New York State

Fisher Management Plan

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

New York State Department of Environmental Conservation
Division of Fish, Wildlife and Marine Resources
Bureau of Wildlife

November 2015

Acknowledgments

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The team would like to acknowledge Dr. Angela Fuller, Leader, USGS New York Cooperative Fish and Wildlife Research Unit at Cornell University for her collaboration with fisher surveys in Central/Western New York and comments on portions of this plan. We appreciate the assistance of many New York trappers who provided bait for fisher surveys. Lastly, we thank Gordon Batcheller, retired Bureau of Wildlife Chief for comments on previous drafts of this plan and his strong support of the NYS Furbearer Management Program and Team.

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A contribution of Federal Aid in Wildlife Restoration, New York Grant W-173-G

Suggested citation:

New York State Department of Environmental Conservation (NYSDEC). 2015. New York State Fisher Management Plan. Albany, NY.

Cover: A fisher approaches bait at a combination camera trap/hair snare survey station in central New York (top left; NYSDEC photo), a young trapper assists his father on the trapline in St. Lawrence County (top right; photo used with permission), and a fisher in the Catskills resting during winter (bottom right; photo used with permission, courtesy Gene McGarry).

New York State
Fisher Management Plan
2016-2025

Patricia Riexinger, Director
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12/17/15

Date

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12/11/15

Date

NYS Fisher Management Plan

Mission of the Bureau of Wildlife

To provide the people of New York the opportunity to enjoy all the benefits of the wildlife of the State, now and in the future. This shall be accomplished through scientifically sound management of wildlife species in a manner that is efficient, clearly described, consistent with law, and in harmony with public need.

Goals of the Bureau of Wildlife

Goal 1. Ensure that populations of all wildlife in New York are of the appropriate size to meet all the demands placed on them.

Goal 2. Ensure that we meet the public desire for: information about wildlife and its conservation, use, and enjoyment; understanding the relationships among wildlife, humans, and the environment; and clearly listening to what the public tell us.

Goal 3. Ensure that we provide sustainable uses of New York's wildlife for an informed public.

Goal 4. Minimize the damage and nuisance caused by wildlife and wildlife uses.

Goal 5. Foster and maintain an organization that efficiently achieves our goals.

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EXECUTIVE SUMMARY

Fishers (*Pekania [Martes] pennanti*) are an important component of New York's wildlife community and are a highly-valued resource by trappers. As forest-dependent carnivores with a high trophic position, fisher populations can reflect the status of forested ecosystems and lower trophic levels (e.g., prey populations) and are an ecologically important predator of, and competitor with, a variety of other wildlife species (e.g., snowshoe hare [*Lepus americanus*], American marten [*Martes americana*], coyote [*Canis latrans*]). Fishers occur at naturally low densities and have relatively low reproductive capacity compared with more common furbearers. These characteristics, combined with the fact that fishers are easily trapped and susceptible to overharvest, necessitate that we carefully regulate trapping seasons and monitor harvests and populations.

Historical trends in fisher populations in New York indicate that fishers were much less abundant in the early 1900s, likely due to unregulated trapping and large-scale declines in habitat suitability resulting from timber harvesting, fires, and agricultural practices. However, these trends were reversed by closures in trapping seasons during 1936-1948, initially restrictive harvest regulations when trapping seasons resumed in 1949, an increase in habitat suitability as forests recovered via succession across much of the New York landscape, and a reintroduction in the Catskill Mountains in the late 1970s and early 1980s. While our harvest estimates during 1949 to the present strongly indicate an increasing fisher population, more recent data from the past decade suggest an apparent decline in fisher populations in the Adirondack region. Concurrently over this same time period, it appears that fisher populations have increased and expanded their range in much of the Southern Zone (SZ) portion of the state. These differences require a regional approach to managing and conserving fisher populations in New York.

Purpose & Goals

Section 11-0303 of New York's Environmental Conservation Law directs NYSDEC to develop and carry out programs that promote the maintenance of desirable species in ecological balance, with due consideration of ecological factors, the importance of fish and wildlife resources for recreational purposes, and public safety. This plan documents and describes the goals, objectives and strategies that will guide NYSDEC's actions and decisions related to management of fisher populations in New York in accordance with this legal mandate, over the next 10 years (2016-2025).

This plan advances two goals for managing fisher populations in New York that are closely aligned with the goals of the NYSDEC Bureau of Wildlife, including:

> **<u>Goal 1:</u> Maintain or enhance fisher populations in all areas of the state where suitable habitat exists.**
>
> **<u>Goal 2:</u> Provide for the sustainable use and enjoyment of fishers by the public.**

These goals underscore our responsibilities to ensure the conservation and sustainable use of fisher populations as a public trust resource in New York. To accomplish these goals we define region-specific objectives and strategies. In the sections below we provide a summary of our existing data on fisher populations and harvests, and management objectives for the following three fisher management zones: Northern, Southeastern, and Central/Western New York. New York City and Long Island are excluded because historically fishers did not exist in this region of the state.

Northern New York

With the exception of season closures in 1977, 1983, and 1984, Northern New York has had regulated fisher trapping seasons since 1949. During the past 6 decades, fisher harvests in New York have increased substantially, concurrent with general harvest increases throughout the northeastern U.S. and adjacent areas in southern Canada. However, it appears that recent fisher harvests may have exceeded sustainable harvest rates (i.e., ≥20%) for much of this region and contributed to subsequent declines in harvests and take per-unit-effort (TPUE). Using published density estimates for ecologically-similar areas of the northeastern U.S. and sex ratio data, we estimated fisher population abundance and harvest rates.

We estimated the fisher population in Adirondack WMUs to range from approximately 3,800-5,000 fishers. Estimated annual harvest rates based on sex ratio data (2002-2011) ranged from 8.6-38.3% (Central Adirondacks), 13.2-30.3% (all Adirondack WMUs), and 10.6-30.0% (Northern New York outside of the Adirondacks). Furthermore, predicted harvest rates in Northern New York were ≥20% for 8 out of 10 years and >25% for 4 out of 10 years of the time series. Predicted harvest rates for all Adirondack WMUs were ≥20% for 6 out of 10 years and >25% for 4 out of 10 years of the time series.

Analysis of fisher TPUE and pelt sealing data revealed that a proposed 30-day season (a 35% reduction in season length from the current 46-day season) for Adirondack WMUs would result in a harvest of approximately 835 fishers and a harvest rate of 17-22% during years of decreased food abundance and 580 fishers and a harvest rate of 12-15% during years of increased food abundance. We propose to implement these season changes in 2016, with season dates of November 1-30.

Objectives for this management zone support the development of new regulations designed to achieve sustainable fisher harvests, continued collection of data that have been useful for monitoring harvest rates, and the implementation of noninvasive surveys for population monitoring.

<u>Management Objectives:</u>

1. Monitor harvest and population trends through the collection of harvest and survey data.

2. Achieve a target harvest rate that is <20% of the fisher population in Adirondack WMUs of Northern New York.

Southeastern New York

In 1985, an experimental trapping season for fishers was opened in the Catskills (former WMU 11) and has remained open since. Other areas of the SZ (i.e., Hudson River Valley) were opened to fisher trapping in 1988. In contrast to Northern New York, fisher harvests in Southeastern New York appear to be stable to increasing, concurrent with an apparent increase in distribution and harvest density, which has likely been facilitated by low harvest rates (5-18% during 2002-2011). In Southeastern New York we documented an increase in the number of towns with reported fisher harvests between the time periods 2002-2006 and 2007-2011, with the exception of the southeastern corner (portions of Dutchess, Putnam, and Orange counties within the Hudson Valley and South Taconic Highlands WMU Aggregates), where few or no fishers were harvested during 2002-2011. This may reflect fisher habitat suitability, a lack of trapping effort, and (or) potential competitive interactions in the carnivore community (e.g., bobcats [*Lynx rufus*]) that may be limiting fisher populations.

Objectives for this management zone support the continued collection of harvest monitoring data (e.g., sex ratio) including the implementation of methods to collect trapper effort and biological data.

Management Objectives:

1. Monitor harvest and population trends through the collection of harvest data (effort, sex ratio, age structure).

Central/Western New York

Observations by NYSDEC staff, hunters, trappers, and other outdoor enthusiasts clearly indicate that fisher range is expanding throughout New York State, beyond their historic core range in northern and southeastern New York. This expansion has been occurring for several years and fishers emigrating from a reintroduced population in Pennsylvania have likely fostered growth of fisher populations in the southern tier of New York. We have systematically documented observations of fishers from a variety of sources, including reports from the general public and various agency surveys including the Bowhunter Sighting Log, Trapper Mail Survey, and Furbearer Observation Reporting System. Since 2005 we have confirmed 631 observations of fishers in this region of the state. Additionally, during the winters of 2013-2015, NYSDEC staff in partnership with the USGS New York Cooperative Fish and Wildlife Research Unit at Cornell University, initiated detection surveys for fishers across a large area of central and western New York. Survey methods included the use of camera traps and hair snares at 300 and 608 sample units in 2013 and 2014-2015, respectively, and were effective at documenting fisher distribution and occupancy throughout the study area.

Based on predicted occupancy in WMU Aggregates with an open fisher trapping season (range = 0.40-0.70), we believe we can open a conservative trapping season in those aggregates with a predicted occupancy of ≥40%. Using this threshold, we propose opening the following WMU Aggregates for fisher trapping beginning in 2016: Oswego Lowlands, West Appalachian Plateau, Central Appalachian Plateau, East Appalachian Plateau, and Otsego-Delaware Hills. We predicted that a 6-day season (October 25-30) without a seasonal bag limit would result in a harvest of 265 fishers (range = 140-390). Furthermore, we predicted that the maximum fisher harvest (and resulting harvest density) in these WMU Aggregates would be similar to the long-term (2002-2011) harvest density of 1.53 fishers/100 km^2 observed in Southeastern New York, where our harvest data suggest a stable to increasing fisher population.

Objectives for this management zone support the continuation of noninvasive fisher surveys that will provide the Department with distribution and population abundance data and opening a limited and conservative fisher trapping season in portions of this zone.

Management Objectives:

1. Determine fisher distribution and abundance in Central/Western New York and document continued expansion of fisher populations in this management zone.

2. Open a fisher trapping season in portions of Central/Western New York and monitor harvest and population trends through the collection of harvest data (effort, sex ratio, age structure).

Statewide

In addition to our objectives for the three Fisher Management Zones, we provide management objectives that are applicable statewide.

Management Objectives:

1. Conduct outreach to increase public understanding, appreciation, and support of fishers as a sustainable wildlife resource in New York State.

1.0 INTRODUCTION

1.1 Purpose and Need

Section 11-0303 of New York's Environmental Conservation Law directs the New York State Department of Environmental Conservation (NYSDEC) to develop and carry out programs that promote the maintenance of desirable species in ecological balance, with due consideration of ecological factors, the importance of fish and wildlife resources for recreational purposes, and public safety. This plan documents and describes the goals, objectives and strategies that will guide NYSDEC's actions and decisions related to management of fisher (*Pekania [Martes] pennanti*) populations in New York in accordance with this legal mandate, over the next 10 years.

A management plan for fishers was developed at this time for several reasons. First and foremost, fishers are highly valued by trappers as a furbearing species and harvest must be carefully managed to ensure sustainable populations. In the absence of such harvest pressure, the need for careful monitoring and management would be greatly reduced. Secondly, fisher populations have increased rather dramatically in some parts of the State, and observations of this species are now being reported with great frequency by trappers, hunters, trail camera users, other outdoor enthusiasts, and the public at large.

These frequent encounters with an unfamiliar species have prompted considerable public interest in the ecology and status of this species. Additionally, while fisher populations seem to be increasing in many areas, there are some indications that populations in northern New York may have declined over the last 5-10 years. Reasons for the apparent decline are uncertain, so this requires further investigation and consideration of harvest reductions to sustain those populations at desired levels. Finally, fishers are an ecologically important predator or competitor of various other wildlife species. For example, fishers compete with and prey on American marten (*Martes americana*), a closely related species that occurs only in the Adirondacks.

1.2 Physical Characteristics, Distribution, and Ecology

The fisher is a North American member of the weasel family *Mustelidae*, with a fairly extensive range across Canada and the northern portion of the United States (Fig. 1). In New York, the primary range of fishers has been in the northern part of the state and the Catskills. However, contemporary data confirm that fishers are expanding their range through the southern tier of central and western New York, where large areas appear to contain suitable forested habitat (Fig. 1). There have been no historic records of fisher on Long Island. Under the New York State Environmental Conservation Law (ECL), fishers are defined as a protected, small game species (ECL 11-0103(2)(c)).

Physical Characteristics

Fishers are medium-sized carnivores with a stature that is relatively low to the ground, with short legs, small ears and a well-furred tail that makes up about one-third of their body length. The color of their fur varies from dark brown to nearly black. Females and juveniles usually have a more uniform color, and males will have a blonde or grizzled appearance due to multi-colored guard hairs around the neck, upper back and shoulders. There are often white 'blazes' of irregular shapes and sizes found on the ventral side of animals.

There is considerable evidence of dimorphism between the sexes, with males weighing between 7 and 13 pounds, and females between 3 and 7 pounds (Powell 1981). Total lengths for males range from 35-47 inches, and females, 30-37 inches. Fisher have large, wide feet with five toes on each foot and semi-retractable claws. This makes them well adapted for walking on snow, climbing trees and grasping and killing prey. They are capable of rotating their hind feet nearly 180º, which allows for a headfirst descent from trees (Powell 1977). As with all members of the weasel family, both sexes have large anal scent glands which are used to mark territories and attract potential mates.

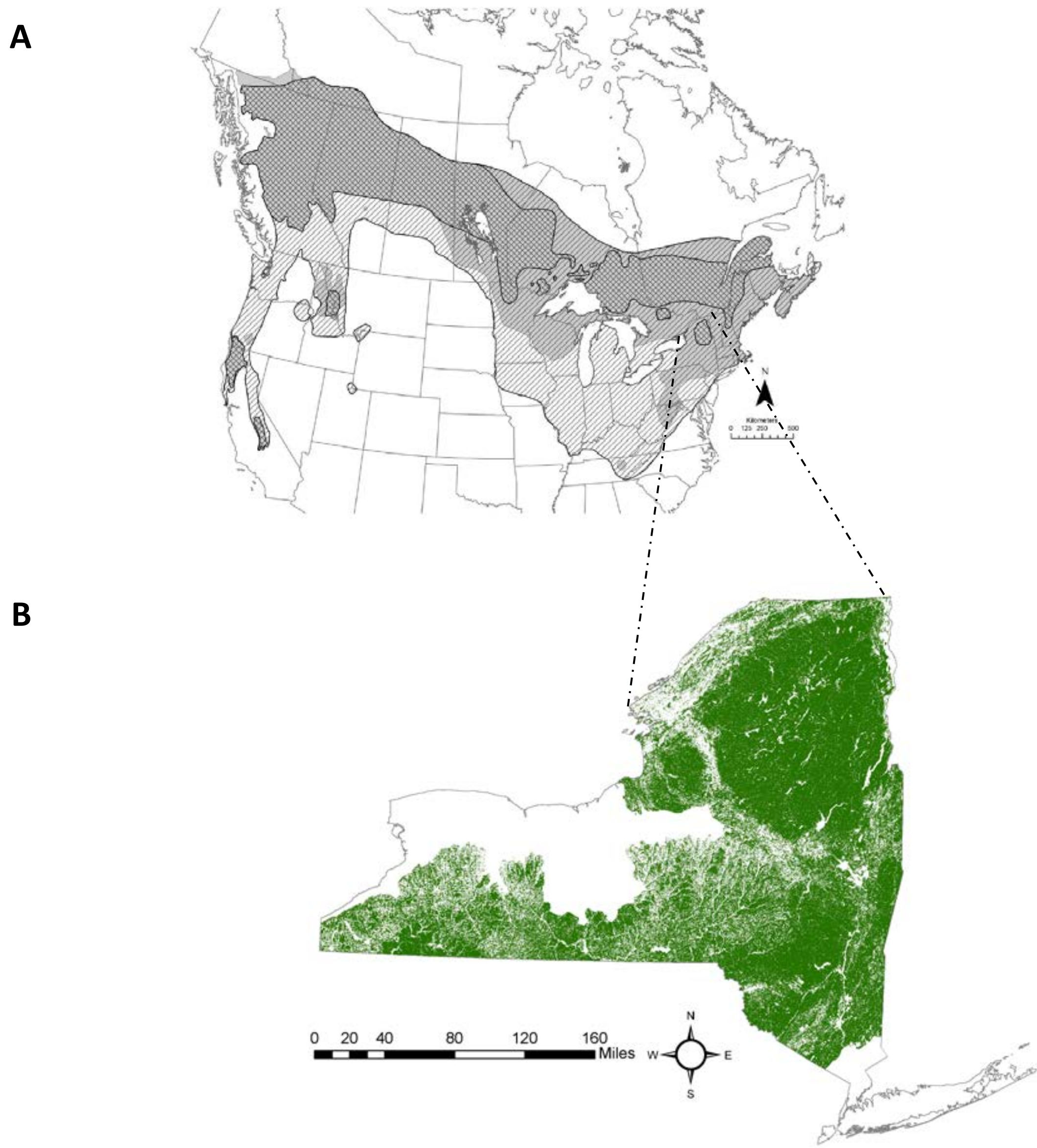

Figure 1. A.) Geographic range of fishers in North America (from Lewis et al. 2012). Light and dark diagonal lines represent the historical (pre-European settlement) and current range of fishers, respectively. The dark cross-hatch represents fisher range at its most contracted state in the early 1900s. B.) Predicted , distribution of suitable fisher habitat (green) in New York State based on a wildlife habitat response model developed by the New York Gap Analysis Project (Smith et al. 2001).

