Draft

FINDING OF NO SIGNIFICANT IMPACT
FOR

IMPLEMENTATION OF THE TYNDALL AIR FORCE BASE INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN ENVIRONMENTAL ASSESSMENT

Pursuant to the Council on Environmental Quality (CEQ) regulation for implementing the procedural provisions of the National Environmental Policy Act (NEPA), Title 40 of the Code of Federal Regulations (CFR) Parts 1500 through 1508, and the Air Force Environmental Impact Analysis Process (EIAP) regulations 32 CFR Part 989, the United States Air Force (USAF) has prepared an Environmental Assessment (EA) to identify and assess the potential effects on the natural and human environment associated with implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP).

Purpose and Need

The purpose of the Proposed Action is to effectively guide natural resources management at Tyndall AFB based on the environmental conditions, natural resources management needs, and mission activities that are applicable to the 2020-2024 planning period. The Proposed Action is needed to 1) comply with laws and regulations applicable to INRMPs, which primarily include the Sikes Act, as amended, and Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*; 2) ensure that Tyndall AFB's natural resources are maintained in a healthy condition and are capable of supporting the military mission (AFMAN 32-7003); and 3) guide natural resources management at Tyndall AFB in a manner that is appropriate for current ecological conditions, which are considerably different than the conditions managed during the previous planning period, prior to the impacts of Hurricane Michael in 2018.

Proposed Action

The Proposed Action is to implement the Tyndall AFB INRMP that has been updated for the 5-year planning period from 2020 to 2024. The Tyndall AFB INRMP provides guidance to the USAF on how to effectively manage natural resources in concert with its mission at the Base. It identifies natural resources management goals and objectives that will ensure the USAF has continued access to the land and airspace required to accomplish its mission while maintaining the natural resources in a healthy condition. The designated Tyndall AFB Natural Resources Manager has primary responsibility of developing, updating, and implementing the Tyndall AFB INRMP. The Tyndall AFB INRMP is prepared in cooperation with the U.S. Fish and Wildlife Service (USFWS) and Florida Fish and Wildlife Conservation Commission (FWC). The signing of the INRMP by these agencies represents their approval of the aspects of the Plan that are within their regulatory authority.

Alternatives

Based on the alternatives screening analysis conducted, only Alternative 1, which is to implement the updated and approved Tyndall AFB INRMP in its entirety was determined to be a reasonable alternative for the Proposed Action. Alternative 1 would fully comply with the Sikes Act and USAF regulations applicable to the development and implementation of INRMPs (Selection Standard 1); support the Tyndall AFB mission with little to no disruptions to mission activities (Selection Standard 2); and address current environmental conditions and associated natural resources management needs that reflect the

impacts of Hurricane Michael that have occurred since the previous planning period (Section Standard 3) The other alternatives considered did not fully meet the purpose of or need for the Proposed Action, or any of the selection standards.

Under Alternative 1, the Tyndall AFB INRMP would be implemented in its current finalized form, which has been approved by Tyndall AFB, the USFWS, and the FWC. The current updated version of the INRMP incorporates substantial revisions to the information presented in the previous INRMP to reflect the impacts to natural resources from Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018. The primary elements of Tyndall AFB's natural resources management program identified in the updated INRMP are as follows:

- Fish and Wildlife Management
- Outdoor Recreation and Public Access to Natural Resources
- Conservation Law Enforcement
- Management of Threatened and Endangered Species, Species of Concern, and Habitats
- Water Resource Protection
- Wetland Protection
- Grounds Maintenance
- Forest Management
- Wildland Fire Management
- Integrated Pest Management Program
- Invasive and Nuisance Species Management
- Bird/Wildlife Aircraft Strike Hazard (BASH) Program
- Coastal Zone and Marine Resources Management
- Cultural Resources Protection

The Tyndall AFB INRMP discusses each of these primary natural resources program elements and how they are implemented at the Base. The updated INRMP identifies the following five principal goals for managing natural resources at the Base during the 2020-2024 planning period:

- GOAL I: Provide natural resources management and coordination services in support of the mission.
- GOAL II: Restore and manage forests for mission use, habitat improvement, and protection of T&E species.
- GOAL III: Enable long-term sustainability of beach environments for military use by protecting T&E species and their habitats.
- GOAL IV: Restore and protect wetland habitats to comply with federal law and protect T&E species.
- GOAL V: Provide a variety of uses, values, products, and services to present and future generations while maintaining sustainable ecosystems.

These five primary goals are broad, overarching, and designed to be achieved over the long-term during the course of the current planning period and continuing into subsequent planning periods. Each of these five principal goals are further broken down into associated supporting goals and objectives in the INRMP. Together, the primary goals and associated secondary goals and objectives express the desired condition for the Base's natural resources during and beyond the planning period.

The No Action Alternative is to maintain existing conditions. Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. The previous INRMP would not address current environmental conditions and associated natural resources management needs that reflect the impacts of Hurricane Michael, or that have occurred since the previous planning period.

Environmental Consequences

Based on the findings of this EA, Alternative 1 would have no appreciable effect on noise, airspace, geology, infrastructure, utilities, transportation, socioeconomics, or cultural resources, and would have beneficial impacts on water resources, biological resources, and land use. Alternative 1 would not have disproportionately high or adverse human health or environmental effects on minority or low-income populations and would not result in environmental health or safety risks to children. Alternative 1 would potentially have minor impacts on air quality, soils, safety, and hazardous materials/waste; the impacts on these resources would not be significant. When combined with past, present, or future actions, Alternative 1 would have no adverse cumulative impacts on these resources.

Mitigation Measures and Required Permits

Environmental impacts from mission and recreational activities at Tyndall AFB are avoided, minimized, and mitigated through various management actions implemented under the INRMP. The NEPA, permitting, and mitigation requirements of proposed actions at the Base are determined through EIAP review in association with implementation of the INRMP.

Certain natural resources management activities that would be implemented under the updated INRMP may require permits and mitigative measures. Projects that would impact federal and state jurisdictional wetlands/waters would require authorization through the federal Clean Water Act Section 404 dredge and fill permitting program and the State of Florida Environmental Resource Permit (ERP) program. Any construction project under the updated INRMP that would disturb 1 acre or more of land would require a National Pollutant Discharge Elimination System *Generic Permit for Stormwater Discharges from Large and Small Construction Activities*, issued by the Florida Department of Environmental Protection. This permit is often referred to as a Construction Generic Permit or construction stormwater permit. A Stormwater Pollution Prevention Plan must be prepared and implemented as part of this permit to address the best management practices and engineering controls to be used to prevent and minimize erosion, sedimentation, and pollution during construction. Examples of planned projects expected to require Section 404, ERP, and construction stormwater permits include the proposed projects to replace the recreational boardwalks and access roads on the barrier islands that were destroyed by Hurricane Michael.

The primary management actions required to prevent adverse impacts during insecticide use under the Tyndall AFB BASH program have been identified in the attached EA. These management actions were developed in coordination with Tyndall Natural Resources, the United States Department of Agriculture BASH biologist for Tyndall AFB, and the USFWS liaison to Tyndall AFB and include measures to prevent direct contact with aquatic bodies during applications and indirect contact with aquatic bodies via runoff and aerial/wind drift. These management actions will be included in the next update of the BASH Plan and will also be incorporated as appropriate into the next updates of the INRMP and Pest Management Plan.

The following management actions will be implemented to prevent environmental impacts from insecticide use under the Tyndall AFB BASH program:

- Insecticides will be used only by certified personnel in accordance with the instructions provided on their U.S. Environmental Protection Agency pesticide product labels.
- All insecticides proposed for use will be sent to the 325 CES/CEIEC Hazardous Materials Office for review and approval prior to use on the Base and must be tracked throughout the duration of their use.
- All treatment areas will be surveyed for aquatic bodies and drainage features prior to treatment. Aquatic bodies and drainage features will be identified on mapping and marked in the field as necessary.

- Insecticides will be applied from the ground only; aerial spraying of insecticides will not be conducted.
- Insecticides will be applied only to areas covered by grass that is regularly mowed. Insecticides will not be applied to impervious surfaces such as pavement, bare soil with no vegetative cover, or vegetated areas that are covered by shrubs or trees.
- Insecticides will not be applied within 25 feet of aquatic bodies. Grass or other vegetative cover that can serve as a vegetated buffer strip must exist between areas to be treated and aquatic bodies.
- Insecticides will not be applied within 25 feet of storm drains, culverts, or other drainage features that could transport them to connected aquatic systems.
- To minimize runoff potential, applications will consider site topography and drainage patterns. Steeply sloped areas leading to aquatic habitats and other areas where excessive runoff could occur will be identified and avoided.
- To minimize runoff potential, insecticides will not be applied if heavy rainfall is imminent. To the extent practicable, applications will be avoided when rainfall is forecasted to occur within 48 hours.
- To minimize drift potential, insecticides will be applied only during low-wind conditions. To the extent practicable, applications will be conducted when wind speeds are less than 10 miles per hour (mph) and will not be conducted when wind speeds exceed 15 mph. Aerial drift may be reduced by adjusting spray nozzles to apply larger-sized droplets.
- To minimize drift potential, insecticides will be applied outside of temperature inversions to the extent practicable. Temperature inversions are characterized by increasing temperatures with altitude and they restrict vertical air mixing. Inversions begin to form as the sun sets and often continue into morning. The presence or absence of temperature inversions in the area will be confirmed by the Tyndall AFB Weather Office.

Public Review and Stakeholder Consultation

A Notice of Availability is being published in the *Panama City News Herald* to announce the 30-day availability of the draft EA for public review and comment. Copies of the draft EA are being made available for public review at the Bay County Public Library and on the Tyndall AFB public website. The USAF is consulting with the USFWS, FWC, State Historic Preservation Office, and applicable Native American Tribes on the Proposed Action. The Florida State Clearinghouse is coordinating state review of the draft EA and determining consistency of the Proposed Action with the Florida Coastal Management Program.

Finding of No Significant Impact

Based on my review of the facts and analysis in the attached EA, I conclude Alternative 1 would not have a significant impact on the natural or human environment, either by itself or considering cumulative impacts. The requirements of the NEPA, the President's CEQ, and 32 CFR Parts 651 and 989 have been fulfilled. An Environmental Impact Statement is not required and will not be prepared.

GREGORY M. MOSELEY
Colonel, USAF
Commander

Date

D R A F T

Environmental Assessment for Implementation of the Tyndall Air Force Base Integrated Natural Resources Management Plan

Prepared for

Air Combat Command
325th Fighter Wing
Tyndall AFB, Florida

March 2021

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Acronyms and Abbreviations

325 CES/CEIE	325th Civil Engineer Squadron/Environmental Element
325 CES/CEIEA	325th Civil Engineer Squadron/Environmental Element, Natural Resources
325 CES/CEIEC	325th Civil Engineer Squadron/Environmental Element, Compliance
325 FW	325th Fighter Wing,
325 FW/SEF	325th Fighter Wing/Flight Safety
ACM	asbestos-containing material
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, and Health
BASH	Bird/Wildlife Aircraft Strike Hazard
BGEPA	Bald and Golden Eagle Protection Act
bls	below land surface
BMP	best management practice
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIE	Crooked Island East
CIW	Crooked Island West
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DoD	Department of Defense
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
ERP	Environmental Resource Permit
ESA	Endangered Species Act
FAC	Florida Administrative Code
FBBCR	Florida Black Bear Conservation Rule
FCMP	Florida Coastal Management Program
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FNAI	Florida Natural Areas Inventory
FONSI	Finding of No Significant Impact
FWC	Florida Fish and Wildlife Conservation Commission
GHG	greenhouse gas
ICRMP	Integrated Cultural Resources Management Plan
IDP	Installation Development Plan

IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
LBP	lead-based paint
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
MMRP	Military Munitions Response Program
mph	miles per hour
MS4	Municipal Separate Storm Sewer Systems
MSGP	Multi-Sector General Permit
NAAQS	National Ambient Air Quality Standards
NCEI	National Center for Environmental Information
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OSHA	Occupational Safety and Health Administration
PCBs	polychlorinated biphenyls
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
POL	petroleum, oil, and lubricants
RCRA	Resource Conservation and Recovery Act
RCW	red-cockaded woodpecker
RICE	Reciprocating Internal Combustion Engine
SAIA	Sikes Act Improvement Act
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SOP	standard operating procedure
SWPPP	stormwater pollution prevention plan
T&E	Threatened and Endangered
tpy	tons per year
U.S.	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTV	utility terrain vehicle
UXO	unexploded ordnance
WMA	Wildlife Management Area

SECTION 1

Purpose and Need for the Proposed Action

1.1 Introduction

The United States Air Force (USAF) updated the Integrated Natural Resources Management Plan (INRMP) for Tyndall Air Force Base (AFB), Florida for the 5-year planning period from 2020 to 2024. The Tyndall AFB INRMP (USAF, 2020a) provides guidance to the USAF on how to effectively manage natural resources in concert with its mission at the Base. The current updated version of the INRMP incorporates substantial revisions to the information presented in the previous INRMP, which were needed as a result of the impacts of Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018 and caused catastrophic damage to the infrastructure and natural resources of the Base.

Based on the extent of the revisions needed to update the INRMP to reflect post-hurricane conditions, the USAF determined that the Plan should undergo a detailed environmental review prior to its implementation. Accordingly, the USAF prepared this Environmental Assessment (EA) to analyze the potential environmental impacts associated with implementation of the updated Tyndall AFB INRMP. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) (42 United States Code [USC] §4321-4347), the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] §1500-1508), and 32 CFR Part 989, et seq., Environmental Impact Analysis Process. NEPA is the basic national requirement for identifying environmental consequences of federal decisions. NEPA ensures that environmental information is available to the public, agencies, and the decision-maker before decisions are made and before actions are taken.

1.2 Purpose and Need

The purpose of the Proposed Action is to effectively guide natural resources management at Tyndall AFB based on the environmental conditions, natural resources management needs, and mission activities that are applicable to the 2020-2024 planning period. Implementation of the updated INRMP would allow the USAF to manage natural resources at Tyndall AFB based on post-hurricane conditions, which represent a new ecological baseline and associated management needs, and based on the current mission of the Base, which has also changed since the previous planning period.

The Proposed Action is needed to 1) comply with laws and regulations applicable to INRMPs, which primarily include the Sikes Act, as amended, and Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*; 2) ensure that Tyndall AFB's natural resources are maintained in a healthy condition and are capable of supporting the military mission (AFMAN 32-7003); and 3) guide natural resources management at Tyndall AFB in a manner that is appropriate for current ecological conditions, which are considerably different than the conditions managed during the previous planning period, prior to the impacts of Hurricane Michael.

1.3 Location of the Proposed Action

Tyndall AFB is located approximately 13 miles east of Panama City in the southeastern corner of Bay County, Florida (Figure 1-1). The Base is approximately 18 miles long by 3 miles wide and encompasses approximately 29,276 acres on a peninsula that is surrounded by the waters of the Gulf of Mexico to the south, St. Andrew Bay to the west, and East Bay to the north. Tyndall AFB property includes the barrier spits of Shell Island, Crooked Island West (CIW), and Crooked Island East (CIE) on the Gulf of Mexico; CIW and CIE form St. Andrews Sound. United States (U.S.) Highway 98 extends through the Tyndall AFB peninsula, dividing the Base into north and south segments.

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Map source: Microsoft Mappoint. © 2006 Microsoft Corporation. © 2006 NAVTEQ.

Figure 1-1. Location of Tyndall Air Force Base

1.4 Decision to be Made

The USAF will make one of the following three decisions regarding the Proposed Action:

1. Select the No Action Alternative and do not implement the updated Tyndall AFB INRMP.
2. Prepare a Finding of No Significant Impact (FONSI) and implement the updated Tyndall AFB INRMP, if based on the analysis in this EA, the Proposed Action would not have a significant environmental impact.
3. Initiate preparation of an Environmental Impact Statement (EIS), if based on the analysis in this EA, the Proposed Action would have a significant environmental impact.

1.5 Interagency Coordination and Consultation

The environmental analysis process, in compliance with NEPA guidance, includes public and agency review of information pertinent to the Proposed Action. Scoping is an early and open process for developing the breadth of issues to be addressed in an EA and for identifying significant concerns related to an action. Per the requirements of the Intergovernmental Cooperation Act of 1968 (42 USC 4231[a]) and Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, federal, state, and local agencies with jurisdiction that could potentially be affected by the Proposed Action were

requested to provide input during development of this EA, including the United States Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FWC), Florida State Clearinghouse, and State Historic Preservation Office (SHPO). Those Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) letters and responses are included in Appendix A.

1.6 Government-to-Government Consultation

EO 13175, *Consultation and Coordination with Indian Tribal Governments*, directs federal agencies to coordinate and consult with Native American tribal governments whose interests might be directly and substantially affected by activities on federally administered lands. Consistent with EO 13175, Department of Defense (DoD) Instruction 4710.02, *Interactions with Federally-Recognized Tribes*, and Department of the Air Force Instruction 90-2002, *Interaction with Federally Recognized Tribes*, federally recognized tribes that are historically affiliated with lands in the vicinity of the Proposed Action have been invited to consult on all proposed undertakings that have potential to affect properties of cultural, historical, or religious significance to the tribes. The tribal consultation process is distinct from NEPA consultation or the interagency coordination process, and it requires separate notification of all relevant tribes. The timelines for tribal consultation are also distinct from those of other consultations. The Installation Commander is the point-of-contact for consultation with Native American tribes. Documentation of government-to-government consultation is included in Appendix A.

1.7 Public Review of Environmental Assessment

A Notice of Availability is being published in the *Panama City News Herald* to announce the 30-day availability of the draft EA for public review and comment. Copies of the draft EA are being made available for public review at the Bay County Public Library and on the Tyndall AFB public website. Comments from the public will be included in Appendix B and addressed in the final EA.

1.8 Coastal Zone Management Consistency

The federal Coastal Zone Management Act (CZMA) provides assistance to states, in cooperation with federal and local agencies, to develop land and water use programs in coastal zones. According to Section 307 of the CZMA, federal projects that affect land uses, water uses, or coastal resources in a state's coastal zone must be consistent, to the maximum extent practicable, with the enforceable policies of that state's federally approved coastal zone management plan.

The Florida Coastal Management Program (FCMP) is based on a network of agencies implementing 24 statutes that protect and enhance Florida's natural, cultural, and economic coastal resources. The Florida Department of Environmental Protection (FDEP) implements the FCMP through the Florida State Clearinghouse. The Clearinghouse routes applications for federal activities, such as EAs, to the appropriate state, regional, and local reviewers to determine federal agency consistency with the FCMP. Following their review of the EA, the FCMP state agencies provide comments and recommendations to the Clearinghouse based on their statutory authorities. Based on an evaluation of the comments and recommendations, the FDEP makes the state's CZMA consistency determination for the proposed federal activity. Comments and recommendations regarding federal agency consistency are then forwarded to the applicant in the state clearance letter issued by the Clearinghouse.

An email and copy of the draft EA, along with the USAF's federal CZMA consistency determination, which is provided as Appendix C, are being sent to the Florida State Clearinghouse to obtain the state's CZMA consistency determination for the Proposed Action (Appendix A). The state's CZMA consistency determination for the Proposed Action and associated comments will be included in Appendix A and addressed in the final EA.

1.9 Applicable Laws and Environmental Regulations

Implementation of the Proposed Action would involve coordination with several organizations and agencies. Adherence to the requirements of specific laws, regulations, best management practices, and necessary permits are described in detail in each resource section. A list of laws and regulations relevant to NEPA and the resources assessed in this EA is provided as Appendix D.

1.9.1 National Environmental Policy Act

NEPA requires that federal agencies consider potential environmental consequences of proposed actions. The law's intent is to protect, restore, or enhance the environment through well-informed federal decisions. The CEQ was established under NEPA for the purpose of implementing and overseeing federal policies as they relate to this process. In 1978, the CEQ issued Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR §1500-1508). These regulations specify that an EA be prepared to:

- Briefly provide sufficient analysis and evidence for determining whether to prepare a FONSI or an EIS
- Aid in an agency's compliance
- Facilitate preparation of an EIS when one is necessary

1.9.2 The Environmental Impact Analysis Process

The Environmental Impact Analysis Process (EIAP) is the process by which the USAF facilitates compliance with environmental regulations (32 CFR Part 989, *Environmental Impact Analysis Process*), including NEPA, which is the primary legislation affecting the agency's decision-making process.

SECTION 2

Description of the Proposed Action and Alternatives

2.1 Proposed Action

The Proposed Action is to implement the Tyndall AFB INRMP that has been updated for the 5-year planning period from 2020 to 2024. The INRMP is the primary tool for managing natural resources on U.S. military installations. The Tyndall AFB INRMP (USAF, 2020a) provides guidance to the USAF on how to effectively manage natural resources in concert with its mission at the Base. It identifies natural resources management goals and objectives that will ensure the USAF has continued access to the land and airspace required to accomplish its mission while maintaining the natural resources in a healthy condition. The current updated version of the INRMP incorporates substantial revisions to the information presented in the previous INRMP to reflect the impacts to natural resources from Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018.

2.1.1 Authority

Regulations applicable to INRMPs primarily include the Sikes Act, as amended, and AFMAN 32-7003, *Environmental Conservation*. The Sikes Act (16 U.S. Code 670) was amended by the Sikes Act Improvement Act (SAIA), which was enacted in 1997 to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate such a program, the SAIA requires the secretary of each military department to prepare and implement an INRMP at appropriate military installations throughout the U.S. under their respective jurisdictions, unless the secretary determines the absence of significant natural resources on a particular installation makes the preparation of such a plan inappropriate.

AFMAN 32-7003, *Environmental Conservation*, provides guidance and procedures for natural and cultural resource programs at USAF installations; it implements DoD Instruction 4715.03, *Natural Resources Conservation Program* and Air Force Policy Directive 32-70, *Environmental Considerations in Air Force Programs and Activities*, and supports Air Force Instruction (AFI) 32-7001, *Environmental Management*. AFMAN 32-7003 supersedes AFI 32-7064, *Integrated Natural Resources Management* and AFI 32-7065, *Cultural Resources Management Program*.

2.1.2 Principal Goals and Management Philosophy

The goals and objectives of the Tyndall AFB INRMP have been developed to allow the USAF to manage natural resources based on sound conservation practices in support of its overall mission at the Base. The INRMP assesses the impacts that mission activities have on natural resources at Tyndall AFB and the means to mitigate the impacts. The plan does not evaluate the USAF's mission, nor does it replace any environmental documentation requirements of the mission. Goals and objectives are adjusted over time using an adaptive management approach as the USAF's mission and the ecological conditions at Tyndall AFB change.

The Tyndall AFB INRMP identifies the following five principal goals for managing natural resources at the Base:

1. Provide natural resources management and coordination services in support of the mission.
2. Restore and manage forests for mission use, habitat improvement, and protection of threatened and endangered (T&E) species.

3. Enable long-term sustainability of beach environments for military use by protecting T&E species and their habitats.
4. Restore and protect wetland habitats to comply with federal law and protect T&E species.
5. Provide a variety of uses, values, products, and services to present and future generations while maintaining sustainable ecosystems.

Each of these five principal goals are further broken down into associated supporting goals and objectives. The first principal goal of the INRMP is to ensure the long-term availability of the land and natural resources at Tyndall AFB for the USAF's mission activities at the Base. This goal is compatible with, and depends on, sound environmental stewardship and conservation practices. The USAF can maintain the health of the ecosystem at Tyndall AFB through consideration of the soil, water, floodplains, vegetation, wildlife, and natural communities during planning and implementation of its operations at the Base.

Natural resources at Tyndall AFB are managed using an ecosystem-based management strategy. This strategy balances the USAF's mission needs with the goal of maintaining/improving the integrity, biodiversity, and sustainability of the ecosystem. Biodiversity protection is an integral part of ecosystem management. The preservation and enhancement of biodiversity at Tyndall AFB is consistent with the USAF's mission and is also an overarching goal of INRMP implementation. Based on the Tyndall AFB INRMP, ecosystem management at the Base includes the following principles:

- Maintenance or restoration of native ecosystems across their natural range where practical and consistent with the military mission.
- Maintenance or restoration of ecological processes, such as fire and other disturbance regimes, where practical and consistent with the military mission.
- Maintenance or restoration of the hydrological processes in floodplains and wetlands, when feasible.
- Collaboration with other DoD components as well as other federal, state, and local agencies, and adjoining property owners.
- Provision for outdoor recreation, agricultural production, harvesting of forest products, and other practical utilization of the land and its resources, provided that such use does not inflict long-term ecosystem damage or negatively impact the USAF mission.

Sustainability can be defined as the capacity to endure. Ensuring the sustainability of the USAF's mission and the natural environment is an overarching goal of the Tyndall AFB natural resources management program. Tyndall AFB's environmental management strategy strives to incorporate sound environmental practices in all aspects of USAF actions and plans at the Base to achieve environmental and mission sustainability. The assessment of natural resources through surveys and monitoring is an important element of Tyndall AFB's environmental management strategy. Measuring and monitoring natural resources allows the USAF to evaluate the effectiveness of management plans and practices, and to adapt them as necessary.

2.1.3 Responsibilities and Integration with Other Plans

Effective management of natural resources at Tyndall AFB requires good communication and coordination among various stakeholders and a commitment by each to support the goals and objectives of the Base's natural resources management program. The 325th Civil Engineer Squadron/ Environmental Element (325 CES/CEIE) has primary responsibility for implementing the Tyndall AFB natural resources management program and is the lead organization for monitoring the program's compliance with applicable federal, state, and local regulations. The designated Tyndall AFB Natural Resources Manager under the 325th Civil Engineer Squadron/Environmental Element, Natural

Resources (325 CES/CEIEA) has primary responsibility of developing, updating, and implementing the Tyndall AFB INRMP.

The 325 CES/CEIE coordinates with other internal organizations and military user groups to ensure that natural resources management at Tyndall AFB is integrated with other Base management programs and with mission activities. The INRMP is prepared in cooperation with the USFWS and FWC. The signing of the INRMP by these agencies represents their approval of the aspects of the Plan that are within the scope of their regulatory authority. In addition to the USFWS and FWC, the Tyndall AFB INRMP is also signed by the 325th Fighter Wing (325 FW) Commander.

Development and implementation of the Tyndall AFB INRMP is integrated with several other Base plans and documents. For example, the INRMP is integrated with the Installation Development Plan and Air Installation Compatible Use Zone Plan with respect to guidance for on-base infrastructure development. The 325 CES/CEIE ensures that the environmental constraints identified in the INRMP are considered during the planning process for development projects, and that development projects are implemented in compliance with all applicable environmental laws and regulations. Other examples include the integration of the INRMP with the Bird/Wildlife Aircraft Strike Hazard (BASH) Plan, which addresses the hazards associated with incidents of birds and other types of wildlife striking aircraft, and with the Integrated Pest Management Plan, which addresses control of insects and other pests at the Base. The integration of the INRMP with these and other plans is directed by AFMAN 32-7003, *Environmental Conservation*.

2.1.4 Review and Revision Process

The updated Tyndall AFB INRMP that is addressed under the Proposed Action covers the 5-year planning period from 2020 to 2024. At the end of this and each subsequent 5-year planning period, a revised/ updated plan will be prepared for the next planning period. Within the 5-year planning period, the INRMP should also be reviewed and modified as necessary not less than annually, or as changes to natural resources management practices occur, including those driven by changes in applicable regulations. Annual reviews of the Tyndall AFB INRMP are conducted by the Tyndall AFB Natural Resources Manager in coordination with the USFWS and FWC; these agencies document their concurrence with the findings of the annual review by signing the Annual INRMP Review Summary. The 325 FW Commander certifies the annual reviews of the Tyndall AFB INRMP. Five-year and annual reviews of the INRMP should evaluate the effectiveness of the plan; the plan's potential impact on the USAF's mission; and whether the information in the plan is current, relevant, and reliable.

2.2 Selection Standards

Under NEPA and 32 CFR Part 989, this EA is required to analyze the potential environmental impacts of the Proposed Action, No Action Alternative, and reasonable alternatives. Reasonable alternatives are those that meet the underlying purpose of, and need for, the Proposed Action; are feasible from a technical and economic standpoint; and meet reasonable selection standards (screening criteria) that are suitable to a particular action. Selection standards may include requirements or constraints associated with operational, technical, environmental, budgetary, and time factors. Alternatives that are determined to not be reasonable can be eliminated from detailed analysis in this EA.

The primary selection standards used to screen alternatives for the Proposed Action of implementing an INRMP at Tyndall AFB included 1) complying with the Sikes Act and USAF regulations applicable to INRMPs, 2) supporting the Tyndall AFB mission with minimal disruptions, and 3) addressing current environmental conditions and natural resources management needs (Table 2-1).

Table 2-1. Selection Standards for Alternatives
EA for Implementation of Tyndall AFB INRMP

Selection Standards	Description
1 – Complies with the Sikes Act and USAF regulations applicable to INRMPs	Natural resources management at Tyndall AFB must be guided by an INRMP that is developed and implemented in compliance with the Sikes Act, as amended, and applicable USAF regulations, including AFMAN 32-7003, *Environmental Conservation*.
2 – Supports the Tyndall AFB mission with minimal disruptions	Natural resources management at Tyndall AFB must be guided by an INRMP that supports the current Tyndall AFB mission with minimal disruptions to mission activities. Any disruptions must be minor and have an overall beneficial impact on the mission.
3 – Addresses current environmental conditions and management needs	Natural resources management at Tyndall AFB must be guided by an INRMP that addresses environmental conditions and natural resources management needs that are current and applicable to the 2020-2024 planning period. Current environmental conditions and natural resources management needs reflect the impacts of Hurricane Michael that have occurred since the previous planning period.

2.2.1 Screening of Alternatives

The USAF screened the following alternatives to determine if they meet the purpose of and need for Proposed Action, are feasible from a technical and economic standpoint, and if they meet the selection standards identified in Table 2-1.

1. Alternative 1 (Preferred Alternative) – Implement the Tyndall AFB INRMP that has been updated and approved for the 2020-2024 planning period. Under this alternative, the entire INRMP would be implemented.
2. Alternative 2 – Partially implement the Tyndall AFB INRMP that has been updated and approved for the 2020-2024 planning period. Under this alternative, certain components of the INRMP, but not the entire Plan, would be implemented.
3. No Action Alternative – Do not implement the Tyndall AFB INRMP that has been updated and approved for the 2020-2024 planning period. Under this alternative, natural resources management at the Base would continue to be conducted under the previous version of the INRMP.

Based on the alternatives screening analysis conducted, only Alternative 1 (Preferred Alternative), which is to implement the updated and approved Tyndall AFB INRMP in its entirety was determined to be a reasonable alternative for the Proposed Action. Alternative 1 would fully comply with the Sikes Act and USAF regulations applicable to the development and implementation of INRMPs (Selection Standard 1); support the Tyndall AFB mission with little to no disruptions to mission activities (Selection Standard 2); and address current environmental conditions and associated natural resources management needs that reflect the impacts of Hurricane Michael that have occurred since the previous planning period (Section Standard 3) (Table 2-2). For these reasons, Alternative 1 was determined to be a reasonable alternative and is analyzed in detail in this EA.

Alternative 2 would not fully meet the purpose of or need for the Proposed Action, or the selection standards (Table 2-2); therefore, it was determined to not be reasonable and was eliminated from detailed analysis in this EA. The No Action Alternative would also not meet the purpose of or need for the Proposed Action, or the selection standards; however, it is analyzed in detail in this EA to provide a comparative baseline against which the effects of the Proposed Action can be assessed, as required under CEQ Regulations (40 CFR Part 1502.14). Alternative 1 and the No Action Alternative are described

in detail in Section 2.3 and the alternatives that were eliminated from detailed analysis are described in detail in Section 2.4.

Table 2-2. Comparison of Potential Alternatives Against Selection Standards
EA for Implementation of Tyndall AFB INRMP

Potential Alternative	Selection Standard		
	1 – Complies with Regulations Applicable to INRMPs	**2- Supports the Mission with Minimal Disruptions**	**3 – Addresses Current Environmental Conditions and Management Needs**
Alternative 1 – Implement the 2020-2024 Tyndall AFB INRMP	Yes	Yes	Yes
Alternative 2 – Partially implement the 2020-2024 Tyndall AFB INRMP	Partially	No	Partially
No Action Alternative – Do not implement the 2020-2024 Tyndall AFB INRMP	No	No	No

Yes Meets selection standard
No Does not meet selection standard
Partially Does not fully meet selection standard

2.3 Detailed Description of the Alternatives

2.3.1 Alternative 1 (Preferred Alternative)

Alternative 1, which is the Preferred Alternative, is to implement the Tyndall AFB INRMP that has been updated for the 2020-2024 planning period. Under this alternative, the INRMP would be implemented in its current finalized form, which has been approved by Tyndall AFB, the USFWS, and the FWC. Alternative 1 acknowledges that the INRMP will be revised as necessary during the planning period to address changes in environmental conditions, natural resources management practices, or applicable regulations, and that such changes will require approval by the signatory stakeholders prior to implementation. Major changes to the INRMP during the planning period may require additional NEPA analysis and documentation, depending on their magnitude and potential effects.

The current updated version of the INRMP incorporates substantial revisions to the information presented in the previous INRMP to reflect the impacts to natural resources from Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018. The primary elements of Tyndall AFB's natural resources management program identified in the updated INRMP are as follows:

- Fish and Wildlife Management
- Outdoor Recreation and Public Access to Natural Resources
- Conservation Law Enforcement
- Management of Threatened and Endangered Species, Species of Concern, and Habitats
- Water Resource Protection
- Wetland Protection
- Grounds Maintenance
- Forest Management
- Wildland Fire Management
- Integrated Pest Management Program

- Invasive and Nuisance Species Management
- Bird/Wildlife Aircraft Strike Hazard (BASH) Program
- Coastal Zone and Marine Resources Management
- Cultural Resources Protection

The Tyndall AFB INRMP discusses each of these primary natural resources program elements and how they are implemented at the Base. The elements are described and analyzed in this EA with respect to their potential impacts on the resources that are addressed.

Per AFMAN 32-7003, *Environmental Conservation*, "the primary objective of Air Force natural resources programs is to sustain, restore, and modernize natural infrastructure to ensure operational capability and no net loss in the capability of Air Force lands to support the military mission of the installation." In line with this overarching objective, the Tyndall AFB INRMP has been developed to allow the USAF to manage natural resources based on sound conservation practices in support of its overall mission at the Base.

The updated Tyndall AFB INRMP identifies the following five principal goals for managing natural resources at the Base during the 2020-2024 planning period:

- GOAL I: Provide natural resources management and coordination services in support of the mission.
- GOAL II: Restore and manage forests for mission use, habitat improvement, and protection of T&E species.
- GOAL III: Enable long-term sustainability of beach environments for military use by protecting T&E species and their habitats.
- GOAL IV: Restore and protect wetland habitats to comply with federal law and protect T&E species.
- GOAL V: Provide a variety of uses, values, products, and services to present and future generations while maintaining sustainable ecosystems.

These five primary goals are broad, overarching, and designed to be achieved over the long-term during the course of the current planning period and continuing into subsequent planning periods. Each of these five principal goals are further broken down into associated supporting goals and objectives in the INRMP. Together, the primary goals and associated secondary goals and objectives express the desired condition for the Base's natural resources during and beyond the planning period. These goals and objectives, along with the specific projects identified in the INRMP to accomplish the goals and objectives, collectively represent the primary components of INRMP implementation during the planning period. The specific projects identified in the INRMP are associated with the annual workplans and are programmed into the overall budget of the natural resources management program.

For the purpose of analyzing the potential impacts of INRMP implementation in this EA, the management goals and objectives presented in Section 8 of the INRMP and the projects associated with the annual workplans presented in Section 10 of the INRMP were consolidated into a concise list of actions that represent the primary components of INRMP implementation under Alternative 1 (Table 2-3). This list was developed in coordination with the Tyndall AFB Natural Resources Manager, United States Department of Agriculture (USDA) BASH biologist for Tyndall AFB, and the USFWS liaison to Tyndall AFB, and serves as the basis for analyzing the potential impacts of Alternative 1 in this EA.

