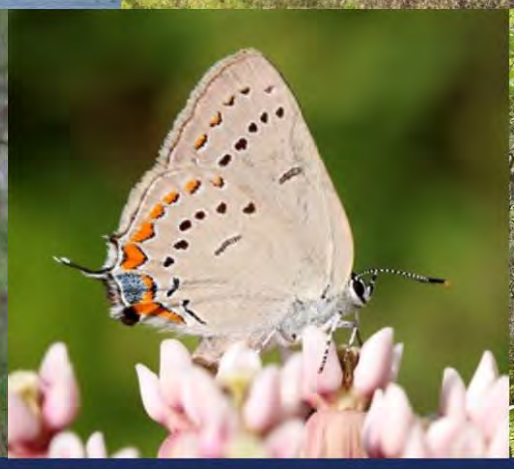
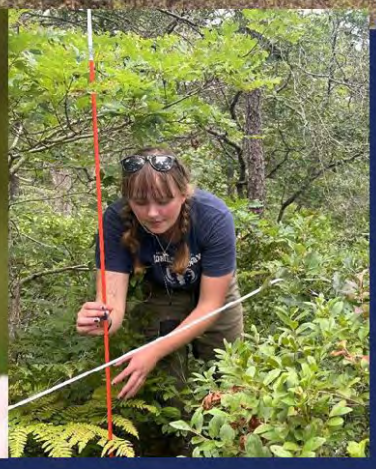
STATE OF THE RESERVATION REPORT

TRAINING YEAR 2024• CAMP EDWARDS
FINAL





Final Annual State of the Reservation Report, Camp Edwards, Training Year 2024
March 2025

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Preface

The Annual *State of the Reservation Report* (the Annual Report), established by the Massachusetts Environmental Policy Act process and required by state law (Chapter 47 of the Acts of 2002), is the result of many years of environmental reviews and submissions by the Massachusetts Army National Guard. Chapter 47 of the Acts of 2002 is available at: https://www.mass.gov/doc/chapter-47-of-the-acts-of-2002/download

The Annual Report describes the nature and extent of military training and other activities taking place in the Camp Edwards Training Area/Upper Cape Water Supply Reserve. In addition, it describes the status of the Massachusetts Army National Guard's compliance with environmental laws, regulations and the Environmental Performance Standards, a set of 19 standards established in Chapter 47 of the Acts of 2002 guiding military and civilian usage of the Camp Edwards Training Area/Upper Cape Water Supply Reserve (Training Area/Reserve). The Annual Report illustrates that coordinated military training can occur in the Camp Edwards Training Area/Upper Cape Water Supply Reserve in a manner that is compatible with the natural resources purposes of water supply and wildlife habitat protection.

The Annual *State of the Reservation Report* covers the Massachusetts National Guard's Training Year 2024, which ran from October 1, 2023 to September 30, 2024; therefore, information provided in this report generally encompasses an individual training year rather than calendar year. The Annual Report's primary focus is the review of the Massachusetts Army National Guard's environmental programs relative to compliance with applicable local, state, and federal regulations. Each year, the Annual Report provides information on military training levels, range area usage, resource management activities, environmental indicators for training activities, and coordination among other activities and projects, such as the regional water supply and the remediation program activities.

The Annual Report also provides information on environmental reviews for proposed Massachusetts National Guard and other projects within the Upper Cape Water Supply Reserve.

The Annual Report is structured as follows:

Section 1, Introduction, discusses the organizational structure of Joint Base Cape Cod and the environmental management structure pertaining to activities in the northern training areas of Camp Edwards.

Section 2, Small Arms Ranges and Military Training Activities, provides an update on live fire at the Small Arms Ranges at Camp Edwards and associated activities. This section also provides information on military training that occurred in the Training Area/Reserve during Training Year 2024. Data are provided on the levels of training in the various training areas in the Training Area/Reserve and range usage, as well as at the various training support area facilities in the Cantonment Area on Camp Edwards.

Section 3, Environmental Program Management, focuses on environmental management programs operated by the Massachusetts Army National Guard in the Training Area/Reserve and program compliance with the Environmental Performance Standards for the Training Area/Reserve for the training year.

Section 4, Remediation Program Activities, provides a summary of remediation activities undertaken in the Training Area/Reserve during the training year by the Installation Restoration Program and the Impact Area Groundwater Study Program.

Section 5, Miscellaneous Military and Civilian Activities and Environmental Program Priorities, provides information on major activities undertaken during Training Year 2024 that may not be directly related to a Massachusetts Army National Guard Environmental Management Program, actions in the Training Area/Reserve, or specific Environmental Performance Standards for the Training Area/Reserve.

The Annual Report is the culmination of a year-long effort by the military and civilian employees of the Massachusetts Army National Guard, Training Site Camp Edwards, the Environmental & Readiness Center, the Natural Resource Program, and the Environmental Management Commission to provide valuable information on the state of the Training Area/Reserve to interested stakeholders and the community at large. In good faith, the Annual Report is provided to the Environmental Management Commission's Environmental Officer, and the Commission's Science Advisory Council and Community Advisory Council for their input.

Referenced Documents

The Annual *State of the Reservation* report encompasses a large amount of information and makes reference to many letters, reports and other documents that were developed over the course of Training Year 2024. Many of these are available on-line and any letter, document or report, such as the *Camp Edwards Natural Resources & Training Lands Management Annual Report Fiscal Year 2024*, referenced in the *Annual State of the Reservation Report* is available by contacting Emily Kelly, Community Involvement Specialist, Massachusetts National Guard Environmental & Readiness Center, 339-202-9341, emily.d.kelly2.nfg@army.mil. The Massachusetts National Guard Environmental & Readiness Center's website is: https://www.massnationalguard.org/ERC/index.htm. The Environmental Management Commission's website may be found at: https://www.mass.gov/info-details/environmental-management-commission-emc.

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Acronyms

AFCEC	Air Force Civil Engineer Center
AgCS	Agassiz's Clam Shrimp (*Eulimnadia agassizii)*
AmCS	American Clam Shrimp (*Limnadia lenticularis*)
ANGB	Air National Guard Base
AR	Army Regulation
ATV	All Terrain Vehicle
BP	Battle Position
BMP	Best Management Practice
CAA	Clean Air Act
CAC	Community Advisory Council
CER	Camp Edwards Regulation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CIA	Central Impact Area
CMP	Conservation and Management Plan
CMR	Code of Massachusetts Regulations
CPMPP	Construction Period Monitoring and Protection Plan
CRREL	Cold Regions Research and Engineering Laboratory
CS	Chemical Spill
CSCRMP	Clam Shrimp Conservation and Roadway Maintenance Plan
CSE	Comprehensive Site Evaluation
DBH	Diameter at Breast Height
DCR	Department of Conservation and Recreation
DFG	Department of Fish and Game
DFW	Division of Fisheries and Wildlife
DoD	Department of Defense
E&RC	Environmental & Readiness Center
EDB	Ethylene Dibromide
EIS	Environmental Impact Statement
EMC	Environmental Management Commission
EPA	Environmental Protection Agency
EPS	Environmental Performance Standard
FS	Fuel Spill
IAGWSP	Impact Area Groundwater Study Program
IED	Improvised Explosive Device
IMT	Individual Movement Techniques
INRMP	Integrated Natural Resources Management Plan

Acronyms, continued

IWFMP	Integrated Wildland Fire Management Plan
IRP	Installation Restoration Program
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JBCC	Joint Base Cape Cod
LQG	Large Quantity Generator
MAANG	Massachusetts Air National Guard
MAARNG	Massachusetts Army National Guard
MANG	Massachusetts National Guard
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MA SHPO	Massachusetts State Historic Preservation Office
MEC	Munitions and Explosives of Concern
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MGL	Massachusetts General Law
MIPAG	Massachusetts Invasive Plants Advisory Group
mm	millimeter
MMR	Massachusetts Military Reservation
MMRP	Military Munitions Response Program
MPMG	Multipurpose Machine Gun Range
NBC	Nuclear-Biological-Chemical
NEPA	National Environmental Policy Act
NHESP	Natural Heritage and Endangered Species Program
NLEB	Northern Long-eared Bat
NWCG	National Wildfire Coordinating Group
OB/OD	open burning/open detonation
OMMP	Operation, Maintenance and Monitoring Plan
P2	Pollution Prevention
PAVE PAWS	Precision Acquisition Vehicle Entry – Phased Array Warning System
ppb	parts per billion
ppm	parts per million
PFAS	Per- and polyfluoroalkyl substances
RDX	Royal Demolition Explosive
REC	Record of Environmental Consideration
RI/FS	Remedial Investigation/Feasibility Study
ROA	Record of Action
ROCA	Range Operations and Control Area

Acronyms, continued

ROD	Record of Decision
RP	Rare Plant
ROTC	Reserve Officers Training Corps
SAC	Science Advisory Council
SDZ	Surface Danger Zone
SGCN	Species of Greatest Conservation Need
SFS	Space Force Station
SOP	Standard Operating Procedure
SR/ES	Source Registration/Emissions Statement
SVL	Soldier Validation Lane
TA	Training Area
TSA	Training Support Area
TTB	Tactical Training Base
TY	Training Year
UAS	Unmanned Aerial System
UMass	University of Massachusetts
URI	University of Rhode Island
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTES	Unit Training and Equipment Site
UTM	Ultimate Training Munition
WFPC	Wildland Fire Program Coordinator
WPA	Wetlands Protection Act
WWTP	Wastewater Treatment Plant

Glossary of Terms

Action Levels: To determine when a range needs maintenance and/or a pause in use, action levels, which are media dependent, are used in combination with a sudden elevated occurrence of constituents of concern, or trending up or down, and as a final determinant in some cases. Surface soil action levels for lead, copper, and antimony are set using selected concentrations from the Massachusetts Contingency Plan. Porewater action level numbers are based on drinking water standards because the porewater is monitored as an early warning of potential groundwater impacts. Groundwater action levels are set equal to one half of the drinking water standard because a detection of range-related metals in groundwater at these concentrations would indicate a potentially significant and unexpected occurrence. Training may be paused or stopped so that coordination with the EMC may take place as required.

Air Force Civil Engineer Center: The Air Force Civil Engineer Center, located at Joint Base San Antonio-Lackland, Texas, is responsible for providing responsive, flexible full-spectrum installation engineering services. AFCEC missions include facility investment planning, design and construction, operations support, real property management, energy support, environmental compliance and restoration, and audit assertions, acquisition and program management. AFCEC manages the Installation Restoration Program at Joint Base Cape Cod.

Algonquin: The Algonquin Gas Transmission Pipeline is a 1,100-mile-long pipeline system, which delivers natural gas to New England.

Bullet pocket: The part of the target or backstop berm that receives the fired bullets.

Calero Mobile Military Operations on Urban Terrain Site: The Calero MOUT site on Camp Edwards comprises 29 single and multi-floor structures designed to provide a training environment in which units learn the individual and unit skills necessary to fight and defeat an enemy in an urban environment. The facility is also used to conduct Law Enforcement, Civil Disturbances, Emergency Responses, and other related training.

Camp Edwards Training Area: The Massachusetts Army National Guard Camp Edwards Training Site (Camp Edwards Training Area) is the major training area for Army National Guard soldiers in the Northeast. It is approximately 14,886 acres located on the northern portion of Joint Base Cape Cod. At Camp Edwards, soldiers practice maneuvering exercises, bivouacking, and use the small arms ranges. The Upper Cape Water Supply Reserve also is located on the 14,886 acres of Camp Edwards. It comprises—and for the purposes of this report, may be synonymous with—Camp Edwards' 14,886-acre northern training area.

Cantonment Area: The southern 7,200-acre developed area of Joint Base Cape Cod with roads, utilities, office and classroom buildings, training support areas, and housing. There are numerous federal, state and county entities located there.

Cape Cod Space Force Station: Cape Cod Space Force station, which includes the Pave PAWS early warning radar system, is located on an 87-acre parcel of land on the northwest corner of Joint Base Cape Cod.

Community Advisory Council: The EMC's Community Advisory Council assists the commission on issues related to protection of the water supply and wildlife habitat in the Reserve. The 15-member council consists of one representative from each of the surrounding towns (Bourne, Falmouth, Mashpee, and Sandwich), one resident of base housing, two representatives from the military, one representative from the Cape Cod Commission, one representative from the Upper Cape Regional Water Supply Cooperative, one representative from the Wampanoag Tribe, and five other members appointed by the governor. Meetings are held two times per year.

CONEX Box: A type of cargo container used to transport and store supplies.

Converge/American States Utility Services (ASUS): Converge is a global investment and development company which owns and operates businesses that provide essential services. Joint Base Cape Cod's water and wastewater systems were divested to Converge, which partnered with American States Utility Services (ASUS), Inc., to operate and maintain the systems.

Department of Conservation and Recreation (DCR): DCR manages state parks and oversees more than 450,000 acres throughout Massachusetts. It protects, promotes, and enhances the state's natural, cultural, and recreational resources.

Department of Environmental Protection (MassDEP): MassDEP's mission is to protect and enhance the Commonwealth's natural resources - air, water, and land - to provide for the health, safety, and welfare of all people, and to ensure a clean and safe environment for future generations.

Department of Fish and Game: The Department of Fish and Game's mission is to conserve the Commonwealth's abundant marine and freshwater fisheries, wildlife, plants, and natural communities, as well as the habitats that support them, for the benefit and enjoyment of all people.

Environmental & Readiness Center: The mission of the Environmental & Readiness Center is to integrate protection of the environment with compatible military training within the Camp Edwards Training Area and Upper Cape Water Supply Reserve.

Environmental Management Commission: The Environmental Management Commission (EMC) ensures the permanent protection of the drinking water supply and wildlife habitat of the Upper Cape Water Supply Reserve. The EMC is comprised of the commissioners of the Department of Fish and Game, the Department of Environmental Protection and the Department of Conservation and Recreation. Its primary authority comes from Massachusetts Chapter 47 of the Acts of 2002.

Environmental Officer: The Environmental Officer reports to the EMC Commissioners. The duties and responsibilities of the Environmental Officer include monitoring the activities being conducted on, and the uses of, the Upper Cape Water Supply Reserve and the impact of such activities and uses on the water supply and wildlife habitat.

Environmental Performance Standards: The Environmental Performance Standards (Appendix A) are a list of requirements, or standards for performance, that guide both military and other users in the protection of Camp Edwards' natural and cultural resources and the groundwater beneath the Training Area/Reserve. The Environmental Performance Standards were specifically created through the Massachusetts Environmental Policy Act process to protect the resources in the Training Area/Reserve and codified in Chapter 47 of the Acts of 2002. They are based in large part on existing federal, state, and Department of Defense regulations. In some cases, the protections offered by the performance standards are more stringent than those offered by other regulations. These standards apply to the Upper Cape Water Supply Reserve within the Camp Edwards Training Area.

Eversource: Eversource is a utility providing electric, gas and water service in New England.

Frost Bottom: A low-lying area where early frost occurs in the fall and late frost in spring.

Glyphosate: Glyphosate is a broadleaf plant and grass herbicide.

Impact Area: The 2,200-acre Impact Area is located in the center of the Upper Cape Water Supply Reserve/Camp Edwards Training Site. The small arms ranges, both active and inactive, are situated around the perimeter of the Impact Area, with range firing toward the Impact Area. The 330-acre Central Impact Area is located within the Impact Area; it was the primary target area for artillery, mortar, and other firing activities from the early 1900s until firing ceased in 1997.

Impact Area Groundwater Study Program: The Impact Area Groundwater Study Program is an environmental cleanup program at Camp Edwards addressing areas of groundwater contamination and its sources from the northern portion of Joint Base Cape Cod and some off-base areas. The program is managed by the Army National Guard and is regulated under the Safe Drinking Water Act.

Installation Restoration Program: The Installation Restoration Program, an environmental cleanup program regulated under the Comprehensive Environmental Response, Compensation and Liability Act, is addressing contamination caused by military-related activities and found primarily in the southern portion of JBCC and off-base. The program is managed by the Air Force Civil Engineer Center.

Integrated Training Area Management Program: The Integrated Training Area Management (ITAM) Program is responsible for maintaining the land to help the Army to meet its training requirements. The Integrated Training Area Management Program is the U.S. Army standard for sustaining the capability of installation land units to support their military training missions.

Lysimeter: A lysimeter is a container buried in the ground used by researchers to measure how water moves through soil and vegetation.

Massachusetts Environmental Policy Act (MEPA): The MEPA review process provides meaningful opportunities for public review of the environmental impacts of projects for which agency actions are needed. It requires agencies to study the environmental impacts of projects requiring agency permits or other approvals, financial assistance, or land transfers, and to use all feasible measures to avoid, minimize, and mitigate damage to the environment.

Military Construction (MILCON): MILCON projects are congressionally authorized and appropriated. MILCON funds are available for new obligations for five years.

Natural Resource Program: Camp Edwards Natural Resources and Training Lands Program staff is responsible for maintaining and enhancing soldier training lands in the Training Area through ecosystem conservation, stewardship and partnership.

National Environmental Policy Act (NEPA): NEPA ensures agencies consider the significant environmental consequences of proposed actions and inform the public about decision making. NEPA establishes procedural requirements for proposals for major Federal actions significantly affecting the quality of the human environment by requiring Federal agencies to prepare a detailed statement on the environmental impact of the proposed action; any adverse effects that cannot be avoided; alternatives to the proposed action; the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and any irreversible and irretrievable commitments of resources that would be involved in the proposed action

Operations, Maintenance, and Monitoring Plan: Operations, Maintenance, and Monitoring Plans outline range-specific monitoring to protect the environment. All active ranges at Camp Edwards operate under an OMMP.

Pop-up targets: A pop up target is a mechanical target that is used during shooting practice on Echo Range and Sierra Range. A mechanism raises and lowers the targets in a pre-determined pattern.

Porewater: Porewater is water that fills the tiny spaces between soil particles or sediment grains.

Pyrotechnics: Military pyrotechnics are devices that create light, smoke, and other effects for signaling, illumination, and simulation. They are used in a variety of military applications, including battle simulation, chemical detection, and obstacle breaching.

Range Control: Camp Edwards's Range Control manages and controls the use of training ranges and airspace to ensure safe and efficient training operations.

Range Operations and Control Area (ROCA): ROCA structures support range operations and safety on small arms ranges. ROCA structures include buildings like a mess shelter, ammunition breakdown building, bleachers, control tower, storage buildings, and classroom facilities.

Records of Environmental Consideration: A Record of Environmental Consideration (REC) is a signed statement submitted with project documentation that briefly documents that an Army action has received environmental review. While a REC may document compliance with the requirements of NEPA, it does not fulfill the requirements of other environmental laws and regulations. For full text please see 40 CFR 651.19.

Remediation: Environmental remediation is the process of cleaning up pollution and contamination from the environment.

Science Advisory Council: The EMC's Science Advisory Council provides scientific and technical assistance to the commission as it relates to protection of natural resources of the Reserve. The Science Advisory Council, appointed by the governor, consists of scientists and engineers recognized for their expertise in the areas of public health, water protection, wildlife habitat management, and land use management. Meetings are held two times per year.

Sentry Well: A sentry well is a groundwater monitoring well that can detect chemicals in groundwater and are installed to provide early warning of chemical contamination.

Simulated munitions: Wax marking tipped ammunition that can be used in a standard weapon. They can be shot at a Soldier wearing proper personal protective equipment with the wax projectile leaving a colored mark on their clothing letting them know they are hit. Simulated munitions are best used in concert with other simulators to be effective for most units.

Small Arms Ranges: Small arms ranges allow live-fire qualification training with weapons of a small caliber, i.e., pistols, rifles and semi-automatic and automatic rifles. Small arms training is designed to train a soldier to be "qualified" in the use and maintenance of his or her assigned weapon. There are four operational active small arms ranges on Camp Edwards, which the Massachusetts Army National Guard uses for weapons familiarization, weapons zeroing (essentially customizing it to give the soldier a more accurate shot) and qualification. There are two ranges currently undergoing redesign/reconfiguration. On Camp Edwards there are 11 operationally inactive legacy ranges that have been remediated by the Impact Area Groundwater Study Program as required.

Sea Cadets: The United States Naval Sea Cadet Corps *(*Sea Cadets*)* is the Navy's youth development program. The Sea Cadets give young Americans skills, knowledge, and confidence through a variety of training opportunities.

Soldier Validation Lane: The Soldier Validation Lane (SVL) training concept was developed to enhance the effectiveness and realism of existing pre-mobilization training. The SVL is a Home Station Training Lane for Counter Improvised Explosive Device-related training utilizing containerized structures to create flexible "villages" or "urban clusters" at various locations throughout the Camp Edwards training area.

Sole Source Aquifer: A Sole Source Aquifer is an aquifer that has been designated by the United States Environmental Protection Agency as the sole or principal source of drinking water for an area. By definition, a Sole Source Aquifer is an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer.

Tetra Tech: Tetra Tech is an environmental consulting and engineering services firm.

Training Year: A training year runs from October 1 to September 30 and is based on the federal fiscal year. Information found in the annual *State of the Reservation Report* is compiled by training year. This *Annual State of the Reservation Report* is for Training Year 2024 (October 1, 2023 – September 30, 2024).

Training Support Area: There are separate facilities and equipment that can simulate live military training; these are grouped under the Training Support Area. The majority of the training activities associated with these facilities are conducted in the Cantonment Area of Camp Edwards. Training Support Areas include Kelley Tactical Training Base, the Calero Mobile Military Operations on Urban Terrain Site, the Engagement Skills Trainer, and the Virtual Convoy Operations Trainer, which are all outside of the Upper Cape Water Supply Reserve/Camp Edwards Training Area.

Triclopyr: Triclopyr is a systemic herbicide.

US Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL): The Cold Regions Research and Engineering Laboratory, located in Hanover, New Hampshire, and with facilities in Alaska, comprises more than 250 engineers, scientists, technicians, and support personnel working together to address current and emerging technical challenges related to cold regions. Research at CRREL focuses on geospatial research and engineering, installations and environment, military engineering, and water resources.

United States Coast Guard Communications Station: The US Coast Guard operates high seas communication stations used to communicate with ships throughout the Atlantic and Pacific Ocean and provide a variety of services to the maritime public.

United States Geological Survey: The U.S. Geological Survey is the nation's largest water, earth, and biological science and civilian mapping agency. It collects, monitors, analyzes, and provides scientific understanding of natural resource conditions, issues, and problems.

Unit Training Equipment Site: A vehicle maintenance facility located in Camp Edwards Cantonment Area, where major repairs and other maintenance activities and training may occur.

Upper Cape Regional Water Supply Cooperative: The Upper Cape Regional Water Supply Cooperative consists of three water supply wells and seven sentry monitoring wells located in the northern part of JBCC. The wells provide water to Bourne, Mashpee, Sandwich, Falmouth, the Barnstable County Correctional Facility and the Converge/American States Utility Services (ASUS) water supply system located on JBCC.

Upper Cape Water Supply Reserve: The Upper Cape Water Supply Reserve was established by Chapter 47 as public conservation land dedicated to three primary purposes: water supply and wildlife habitat protection; the development and construction of public water supply systems, and the use and training of the military forces of the commonwealth; provided that, such military use and training is compatible with the natural resource purposes of water supply and wildlife habitat protection. It comprises—and for the purposes of this report, may be synonymous with—Camp Edwards' 14,886-acre northern training area.

Vernal Pool: A vernal pool is a shallow, temporary wetland that fills with water in the spring and dries up in the summer. They are important habitats for many species of wildlife, including frogs, salamanders, and insects. Vernal pools are protected if they are located within a jurisdictional resource area protected under the Wetland Protection Act.

Zeroing Range: A 25-meter range that Soldiers can use to zero their weapons. Zeroing is the process of calibrating the weapon's sites to cause the shot to impact where the Soldier aims.

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Section 1
Introduction

1.0 Introduction

This section of the Annual *State of the Reservation Report* (Annual Report) provides information on Joint Base Cape Cod (JBCC) and the environmental management structure overseeing activities in the approximately 14,886-acre Camp Edwards Training Area/Upper Cape Water Supply Reserve (Training Area/Reserve). The Upper Cape Water Supply Reserve is located on, and is contiguous with, the 14,886 acres of the Camp Edwards Training Area. (See Section 1.1 and Figure 1-1).

1.1 Joint Base Cape Cod Structure

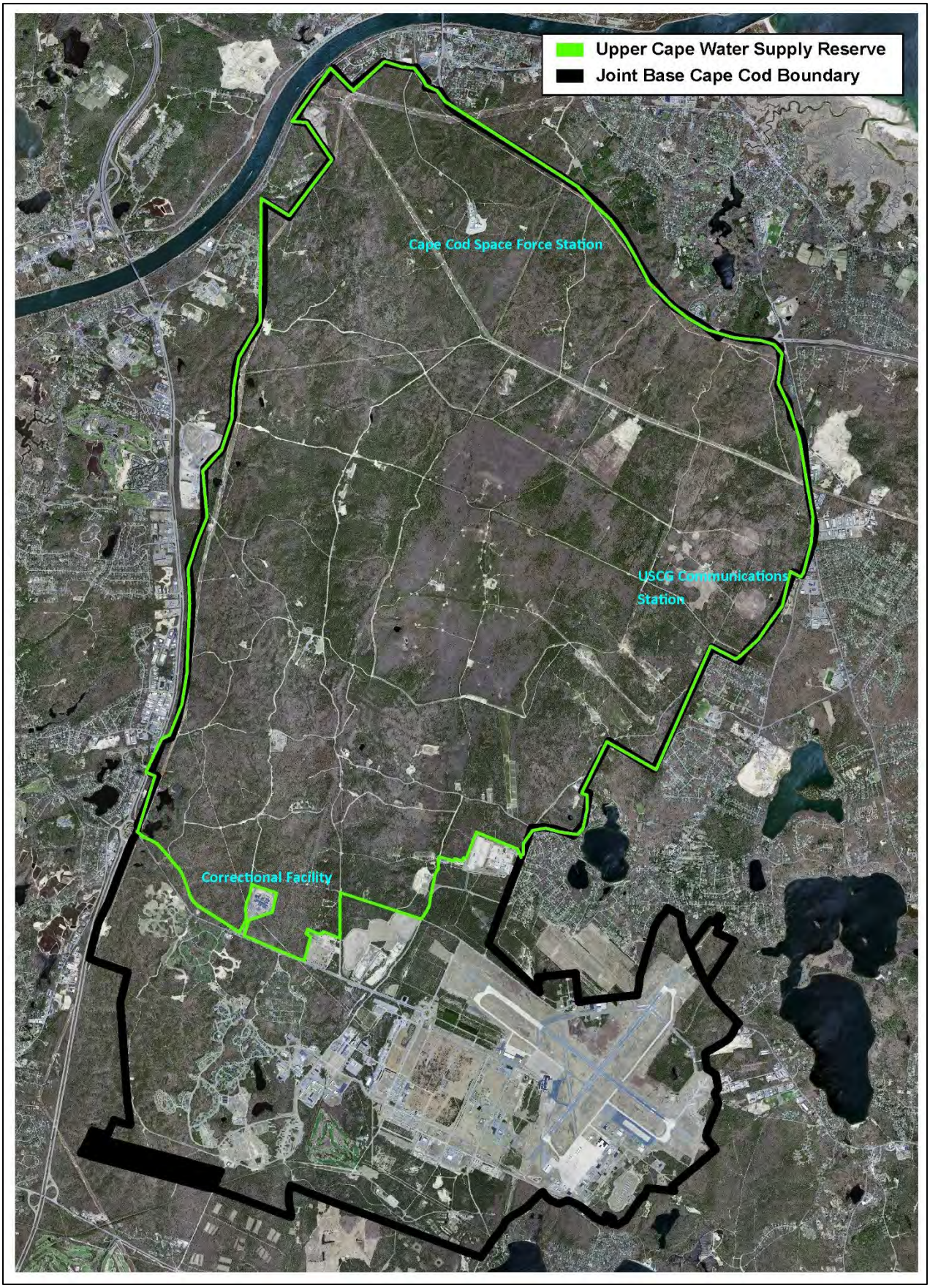
Joint Base Cape Cod is a multi-service military installation and is home to the Massachusetts Army National Guard's (MAARNG) Camp Edwards, the Massachusetts Air National Guard's (MAANG) Otis Air National Guard Base (ANGB), the United States Coast Guard's (USCG) Base Cape Cod, USCG Air Station Cape Cod, the U.S. Space Force's Cape Cod Space Force Station (SFS), and the Department of Veterans Affairs Cemetery. Joint Base Cape Cod is located in the upper western portion of Cape Cod, immediately south of the Cape Cod Canal in Barnstable County, Massachusetts. It includes parts of the towns of Bourne, Mashpee and Sandwich, and abuts the Town of Falmouth. Joint Base Cape Cod covers nearly 21,000 acres – approximately 30 square miles (Figure 1-1).

The Camp Edwards Training Area comprises 14,886 acres of the northern portion of JBCC. The remaining Camp Edwards military-controlled area of JBCC lies in the southern portion, or Cantonment Area. The Commonwealth of Massachusetts owns the land comprising Camp Edwards and leases the property to the Department of the Army, who in turn licenses the land to MAARNG for training.

The MAARNG and MAANG are part of the Commonwealth of Massachusetts Military Division. However, federal law largely dictates their activities, make-up, training, and functions. For example, most of the day-to-day activities conducted at JBCC by the National Guard, including annual and weekend training, are federal military activities funded by the federal government. In conducting federal military activities, the National Guard is required by federal law to follow Department of Defense (DoD) regulations, Army regulations, Air Force instructions, and applicable federal and state laws and regulations.

There are two major facilities in the northern portion of JBCC that are on land not under the operational control of the Massachusetts National Guard. Cape Cod SFS, which includes the PAVE PAWS ballistic missile early warning radar system, is located on an 87-acre parcel of land on the northwest corner of the Training Area/Reserve. The USCG's Communications Station is located on a 542-acre parcel along the northeastern side of the Training Area/Reserve. The Barnstable County Correctional Facility that opened in 2004 is located on a 29-acre parcel of land between Connery Avenue and the southern edge of the Training Area/Reserve. The locations of these facilities are shown in Figure 1-1. These facilities are located on land not under the control of the Massachusetts National Guard; therefor, detailed information concerning activities at these facilities is not included in the Annual Report. Questions pertaining to activities at Cape Cod SFS, the Coast Guard Communications Station, and the Barnstable County Correctional Facility should be addressed to the persons listed in Appendix A of this report.

Figure 1-1 Map of Joint Base Cape Cod



The Commonwealth of Massachusetts has issued three utility easements on its state-owned property in the Training Area/Reserve: an electrical power line easement (Eversource), a natural gas pipeline easement (National Grid), and a natural gas pipeline easement (Algonquin - that partially overlays the National Grid easement).

Additionally, there are easements issued to the Upper Cape Regional Water Supply Cooperative and to the Bourne Water District. The locations of the utilities and facilities are shown in Figure 1-2.

1.2 Environmental Management Structure

1.2.1 Environmental Management Commission

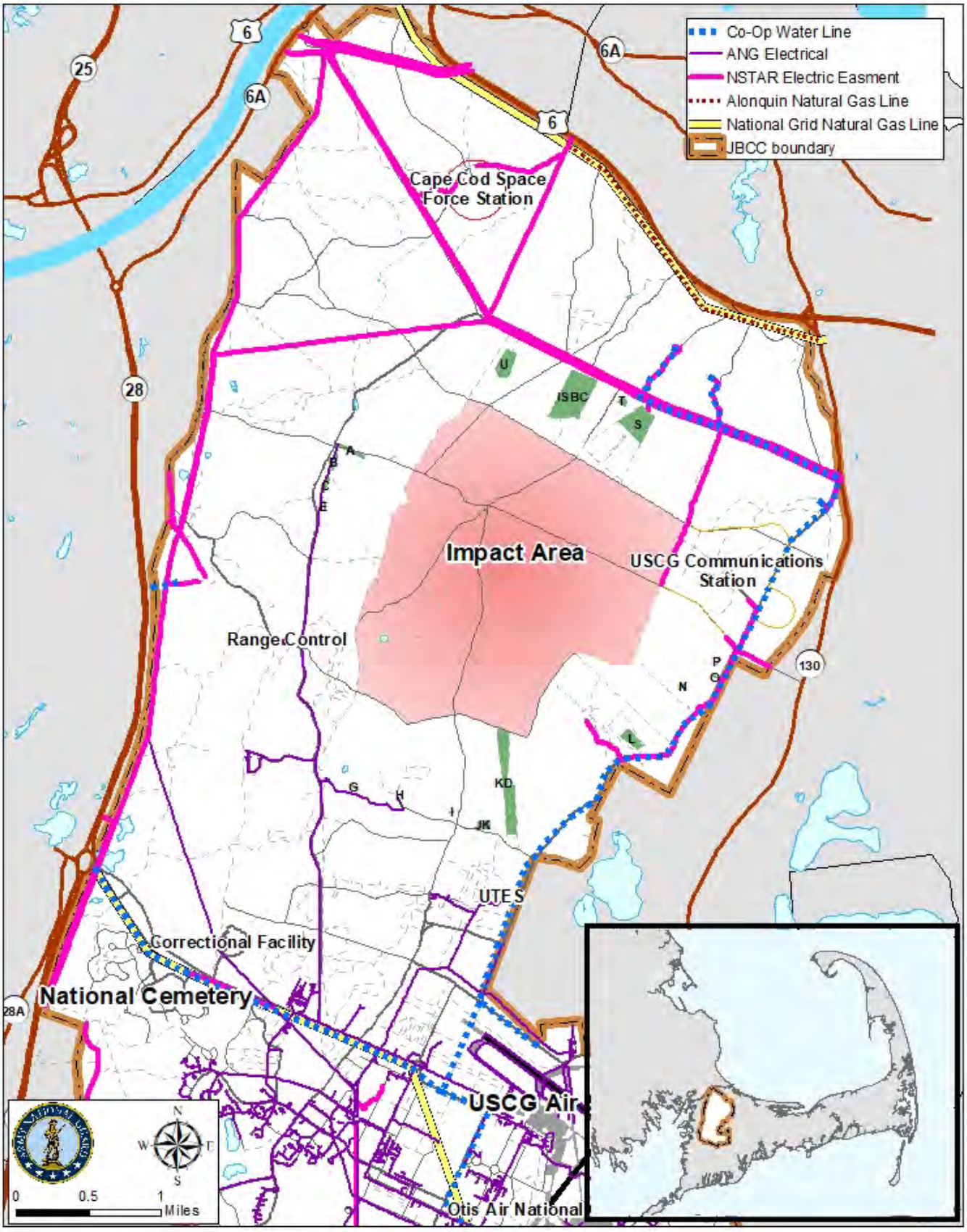
Chapter 47 of the Acts of 2002 (hereafter Chapter 47) established the Environmental Management Commission (EMC), consisting of the Commissioner of the Department of Fish and Game (DFG), the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP), and the Commissioner of the Department of Environmental Management (now the Department of Conservation and Recreation [DCR]). The EMC oversees compliance with and enforcement of the Environmental Performance Standards (EPSs) (see Appendix B) in the Training Area/Reserve, coordinates the actions of environmental agencies of the Commonwealth in the enforcement of environmental laws and regulations in the Training Area/Reserve, as appropriate, and facilitates an open and public review of all activities in the Training Area/Reserve. The legislation also states that the environmental agencies on the EMC retain all their respective, independent enforcement authority.

Chapter 47 also directed that the EMC be assisted by two advisory councils, appointed by the Governor of Massachusetts. The Community Advisory Council (CAC), consisting of 15 members, assists the EMC by providing advice on issues related to the protection of the water supply and wildlife habitat within the Training Area/Reserve. The Science Advisory Council (SAC), consisting of up to nine members, assists the EMC by providing scientific and technical advice relating to the protection of the drinking water supply and wildlife habitat within the Training Area/Reserve. Table 1-1 lists the CAC and SAC members as of March 2025.

Table 1-1 Community Advisory Council and Science Advisory Council Members

Community Advisory Council Member	***Area***
Andrew Campbell	Bourne Representative
Shawn Cody	Military Member
Viginia Gaglio	Military Member
Mark Harding	Wampanoag Representative
Mimi McConnell	At-Large Member
Heather McElroy	Cape Cod Commission
Robert Prophett	Upper Cape Water Supply Reserve Cooperative
Ralph Vitacco	Sandwich
Science Advisory Council Member	***Area***
Paul Cavanagh	Subject Matter Expert, Natural Resources
Phil Gschwend	Subject Matter Expert, Chemistry
Denis LeBlanc	Subject Matter Expert, Hydrogeology
Tara Lewis	Subject Matter Expert, Natural Resources

Figure 1-2 Utility Easements and Leases



Camp Edwards's ranges are shown in green on the figure above.

Chapter 47 also established an Environmental Officer for the Training Area/Reserve. Mr. Leonard Pinaud of MassDEP is the current Environmental Officer. In this capacity, the Environmental Officer provides monitoring of military and civilian activities on and uses of the Training Area/Reserve and the impact of those activities and uses on the water supply and wildlife habitat. Working directly for the EMC, the Environmental Officer has unrestricted access to all data and information from the various environmental and management programs in the Training Area/Reserve. The Environmental Officer has full access to all points in the Training Area/Reserve and conducts inspections at any time in order to monitor, oversee, evaluate, and report to the EMC on the environmental impact of military training and other activities. The Environmental Officer's on-site monitoring occurs prior to, during, and immediately following training and other activities. The Environmental Officer's monitoring activities include but are not limited to training sites, pollution prevention and habitat protection activities for both military and military contractors and civilians and civilian contractors in the Training Area/Reserve, as well as coordinating with and consulting with the Massachusetts National Guard Environmental & Readiness Center (E&RC) on various projects, initiatives and issues.

The Environmental Officer acts as a liaison between the EMC, SAC, CAC, military, general public, and various state agencies. The Environmental Officer identifies and monitors ongoing issues regarding training procedures and the environment in the Training Area/Reserve and keeps the EMC, SAC and CAC apprised of the progress of these issues in addition to bringing issues to the E&RC for resolution. The Environmental Officer also participates in community outreach activities with the E&RC and facilitates the EMC, SAC and CAC public meetings under the legislation.

During TY 2024, the SAC met in May 2024 and September 2024, and the CAC met in October 2023 and May 2024. The EMC met in October 2023 and May 2024. The advisory councils discussed a number of topics, all of which are covered in this report. Minutes from the meetings may be found at https://www.mass.gov/info-details/environmental-management-commission-emc.

1.2.2 Science Advisory Council Ad Hoc Committee

On November 2, 2017, the EMC formed an Ad Hoc Committee to the SAC to review the current small arms range environmental monitoring process and aide in developing the most appropriate monitoring processes for those ranges. Committee members are SAC member Phil Gschwend, a geochemist, SAC member Denis LeBlanc, US Geological Survey, and Jay Clausen from the US Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL), who is a metals mobility expert. The committee had a sunset clause of two years; however, based on the effectiveness of the body and emerging issues, e.g., range monitoring and pyrotechnics, the EMC voted to allow the Ad Hoc committee to continue. The Ad Hoc Committee was most recently extended to 2026 during the EMC meeting in May 2024.

The Ad Hoc Committee met in early TY 2024 to discuss projectile removal at Camp Edwards' small arms ranges.

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Section 2
Small Arms Ranges and Military Training Activities

2.0 Introduction

Section 2 of the Annual Report provides an update on actions associated with operational active small arms ranges in the Training Area/Reserve including range maintenance, environmental sampling, and levels of military and civilian. use of the ranges.

This section also provides information on the use of Training Areas, Training Support Areas (TSA) in the Cantonment Area of Camp Edwards, information on simulated munitions, and off-site training during TY 2024.

The Massachusetts National Guard (MANG) reports on some Cantonment Area training activities to provide context for why soldiers then move into the Training Area/Reserve to conduct the most realistic training possible to provide for trained and ready soldiers. In the words of the MAARNG trainers, soldiers are provided training in a “crawl, walk, run” scenario. The crawl phase is in the classroom where they learn theory and the basics of the training they are about to undertake; the walk phase is where soldiers can literally walk through the training event in a classroom setting, use simulators, or go into the field and walk through a scenario. Finally, the run phase is where the crawl and the walk phases are put into the most realistic field setting possible in the Training Area/Reserve.

2.1 Camp Edwards Training Area/Upper Cape Water Supply Reserve

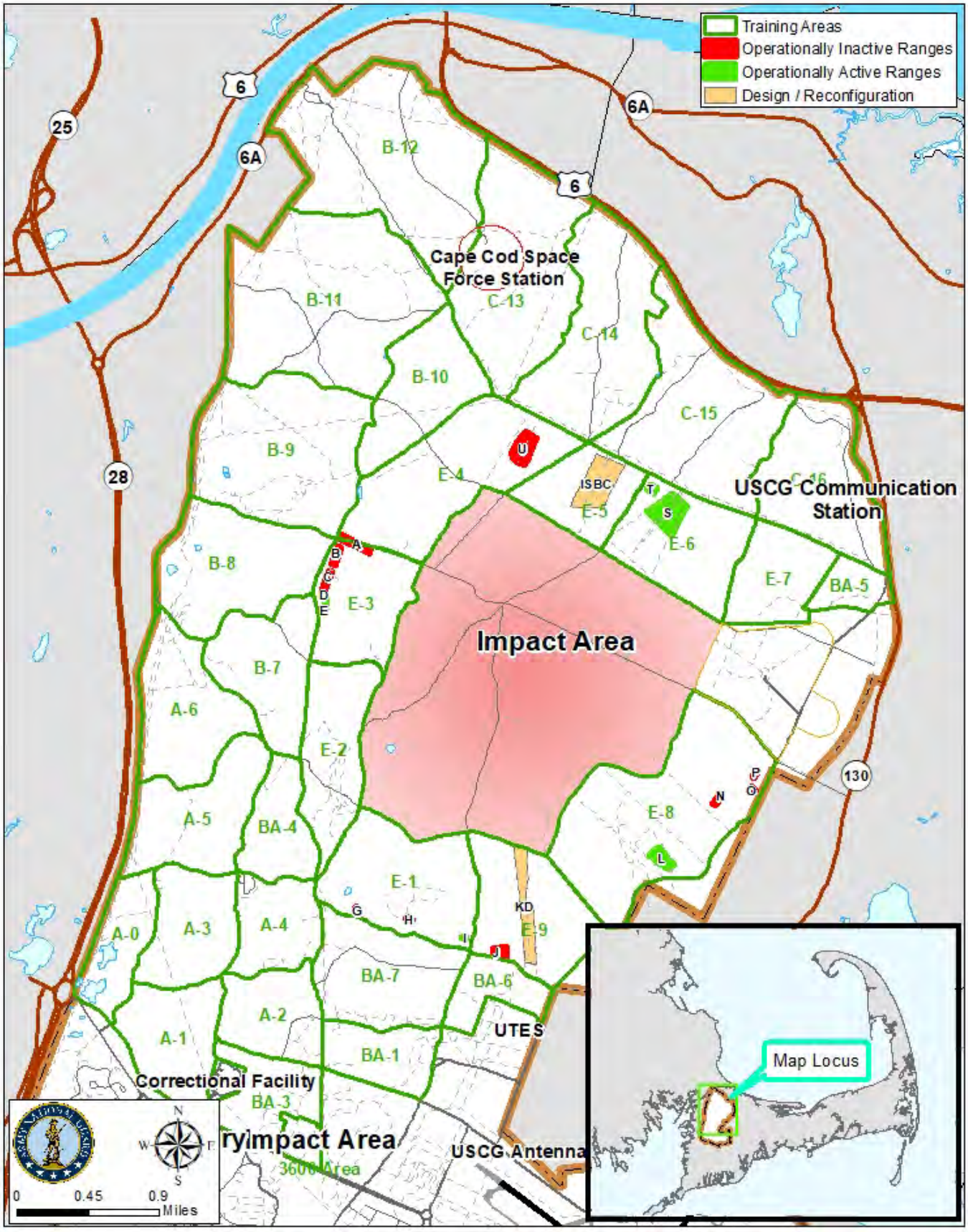
2.1.1 Military and Civilian Use

The MAARNG has approximately 5,625 soldiers who train on average one weekend per month and one two-week cycle during a training year. The Training Area/Reserve is also utilized by other DoD and law enforcement agencies (i.e.: Marines, US Coast Guard, Barnstable County Sheriff's Department, and Federal and local law enforcement). Units start planning their training several years in advance of the year in which they actually conduct their training. The unit leadership assesses the strengths and limitations of its personnel and begins to schedule training sites and resources to best support the training their units require. During the year prior (TY 2023) to the year of execution (TY 2024) units confirm geographical areas and training sites within the Training Area/Reserve. Figure 2-1 shows the locations of the training areas and small arms ranges in the Training Area/Reserve.

Military training activities in the Training Area/Reserve are tracked by Camp Edwards Range Control based on individual training area use and the number of personnel participating in this use. This method records the number of times each training area is utilized and the number of personnel and vehicles utilizing the areas for each event. Range Control is operational 24 hours per day when units are training and, during a training day, personnel from Range Control will observe units at various locations to ensure that they are following range, safety, and environmental regulations.

Military training activities in the Training Area/Reserve are tracked by the number of times each training area is utilized per day and by the number of personnel and vehicles utilizing the areas for each use. In many cases personnel and vehicles utilize more than one training area per day and may be counted for the same training area more than once per day.

Figure 2-1 Camp Edwards Training Areas and Ranges



As units become aware that the ranges and other training venues at Camp Edwards meet qualification standards, the use of the areas where these venues are located has increased. Fluctuations in training usage is also largely influenced by deployment cycles and changes to training doctrine and directives. Increases in usage are also related to the inaccessibility of other training bases for the MAARNG to use for their readiness training needs. In addition, over the past two decades, legacy contamination cleanup activities (managed by Air Force Civil Engineer Center (AFCEC)/Impact Area Groundwater Study Program (IAGWSP) [See Section 4.0]) in the Training Area/Reserve have resulted in small arms ranges and other training venues being unavailable for use. However, as clean-up activities have been completed these training venues are again available for compatible military use. So, with updated ranges and training venues, and investment in modernizing the Range Operations and Control Area, and the eventual completion of the cleanup program, Training Area use and numbers will fluctuate accordingly.

Table 2-1 shows the overall utilization of the ranges, training areas and training support areas during TY 2024, while Table 2-2 shows their utilization for each of the past ten training years.

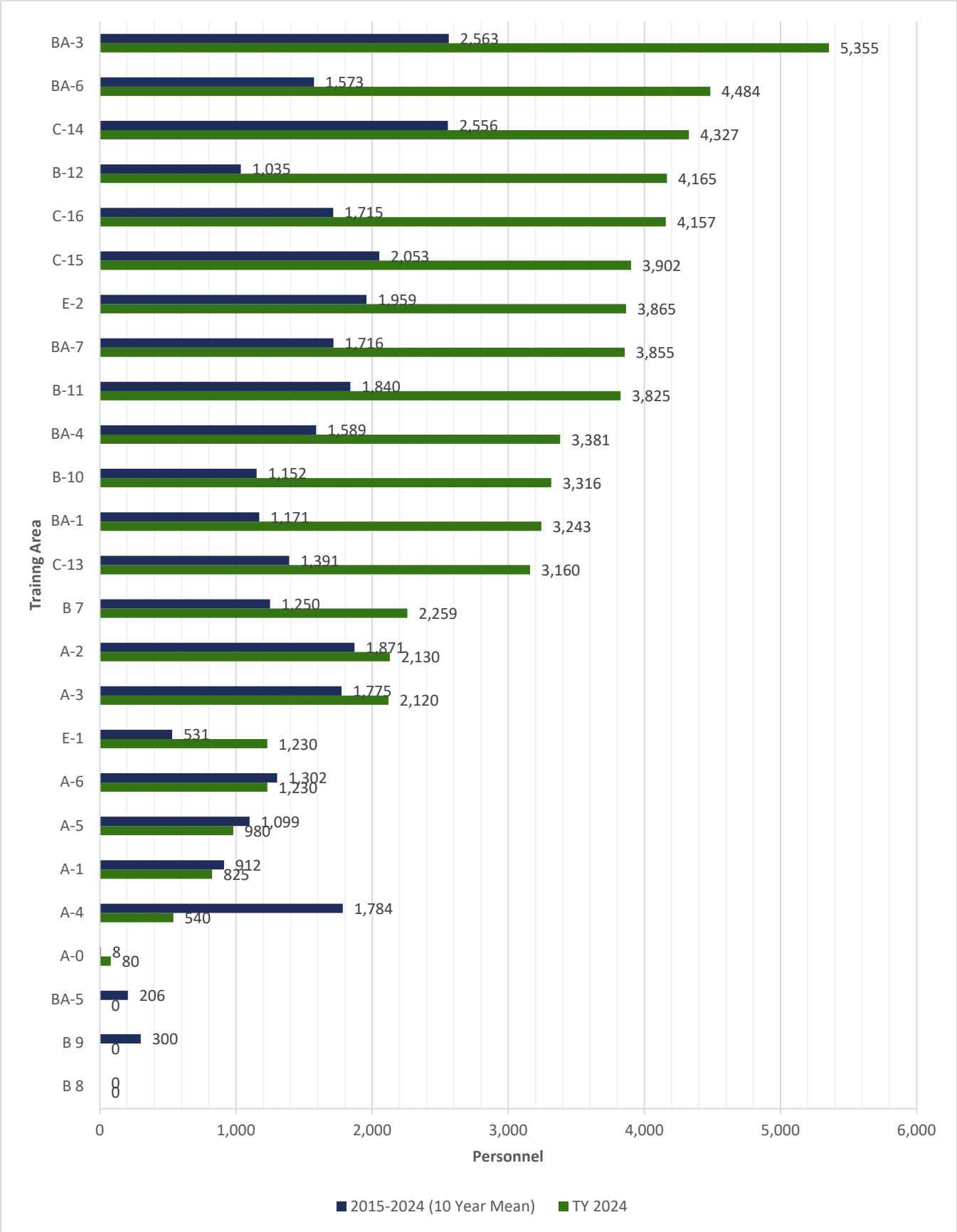
In Table 2-1 and Table 2-2, civilian use includes use of the ranges and training areas in the Training Area/Reserve and the Training Support Areas (TSA) in the Cantonment Area; civilian use ranges from unmanned aircraft systems ground operations and flight testing, to practicing land navigation, to training in the Calero Mobile Military Operations on Urban Terrain Site, to use of classrooms and other facilities. In addition, there were also public deer and turkey hunting seasons during TY 2024. Information on these activities is provided in Sections 3.5.3 and 3.5.4 of this report. Fluctuations in training days and event numbers from year to year is a result of inaccessibility of other training bases, differing unit training requirements, combined training needs, and deployment cycles (see above paragraph).

Graph 2-1 shows personnel use by training area for TY 2024 and the average personnel use by training area for TY 2015 to TY 2024. Graph 2-1 shows usage in Training Area BA-3 increased over the 10-year average during TY 2024. It was used as a Bivouac and staging for large scale combat training. Previously Tactical Training Base Kelley was used as a staging and Bivouac area for these larger exercises. However, Tactical Training Base Kelley is being decommissioned.

Graph 2-2 shows training area usage by days used for TY 2024 and the average days used by training area for TY 2015 to TY 2024. Use of specific training areas is dependent upon its capacity to hold Soldiers, its appropriateness to support a given training exercise, and restoration of training venues through the AFCEC and IAGWSP cleanup and the Integrated Training Area Management (ITAM) programs. For specific training area use for TY 2024 see Section 2.1.2.

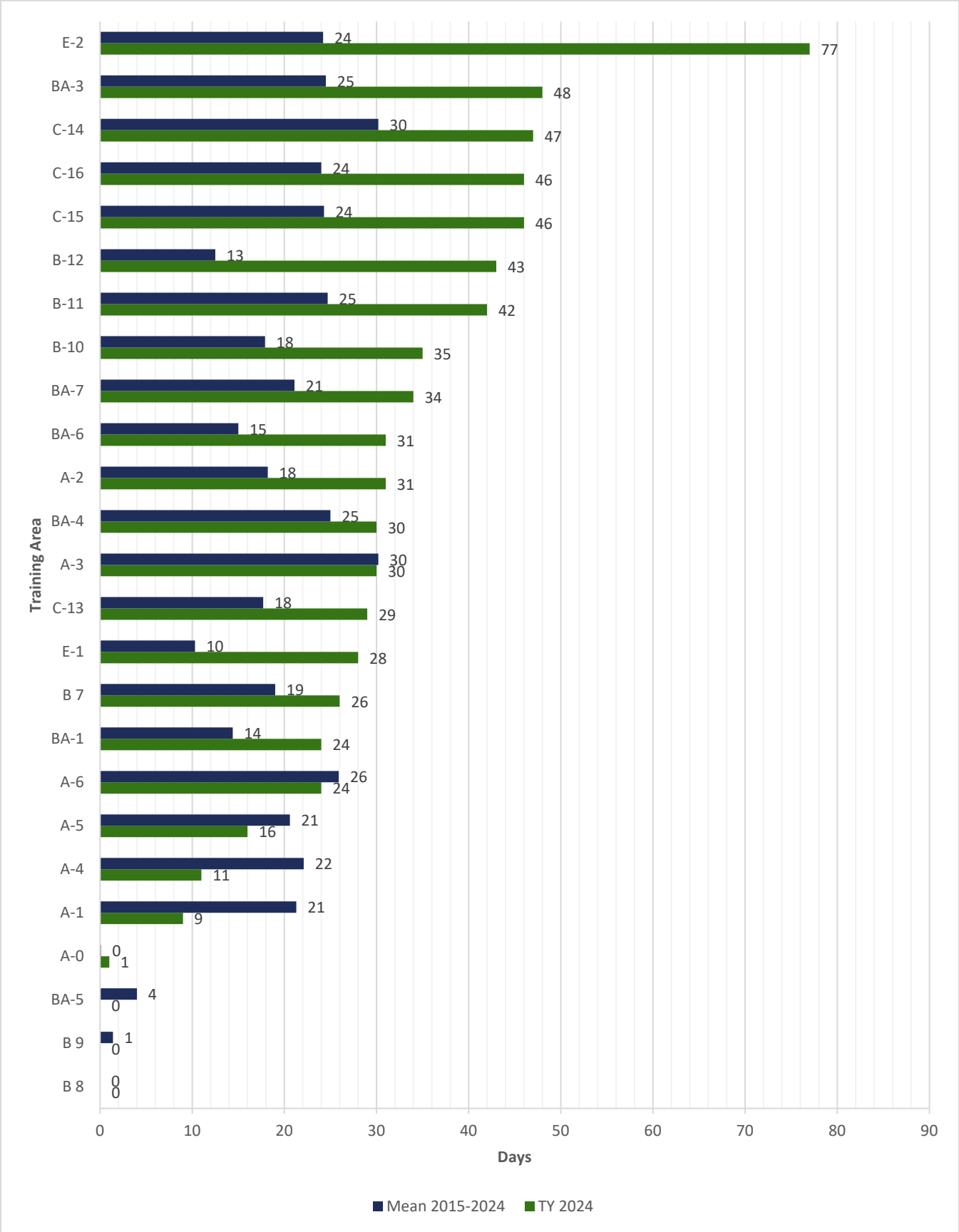
During TY 2024, Camp Edwards supported standard National Guard training such as weapons qualification, land navigation and maneuvers. Fourteen MAARNG units were projected to conduct their annual training at Camp Edwards during the year, however 22 units actually completed their annual training at the site. One of the many reasons units needed to move their training to Camp Edwards is the unexpected lack of availability or bumping at another training site. For example, the MAARNG's 1-182 Infantry's training was shifted to Camp Edwards due to a priority unit requiring use of Camp Ethan Allen Firing Range in Vermont, i.e., they were bumped from the range. A single large-scale exercise was conducted during TY 2024: "Cyber Yankee," where more than 250 Soldiers conducted an unclassified cyber defense exercise focused on the New England Region was held from May 6 to May 17. The busy training year is reflected in the military personnel training numbers in Table 2-2.

Graph 2-1 Personnel Use by Training Area



See Figure 2-1 for Training Area locations on Camp Edwards.

Graph 2-2 Training Area Usage by Days Used



See Figure 2-1 for Training Area locations on Camp Edwards.

Table 2-1 Overview Of Training Use - TY 2024

Area	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*
Ranges	305	9,665	90
Training Areas	1,276	112,396	173
Training Support Areas	2,203	94,042	6,987
Total	**3,784**	**216,103**	**7,250**

Table 2-2 Training Use History

Training Year	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*
TY 2024	3,784	216,103	7,250
TY 2023	3,261	192,039	7,168
TY 2022	3,894	147,303	12,139
TY 2021	3,947	168,145	6,021
TY 2020	3,041	138,474	6,828
TY 2019	2,481	94,874	12,424
TY 2018	2,118	103,864	1,673
TY 2017	2,268	144,671	3,450
TY 2016	2,065	92,083	2,271
TY 2015	2,105	122,645	2,691
Total	**28,964**	**1,420,201**	**61,915**
Mean	2,896	142,020	6,192

2.1.2 Training Areas

Camp Edwards has numerous areas that support military training: training areas, battle positions, observation posts, training roads, etc. The training areas also support a variety of training activities including land navigation, bivouacs, Soldier Validation Lanes, meteorological data collection, engineer/infantry/artillery skills training, driver (day and night) training, and Reserve Officer Training Corps (ROTC) training.

Other military users of the training areas during TY 2024 included the MA Air National Guard, US Army, the US Army Reserve, the US Marine Corps Reserve, and the US Navy.

Civilian organizations using the training areas during TY 2024 included the Civil Air Patrol, Falmouth Police, the Sea Cadets, and environmental remediation and restoration contractors.

Information on utilization of the training areas and major locations within them during TY 2024 is provided in Table 2-3 and 2-4. The total overall utilization of the training areas for the past 10 training years is included in Table 2-5. The variations over the years in training days and personnel numbers is a result of differing unit training requirements, combined training needs, and deployment cycles. During TY 2024, some type of training was conducted in at least one of the training areas and ranges on 209 calendar days.

The numbers in Tables 2-3 to 2-5 do not include employees and vehicles from the remediation programs and private contracting firms. Also, hunters using the Training Area/Reserve during the deer and turkey seasons are not tracked as they move through the various training areas. During TY 2024, hunter days in the Training Area/Reserve accounted for around 1.5 percent of the usage, and approximately 70% of the Training Area/Reserve was available to hunters during the deer hunting season. Please see Sections 3.5.3 and 3.5.4 for information about the deer and turkey hunting seasons.

Graphs 2-3 and 2-4 provide a visual representation of military and civilian personnel use in the training area over the past 10 training years. Graph 2-3 shows a general upward trend over time in military personnel use with a particular increase in training in TY 2024 due to units moving to a changing training doctrine that requires more field training. Graph 2-4 shows a drop in civilian usage in TY 2020 due to Covid-19 related civilian agency restrictions; in addition, the Camp Edwards turkey hunting season was canceled. During TY 2019, civilian use numbers are higher than in past years due to the Cape Cod Police Academy's use of facilities in the Cantonment Area as well as a Federal Emergency Management Agency training that took place.

Table 2-3 Training Area Use – TY 2024

Training Area	*Training Days*	*Military Personnel*	*Civilian Personnel*	*Vehicles (Wheeled)#*	*Vehicles (Tracked)#*
A-0	1	80	0	0	0
A-1	9	825	0	0	0
A-2	31	2,130	0	0	0
A-3	30	2,120	0	0	0
A-4	11	540	0	0	0
A-5	16	980	0	0	0
A-6	24	1,230	0	28	0
B-7	26	2,259	0	0	0
B-10	35	3,316	0	0	0
B-11	42	3,825	0	0	0
B-12	43	4,165	0	0	0
BA-1	24	3,243	0	22	0
BA-3	48	5,355	0	17	0
BA-4	30	3,381	0	0	0
BA-6	31	4,484	0	5	0
BA-7	34	3,855	0	2	0
C-13	29	3,160	0	0	0
C-14	47	4,327	0	0	0
C-15	46	3,902	0	9	0
C-16	46	4,157	0	0	0
Total	**603**	**57,334**	**0**	**83**	**0**

See Figure 2-1 for Training Area locations on Camp Edwards.

Table 2-4 Training Venue Use in the Training Areas – TY 2024

Location	*Training Area*	*Training Days*	*Military Personnel*	*Civilian Personnel*	*Vehicles (Wheeled)*	*Vehicles (Tracked)*
SVL-OBJ 1	A-4	41	3,807	0	4	0
SVL-OBJ 2	BA-4	34	3,338	0	0	0
SVL-OBJ 4	C 14	2	118	0	21	0
OP 1	E-2	34	1,310	0	0	0
OP 2	E-2	5	325	0	0	0
OP 3	E-2	5	325	0	0	0
OP 4	E-2	5	325	0	0	0
OP 5	E-2	5	325	0	0	0
OP 6	E-2	5	325	0	0	0
OP 7	E-2	5	325	0	0	0
OP 8	E-2	13	605	0	0	0
BP 1	BA-3	3	135	0	0	0
BP 2	BA-4	27	1,500	0	0	0

Table 2-4 Training Venue Use in the Training Areas – TY 2024, cont'd

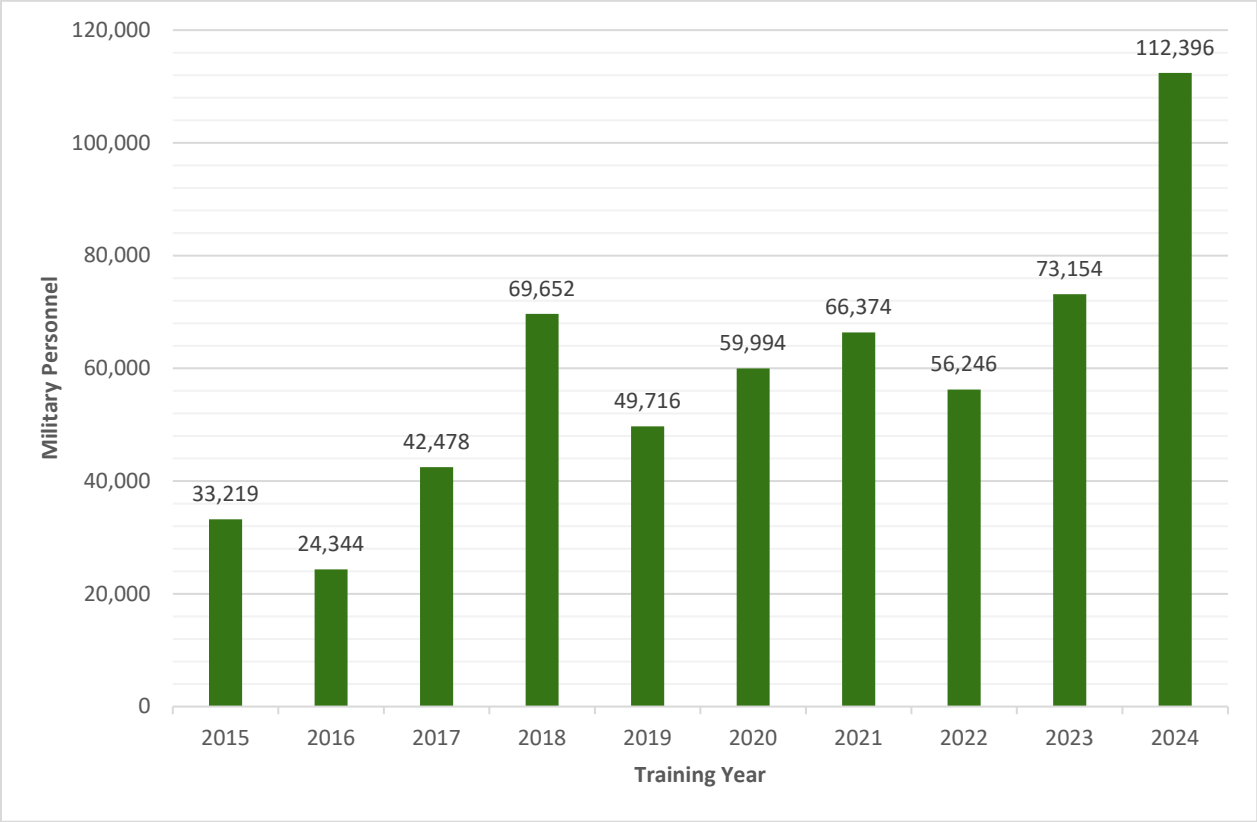
Location	*Training Area*	*Training Days*	*Military Personnel*	*Civilian Personnel*	*Vehicles (Wheeled)*	*Vehicles (Tracked)*
BP 14	B-11	4	200	0	0	0
BP 16	B-11	4	200	0	0	0
BP 20	B-11	13	1,950	0	0	0
BP 24	A-6	9	405	0	0	0
BP 27	E-1	28	1,230	0	0	0
NBC 01	A-4	9	1,010	0	0	0
Training Roads	Multiple	76	10,551	0	0	0
Wheelock Hill	A-5	27	1,639	0	2	0
Land Nav 1	A-2	49	3,938	20	2	0
Land Nav 2	A-5	39	4,303	0	0	0
Land Nav 3	A-1	36	2,870	153	4	0
Land Nav 4 Alpha	C-15	27	2,112	0	0	0
Land Nav 4 Bravo	C-16	17	2,024	0	0	0
Land Nav 4 Charlie	C-15/16	15	1,724	0	0	0
Dig Site 1	B-9	33	1,558	0	0	0
Dig Site 2	C-14	41	2,885	0	0	0
Dig Site 3	BA-1	44	2,062	0	8	5
Landing Zones	Multiple	18	1638	0	48	0
Total		**673**	**55,062**	**173**	**89**	**5**

See Figure 2-1 for Trainng Area locations on Camp Edwards.