Geographic Distribution

Found exclusively in North America, fishers inhabit a band of forested and semi-forested land from coast to coast. In the east, they range from Virginia north to Quebec and the maritime provinces of Canada. Historically, fishers experienced a severe decline during the late 1800s and early 1900s due to over-exploitation and loss of forested habitat due to unregulated logging and the clearing of land for farms (Brander and Books 1973, Irvine et al. 1964). Reintroduction programs have proven to be effective in restoring populations, along with regulation of trapping opportunities and the initiation of reforestation programs (Lewis et al. 2012).

Fishers were extirpated from large portions of New York, with the exception of the Adirondacks in the northern part of the state (Wallace and Henry 1985). The Adirondacks remained the core of the species range in New York until a restoration program was undertaken by NYSDEC in the mid-1970s. Between 1976 and 1979, 43 fishers were live-trapped in the Adirondacks and Vermont and relocated to suitable habitats in the Catskill Mountains (Wallace and Henry 1985, Lewis et al. 2012). Department staff monitored this newly restored population through track surveys, observation reports by trappers and other members of the public, and reports of road kills and other mortalities of tagged animals (Wallace and Henry 1985, Brown and Parsons 1983). By the mid-1980s, the population was secure enough to sustain limited trapping opportunities and the first season in the Catskills opened in fall 1985 (Wallace and Henry 1985). As populations continued to expand, additional seasons were opened in fall of 1988 in the lower Hudson Valley in an effort to gather biological information such as age and sex composition and harvest densities. By fall of 1989 fisher seasons encompassed much of eastern New York, including all of the Northern Zone, the Taconics, Catkills, and Hudson Valley (except Rockland and Westchester counties). A trapping season in the Mohawk Valley was opened in 1990, and the season has remained consistent across northern and southeastern New York since that time.

More recently, there is evidence that fisher have continued to expand their populations across central and western New York. The source of this expansion may be animals dispersing from the Adirondacks, Tug Hill, and Catskill regions, as well as northern Pennsylvania. The NYSDEC, in partnership with the New York Cooperative Fish and Wildlife Research Unit, has initiated research to determine fisher occupancy in central and western New York, as well as to develop density estimates through noninvasive capture-recapture techniques. This study may also help determine the “front” of fisher expansion in western New York, and identify landscape features that facilitate or limit movements and range expansion.

Fisher do not currently exist on Long Island, nor are they documented in historical records to suggest they once occupied the area (Connor 1971). The now heavily developed landscape and high road densities limit the amount of suitable habitat for fishers in Long Island. In addition to the historical absence on Long Island, the available habitat is likely insufficient to support a sustainable fisher population. Using National Land Cover Data and a focal cell approach in GIS, we identified areas of New York that were unlikely to support fisher populations. Only isolated patches on Long Island met the criterion of a minimum of 40% forest cover (after Lancaster et al. 2008). Moreover, fisher are typically found in forests with moderate to long fire-return interval (Meyer 2007), unlike the historical short fire-return interval of the coniferous Long Island Pine Barren areas (Collins and Anderson 1994). The Department has no plans to introduce or establish a fisher population on Long Island.

Habitat Ecology

Fisher use a variety of structures for year-round denning purposes such as the natural cavities found in older trees, hollow logs, cavities in rocky outcrops, brush piles and underground burrows (Godin 1977). Dens used for birthing of young are usually found in hollow sections of trees, high above the ground. In Massachusetts and New Hampshire, fishers selected larger-diameter den trees and dead trees in overstory and understory cover types dominated by softwoods (Powell et al. 1997), while researchers in Maine found that den trees were predominantly in large-diameter (> 40 cm dbh) hardwoods (Paragi et al. 1996).

A review of the literature revealed home range estimates ranging from about 2 km^2 for female fishers (Koen et al. 2006) to almost 40 km^2 for male fishers (Tully 2006), with a mean home range size of 13 and 23 km^2 for female and male fishers, respectively (Table 1). Variation in home range size may be due to differences in population density, prey availability, habitat quality, landscape composition, as well as differences in sample size of locations and methods of estimating home ranges.

Table 1. Estimates of fisher home range size (in km^2) from a review of the literature.

Fisher Home Range Estimates (km^2)		Reference
Female	Male	
2.1	11.0	Koen et al. 2006 (Ontario)
5.4	9.2	Garant and Crete 1997 (Quebec)
7.6	10.0	Fuller et al. 2001 (Massachusetts)
15.0	35.0	Buck et al. 1979, Hamilton and Cook 1955, Kelly 1977, Powell 1977
15.0	20-25 (adult-subadult)	Kelly 1977 (New Hampshire)
16.0	31.0	Arthur et al. 1989 (Maine)
29.9	38.7	Tully 2006 (Ontario)
13.0	**22-23**	**Mean**

Fishers use deciduous, coniferous and mixed forests, preferring dense canopy cover and large diameter trees (Thomasma et al. 1991). Several researchers have found that fishers prefer extensive closed canopy forests (Coulter 1966, Clem 1977, Powell 1977, Allen 1983), but more recently this species has been observed expanding its range across a more heterogeneous landscape that contains both forested and open habitats (Lancaster et al. 2008, NYSDEC unpublished data). Despite this species apparent tolerance of landscape with an open-habitat component, research indicates that a minimum threshold of forested cover is still needed to sustain a population and that populations (as indicated by trapping harvest) are more stable in predominantly forested landscapes (Lancaster et al. 2008). For example, in Ontario, Canada, Lancaster et al. (2008) found that no fishers were harvested in areas with <40% forest cover.

Understanding habitat use by fishers in New York and elsewhere is a difficult process due to the complex interactions of prey type and abundance, forest structure, fragmentation, and competition with other carnivores (Proulx and Santos-Reis 2012, Hearn et al. 2010). Habitat selection is largely driven by availability of prey, uninterrupted overhead cover, and the availability of suitable den sites (Buskirk and Powell 1994, Paragi et al.

1996), but further study is needed to reveal how these factors work together with forest structure and fragmentation to influence fisher distribution in New York.

Foraging Ecology

Fishers are dietary generalists. They eat a wide variety of small to medium sized mammals and birds, and a variety of hard and soft mast such as beechnuts, apples, and berries. Common prey items include porcupines, hares, rabbits, squirrels, mice, shrews, and carrion from large mammals such as white-tailed deer. In winter, hares and carrion from white-tailed deer are important food sources. Other carnivores such as martens, bobcat, coyote, red fox and grey fox and some raptors compete with fishers for prey.

Line drawing by Michael Stickney (used with permission).

Reproduction

Fishers reach sexual maturity in their first year of life, and females may be receptive at that time, however, most females do not breed until age 2. Implantation of the fertilized egg in the blastocyst stage is delayed until the following season, with females giving birth at age 3. Reproduction peaks in early March, and breeding may occur as late as May. Average litter size is 2-3 young, and kits are born partially furred with closed eyes and ears, essentially helpless at birth (Coulter 1966). Weaning occurs within 8-10 weeks, and dispersal of young may occur by their fifth month, as interfamilial aggression begins by the onset of autumn. Fishers are solitary except for brief periods during the breeding season (Coulter 1966, Powell 1977). They have been found to be active at any time during the day or night. Males generally have larger home ranges than females, and their territories seldom overlap that of other males, suggesting territoriality between the sexes (Coulter 1966, Powell 1977).

Survival and Mortality
Fishers have few natural enemies; coyotes and bobcats may be the most important predators (Wengert et al. 2014). Where fishers are harvested, trapping (Krohn et al. 1994) likely accounts for the majority of fisher deaths.

Diseases and parasites known to occur in fisher are few. Rabies is often of concern to the public because of its potential transmission to humans and domestic animals and always fatal consequences. However, the occurrence of rabies in fisher in New York is rare with only three animals testing positive from 2002 to 2011 (New York State Department of Health, unpublished data). A review of necropsy records of NYSDEC's Wildlife Health Unit from 1973 to present revealed two incidences of distemper and in one noteworthy recent submission, a probable diagnosis of anticoagulant rodenticide poisoning; an issue emerging as a significant concern for fisher populations in California (Gabriel et al. 2012). A few species of parasites (tapeworm, intestinal roundworm, and flatworm) have been identified and their effects on health appear to be minimal (NYSDEC, Wildlife Pathology Unit, unpublished data).

1.3 Harvest Management

The Department is responsible for managing fisher populations and accomplishes this through laws and regulations that define Wildlife Management Units (WMU) that are open to fisher trapping, season timing, season length, and methods of take. Fishers have been harvested by trappers operating under an annual season framework since 1949. The NYSDEC has required that pelts be recorded through a pelt tagging system since then. Contemporary fisher trapping seasons have included season dates of October 25-December 10 with no bag limit. Most fishers are pelted and enter the fur trade via both domestic and international outlets. Fisher pelts provide income to many trappers in New York. During the period 2005-2015, average fisher pelt prices have ranged from approximately $30-$158 USD; current prices (2013-2015) have ranged from $55-$158 USD (Fur Harvesters Auction Inc.; <http://www.furharvesters.com/auctionresults.html>, accessed September 30, 2015).

While trappers are the most obvious users of the fisher resource, wildlife enthusiasts, nature photographers, and others also appreciate the existence of a healthy fisher population in New York. As is the case with some trappers, many wildlife photographers also view the elusive fisher as a highly desirable species and a rewarding challenge to capture on film. Others simply value knowing that fisher exist in the wild in New York, and that they are an indicator of healthy ecosystems. As evidenced by the number of observation reports fielded by Department staff, the public is interested in fisher and can play a role in their management by facilitating the collection of data on this species.

1.4 Human-Fisher Interactions

The majority of human-fisher interactions involve observations of animals during outdoor activities such as hunting and hiking and are regarded by most as a positive experience. However, each year the Department receives approximately 8-12 complaints involving negative interactions with fishers. Most of these complaints involve fishers killing domestic fowl. In these situations, the Department may issue a damage permit allowing the landowner to trap the fisher and protect their animals.

Additionally, each year the Department receives a limited number of complaints involving fishers preying on house cats. Many of these complaints are difficult to investigate, because they often involve a missing pet and the assumption that a fisher was the predator responsible for its death. While fishers are opportunistic predators that will occasionally prey on house cats (Powell et al. 1997), research conducted near Albany revealed that their diet was largely comprised of natural foods, despite the proximity of the study area to suburban development and human-provided food sources (R. Kays, North Carolina State Museum of Natural Sciences, unpublished data). It is also important for pet owners to recognize that many other predators will also opportunistically prey on house cats, including domestic dogs, fox, bobcats, coyotes, and raptors.

Lastly, negative human-fisher interactions can be indirect; for example as competitors with hunters and trappers for small game species. These species include snowshoe hare, cottontail rabbit, gray squirrel, raccoon, ruffed grouse, and wild turkey. In general, mammals, fruits, and nuts are dominant food items for fishers (Brown and Will 1979, Martin 1994, Powell et al. 1997); in the northeast, small mammals (voles, mice, red squirrels), snowshoe hare, and deer carrion (carcasses) are of particular importance. There is little support in the scientific literature that fishers are a major predator of game birds such as turkeys. For example, Powell et al. (1997) reported that wild turkey remains were found infrequently in their study in Massachusetts and New Hampshire. Presently, negative human-fisher interactions are infrequent; however, the Department will continue to address these complaints on a case-by-case basis, including the issuance of damage permits when appropriate.

1.5 Climate Change and Fisher Populations

In a recent review, Lawler et al. (2012) highlighted key habitat and community-level changes that may result from climate change and alter fisher and marten distributions in North America and elsewhere. Some of these changes included alteration of forest composition and forest structure, prey abundance, fire frequency, drought, water stress, insect and disease occurrence, snowpack, and competitive interactions with other carnivores. However, the magnitude of these changes, their interactions, and the direction of the impact on populations (i.e., positive/negative) are difficult to predict. Indeed, one conclusion of Lawler et al. (2012) review was that *"Climate change is also likely to result in a number of other complex and largely unpredictable effects on Martes species."*

Specific to the northeastern U.S., fisher populations may be most impacted by decreases in snowfall and competitive interactions with other carnivores. In particular, potential changes in snowfall resulting from climate change may influence competitive interactions between fishers and martens (Krohn et al. 1995, Krohn et al. 2004, Carroll 2007) and likely coyotes. Although martens and fishers are sympatric across much of their geographic range in North America (including the Adirondacks), Krohn et al. (1995) formally introduced the hypothesis that fisher populations limit marten populations and that snowfall influences these competitive interactions by limiting fisher populations. This hypothesis incorporates the understanding that fishers prey on martens (Hodgman et al. 1997) and fisher movements (and likely foraging opportunities) are restricted by deep snow (Raine 1983). Furthermore, the hypothesis assumes that energetic restrictions imposed by deep snow negatively influences fisher fitness (via survival and reproduction) and, therefore, fisher population abundance on the landscape (Krohn et al. 1995, 1997). Because martens have lower foot-loading than fishers (Krohn et al. 2004) and are better adapted than fishers for exploiting small mammal prey under snow cover (Buskirk and Powell 1994), they gain a competitive advantage in deep snow environments. In addition to fishers, other mammalian carnivores that prey on martens include coyotes (Paragi et al. 1996) and red fox (*Vulpes vulpes*; Thompson 1994); these species also experience higher foot-loading in snow than martens (Krohn et al. 2004). Thus, the mediating effects of snow on intraguild interactions may be a key determinant shaping these ecological communities.

In closing, climate change may continue to result in warmer winters and decreased snowfall; however, unknown impacts including changes in lake-effect snow from Lake Ontario, prey abundance, and prey availability may result in unexpected effects. For example, while decreased snowfall may benefit fishers and other generalist carnivores like coyotes, the availability of deer carrion (an important winter food of both species) via winter mortality may decrease and have negative impacts on these species. Recognizing uncertainty in our ability to predict community-level changes resulting from climate change, we will continue to manage fisher populations adaptively and adjust harvest regulations as necessary.

Interactions among these carnivores, snowfall, and prey populations are undoubtedly complex and warrant additional research to better predict climate change impacts. Therefore, we propose research focused on fisher winter ecology and competitive interactions with martens and coyotes in Northern New York. This work would build on current research investigating biotic and abiotic drivers of marten and fisher distributions in New York using species distribution models (P. Jensen, NYSDEC, unpubl. data). Similar research investigating fisher-bobcat interactions may be warranted for areas of Central/Western New York and Southeastern New York.

2.0 STATUS OF FISHERS IN NEW YORK

For purposes of this plan, we divided the state into four fisher management zones (Fig. 2) using Wildlife Management Unit (WMU) aggregates, as described below.

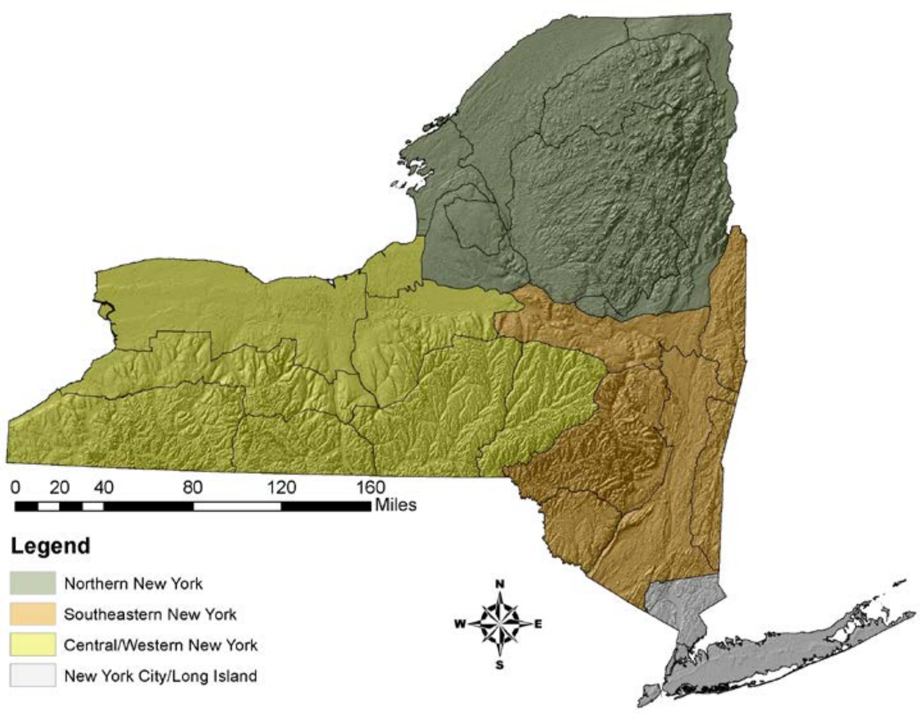

Figure 2. Fisher management zones in New York State as defined in this plan. Lines within management zones represent Wildlife Management Unit Aggregate boundaries.

Northern New York includes all areas where contemporary fisher trapping seasons have been in place since 1949. This includes the entire Northern Zone (NZ; WMU Aggregates: Champlain Valley and Transition, Central Adirondacks, Northern Adirondacks, St. Lawrence Valley, East Ontario Plain, Tug Hill Transition, and Tug Hill).

Southeastern New York includes an area roughly defined by the Hudson and Mohawk river valleys and Catskill Mountains within the Southern Zone (SZ) and contains the following WMU Aggregates: Mohawk Valley, North Taconic Highlands, South Taconic Highlands, Catskills, Hudson Valley, and Neversink-Mongaup Hills. Contemporary fisher trapping seasons in this area have been in place since the mid- to late 1980s.

