shows a large but expected dip in response to a 2004 regulation change. This is due to changes in trapper behavior as a response to new regulations and does not indicate a significant decline in the fisher population (p. 6).

- Trends over time in the number of fishers harvested and the amount of effort put in by trappers mirror each other closely. This is evidence that declining trapper effort probably accounts for declining numbers of fisher harvested, rather than a declining fisher population (p. 11).

- Fishers in Vermont are being exposed to anti-coagulant rodenticides (ARs). Two peer-reviewed papers (1, 2) flag this as a potential risk to monitor. However, there is no evidence that fishers are dying from this level of exposure at present. Trapper harvest continues to be the best method to sample fisher for AR exposure (p. 20).

Attitudes About Fisher Trapping

Most public comments the board received about this petition supported a moratorium on fisher trapping. It is unlikely these comments reflect overall public attitudes about fisher trapping. A department survey showed that 60% of Vermonters moderately or strongly approve of regulated trapping, while only 25% moderately or strongly oppose it. Our survey also found that 53% of Vermonters support regulated trapping as a way to manage fishers, while only 23% oppose it.

If there were a risk to Vermont's fisher population from trapping, the department would recommend limiting trapping; at this time, there is no evidence of such a risk. Limiting the very small amount of regulated fisher trapping that happens in Vermont every year would not strengthen Vermont's already robust fisher population. It would, however, make it much harder for biologists to detect if stressors like rodenticide exposure and habitat loss do start to impact fisher down the road. At this time the best thing for keeping Vermont's fisher population healthy and for making sure they stay healthy is allowing a small amount of regulated trapping to continue.

Petition to Implement a Moratorium on Fisher Trapping
Department Recommendation

Summary of Issues for Consideration:

On October 16, 2024, Jennifer Lovett petitioned the Fish and Wildlife Board (Board) to:

(1) Implement a moratorium on the fisher trapping season due to a declining population and high anticoagulant rodenticide (ARs) exposure.

Vermont Fish and Wildlife Department (Department) Recommendation:

The Department recommends that the Board not implement a moratorium on the fisher trapping season.

Summary of Findings:

The proposal for a moratorium on fisher trapping due to concerns about rodenticide use, while well-intentioned, is not a solution for reducing wildlife exposure to rodenticides. As detailed below, the Department finds no definitive evidence that Vermont's fisher population is in decline as posited by the petitioner nor does it believe that a moratorium on fisher trapping is in the best interest of safeguarding the sustainability of this iconic furbearer species. The petitioner relied heavily on CPUE data during their presentation, therefore the Department explains the interpretation and use of this information.

- **Catch-per-Unit of Effort (CPUE):** While it is an index of population trends, it does not provide a direct population estimate and is influenced by various factors which must be considered when interpreting trends in the dataset. Furthermore, any trend's direction whether increasing or decreasing needs to be considered in context of the scale of that direction.

- **CPUE Interpretation:** A season extension in 2004 increased trapper effort (number of trapper nights) while maintaining the same average harvest. The average CPUE abruptly decreased after 2004, and subsequently appeared to show a small scale decrease over the next 20 years. To properly interpret long-term trends, it is important to consider the two time periods separately. Although a small-scale decline is observed post-2004, it would require a more substantial, sustained decline in CPUE to signal a potential population issue that may warrant such a response as a moratorium on fisher trapping.

- **Comprehensive Analysis:** Relying on CPUE alone can be misleading without considering other factors that influence population trends. Key metrics such as sex/age ratios, health data, distribution, and trapper engagement provide a more comprehensive picture of fisher population status. As detailed below, these other metrics consistently suggest a population that is widely distributed and not experiencing an ecologically concerning precipitous decline.
    - **Juvenile Recruitment:** The juvenile-to-adult and juvenile-to-adult female ratios have remained relatively stable since 2004 with juveniles making up half of the harvest and at least double the number of juveniles per adult female each season. This consistent pattern indicates healthy recruitment over time. If rodenticide exposure were negatively impacting reproduction and survival, the Department would expect to observe concordant changes in these sex/age ratios.
    - **Health Data:** The body weights of juvenile and adult fishers in Vermont have remained within normal ranges, showing no unusual trends since the inception of our weight data collection efforts (2010-11 season).
    - **Trapper Effort and Harvest:** Trapper effort and harvest numbers have both declined for a variety of reasons unrelated to fisher population abundance. Decreased pelt prices, the overall economy, and aging trapper demographics all contribute to these trends. Importantly, these trends are parallel, suggesting that there is no disproportionate increase in effort with a concurrent decrease in harvest.
    - **Additional Population Data:** Trap-derived data is not the sole method used for monitoring population status. Camera data collected over the last decade show a wide distribution of fishers with high rates of habitat use, confirming their common presence across Vermont.
- **Trapping, AR Exposure and Population Threats:** There is no evidence to suggest that regulated trapping poses a threat to Vermont's fisher population. Similarly, there is no scientific evidence to suggest that regional declines are due to rodenticide exposure. Eliminating a regulated trapping season would have no effect on rates of rodenticide exposure or its potential impacts but would, in fact, hamper our ability to effectively track this population and collect carcasses for further rodenticide sampling and research.

- **AR Testing Methods:** The only reliable way to collect comparable data on a species' exposure to anticoagulant rodenticides (ARs) is by taking a liver sample. This is where the compounds accumulate over time. Collecting blood and serum samples from live-trapped fisher, hair sample analysis, and other methods posited by the petitioner as means for collecting AR samples are not viable options.

- **Wildlife Damage Control:** Very few fishers have been captured for wildlife damage control purposes, with an estimated 15 fishers captured since 2001.

- **Department Plan:** The Department is actively engaged in and contributes to the research cited by the petitioner, further demonstrating our commitment to understanding and managing fisher populations and their conservation. The Department continues to collect biological samples from trapper derived carcasses for analysis. Comprehensive camera data from the last decade continues to be analyzed to assess habitat use for a suite of species, and fisher are commonly detected. We are collaborating with university researchers on camera data and building multi-year models to document any changes from year to year. We are also collaborating with university researchers to evaluate other ways to determine the potential impacts of ARs on fisher. Currently, we are actively involved in collecting fisher carcasses for a multi-state study on fisher health. We continue to work with the Agency of Agriculture to communicate any findings with them.

Department Response to Proposal:

1. **Comment/Question: "According to the Vermont Fish and Wildlife's CPUE data in their 2023 newsletter, the fisher population is declining," and "CPUE data over the last 30+ years shows that there has been a significant decline of the CPUE in the last 17 years compared to a 15-year baseline for CPUE between 1990 and 2004."**

   Response: In the Department's 2023 *Vermont Furbearer Management Newsletter*, we state:

   "The Fish & Wildlife Department monitors furbearer population trends through the annual collection and assessment of trapper derived Catch per Unit of Effort (CPUE) data. *It is an indirect index of population trends* that helps biologists track the growth or decline of furbearer populations over time. This index is universally used across the world to measure capture rates for trapping, and is similarly used for other applications including wildlife field camera surveys, hunter sighting rates, etc."

   What is CPUE?

The Department endeavors to sustain healthy furbearer populations in Vermont and CPUE data is an essential element of our efforts to monitor the long-term status of these species in the state. CPUE data is inherently complex and easily misinterpreted, thus, the Department often seeks to explain what the data consists of and what it means, along with other data sources such as game cameras that indicate distribution and relative abundance and carcasses from which age and sex data are derived. The newsletter does not claim to present a population estimate or even a direct population trend. Instead, it provides an index that can be used to interpret the status of the population. CPUE represents the number of animals caught relative to the amount of effort expended (e.g., days spent trapping, number of traps set). By tracking CPUE over time, we can infer whether a population might be increasing or decreasing over certain time periods and assess the relative scale of that potential population change.

How do we analyze CPUE?

The CPUE graph used in our newsletter is a visual display of the average CPUE for each year. We do not claim, nor does that graph show, that the fisher population is in decline. It is very important to know that the numbers on that graph are a single number, which cannot be statistically analyzed appropriately without accounting for the underlying data points that single number is derived from.