Table 2-3. Proposed Natural Resources Management Actions under Alternative 1
EA for Implementation of Tyndall AFB INRMP

Natural Resources Management Action	Description	Previous/Recurring or New INRMP Action
INRMP GOAL I: Provide Natural Resources Management and Coordination Services in Support of the Mission		
Action 1: Assess potential impacts and satisfy applicable regulatory requirements for proposed mission activities.	• Ensure that proposed mission-related activities do not proceed until their potential impacts on natural resources are assessed via the EIAP process and all applicable regulatory requirements and agency consultations are satisfied.	Previous/Recurring
Action 2: Communicate and track natural resources requirements for proposed mission activities.	• Review permits, NEPA documents, and consultations to identify natural resources commitments made by Tyndall AFB. • Communicate the requirements to pertinent Base personnel for implementation and track/monitor compliance (for example, via site inspections).	Previous/Recurring
Action 3: Communicate beach protection measures to military users.	• By January 1 of each year, determine which military users require beach access and driving. • By February 1 of each year, provide a reminder or new notice to those users on environmental protection measures to be followed while on the beach.	Previous/Recurring
Action 4: Evaluate compatibility of recreational areas with mission.	• Ensure compatibility of recreational areas with short- and long-term mission requirements through at least annual coordination with natural and cultural resources managers.	Previous/Recurring
Action 5: Evaluate the effects of climate change on the mission and natural resources.	• Coordinate with internal and external organizations on the potential effects of climate change on the military mission and natural resources. • Evaluate options for addressing the effects of climate change on natural resources.	Previous/Recurring
Action 6: Provide prescribed fire management support to the mission.	• On an annual basis, and in coordination with the Eglin Wildland Support Module, prioritize areas that require prescribed fire. • On an annual basis, update the map of proposed burn units. • On an annual basis, submit the AF Form 813 for proposed burn units and roads and firebreaks proposed to be maintained or created. • On an annual basis, provide education to military users on wildfire prevention and the benefits of prescribed fire to reduce fire starts.	Previous/Recurring

Table 2-3. Proposed Natural Resources Management Actions under Alternative 1
EA for Implementation of Tyndall AFB INRMP

Natural Resources Management Action	Description	Previous/Recurring or New INRMP Action
Action 7: Provide wildland fire management support to the mission.	• By 2021, update all interagency agreements related to wildfire incident response. • By 2022, develop a fire considerations map that identifies sensitive areas such as wetlands, T&E species locations, and unexploded ordnance areas, and formalize procedures required for these areas. • By 2023, identify a system of fire breaks, including minimum specifications and condition monitoring protocols, to reduce the potential for fire to impact areas of high mission value. Annually maintain firebreaks based on needs identified during the condition monitoring. • By 2023, identify priority fire-dependent areas that require mechanical vegetation removal due to the difficulty of burning (for example, along urban interfaces and in fire suppressed areas that pose a safety risk). By 2024, conduct mechanical fuel treatments on the identified areas.	New
Action 8: Provide natural resources support to Flight Safety and BASH program.	• Maintain depredation permits required for control of migratory birds and coordinate removal of hazardous wildlife as needed to promote airfield safety. • Semi-annually meet with the BASH Working Group to identify long-term solutions for management of airfield wetlands to reduce BASH risk. • Conduct forestry operations to remove trees that are in or have immediate potential to encroach into airfield glide slopes.	Previous/Recurring
Action 9: Incorporate insecticide use into the BASH Program.	• Conduct insecticide treatments to control insect food sources on the main and drone airfields. • Monitor and document the results of treatments. • Annually evaluate and refine the treatment strategies in coordination with Flight Safety, Tyndall Natural Resources, USFWS, and FWC.	New
INRMP GOAL II: Restore and Manage Forests for Mission Use, Habitat Improvement, and Protection of T&E Species		
Action 1: Implement a prescribed fire program to benefit natural forest communities and reduce the potential for severe wildfires that could impact Tyndall AFB's mission and assets.	• Meet annual prescribed fire targets of 4,500 acres from 2020 to 2022, and between 4,500 acres and 6,000 acres during 2023 and 2024. • Annually adjust prescribed fire plan based on fire and smoke behavior and effects resulting from post-hurricane fuel conditions.	New

Table 2-3. Proposed Natural Resources Management Actions under Alternative 1
EA for Implementation of Tyndall AFB INRMP

Natural Resources Management Action	Description	Previous/Recurring or New INRMP Action
	• Monitor first-order fire effects using the Composite Burn Index protocol within all permanent vegetation plots located within areas that are burned.	
Action 2: Restore native forest ecosystems and dependent species to increase ecosystem resiliency and military mission flexibility.	• Plant 9,000 to 10,000 acres of longleaf pine seedlings by 2025 at approximately 681 trees per acre. Prepare planting sites with fire or mechanical means before planting and use prescribed fire to promote proper growth and ground cover after planting.	New
Action 3: Manage invasive plant species and nuisance animal species.	• Annually identify and map locations of invasive plant species and annually treat approximately 500 acres of priority areas. • Provide education/outreach services to housing residents, security forces, and geographically separated work areas regarding nuisance species. Conduct nuisance species removal in priority areas.	Previous/Recurring
Action 4: Protect bald eagles, migratory birds, and other avian species in accordance with federal law.	• Conduct annual surveys for new bald eagle nests, and monthly surveys during the nesting season. • Ensure that construction and other applicable activities follow the Bald Eagle Management Guidelines, including maintaining a minimum 330-foot buffer around active bald eagle nests.	Previous/Recurring
Action 5: Protect indigo snakes and their habitats in accordance with federal law and prepare for the federal listing of the gopher tortoise.	• Survey for gopher tortoises, indigo snakes, and other sensitive commensal species in high-priority habitat where the ground is proposed to be disturbed. Conduct relocations of gopher tortoises and commensals as needed. • Annually prepare a report and map of known gopher tortoise burrows for the gopher tortoise Candidate Conservation Agreement.	Previous/Recurring
Action 6: Survey for and manage federally listed and petitioned plant species in accordance with federal law.	• Continue to survey and map federally listed and petitioned plant species that occur or potentially occur at Tyndall AFB, including the following: Godfrey's butterwort, telephus spurge, bear tupelo, Henry's spider lily, blackbract pipewort, hairy-peduncled beakrush, Kral's yellow-eyed grass, panhandle meadow-beauty, small-flower meadow-beauty, smooth-barked St John's wort, and West's flax. • Conduct annual population counts for federally listed plant species.	Previous/Recurring

Table 2-3. Proposed Natural Resources Management Actions under Alternative 1
EA for Implementation of Tyndall AFB INRMP

Natural Resources Management Action	Description	Previous/Recurring or New INRMP Action
INRMP GOAL III: Enable Long-Term Sustainability of Beach Environments for Military Use by Protecting T&E Species and Their Habitats		
Action 1: Monitor and survey sea turtles, beach mice, shorebirds, and Gulf sturgeon in accordance with federal law.	• Locate, protect, and evaluate 100 percent of sea turtle nests on Tyndall AFB property. Install nest protection screens and collect data on nest success, depredation, and disorientation for all nests. • Respond to, and investigate, 100 percent of sea turtle stranding reports on Tyndall AFB property. Collect appropriate data and report to the Florida Stranding and Salvage Network; contact within 24 hours of investigating the report. Coordinate with outside partners on marine mammal strandings. Report 100 percent of Gulf sturgeon strandings to the USFWS-Panama City and NMFS Protected Resources Division-St. Petersburg. • Conduct or support FWC and USFWS track count surveys, tracking tube surveys, and trapping for population density and trends of Choctawhatchee and St. Andrew beach mice. Support translocation of Tyndall AFB beach mice offsite if determined to be helpful to achieve species recovery. • Monitor beach mice for activities that result in or potentially result in take or habitat loss and conduct periodic monitoring of habitat and species health (live trapping/observations). Conduct population surveys as needed to verify the success of the overall recovery effort.	Previous/Recurring
Action 2: Reduce or eliminate threats to sea turtles, beach mice, and shorebirds in accordance with federal law.	• Annually post the locations of nesting and wintering areas for shorebirds (piping plover, red knot, snowy plover, least tern, black skimmer, and American oystercatcher) for their protection. • Install scavenger-proof trashcans in areas where beach mice are found and work with 325 CES/Operations to ensure frequent trash pick-up.	Previous/Recurring
Action 3: Protect and restore beach habitats for sea turtles, beach mice, and shorebirds in accordance with federal law.	• Identify priority beach areas in need of erosion prevention, food sources, and cover for protected species, and employ appropriate dune and/or native vegetation reestablishment measures.	Previous/Recurring

Table 2-3. Proposed Natural Resources Management Actions under Alternative 1
EA for Implementation of Tyndall AFB INRMP

Natural Resources Management Action	Description	Previous/Recurring or New INRMP Action
Action 4: Restore barrier island dunes, vegetation, and infrastructure damaged by Hurricane Michael.	• Re-establish dunes; promote dune establishment and minimize beach erosion with sand fencing and other appropriate measures. • Plant suitable native vegetation on restored dunes and in other affected areas. • Replace boardwalks, access roads, and posted signs that were destroyed by Hurricane Michael.	New
INRMP GOAL IV: Restore and Protect Wetland Habitats to Comply with Federal Law and Protect T&E Species		
Action 1: Survey and rehabilitate priority wetlands in accordance with federal law.	• By 2021, conduct wetland field investigations, update wetland GIS data, and prepare written reports that include proposed measures to restore wetland hydrology throughout Tyndall AFB; prioritize projects based on impact and cost.	New
Action 2: Survey and manage federally petitioned wetland animal species.	• As needed, survey and map potential locations of federally petitioned wetland animal species at Tyndall AFB, including the coastal flatwoods crayfish, purple skimmer, and Say's spiketail.	Previous/Recurring
Action 3: Monitor and maintain wetland mitigation sites.	• Continue to conduct monitoring and maintenance, including associated report preparation, for existing wetland mitigation sites in accordance with permitting requirements.	Previous/Recurring
INRMP GOAL V: Provide a Variety of Uses, Values, Products, and Services to Present and Future Generations While Maintaining Sustainable Ecosystems		
Action 1: Provide hunting and fishing opportunities consistent with demand, quality, and cost within the constraints of the USAF mission.	• Annually maintain/repair boat ramps to prevent erosion and safety issues. • Work with the USFWS to evaluate the fisheries management potential of Tyndall AFB ponds. Develop a management plan and work with the FWC/USFWS on stocking ponds as funding allows. • Annually monitor deer populations to ensure management objectives are being met and determine the feasibility of surveying other game species (for example turkey and quail).	Previous/Recurring
Action 2: Provide non-consumptive recreation opportunities consistent with demand, quality, and cost within the constraints of the USAF mission.	• By 2023, evaluate funding and logistical options for replacing the downed bridge on the Felix Lake Nature Trail. • Annually evaluate and repair posted informational signs describing sensitive beach habitats and species, and the associated protective measures that should be followed. • Provide information to the public on sensitive species, habitats, and regulatory requirements.	New

Table 2-3. Proposed Natural Resources Management Actions under Alternative 1
EA for Implementation of Tyndall AFB INRMP

Natural Resources Management Action	Description	Previous/Recurring or New INRMP Action
	• By 2022, develop and implement penalties for violations of Tyndall AFB regulations on the beaches, including presence of pets, pedestrian traffic on dunes, camping, and lights at night. • Replace recreational boardwalks and access roads on the barrier islands that were destroyed by Hurricane Michael.	
Action 3: Provide forest products compatible with the military mission while restoring and maintaining long-term ecosystem sustainability, diversity, and productivity.	• Annually update the three-year reforestation prioritization plan. • Identify and mitigate potential conflicts between the reforestation plan and installation projects.	Previous/Recurring

2.3.2 No Action Alternative

The No Action Alternative is to maintain existing conditions. Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. The previous INRMP would not address current environmental conditions and associated natural resources management needs that reflect the impacts of Hurricane Michael, or that have occurred since the previous planning period. Therefore, much of the previous INRMP is functionally obsolete and cannot be used to effectively guide natural resources management at Tyndall AFB. The No Action Alternative would not meet the purpose of or need for the Proposed Action, or the selection standards used to evaluate alternatives; however, it is analyzed in detail in this EA to provide a comparative baseline against which the effects of the Proposed Action can be assessed, as required under CEQ Regulations (40 CFR Part 1502.14).

2.4 Alternatives Considered but Eliminated from Detailed Analysis

Alternative 2, which is to partially implement the Tyndall AFB INRMP, was considered by the USAF during project planning. Under Alternative 2, certain components of the updated INRMP, but not the entire Plan, would be implemented. For example, to reduce or delay management costs, this alternative may involve not implementing certain new measures proposed in the updated INRMP, such as repairing boardwalks or other recreational infrastructure damaged by Hurricane Michael or retaining certain measures that are not optimal for post-hurricane conditions. While this alternative may reduce or delay overall natural resources management costs at Tyndall AFB, it would have the potential to result in ineffective or suboptimal management of natural resources and, therefore, would not fully address the current management needs and associated mission support at the Base. In addition, not implementing the updated INRMP in its entirety would fall short of fully complying with federal regulations applicable to implementation of INRMPs. For these reasons, this alternative was determined to not be reasonable and, therefore, was eliminated from detailed analysis in this EA.

SECTION 3

Affected Environment and Environmental Consequences

3.1 Scope of the Analysis

This section addresses the affected environment and environmental consequences of the alternatives of the Proposed Action, which are Alternative 1 and the No Action Alternative. The affected environment is the existing condition of each resource for which the alternatives are assessed. Per the scoping process prescribed in 40 CFR §1501.7(a) (3), resources that have the potential to be affected by the Proposed Action are analyzed in detail in this EA whereas resources that do not have the potential to be appreciably affected by the Proposed Action were eliminated from detailed analysis in this EA.

The environmental consequences are the potential direct, indirect, and cumulative impacts of the alternatives on each resource. Direct impacts are those that would result from the action at the same time and in the same place the action is being implemented. Indirect impacts are those that would result from the action at a later time or would be farther removed in distance from the action but are still reasonably foreseeable. Cumulative impacts are those that would result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions. As appropriate, impacts are further discussed as being temporary, short-term, or long-term.

In an EA, the magnitude of the impact is considered regardless of whether the impact is adverse or beneficial. Determination of the significance of the impact, as described in 40 CFR §1508.27, requires considerations of both context and intensity. Context considers the geographic extent of the potential impact (local, regional, or greater extent) while intensity considers the severity of the impact. The following terms are used to describe the magnitude of impacts in this EA:

- **No Effect—**The action would not cause a detectable change.
- **Negligible—**The impact would be at the lowest level of detection; the impact would not be significant.
- **Minor—**The impact would be slight but detectable; the impact would not be significant.
- **Moderate—**The impact would be readily apparent; the impact would not be significant.
- **Major—** The impact would be of high magnitude in terms of its extent, duration, consequence, or other factor; the impact has the potential to be significant. The significance of an impact is subject to interpretation and should be determined based on the final proposal. In some cases, the impact may be reduced to less than significant by mitigation, design features, and/or other measures that may be taken.

3.2 Resources Analyzed

The following resources were determined to have potential to be affected by the Proposed Action and, therefore, are analyzed in detail in this EA:

- Air Quality
- Soils
- Water Resources
- Biological Resources
- Cultural Resources
- Land Use

- Safety
- Hazardous Materials/Waste and Solid Waste

3.3 Resources Eliminated from Detailed Analysis

The Proposed Action was determined to have no appreciable effect on several resources; therefore, these resources were eliminated from detailed analysis in this EA. The resources that were eliminated from detailed analysis and the rationale for their elimination are presented in the subsections that follow.

3.3.1 Noise

Noise can be simply defined as unwanted sound. The impact of noise is influenced by the characteristics of the noise, such as the sound level, frequency (pitch), and duration, as well as the characteristics of the receptor (for example, a person or animal). The effects of noise on humans include annoyance, sleep disturbance, and health impacts. The effects of noise on wildlife are less well understood. Behavioral effects, such as startle response have been observed; however, direct physiological effects of noise on wildlife are difficult to measure in the field.

The primary sources of ambient noise at Tyndall AFB include military aircraft, small arms ranges, vehicular traffic, and construction activities. The primary sources of noise associated with natural resources management at the Base include the use of heavy machinery during various forestry operations and a helicopter during prescribed burning. Overall noise levels from these activities are intermittent and short-term. The vast majority of forestry operations are conducted during daytime and in undeveloped portions of the Base that are distant from noise sensitive areas, such as housing, churches, and schools. The use of heavy machinery for forestry operations at Tyndall AFB has decreased since 2006, when the planting of slash pine (*Pinus elliottii*) for timber production ceased and since which harvesting of standing slash pine has progressively decreased at the Base. After Hurricane Michael in 2018, no standing slash pine remains to be harvested at the Base. Any changes in noise levels associated with implementation of the updated INRMP relative to the previous INRMP would be relatively minor. For these reasons, the Proposed Action would have no appreciable noise-related effects.

3.3.2 Airspace

The Proposed Action would have no effect on the classification or parameters of any Special Use Airspace or any other existing airspace that overlies Tyndall AFB. The Proposed Action would also have no potential to result in airspace restrictions or congestion, or otherwise impact military or non-military use of any airspace. For these reasons, the Proposed Action would have no effect on airspace.

3.3.3 Geology

The Proposed Action would not involve any activity that would adversely affect subsurface geological formations. Construction of infrastructure under the updated INRMP, such as the proposed replacement of recreational boardwalks and access roads on the barrier islands that were destroyed by Hurricane Michael, would be conducted using standard methods that would have no appreciable impact on geology, such as site clearing, grading, and compacting. For these reasons, the Proposed Action would have no appreciable effect on geology. Soils and groundwater have the potential to be impacted by certain natural resources management activities; therefore, these resources are analyzed in detail in this EA.

3.3.4 Infrastructure, Utilities, and Transportation

Infrastructure construction under the updated Tyndall AFB INRMP is proposed to include replacing boardwalks, access roads, and posted signs on the barrier islands that were destroyed by Hurricane Michael. The proposed construction on the barrier islands and other natural resources management

operations under the updated INRMP would not involve permanent personnel relocations, permanent employee hires, or otherwise change the number of persons working at Tyndall AFB or living in the local area. Any new infrastructure that is constructed under the updated INRMP would use existing utility lines/systems to the extent practicable; any proposed new utilities would be sized appropriately and associated connections to existing utility lines/systems are not expected to result in adverse impacts. Based on the small amount of construction work that would occur, associated construction-related traffic is expected to have a negligible impact on traffic levels on and outside Tyndall AFB. For these reasons, the Proposed Action would have no appreciable effect on energy consumption/distribution, potable water consumption/distribution, domestic wastewater distribution/treatment, or traffic levels/flow.

3.3.5 Socioeconomics

The Proposed Action would not change the number of persons working at Tyndall AFB or living in the local area. The Proposed Action would be confined within the boundary of Tyndall AFB and, therefore, would have no impact on commercial uses or other public economic activity, except the economic activity associated with outside contractor services for certain natural resources management operations. Natural resources management operations that require contractor support under the updated INRMP would be relatively minor and, therefore, would have a negligible impact on the local economy. For these reasons, the Proposed Action would have no appreciable effect on the local demographics, local economy, number of persons living in on-base or off-base housing, number of children attending schools in the area, or demand for emergency services (medical, police, and fire-fighting).

3.3.6 Environmental Justice and Protection of Children

On February 11, 1994, the President issued EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*. This EO requires federal agencies to address disproportionate environmental and human health impacts from federal actions on minority populations and low-income populations. The President directed all federal agencies to analyze the environmental effects on minority and low-income communities, including human health, social, and economic effects.

The USAF's *Guide for Environmental Justice Analysis Under the Environmental Impact Analysis Process (EIAP)* provides guidance on how environmental justice should be analyzed in conjunction with EIAP, in accordance with NEPA (USAF, 2014). According to this guidance, if the Proposed Action would have no environmental impact(s), or impact(s) that would not be adverse, the Proposed Action would not disproportionately impact minority or low-income populations and no environmental justice analysis would be required. If the Proposed Action is determined to have an adverse environmental impact, then the environmental justice analysis should be conducted in accordance with the guidance to determine if it would disproportionately impact minority or low-income populations. The guidance defines adverse impacts as follows: "Adverse means the impact would have a negative effect on human health or the environment that is significant, unacceptable, or above generally accepted norms. Adverse human health effects include bodily impairment, infirmity, illness, or death. Adverse environmental effects may include ecological, cultural, human health, economic, or social impacts when interrelated to impacts on the natural or physical environment."

Guidelines for the protection of children are specified in EO 13045, *Protection of Children from Environmental Health Risks and Safety Risk* (*Federal Register*, Volume 62, Number 78, April 23, 1997), amended in 2001 by EO 13229 and in 2003 by EO 13296. EO 13045 requires that federal agencies make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, and ensure that policies, programs, and standards address disproportionate risks to children that result from environmental health or safety risks.

Based on the analysis conducted in this EA, the Proposed Action would not result in any adverse environmental impacts. Therefore, the Proposed Action would not disproportionately impact minority or low-income populations. Implementation of the Proposed Action would not result in increased exposure of children to environmental health or safety risks such as those associated with the improper generation, use, or storage of hazardous materials/waste. Access restrictions to unauthorized areas are strictly enforced at Tyndall AFB and standard site safety precautions are implemented as needed at sites where natural resources management activities are conducted at the Base. Therefore, the Proposed Action would not result in disproportionate environmental health or safety risks to children.

3.4 Air Quality and Climate Change

3.4.1 Affected Environment

3.4.1.1 Air Quality

Pursuant to the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. NAAQS have been established for the following air pollutants, which are called criteria pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, sulfur dioxide (SO_2), and respirable particulate matter defined as particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) (Table 3-1). Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects.

An area (county or air basin) that meets the air quality standard for the criteria pollutants is designated as being in attainment. An area that does not meet the air quality standard for one of the criteria pollutants is designated as being in nonattainment for that standard and is subject to planning requirements to attain the standard. An area that currently meets the air quality standard but previously was classified as being in nonattainment is in maintenance for that standard. Areas may be designated as unclassifiable where insufficient information is available to make an attainment or nonattainment designation. The area encompassed by Tyndall AFB is currently classified as being in attainment for all criteria pollutants stipulated under the NAAQS (EPA, 2020a).

Tyndall AFB is identified as a minor source of air emissions based on air permitting regulations, and currently operates under Minor Source Air Operation Permit 0050024-019-AF, issued by the FDEP on September 30, 2020. This permit regulates specific stationary sources of air pollutant emissions at Tyndall AFB and requires that the emissions from these sources do not exceed major source values regulated under Title V air permitting.

The following stationary sources of air emissions at Tyndall AFB are regulated under the Base's air permit: paint booths (seven units); fuel fill stands (three stands used to transfer fuel between tank trucks and storage tanks); jet engine testing (Building 325); fuel tanks (eight storage tanks); external combustion equipment (boilers and paint booth reheat burners); Reciprocating Internal Combustion Engines (RICEs) constructed before June 12, 2006; and RICEs constructed after June 12, 2006.

The 1990 amendments to the Clean Air Act require federal agencies to ensure that their actions conform to the State Implementation Plan in a nonattainment area. The EPA has developed two distinct sets of conformity regulations: one for transportation projects and one for non-transportation projects. Non transportation projects are governed by general conformity regulations (40 CFR Part 51, Subpart W and 40 CFR Part 93, Subpart B), and the State of Florida has adopted the federal regulations by reference (Rule 62-204.500, Florida Administrative Code [FAC]). The Proposed Action is a non-transportation project within an attainment area; therefore, it does not require a general conformity analysis.
De minimis levels are the emission thresholds for which a conformity determination must be performed in a nonattainment area. The de minimis threshold for each criteria pollutant except lead is 100 tons per

year (tpy); the de minimis threshold for lead is 25 tpy. The de minimis threshold for VOCs is also 100 tpy. Ozone is formed when VOCs and nitrogen oxides (NOx) react in the presence of sunlight.

Table 3-1. National Ambient Air Quality Standards
EA for Implementation of Tyndall AFB INRMP

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead		Primary and Secondary	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	1 year	53 ppb	Annual mean
Ozone		Primary and Secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	Primary	1 year	12 µg/m^3	Annual mean, averaged over 3 years
		Secondary	1 year	15 µg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		Primary	1-hour	75 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

µg/m^3 = micrograms per cubic meter
ppb = parts per billion
ppm = parts per million

Data Source: EPA, 2020b

3.4.1.2 Climate Change

Climate change refers to the variation in the Earth's climate over time. Climate change is known to be caused by natural processes such as variations in ocean currents and solar energy and is also generally believed to be influenced by human activities such as greenhouse gas (GHG) emissions. GHGs are gases that trap heat in the Earth's atmosphere. They are emitted by both natural processes and human activities, and include water vapor, carbon dioxide (CO_2), methane, nitrous oxides, and other gases. Much of the CO_2 that humans release into the atmosphere is a by-product of energy use, such as the burning of fossil fuels. To compare GHGs to each other, each GHG quantity is translated into a common unit called the carbon dioxide equivalent (CO_{2e}).

The global average temperature has increased since the late 19th Century. Each of the past 3 decades has been successively warmer than any of the previous decades and 2010 to 2019 has been the warmest decade on record. The global average temperature is estimated to have increased by 0.89 degrees

Celsius over the period 1901 to 2012 (IPCC, 2013). Most of the recent warming has occurred in the northern hemisphere, with less warming in the tropics and subtropics. Climate data show that since 1895, annual average temperatures in Florida have varied widely from year to year. Although a distinct warming trend is not apparent throughout the entire period, the data indicate that annual average temperatures in Florida have generally risen over the last 40 years (NCEI, 2018). Annual total rainfall in Florida has also varied widely from year to year since 1895. The data does not show an obvious trend of increasing rainfall in the state over time; however, the state has experienced a greater frequency of rain events of 2 inches or more over the past century (NCEI, 2018). Sea level rise is caused primarily by two factors related to global warming: the water added by melting land ice and the expansion of seawater as it warms. Satellite data indicate that from 1993 to 2018, sea levels have risen by approximately 3.7 inches (NASA, 2020). For most purposes, Florida sea-level rise can be considered similar to global sea level rise throughout the state's coastal areas (Merrifield et al., 2009).

EO 13693, *Planning for Federal Sustainability in the Next Decade*, outlines policies intended to ensure that federal agencies evaluate climate change risks and vulnerabilities and manage the short- and long-term effects of climate change on their operations and mission. The EO specifically requires agencies within the DoD to measure, report, and reduce their direct and indirect emissions of GHGs.

3.4.2 Environmental Consequences

3.4.2.1 Alternative 1

Air Quality

The primary natural resources management activity under the updated Tyndall AFB INRMP that would generate air emissions is prescribed burning. Emissions from prescribed burning are generated primarily from the combustion of vegetative material and to a lesser extent from the equipment used during the burning. The analysis of air quality in this EA focuses on the emissions from prescribed burning and also includes the emissions from tree planting. Based on the amount of emission-generating equipment that would be used, other types of natural resources management activities that would be conducted at Tyndall AFB over the next 5 years under the updated INRMP would generate relatively low amounts of air emissions; the associated emissions would be negligible compared to the air emissions generated by commuter traffic in and out of Tyndall AFB on a daily basis. Construction activity that would occur at Tyndall AFB under the updated INRMP would primarily include replacement of boardwalks and access roads on the barrier islands that were destroyed by Hurricane Michael. Based on the overall amount of construction that would be conducted over the next 5 years at the Base, the amount of associated air emissions that would be generated under Alternative 1 would be negligible.

Air emissions from wildfires consist mostly of CO_2, which accounts for approximately 92 to 95 percent of the total emission composition; the remainder of the emissions, by quantity, consist of carbon monoxide (4 to 7 percent), $PM_{2.5}$, methane, and other compounds (Urbanski et al., 2009). Under the updated INRMP, approximately 4,500 acres at Tyndall AFB would be prescribed burned per year from 2020 to 2022 and between approximately 4,500 acres and 6,000 acres would be prescribed burned per year during 2023 and 2024. A total of two to three prescribed burn events would be conducted per year. Each burn event would be conducted during the course of 1 day and the vast majority of prescribed burn operations would be conducted during daytime (some cleanup operations may continue into nighttime). Each burn event would typically be conducted by approximately 20 workers, one bulldozer, one tractor plow, five brush trucks, six utility terrain vehicles (UTVs), and one helicopter that flies for 2 to 3 hours during the burn event.

Under the updated Tyndall AFB INRMP, 9,000 to 10,000 acres at the Base would be planted with longleaf pine (*Pinus palustris*) over the next 4 to 5 years. Longleaf pine planting at Tyndall AFB is conducted by hand planting seedlings in areas that have been prepared for planting. The amount of tree planting proposed per year under the updated INRMP (up to 3,000 acres/year) would typically be

conducted by approximately 20 workers, six work trucks, and 2 refrigerator trucks (seedling storage) over the course of approximately 2 to 3 months each year.

For this EA, air emissions that would be generated by prescribed burning at Tyndall AFB under the updated INRMP were estimated using the EPA's *Compilation of Air Pollutant Emissions Factors (AP-42) (EPA, 1995)* for prescribed burning itself and the Air Force Civil Engineer Center's (AFCEC's) *Air Emissions Guide for Air Force Mobile Sources* (AFCEC, 2018) for emissions from equipment used to conduct prescribed burning, except for the helicopter. Equipment emissions associated with tree planting and emissions from the helicopter used for prescribed burning at Tyndall AFB were estimated using the USAF's Air Conformity Applicability Model, Version 5.0.16b. The results of these analyses are discussed below; the parameters and calculations used for the analyses are provided in Appendix E. It should be noted that the areas that would be burned at Tyndall AFB currently consist of hurricane-impacted pine forests that have different fuel loads due to downed vegetative debris compared to unimpacted forests. To account for the appropriate type of fuel load that exists, the EPA AP-42 emission factor for "Logging Slash" was used for the analyses, which is a fuel load category that includes areas of woody debris left on the ground after timber cutting and/or as a result of storm, fire, or other damage.

The estimated maximum annual air emissions that would be generated by prescribed burning and tree planting under Alternative 1 are presented in Tables 3-2 through 3-6; the detailed emissions calculations are provided in Appendix E.

Table 3-2. Estimated Maximum Annual Air Emissions Generated by Prescribed Burning and Tree Planting Under Alternative 1 During 2020
EA for Implementation of Tyndall AFB INRMP

Emission Source	**2020 Emissions (tons per year)**						
	VOC	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
Prescribed Burning	72.9	1,499	--	--	162	162	--
Mobile Vehicle/Equipment for Prescribed Burning	0.00310	0.00747	0.0267	0.000193	--	0.000855	9.23
Mobile Vehicles/Equipment for Tree Planting	0.232	0.929	1.30	0.005	0.044	0.044	413
Total Emissions	**73.1**	**1,499**	**1.33**	**0.00519**	**162**	**162**	**422**

NA = not applicable

Table 3-3. Estimated Maximum Annual Air Emissions Generated by Prescribed Burning and Tree Planting Under Alternative 1 During 2021
EA for Implementation of Tyndall AFB INRMP

Emission Source	**2021 Emissions (tons per year)**						
	VOC	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
Prescribed Burning	72.9	1,499	--	--	162	162	--
Mobile Vehicle/Equipment for Prescribed Burning	0.00297	0.00617	0.0250	0.0000467	--	0.000724	9.23
Mobile Vehicles/Equipment for Tree Planting	0.221	0.923	1.16	0.005	0.039	0.039	413
Total Emissions	**73.1**	**1,499**	**1.18**	**0.00505**	**162**	**162**	**422**

NA = not applicable

Table 3-4. Estimated Maximum Annual Air Emissions Generated by Prescribed Burning and Tree Planting Under Alternative 1 During 2022
EA for Implementation of Tyndall AFB INRMP

Emission Source	2022 Emissions (tons per year)						
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Prescribed Burning	72.9	1,499	--	--	162	162	--
Mobile Vehicle/Equipment for Prescribed Burning	0.00287	0.00507	0.0237	0.0000467	--	0.000610	9.23
Mobile Vehicles/Equipment for Tree Planting	0.210	0.919	1.03	0.005	0.034	0.034	413
Total Emissions	**73.1**	**1,499**	**1.06**	**0.00505**	**162**	**162**	**422**

NA = not applicable

Table 3-5. Estimated Maximum Annual Air Emissions Generated by Prescribed Burning and Tree Planting Under Alternative 1 During 2023
EA for Implementation of Tyndall AFB INRMP

Emission Source	2023 Emissions (tons per year)						
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Prescribed Burning	97.2	1,998	--	--	216	216	--
Mobile Vehicle/Equipment for Prescribed Burning	0.00287	0.00507	0.0237	0.0000467	--	0.000610	9.23
Mobile Vehicles/Equipment for Tree Planting	0.201	0.915	0.924	0.005	0.030	0.030	413
Total Emissions	**97.4**	**1,999**	**0.924**	**0.00505**	**216**	**216**	**422**

NA = not applicable

Table 3-6. Estimated Maximum Annual Air Emissions Generated by Prescribed Burning and Tree Planting Under Alternative 1 During 2024
EA for Implementation of Tyndall AFB INRMP

Emission Source	2024 Emissions (tons per year)						
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Prescribed Burning	97.2	1,998	--	--	216	216	--
Mobile Vehicle/Equipment for Prescribed Burning	0.00287	0.00507	0.0237	0.0000467	--	0.000610	9.23
Mobile Vehicles/Equipment for Tree Planting	0.192	0.911	0.831	0.005	0.026	0.026	413
Total Emissions	**97.4**	**1,999**	**0.831**	**0.005**	**216**	**216**	**413**

NA = not applicable

As indicated in Tables 3-2 through 3-6, prescribed burning itself (combustion of vegetative material) would account for the vast majority of emissions that would be generated by implementation of the updated INRMP. The exhaust emissions from vehicles/equipment used to conduct prescribed burning would represent a small percentage of the total emissions generated by prescribed burning itself. The vehicle/equipment emissions from tree planting would be higher than those from prescribed burning due to the longer duration of the tree planting work; however, the vehicle/equipment emissions associated with tree planting would also be relatively minor in relation to prescribed burning.

Maximum annual emissions generated by prescribed burning at Tyndall AFB under Alternative 1 would exceed the respective *de minimis* thresholds for CO, PM_{10}, and $PM_{2.5}$, which are each 100 tpy; however, the Proposed Action is located in an attainment area and exempt from the general conformity rule and associated thresholds. Moreover, under its 2016 Exceptional Events Rule (40 CFR Parts 50 and 51) and subsequent 2019 exceptional events guidance regarding prescribed fires (EPA, 2019), the EPA treats prescribed fire as an exceptional event such as wildfires, with respect to regulatory compliance.

Fugitive dust emissions from prescribed burning are estimated to be approximately 45 tons of PM_{10}, in 2020, 2021, and 2022, and 60 tons of PM_{10} in 2023 and 2024, which are part of the total PM_{10} emissions identified in Tables 3-2 through 3-6. Generated fugitive dust would consist primarily of nontoxic particulate matter and any associated impacts of fugitive dust emissions under Alternative 1 are expected to be minor. The amount of prescribed burning that would be conducted at Tyndall AFB under Alternative 1 would be comparable to the amount of prescribed burning conducted at the Base prior to Hurricane Michael, which targeted approximately 6,000 acres per year. Therefore, the air emissions generated under the updated INRMP would be comparable to those generated under the previous INRMP prior to the hurricane. Although prescribed burning can generate relatively high emissions of certain criteria pollutants, the associated short-term impacts on air quality are outweighed by the long-term benefits of reducing fuel loads, which would otherwise have greater impacts on air quality in the event of a wildfire.

Proper management of smoke generated by prescribed burning at Tyndall AFB is essential to minimize the associated impacts of the smoke on the military mission and public safety. Smoke results from all prescribed burns and natural wildfires, and the potential for excessive amounts of smoke increased at Tyndall AFB after Hurricane Michael due to the presence of downed woody debris and its potential for prolonged smoldering when burned. The potential impacts of smoke and smoke management are discussed further in Section 3.10.

Natural resources management activities under the updated Tyndall AFB INRMP would not remove or otherwise affect existing stationary sources of air emissions regulated under the Base's air permit and would not add new stationary sources of air emissions requiring regulation. Therefore, no regulated stationary sources of air emissions would be removed, added, or otherwise be affected under the updated INRMP.

Climate Change

EPA emission factors for CO_{2e} emissions from prescribed burning are not available; therefore, the amount of CO_{2e} that would be generated by prescribed burning at Tyndall AFB under Alternative 1 cannot be accurately estimated. The maximum annual emissions of CO_{2e} presented in Tables 3-2 through 3-6 account for the emissions from vehicles and equipment used to conduct prescribed burning but do not include the emissions from prescribed burning itself due to the lack of associated emission factors. However, there are no quantity thresholds established for CO_{2e} for determining its impact on climate change. Moreover, the amount of prescribed burning that would be conducted at Tyndall AFB under the updated INRMP would be comparable to the amount of prescribed burning conducted at the Base prior to Hurricane Michael, which targeted approximately 6,000 acres per year. Therefore, the air emissions that affect climate change generated under the updated INRMP would be comparable to

those generated under the previous INRMP prior to the hurricane. For these reasons, the associated effect of Alternative 1 on climate change would be negligible.

Recorded global climate changes over the past century are discussed in Section 3.4.1.2. In the absence of major volcanic eruptions and long-term changes in solar irradiance, global air temperatures, precipitation, and sea levels are predicted to continue to rise in response to GHG emissions over the next century (IPCC, 2013). Extreme precipitation events are also expected to be more intense and frequent over most of the mid-latitude land masses and wet tropical regions, including Florida. Coastal zone modeling conducted in association with the update of the INRMP estimated that sea-level rise would decrease the land area of Tyndall AFB by approximately 6.5 percent in 2035 and 9.6 percent in 2065 (USAF, 2020a). If these predictions hold true, Tyndall AFB would become more prone to flooding from tidal surges and rainfall over time, especially during the wet season. Other climatic changes that could potentially affect the Base include more frequent and intense heat waves, droughts, wildfires, and hurricanes. The associated impact on Tyndall AFB, and specifically natural resources management activities under the updated INRMP and future INRMPs, would depend on the magnitude of such changes. Near-term climate changes are expected to have no appreciable effect on natural resources management activities at Tyndall AFB under Alternative 1. The updated INRMP addresses potential climate change effects on vegetative communities, fish and wildlife, and T&E species, and presents potential adaptation approaches for natural resources management at the Base.

