BLACK BEAR IN NEW JERSEY
Status Report 2004

New Jersey Department of Environmental Protection
New Jersey Division of Fish and Wildlife
Bureau of Wildlife Management

INTRODUCTION

The black bear occurred statewide in New Jersey through the 1800's, however, by the mid-1900's less than 100 existed and these were restricted to the northern portion of the state (Lund 1980, McConnell et al. 1997). Since 1953, the New Jersey Division of Fish and Wildlife (DFW) and the Fish and Game Council (Council) have managed the black bear as a game animal. Game animal status protected bears from indiscriminate killing, which stabilized the population. Limited hunting was legal in 10 seasons from 1958-1970 and resulted in a harvest of 46 bears. Based upon data gathered through the regulated hunting seasons the bear population status was assessed and the Council closed the bear-hunting season in 1971 (Lund 1980). Since the 1980's the black bear population has increased and its range has expanded due to the protection afforded them by game animal status, coupled with bear population increases in Pennsylvania and New York and improved habitat in New Jersey provided by the maturation of forested areas (McConnell et al. 1997). Black bears in New Jersey have adapted to live in close proximity to people and human development, taking advantage of human-derived food sources and protected habitats such as wetlands, public and quasi-public undeveloped open space, and forested waterways (Fimbel et al. 1991).

The 1997 Black Bear Management Plan (McConnell et al. 1997) recognized that cultural carrying capacity had been reached in northern New Jersey and the bear population was large enough to sustain a limited, regulated hunting season. In Year 2000, the New Jersey Council amended the Game Code to include a three-segment black bear hunting season. The purpose of the hunting season was to reduce the bear population (to 350 bears or 1 bear per 2.5 square miles) in order to reduce the associated bear/human conflicts, including property damage caused by bears. Hunting is a safe, legal, responsible use of the wildlife resource and the primary means of controlling black bears in 27 states. Hunting is a legitimate and effective means to control the increasing population of bears, thereby reducing associated problems (vehicle collisions, home entries, livestock kills, pet kills and property damage) in a cost-effective manner. Hunting is, therefore, considered one element of an integrated approach to manage bear populations.

In response to a lawsuit filed with the Appellate Division of the Superior Court in Trenton, along with a request by then Governor Whitman to suspend the hunt due to public urging, the Council voted to suspend the black bear hunting season, six days before the scheduled opening. An alternate bear management strategy was funded and implemented and it included an increased educational outreach, a more intensive bear population monitoring program and a more aggressive response to nuisance and problem bears.

In 2002, the Department of Environmental Protection (DEP) Commissioner hosted four public education forums in northern New Jersey, which emphasized how to live in bear country. The Commissioner also responded to the public's questions and concerns.

The 1997 BBMP proposed legislation to make intentional feeding of bears illegal because bears habituated to human sources of food through intentional feeding can cause problems for entire communities. In 2003, Governor James E. McGreevey signed legislation banning intentional feeding of black bears. An educational and enforcement effort resulting from this legislation will work towards a reduction in human-bear related conflicts.

The aggressive response to problem bears included development of a bear response policy based upon categories of bear behavior. The black bear rating criteria and response is a result of years of evaluating natural and nuisance behavior in New Jersey and other states. As black bears become more habituated to people, nuisance behavior can grow in frequency and severity. The special appropriation allowed the DFW to hire two full time bear education specialists, five wildlife technicians to aid in research and control actives and one full time law enforcement officer to train cooperating municipal and other agency personnel to assist in bear control and response.

2003 HUNTING SEASON

In 2003, the Council amended the Game Code to include a conservative bear season concurrent with the Six-Day Firearm Buck Season, December 8 to December 13, 2003. A conservative approach to the first bear hunt in over 30 years allowed for data to be collected without negatively impacting the bear population. The Council addressed several issues, which were raised regarding the more liberal bear season format proposed in 2000. By placing the season in December, impact on the population was minimized because most pregnant females would be denned and not available for harvest. Conflicts with other outdoor recreational activities was minimized by holding a bear hunt during the most popular hunting season when 80,000 hunters are already afield hunting deer. As expected the majority of applicants for the limited number of bear permits were hunters who already had permission to hunt deer within the bear hunting zone.

Bear hunting was limited to an area north of Rt. 78 and west of Rt. 287, an area of 1558 square miles. A quota of 10,000 permits was established and applicants were

required to attend a mandatory bear hunting orientation seminar. Hunters were allowed to use a shotgun not smaller than 20 gauge nor larger than 10 gauge with slugs only or a muzzleloading rifle of .45 caliber or greater. The season bag limit was one bear per hunter and all harvested bears had to be taken to a mandatory bear check station where biological and geographical information was obtained. The Council authorized the Commissioner of DEP, with consultation with the Director of the DFW and the Chairman of the Council to call off the bear season with 24 hours notice if biologists determined the harvest was excessive based on tagged bear returns in the harvest. Based upon success rates in adjacent states with similar seasons, and the number of permits issued, the Division estimated a harvest of between 272 and 408 bears. Such a harvest would not surpass yearly recruitment into the population.

The results of the 2003 black bear hunting season followed the predictions of DFW biologists based upon the conservative format. Hunter participation (5,450 hunters) was less than 10% of the 80,000 licensed firearm hunters. The total hunter harvest was 328 bears. Hunter success rate was 6%, within the 5 to 7.5% predicted. Biologists also predicted that the bear population, which is extremely productive with a high survival rate, could withstand a harvest rate up to 25%. The harvest rate based on bears tagged in 2003 and available to harvest was 22%. Based on the population estimate resulting from data collected during the season, the harvest rate was 19%. As predicted, the sex and age structure of the harvest matched that of bears captured during research and control activities.

A survey of bear permit applicants indicated 47% had previously hunted bears and 86% stated that they intended to hunt bears where they traditionally deer hunt. Participation by non-resident hunters (4.3%) was consistent with other seasons such as deer and turkey hunting. Additional statistics regarding the season are found in Appendix A.

Although it was speculated that the bear hunt would create trespass and safety problems, no specific landowner complaints involving bear hunters and no hunter accidents were reported. The hunt successfully established that hunters could safely harvest bears in a controlled manner. Biological data on the bears and demographic data on hunter success and participation collected during the season will be valuable for designing future management actions. Prior to the season, 7 lawsuits regarding the hunt were filed, including a case heard in the Federal District Court, Third Circuit involving bear hunting on federal land within New Jersey. All lawsuits were decided in favor of the bear hunting season.