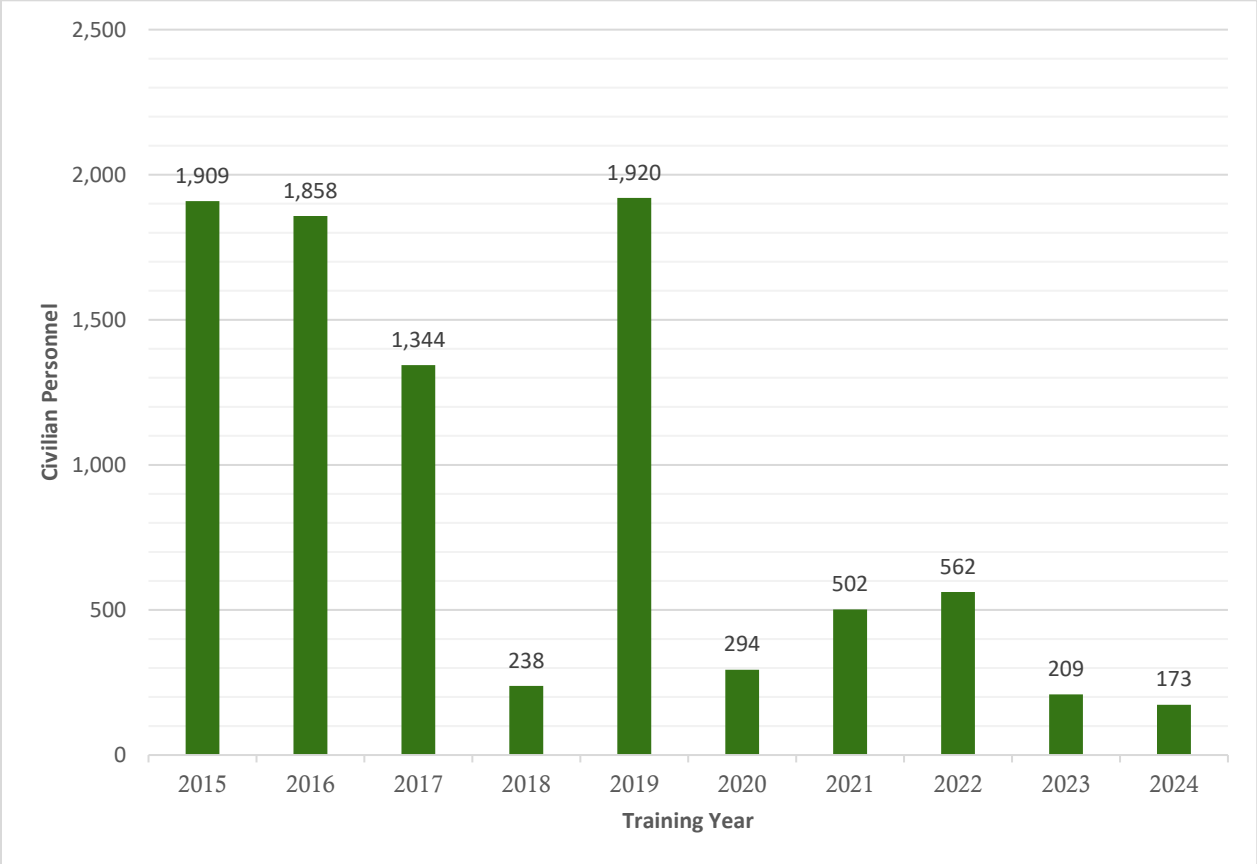
Table 2-5 Training Area Use History

Training Year	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*	*Vehicles (Wheeled)*	*Vehicles (Tracked)*
TY 2024	1,276	112,396	173	172	5
TY 2023	881	73,154	209	0	0
TY 2022	1,088	56,246	562	9	0
TY 2021	1,277	66,374	502	36	0
TY 2020	898	59,994	294	110	0
TY 2019	702	49,716	1,920	618	0
TY 2018	893	69,652	238	530	12
TY 2017	688	42,478	1,344	1,244	12
TY 2016	551	24,344	1,858	2,805	0
TY 2015	681	33,219	1,909	2,198	0
Total	**8,935**	**587,573**	**9,009**	**7,722**	**29**
Mean	894	58,757	901	772	3

Graph 2-3 Training Area Use History: Military Personnel



Graph 2-4 Training Area Use History: Civilian Personnel



2.1.3 Training Support Areas (Cantonment Area)

There are separate facilities and equipment that can simulate live military training; these are grouped under the Training Support Area (TSA). The majority of the training activities associated with these facilities are conducted in the Cantonment Area of Camp Edwards.

Table 2-6 presents the total number of training days/events and personnel that used each TSA during TY 2024.

Table 2-6 Training Support Area Use – TY 2024

Training Support Area	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*
1100 Training Area (Drivers Training)	47	4,147	0
1300 Training Area	3	1,050	0
3400 Training Area/Rail Load Ramp	11	780	0
3500 Training Area	1	20	0
ACFT Running Track	19	1,872	0
Asymmetric Threat Classroom	3	400	0
Battle Simulation Ctr - Bldg 1206	110	12,418	620
Battle Simulation Ctr - Rear Offices	39	1,152	0
Battle Simulation - Bldg 1213, 1st Floor	66	3,559	600
Battle Simulation - Bldg 1213, 2nd Floor	55	3,133	600
Battle Simulation - TOC Pads	16	1,905	0
Bldg 3499 - IWQ	9	1,309	0
Calero Mobile MOUT	48	5,041	0
Call for Fire Trainer II 1:30	62	1,394	50
CIED Visual Indicator Lane	11	361	0
Distance Learning Lab 5218	123	11,211	0
Engagement Skill Trainer 2000 - A	54	472	0
Engagement Skill Trainer 2000 - B	86	1,285	96
Engagement Skill Trainer 2000 - C	61	860	60
1243-High Risk Entry Facility-Control	14	1,305	150
1244-High Risk Entry Facility	14	1,305	150
JBCC Theater _ Bldg 5219	110	14,398	2350
Leadership Reaction Course	56	3,296	320
Lee Field	4	376	500
Mine Warfare Area	1	85	0
Obstacle Course	55	3,868	218
Rappel Tower 1	21	1,115	300
Rappel Tower 2	1	6	0
Shaw Field	51	5,618	138
Structural Collapse Site	7	308	0
TTB Kelley	19	1,776	0
Unstabilized Gunnery	2	8	0
Vault 1 - TSC	113	355	0
Vault 2 - TSC	366	795	0
Vault 3 - TSC	366	751	0
VBS3 Classroom - Bldg 3494	22	803	0

Table 2-6 Training Support Area Use – TY 2024, cont'd

Training Support Area	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*
Virtual Convoy Opns Trainer #98 (VCOT - TSC)	1	1	0
Weapons Cleaning - Bldg 3498	25	478	0
Welcome Center	125	4,549	735
YD Memorial Park	6	477	100
TY 2024 Total	**2,203**	**94,042**	**6,987**

Overall historical use of the TSA for the past 10 training years is included in Table 2-7. Figure 2-2 shows TSA locations in the Cantonment Area. Because unit commanders maximize training time by rotating personnel through several different events or exercises in a given training cycle, this again presents an inflated figure for training days compared to calendar days.

Table 2-7 Training Support Area Use History

Training Year	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*	*Total*
TY 2024	2,203	94,042	6,987	103,232
TY 2023	2,214	111,365	6,959	118,324
TY 2022	2,625	83,499	11,551	95,050
TY 2021	2,484	94,055	5,305	99,306
TY 2020	1,931	71,586	5,833	77,419
TY 2019	1,554	39,888	10,223	51,665
TY 2018	1,061	39,619	4,285	43,904
TY 2017	1,299	96,783	1,150	97,933
TY 2016	1,224	50,463	282	50,745
TY 2015	1,313	73,678	627	75,618
Total	**17,908**	**754,978**	**53,202**	**694,990**
Mean	1,179	75,498	5,320	81,320

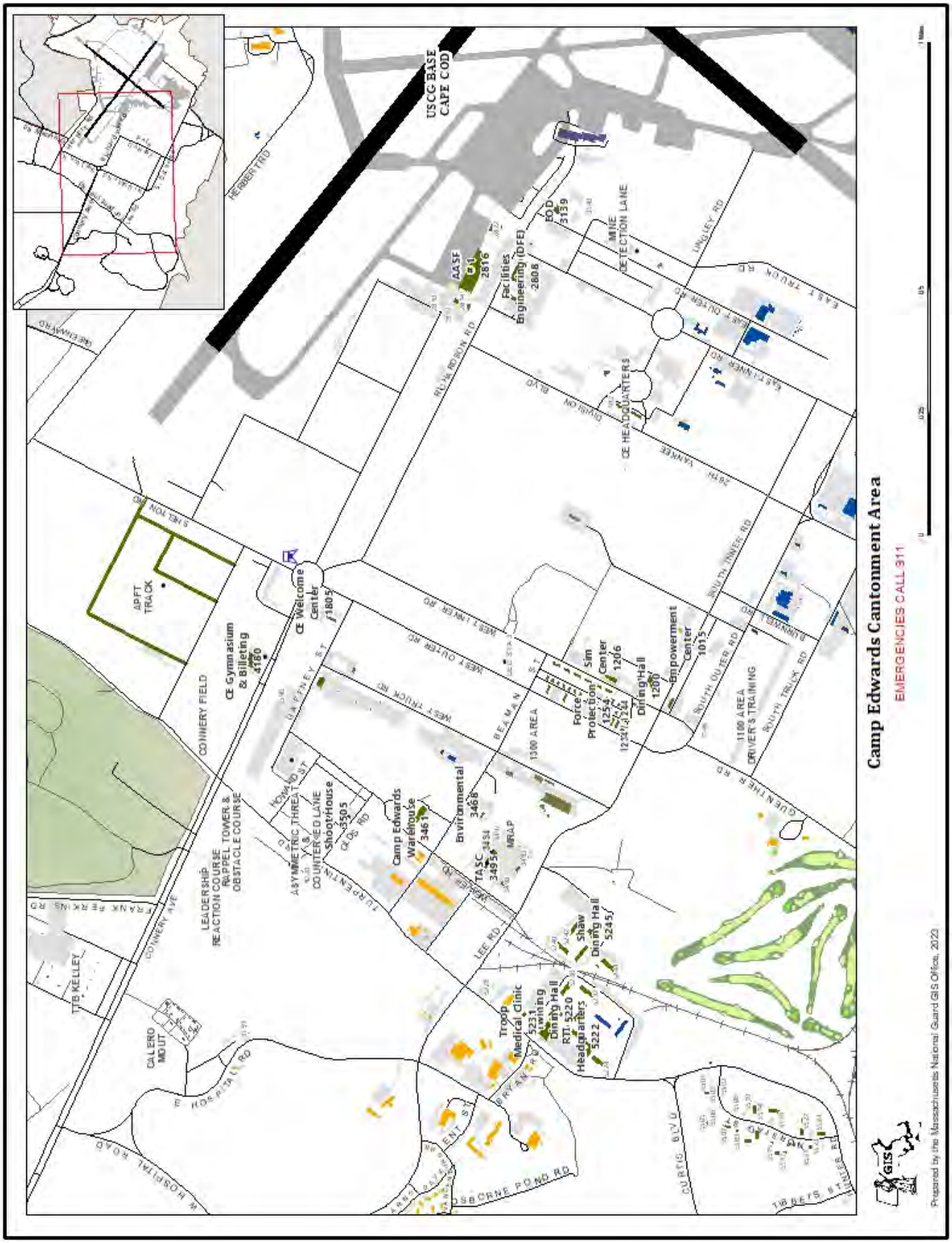
Civilian organizations using the TSA in the Cantonment Area of Camp Edwards during TY 2024 included Allied Universal Security, Barnstable County Sherrif's Department, Boy Scouts of America, Cape Cod Technical Regional High School, Civil Air Patrol, Falmouth Police, FBI Boston, Massachusetts State Police, Massachusetts Emergency Management Agency, Rhode Island State Police, Sea Cadets, and the United States Geological Survey.

2.2 Off-Site Training

During TY 2024, the MAARNG had 83 units conduct their annual two-week training cycle. Of these, 52 units trained in Massachusetts, 27 of which trained solely at Camp Edwards (approximately 2,135 Soldiers). One unit trained in Iowa; twelve units trained in Vermont; seven units trained in New Jersey, five units trained in New York, one unit trained in Louisiana; one unit trained in Connecticut; two units trained in Pennsylvania and one unit trained in Kenya. Twelve units were mobilized and deployed in support of contingency operations; all twelve units deployed overseas.

The total number of Massachusetts Soldiers trained during annual training for TY 2024 was 4,885 out of 5,625. Seventeen units conducted year-round annual training consisting of 782 Soldiers. The number of MAARNG Soldiers that completed a two-week annual training cycle by general geographical locations is: 3,723 in Massachusetts, 991 in other states, and 171 in Kenya.

Figure 2-2 Training Support Areas



2.3 Range Update

This section relates to EPS 19, Range Performance Standards. The current operational active small arms ranges on Camp Edwards are Sierra, India, Echo, and Tango ranges. The MAARNG conducts marksmanship training on Camp Edwards small arms ranges. Weapons used for training at Camp Edwards include the M16 and M14 rifles, the M249 light machine gun with 5.56 mm copper ammunition, the M240 machine gun using 7.62mm copper ammunition, pistols using 9mm lead ammunition, and shot guns where approved. Although not a small arms range, Lima Range, a 40 mm practice grenade range, using the M203 or M320 grenade launcher with practice 40mm grenades, will be discussed in this section. The locations of these ranges are shown in Figure 2-1.

2.3.1 Operations, Maintenance and Monitoring Plans

Each range is guided by an Operations, Maintenance, and Monitoring Plan (OMMP) that outlines range-specific monitoring to ensure the environment is protected to the maximum extent practicable. OMMPs are living documents that are in continuous review and updated as coordinated with the EMC Environmental Officer. Currently, the OMMPs are under review with revisions planned to include consolidating the individual, range-specific OMMPs into one document to ensure an effective and efficient document for the end user and consistent administration across all ranges. Best Management Practices (BMPs) outlined in the OMMPs are functioning as intended and are protective of the environment.

In accordance with the OMMP for each range, the MAARNG is required to capture, contain, and recover bullets/projectiles to the greatest extent practical. Recovery of projectiles is based on usage, time, and projectile density. The OMMPs define when this is required for each range. The purpose of removing projectiles is to maintain appropriate capture and containment of the projectiles, which prevents significant bullet on bullet impact, where projectiles leave the bullet pocket (an area on the capture berms where rounds are concentrated) by ricocheting, and projectile fragmentation.

2.3.2 Small Arms Range Monitoring

From the monitoring of the small arms ranges, it has been shown that there are no exceedances of the OMMP standards for soil or groundwater at the ranges. Porewater is subsurface water present in soil. For porewater, collected via lysimeters, there have been exceedances of the OMMP action levels for antimony (Sb) at ranges using legacy soil for backstop berms. Those ranges include operationally active India and Tango ranges and operationally inactive Juliet and Kilo ranges. There were no porewater exceedances at the firing line or mid-range lysimeters. Antimony exceedances at the ranges that used legacy soils began to occur approximately two years after their use began. For further information about antimony exceedances see the paragraphs below.

In 2024 for porewater at India Range, there was an action level exceedance (6 ppb) for antimony at 11.0 ppb. This exceedance is consistent with past exceedances for this lysimeter (LY002).

Antimony is in lead alloy bullets and in bullet primers. There are two causes of increased antimony in porewater:

- legacy range soils, where lead-antimony bullets were fired, were used for berm and range construction at Juliet, Kilo, and Tango ranges.
- phosphates added to range soils (1998-1999) and lime to adjust pH and to immobilize lead in legacy soils

A finding of the Ad Hoc Committee through lab studies at CRREL is that antimony is not threatening the groundwater. The work determined that the previous use of phosphates for lead immobilization and pH amendments were the cause of increased antimony in porewater and that there is not a threat to the groundwater. Soil amendments were halted several years ago at the direction of the SAC Ad Hoc committee. It has also been determined through soil sampling that antimony mobility is limited to surface soils where amendments were applied. A description of the work conducted by CRREL can be found in the TY 2022 *Annual State of the Reservation Report* on the E&RC's website: https://www.massnationalguard.org/ERC/publications.htm.

Soil, porewater and groundwater sampling conducted at each range are discussed in the sections pertaining to each range below.

2.4 Echo Range

Echo Range, a dual-purpose range, is a Combat Pistol/Military Police Qualification Course, consisting of 15 firing lanes with seven pop-up targets per lane offset along the firing lanes at varying distances with one fixed Military Police target at the end of the lane. Two courses of fire, on the same range, are referred to as an automated combat pistol/military police firearms qualification course. Echo Range is the only range on Camp Edwards approved for lead ammunition as a 9 mm copper round is not available in the Army inventory. Copper ammunition may be approved for use on Echo Range through non-standard training requests coordinated with and approved by the EMC's Environmental Officer.

The backstop berm is utilized as the primary projectile capture area. Single Individual Target frontal berms are the capture location for extreme low shot projectiles. The backstop berm was constructed on core material (native), landscape fabric as a demarcation line, a projectile capture medium that is 1/8th minus (road sand) and capped with topsoil that slows projectiles and allows for vegetation and slope stabilization.

Echo Range became operational in September 2019.

2.4.1 Range Maintenance and Sampling

At Echo Range, maintenance included repairing and filling bullet pockets. A list of Range Control's maintenance and inspection activities at Echo Range in TY 2024 is included in Appendix C.

In August and September 2024, surface soil samples were collected from Echo Range and analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen, where appropriate for the media being sampled. There were no anomalous, trending, or exceedance of the action levels specified in the OMMP for Echo Range. Groundwater could not be sampled as groundwater monitoring well (468S) located on Echo Range was compromised when the pump fell into the well and became lodged in the casing. The well was abandoned in accordance with MassDEP procedures, and a new groundwater monitoring well is planned to be developed on Echo Range during TY 2025. Placement of the new well on the range was coordinated with the US Army Corps of Engineers and the EMC EO. The new well will be located in Lane 3 on Echo Range, downgradient of the heaviest use lanes. Figure 2-3 shows the planned placement of the new well on Echo Range.

Figure 2-3 Planned Placement of the New Echo Range Groundwater Monitoring Well

Note: The blue circle denotes the well's planned location. The red lines indicate particle flow.

A figure showing soil sampling locations on Echo Range, an example of a groundwater well installation, and the sampling results for TY 2024 are available in Appendix C.

2.5 India Range

India Range is a 25-meter small arms range using copper-only ammunition to train soldiers on the skills necessary to align the sights on their weapons and practice basic marksmanship techniques against stationary targets. It has 20 firing positions with one target in each firing lane. The range is also used for short-range marksmanship training and qualification.

2.5.1 Range Maintenance and Sampling

Maintenance activities on India Range included bullet pocket maintenance. A list of Range Control's inspection and maintenance activities at India Range in TY 2024 is included in Appendix C.

In August 2024, groundwater, porewater, and surface soil samples were collected from India Range. The samples were analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen where appropriate for the media being sampled. Results of the soil analyses continue no anomalous, trending, or exceedance of the action levels specified in the OMMP. For porewater there was an action level exceedance (6 ppb) for antimony at 11.0 ppb. This exceedance is consistent with past exceedances for this lysimeter. For groundwater there was an action level exceedance (7.75 ppb) for lead at 57.6 ppb in the groundwater monitoring well (MW639S) on that range. The MAARNG will resample MW639S for lead in March 2025 and the results will be provided to the EMC's EO. Previous exceedances are discussed in Section 2.3.2.

During TY 2024, a lysimeter was installed beneath a bullet pocket on the backstop berm. During discussions about projectile removal at small arms ranges at the SAC Ad Hoc meeting in November 2023 it was determined that placing a lysimeter under bullet pockets on Tango and India Ranges would be useful in showing if any constituents are percolating through the berm from the bullet pocket.

Lysimeter installation under a bullet pocket on the India Range backstop berm. *Photos by MANG Environmental & Readiness Center*

A figure showing the monitoring wells, lysimeters and soil sampling locations on India Range and the sampling results for TY 2024 are available in Appendix C.

2.6 Lima Range

Lima Range is a 40 mm practice grenade range. In 2012, the Environmental Protection Agency (EPA) Region 1 and the EMC approved returning to live firing on Lima Range using the M781 40mm Training Round.

The M781 is a practice grenade that is fired as a projectile composed of a hollow plastic “windshield” filled with Day-Glo-Orange marking powder. According to the Safety Data Sheet, the Day-Glo-Orange marking powder is considered to be non-toxic. The initial firing of the M781 40mm Training Round occurred in 2013.

Lima Range is used to train and test individual soldiers on the skills necessary to engage and defeat stationary target emplacements with the 40mm grenade launcher. The range has four self-contained stations and is 30-meters wide by 400-meters long. The stations consist of firing positions and targets of various types and distances, ranging from 100 to 350 meters. Station 1 consists of a prone fighting position with sandbags for support and two zeroing targets at 200 meters. Station 2 consists of an upright log or wall, a kneeling firing position about four feet high, and two point-type targets. The targets include a simulated window or door of a building at 100 meters and a small bunker or fighting position at 125 meters. Station 3 consists of a fighting position and two targets. The targets are a two-person bunker at 175 meters and an automatic weapon position at

200 meters. The bunker represents a point target, while the automatic weapons position represents an area target. Station 4 consists of a prone fighting position with a log or sandbag support and two area type targets at 250 meters and 350 meters.

2.6.1 Range Maintenance and Sampling

A list of Range Control's inspection and maintenance activities Lima Range in TY 2024 is included in Appendix C.

In August 2024 porewater and surface soil samples were collected from Lima Range and analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen, where appropriate for the media being sampled. There were no action level exceedances for soil and porewater. Groundwater at Lima Range is being monitored by the IAGWSP.

A figure showing the monitoring wells, lysimeters and soil sampling locations on Lima Range and the sampling results for TY 2024 are available in Appendix C.

2.7 Sierra Range

Sierra Range is an automated 300-meter pop-up modified record of fire range using copper ammunition only and is used to qualify soldiers in marksmanship proficiency. The firing line is 200 meters long with 10 firing positions. There are nine stationary, pop-up targets in each firing lane. The targets are located at 50, 100, 150, 200, 250, and 300 meters, with two targets at the 50-meter distance and one each at the other distances.

2.7.1 Range Maintenance and Sampling

Maintenance activities during TY 2024 at Sierra Range included bullet pocket maintenance and clearing the Stationary Infantry Target locations of debris such as dirt and weeds. A list of Range Control's inspection and maintenance activities at Sierra Range in TY 2024 is included in Appendix C.

In August 2023, groundwater, porewater, and surface soil samples were collected from Sierra Range. The samples were analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen where appropriate for the media being sampled. Results of the soil, porewater, and groundwater analyses continue to show no anomalous, trending, or exceedance of the action levels specified in the OMMP.

Figures showing the monitoring wells, lysimeters and soil sampling locations on Sierra Range and the sampling results for TY 2024 are available in Appendix C.

2.8 Tango Range

Tango Range is a 25-meter copper zeroing range with 32 firing positions with one target in each lane. Tango Range was redeveloped as a copper range during TY 2021 in support of weapons qualification at Sierra Range. Soldiers zero their weapons at Tango Range and then move to the adjacent Sierra Range to conduct weapons qualification.

2.8.1 Range Maintenance and Sampling

A list of Range Control's inspection activities at Tango Range in TY 2024 is included in Appendix C.

In August 2024, porewater, groundwater, and surface soil samples were collected from Tango Range. The samples were analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen where appropriate for the media being sampled. Results of the soil and porewater analyses show no anomalous, trending, or exceedance of

the action levels specified in the OMMP. For groundwater there was an action level exceedance (7.75 ppb) for lead at 38.3 ppb in the groundwater monitoring well (MW467S) on that range. The MAARNG will resample MW467S for lead in March 2025 and the results will be provided to the EMC's EO.

A figure showing the monitoring wells, lysimeters, and soil sampling locations on Tango Range and the sampling results for TY 2024 are available in Appendix C. A lysimeter was installed on Tango Range in November 2023.

2.9 Range Usage Data

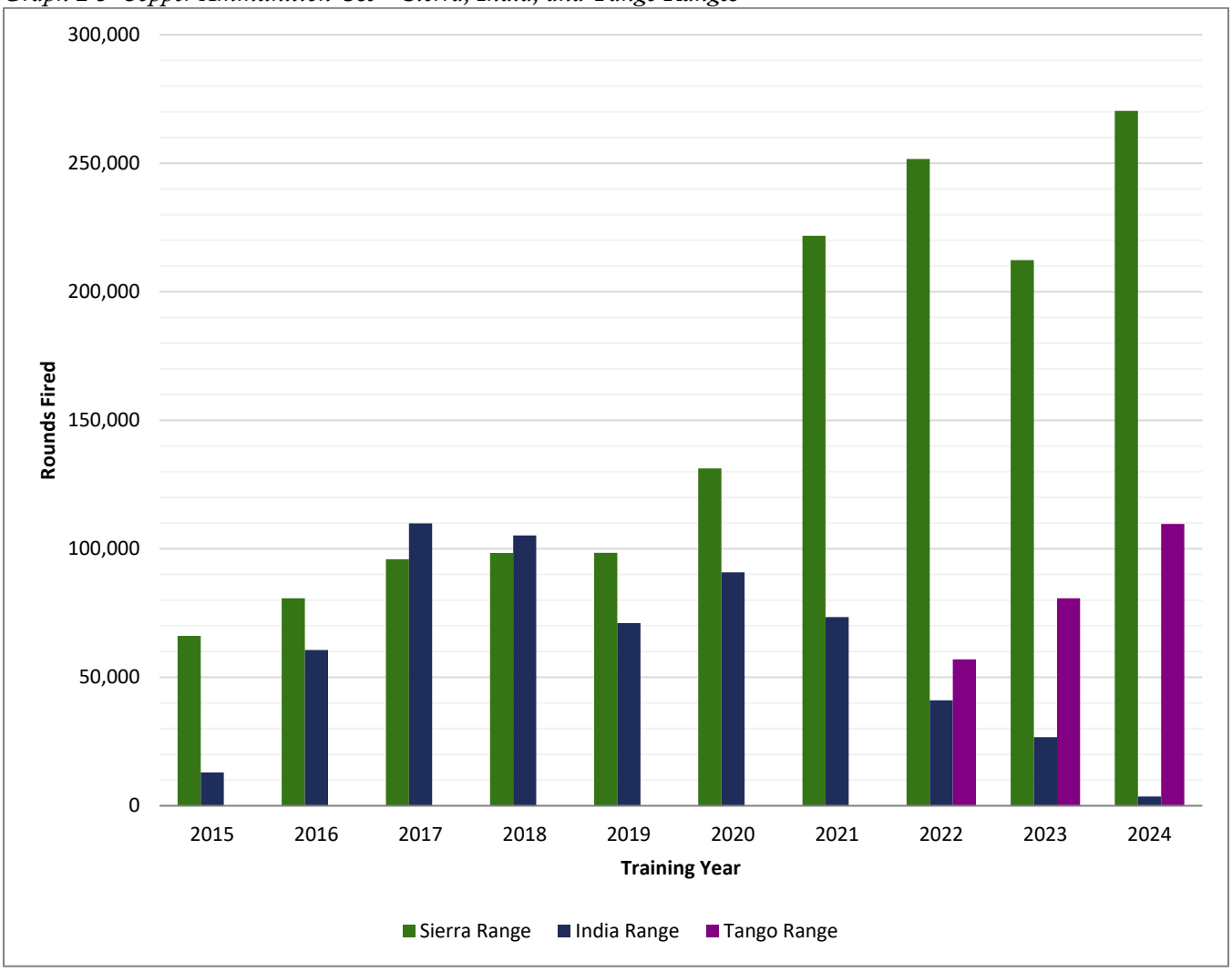
A total of 2,583,392 rounds of copper ammunition has been fired at Camp Edwards since its use was approved: 1,642,612 at Sierra Range, 640,632 at India Range, and 247,305 at Tango Range. The total number of copper ammunition rounds fired includes 16,718 at the inactive operational ISBC Range, which was used for two approved, non-standard training events in June and July 2022 and an approved, non-standard training event in April 2023; and 36,125 rounds fired on Echo Range during two non-standard training events in TY 2021 and two approved, non-standard training events in TY 2022.

Graph 2-5 provides a summary of copper ammunition fired at Sierra, India and Tango ranges since use of copper ammunition was approved at them. During TY 2020, the MAARNG transitioned to all copper-based rifle ammunition. The graph shows an upward trend in copper ammunition use overall. On India Range, range use has declined since India Range ceased to be the primary zeroing range for Sierra Range due to a change in standard in 2020 that eliminated the use of Alternate Course of Fire for qualification. When Tango Range was redeveloped into a copper ammunition range in TY 2021, it became the primary zeroing range, and it is easy for Soldiers to walk to Sierra Range to qualify. Information on the number of copper ammunition fired on Sierra, India, and Tango ranges each training year is provided in Appendix C.

Since TY 2019, a total of 287,390 rounds of 9mm lead ammunition has been fired at Echo Range. During TY 2024, 2,740 rounds of .40 caliber lead ammunition were fired on Echo Range in November 2023 and 430 rounds of 12 Gauge ammunition (lead) were fired on Echo Range in August 2024 as part of approved, non-standard training events. Graph 2-6 shows the number of 9mm rounds of lead ammunition and 5.56mm copper rounds fired on Echo Range.

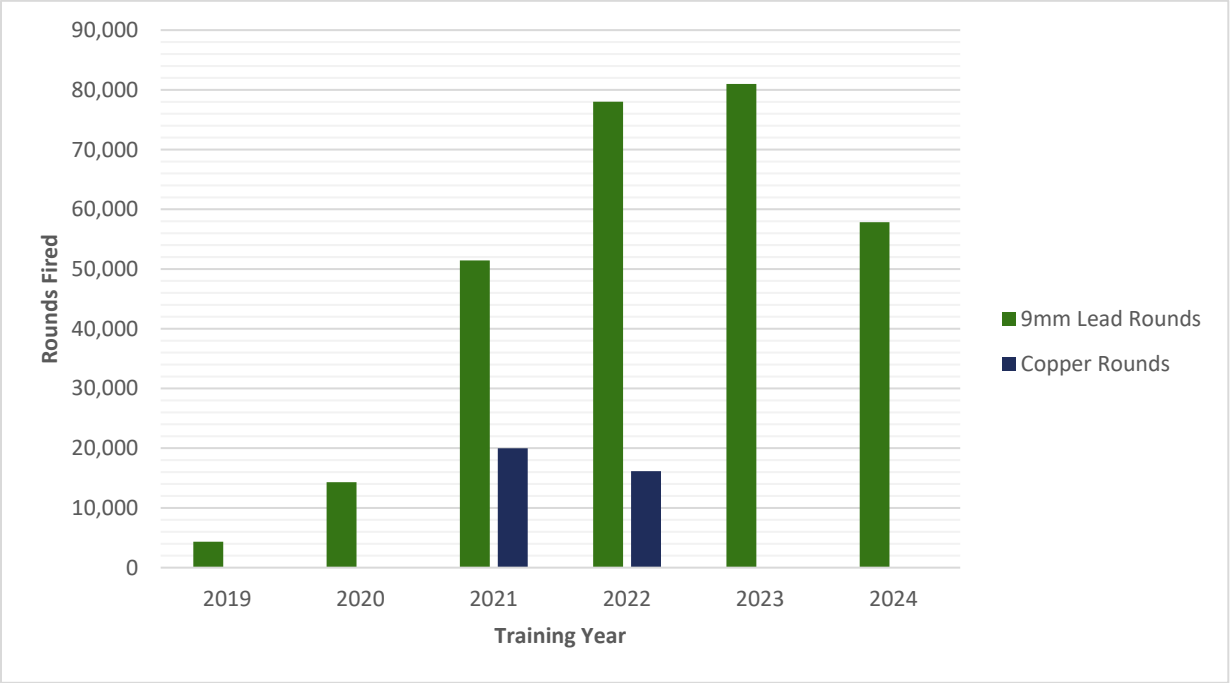
Information on lead ammunition fired from TY 2007 through TY 2024, including amounts and types, is provided in Appendix C.

Graph 2-5 Copper Ammunition Use – Sierra, India, and Tango Ranges



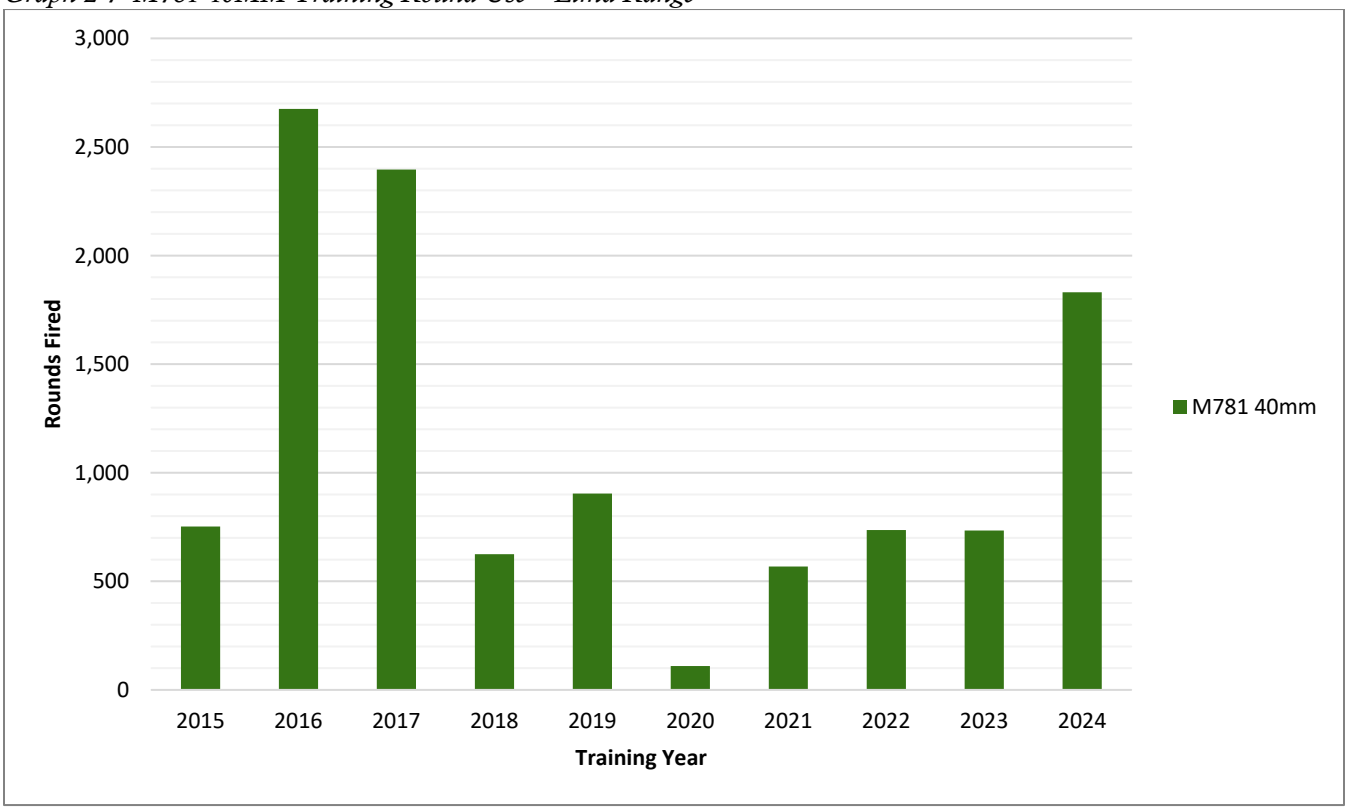
Note: Tango Range became operational utilizing copper ammunition during TY 2022.

Graph 2-6 9mm Lead and Copper Ammunition Round Use – Echo Range



A total of 14,206 M781 40mm Training Rounds have been fired at Lima Range since its use was approved. Graph 2-7 provides information on the number of M781 40mm Training Rounds fired at Lima Range. The graph reflects the cyclic requirement for qualification for grenadiers. Units that have grenadiers only have one to two soldiers with that requirement in the unit; not every soldier uses this weapon.

Graph 2-7 M781 40MM Training Round Use – Lima Range



The only civilian use of the small arms ranges during TY 2024 was by the Falmouth Police. They fired 3,550 5.56mm rounds of copper ammunition and 2,740 .40 cal rounds of copper ammunition.

During TY 2024, some type of weapons firing was conducted on at least one of the ranges on 130 calendar days.

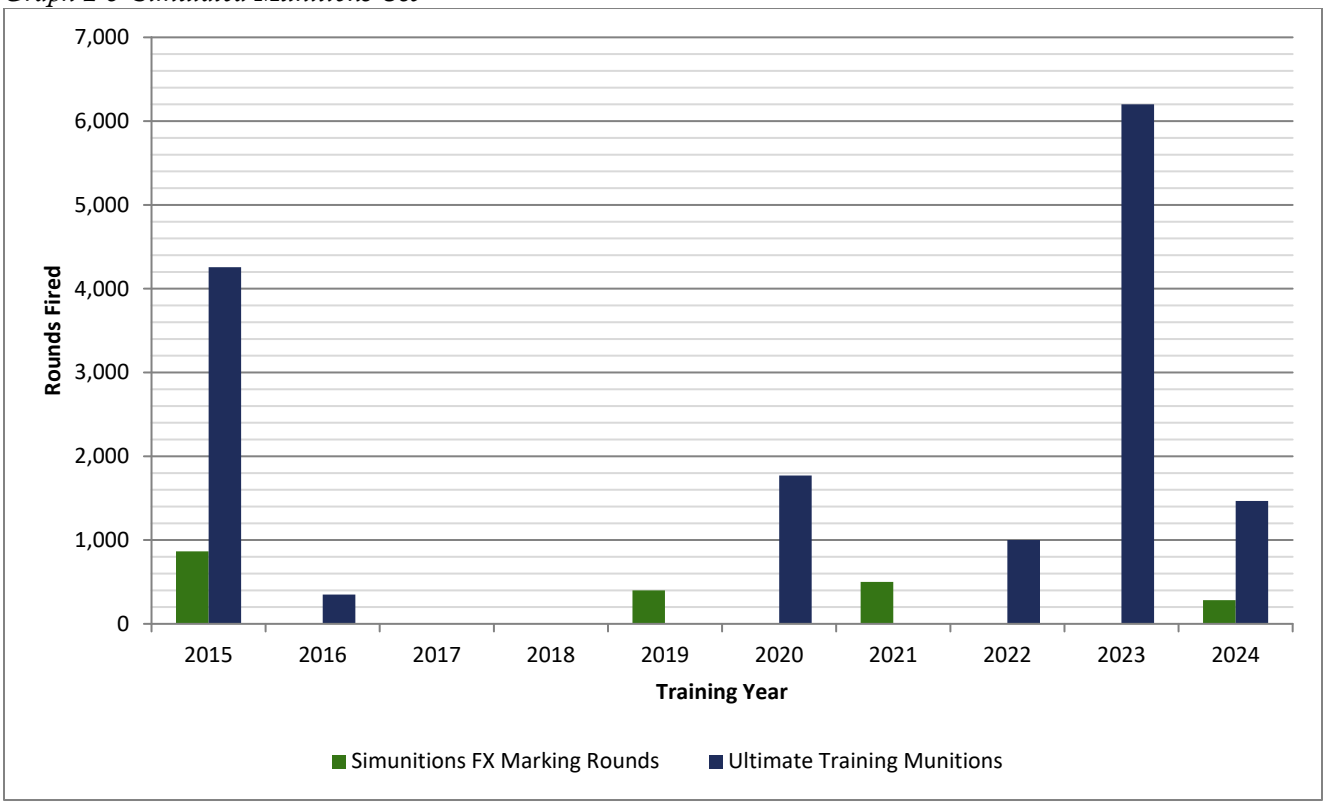
2.10 Simulated Munitions

The MAARNG uses two types of simulated munitions at Camp Edwards: an Ultimate Training Munitions (UTM) Man Marker Round and a Simunitions FX Marking Round. Simulated munitions are wax marking tipped ammunition that can be used in a standard weapon. They can be shot at a Soldier wearing proper personal protective equipment with the wax projectile leaving a colored mark on their clothing letting them know they are hit. Simulated munitions are best used in concert with other simulators to be effective for most units. The UTM Man Marker Round and the Simunitions FX Marking Round are on the Camp Edwards Approved Munitions List. These munitions are primarily used at Training Area venues such as the Soldier Validation Lanes.

The EMC required that the Annual Report include steps taken by the National Guard and progress associated with converting to the use of lead-free primer in simulated munitions. The Massachusetts National Guard monitors the availability of alternate munitions; currently, no new information has been provided.

Graph 2-8 provides the number of UTM and Simunitions FX Marking Rounds fired in the Training Area/Reserve since 2014. As units become aware that the ranges and other training venues at Camp Edwards meet qualification standards, the use of the areas where these venues are located has increased. Fluctuations in training usage is also largely influenced by deployment cycles and changes to training doctrine and directives. Increases in usage are also related to the inaccessibility of other training bases for the MAARNG to use for their readiness training needs.

Graph 2-8 Simulated Munitions Use



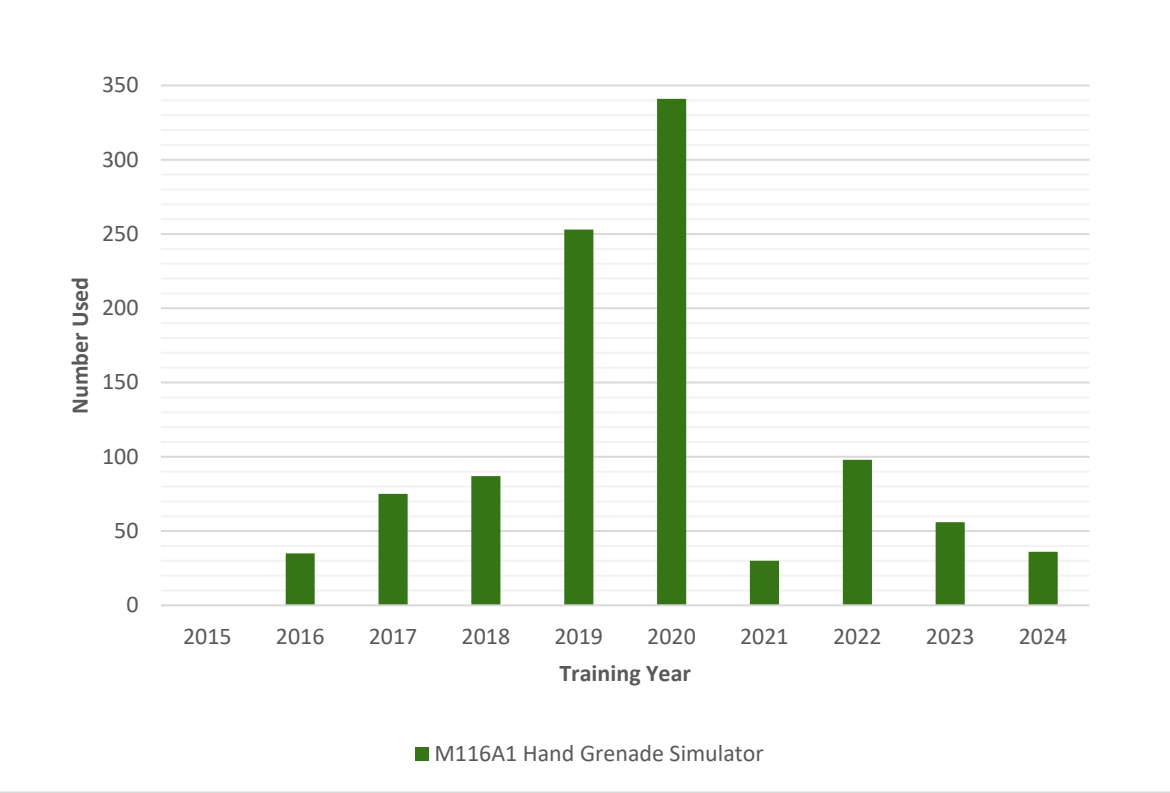
2.11 Pyrotechnics

Military pyrotechnics are used to simulate battlefield noises and effects during troop maneuvers and training. Use of these devices is to prepare soldiers for the rigors of combat by simulating the stress and confusion of war. Currently the M116A1 and M69 Hand Grenade Simulators are approved for training use at Camp Edwards and are on the Camp Edwards Approved Munitions List.

2.11.1 M116A1 Hand Grenade Simulator

The M116A1 Hand Grenade Simulator was approved for use at Camp Edwards in March 2010. Thirty-six were used in the Training Area/Reserve during TY 2024. Graph 2-9 shows the number used each training year since TY 2015. M116A1 hand grenade simulator use increased because the MAARNG has been conducting more collective training versus individual unit training. The M116A1 is used primarily during collective unit training and is used to simulate battlefield conditions during training events. However, during TY 2023 and TY 2024, Camp Edwards supported more standard, individual/Annual National Guard training rather than collective training exercises.

Graph 2-9 M116A1 Hand Grenade Simulator Use



2.11.2 M69 Hand Grenade Simulator

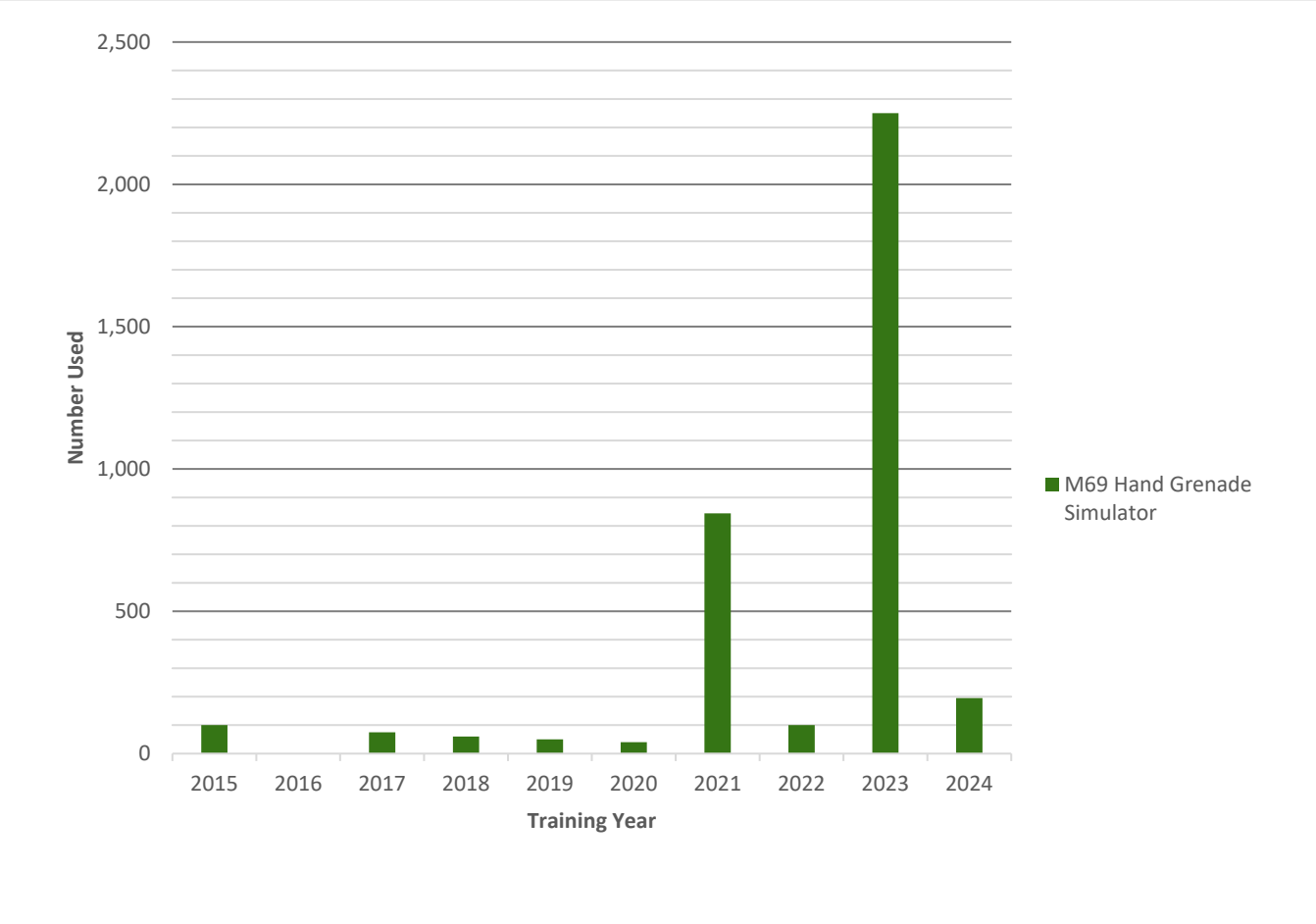
In 2013, EPA Region 1 and the EMC approved the use of the M69 Hand Grenade Simulator on Camp Edwards.

The M69 provides realistic training and familiarizes soldiers with the functioning of a fragmentation hand grenade. After a delay of four to five seconds, the M69 emits a small puff of white smoke and makes a popping noise. The grenade bodies are reused repeatedly by replacing the fuse assembly.

Camp Edwards developed a Standard Operating Procedure and Course Management Plan for the M69 Hand Grenade Simulator, approved by the EMC in 2014. The plan allows for maximum effective use of the M69 Hand Grenade Simulator with the M288 Fuse in the Camp Edwards training areas and on the Hand Grenade Qualification Course while abiding by training and environmental guidelines. Use of the M69 Hand Grenade

Simulator began in September 2014. During TY 2024, 195 were used in the Training Area/Reserve. Graph 2-10 shows the number of M69 Hand Grenade Simulators from TY 2015 to TY 2024. M69 Hand Grenade Simulator use showed a decrease during TY 2024; the nature of required M69 grenade training is cyclical, and during TY 2023, some units that may have trained at Fort Devens trained at Camp Edwards as Fort Devens was unavailable.

Graph 2-10 M69 Hand Grenade Simulator Use

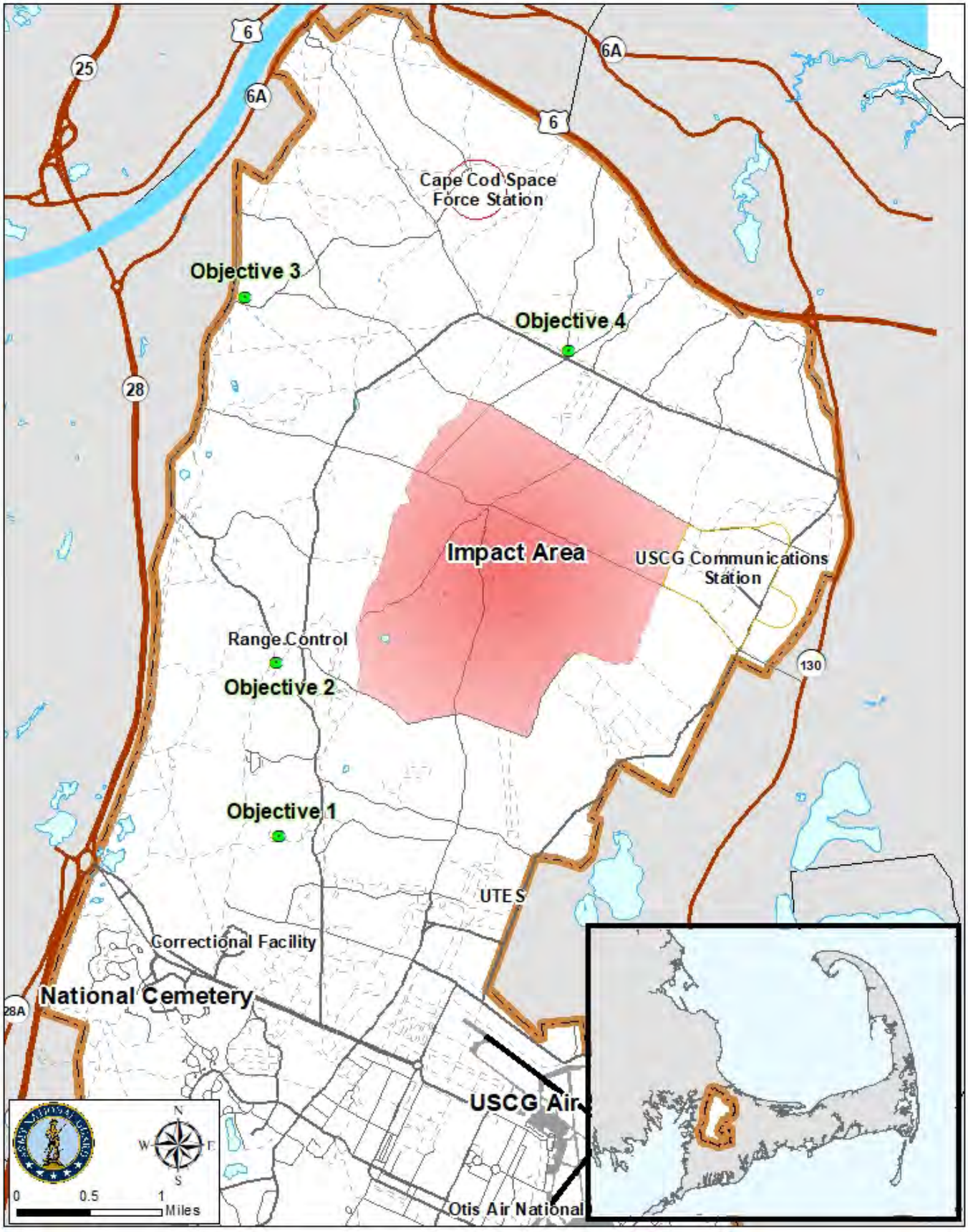


2.12 Soldier Validation Lane

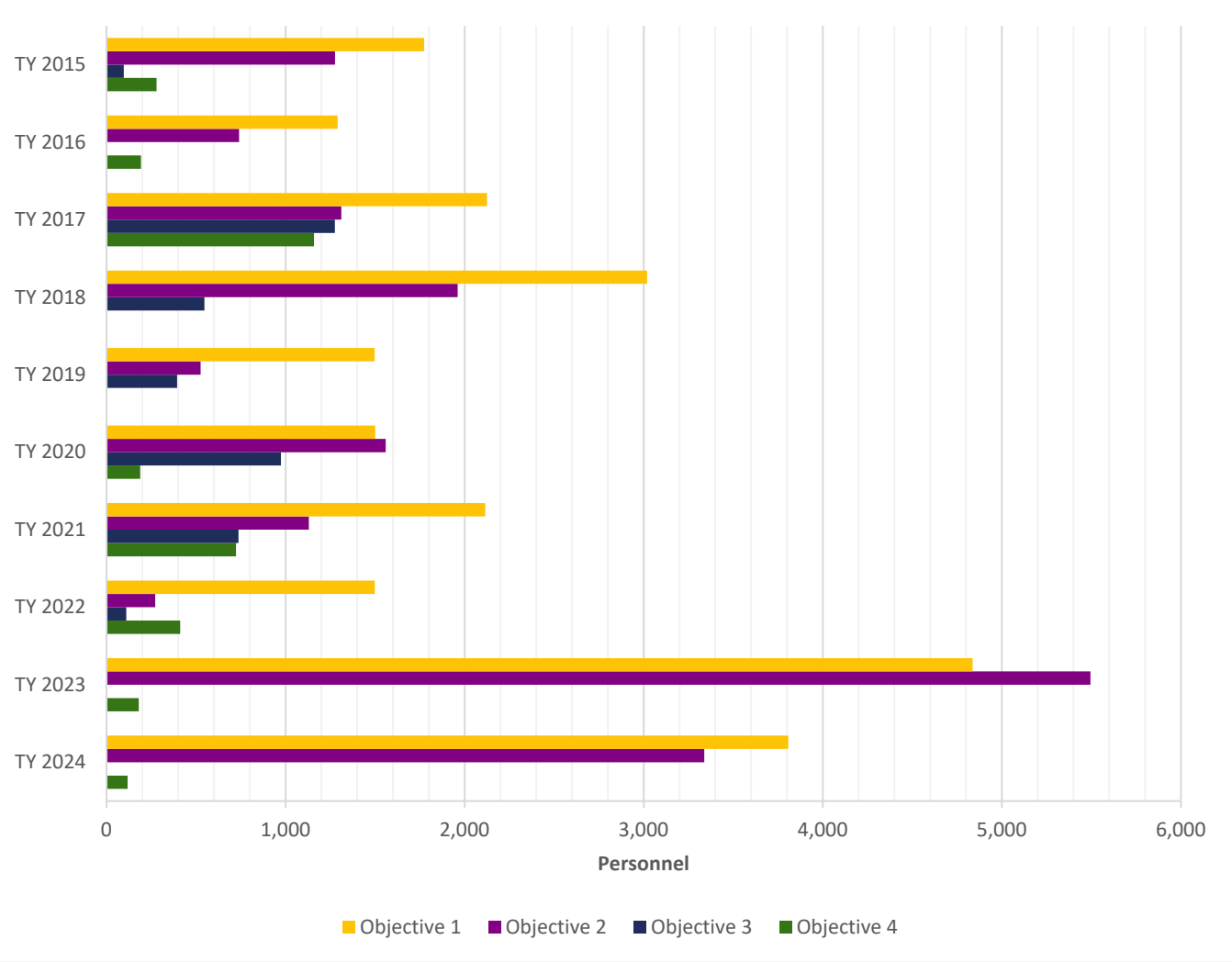
The SVL uses conex-like shipping containers as training aids, which can be reconfigured to mimic small villages and used for Improvised Explosive Device (IED) training. The containers are located in open or previously cleared, historically-used locations including training and bivouac sites within the Training Area. The ability to periodically reconfigure the portable training aides within the Training Area will critically enhance the ability to adapt scenarios to the most current combat situations, ultimately helping to save the lives of soldiers on the battlefield.

Three SVL locations (called objectives) were used during TY 2024 to meet military training needs: Objective 1 in Training Area A-4; Objective 2 in Training Area BA 4; and Objective 4 in Training Area C-14. Objective 3 in Training Area B 11 was not used. Graph 2-11 shows the use of all four SVL Objectives since TY 2015. The locations of the SVL Objectives are shown in Figure 2-4. The Soldier Validation Lane Annual Monitoring Report for TY 2024 is available in Appendix C.

Figure 2-4 Soldier Validation Lane Objective Locations



Graph 2-11 Soldier Validation Lane Use



2.13 Multi-Purpose Machine Gun Range

In TY 2015, the Massachusetts Army National Guard (MAARNG) secured congressional funding for an approximately $11.5 million Military Construction (MILCON) project to develop a Multi-Purpose Machine Gun Range (MPMG) at Camp Edwards. An MPMG, where soldiers train and qualify with automatic weapons, was planned to be constructed at the currently inactive KD Range. As part of the planning process, the MAARNG conducted a number of assessments, including a noise simulation and archeological and flora and fauna surveys.

Over the past nine years, the MAARNG has coordinated with multiple state and Federal agencies including NHESP to ensure that adverse impacts to natural resources (including state-listed rare species) were avoided or mitigated.

In TY 2020, the MAARNG began the MEPA and NEPA processes. After filing a Notice of Project Change in February 2020 with the MEPA Office and completing a Supplemental Environmental Impact Report (SEIR), the MAARNG received a certificate signed by the Secretary on July 17, 2020, which determined the SEIR submitted for the project adequately and properly complies with MEPA and its implementing regulations. The NEPA Environmental Assessment, completed in August 2020, prompted public feedback with concerns about environmental impacts and necessity of locating the range at Camp Edwards. In April 2021, National Guard Bureau determined the Environmental Assessment met the “Finding of No Significant Impact.”

In August 2021, the EPA began a Sole Source Aquifer review. A draft determination released in April 2023 stated that the MPMG has "the potential to contaminate the aquifer and create a significant public health hazard." The EPA has not yet released a final determination.

During TY 2024, bids received to build the MPMG were much higher than the MILCON money originally allotted to the MAARNG and would no longer cover the cost of the range as originally planned. The MAARNG made the decision to revise the bidding documents and reduced the proposed scope of the MPMG from eight lanes to three. Several bids were received, however, at the end of September 2024, the Governor of Massachusetts declined to sign the construction contract for the MPMG. Without a construction contract in place at the end of Federal Fiscal Year 2024, the MILCON funding previously authorized for the MPMG was lost.

Documents related to the MPMG are available on the publications page of the E&RC's website: https://www.massnationalguard.org/ERC/publications.htm.

2.14 Range Operations and Control Area (ROCA)

During TY 2024, Camp Edwards began upgrading the Range Operations and Control Area (ROCA) support facilities on India, Sierra, and Tango ranges. ROCA structures support range operations and improve safety on small arms ranges. The support buildings currently on those ranges were either dilapidated or not on the range at all. The support structures being upgraded or constructed include range towers, ammunition break-down buildings, equipment storage, bleacher overhangs and covered mess areas. There is no significant change in use on these ranges.

In March 2024, a Notice of Project Change to the Final Environmental Impact Report, June 2001 (Executive Office of Energy Environmental Affairs project #5834), was submitted to MEPA describing the proposed support facilities and on April 22, 2024, the Secretary of the Executive Officer of Energy and Environmental Affairs issued a certificate for the project. Work on the project began in May 2024 and is planned to be complete in early 2025.

ROCA facility work at Sierra Range.

Section 3
Environmental Program Management

3.0 Introduction

Chapter 47 requires the Annual Report to contain information describing the range of resource management activities conducted by the MAARNG in the Training Area/Reserve and to report on activities associated with the EPSs for the Training Area/Reserve. Sections 3.1 through 3.15 include information for each EPS where there were associated activities. Section 3.16 provides similar information for the generic Cultural Resources EPS that also applies to MAARNG activities in the Training Area/Reserve. In addition to meeting this requirement, Section 3 provides information on required mitigation measures undertaken by the MAARNG and information on any noncompliance with the EPSs or other laws and/or regulations.

Chapter 47 also requires the Annual Report to describe long-term trends in the major areas of resource management and activities. Data are provided in this report back through TY 2015, when available, or longer when appropriate to illustrate long-term trends. Additional information on environmental management activities performed in the Training Area/Reserve can be found on the Publications page of the E&RC web site at: https://www.massnationalguard.org/ERC/publications.htm.

During TY 2024, Records of Environmental consideration (RECs) were prepared to assess the potential impacts of six proposed actions on natural and cultural resources in the Training Area/Reserve. RECs are an internal environmental review document based on NEPA.

Appendix D identifies the relevant federal, state, DoD, and U.S. Army environmental regulations governing MAARNG activities in the Training Area/Reserve.

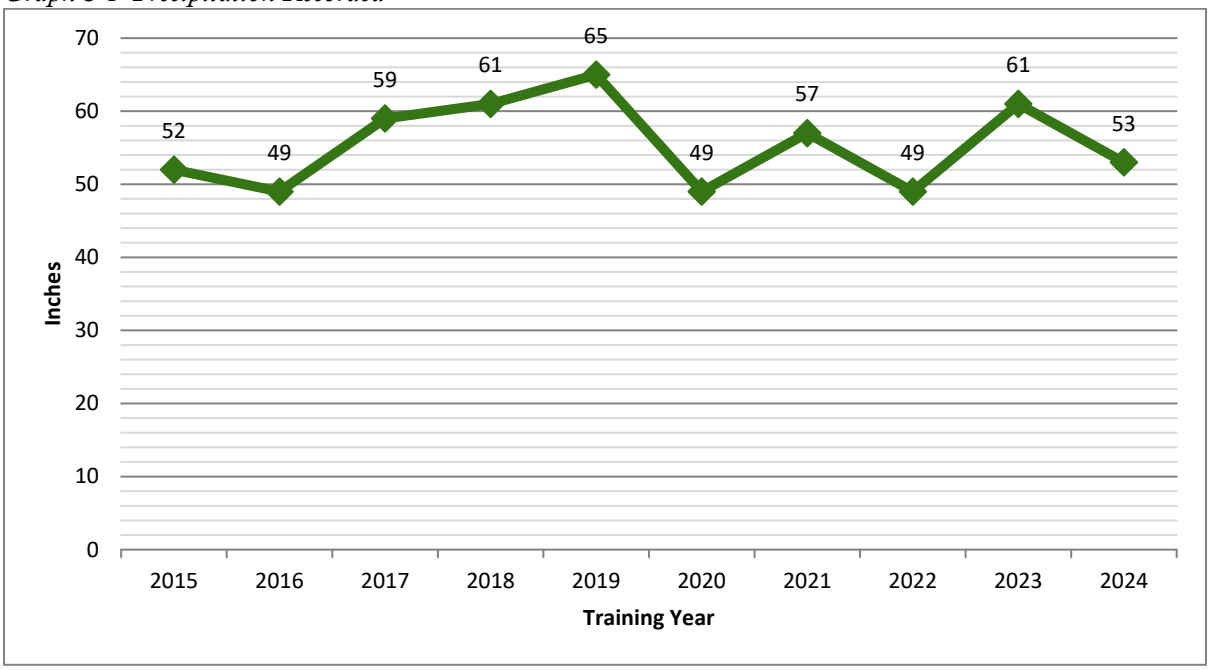
3.1 Groundwater Resources Management

The MAARNG complied with EPS 1, Groundwater Resources Performance Standard during TY 2024. Travel in Zone 1 Wellhead Protection Areas was limited to foot travel or to vehicles required for construction, operation, or maintenance of wells. The Upper Cape Regional Water Supply Cooperative continues to have fencing around its three water supply wells and appropriate signage around the each of the well's 400-foot radius in the Training Area/Reserve. Both the Upper Cape Regional Water Supply Cooperative, the 102nd Intelligence Wing, and Converge/ASUS (see Section 3.1.3) operated within the water withdrawal limits of their respective MassDEP issued permit or registration. The Bourne Water District has a well in the Training Area/Reserve that is part of its overall water supply system. The JBCC Groundwater Protection Policy is available on the Publications page of the E&RC website at https://www.massnationalguard.org/ERC/publications.htm.

3.1.1 Precipitation

Precipitation information included in the Annual Report is obtained from the Northeast Regional Climate Center at Cornell University in Ithaca, New York, based on recordings from a station in East Sandwich, Massachusetts. That station reported a total of 53.34 inches of precipitation for TY 2024 (Graph 3-1).