Central/Western New York encompasses the region south of Lake Ontario, including the Finger Lakes and southern tier and contains the following WMU Aggregates: Great Lakes Plain, Oswego Lowlands, Oneida Lake Plains, North Appalachian Hills, West Appalachian Plateau, Central Appalachian Plateau, East Appalachian Plateau, and Otsego-Delaware Hills.

New York City/Long Island includes that area of the state where fisher populations have been absent historically. Note: fishers occur occasionally in the New York City Transition WMU Aggregate, however, we are not proposing any management changes in this aggregate.

In the sections below, we describe fisher management zones in more detail and summarize available harvest and non-harvest data.

2.1 Northern and Southeastern New York

We include Northern and Southeastern New York together in this section because of the availability of fisher harvest data from these management zones. With the exception of season closures in 1977, 1983, and 1984, the NZ of northern New York has been continuously open to regulated fisher trapping since 1949. In 1985 an experimental trapping season for fishers was opened in the Catskills (former WMU 11) and has remained open since then. Other areas of the SZ were opened to fisher trapping in 1988 (Hudson River Valley) and 1990 (Mohawk Valley)

Most of the fisher harvest data in New York have been collected through the NYSDEC Pelt Sealing Program which requires trappers to register their harvest (indicated by a numbered plastic seal that is attached to the pelt) prior to selling or exporting pelts. As part of the pelt sealing process, trappers first submit furbearer possession tags (FPTs) that include trapper information and harvest data (i.e., date and location of the harvest, sex of the trapped animal; Appendix B). Using these data, we summarized fisher harvests during the past decade; additional harvest and non-harvest data are presented in Appendix C. In all cases we present contemporary data that were currently available at the time of analysis, however the time series varies between 2002-2011 and 2002-2014. In addition to data collected from FPTs, we have collected data on fisher take per-unit-effort (TPUE) from trappers that obtained a marten trapping permit (2005-2012) for WMUs in the Adirondacks, trapper mail surveys, and during 2006-2008 as part of a cooperative NYSDEC-Cornell University furbearer harvest research project (N. Roberts, unpublished data; Appendix C).

Harvest Trends
During the past 6 decades, fisher harvests in New York have increased substantially, concurrent with general harvest increases throughout the northeastern U.S. and adjacent areas in southern Canada (P. Jensen, unpubl. data; Fig. 3). It is likely that these increases reflect recovery of fisher populations from a period of intensive

harvesting in the early 1900s and an increase in fisher habitat suitability as agricultural lands have transitioned back to forests over this same time period (Lancaster et al. 2008). These authors also noted similar sharp increases in fisher harvests beginning in the early to mid-1990s and suggested that land cover had reverted to a minimum threshold of 40% forest cover during this time.

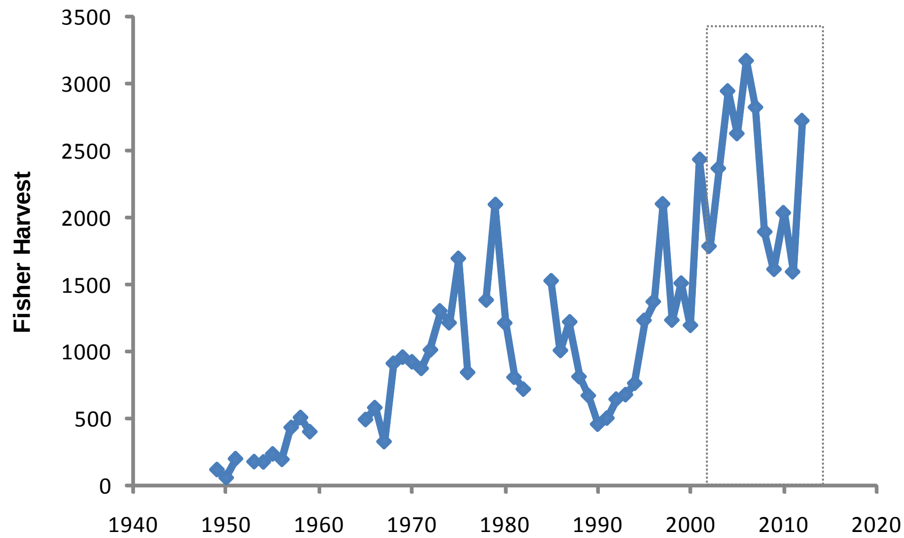

Figure 3. Fisher harvests in New York, 1949-2012. In this plan, we summarize contemporary harvest data (box).

More recent trends suggest that fisher harvests in Northern New York may have peaked in 2006 or 2007 and declined thereafter (with the exception of 2012; Fig. 4). Fisher harvests were similar in the Adirondacks (WMUs 5C, 5F, 5G, 5H, 5J, 6F, 6J) and areas outside the Adirondacks in the NZ (Fig. 4b). Fisher harvests in Southeastern New York increased from 2002-2006 and have been relatively stable for the remainder of the time series (Fig 4a.). On a statewide basis, there has been a consistent decline in the proportion of the fisher harvest taken in Northern New York and increase in Southeastern New York. For example, in 2002, 91% and 9% of the total fisher harvest was taken in Northern and Southeastern New York, respectively. In 2012, 69% and 31% of the total fisher harvest was taken in these management zones, respectively. Mean annual fisher harvests in Southeastern New York after 2006 were stable (518 fishers), therefore, the increase in the proportion of fishers trapped in this zone reflects a declining fisher harvest in Northern New York.

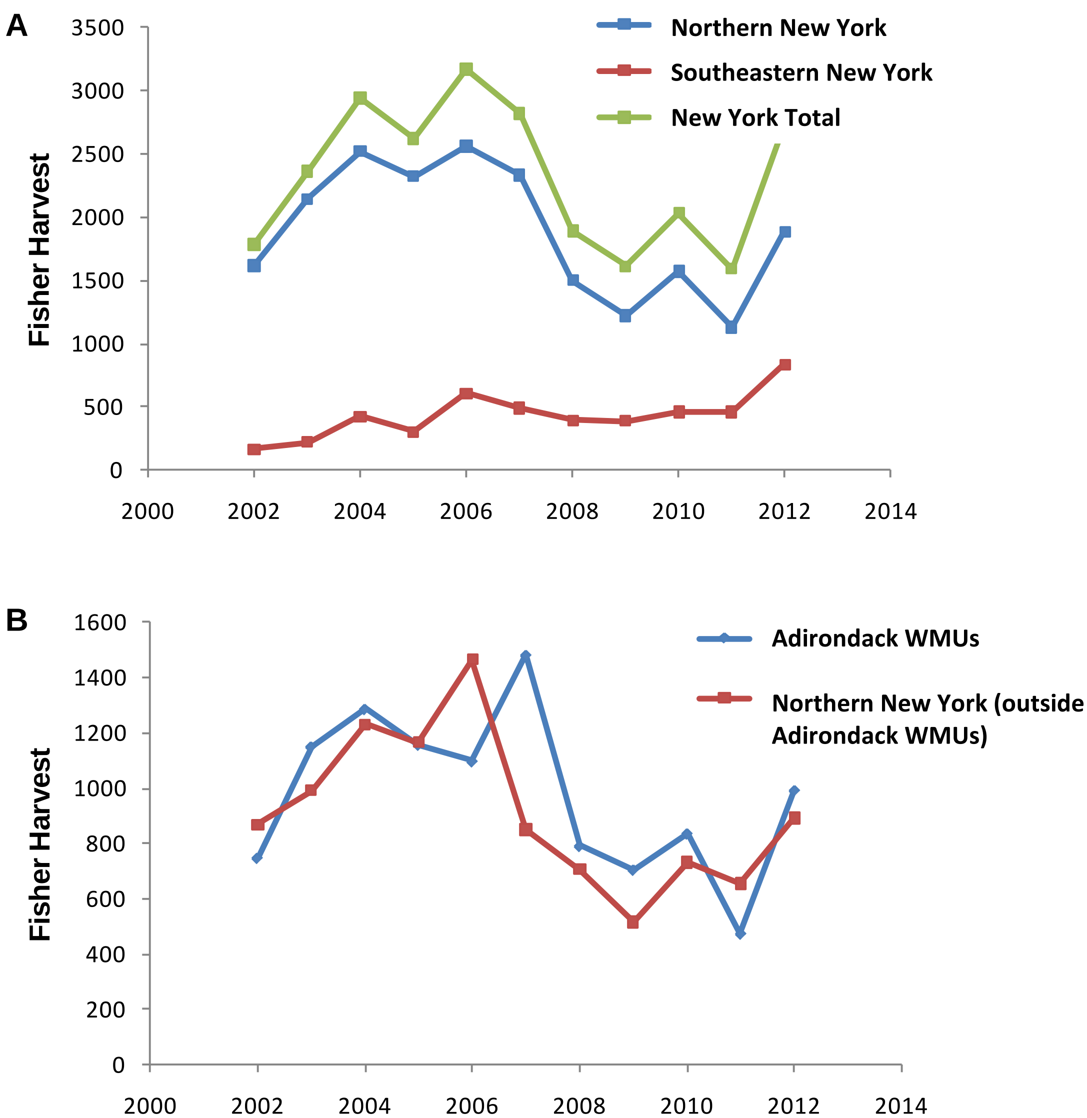

Figure 4. Fisher harvests in Northern New York and Southeastern New York (A) and within Adirondack WMUs (5C, 5F, 5G, 5H, 5J, 6F, 6J) and outside of Adirondack WMUs in Northern New York (B), 2002-2012.

Harvest Success Rate

A total of 2,323 individual trappers were successful at harvesting ≥1 fisher during the period 2002-2011 (662 and 1,661 trappers in Southeastern and Northern New York, respectively). These trappers harvested a total of 18,599 fishers in Northern New York and 3,905 fishers in Southeastern New York over this 10-year period. In Northern New York, harvest success rates remained high during 2002-2005 (5.71-6.06 fishers/successful trapper) and declined thereafter to a low of 3.28 fishers/successful trapper in 2011. In Southeastern New York, harvest success rate remained relatively stable (2.32-3.61 fishers/successful trapper) and fluctuated slightly from a mean of 2.96 fishers /successful trapper (Fig. 5).

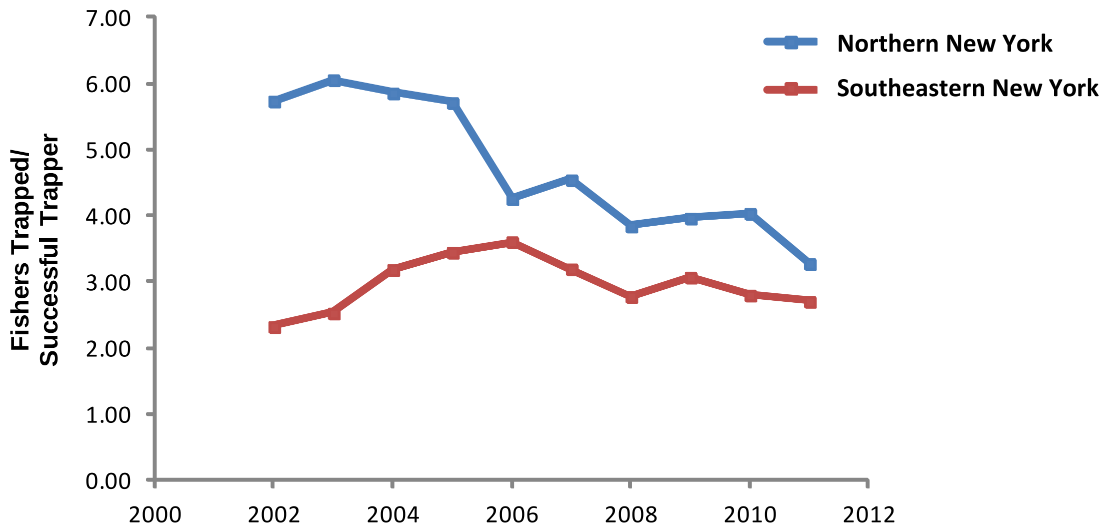

Figure 5. Harvest success rate (fishers trapped/successful trapper) in Northern New York and Southeastern New York, 2002-2011.

Harvest Density

We used data from FPTs to estimate mean annual fisher harvest density (number of fishers trapped/100 km^2) at the town scale and mapped these data within a GIS (ArcGIS 10.0, ESRI, Redlands, CA) for 2002-2006 and 2007-2011. Therefore, these data represent a spatial depiction of the harvest data presented above (Fig. 4). We acknowledge that harvest density at this scale can be influenced by multiple factors; for example, the number of trappers that are actively trapping within a township on an annual basis, trapper effort, and the amount of road access (Hodgman et al. 1994). However, we assumed that relative differences in harvest densities between these time periods and within towns generally reflect differences in fisher population abundance.

In several towns in Northern New York, harvest density declined between the two time periods, most notably in the St. Lawrence Valley, Tug Hill/Black River Valley, eastern Adirondacks, and northern Adirondacks where fishers were trapped at densities ≥ 8 fishers/100 km^2 during 2002-2006 (Fig. 6). In Southeastern New York we documented an increase in the number of towns with reported fisher harvests between the two time periods, with the exception of the southeastern corner of this management zone (portions of Dutchess, Putnam, and Orange counties within the Hudson Valley and South Taconic Highlands WMU Aggregates; Fig. 6), where few or no fishers were harvested during 2002-2011.

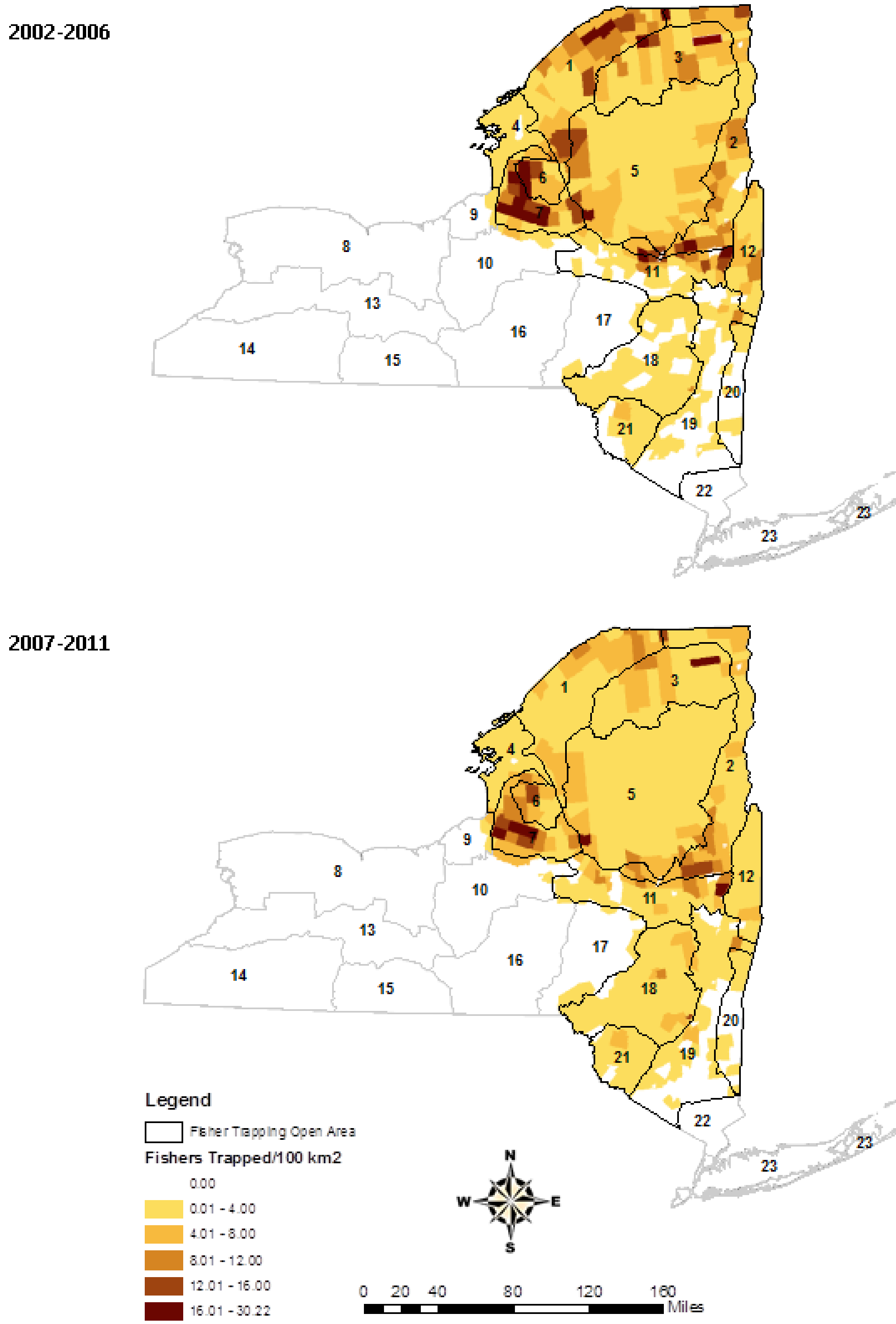

Figure 6. Mean fisher harvest density (fishers trapped/100 km^2 [38.6 mi^2] during 2002-2006 (top panel) and 2007-2011 (bottom panel), New York State. Wildlife Management Unit (WMU) Aggregates with black boundaries represent units that are open to fisher trapping (see Appendix A for WMU Aggregate names).