INTEGRATED BLACK BEAR MANAGEMENT STRATEGY

The DFW and the Council manage black bear to assure their continued survival in New Jersey. Black bear can provide recreational opportunity and esthetic benefit for the

citizens of New Jersey through hunting, photography and wildlife observation. They can also cause property damage and raise safety concerns for residents and farmers. It is important that the black bear remains a public asset rather than a costly liability to the citizens of the state. Since 1980, the DFW has utilized an integrated approach to managing black bears. This strategy includes monitoring of the bear population; educating the citizens of New Jersey regarding black bear ecology and how to adjust human activities while living within bear range; and response to nuisance bear activity to minimize bear-human conflicts.

As previously stated, in November 2000, the Division instituted a more aggressive integrated black bear management strategy that included an increased research/monitoring, control and educational effort (Carr 2001).

1. Education

Since 1997, the DFW has enhanced its educational campaign to provide New Jersey residents and visitors with techniques and methods for living and recreating in areas where bears exist. The primary message is "Do Not Feed Bears," either intentionally or non-intentionally and "bear – proof" your surroundings to avoid conflicts with bears. The DFW regularly issues news releases and public service announcements alerting the public to safety issues regarding New Jersey's growing black bear population and providing bear information and bear-proofing techniques. The DFW' s Web Page (www.njfishandwildlife.com) provides additional bear biology, natural history and bear-proofing information, including a black bear slide show and a bear-proof garbage container listing.

The special appropriation in 2003 allowed the DFW to create and distributed nearly two million pieces of informational literature including 750,000 "Living In Bear Country" and "You Are In Bear Country" brochures, 300,000 educational brochures for children, 50,000 nuisance / damage brochures for homeowners and farmers, 200,000 garbage can tags with bear-proofing tips, 200,000 educational cards for campers, 200,000 "Do Not Feed the Bears" bookmarks 50,000 educational book covers, 40,000 educational coloring books for schoolchildren, 3,000 plastic picnic table signs, 5,000 Tyvec Bear Country signs, 5,000 Tyvec Bear Warning signs, and 25,000 "Do Not Feed the Bears" bumper stickers.

In 2001 and 2002, DFW biologists and public information specialists also presented about 120 programs over 15,000 people, including school groups, camp groups, service organizations, clubs, boy and girl scouts, police and township meetings. In 2003, radio and television public service announcements were aired for the bear activity seasons in spring summer and fall. The Division's black bear education specialist presented more than 50 programs on bears and bear safety to nearly 10,000 people at schools, camps, civic organizations, boy and girl scout meetings, municipalities and state parks.

2. Population Monitoring and Research

A part of the bear population monitoring includes an analysis of the growth and expansion of the range of the population and the effects on the citizens of New Jersey. The bear population has been spreading south and east, impacting people in areas of New Jersey that have not had bears in this century. Additional emigration of New Jersey bears into neighboring Pennsylvania and New York has impacted these states. The expanding human habitat/bear habitat interface provides potential for conflict because individual black bears are contacting humans as they attempt to forage throughout their habitat. In 2001, the available bear habitat in the prime bear range of Sussex, Warren, Passaic and Morris counties of northern New Jersey had a higher density of bears than the habitat found in the counties of eastern and central New Jersey. Dispersing bears were beginning to occupy suitable habitat in east central (Monmouth county) and southern (Ocean county) New Jersey. In 2003, bear sightings were recorded for 16 of New Jersey's 21 counties including Bergen and Union in the east, and Atlantic and Cumberland in the south.

The bear population increase is reflected by the distribution and number of sightings and bear incidents reported by the public. The following table outlines the expansion of the bear population in New Jersey:

BLACK BEAR ACTIVITY IN NEW JERSEY

	1995	2003
Municipalities reporting bear sightings or damage	48	111
Bears killed by vehicles	15	55
Bear damage complaints	285	1208
Bear sightings	43	680
Bear range (square miles)	1495	2643

Prior to the 2003 bear-hunting season, the most important known mortality factor for black bears in New Jersey was vehicle kills. Other sources of known mortality include euthanasia of problem bears and illegal killing of bears.

Reports of bears tagged in New Jersey and killed in other states are also logged. Both Pennsylvania and New York biologists report road-kills and hunter harvest of bears originally tagged in New Jersey. In 2001, 6 Pennsylvania and 3 New York hunter harvests and 1 New York vehicle strike were reported. In 2002, 13 Pennsylvania and 8 New York hunter harvests were reported. In 2003, 8 Pennsylvania and 7 New York hunter harvests and 1 New York vehicle strike were reported. New Jersey, New York and Pennsylvania black bears are contiguous and effectively interact as one population.

Research Trapping

Since 1981, DFW personnel have tagged over 1200 black bears including 463 newborn cubs. Data are collected on bears using foot snare or hair snare trap lines, from bears located in winter dens, target and non-target bears caught during bear control activities and from bears found dead as a result of vehicle strikes or other from other types of mortality. Bears continue to be radio-collared and monitored by radio telemetry

to acquire information on reproduction, survival, mortality, and home range size and habitat use.

In 2001, black bear project personnel captured a total of 154 bears (70M:84F) for research purposes; 100 adults, 29 yearlings and 25 cubs were handled. These captures include 10 adult bears (1M:9F) in dens, 13 cubs of the year (4M:9F) in dens, and 131 (65M: 66F) on traplines or free ranging. In 2002, black bear project personnel captured a total of 241 bears (93M:148F) for research purposes; 90 adults, 53 yearlings and 98 cubs were handled. These captures include 44 adult bears (3M: 41F) in dens, 90 cubs of the year (43M:47F) in dens, and 107 (47M:60F) on trap lines or free ranging.

In 2001, personnel handled a total of 314 bears (dead and alive) for research and control purposes and collected 679 hair and tissue samples for DNA analysis, of which 512 had good genotypes. DFW personnel identified 353 individual black bears from captured and dead bears and from barbed wire bear hair snares. Collection from the bear hair snares in the prime bear range in 2001 resulted in identification of 82 different bears (34M caught 41 times and 48F caught 76 times).

In 2002, personnel handled a total of 370 bears (dead and alive) for research and control purposes and collected 205 bear hair samples for DNA analysis from barbed wire bear hair snares, of which 172 had good genotypes. Collection from the bear hair snares in the prime range in 2002 resulted in identification of 69 different bears (23M caught 27 times and 46F caught 60 times).

In 2003, personnel handled a total of 628 bears (dead and alive) for research and control purposes. Of the 628 bears 262 (42%) were males, 358 (57%) were female and 8 (1.3%) were unknown. Of the 628 bears handled 340 (54%) were adults, 112 (18%) were assumed to be yearlings and 168 (27%) were cubs of the year.