On the CPUE graph below (Figure 1) that Dr. Bosworth used in his October 16, 2024, presentation to the Board supporting Ms. Lovett's petition, each year shows an average of the CPUE per year. Within that average, there is a range of CPUE values for each trapline, and a statistically robust regression trendline needs to account for all these underlying CPUE values for each trapline; Dr. Bosworth's regression does not. Conducting a regression analysis on a single averaged value per year obscures the actual differences between years because that single value provides no measure of the variation among all data points it is comprised of.

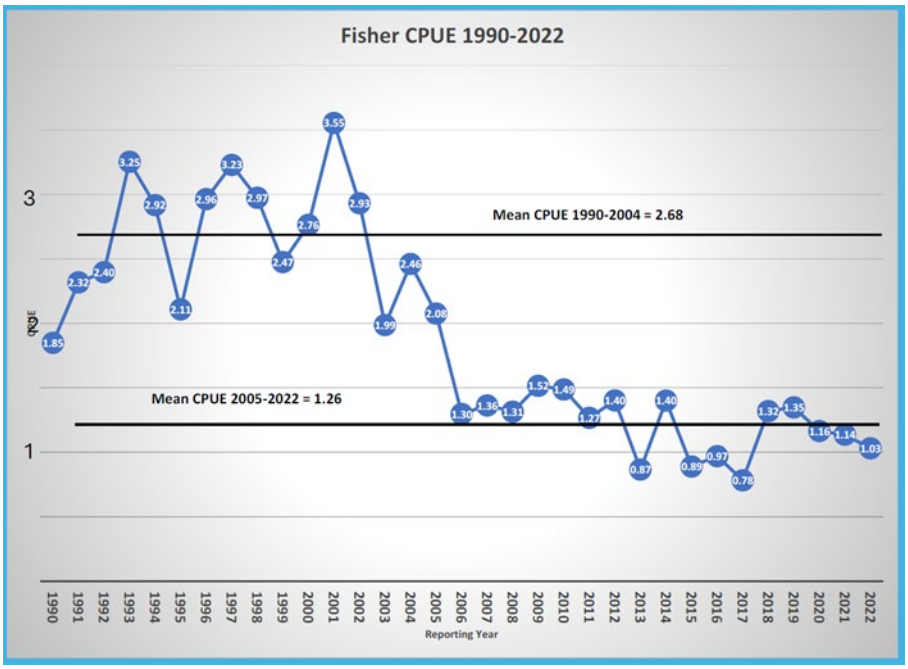

Figure 1. Average CPUE per year as presented by Dr. Boswell.

Below is a depiction of all the CPUE data points per year that comprise the averages in Figure 1, showing the variation that needs to be incorporated in any formal statistical analysis of the CPUE data (Figure 2).

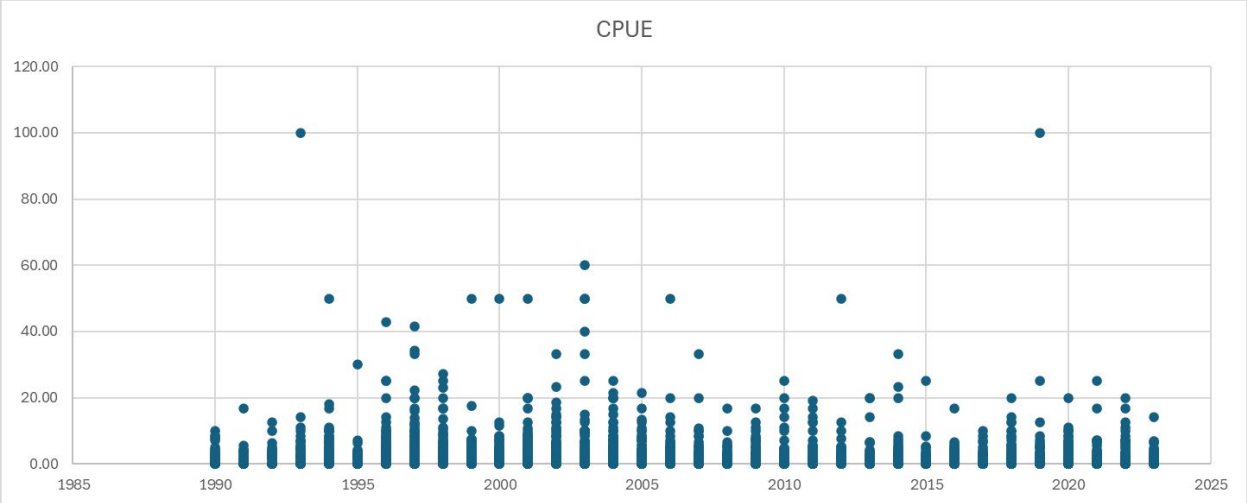

Figure 2. CPUE variation from 1990-2024, showing all CPUE values for each trapline, and not just one average. Data is compiled from trapper reports submitted to VFWD.

Additionally, CPUE does not equate to a direct 1:1 relationship with populations and any trend in CPUE must be interpreted carefully as there are many other factors such as fur prices, trapper effort, weather, trap location and others that can affect CPUE. Furthermore, the scale of any trend in CPUE is of utmost importance in interpreting any

CPUE trends because wildlife populations are constantly changing. Thus, depending on the time frame, a population index such as CPUE will always indicate some amount of change from year to year, but a small decrease is not indicative of a population in sustained precipitous decline.

How do we interpret CPUE?

Fisher CPUE should not be analyzed or interpreted by looking at the dataset in its entirety (i.e., from 1990 through present) because there was a two-week extension of the trapping season in 2004 that resulted in an expected decline in CPUE. This is why you see a sharp drop in the CPUE values post 2004 which, if interpreted in the absence of consideration of the season extension, would appear as an alarming abrupt decline in the population. The appropriate way to interpret this long-term dataset is by looking at the two time periods separately (i.e., pre and post season extension) and conducting an analysis of the trend that accounts for all the individual data points (i.e. trap lines) in each year.

Another graph (Figure 3) presented by Dr. Boswell shows a regression trendline of the CPUE data with the conclusion that the population trend is in sharp decline.

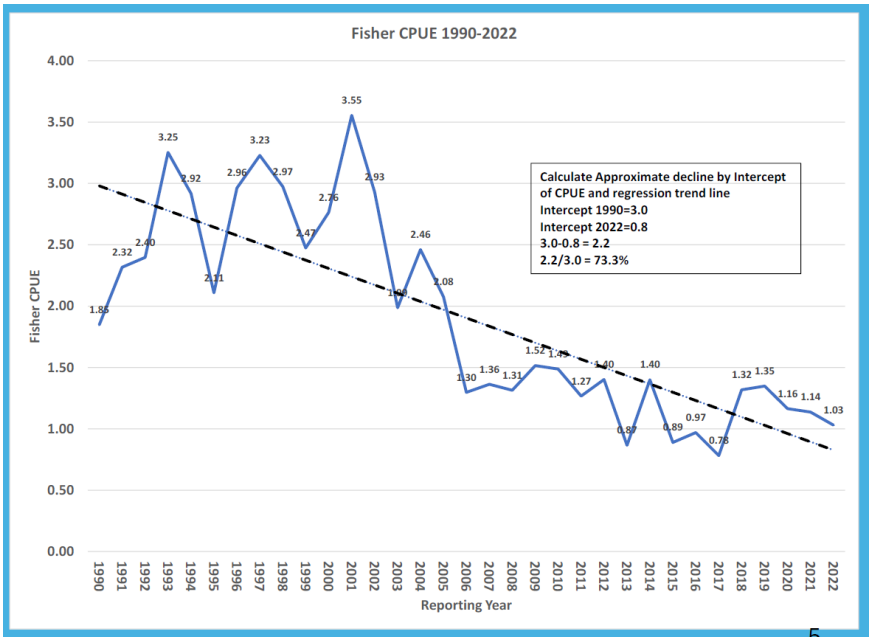

Figure 3. Fisher CPUE from 1990-2024 displayed by Dr. Bosworth, demonstrating an inaccurate declining trend.