Graph 3-1 Precipitation Recorded



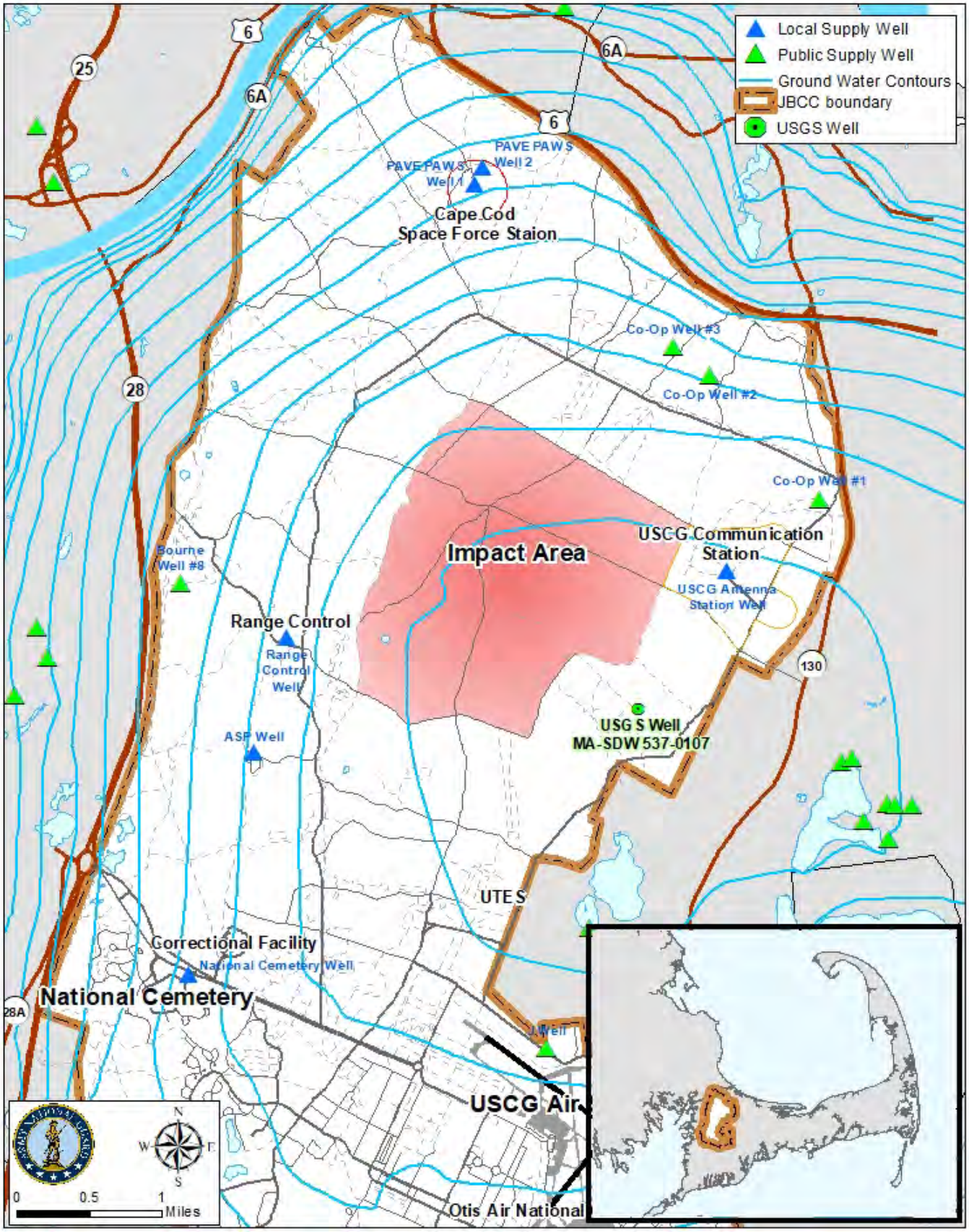
3.1.2 Groundwater Level

During the early part of TY 2005, the U.S. Geological Survey (USGS) installed a monitoring well (USGS number MA-SDW 537-0107) on Camp Edwards to record the altitude of the water table in the Cape Cod aquifer. The well is located west of Greenway Road on the J-1 Range of the Training Area/Reserve and is about 107 feet deep. A recording device in the well electronically transmits a continuous record of the water level near the top of the water-table mound that forms the Sagamore groundwater-flow system on western Cape Cod. The well's location is shown in Figure 3-1.

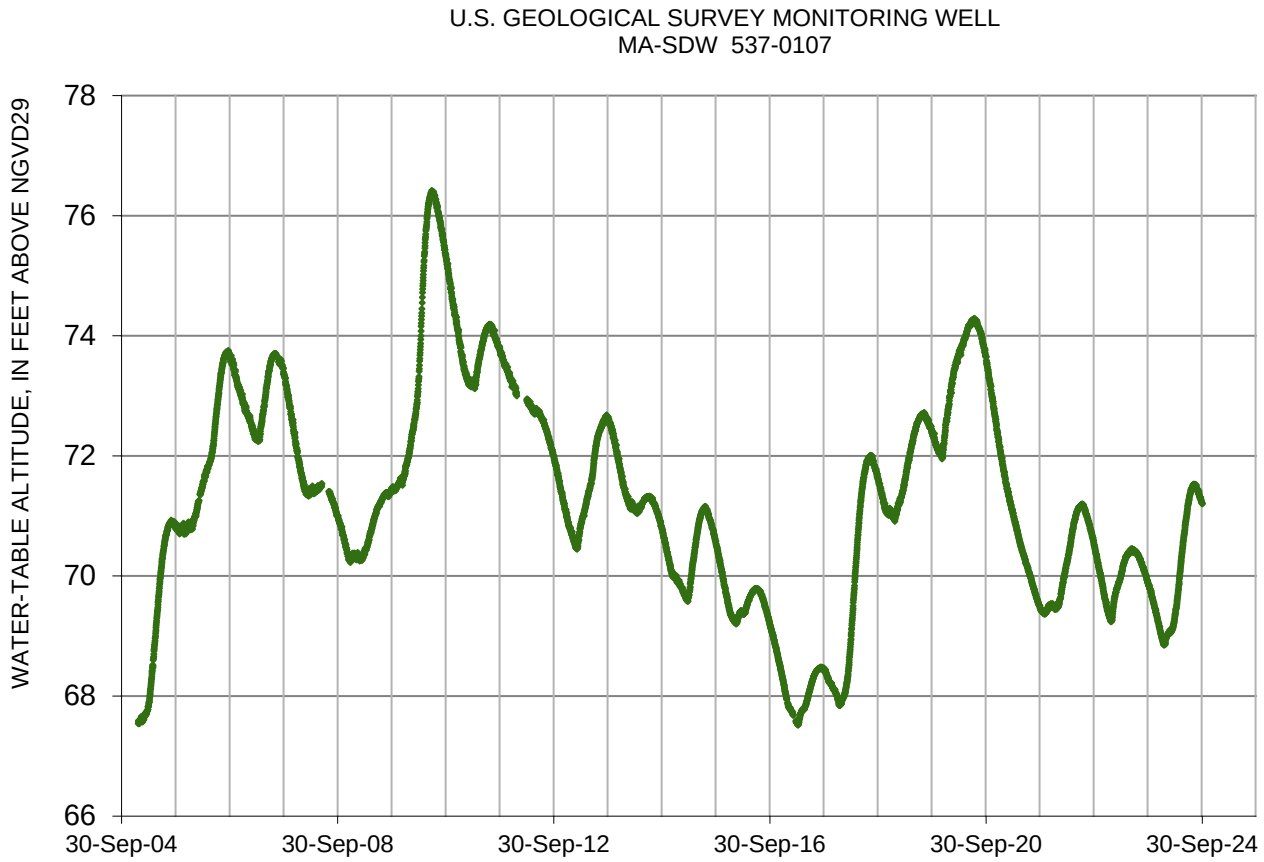
The pattern of water-level changes observed at the monitoring well is caused by natural seasonal and year-to-year variations in recharge from precipitation. Graph 3-2 shows the trend in the water-table altitude at the USGS monitoring well for the 2005-2024 training years. The water-table altitude declined about 1 foot between October 2023 and January 2024, rose about 2.7 feet between January and August, and declined about 0.3 feet between August and the end of September. The water level at the end of the training year was at about its average altitude for the 20-year-long monitoring period. Similar trends in groundwater levels were observed this year elsewhere on Cape Cod and in southeastern Massachusetts (https://www.usgs.gov/centers/new-england-water/data-tools).

The well became operational in January 2005. Information about the well and the observed groundwater levels are publicly available on the following USGS website: https://waterdata.usgs.gov/monitoring-location/414159070310501/

Figure 3-1 Well Locations



Graph 3-2 U.S. Geological Survey Monitoring Well



3.1.3 Water Supply Systems

Upper Cape Regional Water Supply Cooperative

The Upper Cape Regional Water Supply Cooperative provided 371,462,000 gallons of water (a daily average of 1,017,704) from its three wells to the six public water supply systems it services during TY 2024: Bourne Water District, Mashpee Water District, Sandwich Water District, the Town of Falmouth water system, the Barnstable County Correctional Facility, and the Converge/ASUS water supply system (formerly the Otis ANGB system). The Cooperative is authorized to withdraw up to 3.0 million gallons per day. Graph 3-3 shows the daily average pumping rate of the Cooperative since TY 2015. The locations of the Cooperative's three water supply wells (WS-1, WS-2, WS-3) and its seven sentry monitoring wells (C-1 through C-7) are shown in Figure 1 in Appendix E. The Cooperative's 2023 Long Term Monitoring Sentry Well Sampling Results and 2023 Consumer Confidence Report is provided in Appendix E.

Converge/ASUS Public Water Supply System

In 2022, the US Air Force entered into an agreement to transfer ownership of the Otis Air National Guard Base water and wastewater systems to Converge LLC. Converge then selected American States Utility Services, Inc. (ASUS) to operate and maintain the systems. In April 2024, Converge/ASUS began operations at the facilities.

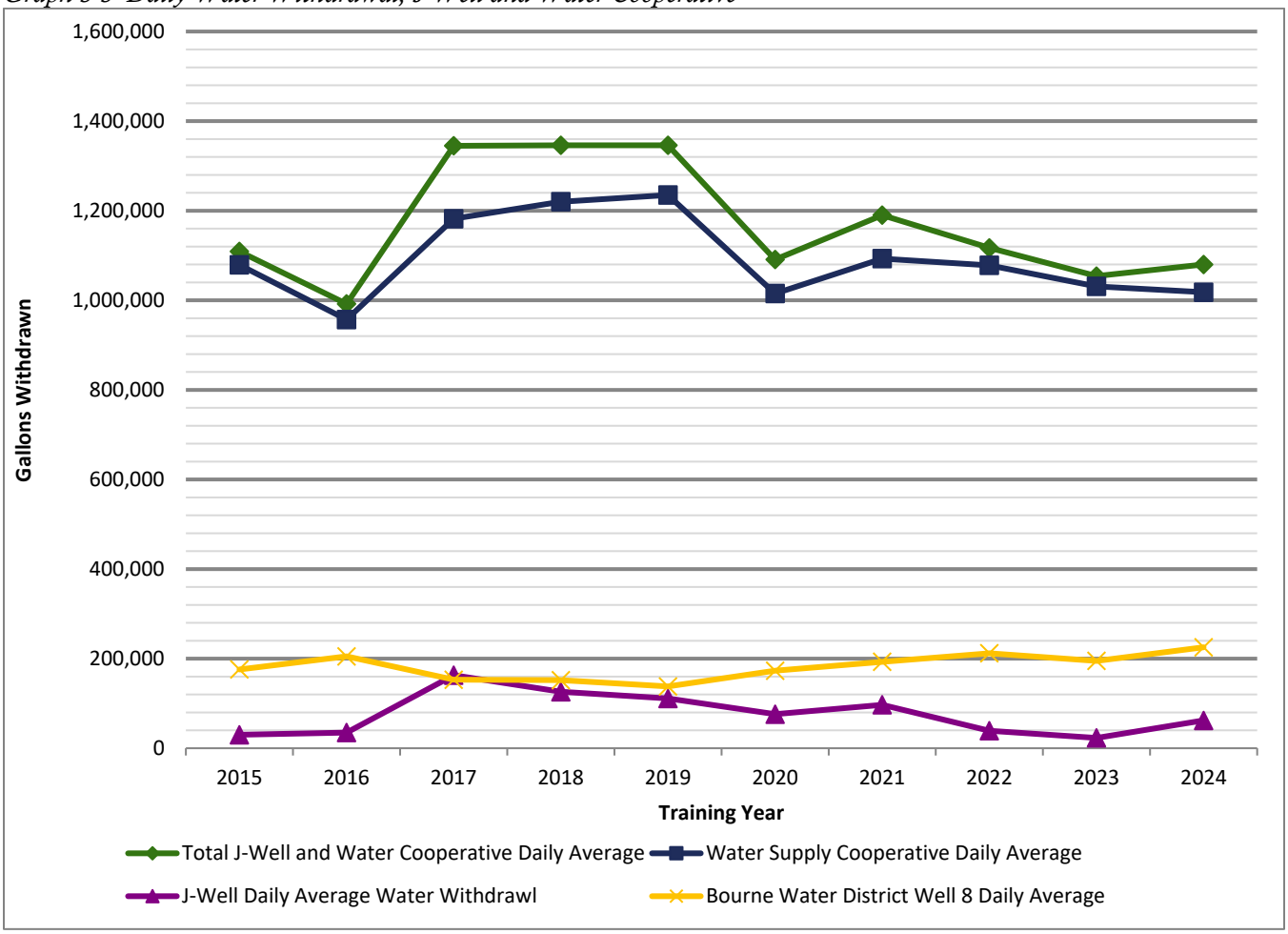
The Converge/ASUS system pumped an average of 61,547 gallons of water per day and a total of 22,464,800 gallons of water from its well, known as J-Well (located in the Cantonment Area), during TY 2024. It also received 14,829,000 gallons from the Cooperative during TY 2024; a daily average of 40,627 gallons. Graph 3-3 shows the daily average pumping rate of the Otis system since TY 2015.

A copy of the calendar year 2023 Consumer Confidence Report for Otis ANGB is provided in Appendix E.

Bourne Water District Water Supply Well

During TY 2024, Bourne Water District Well 8 pumped a total of 82,265,500 gallons, with a daily average of 225,385 gallons pumped. Graph 3-3 shows the daily average pumping rate of Well 8 for TY 2015 through TY 2024. The well's location is shown in Figure 3-1. A copy of the calendar year 2023 Bourne Water District's Consumer Confidence Report is provided in Appendix E.

Graph 3-3 Daily Water Withdrawal, J-Well and Water Cooperative



Other Water Wells

There are two water supply wells located within the boundary of the Training Area/Reserve. These are located at Cape Cod SFS (PWS# 4036008) and the USCG Communications Station. Further information on water supply wells is available on MassDEP's website: https://www.mass.gov/service-details/well-database.

3.2 Wetlands and Surface Water Management

The MAARNG did not take any actions during TY 2024 that resulted in the loss of any wetland resources or their 100-foot buffer areas. Environmental Performance Standard 2 is the Wetlands and Surface Water Performance Standard. No new bivouac areas were created in the Training Area/Reserve during the year within 500 feet of any wetland and no land alteration activities were conducted by the MAARNG within 100 feet of a certified vernal pool during the year. Consistent with EPS 2.7, in TY 2024 trails and roads listed within 500 feet of wetlands were closed to vehicle access from February 15 to May 15 to protect migrating and breeding amphibians. Environmental Program representatives routinely attended coordination meetings held by various parties (e.g.,

Camp Edwards, IAGWSP, utility companies) to stay abreast of the activities in the Training Area/Reserve and to ensure appropriate coordination occurred and wetland impacts were avoided or permitted. No official permitting was required for projects during TY 2024.

3.2.1 Vernal Pools

Vernal pools are protected by the state if they are located within a jurisdictional resource area protected under the Wetland Protection Act and if they meet the following biological and physical criteria for certification of a vernal pool in Massachusetts: (1) breeding evidence of obligate vernal pool amphibian species or fairy shrimp, and no permanently flowing outlet; or (2) breeding evidence of two or more facultative vernal pool amphibian species, and no permanently flowing outlet, and evidence of the pool in a dry state (excludes the possibility of reproduction fish populations). The Bourne and Sandwich Wetland Protection bylaws can provide protection to vernal pools not protected by the state with their broader definitions of jurisdictional wetlands.

The MAARNG did not take any action during TY 2024 that impacted vernal pool habitat. Consistent with EPS 2.7, in TY 2024 trails and roads listed within 500 feet of wetlands were closed to vehicle access from February 15 to May 15 to protect migrating and breeding amphibians.

A planning effort, initiated in TY 2021, examined the possibility of creating new vernal pool habitat at Camp Edwards. Vernal pool creation sites were determined through a siting analysis performed in TY 2024 by SWCA Environmental Consultants, using GIS and field verification, to locate appropriate sites that do not interfere with the military mission but that provide ecological benefit. The next planning phase prior towards implementation was going to involve an archaeological survey and evaluation since the proposed sites are within archeologically sensitive areas. In TY 2024, the Natural Resources Program reexamined this project from various fronts including programmatic priorities and ecological impacts and decided to postpone vernal pool creation for the foreseeable future.

3.3 Rare Species Management

Environmental Performance Standard 3 is the Rare Species Performance Standard. Rare species monitoring and management is an integral part of adaptive management for a healthy ecosystem. Rare species are often important indicators of regional or local ecological threats and trends. Collaborative planning and prioritization of rare species efforts is a priority for MAARNG within and outside the Training Area/Reserve and are key to DoD conservation. The Natural Resources Program in TY 2024 undertook extensive rare species monitoring and management efforts through contracted and in-house projects. This includes numerous efforts documenting and reporting wildlife and plant species listed under the Massachusetts Endangered Species Act (MESA) on Camp Edwards.

The tables below only include state-listed (MESA) and federally listed species. The Natural Resources Office also reports observations of “Tracking List” species to NHESP as a standard condition of scientific collection permits for reptiles and amphibians. Additionally, observations of species on the MassWildlife Plant Watch List are reported annually.

The following subsections outline efforts for species or species groups during TY 2024. The tables below present raw number counts that are reported to NHESP based on sightings, including formal surveys and casual encounters. Some of the totals reported include results of formalized surveys that are used to evaluate populations, however, the raw count totals in the following tables should not be used to infer population trends or similar. Counts are highly dependent on within-year project priorities and efforts, as well as external influences (location availability during survey windows, etc.). Zeros most often represent a lack of effort relative to a particular species, rather than absence.

3.3.1 Rare Plants

Camp Edwards currently supports five state-listed rare plant species (see Table 3-1 in Section 3.3.1.5). The Natural Resources Program plans and coordinates surveys to monitor populations and to inform management strategies and conservation efforts through contracted and in-house projects. Surveys and management activities are prioritized and implemented through permit requirements and/or partner agency communication as well as through internal programmatic or base-wide interest and needs. In addition to projects that are directed at rare species, monitoring and management for uncommon and important flora, such as Wild Lupine (*Lupinus perennis*) and Milkweed (genus *Asclepias*), are also conducted to protect and maintain their populations. For example, Butterfly Milkweed (*Asclepias tuberosa*) is on the Watch List of plants in Massachusetts and is crucial to the Collared Cycnia Moth (*Cycnia collaris*, state Threatened) and Monarch Butterfly (*Danaus plexippus*, federal Proposed Threatened) among other rare fauna.

3.3.1.1 Frost Bottom Rare Plants

The Natural Resources Program conducts annual surveys to monitor the populations of Broad Tinker's-weed (*Triosteum perfoliatum*, state Endangered) and Adder's Tongue Fern (*Ophioglossum pusillum*, state Threatened]) which co-occur in frost bottom or depressional landforms at Camp Edwards. The frost bottom sites where one or both rare species occur are called rare plant (RP) sites and surveys target a subset of these sites, so each is surveyed roughly at least every three years. According to observations going back to 2010, there are about ten RP sites that support Broad Tinker's-weed and five that support Adder's Tongue Fern. A new incidental sighting of Broad Tinker's-weed was discovered growing at the woodland edge of one of the inactive firing ranges in TY 2023 and continued through TY 2024. This was the first new location of Broad Tinker's-weed at Camp Edwards in many years and the first not within a frost bottom type feature.

Broad Tinker's-weed growing with taller Common Milkweed at the woodland edge of an inactive firing range.
Photograph by Erin Hilley, Natural Resources Program

A more common relative to Broad Tinker's-weed called Orange-fruited Horse-gentian (*Triosteum aurantiacum*) was, up until 2022, identified at Camp Edwards and observed to be occurring with Broad Tinker's-weed. This distinction was based on leaf morphology and other identification features that often were difficult to discern, making positive identification difficult. This led the Program to contract a genetics study in TY 2020, comparing the Triosteum plants at Camp Edwards to a known population of each species occurring elsewhere in Massachusetts. The genetic study results did not place the Camp Edwards Triosteum population neatly with either species or suggest a hybrid species but suggests that the population is more like the rare Broad Tinker's-weed

than Orange-fruited Horse-gentian. This study became a larger effort than anticipated, garnering interest, and cooperation from geneticists in Belgium. The resulting manuscript is currently in the peer-review phase (see 2022 Annual Report). Since 2022, culminating from this study, Triosteum at Camp Edwards, regardless of morphological features, is recognized as the rare Broad Tinker's-weed. This makes comparing survey results from sites that had "both Triosteum species" further back than 2022 difficult or impractical. It also means that sites investigated historically for Broad Tinker's-weed which resulted in absence should be revisited in the event Triosteum was present but identified as Orange Fruited Horse-gentian.

Surveys

In late July 2024, the Natural Resources Program surveyed Broad Tinker's-weed at four rare plant sites (RP04, RP05a, RP07, and RP13). Adder's Tongue Fern was surveyed earlier in July at three rare plant sites (RP13, RP15, and RP19). Surveys for both species count each stem, or ramet, instead of a clump of stems, or genet, as is often exhibited in Broad Tinker's-weed. Counts usually involve a systematic search of the entire RP site or the known location within the RP site, especially for the very small-statured Adder's Tongue Fern. Population structure and size, site conditions, and other metrics are recorded, and results are submitted to MassWildlife using the online rare species reporting platform Heritage Hub. See Table 3-1 in Section 3.3.1.5.

Broad Tinker's-weed was present at all four surveyed sites. Total stem counts for each of the three sites, RP04, RP05a, and RP13, that can be compared since 2022, were greater than the previous years. Overall, the proportion of stems that possessed flowers or fruit (aka reproductive stems) at the time of surveys, was low, with two of the four sites not exhibiting any reproductive stems.

Adder's Tongue Fern was present at two of the three sites surveyed. Surveyors counted a total of 292 plants with 288 of these from RP15, consistently the best site at Camp Edwards for this rare fern. Only 9 percent of the plants at RP05 were observed to have reproductive stalks and RP19 had zero reproductive stalks among the 4 observed plants. Adder's Tongue Fern was absent from RP13 and hasn't been observed there since 2013, when according to a MassWildlife record, there were 4 plants, and in 2012, eighty-four plants. Natural Resources biologists will continue engaging with MassWildlife regarding the population status and management of this small-statured and easily overlooked plant that is understood to be declining across the state. Further information is available in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2024*.

Management

In past years, exploratory efforts designed to gauge protections and resulting benefits to Broad Tinker's-weed and Adder's Tongue Fern at frost bottom sites included erecting a wooden "corral" style fence to exclude deer browse, installing game cameras to observe use of the sites by deer and other wildlife, including browse pressure on the rare plants, and hand cutting the overshading Bracken Fern to increase solar exposure for better flower and fruit production. In April 2024, two frost bottom rare plant sites, RP05 and RP05a, both containing Broad Tinker's-weed and one with Adder's Tongue Fern, were burned over as part of a larger prescribed burn. The burn was effective in removing some of the deep thatch layer in RP05, a result from the extensive bracken fern, and in thinning some of the dense scrub oak in RP05a.

Future, larger scale management of frost bottom rare plant sites will examine and emphasize setting back woody succession and reducing tree and shrub canopy within the depressions. Management planning and priorities could be supported by an effort in TY 2025 to revisit historic or previously suspected rare plant sites to determine their functional status as frost bottoms and rare plant sites and whether tree and shrub removal is warranted and feasible. Invasive plants pose a low to negligible threat level at most frost bottom rare plant sites due to their relatively remote locations but also due to ongoing early detection and management efforts in and around rare plant sites.

3.3.1.2 Papillose Nut-sedge

Papillose Nut-sedge (*Scleria pauciflora*, state Endangered) was first observed at Camp Edwards in September 2023 during a contracted planning level survey targeted at rare plant species. The contractor's observations included two general locations; at KD Range and within the highly restricted Impact Area in localized areas where vegetation was previously removed to ground level for purposes of detecting metals. Only days after the contractor's observations, and after getting eyes on the small-statured grass-like plant, two Natural Resource Program seasonal field technicians discovered another population existing within a mowed fire break in the retired portion of Tango Range. In TY 2024, still another population was discovered by Natural Resources Program staff. This population, like Tango Range, is small, covering less than 115 square meters, and is near a regularly maintained fence line and mowed area in association with UTES facility. Further information is available in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2024*.

Papillose Nut-sedge (left) is a highly disturbance-dependent upland sedge growing in full sun that is easily overlooked, blending in with Pennsylvania Sedge, Little Bluestem, and other grasses and grass-like plants. Only in the late summer and fall when the white fruits (achenes), resembling miniature golf balls, are present, are the plants more easily distinguished from look-a-likes. Seeds, as well as the nodular rhizomes, are understood to be long lived in the soil, allowing the plant to persist, even while above ground conditions remain unsuitable (e.g., forest cover), until natural or human-caused disturbance, such as fire, remove overstory and leaf litter. The white round achenes shown in the right photo aid in detection of the sedge. Photos taken at KD Range. *Photographs by Erin Hilley, left and Jake McCumber, right*

Surveys

Papillose Nut-sedge surveys were conducted in September 2024 for the populations at KD Range and Tango Range and in July for the UTES population. Papillose Nut-sedge within the impact area locations, a more restricted area of the base, were not surveyed or revisited in TY 2024. The population growing on the KD Range is immensely larger in size and abundance than the other populations on base. Monitoring surveys and other conservation actions for the KD Range are carried out in compliance with the MPMG Range CPM for which an Amendment to address the rare species was initiated with MassWildlife in TY 2023 and finalized in TY 2024.

Management

Conservation measures to protect, maintain, improve, and monitor Papillose Nut-sedge at the KD location before, during, and after then proposed range development are detailed in the CMP Amendment in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2024*. The project for which the CMP and Amendment were developed is currently in uncertain status, which places permit requirements, especially those needing funding, in uncertain status. Provided resources are available, the Natural Resources Program intends to coordinate with MassWildlife on monitoring and management activities to benefit the Nut-sedge and keep in compliance with the CMP Amendment. Either way, monitoring and management for this species will continue through the INRMP and conservation efforts.

Initial brush mowing of the one-acre Core Expansion Area to reduce the height and shading impact of Pitch Pine and other woody shrubs including Scrub Oak, Low Bush and Hillside Blueberry, and Sheep Laurel, was conducted in May TY 2024. At the same time, the remainder of the 36-acre range floor, including the approximately one-acre Core Protection area, was mowed. Prior to mowing and on the same day, the Natural Resources Program together with individuals from the Camp Edwards Roads and Grounds Program, conducted a sweep over the entire range floor to temporarily remove any box turtles from the mow area. Plant Protection signs were installed at the corners and middle points of all the protection areas in TY 2024 to convey area protections with site users and maintenance personnel. Further information on Papillose Nut-sedge surveys and management is available in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2024*.

3.3.1.3 Sandplain Grassland/Heathland Rare Plants

Camp Edwards manages approximately 360 acres of sandplain grassland and heathland habitat in the cantonment area of the base. These early successional plant communities are declining regionally in area and occurrence and are critically important to many of the state's rare and uncommon species. About half of Camp Edward's rare species are associated with these relatively treeless habitats. Sandplain grassland and heathlands are maintained or perpetuated by natural and human disturbance necessary to set back the encroachment of woody trees and shrubs that leads to reforestation. In the northern training area, smaller patches of open habitat representative of sandplain grassland and heathland communities exist as natural and human established openings in the woodlands and shrublands including on firing ranges, battle positions, and other soldier training venues, as well as on mowed roadsides and utility easements. Many of these areas provide similar or complimentary ecological functions and wildlife benefits as the larger grassland/heathland expanses.

The Natural Resources Program manages the sandplain grassland and heathland units in the cantonment area through prescribed burns, mowing, and mechanical and chemical removal of woody and invasive plants. In TY 2024, the Natural Resources Program carried out various in-house projects in the cantonment area and grassland units concentrating on removal of Autumn Olive (*Elaeagnus umbellata*) but including other woody invasive plants. In TY 2024, the Natural Resources Program also initiated a contract for invasive plant management that prioritized the removal of Autumn Olive in an approximately 9-acre wooded unit adjacent to the grassland units and including 61 acres of follow-up control to remove persistent invasive woody plants that were treated in TY 2023. The 9-acre area adjacent to the grasslands and eight of the 61 acres in the grasslands were completed in TY 2024, with the remaining acres on schedule for TY 2025. Prescribed burning in the sandplain grassland units included 66.5 acres in TY 2024.

Habitat protection signs with mowing time of year restrictions are posted along the grassland unit boundaries and convey protections to rare species occurring in the managed grasslands and heathlands of the cantonment area. In TY 2024, a year after Stiff Yellow Flax (*Medium var. texanum*, state Threatened) was discovered during the planning level survey in two locations at the edges of the grasslands, Natural Resources Program coordinated with separate Camp Edwards entities in charge of roadside and yard maintenance to alter the mowing schedule in these precise locations to allow the Stiff Yellow Flax to mature and set seed. Stiff Yellow Flax is a small, easily overlooked annual wildflower. At Camp Edwards it is growing where mowing and other human activity maintains a patchiness of bare mineral soil and herbaceous vegetation (e.g., mowed roadside adjacent to grassland unit and a site sometimes used to stage equipment). The watch list plant, Whorled Milkwort (*Polygala verticillata*), also discovered in TY 2023 during the planning level survey, was observed to be thriving in TY 2024, sharing space with the Stiff Yellow Flax. Other Watch List species, including Nutall's Milkwort (*Polygala nuttallii*), Narrow-leaved Bush-clover (*Lespedeza angustifolia*), and Butterfly Milkweed (*Asclepias tuberosa*) are relatively common in the open grasslands and related habitat and observed in TY 2024 to be in at least stable numbers if not in greater abundance.

3.3.1.4 Wild Lupine

Wild Lupine (*Lupinus perennis*), a state recognized Watch List plant, has recently been proposed for addition to MESA (Special Concern) due to a decline in the number of locations where it occurs in Massachusetts. This is due primarily to habitat loss and habitat degradation from development and from the suppression of natural disturbance regimes like fire. The rarity of this species and the fact that it was only known from one location on the base makes it a species of conservation interest for Natural Resources Program. In the past few years Natural Resources Program has started two new satellite populations using seed collected from the original population in the northern training area, called RP10. The two satellite populations were established in the cantonment area for easier monitoring and intervention, such as watering in the first year or two, to ensure successful establishment. Seeds collected from the new sites will be used to augment and expand on the existing populations as well as to establish new locations.

Native Wild Lupine, shown here growing at Camp Edwards, has fewer leaflets and shorter flower stalks than the non-native ornamental, blue lupine. Photograph by *Erin Hilley*

Survey

On June 11, 2024, the Natural Resources Program counted 350 reproductive stems from the RP10 population and 130 reproductive stems from the first planted satellite population that was planted in January 2022 from only 150 seeds. The second satellite population, planted from seed in TY 2024, is in its first growing season and was not surveyed but germination and establishment rates appear promising. Reproductive stems, or ramets, are counted over clumps, or genets, because of the tendency for Wild Lupine to form colonies with underground connected stems not clearly adhering to one plant or the other. The TY 2024 RP10 population count was above past years, with 245 reproductive stems reported last year by Native Plant Trust and 103 stems counted in 2022 by Natural Resources Program.

Management

In TY 2025, the Natural Resources Program plans to begin efforts to expand the original Wild Lupine site (RP10) by thinning trees and shrubs in an area adjacent to the population. This will increase sunlight reaching the forest floor and better mimic vegetative conditions within RP10. Tree removal will be conducted when the lupine is dormant in the winter. A prescribed burn that incorporates RP10 is planned for the spring TY 2025 and will help to reduce leaf litter and expose pockets of bare soil conducive to seed germination. Wild Lupine seed collected

from the satellite populations will be planted into the newly opened areas. Increasing the number of Lupine sites and site sizes will increase the species' resiliency and will support numerous species that are either host specific to Lupine or a combination of Lupine and Wild Indigo (*Baptisia tinctoria*). Wild Lupine is the sole plant that the federally Endangered Karner Blue Butterfly larvae can eat and while the butterfly does not currently occur in MA, bolstering its critical food source could have real benefits in the future.

3.3.1.5 State-listed Species Reporting

The Massachusetts Army National Guard reports all observations of state-listed listed species on MAARNG lands to the DFW through the Heritage Hub website portal. State-listed plant surveys are described in detail above. In the table below, reported values reflect varying effort and/or sites year to year and do not represent consistent data for trend analysis. "Stable" indicates that a dedicated count/survey did not occur, but that the species was observed in the field to be consistent with prior reports. A list of rare species reported to NHESP from TY 2015 to TY 2024 is in Appendix F.

Table 3-1 State-Listed Plants Reported to NHESP

Common/Scientific Names	*Fed Status*	*State Status*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
Adder's Tongue Fern (Ophioglossum pusillum)	-	T	247	0	25	646	N/A	225	215	292
Grass-leaved Ladies'-tresses (Spiranthes vernalis)	-	T	0	0	0	0	6	0	31	Stable
Broad Tinker's-weed (Triosteum perfoliatum)	-	E	127	0	200	6	N/A	1,883	3,161	3,637
Stiff Yellow Flax (Linum medium var. texanum)	-	T	0	0	0	0	0	0	92	Stable
Papillose Nut-sedge (Scleria pauciflora)	-	E	0	0	0	0	0	0	41,081	82,034

Note: Quantities shown should not be interpreted as population trends.

3.3.2 Federally Listed Bats

The Northern Long-eared Bat (NLEB) was federally listed under the Endangered Species Act as threatened in May 2015 and proposed for listing as endangered in March 2022. The change to endangered status became effective in March 2023. The Tricolored Bat was proposed for listing as endangered in September 2022. The Little Brown Bat is currently under review for listing. These listings are primarily due to the severe population crashes caused by white-nose syndrome (https://www.whitenosesyndrome.org/). Losses are estimated to be more than 95 percent of the entire NLEB population and more than 90 percent of Tricolored Bat in the areas where the *Pseudogymnoascus destructans* fungus, which leads to white-nose syndrome, has impacted hibernating bat colonies. The extent of population loss drives concerns for impacts on individuals and maternal roost sites throughout the eastern United States. The change in federal status from threatened to endangered for the NLEB eliminated the procedural allowances for habitat management and some training activities that existed under a Section 4(d) rule. The USFWS created the Interim Consultation Framework for Northern Long-eared Bats to cover activities until April 1, 2024. For actions continuing past this date, the MAARNG needed to reinitiate consultation. On April 7, 2023, the Natural Resources Program submitted the Biological Assessment Form for the Interim Consultation Framework to cover regular training activities, planned habitat management, prescribed fire activities, and groundwater remediation activities planned before April 1, 2024.

3.3.2.1 Regulatory Updates

USFWS issued extensions of the Interim Consultation Framework through November 30, 2024. A final determination on listing Tricolored Bat was not made in TY 2024, and the species status assessment for Little Brown Bat was not completed in TY 2024. On October 23, 2024, the USFWS released final tools and guidance

including the Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key and guidance documents for development projects, wind projects, and sustainable forest management.

3.3.2.2 Consultations for Current Training Year

In TY 2024, the Natural Resources Program worked with a contractor to analyze past acoustic and mist netting data on bat presence and seasonal use. The spatial and temporal use of the training area by the three above mentioned bat species was used in consultation with training staff to determine appropriate conservation measures, prepare an effects analysis, and make a determination for level of effects.

Based on intensive acoustic monitoring, NLEB activity has only been detected along the eastern and northern boundary of the base, with a clear preference for areas on the eastern boundary behind neighborhoods. Additionally, mist-netting efforts and radio-telemetry of captured bats suggest that the vast majority of NLEB roosting occurs, not on Camp Edwards, but in the neighborhoods along the eastern boundary. The installation likely provides foraging habitat away from roost sites with activity primarily associated with small water features within larger topographic depressions near or generally connected to larger kettle hole ponds. Tricolored Bat acoustic results (no captures during mist netting) also show a predominance of use on the eastern boundary.

Using the spatial detections of NLEB and Tricolored Bat and working with training staff, the MAARNG was able to create a conservation area along the eastern boundary that restricts military smoke and ground burst simulator use, the elevation of helicopters, and the use of certain landing zones during the bat active season while allowing for these uses unrestricted in the remainder of the training areas where the chance of NLEB and Tricolored Bat presence is discountable. Overall, this is a scientifically informed increase in allowable training compared to applying standard conservation measures more broadly and an important justification for past and future bat surveys and monitoring. Tree cutting activities inside the conservation area are also restricted to times outside the bat active season, which runs from March 15 through September 30. Tree work in other areas of the base will be allowed (following standard reviews and approvals) from September 1 through May 15, which avoids the pup season. These conservation measures and others were submitted to the USFWS on March 13, 2024, in an informal consultation for military training, groundwater cleanup, forestry management and associated building and grounds maintenance activities. The MAARNG received a concurrence letter from the USFWS dated August 15, 2024.

Two activities, prescribed fire and Southern Pine Beetle suppression activities, had more potential to impact bats based on the need to conduct fires during the bat pup season and the unknown timing or location of a southern pine beetle infestation. The MAARNG created conservation measures to minimize impacts to bats during prescribed fires, such as roost protections and smoke management, and increased monitoring and tree thinning treatments to minimize the size of southern pine beetle suppression cuts. The MAARNG submitted a formal consultation for these activities on October 25, 2024.

Due to the change in status of the NLEB and the proposed listing of Tricolored Bat, the MAARNG re-initiated consultation for the clearing, construction, and use of the MPMG, including firebreaks in the area, on November, 15, 2023. The Biological Evaluation determined that the project was not likely to adversely affect NLEB or other federally-listed (including proposed and candidate) species based on conservation measures and information on distribution and ecology. A new concurrence letter from USFWS was received on January, 16, 2024 for this project. This project had previously received concurrence with a determination of “may affect, not likely to adversely affect” NLEB and other federally-listed species on July, 20, 2020.

To prepare for consultations due to changes in species listings, Tetra Tech was contracted to compile the nine years of acoustic data. In reviewing data from previous consultations, the large number of calls in 2016 compared to other years and comments for confirmed calls expressing doubts in the confidence and quality of calls prompted a review of the 2016 vetted data and earlier 2014 and 2015 data given the increase in knowledge and quality of call analysis programs and classifiers since that time. The qualified biologists conducting the review

noted that many of the bat passes previously described as NLEB or Tricolored Bat did not contain the diagnostic characteristics required for confirmation. This review eliminated a number of calls from those years that were misidentified. After reassessing data from 2014-2016, the number of bat passes for NLEB and Tricolored Bat were consistent with the results from 2017 to 2023. All past acoustic data was compiled to determine the spatial and temporal use of the base by declining Myotid bats.

No new bat surveys were conducted during TY 2024 at Camp Edwards. One significant change with regard to bats on base during the year was the addition of three Lasiurine bats (also known as migratory tree bats) to the list of protected species under MESA. All three species were added as Special Concern and they are Eastern Red Bat (*Lasiurus borealis*), Hoary Bat (*Lasiurus cinereus*), and Silver-haired Bat (*Lasionycteris noctivagans*). This is not expected to have any practical change given the existing bat conservation measures in place. Additionally, MassWildlife does not take acoustic-only bat data for listed species records so backwards looking data submission will likely be limited to captures. All three species have been detected with acoustic monitoring at Camp Edwards, though only two (Eastern Red and Silver-haired) have been confirmed via capture or photograph. The Silver-haired Bat has been documented roosting at Camp Edwards with a manuscript still in process documenting this observation. The Eastern Red Bat is one of the more common bats at Camp Edwards and in the region and, in general, has shown notable increase in prevalence at Camp Edwards when comparing results from the last ten years to the capture efforts completed in 1999 and 2000. These three species are not impacted by White-nose Syndrome and are not particularly habitat limited. They are highly migratory and vulnerable to wind development, though fairly well protected by voluntary turbine curtailment during suitable migration conditions.

3.3.3 New England Cottontail Rabbit Study

The Natural Resources Program began a study in TY 2010 on the New England Cottontail Rabbit (*Sylvilagus transitionalis*), at the time a candidate species for federal listing. Original study objectives were to determine the home range and habitat preferences of the species. This information can be used regionally to influence effective management efforts for this species. Current and future efforts are transitioning more from research into population monitoring, though with a strong emphasis on evaluating the effects of habitat management on cottontails. New England cottontails occur in suitable scrub oak or dense shrub habitat along powerlines or in the Impact Area on Camp Edwards.

In 2015, the USFWS removed New England cottontail from the federal candidate list. The finding was based upon the conservation implementation enacted and future commitments by the large regional partnership, including MAARNG and Camp Edwards. Continued habitat management and monitoring are critical to New England cottontail success and keeping the species from being federally listed.

In TY 2021, the Natural Resources Program contracted the USFWS working with the University of Rhode Island to perform statistical analysis and reporting for the New England cottontail data compiled thus far. The USFWS contributed additional funding to analyze their data from Mashpee National Wildlife Refuge as a larger data set to have more applicability for all of Cape Cod. The DFW also added their data on Cape Cod to provide a more robust data set. The University of Rhode Island completed their report in late FY 2023 and a manuscript is near completion. The research findings included lower marginal occupancy rates for New England cottontail than eastern cottontails, a lack of selection of managed sites by New England cottontail, and the use of a wide variety of habitats by New England cottontail including residential areas. Because Eastern cottontail are more capable of dispersing to open areas and are more widespread and numerous on the landscape, they may be preventing New England cottontail from occupying the managed habitats. New England cottontail detections were more likely at sites off base or off of Mashpee National Wildlife Refuge that are smaller patches, and often had wetland habitat. These areas should be the focus of New England cottontail conservation on Cape Cod, and research should focus on mechanisms to limit the impact of Eastern cottontail. Although ineffective at promoting New England cottontail occupancy in the near term, habitat management is still integral for creating early successional habitat for many imperiled species and for reducing fuel loads thereby reducing wildfire threats to the public.

The Natural Resources Program performed pellet searches again in TY 2024 in regional plots and in areas with previous management history. In TY 2024, the Natural Resource Program also continued collaborating with the State University of New York College of Environmental Science and Forestry and USFWS to monitor experimental management plots for New England cottontail, bird, and bat utilization.

3.3.4 Agassiz's Clam Shrimp

Puddles in dirt/gravel roads in the Training Area/Reserve provide habitat for three rare clam shrimp species. Agassiz's Clam Shrimp (*Eulimnadia agassizii*, state Endangered) were discovered in roadway puddles on base in TY 2015 during an effort to resurvey rare species records older than 15 years. One of only eight or so global records, at the time, for Agassiz's Clam Shrimp was an observation and collection made at Camp Edwards in 1999. A separate, but visually similar species, the American Clam Shrimp (*Limnadia lenticularis*, state Special Concern), was identified by the Natural Resources Program in TY 2021. A third species, the Mattox Clam Shrimp (*Cyzicus gynecia*), while not listed rare, is apparently uncommon in Massachusetts and has been infrequently observed in roadway puddles. Mattox Clam Shrimp was unknown in Massachusetts until 2000 when it was discovered in two puddles in western Massachusetts. The most ubiquitous species in dirt road puddles at Camp Edwards is the Endangered Agassiz's Clam Shrimp.

Monitoring of puddles for clam shrimp, habitat management, and other conservation efforts are carried out on an annual basis. Monitoring protocols and the framework that supports habitat protection and management were established and are carried out through the Agassiz's Clam Shrimp and Training Area Roads Conservation and Management Permit (CMP).

3.3.4.1 Clam Shrimp Annual Monitoring

Standardized clam shrimp monitoring was carried out for the seventh consecutive year in TY 2024. From May through October, a subset of twelve puddles, situated throughout the northern training area, were monitored by the Natural Resources Program. These surveys are completed every two weeks, beginning mid-May to mid-July and then once a month until mid-October, resulting in eight survey events. The monitoring set changes every year to sample a combination of known clam shrimp puddles, puddles not known to support clam shrimp, and puddles that have been modified in the past, and represent puddles that are distributed relatively evenly over the Training Area/Reserve in what are established in the CMP as Zones 1-5. Puddles containing standing water at the time of surveys are measured for area, depth, water clarity, temperature, and pH. Detection of clam shrimp and other aquatic invertebrates as well as amphibians is often visual if puddle depth and water clarity allows. Shallow dip trays and dip nets are used to sample the puddles and to collect specimens for later identification under magnification.

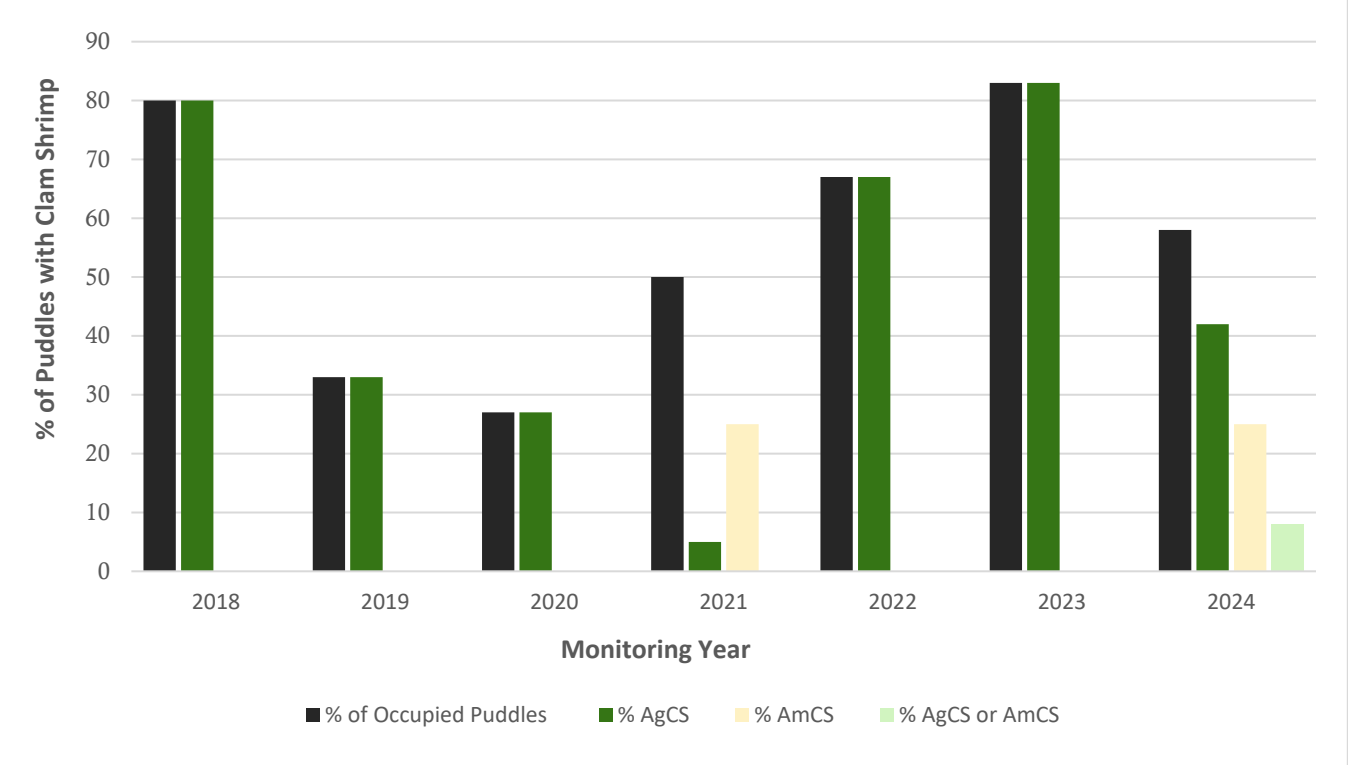
In TY 2024, seven of the 12 puddles, or 58 percent, contained either Agassiz's or American Clam Shrimp, or both. Five of the six puddles contained Agassiz's Clam Shrimp, three contained American Clam Shrimp, with two of those being inhabited by both species, and one contained either Agassiz's or American Clam Shrimp but could not be identified to species due to the early developmental stage. The seven puddles containing rare clam shrimp were distributed across the Camp Edwards training area, representing all five Zones. One of the puddles, called WHEE2, had Agassiz's Clam Shrimp introduced in TY 2021 to mitigate for the loss of other clam shrimp puddles. Soon after introduction, the puddle was accidentally filled, only to naturally reform over time and in TY 2023, found to contain Agassiz's Clam Shrimp. The rediscovery of Agassiz's Clam Shrimp, in a naturally reformed puddle two years after introduction and subsequent filling, shows how well adapted this species is to this incredibly dynamic and multi-use environment. This series of events was documented in more detail in previous reporting.

In addition to the two state-listed rare species, one monitored puddle contained Mattox Clam Shrimp, a species previously collected from three road puddles at Camp Edwards in 2017. While not a state-listed species, NatureServe ranks the species Globally Imperiled but does not apply a state-rank, likely reflecting a lack of

knowledge. Clam shrimp collected were keyed out to species in the lab under magnification by the Natural Resources Program and field technicians and were collected under an annually renewed Scientific Collection Permit issued by MassWildlife.

Seven out of 12 puddles found to be supporting rare clam shrimp and their distribution in all five Zones across Camp Edwards in 2024 are positive results, congruent overall with past years. The Camp Edwards' population of Agassiz's Clam Shrimp appears stable, yet fluid, which is necessary given their short and explosive life cycle tied to ephemeral shallow pools that dry up regularly and can disappear and reappear in new locations altogether. With any field or research effort, there are both anticipated and unforeseen obstacles or variables. Periods of dryness during the monitoring period can cause every puddle in the monitoring subset to dry up. While the seasonal wetting and drying is an adapted benefit and requirement of the clam shrimp life cycle, it undoubtably impacts year-to-year monitoring results (e.g., 2020 saw little precipitation and therefore fewer clam shrimp observed in puddles).

Graph 3-4 Agassiz's & American Clam Shrimp Monitoring Results



Results from standardized annual monitoring showing the total percentage of puddles containing Agassiz's Clam Shrimp (AgCS) and/or American Clam Shrimp (AmCS) and that percentage of puddles broken down by species. The number of puddles surveyed each year ranged between 10 and 12 with 12 being the standard from 2021 forward.

An unforeseen issue, yet perhaps unsurprising given clam shrimp habitat in roadways, occurred when one of the monitoring puddles (named CAVI6) was graded over sometime in the late summer to accommodate heavy trucks using the Canal View Road for materials hauling by an outside entity. This work was not coordinated with the Natural Resources Program and so did not take into consideration clam shrimp habitat and active monitoring. All three clam shrimp species had been collected from CAVI6 during earlier season monitoring events, an exciting revelation and a first for annual monitoring, at least for the years reported from 2018-2024. Fortunately, this incident only impacted on the last two monitoring events of the year, September, and October. Conditions in October suggest that the puddle feature may reform in its original location without intervention in which case, it is likely clam shrimp will continue to inhabit the puddle. Examples of road puddles that continued to support

Agassiz's Clam Shrimp after they were filled are WHEE2, initially reported in TY 2021, where it was wrongly referred to as WHEE3, and PEW, reported in TY 2023.

Separate from annual monitoring, a new discovery of Agassiz's Clam Shrimp within the old UTES resulted in Camp Edwards being able to protect about one-third of an acre outside of a roadway for clam shrimp.

3.3.4.2 Clam Shrimp Habitat Management

Habitat management for state-listed clam shrimp is planned and coordinated through the CMP. The Clam Shrimp Conservation and Road Maintenance Plan (Road Work Plan), a primary component of the CMP, provides a comprehensive long-term plan allowing for necessary road maintenance in the training area while maintaining habitat for rare clam shrimp. Habitat management often involves the in-situ alteration of a road puddle, occurring when puddle size thresholds (depth, width, and duration of ponding) impact normal road function. Rock and other material is added to the puddle to reduce the size but to maintain the ponded feature. Sediment from the puddle floor that would contain the durable clam shrimp eggs is retained while work is conducted and added back to the puddle upon completion. This helps to more quickly restore clam shrimp. To date, this work has been carried out with much success.

Clam shrimp sign posted at the roadside to alert site users not to fill or degrade the road puddle. *Photograph by Erin Hilley, Natural Resources Program*

Puddles that contain Agassiz's and American Clam Shrimp are posted with protected habitat signage (see photo above). In addition to the puddles protected with signage, the Road Work Plan establishes a set number of puddles in each of the five Zones covering the northern training area to be conserved as available habitat. Road work that intersects with, or that may impact clam shrimp habitat, as well as intentional habitat projects are planned in coordination with other Camp Edwards entities on an annual schedule and developed into a comprehensive Road Work Plan. A puddle's status, known to contain rare clam shrimp or available puddle habitat, dictates whether and what type of mitigation is required (e.g., in-situ puddle improvement and puddle creation). The Road Work Plan, including mitigation measures, and subsequent Summary Reports are submitted to MassWildlife per the CMP for coordination and approval.

3.3.4.3 TY 2024 Habitat Conservation and Management Projects:

1. The in-situ improvement of two puddles (BP1-2 and BP1-4) located along the same woodland stretch of dirt road was carried out in accordance with the Road Work Plan Proposal 3-Mar2023. Both puddles had exceeded the three size criteria thresholds (depth, road cover, and duration of ponding) specified in the CMP and were impacting on normal road use. In June 2024, taking advantage of already low water, the Natural Resource Program finished draining BP1-2 and BP1-4. Puddle sediment presumably containing Agassiz's Clam Shrimp eggs was shoveled into five-gallon buckets and set aside. Both puddles were then partially filled with rock and a blue stone cap to reduce the puddle's footprint. Once complete, the five-

gallon buckets containing puddle sediment were added back to the reformed puddle. Within just two weeks after project completion, rainfall provided the conditions necessary for Agassiz's Clam Shrimp eggs to hatch and adult Agassiz's were later collected from both puddles. The Natural Resources Program will continue to assess conditions of the reformed puddles.

2. An opportunity to bolster the Agassiz's Clam Shrimp population and provide some form of resilience in an area not within roadway habitat occurred in May 2024. The species was found to be quite abundant across a relatively extensive area of shallow ephemerally ponded soils within the old UTES. The flat, open terrain, and soil regularly exposed from staging and maintaining equipment and materials, created ideal conditions for Agassiz's Clam Shrimp. Through cooperation with Camp Edwards Facilities and Engineering and Soldier training components, the Natural Resources Program was able to set aside half of an acre for rare clam shrimp habitat. The area is identified using Siebert staking and signage. The protected area will periodically require intervention in some form of ground disturbance to perpetuate suitable clam shrimp habitat.

3. Currently, there are 47 puddles marked with habitat protection signs. These are puddles that have been documented to contain Agassiz's and/or American Clam Shrimp. Habitat protection signs were installed at six new puddle sites resulting from TY 2024 annual monitoring (CAVI6, GOAT1, HOW2, HOW3, PEW2, and SAND2). Signage from one site, called BRNG, was removed due to its lost ability to hold water for a duration long enough to provide clam shrimp habitat. The location is in the Bravo firing range parking lot. Agassiz's Clam Shrimp were collected from the site in 2018 and have not been documented since. At that time of collection, the puddle was documented to be very small and in a deep tire rut, too small to take multiple readings for H20, pH and temp.

3.3.5 Eastern Box Turtle

3.3.5.1 Turtle Protection

Extensive Eastern Box Turtle (*Terrapene carolina*, state Special Concern) protection planning and efforts exist in support of the MPMG. In TY 2024 MPMG turtle protection efforts were focused on basic monitoring of area turtles, including opportunistically tagging new turtles found in the area. In TY 2024, AECOM (contracted support) tracked turtles outfitted with radio-transmitter tags at the proposed range location to change out transmitters and to get fall hibernacula locations. A summary of their activities was submitted to NHESP in March 2024. AECOM also assisted with sweeps (thorough turtle surveys) in advance of mowing on KD range for management activities for a state-endangered plant, Papillose Nut-sedge.

LEC Environmental Consultants, Inc. provided turtle protection oversight in coordination with MassWildlife and the Natural Resources Program for the physical fitness track and field construction (outside the Training Area/Reserve). Natural Resources and Training Lands Program staff provided turtle protection oversight in coordination with MassWildlife for the installation of ROCA buildings at Sierra, Tango and India ranges.

Oxbow Associates, an environmental contractor contracted by Eversource, coordinated with the Natural Resources Program on their activities on base including turtle protection for the Bourne Switching Station and along the Gibbs Road powerline easement. The Natural Resources Program shared transmitter frequencies for turtles along the powerlines to facilitate turtle protection during powerline installation this year. Oxbow Associates has also provided information on the health of turtles they find on base and coordinated on nesting site creation to be completed on the powerline for their mitigation efforts.

In TY 2024, the Natural Resources Program held an annual training on box turtles. The training targets base personnel, including Roads and Grounds Maintenance staff, Range Operations, and others. Primary instruction covers how to effectively conduct turtle sweeps and basic avoidance, protection, and reporting procedures.

3.3.5.2 Eastern Box Turtle Monitoring

In-house 2024 Eastern Box Turtle telemetry efforts focused on tracking tagged turtles during spring emergence and changing out transmitters. Turtles were assessed for the presence of fly larvae when found above ground. Tagged turtles are mostly in Training Areas C-14, E-5 (Sierra and Tango ranges) and E-9, which are areas with future construction projects or areas with previously tagged turtles. Other turtles from the canine-assisted surveys are also tracked in mitigation areas and forest retention areas. Fifty turtles were being tracked by the end of the fiscal year. AECOM also compiled data from previous years into a master database for ease of future data analysis.

3.3.5.3 Spotted Turtle Monitoring

In 2015, the USFWS published a substantial 90-day finding that listing of the Spotted Turtle (*Clemmys guttata*) may be warranted. The final listing determination was projected to be made by 2023; however, the final listing determination has not yet been published. In anticipation of a potential listing of Spotted Turtles, the Natural Resources Program has conducted trapping across the available wetland habitats on base to determine the species' distribution on the site. Past trapping for this species occurred in 2016, 2017, and 2021. Initial trapping in 2016 included 16 wetlands with an average of 4 (range 2-7) trap nights at each location. In 2017, four of the larger wetlands on base were trapped for an average of 5.75 nights (2-9 nights range). In 2021, trapping occurred at 3 wetlands as part of a larger Legacy grant funded project carried out by the Smithsonian Conservation Biological Institute and their contractors. Efforts in FY24 were aimed at completing a comprehensive presence/absence survey for the species across the base's available wetland habitats. In TY 2024, 19 wetlands were trapped for an average of 5.26 nights (4-9 nights range). Across all years of surveys, only three wetlands had spotted turtles present. One wetland accounted for 93 percent (68 out of 73) of spotted turtle captures across all years. In 2024, this wetland accounted for all 16 captures. Knowledge of the species' distribution on base will aid conservation planning and inform project planning and permitting.

3.3.5.4 Publication of Past Research

In TY 2024, the Wildlife Epidemiology Lab published two articles in the Journal of Zoo and Wildlife Medicine entitled "Cutaneous myiasis and its relationship to wellness in eastern box turtles (*Terrapene carolina carolina*) in Cape Cod, Massachusetts." and "Health assessment of spotted (*Clemmys guttata*) and painted (*Chrysemys picata*) turtles in Cape Cod, Massachusetts, U.S.A, with detection of a novel adenovirus."

The Natural Resources Program facilitated a UMass Amherst graduate student's research on dipteran larval infestations in Eastern Box Turtles on Camp Edwards in TY 2022 comparing the movements of healthy and infected turtles to determine impacts on mobility from larval infestations. In TY 2024, the findings from this research were published in the Special Issue, "Biology and Conservation of Emydine Turtles," in the Northeastern Naturalist, titled "The effect of myiasis on Eastern Box Turtles (*Terrapene carolina carolina*) body condition, movement, and habitat use at Camp Edwards in Massachusetts."

3.3.5.5 State-listed Species Reporting

The MAARNG reports all observations of state-listed listed species on MAARNG lands to DFW through the Heritage Hub website portal. The Eastern Box Turtle receives much attention at Camp Edwards so the numbers in Table 3-2 are an aggregate of known, tracked individuals from multiple studies and opportunistic observations reported to the Natural Resources Program by a wide variety of site users, including Soldiers, maintenance personnel, and contractors. Recent observations of Eastern Hog-nosed Snake (*Heterodon platirhinos*, state Special Concern) are primarily opportunistic observations made while conducting other surveys and site visits in the training area. This species, much like the Eastern Box Turtle, shows a preference for diverse Pine Barrens mosaic habitat and transitions between pine-oak woodland and grassy woodland openings, such as battle positions and ranges.

Table 3-2 State-Listed Reptiles and Amphibians Reported to NHESP

Common/Scientific Names	*Fed. Status*	*State Status*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
Eastern Box Turtle *(Terrapene carolina carolina)*	-	SC	42	43	58	45	83	62	96	77
Eastern Hog-nosed Snake *(Heterodon platirhinos)*	-	SC	3	8	9	1	2	6	7	4

Note: Numbers are not results of standardized surveys and should not be interpreted as population trends

3.3.6 Lepidoptera (Moths and Butterflies)

Camp Edwards and the Upper Cape Water Supply Reserve are home to a high number of listed and otherwise rare butterflies and moths, many of which are closely tied to a single host-plant and/or barrens habitat conditions. Nearly half (22 of 49*) of the listed species at Camp Edwards are butterflies (2) or moths (20). Many other declining Lepidoptera species are found at Camp Edwards and few other locations in Massachusetts. Active monitoring efforts and incidental observations show a strongly positive response from many of these species to active habitat management efforts and soldier training support. Monitoring of populations and subsequent outreach, including public and scientific presentations, and data sharing (USFWS, Monarch Joint Venture) are both increasing parts of the program. These serve to more formally and fully evaluate the influence of management on these species, implement adaptive management, communicate the ecological benefits of pine barrens restoration, and aid in evaluations of the species population for potential listing at the federal level.

Conducting a moth survey using a light-sheet with two LepiLED bulbs and photographer backdrop sheet. Moths are documented and catalogued with macro-photography with species ranging from a few millimeters long to several inches across. Photograph by *Erin Hilley, Natural Resources Program*

3.3.6.1 Moths

The Conservation and Management Permit for range projects on Camp Edwards requires habitat mitigation in the form of mechanical forestry and prescribed fire treatments. Many of the Lepidoptera species on base are expected to benefit greatly from the reintroduction and increased frequency of fire as well as increased habitat patch diversity. The monitoring component of the CMP requires long-term Lepidoptera surveys to evaluate effects of

* The total of 49 MESA species is the "primary" list at Camp Edwards, which excludes 7 bird species that do not breed on-site, but winter, migrate through, or show up erratically.

the overall range development, fire hazard reduction actions, and habitat restoration (i.e., mitigation) actions on the Lepidoptera community over both short and long time periods. Monitoring of moth and butterfly species will guide adaptive management for habitat management including fire (e.g., seasonality, intensity, return interval) and forestry.

The Natural Resources Program contracted Western EcoSystems Technology, Inc. (WEST) in FY21 to provide a robust analysis of sampling designs to make the most use of moth monitoring data. We worked with WEST, MassWildlife, and others through 2022 to develop effective, informative, and achievable monitoring protocols for moths and habitat. Annual efforts broadly sample sites using vegetation sampling to monitor habitat conditions, including vegetation structure and plant species composition. Moths are monitored at a smaller subset of sites using UV light traps. Daytime caterpillar surveys are included to sample Buck Moth (*Hemileuca maia*, state Special Concern), a state-listed species believed to be an effective indicator for positive habitat condition.

The fourth year of vegetation sampling for the broader moth protocol was completed in TY 2024, as described above. The Natural Resources Program contracted a consultant to sample 24 of the 29 plots and enter all recorded data into the electronic database created for the moth protocol.

In TY 2024, a consultant was contracted to implement UV light trap sampling for night flying moths at 7 sites 4 times spaced out during the flight periods for target species. Sampling in TY 2024 captured four state-listed (Special Concern) species: Pink Sallow Moth (*Psectraglaea carnosa*) at 3 stations, Pine Barrens Zale (*Zale lunifera*) at 3 stations, Scrub Euchlaena (*Euchlaena madusaria*) at 1 station, and Pine Barrens Macaria (*Macaria exonerata*) at 3 stations. This represents an increase in state-listed species from TY 2023, which may be attributed to the interannual variability or the difference in habitat and past management at the chosen sites. Although found in 2017 and prior years, both Pine Barrens Zale and Scrub Euchlaena had not been detected in 2022 and 2023 sampling, but were found at nearly half the sites sampled in 2024. This is the first year in all the years sampled that Herodias' Underwing (*Catocala herodias*, state Special Concern) was not detected. These findings will be explored further in the report from all sampling events, expected in spring 2025.

During TY 2024 more casual (compared to standardized light traps) moth surveys continued as an in-house effort. Adult moths were surveyed primarily with light sheets using a photography backdrop anchored with ropes and lit with two LepiLED lights (see above photo). A total of five sheet-nights were completed in 2024 including one night in late June (grasslands and Battle Position 9), early July (Goat Pasture and Gibbs Road intersection), mid-July (Battle Position 28), and mid-September (grasslands). Opportunistic surveys and observations were also made of diurnal moths while out in the field, accounting for many diurnal and host-plant specialist species. Caterpillar surveys were conducted with ultraviolet (UV) flashlights at night and some opportunistic daytime searches. At least 13 UV flashlight surveys were conducted, each combined with the above light-sheet surveys. Only accounting for photographic records uploaded to iNaturalist (https://www.inaturalist.org/projects/ fauna-and-flora-of-jbcc) the Natural Resources Program recorded 1,122 individuals of 286 species. Included within these were multiple state-listed species and other rare species of Greatest Conservation Need such as the continuing Plain Prominent (*Coelodasys apicalis*), which is ranked as G3 (globally vulnerable to extinction) and S1 (critically imperiled in Massachusetts). Much like the Frosted Elfin this species is ranked as either Imperiled (S2), Critically Imperiled, or Extirpated in every state or province that has it ranked. The light-sheet setups pair very well with other nocturnal surveys, such as Frosted Elfin caterpillar searches, and while not highly regimented at this time still provide valuable information on moth species richness, response to management, and more.

3.3.6.2 Frosted Elfin Butterfly

The Frosted Elfin is classified as an At-risk Species by the USFWS and it is currently under federal review for listing under the Endangered Species Act based on the significant population loss and fragmentation of remnant populations. The species is state-listed in Massachusetts and, although it is widespread across 31 states and provinces in eastern North America, it is classified as Imperiled, Critically Imperiled, or Extirpated throughout (NatureServe, 2024; USFWS, 2018). The Frosted Elfin is associated with native savannah habitats and in the

Northeastern United States it is primarily associated with sandplain grassland/heathland habitat with patchy, sparse Pitch Pine cover. Populations feed exclusively on either Sundial Lupine (*Lupinus perennis*) or Wild Indigo (*Baptisia tinctoria*). The population at Camp Edwards and nearby sites (Myles Standish State Forest, Frances A. Crane Wildlife Management Area) feed on Wild Indigo.

Frosted Elfin butterfly on the endemic Sickle-leaved Golden-aster (*Pityopsis falcata*), May 2024, in the cantonment grasslands. Photograph by *Jake McCumber, Natural Resources Program*

The "Frosted Elfin Habitat and Butterfly Survey Protocol" from the USFWS has been implemented annually at Camp Edwards since its start in 2018 to assess Frosted Elfin populations on-site. In TY 2024, the Natural Resources Program sampled eight official survey sites, six of which had confirmed presence of Frosted Elfins as either adults or caterpillars. Additionally, presence was confirmed at one informal survey site. The collected data will be submitted to USFWS to aid in their regional survey efforts in support of a range-wide status assessment and federal listing evaluation. The formal protocol combines plot mapping, host plant assessment, adult flight surveys, and larval (caterpillar) surveys. Typically, the only deviation from the protocol at Camp Edwards is delineation of surveys sites. The majority of locations throughout their range are isolated patches of host plant and the survey protocol samples an entire host patch. However, at Camp Edwards, the Wild Indigo is so abundant and widespread that sample plots are artificially constrained within the habitat (e.g., segment of powerline corridor, grassland habitat, etc.). Due to limited staff availability during the Frosted Elfin flight period in FY24, adult flight surveys were only condcted at one site. Larval surveys and host plant assessments were conducted for all official survey sites.