In 2003, personnel handled 124 bears during the 2003 winter denning season. A total of 40 adult bears (2M:38F), 60 cubs of the year (32M:28F) and 14 yearlings (7M:7F) were handled during the 2003 denning season. DFW personnel captured a total of 159 bears during the two research trapping sessions. Of the 159 bears captured 83 (27M:56F) were adults, 50 (30M:20F) were yearlings, and 26 (17M:9F) were cubs. Of those 159 bears captured 117 (74%) were never previously handled and only 42 (26%) were previously tagged. In addition to research captures DFW personnel added an additional 12 (4M:8F) as non-target captures at nuisance complaint sights. These animals were also tagged and released.

DFW personnel continue to handle a large number of bears each year; 70 % of which have never been handled despite an aggressive trapping and tagging effort. NEW JERSEY's black bear population heavily favors adult females, which indicates that our population has a significant reproductive potential.

For all litters examined during winter den work from 1984 to 1996, the average litter size for the Kittatinny study area was 2.9, and that for the Bearfort study area was 2.7 (McConnell et al., 1997). From 1999 to 2002, personnel documented average litter

size of 2.7 for the Kittatinny study area and 2.4 for the Bearfort area. The lower litter size is attributed to processing younger aged females in winter den work. Thirty-eight percent (38%) of the litters handled in the Kittatinny area (10 of 26) were from females aged 2-3 averaging 2.0 cubs per litter, while 19% (16 of 86) of the litters processed by McConnell et al. (1997) were from females aged 2-3 averaging 2.3 cubs per litter. Although McConnell et al. (1997) reported that Bearfort females do not produce cubs until 4 years of age, DFW personnel handled 4 litters from 3-year-old females in the Bearfort area, which averaged 2.0 cubs per litter. As in the earlier research, older aged females produced larger litter sizes, 10 Kittatinny females aged 5-10+ averaged 3.2 cubs per litter and 7 Bearfort females aged 6-9 averaged 2.6 cubs per litter.

In 2003, personnel handled 22 adult females, which produced 60 cubs (32M:28F) for an average litter size of 2.7 cubs per litter. A total of 16 adult females had 43 cubs of the year in 2002. In 2003 those 16 adult females had 30 yearlings still alive. Division personnel handled 14 (7M:7F) of these yearlings and observed 16 others but were unable to handle them. This represents a 70% survival rate for cubs of the year which is consistent with earlier studies.

The average litter size of 2.7 cubs is consistent with the results found by DFW biologists for the past 20 years. A reproductive rate of 2.7 cubs per litter and a survival rate of 70% indicate the black bear population found in New Jersey is capable of recruiting a significant number of animals into the population. Based on this information we can expect to see the black bear population expand its range in New Jersey.

Cooperative Research

A number of cooperative studies between the DFW, Rutgers University and East Stroudsburg University continue. Ongoing research studies include a radio-telemetry study of home range and habitat use of nuisance/non-nuisance female bears, a stomach content analysis study of nuisance/non-nuisance bears, teat length measurement to determine age of first reproduction and media content analysis of newspaper articles concerning bears in New Jersey. Project personnel continue to collect reproductive tracts to document reproductive parameters (age of first production, litter size) and diaphragms to examine for trichinosis. DFW biologists and technicians also conducted preliminary trials to test the effectiveness of a smell aversion chemical for black bears. An evaluation of the effectiveness of aversive conditioning is continuing.

Biologists have documented that 3 black bears (6% of bears sampled) tested positive for West Nile Virus neutralizing antibodies, indicating that the bears were exposed to the virus during the course of the mosquito transmission season. Radio-telemetry research conducted in 2002 and 2003 has revealed that female bears in New Jersey's prime bear habitat have compacted individual home range sizes over the last 10 years and now average about 2 square miles, as compared to the 6.5 square miles documented in the early 1990's. Telemetry research has also documented that there is no significant difference in home range, habitat use and movement patterns for female bears characterized as nuisance versus non-nuisance bears. All female bears in the study

utilized residential areas within their home ranges. The analysis of stomach content in bears characterized as nuisance versus non-nuisance also revealed no statistical difference; human-derived foods were found in most stomachs. The preliminary results of blood samples taken from live-captured and hunter-harvested bears indicates that New Jersey bears have been exposed to and carry antibodies for Toxoplasmosis.

In November 2002, the Department entered into a Memorandum of Understanding with the Humane Society of the United States (HSUS) to investigate the feasibility of fertility control as a means of controlling the black bear population. As part of the agreement, HSUS was to develop a proposal to first test chemical fertility agents on a captive population of bears. To date, the Department has not received a formal proposal.

3. Bear Response & Control

Increasing human development in the rural northwestern counties of the state, the coincident increase of the bear population within these counties and resulting expansion south and east has resulted in an increase in bear-human conflicts. Incidents involving bear damage to property and livestock remain high in frequency and severity. The DFW's Wildlife Control Unit (WCU) received 1,096 complaint calls in 2001 and 1,412 complaint calls in 2002 and 1,308 complaint calls in 2003. These complaints range from raids on garbage bins and birdfeeders to bears attacking humans, entering homes, killing livestock and pets or destroying beehives and agricultural crops. Damage estimates are in excess of $100,000 annually. It is important to note that since 2001 there have been 4 aggressive contacts with humans reported to the DFW. Of the four, 2 took place in 2003. Only minor injuries were reported in all instances. The following chart details bear complaints for 1999-2003:

Number of Black Bear Complaints 1999-2003

Reported to DFW Wildlife Control Unit

INCIDENT TYPE	1999	2000	2001	2002	2003
NUISANCE	468	483	357	525	357
GARBAGE	496	290	269	379	503
BIRDFEEDER	274	202	137	137	89
PROTECTED HIVE	4	7	0	2	3
UNPROTECTED HIVE	19	16	13	24	9
LIVESTOCK KILL	25	22	36	27	17
RABBIT KILL	28	38	57	34	38
UNPROVOKED DOG ATTACK	12	17	6	15	11
PROVOKED DOG ATTACK	***	***	***	***	22
HOME ENTRY	29	29	29	55	53
AGGRESSIVE	34	51	37	28	19
CAMPSITE / PARK	28	22	5	10	1
URBAN REMOVAL	10	7	12	19	11
PROPERTY DAMAGE	232	191	123	111	132
HUMAN ATTACK	0	0	1	1	2
ATTEMPTED HOME ENTRY	*	*	5	25	23
AGRICULTURAL DAMAGE	*	*	5	9	5
TENT ENTRY	*	*	2	5	4
VEHICLE ENTRY	*	*	2	6	9
Total	**1,659**	**1,375**	**1,096****	**1,412****	**1,308****

* Separate Incident Type beginning in 2001
** Does not include calls handled by police departments.
*** New Incident Type for 2003

As part of the integrated bear management strategy initiated in 2000, DFW developed a problem black bear rating and response policy. The bear rating and response policy constitutes a responsible action by the Division to manage the growing black bear resource while minimizing negative impacts to humans, their pets and livestock and property. This policy recognizes 3 categories, which are described below. Integral to the implementation of this policy was the cooperation of law enforcement personnel from other agencies within bear range. Since January 2001, the Division has trained 589 municipal, county and state law enforcement officers from 97 municipalities, and 21 state, county and federal parks to assist the Division in bear control.