Conclusion

Based on the analysis conducted, Alternative 1 would have a minor impact on air quality and climate change. The impact would not be significant.

3.4.2.2 No Action Alternative

Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. Air emissions at Tyndall AFB under the previous INRMP would be generated primarily by prescribed burning, as they would under the updated INRMP. The amount of prescribed burning conducted at Tyndall AFB under the previous INRMP was typically approximately 6,000 acres per year prior to Hurricane Michael and, therefore, was comparable to the amount of prescribed burning that would be conducted at the Base under the updated INRMP. For these reasons, natural resources management activities under the No Action Alternative would generate criteria pollutants, VOCs, and GHGs that are comparable to those that would be generated under Alternative 1, which would result in a minor impact on air quality and climate change.

3.5 Soils

3.5.1 Affected Environment

Soil consists of varying amounts of mineral particles and organic matter. It serves as a medium for plant growth and water storage, and as habitat for certain types of organisms. Soils are formed by numerous physical, chemical, and biological processes, which include weathering of parent material, accumulation of organic matter, and biochemical leaching or reduction of minerals.

In general, soils of Tyndall AFB are sandy and acidic (USAF, 2020a). Based on the Natural Resources Conservation Service (NRCS) Soil Survey for Bay County, Florida, 20 different soil types exist at Tyndall AFB; the updated INRMP includes descriptions of the soil types and shows their distribution at the Base (USAF, 2020a).

Soil erosion is the process by which soil is removed from a given location by wind or water flow, and then transported to other locations. The extent to which stormwater runoff can erode soil depends on

factors such as soil type, site topography, and the amount and speed of the stormwater that drains off the site. Well drained soil types allow rapid percolation of stormwater and, therefore, have low runoff and flooding potential. These soil characteristics facilitate stormwater management because the associated amount and speed of stormwater runoff are low. Alternatively, poorly drained soil types have high runoff and flooding potential; stormwater management in areas with these soils need to account for the greater quantity and speed of the stormwater runoff relative to most other areas.

3.5.2 Environmental Consequences

3.5.2.1 Alternative 1

Few natural resources management activities under the updated Tyndall AFB INRMP have the potential to impact soils. Natural resources management activities that have the greatest potential to physically disturb soils at Tyndall AFB include forestry management practices such as prescribed burning, tree planting, and wildfire suppression; costal dune restoration; and construction of recreational infrastructure damaged or destroyed by Hurricane Michael. The majority of soils that would be disturbed by natural resources management activities under the updated INRMP have been previously disturbed by forestry management practices; earthwork associated with land development, and/or Hurricane Michael.

Physical disturbance of soils may occur during certain forestry management practices such as when fire breaks and unpaved access roads are created or maintained for prescribed burning or wildfire suppression; and when sites are mechanically prepared for tree planting. Soils within the construction footprints for replacing boardwalks and access roads on the barrier islands destroyed by Hurricane Michael have the potential to be physically disturbed by site clearing, excavation, filling, grading, and paving. Appropriate measures and controls would be implemented during natural resources management activities that disturb soils to minimize the potential for soil erosion and sedimentation impacts. Examples of such measures and controls include but are not limited to best management practices (BMPs) to control the volume and velocity of stormwater runoff, soil stabilization measures such as sodding or seeding, and structural controls such as silt fences, spreader swales, and sediment traps. In general, the overall potential for forestry management practices to cause soil erosion and sedimentation impacts is relatively low and minimized to the extent practicable by well-established measures and controls in areas more susceptible to being impacted such as steeply sloped areas and near wetlands and surface water bodies.

Any construction project under the updated INRMP that would disturb 1 acre or more of land would require an National Pollutant Discharge Elimination System (NPDES) *Generic Permit for Stormwater Discharges from Large and Small Construction Activities* (FDEP Form 62-621.300(4)(a)), issued by the FDEP. This permit is often referred to as a Construction Generic Permit or construction stormwater permit. As part of this permit, the proponent of the project is required to prepare and implement a Stormwater Pollution Prevention Plan (SWPPP), which outlines the BMPs and engineering controls to be used to prevent and minimize erosion, sedimentation, and pollution during construction.

Under Goal III, Action 4 of the updated INRMP, Tyndall AFB proposes to restore dunes on the barrier islands that were washed out by Hurricane Michael (Table 2-3). This would be accomplished by using sand fencing and other appropriate measures to promote the establishment of new dune systems and to minimize the potential for additional beach erosion from future storms. The specific methods to be used under this INRMP goal are currently being evaluated. Sand fencing is an effective, environmentally benign method for establishing new coastal dunes and it has been successfully used on the barrier islands at Tyndall AFB in the past. Although some physical soil disturbance can be expected to occur depending on the specific method used, implementation of this goal would have an overall beneficial impact on the sand dunes of Tyndall AFB's barrier islands, which provide habitat for a variety of protected species and serve as a natural barrier against storm surges and associated flooding.

Conclusion

Based on the analysis conducted, Alternative 1 would have a minor impact on soils. The impact would not be significant.

3.5.2.2 No Action Alternative

Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. Overall, potential soil impacts and soil erosion management under the previous and updated INRMPs would be comparable. The previous INRMP, however, did not address the impacts of Hurricane Michael on Tyndall AFB's coastal dunes. Therefore, implementation of the previous INRMP under the No Action Alternative would not adequately address the loss of the barrier island dunes or the measures necessary to restore the dune systems. For these reasons, natural resources management activities under the No Action Alternative would have a moderate impact on soils.

3.6 Water Resources

3.6.1 Affected Environment

3.6.1.1 Wetlands and Surface Water

The EPA and United States Army Corps of Engineers (USACE) jointly define wetlands as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (EPA, 2020c).

EO 11990, *Protection of Wetlands*, requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. 32 CFR Part 989.14(g) requires preparation of a Finding of No Practicable Alternative when a proposed federal action is located in wetlands (or floodplains).

Wetlands and surface water bodies, unless they qualify to be exempted, are under the regulatory jurisdiction of the federal Clean Water Act (CWA) Section 404 program and State of Florida Environmental Resource Permit (ERP) program. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S., including wetlands. Under the federal Section 404 program, no discharge of dredged or fill material may be permitted if a practicable alternative exists that is less damaging to the aquatic environment, or if the nation's waters would be significantly degraded. The Section 404 program is jointly administered by the EPA and USACE, with the USACE being responsible for Section 404 permit decisions.

The State of Florida regulates wetlands and surface waters through the ERP program. The ERP program is in effect statewide and is implemented jointly by the FDEP and the state's five water management districts under operating agreements that provide a division of responsibilities between the agencies. In addition to dredging and filling in wetlands and surface waters, Florida's ERP program also regulates activities in uplands that generate stormwater runoff or otherwise alter surface water flows. Per these regulations, activities that create a total of more than 4,000 square feet of impervious and semi-impervious surface area subject to vehicular traffic or a total of more than 9,000 square feet of impervious and semi-impervious surface area, require an ERP from the FDEP or one of the state's water management districts (Chapter 62-330.020, FAC).

Point-source stormwater discharges in Florida are regulated by the FDEP under the NPDES stormwater program. Any construction project that would disturb 1 acre or more of land would require an NPDES

Generic Permit for Stormwater Discharges from Large and Small Construction Activities (FDEP Form 62-621.300(4)(a)), issued by the FDEP. This permit is often referred to as a Construction Generic Permit or construction stormwater permit. As part of this permit, the proponent of the project is required to prepare and implement a SWPPP, which outlines the BMPs and engineering controls to be used to prevent and minimize erosion, sedimentation, and pollution during construction. In addition to construction activities, the NPDES stormwater program regulates stormwater discharges from industrial and non-industrial activities. Tyndall AFB operates under an NPDES Multi-Sector General Permit (MSGP) for stormwater discharges associated with industrial activity, and implements a SWPPP (USAF, 2017a) to maintain compliance specifically with the MSGP. Non-industrial discharges of stormwater at Tyndall AFB are regulated under the Base's NPDES Municipal Separate Storm Sewer Systems (MS4) permit.

Wetlands at Tyndall AFB have been mapped and classified in accordance with the USFWS's National Wetlands Inventory (NWI) classification system as described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et. al., 1979). Approximately 40 percent of Tyndall AFB is estimated to be wetland based on NWI mapping (USAF, 2020a). Based on the NWI classification system, the most dominant wetland type at Tyndall AFB is Palustrine Forested. Other wetland types at the Base include Palustrine Scrub/Shrub, Palustrine Emergent, and Estuarine. The estimated coverage of wetlands at Tyndall AFB is shown on Figure 3-1.

Tyndall AFB is located within the St. Andrew Bay Watershed. The Tyndall AFB peninsula is surrounded by the following surface water bodies: St. Andrew Bay, East Bay, St Andrew Sound, and the Gulf of Mexico (Figures 1-1 and 3-2). These bodies of water are hydrologically connected to Choctawhatchee Bay to the west. Surface water bodies at Tyndall AFB primarily include tidal bayous; tidal and freshwater creeks; man-made and natural freshwater lakes; and stormwater drainage ditches and retention ponds. In general, stormwater at Tyndall AFB drains northward in areas north of U.S. Highway 98 and southward in areas south of U.S. Highway 98 (USAF, 2020a). The Base stormwater system consists primarily of drainage ditches in undeveloped areas and underground piping in developed areas.

3.6.1.2 Groundwater

Groundwater is water that occupies the pore spaces in subsurface rocks and sediments. Tyndall AFB is underlain by the following three groundwater aquifers (from shallowest to deepest): surficial aquifer, Intermediate Confining Unit, and Floridan Aquifer (USAF, 2020a). The surficial aquifer at Tyndall AFB consists primarily of unconsolidated, siliciclastic deposits and ranges in thickness from approximately 50 to 100 feet. In certain portions of the Base, the surficial aquifer can occur just below land surface (bls). There are several on-base wells that pump water from the surficial aquifer for irrigation and other non-potable uses.

The Intermediate Confining Unit is a low permeability layer that separates the surficial aquifer from the deeper Floridan Aquifer. This confining unit consists primarily of fine-grained siliciclastic deposits interlain with carbonate strata. Under Tyndall AFB, the Intermediate Confining Unit typically occurs at approximately 50 to 100 feet bls and ranges in thickness from approximately 200 to 250 feet.

The Floridan Aquifer consists primarily of limestone and dolomite, and supplies most of the water used for domestic, urban, and agricultural purposes in the state. Under Tyndall AFB, the Florida Aquifer typically occurs at approximately 250 to 350 feet bls and ranges in thickness from approximately 800 to 1,600 feet (USGS, 1990). Some of the potable water used by Tyndall AFB is pumped from the Floridan Aquifer by three on-base permitted wells; water from these wells is filtered and chlorinated prior to use. However, most of the potable water used by the Base is supplied by the Bay County Utility Services Department, which uses Deer Point Lake as its water supply source (USAF, 2020a).

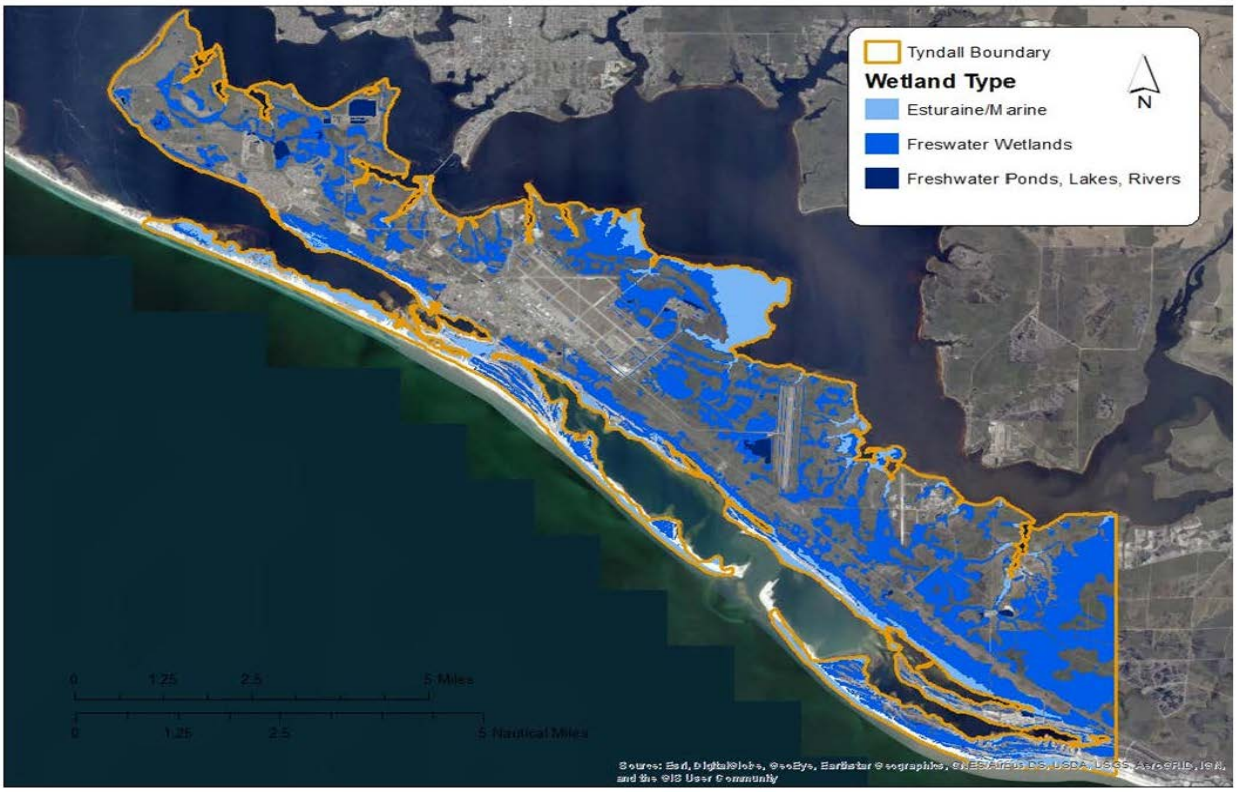

Figure 3-1. Wetlands at Tyndall Air Force Base
Source: USAF, 2020a

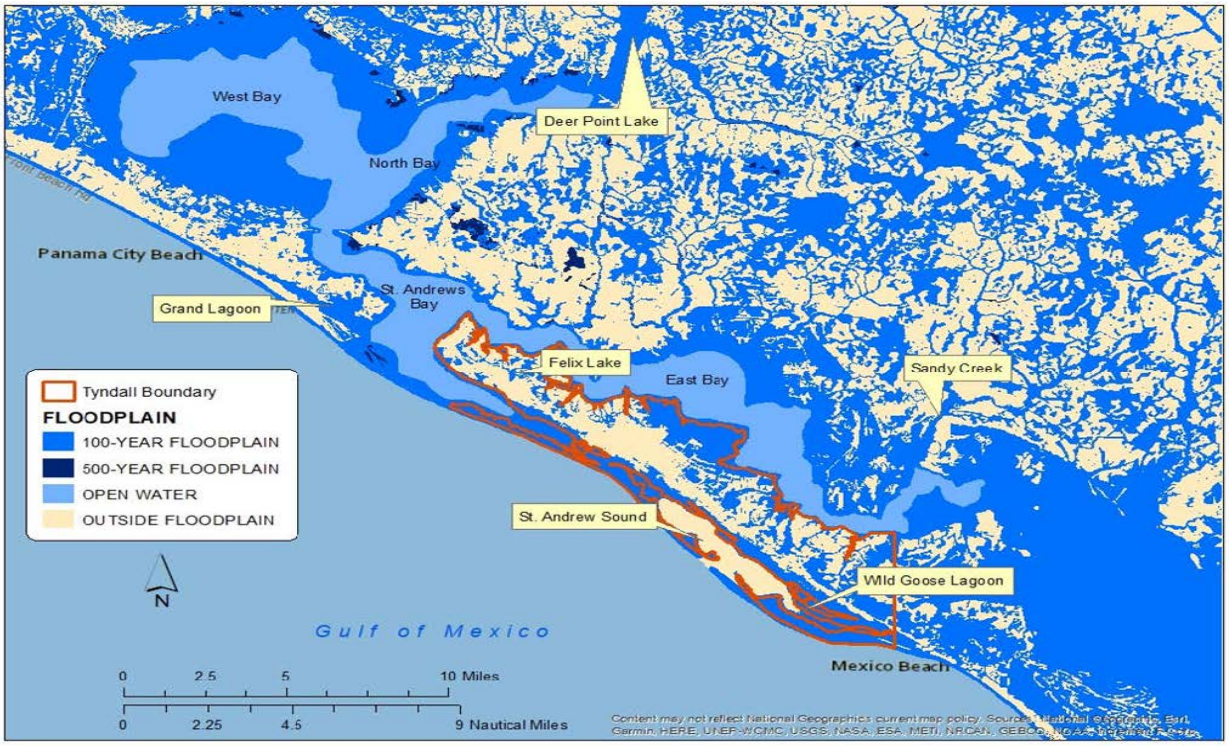

Figure 3-2. Surface Waters and Floodplains at Tyndall Air Force Base
Source: USAF, 2020a

3.6.1.3 Floodplains

EO 11988, *Floodplain Management*, requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. EO 11988 was amended on January 30, 2015 by EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input.* On August 15, 2017, the President issued EO 13807, *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects*, which revoked EO 13690. EO 13807 left in place EO 11988, which provides for uniform floodplain management standards.

The 100-year floodplain is the area covered by water in the event of a 100-year flood, which is a flood that has a 1 percent chance of being equaled or exceeded in magnitude in any given year. The 500-year floodplain is the area covered by water in the event of a 500-year flood, which is a flood that has a 0.2 percent chance of being equaled or exceeded in magnitude in any given year. The estimated coverage of floodplains at Tyndall AFB is shown on Figure 3-2.

3.6.2 Environmental Consequences

3.6.2.1 Alternative 1

Water resources protection is one of the primary elements of Tyndall AFB's natural resources management program. Restoring/maintaining the hydrological processes in wetlands and other water resources at Tyndall AFB is an important component of ecosystem management at the Base. Goal IV of the updated Tyndall AFB INRMP is to "Restore and Protect Wetland Habitats to Comply with Federal Law and Protect T&E Species" (Table 2-3). The actions proposed to support this goal include survey and restoration of priority wetlands; proper management of petitioned wetland animal species; and monitoring and maintenance of existing wetland mitigation sites (Table 2-3). Implementation of these actions and the overall updated Tyndall AFB INRMP would have beneficial impacts on water resources at the Base.

The management of water resources at Tyndall AFB is integrated and coordinated with other natural resources management programs at the Base. For example, protection of wetlands and surface water bodies is considered during planning and implementation of prescribed burning, wildfire suppression, forest restoration, invasive plant species control, and management of T&E species and their habitats. Management of the airfield wetlands is also integral to reducing the BASH risk at the Base.

Wetlands at Tyndall AFB are protected by various regulations; however, they are still vulnerable to being impacted by invasive plant species, inadequate fire frequency, non-point source pollution, and hydrological alterations. Wetland conservation measures implemented at Tyndall AFB include but are not limited to, controlling invasive plant species, hardwoods, and other encroaching vegetation in wetlands; implementing prescribed fire with appropriate seasonality and frequency considerations for wetlands; protecting wetlands from vehicle and equipment damage; and mitigating wetland losses from construction or military activities.

The 325th Civil Engineer Squadron/Environmental Element, Compliance (325 CES/CEIEC) has primary responsibility for protection of water resources at Tyndall AFB, including evaluation of potential impacts to water resources by proposed actions. Proposed projects and activities at Tyndall AFB that have potential to impact water resources must go through EIAP review and approval by the 325 CES/CEIEC. The 325 CES/CEIEC uses NWI mapping, GIS data, and other available information to determine if proposed actions would result in potential impacts to wetlands/surface waters. If the proposed action is determined to have the potential to impact wetlands/surface waters, the 325 CES/CEIEC coordinates with the proponent and attempts to modify the action to avoid or further minimize the potential impact. Following this coordination, the 325 CES/CEIEC determines the NEPA, permitting, and mitigation requirements for the action. Projects that propose impacts to federal and state jurisdictional wetlands

or surface water bodies require authorization through the federal CWA Section 404 dredge and fill permitting program and the State of Florida's ERP program. Certain projects may also be required to obtain an NPDES construction stormwater permit and implement an associated SWPPP that identifies the BMPs and engineering controls to be used to prevent and minimize erosion, sedimentation, and pollution during construction.

Groundwater and floodplain protection at Tyndall AFB would continue under the updated INRMP with no appreciable changes. Proposed projects at the Base would continue to be evaluated for their potential impacts on groundwater; preventing releases of hazardous materials into groundwater is a primary objective. New development in the floodplain at the Base would continue to be minimized to the extent practicable in compliance with EO 11988, *Floodplain Management.* Flooding potential associated with Increases in impervious area would be offset by permanent stormwater control features that would be constructed for the infrastructure. Any new facilities proposed to be constructed in the floodplain would be designed and constructed in compliance with UFC, FEMA, and USAF floodproofing criteria.

Wetlands at Tyndall AFB are treated by prescribed fire to control invasive vegetation and prevent excessive understory growth to maintain proper wetland plant community composition and structure. Impacts to wetland vegetation, soils, and hydrology during prescribed burning and other land management activities are minimized via implementation of BMPs adopted from the Florida Department of Agriculture and Consumer Services' (FDACS) *Silviculture Best Management Practices* (FDACS, 2008), as well as others developed by Tyndall AFB specifically for management activities in wetlands. In areas where prescribed fire has not been effective, other methods are implemented to maintain wetlands at the Base in a healthy condition, including selective herbicide treatments, thinning, mowing, roller chopping, and/or hand removal of vegetation. Fire suppression activities are avoided in wetlands unless the fire threatens infrastructure or other sensitive areas; any damage to wetlands during wildland fire management activities is rehabilitated when safe to do so.

One of the management actions associated with Tyndall INRMP Goal IV is to develop and implement a plan to restore wetland and surface water hydrology throughout Tyndall AFB (Table 2-3). This is a new management action that will be implemented in conjunction with post-hurricane rebuilding of the Base. The aim of this action is to re-establish natural hydrological conditions and the historical connectivity between freshwater and marine environments that have been severed by Base development and past land management practices, include silviculture operations. Implementation of this plan would benefit the targeted wetlands and surface water bodies and the natural aquatic communities they support and would also minimize the severity and impacts of flooding from future storm events.

Several wetland mitigation sites at Tyndall AFB are currently monitored and maintained in compliance with their respective permit conditions. These sites provide compensatory mitigation for unavoidable wetland impacts associated with past projects at the Base, and are managed under the INRMP. In addition to these permitted wetland mitigation sites, Tyndall AFB also implements measures to enhance a high-priority wetland at the Base that contains Godfrey's butterwort (*Pinguicula ionantha*), which is federally endangered plant species.

Conclusion

Based on the analysis conducted, Alternative 1 would have a major beneficial impact on water resources.

3.6.2.2 No Action Alternative

Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. Overall, management of water resources at Tyndall AFB under the previous and updated INRMPs would be comparable. However, under the updated INRMP, a plan to restore wetland and surface water hydrology throughout Tyndall

AFB would be developed and implemented in conjunction with post-hurricane rebuilding of the Base. Implementation of the previous INRMP under the No Action Alternative would not include base-wide hydrological improvements. Although the previous INRMP would have less overall benefits than the updated INRMP, it would still have a net positive effect on water resources at the Base. For these reasons, natural resources management activities under the No Action Alternative would have a moderate beneficial impact on water resources.

3.7 Biological Resources

3.7.1 Affected Environment

3.7.1.1 Vegetation and Wildlife

Much of the historical vegetation of the Tyndall AFB peninsula has been altered by past agricultural and silvicultural practices. Slash and sand pine plantations replaced much of the native longleaf pine communities that once covered the area. In 2006, Tyndall AFB shifted from commercial forestry practices (timber production) to an ecosystem-based forestry program that focuses on restoring historical vegetative conditions and natural processes through selective thinning, natural and artificial regeneration of native species, and prescribed fire. Since then, longleaf pine restoration at the Base has been an important component of the INRMP and associated Forest Management Component Plan.

Planted pine (tree plantation) is the dominant vegetative community at Tyndall AFB, accounting for approximately 27 percent of the total land area of the Base, followed by wet flatwoods (15 percent), and coastal scrub (9 percent) (USAF, 2020a). The coverage of planted pine and the natural forest communities at Tyndall AFB is shown on Figure 3-3.

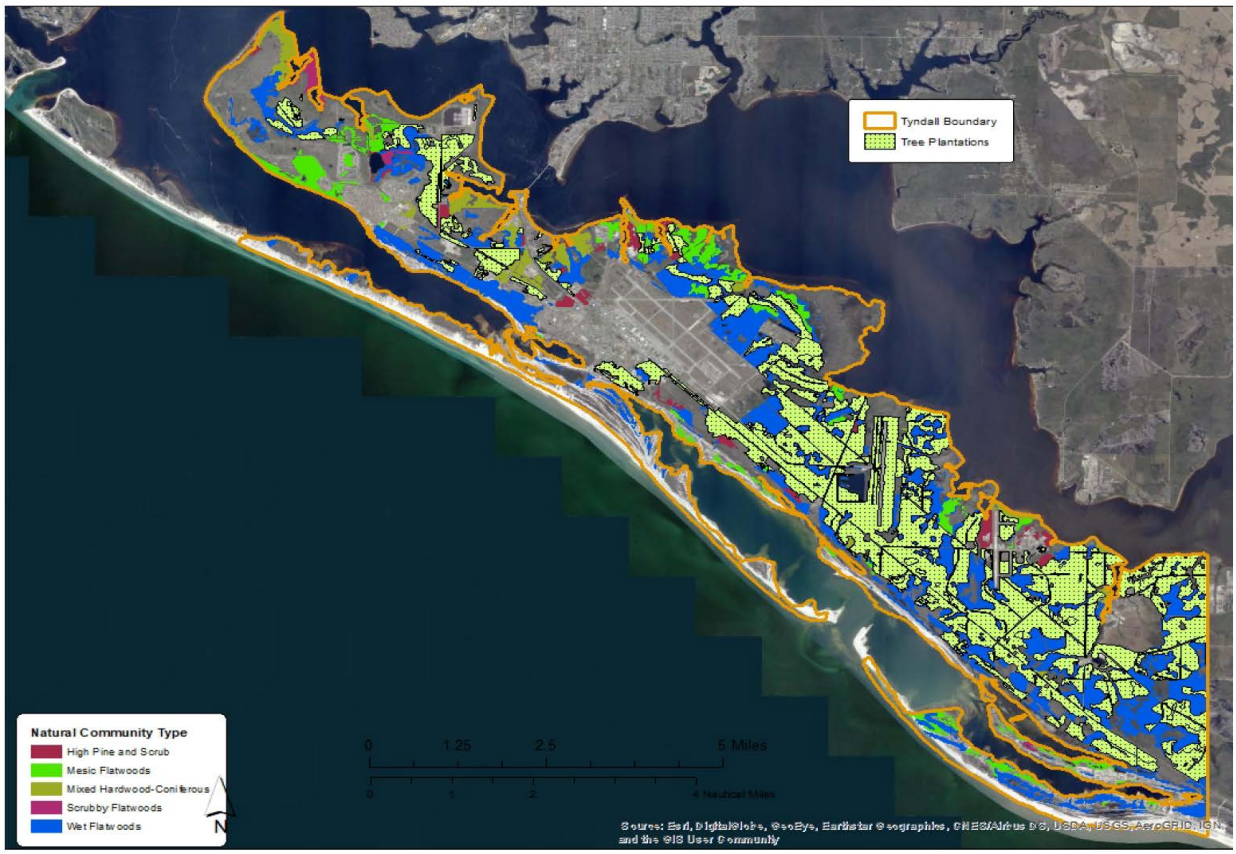

Figure 3-3. Forest Communities at Tyndall Air Force Base
Source: USAF, 2020b

Hurricane Michael, which made landfall on October 10, 2018, caused extensive damage to the pine forests at Tyndall AFB. A total of 12,000 acres of pine forest at the Base sustained severe (5,000 acres) or catastrophic (7,000 acres) wind damage from the hurricane (USAF, 2020a). Cleanup and timber salvage operations on 9,285 acres began in December 2018 and were completed in March 2020; the areas on Tyndall AFB where timber salvage operations were conducted are shown on Figure 3-4. Salvage operations initially involved traditional salvage of long timber poles and were followed by cutting, chipping, and hauling of the remaining tree debris. The extent to which other vegetative communities have been impacted by the hurricane continues to be evaluated by Tyndall Natural Resources.

Tyndall AFB provides habitat for a wide variety of fish and wildlife species. Terrestrial wildlife species diversity and abundance at the Base are generally representative of populations naturally occurring in northwestern Florida. The coastal waters of Tyndall AFB are rich in marine life and support a large diversity of fish and several species of sea turtles and marine mammals. The updated Tyndall AFB INRMP provides a list of representative fish and wildlife species that have been documented to occur at the Base. The management of fish and wildlife at the Base is integrated closely with several other elements of natural resources management, including management of outdoor recreation, water resources, forests, and invasive and nuisance species. The game wildlife species managed at Tyndall AFB include white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), wood duck (*Aix sponsa*), and mourning dove (*Zenaida macroura*). Fishing at Tyndall AFB is provided on five lakes/ponds and along 122 miles of saltwater shorelines. Common freshwater fish species that occur in the lakes/ponds at the Base include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), crappie (*Pomoxis nigromaculatus*), and channel catfish (*Ictalurus punctatus*). Further discussion of hunting, fishing, and other recreation activities at Tyndall AFB is provided in Section 3.9.

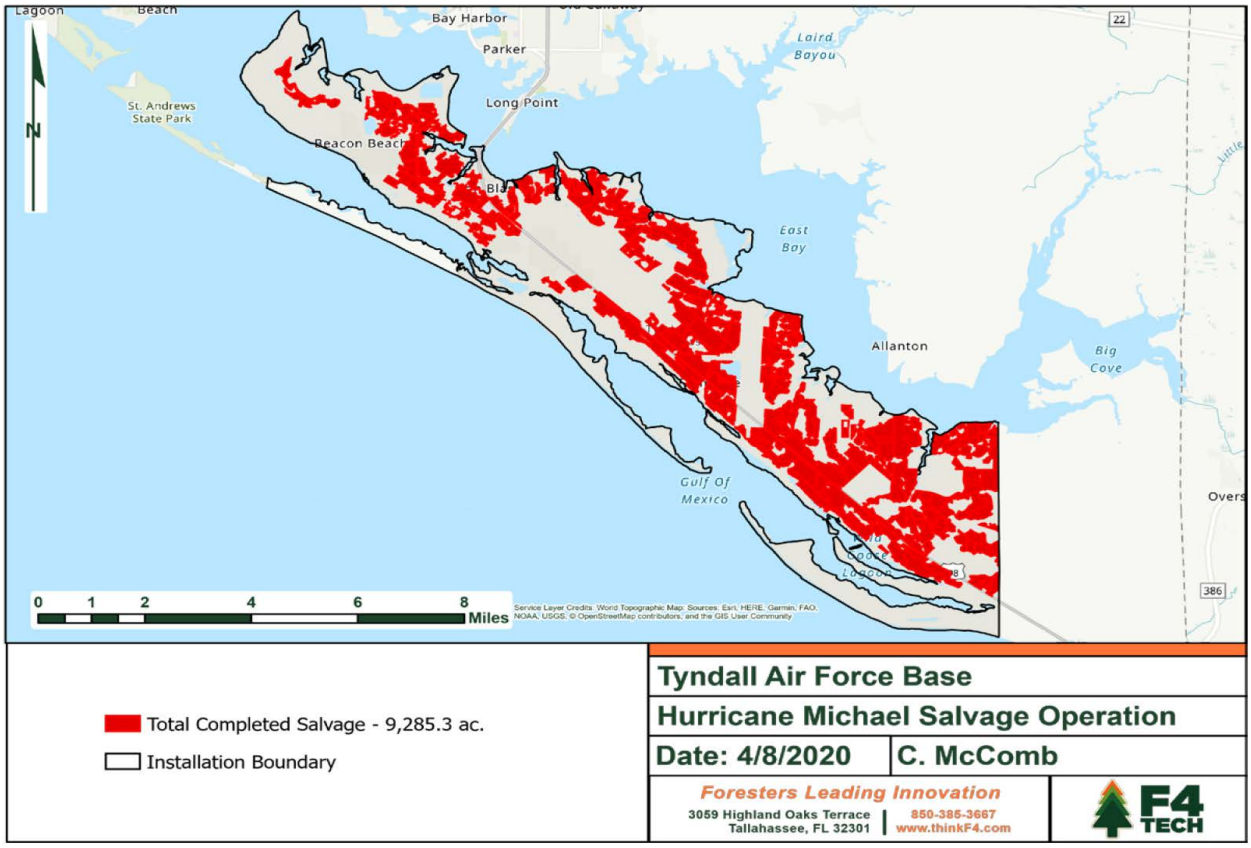

Figure 3-4. Post-Hurricane Timber Salvage Areas at Tyndall Air Force Base
Source: USAF, 2020b

3.7.1.2 Threatened and Endangered Species

Plant and animal species that are federally listed as Threatened or Endangered are afforded legal protection under the Endangered Species Act (ESA). The ESA requires federal agencies to ensure that actions they authorize, fund, or carry out will not likely jeopardize the continued existence of federally listed species, or result in the destruction or adverse modification of designated critical habitat of such species. Federal protection is also afforded to Candidate and Petitioned species. Candidate species are species for which the USFWS has sufficient information to propose them as Threatened or Endangered under the ESA, but for which development of a listing regulation is precluded by other higher priority actions. Petitioned species are species that have been petitioned for listing under the ESA and for which the USFWS has found substantial information that may warrant a listing.

Critical habitat is defined by the ESA as specific areas within or outside the geographical area occupied by a listed species that contain physical or biological features essential to the species' conservation, and that may require special management considerations or protection. The ESA also requires that federal agencies implement measures to conserve, protect, and, where possible, enhance any listed species and its habitat. The ESA is administered by the USFWS and National Marine Fisheries Service (NMFS). Generally, the USFWS manages land and freshwater species and the NMFS manages marine and anadromous species, which are species that breed in freshwater but live most of their lives in the sea. Section 7 of the ESA requires that federal actions determined to potentially impact federally listed species be consulted with the USFWS or NMFS.

Animal species in Florida may also be awarded state listing and associated regulatory protection in accordance with Rule 68A-27, FAC. The FWC maintains the state's list of such animal species. Animal species that are not federally listed, but which are determined to be at risk of extinction in the state are state listed as Threatened. Plant species in Florida may also be awarded state listing and associated regulatory protection in accordance with Chapter 5B-40, FAC. The FDACS maintains the state's list of such plant species.

Several species known to occur at Tyndall AFB that are not ESA-listed or state listed are afforded regulatory protection under the Marine Mammal Protection Act (MMPA), Bald and Golden Eagle Protection Act (BGEPA), or Migratory Bird Treaty Act (MBTA). The Florida black bear, which commonly occurs at Tyndall AFB, is protected under the Florida Black Bear Conservation Rule (FBBCR). The 325th Civil Engineer Squadron/Environmental Element, Natural Resources (325 CES/CEIEA), commonly known as Tyndall Natural Resources, has primary responsibility for the management of T&E species and their habitat at Tyndall AFB. T&E species are managed at the Base through implementation of the INRMP and associated T&E Species Component Plan.

Several listed species surveys have been conducted at Tyndall AFB, including surveys conducted by the USFWS, FWC, Florida Natural Areas Inventory (FNAI), Tyndall Natural Resources, and environmental firms. Table 3-7 presents the federal and state protected species that have been documented to occur or have potential to occur at Tyndall AFB and in surrounding Gulf of Mexico waters, as presented in the updated Tyndall AFB INRMP (USAF, 2020a). Table 3-8 presents species petitioned for listing under the ESA that are known to occur or potentially occur at the Base.