There are now eleven known sites for Frosted Elfin on Camp Edwards, all of which have abundant Wild Indigo. The sites include grassland/heathland savannah habitat in cantonment, powerline rights-of-way with open Scrub Oak shrubland, managed battle positions, former small arms ranges, and restored pine barrens. Surveys in TY 2024 continued the annual trend of adding new sites, including areas having recent pine barrens restoration. The four newly identified locations at Camp Edwards this year included two maintained battle positions and two areas that had been treated with a combination of forestry and prescribed fire to restore Pitch Pine – Scrub Oak savannah with intermixed grasses and forbs. Frosted Elfins tend to be found along edges either where the woodland opening meets the woods (dappled shade as in savannah conditions) or along roads and trails within more shrub dominated habitats. Maintaining or expanding grass/forb cover within habitats, including with skid roads from active habitat restoration and intentional mosaic treatment to increase structure and species diversity is important to restoring Frosted Elfin populations and many other species relying on diverse habitats. Camp Edwards will continue to monitor and manage for Frosted Elfin in years to come and will continue to play an active role in recovery and conservation efforts.

A total of 49 Frosted Elfins were documented at Camp Edwards in 2024, including adults and larva. This was down from the previous year (64), but much higher than any year prior to 2020 when counts were typically less

than 10 individuals. While fewer adult surveys (both locations and events) were conducted in 2024, the adult flight period was also very challenging with very few observations during informal searches and other efforts. The flight period at Camp Edwards typically runs from very late April through early June, peaking in mid-May. In 2024 only a single adult was observed prior to May 28 and this was on May 9, which was notably late. A total of 15 adults were documented, 13 of which were between June 3 and June 10. The spring was notably wet and with a late hard freeze, which may have negatively impacted adult flight. The later adults that were observed were actively ovipositing on Wild Indigo. There may also be challenges to flight-season observations that vary between years as caterpillars were fairly well represented during larval surveys in July. Caterpillar surveys with ultraviolet (uvBeast$_{TM}$) flashlight are one of the most reliable methods for surveying and documenting Frosted Elfins, but are time consuming and confirmation of identification requires a fair amount of experience. These surveys do pair well with other worthwhile nocturnal surveys, such as moth sheets.

3.3.6.3 Monarch Butterfly

The Monarch Butterfly (*Danais plexipus*) was designated as a Candidate under the federal Endangered Species Act in 2020. This widespread, but declining species was found to warrant listing, but it was "precluded by higher priority actions" (USFWS 2020). The species has a listing priority of 8, on a scale of 1 to 12, with lower numbers having greater priority, based on imminent, species-level threat with moderate risk of extinction. This status emphasizes a significant need for collaborative conservation measures across the continent and the USFWS has identified the Department of Defense as a key stakeholder for candidate conservation and recovery. Installations are requested to have specific conservation measures identified in INRMPs and monitoring is encouraged.

Surveys were completed at four sites in 2024 using the Monarch Larva Monitoring Project (https://mlmp.org/) protocol. The project is a partnership of the Monarch Joint Venture and the University of Wisconsin-Madison Arboretum to provide a broad and standardized larval (caterpillar) survey across the butterfly's range to track population health and success. The surveys consist of weekly visits to consistent milkweed patches from early June through mid-September, which is a substantial level of effort and investment in staff time. All sites surveyed supported Monarch eggs and caterpillars.

Department of Defense installations have been urged to identify milkweed conservation areas as part of collaborative conservation and recovery implementation for the Candidate Species. Ten sites were signed as milkweed conservation areas including eight scattered throughout the Training Area/Reserve. These areas are prioritized for maintenance with mowing and/or prescribed fire but have mowing restrictions (avoidance) during the egg and caterpillar development timeframe. This provides an abundant, widespread, and diverse source area for monarch butterflies at Camp Edwards. Milkweed patches within the grassland are abundant but were not signed as milkweed conservation areas due to the existing prioritization of sandplain grassland/heathland habitat, ensuring milkweed conservation. An interesting observation in patches of Butterfly Milkweed (*Asclepias tuberosa*) is that the state-listed Collared Cycnia Moth (*Cycnia collaris*) can have notable impact on milkweed availability through herbivory. However, Collared Cycnia tends towards host specificity, while the Monarch Butterfly is less selective and has a much more widespread milkweed food source.

3.3.6.4 Acadian Hairstreak Butterfly

The Acadian Hairstreak (*Satyrium acadica*, state Threatened) was newly added to the MESA list in 2024. Camp Edwards is one of only two known locations in Massachusetts with recent observations of the species. This is despite its typical association with wet meadows and more northern habitats. This species used to be somewhat widespread across Massachusetts and has experienced significant declines. These declines do not seem to be associated with host plant (willow) availability and may be a complex interaction with climate change, vegetation management, and unknown effects. Acadian Hairstreaks have been the focus of an annual survey and field trip with the Massachusetts Buttefly Club, led by Jake McCumber and Peter Trimble, for several years.

During 2024 multiple searches were conducted for Acadian Hairstreaks within their typical area along the Gibbs right-of-way and nearby areas. As part of this, the annual field trip with the Massachusetts Butterfly Club had a

significant effort and search time. Despite these searches no Acadian Hairstreaks were observed at Camp Edwards (or elsewhere in Massachusetts) in 2024. This is a concerning result, but consistent with regional trends. Little information exists on larval habits, but nocturnal willow surveys in spring could potentially be useful. It is important to note that Acadian Hairstreaks at Camp Edwards have only been documented within the electrical utility easement. None have been observed within areas under Camp Edwards management.

3.3.6.5 State-listed Species Reporting

The Massachusetts Army National Guard reports all observations of state-listed listed species on MAARNG lands to DFW through the Heritage Hub website portal. Moth and butterfly observations are highly influenced by effort. As with any wildlife surveys, whether formalized or casual, must occur in the right habitat within the right season, which sometimes is a two-week window. The listed butterflies require significant dedicated effort and training to find and identify. Most of the moths are even more specialized with nocturnal habitats and a wide array of flight times across the listed species. Even robust monitoring programs will miss the flight times of certain species and year-to-year variation is often substantial. The preponderance of zeroes in the table below likely does not represent absence of the species, but the lack of detections under recent monitoring efforts. The long-term moth sampling protocol, developed with MassWildlife and others, knowingly will miss certain species and time periods, but seeks to represent the barrens moth community overall through sampling of various habitats and portions of the growing season. Note that clusters of communal caterpillars (e.g., Buck Moth, Collared Cycnia) are reported as a single observation. Buck Moth numbers are highly influenced by level of effort to document during the October flight period as the species is fairly abundant and widespread at Camp Edwards.

Table 3-3 List of Rare Butterflies and Moths

Common/Scientific Names	*Fed Status*	*State Status*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
Buck Moth[2] (*Hemileuca maia*)	-	SC	95	0	4	2	74	133	23	72
Pine Barrens Speranza (*Macaria exonerata*)	-	SC	13	0	0	0	0	4	0	3
Sandplain Euchlaena (*Euchlaena madusaria*)	-	SC	7	0	0	1	0	0	0	1
Heath Metarranthis (*Metarranthis pilosaria*)	-	SC	1	0	0	0	0	0	0	0
Melsheimer's Sack Bearer (*Cicinnus melsheimeri*)	-	T	0	0	0	7	0	0	0	0
Gerhard's Underwing (*Catocala herodias*)	-	SC	10	0	0	2	0	35	6	0
Pine Barrens Zale (*Zale lunifera*)	-	SC	8	0	0	0	0	0	0	4
Barrens Dagger Moth (*Acronicta albarufa*)	-	T	0	0	0	0	0	0	0	0
Sandplain Heterocampa (*Heterocampa varia*)	-	T	0	N/A	N/A	N/A	N/A	1	0	0
Chain-dotted Geometer (*Cingilia catenaria*)	-	SC	0	0	1	0	0	0	0	0
Drunk Apamea (*Apamea inebriata*)	-	SC	0	0	0	0	0	0	0	0
Pink Sallow (*Psectraglaea carnosa*)	-	SC	5	0	0	0	0	0	6	8
Pink Streak (*Dargida rubripennis*)	-	T	0	0	0	3	1	1	2	0

Table 3-3 List of Rare Butterflies and Moths, cont'd

Common/Scientific Names	*Fed Status*	*State Status*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
Collared Cycnia[2] (*Cycnia collaris*)	-	T	1	0	11	33	200	7	4	4
Coastal Heathland Cutworm (*Abagrotis benjamini*)	-	SC	1	0	0	0	0	0	0	0
Woolly Gray (*Lycia ypsilon*)	-	T	2	0	0	0	0	0	0	0
Water-willow Stem Borer (*Papaipema sulphurata*)	-	T	1	0	0	0	0	0	0	0
Waxed Sallow Moth (*Chaetaglaea cerata*)	-	SC	2	0	0	0	0	0	0	0
Frosted Elfin[3] (*Callophrys irus*)	-	SC	5	5	1	25	57	13	64	49
Slender Clearwing Sphinx (*Hemaris gracilis*)	-	SC	0	0	0	5	3	26	3	1
Acadian Hairstreak (*Satyrium acadia*)	-	T	4	NA	2	0	4	5	2	0

Note: Quantities shown are not resulting of standardized surveys, and should not be interpreted as population trends

3.3.7 Other Insects

While other insects tend to lack the standardized protocols and regulatory emphasis of the moths and butterflies described above, Camp Edwards has four other state-listed insects and many additional species that are highly specialized and localized within pine barrens habitats. Overall, insect diversity is a powerful indicator of ecosystem health and resilience. Insect populations are also highly dynamic in this period of change with range shifts (including contraction and loss) and new colonizations happening regularly. Many groups of insects warrant much more detailed study, even basic planning level surveys at Camp Edwards, including beetles (Coleoptera) and Orthopterans (e.g., grasshoppers, katydids, etc.). Initial planning level surveys and some supplemental work has been completed for other groups including Odonata (dragonflies and damselflies), which have received many years of observation by Peter Trimble, bees (Anthophila), and tiger beetles (Cicindelidae).

3.3.7.1 Walsh's Digger Bee

Walsh's Digger Bee (*Anthophora walshii*, state Endangered) has a highly isolated population in Southeastern Massachusetts. The species was first identified at Camp Edwards by Michael Veit in 2017 who found multiple active nests. During a subsequent, targeted survey in 2019 Mr. Veit documented a robust and fairly widespread population of the species across Camp Edwards, including throughout the more open portions of the cantonment grasslands and the Gibbs Road powerline right-of-way. Walsh's Digger Bee depends on very open, maintained grassland habitat with abundant open sand and abundant Wild Indigo.

During 2024 numerous opportunistic searches were conducted for Walsh's Digger Bee with positive results. Of greatest note were two particular observations. The first was documenting very active use of Common Milkweed (*Asclepias syriaca*) flowers for feeding just prior to the flowering of the primary host, Wild Indigo. This was observed during the first two days of July, immediately following observations of the same behavior at Frances A. Crane Wildlife Management Area on June 29. However, the bees at Crane were visiting Butterfly Milkweed. In four different milkweed patches at Camp Edwards and two at Crane the number of individuals ranged from two to at least six, with higher numbers at Camp Edwards. As expected for solitary bees at the beginning of the flight period, the majority were male. This may be a very effective tool for documenting or detecting populations of Walsh's Digger Bee in areas of uncertainty.

The second observation of particular note was the active use of recently restored areas by multiple female Walsh's Digger Bees. Within the central grasslands there are some large, rectangular strips where pavement from the 1940s was removed in 2013. These strips had been overgrown by young pitch pines, which were pulled, piled, and burned in the fall and winter of 2023 into early 2024. These areas flushed rapidly with Wild Indigo, Sickle-leaved Golden-aster (*Pityopsis falcata*), and other species thriving in open, sandy barrens habitat. As hoped, this also led to active use by Walsh's Digger Bee, which needs moderately loose, open sand for nesting and abundant Wild Indigo for feeding and provisioning a nest. The restoration methods were designed to provide these conditions for bees and associates needing sandy openings within grassland/heathland habitat, such as tiger beetles. Walsh's Digger Bees were observed opportunistically on a few other occasions within recently managed areas, including spring 2024 prescribed fire, for a total of 12 locations and approximately 35 individuals at Camp Edwards.

3.3.7.2 Tiger Beetles

Though mostly opportunistic searches, substantial effort was applied to survey and document Purple Tiger Beetles (*Cicindela purpurea*, state Special Concern) and their ecology at Camp Edwards during 2024. This effort culminated in developing a species summary in September. While this species had not been documented at Camp Edwards prior to 2023 numerous observations were made in 2023 and 2024 with particular association with restored pine barrens and grassland/heathland habitat. Within each habitat they are predominantly observed along roads and within sparsely vegetated, sandy openings within the broader, open habitat matrix. Consistent with the oddly spare spring for Frosted Elfin Butterfly observations, no Purple Tiger Beetles were observed during their spring (May) active period. However, during the 2024 fall adult active period at least 12 observations were made totaling 90 individuals between 21 August and 16 September. These observations included locations across Camp Edwards from the central grasslands area through the northern training area. Most notably observations included substantial counts (greater than 30) at Battle Positions 9 and 10 (Training Area BA-7) and within a series of open, sandy scrapes in the grasslands (>12). Also of particular note were observations at Wheelock Overlook (Training Area A-5) with at least five individuals and at least two individuals at the restored frost bottom in Training Area E-3. The association with openings within active pine barrens restoration sites is a welcome sign of ecological success, as is the association with numerous other rare and listed species of plants and animals.

A new, state-listed species of tiger beetle was observed in Training Area B-10 in April 2024. The Twelve-spotted Tiger Beetle (*Cicindela duodecimguttata*, state Special Concern) was on a sandy, two-track road within a small powerline right-of-way with low, sandplain habitat. This appears to have been the first record for the Upper Cape and second for all of Cape Cod but was followed by two individuals recorded at an early successional habitat restoration site in Falmouth in August 2024. It's unclear if this species has been overlooked or has been expanding into suitable habitat conditions on Cape Cod with an increase in sandplains and barrens habitats. This is similar to the apparent significant increase in Purple Tiger Beetles and the uncertainty as to whether that is more due to search effort and interest in tiger beetles or to actual changes in abundance and/or distribution. It is worth noting that Mark Mello, contracted through the Lloyd Center for the Environment, conducted tiger beetle surveys in 2016 at Camp Edwards and did not document any rare or listed species. A single year or season of effort can be strongly influenced by typical fluctuations or conditions. An example is the lack of Purple Tiger Beetle detections during the spring of 2024 despite numerous observations during adult active periods in 2023 and late summer 2024.

3.3.7.3 State-listed Species Reporting

The Massachusetts Army National Guard reports all observations of state-listed listed species on MAARNG lands to the DFW through the Heritage Hub website portal. Purple Tiger Beetle and Walsh's Digger Bee received a fair amount of attention through casual and opportunistic searches (i.e., not formalized survey protocols) during TY 2024. Counting individuals, especially with groups of nectaring bees can be quite difficult so the numbers are estimates based on highest count visible at one time to avoid overcounting.

Table 3-4 State-Listed Beetles and Bees Reported to NHESP

Common/Scientific Names	*Fed. Status*	*State Status*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
Purple Tiger Beetle *(Cicindela purpurea)*	-	SC	0	0	0	0	0	0	25	90
Twelve-spotted Tiger Beetle *(Cicindela purpurea)*	-	SC	0	0	0	0	0	0	0	1
Walsh's Digger Bee[1] *(Anthophora walshii)*	-	E	5 (1)	0	32 (9)	4	N/A	1	9	27

[1] Lead number is count of flying/foraging records with confirmed nesting activity in parentheses.
Note: Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends.

3.3.8 Eastern Whip-poor-will

The Eastern Whip-poor-will is state listed in Massachusetts, classified as an SGCN, and considered an At-risk Species by the Northeast Region of the USFWS. This species has been a focus of long-term monitoring and focal research at Camp Edwards due to its status, association with remnant pine barrens, and positive response to habitat restoration. The Eastern Whip-poor-will is a strong indicator of pine barrens ecosystem health and diversity due to its reliance on moths as a primary food source and their reliance upon healthy host plants. It is also an important monitoring species and indicator of site quality due to its sensitivity and significant declines throughout the northeastern United States. Along with the vast majority of species of conservation concern in southeastern Massachusetts, the Eastern Whip-poor-will is closely tied to wildland fire, which maintains open mid-stories and vigorous plant communities that support a high degree of species diversity.

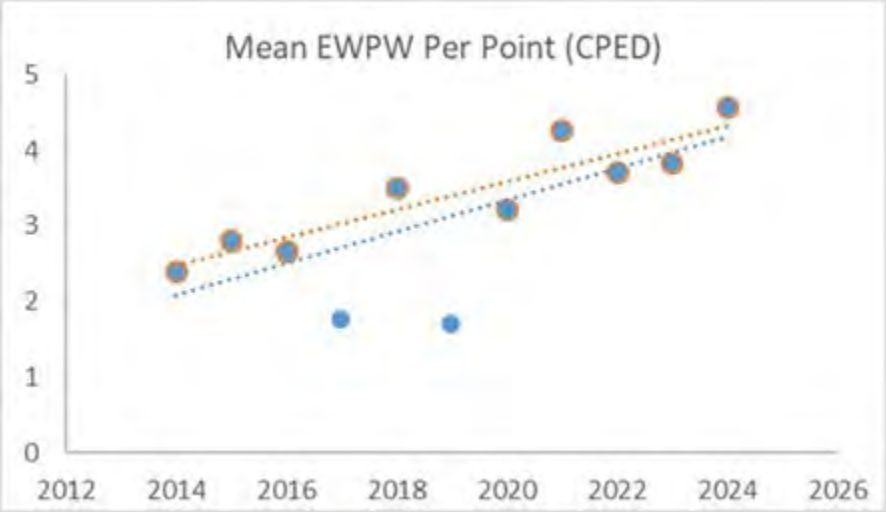
Annual implementation of the Northeastern Nightjar Survey facilitates the evaluation of population trends throughout Camp Edwards using a standardized protocol implemented throughout the eastern United States. A subset of 10 points originally set by MassWildlife has been surveyed annually since 2013. Three full routes were established the following year to provide better coverage with 32 point-count locations. The routes are run one time each per year with supplemental surveys at subsets of points prior to the formal count night.

During the 2024 surveys, one station (ST-01) was missed due to an oversight by surveyors, hence 31 of the typical 32 sites were surveyed during official surveys. The station ST-01 was surveyed during opportunistic surveys, and Whip-poor-wills were recorded. Whip-poor-wills were observed at 30 of 31 sampled points during official surveys in 2024 for 0.97 occupancy overall, which maintains the typical trend of widespread presence (Fig. 3). The long-term occupancy mean is 0.92 (2013 – 2024, range 0.64 – 1.0), which is impacted by results from 2017 and 2019 where surveys were conducted in sub-ideal conditions. The overall average for the 2024 formal Whip-poor-will surveys was 4.6 birds per point (range 0 – 8). The highest individual count was 9 at point 10-5 and 10-7; two points had counts of eight and three points had counts of 7 by a single observer. Zone averages ranged from 1.3 in the northeast to 6.3 in the southeast. All zones also have increasing trends, which is useful to evaluate the overall pattern at Camp Edwards and whether increases represent a redistribution of birds or an overall population increase. The zone patterns suggest the site-wide trend represents an overall increase.

Both focal research efforts (previous migration studies in the Training Area/Reserve) and longer-term trends from annual monitoring suggest that the overall population is quite healthy and strongly increasing at Camp Edwards. The response to management actions including prescribed burning and mechanical forestry appears to be overall positive from targeted research, long-term monitoring, and anecdotal observation. Eastern Whip-poor-will is showing statistically significant increases at Camp Edwards at all analyzed scales, including site-wide and across spatial zones. All six geographic zones and all three survey routes showed increasing trends. Graph 3-5 shows the annual site-wide results for formal surveys from 2014 (first year with full set) through 2024. Two years (2017 and 2019) had low counts as outliers due to limited available survey nights and relatively poor conditions during actual surveys. Both the full set of years and excluding 2017 and 2019 have statistically significant increasing trends. Removing the two years with results that anecdotally were not representative of conditions provides a

particularly tight fitting trendline and high degree of confidence in the increasing trend. The Natural Resources Program is currently working with partners from the USFWS, MassWildlife, DCR, and others, seeking funding for a detailed research project to evaluate if these profound results are replicated at other pine barrens restoration areas (e.g., Camp Cachalot, Myles Standish State Forest) and if the nest success and condition of Eastern Whip-poor-wills are consistent with the increasing counts.

Graph 3-5 Annual Site-Wide Results for Formal Surveys, 2014 to 2024



3.3.8.1 State-listed Species Reporting

The MAARNG reports observations of state-listed listed species on MAARNG lands to the DFW Heritage Hub portal. Practical considerations for conservation and management mean that bird observations are treated differently under MESA and for annual reporting. The species included below with reported numbers are the unique observations from formal survey efforts. Northern Harrier and Bald Eagle were only observed as wintering individuals and any breeding season activity would be separately reported. Note that the numbers below are raw data and not analyzed for effort and other considerations in contrast to results reported above.

Table 3-5 State-Listed Birds Reported to NHESP

Common/ Scientific Names	*Fed. Status*	*State Status*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
Grasshopper Sparrow *(Ammodramus savannarum)*	-	T	15	16	20	34	36	29	30	26
Northern Harrier *(Circus cyaneus)*	-	T	W[1]	W	W	W	W	W	W	W
Upland Sandpiper *(Bartramia longicauda)*	-	E	8	7	12	6	2	1	4	3
Eastern Meadowlark *(Sturnella magna)*	-	SC	3	2	7	14	17	9	21	15
Eastern Whip-poor-will *(Antrostomus vociferous)*	-	SC	52	110	53	99	123	101	105	130
Bald Eagle *(Haliaeetus leucocephalus)*	-	SC	0	0	0	0	0	0	0	W

[1] Wintering

3.4 Soil Conservation Management

All military and civilian uses and activities in the Training Area/Reserve during the year were reviewed by the Natural Resources Office to ensure that they were compatible with the limitations of the underlying soils (EPS 4, Soil Conservation Performance Standards). All users were instructed to report evidence of soil erosion to Range Control so that potential repairs to roads, bivouac areas and well pads could be identified in a timely manner. None of the existing unimproved roads in the Training Area/Reserve were made into improved roads because of IAGWSP remediation activities during the year. Additionally, any maintenance on unimproved roads during the year did not involve paving the roads.

All repairs were coordinated with the EMC's Environmental Officer. All projects were also coordinated closely with Natural Resources to follow the Conservation and Management Permit for Agassiz's Clam Shrimp that ensures conservation of that species while supporting critical operations through road maintenance.

3.5 Vegetation, Habitat and Wildlife Management

Section 3.5 discusses the Natural Resources Program's actions related to EPS 5, Vegetation Management Performance Standard, EPS 6, Habitat Management Performance Standards, and EPS 7, Wildlife Management Performance Standards.

The Natural Resources Program manages for a diversity of natural communities, plants, and animals with an ecosystem-based conservation approach. This supports a sustainable military training site and high-quality habitat for rare species, as described above, as well as common ones. Particular emphasis is on maintenance and restoration of earlier successional habitats (e.g., grasslands, shrublands, pine/shrub savannah) due to the conservation value of these habitats and rapidity at which they are lost to both natural processes (in absence of disturbance) and development. However, overall ecosystem management with a diversity of habitat maturity and composition is important to habitat management and climate resilience efforts.

Mechanical restoration, prescribed fire, resource monitoring, invasive plant management and others are important tools used within the Reserve to manage for a healthy, sustainable ecosystem and ensure the required protection of wildlife habitat and species.

Management and conservation planning for holistic ecosystem health are fundamental to Department of Defense conservation and efforts at Camp Edwards within and outside the Training Area/Reserve. Rare species habitat management integrates climate resilience, carbon sequestration, risk minimization (e.g., fire and southern pine beetle), military training objectives, habitat diversity, and other considerations. Monitoring and research continue to develop and support informed management and integration of these multiple objectives. Rigorous vegetation and moth study designs were developed in TY 2021 for long-term monitoring supporting the master development plan CMP. Breeding bird surveys continue to show positive or stable trends for Species of Greatest Conservation Need while more targeted efforts such as Eastern Whip-poor-will monitoring and research continue to show a strong, positive association with soldier training and habitat management. A critical outreach element continued to be communicating through public tours and other venues that the entirety of Camp Edwards, especially within the Training Area/Reserve, is managed for wildlife habitat – including small arms ranges and other military training venues that provide critical open field habitat for a wide variety of pollinators and other fauna within the greater pine barrens mosaic.

3.5.1 Vegetation Surveys

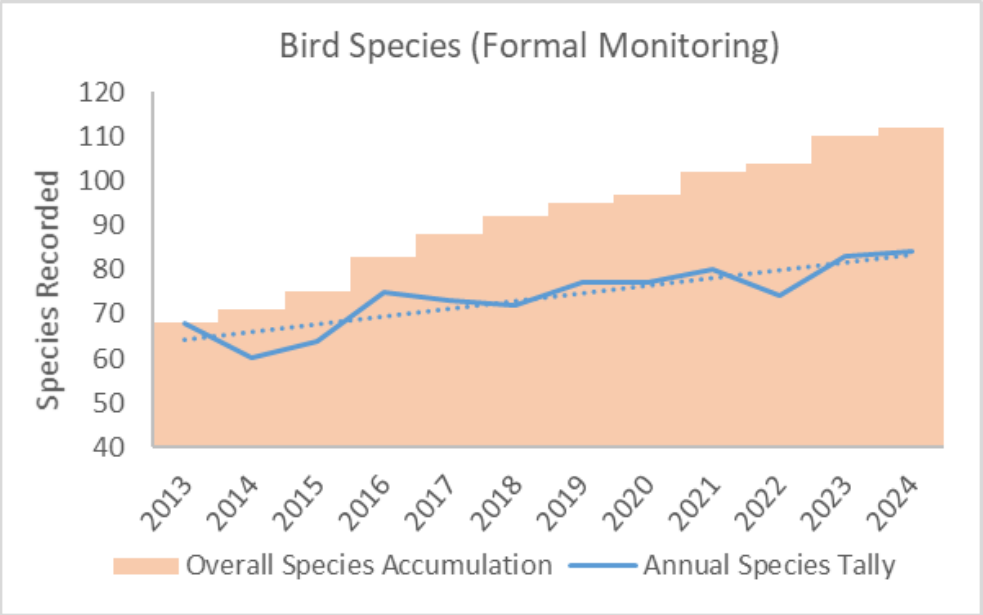
In TY 2024, the Natural Resources Program contracted a consultant to carry out the fourth consecutive year of vegetation surveys that are a component of the long-term Lepidoptera study developed with the MPMG Range Permit. A consultant completed vegetation sampling at 24 of the total 29-sampling units. The remaining five

units were completed by Natural Resources Program staff and seasonal field technicians. Each year, the moth-vegetation field sampling amounts to about a three-week effort. The survey protocol includes a transect design for a total of 200-meter length. Measurements to record substrate, species, and growth form, at varying vertical strata are recorded at each even numbered meter along the transects. A consultant also entered the field collected data from the 29 units into the database that was created for the Lepidoptera study. This long-term effort will provide valuable response and trend data for a variety of habitats to inform management activities and strengthen interpretation of faunal survey results. This intensive effort was designed with a collaborative team, including ecologists, land managers, and statisticians to create an achievable, but informative protocol and long-term effort. Data will be analyzed and reported after the fifth year of implementation

3.5.2 Bird Surveys

Training Year 2024 marked the 31st year of annual bird monitoring at Camp Edwards – a remarkable effort and data set providing for analysis of bird populations and habitat conditions. It was also the twelfth year following the updated point-count protocol, providing a good longevity for evaluating trends. The standard set of 79 bird point-counts (14 grassland, 65 training area) were surveyed in three successive rounds for a total of 237 point-counts from May 20 through June 19. In addition, two other points were surveyed once each on KD Range. A total of 7,728 observations were recorded for a total of 7,904 individual birds, averaging about 32.5 observations per point-count event.

Graph 3-6 Bird Species (Formal Monitoring)



Total number of bird species documented during formal breeding season point-count surveys at Camp Edwards. The total species count for each year is shown by the blue line with a dotted trend line showing the increase over time. The orange bars show the cumulative total of species documented during breeding bird point counts since 2013.

A total of 84 species were recorded during the 2024 breeding bird point-counts, which is the second year in a row with a new high species tally. Only one new species, Eastern Screech-Owl, was recorded for the effort and this is a common species throughout the base typically recorded during nocturnal surveys. Three of the six new species from the 2023 surveys (Purple Martin, Rose-breasted Grosbeak, and Wood Thrush) were again recorded during 2024 point-counts. The average annual species tally is 73.3 (range 60 to 83) and a total of 112 species have been recorded during the formal surveys since 2013. Of particular note is that the total number of species detected each year during the formal daytime point-count surveys is increasing with a strongly statistically significant trend. The mean from 2013 through 2024 is 74 species per year. The count is increasing with a rate of 1.7 species per year ($p<0.0003$). This increase is likely due to a combination of factors that includes climate change and habitat restoration. Northward range shifts likely account for some of the increase over the years while an increase in

ecosystem health and habitat diversity also likely lead to the presence of additional species and/or greater detectability of certain species due to increased distribution. The number of point-count locations has also increased over time from a low of 39 to 81 with an average of 65 over the twelve-year protocol currently in use. While this increase does likely account for some increase in detectability of species it doesn't account for the strong trend and continued increase since the number of points was increased to 79 or greater in 2018.

Table 3-6 Avian Species of Greatest Conservation Need: Training Area Points

Species Occupancy	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*	*Mean*	*Slope*	*R2*	*p-value*
Black-and-white Warbler	0.38	0.33	0.38	0.36	0.33	0.27	0.45	0.57	0.46	0.40	0.48	0.43	0.40	0.01	0.28	0.08
Black-billed Cuckoo	0.08	0.21	0.28	0.28	0.21	0.09	0.20	0.20	0.20	0.05	0.08	0.01	0.16	-0.01	0.27	0.08
Brown Thrasher	0.49	0.51	0.72	0.54	0.69	0.41	0.68	0.69	0.55	0.68	0.60	0.66	0.60	0.01	0.12	0.27
Blue-winged Warbler	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.05	0.04	0.01	--	--	
Chimney Swift	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.00	0.03	0.01	0.00	0.02	0.66
Eastern Towhee	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	0.00		
Field Sparrow	0.28	0.21	0.10	0.15	0.21	0.10	0.37	0.48	0.35	0.31	0.43	0.43	0.29	**0.03**	0.48	0.01
Prairie Warbler	0.51	0.41	0.41	0.49	0.41	0.41	0.54	0.52	0.52	0.60	0.66	0.60	0.51	**0.02**	0.59	0.00
Purple Finch	0.18	0.33	0.05	0.28	0.13	0.09	0.15	0.15	0.14	0.11	0.17	0.09	0.16	-0.01	0.17	0.18
Ruffed Grouse	0.44	0.67	0.87	0.72	0.56	0.36	0.85	0.98	0.77	0.85	0.58	0.31	0.66	0.00	0.00	0.96
Scarlet Tanager	0.67	0.69	0.85	0.67	0.90	0.57	0.80	0.91	0.80	0.92	0.88	0.82	0.79	0.02	0.28	0.07
Eastern Whip-poor-will	**1.00**	0.89	0.97	0.92	0.63	0.97	0.78	0.94	**1.00**	**1.00**	0.94	0.97	0.92	0.00	0.03	0.62
Species Abundance	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***	***2021***	***2022***	***2023***	***2024***	***Mean***	***Slope***	***R2***	***p-value***
Black-and-white Warbler	0.19	0.19	0.20	0.19	0.21	0.33	0.27	0.33	0.26	0.24	0.32	0.26	0.25	**0.01**	0.44	0.02
Black-billed Cuckoo	0.03	0.09	0.10	0.10	0.09	0.09	0.10	0.08	0.09	0.02	0.03	0.00	0.07	-0.01	0.24	0.10
Brown Thrasher	0.33	0.35	0.51	0.42	0.58	0.53	0.57	0.56	0.55	0.56	0.47	0.45	0.49	0.01	0.23	0.12
Blue-winged Warbler	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03	0.02	0.01	--	--	
Chimney Swift	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.86
Eastern Towhee	4.79	4.72	4.98	4.85	4.86	5.34	5.50	6.18	6.68	7.36	7.73	7.41	5.87	**0.30**	0.89	0.00
Field Sparrow	0.17	0.13	0.06	0.08	0.09	0.14	0.33	0.46	0.29	0.23	0.39	0.36	0.23	**0.03**	0.55	0.01
Prairie Warbler	0.49	0.51	0.62	0.73	0.54	0.74	0.87	0.75	0.84	0.78	0.99	0.80	0.72	**0.04**	0.69	0.00
Purple Finch	0.09	0.11	0.02	0.16	0.05	0.10	0.06	0.07	0.05	0.04	0.07	0.03	0.07	0.00	0.18	0.17
Ruffed Grouse	0.17	0.38	0.37	0.46	0.26	0.37	0.56	0.71	0.48	0.52	0.27	0.12	0.39	0.00	0.01	0.79
Scarlet Tanager	0.38	0.48	0.78	0.62	0.85	0.64	0.69	1.00	0.71	0.84	0.77	0.64	0.70	0.02	0.27	0.08
Eastern Whip-poor-will	3.67	2.41	2.81	2.67	1.77	3.50	1.70	3.22	4.27	3.72	3.83	4.58	3.18	**0.14**	0.30	0.01

Population trend analysis is an important tool for adaptive land management and the breeding bird survey effort at Camp Edwards is one of the best long-term efforts for evaluating trend over time for a group of species (birds) that dominate with respect to long-term monitoring data at a variety of scales from local to continental and global. This provides for a strong understanding of trends at the different scales, but also comparability across sites or regions. The TY 2022 *Annual State of the Reservation Report* (https://www.massnationalguard.org/ERC/publications/Annual_Reports/AR-TY-2022-FINAL.pdf) contains a detailed analysis and summary of population trends for Species of Greatest Conservation Need (SGCN) as identified in the State Wildlife Action Plan (https://www.mass.gov/doc/state-wildlife-action-plan-chapter-3/download). This analysis focused on the most recent decade of surveys with a revised point-count protocol allowing for better assessment of bird abundance. Based in part on that analysis results were reported at the Cape Cod Natural History Conference in a presentation entitled Bird Population Trends Reflect Pine Barrens Conservation at Camp Edwards. This highlighted how the population increases across all habitat association guilds (grassland, shrubland, pine barrens, forest) indicate successful and holistic conservation management with compatible military training.

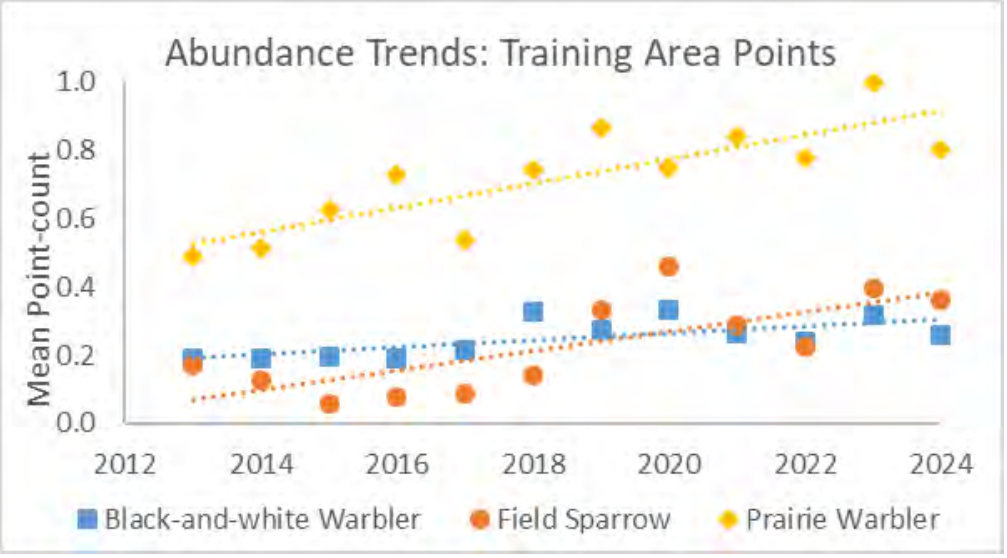
Trend analysis was updated to include the twelve-year period of 2013 through 2024 and again, focused on SGCN. This set of species provides good coverage across habitat type, food source, etc., unfortunately due to somewhat ubiquitous declines in bird populations. It is also useful to focus the assessment somewhat to a manageable set of

species. A total of 69 species (62%) has more than 5 years of observations at Camp Edwards (treated as a minimum for trend analysis) and 49 species (44%) were detected in all years of surveying. Seventeen Species of Greatest Conservation Need are included in the trend analysis. Seven recorded SGCN were excluded from trend analysis. The American Woodcock is not well surveyed by diurnal counts and is the focus of occasional targeted surveys (described below) that do not yet lend to long-term trend analysis. Three species (Common Loon, Great Black-backed Gull, and Herring Gull) were excluded as they do not breed on site and are only recoded as fly-overs. Finally, three species (Blackpoll Warbler, Nashville Warbler, and Olive-sided Flycatcher) are recorded as late spring migrants and are not breeding at Camp Edwards. Again, all these categories relate to more species, but this is restricted to SGCN at Camp Edwards.

Table 3-6 above provides the occupancy (above) and abundance (below) data and trend analysis for SGCN at Camp Edwards from 2013 through 2024, limited to the points in the northern training area (typically 65 points). The columns on the right of each table include the mean count per point for each species, the slope coefficient of the linear trendline (m of y=mx+b), the R^2 statistic, and the p-value of the linear trendline using an F-test in Microsoft Excel. The year columns provide annual results, which are summarized to the right. The R2 statistic evaluates the goodness of fit or how well a trendline fits the data points with points closer to 1 having better fit. The p-values for the slope are provided and in red if significant at $p<0.05$. The corresponding species and slope value are bolded if significant.

Occupancy calculates the proportion of surveyed sites where a species was observed, measured from 0 (absent at all sites) to 1 (present at all sites). In the occupancy table years where a species was present at all surveyed locations are bolded. Abundance values, a subset of which are also shown in Graph 3-7 below, calculate the mean count per survey point for a species per survey event. For example, on average, 0.64 Scarlet Tanagers (detailed in the figure below) were observed per point-count event across the 67 training area points in 2024. A total of 129 Scarlet Tanagers were recorded overall, averaging 43 per round of counts and ranging from zero to 3 at each point. Scarlet Tanager was observed at 82% (occupancy = 0.82) of the survey locations. While both the occupancy and abundance of Scarlet Tanagers was slightly lower in 2024 the overall trend for each is positive and near statistical significance ($p\leq0.08$).

Graph 3-7 Abundance Trends: Training Area Points

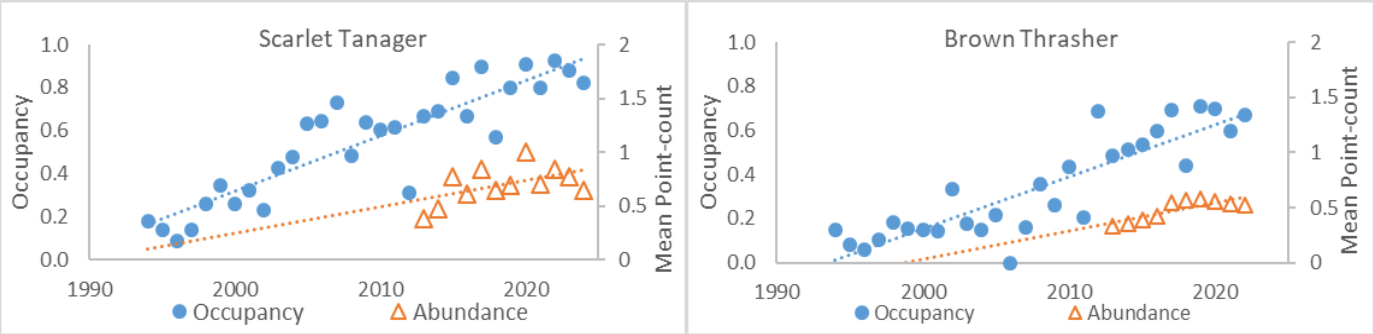


Long-term abundance (per point count means) for three select avian Species of Greatest Conservation Need at Camp Edwards. Linear trends are shown with dotted lines.

A few items are of particular note for discussion in the ongoing trends for SGCN within the training area. Both Field Sparrow and Prairie Warbler are increasing with statistically significant trends for both occupancy and

abundance. This means that not only are they increasing in distribution, but their average count is increasing, demonstrating a strong population increase rather than a redistribution. Likewise, both Eastern Whip-poor-will (a focus of separate, nocturnal surveys) and Eastern Towhee have statistically significant, increasing abundance trends. The only reason these two species do not have statistical significance for occupancy trends is that they are functionally at saturation for their distribution at Camp Edwards and they are documented at all or nearly all survey locations annually. This is a very noteworthy result and continuing trend for species experiencing severe declines throughout most of their ranges. It is also important to note that the stable to increasing trends for SGCN and other species are seen across habitat affiliations, including species associated with open Pitch Pine – Scrub Oak savannah (e.g., Prairie Warbler) and closed canopy pine – oak forest (e.g., Black-and-white Warbler). Prairie Warbler and Eastern Whip-poor-will are both classified as "At-risk" species by the USFWS, Northeast Region, based on the extents of their declines and potential for future federal listing. The very positive results for these species at Camp Edwards are hopefully mirrored at other pine barrens restoration areas in the region. They also indicate the strong potential for collaborative species recovery given sufficient social and political will and investment for landscape level conservation and ecosystem resilience.

Graph 3-8 Long Term Occupancy and Abundance Comparisons for Scarlet Tanager and Brown Thrasher at Camp Edwards



Long-term occupancy and abundance comparisons for Scarlet Tanager and Brown Thrasher at Camp Edwards. Both species are experiencing dramatic range-wide declines, but overall long-term increases on base.

Some species are showing subtle declines, including Black-billed Cuckoo and Purple Finch. Black-billed Cuckoos tend to have very complex, fluctuating population dynamics which make them challenging for interpretation, but may also make them vulnerable to stochastic events when they are in population low points. Some species, including long-term increasers like Brown Thrasher and Scarlet Tanager had lower mean counts in 2023 and/or 2024 compared to previous years. There is no obvious explanation and it is likely just typical population dynamics and continued monitoring will evaluate this. It's also true that the ongoing increases will temper and fluctuate as species approach carrying capacity or continue to be influenced by larger and external pressures. One curious result in the 2023 and 2024 monitoring is the reduced occupancy and abundance for Ruffed Grouse. These results do not match with the targeted grouse drumming surveys completed earlier in the spring and described in more detail, below. This discrepancy warrants some additional attention and discussion related to both monitoring and populations given the very high levels documented, particularly in 2019 through 2022, during the general breeding bird survey point-counts. It's not certain what conditions could be driving discrepancies and/or changes. Detectability almost certain changes through the spring as drumming winds down and this activity is likely influenced by seasonal conditions.

The strong majority of SGCN and other species at Camp Edwards have increasing or stable trends, which is quite notable in comparison to range-wide and regional declines for species classified as SGCN or with other conservation concerns. Long-term monitoring will continue to be very important for tracking avian trends through time at Camp Edwards. Not only is it informative for pine barrens restoration and habitat management efforts, but also to evaluate the challenging situation of managing ecosystem remnants surrounded by converted

habitats and areas lacking conservation management. Much is yet to be seen if the increases for species such as Scarlet Tanager and Brown Thrasher (Graph 3-8, above) will be sustainable over the long-term given land use and conservation challenges throughout the region. The importance of long-term monitoring efforts is also highlighted in the figures at right for these two species representing mature forests (Scarlet Tanager) and a more open gradient of savannah and shrubland (Brown Thrasher). Over the last thirty years both species have had remarkable increases in occupancy at Camp Edwards. The former monitoring protocol presents challenge for abundance estimation, but occupancy is a valid surrogate for abundance as the two are highly correlated. While the shorter term abundance trends for both species shows a recent stabilization, the long-term population trend, including distribution across the training area is strongly positive.

3.5.2.1 American Woodcock and Ruffed Grouse Surveys

Both the American Woodcock (*Scolopax minor*) and Ruffed Grouse (*Bonasa umbellus*) are classified as Species of Greatest Conservation Need in Massachusetts. Both are also harvestable game birds in Massachusetts. Both of these species are also challenging to survey and document during typical point-count surveys for general breeding birds. Targeted surveys are conducted occasionally at Camp Edwards to better document and track these species' populations.

In the spring of 2024, Camp Edwards' Natural Resources team conducted American woodcock singing ground surveys in compliance with the USFWS Division of Migratory Bird Management protocol. At Camp Edwards, there are 103 sites organized at least 0.4 miles apart along 11 routes, scattered along roads throughout the northern training area. The sites varied by dirt, sand, or paved roads, and forested or open habitat. Woodcocks males were heard peenting or heard in flight at 46.6 % of the sites surveyed (48 out of 103). This survey was also completed in 2018, 2016 (a portion of the sites), and in 2012. In 2018, 43% of sites were occupied (38 out of 89 sites). In 2012, 44.5% of sites were occupied (45 out of 101 sites). Surveys in 2024 and 2012 surveyed the most sites. Of the 101 sites surveyed in both years, 29 sites stayed occupied, 38 sites stayed unoccupied, 16 sites that were occupied in 2012 were not occupied in 2024, and 18 sites that were not occupied in 2012 were occupied in the 2024 survey. The similar percentage of sites occupied and the similar number of sites changing from occupied to unoccupied as from unoccupied to occupied indicates a stable population that likely shifts based on management history. The numbers indicate a slight uptick in percentage occupied sites and new sites occupied.

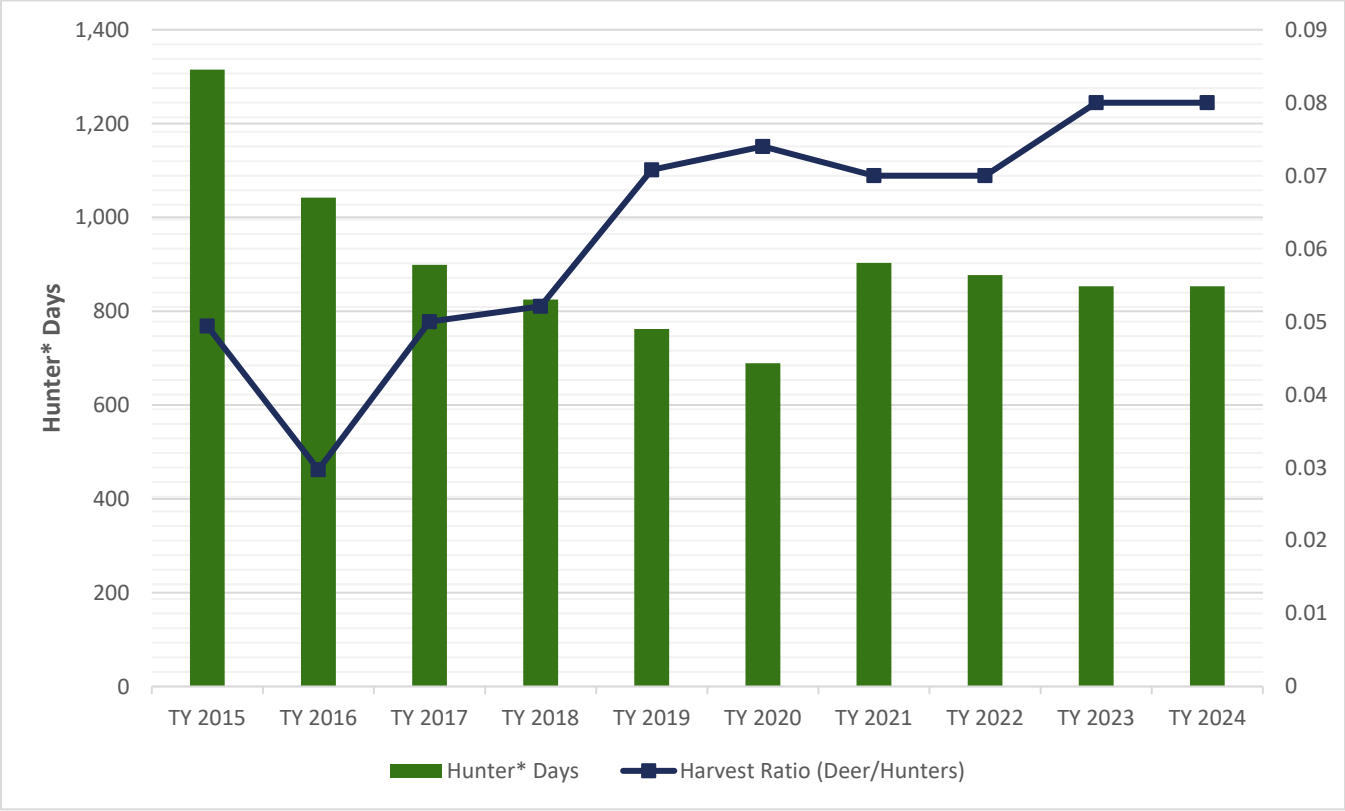
The MAARNG staff also completed surveys for ruffed grouse, a species experiencing declines range-wide. The surveys counted the number of drums heard at each point along survey routes throughout Camp Edwards. In the spring of 2024, surveys were conducted along nine routes with a total of 90 points throughout Camp Edwards. Of the 90 sites surveyed, 80 sites (88.8%) were occupied. The same protocol was completed in 2014 at a total of 92 sites, which included all the sites surveyed in 2024. In 2014, 86 sites (93.5%) were occupied. Only one site was unoccupied in both years. Seventy-five sites were occupied in both years. Nine sites were occupied in 2014 and no longer occupied in 2024. Five sites that were not occupied in 2014 are now occupied in 2024. Of note, however, is a difference in the number of times sites were surveyed. Of the 10 unoccupied sites in 2024, five sites had only one survey, 3 had 2 surveys, and 2 had 3 surveys; whereas in 2014 of the 6 unoccupied sites, 1 had 3 surveys and 5 had 2 surveys. To compensate for uneven sampling efforts, the data will be analyzed accounting for detection probabilities to determine more accurate occupancy estimates. It is also worth noting that detection of this species seems highly influenced by background noise. Particularly low-frequency sounds, such as vehicles (adjacent highways) and wind turbines, overlap or mask grouse drumming and hinder surveys. It is also of particular interest that the 2024 focal survey result is far higher than the Ruffed Grouse occupancy recorded during the general bird survey point-counts. Observers are listening exclusively for Ruffed Grouse drumming, a sometimes challenging sound. That being said, the Ruffed Grouse occupancy during the general point-counts has been very dynamic with a peak of 0.98 in 2020 and an average of 0.66 from 2013 through 2024 in which the lowest occupancy was recorded at 0.31. Despite only being detected at 31% of general point-counts the species was recorded at almost 90% of targeted survey sites.

3.5.3 Deer Hunt

The TY 2024 deer hunting season at Camp Edwards ran from September 30, 2023 through late December 2023. In total, 77 deer were taken during 853 hunter-days. The Natural Resources Program supports a hunt sufficient to maintain a harvest level that is compatible with a healthy deer herd and healthy ecosystem. MAARNG and DFW generally feel that the recent average of 60 plus deer per year meets the overall objective. DFW primarily relies on the biological data collected at the deer check to adjust the number of tags that are available each year. The 2017 browse survey indicated little to no browse pressure at Camp Edwards. More recent casual observations of browse on site do not indicate excessive browsing, except on specific species. Deer will commonly preferentially browse certain species. Unfortunately, at Camp Edwards some of these are state-listed plants and herbivory is a contributor to decline and loss for the species. The Natural Resources Program has successfully tested some methods to exclude deer from sites where this species-specific browse has been observed.

The Natural Resources Program continues to provide a variety of hunting opportunities to best engage the hunting community and encourage new hunters through events such as the youth day, archery, and military and first responder sportsmen hunt. Hunting during TY 2024 included a three-day hunt by paraplegic sportsmen (November 2-4, 2023), a one-day youth hunt (September 30, 2023), a two-day opening for archery scouting (November 13-14, 2023), a three-day archery season (November 16-18, 2023), a one-day hunt for military and first responder sportsmen (December 1, 2023), a six-day shotgun season (December 4-9, 2023), and a two-day primitive firearms (muzzleloader) season (December 19-20, 2023). Graph 3-9 shows the hunter days and deer harvest ratio since TY 2015.

Graph 3-9 Camp Edwards Deer Harvest



Note: Hunter Days is the sum of the number of hunters each day for each day of the annual hunt.

The Massachusetts Department of Public Health and DFW sampled deer at check stations on Cape Cod for PFAS during the 2023 hunt. PFAS is an emerging contaminant that has been found in the muscle tissue in deer in other states near PFAS sources. In addition, COVID testing was conducted. The official report on these results has not

been released, but no advisory has been released or additional sampling been implemented on Camp Edwards. Preliminary results from MassWildlife indicate that no concerns for PFAS were identified on Cape Cod and that no additional testing is planned.

3.5.3.1 Hunter Surveys

Hunter surveys were collected in TY 2023 with 30 respondents. Eighty percent had been hunting the base for 5 years or more, 10 percent recently started hunting here, and 10 percent returned to hunting here. Some noted that the check in process is very good and has improved. Five out of 30 hunters (17 percent) said they use the electronic maps made available in recent years. Hunters noted that the hunts are less crowded now. Five hunters requested more areas be opened to hunting while one appreciated an area being reopened to hunting. Two hunters noted that the hunt is doing great and another expressed appreciation for the base being open to hunt. One suggested that archery scouting occur the week before archery to allow deer time to settle, which was implemented in TY 2025.

Hunter surveys were collected again in TY 2024 with 34 respondents. Eighty-two percent reported hunting the base for 5 years or more, 6 percent recently started hunting here, and 6 percent returned to hunting here. Half of respondents waited 15 minutes or less to check in and 21 percent waited for 20 plus minutes. All but one said they would return next year (one left blank). Four hunters (12 percent) used electronic maps, and ten (29 percent) participated in the first responder hunt. Eleven hunters requested to do away with the no drive zones, one noted a hazard with driving and another suggested part-time restriction on driving. Four hunters asked for more gates and roads to be opened.

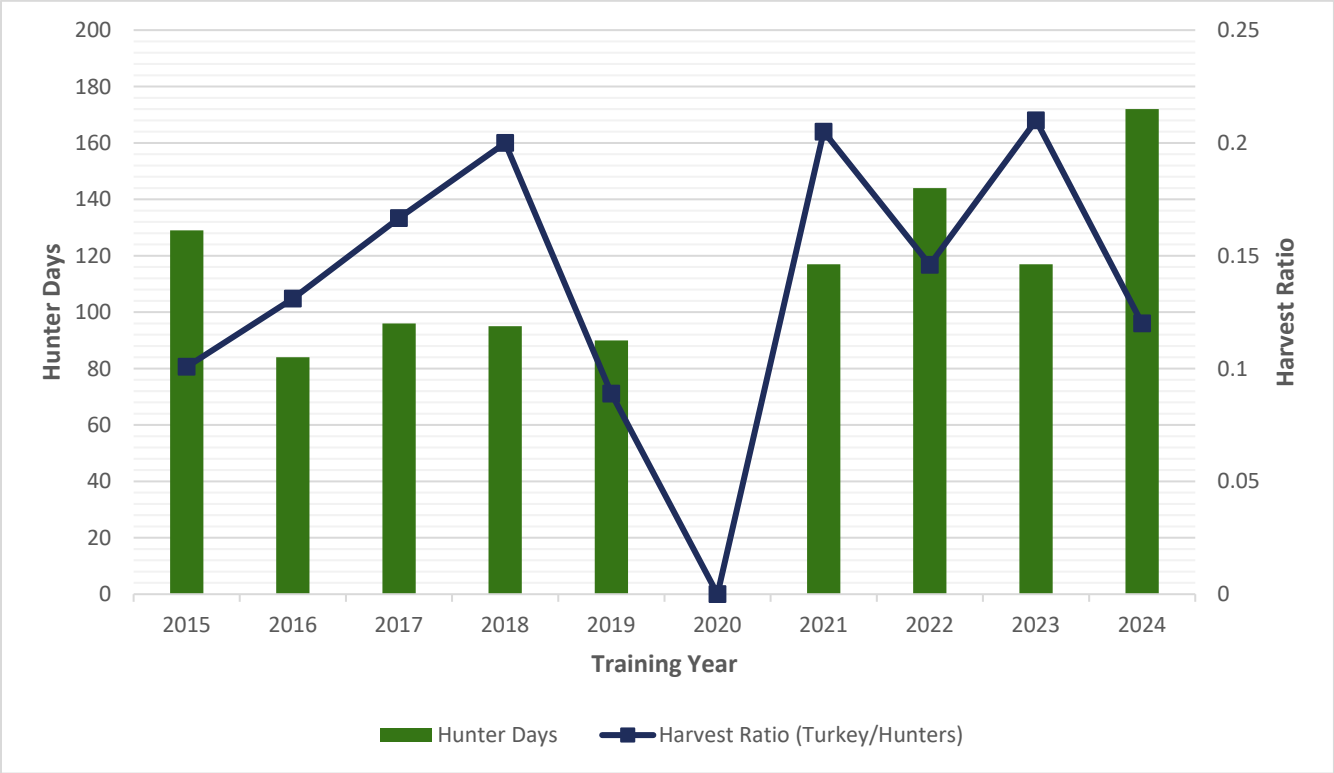
The Natural Resources Program, Range Operations, and the DFW Southeast District have continued to make as many days and acres available to hunting as is possible given safety concerns and staff resources. Efforts to advertise the hunt were also aimed at increasing harvest as well as recreational use of the site. The “No Drive Zones” were established several years ago in response to hunters expressing concerns about safety when large groups of hunters conducting a drive would move through when lone or small groups of hunters were in the area. To accommodate both styles of hunting, the zones were established and rotated around the base to prevent any one area being excluded to certain types of hunters.

Wild Turkey (Meleagris gallopavo) displaying in recently burned savannah at Camp Edwards, Spring 2024. *Photograph by Jacob McCumber, Natural Resources Program*

3.5.4 Wild Turkey Hunt

The TY 2024 turkey hunt at Camp Edwards lasted six days from May 6-11, 2024, during which 135 hunters took 13 turkeys. In addition, a one-day youth turkey hunt was held on April 27, 2024, in which seven youths participated with five turkeys taken. For the first time, a one-day adult mentored turkey hunt occurred on May 14, 2024, during which 9 youth hunters and 8 mentors participated, but no turkeys were taken. Another first during TY 2024 was a fall turkey hunt from October 17-18, 2023, during which 13 hunters took 3 turkeys. Graph 3-10 provides information on the wild turkey hunts conducted in the spring since TY 2015.

Graph 3-10 Camp Edwards Turkey Harvest



Note: Hunter Days is the sum of the number of hunters each day for each day of the annual hunt. In TY 2020, the turkey hunt was canceled due to the statewide shutdown for the Covid-19 pandemic.

3.5.5 Restoration Activities

In TY 2024, the Natural Resources Program intentionally focused effort on maintenance in restoration areas and planning for future projects. This was in part due to budget constraints but was primarily based on the need to cycle efforts and not lose track of habitat maintenance in restored areas.

3.5.5.1 BP-16 LZ Expansion

In the northwest corner of the base, Battle Positions 14 and 16 are two pre-existing clearings along Jefferson Road. BP-14 has almost no current utility but BP-16 sees frequent use as a popular, albeit cramped landing zone for Blackhawk helicopters. Camp Edwards has had two long-standing aviation-related training site requests – a brown out landing zone, where pilots can practice landing in zero visibility dusty conditions, and larger landing zones to land multiple aircraft in formation.

The BP-16 LZ Expansion project will conduct mechanical forestry to expand the current BP-16 footprint into surrounding woods, and to connect it to BP-14. The core of the project will remove all trees and stumps from 10 acres of land, centered on the pre-existing LZ at BP-16. Contractors will also remove trees in an additional six acres to remove potential rotor hazards along likely helicopter approach routes, although they will not be removing stumps or understory vegetation in these six acres.

Once contractors have completed their work, in-house staff will conduct further work to remove any terrain irregularities that could pose a risk to landing aircraft or disembarking troops. This work will also remove woody debris that could threaten aircraft and will set the stage for future reseeding with warm and cool season grasses. Additionally, staff will establish and maintain a 200’x200’ portion of BP-14 as exposed soil to create a brown out landing zone, as requested.

The project will convert ten new acres of grassland that will, in time, be seeded with pollinator-friendly herbaceous species and expand welcoming habitat for desirable species like the Frosted Elfin, which have been

recently spotted in the area as they expand along the utility right of way. Additionally, the project will create 4,500 feet of new forest edge to benefit Whip-Poor-Wills and Woodcocks, both of which have responded extremely well to similar restoration projects in the past and already have a limited presence in this part of the base.

Restored Pitch Pine – Scrub Oak natural community in Training Area C-14. This long-term restoration effort has applied our principles of complex restoration with excellent results and has been a focus of both outreach efforts and sharing lessons learned with other conservation and land management programs. At the time of this photo (May 2024) the site was hosting a flock of Red Crossbills responding to the strong cone crop, a pattern shared in other nearby pine barrens restoration sites. *Photograph by Jake McCumber, Natural Resources Program*

3.5.5.2 C-14 Coppice Thinning

This project was conceived of and funded in 2023 but was executed in 2024. Following a successful 2018 forest thinning harvest in Training Area C-14, hardwood stumps were regenerating at an aggressive rate, overstocking the unit with bushy coppices which shade out understory, block line of sight, hinder dismounted maneuver, complicate future prescribed fire operations, and are unlikely to provide our desired distribution of standalone Oaks with strong central leaders and sufficient canopy spacing. The long-term habitat management goal for the area is an open, patchily distributed Pitch Pine-Oak woodland with Scrub Oak understory. The woodland condition is dominated by widely spaced, large and relatively old Pitch Pine with historic fires periodically resetting the Oak midstory.

This project took a successful strategy to manage coppice regeneration and applied it on an additional 13 acres. Contractors with hand-held equipment cut regenerating stems and, in some cases, applied herbicide directly to the resulting stumps. For 75 percent of the coppices in this unit, contractors cut all stems and applied a Triclopyr solution directly to the stems. For the remaining 25 percent, contractors selected the strongest stem for retention and cut all other stems. No herbicide was applied to any stumps on coppices selected for retention. All cut stems were left in place for future consumption by prescribed fire. The project also targeted any present Black Locust (*Robinia pseudoacacia*) for 100 percent cut and spray. At the conclusion of this final 13 acres, the entirety of the original harvest site had been maintained with this method.

This project will slow the total rate of regeneration on the site, preserving the military training benefits that motivated the original 2018 project. By removing this aggressive regeneration, the Natural Resources Program aims to reduce competition for nutrients and sunlight, increasing the productivity and success rates of understory species and the vigorous central leaders selected for retention. Additionally, by cutting and spraying stumps, the

Natural Resources Programs aims to use less herbicide and reduce the risk of off-target impacts that can occur with traditional foliar spraying. In 2024, the Natural Resources Program contractor applied 24 pounds of Triclopyr in the execution of this project.

3.5.6 Invasive and Nuisance Vegetation Management

Section 3.5.6 encompasses activities related to Environmental Performance Standard 10, Pest Management Performance Standards.

Invasive plants are non-native species that have spread into natural, minimally managed, or disturbed plant systems in Massachusetts. They can cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems. As defined here, "species" includes all synonyms, subspecies, varieties, forms, and cultivars of that species unless proven otherwise by a process of scientific evaluation. Invasive species are primarily from the Massachusetts Invasive Plants Advisory Group (MIPAG) lists, but also include emerging invasive species as coordinated with partner agencies.

Nuisance species are more selectively or situationally defined and may include native plants under certain conditions. Several native species have displayed such aggressive establishment and regeneration that they require targeted management in order to preserve the training and preferred habitat value of some training venues. Although not exotic, these species, under certain conditions, can display the same dominant and disruptive characteristics normally associated with invasive species. Pitch Pine in particular has historically taken advantage of neglected training sites to create impenetrably dense, overstocked monocultures that exclude nearly all other species of plants and animals, produce unhealthy trees, present significant fire hazard, and impede training. Other native, desirable species that may situationally present a nuisance condition from a habitat perspective include Bayberry and Sweet-Fern, due to tendencies towards monoculture through chemical defenses.

Exotic invasive plants are a management concern both in the Training Area/Reserve and within the Cantonment area. Effective management of these species, primarily Autumn Olive (*Elaeagnus umbellata*), Oriental Bittersweet (*Celastrus orbiculatus*), and Shrub Honeysuckles (Lonicera spp.), is both labor and cost intensive. Natural Resources-ITAM has four trained and licensed Massachusetts core pesticide applicators on staff. This functionality has allowed our program to respond to invasive species as they're identified on ranges, in training areas, at facilities, or in valued habitat.

By far, the majority of 2024's invasive plant management was conducted in the cantonment grassland area. The programmatic goal of this year was to make a concerted effort towards eradicating Autumn Olive in units throughout cantonment. NR-ITAM used in-house mechanical methods (mowing with tractor and skid-steer loader attachments) and herbicide to control Autumn Olive on 0.65 miles of roadsides and 79 acres of grasslands and wooded units. These in-house pesticide applications used both foliar and basal bark treatments and altogether applied 94 pounds of active ingredient (specifically, 21 pounds of Glyphosate and 73 pounds of Triclopyr).

In addition to in-house treatment, NR-ITAM contracted Davey Resource Group (DRG) to conduct herbicide application in two units that were overwhelmed by invasive species, predominantly Autumn Olive and Bittersweet. DRG conducted this work in October 2024 and applied 58.5 pounds of Triclopyr divided between one site in the 1100 block of Cantonment and the laydown yard of the old UTES facility. Although conceived and contracted in TY 2024, because this treatment took place in TY 2025, the herbicide use will be reported in TY 2025 numbers.

Altogether, the reported use of herbicidal active ingredient in TY 2024 was 94 pounds. For context, the reported use of herbicidal active ingredient in TY 2023 was 408 pounds, so this year was a marked decrease in total herbicide use.