The drop in bear complaints from 1999 to 2003 is attributed to: euthanizing Category I bears thereby eliminating further negative behaviors by those animals; the Division's education program successfully reaching residents who bear-proof their yards including proper garbage management; an increased tolerance of bears by the public due to the Division's policy of destroying Category I bears; and residents calling local police who have been trained by the Division for bear assistance.

Category I Bears

Category I black bears constitute an immediate threat to life and property. Those bears exhibiting behavior that is a threat to human safety or causing serious property damage are euthanized. Division personnel, law enforcement officers and park rangers trained by the Division, may destroy Category I bears immediately. In 2001 the Unit tallied 200 reports for Category I behavior, which includes a human attack, home entries, aggressive bears, attacks on livestock, pets and dogs, and damage to beehives and agricultural crops. Black bear project personnel set traps at 92 sites for Category I bears, catching 17 target and 21 non-target bears. A total of 24 bears were euthanized in 2001 for Category I behavior; 20 by WCU staff, 2 by municipal police officers, and 2 by private citizens.

In 2002, black bear project personnel set traps at 107 sites for Category I bears, catching 24 target and 22 non-target bears. A total of 35 bears were euthanized in 2002 for Category I behavior; 26 by WCU staff, 1 by a Conservation Officer 1 by a state park ranger, 2 by municipal police officers, 1 by a state police officer and 4 by private citizens.

In 2003 Division personnel set Category I traps at 85 sites catching 10 (5M:5F) target animals, which were subsequently euthanized, and 8 (4M:4F) non-target animals, which were released. A total of 18 black bears were euthanized in 2003 for Category I behavior, 11 by WCU staff, 6 by police officers, and 1 by a farmer. In 2001 and 2002, WCU personnel issued 12 Permits to Kill Depredating Black Bears to farmers experiencing agricultural damage, although no permit holders killed depredating bears. In 2003 WCU personnel issued 3 Permits to Kill Depredating Black Bear to 2 different farmers, no bears were killed.

Category II Bears

Category II black bears are nuisance bears which are not an immediate threat to life and property. Category II bears may be treated with aversive conditioning techniques by DFW WCU personnel, DFW Bureau of Law Enforcement personnel, local law enforcement officers and State Park Rangers trained by the Division. WCU personnel set traps to capture Category II bears which could not be treated with free-range aversive conditioning.

In 2001, black bear project personnel set traps at 74 sites for Category II bears, catching 18 target and 11 non-target bears. The Division recorded Category II conditioning by Division personnel in 21 instances, by Parks in 26 instances, and by Police in 41 instances. 3 adult males (Category II) were removed from under houses and decks.

In 2002, black bear project personnel set traps at 82 sites for Category II bears, catching 15 target and 14 non-target bears. The Division recorded Category II conditioning by Division personnel in 30 instances, by Parks in 31 instances, and by Police in 86 instances. 1 adult male (Category II) was removed from under a house.

In 2003, black bear project personnel set traps at 10 sites for Category II bears, catching 3 target animals and 2 non-target bears. Target animals were aversively conditioned and released on site. The Division recorded Category II conditioning by Division personnel in 2 instances, by Parks in 25 instances, and by Police in 141 instances. 1 adult male (Category II) was removed from under a house.

Category III Bears

Category III bears are exhibiting normal behavior and are not creating a nuisance and are not a threat to the safety of the public. In general, these are animals observed and reported to the WCU by the public or local authorities. Such animals may be considered by the caller to be a nuisance or a danger because the caller has not had the experience of interacting with bears. Except for removing dispersing bears stranded in urban situations, the DFW takes no action with Category III bears.

Surveys of Cooperating Agencies

An analysis of surveys received from cooperating municipal police departments and parks (88% responding) reveals that in 2001 the police departments tallied at least 1172 citizen calls concerning bears, referring only 103 to the Division's Wildlife Control Unit. Therefore, in 2001 local police departments and state parks and forests handled 1069 citizen bear calls in addition to the 1096 citizen complaint calls received by the Wildlife Control Unit.

In 2001, police officers from 13 townships reported conditioning black bears in 41 instances. Rangers from 4 state parks conditioned bears in 26 instances. Police officers gave advice in 347 instances and conducted on-site response in 307 instances. Ninety (90) calls were referred to the animal control officer (ACO) within the township.

In 2002, police officers from 17 townships reported conditioning a black bear in a total of 86 instances. Rangers from 6 state parks conditioned bears in 31 instances. Trained officers gave advice in 155 instances and conducted on-site response in 718 instances. No calls were reported to the ACO according to the surveys received.

In 2002, 43% (45) of the 104 cooperating agencies responded, reporting 827 citizen calls. Law enforcement agencies referred 178 of the calls to the DFW's Wildlife Control Unit. Therefore, in 2002 local police departments and state parks and forests handled 649 citizen bear calls in addition to the 1412 citizen complaint calls received by the Wildlife Control Unit.

Cooperating agencies were again surveyed to gather data on activities for 2003. At present survey results are incomplete. Currently only 71 (60%) of the 118 cooperators have responded, reporting 2,077 calls, 220 (11%) of which were referred to the DFW. As of February 19, 2004 a total of 3,998 calls have been placed to the DFW, Municipal, State and Federal Parks as well as municipal and state law enforcement agencies. It is important to note that many of the townships with chronic black bear problems have never responded to our survey. Most notable of these townships is West Milford Township located in Passaic County.

In 2003 respondents to the survey indicate that officers employed aversive conditioning techniques 141 times. Officers euthanized 6 bears for Category I behavior in 2003, compared to 3 in 2002.

As a result of the conclusion of the special funding appropriation to enhance bear management, the DFW has reduced staff responsible for responding to bear complaints. In the last two years, the Division has increasingly referred calls to cooperating local police agencies, which have the ability to respond more quickly. As more local police officers are trained and gain experience, and as citizens more frequently rely on their response, the number of responses to nuisance complaints handled by local agencies has increased. Trained officers may be more comfortable with aversive conditioning techniques in 2003 than they were in 2001, and more willing to employ them on a nuisance bear.