This is an example of why the data should be analyzed separately between the two time periods, otherwise that sharp change in 2004 inaccurately visualizes a sharp decline. This regression is again based on the averaged yearly CPUE, which is one value per year. Regression analysis is not done this way since there is a lot of variability in the data that the regression needs to incorporate. A regression analysis is not drawing a line. You get many results (not just one result), that needs to be interpreted, which is nuanced.

Any statistical analysis also must meet certain assumptions for interpretation of results to be valid. These assumptions include statistical tests for things like a normal data distribution, even spread of standard errors and variance, and independence of observations. All these assumptions need to be tested to properly interpret the results, and if any assumptions are not met, then other statistical methods like data transformations must be conducted to assess whether the specific statistical analysis is appropriate to use.

In the case of the CPUE data, there is a high preponderance of zeros and low values, which violates the aforementioned normality assumption. Even after a data transformation was conducted, assumption tests indicated that some assumptions were still not being met well. This is all to say that the linear regression analysis that Dr. Bosworth presented is a lot more complicated than simply an equation and line on a figure, and it cannot be assumed that one single averaged value per year accurately represents all the actual data points (i.e. every trapline) that were not included in Dr. Bosworth's analysis.

We conducted a linear regression analysis on all the datapoints in each year, along with accounting for assumption tests and data transformations, and found a weak relationship between CPUE and year. The analysis estimated that only about 1-2% of the variation in CPUE can be explained by year alone. This is not surprising. As previously explained, there are many other factors that can affect CPUE. This weak relationship makes it difficult to conclusively trust any measure of increase or decrease from a regression trend line because there are many unknown factors that introduce a lot of noise that the regression cannot model. Keeping this in mind, our analysis did indicate a decline of approximately 0.06 per year from 2004-2023. Of course, year to year, the trend can vacillate between increasing and decreasing, thus any slight change in the proceeding years could tip such a slight decrease into an overall positive increase. The scale of change is of utmost importance in assessing CPUE trends.

Why are we not providing population estimates

All our current data is crucial for informing various aspects of management, particularly because the number of furbearing animals being harvested—especially compared to larger datasets like those for deer—is relatively low. Estimating the fisher population doesn't carry the same urgency as it does for other harvested species. For species like deer or bear, the urgency stems from setting harvest limits for large populations, which are much more numerous than fisher populations. These species also allow for close tracking of specific demographic data (e.g., mortality rates, recruitment rates, starting population sizes) and the development of robust population models.

In contrast, for furbearers like fisher, the situation is more complicated. Their life histories are more complex, our sample sizes are smaller, and population models would likely yield estimates with high uncertainty and error. Even if we were to estimate a starting population or other demographic parameters, such models wouldn't be as useful for understanding the fisher population as knowing whether there has been a significant change over the long term. CPUE data is better at detecting these substantial long-term changes than population models. Additionally, harvest data provides valuable insights into potential drivers of population changes, something that population estimates from models alone cannot reveal.

What does this other information show us about the fisher population?

There are several uses of CPUE data, but it must be combined with as much auxiliary information as possible to make sense of it. The Department gets our best estimate of population change using carcass data because it provides accurate information on age and sex. Just the one index, CPUE, has lower accuracy without other pieces of information and should not be used alone to interpret the status of a population. Looking at the CPUE trends alone is not going to give you meaningful insights without looking into all the other pieces of information that help to interpret it. Age/sex ratios, harvest success and distribution, health information, and trapper engagement are all important pieces of the puzzle that come from trapper derived data. Camera data helps to support what CPUE trends may be showing and does not rely on trapper derived data.

1) Age/sex Ratios: The age and sex distribution from harvest plays a role in population monitoring because it assesses the population structure, indicates population health, shows reproductive potential and capacity, and can predict future population trends. It helps the furbearer program make informed decisions about harvest regulations and management strategies. A high juvenile to adult ratio is good, showing that there is a high reproductive output (Figure 4). As expected, there are more males in the harvest due to their larger home ranges, making them more

susceptible to capture. In a more intensely trapped population, adult females would be harvested more and would be concerning in terms of evaluating trapping pressure on fisher. The consistently high capture rate of juveniles and of males suggest that trapping is not negatively impacting the population, and that the age/sex distribution appears normal.

Another metric commonly looked at is the proportion of juveniles to adult females (Table 1). The juvenile to adult female ratio has remained steady (Figure 5). A consistent ratio above 2 suggests good recruitment overall, which is what is seen in a stable or increasing population.

Table 1. Sex and age ratios since 2004.

Season	Carcass Sample	Males/Females	Proportion of juveniles in harvest	Juvenile (0)/Adult Females (>=2)
2004-05	617	0.7	0.4	2.0
2005-06	420	1.2	0.5	4.4
2006-07	608	1.1	0.4	2.4
2007-08	389	0.8	0.5	3.3
2008-09	368	0.8	0.5	2.9
2009-10	400	0.7	0.5	2.7
2010-11	430	0.8	0.4	3.1
2011-12	425	1.0	0.4	3.1
2012-13	533	0.8	0.4	2.6
2013-14	416	0.9	0.4	3.3
2014-15	420	0.9	0.5	3.5
2015-16	258	1.1	0.5	3.1
2016-17	231	0.8	0.4	2.4
2017-18	172	1.0	0.4	3.6
2018-19	243	1.1	0.5	4.0
2019-20	191	1.0	0.4	4.1
2020-21	173	0.9	0.4	5.9
2021-22	110	1.3	0.3	3.5
2022-23	120	0.9	0.4	5.3
2023-24	106	1.6	0.5	6.3
Previous 10 Year Average	233.4	1.0	0.4	4.1

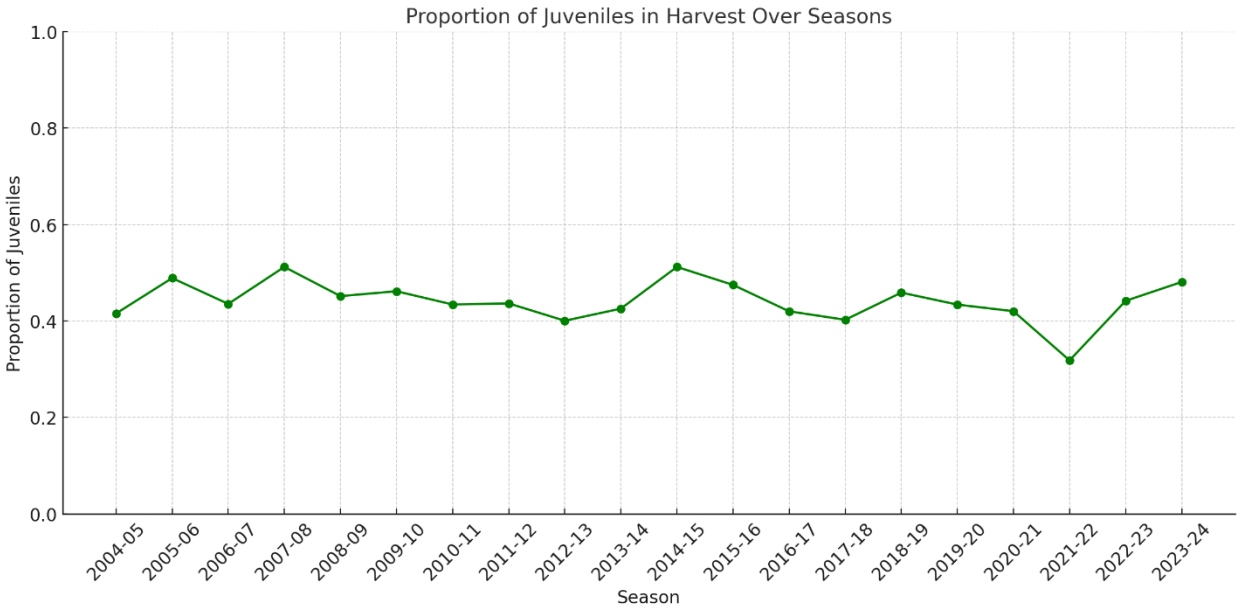

Figure 4. Proportion of juveniles in harvest showing consistency over time.