3.6 Wildland Fire Management

Section 3.6 summarizes Natural Resource Program actions related to Environmental Performance Standard 11, Fire Management Performance Standards. Wildland fire is an important process in the fire prone Northern Atlantic Coastal Plain Pitch Pine Barrens that dominate the remnant landscape of Camp Edwards and the Upper Cape Water Supply Reserve. Wildfire can reduce military readiness through the loss of training days, threaten life and property on and around Camp Edwards, and negatively impact natural resources if the occurrence of the fire is outside the historical and/or natural range of variability. The 2023 National Cohesive Wildland Fire Management Strategy update, provides common nationwide guidance on achieving effective wildland fire management. The vision statement of the national strategy is "To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and collectively, learn to live with wildland fire". The three overarching goals in support of this vision statement are:

- Resilient Landscapes – Landscapes, regardless of jurisdictional boundaries are resilient to fire, insect, disease, invasive species and climate change disturbances, in accordance with management objectives.
- Fire Adapted Communities – Human populations and infrastructure are as prepared as possible to receive, respond to, and recover from wildland fire.
- Safe, Effective, Risk-based Wildfire Response – All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

Using the principals outlined in the National Cohesive Wildland Fire Management Strategy the Natural Resources Office conducts wildland fire management to support military readiness and to meet the goals and objectives outlined in the 2020 version of the Integrated Natural Resources Management Plan (INRMP) and 2006 version of the Integrated Wildland Fire Management Plan (IWFMP) for Camp Edwards. The current versions of the IWFMP and INRMP are available at the Environmental and Readiness Center's website: https://www.massnationalguard.org/ERC/publications.htm.

3.6.1 Wildland Fire Management Administration

Wildland fire administration such as planning, training, resource management, and reporting are undertaken in support of goals and objectives outlined in the IWFMP and INRMP for Camp Edwards. Administrative actions adhere to Army Wildland Fire Policy and National Wildfire Coordinating Group's (NWCG) standards.

3.6.1.1 Integrated Wildland Fire Management Plan

Installations characterized by unimproved grounds that present a wildfire hazard and/or installations that utilize prescribed fire as a land management tool are required to develop an IWFMP in accordance with AR 200-1 and AR 420-1.

The update of the 2006 Camp Edwards IWFMP is in the final stages of preparation for signatures. The IWFMP update was prepared in a format consistent with the March 15, 2021, Army Installation Wildland Fire Program Implementation Guidance Memorandum. The final version of the IWFMP is expected to be signed in early 2025.

3.6.1.2 Prescribed Fire Burn Plans

Prescribed fire burn plans are required for each fire application ignited by management and remain valid after approval until conditions change for the area described in the plan, usually 5 years or less. Prescribed fire burn plans for Camp Edwards are drafted following the requirements and standards outlined in the NWCG Standards for Prescribed Fire Planning and Implementation publication (PMS 484).

No new prescribed fire burn plans were drafted in TY 2024. There are three active prescribed burn plans covering 2,041 acres for broadcast burning and one programmatic Camp Edwards wide prescribed fire burn plan for pile burns. The decrease in current or valid burn plans leaves a critical gap for the prescribed burn program. This highlights the challenges in sustaining wildland fire programs, especially as an agency not specifically focused on

land management. Other critical gaps in staffing, equipment, facilities, partnerships, etc. limit the time available for drafting prescribed burn plans. Authorship of burn plans requires specific qualifications and standards. Within Military Division and partner agencies, those personnel are also responsible for program administration, operational oversight, and more. Adequate resourcing for personnel and equipment is essential to ensure qualified staff are able to address all the administrative and planning needs for fire programs, including development of quality prescribed burn plans. Table 3-7 summarizes the areas under prescription and the plan's expiration date.

To increase wildland fire management capacity and to enable new prescribed burn plans to be drafted an Environmental Analyst III (Prescribed Fire and Fuels Specialist) position was posted. This position will help to meet critical capacity gaps and will allow for the safe and effective expansion of current wildland fuels management to better address critical needs and accomplish targets so as to reduce wildfire risk, increase ecological integrity and resilience in support of military training and readiness at Camp Edwards.

Table 3-7 TY 2024 Prescribed Fire Burn Plans

Prescribed Fire Burn Plan	*Acres*	*Expiration*
Camp Edwards Programmatic Piled Vegetation	N/A	02/01/27
A-3, A-4, A-5, and BA-4	914	06/30/26
BA-1, BA-2, and BA-7	634	06/30/26
Cantonment Area Grasslands	493	11/30/25

3.6.1.3 Wildland Fire Fuels Plans

To better facilitate wildland fuels management and wildfire response on the 664 acres immediately north and west of the Ammunition Supply Point a project package was finalized for work in TY 2025. The project package outlines the improvement 600 linear feet of Pew Road and reestablishment of 350 linear feet of Pew Road and 1,000 linear feet of Pocasset Forestdale Road.

3.6.1.4 Wildland Fire Agreements

The Natural Resources Program manages the Master Cooperative Wildland Fire Management and Stafford Act Agreement for the MAARNG that is between the Northeastern Region of the National Park Service, Eastern Region of the Bureau of Indian Affairs, Northeast Region of the USFWS, Northeastern Area State and Private Forestry of the U.S. Department of Agriculture, Connecticut Department of Energy and Environmental Protection, DCR, DFG, and Massachusetts National Guard's Military Division. The agreement establishes a commitment of the parties to improve efficiency by facilitating the coordination and exchange of personnel, equipment, supplies, services, and funds among the parties to the agreement in sustaining wildland fire management activities, such as prevention, preparedness, communication and education, fuels treatment and hazard mitigation, fire planning, response strategies, tactics and alternatives, suppression and post-fire rehabilitation and restoration.

The agreement was established in 2017 and expired in 2023. In 2023 and again in 2024 a modification of the agreement was provided to all signing parties to extend the agreement into 2025 to allow for a renewal of the Master Cooperative Wildland Fire Management and Stafford Act Agreement.

3.6.1.5 Prescribed Fire Permits

Prescribed burns are authorized under permit by MassDEP. The authorization by MassDEP has been determined under criteria outlined in 7.07 Open Burning as contained in 310 CMR 7.00 "Air Pollution Control" regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-N, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6 of the "Air Pollution Control Regulations." The current permit (#4F02008) for Camp Edwards was renewed on August 16, 2022, and is valid through December 31, 2024. The permit allows for up to 1,300 acres to be burned in a year and sets air quality and implementation criteria.

3.6.1.6 Wildland Fire Training

Wildland fire trainings conducted during TY 2024 consisted of classroom, hybrid online/in person, and performance-based training and evaluations. These trainings were focused on building the skill sets of the Camp Edwards Prescribed Burn Team and partner agencies so as to increase wildland fire operational capacity and safety. Trainings were selected to ensure effective progress towards compliance with the 2021 Army Wildland Fire Policy that requires the transition to NWCG qualifications standards. As a result of a lack of funding in TY 2024 no annual Wildland Fire Academy was held. A summary of trainings and participation in the trainings is presented in Table 3-8.

Table 3-8 TY 2024 Wildland Fire Training Summary

Trainings, Trainee Assignments, and Qualifications	*Prescribed Burn Team*	*MAARNG Soldiers*	*Partner Agency Crew*
Wildland Fire Safety Training Annual Refresher (RT-130)	14	11	-
Firefighter Training (S-130)	3	-	5
Introduction to Wildland Fire Behavior (S-190)	3	-	5
Position Trainee Assignments	45	-	10
Qualification – Firefighter Type 2, Crewmember (FFT2)	2	-	-
Qualification – Resource Advisor (READ)	1	-	-
Qualification – Resource Advisor, Fireline (REAF)	1	-	-

To enhance wildland fire training approximately $106,000 of FY 2024 Congressional Interest Wildland Firefighting funds to acquire a Simtable have been secured. A digital sand table and customized model for the delivery of wildland fire tactical decision exercises. The Simtable will be used to conduct realistic incident training scenarios for the Massachusetts Army National Guard and its wildland fire partner agencies at Camp Edwards across Massachusetts.

3.6.1.7 Prescribed Fire Resources

To effectively and safely conduct wildland fire operations resources in the form of qualified crew and appropriate equipment are required. The Camp Edwards Prescribed Burn Team size is remaining constant at approximately 15 active participants. Qualifications and experience of all team members is effectively being maintained and expanded on with training and prescribed burn operations. However, wildland fire assignments are currently a limiting factor to progress on some qualifications. Partner agencies such as DCR and DFW provided approximately 20 percent of the crew and equipment needed for prescribed fire operations. The JBCC Fire Department provided approximately another 20% of the crew and equipment needed for prescribed fire operations with the remaining 60 percent of crew and equipment coming from the Camp Edwards Prescribed Burn Team. The Natural Resource Office's fire cache and Type 6 Engine continue to be organized, maintained, and expanded as funds and time permit. However, the lack of appropriate storage facilities for the Type 6 Engine and lack of funding for equipment may result in reduced prescribed fire capacity.

3.6.1.8 Wildfire Reporting

The JBCC Fire Department has primary wildfire response for wildfires on Camp Edwards and within JBCC. Wildland fires originating from unplanned ignitions for TY 2022 to TY 2024 are summarized in Table 3-9. Training Years 2014 to 2021 are not reported due to missing data and/or inconsistent reporting.

Table 3-9 Wildfire Incidents and Acres for Camp Edwards

	TY 2022 Incidents	*TY 2022 Acres*	*TY 2023 Incidents*	*TY 2023 Acres*	*TY 2024 Incidents*	*TY 2024 Acres*
Electrical Transmission	1	0.01	1	0.25	-	-
Military Training	3	0.50	5	11.57	2	0.20
Total	**4**	**0.51**	**6**	**11.82**	**2**	**0.20**

3.6.1.9 Ignition and Suppression Supplies Reporting

In January 2023 following review by the MAARNG's Natural Resources Program, JBCC Fire Department, Headquarters Camp Edwards, and the EMC's EO the Use and Reporting of Wildland Firefighting Water Additives Standard Operating Procedure (SOP) was adopted for use at Camp Edwards and the Upper Cape Water Supply Reserve. The SOP guides the use of Wildland Firefighting Ignition Equipment to the extent that is practicable during wildland fire operations (wildfire, prescribed fire, and wildland fire training), but does not under any circumstances hinder management decisions and actions taken by an Incident Commander when protecting life and property. When conducting planned operations such as prescribed burns and wildland fire trainings, every effort shall be made to apply the SOP to pre-operational planning. Information collected post wildland fire operations shall be used to identify products that are not currently listed in this SOP. This information will be used to update the SOP, initiate coordination efforts to prevent or guide future use of a product, and/or facilitate as required any post use mitigation efforts. A summary of TY 2024 Wildland Firefighting Equipment Ignition Fuels is provided in Table 3-10.

Table 3-10 TY 2024 Wildland Firefighting Equipment Ignition Fuels Summary

Product Name	*Type Use: Wildfire*	*Type Use: Prescribed Fire*	*Type Use: Wildland Fire Training*	*Total*
Dragon Balls (Potassium Permanganate)	-	15 oz	-	15 oz
Catalyst for Dragon Balls (Ethylene Glycol)	-	75 ml	-	75 ml
Drip Torch Fuel (3/1 Diesel to Gas Mix)	-	195 gal	-	195 gal
Fusees, Backfiring	-	-	4 fusees	4 fusees

3.6.2 Wildland Fire Operations

Wildland fire operations at the Training Area/Reserve in support of land management objectives are designed and conducted to control the flammability and reduce the resistance to control of wildland fuels through mechanical, chemical, biological, manual means, or using prescribed fire.

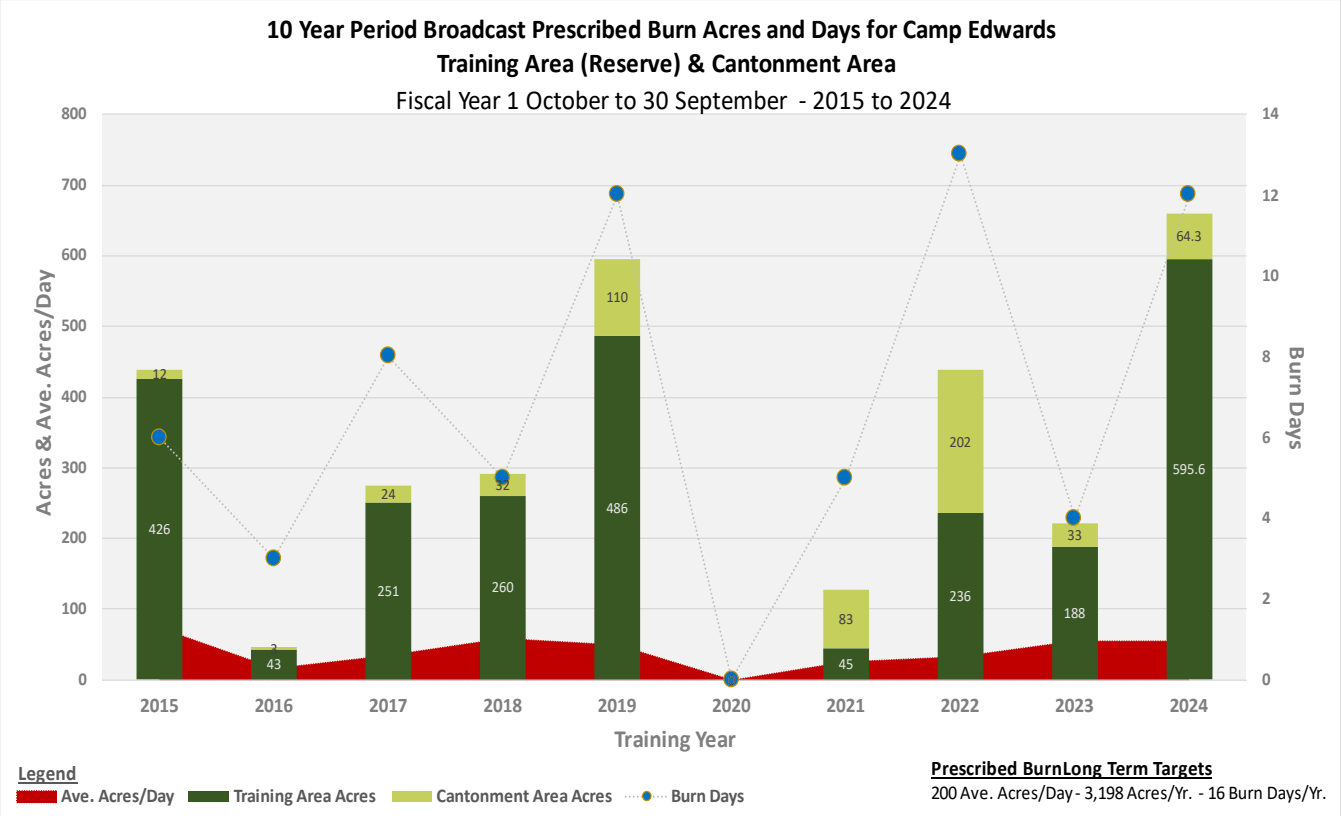
3.6.2.1 Prescribed Fire

Prescribed fire is wildland fire originating from a planned ignition in accordance with applicable laws, policies, and regulations to meet specific objectives. It is the most important ecosystem and land management tool at Camp Edwards and throughout the region. It is used at the Training Area/Reserve to support military readiness and to meet the goals and objectives outlined in the Camp Edwards INRMP and IWFMP, including restoration and maintenance of pine barrens and sandplain grasslands. To meet the wildland fire management goals at Camp Edwards approximately 3,000 acres/year, averaging 200 acres/burn, and 16 burn days/year are required each year. These are ambitious goals based on principles of sound ecosystem management and fire hazard reduction in a remnant of the North Atlantic Coastal Pine Barrens.

The program remains in a period of development, but with significant challenges with regards to meeting the long-term objectives and landscape needs. Reaching the point of a truly fire-maintained ecosystem will require significant investment in wildland fire equipment (engines, personal protective gear, hoses, tools, etc.), facilities (wildland fire building, equipment cache), and personnel. As discussed with the decline of current burn plans, the program administration, operational planning, equipment resourcing and maintenance, and all other elements

require dedicated time and agency commitment. As partner programs grow, different barriers to program development and sustainability are encountered. Meeting the long-term goal for wildland fire is critical for the wildlife habitat, ecosystem resilience, soldier training lands, and community safety. It will require emphasis and commitment from the local communities, from Commonwealth leadership, and from each wildland fire program and agency. In the near term, we most essentially require a better ability to fund key equipment and storage gaps as well as increasing staffing with higher level qualifications.

Graph 3-11 10 Year Period Broadcast Prescribed Burn Acres and Burn Days for Training Area/Reserve and Cantonment Area



During TY 2024, 596 acres of the Training Area/Reserve and 64 acres in the grassland within the Cantonment Area at Camp Edwards were burned with prescribed fire (Graph 3-11, above). The 670 total acres were burned during a total of 12 operational burn days and averaged 55 acres/day.

Grassland prescribed burns were conducted in March 2024. Two subunits were burned on March 13, including Grassland Unit (GLU) 4E (17 acres) and the southern 10 acres of GLU4A (photo below). This was followed by almost 38 acres on March 18, continuing northward in GLU4A and GLU4B. This eastern portion of the central grasslands has been the focus of restoration efforts since 2015 with significant success and remarkable plant and animal diversity, including numerous state-listed species and rare flora and fauna. All three subunits are part of ongoing grassland habitat maintenance and within the Sandplain Grassland Mitigation Focal Area established under a Conservation and Management Permit with MassWildlife. The grassland habitat response to prescribed burning is remarkable and there is a suite of very rare species that are primarily observed and documented the season or two immediately following burning. This includes extremely rare moths with isolated populations at Camp Edwards such as *Sitochroa dasconalis*, Cranberry Spanworm (*Ematurga amitaria*), and *Pococera baptisiella*.

Training Area/Reserve prescribed burns focused on pine barrens habitat conditions. All prescribed burns, especially in pine barrens are meeting multiple objectives for ecosystem health, fuel hazard reduction, and soldier

training enhancement. A total of 13 units or subunits were burned across 10 days as outlined on Figure 3-2. Spring burning in the northern training area began immediately after the grassland burns with 120 acres in Training Area BA-7 on March 19 and March 20. These were important habitat maintenance burns following previous treatments in 2013 and 2009 and these were important burns in a long-term strategy for the southern training areas that will hopefully continue through TY 2025. The second day of burning also included a subunit in Training Area BA3, which had been on a "waitlist" for the right burning conditions and facilitated subsequent burning in April.

Sandplain grassland in GLU4A (Sep. 2024) following a March burn. In late summer the area was lush with blooming Purple Wood Aster (*Eurybia spectabilis,* foreground) and Little Bluestem (*Schizachyrium scoparium*) and hosting rare insects including Northern Flower Moth and Purple Tiger Beetle. *Photo by Natural Resources Program*

April burning started with a focus around Sierra Range, which is a critical area from the perspectives of ecosystem management, soldier training support, and wildfire risk reduction. Sierra Range is surrounded by high quality Scrub Oak shrubland and Pitch Pine – Scrub Oak natural community with numerous rare and state-listed species. Between April 9 and April 16 a total of 226 acres were burned, including a 145 acre burn east of the range on April 10. This is another example of using strategic burns to facilitate burns with greater size and/or complexity. Additional April burns were conducted on the 22nd (3 subunit in BA-3, BA-1, and A-5) totaling 48 acres and culminating in the burning of the Wheelock Overlook restoration area on the 23rd (67 acres). The Wheelock Overlook Area has been a focal Pitch Pine – Scrub Oak savannah restoration beginning in 2019 with notable success for rare flora and fauna. There was a single June burn in 2024 with 39.5 acres of high priority Scrub Oak shrubland south of Sierra Range burned on June 12. June burning is essential, both from the perspective of safety and facilitating ecosystem diversity. Many areas of Scrub Oak can only be safely burned either with intensive mechanical pre-treatment or burning in June when green leaves moderate fire behavior.

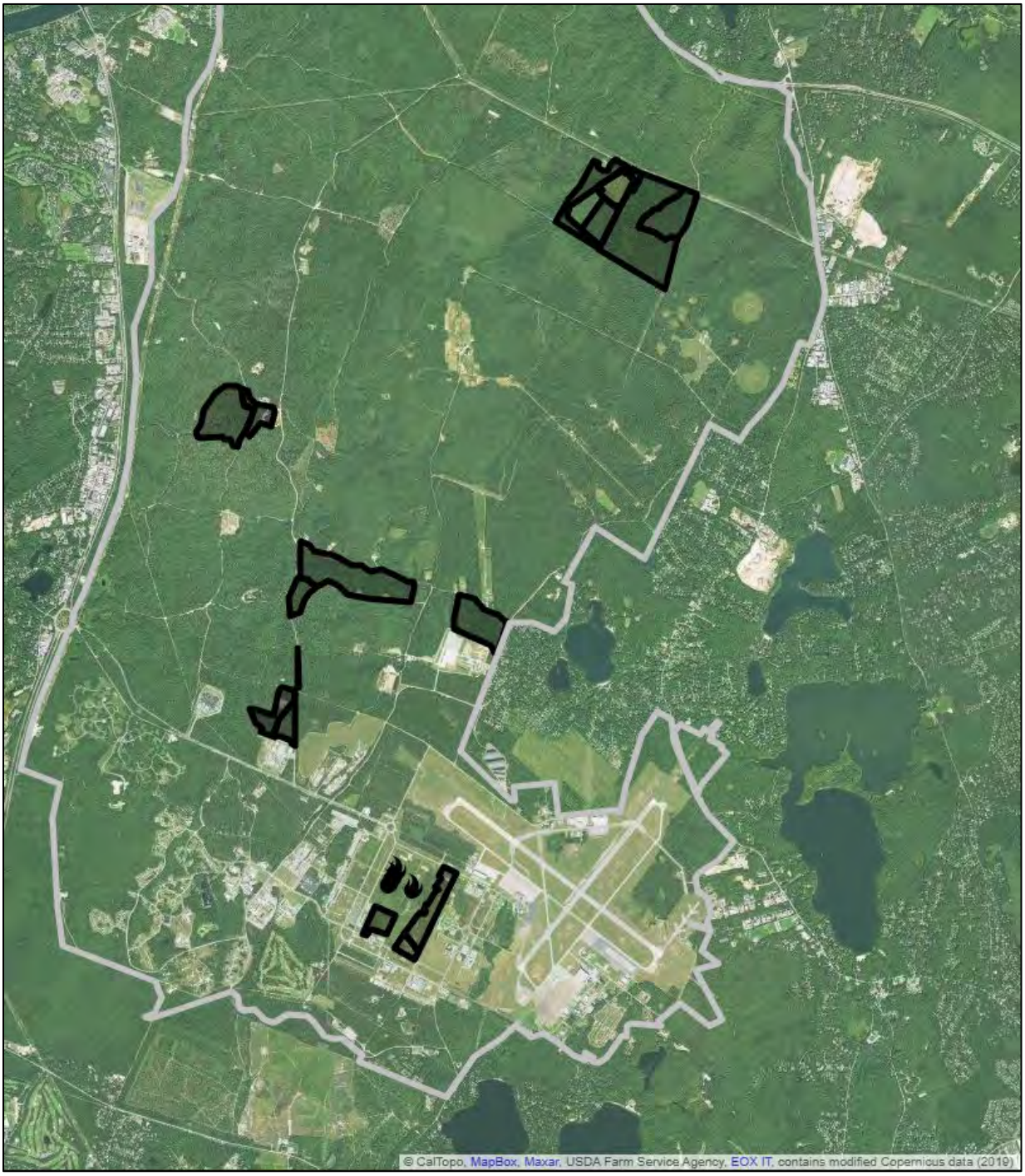
3.6.2.2 Mechanical Wildland Fire Fuel Treatments

During TY 2024 no mechanical wildland fuel treatments projects designed to manipulate or remove wildland fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to the control of wildland fire were conducted.

3.6.2.3 Wildland Fire Control Lines

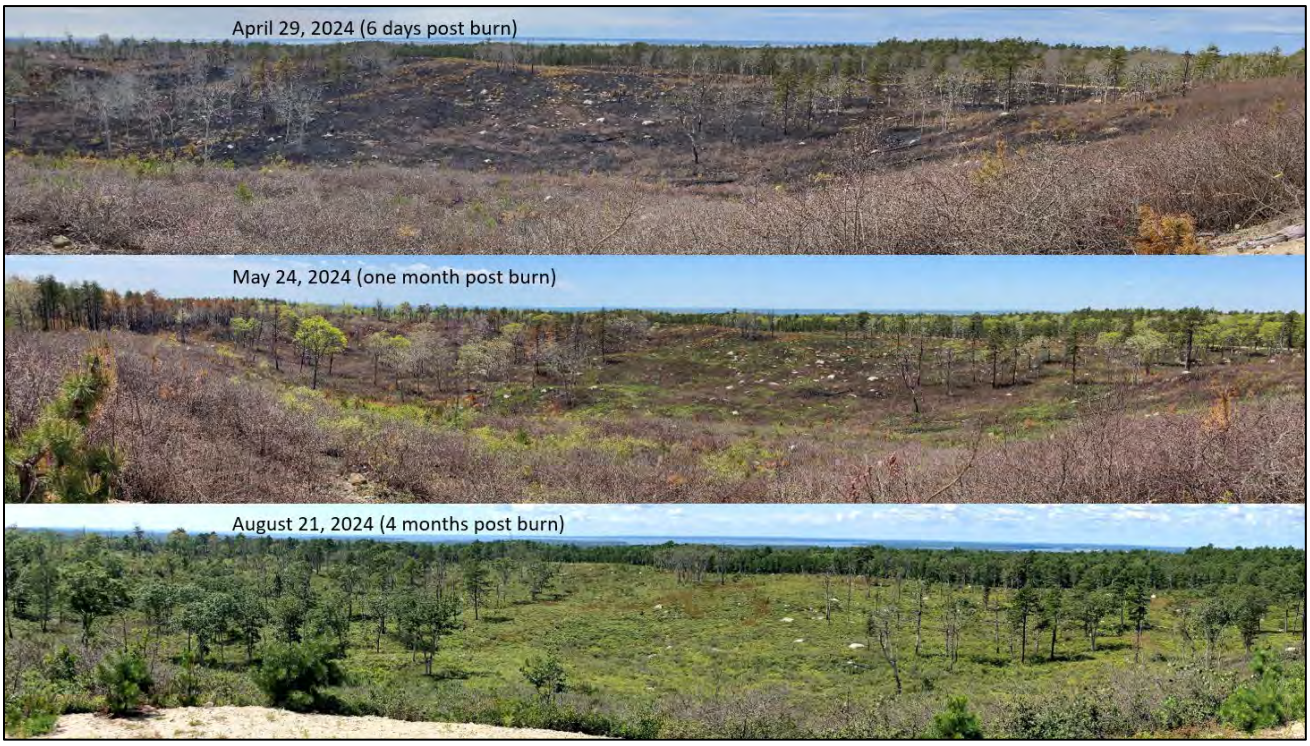
Constructed and treated control lines are used for the control of wildland fire at Camp Edwards and consist of two types. Fire control roads are cleared paths wide enough to permit vehicular passage with natural or manmade changes in fuel characteristics on one or both sides and will affect fire behavior so that fires burning into them can be more readily controlled. Fuel breaks which are generally temporary treatments that make changes to fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.

Figure 3-2 Prescribed Burns Completed in TY 2024.



Note: Prescribed burns completed in TY 2024 are outlined and shaded in black. This year was a much needed success for increasing acreage and number of burn days. The accomplished burns were high priority for long-term management strategies and key ecosystem restoration areas. The black flame symbols to the south in the grasslands represent pile burns in which young pitch pines were removed from sandy areas that had been heavily encroached by trees. The pile burns provide important habitat diversity by applying a combination of heat and biochar, which facilitate habitat recovery in a patchy mosaic. These areas hosted numerous rare species following the pine removal and pile burning, including Walsh's Digger Bee. The map shows a strategic layout of burns in which fire is used patchily throughout Camp Edwards, but also with a "clumped" pattern to facilitate future burns and expand in a localized way on the many benefits of wildland fire.

During TY 2024 all fire control roads were maintained so that they were passable by vehicles and no new fire control roads were created. Approximately 23.4 miles of existing fuel breaks were maintained and approximately 3.1 miles of fuel breaks were improved to facilitate the implementation of prescribed fire and wildfire response. Maintenance is typically simple tractor mowing of road-side vegetation while improvement of fuel breaks is a combination of heavier mowing, typically with a forestry attachment on a skid steer, and minor surface maintenance to support tractor mowing (e.g., moving rocks) or improve equipment access for wildland fires (minor road repair with gravel and/or grading).



Wheelock Overlook restoration area time series showing rapid vegetation response to prescribed fire. North Atlantic Coastal Pine Barrens evolved with fire and the natural communities respond extremely well to fire effects, particularly when applied through a long-term management strategy, such as the Camp Edwards INRMP and the very active, regional inter-agency conservation partnerships. This site hosts numerous rare plants and animals, including high numbers of Buck Moths and Eastern Whip-poor-wills. *Images courtesy Natural Resources Program*

3.7 Air Quality Management

Environmental Performance Standard 8, Air Quality Performance Standard, is covered in Section 3.7.

3.7.1 Air Quality Permits

Potential air emissions from stationary sources at Camp Edwards are below the established federal and state thresholds for the designated primary air pollutants (carbon monoxide, nitrogen oxide, particulate matter, sulfur dioxide, and volatile organic compounds); therefore, Camp Edwards does not require an air quality control permit for stationary source emissions under the provisions of the Clean Air Act (CAA) or to measure and report actual emissions from its stationary sources.

The prescribed burn program requires an air quality control permit. The MassDEP Southeast Regional Office renewed the Camp Edwards smoke management and prescribed burn permit (#4F02008) on August 16, 2022. The permit is valid through December 31, 2024.

3.7.2 Air Quality Reports

310 CMR (Code of Massachusetts Regulations) 7.12(2)(b) requires that any person having control of a fuel burning facility or facilities with a maximum energy input capacity of 10,000,000 Btu/hr of natural gas report certain information to MassDEP once every three years. Because of the number of facilities at Camp Edwards, the MAARNG is required to submit a Source Registration/Emissions Statement (SR/ES) report for Camp Edwards every three years on or before the date established by the MassDEP. The Camp Edwards SR/ES report is being finalized and is expected to be submitted in February 2025.

The only MAARNG stationary source emissions locations in the Training Area/Reserve on Camp Edwards are Range Control and the Ammunition Supply Point.

3.8 Noise Management

Section 3.8 provides information related to Environmental Performance Standard 9, Noise Management Performance Standards.

The MAARNG's Statewide Operational Noise Management Plan provides a strategy for noise management at MAARNG facilities, including Camp Edwards. The plan includes a description of noise environments, including levels from small arms and aircraft training activities. Elements of the plan include education, complaint management, possible noise and vibration mitigation, noise abatement procedures, and land use management. Specific procedures are provided for noise complaints and protocols are provided for providing public notification for detonation of unexploded ordnance in place and for other unusual noise events.

In May, a noise complaint was made to the Joint Force Headquarters Public Affairs media line by a Forestdale resident relating to nighttime training at a small arms range. Camp Edwards' Community Relations Specialist responded to the complaint with all parties satisfied.

3.9 Stormwater Management

Environmental Performance Standard 12, Stormwater Performance Standards: There were no new stormwater runoff increases in the Training Area/Reserve due to military training activities, and no new stormwater discharges from military training activities were made directly into wetland resource areas in the Training Area/Reserve.

3.10 Wastewater Management

Information related to Environmental Performance Standard 13, Wastewater Performance Standards, is included in Section 3.10.

Depending on the location of facilities, wastewater and sewage from MAARNG training activities in the Training Area/Reserve was pumped from portable toilet facilities and hauled off base for disposal at licensed disposal facilities or discharged through the normal operation of existing septic systems (1,000 gallon) at Range Control and the Ammunition Supply Point that are regulated by MassDEP. (Note: There is a septic system at the former Otis Fish & Game Club located on Camp Edwards in the southwestern corner of the Training Area/Reserve; it is not in use at this time because the building is out of service. There are septic systems within the boundary of the Training Area/Reserve, at Cape Cod AFS and the USCG Communications Station, which are regulated by MassDEP.)

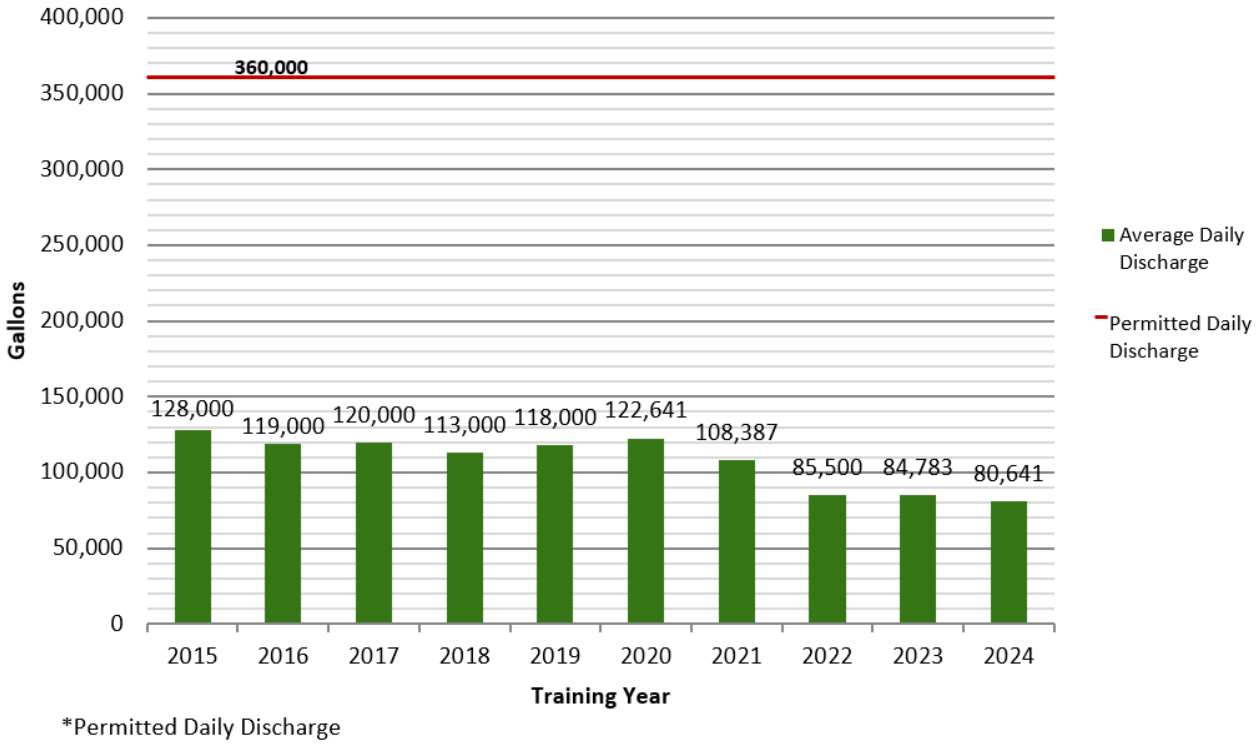
3.10.1 Wastewater Treatment Plant Discharge

The Converge/ASUS wastewater treatment plant operated within the discharge volume limits of its wastewater discharge permit during TY 2024. In 2022, the US Air Force entered into an agreement to transfer ownership of

the Otis ANGB water and wastewater systems to Converge LLC. Converge then selected American States Utility Services, Inc. (ASUS) to operate and maintain the systems. In April 2024, Converge/ASUS began operations at the facilities.

The plant discharged 29,434,025 gallons of sewage into the sand filtration beds in the Training Area/Reserve; a daily average of 80,641 gallons versus its permitted twelve-month moving average flow of 360,000 gallons. Graph 3-12 shows the daily average pumping rate of the system since TY 2015.

Graph 3-12 Wastewater Treatment Plant Discharge



3.11 Solid Waste Management

This section provides information related to Environmental Performance Standard 14, Solid Waste Performance Standards.

The Camp Edwards Ammunition Supply Point did not turn in any ammunition casings for recycling to the Defense Logistics Agency office in Groton, Connecticut, during TY 2024. Casings are turned in periodically when economical.

The MAARNG has a Statewide Integrated Solid Waste Management Plan for all of its Army National Guard facilities. The plan establishes MAARNG policy, responsibilities, goals, and objectives for compliance with statutory requirements for waste minimization, recycling, and solid waste disposal. Chapter 8 of the plan includes solid waste management procedures specific to Camp Edwards, as well as identifying potential future solid waste management alternatives.

3.12 Hazardous Materials Management

This section provides information related to Environmental Performance Standard 15, Hazardous Materials Performance Standards.

Camp Edwards has appropriate protocols in place to respond to oils or hazardous materials releases, such as fuel spills, in the Training Area/Reserve. These protocols include the Soldiers Field Card that outlines how Training Area/Reserve users respond if a spill occurs, and Camp Edwards has trained staff to initiate all required spill response actions in accordance with the Camp's Spill Prevention, Control and Countermeasure plan and/or Massachusetts Contingency Plan (310 CMR 40.00) if applicable. The EMC EO is notified of all reported spills in accordance with Chapter 47, and MassDEP is notified, if applicable. All users of the Camp Edwards training lands, including civilians, are required to complete a series of Range Control briefings. Users are directed via verbal instruction, as well as in training videos, to immediately report petroleum, oils, and lubricants hazardous materials spills and/or releases of any size to Range Control.

There was one small spill in the Training Area/Reserve during TY 2024 below the reporting levels established in the Massachusetts Contingency Plan. Less than a quart of hydraulic fluid leaked from a contractor's dump truck onto asphalt. A drip pan and spill kit were placed under the truck, and the cleanup materials were disposed of in accordance with applicable federal and state environmental regulations.

3.12.1 Vehicle Use, Fueling and Maintenance

Pumping fuel in the Training Area/Reserve has been prohibited by the EPSs since 2002. Currently, the fuel point and the secondary containment pads in the Tactical Training Base Kelley area represent the designated location for units to refuel and park and store tanker trucks at Camp Edwards. Environmental Performance Standard 15.3.3 states "No storage or movement of fuels for supporting field activities, other than in vehicle fuel tanks, will be permitted except in approved containers no greater than five gallons in capacity." Exemptions to EPS 15.3.3 have been granted to the MAARNG by the EMC Environmental Officer to refuel in the Training Area/Reserve for critical training events, remediation and natural resource restoration work, and utility company modernization and maintenance. Refueling activities in the Training Area/Reserve during these exemptions were all completed with no adverse environmental impacts.

3.13 Hazardous Waste Management

Information related to Environmental Performance Standard 16, Hazardous Waste Performance Standard, is in Section 3.13.

The MAARNG complied with its policy of not performing maintenance activities on military vehicles in the Training Area/Reserve throughout the year. Personnel in the field are authorized only to check fluid levels, add small amounts, and repair flat tires or track sections that separate during training. Thus, hazardous wastes normally associated with vehicle maintenance and repair facilities were not generated or stored in the Training Area/Reserve.

Major repairs and other maintenance activities and training occur at the Unit Training Equipment Site (UTES) facility located in the Cantonment Area of Camp Edwards. The UTES facility is a vehicle and motor pool area; the Massachusetts National Guard has also designated the area as a Satellite Accumulation Point to store hazardous waste. Satellite Accumulation Points are defined areas to accumulate hazardous waste (oily solids, flammable solids, etc.) Once the 55-gallon drums are full, they are transported to the 90-day central accumulation area located at the Camp Edwards warehouse. Hazardous waste is picked up on a regular schedule of approximately 70-80 days.

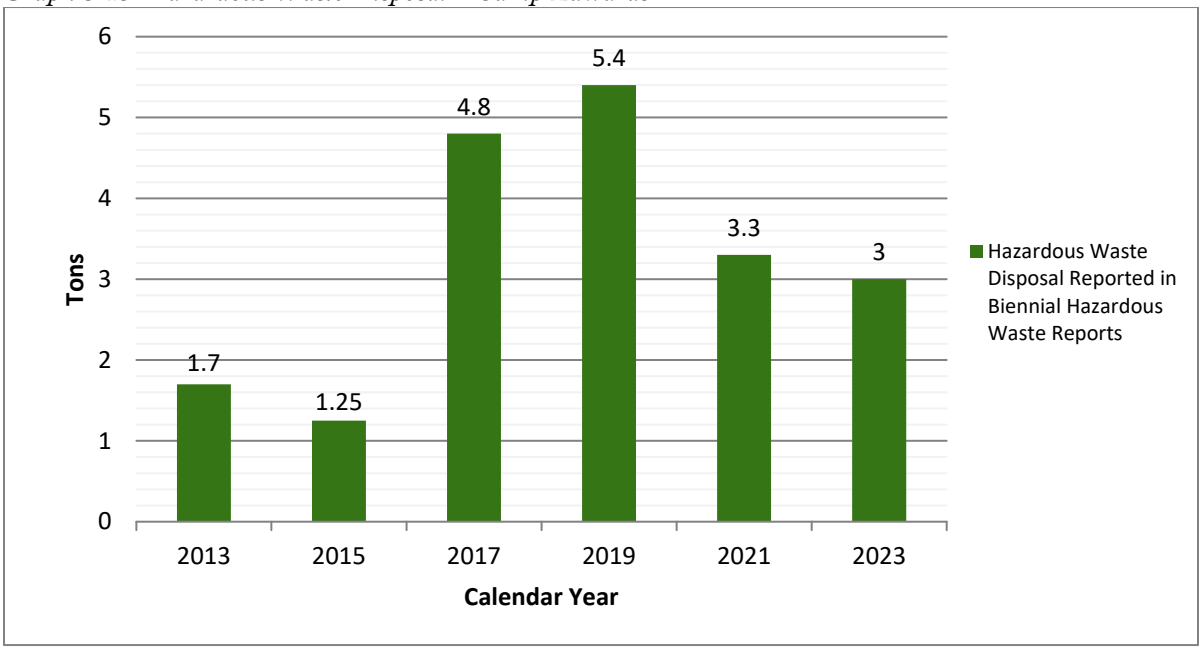
In instances where the Installation Restoration Program or IAGWSP use the EPA identification number of the MAARNG to dispose of wastes generated by remediation activities in the Training Area/Reserve, MAARNG Environmental tracks the procedure to ensure compliance with applicable regulations.

Hazardous wastes generated within the Training Area/Reserve are managed within the existing accumulation area located at UTES, which is located outside of the Training Area/Reserve.

3.13.1 Hazardous Waste Disposal and Reporting

A biennial Hazardous Waste Report must be prepared and submitted to the EPA and MassDEP in March of even-numbered years reporting on hazardous waste generated by large quantity generators (LQG) during the preceding odd-numbered year. The last report for Camp Edwards was in March 2024 for hazardous waste disposed of during calendar year 2023. Graph 3-13 provides information on the volumes of hazardous waste disposal reported for the past six biennial reports. In general, the majority of the reported waste is generated from the repair and maintenance of military vehicles, aircraft, and equipment. These wastes include vehicle fuels, oils, antifreeze and associated rags and clean-up materials. The quantities of waste disposed of will fluctuate year to year based on the operational tempo of the MAARNG within that year.

Graph 3-13 Hazardous Waste Disposal – Camp Edwards



3.14 Vehicle Management

This section provides information associated with Environmental Performance Standard 17, Vehicle Management Performance Standards.

Unauthorized All Terrain Vehicle (ATV), dirt bike, bicycle, and e-bicycle access to the Training Area continued to be a problem in TY 2023. Range Control officials provided information to the Environmental Police as to locations and times such use was identified to help them adjust their patrols accordingly. As the level of unauthorized ATV and dirt bike access increases, continued coordination with the Environmental and local police takes place. Current efforts including sign posting, cameras, Camp Edwards Range Control inspections and Environmental and State Police patrols, have seemed to slow the illegal use of the Training Area/Reserve for ATV and dirt bike riding. However, this will be an ongoing effort. The entire Training Area/Reserve is now posted as off limits. This should help with public awareness and the enforcement of no trespass laws.

3.15 General Use and Access Management

This section relates to Environmental Performance Standard 18, General Use and Access Management Standards. Public access to Camp Edwards is limited; however, under certain circumstances regulated public access to Camp Edwards may be available such as hunting during the deer and turkey seasons (See Section 3.5.3 and 3.5.4). The

Massachusetts Butterfly Club made use of the Training Area/Reserve for an Acadian Hairstreak Butterfly walk in July 2024. Other civilian groups that utilized the Training Area/Reserve in TY 2024 are listed in Section 2.1.2.

3.16 Cultural Resources Management

All MAARNG actions in the Training Area/Reserve are reviewed by the MAARNG Cultural Resource Manager to ensure compliance with all applicable federal, state, and local cultural resource regulations. The MAARNG consults regularly with the Massachusetts State Historic Preservation Office (MA SHPO) ensuring actions are in compliance with Section 106 of the National Historic Preservation Act. In addition to the MA SHPO, the MAARNG consults regularly with the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe on undertakings that may affect historic properties that the Tribe has attached religious and cultural significance.

3.17 EPS Violations

There were no EPS violation notices issued during TY 2024. Appendix G lists violations reported since TY 2015.

3.18 Mitigation

The Massachusetts Army National Guard received a Conservation and Management Permit in 2020 that established a master planning framework for projects implemented at JBCC by both Air and Army National Guard. A comprehensive mitigation plan was developed, including an on-site mitigation bank covering multiple habitats. The primary projects incorporated into the master planning mitigation strategy include MPMG Range at the current KD Range, Infantry Squad Battle Course at the formerly used Infantry Battle Course, expansion of Tango and Sierra ranges, cantonment modernization including a running track and classroom buildings, and potential solar development. The mitigation plan combines project design and impact minimization, take avoidance, land transfers, extensive habitat improvement, and long-term monitoring to provide for Net Benefit of a large number of state-listed species. It also establishes a framework for ongoing site development (including additional or modified projects) and land use planning while providing for proactive mitigation and demonstrable net benefit for state-listed species.

The mitigation plan focuses on species guilds (pine barrens and sandplain grassland) for the majority of species with similar habitat condition needs and/or threats (e.g., loss of open canopy condition through forest closure). The Eastern Box Turtle is treated separately as it has differing needs and threats compared to the other species. Mitigation focal areas, tied to the guilds, have been identified to localize various mitigation actions for maximized benefit. Standards for mitigation have been developed for each type of guild and focal area to ensure sufficient conservation commitments are included in the plan and to provide assurances to DFW for net benefit. For example, pine barrens mitigation will require 20% to 40% of habitat improvement work to be in the form of mechanical forestry, as the majority of the pine barrens guild species are threatened and declining due to tree encroachment and canopy closure where suitable and protected habitat exists. In addition to pine barrens and grassland focal areas, forest canopy retention areas are identified for box turtle hibernation and these areas are prioritized for maintenance of later successional forest condition and closed tree canopy.

3.18.1 Permit Amendment for Papillose Nut-sedge

In TY 2024, the Natural Resource Program coordinated with MassWildlife and Camp Edward's stakeholders to amend the MPMG CMP Permit, to account for the detection of Papillose Nut-sedge (*Scleria pauciflora*), a state-listed Endangered plant, within the project area for the MPMG Range. Papillose Nut-sedge had been included in the MAARNG's original CMP application to MassWildlife but was not specifically named in the issued permit. On February 9, 2024, the Natural Resources Program submitted the request to MassWildlife with a detailed conservation plan to avoid and minimize impacts to the species and provide a Net Benefit. The approved

amendment was issued on April 5, 2024. The project for which the CMP and Amendment were developed is not under contract and does not have funding. The Natural Resources Program will coordinate with MassWildlife and other internal stakeholders and intends to carry out monitoring and some management activities if resources are available.

Measures to protect, maintain, improve, and monitor Papillose Nut-sedge at the KD location before, during, and after range development include permanent protection, habitat expansion and improvement, development of cooperative long term range management standards (e.g., mow schedule), and long-term species monitoring and reporting. The conservation plan establishes protection areas, with different functions and protections, based on location in relation to the MPMG range design and known presence and absence of the rare plant. Two of the protection areas, the Core Population Area and Core Expansion Area are adjacent and outside of the MPMG project limit of work and benefit from permanent protection. The Core Population Area is 0.85 acres, and the location Papillose Nut-sedge was first observed and where it is growing most densely. The Core Expansion Area abuts the Population Area and is 1.0 acre. Papillose Nut-sedge was not observed in this area in TY 2023 despite repeated searches. The conservation plan calls out habitat management to improve conditions for Nut-sedge in the Core Expansion Area. The Patch Protection Areas are within the MPMG project area, consisting of five separate subareas totaling 1.63 acres. Patches are to be protected during range construction thereby preserving the Nut-sedge growing within and providing a source for the plant to spread after construction. The three protection areas are treated differently, having their own set of conservation actions or measures as described in the Permit Amendment.

3.18.2 TY 2024 Permit Amendment Conditions and Compliance

In TY 2024, the Natural Resources Program carried out a series of activities laid out in the Request to Amend the Multi-Purpose Machine Gun (MPMG) Range, Coservation and Management Permit for Papillose Nut-sedge *Scleria pauciflora*), called the Conservation Plan.

- In May 2024, mitigation in the form of brush mowing to improve habitat conditions for Papillose Nut-sedge on the entire 36-acre KD Range floor was completed. This includes the approximately 15-acre area encompassing the Plant Protection Areas. Mowing was conducted to reduce the height of Pitch Pine and other colonizing woody plants to reduce competition and shading effects for Papillose Nut-sedge. TY 2024 surveys show an expansion of Nut-sedge in areas that were mowed.
- In the fall of 2024, the Natural Resources Program surveyed the KD population within the Core Population Area, Core Expansion Area, and the Patch Protection Areas using a protocol like the methods developed for the fall 2023 survey but improved for long term monitoring goals. This provided a second year of survey data. Survey results and protocol will be submitted to MassWildlife through Heritage Hub in TY 2025.
- In the fall 2024, the Natural Resources Program installed plant protection signage at the Protection Areas to communicate special status to contractors, soldiers, and other site users. Orange construction fencing to exclude machinery into these areas was not installed due to the MPMG Range status.
- A long-term range maintenance plan that supports Papillose Nut-sedge and is conducive to range use and minimizing wildfire risk is not being pursued at this time due to the MPMG Range status but will be initiated if status changes.
- The Conservation Plan, or Amendment, is an update to the original MPMG Range CMP. Like the original Permit, the Amendment with the associated Conservation Plan will be appended to the INRMP annual review documents and formally included in the next INRMP update (2025).

3.18.3 Construction Projects

Range Operations Control Areas (Tango, India, and Sierra Ranges): The final stage of the Tango Range redevelopment is construction of basic range support facilities. This project is planned for completion by mid-

2025 and at its finish a request for a certificate of compliance will be sent along with as-built documents and a summary report. Additionally, ROCA buildings were contracted for India and Sierra Ranges, which was consulted with MassWildlife prior to MEPA review and approval. The initial preparatory work for Tango Range was mitigated in 2022 with one acre of habitat mitigation. The remainder of the work, including the other sites had no habitat or species take. While associated administratively with this CMP, no mitigation was required due to the lack of take. Standard conservation measures from the CMP and typical best practices were applied, including the Natural Resources Program staff conducting regular wildlife sweeps within the sediment barrier and inspecting buildings to be demolished.

Physical Fitness Track & Field: This project is located outside of the Training Area/Reserve adjacent to the Camp Edwards gymnasium and is mostly complete with some final tasks for spring 2025. Camp Edwards Facilities Engineers will provide summary reporting on the project including, as-built drawings and compliance with the CMP requirements. A request for a certificate of compliance is anticipated for spring. Three acres of mitigation were applied during pre-construction coordination in 2023.

3.18.4 Mitigation Implementation

The framework of the CMP was erected to encourage early and abundant investment in monitoring and active mitigation efforts supporting the overall mitigation bank and evaluation of long-term monitoring results. The MAARNG has consistently, effectively, and extensively managed for and monitored state-listed species, their habitats, and overall ecosystem health. CMP reportable and funded actions are a specific subset of MESA-related conservation, which itself is a subset of overall natural resources management and ecosystem sustainability efforts. All of these efforts are guided by and captured within the Camp Edwards INRMP (https://www.massnationalguard.org/ERC/publications/Natural_Cultural/Final-INRMP-21.pdf) and frequent coordination with Sikes Act partner agencies (DFW, USFWS), multiple other partner agencies, conservation collaboratives, universities, and others. CMP mitigation actions are implemented within mitigation focal areas (Pine Barrens, Sandplain Grassland, Forest Canopy Reserves). They also meet specified objectives of the CMP, associated plans, and interagency coordination (e.g., annual review meetings). The master development plan CMP effectively doubled the Natural Resources/ITAM project budget for active conservation efforts, including monitoring and habitat restoration and management.

Projects with mitigation acres or monitoring applied to TY 2024 totaled a direct investment of $232,894. Estimated internal costs (staff salary for in-house projects and contract management) of an additional $175,000 means a total of approximately $408,000 during TY 2024. A total of 391 acres benefited from mitigation projects including initial treatments on 72 acres in Pine Barrens Mitigation Focal Areas and 254 acres of habitat maintenance (second or further follow-up treatments) with fire or mechanical work. Within the Primary Sandplain Grassland Mitigation Focal Area 72 acres of habitat maintenance activities occurred. Tables 3-11 and 3-12 are summary tables for types of mitigation (project type, mitigation area, etc.), broken into acreages applied and financial investment. Under the established CMP and mitigation banking process both habitat take and mitigation offsets are treated in acres and not converted to monetary values. However, the necessary financial investment is critical context to understanding the overall mitigation.

Table 3-11 Sum of Mitigation and Take Acreage by Project Type

	FY 2019	*FY 2020*	*FY 2021*	*FY 2022*	*FY 2023*	*FY 2024*	*Grand Total*
Pine Barrens	527	401	184	189	89	327	1,716
Construction: Pine Barrens		-6		-1	-3		-10
Mitigation: Initial treatment, fire	448			104		56	608
Mitigation: Initial treatment, mechanical	79	106	164	27	49	16	441

Table 3-11 Sum of Mitigation and Take Acreage by Project Type, cont'd

	FY 2019	*FY 2020*	*FY 2021*	*FY 2022*	*FY 2023*	*FY 2024*	*Grand Total*
Mitigation: Maintenance treatment, fire			20	59	13	206	298
Mitigation: Maintenance treatment, other		40			30	48	118
Mitigation: Real Property		261					261
Sandplain Grassland	62	80	47	79	116	72	448
Mitigation: Initial treatment, fire	62				33		95
Mitigation: Initial treatment, mechanical		80					80
Mitigation: Maintenance treatment, fire			47	65		64	176
Mitigation: Maintenance treatment, mechanical						8	
Mitigation: Maintenance treatment, other				14	83		97
Grand Total	**589**	**481**	**231**	**268**	**205**	**399**	**2,172**

Note: This table summarizes all mitigation acres, including take and applied mitigation actions within focal areas. The totals are net acres.

Table 3-12 Sum of Contract Cost by Project Type

	FY 2019	*FY 2020*	*FY 2021*	*FY 2022*	*FY 2023*	*FY 2024*	*Grand Total*
Mitigation: Administrative	$48,020	$45,169	$11,262	$32,557	$10,000	$47,000	$194,008
Mitigation: Construction support		$221,876		$540		$420	$222,836
Mitigation: Monitoring	$62,810	$103,248	$123,739	$151,431	$73,893	$87,944	$603,064
Mitigation: Other		$9,700					$9,700
Mitigation: Initial treatment, fire	$64,480					$1,200	$65,680
Mitigation: Initial treatment, mechanical	$179,986	$88,458	$148,900		$175,900	$78,890	$672,134
Mitigation: Maintenance treatment, other		$55,950	$8,000	$118,840	$124,459		$307,249
Mitigation: Maintenance treatment, fire						$4,400	$4,400
Mitigation: Maintenance treatment, mechanical						$13,040	$13,040
Grand Total	**$355,295**	**$524,401**	**$291,900**	**$303,368**	**$384,252**	**$232,894**	**$2,092,111**

Note: This table estimates fiscal investment, including direct contracting and equipment costs and staff salary for mitigation actions.

As shown in the tables, the net mitigation action through active habitat restoration and maintenance at Camp Edwards is nearly 2,200 acres. These are projects within designated Mitigation Focal Areas and planned and implemented to demonstrably improve habitat conditions and populations of state-listed species. Long-term monitoring and other surveys continue to demonstrate the broad ecological benefit from this remarkable mitigation investment. State-listed plants and animals of widely different taxa are increasing with regular documentation of assisted colonization of restored areas. A wide array of otherwise rare and endemic species is thriving with the active mitigation efforts and the conservation management outside of mitigation areas. This ongoing effort, in its sixth year, is dramatically improving biodiversity and supporting overall ecosystem health and resilience. The financial investment that is now over two-million dollars also demonstrates the commitment

to implementing the mitigation and monitoring to demonstrably provide net benefit for state-listed species and habitats.

Further information related to mitigation may be found in *Camp Edwards Natural Resources & Training Lands Management Annual Report, Fiscal Year 2024.*

Section 4
Remediation Program Activities

4.0 Introduction

This section of the Annual Report provides summaries on remediation activities in the Training Area/Reserve during TY 2024.

4.1 Investigation and Remediation Programs

There are two independent cleanup programs operating at JBCC: the Installation Restoration Program (IRP) and the Impact Area Groundwater Study Program.

The IRP was initially established at the installation in 1982. Oversight of the program was transitioned to the Air Force Center for Environmental Excellence, now known as the Air Force Civil Engineer Center (AFCEC), in 1996. The program operates under the regulatory guidance of the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Most of the activity of the IRP has been focused in the Cantonment Area and in off-installation plumes emanating from the Cantonment Area. AFCEC is responsible for two IRP sites in the Training Area/Reserve: Chemical Spill-19 (CS-19) and Fuel Spill-12 (FS-12) and three Military Munitions Response Program (MMRP) sites: Old K Range, Mock Village, and Otis Gun Club. Five groundwater treatment systems are currently operating on five groundwater plumes to clean 6.5 million gallons of groundwater per day. More than 95 billion gallons of groundwater have been treated to date.

The IAGWSP at Camp Edwards working in cooperation with the EPA and MassDEP, is committed to the cleanup of groundwater contamination and its sources. The IAGWSP's investigations and cleanup have been conducted under the authority of EPA's Safe Drinking Water Act Administrative Orders and in consideration of the substantive cleanup standards of the Massachusetts Contingency Plan. Investigation of the environmental impacts of legacy training in the upper 14,886 acres of JBCC began in 1996 and cleanup of groundwater contamination began in 2004. Seventeen treatment systems are currently operating on seven groundwater plumes to clean more than 3.9 million gallons of groundwater per day. More than 19 billion gallons of groundwater have been treated to date. The program maintains a robust Land Use Controls program that works to prevent access to or use of the groundwater from plume areas. Land Use Controls are administrative and/or legal controls that limit exposure to contaminated groundwater above regulatory standards, health advisories, and/or risk-based levels. The program also maintains the integrity of monitoring wells and treatment systems. Information on the IAGWSP can be obtained on its website: http://jbcc-iagwsp.org.

Both the IRP and IAGWSP have active regulatory participation and community involvement programs. The communities surrounding the installation are kept informed through neighborhood notices and meetings, media releases, community updates, fact sheets, publication and distribution of plans and reports, websites, and information repositories at local libraries.

The programs meet regularly with EPA Region 1 and MassDEP to discuss findings and determine appropriate response actions. Public comment periods are held, as necessary, to present and solicit input on proposed actions. The programs also provide updates on their activities to public meetings of the joint citizens' advisory team, the JBCC Cleanup Team. The JBCC Cleanup Team includes representatives from the surrounding communities and the regulatory agencies.

The IRP and IAGWSP each operate under different regulatory directives and mostly address different contaminants of concern. However, they share sampling results, equipment, technical innovations, and even a

treatment facility. Figure 4-1 shows the areas under remediation by the IRP and the IAGWSP in the Training Area/Reserve.

4.2 Installation Restoration Program Activities in the Training Area/Reserve

The three MMRP sites that are in the Training Area/Reserve are:

- Mock Village MMRP site: A World War II-era Mock Village that had no munitions and explosives of concern (MEC) or munitions constituents were identified at the site and a Record of Decision (ROD) prescribing Land Use Controls/Long-Term Management was finalized in TY 2022. Three Land Use Controls/Long-Term Management annual inspection events were completed at the Mock Village from TY 2022 to TY 2024.
- Old K Range MMRP site: A Remedial Investigation (RI) was completed in TY 2019 at the World War II-era Old K Range and an FS was finalized in TY 2022. Numerous 2.36-inch rockets and other ordnance were discovered at the Old K Range during the Comprehensive Site Evaluation Phase II and RI field work. Because some of the rockets contained high explosives, this site is off limits and ordnance warning signage was placed around the perimeter of the site. A draft Proposed Plan is final, and a draft ROD is currently under regulatory review which specifies the preferred remedy: Alternative 3, Long-Term Management with groundwater monitoring, unexploded ordnance construction support and full annual MEC sweeps. Interim Land Use Controls have been implemented, and one interim Land Use Controls/Long Term Management inspection event was completed in TY 2024.
- Otis Gun Club MMRP site: An RI was completed for the former Otis Gun Club and an FS was drafted but identified data gaps; therefore, a Supplemental RI was conducted to collect additional data, and the report has been finalized. A Revised Draft Feasibility Study is currently under regulatory review.

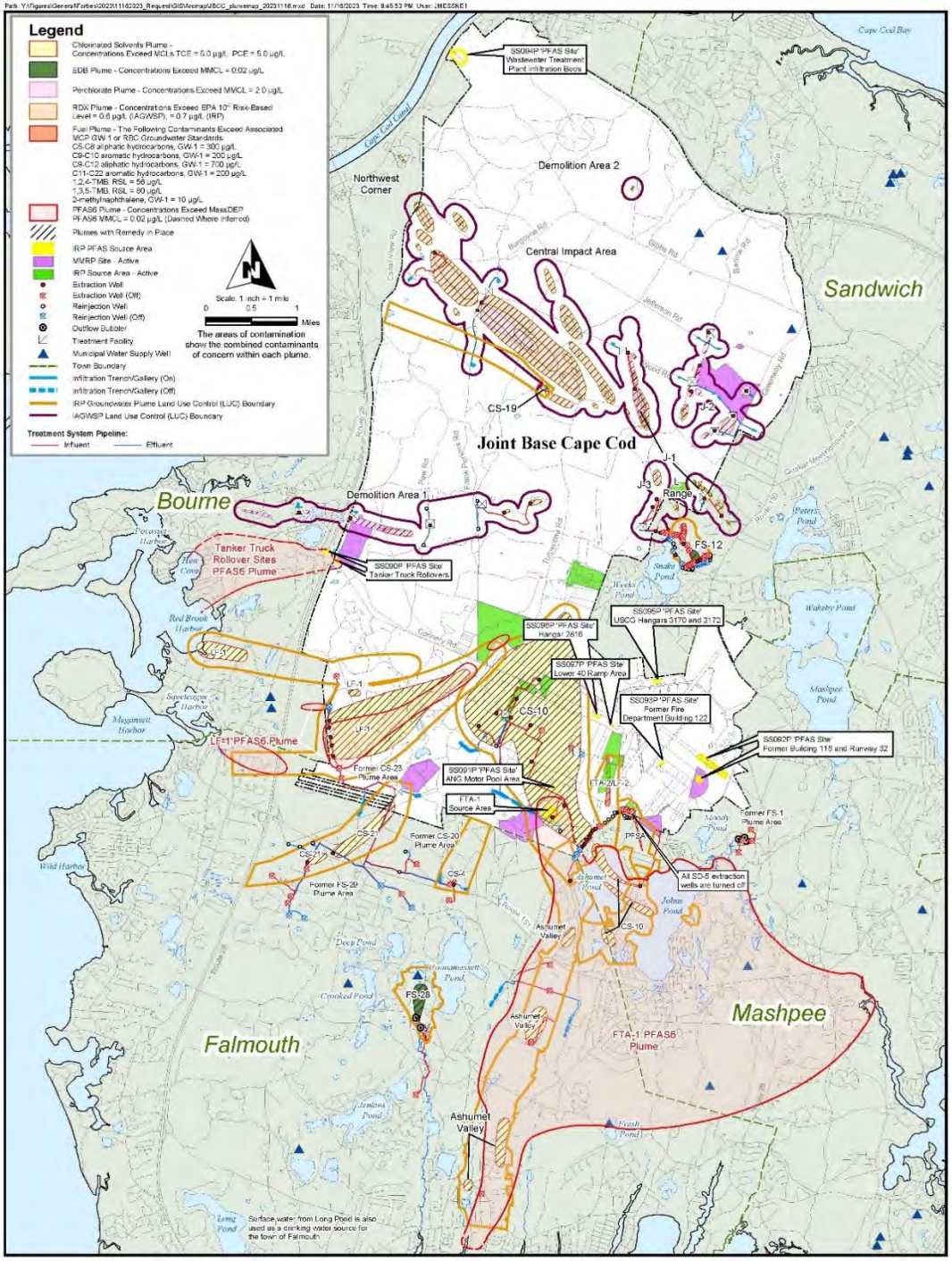
In addition to the MMRP sites, AFCEC manages two groundwater plumes in the Training Area/Reserve: CS-19 and FS-12.

- Chemical Spill-19 (CS-19): In TY 2024, groundwater monitoring was conducted at CS-19 where the contaminant of concern is RDX. RDX was detected above the EPA risk-based level of 0.97 µg/L in two of three monitoring wells sampled. The highest RDX concentration was 1.3 µg/L.

- Fuel Spill-12 (FS-12): In TY 2024, the FS-12 groundwater treatment system continued to remove ethylene dibromide (EDB) using four extraction wells operating between 240-280 gallons per minute (gpm). The maximum EDB concentration detected in groundwater at FS-12 in TY 2024 was 2.4 micrograms per liter (µg/L) compared to 740 µg/L in 1997. The Massachusetts Maximum Contaminant Level for EDB is 0.02 ug/L.

AFCEC also manages three 1.5 MW wind turbines at JBCC, two of which are in the Training Area/Reserve. The turbines offset the energy use in the IRP by 100% (approximately $1.5 million per year). The turbine operation is curtailed for the Northern Long-Eared Bat from July 15 to October 15, 30 minutes before sunset to 30 minutes after sunrise for wind speeds less than 4.5 meters per second. There were no reported bat or bird strikes during TY 2024.