Introduction of Black Mouth Yellow Cur dogs

Using specially trained dogs of various species to assist in the harassment of bears as part of the aversive conditioning process is a method often recommended by citizens and organizations opposed to the lethal control of problem bears. After consulting with other states currently using such dogs for nuisance abatement in black bears populations, the DFW decided to implement a bear dog program. In the fall of 2003, three (1M:2F) Black Mouth Yellow Cur pups were purchased from Wrights Curs located in Hughes, Texas. This breeder has supplied dogs to other states that are using these dogs for managing nuisance black bear. The dogs are currently 8 months old and in training. The dogs have successfully completed an obedience-training course and continue to work with DFW personnel to hone their aversive conditioning skills.

POPULATION STATUS

As described in the previous research section, the New Jersey population of bears is monitored through data collected at dens, research trap lines, during wildlife control activities and from vehicle struck bears. The results of these activities indicate that our bears, like those throughout the Mid-Atlantic region, are healthy, gain weight faster and consequently breed earlier and have larger litters than their counterparts in other regions of the United States and Canada. All data from sightings and research efforts indicate New Jersey's bear population is increasing in size and extending its range south and eastward. Such facts are sufficient to make management decisions, including whether or not the population can support recreational hunting.

Nevertheless, a frequently asked question is what is the actual size of the population. Attempting to estimate the statewide population size for a wild, free ranging animal such as bears is a difficult, expensive and complicated undertaking that most states do not endeavor to undertake. Nevertheless, as part of the research effort conducted in New Jersey during the last twenty years, various estimates have been generated. In order to put these estimates in perspective, it is important to understand how they are derived.

Population Model Selection

One of the benefits of tagging (marking) bears is that it allows for an opportunity to estimate the population. The proportion of bears initially tagged and recaptured at a later point in time can be used to derive an estimate of the total number of bears in the study area. These so called Mark/Recapture studies are often used to estimate wildlife populations. However, it is not always possible to satisfy all the mathematical assumptions associated with a particular model under field conditions. In order for the estimates to be accurate, there should be no changes in the population resulting from births, deaths, immigration into the study area or emigration out of the study area between the initial tagging or marking event and the subsequent recapture. If the above assumption applies, the population is considered closed and a simple "closed" mathematical model may be used.

When dealing with large animals with large home ranges that are difficult and expensive to capture and mark, and that move in and out of the study area, such closed models are invalid. An "open" population model must be used. A further assumption that does not often exist in the real world is that all animals in the population are "equally likely" to be captured during the first and second capture period. Some animals are more wary and will never be caught, or will avoid the same trap (trap "shy") once having been caught, and some will be trap "happy" and be caught multiple times in order to get at the bait. Researchers may change the capture method between the initial trapping (marking) and second trapping (recapture) session in order to avoid trap "shy" or trap "happy" bias. For example, marking bears by capturing them in foot snares and recapturing them by using hair snares or by hunting seeks to solve this trap bias. Some trapping methods

currently used such as the hair snare are considered more neutral regarding influencing recapture. The bear just brushes up against some barbed wire as it approaches the trap and leaves some hair, but is not negatively influenced to avoid the baited trap in subsequent visits.

A further assumption that the researcher may not always be able to meet is the condition that traps be placed evenly throughout the study area (the ability to get permission to trap on public vs. private land), so that all animals are "equally likely" to be trapped. To further compound the ability to meet the assumption above, the age and sex of the individual animal may influence the likelihood of being trapped due to differential experience and behavior. And finally, since bears are so difficult and expensive to trap, bears caught under any circumstance (research trap lines, winter den work, bear control work) are tagged and released and later used in recapture analysis. The variability in initial capture (tagging) methods complicate the population analysis. With knowledge of the above biases, biologists have relied on sophisticated open population models run on computers which can analyze and account for the above problems or biases in order to more accurately estimate population abundance of wildlife.

New Jersey Methods

In 2001 and 2002, DFW biologists collected bear hair samples using bear hair snares and determined individual identity by DNA analysis of the hair as part of a mark/recapture study. The population or abundance estimate was then calculated using a widely used population-modeling program, named CAPTURE, which can choose the appropriate population model considering the above-discussed biases. Because of the impossibility of uniformly setting bear snare traps throughout bear range, the coverage of the bear hair trapping sites was not sufficient to ensure that a bear anywhere in the prime bear range had the potential to be trapped. Some bears, then, would have a trivial probability of being sampled. To compensate for trivial sampling probability, the area of influence around each bear hair snare was designated as an average bear home range size as previously determined by radio-telemetry. Density estimates for the area of influence or study area were then used to estimate a population for the entire area north of Rt. 80 and west of Rt. 287, considered the prime bear range in New Jersey. The population estimate was 1777 adult bears (see Black Bear in NJ Status Report 2003 (Carr and Burguess 2003) for a more thorough discussion).

Although, bear hair analysis shows promise and is being used in many states, results are delayed because of the time necessary to analyze the DNA and thus identify each animal. Additionally, multiple hairs from the same animal may be inadvertently analyzed several times, thereby increasing costs.

The 2003 population estimate was calculated based on similar capture/recapture methodology but using different sampling techniques. All bears captured, tagged and released alive by Division personnel in 2003 were considered the capture. Harvest by hunters in the 2003 regulated hunting season was considered the recapture. This method is widely used by other states having regulated hunting seasons because the recapture is

different, therefore minimizing trap bias and because hunting recovery is less expensive than research trapping. The fact that other states such as Pennsylvania use this method allows comparison of New Jersey data.

DFW personnel captured 264 individual bears in 2003, but 25 were known to be dead before the NJ bear hunting season began on December 8. Of the 239 bears tagged in 2003 and available, 55 were harvested during the bear hunting season from December 8-13. The total number of bears used in the analysis (328 legally harvested, 2 illegal harvest and 3 shot and not recovered by hunters) was 333.

Because of the questions surrounding earlier bear population estimates, data was submitted to bear biologists in Maryland, Pennsylvania, and the U.S. Fish and Wildlife Service; and statisticians at Penn State University, Colorado State University, and Rutgers University. All were familiar with the analysis of bear data. DFW allowed the consultants to analyze the data independently and then shared results and asked the consultants to address issues of concern noted with the data by DFW and the consultants. Concerns included uneven capture and recapture within the area of the hunt, varying time between capture and recapture, differential sex ratio and hunter success rates by region and suspected correlation between harvest of females and cubs. Additionally, data of New Jersey tagged bears harvested in Pennsylvania and New York indicated an open population. All but the Maryland biologist provided population estimates and the statistician from Rutgers University concurred on the analysis method of the Penn State University statistician.