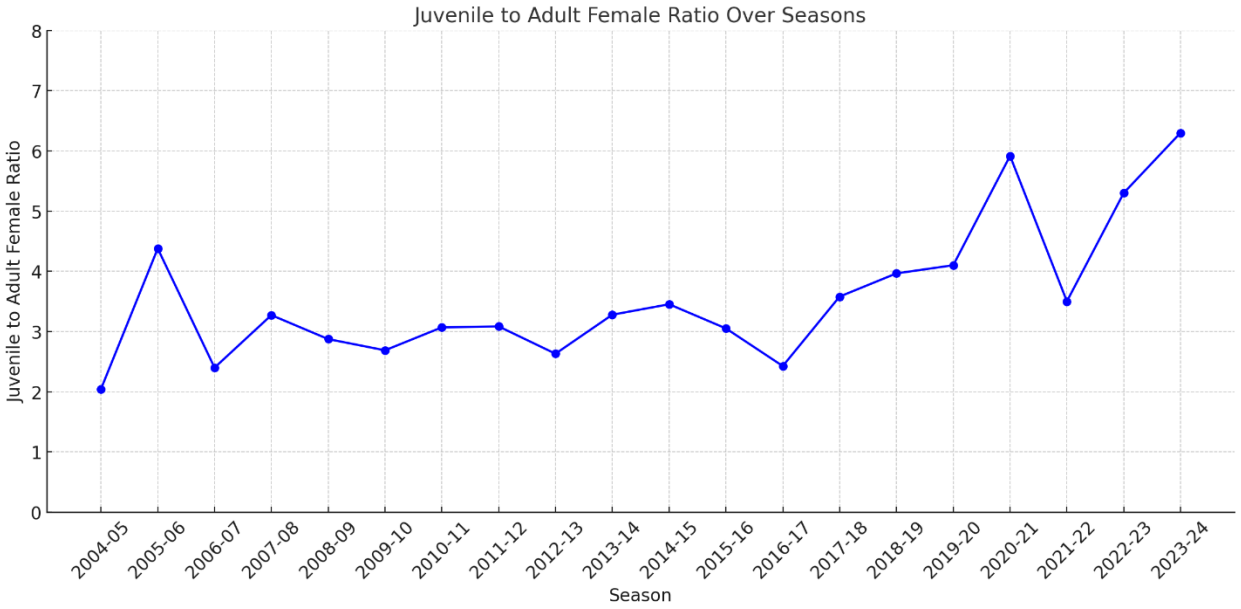

Figure 5. Juvenile per adult females over time, showing values consistently higher than 2.

As seen in the graphs below, the juvenile age class is harvested more than adults; this is largely due to juveniles' abundance and behavior on the landscape (Figure 6). This consistency is important, because if we start to observe more adults being harvested, then that would signal that there is something wrong with reproduction or juvenile survival rates; our data show no cause for concern. Note that the last few years have lower sample sizes due to lower harvest numbers.

Figure 6. Age and sex distribution of harvest over time.

2) <u>Harvest and Trapper Effort</u>:

Harvest and trapper effort provide a lot of useful information, especially in the context of this petition. Harvest patterns do influence CPUE trends, and the factors that drive harvest patterns are things like the weather, trapper motivation, and pelt prices. The decline in harvested fisher over time is similar to most furbearing species and is not necessarily reflective of any true population decline. In the graph below, trapper effort strongly correlates with harvest (Figure 7). If trappers are investing less time in recent years, this will affect the harvest. Most importantly, the consistent parallel between harvest and effort is what the Department would expect for a stable population. Things to look out for would be more effort and less harvest.

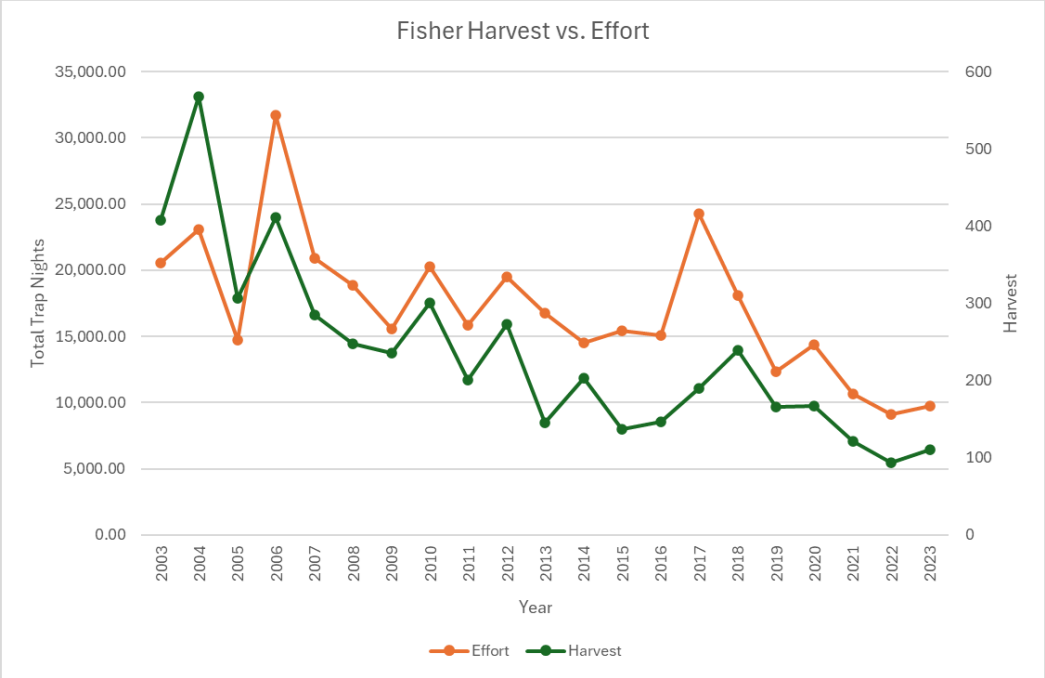

Figure 7. Trapper effort and harvest over time. Note that in 2013-14, the average pelt price rose to $96.70, which is why you see in 2016-17 an increase in harvest and effort.

Economic factors can influence this observed decline in fisher harvest. Fur market changes and gas prices can strongly affect effort. The price for fisher has steadily been decreasing, and we expect this to continue especially with the poor international relations with Russia. There have been less active trappers over time, indicating less effort and potentially declining interest. It may be difficult for people to take time off work, especially if the lower value of the pelts and high gas prices do not contribute to motivation. Weather can affect harvest rates in several ways including altering trapper effort and access, impacting efficiency and functionality of trapping systems, and changing animal behavior.

3) <u>Necropsy results</u>

Weight is a good measure of health condition, especially for females, because they have delayed implantation, which relies on good body condition for reproduction. Below you can see that the average weight for juvenile and adult females and males has not changed. If there was an effect of rodenticides on fisher, we would expect to see lower weights due to reduced foraging efficiency or reduced immune function.

Table 2. The average weight of necropsied fisher, showing a consistent range of values. There are no alarming trends that indicate a drop in weight for either sex and age class. Note that weights are fisher without fur and desiccated fisher were not weighed.

Trapping Season	Juvenile (Age 0-1)		Adult (Age 2+)	
	Female	Male	Female	Male
2011	3.85	7.47	4.01	9.19
2012	4.37	7.89	4.21	8.85
2013	4.27	7.81	5.40	8.83
2014	4.20	7.94	4.33	8.69
2015	4.17	7.99	4.45	8.96
2016	4.21	7.75	4.39	9.02
2017	4.40	8.34	4.59	8.90
2018	4.24	8.00	4.18	9.20
2019	4.64	8.08	4.52	9.11
2020	4.03	8.01	4.27	8.79
2021	4.29	7.82	4.02	8.48
2022	4.55	7.47	4.42	9.01
2023	4.68	8.02	4.57	9.17

The weights for fisher sampled for rodenticides in comparison to other fisher harvested during the same time period also shows no difference between those sampled (which had exposure) and those not sampled (unknown exposure) (Figure 8). We also compared this with several years of sampling data, and again, there was no difference between the weights (Figure 9). It appears body condition has stayed the same, which is another indicator of good population health.