Figure 4-1 JBCC Groundwater Plume Map



Contaminant of Concern (COC)	Type of Contaminant	Risk-Based Level
TCE = trichloroethene	solvent	MCL = 5 µg/L
PCE = perchloroethene	solvent	MCL = 5 µg/L
CCl_4 = carbon tetrachloride	solvent	MCL = 5 µg/L
EDB = ethylene dibromide	fuel-related compound	MMCL = 0.02 µg/L
benzene	fuel-related compound	MCL = 5 µg/L
VC = vinyl chloride	solvent	MCL = 2 µg/L
1,1,2,2-TeCa = 1,1,2,2-tetrachloroethane	solvent	GW-1 = 2 µg/L
1,4-DCB = 1,4-dichlorobenzene	solvent	MMCL = 5 µg/L
Mn = manganese	metal	EPA Health Advisory = 300 µg/L
thallium	metal	MCL = 2 µg/L
lead	metal	15 µg/L (treatment technique action level for water distribution systems)
toluene	fuel-related compound	MCL = 1,000 µg/L
RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine	explosive	HA = 2 µg/L GW-1 = 1 µg/L 10^{-6} = 0.6 µg/L (IAGWSP); = 0.7 µg/L (IRP)
perchlorate	oxidizer	HA = 15 µg/L MMCL = 2 µg/L
C5-C8 aliphatic hydrocarbons	fuel-related compound	GW-1 = 300 µg/L
C9-C10 aromatic hydrocarbons	fuel-related compound	GW-1 = 200 µg/L
C9-C12 aliphatic hydrocarbons	fuel-related compound	GW-1 = 700 µg/L
C11-C22 aromatic hydrocarbons	fuel-related compound	GW-1 = 200 µg/L
1,2,4-TMB	fuel-related compound	RSL = 56 µg/L
1,3,5-TMB	fuel-related compound	RSL = 60 µg/L
2-methylnaphthalene	fuel-related compound	GW-1 = 10 µg/L
1,4-dioxane	solvent	RG = 0.46 µg/L

Joint Base Cape Cod Groundwater Plume Map, and IRP and IAGWSP LUC Areas

Issued November 2023

Note: MCL – Maximum Contaminant Level
MMCL - Massachusetts Maximum Contaminant Level
HA – Federal Lifetime Health Advisory
PFAS - Per- and Polyfluoroalkyl substances
GW-1 – State default cleanup value to be used in lieu of site-specific risk-based level
10^{-6} – EPA level resulting in an excess cancer risk of one in a million
RG – Site Specific Risk Based Remediation Goal
RSL – Regional Screening Level

The map is available at jbcc-iagwsp.org/community/facts/jbcc_plume_map_040523.pdf

4.3 Impact Area Groundwater Study Program Activities

All the IAGWSP sites are in the Training Area/Reserve. The operable units investigated by the IAGWSP include: Demolition Area 1, Northwest Corner, J-1 Range, J-2 Range, J-3 Range, L Range, Central Impact Area, Training Areas, Small Arms Ranges, Gun and Mortar Positions, Former K Range, Former A Range (closed) and the Western Boundary (closed). All the IAGWSP's sites have final Decision Documents in place. Decision Documents record the selected response action for each site, explain why it was chosen and how it will be implemented. Significant activities that occurred during TY 2024 included:

Treatment Systems

The IAGWSP operated groundwater treatment systems for plumes associated with Demolition Area 1, J-3 Range, J-2 Range (northern and eastern), the J-1 Range (southern and northern), and the Central Impact Area (CIA). These systems are treating approximately 3.9 million gallons of water per day. Ongoing monitoring of treatment plant operations and groundwater wells is in place to observe changes in the plumes and make certain the selected remedies are working as predicted.

New Monitoring Wells

No new monitoring wells were installed in TY 2024. Ongoing monitoring of existing groundwater wells is in place to observe changes in the plumes and make certain the selected remedies are working as predicted.

PFAS

The IAGWSP continued to conduct sampling to evaluate whether Per- and polyfluoroalkyl substances (PFAS) are present in the groundwater from sites where former open burning/open detonation (OB/OD) is known to have occurred. While no known releases of PFAS have occurred on Camp Edwards, IAGWSP began sampling PFAS in 2019 at OB/OD munitions disposal sites due to the possibility that PFAS-containing aqueous film-forming foam may have been released or used at OB/OD sites, though no aqueous film-forming foam usage is documented. If firefighting foams were used at these sites they likely would have been used in conjunction with the OB/OD activities and, therefore, any PFAS compounds that were released would have been co-released with other contaminants associated with those activities. Groundwater sampling conducted in TY 2024 was conducted as follow-up to detections from 2023 PFAS sampling. Review of the data is ongoing and a comprehensive report with results and recommendations for sampling of additional wells and further investigations is being developed for EPA and MassDEP review and approval. The IAGWSP's *Draft Comprehensive PFAS Report, Camp Edwards, Joint Base Cape Cod*, was submitted to EPA and MassDEP for review in November 2024.

Source Removals

In the CIA, the removal of munitions and explosives from the source of the CIA groundwater plume continued. Work on Phase IV Area 3 and Phase IV Area 4 (approximately 13.5 acres) of the CIA long-term source area response continued throughout the year. Teams from the Army Corps of Engineers used Metal Mapper, a multi-sensor electromagnetic detection technology, for the removal efforts. This geophysical technology is designed to discriminate between munitions and scrap metal in the subsurface. Use of the Metal Mapper allows the program to increase the efficiency of unexploded ordnance removal while reducing impacts to the surface soil and vegetation when compared to traditional excavation techniques.

Section 5
Miscellaneous Military and Civilian Activities and Environmental Program Priorities

5.0 Miscellaneous Military Activities

5.0.1 Camp Edwards Tours and Community Involvement

Camp Edwards engaged in a variety of outreach efforts in TY 2024. In Fall 2023, Camp Edwards hosted tours for both the Cape Cod Commission staff and Town of Sandwich staff. Fall 2023 community activities included a Camp Edwards information table at the Bourne Resource Fair and a coordinated effort with Otis ANGB to host Latham Centers special education students.

Camp Edwards hosted six tours of the training area open to community members from May to October 2024. One hundred-fifty-five members of the community attended the tours. Camp Edwards went out into the community to do presentations for the Southport retirement community, Cape Cod Community Leadership Institute, Mashpee Women's Club, and Cape Cod Men's Club. Along with the other base commands, Camp Edwards participated in JBCC tours for Upper Cape Technical School staff and ESGR employers**.** Camp Edwards Natural Resources team amplified their outreach in 2024 with a presentation at Highfield Hall, presentations at the Cape Cod Natural History Conference and the Northeast Association of Fish and Wildlife Agencies meeting, as well as a tour of Camp Edwards for Mass Audubon leadership. In addition, the Natural Resource Office hosted four grassland bird tours in the grasslands of Camp Edwards in 2024 with approximately 20 individuals per tour and walks for the Massachusetts Butterfly Club and Botanical Club of Cape Cod and the Islands.

From left: Jake McCumber, Natural Resources and Training Lands Manager, presents at Highfield Hall in Falmouth, MA. Leonard Pinaud, EMC Environmental Officer, discusses the EMC's role at Sierra Range during a tour of Camp Edwards.
Photos by Kathleen Kolva, Camp Edwards

5.0.2 USFWS Honors Natural Resources Program's Conservation Work

In September 2024, the US Fish and Wildlife Service awarded Camp Edwards with the 2024 Northeast Region Military Conservation Partner Award, which honors significant conservation achievements made through

cooperating with USFWS and other partners. The award covers all military installations and facilities of the USFWS Northeast Region from Virginia through Maine. A presentation ceremony and tour were held in November. The award recognizes the strong investment in partnership and regional conservation from the Natural Resources Program team and the agencies leadership. More information is available here: https://www.fws.gov/press-release/2024-11/camp-edwards-recognized-significant-conservation-achievements and https://www.dvidshub.net/news/486066/cape-cod-military-installation-recognized-environmental-stewardship

5.0.3 National Academy of Sciences

In May 2024, Camp Edwards announced the MAARNG and the US Army planned to collaborate with the National Academy of Sciences to fund an 18-month study focused on the mobility of metals in soils at Camp Edwards. This initiative aims to address environmental concerns and gather insights from subject matter experts in fields like groundwater hydrology, geology, geochemistry, risk assessment, and toxicology. The National Academies of Sciences met for a one-day gathering on October 30, 2024, which brought together selected experts and government officials in fields like groundwater hydrology, geology, geochemistry, risk assessment, and toxicology to examine potential impacts on the aquifer. Updates will be shared with the EMC and its advisory councils as they become available.

5.1 Joint Base Cape Cod Executive Director

The primary roles of the JBCC Executive Director are to ensure inter-agency communication and coordination are implemented and practiced, and that government and community stakeholders are kept informed. Additionally, the Executive Director is responsible for looking at efficiencies that might be gained through consolidation and cost-sharing of base operations and activities.

The Executive Director serves as the Adjutant General's representative to the Joint Oversight Group that considers items of mutual concern. The Executive Director also is the military co-chair of the JBCC Military-Civilian Community Council, an advisory board formed to provide interaction between community representatives and base officials for timely and consistent notification regarding military mission projects, policies, and activities of mutual interest. Brigadier General (ret) Christopher Faux was appointed JBCC Executive Director in June 2018.

5.2 Miscellaneous Civilian Activities

5.2.1 HB 919

HB 919, an Act Relative to the Environmental Protection of Joint Base Cape Cod, was filed by Representative David Vieira, Third Barnstable District, on February 16, 2023. HB 919 updates the name of JBCC from the Massachusetts Military Reservation, updates the names of the environmental agencies comprising the EMC, and makes changes in Section 6, which describes how CAC and SAC members are appointed and serve. Appointments would be changed to three-year appointments that may be renewed. HB 919 proposes changing appointments from the Governor to the EMC. The bill was heard by the Joint Committee on Environment and Natural Resources on September 27, 2023. HB 919 was sent to study, Order 4555, on April 16, 2024.

5.2.2 Eversource Projects

5.2.2.1 Switching Station Replacement Project

Eversource concluded construction of a switching station replacement project (Bourne Switching Station #917) located on an easement in the Training Area/Reserve (Figure 5-1) by demolishing the original 115 kilovolt (kV) Station, which will be the area for the new 345 kV station. Eversource sited the switching station southwest of the existing switching station in order to minimize loss of training land and impact to state priority habitat. The property transfers between Eversource and the Commonwealth of Massachusetts leaves a net benefit of

Figure 5-1 New 115kV Station and Proposed 345kV Station Locations

approximately 2.51 acres for the MAARNG for training. Because the Training Area/Reserve is land protected under Article 97 Articles of Amendment to the Constitution of the Commonwealth of Massachusetts, legislation was required to be passed to change the use of the property. Governor Charlie Baker signed Chapter 216 of the Acts of 2018 (https://malegislature.gov/Laws/SessionLaws/Acts/2018/Chapter216) to change its use in August 2018. Eversource submitted an Environmental Notification Form (EEA# 15952) to the MEPA office on December 17, 2018.

5.2.2.2 Cape Cod Solution Program

Another Eversource project completed in 2024 was Cape Cod Solution - Phase 1 (Formerly the Mid-Cape Reliability Project). The Cape Cod Solution Program is a co-optimized, multi-phase transmission program that meets growing electrical needs on Cape Cod and allows for the integration of offshore wind energy. Phase 1 was a new reliability project consisting of a new transmission line and supporting structures from the Bourne Switching Station running down Cape Cod to the Town of Barnstable. This created a redundant line that will help ensure the Cape has reliable power. The new infrastructure is located within the existing cleared utility rights-of-way along Gibbs Road within the Training Area/Reserve. On May 9, 2024, the new line went into service at 115 kV.

To manage stormwater, a suite of BMPs were selected to minimize erosion and control sediment in active work areas. These BMPs were monitored by Eversource's compliance team at a minimum of once every seven days and after significant rain events. Erosion and sediment controls prescribed for the site include straw wattle, straw

bales, silt fence, erosion control blankets, slope diversions, and more. BMPs remained in place until the site was restored and determined stable in Fall 2024.

An eastern box turtle found cooling off in a puddle during a preventative wildlife search before daily work activities. *Photograph courtesy of Eversource*

Cape Cod Solution - Phase II (formerly the QP700 Project) consists of operating the new transmission line at 345-kV to enable 800MW of off-shore wind to interconnect to the power grid. To support the increase in voltage, additional facilities will be constructed at each end of the new transmission line. Within JBCC, on Jarvis Road, Eversource will construct a new 345-kV switching station within the footprint of the demolished 115-kV switching station, minimizing disturbance to state priority habitat (Figure 5-1). Eversource filed with the Department of Public Utilities and the Energy Facilities Siting Board in February 2023 and expects to receive a decision in early 2025. The project also received the MEPA Notice of Project Change Certificate in November 2023. The start of construction for the new 345-kV switching station is planned to begin in Quarter 2 of 2025.

A structure work pad restored with vegetation along Gibbs Road. *Photograph courtesy of Eversource*

5.2.2.3 Eversource Implosive Splicing Device

In October 2023, as part of upgrading Bourne Switching Station #917 and installing additional power line structures (see 5.2.2.2 above) Eversource requested the use of “Implosive Splicing” devices to weld sections of powerline together. These devices eliminate the need for high pressure hydraulic use reducing the potential for

spills; in addition, there is no debris or shrapnel created during the installation. Eversource requested using 12 implosion splices on their easement in the Training Area/Reserve during early December 2023. Eversource coordinated use of these devices with the E&RC and EMC EO. Notifications were made to the JBCC Fire Department and the public prior to use of the devices. In May 2024, Eversource requested that it be able to detonate 30 remaining unused devices at former D Range on Camp Edwards.

An example of an Implosive Splicing device used to weld powerline sections together. *Photograph courtesy of Eversource*

5.2.3 Cape Cod Canal Bridges Program

The Massachusetts Department of Transportation (MassDOT) is addressing the Bourne and Sagamore Bridges and improvements to the approach roadway network through the Cape Cod Bridges Program. Last year, several potential bridge types were presented to the public during MassDOT's public outreach meetings. In August 2023, the program applied for a grant for only the Sagamore Bridge through the Multimodal Project Discretionary Grant. In December 2023, $372 million was awarded through the grant for the Sagamore Bridge. An additional $1 billion was awarded through the Bridge Investment Program for the Sagamore Bridge. Another $700 million in state funding has been pledged for the Sagamore Bridge. In May 2024, the program applied for a Multimodal Project Discretionary Grant for the Bourne Bridge and in August 2024 a Bridge Investment Program application was submitted for the Bourne Bridge.

In August 2023, the Federal Highway Administration determined an Environmental Impact Statement (EIS) is required through NEPA and a Notice of Intent was published in the Federal Register. The scoping process was finished in May 2023. MassDOT is utilizing a combined NEPA/MEPA process and is preparing a Draft EIS/Environmental Impact Report. Information related to the program may be found at: https://www.mass.gov/info-details/latest-updates-cape-cod-bridges-program.

The Cape Cod Canal Transportation Study, led by MassDOT, covered areas in Bourne and Sandwich and west along Route 25 into Wareham. Some changes detailed in the Cape Cod Canal Transportation Study: Final Report could have potential impacts to JBCC and specifically the Camp Edwards Training Site. The final report is available at https://www.mass.gov/lists/cape-cod-canal-study-documents#cape-cod-canal-transportation-study:-final-report-.

5.2.4 Algonquin/Enbridge Proposed Gas Line

As part of MassDOT's planned replacement of the Bourne and Sagamore bridges (see Section 5.2.3 above), Algonquin/Enbridge must relocate its natural gas pipeline, which may require the development of a new easement along the western and northern boundaries of Camp Edwards. Any work to create a new easement in the Training Area/Reserve would be coordinated with Camp Edwards, the MAARNG and the EMC's EO. More information

about the project is available at: https://www.enbridge.com/projects-and-infrastructure/public-awareness/algonquins-cape-cod-canal-bridge-relocation-project.

5.3 Environmental Program Priorities

5.3.1 TY 2024 Environmental Program Priorities

The following subsections provide a list of the environmental program priorities established for TY 2024 as published in the TY 2023 Annual Report for its activities associated with the Training Area/Reserve and the status of achieving them.

Natural Resources and ITAM Management

- Continue to develop wildland fire capabilities and capacity through program and personnel development and increasing available fire windows by addressing barriers to fire. Key barriers include qualified planning capacity, aging and inadequate equipment, lack of adequate radio communications, a need for additional crew, greater agency administrative and credentialing requirements, and increased restrictions on potential burn windows. Increasing capacity and implementation of prescribed fire is consistent with the habitat management priorities, supported by long-term monitoring of flora and fauna, and essential to reducing wildfire hazard. **Status: This effort is ongoing and building. As barriers are known progress continues with TY 2024 efforts including develop staff training and qualifications, working with those responsible for radio system upgrades, and continued internal and external coordination to better resource the wildland fire program. Training Year 2024 wildland fire accomplishment was quite successful with strong hopes for TY 2025 along with continued efforts to address long- and short-term barriers to wildland fire.**

- Continue annual monitoring and survey requirements and habitat maintenance and improvement projects to meet existing conditions of the Multipurpose Machine Gun Range CMP and the Road Repair and Clam Shrimp Relocation CMP. **Status: This was effectively met for TY 2024 with extensive details in the report.**

- Continue annual monitoring and habitat management projects related to conservation and protection of At-risk, MESA listed, or USFWS candidate species that are not directly related to a CMP (e.g., Broad Tinker's-weed, Spotted Turtles, Monarch Butterfly). **Status: Our broader ecosystem monitoring and management continues to be both highly important and well implemented with noteworthy ecological results as outlined in the resource monitoring sections.**

- Coordinate with NHESP and Camp Edwards internal stakeholders regarding the protection, management, and monitoring of MESA rare plant species, newly discovered during TY 2023 rare plant surveys (e.g., Papillose Nut-sedge). Continue efforts to survey for rare plant species, targeting plant community types not surveyed during TY 2023. **Status: these efforts have been quite effective with much coordination and development of plant surveys, both formal and informal.**

- Continue efforts to construct two to three ephemeral water features (i.e., vernal pools) in the northeastern portion of the training area. Efforts in TY 2024 involve coordination with Camp Edwards Cultural Program to learn the results of an archeological survey currently underway and to engage with the Conservation Office to explore potential permitting or non-permitting process that will help to document and mitigate future jurisdictional issues or confusion. **Status: This effort is no longer a significant priority given constrained resources and other ecosystem management priorities. The Natural Resources Program will continue to evaluate opportunities for enhancing or expanding vernal pool features, but this particular construction effort has not been funded and is outweighed by requirements.**

- Further develop supplemental plans for Natural Resources/ITAM long-term budgets and implementation, including invasive species, wildland fire, and land rehabilitation. This effort is ongoing with the continued update of the Integrated Wildland Fire Management Plan and Integrated Pest Management Plan, and development by the Woodwell Climate Research Center of a Climate Resilience Plan that will be appended to the INRMP. **Status: This effort had good progress during TY 2024, including all three mentioned plans as described in the report. Finalization is expected for all during TY 2025.**
- Continue to address potential federal status changes to species at Camp Edwards through interagency consultation, planning, and partnership. This effort is ongoing with particular emphasis on the proposed change of the Northern Long-eared Bat from Threatened to Endangered under the Federal Endangered Species Act. **Status: As outlined, this was a prominent effort for our program during TY 2024 with strong accomplishment providing for continued wildlife habitat management, Soldier training, and other actions at Camp Edwards.**
- Continue to develop wildland fire capabilities and capacity through program and personnel development and increasing available fire windows by addressing barriers to fire. Key barriers include listed species consultation and permitting (federal Endangered Species Act) and fuels management. Increasing capacity and implementation of prescribed fire is consistent with the habitat management priorities, supported by long-term monitoring of flora and fauna, and essential to reducing wildfire hazard. These are also ongoing efforts consistent with above reporting and management plans. **Status: As mentioned above for the similar priority, these challenges did receive focus during TY 2024 and barriers to wildland fire implementation continue to be addressed, including ongoing formal consultation with USFWS.**

Cultural Resources Management

- Conduct applicable reviews of all IAGWSP, IRP and MAARNG proposed activities in the Training Area/Reserve for potential cultural resources impacts. (Ongoing)
- Document any new occurrences of identified cultural resources. (Ongoing)

Other E&RC Environmental Management Programs

- Coordinate required soil, lysimeter and groundwater sampling at operational active small arms ranges in accordance with approved range management plans. (Accomplished)
- Provide appropriate support to Camp Edwards for small arms range development. (Accomplished)
- Continue to support Camp Edwards through the environmental process for proposed training venues in the Training Area/Reserve. (Accomplished)
- Provide support as needed to the JBCC Executive Director Office with regards to community involvement and environmental and training issues. (Accomplished)
- Attend all scheduled EMC, CAC and SAC meetings, both internally and externally, that may involve activities within and surrounding the Training Area/Reserve. (Accomplished)
- Provide information on environmental program activities regarding the Training Area/Reserve. (Accomplished)
- Work closely with Camp Edwards, the Natural Resources Office, and the EMC to ensure training is compatible with the EPSs. (Accomplished)
- Provide support for the EMC and its advisory councils as required in Chapter 47. (Accomplished)
- Publish the final TY 2023 *State of the Reservation Report.* (Accomplished)

5.3.2 TY 2025 Environmental Program Priorities

The following subsections provide a list of environmental program priorities for Camp Edwards for activities associated with the Training Area/Reserve in TY 2025. Natural Resources and ITAM Program priorities for FY 2025 are largely the same, carried over from previous years within a well-established program.

Natural Resources and ITAM Management

- Continue to develop wildland fire capabilities and capacity through program and personnel development and increasing available fire windows by addressing barriers to fire. Key barriers include qualified planning capacity, aging and inadequate equipment, lack of adequate radio communications, a need for additional crew, greater agency administrative and credentialing requirements, and increased restrictions on potential burn windows. Increasing capacity and implementation of prescribed fire is consistent with the habitat management priorities, supported by long-term monitoring of flora and fauna, and essential to reducing wildfire hazard.
- Continue to develop partnerships and efforts to address funding gaps for natural resources monitoring and management and training lands management.
- Continue to implement extensive ecosystem resilience efforts, particularly pine barrens restoration, to address ongoing changes and emerging environmental threats. Projects are planned and implemented to enhance ecosystem health and Soldier training together with notable benefit for training opportunities, rare species, and natural communities with the BP 14/16 project and prescribed fire in the southern half of Camp Edwards being key priorities during TY 2025.
- Continue annual monitoring and survey requirements and habitat maintenance and improvement projects to meet requirements of Conservation and Management Permits.
- Continue annual monitoring and habitat management projects related to ecosystem management and conservation and protection of At-risk, MESA listed, or USFWS priority species that are not directly related to a CMP.
- Continue broad and informative natural resources monitoring and public outreach sharing the results and importance of restoration and management in a globally important Atlantic Coastal Pine Barrens remnant.

Other E&RC Environmental Management Programs

- Coordinate required soil, lysimeter and groundwater sampling at operational active small arms ranges in accordance with approved range management plans.
- Provide appropriate support to Camp Edwards for small arms range development.
- Continue to support Camp Edwards through the environmental process for proposed training venues in the Training Area/Reserve.
- Provide support as needed to the JBCC Executive Director Office with regards to community involvement and environmental and training issues.
- Attend all scheduled EMC, CAC and SAC meetings, both internally and externally, that may involve activities within and surrounding the Training Area/Reserve.
- Provide information on environmental program activities regarding the Training Area/Reserve.
- Work closely with Camp Edwards, the Natural Resources Office, and the EMC to ensure training is compatible with the EPSs.
- Provide support for the EMC and its advisory councils as required in Chapter 47.
- Publish the final TY 2024 *State of the Reservation Report.*

Appendix A
List of Contacts

List of Contacts

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Appendix B
Environmental Performance Standards as Amended on April 6, 2017

ENVIRONMENTAL PERFORMANCE STANDARDS
APRIL 6, 2017

For Massachusetts National Guard Properties at the Massachusetts Military Reservation

CAMP EDWARDS TRAINING AREA GENERAL PERFORMANCE STANDARDS

None of the following banned military training activities shall be allowed in the Camp Edwards Training Areas:
-Artillery live fire
-Mortar live fire
-Demolition live fire training
-Artillery bag burning
-Non-approved digging, deforestation or vegetation clearing
-Use of' 'CS', riot control, or tear gas for training outside the NBC bunkers
-Use of field latrines with open bottoms
-Vehicle refueling outside designated Combat Service Area and Fuel Pad locations
-Field maintenance of vehicles above operator level

Limitations on the use of small arms ammunition and live weapon fire fall into the following two categories:

- Live weapon fire is prohibited outside of established small arms ranges. Live weapon fire is not allowed on established small arms ranges except in accordance with Environmental Performance Standard 19, other applicable Performance Standards, and a range-specific plan approved through the Environmental Management Commission (EMC).

- Blank ammunition for small arms and simulated munitions may be used in areas outside of the small arms ranges, using only blank ammunition and simulated munitions identified on an approved list of munitions. Joint review and approval for inclusion on the list shall be through by the Environmental & Readiness Center (E&RC) and the EMC.

Each user will be responsible for proper collection, management, and disposal of the wastes they generate, as well for reporting on those actions.

Use and application of hazardous materials or disposal of hazardous waste shall be prohibited except as described in the Groundwater Protection Policy.

Vehicles are only authorized to use the existing network of improved and unimproved roads, road shoulders, ranges and bivouac areas, except where necessary for land rehabilitation and management, water supply development, and remediation, or where roads are closed for land rehabilitation and management.

Protection and management of the groundwater resources in the Camp Edwards Training Area will focus on the following:

- Development of public and Massachusetts Military Reservation water supplies.
- Preservation and improvement of water quality and quantity (recharge).
- Activities compatible with the need to preserve and develop the groundwater resources.

All users of the Camp Edwards Training Area must comply with the provisions of the Groundwater Protection Policy and any future amendments or revisions to the restrictions and requirements. These will apply to all uses and activities within the overlays relative to Wellhead Protection, Zone II's within the Cantonment Area, and the Camp Edwards Training Areas.

Development of water supplies will be permitted within the Camp Edwards Training Area after review and approval by the managing agencies, principally the Department of the Army and its divisions, together with the Massachusetts Department of Environmental Protection, and the Massachusetts Division of Fish and Wildlife.

All phases of remediation activities will be permitted within the Camp Edwards Training Area after review and approval by the managing agencies, principally the Department of the Army and its divisions, together with the federal and state agencies who will have jurisdiction for remediation.

Pollution prevention and management of the Camp Edwards training ranges will focus on and include the following:

The Camp Edwards Training Area, including the Small Arms Ranges (SAR) and their associated "Surface Danger Zones," and any areas where small arms or other munitions or simulated munitions are used, shall be managed as part of a unique water supply area under an adaptive management program that integrates pollution prevention, and best management practices (BMP), including the recovery of projectiles. This will be done through individual range-specific plans that are written by the Massachusetts National Guard and approved for implementation through the EMC and any other regulatory agency having statutory and/or regulatory oversight. Adaptive, in this context, means making decisions as part of a continual process of monitoring, reviewing collected data, evaluating advances in range monitoring, design and technology, and responding with management actions as dictated by the resulting information and needs of protecting the environment while providing compatible military training within the Upper Cape Water Supply Reserve.

A range plan shall be designed and followed to reduce the potential for an unintended release to the environment outside of the established containment system(s) identified in the range-specific plans. All users must be aware of, and comply with, the Environmental Performance Standards that are applicable to all SAR activities. Any range specific requirements will be coordinated through the E&RC with the EMC, incorporating those specific requirements into the appropriate range-specific plans and range information packets. Camp Edwards SAR Pollution Prevention Plan shall be followed to prevent or minimize releases of metals or other compounds related to the normal and approved operation of each SAR. The adaptive SAR management program components required in each range-specific plan shall include:

- Consultation with applicable agencies with oversight of the training area before undertaking any actions that are subject to state and/or federal regulatory requirements.
- Specific recovery plans for the removal and proper disposition of spent projectiles, residues and solid waste associated with the weapons, ammunition, target systems, and/or their operation and maintenance.
- Reduction of adverse impacts to the maximum extent feasible, including consideration for the design/redesign and/or relocation of the activity or encouraging only those activities that result in meeting the goal of overall projectile and/or projectile constituent containment.
- Internal and external coordination of documentation for the Camp Edwards range management programs and other related Camp Edwards management programs including: the Integrated
- Training Area Management Program, Range Regulations, Camp Edwards Environmental Management System, Civilian Use Manual, and Standard Operating Procedures.
- Long-term range maintenance, monitoring and reporting of applicable parameters and analysis.

The Massachusetts National Guard shall ensure that all training areas where munitions or simulated munitions are used or come to be located, including range areas, range surface danger zones, and any other areas within the Upper Cape Water Supply Reserve that are operational ranges are maintained and monitored following approved management plans that include planning for pollution prevention, sustainable range use and where applicable, restoration.

Protection and management of the vegetation of the Camp Edwards Training Area for focus on the following:

- Preservation of the habitat for federal- and state-listed rare species and other wildlife.
- Preservation of the wetland resource areas.
- Activities compatible with the need to manage and preserve the vegetative resources.
- Realistic field training needs.
- Identification and restoration of areas impacted by training activities.

Goals for the Adaptive Ecosystem Management approach to management of the Camp Edwards properties will be as follows:

- Management of the groundwater for drinking water resources
- Conservation of endangered species.
- Management of endangered species habitat for continuation of the species.
- Ensuring compatible military training activities.
- Allowing for compatible civilian use.
- Identification and restoration of areas impacted by training activities.

The Environmental Performance Standards will be incorporated into the programs and regulations of the Massachusetts National Guard as follows. Those standards relating to natural resources management shall be incorporated as standards into each of the state and federal environmental management programs and attached as an appendix or written into the documentation accompanying the plan or program. All the Environmental Performance Standards will be attached to the Integrated Training Area Management Plan 'Trainer's Guide' and to the Camp Edwards Range Regulations. Modification of the Standards Operating Procedures will include review and conformance with the Environmental Performance Standards for trainers and soldiers at Camp Edwards.

SPECIFIC RESOURCE PERFORMANCE STANDARDS IN THE CAMP EDWARDS TRAINING AREA

1. Groundwater Resources Performance Standards

1.1. All actions, at any location within the Camp Edwards Training Areas, must preserve and maintain groundwater quality and quantity, and protect the recharge areas 1:0 existing and potential water supply wells. All areas within Camp Edwards Training Areas will be managed as State Zone U, and, where designated, Zone I, water supply areas.

1.2 The following standards shall apply to designated Wellhead Protection Areas:

- The 400-foot radius around approved public water supply wells will be protected from all access with signage. That protection will be maintained by the owner and/or operator of the well, or the leaseholder of the property.
- No new stormwater discharges may be directed into Zone I areas.
- No in ground septic system will be permitted within a Zone I area.
- No solid wastes may be generated or held within Zone I areas except as incidental to the construction, operation, and management of a well.
- Travel in Zone I areas will be limited to foot travel or to vehicles required for construction, operation, and maintenance of wells.
- No new or existing bivouac activity or area shall be located within a Zone I area.
- All other areas will be considered as Zone II designated areas and will be subject to the standards of the Groundwater Protection Policy.

1.3 Land-use activities that do not comply with either the state Wellhead Protection regulations (310 CMR 22.00 et seq.) or the Groundwater protection Policy are prohibited.

1.4 All activities will suppol1 and not interfere with either the Impact Area Groundwater Study and/or the Installation Restoration Program. All activities shall conform to the requirements of Comprehensive Environmental Response, Compensation and Liability Act, the Massachusetts Contingency Plan, and the Safe Drinking Water Act.

1.5 Extraction, use, and transfer of the groundwater resources must not de- grade [e.g. draw down surface waters] in freshwater ponds, vernal pools, wetlands, and marine waters, unless properly reviewed, mitigated, and approved by the managing and regulating agencies.

1.6 Land uses and activities in the Camp Edwards Training Areas will meet the following standards:

- Will conform to all existing and applicable federal, state and local regulations.
- Must be able to be implemented without interference with ongoing remediation projects.

- Allow regional access to the water supplies on the Massachusetts Military Reservation.

1.7 The following programs and standards will be used as the basis for protecting groundwater resources in the Camp Edwards Training Areas:

- Groundwater Protection Policy.
- Federal and Department of Defense environmental programs: Integrated Natural Resources Management Plan, Integrated Training Area Management Program, Range Regulations, Spill Prevention Control and Countermeasures Plan (or equivalent), Installation Restoration *Plan,* Impact Area Groundwater Study, or other remediation programs.
- State and federal laws and regulations pertaining to water supply.

2. Wetlands and Surface Water Performance Standards

2.1 Since there are relatively few wetland resources found at the Massachusetts Military Reservation, and since they are important to the support of habitat and water quality on the properties, the minimum standard will be no net loss of any of the wetland resources or their 100-foot buffers.

2.2 Land uses and activities will be managed to prevent and mitigate new adverse impacts and eliminate or reduce existing conditions adverse to wetlands and surface water resource areas. Impacts from remediation activities may be acceptable with implementation of reasonable alternatives.

2.3 Wetland area management priorities:

- Protection of existing; wetland resource areas for their contributions to existing and potential drinking water supplies.
- Protection of wetlands for rare species and their habitats.
- Protection of human health and safety.

2.4. Activities will be managed to preserve and protect wetlands and vernal pools as defined by applicable, federal, state, and local regulations. These activities will include replacement or replication of all wetland resource buffer areas, which are lost after completion of an activity or use.

2.5 All land altering activities within 100 feet of a certified vernal pool must be reviewed before commencement by the Massachusetts Department of Environmental Protection/Wetlands Unit and the Natural Heritage and Endangered Species Program within the Division of Fish and Wildlife for impacts to wildlife and habitat. The certification of vernal pools will be supported by the on site personnel and will proceed with the assistance of the appropriate state agencies.

2.6 All new uses or activities will be prohibited within the wetlands and their IOO-foot buffers, except those associated with an approved habitat enhancement or restoration program; those on existing improved and unimproved roads where appropriate sediment and erosion controls are put in place prior to the activity; or those where no practicable alternative to the proposed action is available. No new roads should be located within the 100-foot buffers. Existing roads within such buffers should be relocated provided that:

- The relocation does not cause greater environmental impact to other resources.
- There are funds and resources allocated for resource management and that those resources are approved and available for the relocation.

2.7 During the period of 15 February to 15 May, listed roads/trails within 500 feet of wetlands will be closed to vehicle access to protect the migration and breeding of amphibians. Emergency response and environmental management activities will not be restricted.

- Donnelly and Little Halfway Ponds maneuver trails (excluding the permanently closed section along the eastern edge of Donnelly Pond) from Frank Perkins Road north to Wood Road
- Red Maple Swamp trail from Wood Road north and east to Avery Road

- Orchard and Jefferson Roads (continuous) from Cat Road south and east to Burgoyne Road
- Maneuver trail(s) in powerline easement north of Gibbs Road from Goat Pasture Road west to the boundary of training areas C-13 and C-14
- Grassy Pond trail (side access to Sierra Range) from Gibbs Road south to Sierra Range
- Sandwich Road from the powerline easement north to the gas pipeline right of way
- Bypass Bog/Mike Range Road from entrance to Mike Range south and west to Greenway Road

2.8 No new bivouac area shall be located within 500 feet of any wetland. Any existing bivouac within a wetland buffer shall be relocated provided there are funds and resources allocated for the relocation.

3. Rare Species Performance Standards

3.1 As the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife has identified the entire Massachusetts Military Reservation as State Priority Habitat for state-listed species (version dated 2000-2001), all activities and uses must comply with the Massachusetts Endangered Species Act and its regulations.

3.2 Where activities and uses are not specifically regulated under the Camp Edwards Training Area Range and Environmental Regulations, including these Environmental Performance Standards, the MMR Environmental and Readiness Center must review the activities for conformance with the Integrated Natural Resource Management Plan, and shall- consult with the Natural Heritage and Endangered Species Program regarding potential impacts to state-listed species.

3.3 All activities impacting rare species habitat must be designed to preserve or enhance that habitat as determined by the MMR Environmental and Readiness Center in consultation with the Natural Heritage and Endangered Species Program.

3.4 Users are prohibited from interfering with state and federal listed species.

3.5 Users will report all sightings of recognized listed species, e.g. box turtles, within any area of the Massachusetts Military Reservation.

4. Soil Conservation Performance Standards

4.1 Activities and uses must be compatible with the limitations of the underlying soils. Limitations on uses and activities may be made where the soils or soil conditions would not support the activity.

4.2 Agricultural soil types will be preserved for future use.

4.3 Any perennial or intermittent stream identified by the Environmental & Readiness Center Office will be protected from siltation by retaining undisturbed vegetative buffers to the extent feasible.

4.4 Cultural resource evaluations must be completed before any earth-moving operation may take place in undisturbed areas with high potential for cultural resources, and earth moving may be limited to specific areas (See Cultural Resource Performance Standards).

4.5 An erosion control analysis will be made part of the land management programs (Integrated Natural Resource Management Plan, the Integrated Training Area Management Program, Range Regulations, Civilian Use, and Standard Operating Procedures) for the Camp Edwards Training Area, including appropriate mitigation measures where existing or potential erosion problems are identified.

4.6 For all improved and unimproved roads, ditches and drainage ways:

- All unimproved roads, ditches, roads and drainage ways identified for maintenance will be cleaned of logs, slash and debris.

- Unimproved roads and roads may not otherwise be improved unless approved for modification.
- Any trail, ditch, road, or drainage way damaged by activities will be repaired in accordance with the hazard and impact it creates.

4.7 Erosion-prone sites will be inspected periodically to identify damage and mitigation measures.

5. Vegetation Management Performance Standards

5.1 All planning and management activities impacting vegetation

- Will ensure the maintenance of native plant communities, and
- Shall be performed to maintain the biological diversity.

5.2 Revegetation of disturbed sites will be achieved by natural and artificial recolonization by native species.

5.3 Timber harvesting or clear-cutting of forested areas should not occur on steep slopes with unstable soils or with in the buffers to wetland resources.

5.4 Vegetation management will be subject to a forest management and fire protection program prepared by the users in accordance with federal standards, and carried out in a manner acceptable to the Massachusetts Military Reservation Committee and other state agencies or commissions, as may be designated by the Commonwealth of Massachusetts.

6. Habitat Management Performance Standards

6.l The Camp Edwards Training Area will be managed as a unique rare species and wildlife habitat area under n adaptive ecosystem management program that integrates ecological, socio-economic, and institutional perspectives, and which operates under the following definitions:

- Adaptive means making decisions as part of a continual process of monitoring, reviewing collected data, and responding with management actions as dictated by the resulting information and needs of the system.
- Ecosystem means a system-wide understanding of the arrangements of living and non-living things, and the forces that act upon and within the system.
- Management entails a multi-disciplinary approach where potentially competing interests are resolved with expert analysis, user and local interest considerations, and a commitment to compromise interests when the broader goal is achieved to manage the Camp Edwards Training Area as a unique wildlife habitat area.

6.2 The adaptive ecosystem management program will include:

- Coordinated documentation for the management programs, Integrated Natural Resource Management Plan, the Integrated Training Area Management Program, Range Regulations, Civilian Use, and Standard Operating Procedures.
- The Massachusetts National Guard Environmental and Readiness Center staff and necessary funding to support its ecosystem management plans, as related to the amount of training occurring.
- Cooperative agreements to create a management team of scientific and regulatory experts.
- Long-term land maintenance, monitoring of resources and trends, study and analysis.
- Recovery plans for species and habitats identified for improvement.
- Consultation with Federal and State agencies charged with oversight of the Endangered Species Program before any actions that may affect state and federal-listed species habitat.
- Reduction of adverse impacts to the maximum extent possible, including consideration for the relocation of the activity or encouraging only those activities that result in meeting a habitat management goal.
- Habitat management activities designed to promote protection and restoration of native habitat types.

7. Wildlife Management Performance Standards

7.1 Native wildlife habitats and ecosystems management will focus on the following:

- Protecting rare and endangered species, and,
- Maintaining biodiversity.

7.2 Hunting, recreation and educational trips must be approved, scheduled, planned, and supervised through Range Control.

7.3 Any activity or use will prioritize protection of life, property, and natural resource values at the boundaries of the Camp Edwards Training Area where wildlife interfaces with the surrounding built environment.

7.4 Wildlife management will include the following actions, specific to the species targeted for management:

- Development and implementation of a plan to monitor hunting of game species.
- Planning for multi-use objectives for recreation and hunting that incorporate public input and recommendations.
- Development of suitable monitoring programs for federal and state-listed species, and regular exchange of information with the Natural Heritage and Endangered Species Program.

8. Air Quality Performance Standard

8.1 All uses and activities will be responsible for compliance with both the State Implementation Plan for Air Quality and the Federal Clean Air Act.

8.2 Air quality management activities will include air sampling if required by regulation of the activity.

9. Noise Management Performance Standards

9.1 Noise management activities shall conform to the Army's Environmental Noise Management Program policies for evaluation, assessment, monitoring, and response procedures.

10. Pest Management Performance Standards

10.1 Each user will develop and implement an Integrated Pest Management Program to control pest infestations that may include outside contracting of services. Non-native biological controls should not be considered unless approved by federal and state agencies.

10.2 Each user will be held responsible for management of pests that threaten rare and endangered species, or are exotic and invasive species, Invasive plant species that may be considered pest species are those defined by the United States Fish and Wildlife Service and the Massachusetts Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife office. Site-specific analysis will be performed before implementation of any proposed pest management plans.

10.3 Pest vegetation control must be balanced against environmental impact and any proposed pest management activities, including the use of herbicides and mechanical methods, within rare species habitat areas must be approved by the Natural Heritage and Endangered Species Program, or in the case of federally listed species, by the United States Fish and Wildlife Service.

10.4 Only herbicide formulations approved by the United States Environmental Protection Agency, the Department of Agriculture, the agency managing the user, and the Commonwealth of Massachusetts may be applied.

10.5 Herbicides and pesticides will not be applied by aerial spraying unless required by emergency conditions and approved under applicable state and federal regulations.

11. Fire Management Performance Standards

11.1 All activities and uses shall manage, prevent, detect, and suppress fires on the Camp Edwards Training Area in coordination with the local and state fire services and natural resource managers in the Environmental & Readiness Center.

11.2 Prescribed bums will be used as a habitat management and fire prevention tool. Prescribed burns will be used to reduce natural fire potential and create or maintain diverse and rare species habitat.

11 .3 Pre-suppression activities will include strategic firebreaks and other management of vegetation in high risk and high-incidence areas. The Integrated Natural Resource Management Plan and Fire Management Plan will be consulted for proposed actions.

11.4 Other than the above, no open fires are allowed.

12. Stormwater Management Performance Standards

12.1 All stormwater facilities shall comply with the State Department of Environmental Protection Guidelines for Stormwater Management, including Best Management Practices and all other applicable standards for control and mitigation of increased storm water flow rates and improvement of water quality.

12.2 All increases in stormwater runoff will be controlled within the user's property.

12.3 No new stormwater discharges will be made directly into wetlands or wetland resource areas.

13. Wastewater Performance Standards

13.1 All wastewater and sewage disposal will be in conformance with the applicable Federal and Massachusetts Department of Environmental Protection agency regulations.

14. Solid Waste Performance Standards

14.1 All solid waste streams (i.e., wastes not meeting the criteria for hazardous wastes) will be monitored and managed to substitute, reduce, recycle, modify processes, implement best management practices, and/or reuse waste, thereby reducing the total tonnage of wastes,

14.2 All users will be held responsible for collection, removal and disposal outside of the Camp Edwards Training Areas of solid wastes generated by their activities.

14.3 All users must handle solid wastes using best management practices to minimize nuisance odors, windblown litter, and attraction of vectors.

14.4 No permanent disposal of solid waste within the Groundwater protection Policy area/Camp Edwards field training areas will be permitted.

15. Hazardous Materials Performance Standards

15.1 Where they are permitted, use and application of hazardous materials shall be otherwise minimized in accordance with pollution prevention and waste minimization practices, including material substitution.

15 .2 No permanent disposal of hazardous wastes within the Groundwater protection Policy area/Camp Edwards field training areas will be permitted.

15.3 Fuel Management

15.3.1 Spill Prevention, Control, and Countermeasure Plan, is in place to reduce potential for a release. Camp Edwards Spill Response Plan is in place to respond to a release if an event should occur. All users will comply with these plans at the Camp Edwards Training Area.

15.3.2 If found, non-complying underground fuel storage tanks will be removed in accordance with state and federal laws and regulations to include remediation of contaminated soil.

15 .3.3 No storage or movement of fuels for supporting field activities, other than in vehicle fuel tanks, will be permitted except in approved containers no greater than five gallons in capacity.

15.3.4 New storage tanks are prohibited unless they meet the following requirements:

- Are approved for maintenance heating, or, permanent emergency generators and limited to propane or natural gas fuels.
- Conform to the Groundwater Protection Policy and applicable codes.

15.4 Non-fuel Hazardous Material Storage

15.4 .1 No storage above those quantities necessary to support field training activities will be allowed within the Camp Edwards Training Area except where necessary to meet regulatory requirements, and where provided with secondary containment.

15.4.2 When required by applicable regulation, the user shall implement a Spill Prevention, Control and Containment/Emergency Response or other applicable response plan.

16. Hazardous Waste Performance Standards

16.1 All uses shall comply with applicable local, state, and federal regulations governing hazardous waste generation, management, and disposal (including overlays relative to Wellhead Protection, Zone II' s within the Cantonment Area) .

16.2 Accumulations of hazardous waste shall be handled in accordance with regulations governing accumulation and storage.

16.3 Existing facilities must implement pollution prevention and waste minimization procedures (process modifications, material substitution, recycling, and best management practices) to minimize waste generation and hazardous materials use.

16.4 Occupants and users will be held responsible for removing all solid or hazardous wastes generated during the period of use/tenancy/visitation upon their departure or in accordance with other applicable or relevant regulations.

16.5 Remedial activities undertaken under the Installation Restoration Program, the Impact Area Groundwater Study Program, the Massachusetts Contingency Plan, or other governing remediation programs are exempt from additional regulation (e.g., waste generation volume limits). Removal, storage, and disposal of contaminated material are required to comply with all state, and federal regulations.

16.6 Post-remedial uses and activities at previously impacted sites will be allowed in accordance with terms and conditions of the applicable regulations.

16.7 All hazardous wastes will be transported in accordance with federal Department of Transportation regulations governing shipment of these materials.

16.8 Transport shall reduce the number of trips for transfer and pick-up of hazardous wastes for disposal to extent feasible. Tills may include planning appropriate routes that minimize proximity to sensitive natural resource areas, and reducing internal transfers of material, including transfers from bulk storage tanks to drums, tankers, carboys, or other portable containers or quantities.

16.9 No permanent disposal of hazardous wastes within the Groundwater Protection Policy area/Camp Edwards field training areas will be permitted.

17. Vehicle Performance Standards

17.1 Vehicles within the Camp Edwards Training Area will be limited to the existing improved and unimproved road system except where required for natural resource management or property maintenance or where off-road activity areas are located and approved by the Environmental and Readiness Center in consultation with the Massachusetts Division of Fisheries and Wildlife.

17.2 Unimproved, established access ways will be limited to use by vehicles in accordance with soil conditions as described in the Soil Conservation Performance Standards.

17.3 The number of military and civilian vehicles within the Camp Edwards Training Area will be controlled using appropriate scheduling and signage.

18. General Use and Access Performance Standards

18.1 General User Requirements. Requirements that will apply to all users, both public and private, in the Camp Edwards Training Area include the following:

- All acts that pollute the groundwater supply are prohibited.
- No litter or refuse of any sort may be thrown or left in or on any property.
- All users will be held responsible for providing, maintaining, and re- moving closed-system, sanitary facilities necessary for their use and activity.
- No person shall wade or swim in any water body except for activities approved by the Massachusetts National Guard including remediation, scientific study, or research.
- Vehicles may only be driven on roads authorized and designated for such use and parked in designated areas, and may not cross any designated wetland.
- Public users may not impede the military training activities.

18.2. Civilian Use Manual. To guide public conduct on the Massachusetts Military Reservation, a Civilian Use Manual will be prepared and periodically updated. All civilian users will obtain and follow this Manual.

18.3. Siting and Design Performance Standards

18.3.1 New or expanded buildings should not be proposed within the Camp Edwards Training Areas, with the following exceptions:

- Buildings to support allowed training, operations and activities, including upgrading of those facilities currently in place,
- Buildings used for the purposes of remediation activities,
- Buildings used for the purposes of development, operation and maintenance of water supplies,
- Buildings used for the purpose of natural resource and land management.

19. Range Performance Standards

19.1. All operational ranges including but not limited to small arms ranges (SAR) shall be managed to minimize harmful impacts to the environment within the Upper Cape Water Supply Reserve. Range management at each range shall include to the maximum extent practicable metal recovery and recycling, prevention of fragmentation and ricochets, and prevention of sub-surface percolation of residue associated with the range operations. Camp Edwards shall be held responsible for the implementation of BMPs by authorized range users, including collection and removal of spent ammunition and associated debris.

19.2. Small arms ranges shall only be used in accordance with approved range plans. These plans shall be designed to minimize to the maximum extent practicable the release of metals or other contaminates to the environment outside of specifically approved containment areas/systems. Occasional ricochets that result in rounds landing outside of these

containment areas is expected and every effort to minimize and correct these occurrences shall be taken. Failure to follow the approved range plans shall be considered a violation of this EPS.

19.3. All operational SARs shall be closely monitored by the Massachusetts National Guard to assess compliance of the approved range plans as well as the implementation and effectiveness of the range specific BMPs.

19.4. Camp Edwards/Massachusetts National Guard Environmental and Readiness Center shall staff and request appropriate funding to support its SAR management plans.

19.5. All users must use and follow Camp Edwards' Range Control checklists and procedures to:

- Minimize debris on the range (e.g. shell casings, used targets)
- Minimize or control residues on the ranges resulting from training (e.g., unburned constituents, metal shavings from the muzzle blast)
- Ensure the range is being used for the designated purpose in accordance with all applicable plans and approvals

19.6. Camp Edwards is responsible for following range operation procedures and maintaining range pollution prevention systems. Range BMPs shall be reviewed annually for effectiveness and potential improvements in their design, monitoring, maintenance, and operational procedures in an effort to continually improve them. Each year the annual report shall detail the range-specific activities including, but not limited to, the number of rounds fired, number of shooters and their organization, and the number of days the range was in use. The annual report will also detail active SAR groundwater well and lysimeter results, as well as any range maintenance/management activities that took place that training year and the result of such activities, i.e. lbs. of brass and projectiles recovered and recycled, etc. The Massachusetts National Guard shall provide regular and unrestricted access for the EMC to all its data and information, and will provide immediate access to environmental samples from the range, including range management and monitoring systems and any other applicable activities operating on the ranges.

19.7. Range plans and BMPs for training areas shall be reviewed and/or updated at least every three years. Management plans for new and upgraded ranges shall be in place prior to construction or utilization of the range. Range plans, at a minimum, will address long-term sustainable use, hydrology and hydrogeology, physical design, operation, management procedures, record keeping, pollution prevention, maintenance, monitoring, and applicable technologies to ensure sustainable range management. Range plans shall be integrated with other training area planning processes and resources.

19.8. The Massachusetts National Guard shall establish procedures for range maintenance and where applicable, maintenance and/or clearance operations to permit the sustainable, compatible, and safe use of operational ranges for their intended purpose within the Upper Cape Water Supply Reserve. In determining the frequency and degree of range maintenance and clearance operations, the Massachusetts National Guard shall consider, at a minimum, the environmental impact and safety hazards, each range's intended use, lease requirements, and the quantities and types of munitions or simulated munitions expended on that range.

Appendix C
Small arms Range and Soldier Validation Lane Information

Operations Maintenance and Monitoring Activities

Operations, Maintenance & Monitoring Activities
Echo Range
TY 2024

Date	*Activity*
2 Oct 23	Soil Sampling
21 Oct 23	Pre/Post-Firing Inspection
3, 4 Nov 23	Pre/Post-Firing Inspection
6, 15 Nov 23	Pre/Post-Firing Inspection
17, 19 Nov 23	Pre/Post-Firing Inspection
2, 3 Dec 23	Pre/Post-Firing Inspection
10 Jan 24	Monthly Inspection
7 Feb 24	Monthly Inspection
9 Mar 24	Pre/Post-Firing Inspection
20 Mar 24	Pre/Post-Firing Inspection
12 Apr 24	Pre/Post-Firing Inspection
13 Apr 24	Pre/Post-Firing Inspection
19 Apr 24	Pre/Post-Firing Inspection
27 Apr 24	Pre/Post-Firing Inspection
4 May 24	Pre/Post-Firing Inspection
10 May 24	Pre/Post-Firing Inspection
17, 18 May 24	Pre/Post-Firing Inspection
1 Jun 24	Pre/Post-Firing Inspection
21 Jun 24	Pre/Post-Firing Inspection
28 Jun 24	Pre/Post-Firing Inspection
21 Jul 24	Pre/Post-Firing Inspection
2, 6 Aug 24	Pre/Post-Firing Inspection
9 Aug 24	Pre/Post-Firing Inspection
6 Sep 24	Pre/Post-Firing Inspection
7, 8 Sep 24	Pre/Post-Firing Inspection
13 Sep 24	Pre/Post-Firing Inspection

Operations, Maintenance & Monitoring Activities
India Range
TY 2024

Date	*Activity*
3 Oct 23	Soil Sampling
4 Oct 23	Lysimeter Sampling
4 Oct 23	Monthly Inspection
10 Oct 23	Lysimeter Sampling
8 Nov 23	Monthly Inspection
13 Dec 23	Monthly Inspection
10 Jan 23	Monthly Inspection
7 Feb 24	Monthly Inspection
13 Mar 24	Monthly Inspection
3 Apr 24	Monthly Inspection
15 May 24	Monthly Inspection
11 Jun 24	Monthly Inspection
9 Jul 24	Monthly Inspection
3 Aug 24	Pre/Post-Firing Inspection
13 Sep 24	EMC Inspection

Operations, Maintenance & Monitoring Activities
Lima Range
TY 2024

Date	*Activity*
3 Oct 23	Soil Sampling
4 Oct 23	Lysimeter Sampling
4 Oct 23	Monthly Inspection
8 Nov 23	Monthly Inspection
13 Dec 23	Monthly Inspection
10 Jan 24	Monthly Inspection
7 Feb 24	Monthly Inspection
13 Mar 24	Monthly Inspection
3 Apr 24	Monthly Inspection
10 May 24	Pre/Post-Firing Inspection
17 Jun 24	Pre/Post-Firing Inspection
9 Jul 24	Monthly Inspection
3 Aug 24	Pre/Post-Firing Inspection
19 Sep 24	Monthly Inspection

Operations, Maintenance & Monitoring Activities
Sierra Range
TY 2024

Date	*Activity*
3 Oct 23	Soil Sampling
4 Oct 23	Lysimeter Sampling
10 Oct 23	Soil, Lysimeter, and Groundwater Sampling
12, 14 Oct 23	Pre/Post-Firing Inspection
21 Oct 23	Pre/Post-Firing Inspection
28 Oct 23	Pre/Post-Firing Inspection
29 Oct 23	Pre/Post-Firing Inspection
3, 5 Nov 23	Pre/Post-Firing Inspection
17, 19 Nov 23	Pre/Post-Firing Inspection
2, 3 Dec 23	Pre/Post-Firing Inspection
10 Jan 24	Monthly Inspection
3 Feb 24	Pre/Post-Firing Inspection
8, 9 Mar 24	Pre/Post-Firing Inspection
24 Mar 24	Pre/Post-Firing Inspection
7 Apr 24	Pre/Post-Firing Inspection
12 Apr 24	Pre/Post-Firing Inspection
12 Apr 24	Pre/Post-Firing Inspection
13 Apr 24	Pre/Post-Firing Inspection
17 Apr 24	SIT Locations Cleaned of Debris (dirt, weeds, etc.)
19 Apr 24	EMC Inspection
20 Apr 24	Pre/Post-Firing Inspection
27, 28 Apr 24	Pre/Post-Firing Inspection
3, 4 May 24	Pre/Post-Firing Inspection
4 May 24	Pre/Post-Firing Inspection
10 May 24	Pre/Post-Firing Inspection
11 May 24	Pre/Post-Firing Inspection
17, 18 May 24	Pre/Post-Firing Inspection
7, 9 Jun 24	Pre/Post-Firing Inspection
11, 13 Jun 24	Bullet Pocket Maintenance
21, 23 Jun 24	Pre/Post-Firing Inspection
28, 30 Jun 24	Pre/Post-Firing Inspection
20, 21 Jul 24	Pre/Post-Firing Inspection
25 Jul 24	Pre/Post-Firing Inspection
2 Aug 24	Pre/Post-Firing Inspection
3 Aug 24	Pre/Post-Firing Inspection
9, 10 Aug 24	Pre/Post-Firing Inspection
11, 12 Aug 24	Pre/Post-Firing Inspection
6, 7 Sept 24	Pre/Post-Firing Inspection
13, 15 Sep 24	Pre/Post-Firing Inspection
16 Sep 24	EMC Inspection

Operations, Maintenance & Monitoring Activities
Tango Range
TY 2024

Date	*Activity*
3 Oct 23	Soil Sampling
11 Oct 23	Groundwater Sampling
12, 13 Oct 23	Pre/Post-Firing Inspection
21 Oct 23	Pre/Post-Firing Inspection
20 Oct 23	Pre/Post-Firing Inspection
3, 4 Nov 23	Pre/Post-Firing Inspection
17, 19 Nov 23	Pre/Post-Firing Inspection
1, 2 Dec 23	Pre/Post-Firing Inspection
10 Jan 24	Monthly Inspection
2, 3 Feb 24	Pre/Post-Firing Inspection
8, 9 Mar 24	Pre/Post-Firing Inspection
7 Apr 24	Pre/Post-Firing Inspection
11, 13 Apr 24	Pre/Post-Firing Inspection
19 Apr 24	EMC Inspection
19, 20 Apr 24	Pre/Post-Firing Inspection
27, 28 Apr 24	Pre/Post-Firing Inspection
3, 4 May 24	Pre/Post-Firing Inspection
4 May 24	Pre/Post-Firing Inspection
17 May 24	Pre/Post-Firing Inspection
18 May 23	Pre/Post-Firing Inspection
7, 9 Jun 24	Pre/Post-Firing Inspection
21, 23 Jun 24	Pre/Post-Firing Inspection
28, 30 Jun 24	Pre/Post-Firing Inspection
19, 20 Jul 24	Pre/Post-Firing Inspection
27, 28 Jul 24	Pre/Post-Firing Inspection
2 Aug 24	Pre/Post-Firing Inspection
2, 4 Aug 24	Pre/Post-Firing Inspection
11 Aug 24	Pre/Post-Firing Inspection
6, 7 Sep 24	Pre/Post-Firing Inspection
13, 15 Sep 24	Pre/Post-Firing Inspection
16 Sep 24	EMC Inspection

Lead Ammunition Use

Echo Range

Lead Ammunition Use History, Echo Range

Training Year	*.40 Cal Lead*	*12 Gauge Buckshot*	*9 mm Lead*	*Total*
TY 2024	2,740[1]	430[1]	57,830	61,000
TY 2023	0	30[1]	80,996	81,026
TY 2022	0	0	78,021	78,021
TY 2021	2,996[1]	0	51,438	54,914
TY 2020	0	0	14,308	14,308
TY 2019	0	0	4,350	4,350
TY 2018	0	0	0	0
TY 2017	0	0	0	0
TY 2016	0	0	0	0
TY 2015	0	0	347[2]	347
TY 2008 - TY 2014	0	0	0	0
TY 2007	0	0	100[2]	100
Total	**5,736**	**460**	**287,390**	**294,066**

Notes: Echo Range became operational in Fall 2019.
[1] Ammunition was used on Echo Range as part of approved, non-standard training events.
[2] Firing at Echo Range in TY 2007 and TY 2015 were part of tests for reintroducing lead ammunition.

Lead Ammunition Use History, Cumulative

Training Year	*Echo Range*	*Sierra Range*	*KD Range*	*Tango Range*	*Juliet[1] Range*	*Kilo[1] Range*	*Total*
TY 2024	61,000	0	0	0	0	0	61,000
TY 2023	81,026	0	0	0	0	0	81,026
TY 2022	78,021	0	0	0	0	0	78,021
TY 2021	54,914	0	0	0	0	0	54,914
TY 2020	14,308	0	0	0	7,690	84,032	106,030
TY 2019	4,350	0	0	0	30,089	81,179	115,618
TY 2018	0	0	0	0	36,583	119,342	155,925
TY 2017	0	0	0	16,495	51,897	115,662	184,054
TY 2016	0	0	0	4,200	61,052	49,638	114,890
TY 2015	347[2]	0	1,993[4]	6,960	65,266	69,973	144,539
TY 2014	0	0	0	3,220	36,937	80,356	120,513
TY 2013	0	0	0	9,950	40,196	73,742	123,888
TY 2012	0	0	0	12,117	31,026	59,912	103,055
TY 2011	0	2,120[3]	0	37,122	63,541	125,154	227,937
TY 2010	0	0	0	90,328	34,371	60,362	185,061
TY 2009	0	0	0	137,362	16,262	29,783	183,407
TY 2008	0	0	0	17,725	0	0	17,725
TY 2007	100[2]	0	0	8,547	0	0	8,647
Total	**294,066**	**2,120**	**1,993**	**344,026**	**474,910**	**949,135**	**2,066,250**

Notes: [1] Juliet and Kilo ranges are currently operationally inactive ranges; their STAPP systems were dismantled in Fall 2020.
[2] Firing at Echo Range in TY 2007 and TY 2015 were part of tests for reintroducing lead ammunition.
[3] Firing at Sierra Range in TY 2011 was part of a Line of Sight Analysis test.
[4] Firing at KD Range in TY 2015 was part of a planning-level noise assessment.

Copper Ammunition Use

Sierra, India, and Tango Ranges

Copper Ammunition Use History

Training Year	*Sierra Range 5.56 Copper*	*Sierra Range 7.62 Copper*	*India Range 5.56 Copper*	*India Range 7.62 Copper*	*Tango Range[1] 5.56 Copper*	*ISBC Range 5.56 Copper*	*Echo Range 5.56 Copper*	*Total*
TY 2024	269,399	1,000	36,000	0	109,633	0	0	0
TY 2023	212,298	0	26,700	0	80,726	2,620[2]	0	322,344
TY 2022	251,672	0	41,041	0	56,946	14,098[2]	16,150[3]	379,907
TY 2021	221,756	0	73,400	0	0	0	19,975[3]	315,131
TY 2020	131,274	0	90,849	0	0	0	0	222,123
TY 2019	98,426	0	71,098	0	0	0	0	169,524
TY 2018	98,393	0	105,143	0	0	0	0	203,536
TY 2017	95,905	0	105,099	4,793	0	0	0	205,797
TY 2016	80,747	0	60,571	0	0	0	0	141,318
TY 2015	66,086	0	12,947	0	0	0	0	79,033
TY 2014	46,804	0	27,872	0	0	0	0	74,676
TY 2013	34,493	0	10,918	0	0	0	0	45,411
TY 2012	34,359	0	6,601	0	0	0	0	40,960
Total	**1,641,612**	**1,000**	**668,239**	**4,793**	**247,305**	**16,718**	**36,125**	**2,615,792**

Note: [1]Tango Range became operationally active for copper ammunition in TY 2022.

[2]Copper ammunition was used on the operationally inactive ISBC Range for two approved, non-standard training events during TY 2022 and an approved, non-standard training event in TY 2023.

[3]Copper ammunition was used on Echo Range during two non-standard training events in TY 2021 and two approved, non-standard training events in TY 2022.