A consensus was reached that an open population model estimator, which also accounts for various parameters such as emigration, sampling rates and interdependence provided the best estimate. Bears in New Jersey are highly mobile, as evidenced by tag returns. Every year, bears tagged in New Jersey are captured or killed (vehicle strikes and hunter harvest) in both Pennsylvania and New York. Additionally, about 11% of bears tagged in a given region within New Jersey are recaptured or killed in a different region. Capture rates and harvest rates of bears in New Jersey vary by sex and age class, therefore violating the assumption of equal probability of both capture and recapture. In addition, the capture and harvest of cubs is associated with the capture and harvest of the female, thus not independent. A statistical test of the closed population model indicated this model did not account for these biases and was therefore rejected. The open model was found to be statistically valid. Therefore for New Jersey's data, the best population estimator resulted from an open population model, not a simple closed model such as the Lincoln-Peterson estimator.

Additionally, all the consulting biologists and statisticians concurred that the population estimate should be limited to the area sampled. The statisticians agreed that the individual estimates for the Eastern Region (NE and SE) and Western Region (NW and SW) were based on an adequate sampling however the center of the hunt area (Wallkill Valley north of Rt. 80) and hunt area south of Rt. 80 was not adequately sampled and should not be included in the population analysis (see Figure 1). The Eastern Region comprises an area of approximately 350 square miles and the Western

Region approximately 230 square miles. Therefore, the area sampled for the population estimation is approximately 580 square miles. This compares to the entire area open for the black bear hunting season of approximately 1558 square miles; that area North of I-80 and West of I-287 is approximately 950 square miles.

The 2003 population estimate for the Eastern region is 947 bears and for the Western region is 543 bears. The total population estimate for the approximately 580 square mile area adequately sampled is 1490 bears at the start of the 2003 bear hunting season or 2.56 bears/sq. mile.

The above estimate includes cubs. However, estimates reported in the Black Bear Management Plan (BBMP 1992-1996 estimate published in 1997) and 2001 and 2002 did not include cubs. Therefore, in order to compare these results, the estimate of cubs for 2003 were removed from the following analysis. For the 149 square miles sampled for the BBMP, (Figure 2) the bear density was 0.6 bears/mi^2. In 2001 and 2002, (Figure 3) for the 131 square miles sampled, the bear density was 1.5 bears/mi^2 in 2001 and 1.6 bears/mi^2 in 2002. In 2003, for the 580 square miles sampled, the bear density was 1.9 bears/mi^2. Although these estimates are based upon different sampling and analysis techniques, it is clear that the population has increased overtime. As indicated in Figures 1-3, the area of each subsequent estimate encompasses but is larger than the study area from 1997.

Of the 328 bears harvested, only 100 bears were tagged at some time by the DFW. Therefore, 7 of 10 bears harvested by hunters had never been handled by DFW personnel. The percentage (70%) of untagged bears mirrors the proportions which DFW personnel encounter on research traplines, during nuisance activities or when recovering vehicle-killed bears.

The sex ratio of bears in the harvest were similar to those are found in the wild. Although the sex ratio at birth is nearly 50:50, DFW personnel consistently handle more females than males in research and control work in New Jersey. The similarity in the percentage of untagged bears and the sex ratio of bears in the harvest compared to other methods of data collection indicates that the harvest and the subsequent analysis is reflective of the actual population.

According to the 1997 BBMP, the population density reported for the relatively small study area (149 sq. miles) were used to estimate a bear population estimate for the 942 sq. mile area then considered to be New Jersey's bear range. In 2003, DFW biologists following a similar rationale, estimated a 2001 population estimate of 1777 adult bears for an area north of Rt. 80 and west of Rt. 287. Based upon the estimated recruitment into the population from these bears as well as an estimate of mortality, a 2003 New Jersey bear population was estimated to be 3278. However, this potential population increase would result in dispersing bears south and east within New Jersey, as

well as north and west into adjacent states. Although the latter estimates were based upon a research sample far larger than available in 1997 and resulting from more sophisticated population models, the data was disputed by persons opposed to the proposed bear hunting season. Data and the analysis resulting from the 2003 bear hunt are similar for those reported for 2001, however the DFW declines to project these densities to unsampled areas within known New Jersey bear range.

Although the Wallkill Valley may contain similar densities of bears (based upon nuisance bear complaints) and that the difference in land ownership accounts for the inability to adequately sample the bears within the region, estimating the population in this region is not a critical requirement for selecting bear management options. Similarly, a lack of sampling south of Rt. 80 is likely due to a lower bear density, as evidenced by lack of past trapping success and lower nuisance complaints. However, a population estimate is not necessary for this area in order to responsibly manage the bears. It is clear that attempting to capture an adequate sample of bears in these two areas would require an inordinate expenditure in time and resources.

The Kittatinny (Western) and Bearfort (Eastern) bear populations (Figures 1-3) have been studied since 1980 and represent a solid long term and extremely valuable database upon which to make management decisions. Future research efforts should concentrate on continuing this monitoring effort which can be used as an index to the population within prime bear range.

The recent analysis of the bear population in the prime bear range indicates it is being regulated through dispersal and emigration. New Jersey tag returns from Pennsylvania and New York and colonization in eastern and central New Jersey support this conclusion. The sex ratio of cubs-of-the-year in dens found in 2003 does not differ from the long-term average of approximately 50:50 (1M:1F). The average litter size and the survival rate of adults and young-of-the-year showed no significant decrease and are high compared to other North American black bears. These data indicates that New Jersey bears in prime range are healthy and reproduction and survival have not decreased as the population has grown. We expect that bears will continue to disperse and colonize available habitat throughout New Jersey as long as high bear densities exist in the prime range.

In conclusion, the DFW will continue to focus on an integrated strategy for bear management that includes a continuing educational campaign, research and monitoring, and appropriate control measures. The 1997 BBMP set a target density of 1 bear/ 2.5 sq. miles in order to minimize conflicts and to manage New Jersey bears consist with target densities of adjacent states with similar habitat. The results of this most recent population analysis and the results of the 2003 bear hunting season indicate that the current population can support a recreational hunting season. Should the Council consider such a season in 2004, the DFW recommends that the format mirror the 2003 season in order to continue a conservative approach and allow consistent analysis. The

DFW is confident that with careful management of this species, black bears will be able to thrive in New Jersey where they can safely coexist with New Jersey residents.