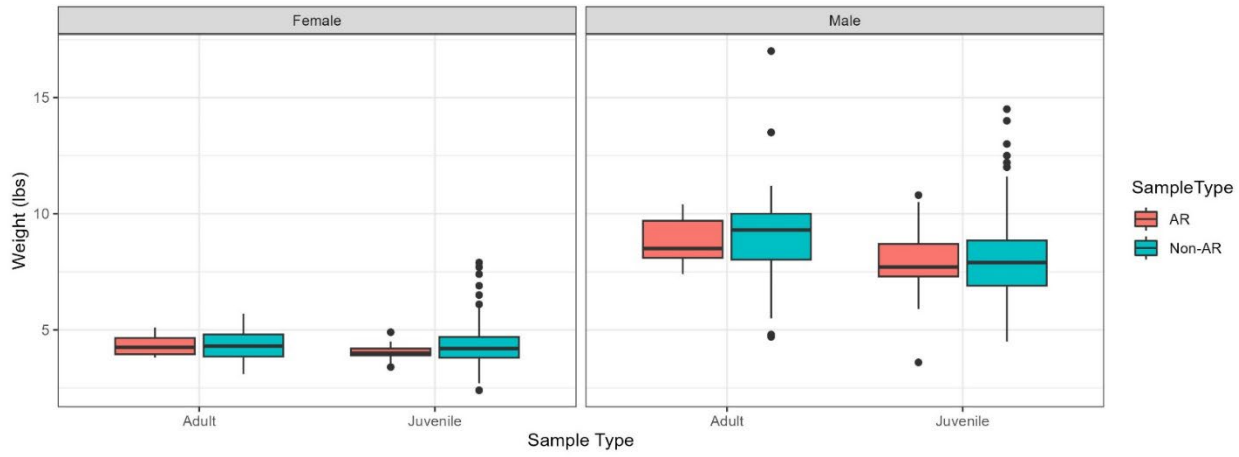

Figure 8. Weights for sampled fisher 2018-2021, with a comparison between sampled fisher and non-sampled fisher. Weights appear to be similar between AR sampled fisher that had rodenticide exposure and fisher that were not sampled (with unknown exposure). The weight

range for non-sampled juvenile males and females were 4.5 - 14.5 lbs. and 2.4 - 7.9 lbs. respectively. The weight range for non-sampled adult male and females were 4.7 - 17 lbs. and 3.1 - 5.7 lbs. respectively. Note that weights are from fisher without fur and desiccated fisher were not weighed.

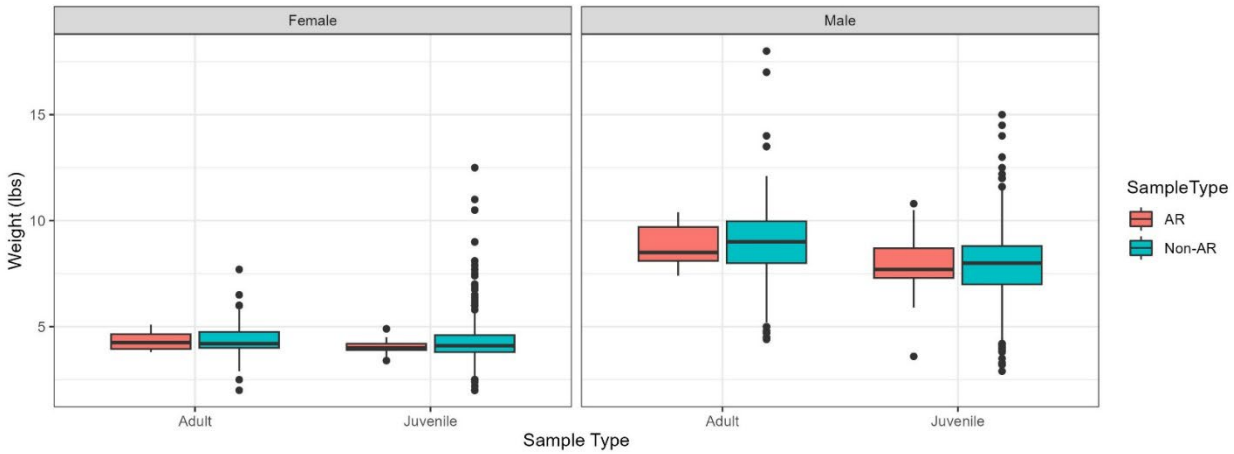

Figure 9. Weights of sampled fisher from 2011-2023 (unknown exposure) compared to sampled fisher testing positive for rodenticide exposure. Even with a larger dataset to compare to, there is no apparent difference between weights. The weight range for juvenile males and females was 2.9 - 15 lbs. and 2 - 12.5 lbs. respectively. The weight range for adult male and females was 4.4 - 18 lbs. and 2 - 7.7 lbs. respectively. Note that weights are from fisher without fur and desiccated fisher were not weighed.

4) <u>Camera data</u>

These data, provided through camera monitoring instead of reports from trappers, are important information that helps supplement what we see in CPUE trends. Occupancy modeling from camera data is non-invasive and provides more insight into habitat use which is critical because habitat is essential to fisher survival. This approach is crucial for conservation efforts, as it reveals habitat preferences, presence/absence, and other variables that a population estimate alone may not address. Ultimately, occupancy modeling offers practical, insightful, and comprehensive data for fisher conservation that is complementary to CPUE. The Department, university researchers, and federal partners have been collaborating for at least a decade of camera monitoring across Vermont. The Department continues to work on this project and supports students and post-docs to continuously improve camera monitoring techniques and build new models to detect changes from year to year. The Department is working with an enormous dataset, that is costing thousands of dollars ($160,000) and considerable staff time.

Below are the results from occupancy models (habitat use) and detection rates in Vermont (Figure 10). Habitat use data were collected from fall-spring each year, 2015-2019. Snow depth and tree height were the positive covariate relationships for this model. The maps show wide fisher distribution, high habitat use probability, and frequent detection rates in Vermont. Fisher are a common species found in our 10-year long camera work dataset (Figure 11). We would not expect to have these observations in a declining population.

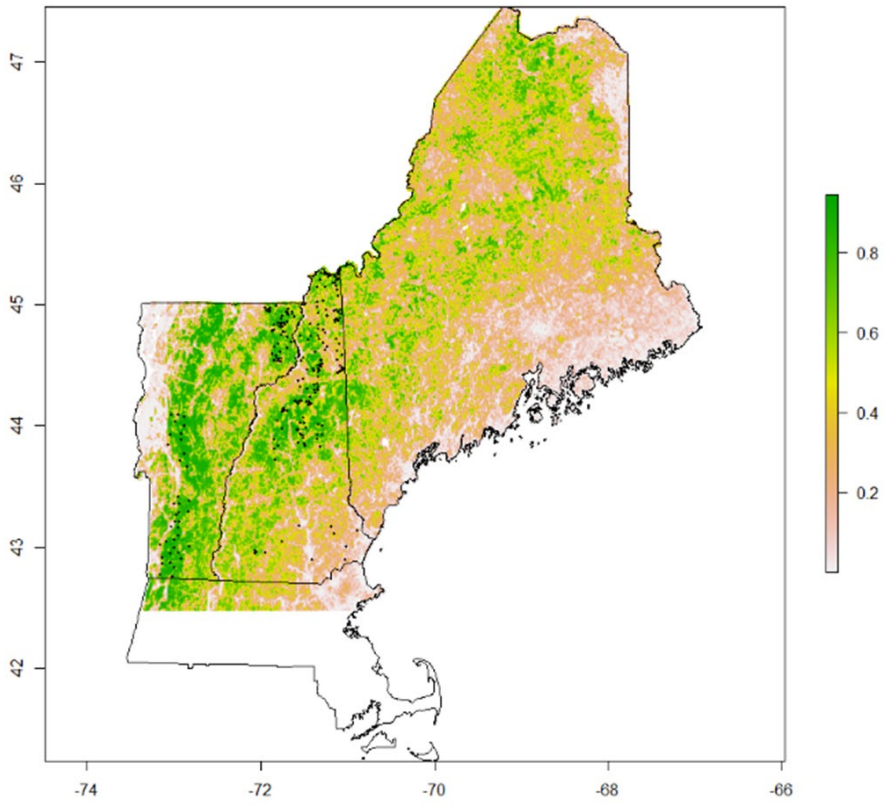

Figure 10. Occupancy of fisher across New England. Green values show higher probability of fisher habitat use.