Table 3-7. Federal and State Protected Species that Occur or Potentially Occur at Tyndall Air Force Base and in Surrounding Gulf Waters
EA for Implementation of Tyndall AFB INRMP

Common Name	Scientific Name	Federal Legal Status (USFWS)	State Legal Status (FWC or FDACS)
Plants			
Apalachicola aster	*Eurybia spinulosa*		E
Apalachicola dragonhead	*Physostegia godfreyi*		T
Chapman's butterwort	*Pinguicula planifolia*		T
Chapman's crownbeard	*Verbesina chapmanii*		T
Dew thread sundew	*Drosera filiformis*		E
Giant water dropwort	*Oxypolis greenmanii*		E
Godfrey's butterwort	*Pinguicula ionantha*	T	E
Godfrey's golden aster	*Chrysopsis godfreyi*		E
Gulf coast lupine	*Lupinus westianus*		T
Harper's yellow-eyed grass	*Xyris scabrifolia*		T
Kral's yellow-eyed grass	*Xyris longisepala*		E
Large-leaved jointweed	*Polygonella macrophylla*		T
Parrot pitcher plant	*Sarracenia psittacina*		T
Purple pitcher plant	*Sarracenia rosea*		T
Quillwort yellow-eyed grass	*Xyris isoetifolia*		E
Small spreading pogonia	*Cleistes bifaria*		E
Snakemouth orchid	*Pogonia ophioglossoides*		T
Southern milkweed	*Asclepias viridula*		T
Southern red lily	*Lilium catesbaei*		T
Spoon-leafed sundew	*Drosera intermedia*		T
Telephus spurge	*Euphorbia telephioides*	T	E
Thick-leaved water willow	*Justicia crassifolia*		E
White-flowered wild petunia	*Ruellia noctiflora*		E
Wiregrass gentian	*Gentiana pennelliana*		E
Yellow-flowered butterwort	*Pinguicula lutea*		T

Table 3-7. Federal and State Protected Species that Occur or Potentially Occur at Tyndall Air Force Base and in Surrounding Gulf Waters
EA for Implementation of Tyndall AFB INRMP

Common Name	Scientific Name	Federal Legal Status (USFWS)	State Legal Status (FWC or FDACS)
Fish			
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T/CH	FT
Smalltooth sawfish	*Pristis pectinata*	E	FE
Reptiles			
American alligator	*Alligator mississippiensis*	T (S/A)	FT (S/A)
Eastern indigo snake*	*Drymarchon corais couperi*	T	FT
Florida pine snake*	*Pituophis melanoleucus mugitus*		T
Gopher tortoise	*Gopherus polyphemus*	C	T
Green sea turtle	*Chelonia mydas*	T	FT
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	FE
Leatherback sea turtle	*Dermochelys coriacea*	E	FE
Loggerhead sea turtle	*Caretta*	T	FT
Birds			
American oystercatcher	*Haematopus palliatus*		T
Bald eagle	*Haliaeetus leucocephalus*	BGEPA	
Black rail	*Laterallus jamaicensis*	P	
Black skimmer	*Rynchops niger*		T
Least tern	*Sterna antillarum*		T
Little blue heron	*Egretta caerulea*		T
Marian's marsh wren	*Cistohorus palustris marianae*		T
Piping plover	*Charadrius melodus*	T/CH	FT
Red-cockaded woodpecker*	*Picoides borealis*	E	FE
Reddish egret	*Egretta rufescens*		T
Rufa red knot	*Calidris canutus rufa*	T	FT
Snowy plover	*Charadrius nivosus*		T
Southeastern American kestrel	*Falco sparverius paulus*		T
Tricolored heron	*Egretta tricolor*		T

Table 3-7. Federal and State Protected Species that Occur or Potentially Occur at Tyndall Air Force Base and in Surrounding Gulf Waters

EA for Implementation of Tyndall AFB INRMP

Common Name	Scientific Name	Federal Legal Status (USFWS)	State Legal Status (FWC or FDACS)
Land Mammals			
Choctawatchee beach mouse	*Peromyscus polionotus allophrys*	E/CH	FE
Florida black bear	*Ursus americanus floridanus*		FBBCR
St. Andrew beach mouse	*Peromyscus polionotus peninsularis*	E/CH	FE
Marine Mammals			
Atlantic spotted dolphin	*Stenella frontalis*	MMPA	
Beaked whales	*Mesoplodon spp.*	MMPA	
Bottlenose dolphin	*Tursiops truncatus*	MMPA	
Bryde's whale	*Balaenoptera edeni*	MMPA	
Clymene dolphin	*Stenella clymene*	MMPA	
Dwarf/pygmy sperm whale	*Kogia spp.*	MMPA	
False killer whale	*Pseudorca crassidens*	MMPA	
Florida manatee	*Trichechus manatus latirostris*	E	FE
Fraser's dolphin	*Lagenodelphis hosei*	MMPA	
Killer whale	*Orcinus orca*	MMPA	
Melon-headed whale	*Peponocephala electra*	MMPA	
Pantropical spotted dolphin	*Stenella attenuata*	MMPA	
Pygmy killer whale	*Feresa attenuate*	MMPA	
Risso's dolphin	*Grampus griseus*	MMPA	
Rough-toothed dolphin	*Steno bredanensis*	MMPA	
Short/long-finned pilot whale	*Globicephala spp.*	MMPA	
Sperm whale	*Physeter macrocephalus*	E/MMPA	FE
Spinner dolphin	*Stenella longirostris*	MMPA	
Striped dolphin	*Stenella coeruleoalba*	MMPA	

Agencies
FDACS = Florida Department of Agriculture and Consumer Services
FWC = Florida Fish and Wildlife Conservation Commission
USFWS = U.S. Fish and Wildlife Service

Federal Legal Status
BGEPA = Bald and Golden Eagle Protection Act
C = Candidate for federal listing

Table 3-7. Federal and State Protected Species that Occur or Potentially Occur at Tyndall Air Force Base and in Surrounding Gulf Waters
EA for Implementation of Tyndall AFB INRMP

Common Name	Scientific Name	Federal Legal Status (USFWS)	State Legal Status (FWC or FDACS)

CH = Critical habitat designated
E = Endangered: species in danger of extinction throughout all or a significant portion of its range.
MMPA = Marine Mammal Protection Act
P = Proposed for federal listing
T = Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
T(S/A) = Treated as threatened due to similarity of appearance to a species that is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.

State Legal Status
FE = Federally listed as Endangered
FBBCR = Florida Black Bear Conservation Rule
FT = Federally listed as Threatened
FT(S/A) = Federally treated as Threatened due to similarity of appearance
T = State listed as Threatened. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.

*Not documented on Tyndall AFB; however, the species is known to occur in the region and/or appropriate habitat exists on Tyndall AFB.

Data Source: USAF, 2020a.

Table 3-8. Petitioned Species that Occur or Potentially Occur at Tyndall Air Force Base
EA for Implementation of Tyndall AFB INRMP

Common Name	Scientific Name
Plants	
Bear tupelo	*Nyssa ursina*
Blackbract pipewort*	*Eriocaulon nigrobracteatum*
Hairy-peduncled beakrush*	*Rhynchospora crinipes*
Henry's spider lily	*Hymenocallis henryae*
Kral's yellow-eyed grass	*Xyris longisepala*
Panhandle meadow-beauty*	*Rhexia salicifolia*
Small-flower meadow-beauty*	*Rhexia parviflora*
Smooth-barked St. John's wort*	*Hypericum lissophloeus*
West's flax*	*Linum westii*
Invertebrates	
Purple skimmer*	*Libellula jesseana*
Say's spiketail*	*Cordulegaster sayi*
Coastal flatwoods crayfish	*Procambarus apalachicolae*

Table 3-8. Petitioned Species that Occur or Potentially Occur at Tyndall Air Force Base
EA for Implementation of Tyndall AFB INRMP

Common Name	Scientific Name
Reptiles	
Alligator snapping turtle*	*Macroclemys temminckii*
Eastern diamondback rattlesnake	*Crotalus adamanteus*

*Not documented on Tyndall AFB.

Data Source: USAF, 2020a.

As indicated in Table 3-7, a total of two plant species and 15 animal species that are federally listed as Threatened or Endangered are known to occur or have potential to occur at Tyndall AFB and in surrounding Gulf waters. The American alligator (*Alligator mississippiensis*) is federally listed solely due to its resemblance to the federally listed American crocodile (*Crocodylus acutus*), which is not known to occur at Tyndall AFB. The federally threatened eastern indigo snake (*Drymarchon couperi*) occurs in a variety of habitats and often uses gopher tortoise (*Gopherus polyphemus*) burrows for shelter and egg laying. There have been no sightings of indigo snakes at Tyndall AFB; however, indigo snakes have been documented to occur in Bay County and suitable habitat for them exists at the Base. The federally endangered red-cockaded woodpecker (RCW) occurs primarily in open, fire-maintained longleaf pine forests, and nests in cavities it creates in living pine trees. There have been no sightings of RCWs at Tyndall AFB, however, RCWs were known to nest on Lathrop Island located approximately 1.5 miles from the Base prior to Hurricane Michael. Much of the pine forests on Lathrop Island were destroyed by the hurricane and the status of the RCW population on the island is unknown. Most if not all potential foraging or nesting habitat for RCWs at Tyndall AFB was also destroyed by Hurricane Michael.

Most of the listed species at Tyndall AFB occur on the barrier islands or within wetlands where interactions with the military mission are minimal. The beaches of the barrier islands are important nesting sites for the loggerhead sea turtle (*Caretta caretta*), as well as for listed shorebirds such as the snowy plover (*Charadrius alexandrinus tenuirostris*) and least tern (*Sterna antillarum*). The dunes are crucially important habitat for the Choctawhatchee beach mouse (*Peromyscus polionotus allophyrs*) and St. Andrew beach mouse (*Peromyscus polionotus peninsularis*). Critical habitat for federally listed species at Tyndall AFB has been designated for the Choctawhatchee beach mouse on Shell Island and CIW; for the St. Andrew beach mouse on CIE; for the piping plover (*Charadrius melodus*) on Shell Island, CIW and CIE; and for the Gulf sturgeon (*Acipenser oxyrinchus desotoi*) from the Gulf coastal shoreline out to 1 nautical mile offshore; critical habitat at Tyndall AFB is shown on Figure 3-5.

Several species known to occur at Tyndall AFB that are not federally protected are state listed as Threatened or Endangered, including 23 plant species. Notable state-listed animal species documented to occur at the Base include the gopher tortoise, least tern, snowy plover, and several wading bird species, including the little blue heron (*Egretta caerulea*), reddish egret (*Egretta rufescens*), and tricolored heron (*Egretta tricolor*). The gopher tortoise is also a candidate for federal listing. It creates burrows in sandy soils and requires upland habitats usually near open areas where shade, water, and the opportunity to feed on a variety of herbs exist.

Protected species documented to occur at Tyndall AFB that are not state or federally listed include the bald eagle (*Haliaeetus leucocephalus*), which is protected under the BGEPA; several migratory bird species protected under the MBTA; and the Florida black bear (*Ursus americanus floridanus*), which is protected under the FBBCR. Several whale and dolphin species protected under the MMPA, including the federally endangered sperm whale (*Physeter microcephalus*), are known to occur in Gulf of Mexico waters offshore of Tyndall AFB.

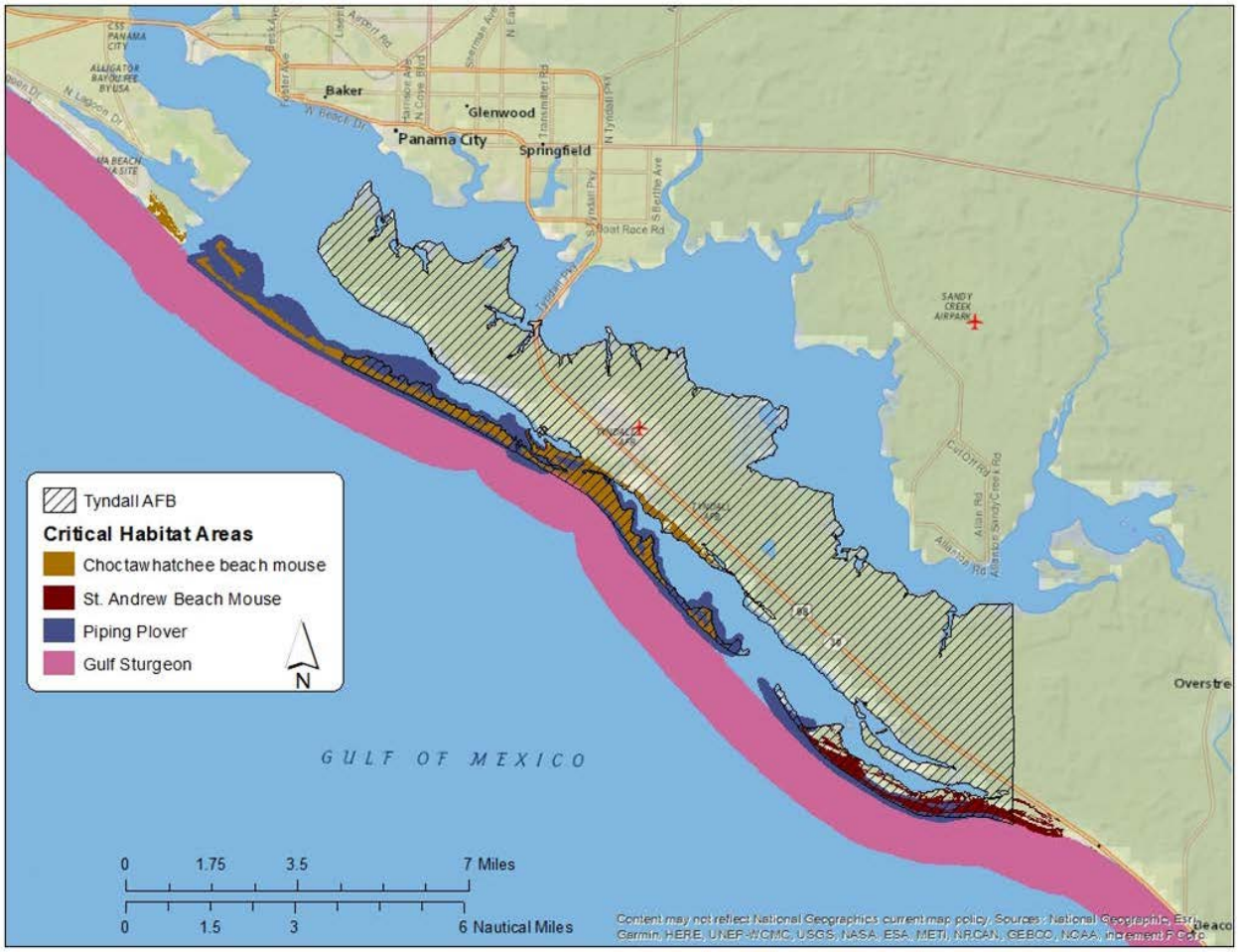

Figure 3-5. Critical Habitat at Tyndall Air Force Base
Source: USAF, 2020a

Shell Island, CIW, and CIE have been designated by the FWC as Critical Wildlife Areas. Public access to portions of these areas may be restricted from April 1 to September 15 for the protection of nesting birds or year round for the protection of migratory and resident wintering birds (USAF, 2020a). Other ecologically important areas on Tyndall AFB include six areas identified by the FNAI as Special Interest Natural Areas. These areas consist mostly of wetland habitat and are relatively pristine. They are considered ecologically valuable and support a variety of plant and wildlife species, some of which are rare or protected.

3.7.2 Environmental Consequences

3.7.2.1 Alternative 1

Many components of the Tyndall AFB natural resources management program involve protection and conservation of biological resources, including management of forests, fish and wildlife, T&E species, BASH, invasive/nuisance species, and outdoor recreation. These components collectively account for most of the budget and resources of the Base's overall natural resources management program. Management of biological resources is integrated among the various actions under Goals I, II, and III of the updated INRMP (Table 2-3).

Vegetation and Wildlife

Approximately 2,000 acres of longleaf pine were planted at Tyndall AFB from 2006 to 2018 (USAF, 2020b). During that period, revenue from timber sales from mature slash pine stands was used to fund

longleaf pine restoration efforts, which also included selective thinning of slash pine stands with longleaf planting in addition to planting of longleaf in cleared areas. Under the updated INRMP, longleaf pine restoration via tree planting at Tyndall AFB would be conducted in greater amounts and at a faster rate to mitigate the adverse impacts of Hurricane Michael on the pine forests at the Base. Long-term restoration of planted areas would be achieved using frequent (2 to 3-year interval), low-intensity fire with emphasis on growing season burning to promote plant species diversity and control undesirable mid-story growth. Longleaf pine communities are dependent on frequent, low-intensity fires to maintain their strata structure and species composition. Prescribed burning is an integral component of the overall Tyndall AFB forestry management program and is critical for supporting the military mission and maintaining ecosystem health at the Base (discussed further in Section 3.10). Under the updated INRMP, approximately 4,500 acres at Tyndall AFB would be prescribed burned per year from 2020 to 2022 and between approximately 4,500 acres and 6,000 acres would be prescribed burned per year during 2023 and 2024 (Action 1 of INRMP Goal II in Table 2-3). The amount of prescribed burning that would be conducted under the updated INRMP would be comparable to the amount of prescribed burning conducted in recent years prior to Hurricane Michael, which was typically about 6,000 acres per year. The longleaf pine restoration proposed under the updated Tyndall AFB INRMP would have major beneficial impacts on biological resources at the Base. The forestry management actions proposed under the updated INRMP would restore native forest communities that provide suitable habitat for a great diversity of plant and animal species, including several protected species.

Vegetation management activities other than longleaf pine restoration at Tyndall AFB primarily include harvesting of slash pine trees within airfield glide slopes and other vegetation control measures for flight safety and controlling the spread of weeds and invasive plant species throughout the Base. Major changes to these practices are not expected during implementation of the updated INRMP. The primary invasive plant species targeted at Tyndall AFB are Chinese tallow (*Triadica sebifera*), cogongrass (*Imperata cylindrica*), and Japanese climbing fern (*Lygodium japonicum*). The use of herbicides to control these and other invasive plant species at Tyndall AFB is discussed in Section 3.11. The spread of invasive plant species at the Base following Hurricane Michael will continue to be monitored and treatment plans will be prepared accordingly during implementation of the updated INRMP.

Management of fish and wildlife at Tyndall AFB is integrated throughout the overall natural resources management program. Components of the program that involve fish and wildlife management include habitat, forest, and water resources management, nuisance wildlife control, BASH, and public hunting and fishing. Fish and wildlife habitat management at Tyndall AFB focuses on the health of the entire ecosystem instead of individual species. This ecosystem-based management strategy is more effective than a species-based management strategy for ensuring the long-term viability and sustainability of fish and wildlife populations at the Base. Ecosystem-based wildlife management strives to improve the integrity, biodiversity, and sustainability of the ecosystem. Biodiversity protection is an integral part of ecosystem management. Many natural resources management practices implemented by Tyndall AFB, such as longleaf pine restoration, prescribed burning, and invasive species control, maintain and enhance biodiversity at the Base.

Management of nuisance wildlife at Tyndall AFB experienced changes following Hurricane Michael. Under the updated INRMP and associated Invasive and Nuisance Species Management Plan (USAF, 2020c), Tyndall Natural Resources implements measures to control the populations of certain nuisance wildlife species at the Base, including the coyote (*Canis latrans*), Florida black bear, and feral cats and hogs. The Florida black bear, which is protected under the FBBCR, is of particular importance because it is native protected species that can also be a nuisance. Management objectives for the Florida black bear at Tyndall AFB include maintaining the current population and reducing human-bear interactions and nuisance bear behavior. All bear management actions at the Base are directed by the FWC. After Hurricane Michael, black bears became a nuisance in the Base housing areas, which were uninhabited for months following the hurricane. Since the hurricane, responsibility for bear control in the Base

housing areas was transferred from Tyndall Natural Resources to the FWC. Once the housing areas are fully operational, responsibilities for bear control in the areas will be re-evaluated. Control of wildlife under the Tyndall AFB BASH program is discussed in Section 3.10. Management of public hunting and fishing at the Base is discussed in Section 3.9.

Threatened and Endangered Species

As discussed for fish and wildlife, management of T&E species at Tyndall AFB focuses on the health of the entire ecosystem and is closely integrated with other components of the overall natural resources management program. T&E species are managed at the Base through implementation of the INRMP and associated T&E Species Component Plan (USAF, 2020d). Pursuant to 16 USC 1533((1)(3)(B)(i)), effective implementation of these plans would allow Tyndall AFB to be exempt from further designation of new critical habitat at the Base.

Proposed actions at Tyndall AFB that have potential to impact T&E species must go through EIAP review and approval by Tyndall Natural Resources, which uses survey data and other available information to determine the potential impact of the proposed action. If the proposed action is determined to have the potential to impact T&E species or their habitat, Tyndall Natural Resources coordinates with the proponent and attempts to modify the action to avoid or further minimize the potential impact. Following this coordination, Tyndall Natural Resources determines the required consultations and protection measures for the action. The ESA Section 7 consultation process is either informal or formal depending on the likelihood of the proposed action to adversely affect a federally listed species. Formal Section 7 consultation has a longer timeline and involves preparation of a Biological Assessment by the proponent of the action and issuance of a Biological Opinion by the USFWS or NMFS at the end of the process. Tyndall Natural Resources works collaboratively with the USFWS and NMFS during the ESA Section 7 process and communicates the terms and conditions of the concurrence or Biological Opinion to the proponents.

It is expected that the number of ESA Section 7 consultations at Tyndall AFB will increase during implementation of the updated INRMP over the next 5 years due to the rebuilding of the Base following Hurricane Michael along with changes to the military mission associated with the potential addition of F-35 and MQ-9 wings to the Base. Consultations would be facilitated by the onsite USFWS liaison to Tyndall AFB who assists Tyndall Natural Resources with the management of federally listed species at the Base. This USFWS liaison participated in the preparation of the updated INRMP and is involved in several initiatives to restore T&E species habitat and document post-hurricane populations of T&E species at the Base over the near term. In addition to the USFWS liaison, there are two other full-time positions staffed by USFWS personnel under the current natural resources management program at Tyndall AFB.

Under the updated INRMP and associated T&E Species Component Plan, specific management strategies would be implemented for the federally listed species known to occur at the Base over the next 5 years. These strategies would be based on the results of past management strategies and assessment of current management needs for each species. Assessments of post-hurricane populations of federally-listed beach mice, sea turtles, and shorebirds on the barrier islands of Tyndall AFB have been initiated and are vital over the planning period due to extensive destruction of dune habitat by the hurricane in areas that are designated as critical habitat.

Management of federally protected species on the barrier islands at Tyndall AFB have primarily included surveys, dune protection and restoration, predator removal, use of appropriate lighting, and beach driving restrictions (USAF, 2020a). Following Hurricane Michael, the USAF and USFWS have partnered with the FNAI to study the dynamics of how the post-hurricane recovery of the St. Andrew and Choctawhatchee beach mice on the barrier islands relates to dune structure and vegetative cover. January 2019 surveys that confirmed the presence of beach mice on Shell Island, CIW, and CIE provide

encouraging evidence that beach mice populations at Tyndall AFB may be able to recover from the impacts of the hurricane.

Among the regular management actions for protecting and conserving beach mice at Tyndall AFB, implementation of the updated INRMP would include new projects to restore impacted dune systems and destroyed boardwalks. Under Action 4 of INRMP Goal II in Table 2-3, Tyndall AFB proposes to re-establish new dune systems using sand fencing and other appropriate measures and to replace recreational boardwalks that were destroyed by the hurricane. The boardwalks minimize foot-traffic disturbance to beach mice habitat from recreational use of the barrier islands; the boardwalk at the access point for Shell Island and CIW is planned to be replaced in Fiscal Year 2021 under the updated INRMP. These new proposed measures coupled with the regular habitat management actions implemented under the INRMP on the barrier islands would have beneficial impacts on both species of beach mice and the overall barrier island ecosystem.

Monitoring of sea turtle nests on the barrier islands of Tyndall AFB began in 1984 and has continued on an annual basis to date. Shorebirds have been monitored on the barrier islands of the Base since the late 2000s. Long-term monitoring data and measures implemented to protect sea turtles and shorebirds, including the federally threatened piping plover and rufa red knot (*Calidris canutus rufa*) from mission and recreational impacts, such as beach driving, are presented in the T&E Species Component Plan that is part of the updated INRMP. The proposed actions under the updated INRMP to restore dunes and replace boardwalks, as described for beach mice, would also benefit sea turtles and shorebirds. Tyndall Natural Resources and the USFWS would monitor these species over the planning period to assess nesting and population trends under post-hurricane conditions.

The extensive post-hurricane restoration of longleaf pine along with prescribed burning, invasive species control, and other ecosystem-based management practices under the updated INRMP would benefit certain T&E species and their habitats on the mainland of the Base. Godfrey's butterwort and telephus spurge (*Euphorbia telephioides*), which are the two federally listed plant species known to occur at Tyndall AFB, and the gopher tortoise, which is candidate for federal listing, would particularly benefit from prescribed burning. The FNAI first recorded the presence of Godfrey's butterwort at Tyndall AFB in 1994 and Tyndall Natural Resources has been conducting surveys for this species since 2009. Under the updated INRMP and associated T&E Species Component Plan, specific measures to benefit the Godfrey's butterwort would include prescribed burning in wet flatwoods and other targeted wetland and transitional habitats during the growing season. Telephus spurge was first discovered at Tyndall AFB in 2015. This species occurs in a variety of habitat types and would be managed primarily with prescribed fire in target locations and habitats, habitat protection measures, and invasive species control.

In summary, the species-specific and ecosystem-based management actions that would be implemented for T&E species at Tyndall AFB under the updated INRMP and associated T&E Species Component Plan would have multiple beneficial impacts on the target species. As participating agencies in the preparation of the INRMP, the USFWS and FWC assisted Tyndall AFB in the development of the management actions proposed for the species for which they have regulatory jurisdiction. Tyndall AFB will work closely with these agencies to implement, evaluate, and refine the management strategies based on the needs of the species over the planning period.

Agency Consultation

The updated Tyndall AFB INRMP that is addressed in this EA was prepared by the USAF in cooperation with the USFWS and FWC. The signing of the INRMP by the USFWS and FWC represents their approval of the aspects of the Plan that are within their regulatory authority. Scoping letters were sent to the USFWS and FWC to request any input they may have during development of this EA (Appendix A). In an email dated November 9, 2020 (Appendix A), the FWC stated that based on the previous coordination they provided on the update of the INRMP, they "have no further comments or recommendations related to fish and wildlife or listed species and their habitat." In an email dated December 10, 2020, the

USFWS acknowledged receipt of the scoping letter and indicated that they look forward to receiving the draft EA for review. Any comments received from these agencies following their review of the draft EA will be addressed in the final EA.

Conclusion

Based on the analysis conducted, Alternative 1 would have a major beneficial impact on biological resources.

3.7.2.2 No Action Alternative

Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. Implementation of the previous INRMP under the No Action Alternative would fall short of addressing several post-hurricane biological resources management needs at Tyndall AFB. For example, longleaf pine restoration via tree planting under the previous INRMP would not be sufficient to meet the restoration needs of the impacted forests at the Base. Implementation of the previous INRMP would also not include measures to address hurricane impacts to T&E species habitat on the barrier islands, including the re-establishment of washed out dunes and replacement of destroyed boardwalks, which are proposed under the updated INRMP. Although the previous INRMP would have less overall benefits than the updated INRMP, it would still have a net positive effect on biological resources at the Base. For these reasons, natural resources management activities under the No Action Alternative would have a moderate beneficial impact on biological resources.

3.8 Cultural Resources

3.8.1 Affected Environment

Cultural resources consist of any physical or traditional evidence of human activity considered relevant to a particular culture or community. Cultural resources include prehistoric and historic sites, structures, districts, and artifacts, as well as a community's heritage and way of life.

The National Historic Preservation Act (NHPA) sets forth government policy and procedures regarding historic properties. Historic property is defined under 36 CFR Part 800.16 (l)(1) as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior." Section 106 of the NHPA requires federal agencies to consider the effects of their actions on such properties, following regulations issued by the Advisory Council on Historic Preservation (36 CFR Part 800).

The Tyndall AFB Integrated Cultural Resources Management Plan (ICRMP) provides guidance on cultural resources management and its integration with mission activities and other Base management programs (USAF, 2019). Development and approval requirements for the ICRMP are included in AFMAN 32-7003, *Environmental Conservation*, which superseded AFI 32-7065, *Cultural Resources Management Program*. The 325 CES/CEIEA has primary responsibility for the management of cultural resources at Tyndall AFB.

Cultural resources surveys have been conducted at Tyndall AFB since the early 1900s. Identified sites are evaluated for their potential eligibility for listing in the NRHP and coordinated with the SHPO and the six Native American Tribes who have expressed an interest in Tyndall AFB for their ancestral ties.

Standard Operating Procedure (SOP) 7.4, *Cultural Discoveries*, in the Tyndall AFB ICRMP is required to be implemented when cultural artifacts, fossils, or human remains are inadvertently discovered during construction or other activities at the Base. This SOP outlines the measures to be implemented for the protection of the find, including procedures for avoidance, notification, and initial evaluation of the find.

3.8.2 Environmental Consequences

3.8.2.1 Alternative 1

Section 106 of the NHPA requires the USAF to consider effects of its undertakings on properties listed or eligible for listing in the NRHP. In assessing whether an undertaking, such as the Proposed Action, affects such properties, the USAF must consider both direct and indirect effects. Direct effects include physical impacts, such as demolition or damage from construction or other activity. Indirect effects include impacts that could alter the historic setting or context of a property, such as noise disturbance or aesthetic/visual impacts.

The protection of cultural resources at Tyndall AFB is closely coordinated with the management of natural resources at the Base. Natural resources management activities have low potential to adversely impact previously identified historic structures or archaeological sites at Tyndall AFB based on the known locations of such cultural resources and the specific measures that have been established to protect them at the Base. Management activities that involve earth disturbance, such as certain forestry management practices, erosion control operations, and construction of recreational infrastructure, have the greatest potential to physically impact unknown archaeological sites. Natural resources management activities would have little to no potential to result in indirect effects, such as alteration of the historic setting or context of a property due to noise disturbance or aesthetic/visual impacts.

Natural resources management activities under the updated INRMP that would involve earthwork, such as prescribed burning, would continue to be closely coordinated with cultural resources personnel prior to implementation to determine if cultural resources surveys and/or cultural resources protection measures are required. As standard practice, heavy equipment is not used for prescribed burning or other natural resources management practices in areas on the Base where known cultural resources have been documented to exist. Construction under the updated INRMP would be relatively minor and largely limited to the replacement of boardwalks and other recreational infrastructure that were destroyed by Hurricane Michael. Cultural resources surveys would be conducted and cultural resources protection measures would be implemented as needed at sites proposed for construction under the updated INRMP. Specific restrictions enforced under the Tyndall AFB outdoor recreation program to minimize impacts to cultural resources are discussed in Section 3.9.2.

In the event that unknown cultural resources are inadvertently discovered during natural resources management activities under the updated INRMP, all work would stop immediately, the proper authorities would be promptly notified, and measures to protect and evaluate the inadvertent find would be implemented in accordance with SOP 7.4, *Cultural Discoveriess*, in the Tyndall AFB ICRMP.

Scoping letters solicitating input on the Proposed Action were sent to the Florida State Historic Preservation Office (SHPO) on October 27, 2020 and to the six Native American Tribes who have expressed an interest in Tyndall AFB for their ancestral ties (Miccosukee Tribe of Indians of Florida, Muscogee (Creek) Nation, Poarch Band of Creek Indians, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and Thlopthlocco Tribal Town) on November 16, 2020 (Appendix A). In a reply letter dated November 12, 2020 (Appendix A), the SHPO indicated that it finds that the updated Tyndall AFB INRMP "provides a clear and thorough process for complying with the requirements for the National Historic Preservation Act and other state and federal laws." In an email dated January 4, 2021 (Appendix A), the Seminole Tribe of Florida, Tribal Historic Preservation Office indicated that they have no objections to the Proposed Action at this time, and requested they be notified if any archaeological, historical, or burial resources are inadvertently discovered; the USAF commits to satisfy this request. Comments from the other Tribes on the Proposed Action will be addressed in this EA when received.

Conclusion

Based on the analysis conducted, Alternative 1 would have no effect on cultural resources.

3.8.2.2 No Action Alternative

Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. Overall, protection of cultural resources at Tyndall AFB under the previous and updated INRMPs would be comparable. For these reasons, natural resources management activities under the No Action Alternative would have no effect on cultural resources.

3.9 Land Use

3.9.1 Affected Environment

Land use describes how land is developed and managed for different uses. Land use planning refers to the planned development of property typically with the goal of achieving compatibility among uses within and adjacent to the property. Land use at Tyndall AFB has been affected extensively by Hurricane Michael, which made landfall on October 10, 2018 and caused catastrophic damage to the infrastructure and natural resources of the Base. Following initial damage assessments by multiple task forces, a Program Management Office was established in November 2018 to support long-term redevelopment of Tyndall AFB as the model Air Force Installation of the Future. The rebuilding of Tyndall AFB along with changes to the military mission associated with the potential addition of F-35 and MQ-9 wings to the Base will result in associated land use changes.

Existing land uses at Tyndall AFB are shown on Figures 3-6A through 3-6C and described in the 2015 Tyndall AFB Installation Development Plan (IDP) (USAF, 2015). Based on the IDP, approximately 66 percent of the land area of Tyndall AFB is classified as *Open Space;* this land use category is undeveloped land, which at Tyndall AFB consists primarily of forested habitats. Most of the developed area north of U.S. Highway 98 is classified as *Airfield*, *Industrial*, *Training*, and *Aircraft Operations and Maintenance* land uses. Most of the developed area south of U.S. Highway 98 is classified as *Housing*, *Administrative*, and *Industrial* land uses. Portions of the coastline of Tyndall AFB are classified as *Outdoor Recreation* land use. A post-hurricane master plan is currently being developed for Tyndall AFB, which will provide updated mapping of the land uses at the Base.

Tyndall AFB offers the public numerous outdoor recreation activities, including hunting, fishing, hiking, biking, kayaking/canoeing, camping, and beach activities. DoD personnel are afforded additional recreational opportunities at Tyndall AFB, including access to the Bonita Bay Outdoor Recreation Complex, skeet range, archery range, family campground, and a variety of sports facilities. The primary objective of Tyndall AFB's outdoor recreation program is to provide outdoor recreation opportunities to military personnel and the general public within the constraints of the Base's military mission. The Outdoor Recreation Component Plan (USAF, 2020e) that is part of the updated Tyndall AFB INRMP provides guidance on the management of outdoor recreation and its integration with mission activities and other Base management programs.