Small Arms Range Sampling Reports

Soil Sampling Results

Fall 2024

Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
SSERNG001A-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	0.98	0.25	
SSERNG001A-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	564	20	9.8	J
SSERNG001A-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	55	40	
SSERNG001A-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	4.2	0.39	0.20	J
SSERNG001A-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	6800	9.8	3.3	
SSERNG001A-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	11.7	0.78	0.20	
SSERNG001A-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	59.7	0.20	0.098	
SSERNG001A-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	4.88	--	--	
SSERNG001A-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	231	37	11	
SSERNG001A-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	292	98	39	J
SSERNG001A-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	390	98	
SSERNG001A-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	89	--	--	
SSERNG001A-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	42.7	55	33	J
SSERNG001B-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	0.95	0.25	
SSERNG001B-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	454	19	9.5	J
SSERNG001B-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	53	38	
SSERNG001B-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	3.3	0.38	0.19	J
SSERNG001B-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	5560	9.5	3.2	
SSERNG001B-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	10.1	0.76	0.19	
SSERNG001B-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	48.6	0.19	0.095	
SSERNG001B-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	4.79	--	--	
SSERNG001B-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	251	36	11	
SSERNG001B-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	239	95	38	J
SSERNG001B-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	380	95	
SSERNG001B-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	90.5	--	--	
SSERNG001B-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	40.1	53	32	J
SSERNG001C-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	1.1	0.30	
SSERNG001C-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	465	23	11	J
SSERNG001C-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	53	38	
SSERNG001C-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	3.6	0.46	0.23	J
SSERNG001C-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	5750	11	3.9	
SSERNG001C-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	9.4	0.92	0.23	
SSERNG001C-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	48.8	0.23	0.11	
SSERNG001C-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	4.89	--	--	

Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
SSERNG001C-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	202	35	11	
SSERNG001C-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	251	110	46	J
SSERNG001C-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	460	110	
SSERNG001C-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	92.5	--	--	
SSERNG001C-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	ND	53	32	
SSERNG002-AUG24-09032024	9/3/2024	SW6020B	Antimony	mg/kg	ND	1.0	0.26	
SSERNG002-AUG24-09032024	9/3/2024	SW6020B	Calcium	mg/kg	488	20	10	J
SSERNG002-AUG24-09032024	9/3/2024	SW9056A	Chloride	mg/kg	ND	51	37	
SSERNG002-AUG24-09032024	9/3/2024	SW6020B	Copper	mg/kg	3.7	0.41	0.20	J
SSERNG002-AUG24-09032024	9/3/2024	SW6020B	Iron	mg/kg	6380	10	3.5	
SSERNG002-AUG24-09032024	9/3/2024	SW6020B	Lead	mg/kg	10.0	0.81	0.20	
SSERNG002-AUG24-09032024	9/3/2024	SW6020B	Manganese	mg/kg	51.3	0.20	0.10	
SSERNG002-AUG24-09032024	9/3/2024	SW9045D	pH	pH Units	4.69	--	--	
SSERNG002-AUG24-09032024	9/3/2024	SW6010D	Phosphorus	mg/kg	240	35	11	
SSERNG002-AUG24-09032024	9/3/2024	SW6020B	Potassium	mg/kg	275	100	41	J
SSERNG002-AUG24-09032024	9/3/2024	SW6020B	Sodium	mg/kg	ND	410	100	
SSERNG002-AUG24-09032024	9/3/2024	SM2540G	Soilds	%	94.6	--	--	
SSERNG002-AUG24-09032024	9/3/2024	SW9056A	Sulfate	mg/kg	ND	51	30	
SSERNG003-AUG24-09032024	9/3/2024	SW6020B	Antimony	mg/kg	ND	1.2	0.32	
SSERNG003-AUG24-09032024	9/3/2024	SW6020B	Calcium	mg/kg	406	24	12	J
SSERNG003-AUG24-09032024	9/3/2024	SW9056A	Chloride	mg/kg	ND	52	38	
SSERNG003-AUG24-09032024	9/3/2024	SW6020B	Copper	mg/kg	3.4	0.49	0.24	J
SSERNG003-AUG24-09032024	9/3/2024	SW6020B	Iron	mg/kg	6710	12	4.1	
SSERNG003-AUG24-09032024	9/3/2024	SW6020B	Lead	mg/kg	9.8	0.98	0.24	
SSERNG003-AUG24-09032024	9/3/2024	SW6020B	Manganese	mg/kg	54.3	0.24	0.12	
SSERNG003-AUG24-09032024	9/3/2024	SW9045D	pH	pH Units	4.54	--	--	
SSERNG003-AUG24-09032024	9/3/2024	SW6010D	Phosphorus	mg/kg	206	34	11	
SSERNG003-AUG24-09032024	9/3/2024	SW6020B	Potassium	mg/kg	250	120	49	J
SSERNG003-AUG24-09032024	9/3/2024	SW6020B	Sodium	mg/kg	ND	490	120	
SSERNG003-AUG24-09032024	9/3/2024	SM2540G	Soilds	%	93.2	--	--	
SSERNG003-AUG24-09032024	9/3/2024	SW9056A	Sulfate	mg/kg	ND	52	31	
SSERNG004-AUG24-09032024	9/3/2024	SW6020B	Antimony	mg/kg	ND	1.0	0.27	
SSERNG004-AUG24-09032024	9/3/2024	SW6020B	Calcium	mg/kg	465	21	10	J
SSERNG004-AUG24-09032024	9/3/2024	SW9056A	Chloride	mg/kg	ND	51	37	

Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
SSERNG004-AUG24-09032024	9/3/2024	SW6020B	Copper	mg/kg	5.6	0.41	0.21	
SSERNG004-AUG24-09032024	9/3/2024	SW6020B	Iron	mg/kg	8190	10	3.5	
SSERNG004-AUG24-09032024	9/3/2024	SW6020B	Lead	mg/kg	13.6	0.83	0.21	
SSERNG004-AUG24-09032024	9/3/2024	SW6020B	Manganese	mg/kg	73.2	0.21	0.10	
SSERNG004-AUG24-09032024	9/3/2024	SW9045D	pH	pH Units	4.9	--	--	
SSERNG004-AUG24-09032024	9/3/2024	SW6010D	Phosphorus	mg/kg	221	35	11	
SSERNG004-AUG24-09032024	9/3/2024	SW6020B	Potassium	mg/kg	317	100	41	J
SSERNG004-AUG24-09032024	9/3/2024	SW6020B	Sodium	mg/kg	ND	410	100	
SSERNG004-AUG24-09032024	9/3/2024	SM2540G	Soilds	%	93.4	--	--	
SSERNG004-AUG24-09032024	9/3/2024	SW9056A	Sulfate	mg/kg	ND	51	31	
SSERNG005-AUG24-09032024	9/3/2024	SW6020B	Antimony	mg/kg	ND	0.96	0.25	
SSERNG005-AUG24-09032024	9/3/2024	SW6020B	Calcium	mg/kg	14800	19	9.6	
SSERNG005-AUG24-09032024	9/3/2024	SW9056A	Chloride	mg/kg	ND	50	36	
SSERNG005-AUG24-09032024	9/3/2024	SW6020B	Copper	mg/kg	26.1	0.38	0.19	
SSERNG005-AUG24-09032024	9/3/2024	SW6020B	Iron	mg/kg	20700	9.6	3.2	
SSERNG005-AUG24-09032024	9/3/2024	SW6020B	Lead	mg/kg	30.5	0.76	0.19	
SSERNG005-AUG24-09032024	9/3/2024	SW6020B	Manganese	mg/kg	368	0.19	0.096	
SSERNG005-AUG24-09032024	9/3/2024	SW9045D	pH	pH Units	4.54	--	--	
SSERNG005-AUG24-09032024	9/3/2024	SW6010D	Phosphorus	mg/kg	214	33	10	
SSERNG005-AUG24-09032024	9/3/2024	SW6020B	Potassium	mg/kg	1100	96	38	J
SSERNG005-AUG24-09032024	9/3/2024	SW6020B	Sodium	mg/kg	145	380	96	J
SSERNG005-AUG24-09032024	9/3/2024	SM2540G	Soilds	%	95.5	--	--	
SSERNG005-AUG24-09032024	9/3/2024	SW9056A	Sulfate	mg/kg	ND	50	30	
SSERNG006-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	1.4	0.36	
SSERNG006-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	428	27	14	J
SSERNG006-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	53	38	
SSERNG006-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	5.4	0.55	0.27	J
SSERNG006-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	7000	14	4.7	
SSERNG006-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	12.1	1.1	0.27	
SSERNG006-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	52.6	0.27	0.14	
SSERNG006-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	4.75	--	--	
SSERNG006-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	230	36	11	
SSERNG006-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	232	140	55	J
SSERNG006-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	550	140	

Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
SSERNG006-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	91.1	--	--	
SSERNG006-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	ND	53	32	
SSIRNG001-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	0.51	1.1	0.29	J
SSIRNG001-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	537	22	11	J
SSIRNG001-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	53	38	
SSIRNG001-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	25.6	0.44	0.22	
SSIRNG001-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	7320	11	3.7	
SSIRNG001-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	56.7	0.88	0.22	
SSIRNG001-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	75.0	0.22	0.11	
SSIRNG001-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	4.93	--	--	
SSIRNG001-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	427	70	22	
SSIRNG001-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	294	110	44	J
SSIRNG001-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	440	110	
SSIRNG001-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	90.9	--	--	
SSIRNG001-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	ND	53	32	
SSLRNG001-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	1.3	0.34	
SSLRNG001-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	505	26	13	J
SSLRNG001-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	54	39	
SSLRNG001-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	7.3	0.52	0.26	
SSLRNG001-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	7650	13	4.4	
SSLRNG001-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	11.7	1.0	0.26	
SSLRNG001-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	115	0.26	0.13	
SSLRNG001-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	4.62	--	--	
SSLRNG001-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	227	36	11	
SSLRNG001-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	435	130	52	J
SSLRNG001-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	520	130	
SSLRNG001-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	88.6	--	--	
SSLRNG001-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	ND	54	32	
SSSRNG001-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	1.1	0.30	
SSSRNG001-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	907	23	11	J
SSSRNG001-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	55	40	
SSSRNG001-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	10.9	0.45	0.23	
SSSRNG001-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	6400	11	3.9	
SSSRNG001-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	18.9	0.91	0.23	

Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
SSSRNG001-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	89.2	0.23	0.11	
SSSRNG001-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	5.28	--	--	
SSSRNG001-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	221	36	11	
SSSRNG001-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	404	110	45	J
SSSRNG001-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	450	110	
SSSRNG001-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	88.7	--	--	
SSSRNG001-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	ND	55	33	
SSSRNG002-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	1.2	0.32	
SSSRNG002-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	870	24	12	J
SSSRNG002-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	55	40	
SSSRNG002-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	41.1	0.49	0.24	
SSSRNG002-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	9430	12	4.1	
SSSRNG002-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	14.0	0.97	0.24	
SSSRNG002-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	95.8	0.24	0.12	
SSSRNG002-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	5.53	--	--	
SSSRNG002-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	260	38	12	
SSSRNG002-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	470	120	49	J
SSSRNG002-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	490	120	
SSSRNG002-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	86.4	--	--	
SSSRNG002-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	ND	55	33	
SSSRNG003-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	1.3	0.35	
SSSRNG003-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	1240	27	13	J
SSSRNG003-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	53	38	
SSSRNG003-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	184	0.54	0.27	
SSSRNG003-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	7040	13	4.6	
SSSRNG003-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	43.2	1.1	0.37	
SSSRNG003-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	67.0	0.27	0.13	
SSSRNG003-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	6.03	--	--	
SSSRNG003-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	348	37	11	
SSSRNG003-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	401	130	54	J
SSSRNG003-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	540	130	
SSSRNG003-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	89.9	--	--	
SSSRNG003-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	ND	53	32	
SSSRNG004-AUG24-08282024	8/28/2024	SW6020B	Antimony	mg/kg	ND	1.5	0.39	

Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
SSSRNG004-AUG24-08282024	8/28/2024	SW6020B	Calcium	mg/kg	2300	30	15	
SSSRNG004-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/kg	ND	63	45	
SSSRNG004-AUG24-08282024	8/28/2024	SW6020B	Copper	mg/kg	12.2	0.60	0.30	
SSSRNG004-AUG24-08282024	8/28/2024	SW6020B	Iron	mg/kg	11100	15	5.1	
SSSRNG004-AUG24-08282024	8/28/2024	SW6020B	Lead	mg/kg	45.7	1.2	0.30	
SSSRNG004-AUG24-08282024	8/28/2024	SW6020B	Manganese	mg/kg	126	0.30	0.15	
SSSRNG004-AUG24-08282024	8/28/2024	SW9045D	pH	pH Units	6.04	--	--	
SSSRNG004-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/kg	289	42	13	
SSSRNG004-AUG24-08282024	8/28/2024	SW6020B	Potassium	mg/kg	529	150	60	J
SSSRNG004-AUG24-08282024	8/28/2024	SW6020B	Sodium	mg/kg	ND	600	150	
SSSRNG004-AUG24-08282024	8/28/2024	SM2540G	Soilds	%	76.2	--	--	
SSSRNG004-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/kg	54.4	63	38	J
SSTRNG001A-AUG24-08262024	8/26/2024	SW6020B	Antimony	mg/kg	ND	1.2	0.31	
SSTRNG001A-AUG24-08262024	8/26/2024	SW6020B	Calcium	mg/kg	1240	24	12	
SSTRNG001A-AUG24-08262024	8/26/2024	SW9056A	Chloride	mg/kg	ND	50	36	
SSTRNG001A-AUG24-08262024	8/26/2024	SW6020B	Copper	mg/kg	12.1	0.48	0.24	
SSTRNG001A-AUG24-08262024	8/26/2024	SW6020B	Iron	mg/kg	11900	12	4.0	
SSTRNG001A-AUG24-08262024	8/26/2024	SW6020B	Lead	mg/kg	24.0	0.95	0.24	
SSTRNG001A-AUG24-08262024	8/26/2024	SW6020B	Manganese	mg/kg	106	0.24	0.12	
SSTRNG001A-AUG24-08262024	8/26/2024	SW9045D	pH	pH Units	5.44	--	--	
SSTRNG001A-AUG24-08262024	8/26/2024	SW6010D	Phosphorus	mg/kg	399	86	27	
SSTRNG001A-AUG24-08262024	8/26/2024	SW6020B	Potassium	mg/kg	569	120	48	J
SSTRNG001A-AUG24-08262024	8/26/2024	SW6020B	Sodium	mg/kg	ND	480	120	
SSTRNG001A-AUG24-08262024	8/26/2024	SM2540G	Soilds	%	95.6	--	--	
SSTRNG001A-AUG24-08262024	8/26/2024	SW9056A	Sulfate	mg/kg	ND	50	30	
SSTRNG001B-AUG24-08262024	8/26/2024	SW6020B	Antimony	mg/kg	0.66	1.0	0.27	J
SSTRNG001B-AUG24-08262024	8/26/2024	SW6020B	Calcium	mg/kg	1270	21	10	
SSTRNG001B-AUG24-08262024	8/26/2024	SW9056A	Chloride	mg/kg	ND	51	37	
SSTRNG001B-AUG24-08262024	8/26/2024	SW6020B	Copper	mg/kg	12.9	0.41	0.21	
SSTRNG001B-AUG24-08262024	8/26/2024	SW6020B	Iron	mg/kg	11300	10	3.5	
SSTRNG001B-AUG24-08262024	8/26/2024	SW6020B	Lead	mg/kg	27.6	0.82	0.21	
SSTRNG001B-AUG24-08262024	8/26/2024	SW6020B	Manganese	mg/kg	109	0.21	0.10	
SSTRNG001B-AUG24-08262024	8/26/2024	SW9045D	pH	pH Units	5.33	--	--	
SSTRNG001B-AUG24-08262024	8/26/2024	SW6010D	Phosphorus	mg/kg	379	67	21	

Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
SSTRNG001B-AUG24-08262024	8/26/2024	SW6020B	Potassium	mg/kg	565	100	41	J
SSTRNG001B-AUG24-08262024	8/26/2024	SW6020B	Sodium	mg/kg	ND	410	100	
SSTRNG001B-AUG24-08262024	8/26/2024	SM2540G	Soilds	%	96	--	--	
SSTRNG001B-AUG24-08262024	8/26/2024	SW9056A	Sulfate	mg/kg	ND	51	31	
SSTRNG001C-AUG24-08262024	8/26/2024	SW6020B	Antimony	mg/kg	ND	1.1	0.29	
SSTRNG001C-AUG24-08262024	8/26/2024	SW6020B	Calcium	mg/kg	1100	22	11	
SSTRNG001C-AUG24-08262024	8/26/2024	SW9056A	Chloride	mg/kg	ND	50	36	
SSTRNG001C-AUG24-08262024	8/26/2024	SW6020B	Copper	mg/kg	12.0	0.44	0.22	
SSTRNG001C-AUG24-08262024	8/26/2024	SW6020B	Iron	mg/kg	10600	11	3.7	
SSTRNG001C-AUG24-08262024	8/26/2024	SW6020B	Lead	mg/kg	21.0	0.88	0.22	
SSTRNG001C-AUG24-08262024	8/26/2024	SW6020B	Manganese	mg/kg	98.2	0.22	0.11	
SSTRNG001C-AUG24-08262024	8/26/2024	SW9045D	pH	pH Units	5.49	--	--	
SSTRNG001C-AUG24-08262024	8/26/2024	SW6010D	Phosphorus	mg/kg	383	69	21	
SSTRNG001C-AUG24-08262024	8/26/2024	SW6020B	Potassium	mg/kg	506	110	44	J
SSTRNG001C-AUG24-08262024	8/26/2024	SW6020B	Sodium	mg/kg	ND	440	110	
SSTRNG001C-AUG24-08262024	8/26/2024	SM2540G	Soilds	%	96.4	--	--	
SSTRNG001C-AUG24-08262024	8/26/2024	SW9056A	Sulfate	mg/kg	ND	50	30	
SSTRNG002-AUG24-08262024	8/26/2024	SW6020B	Antimony	mg/kg	ND	1.1	0.29	
SSTRNG002-AUG24-08262024	8/26/2024	SW6020B	Calcium	mg/kg	942	23	11	J
SSTRNG002-AUG24-08262024	8/26/2024	SW9056A	Chloride	mg/kg	ND	53	38	
SSTRNG002-AUG24-08262024	8/26/2024	SW6020B	Copper	mg/kg	16.1	0.45	0.23	
SSTRNG002-AUG24-08262024	8/26/2024	SW6020B	Iron	mg/kg	10300	11	3.8	
SSTRNG002-AUG24-08262024	8/26/2024	SW6020B	Lead	mg/kg	20.6	0.91	0.23	
SSTRNG002-AUG24-08262024	8/26/2024	SW6020B	Manganese	mg/kg	104	0.23	0.11	
SSTRNG002-AUG24-08262024	8/26/2024	SW9045D	pH	pH Units	5.50	--	--	
SSTRNG002-AUG24-08262024	8/26/2024	SW6010D	Phosphorus	mg/kg	365	67	21	
SSTRNG002-AUG24-08262024	8/26/2024	SW6020B	Potassium	mg/kg	591	110	45	J
SSTRNG002-AUG24-08262024	8/26/2024	SW6020B	Sodium	mg/kg	ND	450	110	
SSTRNG002-AUG24-08262024	8/26/2024	SM2540G	Soilds	%	95.2	--	--	
SSTRNG002-AUG24-08262024	8/26/2024	SW9056A	Sulfate	mg/kg	ND	53	32	

Small Arms Range Sampling Reports

Lysimeter Sampling Results

Fall 2024

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
India	LYIRNG-001-AUG24-08272024	8/27/2024	SM2320B	Alkalinity, Total	mg/l	7.8	2	2.5	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SM2320B	Alkalinity, Total	mg/l	8.7	2	2.5	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6020B	Antimony	ug/l	2.5	0.2	0.8	
India	**LYIRNG-002-AUG24-08272024**	**8/27/2024**	**SW6020B**	**Antimony**	**ug/l**	**11**	**0.2**	**0.8**	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6020B	Calcium	ug/l	4030	360	1000	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW6020B	Calcium	ug/l	12800	360	1000	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW9056A	Chloride	mg/l	5	0.8	1	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW9056A	Chloride	mg/l	7.4	0.8	1	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6020B	Copper	ug/l	8.6	1	4	J
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW6020B	Copper	ug/l	357	1	4	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW9060	Dissolved Organic Carbon	mg/l	2.6	0.27	0.5	J-
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW9060	Dissolved Organic Carbon	mg/l	14.2	0.27	0.5	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW6020B	Iron	ug/l	25.7	23	50	J
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6020B	Iron	ug/l	ND	23	50	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW6020B	Lead	ug/l	0.34	0.2	0.8	J
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6020B	Lead	ug/l	2.5	0.2	0.8	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6020B	Manganese	ug/l	2	0.2	0.8	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW6020B	Manganese	ug/l	30.7	0.2	0.8	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW6010D	Phosphorus	mg/l	14.2	1.4	2.5	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6010D	Phosphorus	mg/l	ND	0.028	0.05	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6020B	Potassium	ug/l	681	75	150	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW6020B	Potassium	ug/l	1550	75	150	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW6020B	Sodium	ug/l	2440	50	100	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW6020B	Sodium	ug/l	4890	50	100	
India	LYIRNG-002-AUG24-08272024	8/27/2024	SW9056A	Sulfate	mg/l	6.7	0.6	1	
India	LYIRNG-001-AUG24-08272024	8/27/2024	SW9056A	Sulfate	mg/l	ND	0.6	1	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SM2320B	Alkalinity, Total	mg/l	34.5	2	2.5	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SM2320B	Alkalinity, Total	mg/l	ND	2	2.5	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6020B	Antimony	ug/l	ND	0.2	0.8	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6020B	Antimony	ug/l	ND	0.2	0.8	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6020B	Calcium	ug/l	2340	360	1000	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6020B	Calcium	ug/l	11100	360	1000	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW9056A	Chloride	mg/l	1.3	0.8	1	J
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW9056A	Chloride	mg/l	5.8	0.8	1	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6020B	Copper	ug/l	5.3	1	4	J
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6020B	Copper	ug/l	ND	1	4	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW9060	Dissolved Organic Carbon	mg/l	2.6	0.27	0.5	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW9060	Dissolved Organic Carbon	mg/l	4.1	0.27	0.5	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6020B	Iron	ug/l	66.5	23	50	J
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6020B	Iron	ug/l	ND	23	50	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6020B	Lead	ug/l	0.84	0.2	0.8	J
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6020B	Lead	ug/l	ND	0.2	0.8	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6020B	Manganese	ug/l	0.54	0.2	0.8	J
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6020B	Manganese	ug/l	38.2	0.2	0.8	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6010D	Phosphorus	mg/l	ND	0.028	0.05	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6010D	Phosphorus	mg/l	ND	0.028	0.05	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6020B	Potassium	ug/l	366	75	150	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6020B	Potassium	ug/l	1170	75	150	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW6020B	Sodium	ug/l	1740	50	100	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW6020B	Sodium	ug/l	3450	50	100	
Lima	LYLRNG-001-AUG24-08272024	8/27/2024	SW9056A	Sulfate	mg/l	2.5	0.6	1	
Lima	LYLRNG-002-AUG24-08272024	8/27/2024	SW9056A	Sulfate	mg/l	ND	0.6	1	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SM2320B	Alkalinity, Total	mg/l	4.5	2	2.5	J
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SM2320B	Alkalinity, Total	mg/l	59.5	2	2.5	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6020B	Antimony	ug/l	1.1	0.2	0.8	J
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6020B	Antimony	ug/l	ND	0.2	0.8	
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6020B	Calcium	ug/l	458	360	1000	J
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6020B	Calcium	ug/l	23200	360	1000	
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW9056A	Chloride	mg/l	2.6	0.8	1	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW9056A	Chloride	mg/l	10.1	0.8	1	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6020B	Copper	ug/l	3.2	1	4	J
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6020B	Copper	ug/l	5.8	1	4	J
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW9060	Dissolved Organic Carbon	mg/l	3	0.27	0.5	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW9060	Dissolved Organic Carbon	mg/l	5.6	0.27	0.5	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6020B	Iron	ug/l	ND	23	50	
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6020B	Iron	ug/l	ND	23	50	
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6020B	Lead	ug/l	0.26	0.2	0.8	J
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6020B	Lead	ug/l	ND	0.2	0.8	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6020B	Manganese	ug/l	0.54	0.2	0.8	J
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6020B	Manganese	ug/l	0.7	0.2	0.8	J
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6010D	Phosphorus	mg/l	ND	0.028	0.05	
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6010D	Phosphorus	mg/l	ND	0.028	0.05	
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6020B	Potassium	ug/l	3230	75	150	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6020B	Potassium	ug/l	ND	75	150	
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW6020B	Sodium	ug/l	2130	50	100	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW6020B	Sodium	ug/l	6240	50	100	
Sierra	LYSRNG-001-AUG24-08262024	8/26/2024	SW9056A	Sulfate	mg/l	3.3	0.6	1	
Sierra	LYSRNG-002-AUG24-08272024	8/27/2024	SW9056A	Sulfate	mg/l	ND	0.6	1	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SM2320B	Alkalinity, Total	mg/l	49	2	2.5	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6020B	Antimony	ug/l	0.49	0.2	0.8	J
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6020B	Calcium	ug/l	22700	360	1000	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/l	4.1	0.8	1	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6020B	Copper	ug/l	ND	1	4	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW9060	Dissolved Organic Carbon	mg/l	2.9	0.27	0.5	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6020B	Iron	ug/l	ND	23	50	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6020B	Lead	ug/l	ND	0.2	0.8	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6020B	Manganese	ug/l	1.5	0.2	0.8	J
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/l	ND	0.028	0.05	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6020B	Potassium	ug/l	1220	75	150	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW6020B	Sodium	ug/l	5770	50	100	
Tango	LYTRNG-001-AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/l	22.1	0.6	1	

Small Arms Range Sampling Reports

Groundwater Sampling Results

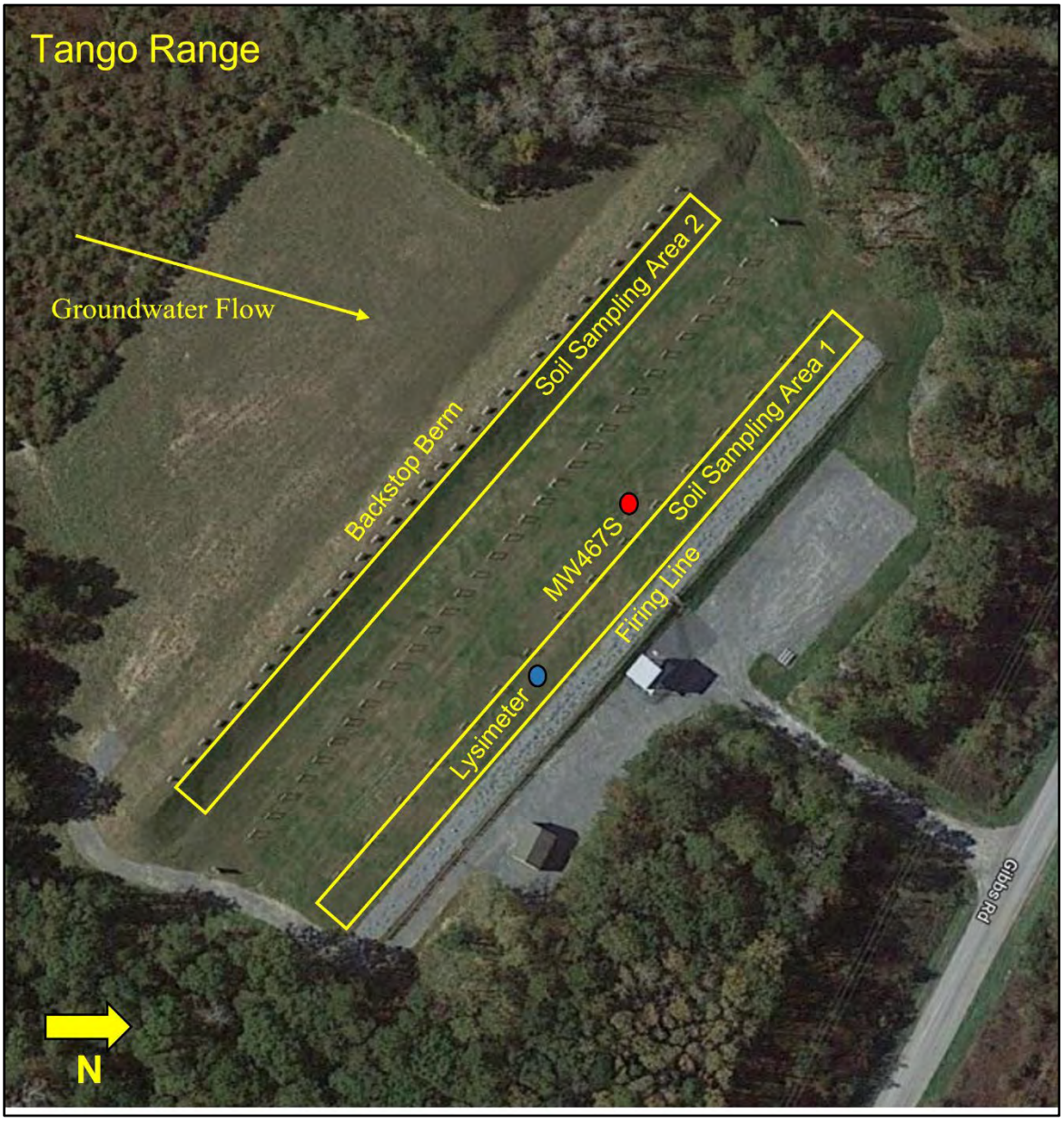
Fall 2024

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
India	MW-639S_AUG24-08282024	8/28/2024	SM2320B	Alkalinity, Total	mg/l	1.2	2	2.5	J
India	MW-639S_AUG24-08282024	8/28/2024	SW6020B	Antimony	ug/l	1.2	0.2	0.8	J
India	MW-639S_AUG24-08282024	8/28/2024	SW6020B	Calcium	ug/l	4520	360	1000	J
India	MW-639S_AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/l	8.6	0.8	1	
India	MW-639S_AUG24-08282024	8/28/2024	SW6020B	Copper	ug/l	173	1	4	J
India	MW-639S_AUG24-08282024	8/28/2024	SW9060	Dissolved Organic Carbon	mg/l	0.92	0.27	0.5	J
India	MW-639S_AUG24-08282024	8/28/2024	SW6020B	Iron	ug/l	117000	120	250	J
India	**MW-639S_AUG24-08282024**	**8/28/2024**	**SW6020B**	**Lead**	**ug/l**	**57.6**	**0.2**	**0.8**	**J**
India	MW-639S_AUG24-08282024	8/28/2024	SW6020B	Manganese	ug/l	1150	1	4	J
India	MW-639S_AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/l	0.93	0.14	0.25	J
India	MW-639S_AUG24-08282024	8/28/2024	SW6020B	Potassium	ug/l	3510	75	150	
India	MW-639S_AUG24-08282024	8/28/2024	SW6020B	Sodium	ug/l	7120	50	100	J
India	MW-639S_AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/l	6.2	0.6	1	J
Sierra	MW-465S-AUG24-08272024	8/27/2024	SM2320B	Alkalinity, Total	mg/l	15.1	2	2.5	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SM2320B	Alkalinity, Total	mg/l	22.9	2	2.5	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6020B	Antimony	ug/l	ND	0.2	0.8	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6020B	Antimony	ug/l	ND	0.2	0.8	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6020B	Calcium	ug/l	4130	360	1000	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6020B	Calcium	ug/l	5790	360	1000	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW9056A	Chloride	mg/l	5.8	0.8	1	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW9056A	Chloride	mg/l	6.9	0.8	1	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6020B	Copper	ug/l	3.1	1	4	J
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6020B	Copper	ug/l	ND	1	4	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW9060	Dissolved Organic Carbon	mg/l	ND	0.27	0.5	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW9060	Dissolved Organic Carbon	mg/l	ND	0.27	0.5	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6020B	Iron	ug/l	156	23	50	J
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6020B	Iron	ug/l	1190	23	50	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6020B	Lead	ug/l	1.6	0.2	0.8	J
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6020B	Lead	ug/l	ND	0.2	0.8	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6020B	Manganese	ug/l	3	0.2	0.8	J
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6020B	Manganese	ug/l	11.6	0.2	0.8	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6010D	Phosphorus	mg/l	0.2	0.028	0.05	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6010D	Phosphorus	mg/l	ND	0.028	0.05	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6020B	Potassium	ug/l	666	75	150	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6020B	Potassium	ug/l	691	75	150	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW6020B	Sodium	ug/l	5160	50	100	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW6020B	Sodium	ug/l	7140	50	100	
Sierra	MW-465S-AUG24-08272024	8/27/2024	SW9056A	Sulfate	mg/l	5.5	0.6	1	
Sierra	MW-466S-AUG24-08262024	8/26/2024	SW9056A	Sulfate	mg/l	8.1	0.8	1	
Tango	MW-467S_AUG24-08282024	8/28/2024	SM2320B	Alkalinity, Total	mg/l	15.5	2	2.5	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW6020B	Antimony	ug/l	0.88	0.2	0.8	J
Tango	MW-467S_AUG24-08282024	8/28/2024	SW6020B	Calcium	ug/l	6850	360	1000	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW9056A	Chloride	mg/l	8	0.8	1	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW6020B	Copper	ug/l	47.2	1	4	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW9060	Dissolved Organic Carbon	mg/l	1.5	0.27	0.5	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW6020B	Iron	ug/l	21400	23	50	
Tango	**MW-467S_AUG24-08282024**	**8/28/2024**	**SW6020B**	**Lead**	**ug/l**	**38.3**	**0.2**	**0.8**	

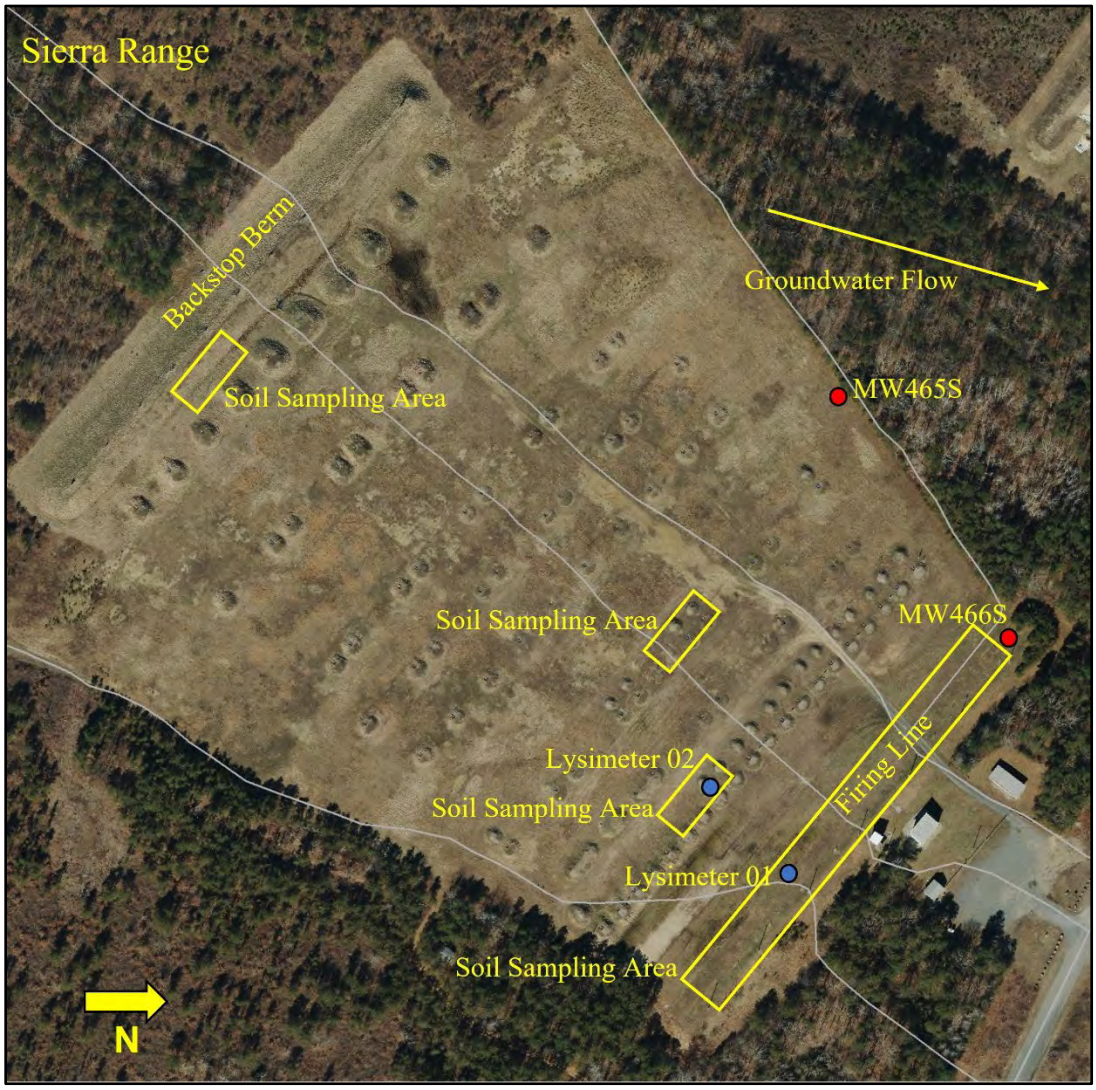
Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	RDL	Qualifier
Tango	MW-467S_AUG24-08282024	8/28/2024	SW6020B	Manganese	ug/l	458	0.2	0.8	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW6010D	Phosphorus	mg/l	1.2	0.14	0.25	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW6020B	Potassium	ug/l	2380	75	150	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW6020B	Sodium	ug/l	7500	50	100	
Tango	MW-467S_AUG24-08282024	8/28/2024	SW9056A	Sulfate	mg/l	8	0.6	1	

Small Arms Range Sample Area Figures

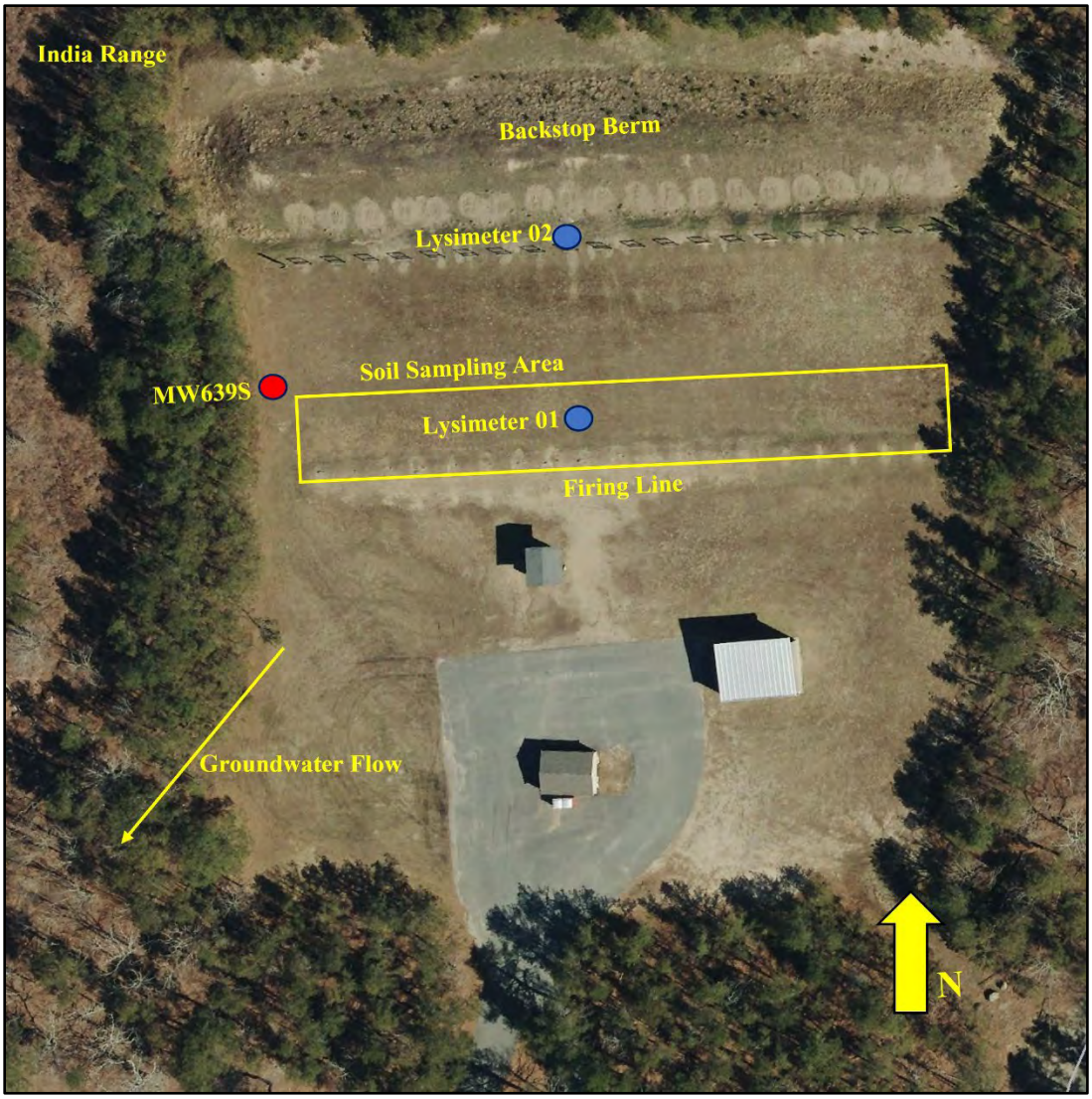


Tango Range (copper only), Structures, and Sampling Areas
Camp Edwards, Massachusetts

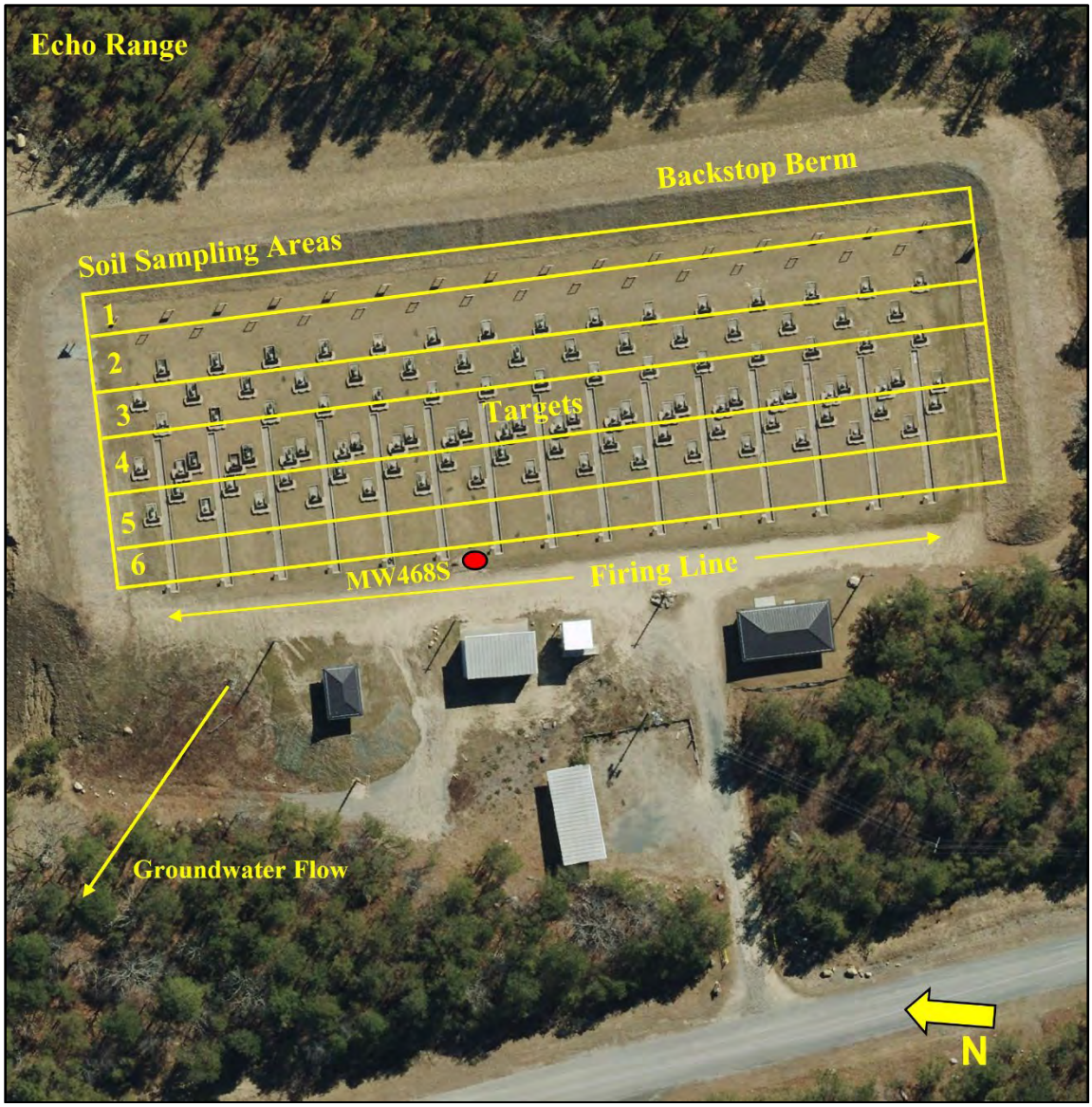
The lysimeter noted on the graphic above was installed November 9, 2023.



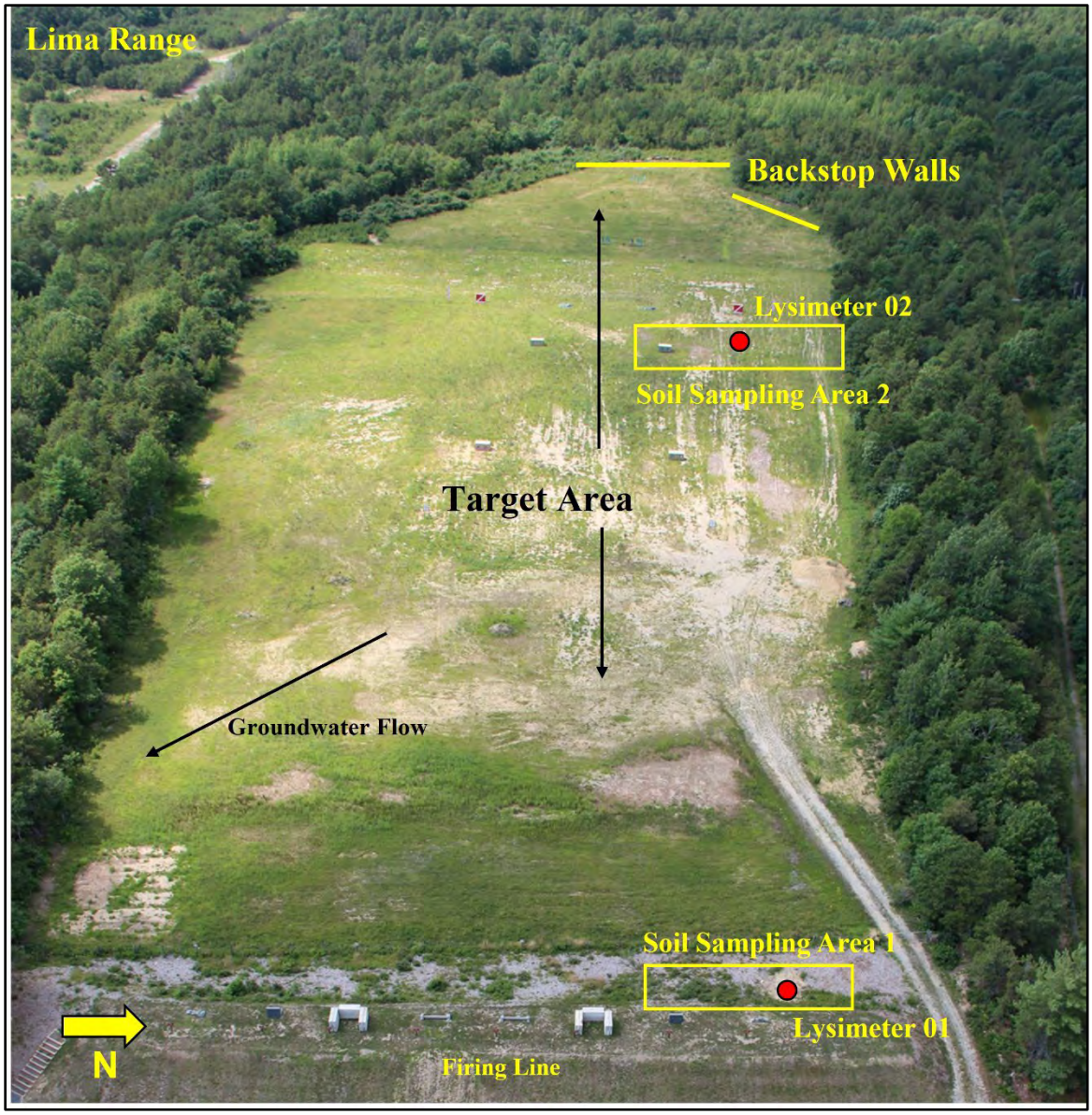
Sierra Range (copper only) Sampling Areas
Camp Edwards, Massachusetts
MW=Monitoring Well



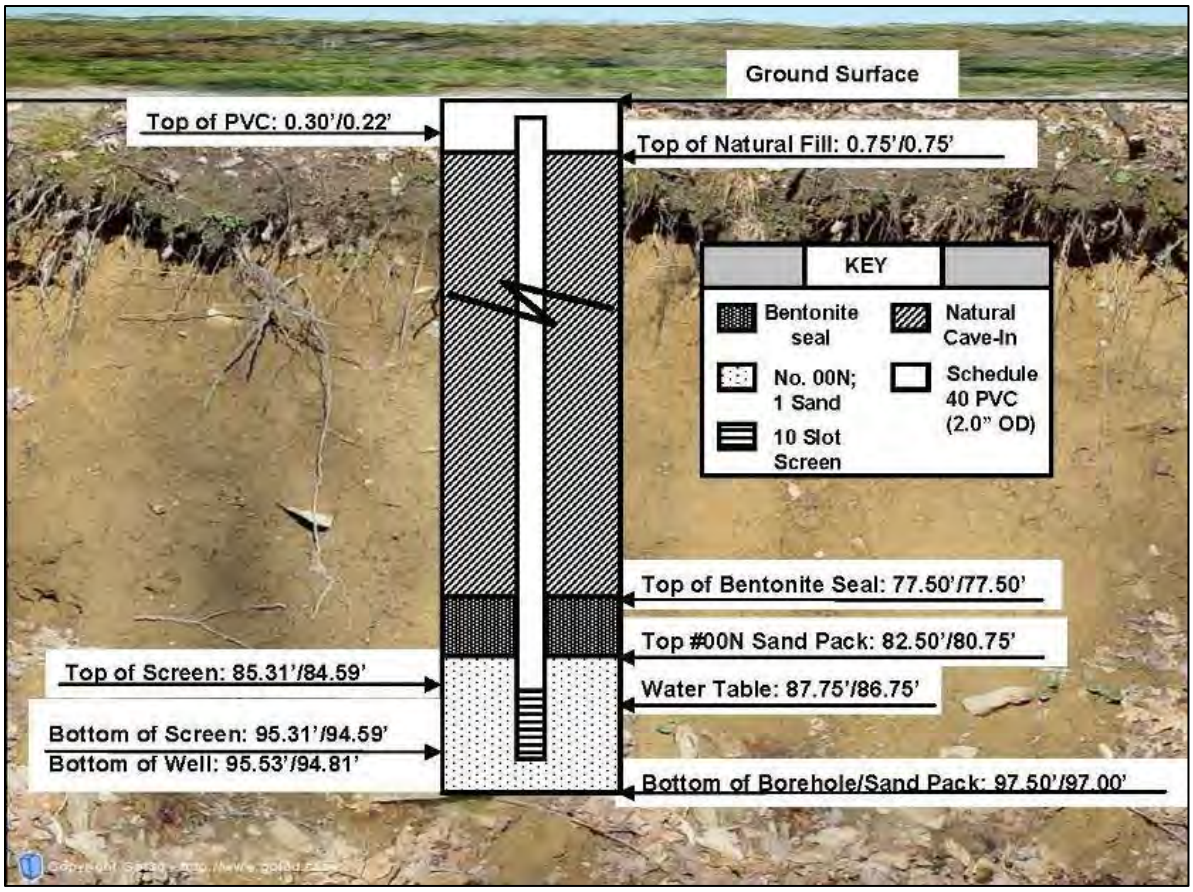
India Range (copper only) Sampling Areas
Camp Edwards, Massachusetts
MW=Monitoring Well



Echo Range Sampling Areas
Camp Edwards, Massachusetts
MW=Monitoring Well



Lima Range
Camp Edwards, Massachusetts.



An example of a groundwater well installation.

Soldier Validation Lane Annual Report

Camp Edwards --- Massachusetts Army National Guard

Soldier Validation Lane Annual Monitoring Report

January, 2025

(NHESP Tracking No.: 08-24210)

Soldier Validation Lane Use

No site composition changes occurred in FY24.

SVL Assessments after 2024 Training Season

All sites with containers were visited on October 31st, 2024 to evaluate training impacts during the 2024 training season. The assessment methodology matched the assessment performed in the Baseline Condition Assessment Report and FYs 12-23, to provide a means of comparison. The containers replicate buildings (conex), and prop materials are utilized to create a more realistic setting, such as barrels, bicycles, grills, tires, wall sections, etc. No major changes were made to sites during 2024 and management activity was limited to mowing by the Training Lands Specialist in February 2024. Limited training impacts occurred at SVL sites and the sites are stable with regular training use.

Conclusion

All regulatory conditions were followed during use of the SVLs and BPs for training. Erosion and rutting impacts have remained static at most sites on the lanes as expected, with regular levels of vehicle use and regular storm water runoff on dirt roads. Some photos of the erosion and rutting have been included below. MAARNG will continue to strive to minimize environmental impacts from these lanes by following the established guidelines.

An important note on the Soldier Validation Lane sites and their continued maintenance and use for training is that these sites play an important role in the pine barrens mosaic of Camp Edwards. They function as woodland openings supporting sandplain and barrens species including endemic plants and listed flora and fauna. This includes observations of Purple Tiger Beetle (*Cicindela purpurea*), Agassiz's Clam Shrimp (*Eulimnadia agassizii*), Pine Barrens Golden-heather (*Hudsonia ericoides*), and others. Their stable land condition with ongoing maintenance and use provides habitat benefit and soldier training benefit.

Site photos are included below. Red lines in photos indicate minor erosion from water runoff that will be assessed and repaired as necessary.

Figure 1: SVL1

Figure 2: SVL 2

Figure 3: NBC

Figure 4: BP 12 with shot of entrance

Figure 5: BP 20 with shot of entrance

Figure 6: BP 24 with shot of entrance

Figure 7: Pew Rd

Appendix D
Environmental Laws and Regulations

Environmental Laws and Regulations
Governing MAARNG Activities in the Training Area/Reserve

Reserve EPS	*Federal Law / Regulation*	*State Law / Regulation*	*DoD Regulation*
Groundwater Resources	Clean Water Act Safe Drinking Water Act	Drinking Water Quality Standards (310 CMR 22.00) State Wellhead Protection (310 CMR 22.21) Water Management Act (310 CMR 36.00)	AR 200-1 AR 200-2 Camp Edwards Regulation (CER) 385-63
Wetlands and Surface Water	Clean Water Act Coastal Zone Management Act Floodplains Management (EO 11988) Protection of Wetlands (EO 11990) Rivers and Harbors Act of 1899 Sikes Act Wetlands Management (EO 11990)	Massachusetts Wetlands Protection Act (M.G.L. c. 131, s40; 310 CMR 100.00)	AR 200-2 CER 385-63
Rare Species	Federal Endangered Species Act Sikes Act	Massachusetts Endangered Species Act (M.G.L. c. 131A, 321 CMR 10.00)	AR 200-1 AR 200-2 AR 200-3 CER 385-63
Soil Conservation	Sikes Act Soils and Water Conservation Act Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-1 AR 200-2 AR 200-3 CER 385-63
Vegetation Management	American Indian Religious Freedom Act Environmental Justice (EO 12898) Exotic Organisms (EO 11987) Sikes Act		AR 200-1 AR 200-2 AR 200-3 CER 385-63
Habitat Management	Sikes Act	Massachusetts Endangered Species Act (M.G.L. c. 131A, 321 CMR 10.00)	AR 200-1 AR 200-2 AR 200-3 CER 385-63
Wildlife Management	Fish and Wildlife Conservation Act Migratory Bird Conservation Act Migratory Bird Treaty Act Sikes Act		AR 200-1 AR 200-2 AR 200-3 CER 385-63

Environmental Laws and Regulations Governing MAARNG Activities in the Training Area/Reserve

Reserve EPS	*Federal Law / Regulation*	*State Law / Regulation*	*DoD Regulation*
Air Quality	Clean Air Act	State Air Quality Regulations (310 CMR 4.00)	AR 200-1 AR 200-2 CER 385-63
Noise Management	Federal Interagency Committee Land Noise Control Act Occupational Safety & Health Act Use Planning Standards on Urban Noise, Guidelines for Considering Noise in Land Planning and Control (June 1990)		AR 200-1 AR 200-2
Pest Management	Animal Damage Control Act Federal Insecticide, Fungicide, and Rodenticide Act Noxious Weed Act Resource Conservation and Recovery Act Sikes Act Toxic Substances Control Act		DoD 4150.7 AR 200-1 AR 200-2 AR 200-5 AR 420-47
Fire Management	Clean Air Act Sikes Act The National Fire Code Uniform Fire Code	State Air Quality Regulations (310 CMR 4.00)	AR 200-1 AR 200-2 AR 200-3 AR 420-90 CER 385-63
Storm Water Management	Clean Water Act NPDES discharge permitting and limitations	Massachusetts Wetlands Protection Act (M.G.L. c. 131 s.40, 310 CMR 10.00.)	AR 200-1 AR 200-2
Wastewater	Clean Water Act	Title V (310 CMR 15.00)	AR 200-1 CER 385-63
Solid Waste	Resource Conservation and Recovery Act Toxic Substances Control Act	State Solid Waste Handling and Disposal (310 CMR 16.00/19.00)	AR 200-1 AR 200-2 AR 420-47 CER 385-63

Environmental Laws and Regulations
Governing MAARNG Activities in the Training Area/Reserve

Reserve EPS	*Federal Law / Regulation*	*State Law / Regulation*	*DoD Regulation*
Hazardous Materials	Asbestos Hazard Emergency Response (40 CFR 763) Federal Insecticide, Fungicide and Rodenticide Act Hazard Communication Standard Program (29 CFR 1910.1200) Lead Contamination Control Act OSHA (29 CFR 1910, 29 USC 91-596) Poison Prevention Packaging Act Toxic Substances Control Act	Hazardous Substances Labeling Law (105 CMR 650.00)	AR 200-1 AR 200-2 CER 385-63
Hazardous Waste	Clean Air Act Clean Water Act Emergency Preparedness and Community Right-To-Know Act Federal Facilities Compliance Act Hazardous Waste Operations and Emergency Response Medical Waste Tracking National Fire Code Oil Pollution Act Pollution Prevention Act Resource Conservation and Recovery Act The National Contingency Plan Underground Storage Tank Program (RCRA, Title I) Uniform Building and Fire Codes Comprehensive Environmental Response, Compensation, and Liability Act	Department of Transportation regulations regarding shipping and transportation, Hazardous Waste Management and Transportation (310 CMR 30.000) Management of Medical Waste (105 CMR 480) Pesticide use (333 CMR 1.00 – 12.00) Solid waste facilities management (310 CMR 16.00/19.00) State right-to-know requirements (105 CMR 670.00) Title V (310 CMR 15.00) Toxic use reduction (310 CMR 5.00) Underground storage tanks standards (527 CMR 4.00 and 9.0) Massachusetts Contingency Plan (310 CMR 40.00)	AR 200-1 AR 200-2 AR 420-47 CER 385-63
Vehicle	Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-2 CER 385-63
General Use And Access	Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-1 AR 200-2 CER 385-63

Environmental Laws and Regulations Governing MAARNG Activities in the Training Area/Reserve

Reserve EPS	*Federal Law / Regulation*	*State Law / Regulation*	*DoD Regulation*
Cultural Resources (This EPS refers to archeological resources only; the list of regulations cited here has therefore been restricted to those that pertain to protection of archeological resources)	Antiquities Act of 1906 Archeological and Historic Preservation Act of 1974 Archeological Resources Protection Act of 1979 Consultation and Coordination with Indian Tribal Governments (Executive Order 13175) Curation of Federally Owned/Administered Archeological Collections Executive Memorandum of April 19, 1994 – Government-to-Government Relations with American Tribal Governments National Environmental Policy Act of 1966, as amended Native American Graves Protection and Repatriation Act of 1990	Massachusetts General Laws, Chapter 9, sections 26-27C as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00) Massachusetts Environmental Policy Act (MEPA) Massachusetts General Laws Chapter 30, sections 61 through 62H, inclusive (301 CMR 11.00) Massachusetts General Laws, Chapter 38, section 6B: Chapter 9, sections 26A and 27C; Chapter 7, section 38A; Chapter 114, section 17; as amended by Chapter 659 of the Acts of 1983 and Chapter 386 of the Acts of 1989	AR 200-2 AR 200-4 DA PAM 200-4 Office of the Secretary of Defense, Annotated Policy Document for the American Indian and Alaska Native Policy (27 October 1999)

DOD Regulations include all regulations and directives of the Department of Defense, Department of the Army, and National Guard Bureau.
AR = Army Regulation
CER – Camp Edwards Regulation
CFR – Code of Federal Regulations
CMR - Code of Massachusetts Regulations
DA PAM = Department of Army Pamphlet
EO – Executive Order
M.G.L – Massachusetts General Laws
RCRA – Resource Conservation and Recovery Act

Appendix E
Water Supply Information

Upper Cape Water Supply Cooperative
Long-Term Monitoring Well Network

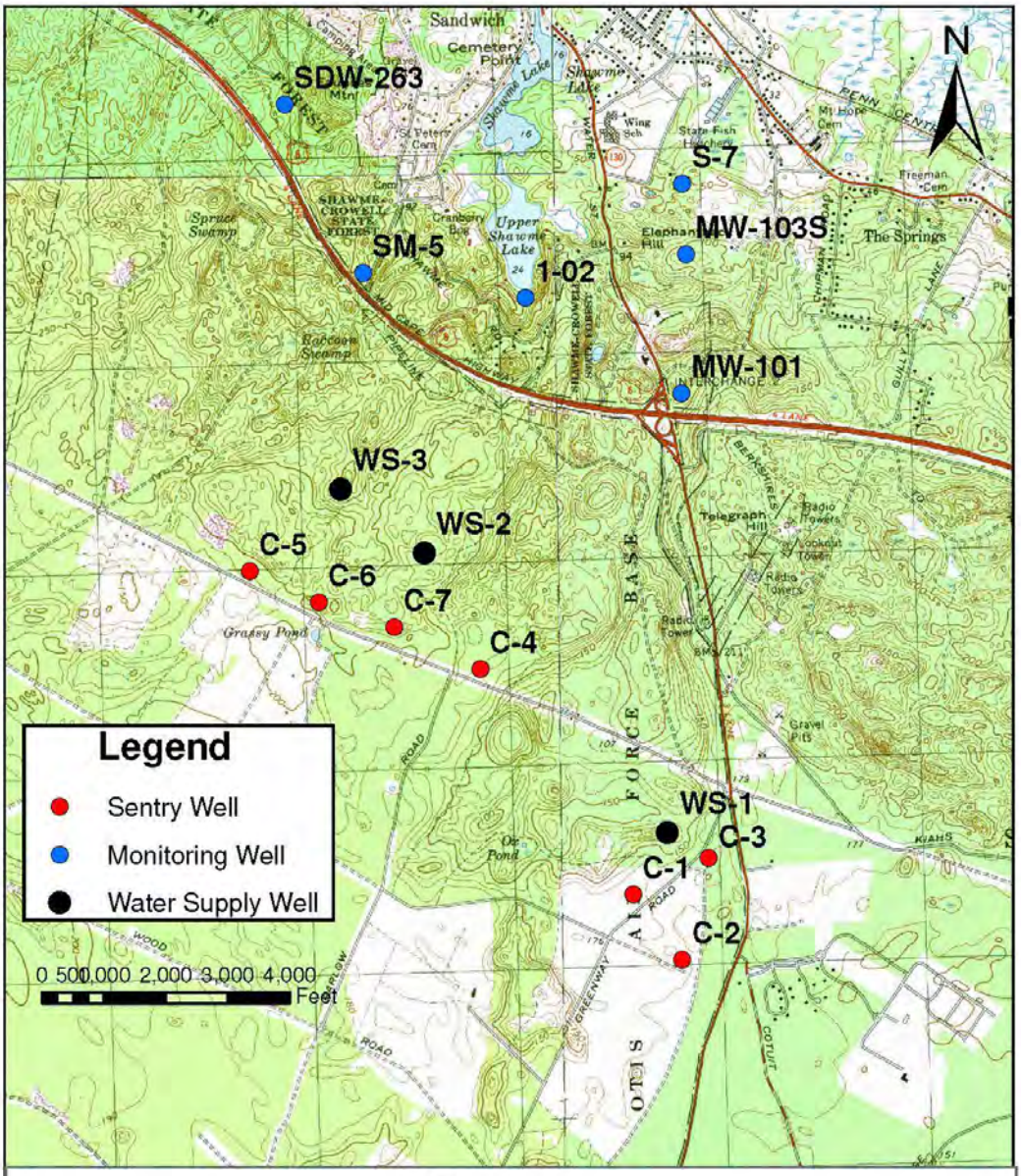


Figure 1
Long-term Monitoring Well Network
Upper Cape Regional Water Supply Cooperative
Cape Cod, Massachusetts

Upper Cape Water Supply Cooperative
Long-Term Monitoring Well Sampling

December 22, 2023

Maura Callahan, P.G.
c/o Upper Cape Regional Water Supply Cooperative
P.O. Box 373
Mashpee, MA 02649-0373

RE: Results of September and November 2023 Water Supply Wells
Long-Term Monitoring Well Sampling Services
Upper Cape Regional Water Supply Cooperative (UCRWS) – Long-Term Monitoring Plan

Dear Ms. Callahan,

KOMAN Government Solutions, LLC (KGS/Trinity) is pleased to provide the results for the September and November 2023 sampling events at the water supply cooperative wells. The purpose of this report is to summarize the analytical results from seven intermediate-depth screened wells as part of the Long-Term Monitoring Plan for the UCRWS. Samples were collected at C4-M(I) and C7-M(I) in September 2023 and at C1-I, C2-I, C3-I, C5-I and C6-I in November 2023 for physical and chemical parameters. The groundwater sample analysis was performed by Envirotech Laboratories, Inc. of Sandwich MA. and by Eurofins Laboratories of Burlington VT. Sampling results are tabulated in Attachment A.

Low levels of chloroform at C1-I, C4-M(I) and C-6I were detected above the laboratory reporting limit but less than the water quality standards under the Massachusetts Maximum Contaminant Levels (MMCL). No other parameters including Volatile Organic Compounds (VOCs), Ethylene Dibromide (EDB), Explosives or Perchlorate were detected in the sentry wells. The current results from 2023 are consistent with historical datasets.

Data validation was performed on the September and November 2023 samples. Data validation and laboratory reports are provided in Attachment B.

Field documentation for sampling is provided in Attachment C.

Please contact me at (781) 820-9301 or lklosterman@komangs.com if you have any questions or require additional information.

Sincerely,
KOMAN Government Solutions, LLC

Lynne Klosterman
Project Manager

Attachments:
Attachment A: 2023 Sampling Results Tables
Attachment B: Data Validation and Laboratory Reports
Attachment C: Field Documentation

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100
Marlborough, Massachusetts 01752
Phone (508) 366-7442
Fax (508) 366-7445
www.komangs.com

Attachment A

Analytical Tables

Table 1-1
Physical-Chemical Parameters
Intermediate Screens at Sentry Wells – November 2023 Sampling Results
Upper Cape Regional Water Supply

Sample ID			C-1I	C-2I	C-3I	C-4M (I)	C-5I	C-6I	C-7M (I)
Collection Date	Water Quality Standard Level	Laboratory Reporting Limit	11/3/2023	11/3/2023	11/3/2023	9/14/2023	11/3/2023	11/3/2023	9/13/2023
pH Method SM4500 H-B	6.5 - 8.5	NA	6.66	6.40	6.62	6.51	6.60	6.61	6.63
Alkalinity - Total as $CaCO_3$ (mg/L) Method SM 2320 B	NE	200	7.5	7.0	8.0	9.9	6.0	7.1	7.1
Turbidity (NTU) Method SM 2130 B	TT	5	1.3	1.3	1.7	1.1	<1.0	2.4	1.5
Specific Conductance (µmhos/cm @25°C) Method EPA 120.1	NE	500	51	54	49	59	50	45	50

Notes:
(1) Water Quality Standard Levels are the Massachusetts Maximum Contaminant Level [(MMCL), 2016]
(2) Water Quality Standard Levels are from the Secondary Maximum Contaminant Levels [(SMCL), 2016]
Samples were analyzed by Envirotech Laboratories Inc. of Sandwich, Massachusetts.