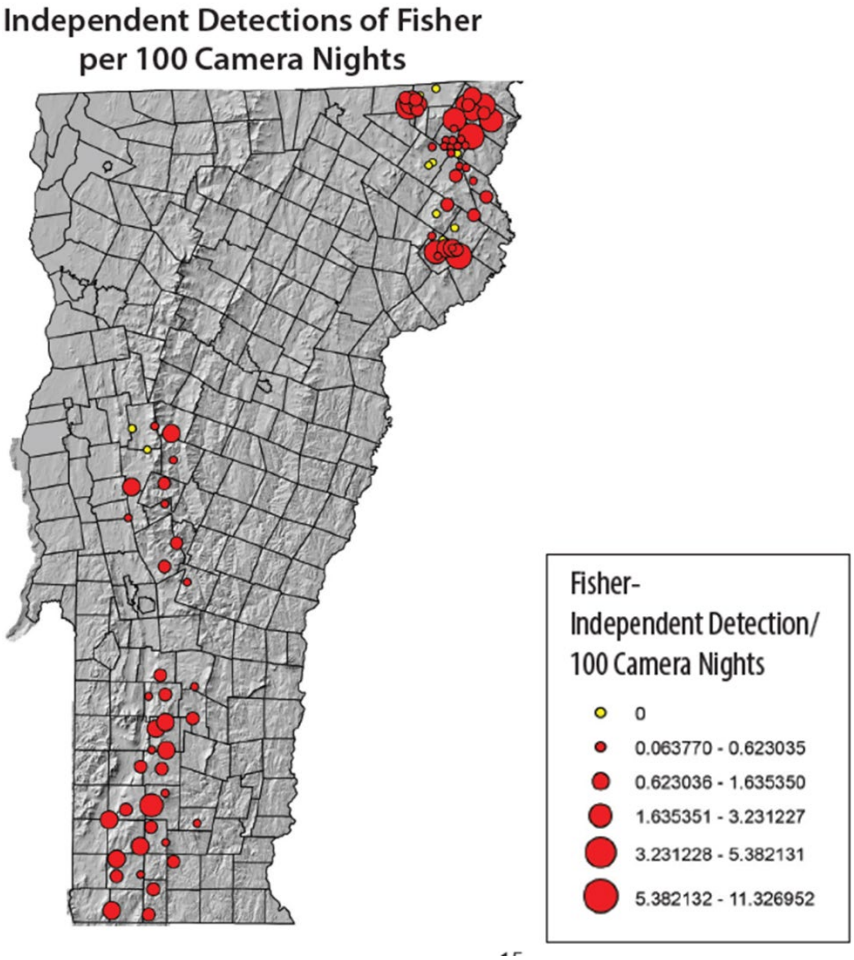

Figure 11. Fisher camera detection rates at sampling sites in the Green Mountains and Northeast Kingdom, showing high rates of fisher detection.

What does all this information boil down to?

All of the information previously mentioned indicates that Vermont has a stable fisher population and there is no apparent evidence that ARs or trapping are impacting Vermont's fisher population. Implementing a trapping moratorium based on indirect or inconclusive evidence may be premature and could divert attention from other potential threats to fisher populations, such as disease or global climate change impacts that need to be monitored. If the concern is specifically about pesticide exposure, the solution should focus on regulating or reducing harmful pesticide use, not halting fisher trapping. Efforts should be directed toward identifying hotspots where rodenticides or other pesticides are being improperly used and mitigating those risks through better enforcement, education, or policy changes.

2. **<u>Comment/Question</u>: "Unfortunately, fisher populations appear to be declining in New England and the reasons are likely complex and the result of habitat loss and fragmentation, trapping, and the use of rodenticides" and "Considerable evidence has established that they are endangered by SGARs and that this threat is on the population level."**

<u>Response</u>: While fisher populations in some states of New England may appear to be declining, the causes are indeed complex and multifaceted. Habitat loss and fragmentation are significant concerns for wildlife. However, Vermont boasts the largest amount of conserved land of any New England state. This may be a contributing factor to the relative stability of fisher populations in Vermont, compared to other states and despite broader regional concerns. The Department is heavily involved in habitat protection, which benefits all wildlife, including fisher and their prey species, and remains committed to conserving habitat and mitigating habitat loss.

There is no evidence that regulated trapping is significantly contributing to fisher population declines. Harvesting approximately 100- 150 fisher per year in Vermont, which is less than one fisher per town, is not going to have a significant impact on the overall population at this time. Eliminating the trapping season would not reduce rodenticide exposure or its potential impacts. Interestingly, research in New York has shown that the probability of fisher presence and habitat use can increase after the introduction of a regulated trapping season.

Rodenticides have been a concern, and may cause mortality in individual fisher, but there is no evidence that ARs are causing declines in fisher populations. The evidence we have is from trapper derived carcasses, not from sick or dead animals suspected of AR exposure. The cause of death was trapping, not AR exposure. To date, there have been no reports of mortality in furbearers due to rodenticide poisoning. While some red fox kits tested positive for AR exposure in 2023, the cause of death was undetermined due to the decomposition of the carcasses, which compromised sample quality.

While controlling rodenticide exposure is challenging, the Agency of Agriculture has been working on solutions. In 2023, educational posters were posted at points of sale for ARs, encouraging proper use. The posters also have a QR code that links to an educational YouTube video. In 2024, legislative changes were introduced to install more stringent regulations on the use of ARs. David Huber, the Deputy Director for the Division of Public Health and Agricultural Resource Management (Vermont Agency of Agriculture, Food and Markets) stated:

"*During this past legislative session, the GA passed S.301 – An act relating to miscellaneous agricultural subjects. S.301 amended 6 V.S.A. § 911 to include definition of "SGARs" and amended § 918(g) to reclassify all SGARs as Class A products. At the time of testimony, there were 68 products registered that contained SGARs, and 56 of those were already classified as Class A. The 12 that were classified as Class B have since been reclassified as Class A, per the amended law. Those 12 were originally classified as Class B due to the May 28, 2008 EPA Risk Mitigation Decision for Ten Rodenticides, which allowed for an agricultural exemption for SGARs sold in minimum of 8lbs buckets for agricultural use and that also contained a label statement of "[d]o not use this product in homes or other human residences." Essentially, S.301 removed this agricultural exemption in Vermont and tightened the regulatory grip on SGARs so that only certified applicators can purchase and use SGARs. In order to be a certified applicator, one must sit for and pass an exam administered by the Agency. Part of the training and study material for this exam covers rodenticides, their appropriate use, and minimizing the potential adverse effects to non-target species*"(pers. communication).

Though the Department cannot control individual decisions, it can help influence them through education. Following the recent findings of fisher exposure, the Department published the results in the furbearer newsletter and online materials about furbearer management and conservation. Additionally, the Department acknowledges the efforts of organizations working to raise public awareness about the link between ARs and wildlife exposure to pesticides. The Department has also testified before the Senate Committee on Agriculture regarding the exposure results. These efforts represent ongoing steps to reduce AR use and ultimately protect wildlife from exposure.