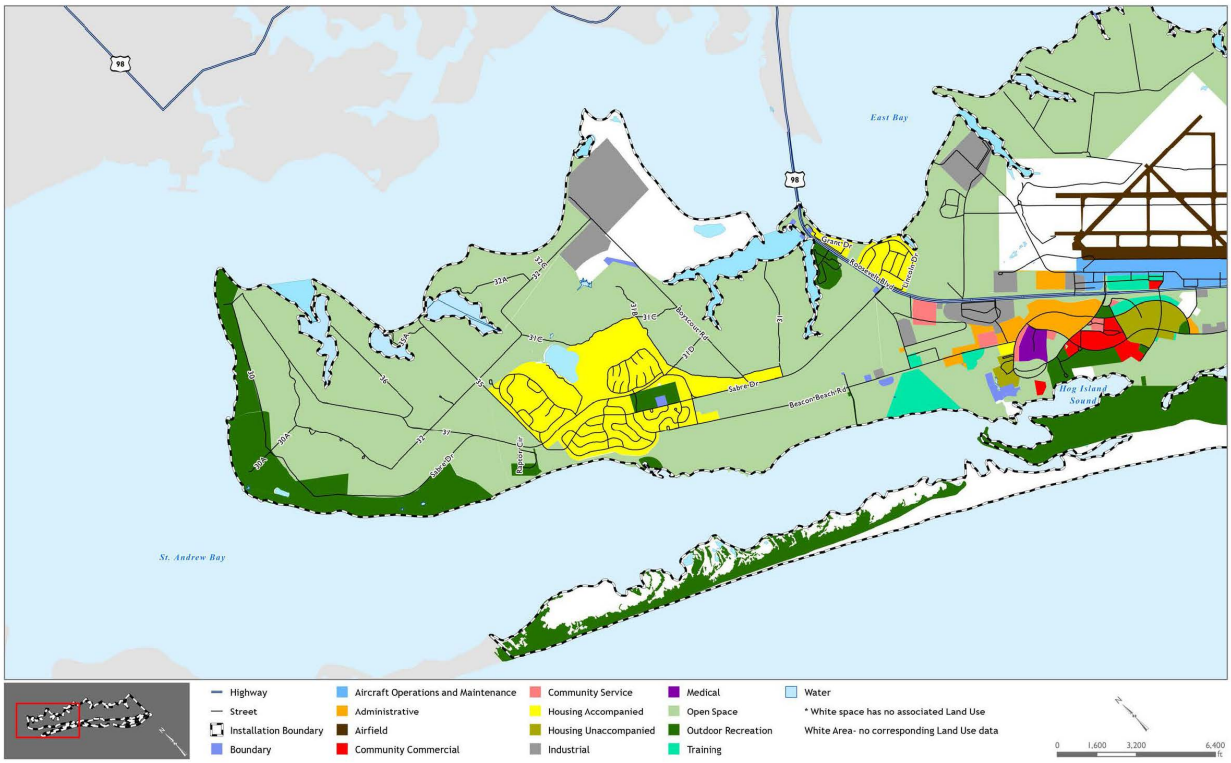

Figure 3-6A. Existing Land Use at Tyndall Air Force Base - West
Source: USAF, 2015

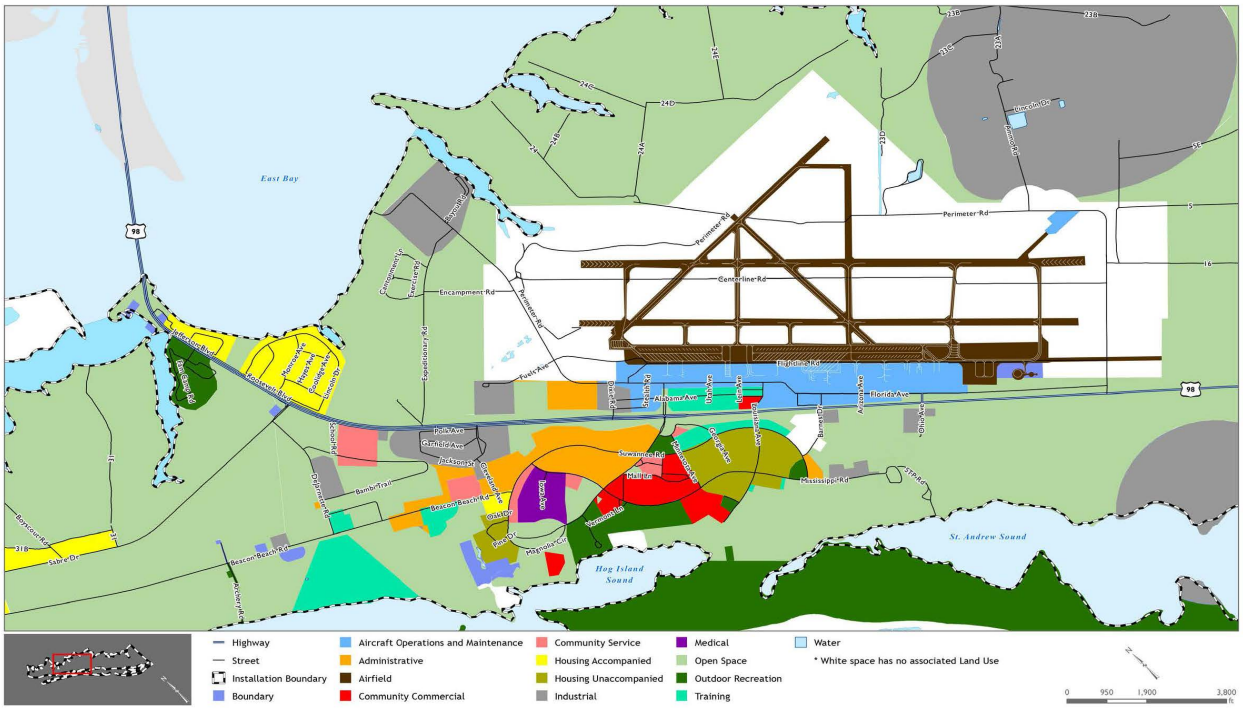

Figure 3-6B. Existing Land Use at Tyndall Air Force Base - Central
Source: USAF, 2015

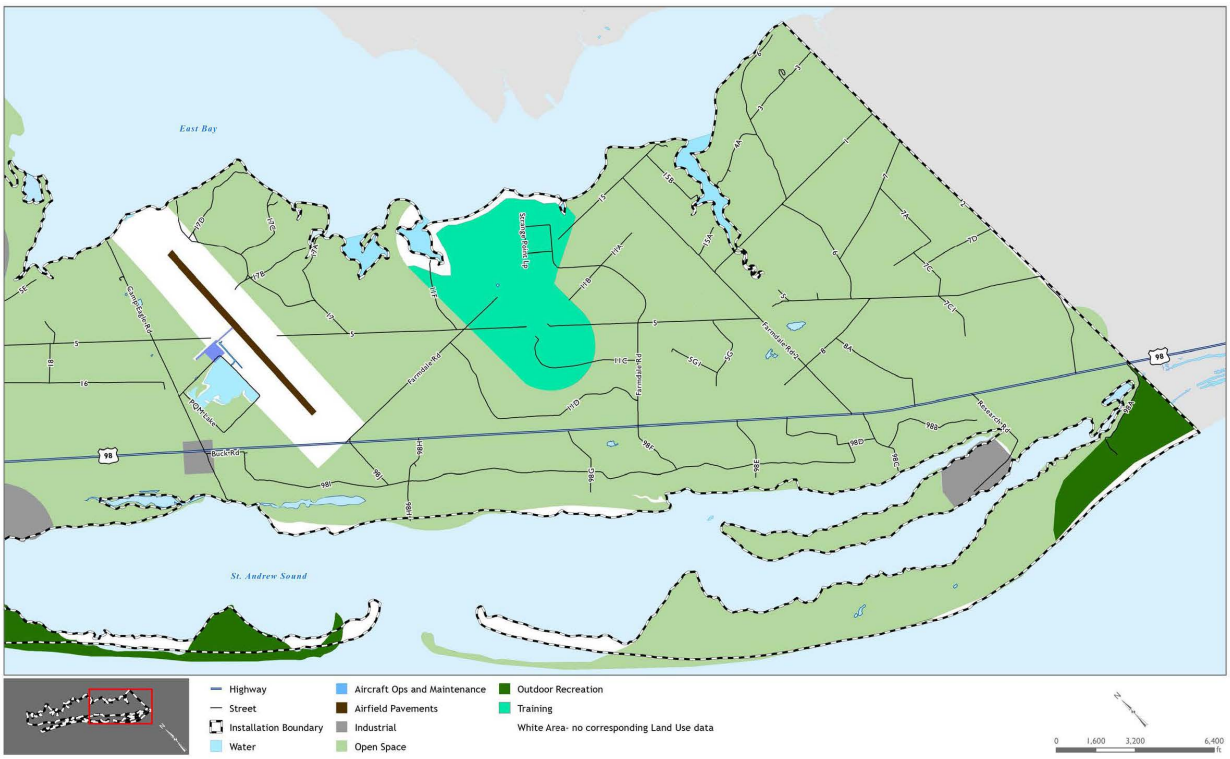

Figure 3-6C. Existing Land Use at Tyndall Air Force Base - East
Source: USAF, 2015

Hunting is provided on approximately 20,300 acres of Tyndall AFB during the State of Florida hunting season with a maximum of 445 hunters participating at any given time. The game wildlife species managed by Tyndall AFB include white-tailed deer, wild turkey, wood duck, and mourning dove. Fishing at the Base is provided on five lakes/ponds and along 122 miles of saltwater shorelines. Common freshwater fish species that occur in the lakes/ponds at Tyndall AFB include largemouth bass, bluegill, redear sunfish, crappie and channel catfish. Three nature trails at Tyndall AFB totaling approximately 4 miles are available for hiking. All elevated boardwalks at Tyndall AFB were destroyed by Hurricane Michael. The Base has three sites for camping; the family campground is available only to DoD personnel.

Hunting and freshwater fishing at Tyndall AFB require State of Florida hunting and fishing licenses as well as Tyndall AFB-specific hunting and fishing permits. General recreation permits are sold to civilians who wish to engage in outdoor recreational activities at the Base other than hunting or freshwater fishing, such as hiking, bicycling, beach use, picnicking, saltwater fishing from shore, and use of boat ramps. All Tyndall AFB hunting, fishing, and outdoor recreation permits are available for purchase online at https://tyndall.isportsman.net. This website also provides current hunting, fishing, and outdoor recreation regulations and maps. Tyndall AFB is divided into the following three outdoor recreation management units: West Unit, Flight Line Unit, and East Unit. These management units are further divided into hunting blocks that are based on the type of hunting allowed (for example, gun or archery) and other designated uses. The 2019-2020 Tyndall AFB hunting and fishing map, presented as Figure 3-7, shows the recreation management units and designated hunting blocks for the previous season.

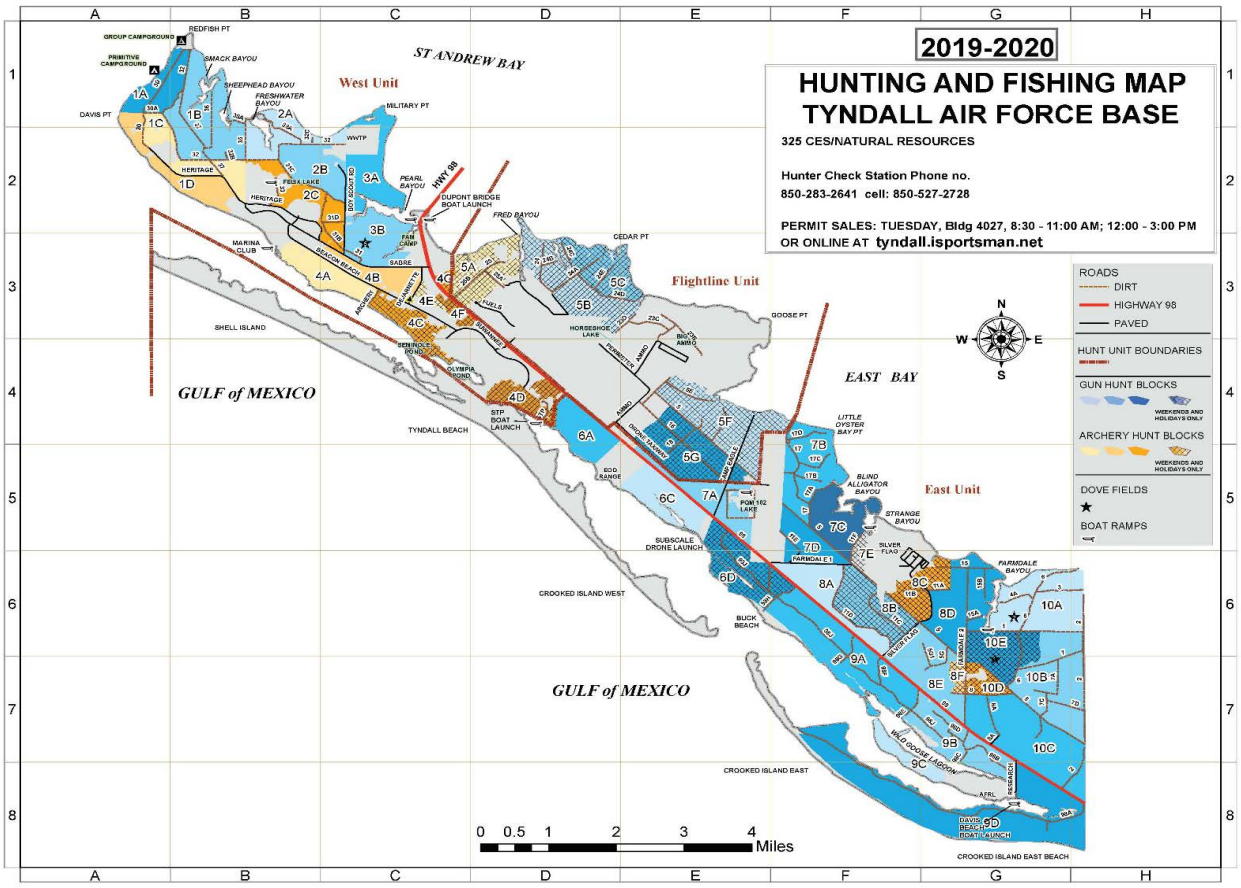

Figure 3-7. Tyndall Air Force Base Hunting and Fishing Map
Source: USAF, 2020e

The hunting and fishing map and regulations are updated annually. The East Unit at Tyndall AFB has been designated by the FWC as a Wildlife Management Area (WMA). Tyndall AFB permits public hunting and fishing and the FWC provides fish and wildlife law enforcement support in the WMA. Hunting is the only type of recreational activity that is available within the undeveloped land that surrounds the Silver Flag area in the eastern portion of Tyndall AFB. Recreational hunting is not allowed within or in the general vicinity of the Silver Flag cantonment area, nor within or in the immediate vicinities of the Sky X Explosives Test Area, drone runway, or drone recovery area.

3.9.2 Environmental Consequences

3.9.2.1 Alternative 1

The rebuilding of Tyndall AFB following Hurricane Michael along with changes to the military mission associated with the potential addition of F-35 and MQ-9 wings to the Base will result in associated land use changes. The protection of natural resources during base reconstruction and the restoration of on-base forest communities damaged by Hurricane Michael will be important components of natural resources management at Tyndall AFB over the next 5 years under the updated INRMP. Base reconstruction would consolidate related functions, improve operational functionality, and increase land-use compatibility at Tyndall AFB and, therefore, would have a beneficial effect on land use at the Base. Natural resources management under the updated INRMP would benefit from such improved land use planning and construction and is not expected to have any adverse effects itself on land uses on or outside the Base.

Outdoor recreation is one of the primary elements of Tyndall AFB's natural resources management program. As a broad, recurring action, Tyndall AFB evaluates the compatibility of recreational areas/opportunities at the Base with the military mission on an annual basis through coordination between natural and cultural resources managers and military users (Table 2-3). INRMP Goal V of the updated INRMP is to "Provide a Variety of Uses, Values, Products, and Services to Present and Future Generations While Maintaining Sustainable Ecosystems" (Table 2-3). Actions 1 and 2 under this goal pertain to recreational opportunities within the constraints of the mission. Action 2 includes specific measures to address hurricane-related damage to recreational infrastructure, including the proposed replacement of the downed bridge on the Felix Lake Nature Trail and the destroyed recreational boardwalks and access roads on the barrier islands. Implementation of these actions and the overall updated Tyndall AFB INRMP would have beneficial impacts on outdoor recreation at the Base.

Recreational activities are prohibited in certain portions of Tyndall AFB due to force protection, public safety, military operations, or environmental protection. The following specific restrictions are enforced under the Tyndall AFB outdoor recreation program in addition to standard State of Florida and Tyndall AFB hunting and fishing regulations to minimize the potential for interactions with the military mission and impacts to environmental and cultural resources.

- Off-road vehicles, motorcycles, and bicycles are restricted to established named roads. The use of off-road vehicles and mountain bikes on the beach or undesignated areas and trails is prohibited.
- Public access is prohibited during the hours of full darkness (1.5 hours after sunset/before sunrise).
- Weekday access restrictions are implemented to ensure a safety buffer around military working areas during high activity periods.
- Outdoor recreational activities should not be conducted within historic cemeteries, which are clearly marked with fencing and signage. The intentional excavation of archaeological sites or cemeteries and/or the removal of objects of antiquity from Tyndall AFB lands is prohibited by a variety of state and federal laws. Violators will be prosecuted to the full extent of the law, which can include fines and imprisonment.
- Boats and other watercraft should be only launched from or landed at permanent boat ramps or the marina.
- Camping and campfires should occur only in designated campgrounds.
- FWC has designated Shell Island, CIW, and CIE as Critical Wildlife Areas. These areas may be posted and closed to access from April 1 to September 15 for the protection of nesting shorebirds or year round for the protection of migratory and resident wintering shorebirds.

The 2018-2019 hunting season at Tyndall AFB was cancelled after Hurricane Michael destroyed most of the forested hunting areas at the Base. Hunting was reinstated for the 2019-2020 season and several changes were made to the overall program to increase public safety. One of the primary post-hurricane changes made to the program is the manner in which tree stands are managed during deer hunting season. Due to the existence of unsafe trees that were damaged by the hurricane and competition for safe trees, hunters are no longer allowed to install their own deer stands at Tyndall AFB. Instead, all tree stands are now installed by Tyndall Natural Resources to ensure that each tree stand is installed on a healthy tree and in an area that is not targeted for clearcutting.

The Outdoor Recreation Component Plan (USAF, 2020e) that is part of the updated Tyndall AFB INRMP provides estimates of current and future demand for recreational services at Tyndall AFB. Based on this analysis, the future demand for hunting, bird watching/nature study, and beach activities at Tyndall AFB is expected to increase in the future as the residential populations near the Base increase and create more public demand for these recreational opportunities. The future demand for fishing, hiking, and picnicking at Tyndall AFB is expected to remain relatively stable. The demand for outdoor recreational

activities at Tyndall AFB will be continuously evaluated and strategies for managing outdoor recreation at the Base would be implemented accordingly via associated updates to the INRMP.

Conclusion

Based on the analysis conducted, Alternative 1 would have a moderate beneficial impact on land use.

3.9.2.2 No Action Alternative

Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. Some recreation management activities under the previous INRMP would not be appropriate or optimal for post-hurricane conditions. In addition, implementation of the previous INRMP would not address repair or replacement of the recreational infrastructure that was damaged by the hurricane. Despite these differences, overall management of outdoor recreation at Tyndall AFB under the previous and updated INRMPs would be comparable. For these reasons, natural resources management activities under the No Action Alternative would have a minor beneficial impact on land use.

3.10 Safety

3.10.1Affected Environment

AFMAN 91-203, *Air Force Occupational Safety, Fire, and Health Standards*, implements Air Force Policy Directive 91-2, *Safety Programs,* and parts of Occupational Safety and Health Administration (OSHA) 29 CFR. The Air Force Occupational Safety and Health (AFOSH) program is explained in AFI 91-202, *The U.S. Air Force Mishap Prevention Program*. Air Force activities must always comply with AFOSH guidance, and with OSHA regulations unless a military-unique exemption applies according to DoD Instruction 6055.1, *DoD Safety and Occupational Health Program*.

The 325 FW Safety Office has primary responsibility for the safe conduct of military operations at Tyndall AFB; it includes Flight Safety, Weapons Safety, and Occupational Safety. Flight Safety ensures safe flying operations for assigned and transient aircraft; Weapons Safety is responsible for safety associated with the use, storage, and transportation of explosive materials; and Occupational Safety is responsible for the safety of the Base population, including military personnel, civilian employees, and dependents. Occupational Safety's responsibilities include workplace safety, traffic safety, recreational safety, providing training to supervisors and unit safety representatives, and investigating aircraft mishaps that involve injury or property damage.

Measures taken to minimize the risk to public safety at Tyndall AFB include enforcing restrictions on public access, either permanently or temporarily, to portions of the Base that pose safety risks. The extent of such restrictions is based on careful evaluation of all potential safety risk factors, which include but are not limited to, noise levels, blast effects, munition projectile impacts, and potential presence of unexploded ordnance (UXO). In addition to the general public, access restrictions could also apply to military personnel, Tyndall AFB employees, or contractors who are not authorized to access the restricted areas.

Due to the safety risks posed by military operations, portions of Tyndall AFB are closed to the public at times. Gates, warning signs, identification requirements, and other public-access controls are used to prevent entry of unauthorized persons into these areas. Any portion of Tyndall AFB may be restricted to the public at any time, if the area is determined to pose a potential risk to public safety. Some military missions require temporary closures of areas normally open to the public; the extent of such temporary closures is dependent on the considered safety risks. The 325 FW Safety Office has the primary responsibility of determining the limits and duration of such temporary closures.

Flight safety involves the potential for aircraft mishaps, which include collisions with other aircraft, objects, or wildlife, and mishaps caused by weather, equipment malfunction, pilot error, or other factors. Mishaps are classified by the DoD based on the severity of injury and the amount of damage measured in monetary value resulting from the mishap. BASH refers to the hazard associated with incidents of birds and other types of wildlife striking aircraft. AFI 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Pro*gram, provides policy and guidance for implementing an effective BASH management program for the USAF. The Tyndall AFB BASH Plan (USAF, 2018a) provides guidance on implementation of Tyndall AFB's BASH program. This plan addresses exposure of local and transient aircraft to both indigenous wildlife populations and seasonal bird migrations at and near the Base. The 325th Fighter Wing/Flight Safety (325 FW/SEF), commonly known as Tyndall Flight Safety, has primary responsibility for implementing the Tyndall AFB BASH Program. The USDA's Wildlife Services support the Tyndall AFB BASH program with an on-base biologist who conducts wildlife surveys, maintains databases of wildlife activities and aircraft strikes, implements active and passive wildlife-control measures, and trains airfield management personnel on proper BASH response.

3.10.2 Environmental Consequences

3.10.2.1 Alternative 1

Wildland fire management and BASH management are components of the Tyndall AFB natural resources management program that directly address public health and safety. These management activities are reflected in the updated Tyndall AFB INRMP under Action 7 of Goal 1, which is to "Provide wildland fire management support to the mission" and Action 8 of Goal I, which is to "Provide natural resources support to Flight Safety and BASH program" (Table 2-3). Public safety is also integral to the management of prescribed burns and outdoor recreation at Tyndall AFB. The management of vegetation adjacent to runways at Tyndall AFB for flight safety purposes is discussed in Section 3.7.

While some of the INRMP measures associated with wildland fire management are recurring, the associated measures in the updated Tyndall AFB INRMP have specific timelines for implementation over the next 5 years to address the update of agency agreements on wildfire response; development of a fire considerations map that identifies sensitive areas; identification, monitoring, and maintenance of a system of effective fire breaks; and identification of priority fire-dependent areas that require mechanical vegetation removal due to the difficulty of burning (for example, along urban interfaces and in fire suppressed areas that pose a safety risk).

Wildfires at Tyndall AFB occur at a frequency of approximately 3 to 5 events per year. Most wildfires at Tyndall AFB are started naturally; relatively few wildfires at the Base are started by military operations. The overall goal of Tyndall AFB's wildland fire management program is to safely suppress all wildfires at the Base to the extent possible commensurate with firefighter safety, current and expected fire behavior, resource values at risk, and impacts to public health and safety. Wildland fire management includes all aspects of fire prevention, detection, suppression, readiness, fire line maintenance, and response training. The Tyndall AFB Wildland Fire Management Plan (USAF, 2020f) provides guidance on the management of wildland fires and its integration with mission activities and other Base management programs. Wildfire suppression at Tyndall AFB is conducted by the Air Force Wildland Fire Center and associated Wildland Support Module at Eglin AFB in consultation with the Tyndall AFB Wildland Fire Program Coordinator, Tyndall AFB Natural Resources Chief, and Tyndall AFB Fire and Emergency Services.

Proper management of smoke generated by wildfires and prescribed burning at Tyndall AFB is essential to minimize the associated impacts of the smoke on the military mission and public safety. Portions of the Base where vegetative debris downed by Hurricane Michael has not been removed are logistically more challenging and pose a relatively greater safety risk to firefighters. These areas are more difficult to access by equipment and have higher fuel loads, which have the potential to produce excessive amounts of smoke due to prolonged smoldering when burned. Tyndall AFB requests a burn

authorization from the Florida Forest Service (Chipola District) for all proposed prescribed burns. Weather conditions that have the potential to result in smoke on U.S. Highway 98, the airfield, or in other smoke-sensitive areas at the Base are avoided to the extent possible. Smoke-sensitive receptors at and near Tyndall AFB are shown on Figure 3-8.

Per the Tyndall AFB Wildland Fire Management Plan (USAF, 2020f), the following measures are implemented during prescribed burns to minimize the potential for smoke and other associated safety risks to the public:

- Warning signs and/or road guards will be used to advise motorists that a prescribed fire is in progress, especially if smoke from the fire could reduce visibility.
- Test fires will be used to assess holding capability and smoke dispersal. Weather forecasts for the burn day and the next two forecast periods will be obtained.
- Smoke from prescribed fires will be managed to avoid smoke-sensitive areas and will follow the Clean Air Act and Florida Statutes pertaining to smoke management, which primarily includes FAC 5I-2, *Open Burning*.
- The timing of the burn to coincide with appropriate wind directions is often enough to mitigate the associated smoke risk on U.S. Highway 98. However, contingencies should be in place prior to ignition of the burn to respond to a wind shift that causes the smoke to drift over the road.
- Smoke in the airfield is generally not tolerated, so prescribed burning in the vicinity of the airfield must be carefully coordinated with airfield management.

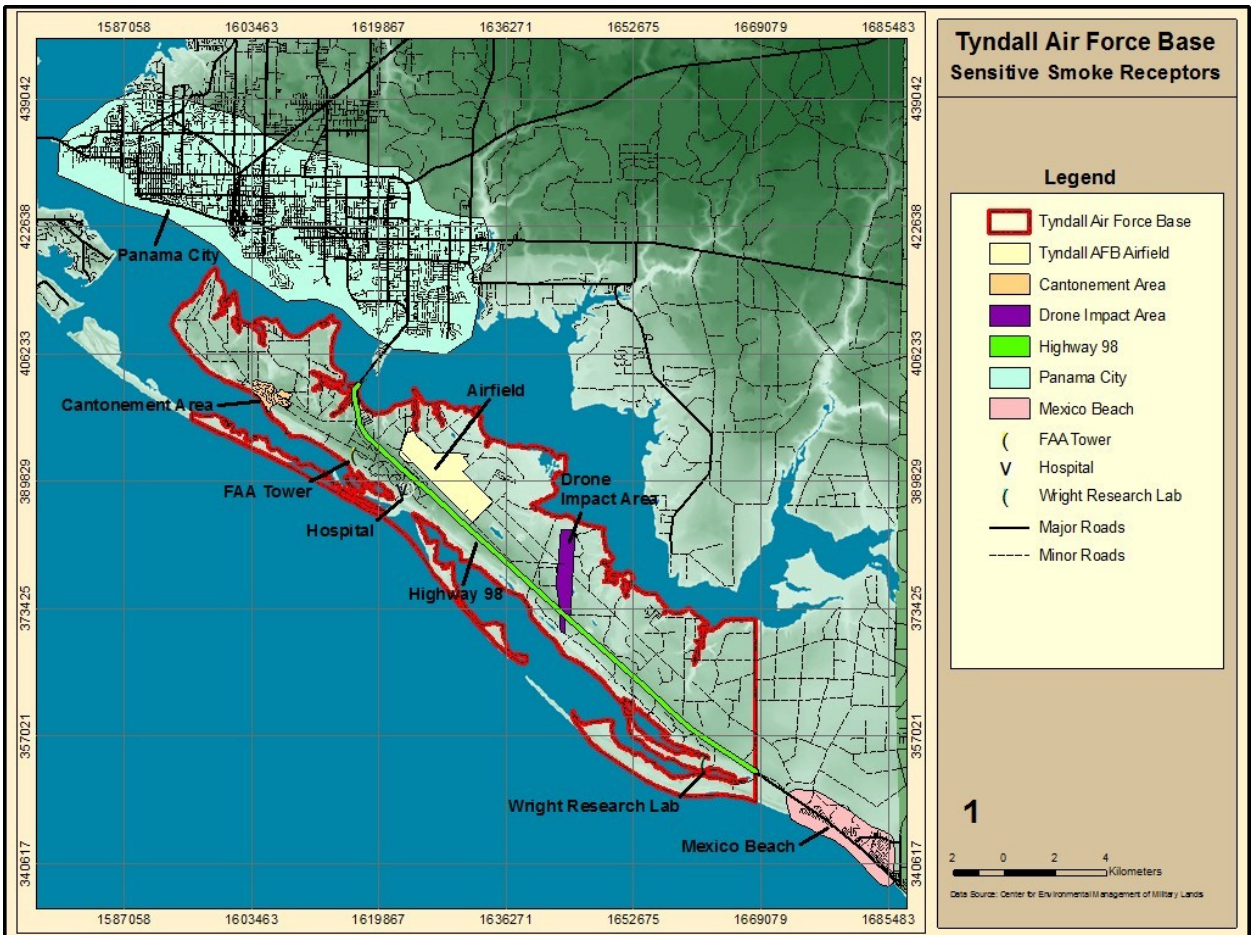

Figure 3-8. Smoke-Sensitive Receptors at and Near Tyndall Air Force Base
Source: USAF, 2020f

For safety reasons, prescribed burning and wildfire suppression are typically not conducted in portions of Tyndall AFB known to contain UXO, which include the Sky X Explosives Test Area and certain portions of the Silver Flag and drone airfield areas. Any natural resources management activities proposed in these areas are coordinated closely with the respective area managers and the 325 FW Safety Office to minimize potential safety risks and operational disruptions. All portions of Tyndall AFB that potentially contain UXO are restricted to public access for outdoor recreation.

Many of the regulations enforced under the Tyndall AFB outdoor recreation program pertain to reducing the associated safety risk to the participating public. Due to the safety risks posed by certain military operations, portions of Tyndall AFB are closed to the public at times; such areas are identified by posted signage as being a "Danger Area" or "Closed Area" and are restricted to the public, either on a permanent or temporary basis.

The Tyndall AFB BASH Program involves multiple components that include land management measures to minimize birds and other types of wildlife on and near the airfield, and procedures that address monitoring and notifications of bird/wildlife activity and strike risk. The Tyndall AFB BASH Plan (USAF, 2018a) provides detailed guidance on the various measures to be implemented to directly and indirectly control birds and other wildlife on and near the airfields of the Base over the next 5 years. The BASH Plan is integrated closely with the INRMP and the Invasive and Nuisance Species Component Plan. Under these plans, Tyndall Natural Resources with support from the USDA's Wildlife Services will use both passive and active measures to control birds and other types of wildlife on and near the airfield over the next 5 years. Passive control measures may include landscape design, elimination of food and roost sources, turf/water management, and forest management, and are the most permanent ways to reduce the occurrence of birds and other wildlife on and near airfields. Active control measures may include trained working dogs, pyrotechnics, bioacoustics, and depredation. Depredation is only implemented as a last resort when other methods are unsuccessful. Tyndall AFB pilots also have access to the Avian Hazard Advisory System and Bird Avoidance Model, which are web-based tools that use historical and real-time data to help aviators assess the BASH risk for specific locations. The Tyndall AFB BASH program has not required major changes since Hurricane Michael in 2018. Assessments of post-hurricane behavior and population trends of birds and other wildlife evaluated by the BASH program have been initiated and will continue through the planning period under the updated INRMP.

Conclusion

Based on the analysis conducted, Alternative 1 would have a minor impact on safety. The impact would not be significant.

3.10.2.2 No Action Alternative

Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. Overall, the measures implemented at Tyndall AFB during wildland fire suppression and prescribed burning to minimize the associated risk to public safety and the manner in which the BASH program is conducted at the Base under the previous and updated INRMPs would be comparable. For these reasons, natural resources management activities under the No Action Alternative would have a minor impact on safety.

3.11 Hazardous Materials/Waste and Solid Waste

3.11.1Affected Environment

3.11.1.1 Hazardous Materials

Hazardous materials have been declared hazardous through federal listings including: Extremely Hazardous Substances listed in Appendix A of 40 CFR 355, *Emergency Planning and Notification*; those

listed as hazardous if released, under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 40 CFR 302.4, *Designation of Hazardous Substances*; and by definition of hazardous chemicals by the OSHA in 29 CFR 1910.1200, *Hazard Communication*. Hazardous materials are defined in AFI 32-7086, *Hazardous Materials Management*, to include all items covered under the Emergency Planning and Community Right-to Know Act or other applicable host nation, federal, state, or local tracking or reporting requirements; all items covered by the OSHA under 29 CFR 1910.1200, *Hazardous Communication* or 29 CFR 1910.1450, *Occupational Exposure to Hazardous Chemicals in Laboratories*; and Class I or Class II Ozone Depleting Substances. Hazardous materials used by the natural resources management program at Tyndall AFB primarily include pesticides, petroleum, oil, and lubricants (POL), paints, and cleaning agents.

3.11.1.2 Hazardous Waste

Hazardous waste is any solid, liquid, or contained gas waste that is dangerous or potentially harmful to human health or the environment. Hazardous wastes are classified under the Resource Conservation and Recovery Act (RCRA) in 40 CFR 261, *Identification and Listing of Hazardous Waste* as either characteristic wastes or listed wastes. Characteristic hazardous wastes exhibit one or more of the following traits: ignitability, reactivity, corrosivity, or toxicity. Listed hazardous wastes are wastes specifically listed as being hazardous and are from either specific sources, non-specific sources, or discarded chemical products.

The Tyndall AFB Hazardous Waste Management Plan provides guidance on the proper handling and disposal of hazardous waste, including spill contingency and response requirements, at the Base. Procedures and responsibilities for responding to a hazardous waste spill or other incident are also addressed in the Tyndall AFB Spill Prevention, Control, and Countermeasure Plan (USAF, 2016). The 325 CES/CEIEC has primary responsibility for the management of hazardous waste at Tyndall AFB.

Tyndall AFB is classified as a Large Quantity Generator of hazardous waste. Hazardous wastes at the Base are controlled and managed from the point of generation to the point of ultimate disposal. Wastes are temporarily stored at designated Initial Accumulation Points at work locations. Once the storage limit is reached, the wastes are transferred to the 90-Day Hazardous Waste Accumulation Site (Building 6011). Within 90 days, the wastes are transported off-base and disposed in accordance with applicable regulations.

3.11.1.3 Toxic Substances

A toxic substance is a substance that when ingested or absorbed is harmful or fatal to living organisms. As discussed previously, toxicity is an attribute of some hazardous waste. Through the Toxic Substances Control Act, the EPA regulates toxic substances such as asbestos, lead-based paint (LBP), polychlorinated biphenyls (PCBs), and radon. Asbestos-containing materials (ACM) at Tyndall AFB are managed in accordance with the guidance provided in the Asbestos Management and Operations Plan (USAF, 2018b). LBP and PCBs are managed at the Base in accordance with all applicable regulations. As standard practice, all structures proposed to be demolished or modified at Tyndall AFB are treated as potentially containing ACM and LBP. Tyndall AFB is located in an area that has low radon levels; indoor radon accumulation has been determined to not be a concern at the Base.

3.11.1.4 Pesticides

Pesticides are substances that control pests; certain pesticides are toxic to humans. Pesticides include herbicides, insecticides, rodenticides, fungicides, and other categories, with herbicides being the most common type of pesticide used. The Federal Insecticide, Fungicide, and Rodenticide Act, as amended, is implemented in the military by DoD Directive 4150.07, *DoD Pest Management Program.* This directive applies to all military pest control activities, including contracted operations, and is implemented by the USAF in AFI 32-1053, *Pest Management Program.* The Tyndall AFB Pest Management Plan (USAF, 2018c) provides policy and guidance on the storage, display, and handling

(including spill response) of pesticides at the Base. This plan also includes an inventory of the various pesticides used at the Base.

3.11.1.5 Environmental Restoration Program

The Installation Restoration Program (IRP) was developed by the DoD to identify, characterize, and remediate contamination from past hazardous waste disposal operations and hazardous materials spills at DoD facilities. Sites on DoD property suspected to be contaminated from past munitions use are investigated and cleaned up under the Military Munitions Response Program (MMRP). Together, the IRP and MMRP make up the DoD's current Environmental Restoration Program. Depending on the circumstances, Environmental Restoration Program sites are investigated and cleaned up in accordance with the CERCLA or RCRA, or an integrated approach based on both laws. The Air Force currently addresses MMRP sites under CERCLA.

3.11.1.6 Solid Waste

Non-hazardous solid waste generated at Tyndall AFB is managed in compliance with the Tyndall AFB Integrated Solid Waste Management Plan (USAF, 2017b). Non-hazardous solid waste at the Base is generated by normal USAF operations and by contractors who conduct construction. Non-hazardous solid waste is properly collected, handled, managed, transported, and disposed off-base by a contractor. The 325 CES/CEIEC has primary responsibility for the management of non-hazardous solid waste at Tyndall AFB.

3.11.2 Environmental Consequences

3.11.2.1 Alternative 1

Proper handling, storage, and disposal of such hazardous materials and wastes, including measures to prevent releases, would continue under the updated INRMP in accordance with all applicable environmental compliance regulations and Base environmental management plans.

Natural resources management activities have low potential to adversely impact ERP sites at Tyndall AFB based on the known locations of such sites and the specific measures that have been established to protect them at the Base. As standard practice, prescribed burning and other natural resources management activities that involve earthwork are not conducted within or adjacent to ERP sites or where other contamination has been documented at the Base.

Pesticides are used by the Tyndall AFB natural resources management program primarily to control the spread of invasive plant species throughout the Base, control weeds and other undesirable vegetation in landscaped areas and on the airfield, and control insects and other household pests in developed portions of the Base.

The use of herbicides to control the spread of invasive plant species at Tyndall AFB is jointly addressed in the Tyndall AFB Pest Management Plan (USAF, 2018c) and Tyndall AFB Invasive and Nuisance Species Component Plan (USAF, 2020c), which is part of the updated INRMP. The primary invasive plant species targeted at the Base are Chinese tallow, cogongrass, and Japanese climbing fern. Commonly used herbicides to control these and other invasive plant species at Tyndall AFB are applied in the most appropriate way to treat the targeted species. Changes in the coverage of these and other invasive species at the Base following Hurricane Michael will continue to be monitored and treatment plans will be prepared accordingly during implementation of the updated INRMP.

In addition to control of invasive plant species, herbicides are also used to control the spread of weeds throughout the developed portions of Tyndall AFB. Most grounds are routinely treated for weed control by Base pest management personnel. Large-scale weed eradication at the Base is conducted by private contractors. Herbicides may also be used at times to prepare sites for tree planting at Tyndall AFB.

Insecticides are used to control a variety of insects in the developed portions of Tyndall AFB, including mosquitos, cockroaches, flies, and others. To control mosquitos, common time-released larvacides such as Altosid and Bactimos briquettes are distributed in standing water in specific locations during mosquito breeding season (April to November). Aerial spraying to control adult mosquitos is typically conducted twice per year over the mainland portion of Tyndall AFB; aerial spraying for mosquito control is not conducted over the barrier islands. For common household insects such as cockroaches, insecticides may be rotated to prevent resistance. Major changes are not expected in the overall use of herbicides for weed control and insecticides for household pest control over the next 5 years at Tyndall AFB. Changes in treatment needs, particularly those associated with hurricane impacts, will be closely monitored and adjusted accordingly during implementation of the updated INRMP and Pest Management Plan.