Harvest Rates

Fisher population models constructed for Ontario and Minnesota indicated that harvest rates of 20-25% and 15-20% (of the pre-trap fisher population), respectively, were sustainable and resulted in population stability (Douglas and Strickland 1987). Coulter (1966) estimated slightly higher sustainable harvest rates at 25-30% of the pre-trap population. Determining fisher harvest rates requires an estimate of the fisher population prior to the trapping season. These data are unavailable for New York. However, an alternate method of estimating harvest rates from sex ratio data was developed by Douglas and Strickland (1987) and is based on differential trapping vulnerability of males and females. Krohn et al. (1994) estimated trapping mortality rates among fisher sex and age classes in south-central Maine; juveniles (no difference between sexes) had the highest mortality rates (mean = 0.62) and adult females had the lowest mortality rates (mean = 0.21 compared with mean = 0.43 for adult males). These authors speculated that adult females were less vulnerable to trapping than adult males due to smaller home ranges (possibly as a function of body size and food requirements), higher fidelity to home ranges, and smaller movement distances. Thus, sex ratios that favor males or approach 1:1 female:male (F:M) reflect a sustainable harvest, whereas F:M ratios that favor females reflect an increase in harvest intensity. Sex ratios are used in a similar manner to monitor marten harvests (Strickland 1994; Fortin and Cantin 2004). We used this method to estimate harvest rates for Northern and Southeastern New York.

During the period 2002-2011 we collected sex data on 22,686 harvested fishers (18,920 and 3,766 fishers from Northern and Southeastern New York, respectively). Female:male sex ratios were highest for the Central Adirondacks WMU Aggregate (mean = 1.16; range = 0.87-1.45) and lowest for Southeastern New York (mean = 0.91; range = 0.67-1.06). Sex ratios for Northern New York (outside of Adirondack WMUs) were similar to the Central Adirondacks (mean = 1.15; range = 0.91-1.29; Fig. 7). Using the regression model developed by Douglas and Strickland (1987), estimated annual harvest rates during this period ranged from 8.6-38.3% (Central Adirondacks), 13.2-30.3% (all Adirondack WMUs), 10.6-30.0% (Northern New York outside of the Adirondacks), and 4.9-18.4% (Southeastern New York; Fig. 7). Furthermore, estimated harvest rates in Northern New York were ≥20% for 8 out of 10 years and >25% for 4 out of 10 years of the time series. Estimated harvest rates for all Adirondack WMUs were ≥20% for 6 out of 10 years and >25% for 4 out of 10 years of the time series. Estimated harvest rates in Southeastern New York were low (5-18%) and consistent with harvest densities ≤ 4.0 fishers/100 km^2 (Strickland 1994; Fig. 6).

Take per-unit-effort

Harvest totals provided through our pelt sealing program are useful for understanding general trends (Fig. 3, Fig. 4), however, annual variation in trapper effort resulting from changes in pelt prices, gasoline prices, and weather (Strickland 1994) severely compromises our ability to infer harvest and population trends using harvest totals alone. In 2005 NYSDEC, with cooperation from the New York State Trappers Association Joint Trapping Initiative Committee, designed a daily trapping log book to collect TPUE data for several furbearers. That same year, we implemented the use of this log book as part of the marten trapping permit system for the Central Adirondack WMU Aggregate (WMUs 5F, 5H, and 6J; Fig. 8), which required trappers to record take and effort data for both martens and fishers. In 2010, the marten trapping area was expanded to include WMUs 5C, 5G, 5J, and 6F, which enabled the Department to collect fisher TPUE data in these units (Fig. 9, Appendix C [Fig. C1]). Additionally, during 2006-2009 we used these log books as part of a cooperative NYSDEC-Cornell University furbearer research project (N. Roberts, unpublished data) that was focused at a statewide level (Appendix C [Fig. C2]).

The collection of trapper effort data through log books allows harvests to be normalized by effort (i.e., the product of the number of traps set and number of days the traps are set; trap-nights [TN]) and the calculation of

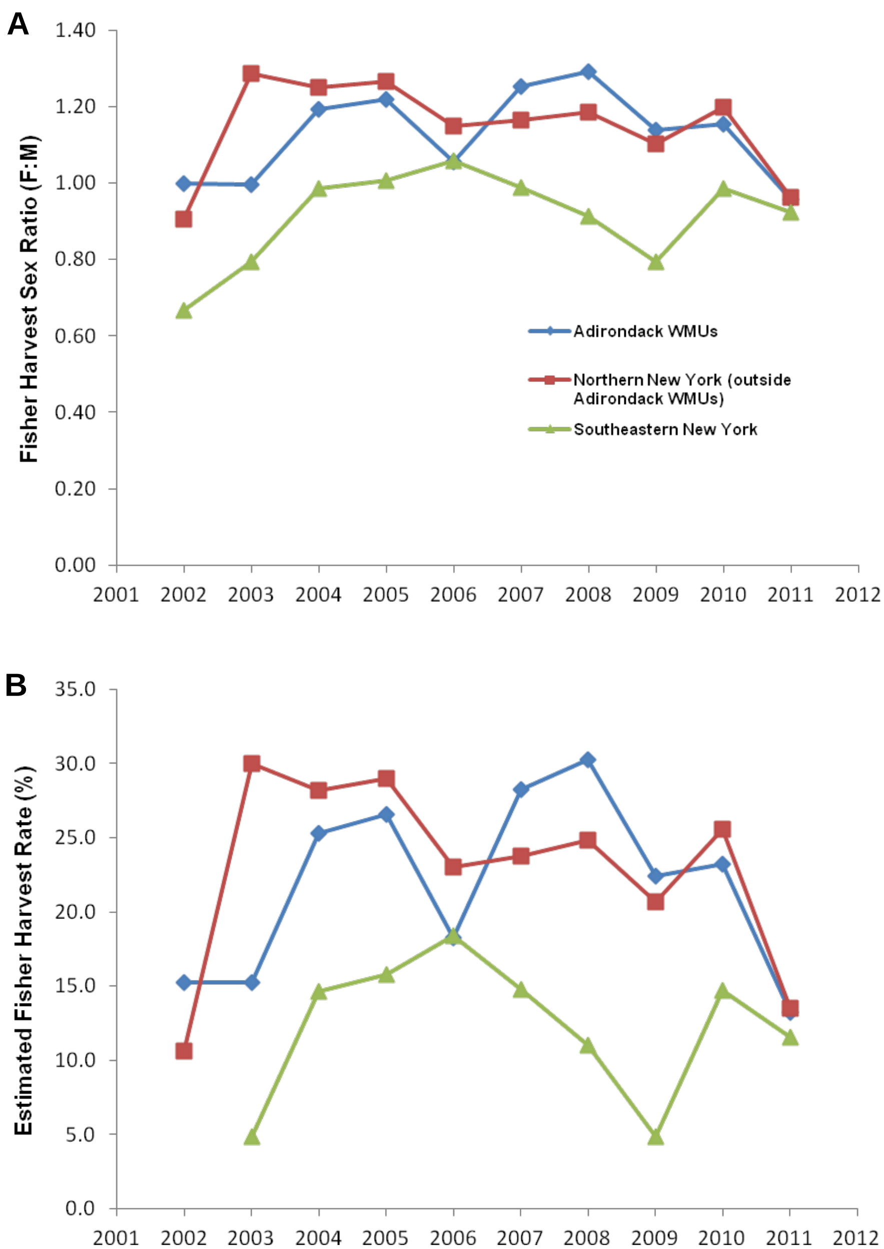

Figure 7. Fisher harvest sex ratio (F:M) data (A) and predicted harvest rates (%; B) based on these data and using the regression model of Douglas and Strickland (1987) for Adirondack Wildlife Management Units (WMU), Northern New York (outside Adirondack WMUs), and Southeastern New York, 2002-2011.

take per-unit-effort (TPUE), which is a more useful metric for assessing harvest and population trends over time. The use of TPUE as an index of abundance is based on the relationship between take (or harvest) and trapping effort and animal abundance. Take per-unit-effort is proportional to abundance under the assumption that trapping vulnerability among years is constant (i.e., the catchability coefficient in fisheries management; Maunder et al. 2006). However, strong resource pulses in the form of mast crops (e.g., beechnuts, mountain ash berries, apples) and subsequent changes in small mammal abundance (e.g., red squirrels, chipmunks) observed in the Adirondacks have a strong effect on trapping vulnerability of martens and fishers (Jensen et al. 2012). These authors noted that trapping harvests for both species declined when these food sources were abundant and increased dramatically when food was scarce; food abundance accounted for 62% of the annual variation in fisher harvest rates. An understanding of these relationships has allowed us to interpret some of the observed annual variation in TPUE. We expect similar relationships between food abundance and trapping vulnerability in areas outside of the Adirondacks, however, these relationships have not been investigated. An important difference in the Adirondacks is the widespread occurrence of American beech and fairly predictable cycles of beechnut production that result in resource pulses that are unlikely to occur at a similar spatial scale or frequency outside of the Adirondacks (Jensen et al. 2012).

Fisher TPUE declined in all WMUs of the Central Adirondacks WMU Aggregate (Fig. 8). Some of the among-year variation was likely due to differences in food abundance; for example, in 2006 and 2011 mast crops were large, whereas in 2007, 2009, 2010, and 2012, there were mast crop failures (Jensen et al. 2012, S. McNulty, unpubl. data). Fisher TPUE in the Northern Adirondacks WMU Aggregate (WMU 5C and 6F) indicate high TPUE in 2007 and 2008, followed by low TPUE during 2010-2013 (Fig. 9). An important difference between TPUE data collected from 2006-2008 and 2010-2013 (Fig. 9) is that trappers were required to submit log books from the latter period, whereas, the submission of log books was voluntary during the former period; however, we are unsure how this difference would influence TPUE estimates.

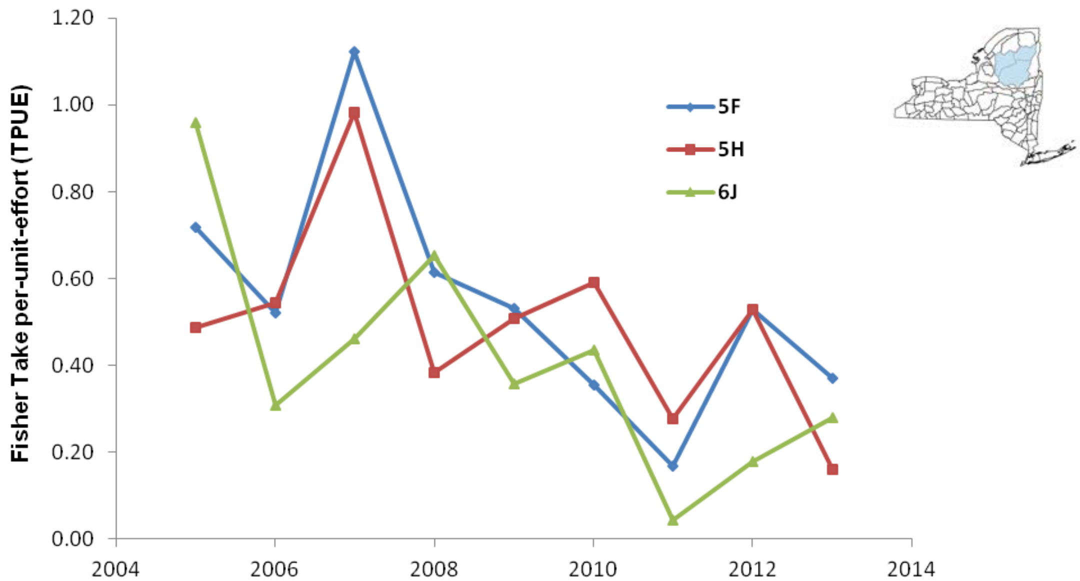

Figure 8. Fisher take per-unit-effort (TPUE; fishers trapped/100 trap-nights [TN]) in the Central Adirondacks WMU Aggregate (WMU 5F, 5H, and 6J), New York, 2005-2013. Inset shows location of this WMU Aggregate.

Figure 9. Fisher take per-unit-effort (TPUE; fishers trapped/100 trap-nights [TN]) in the Northern Adirondacks Wildlife Management Unit (WMU) Aggregate (WMU 5C and 6F), 2006-2013, New York (2009, data not collected; 2006-2008, N. Roberts, unpubl. data; 2010-2013; NYSDEC). Inset shows location of this WMU Aggregate.

2.2 Central/Western New York

**Note: this section focuses on non-harvest data collected from the Central/Western management zone, however, in some cases statewide data are presented.*

Fisher Observations and Incidental Trapping Harvest

Observations by hunters, trappers, hikers, farmers, and other outdoor enthusiasts clearly indicate that fisher range is increasing and expanding throughout New York State, beyond their historic core range in the Catskill and Adirondack mountains.

In addition, emigration of fishers from a reintroduced population in Pennsylvania (Lovallo 2008, Lewis et al. 2012) has likely fostered growth of the fisher population in the southern tier of New York (Matt Lovallo, Pennsylvania Game Commission, personal communication), despite a conservative trapping season there. Fisher can now be found throughout central and western New York. Expanding fisher populations in central/western New York reflect general trends in other portions of their southern range in Pennsylvania, Connecticut, Massachusetts, and Rhode Island (Northeastern Furbearer Resources Technical Committee, personal communication).

The NYSDEC has systematically documented observations of fisher from a variety of sources, including reports from the general public, the Bowhunter Sighting Log program, annual Trapper Mail Survey, and observations made by NYSDEC staff. Since 2005 we have recorded 631 confirmed fisher observations (road kills, incidental captures, photographs) from central/western New York (Fig. 10). These data were not collected under a defined sampling scheme and as such, relative differences in fisher abundance among WMUs cannot be inferred from differences in observation rates. However, these data indicate that fishers occur across a large area of central/western New York with observation rates similar to other regions of the state where fishers have been harvested for many years.

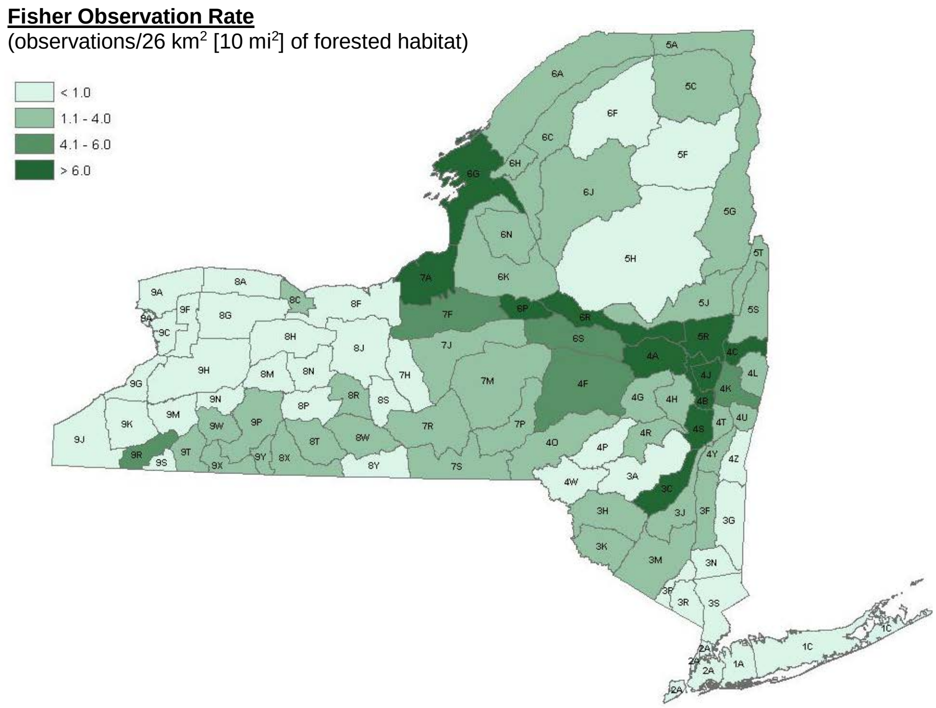

Figure 10. Confirmed observations of fishers (observations/26 km^2 [10 mi^2] of forested habitat) by trappers, bowhunters, and DEC staff, 2005-2013, New York State

Bowhunter Sighting Log and Trapper Mail Survey

Since 2006, bow hunters participating in the Bowhunter Sighting Log have documented observations of fishers and other furbearers while hunting. These hunters have reported over 1,500 observations of fishers over the last 7 years; 505 of those observations were from central/western New York. Annual observations from this region have increased during this time period (Fig. 11).

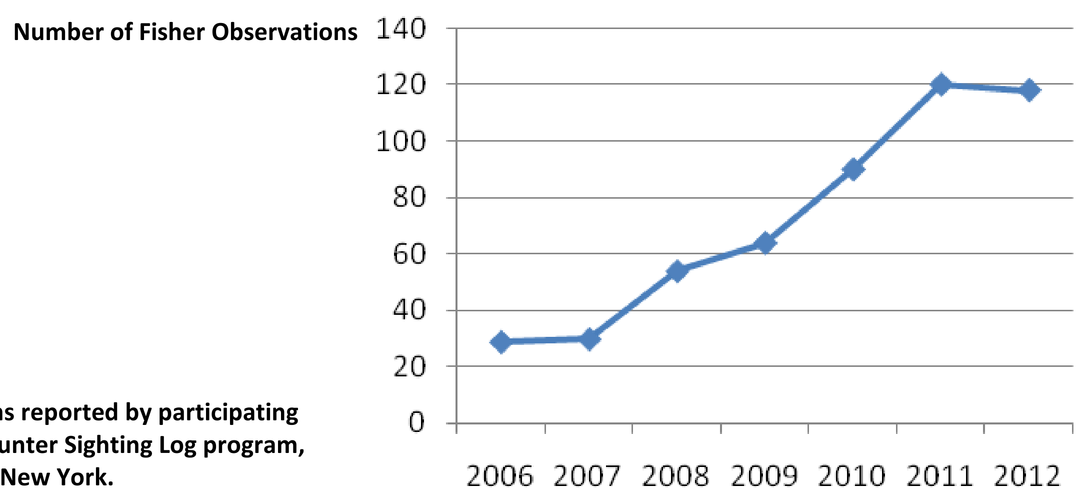

Figure 11. Fisher observations reported by participating hunters in the NYSDEC Bowhunter Sighting Log program, 2006-2012, Central/Western New York.