Though fisher populations may face challenges, including habitat fragmentation and other ecological factors, ongoing monitoring, habitat conservation, and efforts to reduce rodenticide exposure could help address these concerns in Vermont.

3. **<u>Comment/Question</u>: "Trapping of fisher can negatively impact both fisher and protected American marten populations because these species overlap in habitat, food sources, and behavior."**

<u>Response</u>: Marten are considered a state-endangered species in Vermont, as such there is no regulated trapping season for them. Fisher trap sets, however, pose a rare risk of incidentally catching a marten. To address this, the Department has worked closely with regulated trappers, making trap modifications to minimize the chances of such incidents. Regulated trappers do not target marten, both because it is illegal and

because it is in their best interest to promote marten population growth and expansion. In fact, trappers consistently report accurate signs of marten, helping to advance our knowledge and efforts toward removing marten from the state's endangered species list.

Fisher, on the other hand, are abundant and widely distributed across Vermont, as evidenced by camera and regulated harvest data. These data also show that fisher commonly occupy the same areas as marten. Research from other northeastern states suggests that fisher may be a limiting factor in marten distribution and abundance. One of the Department's current priorities is to determine whether fisher are outcompeting marten in these overlapping habitats.

Climate change is another important consideration in this dynamic. Studies have shown that fisher may have a higher likelihood of long-term survival than marten due to reduced snow loads. Marten rely on deep snowpack for survival, which gives them a competitive edge over fisher in certain environments.

Fisher trapping has proven beneficial for marten conservation. Trappers played a key role in reintroducing marten to Vermont from Maine and New York. For a long time after the reintroduction, few marten were detected, and it was presumed that the reintroduction efforts had failed. However, in 2010, a marten was incidentally caught in a fisher set in the southern Green Mountains, sparking new conservation efforts. This incidental capture confirmed the presence of marten in southern Vermont, a critical milestone made possible by regulated trappers targeting fisher.

4. **Comment/Question: "Recently, two ambitious studies, published in 2023 and 2024, focused on the prevalence of AR exposure in fishers in the northeastern United States. The research teams included biologists from the Vermont Fish and Wildlife Department. Their results were consistent with those of the earlier California studies and indicated that, "ARs could pose a threat to wild mesocarnivore species in this region."**

Response: Currently, there is a lack of direct evidence linking ARs to fisher population declines. While there are concerns about rodenticides and other chemicals in certain regions (such as CA with illegal marijuana farms), the overall impact of pesticides on fisher populations in the Northeast, including Vermont, has not been conclusively demonstrated. More research is needed to evaluate how populations are impacted, at what scale, and how different species metabolize the compounds.

It cannot be emphasized enough that the Department has been actively engaged in AR research and contributed to the two papers mentioned by the petitioner. The only

reason why we know what we know now is because of the Department's effort to understand AR exposure better. Vermont, as well as other states, contributed data through trapper derived carcasses. Otherwise, exposure levels would remain unknown to us.

Currently, the Department is actively participating in research to look at fisher health trends across the northeast. This involves collaboration with universities and other state jurisdictions. Our engagement consistently shows that understanding how AR's affect fisher continues to be a high priority.

Below are notes regarding the two publications:

Buckley, J. Y., Cottrell, W., Needle, D., Royar, K., Tate, P., and Whittier, W. (2023). High Prevalence of Anticoagulant Rodenticide Exposure in New England Fishers (Pekania pennanti). Environ Monit Asses. 2023 Oct 19;195(11):1348 doi: 10.1007/s10661-023-11919-xT.

Buckley et al. (2023) asked for more research to understand the source of ARs and whether this exposure poses a significant health risk. In the discussion section of this article, and as quoted by the petitioner:

> "Importantly, regardless of the source and whether the AR use is legal or not, the near universal exposure of the fishers sampled suggests that AR exposure *is widespread and represents an underestimated health risk to wild fishers.*"

How this information is being used is up to interpretation and largely taken out of context. At the time of this study, nothing was known about fisher exposure to ARs and it was assumed that because they are characterized to use deep forest habitats, they would not be exposed to pesticides. The research showed that fisher, in fact, were exposed with a wide distribution of exposure, and thus, AR exposure was previously underestimated. The research suggests that there could be population health risks, but does not show that, nor does it say anywhere that exposure is causing population declines.

Silveira, G., Frair, J.L., Murphy, L., Ellis, J.C., Needle, D., Cunningham, S.A., Watson, A., Facka, A., Tate, P., Webb, S., Royar, K., Bernier, C., Keller, T., Schuler, K. (2024). Drivers of anticoagulant rodenticide exposure in fishers (Pekania pennanti) across the northeastern United States. Frontiers in Ecology and Evolution 12:1304659 doi: 10.3389/fevo.2024.1304659

This peer-reviewed publication found that the main driver of exposure patterns, although complicated, was the proportion of wildland-urban intermix (low density buildings within a largely forest-dominated landscape), and most likely the residential improper use of ARs. This research does not state that the fisher population is in decline due to exposure, nor does it imply any population-level impacts. It does suggest a baseline of where to focus future efforts in better understanding the source of ARs. Another important takeaway from this article is the methods used to draw those conclusions. Again, all authors from different states contributed trapper derived carcasses to this research as the main sources of data. As stated in this article:

> "*Regardless of what actions may be taken to curb non-target wildlife exposure to AR'Rs, we have demonstrated the value of using samples from the regulated harvest of animals at a low cost, rapid, effective, and statistically defensible means of tracking the unintended effects of human activities on free-ranging carnivore populations.*"

5. **<u>Comment/ Question</u>: "There are several non-lethal alternatives that would be more appropriate for fisher. These include collection and analysis of blood and serum from live-trapped fisher and analysis of hair samples collected through use of hair traps. Non-invasive sampling by hair-trapping is increasingly used worldwide in wildlife research."**

<u>Response</u>: There are several methods for collecting data on furbearers and each method has its own purpose, strengths, and weaknesses. The only way to collect reliable and comparable data on a species exposure to ARs is by taking a liver sample because this is where the compounds accumulate over time. Taking a blood sample is not realistic because it would not reflect the true value of exposure and would yield different results, likely lower levels of exposure compared to a liver sample. In addition, wildlife professionals must consider animal safety and welfare. Live capture is invasive and stressful to the animal being captured, and the professional approach to studying wildlife is to avoid capture unless necessary due to the potential harm it can cause the animal. This approach is largely unnecessary when we have scientific, reliable, and comparable sampling methods that are provided to us, and notably, free of cost (i.e., trapper derived carcasses).

One of the main reasons why we do not know more about the effects of AR exposure on wildlife populations is due to the inability to test different exposure levels under a controlled setting. Finding a way around this is not straightforward and trying to conduct research that could help get to these answers without a controlled lab setting is extremely difficult. There are several unknowns that are important for future research.

For example, we do not know how different species metabolize different compounds, and we do not know how age or sex influences the metabolic breakdown of compounds for different species. To answer these questions, there needs to be a method that is not under a controlled lab setting, and the only reliable method we have involves sick or dead wildlife.

Hair sampling fisher can provide a wealth of information regarding diet, genetics, and other population metrics, but it cannot give us information on AR exposure and the impact of that exposure. Scat detection dogs are another valuable method for collecting data on rare species and can yield information that would be otherwise difficult to get. Even this method is not straightforward. It can provide density and genetic information, some major considerations that could influence results include temperature, wind speed, humidity, countermarking by other non-target species, and the experience of the dog and its handler. Scat detection dogs cannot give us information on the effects of ARs on fisher. Taking samples from roadkill is also unrealistic because it would likely not provide a large enough sample size to analyze, and the condition/quality of the animal/sample has a large influence on whether it can be tested or tested accurately.