Pest management operations at Tyndall AFB are conducted out of the Pest Management Shop, which is Building 1701 on Mississippi Road. This facility has two 500-gallon aboveground storage tanks used to store pesticides, and it includes a pesticide mixing/wash rack and spill recovery system. All pesticides used at Tyndall AFB are applied by personnel who have a State of Florida pesticide applicator license and are trained in the proper use of pesticides; pest management services for the Base are currently contracted. During pesticide applications at Tyndall AFB, measures are implemented to minimize pesticide exposure to humans and sensitive ecological resources. Pesticides are not applied in wetlands/waters or areas at Tyndall AFB where T&E species are known to occur. Indirect exposure of ecologically sensitive areas to pesticides via overspray during windy conditions is also avoided to the extent possible.

Insecticide Use by the BASH Program

A new natural resources management action that is being added to the Tyndall AFB INRMP and BASH Plan is the use of insecticides by the BASH program. Tyndall Flight Safety (325 FW/SEF) has requested this to reduce insect food sources for birds on the main and drone airfields at the Base. Under GOAL I, Action 9 of the proposed management actions under Alternative 1 (Table 2-3), the BASH program would incorporate insecticide treatments to control insect food sources at the main and drone airfields, monitor and document the results of the treatments, and annually evaluate and refine the treatment strategies in coordination with Flight Safety, Tyndall Natural Resources, USFWS, and FWC. The potential environmental impacts of the proposed insecticide use by the BASH program are analyzed and identified in this EA. This EA also identifies the protection measures that are required to be implemented to prevent adverse environmental impacts from the proposed insecticide use. These measures will be included and potentially expanded in the next update of the BASH Plan and will also be incorporated as appropriate into the next updates of the INRMP and Pest Management Plan. These protection measures will be continuously refined throughout implementation of the BASH insecticide program.

Tyndall Natural Resources with support from the USDA's Wildlife Services use a variety of passive and active measures to minimize the occurrence of birds and other types of wildlife on and near the Base airfields (see Section 3.10.2). While measures are implemented to eliminate favorable conditions for insects, use of insecticides to control insect populations, which serve as food sources for birds and other wildlife, has not been implemented under the Tyndall AFB BASH program. Tyndall Flight Safety has proposed to specifically use Dimilin 2L, which is an insect growth inhibitor, and bifenthrin, which is a general insecticide, under the BASH program.

Dimilin 2L is an insect growth regulator that is effective at controlling a variety of insects; it is proposed to be used by the Tyndall AFB BASH program primarily to control grasshoppers. Dimilin 2L disrupts the formation of chitin in the grasshopper's exoskeleton and when applied when juvenile grasshoppers are at the second and third instar stage, it effectively interrupts the nymph's ability to molt. Bifenthrin is a common insecticide used to control a variety of insect types; common brands typically contain 25.1 percent bifenthrin by weight. Bifenthrin is proposed to be used by the Tyndall AFB BASH program if

Dimilin 2L is not applied during the appropriate grasshopper instar stage and/or to target insects other than grasshoppers. Insecticide applications under the BASH program are expected to be conducted once a year, during Spring, under normal conditions. The initial treatment may be followed with spot treatments as necessary; the actual number of applications that are conducted during a given year would vary. Both Dimilin 2L and bifenthrin are currently used by the Eglin AFB BASH program.

Dimilin 2L and bifenthrin, like many types of commonly used insecticides, are potentially toxic to certain biological organisms, including humans, depending on dosage and exposure pathway. The potential health and safety risks and precautions for all pesticides used at Tyndall AFB are located on EPA pesticide product labels, material safety sheets, and other documentation kept on file and communicated to workers via training. Dimilin 2L is toxic to aquatic invertebrates and bifenthrin is toxic to both fish and aquatic invertebrates; therefore, these insecticides should not be applied to surface water bodies, including wetlands and intertidal areas. The EPA pesticide product label for Dimlin 2L and for a representative bifenthrin-based insecticide (Bifenthrin 2EC) are provided as Appendix F. The product labels state that the respective products should not be applied on ground within 25 feet of water bodies.

Care must be taken to prevent runoff and aerial drift from transporting these insecticides from treatment areas to aquatic habitats. Vegetative buffer strips between treated areas and aquatic habitats are often effective at minimizing potential impacts from runoff. Runoff potential is also reduced by avoiding applications when heavy rainfall is imminent. Measures to reduce aerial drift include applying larger droplet sizes, applying during low-wind conditions, and applying outside of temperature inversions during which vertical air mixing is restricted.

The locations of the main and drone airfields are shown on Figure 3-9 and the specific areas within the airfields where insecticides are proposed to be used are shown on Figures 3-10 through 3-13. As indicated on the figures, insecticides are proposed to be used only adjacent to the runways and taxiways at each airfield. Figures 3-10 through 3-13 show the NWI-mapped wetlands and surface water bodies in the vicinity of the airfields, with the wetlands/waters within 100 feet of the proposed treatment areas shown in red. At the main airfield, wetlands/waters directly within the proposed treatment area consist primarily of drainage ditches, which are indicated by the red linear features on Figures 3-10 and 3-11. Wetlands/waters outside but within 100 feet of the proposed treatment area also exist in a few locations along the perimeter of the treatment area. At the drone airfield, drainage ditches border most of the perimeter of the proposed treatment area, as indicated by the red linear features on Figures 3-12 and 3-13. It should be noted that the NWI mapping presented in this EA is the only wetland mapping currently available for the airfields at the Base. Protection measures implemented for the BASH Program, however, will be based on field-surveyed locations of wetlands/waters instead of NWI mapping.

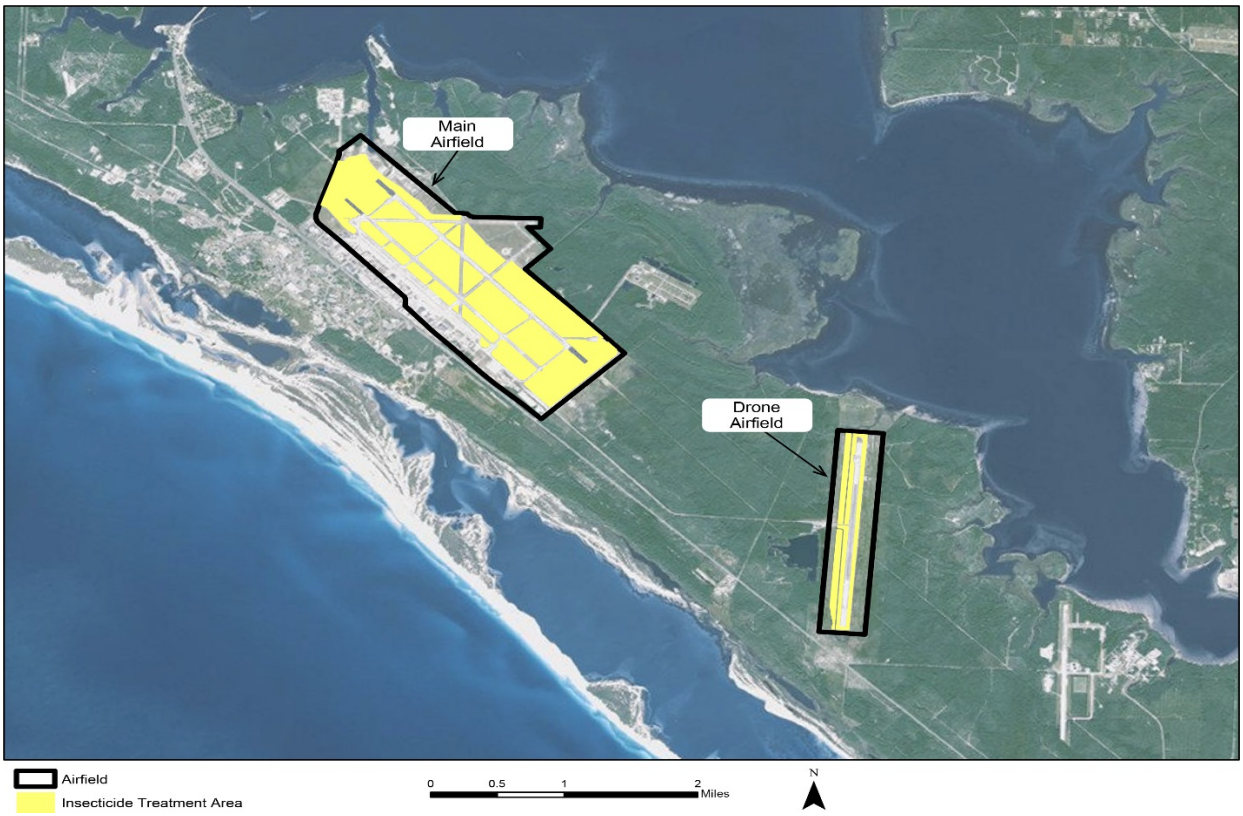

Figure 3-9. Locations of Airfields at Tyndall Air Force Base

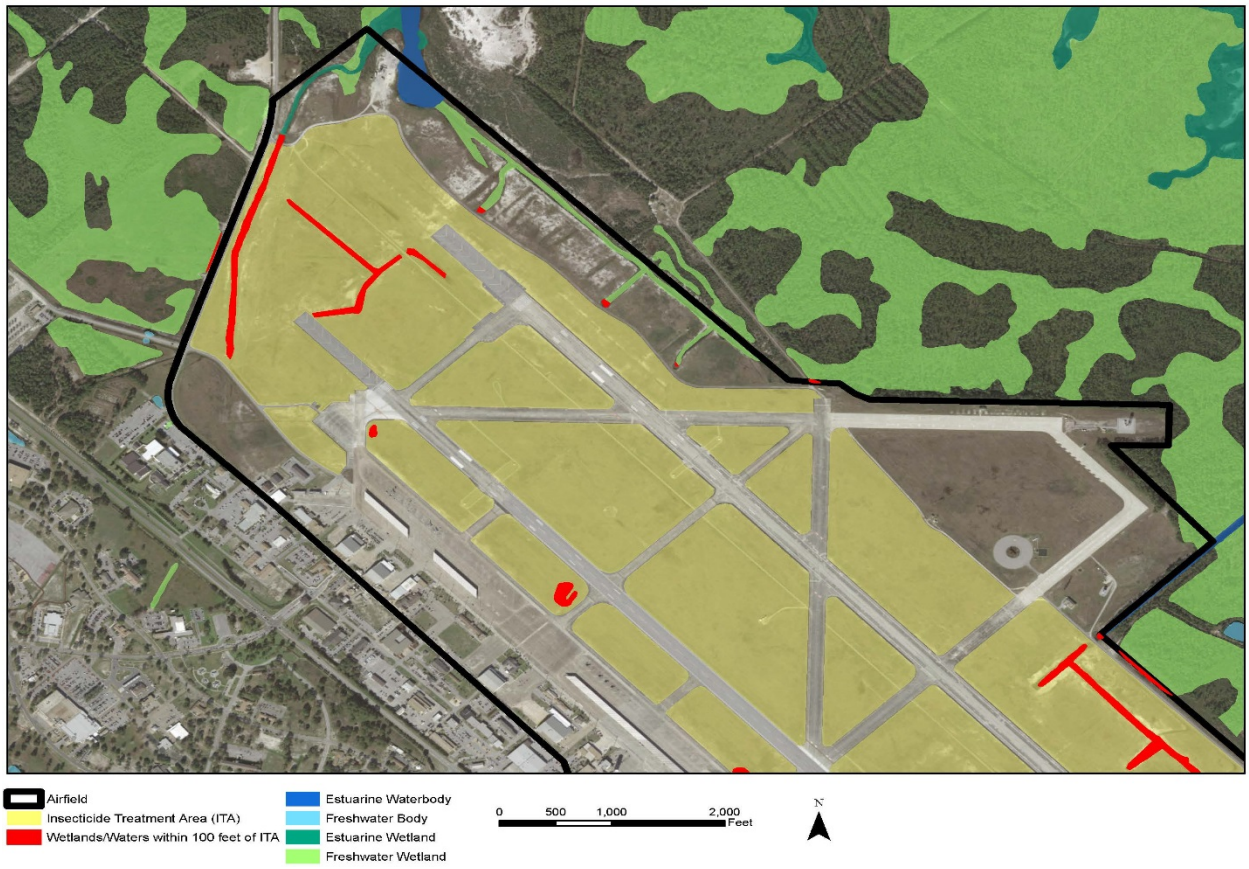

Figure 3-10. Insecticide Treatment Area at Main Airfield - North

Figure 3-11. Insecticide Treatment Area at Main Airfield – South

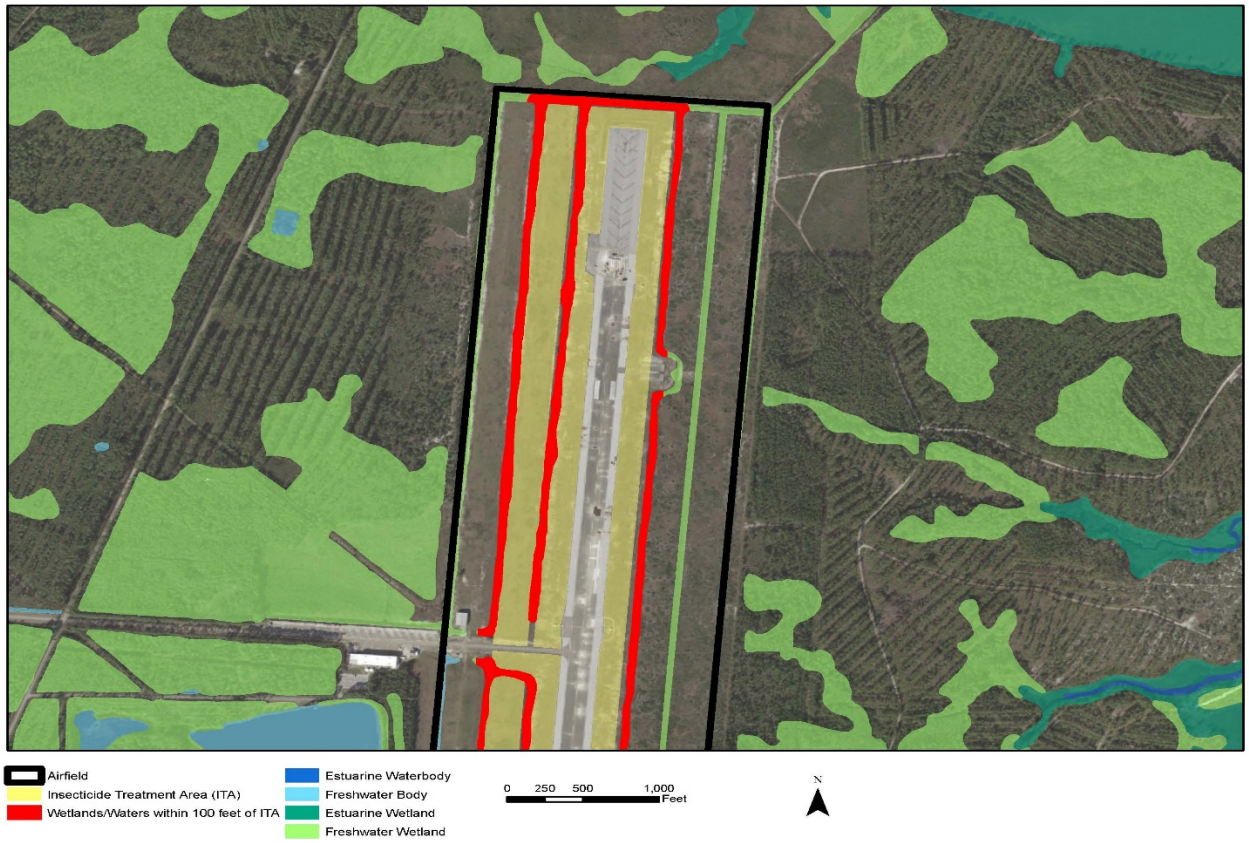

Figure 3-12. Insecticide Treatment Area at Drone Airfield - North

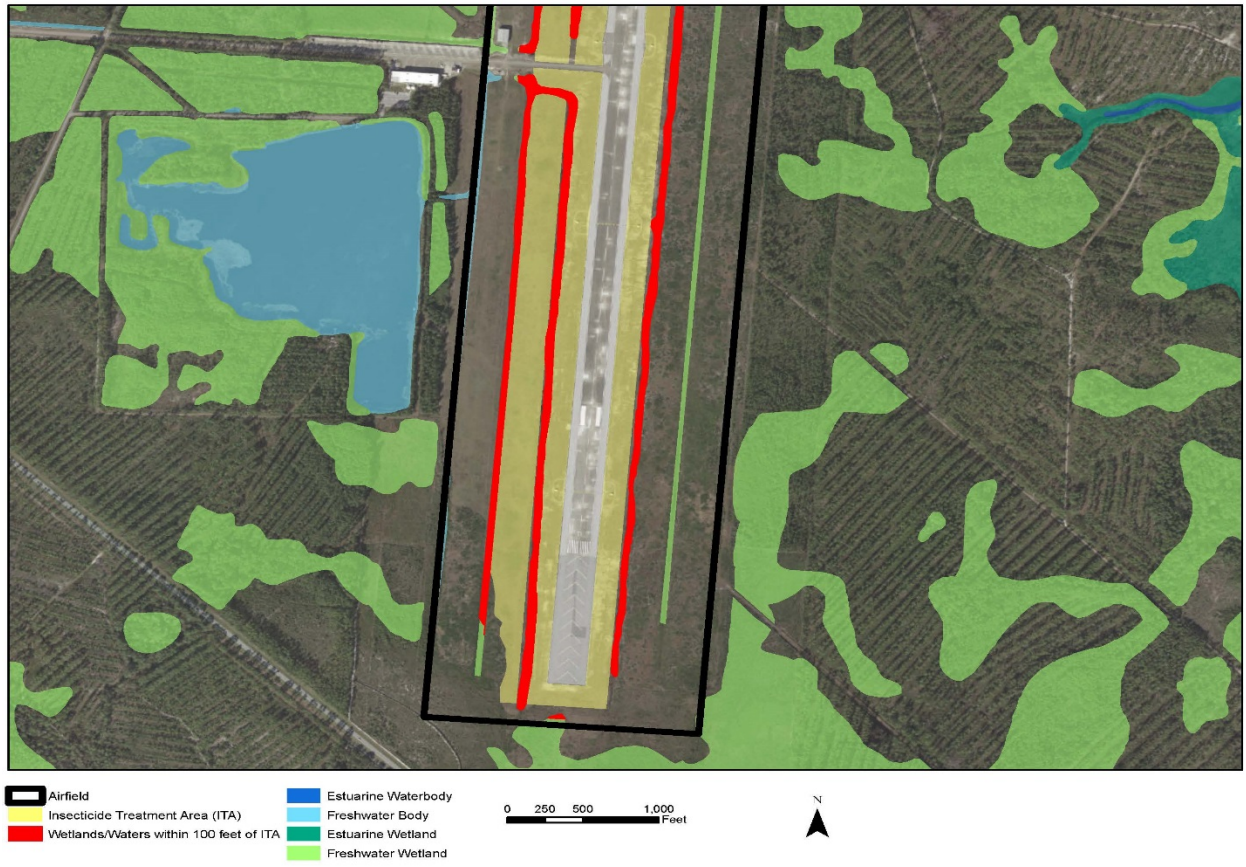

Figure 3-13. Insecticide Treatment Area at Drone Airfield - South

The protection of aquatic habitats from exposure is the primary environmental protection goal associated with the proposed insecticides. Aquatic bodies within the proposed treatment areas at both airfields consist mostly of drainage ditches that are relatively low-quality aquatic habitats because they are regularly mowed and receive stormwater runoff from the airfield. However, the ditches and the wetlands/waters to which they are hydrologically connected can support aquatic life that could be affected by insecticides. Dimilin 2L is toxic to aquatic invertebrates and bifenthrin is toxic to both fish and aquatic invertebrates. No T&E freshwater invertebrate or fish species are known to occur at Tyndall AFB; therefore, use of these insecticides under the BASH program is expected to have no effect on T&E species.

The primary management actions required to prevent adverse impacts during insecticide use under the BASH program have been identified in this EA. These management actions were developed for the BASH insecticide program in coordination with Tyndall Natural Resources, the USDA BASH biologist, and the USFWS liaison to Tyndall AFB and include measures to prevent direct contact with aquatic bodies during applications and indirect contact with aquatic bodies via runoff and aerial/wind drift. The following general management actions will be implemented to prevent environmental impacts from insecticide use under the BASH program at the Base:

- Insecticides will be used only by certified personnel in accordance with the instructions provided on their EPA pesticide product labels.
- All insecticides proposed for use will be sent to the 325 CES/CEIEC Hazardous Materials Office for review and approval prior to use on the Base and must be tracked throughout the duration of their use.

- All treatment areas will be surveyed for aquatic bodies and drainage features prior to treatment. Aquatic bodies and drainage features will be identified on mapping and marked in the field as necessary.
- Insecticides will be applied from the ground only; aerial spraying of insecticides will not be conducted.
- Insecticides will be applied only to areas covered by grass that is regularly mowed. Insecticides will not be applied to impervious surfaces such as pavement, bare soil with no vegetative cover, or vegetated areas that are covered by shrubs or trees.

Measures implemented under the BASH Program to protect aquatic habitats during insecticide treatments would be based on field-surveyed locations and boundaries of wetlands/waters. Ongoing wetland surveys being conducted for Base reconstruction include the main airfield and will be used for the BASH insecticide program when finalized. The wetland survey data will be used to identify the aquatic habitats and drainage features to avoid in and near the treatment areas. It should be noted that most of the aboveground drainage ditches on the main airfield will be replaced by underground storm sewer piping as part of airfield drainage improvements planned for the near future.

Key areas to avoid at both airfields will be identified on mapping and marked in the field as necessary so they are clearly visible during applications. Primary drainage features, such as drains and culverts, in and near the treatment areas will also be identified for avoidance. All insecticide treatments under the BASH program will be applied from the ground; no aerial spraying of insecticides will be conducted under the program. Ground spraying will be conducted on foot and/or using trucks/UTVs. Restricting insecticide treatments to ground applications will reduce the risk of exposure via over spraying or aerial/wind drift. Lastly, as a general environmental protection measure, insecticides will be applied only to regularly mowed grassy areas. Insecticides will not be applied to impervious surfaces, bare soil with no vegetative cover, or vegetated areas covered by shrubs or trees that are not regularly maintained.

Specific measures and restrictions are needed to prevent insecticides from directly or indirectly impacting aquatic habitats. The following specific management actions will be implemented to protect aquatic habitats from direct and indirect exposure to insecticides under the BASH program:

- Insecticides will not be applied within 25 feet of aquatic bodies. Grass or other vegetative cover that can serve as a vegetated buffer strip must exist between areas to be treated and aquatic bodies.
- Insecticides will not be applied within 25 feet of storm drains, culverts, or other drainage features that could transport them to connected aquatic systems.
- To minimize runoff potential, applications will consider site topography and drainage patterns. Steeply sloped areas leading to aquatic habitats and other areas where excessive runoff could occur will be identified and avoided.
- To minimize runoff potential, insecticides will not be applied if heavy rainfall is imminent. To the extent practicable, applications will be avoided when rainfall is forecasted to occur within 48 hours.
- To minimize aerial drift potential, insecticides will be applied only during low-wind conditions. To the extent practicable, applications will be conducted when wind speeds are less than 10 miles per hour (mph) and will not be conducted when wind speeds exceed 15 mph. Aerial drift may be reduced by adjusting spray nozzles to apply larger-sized droplets.
- To minimize aerial drift potential, insecticides will be applied outside of temperature inversions to the extent practicable. Temperature inversions are characterized by increasing temperatures with altitude and they restrict vertical air mixing. Inversions begin to form as the sun sets and often continue into morning. The presence of temperature inversions in the area will be confirmed by the Tyndall AFB Weather Office.

Provided that the management actions identified in this EA are implemented, the use of insecticides by the Tyndall AFB BASH program is not expected to result in adverse impacts to health/safety or environmental resources. These management actions will be included in the next update of the BASH Plan and will also be incorporated as appropriate into the next updates of the INRMP and Pest Management Plan.

Conclusion

Based on the analysis conducted, Alternative 1 would have a minor impact on hazardous materials/waste and solid waste. The impact would not be significant.

3.11.2.2 No Action Alternative

Under the No Action Alternative, the updated Tyndall AFB INRMP would not be implemented and natural resources management at the Base would continue to be conducted under the previous version of the INRMP, which was prepared for the 2015-2019 planning period. Overall, hazardous materials/waste management and the use of pesticides, except for insecticide use by the BASH program, under the previous and updated INRMPs would be comparable. Therefore, natural resources management activities under the No Action Alternative would have a minor impact on hazardous materials/waste and solid waste.

3.12 Cumulative Impacts

Cumulative impacts are defined in the CEQ regulations implementing provisions of NEPA (CEQ 1508.7) as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

3.12.1Past, Present, and Reasonably Foreseeable Future Actions

Tyndall AFB has been an active military installation for over 78 years, from its beginning in 1941 to the present. The area surrounding Tyndall AFB has experienced steady population and economic growth during this period; past major actions in the area have been primarily associated with residential and commercial development in the population centers and development of regional infrastructure such as roadways, airports, and utility systems. Various projects at Tyndall AFB involving improvements to existing on-base facilities, roads, and utility systems, and construction of new infrastructure have been conducted over the years as needed to support the Base's mission.

On October 10, 2018, Tyndall AFB and surrounding areas were directly hit by Hurricane Michael, which had the highest sustained-wind speeds of any hurricane to hit the continental United States in over 25 years. The affected region experienced catastrophic damage from the hurricane and has been in recovery mode ever since. Although some repair and rebuilding has occurred since the hurricane, most of the recovery efforts to date have involved damage assessment and planning for infrastructure reconstruction. Based on initial assessments, approximately 100 facilities were destroyed, and 195 facilities sustained moderate-to-severe damage at Tyndall AFB. A Program Management Office established by the Air Force Installation and Mission Support Center in November 2018 lead the effort to resume mission operations and initiate planning for long-term redevelopment of Tyndall AFB as the model Air Force Installation of the Future. The USAF completed an EA in 2020 that analyzed the potential impacts associated with post-hurricane reconstruction at the Base

Repair and rebuilding of hurricane-damaged Infrastructure constitute the primary foreseeable future mission-support actions at Tyndall AFB. Several Tyndall AFB plans are being updated to document current conditions and outline the goals and objectives for redevelopment of the Base, including the master plan. Tyndall AFB's mission and the type and level of military operations conducted at the Base

have undergone many changes over the years. Tyndall AFB's current mission continues to include training of F-22A Raptor pilots and maintenance personnel. Potential future mission-related actions at Tyndall AFB include the potential beddown of MQ-9 Reaper drone aircraft and F-35 aircraft or just the beddown of F-35 aircraft. Separate NEPA documents are currently being prepared to analyze the potential impacts of adding these aircraft to Tyndall AFB. If Tyndall AFB is ultimately selected as the beddown location for the MQ-9 Reaper and/or F-35, a number of infrastructure projects would be conducted at the Base to support the addition of the aircraft and personnel.

A wide range of future actions may occur at Tyndall AFB depending on Congressional and USAF decisions regarding hurricane response. However, speculative actions that may conceivably occur are not analyzed as cumulative impacts in this EA as they are too uncertain to be "reasonably foreseeable" within the meaning of 40 CFR §1508.7.

3.12.2Cumulative Impacts

Based on the findings of this EA, the Proposed Action would have no appreciable effect on noise, airspace, geology, infrastructure, utilities, transportation, socioeconomics, or cultural resources, and would have beneficial impacts on water resources, biological resources, and land use. When combined with past, present, or future actions, the Proposed Action would have no adverse cumulative impacts on these resources. The Proposed Action would potentially have minor impacts on air quality, soils, safety, and hazardous materials/waste. The potential cumulative impacts of the Proposed Action on these resources are discussed in the subsections that follow.

Air Quality

The primary natural resources management activity at Tyndall AFB that generates air emissions is prescribed burning. The amount of prescribed burning proposed under the updated INRMP would be comparable to burning conducted in recent years prior to Hurricane Michael. The amount of prescribed burning that is conducted at the Base is not expected to increase over the planning period and post-hurricane reconstruction and potential mission changes are not expected to result in major increases in air emissions from other types of natural resources management practices. Air emissions from ongoing and foreseeable off-base actions in the area, which primarily include hurricane-related commercial and residential reconstruction projects, would be temporary, intermittent, and minor. Significant increases in future mission-related air emissions at the Base are not expected. The potential addition of F-35 and MQ-9 wings to Tyndall AFB would increase aircraft air emissions in and around the Base; however, the resulting cumulative air operations are not expected to result in significantly adverse air quality impacts based on the type and number of aircraft that would be added to the Base. For these reasons, no adverse cumulative impacts to air quality or climate change are expected to result from the combination of the Proposed Action with other unrelated actions in the area.

Soils

Few natural resources management activities under the updated Tyndall AFB INRMP have the potential to impact soils. Direct and indirect impacts would be minor overall and beneficial impacts on soils would be achieved through the proposed use of sand fencing and other measures to restore dunes that were washed out by Hurricane Michael. Appropriate measures and controls to prevent and minimize soil erosion and sedimentation impacts would continue to be implemented by the USAF at Tyndall AFB under the updated INRMP. Soil erosion impacts from post-hurricane reconstruction on and off the Base and other development associated with potential mission changes would be required by State of Florida stormwater regulations to also implement appropriate measures to minimize soil erosion and associated impacts. For these reasons, no adverse cumulative impacts to soils are expected to result from the combination of the Proposed Action with other unrelated actions in the area.

Safety

Wildland fire management and BASH management at Tyndall AFB directly address public health and safety. Public safety is also integral to prescribed burning and outdoor recreation at the Base. The Tyndall AFB wildland fire management and BASH programs have beneficial impacts on public health and safety. Most wildfires at Tyndall AFB are started naturally; wildfire frequency at the Base is not expected to increase as a result of foreseeable military activities over the planning period. The amount of prescribed burning that would be conducted under the updated INRMP would also be comparable to burning conducted in recent years prior to Hurricane Michael. Post-hurricane reconstruction and potential mission changes associated with the potential addition of F-35 and MQ-9 wings to the Base are not expected to diminish the ability of the wildfire and prescribed fire programs to minimize safety risks. Ongoing and foreseeable off-base actions in the area, which primarily include hurricane-related commercial and residential reconstruction projects, would also not adversely impact these programs. For these reasons, no adverse cumulative impacts to safety are expected to result from the combination of the Proposed Action with other unrelated actions in the area.

Hazardous Materials/Waste and Solid Waste

Hazardous materials and wastes associated with natural resources management at Tyndall AFB primarily include pesticides, POL, paints, and cleaning agents. Handling, storage, and disposal of hazardous materials and wastes under the Tyndall AFB natural resources management program are conducted in compliance with all applicable regulations and Base environmental management plans. Hazardous materials and wastes associated with foreseeable reconstruction and other development on and off the Base would also be required to be managed in compliance with applicable environmental regulations, thereby, minimizing the potential for associated cumulative impacts. Major changes are not expected in the overall use of hazardous materials at Tyndall AFB over the planning period. With proper use and implementation of appropriate environmental protection measures, which have been identified in this EA, insecticide use under the BASH program at the Base is not expected to result in any adverse cumulative impact on any resource. For these reasons, no adverse cumulative impacts to hazardous materials/waste or solid waste are expected to result from the combination of the Proposed Action with other unrelated actions in the area.

Conclusion

Based on the analysis conducted, when added to past, present, and reasonably foreseeable actions, Alternative 1 is not expected to have significantly adverse cumulative impacts on any resource.

3.13 Summary of Environmental Consequences

The potential environmental consequences of Alternative 1 and the No Action Alternative on the resources analyzed in detail in this EA are summarized in Table 3-9.

Table 3-9. Summary of Environmental Consequences
EA for Implementation of Tyndall AFB INRMP

Resource	Alternative 1	No Action Alternative
Air Quality and Climate Change	*Minor Impact – Not Significant* The primary activity under Alternative 1 that would generate air emissions is prescribed burning. The amount of prescribed burning proposed under Alternative 1 would be comparable to the amount of burning conducted prior to Hurricane Michael, which targeted approximately 6,000 acres per year. Therefore, air emissions under the updated INRMP would be comparable to those generated under the	*Minor Impact – Not Significant* Air emissions under the previous INRMP would be generated primarily by prescribed burning. The amount of prescribed burning conducted under the previous INRMP was comparable to the amount of burning proposed under the updated INRMP.

Table 3-9. Summary of Environmental Consequences
EA for Implementation of Tyndall AFB INRMP

Resource	Alternative 1	No Action Alternative
	previous INRMP prior to the hurricane. Short-term impacts on air quality from prescribed burning are outweighed by the long-term benefits of reduced fuel loads, which would otherwise have greater impacts on air quality during a wildfire. The potential for excessive amounts of smoke increased at the Base after Hurricane Michael due to the presence of downed woody debris and its potential for prolonged smoldering when burned.	
Soils	*Minor Impact – Not Significant* Activities under Alternative 1 that have the greatest potential to physically disturb soils include forestry management practices, costal dune restoration, and construction of recreational infrastructure destroyed by Hurricane Michael. The majority of soils that would be disturbed by these activities have been previously disturbed. Appropriate measures and controls would be implemented to minimize the potential for soil erosion and sedimentation impacts; examples of such measures are provided in Section 3.5. Under the updated INRMP, sand fencing and other appropriate measures would be used to re-establish barrier island sand dunes that were impacted by Hurricane Michael.	*Moderate Impact – Not Significant* Potential soil impacts and soil erosion management under the previous and updated INRMPs would be comparable. The previous INRMP, however, did not address the impacts of Hurricane Michael on the coastal dune systems. Therefore, the No Action Alternative would not adequately address the loss of the barrier island dunes or the measures necessary to restore the dune systems.
Water Resources	*Major Beneficial Impact* Implementation of the updated INRMP under Alternative 1 would have beneficial impacts on water resources. Benefits would be realized from wetland conservation measures (invasive species control; prescribed fire; and habitat protection); EIAP review and approval of proposed actions by the 325 CES/CEIEC; and compliance with applicable water resources regulatory requirements. A plan to restore wetland and surface water hydrology throughout the Base would be developed and implemented under the updated INRMP. This is a new management action that will be implemented in conjunction with post-hurricane rebuilding of the Base. Implementation of this plan would benefit the targeted aquatic systems and would also minimize the severity and impacts of flooding from future storms.	*Moderate Beneficial Impact* Overall, management of water resources at the Base under the previous and updated INRMPs would be comparable. However, implementation of the previous INRMP under the No Action Alternative would not include base-wide hydrological improvements, as proposed under Alternative 1.
Biological Resources	*Major Beneficial Impact* Implementation of Alternative 1 would have beneficial impacts on biological resources. Under the updated INRMP, longleaf pine restoration via tree planting would be conducted in greater amounts and at a faster rate to mitigate the adverse impacts of Hurricane Michael on the pine forests at the Base. The amount of prescribed burning under the updated INRMP would be comparable to the burning conducted in recent years	*Moderate Beneficial Impact* The No Action Alternative would fall short of addressing several post-hurricane biological resources management needs at the Base. Longleaf pine restoration via tree planting under the previous INRMP would not be sufficient to meet the current

Table 3-9. Summary of Environmental Consequences
EA for Implementation of Tyndall AFB INRMP

Resource	Alternative 1	No Action Alternative
	prior to Hurricane Michael, which was typically about 6,000 acres per year. There would be no major changes to management of vegetation for flight safety or control of invasive plants under the updated INRMP. Responsibilities for controlling black bears, which became a nuisance in the Base housing areas following Hurricane Michael, will be re-evaluated with the FWC under the updated INRMP. It is expected that the number of ESA Section 7 consultations at the Base will increase under the updated INRMP over the next 5 years due to development associated with post-hurricane reconstruction and potential mission changes. Implementation of the updated INRMP would include new projects to restore impacted dune systems and destroyed boardwalks, which would benefit T&E species of beach mice, sea turtles, and shorebirds. The updated INRMP would include prescribed burning in targeted habitats to benefit the federally listed Godfrey's butterwort and telephus spurge.	reforestation needs at the Base. The previous INRMP would also not include measures to address hurricane impacts to T&E species habitat on the barrier islands, including the re-establishment of washed out dunes and replacement of destroyed boardwalks, which are proposed under the updated INRMP. Although the previous INRMP would have less overall benefits than the updated INRMP, it would still have a net positive effect on biological resources at the Base.
Cultural Resources	*No Effect* Natural resources management activities have low potential to impact previously identified historic structures or archaeological sites. As standard practice, heavy equipment is not used for prescribed burning or other practices in areas where known cultural resources exist. Cultural resources surveys would be conducted and cultural resources protection measures would be implemented as needed at sites proposed for construction under the updated INRMP. In the event that unknown cultural resources are inadvertently discovered during natural resources management activities under the updated INRMP, all work would stop immediately, the proper authorities would be promptly notified, and measures to protect and evaluate the inadvertent find would be implemented in accordance with SOP 7.4, *Cultural Discoveriess*, in the Tyndall AFB ICRMP. In response to scoping letters sent by the USAF for this EA, the SHPO and Native American Tribes have no objections to the Proposed Action.	*No Effect* Protection of cultural resources at the Base under the previous and updated INRMPs would be comparable.