Additionally, NYSDEC has been soliciting reports of fisher observations on the annual trapper mail survey since 2005, and incidentally-trapped and released fishers since 2008. To date, we have received 12,088 and 432 observation and incidentally-trapped reports statewide, respectively; in central/western New York trappers reported 3,273 fisher observations and 297 fishers that were incidentally-trapped (Fig. 12). Trends in these data are similar to trends in observations collected through the Bowhunter Sighting Log program (Fig. 11).

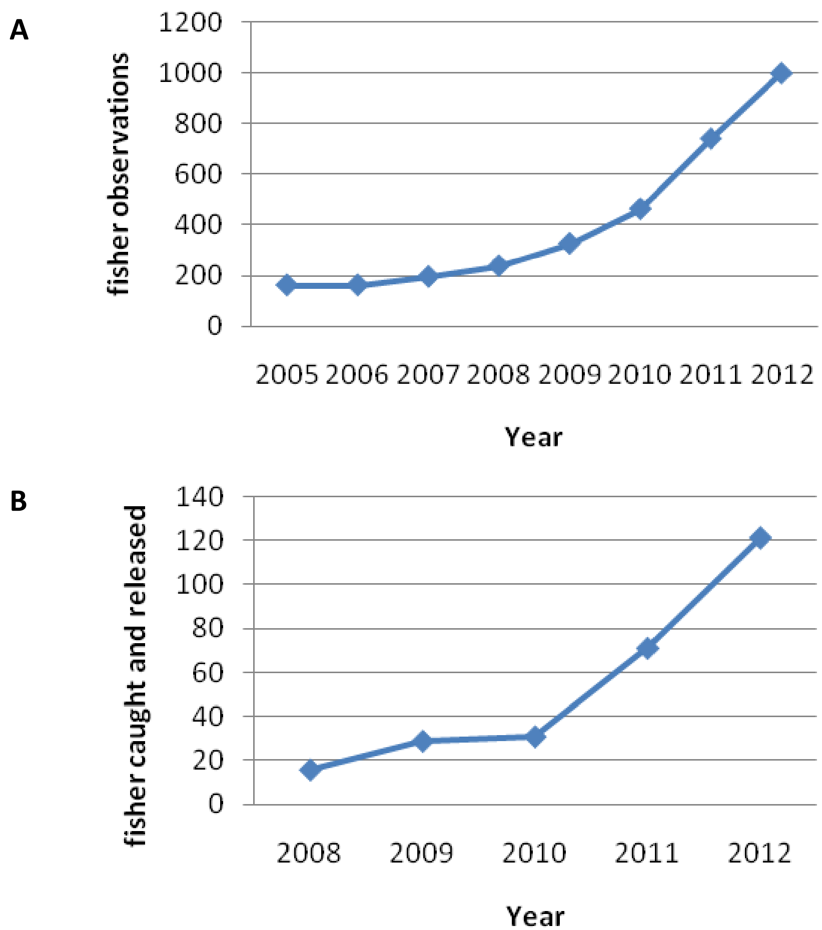

Figure 12. Fisher observations (A; 2005-2012) and incidentally-trapped and released fishers (B; 2008-2012) reported by trappers through the Annual Trapper Mail Survey, Central/Western New York.

Fisher Detection Surveys

During the winters of 2013-2015, NYSDEC staff in partnership with the New York Cooperative Fish and Wildlife Research Unit at Cornell University, conducted noninvasive detection surveys for fishers across a large area of Central/Western New York (Fig. 13) using camera traps and hair snares.

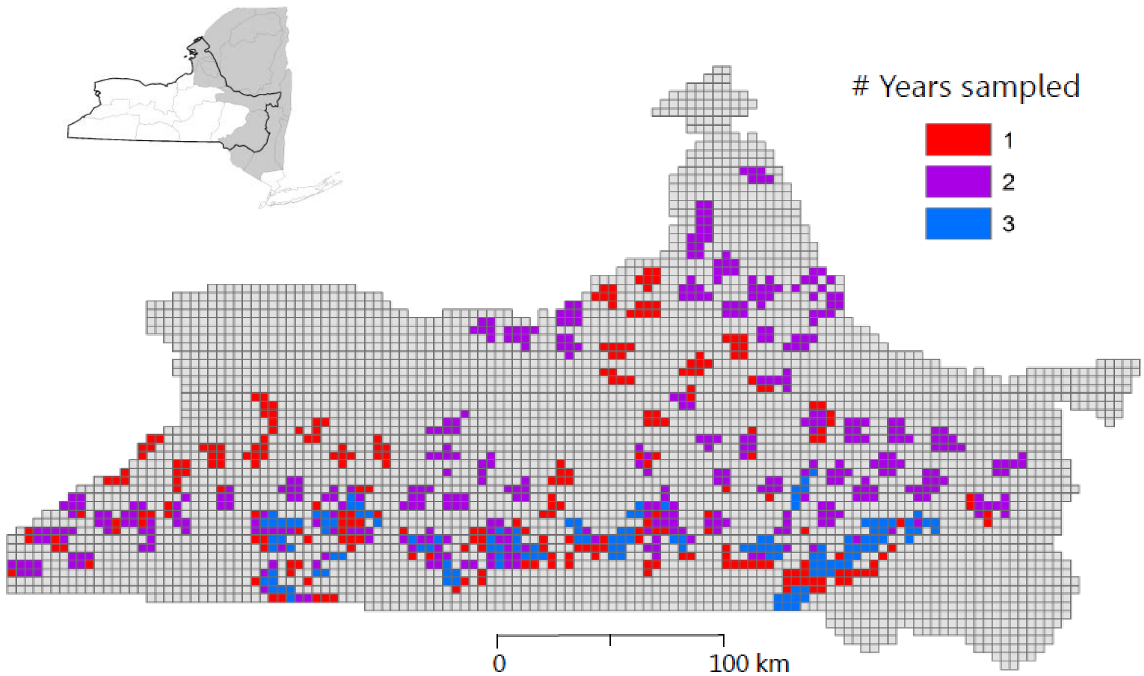

Figure 13. Study area, sampling locations, and the number of years each unit was sampled for fisher detection surveys in Central/Western New York, winters 2013-2015. Gray grid cells were not sampled.

Sites (*n* = 300, 2013; *n* = 608, 2014*; n* = 608, 2015) were surveyed from January – April. Each site consisted of a trail camera and gun brushes mounted on a tree and was in operation for a 4-week (2013) or 3-week (2014, 2015) survey period. After the survey period, camera traps were moved to new sites. It is important to note that not every WMU in Central/Western New York was surveyed for occupancy, as we assumed that fisher population abundance within WMUs along the southern tier border with Pennsylvania was greater than WMUs to the north where we conducted camera surveys. We believe that this assumption is justified because there is a higher proportion of forested land in this area and the number of fisher observations, incidental captures, and road-killed specimens is greater in these WMUs than those that are further north.

During the winters of 2013-2015, fishers were detected at 194, 312, and 236 camera traps, respectively (Fig. 14, Fig. 15); naïve estimates of occupancy (not accounting for imperfect detection) for 2013-2015 were 0.65, 0.51, and 0.39, respectively. Incorporating detection probability, estimates of mean occupancy (standard errors in parentheses) across sites did not differ among years and were 0.67 (0.05), 0.61 (0.03), and 0.67 (0.04) for 2013-2015, respectively. Using these data, we constructed habitat models that related the probability of site occupancy to landscape variables. These habitat models indicated that the probability of fisher occupancy was positively related to the proportion of coniferous/mixed forests and negatively related to road density; occupancy was also negatively related to stream density and the proportion of agriculture on the landscape, however, the relative importance of these variables was less than the others that were included in the top model. We used the habitat models to predict fisher occupancy across Central/Western New York as well as portions of Northern and Southeastern New York; we calculated mean occupancy for WMU Aggregates within these areas (Fig. 16). Thus, this approach allowed us to compare occupancy in areas with and without an open trapping season.

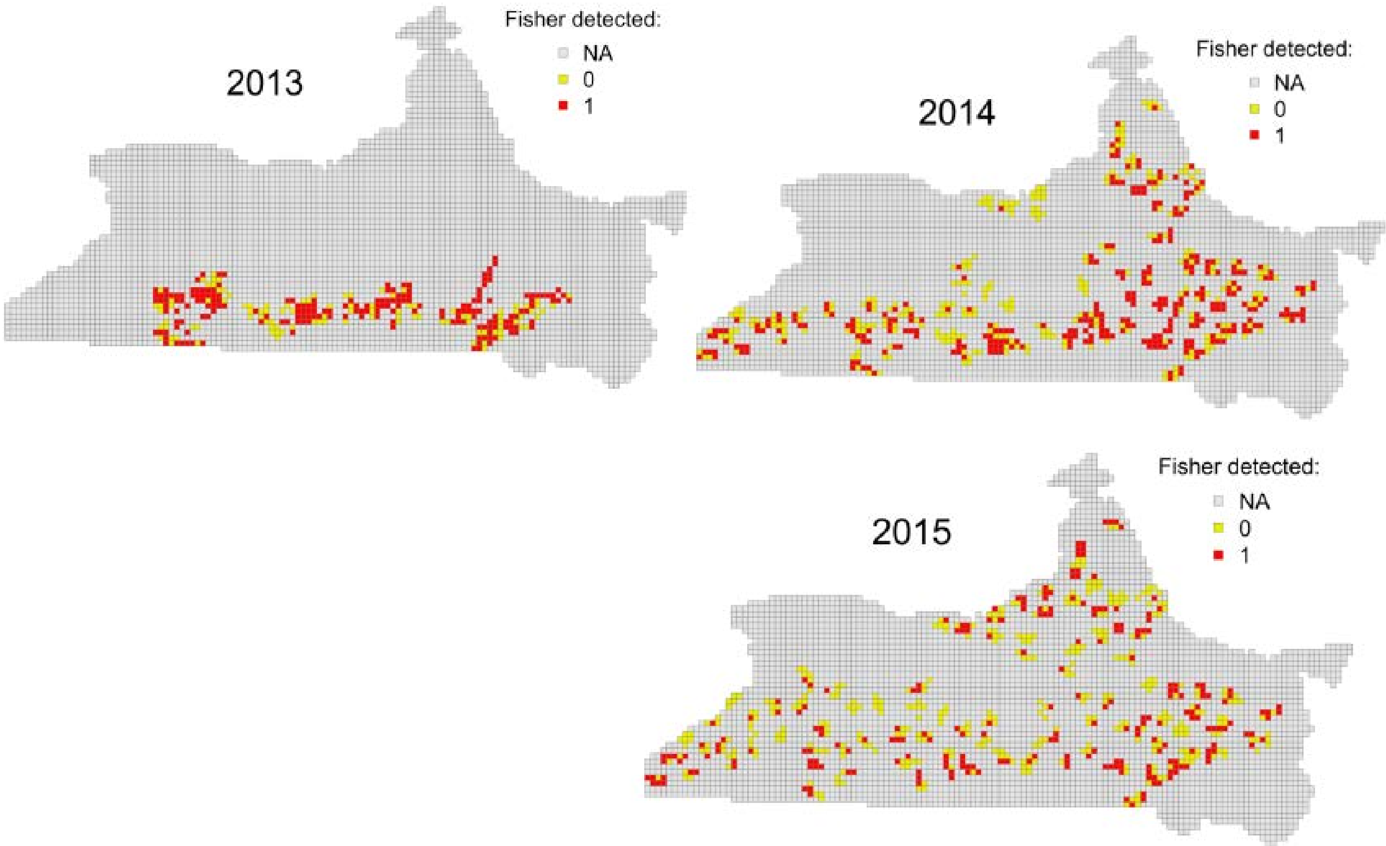

Figure 14. Locations of camera traps in Central/Western New York where fishers were detected (1; red grid cells) and not detected (0; yellow grid cells), winter 2013-2015. Gray grid cells were not sampled.

Figure 15. Camera trap detections of fishers in Central/Western New York, winter 2013.

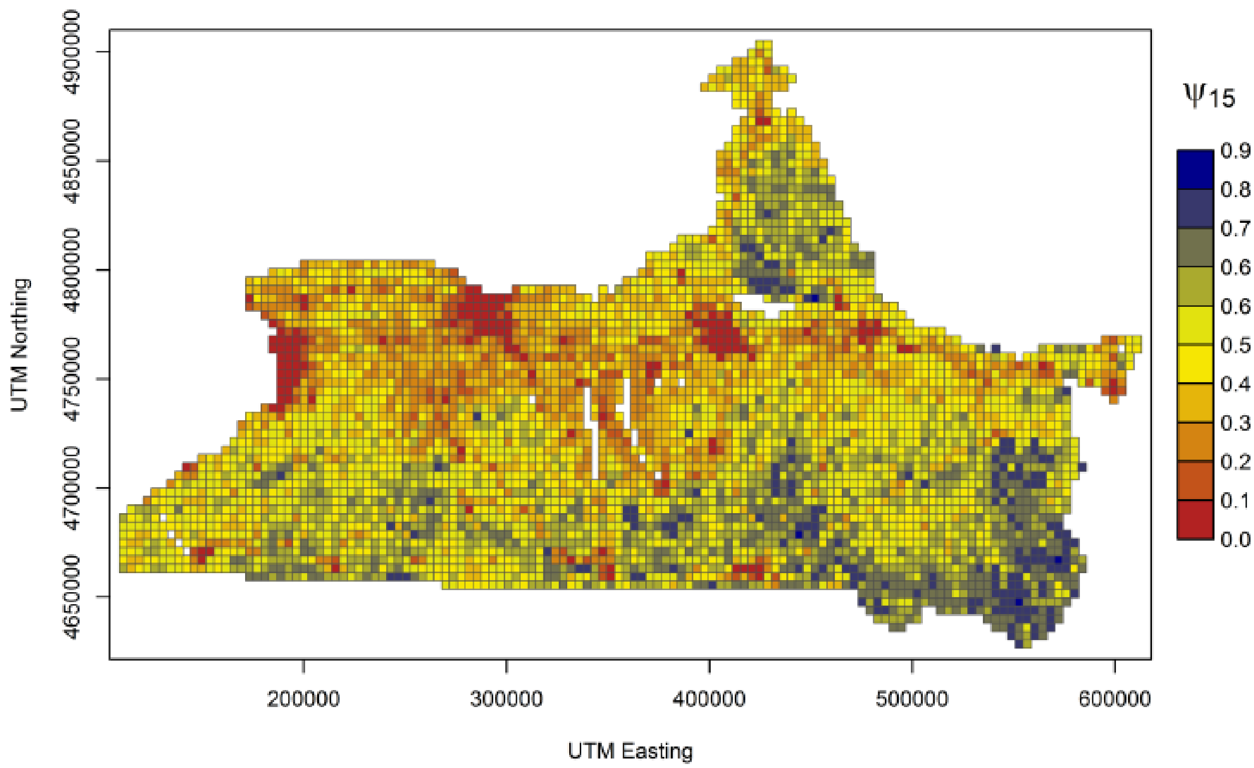

Figure 16. Probability of fisher occupancy (Ψ) in Central/Western New York based on detection data collected during winter, 2013-2015.

2.3 Summary

Northern New York

Fisher populations have made a remarkable recovery in New York since the early 20th century (Fig. 3), however, recent data suggest that fisher populations may be declining in some areas of Northern New York. Although historical data indicate that fisher harvests have declined in the past, the collection of trapper effort data in recent years has improved our ability to track harvest changes over time by accounting for variation in effort (due to pelt prices, gas prices, weather, etc.). Despite limitations and bias inherent in harvest data, we suggest that fisher harvests during 2003-2010 may have exceeded sustainable harvest rates for Adirondack WMUs. For most years during this time series, predicted harvest rates based on sex ratio data approached or exceeded 25% (Fig. 7). Fisher population models constructed for Ontario and Minnesota estimated that harvest rates of 20-25% and 15-20%, respectively, were sustainable and resulted in population stability (Douglas and Strickland 1987). We suggest that our harvest rate predictions combined with declines in harvest success rates, harvest density, and TPUE, indicate fisher population declines in Adirondack WMUs of Northern New York. We acknowledge that the relative contribution of harvest mortality, non-harvest mortality, and other key demographic processes on apparent fisher population declines is unknown; this is an area that requires research. However, it is important to note that harvest mortality can be managed through trapping regulations and resulting harvests can be monitored using age, sex, and TPUE data.

Southeastern New York

In contrast to Northern New York, total fisher harvests and harvest success rates in Southeastern New York appear to be stable to increasing, concurrent with an apparent increase in distribution and harvest density (Fig.

6) that have likely been facilitated by low harvest rates (<20%; Fig. 7). Interestingly, very few (or no) fishers were trapped in the southeastern portion of the SZ during 2002-2011 (Fig. 6), which may reflect habitat suitability, competitive interactions with other carnivores (e.g., bobcat), and/or a lack of trappers targeting terrestrial furbearers or fishers specifically.