6. **<u>Comment/Question</u>: "The main reason cited by the Department for not using these methods are more widely cost/funding – e.g. equipment, analyses, and/or staff time. However, there are costs associated with the current practice of collecting and performing necropsies and sample analysis on fisher carcasses collected from trappers. These funds need to be diverted to a program of non-invasive monitoring of fisher."**

<u>Response</u>: Funding, logistics, available personnel, the species in question, and the feasibility of meeting the study objective are all decisions that need to be made prior to starting any monitoring program. Setting up a monitoring program is not as simple as hiring dog trainers or setting up hair sampling stations. It involves a multitude of complex resources and decisions. Sampling from trapper derived carcasses is not only the most cost efficient, but it also is the only reliable way to collect samples. It yields sampling opportunities for other diseases or research questions with university collaborations. The long-term data collection from necropsy work (since 1980s) is also an important tool we have relied on because of the importance of trend comparisons. It is unique to Vermont, as we have the longest running necropsy dataset than any other state in the Northeast.

In addition to rodenticide exposure, there are several research opportunities that have been available to us through trapper derived carcasses that would otherwise remain unknown, such as covid testing, gamma herpesvirus in bobcats, or the prevalence of

potentially fatal zoonotic diseases such as *E. multilocularis*. Without the carcasses to sample from, we would not have the information we have today. If the goal is to understand population genetics, habitat occupancy, or density, other methods could provide more information that balances the needs of cost, time, and feasibility.

7. **Comment/ Question: "The results from future necropsies won't change. Rodenticide use isn't decreasing."**

Response: There is no scientific evidence to support this claim. The life expectancy of fisher can be up to ten years. The oldest fisher we have on record is 9 years old for both males and females. The time(s) each fisher were exposed in its lifetime is unknown, as well as the length of time the compounds remain in their system. If sampling were to occur 5 years from now, that animal could have been exposed 5 or even 8 years ago, demonstrating that measuring rates of exposure is difficult. Other influences on their immune system, such as availability of prey resources, finding quality habitat for cover, and even winter severity are all factors that could play a role in the impacts of AR exposure, and this is also unknown. The only thing we do know for certain is, of the fisher sampled, the majority had several compounds in their system at varying levels and that their cause of death was from regulated trapping.

The trapper derived carcasses are random sampling because trappers cannot adjust traps based on which sex or age they want to target. It is also spatially unpredictable from year to year based on trapper behavior and motivations. A targeted approach is a more realistic way to monitor changes in rodenticide use and exposure levels over time. To do that, sampling effort would need to increase in areas that have high exposure levels, which is contradictory to the goals of this petition.

8. **Comment/Question: "Fisher are also being killed under title 10 V.S.A. §4828 with no reporting, so there is additional mortality that the Department is largely unaware of."**

Response: While title 10 V.S.A. §4828 authorizes the take (without compensation) of furbearers causing damage on their own property with no requirement of reporting to the Department, fisher are unlikely to be a species of concern. Animal damage control harvest for compensation became mandatory to report in 2018 with many already reporting prior to that.

Based on trapping reporting data since 2001, 15 fisher have been taken for animal damage control, 13 of those were taken out of season. Since 2001, there have been 51 roadkill fisher reported, though, this number is higher due to known roadkill that are not collected because of the condition of the animal. The Department does not receive

frequent calls from the public to help resolve problems with fisher. If the Department received calls of that nature, we would recommend non-lethal actions first.

9. **Comment/Question: Why are we studying fisher compared to other furbearing species?**

   Response: Why fisher is being examined versus other species is better explained by the availability of data from trapper derived carcasses. We do not know how different species metabolize rodenticides, how age and sex affect things, season/diet/habitat changes affect their metabolism of the compounds. We may never actually know this. Fisher were also unexpected to have exposure since they are considered deep forest inhabitants. Fisher being smaller does not equate to them being more in danger to rodenticides.

10. **Comment/Question: What is the maximum number of fisher caught in a season? Has it changed, and do we need a quota like New Hampshire?**

    Response: The maximum number of fisher caught per season is not different before or after the regulation change. The average for any individual trapper per season for 1990-2004 is 22. The average for 2004-2023 is 19. Vermont's trappers are not catching as many fisher as they once were, largely due to low prices and subsequent lower motivation.

    The petitioner refers to the quotas in New Hampshire and asks why Vermont does not have one. Every state has different harvest regulations for a variety of reasons. Historically, New Hampshire has always had a quota, and the regulation language has always stayed the same, but bag limits have varied anywhere from 1 to 15 in some parts of the state over time (Figure 12). Now their quota is two with a fisher trapping participation rate of 3-4% compared to all species pursued for trapping. Their trapping participation has similar barriers as Vermont (high gas prices, low fur prices, etc.), but the main difference is that the fisher population in New Hampshire is not as high as Vermont.

    Again, CPUE does not provide a complete picture of a population's health. In New Hampshire, the CPUE figures show a decline, but this trend is largely influenced by trapping participation rates. The reason that the fisher population is believed to be declining in New Hampshire is possibly due to an oversaturation of bobcats, as suggested by sighting reports and other information such as camera data (*New Hampshire Fish and Game, pers. comm*). There is no regulated harvest of bobcats in New Hampshire.

As explained previously, harvesting approximately 100-200 animals total per season is not impacting the population in Vermont, nor do we expect it to. If harvest skyrocketed to 500+ animals while showing an increase in female harvest, there would be concerns and a quota would be an actional step the Department could look into.

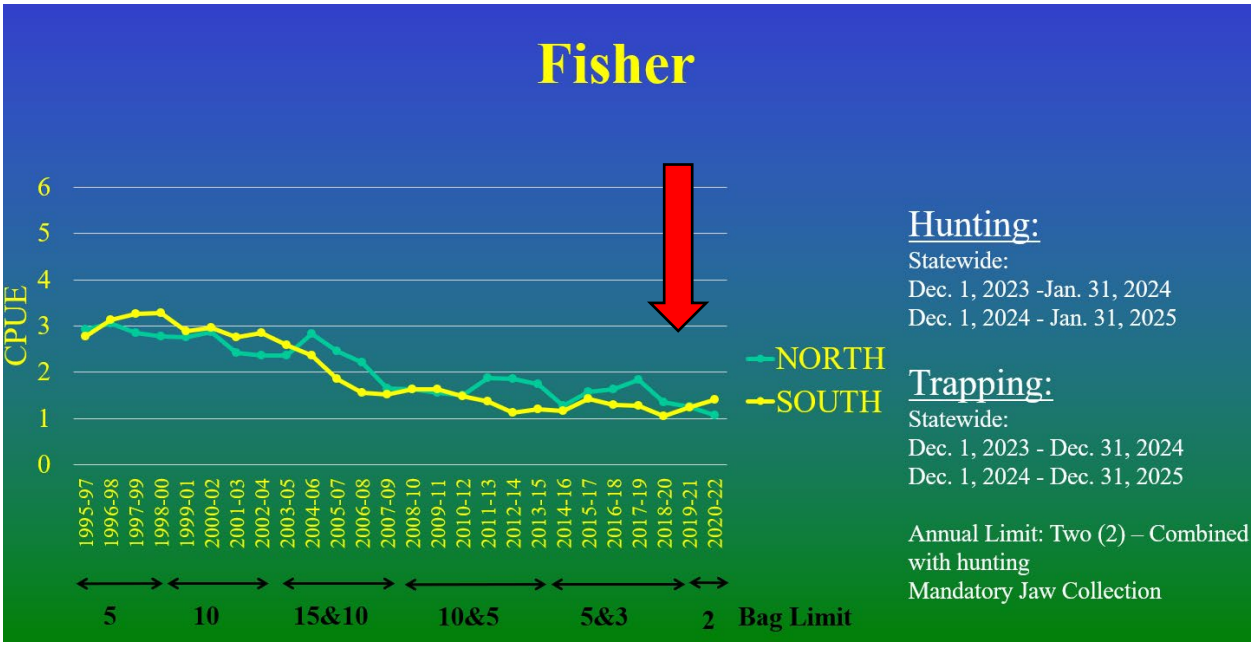

Figure 12. New Hampshire's CPUE and quota over time. Note the historical bag limits. Even with quotas there were high harvest levels. This graph alone does not explain the apparent fisher population decline in New Hampshire, further demonstrating the complexity of CPUE data.