2003 BLACK BEAR SEASON LEGAL HARVEST SUMMARY *Appendix A.*

Final Data 2/16/04

	Monday 12/8	Tuesday	Wednesday	Thursday	Friday	Saturday 12/13	Total
Bears Taken	120	69	33	17	40	49	328
Cumulative Harvest Total	120	189	222	239	279	328	328
Hunter Success Rate (cumulative) based on 5450 permits-no youths	2.2%	3.5%	4.1%	4.4%	5.1%	6.0%	6.0%
2003 tagged bears recovered	17	10	5	5	6	10	53
2003 tagged harvested (%age based on 239 available)	7.1%	11.3%	13.4%	15.5%	18.0%	22.2%	22.2%
Total tagged from all years	36	21	11	7	10	15	100 of 328 harvested 7 of 10 bears in harvest are untagged
Nuisance bears							10
Non-target tagged at nuisance site							7
Urban bears							3
Research bears							74
Unknown (previously handled but tags ripped out)							6

BY COUNTY

County	Total Harvest	Percentage of Harvest	Area mi^2	Percentage of Hunt Area	Harvest/mi^2
Sussex	233	71 %	537	34 %	0.43 / mi^2
Warren	48	15 %	363	23 %	0.13 / mi^2
Passaic	26	8 %	126	8 %	0.21 / mi^2
Morris	20	6 %	429	28 %	0.05 / mi^2
Bergen	1	0.3 %	35	2 %	0.03 / mi^2
Hunterdon	0	0	219	13 %	0 / mi^2
Somerset	0	0	74	4 %	0 / mi^2
Total	328		1558		0.21 / mi^2

Note: Area of individual counties does not add up to Total area due to rounding of municipality data

2003 BLACK BEAR SEASON LEGAL HARVEST SUMMARY

Final Data 2/16/04 (p.2)

SEX AND AGE DISTRIBUTION OF HARVEST

Age	Male	Female	Total (%)
Young of year	46	37	83 (25%)
Yearling	11	22	33 (10%)
Adult	62	150	212 (65%)
Total (%)	119 (36%)	209 (64%)	328

HARVEST RATE OF 2003 TAGGED BEARS

Class	Rate
Young of year (M & F)	17/79 = 21.5%
Males >= 1	7/53 = 13.2%
Females >= 1	29/107 = 27.1%
TOTAL	53/239 = 22.2%

NJ HARVEST BY DAY vs. PREDICTED HARVEST

DAY	Predicted Percentage of Harvest	Predicted Bear Harvest per Day Season Harvest of 328	Actual Bear Harvest per Day Season Harvest of 328
Monday	45 %	148	120 (37 %)
Tuesday	15 %	49	69 (21 %)
Wednesday	10 %	33	33 (10 %)
Thursday	8 %	26	17 (5 %)
Friday	7 %	23	40 (12 %)
Saturday	15 %	49	49 (15 %)
Total	100 %	328	328 (100 %)

2003 BLACK BEAR SEASON LEGAL HARVEST SUMMARY

Final Data 2/16/04 (p.3)

NJ bear harvest predictions by Division of Fish and Wildlife biologists:

Prediction: <10% of80,000 firearms hunters would participate:

6,777 hunters applied
5,450 permits issued (5,665 permits issued, including youths)

Prediction: Bear hunters would hunt bears where they traditionally hunt deer:
86% of bear permit holders said they would hunt bear where they hunt deer (based upon application question)

Prediction: This hunting season would not draw excessive numbers of non-resident hunters:

Only 4.3% of bear permit holders were non-residents. This is similar to other seasons.

Prediction: *About half of the NJ bear hunters would have experience hunting bears:*
47% of permit applicants had hunted bears previously, either in NJ before the season was suspended in 1971 or in other states or provinces

Prediction: *Harvest rate would be less than 25% of available bears:*

22.2% of 2003 tagged bears were harvested

Prediction: *Hunter success rate would be between 5% and 7.5%:*

6.0% of hunters were successful

Prediction: *Harvest would be between 272 and 408 bears*:

328 bears were harvested

Prediction: NJ Harvest would be similar to PA harvest in Carbon, Monroe and Pike counties:

2003 harvests were NJ: 328 PA 2002: 443 PA 2003: 303

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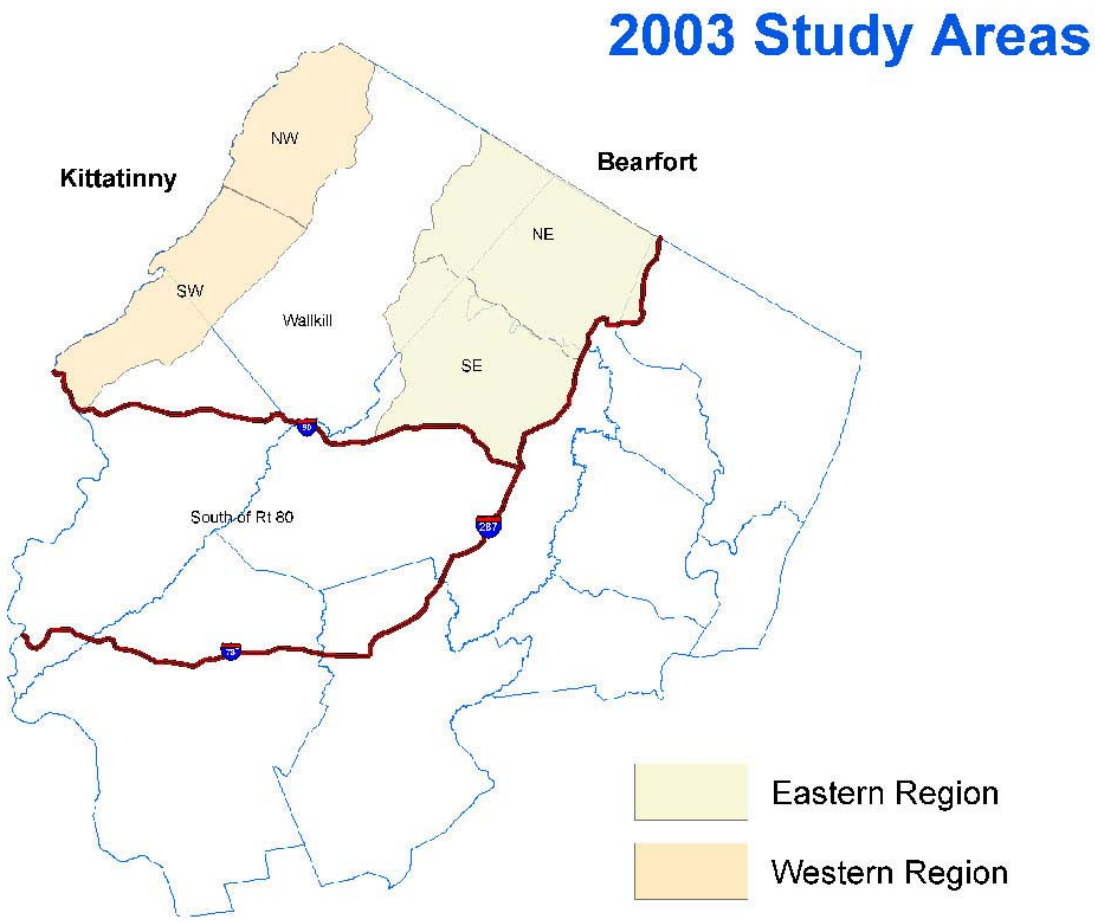
2003 Study Areas
Kittatinny
Bearfort
NW
SW
Wallkill
NE
SE
South of Rt 80
Eastern Region
Western Region