Central/Western New York

Fisher observations and the number of incidentally-trapped fishers have increased dramatically since 2005 (Fig. 11, Fig. 12), providing evidence of an expanding fisher population in Central/Western New York. These positive trends are likely the result of conservative harvest rates in Southeastern New York and a successful fisher reintroduction program in Pennsylvania (coupled with a conservative trapping season there). During 3 field seasons (2013-2015) of noninvasive camera surveys, we documented that fishers were well distributed across the study area (Fig. 14); future analyses of capture-recapture data using hair samples will enable us to estimate population abundance.

3.0 GOALS, OBJECTIVES & STRATEGIES

The goals of the Fisher Management Plan reflect the overarching goals of the NYSDEC Bureau of Wildlife (BOW) and include the following:

GOAL 1: Maintain or enhance fisher populations in all areas of the state where suitable habitat exists.

GOAL 2: Provide for the sustainable use and enjoyment of fishers by the public.

Objectives and strategies that support these two goals within fisher management zones include the following:

GOAL 1: Maintain or enhance fisher populations in all areas of the state where suitable habitat exists.

Objective 1.1: In Northern and Southeastern New York, monitor harvest and population trends through the collection of harvest and survey data.

Strategies

1.1.1 Collect fisher harvest data, including trapper effort and biological data.

We will continue to monitor harvest trends through mandatory pelt sealing. We will explore various means for collecting trapper effort data, which could include trapper diaries or a trapper mail survey. Strategies for collecting these data may differ between Northern and Southeastern New York. The collection of trapper effort and biological data will be accomplished via a mandatory fisher trapping permit (similar to marten and bobcat trapping permits), which will require that trappers submit trapping effort data and the skull or lower jaw/canine tooth from all harvested fisher prior to the pelt being sealed.

Due to sex- and age-related differences in harvest vulnerability that are particularly apparent with fishers and martens, furbearer biologists have advocated collecting biological samples from trapped animals and using these data (e.g., sex and age) to calculate indices that presumably reflect harvest intensity (Douglas and Strickland 1987, Strickland 1994). We will continue to collect sex data on trapped fishers from information supplied by trappers via Furbearer Possession Tags (Appendix B) and monitor sex ratio as an indicator of harvest rates. Determining the sex of trapped fishers is relatively easy (due to the presence of a baculum in males) and we feel confident that most trappers can accurately sex fishers. We will collect data on the age structure of the harvest in Northern and Southeastern New York during 2016-2020 and evaluate the utility of these data for fisher harvest and population monitoring. The NYSDEC Wildlife Health Unit will assist with animal necropsies and the collection of biological samples (including the extraction of teeth for cementum ageing) from trapped fishers.

1.1.2 Collect fisher survey data in Northern New York using noninvasive methods.

NYSDEC BOW will continue to request annual snow tracking survey data from our university partner, SUNY-ESF Adirondack Ecological Center. These data, although restricted to Huntington Wildlife Forest (Newcomb, NY), have been collected since 1987 and provide an additional index to relative fisher abundance in the central Adirondacks (WMU 5F).

Figure 17. Forest carnivore detection station designed to collect tracks and hair samples from fishers and martens (left) and an example of fisher tracks collected from WMU 5J using this station, 2014 (right).

Using established noninvasive methods to survey forest carnivores, we plan to collect data on fisher distribution and abundance in the Adirondacks using a variety of detection methods, which may include track plates (Fig. 17), hair snares, and camera traps (Fig. 15). These non-harvest data will allow us to better understand fisher (and other forest carnivore) distribution and abundance and temporal and spatial variation in harvest vulnerability across this landscape. Using genetic samples collected from hair snares, we plan to estimate fisher population density using spatial capture-recapture (SCR) models, which will enable us to refine harvest rate estimates and validate estimates based on sex ratio data. If adequate samples are obtained, these techniques will allow us to estimate fisher occupancy and population abundance, which is particularly important given apparent declines in fisher populations in the Adirondacks.

Objective 1.2: Determine fisher distribution and abundance in Central/Western New York and document continued expansion of fisher populations in this management zone.

Strategies

1.2.1 Continue collection of verifiable fisher occurrence records from the public through our Furbearer Observation Reporting System,

1.2.2 Continue collection of fisher sightings through the Bowhunter Sighting Log program and trapper mail survey.

1.2.3 Continue camera trapping/hair snare surveys for fishers to assess changes in distribution and abundance.

We will periodically conduct noninvasive surveys for fishers in Central/Western New York to document distribution and abundance in those WMU Aggregates that will remain closed to fisher trapping (i.e., North Appalachian Hills, Great Lakes Plain, and Oneida Lake Plains WMU Aggregates). These data will be used to evaluate the potential for new trapping seasons in these aggregates. Additionally, we will conduct surveys in those WMU Aggregates with proposed trapping seasons to evaluate changes in occupancy and abundance after a minimum of 3 years of harvest (see Strategy 2.2.3).

GOAL 2: Provide for the sustainable use and enjoyment of fishers by the public.

Objective 2.1: Achieve a target harvest rate that is <20% of the fisher population in Adirondack WMUs of Northern New York.

Within the Northern New York fisher management zone, we will focus on regulatory changes to Adirondack WMUs (5C, 5F, 5G, 5H, 5J, 6F, 6J) where our data indicate a declining trend in TPUE (Fig. 8, Fig. 9). While regulatory changes may be warranted for the entire Northern New York fisher management zone, the Department currently lacks key TPUE data that would assist us in making harvest management decisions. Furthermore, a recent NYSDEC trapper mail survey highlighted that more trappers outside of the Adirondacks in Northern New York believed that fisher populations were increasing than those trappers within the Adirondacks (Appendix C, Fig. C4). Therefore, we propose a management strategy designed to limit fisher harvests to <20% of the estimated population in Adirondack WMUs. Previous research has demonstrated that harvest rates of 15-30% of the pre-trap fisher population were sustainable (Coulter 1966, Douglas and Strickland 1987); however, given apparent fisher population declines in Adirondack WMUs, we felt a more conservative harvest rate was warranted. Secondly, we propose maintaining current trapping seasons in areas of Northern New York outside of the Adirondack WMUs (October 25 – December 10; no bag limit) and closely monitoring the fisher population and harvest using Strategies 1.1.1 and 1.1.2. The collection of adequate harvest data will require mandatory submission of effort data and biological samples (skull or jaw/tooth) via a permit system for the entire Northern New York fisher management zone. Monitoring in these regions will provide a comparative study of fisher population response to regulatory changes in the Adirondacks. To date, trends have been similar in both regions, so if harvest mortality is limiting we should see some divergence in our indices.

Strategy

2.1.1 Reduce the length of the trapping season for fishers (and the concurrent marten trapping season) in Adirondack WMUs (5C, 5F, 5G, 5H, 5J, 6F, 6J) beginning in 2016.

The current fisher trapping season in New York is 46 days; other states in the northeast restrict season length to 21-30 days (Lovallo 2008). Shortening the length of the trapping season could reduce the total fisher harvest via a reduction in trapper effort (for example, the total number of trap-nights), however, a criticism of this management approach is that trappers can offset shorter seasons by increasing effort (setting more traps) and maintain high harvest rates (Strickland 1994). While this scenario is possible, available data suggests that trappers set a similar number of traps regardless of the length of time that they trap during the season. This may indicate a time limitation on the number of traps that can be checked in a day or a trade-off between setting/checking more traps and increased costs of fuel for maintaining a longer trap line. Lastly, because juveniles and adult male fishers are more vulnerable to harvest (Krohn et al. 1994) than adult females, a shorter trapping season should result in fewer adult female fishers being trapped which may facilitate population growth.

Based on fisher TPUE and harvest data obtained from pelt sealing, we projected fisher harvests based on season lengths that varied from 15-46 days and determined a season length that resulted in a harvest rate of approximately 15-20%. To determine the number of fishers that could be trapped under these harvest rates, we first estimated an initial fisher population size based on published density estimates (Appendix C, Table C1). We then used data on trapper effort to project the total number of trap-nights for a given season length and used TPUE estimates to determine the number of fishers trapped. As discussed in Strategy 2.1.1, fisher TPUE in the Adirondacks varies widely based on food abundance. We used TPUE estimates (mean, 95% confidence intervals) based on years of low food abundance (mean = 0.72 fishers/100 TN), because fishers are more vulnerable to trapping during these periods (Jensen et al. 2012). However, we also predicted harvests based on TPUE estimates from years of increased food abundance (mean = 0.50 fishers/100 TN) to determine harvest rates during years when this occurs.

Adjusting the trapping season length was chosen because of the substantial data that were available to NYSDEC to estimate harvests under varying season lengths (Fig. 18) and define a season based on harvest objectives of <20% of the fisher population. Additionally, the Department feels that the resulting trapping regulations from this strategy would be the easiest to enforce by our Division of Law Enforcement, especially given the potential for different seasons in Northern New York. Using published density estimates, we estimated the Adirondack fisher population to range from approximately 3,800-5,000 animals (Appendix C, Table C1). Based on these data and using low and high density estimates, we determined an annual target fisher harvest using a 20% harvest rate, which was approximately 760-1,000 fishers. Analysis of fisher TPUE and pelt sealing data revealed that a 30-day season for Adirondack WMUs would result in a predicted harvest of approximately 835 fishers and a harvest rate of 17-22% of the estimated population using a mean TPUE of 0.72 fishers/100 TN (Fig. 18). During years of increased food abundance, a 30-day trapping season would result in a predicted harvest of approximately 580 fishers (using a mean TPUE of 0.50 fishers/100 TN) and a harvest rate of 12-15%. Therefore, under most situations (and considering variation in TPUE and uncertainty in fisher population size), we would achieve a target harvest rate that is <20% of the fisher population.

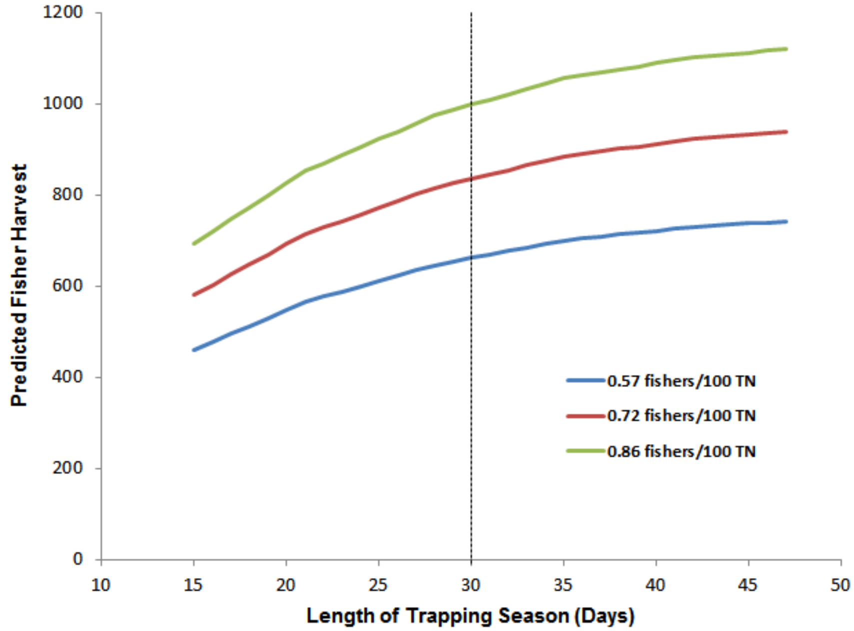

Figure 18. Predicted fisher harvests in Adirondack Wildlife Management Units (WMUs; 5C, 5F, 5G, 5H, 5J, 6F, 6J) based on the length of the trapping season. Estimates were based on trapper effort data (2005-2013) and using the mean TPUE (±95% confidence intervals) from years of low food abundance when fishers are more vulnerable to harvest (Jensen et al. 2012). The dashed-line represents a 30-day trapping season that would result in an estimated harvest of 835 fishers (using a mean TPUE of 0.72 fishers/100 trap-nights [TN]) and a harvest rate of 17-22%.

Harvest chronology data from our current 46-day season indicated a peak in the proportion of trapped fishers during the first three weeks of November in the Northern Zone (Appendix C, Fig. C3). These data likely indicate trapper preference; therefore, the timing of the 30-day season will be November 1-30 for fisher and marten. It is important to note that trapping regulations prohibit the use of bait or lure with body-gripping traps set on land in the Northern Zone when the trapping season for fisher and marten is closed (that is, prior to November 1 or after November 30 in Adirondack WMUs with the proposed season).

In the draft fisher management plan (January 2015) the Department proposed a 22-day season for Adirondack WMUs; October 25 – November 15. Changes to the length and timing of the fisher trapping season presented in the final plan were based on comments received by the Department during the public comment period and represent a compromise that balances trapper preferences and the Department's responsibility to ensure that fisher harvests are sustainable. We will carefully monitor the fisher harvest in Adirondack WMUs through pelt seal, TPUE, and biological data. This will be accomplished via a mandatory fisher trapping permit (described under Strategy 1.1.1), which will require that trappers submit trapping effort data and the skull or lower jaw/canine tooth from all harvested fisher prior to the pelt being sealed. Trapper effort data will allow us to estimate and monitor annual changes in TPUE. The age and sex structure of the harvest will be determined using cementum analysis of teeth and pelt seal data, respectively, and used to estimate harvest rates. These data will allow us to track changes in harvest rates and evaluate our regulations for maintaining a target harvest that is ≤20% of the population. It is important to note that we will collect effort and biological data for a minimum of five years after new harvest regulations have been implemented and make a decision to either continue with or revise fisher trapping regulations for the remainder of this 10-year management plan.

Lastly, we propose research that would address gaps in our understanding of key drivers of fisher populations (and apparent declines) in the Adirondacks. This research would involve estimating fisher population demographic parameters via GPS tags and intensive monitoring of individual animals, enabling us to expand our population and harvest modeling efforts beyond using only harvest data and literature-based density estimates. Data collected using these tags would allow us to determine space use, population density, sources of mortality (harvest vs. non-harvest), and age-sex differences in demographic parameters. Kit production would be estimated using locations of maternal dens (based on clustered locations) and intensive monitoring of these dens using camera traps (Sweitzer et al. 2015).

Alternate Harvest Management Options

In addition to the proposed strategy, we briefly outline the details of other harvest management options that were considered and highlight advantages and disadvantages of each. In most states that allow fisher trapping, bag limits and season length are the primary methods of regulating the harvest (Strickland and Douglas 1987, Strickland 1994, Lovallo 2008), therefore our discussion of management options for Adirondack WMUs will focus on these strategies. Additionally, in these WMUs, trapping seasons for American marten are concurrent with fisher trapping seasons, however, trapping techniques that allow for the selective harvest of fishers but not martens are generally lacking (Strickland 1994). Moreover, trappers are currently restricted to a seasonal bag limit of 6 martens, whereas there are no bag limits on fishers. During years when food abundance declines (beechnuts, small mammals), trapping vulnerability of martens increases dramatically (Jensen et al. 2012). When this occurs, trappers can quickly reach their bag limit on martens but can continue to legally trap for fishers. This scenario results in incidental marten harvest and reduced effectiveness of bag limits as a means of harvest control and is more frequent where marten population abundance is greater than that of fishers (e.g., central Adirondacks). This creates a management mismatch and challenges for regulating the marten harvest that we address in the options below.

1. Implement a seasonal bag limit on fishers in Adirondack WMUs.

Imposing a seasonal bag limit on fishers would reduce the harvest and represents a direct method of aligning fisher and marten management in the Adirondacks. While we do not propose a specific bag limit under this option, attempts to align marten and fisher harvest regulations would require implementing a combined bag limit for martens and fishers (i.e., any combination of the two species that equals the bag limit). A combined marten and fisher bag limit is currently used by the state of Minnesota. Under current marten trapping permit conditions this combined bag limit would be 6; a combined bag limit >6 would require changes to marten trapping permit conditions. Potential drawbacks of imposing a seasonal bag limit on fishers include challenges associated with law enforcement; for example, trappers exceeding their bag limit and tagging them on another trapper's permit or issues associated with implementing a bag limit in Adirondack WMUs but not in other adjacent areas of Northern New York. Related to these issues, establishing bag limits that meet a harvest objective becomes problematic.

2. Implement a combination of a bag limit and reduction in season length in Adirondack WMUs.

Combining bag limits with a reduction in season length would represent a more restrictive option for managing fisher harvests, however, potential law enforcement issues with bag limits remain.

3. Temporarily close fisher trapping seasons in Adirondack WMUs.

Fisher trapping season closures were implemented in New York in 1977, 1983, and 1984; such a strategy functionally represents an emergency measure, however, the Department feels that recently observed fisher harvest declines do not warrant such action. While such measures may provide immediate relief of harvest pressure on fisher populations, short-term season closures are unlikely to provide long-term benefits if other harvest restrictions are not implemented when seasons are re-opened. Furthermore, because fishers and martens are trapped using the same methods, the marten trapping season in the Adirondacks would also be closed under this alternative. Fishers would also continue to be harvested incidental to other terrestrial furbearers with concurrent seasons (for example, fox, raccoon, coyote). Lastly, when trapping seasons are closed, the Department loses a valuable source of data that is used to make management decisions.

4. Maintain current fisher trapping seasons in Adirondack WMUs with no regulatory changes.

Based on our analysis of fisher harvest data, the Department feels that changes to trapping regulations are required to manage fisher harvests on a sustainable basis as a public trust resource. The Department also acknowledges limitations in our ability to infer underlying population dynamics based solely on harvest data. With these limitations in mind, the Department maintains that appropriate harvest-based data collected over large portions of the state and long time periods remain useful for detecting trends and will continue to be a key component of our management system.