NE = Not Established
NA = Not Applicable
µmhos/cm = micromhos per centimeter
TT = Treatment Technique

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KGS

Table 1-2
Volatile Organic Compounds - EPA Method 524.2
Intermediate Screens at Sentry Wells – September and November 2023 Sampling Results
Upper Cape Regional Water Supply

Client Sample ID			C-11	C-21	C-31	C-4M (I)	C-5I	C-6I	C-7M (I)
Collection Date	Water Quality Standard Level (µg/L)	Laboratory Reporting Limit (µg/L)	11/3/2023	11/3/2023	11/3/2023	9/14/2023	11/3/2023	11/3/2023	9/13/2023
VOCs Method E524.2									
1,1,1,2-Tetrachloroethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1-Trichloroethane	200	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	70[2]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene	7	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloropropanone	NE	10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloropropene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2,3-Trichlorobenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2,3-Trichloropropane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2,4-Trichlorobenzene	70	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2,4-Trimethylbenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dibromo-3-Chloropropane	0.2[3]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichlorobenzene	600	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloropropane	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3,5-Trichlorobenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3,5-Trimethylbenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichloropropane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1-Chlorobutane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2,2-Dichloropropane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Butanone	4000[2]	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Chlorotoluene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Hexanone	NE	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
2-Nitropropane	NE	10	<10	<10	<10	<10	<10	<10	<10
4-Chlorotoluene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4-Methyl-2-pentanone (MIBK)	350[2]	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Acetone	6300[2]	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acrylonitrile	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Allyl chloride	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromobenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromochloromethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromochloromethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromoform	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromomethane	10[4]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon disulfide	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon tetrachloride	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroacetonitrile	NE	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chlorobenzene	100	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroform	70[5]	0.50	**1.7**	**0.80**	**0.54**	0.39 J	**6.3**	<0.50	**2.1**
Chloromethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis 1,2-Dichloroethene	70	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,3-Dichloropropene	0.4[4][5]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dibromochloromethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dibromomethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dichlorodifluoromethane	1400[2]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethyl ether	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethyl methacrylate	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	700	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylene Dibromide	0.02[3]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobutadiene	0.6	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachloroethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Isopropylbenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
m,p-Xylene	10000	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methacrylonitrile	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl iodide	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl methacrylate	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-t-butyl ether (MTBE)	70[5]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Naphthalene	140[5]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
n-Butylbenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrobenzene	NE	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
n-Propylbenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
o-Xylene	10000[3]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Pentachloroethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
p-Isopropyltoluene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Propionitrile	NE	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
sec-Butylbenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.36 J
Styrene	100	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
t-Butyl alcohol	NE	50	<50	<50	<50	<50	<50	<50	<50
tert-Butylbenzene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrahydrofuran	600[2]	2.50	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Toluene	1000	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	100	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,3-Dichloropropene	0.4[4][5]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,4-Dichloro-2-butene	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethene	5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichlorofluoromethane	NE	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl chloride	2	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Xylenes, Total	10000[3]	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Notes:
(1) Water Quality Standard Levels are the Massachusetts Maximum Contaminant Level [MMCL], 2016] unless otherwise noted.
(2) Water Quality Standard Level is are the Massachusetts Drinking Water Guidance developed by the Office of Research and Development.
(3) Xylene Standard based on Total Xylene
(4) Water Quality Standard based on for 1,3 dichloropropene (i.e., the sum of cis-1,3- dichloropropene and trans-1,3-dichloropropene)
(5) Winter 2020 Massachusetts Drinking Water Standards and Guidelines
Samples that are **bold** were detected above laboratory reporting limits
Qualified data
ug/L = Micrograms per Liter
NE = Not Established

Table 1-3
Explosive Compounds – EPA Method SW8330
Intermediate Screens at Sentry Wells – September and November 2023 Sampling Results
Upper Cape Regional Water Supply

Sample ID			C-1I	C-2I	C-3I	C-4M (I)	C-5I	C-6I	C-7M (I)
Collection Date	Water Quality Standard Level (µg/L)	Laboratory Reporting Limit (µg/L)	11/3/2023	11/3/2023	11/3/2023	9/14/2023	11/3/2023	11/3/2023	9/13/2023
Explosives Compounds Method SW846/8330B									
1,3,5-Trinitrobenzene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Dinitrobenzene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,4,6-Trinitrophenol	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,4,6-Trinitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,4-diamino-6-nitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,4-Dinitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,6-diamino-4-nitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,6-Dinitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Amino-4,6-dinitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
4-Amino-2,6-dinitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
HMX	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
m-Nitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Nitrobenzene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Nitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p-Nitrotoluene	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
RDX	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Tetryl	NE	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Nitroglycerin	NE	4	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
PETN	NE	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Notes:
(1) Water Quality Standard Levels are the Massachusetts Maximum Contaminant Level [(MMCL), 2016] unless otherwise noted.
Samples analyzed by Eurofins TestAmerica Laboratories, Inc. of South Burlington, Vermont.
ug/L = Micrograms per Liter
NE = Not Established

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Table 1-4
Perchlorate – EPA Method 6850 and EDB – EPA Method 504.1
Intermediate Screens at Sentry Wells – September and November 2023 Sampling Results
Upper Cape Regional Water Supply

Sample ID			C-1I	C-2I	C-3I	C-4M (I)	C-5I	C-6I	C-7M (I)
Collection Date	Water Quality Standard Level (µg/L)	Laboratory Reporting Limit (µg/L)	11/3/2023	11/3/2023	11/3/2023	9/14/2023	11/3/2023	11/3/2023	9/13/2023
Perchlorate	2.0	0.20	< 0.20	**0.054 J**	< 0.20	**0.045 J**	< 0.20	< 0.20	**0.039 J**
Ethylene Dibromide (EDB)	0.020	0.010	< 0.010	< 0.011	< 0.010	<0.50	< 0.010	< 0.011	<0.50

Notes:
(1) Water Quality Standard Levels are the Massachusetts Maximum Contaminant Level [(MMCL), 2019] unless otherwise noted.
Perchlorate and EBD analyzed by Eurofins of Burlington, VT.
µg/L = Micrograms per Liter

Attachment B

Data Validation Reports
EnviroTech Laboratories Reports
Eurofins Laboratories Reports

Data Validation Reports

Data Review Report
Upper Cape Water Supply
Wells

Laboratory: Eurofins, South Burlington, VT	SDG #:200-69941-1
KGS Reviewer: Laurie Ekes	Date: 12/21/2023

Lab Sample ID	Client Sample ID	Date Collected	Analysis	Matrix
200-69941-1	C-7M_F23	9/13/2023	VOCs (524.2), EDB (504.1), perchlorate (SW6850), explosives (SW8330B)	Aqueous
200-69941-4	C-4M_F23	9/14/2023	VOCs (524.2), EDB (504.1), perchlorate (SW6850), explosives (SW8330B)	Aqueous
200-69941-2/-3	TB_091323	9/13/2023	VOCs (524.2), EDB (504.1)	Trip Blank

Summary – KOMAN Government Solutions (KGS) performed a Level 1B data review on the analytical data for the samples listed above. The samples were collected on September 13 and 14, 2023 by KGS for Callahan Consulting from two (2) water supply wells; one (1) trip blank sample was also submitted. The samples were submitted for the following analyses: Volatile Organic Compounds (VOCs) by EPA Method 524.2, Ethylene dibromide (EDB) by EPA Method 504.1, Perchlorate by Method SW846/6850 and Explosives by Method SW846/8330B. Samples were submitted to Eurofins in Burlington, VT for analysis. Eurofins Burlington submitted samples to Eurofins Buffalo for EDB analysis by EPA Method 504.1.

Narrative and Completeness Review – The data package was checked for completeness. All samples were reported as requested.

Qualification: None required.

Sample Delivery and Condition – Samples arrived at the laboratory on September 15, 2023 in acceptable condition and temperature and were properly preserved.

Qualification: None required.

Holding Times –Samples were analyzed within the holding time required for preserved aqueous samples.

Qualification: None required.

Surrogates – Surrogate recoveries (%Rs) were within method control limits for applicable methods.

Qualification: None required.

Laboratory Control Sample – The LCS %Rs for methyl-t-butyl ether and nitrobenzene were outside acceptance limits for the VOC analysis by method 524.2; the results for these VOC were non-detect in all samples. Qualifications were not needed. The LCS %R for picric acid was below acceptance criteria for the explosive analysis by method SW8330; picric acid was non-detect in both samples. Qualifications were not needed. The LCS %Rs for EDB and perchlorate were within control limits.

Qualification: None required.

Method Blanks– The VOCs, 1,3,5-trimethylbenzene (0.48 µg/L J) and 1,2-dichlorobenzene (0.481 µg/L J) were reported in the method blank associated with these samples, 1,3,5-trimethylbenzene

and 1,2-dichlorobenzene were non-detect in associated samples; No qualifications were needed. The method blanks for explosives, EDB and perchlorate analyzed with these samples were non-detect for respective compounds.

Qualification: None required.

Trip Blank – Two trip blank samples were submitted with these samples, TB_091323 (Lab Sample ID: 200-69941-2) was submitted for EDB analysis. EDB was non-detect in TB_091323. TB_091323 (Lab Sample ID: 200-69941-3) was submitted for VOC analysis. Acetone (1.9 µg/L), Methylene chloride (0.12 µg/L J), toluene (0.17 µg/L J) and n-butylbenzene (0.46 µg/L J) were detected in the TB sample. The results for acetone in samples 200-69941-2 and -4 were qualified as non-detect (5.0 U) and the result for n-butylbenzene in sample 200-69941-1 was qualified as non-detect (0.50 U).

Qualification: None required.

Data Review Summary – Chloroform was reported at 2.1 µg/L and 0.39 µg/L J in samples 200-69941-1 and -4. Sec-butyl benzene was reported at 0.36 µg/L J in sample 200-69941-1. Estimated levels of perchlorate were reported in both samples at 0.039 µg/L and 0.045 µg/L. The results for the remaining compounds were non-detect in all samples. The data may be used for its intended purpose.

Data Review Report
Upper Cape Water Supply
Wells

Laboratory: Eurofins, South Burlington, VT	SDG #:200-70672-1
KGS Reviewer: Laurie Ekes	Date: 11/28/2023

Lab Sample ID	Client Sample ID	Date Collected	Analysis	Matrix
200-70672-1	C-1I_F23	11/3/2023	VOCs (524.2), EDB (504.1), perchlorate (SW6850), explosives (SW8330B)	Aqueous
200-70672-2	C-2I_F23	11/3/2023	VOCs (524.2), EDB (504.1), perchlorate (SW6850), explosives (SW8330B)	Aqueous
200-70672-3	C-3I_F23	11/3/2023	VOCs (524.2), EDB (504.1), perchlorate (SW6850), explosives (SW8330B)	Aqueous
200-70672-4	C-5I_F23	11/3/2023	VOCs (524.2), EDB (504.1), perchlorate (SW6850), explosives (SW8330B)	Aqueous
200-70672-5	C-6I_F23	11/3/2023	VOCs (524.2), EDB (504.1), perchlorate (SW6850), explosives (SW8330B)	Aqueous
200-70672-6	TB_110323	11/3/2023	VOCs (524.2),	Trip Blank

Summary – KOMAN Government Solutions (KGS) performed a Level 1B data review on the analytical data for the samples listed above. The samples were collected on November 3, 2023 by KGS from five (5) water supply wells; one (1) trip blank sample was also submitted. The samples were submitted for the following analyses: Volatile Organic Compounds (VOCs) by EPA Method 524.2, Ethylene dibromide (EDB) by EPA Method 504.1, Perchlorate by Method SW846/6850 and Explosives by Method SW846/8330B. Samples were submitted to Eurofins in Burlington, VT for analysis. Eurofins Burlington submitted samples to Eurofins Buffalo for EDB analysis by EPA Method 504.1.

Narrative and Completeness Review – The data package was checked for completeness. All samples were reported as requested.

Qualification: None required.

Sample Delivery and Condition – Samples arrived at the laboratory on November 7, 2023 in acceptable condition and temperature and were properly preserved.

Qualification: None required.

Holding Times –Samples were analyzed within the holding time required for preserved aqueous samples.

Qualification: None required.

Surrogates – Surrogate recoveries (%Rs) were within method control limits for applicable methods.

Qualification: None required.

Laboratory Control Sample – The LCS %Rs for all analyses were within control limits.

Qualification: None required.

Method Blanks– Method blanks analyzed with these samples were non-detect for all compounds.

Qualification: None required.

Trip Blank – One trip blank sample was submitted with these samples, TB_110323 (Lab Sample ID: 200-70672-6). VOCs were non-detect in the TB sample.

Qualification: None required.

Data Review Summary – Low levels of chloroform were reported in four of the five samples ranging from 0.54 µg/L to 6.3 µg/L; perchlorate was reported at 0.054 µg/L in the sample collected from location C-2I. The results for the remaining compounds were non-detect in all samples. The data may be used for its intended purpose.

Envirotech Laboratories Reports

ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063

8 Jan Sebastian Drive
Sandwich, MA 02563
(508)888-6460 1-800-339-6460
FAX (508)888-6446

Tuesday, December 19, 2023

Callahan, Maura
72 Tupper Rd
Sandwich, MA 02563

ProjectName: *JBCC* ***Comments:***
Project Number:
Sampled By: *Maura Callahan*
Lab Order Number: *WW-231694*
Date Received: *09/14/23*

Sample Type C-7M-F23 A	*Sample Time* 09:35	*Sample Date* 09/13/23	*Comments*			
Parameters	***Units***	***Test Results***	***Reportable Limits***	***Date Analyzed***	***Analyst***	***Method***
pH	pH units	6.63	NA	09/14/23	KF	SM 4500 H-B
Specific Conductance	umhos/cm	50	10	09/14/23	KF	EPA 120.1
Turbidity	NTU	1.5	1.0	09/14/23	KF	SM 2130 B
Alkalinity	mg/L (CaCO3)	7.1	2.5	09/14/23	KF	SM 2320 B

Sample Type C-4M-F23 B	*Sample Time* 09:45	*Sample Date* 09/14/23	*Comments*			
Parameters	***Units***	***Test Results***	***Reportable Limits***	***Date Analyzed***	***Analyst***	***Method***
pH	pH units	6.51	NA	09/14/23	KF	SM 4500 H-B
Specific Conductance	umhos/cm	59	10	09/14/23	KF	EPA 120.1
Turbidity	NTU	1.1	1.0	09/14/23	KF	SM 2130 B
Alkalinity	mg/L (CaCO3)	9.9	2.5	09/14/23	KF	SM 2320 B

All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.

We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

****see attached***

By: Ronald Saari
Ronald J. Saari
Laboratory Director

Page 1 of 1

ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063
8 Jan Sebastian Drive Unit 12
Sandwich, MA 02563
(508)888-6460 1-800-339-6460
FAX (508)888-6446

Client Name :	*Koman*	***Location :***	
Address :	293 Boston Post Rd West, Suite100 Marlborough, Ma 01752		Upper Cape Regional Water Supply
		Lab Number :	DW-234819
Collected By :	Malian Jennings	***Date Received :***	11/03/23
Sample Type :	Existing Well	***Well Specs :***	

Location Source A	***Date Collected*** 11/03/23	***Time Collected*** 8:50	***Comments*** C-1I			
Analysis Requested	***Units***	***Recommended Limits***	***Analysis Result***	***Method***	***Date Analyzed***	***Analyzed By***
pH	pH units	6.5-8.5	6.66	SM 4500-H-B	11/03/2023	KF
Alkalinity	mg/L	200	7.5	SM 2320B	11/03/2023	KF
Turbidity	NTU	5.0	1.3	SM 2130B	11/03/2023	KF
Specific Conductance	umhos/cm	500	51	EPA 120.1	11/03/2023	KF

Comments:
All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.
We certify that the following results are true and accurate to the best of our knowledge.

Location Source B	***Date Collected*** 11/03/23	***Time Collected*** 7:45	***Comments*** C-2I			
Analysis Requested	***Units***	***Recommended Limits***	***Analysis Result***	***Method***	***Date Analyzed***	***Analyzed By***
pH	pH units	6.5-8.5	6.40	SM 4500-H-B	11/03/2023	KF
Alkalinity	mg/L	200	7.0	SM 2320B	11/03/2023	KF
Turbidity	NTU	5.0	1.3	SM 2130B	11/03/2023	KF
Specific Conductance	umhos/cm	500	54	EPA 120.1	11/03/2023	KF

Comments:
pH is below recommended limit and may have corrosive characteristics.
All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.
We certify that the following results are true and accurate to the best of our knowledge.

Date 11/7/2023

Ronald J. Saari
Laboratory Director

BRL = Below Reportable Limits **See Attached*
¤Certification is not available for this analyte for potable water samples..

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ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063
8 Jan Sebastian Drive Unit 12
Sandwich, MA 02563
(508)888-6460 1-800-339-6460
FAX (508)888-6446

Client Name :	*Koman*	***Location :***	
Address :	293 Boston Post Rd West, Suite100 Marlborough, Ma 01752		Upper Cape Regional Water Supply
		Lab Number :	DW-234819
Collected By :	Malian Jennings	***Date Received :***	11/03/23
Sample Type :	Existing Well	***Well Specs :***	

Location Source C	***Date Collected*** 11/03/23	***Time Collected*** 10:20	***Comments*** C-3I			
Analysis Requested	***Units***	***Recommended Limits***	***Analysis Result***	***Method***	***Date Analyzed***	***Analyzed By***
pH	pH units	6.5-8.5	6.62	SM 4500-H-B	11/03/2023	KF
Alkalinity	mg/L	200	8.0	SM 2320B	11/03/2023	KF
Turbidity	NTU	5.0	1.7	SM 2130B	11/03/2023	KF
Specific Conductance	umhos/cm	500	49	EPA 120.1	11/03/2023	KF

Comments:
All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.
We certify that the following results are true and accurate to the best of our knowledge.

Location Source D	***Date Collected*** 11/03/23	***Time Collected*** 12:50	***Comments*** C-5I			
Analysis Requested	***Units***	***Recommended Limits***	***Analysis Result***	***Method***	***Date Analyzed***	***Analyzed By***
pH	pH units	6.5-8.5	6.60	SM 4500-H-B	11/03/2023	KF
Alkalinity	mg/L	200	6.0	SM 2320B	11/03/2023	KF
Turbidity	NTU	5.0	<1.0	SM 2130B	11/03/2023	KF
Specific Conductance	umhos/cm	500	50	EPA 120.1	11/03/2023	KF

Comments:
All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.
We certify that the following results are true and accurate to the best of our knowledge.

Date 11/7/2023

Ronald J. Saari
Laboratory Director

BRL = Below Reportable Limits **See Attached*
☑Certification is not available for this analyte for potable water samples..

Page 2 of 3

ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063
8 Jan Sebastian Drive Unit 12
Sandwich, MA 02563
(508)888-6460 1-800-339-6460
FAX (508)888-6446

Client Name :	*Koman*	***Location :***	
Address :	293 Boston Post Rd West, Suite100 Marlborough, Ma 01752		Upper Cape Regional Water Supply
		Lab Number :	DW-234819
Collected By :	Malian Jennings	***Date Received :***	11/03/23
Sample Type :	Existing Well	***Well Specs :***	

Location Source E	***Date Collected*** 11/03/23	***Time Collected*** 11:40	***Comments*** C-6I			
Analysis Requested	***Units***	***Recommended Limits***	***Analysis Result***	***Method***	***Date Analyzed***	***Analyzed By***
pH	pH units	6.5-8.5	6.61	SM 4500-H-B	11/03/2023	KF
Alkalinity	mg/L	200	7.1	SM 2320B	11/03/2023	KF
Turbidity	NTU	5.0	2.4	SM 2130B	11/03/2023	KF
Specific Conductance	umhos/cm	500	45	EPA 120.1	11/03/2023	KF

Comments:
All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.
We certify that the following results are true and accurate to the best of our knowledge.

Date 11/7/2023

Ronald J. Saari
Laboratory Director

BRL = Below Reportable Limits **See Attached*
¤Certification is not available for this analyte for potable water samples..

Page 3 of 3

Upper Cape Regional Water Supply Cooperative
2023 Consumer Confidence Report

UPPER CAPE REGIONAL WATER SUPPLY COOPERATIVE

2023 Consumer Confidence Report

PWS ID # 4261024

The Upper Cape Regional Drinking Water Supply Cooperative consists of three groundwater supply wells located in Sandwich, MA on Joint Base Cape Cod (JBCC). A Board of Managers representing four-member public water supply systems manages the Cooperative. The Cooperative has the capacity to provide a supplemental supply of water to its member public water systems, which include the Town of Falmouth, the Bourne Water District, the Mashpee Water District and the Sandwich Water District. The Cooperative also supplies water to the Otis Air National Guard public water system on JBCC and the Barnstable County Jail.

Wells #1, #2 and #3 are located in a forested area of the northeastern portion of the JBCC. In July 2004, the Department of Environmental Protection completed a source water assessment (SWAP) report for the Cooperative water supply wells. A SWAP report is a planning tool to support local and state efforts to improve water supply protection by identifying land uses within water supply protection areas that may be potential sources of contamination. The report identifies potential sources of contamination including a gas station, a medical facility and a military facility, and helps focus protection efforts on appropriate Best Management Practices. A susceptibility ranking of high was assigned to the Cooperative using information that was collected during the assessment. A copy of the report is available, upon request, from the Cooperative. JBCC has adopted a Groundwater Protection Plan to prohibit inappropriate activities on JBCC property within the Zone II areas of community public water supply wells. In addition, the Environmental Management Commission provides oversight over activities on the northern portion of the JBCC. For questions regarding SWAP or other information contained within this document call Marisa Picone-Devine at 508-888-7262.

2022 WATER QUALITY DATA

Listed below are the substances detected in water samples collected during the most recent sampling period from the three (3) wells that comprise the Upper Cape Drinking Water Supply Cooperative.

Inorganic Contaminants	**Year Sampled**	**Highest Result**	**Range of Detections**	**MCL**	**MCLG**	**Violation (Y / N)**	**Possible Sources**
Barium	2020	0.002 ppm	0.002 ppm	2 ppm	2 ppm	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Nitrate	2023	0.12 ppm	0.12 ppm	10 ppm	10 ppm	No	Runoff from fertilizer use; Leaching form septic tanks, sewage; Erosion of natural deposits
Radioactive Contaminants	**Year Sampled**	**Highest Result**	**Range of Detections**	**MCL**	**MCLG**	**Violation (Y / N)**	**Possible Sources**
Gross Alpha	2021	-.210 (+-.331) pCi/l	-.210 (+-.331) pCi/l	15 pCi/l	0	No	Erosion of Natural Deposits
Radium 226 & 228	2021	0.377 pCi/L	0 – 0.377 pCi/l	5 pCi/l	0	No	Decay of natural and manmade deposits
Unregulated and Secondary Contaminants	**Year Sampled**	**Amount Detected**	**Range of Detections**	**SMCL**	**ORSG**	**Violation**	**Possible Sources**
Chloroform	2023	2.09 ppb	1.56 – 2.09 ppb	NA	70 ppb	No	Trihalomethane: by-product of drinking water chlorination. In non-chlorinated sources, chloroform may be naturally occurring
Chloride	2023	10.0 ppm	9.0 – 10.0 ppm	250 ppm	--	NO	Runoff and leaching from natural deposits; seawater influence
Copper	2023	0.051 ppm	0.027-.051 ppm	1 ppm	--	No	Internal corrosion of household plumbing; erosion of natural deposits
Sodium	2023	6.6 ppm	6.6 ppm	--	20 ppm	No	Discharge from the use and improper storage of sodium-containing de-icing compounds or in water-softening agents
Sulfate	2023	4.0 ppm	3.5 – 4.0 ppm	250 ppm	--	No	Runoff and leaching from natural deposits; industrial wastes

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
Office of Research and Standards Guideline (ORSG): This is the concentration of a chemical in drinking water, at or below which, adverse health effects are unlikely to occur after chronic (lifetime) exposure. If exceeded, it serves as an indicator of the potential need for further action

Parts per million (ppm) or Milligrams per liter (mg/l): One part per million corresponds to one minute in two years.
Parts per billion (ppb) or Micrograms per liter (ug/l): One part per billion corresponds to one minute in 2,000 years.
Picocuries per liter (pCi/L): A measure of radioactivity.
Secondary Maximum Contaminant Level (SMCL): These standards are developed to protect the aesthetic qualities of drinking water and are not health based.
Unregulated Contaminants: Substances for which EPA has not established drinking water standards. The purpose of unregulated monitoring is to assist EPA in determining their occurrence in drinking water and whether future regulation is warranted.

102nd Intelligence Wing
2023 Consumer Confidence Report

2023 Consumer Confidence Report
For
Otis Air National Guard Base
Otis ANGB, Massachusetts
MassDEP PWSID #4096001

This report is a snapshot of the drinking water quality that we provided last year. Included are details about where your water comes from, what it contains, and how it compares to state and federal standards. We are committed to providing you with this information because informed customers are our best allies.

PUBLIC WATER SYSTEM INFORMATION

Address: 156 Reilly St., Box 12 Otis Air National Guard Base on Joint Base Cape Cod, Massachusetts

Contact Person: Mr. Bernie Marshall

Telephone #: (774) 392-7410

Water System Improvements
Our water system is routinely inspected by the Massachusetts Department of Environmental Protection (MassDEP). MassDEP inspects our system for its technical, financial, and managerial capacity to provide safe drinking water to you. To ensure that we provide the highest quality of water available, your water system is operated by a Massachusetts certified operator who oversees the routine operations of our system. As part of our ongoing commitment to service, the MassDEP Drinking Water Program has determined that the public water supply system at Otis Air National Guard Base is compliant with all national Primary Drinking Water Standards and MassDEP Drinking Water Regulations.

Opportunities for Public Participation
If you would like to participate in discussions regarding your water quality, you may attend the following meetings or educational events: *Please see the Otis Notice for any future meetings.*

YOUR DRINKING WATER SOURCE

Where Does My Drinking Water Come From?
Your water is provided by the following sources listed below:

Our drinking water supply is provided entirely by groundwater. J-Well (4096001-01G), which is located on Herbert Road, is our primary pumping station. We are also interconnected to the Upper Cape Regional Water Supply Cooperative. The Cooperative's water sources come from three wells located in the northeastern corner of Joint Base Cape Cod. On average, we provide up to 300,000 gallons of high-quality water every day. All of the Otis public water supply is drawn from the Sagamore Lens of the Cape Cod single-source aquifer. This lens runs from the Cape Cod Canal eastward into the town of Yarmouth. To learn more about our watershed on the Internet, go to the U.S. Environmental Protection Agency's (EPA) "How's My Waterway" website at the following link: https://www.epa.gov/waterdata/hows-my-waterway.

Source Name	MassDEP Source ID#	Source Type	Location of Source
J-Well	4096001-01G	Groundwater	Herbert Road

Is My Water Treated?
Our water system makes every effort to provide you with safe and pure drinking water. To improve the quality of the water delivered to you, we treat the system with potassium carbonate, sodium fluoride, and sodium hypochlorite. The water in this geographic area is naturally acidic, with an average pH of 5.9 (7.0 is neutral). Acidic water can be harmful

1

to the distribution system. Potassium carbonate is used to buffer the water to as close to a neutral pH as possible. At the request of the U.S. Coast Guard, which is the owner and operator of the family housing area, sodium fluoride is added to the water. This compound has proven effective in strengthening teeth. Finally, sodium hypochlorite is used to disinfect the water supply by killing bacteria. The water quality of our system is constantly monitored by us and MassDEP to determine the effectiveness of existing water treatment and to determine if any additional treatment is required. We add a disinfectant to protect you against microbial contaminants.

How Are These Sources Protected?
The Source Water Assessment and Protection (SWAP) Program, established under the federal Safe Drinking Water Act, requires every state to inventory land uses within the recharge areas of all public water supply sources; to assess the susceptibility of drinking water sources to contamination from these land uses; and to publicize the results to provide support for improved protection. MassDEP has prepared a SWAP Report for the water supply source(s) serving this water system. The SWAP Report assesses the susceptibility of public water supplies.

What is My System's Ranking?
A susceptibility ranking of HIGH was assigned to this system due to the absence hydrogeological barriers (i.e., clay) that can prevent contaminant migration.

Where Can I See The SWAP Report?
Information on obtaining the complete SWAP Report is available by contacting the Water Supply Superintendent at (508) 968-4102. To access the SWAP Report on the Internet, go to the Source Water Assessment & Protection (SWAP) Program Website at the following link: *https://www.mass.gov/service-details/the-source-water-assessment-protection-swap-program*

Members can help protect sources by:
- practicing good septic system maintenance
- proper disposal of hazardous chemicals and materials
- limiting pesticide and fertilizer use, etc.

SUBSTANCES FOUND IN TAP WATER

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals, and in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants – such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants – such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, and farming.

Pesticides and herbicides – which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants – including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radioactive contaminants – which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Department of Environmental Protection (MassDEP) and U.S. Environmental Protection Agency (EPA) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) and Massachusetts Department of Public Health (DPH) regulations establish limits for contaminants in bottled water that must provide the same protection for public health.

All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and some infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control and Prevention (CDC) guidelines on lowering the risk of infection by cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Otis Air National Guard Base is responsible for providing high quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

IMPORTANT DEFINITIONS

Maximum Contaminant Level (MCL) – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) –The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Secondary Maximum Contaminant Level (SMCL) – These standards are developed to protect the aesthetic qualities of drinking water and are not health based.

Unregulated Contaminants
Unregulated contaminants are those for which EPA has not established drinking water standards. The purpose of unregulated monitoring is to assist EPA in determining their occurrence in drinking water and whether future regulation is warranted.

Massachusetts Office of Research and Standards Guideline (ORSG) – This is the concentration of a chemical in drinking water, at or below which, adverse health effects are unlikely to occur after chronic (lifetime) exposure. If exceeded, it serves as an indicator of the potential need for further action.

Maximum Residual Disinfectant Level (MRDL) – The highest level of a disinfectant (chlorine, chloramines, chlorine dioxide) allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG) – The level of a drinking water disinfectant (chlorine, chloramines, chlorine dioxide) below which there is no known expected risk to health.
MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

ppm = parts per million, or milligrams per liter (mg/l)
ppb = parts per billion, or micrograms per liter (ug/l)
ppt = parts per trillion, or nanograms per liter
pCi/l = picocuries per liter (a measure of radioactivity)
NTU = Nephelometric Turbidity Units
ND = Not Detected
N/A = Not Applicable
mrem/year = millirems per year (a measure of radiation absorbed by the body)

WATER QUALITY TESTING RESULTS

What Does This Data Represent?
The water quality information presented in the table is from the most recent round of testing done in accordance with the regulations. All data shown was collected during the last calendar year unless otherwise noted in the table (within the last 5 years).

Substance (unit of measurement)	Date(s) Collected	90TH percentile	Action Level	MCLG	# of sites sampled	# of sites above Action Level	Possible Source of Contamination
Lead (ppb)	28-30 Sep 2021	0.0016	15	0	40	0	Corrosion of household plumbing systems; Erosion of natural deposits
Copper (ppm)	28-30 Sep 2021	0.44	1.3	1.3	40	0	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives

Regulated Contaminant	Date(s) Collected	Highest Amount Detected	Range Detected	MCL (MRDL)	MCLG (MRDLG)	Violation (Y/N)	Possible Source(s) of Contamination
Inorganic Contaminants							
Asbestos (MFL)	2022	ND	N/A	7	7	N	Decay of asbestos cement watermains; Erosion of natural deposits
Barium (ppm)	2021	0.028	0.00-0.028	2	2	N	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Cyanide (ppb)	2021	<0.10	N/A	200	200	N	Discharge from metal factories; discharge from plastic and fertilizer factories
Fluoride* (ppm)	2022	0.10	0.00-0.10	4	4	N	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
*Fluoride also has a secondary contaminant level (SMCL) of 2 ppm.							
Nitrate (ppm)	2023	0.14	0.01-0.14	10	10	N	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Nitrite (ppm)	2023	ND	N/A	1	1	N	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Perchlorate (ppb)	2023	ND	N/A	2.0	N/A	N	Rocket propellants, fireworks, munitions, flares, blasting agents

Regulated Contaminant	Date(s) Collected	Highest Amount Detected	Range Detected	MCL (MRDL)	MCLG (MRDLG)	Violation (Y/N)	Possible Source(s) of Contamination
Organic Contaminant							
PFAS6 (ppt)	2023	4.12	0.00-4.12	20	N/A	N	Discharges and emissions from industrial and manufacturing sources associated with the production or use of these PFAS, including production of moisture and oil-resistant coatings on fabrics and other materials. Additional sources include the use and disposal of products containing these PFAS, such as fire-fighting foams.
Radioactive Contaminants							
Gross Alpha ▲ (pCi/l) (minus uranium)	2021	-0.210 (+ -0.331)	-0.461 to -0.210	15	0	N	Erosion of natural deposits
▲ The MCL for beta particles is 4 mrem/year. EPA considers 50 pCi/L to be the level of concern for beta particles.							
Radium 226 & 228 (pCi/L) (combined values)	2021	0.377	-0.178 to 0.377	5	0	N	Erosion of natural deposits
Disinfectants and Disinfection By-Products							
Total Trihalomethanes (TTHMs) (ppb)	QTR3 (2023)	25.85	6.5-25.85	80	N/A	N	By-product of drinking water chlorination
Haloacetic Acids [HAA5] (ppb)	QTR3 (2023)	11.20	0.00-11.20	60	N/A	N	By-product of drinking water disinfection
Chlorine (ppm) (free, total or combined)	Monthly (2023)	2.0	0.01-2.0	4	4	N	Water additive used to control microbes

Unregulated and Secondary Contaminants

Unregulated contaminants are those for which there are no established drinking water standards. The purpose of unregulated contaminant monitoring is to assist regulatory agencies in determining their occurrence in drinking water and whether future regulation is warranted.

Unregulated Contaminants	Date(s) Collected	Highest Detected	Range Detected	SMCL	ORSG	Possible Source
Bromodichloromethane (ppb)	2023	0.65	0.65	N/A	N/A	Trihalomethane; by-product of drinking water chlorination
Bromoform (ppb)	2023	N/A	ND	N/A	N/A	Trihalomethane; by- product of drinking water chlorination
Chloroform (ppb)	2023	2.09	0.74 – 2.09	N/A	70	By-product of drinking water chlorination (in non-chlorinated sources it may be naturally occurring)
Dibromochloromethane (ppb)	2022	0.75	0.75	N/A	N/A	Trihalomethane; by-product of drinking water chlorination

Unregulated Contaminants	Date(s) Collected	Highest Detected	Range Detected	SMCL	ORSG	Possible Source
Manganese* (ppb)	2023	N/A	ND	50	300	Erosion of natural deposits
* US EPA has established a lifetime health advisory (HA) value of 300 ppb for manganese to protect against concerns of potential neurological effects, and a one-day and 10-day HA of 1000 ppb for acute exposure.						
Chloride (ppm)	2023	10.0	9.0-10.0	250	N/A	Runoff and leaching from natural deposits; seawater influence.
Copper (ppm)	2023	0.051	0.027 - 0.051	1	N/A	Internal corrosion of household plumbing; erosion of natural deposits
Sulfate (ppm)	2023	4.0	3.5 - 4.0	250	N/A	Runoff and leaching from natural deposits; industrial wastes.
Zinc (ppm)	2022	0.013	0.011-0.013	5	N/A	Corrosion of household plumbing systems; erosion of natural deposits
Sodium (ppm)	2023	6.6	6.6	N/A	20	Discharge from the use and improper storage of sodium-containing de-icing compounds or ion water-softening agents

COMPLIANCE WITH DRINKING WATER REGS

Does My Drinking Water Meet Current Health Standards?

We are committed to providing you with the best water quality available. We are proud to report that last year your drinking water met all applicable health standards regulated by the state and federal government.

EDUCATIONAL INFORMATION

Cross-Connection Control and Backflow Prevention

Our water system makes every effort to ensure that the water delivered to throughout the installation is clean, safe, and free of contamination. Our members work hard to protect the quality of the water delivered to our customers from the time the water is extracted via deep wells from underground aquifers or withdrawal point from a surface water source, throughout the entire treatment and distribution system. But what happens when the water reaches your building? Is there still a need to protect the water quality from contamination caused by a cross-connection? If so, how?

What is a cross-connection?
A cross-connection occurs whenever the drinking water supply is or could be in contact with potential sources of pollution or contamination. Cross-connections exist in piping arrangements or equipment that allows the drinking water to come in contact with non-potable liquids, solids, or gases (hazardous to humans) in event of a backflow.

What is a backflow?
Backflow is the undesired reverse of the water flow in the drinking water distribution lines. This backward flow of water can occur when the pressure created by equipment or a system such as a boiler or air-conditioning is higher than the water pressure inside the water distribution line (back pressure), or when the pressure in the distribution line drops due to routine occurrences such as water main breaks or heavy water demand causing the water to flow backward inside the water distribution system (back siphonage). Backflow is a problem that many water consumers are unaware of, a problem that each and every water customer has a responsibility to help prevent.

What can I do
Without the pr : a garden ho pollute the drinking water lines in your house. In fact, over half of the country's cross-connection incidents involve unprotected garden hoses. There are very simple steps that you as a drinking water user can take to prevent such hazards, they are:

- NEVER submerge a hose in soapy water buckets, pet watering containers, pool, tubs, sinks, drains, or chemicals.
- NEVER attached a hose to a garden sprayer without the proper backflow preventer.
- Buy and install a hose bibb vacuum breaker in any threaded water fixture. The installation can be as easy as attaching a garden hose to a spigot. This inexpensive device is available at most hardware stores and home-improvement centers.
- Identify and be aware of potential cross-connections to your water line.
- Buy appliances and equipment with backflow preventers.
- Buy and install backflow prevention devices or assemblies for all high and moderate hazard connections.

If you are the owner or manager of a property that is being used as a commercial, industrial, or institutional facility you must have your property's plumbing system surveyed for cross-connection by your water purveyor. If your property has NOT been surveyed for cross-connection, contact your water department to schedule a cross-connection survey.

ADDITIONAL INFORMATION

Brown, Red, Orange, or Yellow Water.
Brown, red, orange, or yellow water is usually caused by rust. The different colors can be attributed to varying chemical oxidation states of the iron (rust) and by varying concentrations of the rust in the water. There are two major sources that can cause water to be rusty:

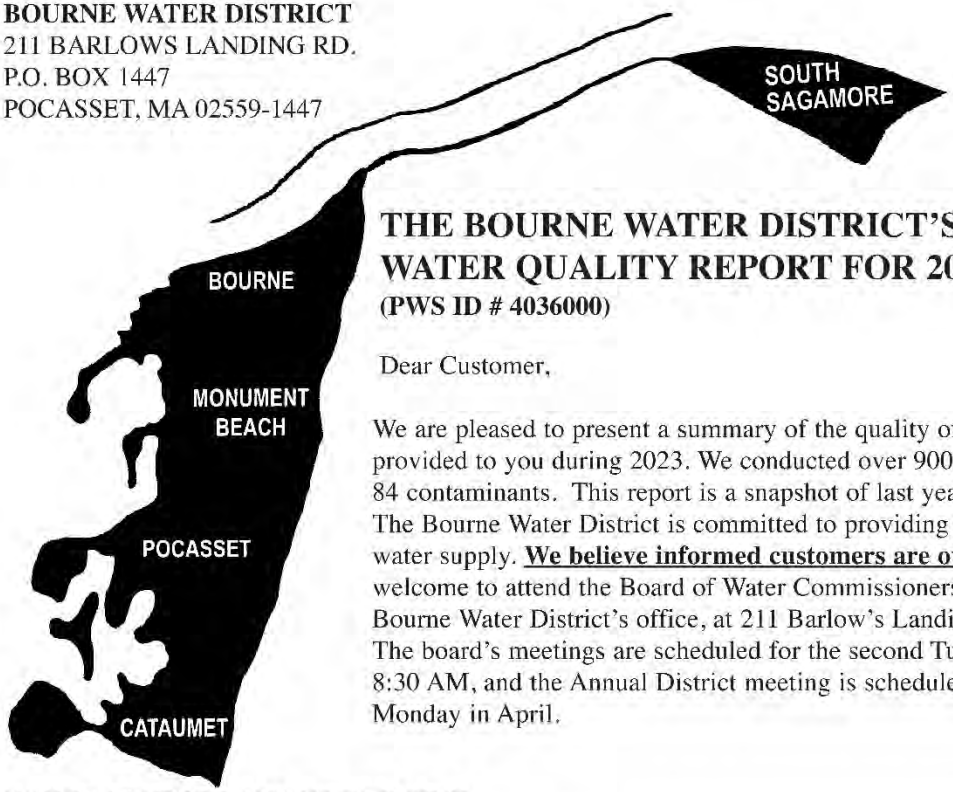
•The water mains, or
•The water pipes in your building

Rusty water occurs from sediment or rust from the inside walls of the water mains. The rust can be disturbed and temporarily suspended in water with unusual water flows from water main breaks or maintenance or by *flushing of a hydrant*. This discolored water is not a health threat.

When the water is discolored it is recommended to either not wash laundry or to use a rust stain remover or regular detergent but not chlorine bleach as it will react with the iron to form a permanent stain. The other major cause of brown, red, orange or yellow water is rusty water pipes in your building. Water that is being discolored by rusty pipes is not a health hazard.

Bourne Water District
2023 Consumer Confidence Report

BOURNE WATER DISTRICT
211 BARLOWS LANDING RD.
P.O. BOX 1447
POCASSET, MA 02559-1447



THE BOURNE WATER DISTRICT'S WATER QUALITY REPORT FOR 2023

(PWS ID # 4036000)

Dear Customer,

We are pleased to present a summary of the quality of the drinking water provided to you during 2023. We conducted over 900 tests for more than 84 contaminants. This report is a snapshot of last year's water quality. The Bourne Water District is committed to providing you with a reliable water supply. **We believe informed customers are our best allies.** You are welcome to attend the Board of Water Commissioners meetings held at the Bourne Water District's office, at 211 Barlow's Landing Road in Pocasset. The board's meetings are scheduled for the second Tuesday of the month at 8:30 AM, and the Annual District meeting is scheduled on the fourth Monday in April.

WATER SOURCES AND TREATMENT

The Bourne Water District is supplied by 10 different sources, 7 of our own gravel packed well sites and 3 gravel packed well sites from the Upper Cape Regional Water Supply Cooperative. Four of our well sites are in the Monument Beach area of the Town Forest. Two wells are in the Cataumet area of the Town of Bourne. One well is on Joint Base Cape Cod. We have one transfer station on Connery Ave. The Bourne Water District treats all supplies with hydrated lime for corrosion control. The hydrated lime is used to raise the pH of the water. This makes the water less aggressive to the copper pipe and lead joints in your homes to prevent exposure to lead and copper.

WHAT DOES THE FOLLOWING TABLE MEAN?

Action Level (AL) The concentration of a contaminant which if exceeded triggers treatment or other requirements.
Maximum Contaminant Level (MCL) The highest level of a contaminant that is allowed in the drinking water. The MCL is set as close to the MCLG as feasible using the best available treatment technology.
Maximum Contaminant Level Goal (MCLG) The level of a contaminant in the drinking water below which there is no known or expected risk to health. The MCLG allow for a margin of safety.
Office of Research and Standards Guideline (ORSG): This is the concentration of a chemical in drinking water, at or below which, adverse health effects are unlikely to occur after chronic (lifetime) exposure. If exceeded, it serves as an indicator of the potential need for further action.
90th Percentile Out of every 10 houses sampled, 9 were below this level.

KEY TO TABLE

AL = Action Level
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MFL = million fibers per liter
Mrem/year = millirems per year (a measure of radiation absorbed by the body)
NTU = Nephelometric Turbidity Units
ORSG = Office of Reasearch and Standards Guideline
pci/l = picocuries per liter (a measurement of radioactivity)
ppm = parts per million, or milligrams per liter (mg/l)
ppb = parts per billion, or micrograms per liter (ug/l)
ppt = parts per trillion, or nanograms per liter
ppq = parts per quadrillion, or picograms per liter
TT = Treatment Technique

	DISTRIBUTION SYSTEM WATER QUALITY This report summarizes only those items detected during Sampling-not all contaminants that are monitored							
Microbial Results	**Highest Detected**	**Range Detected**	**MCL**	**MCLG**		**Violation**		**Possible Source of Contamination**
Total Coliform Bacteria**	500	0-500	0	0		No		Naturally present in the environment
Fecal Coliform or E. Coli	2	0-2	0	0		Yes		Human andAnimal Fecal Waste
*Compliance with the Fecal Coliform/E.Coli MCL is determined upon additional repeat testing								
**Total Coliform:Coliform are bacteria that are naturally present in the environment and are used as an indicator that other potentially harmful bacteria may be present								
Lead and Copper	**Dates collected**	**90th Percentile**	**Action Level**	**MCGL**	**# of sites sampled**	**# Sites above Action Level**	**Violation**	**Possible Source of Contamination**
Lead (ppb)	9/1/2023 thru 12/31/2023	0.0042	15	0	30	1	No	Corrosion of household plumbing systems: Erosion of natural deposits
Copper (ppm)	9/1/2023 thru 12/31/2023	0.227	1.3	0	30	0	No	Corrosion of household plumbing systems: Erosion of natural deposits
TESTING FOR LEAD - If present, elevated levels of lead can causse serious health problems,especially for pregnant women and young childern. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing .Bourne Water District is responsible for providing high quality drinking water,but cannot control the variety of materials used in plumbing components.When you water has been sitting for several hours,you can minimize the potental for lead exposure by flushing you tap for 30 seconds to 2 minutes before using water for drinking or cooking.If you are concerned about lead in your water,you may wish to have your water tested. Information about lead in drinking water,testing methods and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.								
Regulated Contaminants	**Date(s) collected**	**Highest Detect Value**	**Range Detected**		**MCL**	**MCGL**	**Violation**	
					Inorganic Contaminants:			
Nitrate * (ppm)	2023	0.6	0.18-0.6		10	10	No	Runoff from fertilizer use;leaching from septic tanks;sewage;erosion of natural deposits
					Organic Contaminants			
Tetrachloroethylene(PCE)(ppb)	2023	1.18	0-1.18		5	-	No	Discharge from factories and dry cleaners
Chloroform (ppb	2023	1.44	0.68-1.44			NA	No	By-product of drinking water chlorination
CIS-1,2 Dichloroethylene (ppb)	2023	2.04	1.68-2.04		70	NA	No	Breakdown product of tetrachloroethylene
Secondary Contaminents	**Date(s) collected**	**Highest Detect Value**	**Range Detected**		**SMCL**	**ORSG**	**Possible Source of Contamination**	
Magnesium (ppm)	2023	3.4	1.1-3.4		-	-	Natural Mineral and Organis Matter	
Chloride (ppm)	2023	36	7.5-36		250	NA	Natural Mineral, Road Salt	
Iron (ppb)	2023	0.21	0-0.21		300	NA	Erosion of Natural Deposits and oxidation of iron components	
Manganese (ppb)*	2023	0.009	0-0.009		50	NA	Erosion of Natural Deposits	
Calcium (ppm)	2023	22	6.3-22		-	-	Natural Mineral and Organis Matter	
Sulfate (ppm)	2023	7.1	3.6-7.1		250	250	Natural Sources	
Turbidity	2023	1.8	0-1.8			NA	Soil Runoff	
Aluminum	2023	0.078	0-0.078			0		
					PER and POLYFLUOROALKYL			
PFOS total of 6 (ppt)	2023	9.26	0-9.26		20 ppt			

NATIONAL PRIMARY DRINKING WATER REGULATION COMPLIANCE

Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogans may be present or that a potential pathway exits through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.

During the past year, we were required to conduct One Level 1 Assessment. One Level 1 Assessment was completed. In addition, we were required to take corrective actions and we have completed these actions.

During the past year Two Level 2 Assessments were required to be completed for our water system. Two Level 2 Assessments were completed. In addition, we were required to take corrective actions and we competed these actions.

E. Coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes Human pathogens in these wastes. Human pathogens in these wastes can cause short-term effects such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We found E. Coli bacteria, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and to correct any problems that were found during these assessments.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead and copper in drinking water is primarily from materials and components associated with service lines and home plumbing. The Bourne Water District is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead and copper exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead and copper in your water, you may wish to have your water tested. Information on lead and copper in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

If you are interested in a more detailed report, contact Robert Prophett at 508-563-2294.

REQUIRED ADDITIONAL HEALTH INFORMATION:
To insure that tap water is safe to drink, Department of Environmental Protection (DEP) and Environmental Protection Agency (EPA) prescribes limits on the amounts of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) and the Massachusetts Department of Public Health regulations establish limits for contaminants in bottled water. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency Safe Drinking Water Hotline (1-800-426-4791).The sources of drinking water (both tap and bottled) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and radioactive material and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in the sources include:

(A) Microbial contaminants such as viruses and bacteria which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

(B) Inorganic contaminants such as salts and metals which can be naturally-occurring or result from urban storm runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

(C) Pesticides and herbicides, which may come from a variety of sources such as agriculture, storm water runoff and residential uses.

(D) Organic chemical contaminants, including synthetic and volatile organics which are by-products of industrial processes and petroleum production and can also come from gas stations, urban storm water runoff and septic systems.

(E) Radioactive contaminants, which can be naturally occurring or be the results of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protec tion for public health.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infections by Cryptosporidium are available from the Safe Drinking Water Hotline (1-800-426-4791).

SOURCE WATER ASSESSMENT
The Bourne Water District had a source water assessment performed by the MA. Department of Environmental Protection in 2002. The Source Water Assessment and Protection (SWAP) program, established under the Federal Safe Drinking Water Act requires every state to:

- Inventory land uses within the recharge areas of all public water supply sources.
- Assess the susceptibility of drinking water sources to contamination from these land uses.
- Publicize the results to provide support for improved protection.

A susceptibility ranking of high was assigned to the Bourne Water District using the information collected during the assessment by the DEP. The high ranking was due to the potential contamination from land uses such as auto repair shops, truck terminal, furniture refinishing, auto salvage operation, an industrial park and activities in the recharge area (Zone II's) of some of the wells. The complete SWAP report is available at the Bourne Water District's office. For more information contact Robert Prophett at 508-563-2294.

CROSS CONNECTION

A cross connection is a connection between a drinking water pipe and a polluted source. The pollution can come from your own home. For instance, you're going to spray fertilizer on your lawn, and you hook up your hose to the sprayer that contains the fertilizer. If the water pressure drops (say because of a fire hydrant being used or water main break) when the hose is connected to the fertilizer sprayer, the fertilizer may be sucked back into the drinking water pipes through your hose. Using an anti-siphon backflow-prevention device on your sprayer or hose bib can prevent this problem.

The Bourne Water District recommends using devices with an anti-siphon feature or equipping hose bibs with hose bib vacuum breakers to prevent against back flow. For additional information on cross connections and on the status of your water system's cross connection program, please contact Robert Prophett at 508-563-2294.

UPPER CAPE REGIONAL WATER SUPPLY COOPERATIVE
2023 Consumer Confidence Report (PWS ID # 4261024)

The Upper Cape Regional Drinking Water Supply Cooperative consists of three groundwater supply wells located in Sandwich, MA on Joint Base Cape Cod (JBCC). A Board of Managers representing four-member public water supply systems manages the Cooperative. The Cooperative has the capacity to provide a supplemental supply of water to its member public water systems, which include the Town of Falmouth, the Bourne Water District, the Mashpee Water District and the Sandwich Water District. The Cooperative also supplies water to the Otis Air National Guard public water system on JBCC and the Barnstable County Jail.

Wells #1, #2 and #3 are located in a forested area of the northeastern portion of the JBCC. In July 2004, the Department of Environmental Protection completed a source water assessment (SWAP) report for the Cooperative water supply wells. A SWAP report is a planning tool to support local and state efforts to improve water supply protection by identifying land uses within water supply protection areas that may be potential sources of contamination. The report identifies potential sources of contamination including a gas station, a medical facility and a military facility, and helps focus protection efforts on appropriate Best Management Practices. A susceptibility ranking of high was assigned to the Cooperative using information that was collected during the assessment. A copy of the report is available, upon request, from the Cooperative. JBCC has adopted a Groundwater Protection Plan to prohibit inappropriate activities on JBCC property within the Zone II areas of community public water supply wells. In addition, the Environmental Management Commission provides oversight over activities on the northern portion of the JBCC. For questions regarding SWAP or other information contained within this document call Marisa Picone-Devine at 508-888-7262.

2023 WATER QUALITY DATA

Listed below are the substances detected in water samples collected during the most recent sampling period from the three (3) wells that comprise the Upper Cape Drinking Water Supply Cooperative.

Inorganic Contaminants	**Year Sampled**	**Highest Result**	**Range of Detections**	**MCL**	**MCLG**	**Violation (Y / N)**	**Possible Sources**
Barium	2020	0.002 ppm	0.002 ppm	2 ppm	2 ppm	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Nitrate	2023	0.12 ppm	0.12 ppm	10 ppm	10 ppm	No	Runoff from fertilizer use; Leaching form septic tanks, sewage; Erosion of natural deposits
Radioactive Contaminants	**Year Sampled**	**Highest Result**	**Range of Detections**	**MCL**	**MCLG**	**Violation (Y / N)**	**Possible Sources**
Gross Alpha	2021	-.210 (+-.331) pCi/l	-.210 (+-.331) pCi/l	15 pCi/l	0	No	Erosion of Natural Deposits
Radium 226 & 228	2021	0.377 pCi/L	0 – 0.377 pCi/l	5 pCi/l	0	No	Decay of natural and manmade deposits
Unregulated and Secondary Contaminants	**Year Sampled**	**Amount Detected**	**Range of Detections**	**SMCL**	**ORSG**	**Violation**	**Possible Sources**
Chloroform	2023	2.09 ppb	1.56 – 2.09 ppb	NA	70 ppb	No	Trihalomethane: by-product of drinking water chlorination. In non-chlorinated sources, chloroform may be naturally occurring
Chloride	2023	10.0 ppm	9.0 – 10.0 ppm	250 ppm	--	NO	Runoff and leaching from natural deposits; seawater influence
Copper	2023	0.051 ppm	0.027-.051 ppm	1 ppm	--	No	Internal corrosion of household plumbing; erosion of natural deposits
Sodium	2023	6.6 ppm	6.6 ppm	--	20 ppm	No	Discharge from the use and improper storage of sodium-containing de-icing compounds or in water-softening agents
Sulfate	2023	4.0 ppm	3.5 4.0 ppm	250 ppm	--	No	Runoff and leaching from natural deposits; industrial wastes

Appendix F
Rare Species Reported to Natural Heritage and Endangered Species Program

Table F-1 List of Rare Species Reported to NHESP - Birds

Common/ Scientific Names	*Fed Status[1]*	*State Status[2]*	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Grasshopper Sparrow *(Ammodramus savannarum)*	-	T	23	16	15	16	20	34	36	29	30	26
Northern Harrier *(Circus cyaneus)*	-	T	W[3]	W	W	W	W	W	W	W	W	W
Upland Sandpiper *(Bartramia longicauda)*	-	E	4	9	8	7	12	6	2	1	4	3
Eastern Meadowlark *(Sturnella magna)*	-	SC	0	8	3	2	7	14	17	9	21	15
Eastern Whip-poor-will *(Antrostomus vociferous)*	-	SC	96	87	52	110	53	99	136	137	105	130
Bald Eagle *(Haliaeetus leucocephalus)*	-	SC	3	0	0	0	0	0	0	0	0	W

Note: Quantities shown should not be interpreted as population trends.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] Wintering

Table F-2 List of Rare Species Reported to NHESP – Reptiles and Amphibians

Common/ Scientific Names	*Fed Status[1]*	*State Status[2]*	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Eastern Box Turtle *(Terrapene carolina carolina)*	-	SC	13	38	42	43	58	45	83	62	96	77
Eastern Hog-nosed Snake *(Heterodon platirhinos)*	-	SC	0	2	3	8	9	1	2	6	7	4

Note: Quantities shown should not be interpreted as population trends.
[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)
[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

Table F-3 List of Rare Species Reported to NHESP – Plants

Common/ Scientific Names	*Fed Status[1]*	*State Status[2]*	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Adder's Tongue Fern[3] *(Ophioglossum pusillum)*	-	T	256	98	247	0	25	646	N/A	225	215	292
Grass-leaved Ladies' Tresses *(Spiranthes vernalis)*	-	T	0	0	0	0	0	0	6	0	31	Stable
Broad Tinker's Weed[4] *(Triosteum perfoliatum)*	-	E	N/A	113	127	0	200	6	N/A	1883	3,161	3,637
American Arborvitae[5] *(Thuja occidentalis)*	-	E	0	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table F-3 List of Rare Species Reported to NHESP – Plants, cont'd

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Stiff Yellow Flax *(Linum texanum var. medium)*	-	T	0	0	0	0	0	0	0	0	92	Stable
Papillose Nut-sedge *(Scleria pauciflora)*	-	E	0	0	0	0	0	0	0	0	41,081	82,034

Note: Quantities shown should not be interpreted as population trends.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] In most years a subset of O. pusillum sites are surveyed. In 2023, the five known extant sites were surveyed. This needs to be considered if comparing total numbers accross years. In 2018, only sites with historic records and no recent records were surveyed, and this should not be interpreted as a loss of rare plants between 2017 and 2018. The total number of 2019 numbers are likely under representative, as surveys occurred late in the season.

[4] Triosteum perfoliatum surveys, starting in 2022, are carried out using recent findings from a genetics study that suggest that the two species of Triosteum on the base, the other non-rare T. aurantiacum, are the same genetically and should be treated as the rare T. perfoliatum. Totals for years previous to 2022 consist only of Triosteum individuals that showed certain identification features now not relied on.

[5] NHESP is not interested in tracking this population, as it is likely of anthropogenic origin (pers. comm. with State Botanist, Bob Wernerehl).

Table F-4 List of Rare Species Reported to NHESP – Beetles and Bees

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Purple Tiger Beetle *(Cicindela purpurea)*	-	SC	0	0	0	0	0	0	0	0	25	90
Twelve-spotted Tiger Beetle *(Cincindela purpurea)*	-	SC	0	0	0	0	0	0	0	0	0	1
Walsh's Digger Bee[3] *(Anthophora walshii)*	-	E	0	0	5 (1)	0	32 (9)	4	N/A	1	9	27

Note: Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] Lead number is count of flying/foraging records with confirmed nesting activity in parentheses.

Table F-5 List of Rare Species Reported to NHESP – Butterflies and Moths

Common/ Scientific Names	*Fed Status[1]*	*State Status[2]*	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Buck Moth[3] *(Hemileuca maia)*	-	SC	13	90	95	0	4	2	74	133	23	72
Pine Barrens Speranza *(Speranza exonerata)*	-	SC	0	44	13	0	0	0	0	4	0	3
Sandplain Euchlaena *(Euchlaena madusaria)*	-	SC	0	3	7	0	0	1	0	0	0	1
Heath Metarranthis *(Metarranthis pilosaria)*	-	SC	0	1	1	0	0	0	0	0	0	0
Melsheimer's Sack Bearer *(Cicinnus melsheimeri)*	-	T	0	2	0	0	0	7	0	0	0	0
Gerhard's Underwing *(Catocala herodias)*	-	SC	0	33	10	0	0	2	0	35	6	0
Pine Barrens Zale *(Zale lunifera)*	-	SC	0	13	8	0	0	0	0	0	0	4
Barrens Dagger Moth *(Acronicta albarufa)*	-	T	0	1	0	0	0	0	0	0	0	0
Sandplain Heterocampa *(Heterocampa varia)*	-	T			0	N/A	N/A	N/A	N/A	1	0	0

Table F-5 List of Rare Species Reported to NHESP – Butterflies and Moths, cont'd

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Chain-dotted Geometer *(Cingilia catenaria)*	-	SC	0	0	0	0	1	0	0	0	0	0
Drunk Apamea *(Apamea inebriata)*	-	SC	0	1	0	0	0	0	0	0	0	0
Pink Sallow *(Psectraglaea carnosa)*	-	SC	0	9	5	0	0	0	0	0	6	8
Pink Streak *(Dargida rubripennis)*	-	T	0	25	0	0	0	3	1	1	2	0
Collared Cycnia *(Cycnia collaris)*	-	T	0	0	1	0	11	33	200	7	4	4
Coastal Heathland Cutworm *(Abagrotis benjamini)*	-	SC	0	0	1	0	0	0	0	0	0	0
Woolly Gray *(Lycia ypsilon)*	-	T	0	0	2	0	0	0	0	0	0	0
Water-willow Stem Borer *(Papaipema sulphurata)*	-	T	0	0	1	0	0	0	0	0	0	0
Waxed Sallow Moth *(Chaetaglaea cerata)*	-	SC	0	0	2	0	0	0	0	0	0	0
Frosted Elfin[4] *(Callophrys irus)*	-	SC	0	5	5	5	TBD	25	57	13	64	49

Table F-5 List of Rare Species Reported to NHESP – Butterflies and Moths, cont'd

Common/ Scientific Names	*Fed Status[1]*	*State Status[2]*	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Slender Clearwing Sphinx *(Hemaris gracilis)*	-	SC	0	0	0	0	0	5	3	26	3	1
Acadian Hairstreak *(Satyrium acadia)*	-	T			4	N/A	2	0	4	5	2	0

Note: Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] Caterpillar clusters are reported as a single observation. Barrens Buckmoths received dedicated flight count attention in 2021 and 2022, thus the large increase in reported observations.

Caterpillar clusters are reported as a single observation. Barrens Buckmoths received dedicated flight count attention in 2021 and 2022, thus the large increase in reported observations.

[4] MAARNG staff did not perform surveys for *Callophrys irus* in 2019, but facilitated USFWS surveys. Results are pending, but USFWS staff found Frosted Elfins across a wider area than was previously known.

Table F-6 List of Rare Species Reported to NHESP - Crustaceans

Common/ Scientific Names	*Fed Status[1]*	*State Status[2]*	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Agassiz's Clam Shrimp *(Eulimnadia agassizii)*	-	E	1	0	6	38	9	3	5	N/A	12	5
American Clam Shrimp *(Limnadia lenticularis)*	-	SC	0	0	0	0	0	0	3	N/A	0	3

Note: Counts represent the number of sites (i.e., puddles or pools) where clam shrimp were observed during annual surveys. Annual surveys include a subset of sites that have contained clam shrimp in the past, have not contained clam shrimp in the past, and that have not been surveyed previously.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

Table F-7 List of Rare Species Reported to NHESP - Mammals

Common/ Scientific Names	*Fed Status[1]*	*State Status[2]*	*TY 2015*	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*
Northern Long-Eared Bat[3, 4] *(Myotis septentionalis)*	T	E	22 (2)	15 (1)	2	1	3	1	TBD	N/A	0	N/A
Little Brown Bat[3, 5] *(Myotis lucifugus)*	UR	E	40	22	4	2	6	2	TBD	N/A	5	N/A
Tricolored Bat[3,5] *(Perimyotis subflavus)*	UR	E	11	7	3	2	3	1	TBD	N/A	3	N/A
Eastern Small-Footed Bat[3, 5] *(Myotis leibii)*[3, 5]	UR	E	0	0	0	0	1	1	TBD	N/A	0	N/A

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] Acoustic monitoring collects "call sequence" data and the true number of individuals is unknown. Numbers in the table reflect the number of survey sites with acoustic detections confirmed through manual call vetting. Numbers are reported to NHESP but not tracked by them due to current uncertainty in using acoustic identifications.

[4] Number in parentheses is captured individuals trackable by NHESP due to species identification confirmation versus acoustic data.

[5] "UR" indicates a species is currently under review for listing on the federal Endangered Species Act.

Appendix G
Environmental Performance Standards Violations History

EPS VIOLATIONS HISTORY, TY 2015 – TY 2024

Training Year	Reported Violation	*Explanation of Violation*	*Corrective Action*
TY 2024	None	-----	-----
TY 2023	None	-----	-----
TY 2022	General Performance Standard	There was unauthorized use of yellow and white smoke grenades outside of the approved non-standard training plan. White smoke grenades were not approved for use; yellow smoke grenades were used in an unapproved location. The MAARNG reported the nonconformance to the EMC on March 31, 2022.	Full-time range and civilian staff were counseled on their failure to follow established processes for consultation and approval for any non-standard training event; staff were directed that only written non-standard training plans, signed by the EMC EO and the MAARNG representative will be executed, and no verbal authorizations will be authorized. Refresher training was conducted with part-time staff to ensure compliance.
TY 2021	Range Performance EPS (EPS 19)	Additional targets were placed on the 25-meter line on Sierra Range. Transition firing was conducted on Echo Range. No consultation for approval was conducted with Camp Edwards Plans and Training, the Environmental & Readiness Center and the EMC's Environmental Officer. The MAARNG reported the nonconformance to the EMC on February 18, 2021.	Full-time Range Control staff were counseled on the importance of following established processes of consultation and approval for any non-standard training event; the Range Control maintenance manager was directed that he shall not alter or install additional targets on a range unless there is an approval in writing or the range is being prepared for an approved proof of concept for a future training event; OIC formalized non-standard training requests (exceptions to policy) in a Standard Operating Procedure; full-time Range Control staff was retrained; and those personnel involved in approving the non-standard training were given written counseling. In addition to corrective actions instituted by the MAARNG, the EMC required that the full-time Range Control staff undergo annual training on EPS 19.0 and the BMPs and OMMPs; newly assigned Range Control staff undergo training on EPS 19.0 and the BMPs and OMMP prior to being given authority for operational control of the small arms ranges; documenting the corrective actions and additional EMC requirements in Camp Edwards Operations and Training Regulation 350-2 and forwarding that to the EMC for review.

Training Year	Reported Violation	*Explanation of Violation*	*Corrective Action*
TY 2020	Training Area Fire Management EPS (EPS 11)	Three burn barrels (55-gallon drums) were found at SVLs 1 and 2. The MAARNG reported the nonconformance to the EMC on October 25, 2019.	All full-time and Mobilization Day staff are instructed to review Training Area Clearing processes and be re-briefed on guiding regulations and standards that apply to the Training Area/Reserve. Clear and obvious signage stating that open burning is prohibited has been posted at Range Control. The Camp Edwards Operations and Training Regulation 350-2 has been updated to clearly state the requirement for clearing training areas and that open burning is prohibited on Camp Edwards.
TY 2019	General Performance Standard	Three L600 M119 whistling booby trap simulators were used; they are not on the approved munitions list and were not authorized for use. The MAARNG reported a nonconformance to the EMC on September 17, 2019.	All levels: command, units training and the ASP will be provided a list of items permanently and temporarily authorized for a particular training event. The ASP will make a change in their ammunition reservation program that will not allow unauthorized ammunition or simulators to be reserved. Camp Edwards Range Control will do a final munition check as units check in for their reserved training area or venue.
TY 2018	Rare Species EPS (EPS 3)	A road puddle containing state-listed Agassiz clam shrimp was filled by a unit training at Dig Site 1. The MAARNG forwarded a formal notice of violation to the EMC on May 16, 2018.	Camp Edwards will, after relocation of the clam shrimp and in concert with the CMP, fill the puddles, use signage to avoid infilling of relevant puddles, and educate users as to how they are supposed to coordinate with Camp Edwards before taking actions outside of their training plan while in the Training Area/Reserve.
TY 2017	None	-----	-----
TY 2016	General Performance Standard	Eight thousand paintball rounds were fired by a unit on the IMT range (Dig Site 3) without permission or prior coordination. The MAARNG forwarded a formal notice of violation to the EMC on November 9, 2015.	Unit soldiers cleaned and cleared the area of debris, discussion of the seriousness of the violation with the Unit Commander and told of actions needed for compliance when wanting to train with any unapproved munition. Camp Edwards staff conducted a Range Officer in Charge and Range Safety brief audit to validate content and effectiveness. Range Control staff will conduct assessments of units while they are training in the Training Area/Reserve to ensure activities are within established performance standards.
TY 2015	Vehicle Performance Standard EPS (EPS 17)	A pickup truck was driven into, off road, and placed in Training Area BA-7 as a temporary training aid. The MAARNG forwarded a formal notice of violation to the EMC on June 5, 2015.	Camp Edwards staff conducted a Range Officer in Charge and Range Safety brief audit to validate content and effectiveness. Range Control staff will conduct assessments of units while they are training in the Training Area/Reserve to ensure activities are within established performance standards.