Figure 1

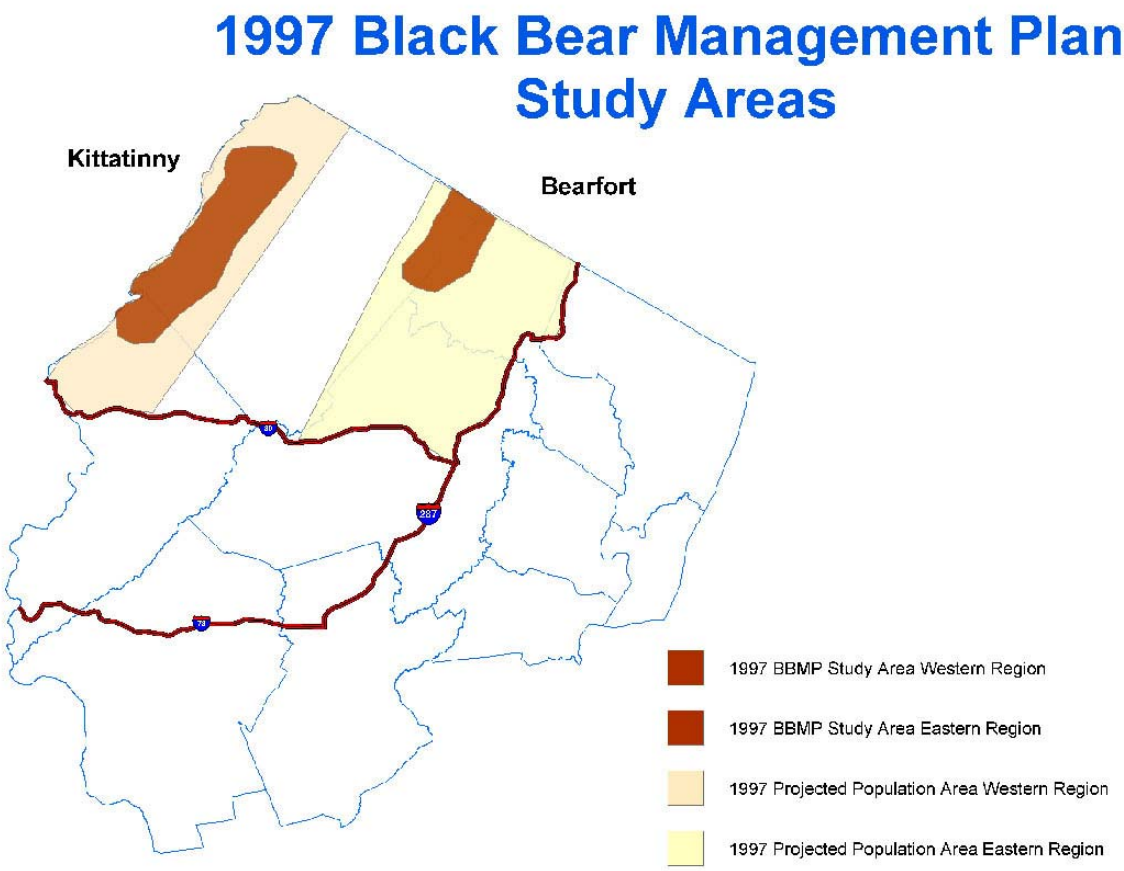
1997 Black Bear Management Plan
Study Areas
Kittatinny
Bearfort
287
1997 BBMP Study Area Western Region
1997 BBMP Study Area Eastern Region
1997 Projected Population Area Western Region
1997 Projected Population Area Eastern Region

Figure 2

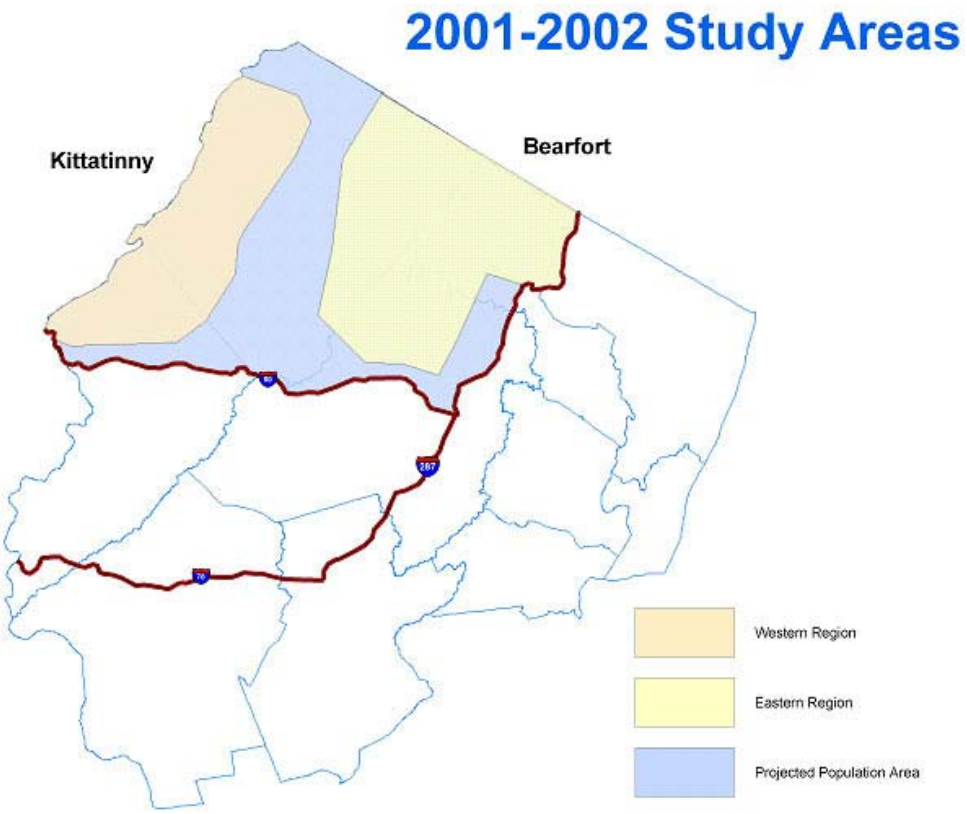
2001-2002 Study Areas
Kittatinny
Bearfort
287
Western Region
Eastern Region
Projected Population Area

Figure 3