Objective 2.2: Open a fisher trapping season in portions of Central/Western New York and monitor harvest and population trends through the collection of harvest data (effort, sex ratio).

Strategies

2.2.1 Consider opening a limited trapping season, beginning in 2016, for any WMU aggregate in Central/Western New York where observed or predicted occupancy by fishers is ≥40% based on camera trap surveys conducted during 2013-2015.

Based on predicted occupancy in WMU Aggregates with an open fisher trapping season (range = 0.40-0.70; Fig. 19), we believe that we can open conservative and sustainable trapping seasons in those aggregates with ≥40% occupancy. Using this threshold, we propose opening the following WMU Aggregates (aggregate numbers in parentheses; Appendix A) for fisher trapping beginning in 2016: Oswego Lowlands (9), West Appalachian Plateau (14), Central Appalachian Plateau (15), East Appalachian Plateau (16), and Otsego-Delaware Hills (17; Fig. 19). Using this criteria, we considered opening a fisher trapping season in the North Appalachian Hills (13; occupancy = 0.41); however, we decided to keep this aggregate closed to fisher trapping to promote continued fisher range expansion and population growth in the Great Lakes Plain (8) and Oneida Lake Plains WMU Aggregates (10; Fig. 19).

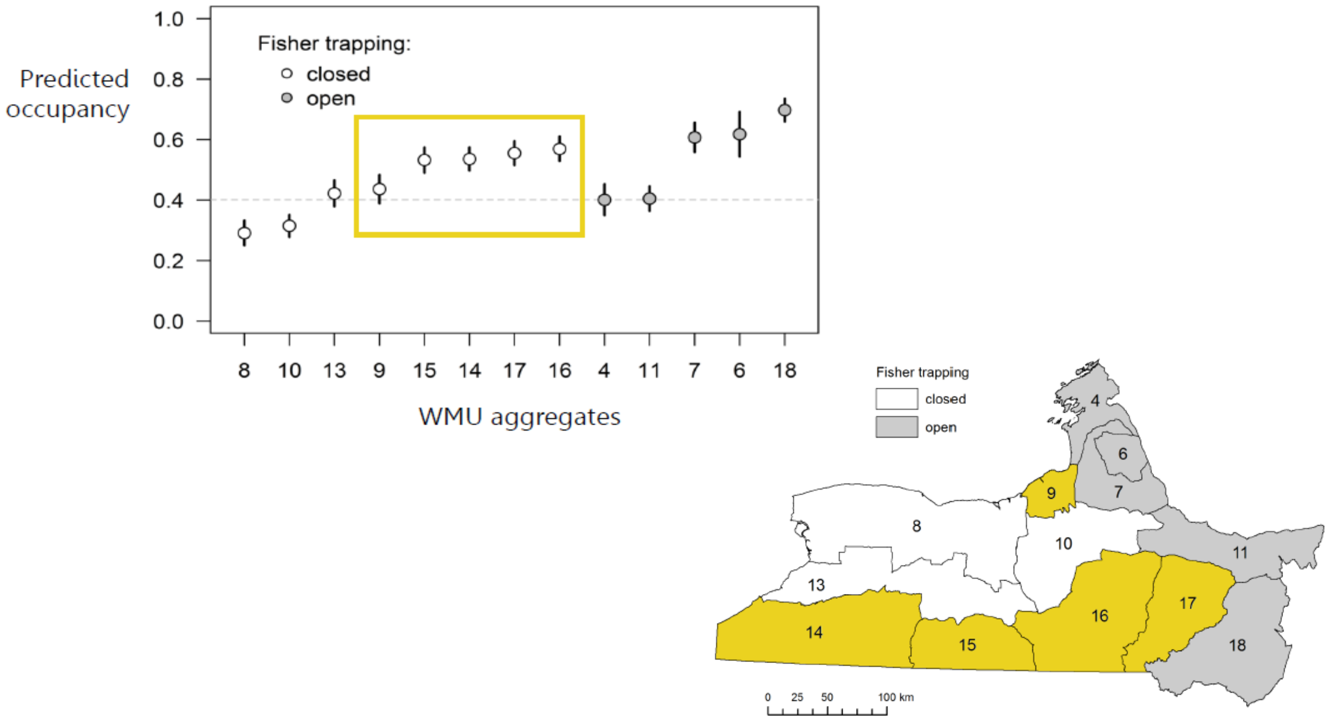

Figure 19. Mean predicted fisher occupancy for Wildlife Management Unit (WMU) Aggregates within Central/Western New York (currently closed to fisher trapping) and portions of Northern and Southeastern New York (currently open to fisher trapping; top panel). The yellow box (top panel) and yellow WMU Aggregates (bottom panel) represent those aggregates with predicted occupancy ≥40% that will be proposed for an open fisher trapping season in 2016.

2.2.2 Consider opening a limited trapping season, beginning in 2020 or later, for additional WMU aggregates where observed or predicted occupancy by fishers is ≥40% based on camera trap surveys.

2.2.3 Open a limited and conservative fisher trapping season, beginning in 2016, for WMU Aggregates identified in Strategy 2.2.1 with a season length of 6 days and no bag limit.

Using a combination of harvest data from Southeastern and Central/Western New York, we estimated potential fisher harvests in the WMU Aggregates identified in Strategy 2.2.1 (Fig. 19). First, we estimated the number of trappers that would potentially trap for fishers using data from our trapper mail survey (2005-2013). We determined the number of participating raccoon trappers in these WMU Aggregates (1,028) and assumed that a similar number of trappers would set traps for fishers. We believe this assumption is reasonable given the similarity of methods and traps used for trapping these species. Next, we defined an approximate harvest objective by calculating the mean harvest density in ecologically-similar WMU Aggregates of Southeastern New York (Fig. 6). Most of this management zone has been open to fisher trapping since the mid to late-1980s and fisher harvests have been stable to increasing over the past decade (see Section 2.1). Additionally, fishers continue to expand their range in this area (Fig. 6). We used a mean harvest density of 1.53 fishers/100 km^2

(calculated from 2002-2011; Fig. 6) to estimate the number of fishers that could be sustainably trapped in these aggregates (419 fishers) while continuing to promote range expansion. Lastly, we estimated fisher harvests using TPUE data from Southeastern New York (mean = 0.43 fishers/100 TN; lower and upper 95% confidence limits = 0.23 and 0.63 fishers/100 TN) and projected harvests over a 10-day season with no bag limits (Fig. 20).

We estimated that a 6-day season with no bag limit would result in a harvest of 265 fishers using the mean TPUE (0.43 fishers/100 TN). Estimated harvests for a 6-day season using the TPUE lower and upper confidence limits were 140 and 390 fishers, respectively (Fig. 20). Therefore, we estimated that the maximum fisher harvest (and resulting harvest density) in these WMU Aggregates would be similar to the long-term harvest density of 1.53 fishers/100 km^2 observed in Southeastern New York during 2002-2011.

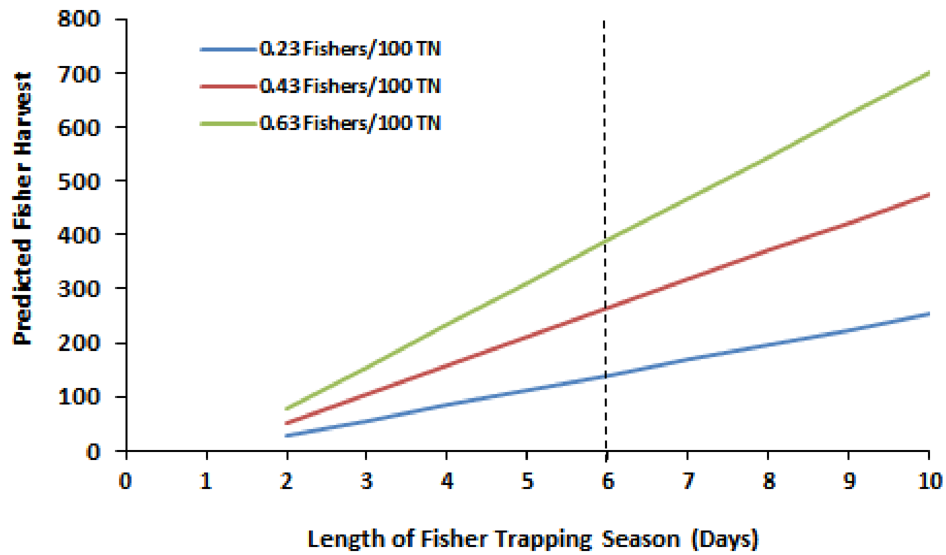

Figure 20. Predicted fisher harvests in Wildlife Management Unit (WMU) Aggregates of Central/Western New York with a proposed fisher trapping season. All estimates were based on trapper effort data collected from Southeastern New York (2006-2008) and using the mean (±95% confidence intervals) TPUE (0.43 ±0.20 fishers/100 trap-nights [TN]). The dashed-line represents a 6-day trapping season (no bag limit) that would result in an estimated harvest of 140, 265, and 390 fishers using TPUE estimates of 0.23, 0.43, and 0.63 fishers/100 TN, respectively.

In the draft fisher management plan (January 2015) the Department proposed a 9-day season with a bag limit of 1 fisher per trapper for these WMUs; October 25 – November 2. Reduction of the length of the fisher trapping season and elimination of the bag limit presented in the final plan were based on comments received by the Department during the public comment period and these changes represent a compromise that balances trapper preferences and the Department's responsibility to ensure that fisher harvests are sustainable. The proposed strategy also represents a balance between the other alternate management strategies discussed below and will enable the Department to achieve both goals of this management plan. A short trapping season would limit the number of fishers harvested, while still providing some opportunity for trappers. Moreover, because juvenile fishers and adult males are more vulnerable to harvest than adult females (Krohn et al. 1994), a short trapping season will result in fewer adult female fishers being trapped and maintain the breeding segment of the population. We believe that these harvest control measures will allow for both a limited and sustainable harvest of fisher, and continued growth of fisher populations in Central/Western New York. Lastly, this strategy is similar to Pennsylvania's short fisher trapping season (5-day season) with the exception of their 1 fisher bag limit; fisher populations there have continued to expand under this conservative management approach which was initiated in 2010. Based on our predictions for Central/Western New York, a 6-day season with no bag limit would result in a fisher harvest similar to the season structure (9 days, bag limit of 1) proposed in the draft fisher management plan. Initially, the timing of a 6-day season would be October 25-30; however, the Department will conduct a trapper mail survey in the future to gauge preferences for this new season.

With the opening of limited trapping seasons in Central/Western New York, we will carefully monitor the harvest through pelt seal, TPUE, and biological data. This will be accomplished via a mandatory fisher trapping permit (described under Strategy 1.1.1), which will require that trappers submit trapping effort data and the skull or lower jaw/canine tooth from all harvested fisher prior to the pelt being sealed. Trapper effort data will allow us to estimate and monitor annual changes in TPUE. The age and sex structure of the harvest will be determined using cementum analysis of teeth and pelt seal data, respectively, and used to estimate harvest rates. The NYSDEC Wildlife Health Unit will assist with animal necropsies and the collection of biological samples from trapped fishers.

After implementing a new fisher trapping season and collecting harvest data for 3 years, we will conduct noninvasive surveys to estimate change in occupancy and abundance, assess the impact of our management decisions, and make changes to trapping regulations, if needed. This approach is similar to the collection of harvest-dependent and harvest-independent data described in Strategies 1.1.1 and 1.1.2.

In support of the preferred strategy, we propose research that would investigate fisher space use and resource selection in Central/Western NY using GPS tags. These data are needed to refine our understanding of fisher-habitat relationships in this management zone, predict suitable habitat, and refine our population density estimates in conjunction with our genetic data from hair snare surveys.

Alternate Harvest Management Options

In addition to the proposed strategy, we briefly outline the details of other harvest management options that were considered and highlight advantages and disadvantages of each.

1. Maintain a closed season for trapping fishers.

While maintaining a closed season for fisher trapping is a viable management option, providing regulated trapping opportunities is consistent with the NYSDEC Bureau of Wildlife's mission *"To provide the people of New York the opportunity to enjoy all the benefits of the wildlife of the State, now and in the future."* These benefits include opportunities to harvest and observe fishers in the wild. The Department supports scientifically-based wildlife management that ensures that harvests are sustainable while maintaining other public opportunities to observe and enjoy wildlife.

2. Open a fisher trapping season with harvest regulations similar to those existing or proposed for Adirondack WMUs, Northern New York, or Southeastern New York (for example, no bag limit; 30-day or 46-day season).

We explored this option as a means of addressing potential concerns regarding inequality of harvest opportunities among fisher management zones or having non-uniform trapping seasons and regulations across the state. Where possible, the Department strives to implement uniform regulations across the state, however, our system of WMU Aggregates allows us to manage wildlife populations at finer scales that account for biological and social differences across the New York landscape.

The Department proposes a limited and conservative fisher trapping season (as opposed to a longer season) in Central/Western New York as a means of balancing the two goals of this plan – maintaining and enhancing fisher populations where suitable habitat exists (Goal 1) and providing for the sustainable use and enjoyment of this wildlife resource by the public (Goal 2). Our analysis, using survey data from Central/Western New York and harvest data from ecologically-similar areas of Southeastern New York, indicates that our harvest management approach will balance these goals. At this time the Department feels that implementing a less restrictive fisher trapping season in Central/Western New York would be counterproductive to, or preclude, achieving both goals.

Objective 2.3: Conduct outreach to increase public understanding, appreciation, and support of fishers as a sustainable wildlife resource in New York State.

Strategy

2.3.1 Provide information on fisher natural history, furbearers as a renewable natural resource, trapping seasons, research, and Citizen Science opportunities via NYSDEC web pages and media outlets (e.g., newspaper and television interviews, *Conservationist* and other magazines). For example, see Batcheller (2001) http://www.highbeam.com/doc/1G1-71704180.html and Wharton (2014) http://www.dec.ny.gov/docs/administration_pdf/1214fisher.pdf.

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5.0 APPENDICES

Appendix A. Wildlife Management Unit (WMU) Aggregate names and corresponding Fisher Management Zones, New York State.

Number	Wildlife Management Unit Aggregate	Fisher Management Zone
1	St. Lawrence Valley	Northern
2	Champlain Valley and Transition	Northern
3	Northern Adirondacks	Northern
4	East Ontario Plain	Northern
5	Central Adirondacks	Northern
6	Central Tug Hill	Northern
7	Tug Hill Transition	Northern
8	Great Lakes Plain	Central/Western
9	Oswego Lowlands	Central/Western
10	Oneida Lake Plains	Central/Western
11	Mohawk Valley	Southeastern
12	North Taconic Highlands	Southeastern
13	North Appalachian Hills	Central/Western
14	West Appalachian Plateau	Central/Western
15	Central Appalachian Plateau	Central/Western
16	East Appalachian Plateau	Central/Western
17	Otsego-Delaware Hills	Central/Western
18	Catskills	Southeastern
19	Hudson Valley	Southeastern
20	South Taconic Highlands	Southeastern
21	Neversink-Mongaup Hills	Southeastern
22	New York City Transition	Historically absent
23	Coastal Lowlands	Historically absent

Appendix B. Furbearer Possession Tag (FPT) used to report trapping harvests of fisher, otter, and bobcat.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Furbearer Possession Tag

1. Complete this tag immediately upon arrival at your mode of travel, camp or home, whichever occurs first.
2. This tag is not an official pelt seal, but must accompany your pelt or unskinned animal at all times.
3. This tag allows you (the taker) to legally possess the pelt or unskinned animal until sealing is required.
4. The pelt or unskinned animal must be sealed before: (a) it may be exported from New York State; (b) sold or transferred to another's possession; (c) mounted or processed; or (d) the end of the tenth day after the close of the season in the Wildlife Management Unit (WMU) where it was taken, whichever comes first.
5. Be sure to record your 12-digit trapping or hunting ID # below.
6. For fields below: SEX : M = Male, F = Female, U = Unkown and TAKE: T = Trapped, H = Hunted, R = Road Killed.

First Name ______ Last Name ______

Date of Birth (mm/dd/yy) __ / __ / __ ID # (from license) ____ - ____ - ____

SpeciesTaken: Only ONE SPECIES may be used ON THIS TAG

○ Fisher ○ Otter ○ Bobcat (may be hunted)

Date Taken (mm/dd/yy)	County (first 4 letters)	Town (first 7 letters)	WMU	Sex	Take	Seal Number (DEC use only)
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	
/ /				○ M ○ F ○ U	○ T ○ H ○ R	

DEC use only	Region	Date Sealed (mm/dd/yy)	Badge/Sealer#
		/ /	

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Appendix C. Additional fisher harvest and mail survey data, New York State, 2002-2012.

Adirondack WMU Fisher Population Estimates

We estimated fisher population abundance using published estimates of fisher population density from harvested fisher populations in the northeastern U.S. and adjacent Canada with habitats similar to those present in Adirondack WMUs of Northern New York (Table C1). When available, we used low and high density estimates which characterized some of the variation in these estimates. We did not use Arthur et al. (1989) low estimate (5.0 fishers/100 km^2) because based on recent harvests in Adirondack WMUs, we felt that this underestimated the population there.

Table C1. Fisher population density estimates from trapped populations in the northeastern U.S. and adjacent Canada used to estimate fisher population abundance in Adirondack Wildlife Management Units (WMU) of Northern New York.