Table 3-9. Summary of Environmental Consequences
EA for Implementation of Tyndall AFB INRMP

Resource	Alternative 1	No Action Alternative
Land Use	*Moderate Beneficial Impact* Natural resources management under the updated INRMP would benefit from the improved land use planning that would result from Base reconstruction and is not expected to have any adverse effects itself on land uses on or outside the Base. The updated INRMP includes specific measures to address hurricane-related damage to recreational infrastructure, including the proposed replacement of the downed bridge on the Felix Lake Nature Trail and the destroyed recreational boardwalks and access roads on the barrier islands. Specific restrictions enforced by the outdoor recreation program minimizes the potential for interactions between recreational activities, military operations, and natural and cultural resources at the Base.	*Minor Beneficial Impact* Some recreation management activities under the previous INRMP would not be appropriate or optimal for post-hurricane conditions. Implementation of the previous INRMP would also not address repair or replacement of the recreational infrastructure that was damaged by the hurricane. Overall management of outdoor recreation at the Base under the previous and updated INRMPs would be comparable.
Safety	*Minor Impact – Not Significant* Wildland fire management and BASH management directly address public health and safety. Public safety is also integral to the management of prescribed burns and outdoor recreation at the Base. Portions of the Base where vegetative debris downed by Hurricane Michael is difficult to access and has not been removed pose a safety risk to firefighters and have the potential to produce excessive amounts of smoke due to prolonged smoldering when burned. Specific measures are implemented during prescribed burns to minimize the potential for smoke and other associated safety risks to the public. The BASH program has not required major changes since Hurricane Michael in 2018. Assessments of post-hurricane behavior and population trends of birds and other wildlife evaluated by the BASH program have been initiated and will continue through the planning period under the updated INRMP.	*Minor Impact – Not Significant* Measures implemented during wildfire suppression and prescribed burning to minimize the risk to public safety and the manner in which the BASH program is conducted at the Base under the previous and updated INRMPs would be comparable.
Hazardous Materials/Waste and Solid Waste	*Minor Impact – Not Significant* Proper handling, storage, and disposal of hazardous materials and wastes, including measures to prevent releases, would continue under the updated INRMP in accordance with all applicable environmental compliance regulations and Base environmental management plans. Prescribed burning and other activities that involve earthwork are not conducted within or adjacent to ERP sites or where other contamination has been documented at the Base. Major changes are not expected in the overall use of herbicides for weed control and insecticides for household pest control over the next 5 years under the updated INRMP. Measures are implemented to	*Minor Impact – Not Significant* Hazardous materials/waste management and the use of pesticides, except for insecticide use by the BASH program, under the previous and updated INRMPs would be comparable.

Table 3-9. Summary of Environmental Consequences
EA for Implementation of Tyndall AFB INRMP

Resource	Alternative 1	No Action Alternative
	minimize pesticide exposure to humans and sensitive ecological resources at the Base. Provided that the management actions identified in this EA are implemented, the use of insecticides by the BASH program is not expected to result in adverse impacts to health/safety or environmental resources.	
Cumulative Impacts	When added to past, present, and reasonably foreseeable actions, Alternative 1 is not expected to have significantly adverse cumulative impacts on any resource.	When added to past, present, and reasonably foreseeable actions, the No Action Alternative is not expected to have significantly adverse cumulative impacts on any resource.

SECTION 4

Mitigation Measures and Required Permits

Environmental impacts from mission and recreational activities at Tyndall AFB are avoided, minimized, and mitigated through various management actions implemented under the INRMP. In association with INRMP implementation, the NEPA, permitting, and mitigation requirements of proposed actions at the Base are determined through EIAP review by 325 CES/CEIEC and Tyndall Natural Resources.

Certain natural resources management activities that would be implemented under the updated INRMP may require permits and mitigative measures. Projects that would impact federal and state jurisdictional wetlands/waters would require authorization through the federal CWA Section 404 dredge and fill permitting program and the State of Florida ERP program. Any construction project under the updated INRMP that would disturb 1 acre or more of land would require an NPDES *Generic Permit for Stormwater Discharges from Large and Small Construction Activities* (FDEP Form 62-621.300(4)(a)), issued by the FDEP. This permit is often referred to as a Construction Generic Permit or construction stormwater permit. A SWPPP must be prepared and implemented as part of this permit to address the BMPs and engineering controls to be used to prevent and minimize erosion, sedimentation, and pollution during construction. Examples of planned projects expected to require Section 404, ERP, and construction stormwater permits include the proposed projects to replace the recreational boardwalks and access roads on the barrier islands that were destroyed by Hurricane Michael.

The primary management actions required to prevent adverse impacts during insecticide use under the Tyndall AFB BASH program have been identified in this EA. These management actions were developed in coordination with Tyndall Natural Resources, the USDA BASH biologist, and the USFWS liaison to Tyndall AFB and include measures to prevent direct contact with aquatic bodies during applications and indirect contact with aquatic bodies via runoff and aerial/wind drift. These management actions will be included in the next update of the BASH Plan and will also be incorporated as appropriate into the next updates of the INRMP and Pest Management Plan.

The following management actions will be implemented to prevent environmental impacts from insecticide use under the Tyndall AFB BASH program:

- Insecticides will be used only by certified personnel in accordance with the instructions provided on their EPA pesticide product labels.
- All insecticides proposed for use will be sent to the 325 CES/CEIEC Hazardous Materials Office for review and approval prior to use on the Base and must be tracked throughout the duration of their use.
- All treatment areas will be surveyed for aquatic bodies and drainage features prior to treatment. Aquatic bodies and drainage features will be identified on mapping and marked in the field as necessary.
- Insecticides will be applied from the ground only; aerial spraying of insecticides will not be conducted.
- Insecticides will be applied only to areas covered by grass that is regularly mowed. Insecticides will not be applied to impervious surfaces such as pavement, bare soil with no vegetative cover, or vegetated areas that are covered by shrubs or trees.
- Insecticides will not be applied within 25 feet of aquatic bodies. Grass or other vegetative cover that can serve as a vegetated buffer strip must exist between areas to be treated and aquatic bodies.
- Insecticides will not be applied within 25 feet of storm drains, culverts, or other drainage features that could transport them to connected aquatic systems.

- To minimize runoff potential, applications will consider site topography and drainage patterns. Steeply sloped areas leading to aquatic habitats and other areas where excessive runoff could occur will be identified and avoided.
- To minimize runoff potential, insecticides will not be applied if heavy rainfall is imminent. To the extent practicable, applications will be avoided when rainfall is forecasted to occur within 48 hours.
- To minimize drift potential, insecticides will be applied only during low-wind conditions. To the extent practicable, applications will be conducted when wind speeds are less than 10 miles per hour (mph) and will not be conducted when wind speeds exceed 15 mph. Aerial drift may be reduced by adjusting spray nozzles to apply larger-sized droplets.
- To minimize drift potential, insecticides will be applied outside of temperature inversions to the extent practicable. Temperature inversions are characterized by increasing temperatures with altitude and they restrict vertical air mixing. Inversions begin to form as the sun sets and often continue into morning. The presence or absence of temperature inversions in the area will be confirmed by the Tyndall AFB Weather Office.

SECTION 5

List of Primary Preparers

Table 5-1 lists the individuals who were the primary preparers of this EA.

Table 5-1. List of Primary Preparers
EA for Implementation of Tyndall AFB INRMP

Name	Organization	Primary Responsibility
Tunch Orsoy	Jacobs, Inc.	Project Manager/Author
Victoria Hernandez	Jacobs, Inc	Deputy Project Manager
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Karen Rhea	Jacobs, Inc.	Document Graphics
Karen Malley	Jacobs, Inc.	Editor

SECTION 6

List of Persons Consulted

The following individuals were consulted during preparation of this EA:

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- Gregory Chilcoat, Seminole Nation of Oklahoma, Wewoka, Oklahoma
- Daniel Childs, Tyndall AFB, Florida
- Jose Cintron, Tyndall AFB, Florida
- Galen Cloud, Thlopthlocco Tribal Town, Okemah, Oklahoma
- Jon Cornman, USDA, Tyndall AFB, Florida
- Billy Cypress, Miccosukee Tribe of Indians of Florida, Miami, Florida
- Crystal Darnell, U.S. Army Corps of Engineers, Mobile, Alabama
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SECTION 7

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Appendix A
Interagency and Intergovernmental Consultation

DEPARTMENT OF THE AIR FORCE
325TH CIVIL ENGINEER SQUADRON (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
540 Mississippi Road (Building 36270)
Tyndall AFB FL 32403-5014

Dr. Sean M. Blomquist
Acting Project Leader
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City FL 32405

Re: Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Tyndall AFB, Florida

Dear Dr. Blomquist

The United States Air Force is currently preparing an Environmental Assessment (EA) for the implementation of the Tyndall AFB INRMP that has been prepared for the 5-year planning period from 2020 to 2024. The EA will analyze the potential environmental impacts of implementing the final INRMP signed by you on behalf of the U.S. Fish and Wildlife Service (USFWS) on July 29, 2020. The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, the Proposed Action of implementing the subject INRMP would have no adverse impacts on any species currently listed as Threatened or Endangered under the Endangered Species Act (ESA), or on any species currently identified as a Candidate species or Petitioned species under the ESA. The draft EA has preliminarily concluded that implementation of the INRMP would result in only beneficial impacts to such species, as intended by the Air Force and USFWS.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA. When completed, the draft EA will be submitted to your office for review and comment.

If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-2714.

Sincerely

CINTRON.JOSE.J.1182275146

Digitally signed by CINTRON.JOSE.J.1182275146
Date: 2020.10.27 15:10:19 -05'00'

JOSÉ CINTRON, GS-12, DAF

Sent via email to: sean_blomquist@fws.gov

From: Yarbrough, Lisa on behalf of Panama City Regs, FW4
To: WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC; jose.cintron.1@us.af.mil
Cc: Kaeser, Melanie J; Orsoy, Tunch/TPA; Basili, Gianfranco D; Herrington, Jay; Lang, Paul
Subject: Fw: [EXTERNAL] RE: Tyndall AFB INRMP Scoping Letter
Date: Thursday, December 10, 2020 2:45:41 PM

Hello Mr. Wallace,

This email acknowledges the receipt of Tyndall Air Force Base's Integrated Natural Resources Management Plan for 2020 - 2024 Environmental Assessment (Tyndall AFB INRMP ES) Scoping Letter. The U.S. Fish and Wildlife Service is looking forward to receiving the draft Tyndall AFB INRMP EA for review.
Thank you,
Lisa Yarbrough

U.S. Fish and Wildlife Service
Panama City Ecological Services Field Office
1601 Balboa Ave.
Panama City, Fl 32405
850-769-0552

DEPARTMENT OF THE AIR FORCE
325TH CIVIL ENGINEER SQUADRON (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
540 Mississippi Road (Building 36270)
Tyndall AFB FL 32403-5014

Ms. Diana K. Pepe
Northwest Region Conservation Biologist
Florida Fish and Wildlife Conservation Commission
5300 High Bridge Road
Quincy FL 32351

Re: Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Tyndall AFB, Florida

Dear Ms. Pepe

The United States Air Force is currently preparing an Environmental Assessment (EA) for the implementation of the Tyndall AFB INRMP that has been prepared for the 5-year planning period from 2020 to 2024. The EA will analyze the potential environmental impacts of implementing the final INRMP signed by the Florida Fish and Wildlife Conservation Commission (FWC) on August 21, 2020. The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, the Proposed Action of implementing the subject INRMP would have no adverse impacts on any fish or wildlife resources regulated by the FWC. The draft EA has preliminarily concluded that implementation of the INRMP would result in only beneficial impacts to such resources, as intended by the Air Force and FWC.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA. When completed, the draft EA will be submitted to your office for review and comment.

If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-2714.

Sincerely

CINTRON.JOSE.J.1182275146 Digitally signed by CINTRON.JOSE.J.1182275146 Date: 2020.10.27 15:06:39 -05'00'

JOSÉ CINTRON, GS-12, DAF

Sent via email to: Diana.Pepe@MyFWC.com; billy.sermons@myfwc.com

From:	Pepe, Diana
To:	WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Cc:	Sermons, Billy; CINTRON, JOSE J GS-12 USAF ACC 325 CES/CEIE; Orsoy, Tunch/TPA; Manor, Philip
Subject:	[EXTERNAL] RE: Tyndall AFB INRMP Scoping Letter
Date:	Monday, November 09, 2020 10:01:18 AM
Attachments:	Scoping_FWC_INRMP EA_2020.pdf

Dear Mr. Wallace:

Florida Fish and Wildlife Conservation Commission (FWC) staff has reviewed the letter received by email on November 2, 2020 regarding the "Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP)" as part of technical assistance in accordance with Chapter 379, Florida Statutes. The letter requests FWC input ahead of a draft Environmental Assessment being prepared by the United States Air Force to analyze the potential environmental impacts of implementing the final INRMP. As stated in the email, FWC staff provided input on the Tyndall Air Force Base 2020-2024 INRMP during the 5-year update and signed the document on August 21, 2020. Based on this previous coordination, we have no further comments or recommendations related to fish and wildlife or listed species and their habitat.

If you need any further assistance, please do not hesitate to contact the central FWC project review inbox by email at ConservationPlanningServices@MyFWC.com. If you have specific technical questions, please contact myself or local FWC staff directly. We look forward to continuing to work with you on implementing the INRMP.

Sincerely,

Diana K. Pepe
Northwest Region Conservation Biologist
Wildlife and Habitat Management Section
Division of Habitat and Species Conservation
Florida Fish and Wildlife Conservation Commission
5300 High Bridge Rd.
Quincy, FL 32351
(850)717-8742

DEPARTMENT OF THE AIR FORCE
325TH CIVIL ENGINEER SQUADRON (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
540 Mississippi Road (Building 36270)
Tyndall AFB FL 32403-5014

Timothy A. Parsons, Division Director
State Historic Preservation Officer
Division of Historic Resources
R.A. Gray Building
500 South Bronough Street
Tallahassee FL 32399-0250

Re: Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Tyndall AFB, Florida

Dear Dr. Parsons

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall AFB INRMP that has been authorized for the 5-year planning period from 2020 to 2024. The Air Force is currently preparing an Environmental Assessment (EA) to analyze the potential impacts of this Proposed Action. The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, natural resources management activities proposed to be conducted at Tyndall AFB under the subject INRMP would have no effect on historic properties, based on the nature of the activities and the policies and procedures established for the protection and management of historic properties at the Base. In the event of any unexpected discoveries of intact archaeological deposits or human remains, all work will cease, and the Air Force will initiate additional consultation with your office.

The updated INRMP is attached for your review. The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA. When completed, the draft EA

will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-2714.

Sincerely

CINTRON.JOSE.J.1182275146 Digitally signed by CINTRON.JOSE.J.1182275146 Date: 2020.10.27 15:15:42 -05'00'

JOSÉ CINTRON, GS-12, DAF

Attachment:
Tyndall AFB INRMP

Sent via email to: Timothy.Parsons@dos.myflorida.com; Jason.Aldridge@dos.myflorida.com

FLORIDA DEPARTMENT of STATE

RON DESANTIS
Governor

LAUREL M. LEE
Secretary of State

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
540 Mississippi Avenue, Mail Stop 42
Tyndall Air Force Base, Florida 32403-5014

November 12, 2020

Re: DHR Project No.: 2020-6731
Implementation of the 2020-2024 Integrated Natural Resources Management Plan
Tyndall Air Force Base, Bay County

Dear Mr. Cintron:

This project was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended and *36 CFR Part 800: Protection of Historic Properties*.

We have reviewed Section 7.14 of the referenced document which deals with Cultural Resources Protection. It is our opinion that the Integrated Natural Resources Management Plan (INRMP) provides a clear and thorough process for complying with the requirements for the National Historic Preservation Act and other state and federal laws.

This office would like to compliment you and your office on the thoroughness and quality of the referenced INRMP. We look forward to receiving the Environmental Assessment and working with Tyndall Air Force Base as a partner in the management and protection of historic properties.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservationist, by electronic mail *scott.edwards@dos.myflorida.com*, or at 850.245.6333 or 800.847.7278.

Sincerely,

Jason Aldridge
For

Timothy A. Parsons, Ph.D.
Director, Division of Historical Resources
and State Historic Preservation Officer

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel Gregory M. Moseley
Commander
325th Fighter Wing
501 Airey Avenue, Suite 1
Tyndall AFB FL 32403-5549

Mr. Billy Cypress
Chairman
Miccosukee Tribe of Indians of Florida
Tamiami Station
P.O. Box 440021
Miami FL 33144

Re: Section 106 Consultation for the Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Bay County, Florida

Dear Principal Chief Cypress

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall AFB INRMP that has been updated for the 5-year planning period from 2020 to 2024. This updated version of the INRMP has incorporated substantial revisions to the information presented in the previous INRMP due to the impacts of Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018.

Based on the extent of the revisions needed to update the INRMP to reflect post-hurricane conditions, the Air Force determined that the Plan should undergo a detailed environmental review prior to its implementation. Accordingly, the Air Force is currently preparing an Environmental Assessment (EA) to analyze the potential impacts of implementing the updated INRMP (Proposed Action). The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, natural resources management activities proposed at Tyndall AFB, under the subject INRMP, would have no effect on historic properties based on the nature of the activities and the policies and procedures established for the protection and management of historic properties at the Base. Tyndall AFB is not aware of any historic properties of religious or cultural significance located within the Area of Potential Effect (APE).

However, we request the assistance of the Miccosukee Tribe of Indians of Florida in identifying the presence of these properties within the APE and any effect the undertaking may have on these properties. It is not expected that undiscovered cultural resources would be found during implementation of the proposed undertaking; however, in the event of an inadvertent discovery during ground-disturbing operations, Tyndall AFB will cease work immediately, contact a professional archaeologist, and initiate additional consultation with your office.

The updated INRMP is attached for your review. The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA, though we will accept responses provided after 30 days. When completed, the draft EA will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-2714. Thank you for your assistance with this undertaking.

Sincerely

MOSELEY.GREGORY.M.1126396879 Digitally signed by MOSELEY.GREGORY.M.1126396879 Date: 2020.11.16 13:54:11 -06'00'

GREGORY M. MOSELEY, Colonel, USAF

Attachment:
Tyndall AFB INRMP

Sent via email to: kevind@miccosukeetribe.com; yalmeida@miccosukeetribe.com; hopel@miccosukeetribe.com

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel Gregory M. Moseley
Commander
325th Fighter Wing
501 Airey Avenue, Suite 1
Tyndall AFB FL 32403-5549

Mr. David J. Proctor
Traditional Cultural Advisor
Muscogee (Creek) Nation
PO Box 580
Okmulgee OK 74447

Re: Section 106 Consultation for the Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Bay County, Florida

Dear Mr. Proctor

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall AFB INRMP that has been updated for the 5-year planning period from 2020 to 2024. This updated version of the INRMP has incorporated substantial revisions to the information presented in the previous INRMP due to the impacts of Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018.

Based on the extent of the revisions needed to update the INRMP to reflect post-hurricane conditions, the Air Force determined that the Plan should undergo a detailed environmental review prior to its implementation. Accordingly, the Air Force is currently preparing an Environmental Assessment (EA) to analyze the potential impacts of implementing the updated INRMP (Proposed Action). The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, natural resources management activities proposed at Tyndall AFB, under the subject INRMP, would have no effect on historic properties based on the nature of the activities and the policies and procedures established for the protection and management of historic properties at the Base. Tyndall AFB is not aware of any historic properties of religious or cultural significance located within the Area of Potential Effect (APE). However, we request the assistance of the Muscogee (Creek) Nation in identifying the presence

of these properties within the APE and any effect the undertaking may have on these properties. It is not expected that undiscovered cultural resources would be found during implementation of the proposed undertaking; however, in the event of an inadvertent discovery during ground-disturbing operations, Tyndall AFB will cease work immediately, contact a professional archaeologist, and initiate additional consultation with your office.

The updated INRMP is attached for your review. The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA, though we will accept responses provided after 30 days. When completed, the draft EA will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-2714. Thank you for your assistance with this undertaking.

Sincerely

MOSELEY.GREGORY.M.1126396879 Digitally signed by MOSELEY.GREGORY.M.1126396879 Date: 2020.11.16 13:54:34 -06'00'

GREGORY M. MOSELEY, Colonel, USAF

Attachment:
Tyndall AFB INRMP

Sent via email to: Section106@mcn-nsn.gov; djproctor@mcn-nsn.gov; clowe@mcn-nsn.gov

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel Gregory M. Moseley
Commander
325th Fighter Wing
501 Airey Avenue, Suite 1
Tyndall AFB FL 32403-5549

Larry D. Haikey, MS
Tribal Historic Preservation Officer
Poarch Band of Creek Indians
5811 Jack Springs Road
Atmore AL 36502

Re: Section 106 Consultation for the Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Bay County, Florida

Dear Mr. Haikey

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall AFB INRMP that has been updated for the 5-year planning period from 2020 to 2024. This updated version of the INRMP has incorporated substantial revisions to the information presented in the previous INRMP due to the impacts of Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018.

Based on the extent of the revisions needed to update the INRMP to reflect post-hurricane conditions, the Air Force determined that the Plan should undergo a detailed environmental review prior to its implementation. Accordingly, the Air Force is currently preparing an Environmental Assessment (EA) to analyze the potential impacts of implementing the updated INRMP (Proposed Action). The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, natural resources management activities proposed at Tyndall AFB, under the subject INRMP, would have no effect on historic properties based on the nature of the activities and the policies and procedures established for the protection and management of historic properties at the Base. Tyndall AFB is not aware of any historic properties of religious or cultural significance located within the Area of Potential Effect (APE). However, we request the assistance of the Poarch Band of Creek Indians in identifying the

presence of these properties within the APE and any effect the undertaking may have on these properties. It is not expected that undiscovered cultural resources would be found during implementation of the proposed undertaking; however, in the event of an inadvertent discovery during ground-disturbing operations, Tyndall AFB will cease work immediately, contact a professional archaeologist, and initiate additional consultation with your office.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA, though we will accept responses provided after 30 days. When completed, the draft EA will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-4346. Thank you for your assistance with this undertaking.

Sincerely

MOSELEY.GREGORY.M.1126396879 Digitally signed by MOSELEY.GREGORY.M.1126396879 Date: 2020.11.16 13:54:54 -06'00'

GREGORY M. MOSELEY, Colonel, USAF

Attachment:
Tyndall AFB INRMP

Sent via email to: THPO@pci-nsn.gov; Lhaikey@pci-nsn.gov

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel Gregory M. Moseley
Commander
325th Fighter Wing
501 Airey Avenue, Suite 1
Tyndall AFB FL 32403-5549

Mr. Greg Chilcoat
Principal Chief
Seminole Nation of Oklahoma
PO Box 1498
Wewoka OK 74884

Re: Section 106 Consultation for the Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Bay County, Florida

Dear Principal Chief Chilcoat

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall AFB INRMP that has been updated for the 5-year planning period from 2020 to 2024. This updated version of the INRMP has incorporated substantial revisions to the information presented in the previous INRMP due to the impacts of Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018.

Based on the extent of the revisions needed to update the INRMP to reflect post-hurricane conditions, the Air Force determined that the Plan should undergo a detailed environmental review prior to its implementation. Accordingly, the Air Force is currently preparing an Environmental Assessment (EA) to analyze the potential impacts of implementing the updated INRMP (Proposed Action). The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, natural resources management activities proposed at Tyndall AFB, under the subject INRMP, would have no effect on historic properties based on the nature of the activities and the policies and procedures established for the protection and management of historic properties at the Base. Tyndall AFB is not aware of any historic properties of religious or cultural significance located within the Area of Potential Effect (APE).

However, we request the assistance of the Seminole Nation of Oklahoma in identifying the presence of these properties within the APE and any effect the undertaking may have on these properties. It is not expected that undiscovered cultural resources would be found during implementation of the proposed undertaking; however, in the event of an inadvertent discovery during ground-disturbing operations, Tyndall AFB will cease work immediately, contact a professional archaeologist, and initiate additional consultation with your office.

The updated INRMP is attached for your review. The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA, though we will accept responses provided after 30 days. When completed, the draft EA will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-2714. Thank you for your assistance with this undertaking.

Sincerely

MOSELEY.GREGORY.M.1126396879 Digitally signed by MOSELEY.GREGORY.M.1126396879 Date: 2020.11.16 13:55:10 -06'00'

GREGORY M. MOSELEY, Colonel, USAF

Attachment:
Tyndall AFB INRMP

Sent via email to: Lincoln.s@sno-nsn.gov, Franks.D@sno-nsn.gov

From: Kad Henderson <kadhenderson@semtribe.com>
Sent: Monday, January 4, 2021 10:53 AM
To: MOSS, JENNIFER E CTR USAF ACC 325 CES/CEIEA <jennifer.moss.1.ctr@us.af.mil>
Cc: Bradley Mueller <bradleymueller@semtribe.com>; Danielle Simon <daniellesimon@semtribe.com>
Subject: [Non-DoD Source] Section 106 Consultation for the Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Tyndall Air Force Base (AFB), Bay County, Florida

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

TRIBAL HISTORIC
PRESERVATION OFFICE

SEMINOLE TRIBE OF FLORIDA

30290 JOSIE BILLIE HIGHWAY
PMB 1004
CLEWISTON, FL 33440

THPO PHONE: (863) 983-6549
FAX: (863) 902-1117

THPO WEBSITE: WWW.STOFTHPO.COM

January 04, 2021

Colonel Gregory M. Moseley
Commander
325th Fighter Wing
501 Airey Avenue, Suite 1
Tyndall AFB FL 32403-5549

Subject: Section 106 Consultation for the Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Bay County, Florida
THPO Compliance Tracking Number: 0032769

In order to expedite the THPO review process:

1. Please correspond via email and provide documents as attachments (a THPO FTP site is available for large files),
2. Please send all emails to THPOCompliance@semtribe.com,
3. Please reference the THPO Compliance Tracking Number if one has been assigned.

Dear Colonel Moseley,

Thank you for contacting the Seminole Tribe of Florida – Tribal Historic Preservation Office (STOF-THPO) Compliance Section regarding the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Bay County, Florida

The proposed undertaking does fall within the STOF Area of Interest. We have reviewed the documents that you provided and completed our assessment pursuant to Section 106 of the National Historic Preservation Act (16 USC 470) as amended and its implementing regulations (36 CFR 800). We have no objections or other comments at this time. Please notify us if any archaeological, historical, or burial resources are inadvertently discovered during project implementation and feel free to contact us with any questions or concerns.

Respectfully,

Kad M. Henderson MA, RPA, Compliance Review Specialist
STOF-THPO, Compliance Review Section
30290 Josie Billie Hwy, PMB 1004
Clewiston, FL 33440
Email: kadhenderson@semtribe.com

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel Gregory M. Moseley
Commander
325th Fighter Wing
501 Airey Avenue, Suite 1
Tyndall AFB FL 32403-5549

Paul N. Backhouse, Ph.D.
Tribal Historic Preservation Officer
Seminole Tribe of Florida
30290 Josie Billie Highway, PMB 1004
Clewiston FL 33440

Re: Section 106 Consultation for the Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Bay County, Florida

Dear Dr. Backhouse

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall AFB INRMP that has been updated for the 5-year planning period from 2020 to 2024. This updated version of the INRMP has incorporated substantial revisions to the information presented in the previous INRMP due to the impacts of Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018.

Based on the extent of the revisions needed to update the INRMP to reflect post-hurricane conditions, the Air Force determined that the Plan should undergo a detailed environmental review prior to its implementation. Accordingly, the Air Force is currently preparing an Environmental Assessment (EA) to analyze the potential impacts of implementing the updated INRMP (Proposed Action). The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, natural resources management activities proposed at Tyndall AFB, under the subject INRMP, would have no effect on historic properties based on the nature of the activities and the policies and procedures established for the protection and management of historic properties at the Base. Tyndall AFB is not aware of any historic properties of religious or cultural significance located within the Area of Potential Effect (APE). However, we request the assistance of the Seminole Tribe of Florida in identifying the presence

of these properties within the APE and any effect the undertaking may have on these properties. It is not expected that undiscovered cultural resources would be found during implementation of the proposed undertaking; however, in the event of an inadvertent discovery during ground-disturbing operations, Tyndall AFB will cease work immediately, contact a professional archaeologist, and initiate additional consultation with your office.

The updated INRMP is attached for your review. The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA, though we will accept responses provided after 30 days. When completed, the draft EA will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-2714. Thank you for your assistance with this undertaking.

Sincerely

MOSELEY.GREGORY.M.1126396879 Digitally signed by MOSELEY.GREGORY.M.1126396879 Date: 2020.11.16 13:55:24 -06'00'

GREGORY M. MOSELEY, Colonel, USAF

Attachment:
Tyndall AFB INRMP

Sent via email to: THPOCompliance@semtribe.com; Annemullins@semtribe.com

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel Gregory M. Moseley
Commander
325th Fighter Wing
501 Airey Avenue, Suite 1
Tyndall AFB FL 32403-5549

Mr. Galen Cloud
Tribal Historic Preservation Officer
Thlopthlocco Tribal Town
PO Box 188
Okemah OK 74859

Re: Section 106 Consultation for the Implementation of the Tyndall Air Force Base (AFB) Integrated Natural Resources Management Plan (INRMP), Bay County, Florida

Dear Mr. Cloud

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall AFB INRMP that has been updated for the 5-year planning period from 2020 to 2024. This updated version of the INRMP has incorporated substantial revisions to the information presented in the previous INRMP due to the impacts of Hurricane Michael, which made landfall on Tyndall AFB as a Category 5 hurricane on October 10, 2018.

Based on the extent of the revisions needed to update the INRMP to reflect post-hurricane conditions, the Air Force determined that the Plan should undergo a detailed environmental review prior to its implementation. Accordingly, the Air Force is currently preparing an Environmental Assessment (EA) to analyze the potential impacts of implementing the updated INRMP (Proposed Action). The subject EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA, and the Air Force NEPA regulations.

Based on the initial findings of the draft EA, natural resources management activities proposed at Tyndall AFB, under the subject INRMP, would have no effect on historic properties based on the nature of the activities and the policies and procedures established for the protection and management of historic properties at the Base. Tyndall AFB is not aware of any historic properties of religious or cultural significance located within the Area of Potential Effect (APE). However, we request the assistance of the Thlopthlocco Tribal Town in identifying the presence

of these properties within the APE and any effect the undertaking may have on these properties. It is not expected that undiscovered cultural resources would be found during implementation of the proposed undertaking; however, in the event of an inadvertent discovery during ground-disturbing operations, Tyndall AFB will cease work immediately, contact a professional archaeologist, and initiate additional consultation with your office.

The updated INRMP is attached for your review. The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA, though we will accept responses provided after 30 days. When completed, the draft EA will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at edwin.wallace.1@us.af.mil, or via telephone at (850) 283-2714. Thank you for your assistance with this undertaking.

Sincerely

MOSELEY.GREGORY.M.1126396879 Digitally signed by MOSELEY.GREGORY.M.1126396879 Date: 2020.11.16 13:55:47 -06'00'

GREGORY M. MOSELEY, Colonel, USAF

Attachment:
Tyndall AFB INRMP

Sent via email to: thpo@tttown.org

Appendix B
Public Review of Environmental Assessment

Appendix C
Federal Agency Coastal Zone Management Act Consistency Determination

FEDERAL AGENCY COASTAL ZONE MANAGEMENT ACT (CZMA) CONSISTENCY DETERMINATION

This document provides the State of Florida with the U.S. Air Force's Consistency Determination under CZMA Section 307 and 15 CFR. Part 930 subpart C, for the Preferred Alternative (Alternative 1) analyzed in the draft Environmental Assessment (EA) for Implementation of the Tyndall Air Force Base Integrated Natural Resources Management Plan. Federal consistency with the statutes implemented under the Florida Coastal Zone Management Program is addressed in the table below. Pursuant to 15 CFR § 930.41, the Florida State Clearinghouse has 60 days from receipt of this document to concur with, or object to, this Consistency Determination, or to request an extension, in writing, under 15 CFR § 930.41(b). Florida's concurrence will be presumed if Tyndall AFB does not receive its response within 60 days from receipt of this document.

Florida Coastal Management Program Review

Statute	Federal Consistency	Scope
Chapter 161 *Beach and Shore Preservation*	The Preferred Alternative would not affect the state's management or preservation of beaches and shores.	This statute provides policy for the regulation of construction, reconstruction, and other physical activities related to the beaches and shores of the state. Additionally, this statute requires the restoration and maintenance of critically eroding beaches.
Chapter 163, Part II *Growth Policy; County and Municipal Planning; Land Development Regulation*	The Preferred Alternative would not affect local government comprehensive plans.	Requires local governments to prepare, adopt, and implement comprehensive plans that encourage the most appropriate use of land and natural resources in a manner consistent with the public interest.
Chapter 186 *State and Regional Planning*	The Preferred Alternative would not affect the state's plans for water use, land development, and transportation.	Details state-level planning efforts. Requires the development of special statewide plans governing water use, land development, and transportation.
Chapter 252 *Emergency Management*	The Preferred Alternative would not affect the state's vulnerability to natural disasters. The Preferred Alternative would not affect emergency response and evacuation procedures.	Provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and manmade disasters.
Chapter 253 *State Lands*	The Preferred Alternative does not involve the use of state lands and would not restrict public access to state lands. Therefore, the Preferred Alternative would be consistent with the state's administration of public lands.	Addresses the state's administration of public lands and property of this state and provides direction regarding the acquisition, disposal, and management of all state lands.
Chapter 258 *State Parks and Preserves*	The Preferred Alternative would not affect state parks or preserves.	Addresses administration and management of state parks and preserves.
Chapter 259 *Land Acquisition for Conservation or Recreation*	The Preferred Alternative would not affect the state's acquisition of environmentally endangered lands or outdoor recreation lands.	Authorizes acquisition of environmentally endangered lands and outdoor recreation lands.

Statute	Federal Consistency	Scope
Chapter 260 *Florida Greenways and Trails Act*	The Preferred Alternative would not affect the Florida Greenways and Trails Program.	Established in order to conserve, develop, and use the natural resources of Florida for healthful and recreational purposes.
Chapter 267 *Historical Resources*	Potential impacts on cultural resources are analyzed in Section 3.8 of the EA. Based on the analysis conducted, the Preferred Alternative would have no effect on cultural resources. Therefore, the Preferred Alternative would be consistent with the management and preservation of the state's archaeological and historical resources.	Addresses management and preservation of the state's archaeological and historical resources.
Chapter 288 *Commercial Development and Capital Improvements*	The Preferred Alternative would not affect current or future business, trade, or tourism in the region.	Promotes and develops general business, trade, and tourism components of the state economy.
Chapter 334 *Transportation Administration*	The Preferred Alternative would not affect the state's administration of transportation.	Addresses the state's policy concerning transportation administration.
Chapter 339 *Transportation Finance and Planning*	The Preferred Alternative would not affect the finance and planning needs of the state's transportation system.	Addresses the finance and planning needs of the state's transportation system.
Chapter 373 *Water Resources*	Potential impacts on water resources are analyzed in Section 3.6 of the EA. Based on the analysis conducted, the Preferred Alternative would have a beneficial impact on wetlands, surface water, floodplains, and groundwater. Therefore, the Preferred Alternative would be consistent with the state's statutes and regulations regarding the water resources of the state.	Addresses sustainable water management; the conservation of surface and ground waters for full beneficial use; the preservation of natural resources, fish, and wildlife; protecting public land; and promoting the health and general welfare of Floridians
Chapter 375 *Outdoor Recreation and Conservation Lands*	The Preferred Alternative would not affect recreational opportunities on state lands.	Develops comprehensive multipurpose outdoor recreation plan to document recreational supply and demand, describe current recreational opportunities, estimate need for additional recreational opportunities, and propose means to meet the identified needs.
Chapter 376 *Pollutant Discharge Prevention and Removal*	Potential impacts on hazardous materials, solid waste, and pollution prevention are discussed in Section 3.11 of the EA. Based on the analysis conducted, the Preferred Alternative would not have a significant impact on these resources/practices. Therefore, the Preferred Alternative would be consistent with the state's statutes and regulations regarding the transfer, storage, or transportation of pollutants.	Regulates transfer, storage, and transportation of pollutants, and cleanup of pollutant discharges.
Chapter 377 *Energy Resources*	The Preferred Alternative would not affect oil and gas resources of the state.	Addresses regulation, planning, and development of oil and gas resources of the state.
Chapter 379 *Fish and Wildlife Conservation*	Potential impacts on fish and wildlife, including protected species, are analyzed in Section 3.7 of the EA. Based on the analysis conducted, the Preferred	Addresses the management and protection of the state's wide

Statute	Federal Consistency	Scope
	Alternative would not have a significant impact on fish and wildlife, including protected species. Therefore, the Preferred Alternative would be consistent with the state's policies concerning the protection of fish and wildlife resources.	diversity of fish and wildlife resources.
Chapter 380 *Land and Water Management*	The Preferred Alternative would not affect state management of land or water.	Establishes land and water management policies to guide and coordinate local decisions relating to growth and development.
Chapter 381 *Public Health, General Provisions*	The Preferred Alternative would not affect the state's policy concerning the public health system.	Establishes public policy concerning the state's public health system.
Chapter 388 *Mosquito Control*	The Preferred Alternative would not affect mosquito control efforts.	Addresses mosquito control effort in the state.
Chapter 403 *Environmental Control*	Potential impacts on air quality, hazardous materials/solid waste, and water quality are analyzed in Section 3.4, Section 3.6, and Section 3.11, respectively, of the EA. Based on the analysis conducted, the Preferred Alternative would not have a significant impact on air quality or hazardous materials/solid waste and would have a beneficial impact on water quality. Therefore, the Preferred Alternative would be consistent with the state's statutes and regulations regarding water quality, air quality, pollution control, solid waste management, and other environmental control efforts.	Establishes public policy concerning environmental control in the state.
Chapter 553 *Building Construction Standards*	Any construction under the Preferred Alternative would be consistent with the state's regulations and standards pertaining to building construction.	Addresses the building construction standards established by the state.
Chapter 582 *Soil and Water Conservation*	The Preferred Alternative would not affect the state's soil and water conservation efforts.	Provides for the control and prevention of soil erosion.
Chapter 597 *Aquaculture*	The Preferred Alternative would not affect the state's policy pertaining to aquaculture.	Addresses enhancement and regulation of aquaculture in the state.