			Fisher Population Density[a]		Fisher Population Estimate[b]	
WMU[c] Aggregate	**WMU**	**WMU Area km^2**	**Low**	**High**	**Low**	**High**
Northern Adirondacks	5C	2903	19.0[d]	25.0[d]	552	726
Northern Adirondacks	6F	3145	19.0	25.0	598	786
Champlain Valley and Transition[e]	5G	3218	12.1[f]	16.1[g]	389	518
Champlain Valley and Transition	5J	1842	19.0	25.0	350	461
Central Adirondacks	5F	3447	12.1	16.1	417	555
Central Adirondacks	5H	7994	12.1	16.1	967	1287
Central Adirondacks	6J	4226	12.1	16.1	511	680
All Adirondack WMUs		26775			**3784**	**5013**

[a]Fishers/100 km^2.
[b]Fisher populations estimated from low and high density estimates.
[c]Wildlife Management Unit.
[d]Source: Fuller et al. (2001).
[e]Champlain Valley and Transition WMU Aggregate represents the eastern portion of the Adirondacks.
[f]12.1 fishers/100 km^2 (Source: Arthur et al. 1989).
[g]16.1 fishers/100 km^2 (Source: Strickland 1994).

Estimating population size and harvest rates in this manner required several assumptions, including: 1.) fisher population density estimates for forested habitats in other areas of the northeast were applicable to similar habitats in Adirondack WMUs of Northern New York, 2.) density estimates did not vary over space (within a WMU group) and are currently applicable to New York's fisher population, and 3.) all areas within the WMU groups were considered suitable habitat for, and occupied by, fishers.

The first assumption is likely reasonable given similarities in forested habitats and harvest status from those areas where population density was estimated (Table C1). However, we acknowledge potential weaknesses in the other assumptions. We know that many factors can influence fisher demographics; therefore, fisher populations are unlikely to be stable over space and/or time. Some of these factors include prey abundance and availability, interactions with other competing carnivores, weather (e.g., winter severity), disease, and harvest rates. However, in the absence of population abundance estimates for New York, we feel that published density estimates provide a reasonable starting point to assess population size and define a target harvest. The third assumption simplifies estimating population size by avoiding additional assumptions regarding fisher habitat suitability and occupancy. The influence of the second assumption on estimating harvest rates is unknown because density estimates could vary within WMU. However, the influence of the third assumption would result in underestimating harvest rates, because the entire landscape does not represent suitable fisher habitat and it is unlikely that all available habitat is occupied. For example, Lancaster et al. (2008) reported that no fishers were harvested in fur management units in Ontario where forest cover was < 40%; suggesting that fishers were absent from these areas.

Take per-unit-effort

Fisher TPUE fluctuated around a mean of 0.59 and 0.93 fishers/100 TN for WMU 5G and 5J, respectively (Fig. C1). Data for these WMU are limited in comparison to the time series available for the rest of the Adirondack WMUs (Fig. 8, Fig. 9), but indicate similar annual variation as WMUs 5F and 5H.

Among WMU Aggregates, fisher TPUE was the greatest in the Northern Adirondacks and ranged from 0.90-2.75 fishers/100 TN (Fig. C2; see also Fig. 9 for 2010-2013). Take per-unit-effort was similar among other WMU Aggregates, with the exception of the Central Adirondacks and Catskills (intermediate TPUE; 0.29-0.82 fishers/100 TN) and Mohawk Valley and Hudson Valley (low TPUE; 0.06-0.20 fishers/100 TN; Fig. C2). When comparing TPUE estimates among aggregates, it's important to keep in mind that sample sizes varied considerably among aggregates. For example, from 2006-2008 1,602 TN of effort were recorded for the North Taconic Highlands, whereas 99,669 TN of effort were recorded for the St. Lawrence Valley.

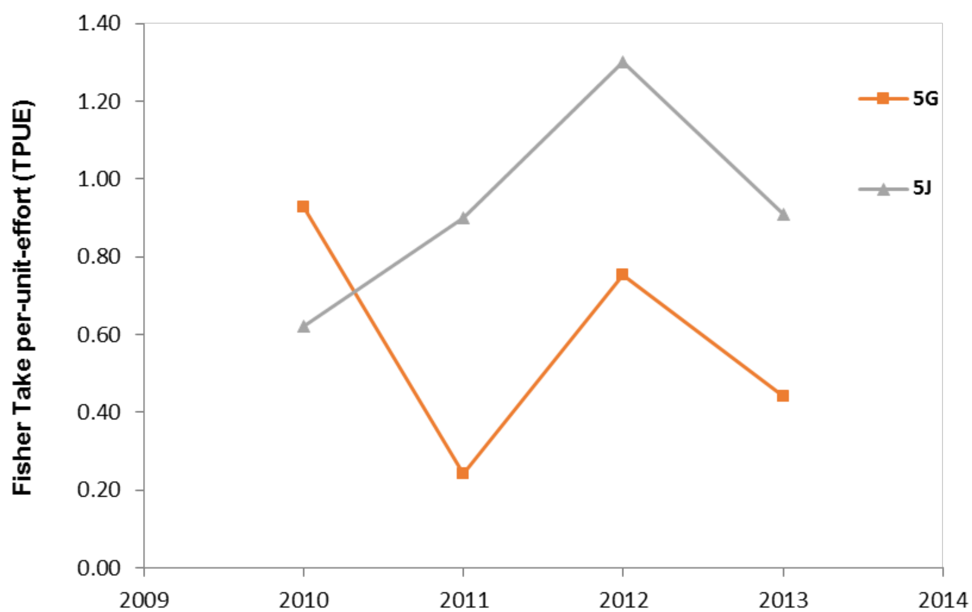

Figure C1. Fisher take per-unit-effort (TPUE; fishers trapped/100 trap-nights [TN]) in the Champlain Valley and Transition WMU Aggregate (WMU 5G and 5J; i.e., eastern Adirondacks), New York, 2010-2013. Data collected from marten/fisher trapper log books.

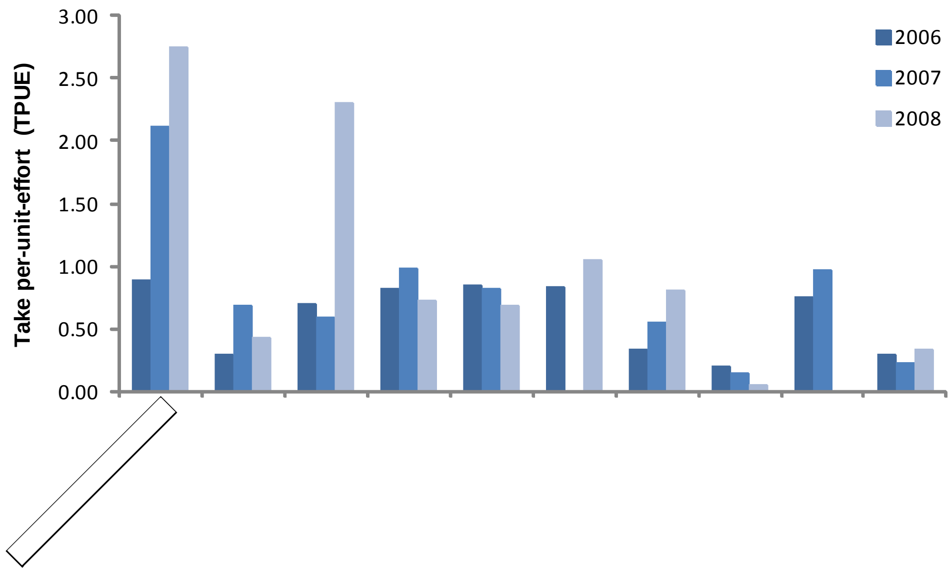

Figure C2. Fisher take per-unit-effort (TPUE; fishers trapped/100 trap-nights [TN]) in Wildlife Management Unit (WMU) Aggregates, New York, 2006-2008 (N. Roberts, unpubl. data).

Harvest Chronology

In Northern New York, 52% of fishers were harvested from November 1-20, whereas 70% of fishers were harvested during the first 4 weeks of the season in Southeastern New York, 2002-2011 (Fig. C3). Proportionally fewer fishers were trapped after November 20 in Southeastern New York than in Northern New York.

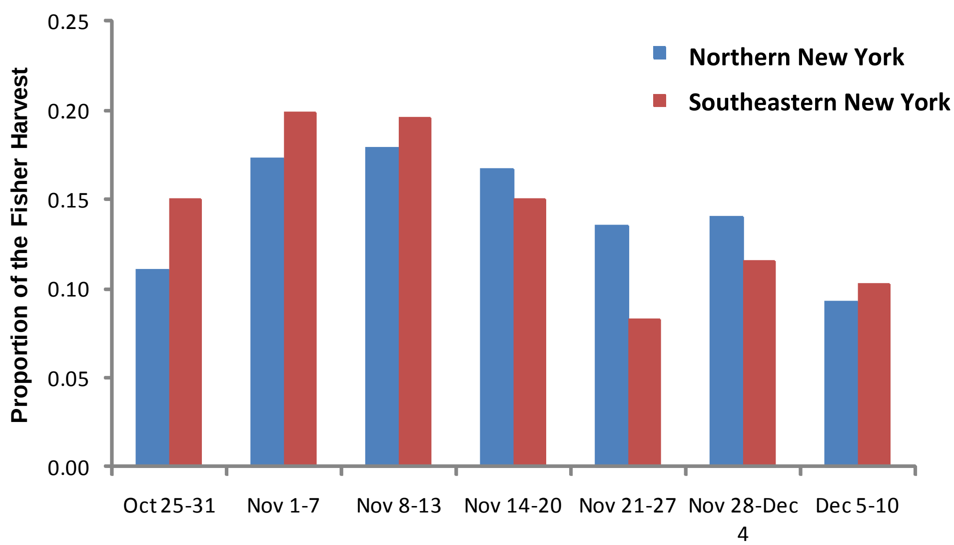

Figure C3. Harvest chronology for fishers trapped in Northern New York (*n* = 18,603) and Southeastern New York (*n* = 3,905) of New York, 2002-2011.

Take (Bag) Frequency

In Northern New York, most successful trappers (40-58%; Table C2) harvested 1 or 2 fishers. Trends in bag frequencies from 2002-2011 indicated an increasing proportion of trappers harvesting 6 or fewer fishers (74-88% annually) and a decreasing proportion of trappers harvesting more than 6 fishers (12-26% annually). Similarly, in Southeastern New York most successful trappers (60-77%; Table C3) harvested 1 or 2 fishers. Trends in bag frequencies from 2002-2011 were relatively stable with 87-97% of trappers in Southeastern New York harvesting 6 or fewer fishers and 3-13% harvesting more than 6 fishers on an annual basis.

Table C2. Proportion of successful fisher trappers by bag size in Northern New York, 2002-2011.

Fishers Harvested	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1-2	0.44	0.44	0.40	0.46	0.54	0.49	0.57	0.50	0.56	0.58
3-4	0.20	0.17	0.22	0.18	0.16	0.24	0.19	0.23	0.17	0.23
5-6	0.10	0.16	0.11	0.11	0.11	0.08	0.10	0.11	0.10	0.07
7-8	0.06	0.05	0.05	0.06	0.05	0.05	0.03	0.05	0.06	0.04
9-10	0.04	0.04	0.06	0.05	0.05	0.04	0.03	0.04	0.05	0.03
11-15	0.07	0.06	0.07	0.06	0.05	0.04	0.04	0.04	0.03	0.03
16-20	0.03	0.02	0.03	0.02	0.01	0.03	0.01	0.01	0.01	0.01
21-50	0.05	0.05	0.04	0.05	0.02	0.03	0.02	0.02	0.03	0.01
>50	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C3. Proportion of successful fisher trappers by bag size in Southeastern New York, 2002-2011.

Fishers Harvested	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1-2	0.69	0.77	0.62	0.60	0.62	0.65	0.61	0.60	0.68	0.66
3-4	0.20	0.11	0.20	0.23	0.20	0.15	0.21	0.21	0.18	0.20
5-6	0.08	0.02	0.06	0.05	0.08	0.11	0.11	0.10	0.06	0.08
7-8	0.01	0.03	0.03	0.05	0.02	0.03	0.04	0.03	0.02	0.02
9-10	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.02
11-15	0.00	0.03	0.03	0.02	0.02	0.02	0.01	0.02	0.04	0.01
16-20	0.00	0.00	0.02	0.01	0.02	0.00	0.00	0.02	0.01	0.00
21-50	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.00	0.01
>50	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00

Trapper Mail Survey

Annually, the Department conducts a trapper mail survey, administered by Cornell University's Department of Natural Resources Human Dimensions Research Unit. Each year this survey is mailed to 4,500 randomly selected licensed trappers. Non-respondents are sent up to 4 follow-up mailings to elicit a response. Trappers are asked to list the species they trapped during the year, the locations (northern NY, western NY, southeastern

NY, Long Island) where they trapped, the number of animals harvested of each species, the total number of days trapped for each species, and the average number of traps per day. Response rates vary annually, but range between 45-55%. During 2011-12, the sample of 4,500 trappers represented about 37% of the 12,416 licensed trappers in New York.

In addition to questions regarding harvest, the Department asks specific questions to solicit opinions on various components of furbearer populations and management. For example, the 2013 survey included a question regarding trappers' perception of fisher population trends in 4 broad regions of the state, including the Adirondacks, NZ (outside of the Adirondacks), Catskills, and Hudson Valley. Trappers could answer this question with 1 of 5 responses: 1.) I do not trap in this area, 2.) fisher populations are increasing, 3.) fisher populations are decreasing, 4.) fisher populations are stable, or 5.) unsure.

The distribution of responses varied among the 4 regions and was more similar within a zone than between zones (i.e., NZ vs. SZ; Fig. C4). Uncertainty regarding fisher population trends among respondents was higher in the SZ (32-49%) than in the NZ (25-28%); however, a greater proportion of trappers felt that fisher populations were increasing in the SZ (40-56%) than in the NZ (21-36%; Fig. C4). The majority of those trapping in the Adirondacks perceived the fisher population to be stable with similar proportions of those indicating increasing or decreasing populations. Outside of the Adirondacks in the NZ, more trappers felt that fisher populations were increasing (Fig. C4).

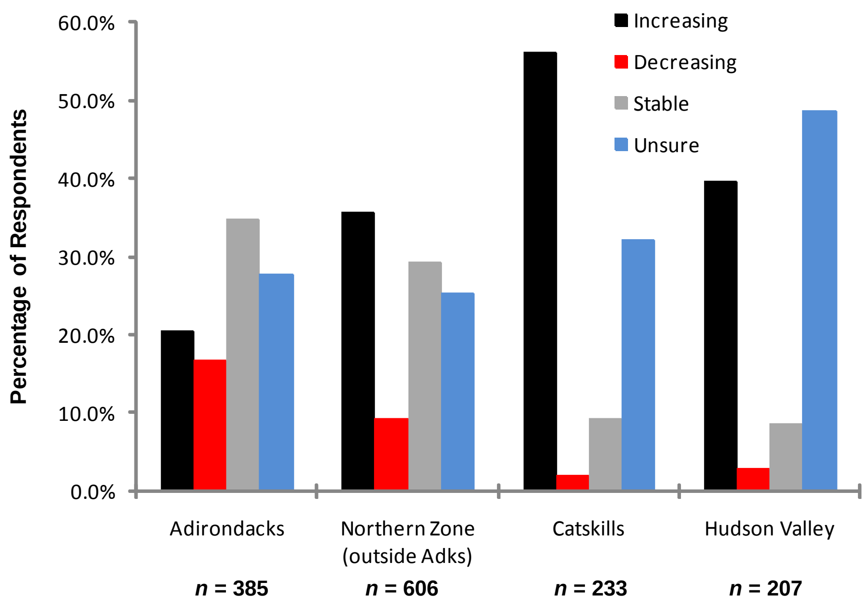

Figure C4. Percentage of respondents from the trapper mail survey indicating that fisher populations were increasing, decreasing, stable, or that they were unsure of population trends for 4 regions of New York, 2013. Sample sizes for each region are provided at the bottom.

For several years the Department has received requests from some trappers to open and close the fisher trapping season later. The primary concern cited by these trappers is the desire to harvest fishers and other furbearers when their fur is most prime. In response to this request, NYSDEC asked 2 questions on the 2011 Trapper Mail Survey (Table C4) to better understand trapper preferences with regards to the timing of land trapping seasons.

Results of this survey indicated that most trappers (57.3%) preferred the current opening date of October 25 for land trapping seasons and with no additional restrictions on body-grip traps (66.0%; Table C4).

Table C4. Responses of trappers to questions regarding land trapping season preferences in New York. These questions represent a portion of the New York State Trapper Survey mailed to 4,500 randomly selected licensed trappers in 2011.

If there was a change in the opening of land trapping seasons to improve pelt quality of trapped animals, which option would you prefer?

Pelt_Quality	Frequency	Percent	Valid Percent
N/A	243	10.0	
Keep the current opening date of October 25	1255	51.6	57.3%
Change the opening date to ***before*** October 25	311	12.8	14.2%
Change the opening date to November 1	434	17.8	19.8%
Change the opening date to ***after*** November 1	189	7.8	8.6%
Total	2432	100.0	100.0%

The DEC feels strongly that trapping seasons for all land species should open on the same (concurrent) date, but recognizes that separate opening dates for fisher/marten season could be possible. Which option would you prefer?

Fisher-Marten_Date	Frequency	Percent	Valid Percent
N/A	327	13.4	
Keep the concurrent opening date of October 25 for all land species with no additional restrictions	1389	57.1	66.0%
Keep concurrent season opening dates, but start the season ***later than October 25*** with no additional restrictions	513	21.1	24.4%
Open fisher/marten season later, but restrict body-grip traps for other land species until fisher/marten season opens	203	8.3	9.6%
Total	2432	100.0	100.0%