Appendix D
Applicable Laws and Regulations

Applicable Laws and Regulations

Laws and regulations relevant to NEPA and the resources assessed in this EA include, but are not limited to, the following:

- Title 40 CFR Parts 1500-1508
- Title 42, USC, Sections 4321-4370f
- Title 32 CFR Part 989, *Environmental Impact Analysis Process*
- EO 11988, *Floodplain Management*, May 24, 1977
- EO 11990, *Protection of Wetlands*, May 24, 1977
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, February 11, 1994
- EO 13175, *Consultation and Coordination with Indian Tribal Governments*, November 6, 2000
- EO 12372, *Intergovernmental Review of Federal Programs*, July 14, 1982
- DoD Instruction 4715.9, *Environmental Planning and Analysis*, May 3, 1996
- AFI 32-1053, *Pest Management Program*
- AFI 32-7001, *Environmental Management*
- AFI 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Program*
- AFMAN 32-7003, *Environmental Conservation*, April 20, 2020
- Air Force Policy Directive 32-70, *Environmental Considerations in Air Force Programs and Activities*
- Sikes Act, Title 16, USC, Section 670
- Noise Control Act, Title 42, USC, Sections 4901 *et seq*.
- Clean Air Act, Title 42, USC, Sections 7401 *et seq*.
- Rivers and Harbors Act, Title 33, USC, Section 401
- Clean Water Act, Title 33, USC, Sections 1251 *et seq*.
- National Historic Preservation Act, Title 16, USC, Section 470
- Archaeological Resources Protection Act, Title 16, USC, Section 470
- Endangered Species Act, Title 16, USC, Section 1531 *et seq*.
- Migratory Bird Treaty Act, Title 16, USC, Sections 703-712
- Bald and Golden Eagle Protection Act, Title 16, USC, Sections 668-668d
- Coastal Zone Management Act, Title 16, USC, Section 1451 *et seq*.
- Resource Conservation and Recovery Act, Title 42, USC, Section 6901 *et seq*.

Appendix E
Air Emissions Calculations

Annual Emissions for 2020 (tons/year)

Activity	CO	VOC	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e}
Prescribed Burning	1,499	72.9	---	---	162	162	---
Off-Road Mobile Vehicles (Supporting Burning Activities)	0.00747	0.00310	0.0267	0.000193	---	0.000855	9.23
Mobile Vehicles (Supporting Tree Planting Activities)	0.929	0.232	1.30	0.005	0.044	0.044	413
Total, tons/year	1,499	73.1	1.33	0.00519	162	162	422

Annual Emissions for 2021 (tons/year)

Activity	CO	VOC	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e}
Prescribed Burning	1,499	72.9	---	---	162	162	---
Off-Road Mobile Vehicles (Supporting Burning Activities)	0.00617	0.00297	0.0250	0.0000467	---	0.000724	9.23
Mobile Vehicles (Supporting Tree Planting Activities)	0.923	0.221	1.16	0.005	0.039	0.039	413
Total, tons/year	1,499	73.1	1.18	0.00505	162	162	422

Annual Emissions for 2022 (tons/year)

Activity	CO	VOC	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e}
Prescribed Burning	1,499	72.9	---	---	162	162	---
Off-Road Mobile Vehicles (Supporting Burning Activities)	0.00507	0.00287	0.0237	0.0000467	---	0.000610	9.23
Mobile Vehicles (Supporting Tree Planting Activities)	0.919	0.210	1.03	0.005	0.034	0.034	413
Total, tons/year	1,499	73.1	1.06	0.00505	162	162	422

Annual Emissions for 2023 (tons/year)

Activity	CO	VOC	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e}
Prescribed Burning	1,998	97.2	---	---	216	216	---
Off-Road Mobile Vehicles (Supporting Burning Activities)	0.00507	0.00287	0.0237	0.0000467	---	0.000610	9.23
Mobile Vehicles (Supporting Tree Planting Activities)	0.915	0.201	0.924	0.005	0.030	0.030	413
Total, tons/year	1,999	97.4	0.948	0.00505	216	216	422

Annual Emissions for 2024 (tons/year)

Activity	CO	VOC	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_{2e}
Prescribed Burning	1,998	97.2	---	---	216	216	---
Off-Road Mobile Vehicles (Supporting Burning Activities)	0.00507	0.00287	0.0237	0.0000467	---	0.000610	9.23
Mobile Vehicles (Supporting Tree Planting Activities)	0.911	0.192	0.831	0.005	0.026	0.026	413
Total, tons/year	1,999	97.4	0.855	0.00505	216	216	422

1.0 Data Used to Estimate Emissions from Prescribed Burning

Fuel Loading =	9	tons/acre [1]
Land Area Burned =	4500	Acres

1.1 Actual Emissions From Proposed Action, Prescribed Burning - Criteria Pollutants

Constituent	Emission Factor [2] (g/kg)	Annual Actual (lb/yr)	Annual Actual (ton/yr)
CO	37	2,997,016	1,499
$PM_{2.5}$	4.0	324,002	162
PM_{10}	4.0	324,002	162
PM	6.0	486,003	243
VOC	1.80	145,801	72.9

(1) Emission Factors for Criteria Pollutants, from AP-42, Section 13.1.3 Table 13.1-1 Southern

(2) Emission Factors for Criteria Pollutants, from AP-42, Section 13.1.3 Table 13.1-3 Logging Slash Debris

3.0 Calculation of Emissions from Off Road Diesel Engines and Vehicles

Activity	days
Prescribed Burning	3
Year	2020

3.1 Actual Emissions From Proposed Action, Off Road Engines - Criteria Pollutants

Type of Unit	Rated HP (hp)	# of Units	Total Daily Usage (hr/day)	Emission Factor (lb/1000 hp-hr) [1]						2020 Actual Emissions (ton/yr)					
				CO	VOC	NOx	SO_2	PM	CO_{2e}	CO	VOC	NOx	SO_2	PM	CO_{2e}
Bulldozer	300	1	6	1.049	0.382	2.673	0.060	0.130	1,189.839	2.83.E-03	1.03.E-03	7.22.E-03	1.62.E-04	3.51.E-04	3.21.E+00
Off-Highway Tractor	65	1	6	1.754	0.441	4.769	0.006	0.200	1,183.120	1.03.E-03	2.58.E-04	2.79.E-03	3.51.E-06	1.17.E-04	6.92.E-01
Off-Highway Truck	500	5	6	0.803	0.402	3.704	0.006	0.086	1,183.254	3.61.E-03	1.81.E-03	1.67.E-02	2.70.E-05	3.87.E-04	5.32.E+00
			3												
4-stroke ATV	50	6	6	81.152	8.028	0.988	0.003	0.135	533.051	3.66.E-02	3.62.E-03	4.45.E-04	1.35.E-06	6.09.E-05	2.40.E-01
TOTAL EMISSIONS										**0.00747**	**0.00310**	**0.0267**	**0.000193**	**0.000855**	**9.23**

(1) Emission factors obtained from "Air Emissions Guide for Air Force Mobile Sources," AFCEC, August 2018.

1.0 Data Used to Estimate Emissions from Prescribed Burning

Fuel Loading =	9	tons/acre [1]
Land Area Burned =	4500	Acres

1.1 Actual Emissions From Proposed Action, Prescribed Burning - Criteria Pollutants

Constituent	Emission Factor [2] (g/kg)	Annual Actual (lb/yr)	Annual Actual (ton/yr)
CO	37	2,997,016	1,499
$PM_{2.5}$	4.0	324,002	162
PM_{10}	4.0	324,002	162
PM	6.0	486,003	243
VOC	1.80	145,801	72.9

(1) Emission Factors for Criteria Pollutants, from AP-42, Section 13.1.3 Table 13.1-1 Southern

(2) Emission Factors for Criteria Pollutants, from AP-42, Section 13.1.3 Table 13.1-3 Logging Slash Debris

3.0 Calculation of Emissions from Off Road Diesel Engines and Vehicles

Activity	days
Prescribed Burning	3
Year	2021

3.1 Actual Emissions From Proposed Action, Off Road Engines - Criteria Pollutants

Type of Unit	Rated HP (hp)	# of Units	Total Daily Usage (hr/day)	Emission Factor (lb/1000 hp-hr) [1]						2020 Actual Emissions (ton/yr)					
				CO	VOC	NOx	SO_2	PM	CO_{2e}	CO	VOC	NOx	SO_2	PM	CO_{2e}
Bulldozer	300	1	6	0.899	0.374	2.337	0.006	0.107	1,189.852	2.43.E-03	1.01.E-03	6.31.E-03	1.62.E-05	2.89.E-04	3.21.E+00
Off-Highway Tractor	65	1	6	1.542	0.427	4.403	0.006	0.174	1,183.157	9.02.E-04	2.50.E-04	2.58.E-03	3.51.E-06	1.02.E-04	6.92.E-01
Off-Highway Truck	500	5	6	0.631	0.381	3.580	0.006	0.074	1,183.268	2.84.E-03	1.71.E-03	1.61.E-02	2.70.E-05	3.33.E-04	5.32.E+00
4-stroke ATV	50	6	6	80.991	7.954	0.980	0.003	0.135	533.023	3.65.E-02	3.59.E-03	4.42.E-04	1.35.E-06	6.09.E-05	2.40.E-01
TOTAL EMISSIONS										**0.00617**	**0.00297**	**0.0250**	**0.0000467**	**0.000724**	**9.23**

(1) Emission factors obtained from "Air Emissions Guide for Air Force Mobile Sources," AFCEC, August 2018.

1.0 Data Used to Estimate Emissions from Prescribed Burning

Fuel Loading =	9	tons/acre [1]
Land Area Burned =	4500	Acres

1.1 Actual Emissions From Proposed Action, Prescribed Burning - Criteria Pollutants

Constituent	Emission Factor [2] (g/kg)	Annual Actual (lb/yr)	Annual Actual (ton/yr)
CO	37	2,997,016	1,499
$PM_{2.5}$	4.0	324,002	162
PM_{10}	4.0	324,002	162
PM	6.0	486,003	243
VOC	1.80	145,801	72.9

(1) Emission Factors for Criteria Pollutants, from AP-42, Section 13.1.3 Table 13.1-1 Southern

(2) Emission Factors for Criteria Pollutants, from AP-42, Section 13.1.3 Table 13.1-3 Logging Slash Debris

3.0 Calculation of Emissions from Off Road Diesel Engines and Vehicles

Activity	days
Prescribed Burning	3
Year	2022

3.1 Actual Emissions From Proposed Action, Off Road Engines - Criteria Pollutants

Type of Unit	Rated HP (hp)	# of Units	Total Daily Usage (hr/day)	Emission Factor (lb/1000 hp-hr) [1]						2020 Actual Emissions (ton/yr)					
				CO	VOC	NOx	SO_2	PM	CO_{2e}	CO	VOC	NOx	SO_2	PM	CO_{2e}
Bulldozer	300	1	6	0.770	0.368	2.047	0.006	0.087	1,189.861	2.08E-03	9.94E-04	5.53E-03	1.62E-05	2.35E-04	3.21E+00
Off-Highway Tractor	65	1	6	1.343	0.415	4.077	0.006	0.149	1,183.186	7.86E-04	2.43E-04	2.39E-03	3.51E-06	8.72E-05	6.92E-01
Off-Highway Truck	500	5	6	0.490	0.364	3.516	0.006	0.064	1,183.280	2.21E-03	1.64E-03	1.58E-02	2.70E-05	2.88E-04	5.32E+00
4-stroke ATV	50	6	6	80.861	7.896	0.973	0.003	0.135	533.000	3.65E-02	3.56E-03	4.39E-04	1.35E-06	6.09E-05	2.40E-01
TOTAL EMISSIONS										**0.00507**	**0.00287**	**0.0237**	**0.0000467**	**0.000610**	**9.23**

(1) Emission factors obtained from "Air Emissions Guide for Air Force Mobile Sources," AFCEC, August 2018.

1.0 Data Used to Estimate Emissions from Prescribed Burning

Fuel Loading =	9	tons/acre [1]
Land Area Burned =	6000	Acres

1.1 Actual Emissions From Proposed Action, Prescribed Burning - Criteria Pollutants

Constituent	Emission Factor [2] (g/kg)	Annual Actual (lb/yr)	Annual Actual (ton/yr)
CO	37	3,996,021	1,998
$PM_{2.5}$	4.0	432,002	216
PM_{10}	4.0	432,002	216
PM	6.0	648,003	324
VOC	1.80	194,401	97.2

(1) Emission Factors for Criteria Pollutants, from AP-42, Section 13.1.3 Table 13.1-1 Southern

(2) Emission Factors for Criteria Pollutants, from AP-42, Section 13.1.3 Table 13.1-3 Logging Slash Debris

3.0 Calculation of Emissions from Off Road Diesel Engines and Vehicles

Activity	days
Prescribed Burning	3
Year	2023

3.1 Actual Emissions From Proposed Action, Off Road Engines - Criteria Pollutants

Type of Unit	Rated HP (hp)	# of Units	Total Daily Usage (hr/day)	Emission Factor (lb/1000 hp-hr) [1]						2020 Actual Emissions (ton/yr)					
				CO	VOC	NOx	SO_2	PM	CO_{2e}	CO	VOC	NOx	SO_2	PM	CO_{2e}
Bulldozer	300	1	6	0.770	0.368	2.047	0.006	0.087	1,189.861	2.08E-03	9.94.E-04	5.53.E-03	1.62.E-05	2.35.E-04	3.21.E+00
Off-Highway Tractor	65	1	6	1.343	0.415	4.077	0.006	0.149	1,183.186	7.86.E-04	2.43.E-04	2.39.E-03	3.51.E-06	8.72.E-05	6.92.E-01
Off-Highway Truck	500	5	6	0.490	0.364	3.516	0.006	0.064	1,183.280	2.21.E-03	1.64.E-03	1.58.E-02	2.70.E-05	2.88.E-04	5.32.E+00
4-stroke ATV	50	6	6	80.861	7.896	0.973	0.003	0.135	533.000	3.65.E-02	3.56.E-03	4.39.E-04	1.35.E-06	6.09.E-05	2.40.E-01
TOTAL EMISSIONS										**0.00507**	**0.00287**	**0.0237**	**0.0000467**	**0.000610**	**9.23**

(1) Emission factors obtained from "Air Emissions Guide for Air Force Mobile Sources," AFCEC, August 2018.

2020	2021	2022	2023	2024
45	45	45	60	60

PM10FD = (20*acre*WD)/2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)

ACRE: Total acres (acres)

WD: Number of Total Work Days (days)

2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: TYNDALL AFB
State: Florida
County(s): Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Tyndall AFB INRMP

- Project Number/s (if applicable):

- Projected Action Start Date: 3 / 2020

- Action Purpose and Need:

- Action Description:
Execution of Tyndall AFB's INRMP.

- Point of Contact
Name: Caitlin Santinelli
Title: Scientist
Organization: Jacobs
Email: caitlin.santinelli@jacobs.com
Phone Number: 314.974.6958

- Activity List:

	Activity Type	Activity Title
2.	Construction / Demolition	Tree Planting - 2020
3.	Construction / Demolition	Tree Planting - 2021
4.	Construction / Demolition	Tree Planting - 2022
5.	Construction / Demolition	Tree Planting - 2023
6.	Construction / Demolition	Tree Planting - 2024
7.	Aircraft	Prescribed Burning - 2020
8.	Aircraft	Prescribed Burning - 2021
9.	Aircraft	Prescribed Burning - 2022
10.	Aircraft	Prescribed Burning - 2023
11.	Aircraft	Prescribed Burning - 2024

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Tree Planting - 2020

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- Activity Description:
Hand planting of trees; 20-man work crew of 6 work trucks and 2 refrigerator trucks

- Activity Start Date
Start Month: 3
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 5
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.229667
SO_x	0.004092
NO_x	1.299892
CO	0.919372
PM 10	0.043773

Pollutant	Total Emissions (TONs)
PM 2.5	0.043759
Pb	0.000000
NH_3	0.000337
CO_2e	411.8

2.1 Trenching/Excavating Phase

2.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 3
Number of Days: 0

2.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Off-Highway Trucks Composite	8	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077
HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

2.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Tree Planting - 2021

- Activity Description:
Hand planting of trees; 20-man work crew of 6 work trucks and 2 refrigerator trucks

- Activity Start Date
Start Month: 3
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 5
End Month: 2021

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- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.218279
SO_x	0.004092
NO_x	1.155748
CO	0.913444
PM 10	0.038469

Pollutant	Total Emissions (TONs)
PM 2.5	0.038455
Pb	0.000000
NH_3	0.000337
CO_2e	411.8

3.1 Trenching/Excavating Phase

3.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 3
Number of Days: 0

3.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Off-Highway Trucks Composite	8	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077
HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

3.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Tree Planting - 2022

- Activity Description:
Hand planting of trees; 20-man work crew of 6 work trucks and 2 refrigerator trucks

- Activity Start Date
Start Month: 3
Start Month: 2022

- Activity End Date
Indefinite: False
End Month: 5
End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.207983
SO_x	0.004092
NO_x	1.029544
CO	0.908920
PM 10	0.033633

Pollutant	Total Emissions (TONs)
PM 2.5	0.033619
Pb	0.000000
NH_3	0.000337
CO_2e	411.8

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4.1 Trenching/Excavating Phase

4.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 3
Number of Days: 0

4.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Off-Highway Trucks Composite	8	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077
HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

4.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Tree Planting - 2023

- Activity Description:
Hand planting of trees; 20-man work crew of 6 work trucks and 2 refrigerator trucks

- Activity Start Date
Start Month: 3
Start Month: 2023

- Activity End Date
Indefinite: False
End Month: 5
End Month: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.198623
SO_x	0.004092
NO_x	0.921436
CO	0.905020
PM 10	0.029421

Pollutant	Total Emissions (TONs)
PM 2.5	0.029407
Pb	0.000000
NH_3	0.000337
CO_2e	411.7

5.1 Trenching/Excavating Phase

5.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2023

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- Phase Duration
Number of Month: 3
Number of Days: 0

5.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Off-Highway Trucks Composite	8	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077
HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

5.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Tree Planting - 2024

- Activity Description:
Hand planting of trees; 20-man work crew of 6 work trucks and 2 refrigerator trucks

- Activity Start Date
Start Month: 3
Start Month: 2024

- Activity End Date
Indefinite: False
End Month: 5
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.190043
SO_x	0.004092
NO_x	0.828772
CO	0.901744
PM 10	0.025521

Pollutant	Total Emissions (TONs)
PM 2.5	0.025507
Pb	0.000000
NH_3	0.000337
CO_2e	411.7

6.1 Trenching/Excavating Phase

6.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2024

- Phase Duration
Number of Month: 3
Number of Days: 0

6.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 0
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings

Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Off-Highway Trucks Composite	8	6

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.578	000.008	000.613	005.086	000.009	000.008		000.034	00391.932
LDGT	000.823	000.010	001.060	008.566	000.010	000.009		000.034	00522.586
HDGV	001.597	000.016	002.785	026.982	000.023	000.020		000.046	00814.010
LDDV	000.216	000.004	000.307	004.001	000.006	000.006		000.008	00402.372
LDDT	000.537	000.006	000.822	008.176	000.008	000.008		000.008	00626.077
HDDV	000.762	000.015	007.639	002.810	000.395	000.363		000.028	01633.017
MC	003.190	000.008	000.648	014.785	000.027	000.024		000.048	00392.026

6.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Prescribed Burning - 2020

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- Activity Description:
Helicopter activity during 2-3 hours of the burn event to monitor prescribed burning activities.

- Activity Start Date
Start Month: 6
Start Year: 2020

- Activity End Date
Indefinite: No
End Month: 6
End Year: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: MC-12W
Engine Model: PT6A-60
Primary Function: General - Turboprop
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	131.43	53.66	1.07	1.89	166.43	1.23	1.11	3234
Approach	339.89	3.31	1.07	4.59	20.86	0.74	0.67	3234
Intermediate	570.64	0.72	1.07	6.69	6.72	0.29	0.26	3234
Military	633.06	0.53	1.07	7.08	5.36	0.26	0.23	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	19 (default)
Takeoff [Military] (mins):	0.5 (default)
Takeoff [After Burn] (mins):	0 (default)
Climb Out [Intermediate] (mins):	2.5 (default)
Approach [Approach] (mins):	4.5 (default)
Taxi/Idle In [Idle] (mins):	7 (default)

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12 (default)
Approach (mins):	27 (default)
Intermediate (mins):	9 (default)
Military (mins):	12 (default)
AfterBurn (mins):	0 (default)

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

7.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Prescribed Burning - 2021

- Activity Description:
Helicopter activity during 2-3 hours of the burn event to monitor prescribed burning activities.

- Activity Start Date
Start Month: 6
Start Year: 2021

- Activity End Date
Indefinite: No
End Month: 6
End Year: 2021

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

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- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: MC-12W
Engine Model: PT6A-60
Primary Function: General - Turboprop
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? Yes
Original Aircraft Name: helicopter
Original Engine Name: unknown

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	131.43	53.66	1.07	1.89	166.43	1.23	1.11	3234
Approach	339.89	3.31	1.07	4.59	20.86	0.74	0.67	3234
Intermediate	570.64	0.72	1.07	6.69	6.72	0.29	0.26	3234
Military	633.06	0.53	1.07	7.08	5.36	0.26	0.23	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 19 (default)
Takeoff [Military] (mins): 0.5 (default)
Takeoff [After Burn] (mins): 0 (default)
Climb Out [Intermediate] (mins): 2.5 (default)
Approach [Approach] (mins): 4.5 (default)
Taxi/Idle In [Idle] (mins): 7 (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12 (default)
Approach (mins):	27 (default)
Intermediate (mins):	9 (default)
Military (mins):	12 (default)
AfterBurn (mins):	0 (default)

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

8.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

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9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Prescribed Burning - 2022

- Activity Description:
Helicopter activity during 2-3 hours of the burn event to monitor prescribed burning activities.

- Activity Start Date
Start Month: 6
Start Year: 2022

- Activity End Date
Indefinite: No
End Month: 6
End Year: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: MC-12W
Engine Model: PT6A-60
Primary Function: General - Turboprop
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? Yes
Original Aircraft Name: helicopter

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Original Engine Name: unknown

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	131.43	53.66	1.07	1.89	166.43	1.23	1.11	3234
Approach	339.89	3.31	1.07	4.59	20.86	0.74	0.67	3234
Intermediate	570.64	0.72	1.07	6.69	6.72	0.29	0.26	3234
Military	633.06	0.53	1.07	7.08	5.36	0.26	0.23	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 19 (default)
Takeoff [Military] (mins): 0.5 (default)
Takeoff [After Burn] (mins): 0 (default)
Climb Out [Intermediate] (mins): 2.5 (default)
Approach [Approach] (mins): 4.5 (default)
Taxi/Idle In [Idle] (mins): 7 (default)

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12 (default)
Approach (mins): 27 (default)
Intermediate (mins): 9 (default)
Military (mins): 12 (default)
AfterBurn (mins): 0 (default)

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

9.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Prescribed Burning - 2023

- Activity Description:
Helicopter activity during 2-3 hours of the burn event to monitor prescribed burning activities.

- Activity Start Date
Start Month: 6
Start Year: 2023

- Activity End Date
Indefinite: No
End Month: 6
End Year: 2023

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: MC-12W
Engine Model: PT6A-60
Primary Function: General - Turboprop
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? Yes
Original Aircraft Name: helicopter
Original Engine Name: unknown

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	131.43	53.66	1.07	1.89	166.43	1.23	1.11	3234
Approach	339.89	3.31	1.07	4.59	20.86	0.74	0.67	3234
Intermediate	570.64	0.72	1.07	6.69	6.72	0.29	0.26	3234
Military	633.06	0.53	1.07	7.08	5.36	0.26	0.23	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	19 (default)
Takeoff [Military] (mins):	0.5 (default)
Takeoff [After Burn] (mins):	0 (default)
Climb Out [Intermediate] (mins):	2.5 (default)
Approach [Approach] (mins):	4.5 (default)
Taxi/Idle In [Idle] (mins):	7 (default)

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12 (default)
Approach (mins):	27 (default)
Intermediate (mins):	9 (default)
Military (mins):	12 (default)
AfterBurn (mins):	0 (default)

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

10.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Prescribed Burning - 2024

- Activity Description:
Helicopter activity during 2-3 hours of the burn event to monitor prescribed burning activities.

- Activity Start Date
Start Month: 6
Start Year: 2024

- Activity End Date
Indefinite: No
End Month: 6
End Year: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
NO_x	0.002256
CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.002309
SO_x	0.000429
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CO	0.009669
PM 10	0.000211

Pollutant	Total Emissions (TONs)
PM 2.5	0.000190
Pb	0.000000
NH_3	0.000000
CO_2e	1.3

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: MC-12W

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Engine Model: PT6A-60
Primary Function: General - Turboprop
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? Yes
Original Aircraft Name: helicopter
Original Engine Name: unknown

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	131.43	53.66	1.07	1.89	166.43	1.23	1.11	3234
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Intermediate	570.64	0.72	1.07	6.69	6.72	0.29	0.26	3234
Military	633.06	0.53	1.07	7.08	5.36	0.26	0.23	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: Yes

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 19 (default)
Takeoff [Military] (mins): 0.5 (default)
Takeoff [After Burn] (mins): 0 (default)
Climb Out [Intermediate] (mins): 2.5 (default)
Approach [Approach] (mins): 4.5 (default)
Taxi/Idle In [Idle] (mins): 7 (default)

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12 (default)
Approach (mins): 27 (default)
Intermediate (mins): 9 (default)
Military (mins): 12 (default)
AfterBurn (mins): 0 (default)

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

11.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

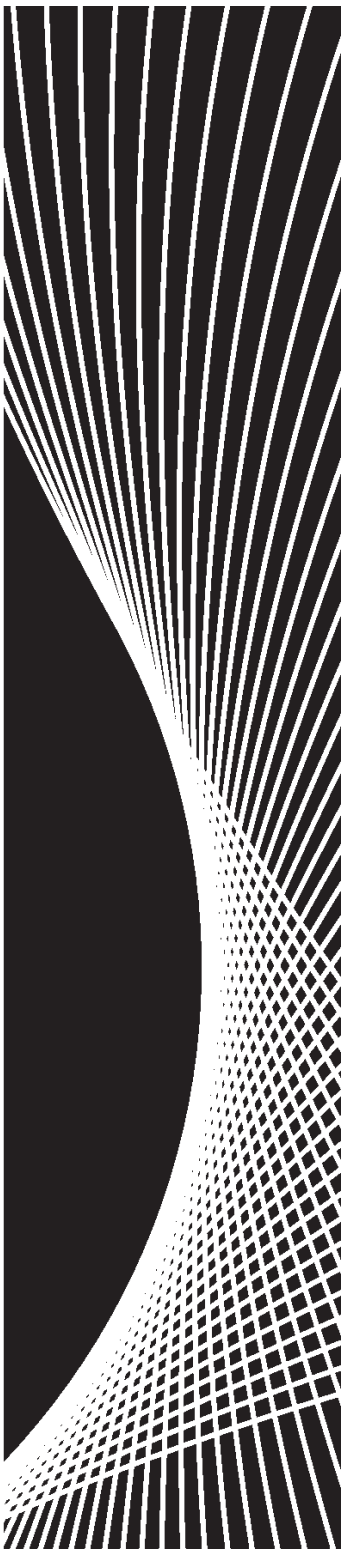
APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

Appendix F
EPA Pesticide Product Labels

Restricted Use Pesticide. Due to toxicity to aquatic invertebrate animals. For retail sale to and use only by Certified Applicators, or persons under their direct supervision, and only for those uses covered by the Certified Applicator's certification.

GROUP	15	INSECTICIDE

Dimilin® 2L



Insect Growth Regulator
Aqueous Flowable

For use on alfalfa, barley, carrot (not grown for seed) , oats, triticale, wheat, citrus, crop group 10-10, cotton, grassland and non-crop areas, leafy brassica and turnip greens, livestock/poultry premises, peach subgroup 12-12B, plum subgroup 12-12C, peanuts, pears, peppers/eggplant, subgroup 8-10B, rice, soybeans, tree nuts, and turfgrass

Not for Homeowner/Residential Use

Net Contents: 1 gallon

COMPOSITION

Active Ingredient: (% by weight)

diflubenzuron
N-[[(4-Chlorophenyl)amino]carbonyl]-2,6-difluorobenzamide*..... 22%
Other Ingredients:..... 78%

TOTAL 100%

*Contains 2 lbs. diflubenzuron per gallon.
*U.S. Patent Number: 6,057,370; and 6,376,430B1 and other patents pending.

EMERGENCY ASSISTANCE: Have the product container or label with you when calling a poison control center or doctor, or going for treatment.
24 HOUR EMERGENCY PHONE:
1-866-928-0789 or 1-215-207-0061

For PRODUCT USE INFORMATION: Call 1-866-761-9397

KEEP OUT OF REACH OF CHILDREN

CAUTION

ACCEPTED
02/04/2016
Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 400-461

EPA REG. NO. 400-461
EPA EST. NO.
068

Manufactured for:
MacDermid Agricultural Solutions, Inc.
245 Freight Street
Waterbury, CT 06702-1818

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
CAUTION

PERSONAL PROTECTIVE EQUIPMENT

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for Category A on an EPA chemical-resistant selection chart.

Applicators and Other Handlers Must Wear: A long-sleeved shirt & long pants; chemical-resistant gloves, such as barrier laminate, nitrile rubber, neoprene rubber, natural rubber, polyethylene, PVC, or viton, when mixing and loading and also when using hand-held equipment; shoes plus socks.

Mixers and Loaders Using Fixed-Wing Aircraft Must Wear: A long-sleeved shirt and long pants; chemical-resistant gloves such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, PVC or viton; shoes plus socks; dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C or a NIOSH approved respirator with any R, P or HE filter).

Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

When handlers use closed systems (including water soluble bags), enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to terrestrial juvenile insects and aquatic invertebrates/mollusks/insects. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. Do not contaminate water when disposing of equipment washwaters or rinsate.

This product may contaminate water through drift of spray in wind. This product has a potential for runoff for several months or more after application. Poorly draining soils and soils with shallow water tables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential for contamination or water from rainfall-runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours. Sound erosion control practices will reduce this product's contribution to surface water contamination.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a foliar application.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in reducing immature bee viability.

DIRECTIONS FOR USE

Restricted Use Pesticide

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- coveralls
- chemical-resistant gloves made of any waterproof material such as polyethylene or polyvinyl chloride.
- shoes plus socks.

INSTRUCTIONS AND INFORMATION

SPRAY DRIFT MANAGEMENT

This product may contaminate water through drift of spray in wind. This product has a potential for runoff for several months or more after application. Poorly draining soils and soils with shallow water tables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential for contamination of water from rainfall-runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours. Sound erosion control practices will reduce this product's contribution to surface water contamination. Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment-and-weather-related factors determine the potential for spray drift. The applicator is responsible for considering all these factors when making decisions. The following drift management requirements must be followed to avoid off-target drift movement from aerial applications to agricultural field crops. These requirements do not apply to ULV applications on grassland and non-crop areas, for the control of grasshoppers and Mormon crickets.

The distance of the outer most nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.

Where states have more stringent regulations, they should be observed.

The applicator should be familiar with and take into account the information covered in the Aerial Drift Reduction Advisory Information

Information on Droplet Size

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see Wind, Temperature and Humidity, and Temperature Inversions).

Controlling Droplet Size

Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.

Select nozzles and pressure that deliver medium spray droplets as indicated in nozzle manufacturer's catalogs and in accordance with ASAE Standard S-572.

- Pressure - Do not exceed the nozzle manufacture's recommended pressures. For many nozzle types lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- Number of nozzles - Use the minimum number of nozzles that provide uniform coverage.
- Nozzle Orientation - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from the horizontal will reduce droplet size and increase drift potential.
- Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid steam nozzles oriented straight back produce the largest droplets and the lowest drift.

Boom Length

For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height

Applications should not be made at a height greater than 10 feet above the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

Swath Adjustment

When applications are made with a cross-wind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for the displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.)

Wind

Drift potential is lowest between wind speed of 2-10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect drift.

Temperature and Humidity

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are hot and dry.

Temperature Inversions

Applications should not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upwards and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas

The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when wind is blowing away from the sensitive areas).

INFORMATION

DIMILIN 2L is an insect growth regulator which is effective on a wide variety of insect pests, predominately from the families Lepidoptera and Diptera. Because of its mode of action, which results in a disruption of the normal molting process of the insect larvae, the action of DIMILIN is slow and several days may elapse before the full effect is seen. Because of its specificity, DIMILIN is an excellent product for use in IPM programs.

RESISTANCE MANAGEMENT: When used as directed DIMILIN 2L provides control of a number of important insect pests as well as providing a margin of safety to beneficial insects and pollinators. DIMILIN 2L should be part of an IPM program that follows good management practices that include:

- Scouting regularly and use DIMILIN 2L against early immature stages for best results.
- Always follow the label rate and timing directions.
- Use chemical alternatives such as oil and preserve beneficial arthropods as part of an IPM program.
- Maintain good coverage of all leaf surfaces with adequate water volume.
- Alternate treatments to classes of insecticides with different modes of action.

USE RESTRICTIONS

- Do not apply this product to bodies of water where swimming is likely to occur.
- **For Carrots:** Do not apply this product to carrots grown for seed.
- **For Field Crops, Row Crops, Orchard Uses, Grassland and Non-Crop Areas:** Do not apply within 25 feet by ground or 150 feet by air of bodies of water such as lakes, reservoirs, rivers, permanent streams, natural ponds, marshes or estuaries. All applications must include a 25 foot vegetative buffer strip within the buffer zone to decrease runoff.
- **RESTRICTIONS ON ROTATIONAL CROPS:** Do not plant food or feed crops in DIMILIN treated soils within 1 month following last application, unless DIMILIN is authorized for use on these crops.

APPLICATION INSTRUCTIONS

USE AND MIXING DIRECTIONS IF USED WITH WATER:

1. Fill tank with half of the required amount of water.
2. Begin agitation and add required amount of DIMILIN 2L.
3. Continue agitation while adding remainder of water.
4. If permitted for the use site, add proper quantity of oil slowly. To avoid formation of an invert emulsion, use at least 2 parts of water for each part of oil.

USE AND MIXING DIRECTIONS IF USED WITHOUT WATER:

Always evaluate any potential mixture for compatibility and sprayability. To ensure thorough mixing of DIMILIN 2L with insecticides or other carriers, premix ingredients in a nurse tank prior to being transferred to aerial or ground ULV application equipment. If nurse tank is not available, or unable to simultaneously mix:

1. Fill tank with the required amount of oil and/or oil based insecticide.
2. Begin agitation and add required amount of DIMILIN 2L.
3. After the contents of the tank have been thoroughly agitated, a volume of carrier sufficient to fill the booms and piping system should be drained and then added back to the tank.

Aerial or ground application: Apply spray with aerial or ground equipment designed or modified to insure full uniform coverage of the entire plant. Adjust equipment to provide droplets with a diameter of 150 to 220 microns. Provide agitation prior to, during, and after blending and while applying.

APPLICATION THROUGH IRRIGATION SYSTEMS - CHEMIGATION

DIMILIN 2L may be applied through properly equipped chemigation systems for insect control in grassland and row crops. Apply this product only through sprinkler (including center pivot, lateral move, end tow, side (wheel) roll, traveler, big gun, solid set, or hand move) irrigation systems. Do not apply this product through any other type of irrigation system.

Crop injury, lack of effectiveness, or illegal pesticide residues in the crop can result from non-uniform distribution of treated water.

In order to calibrate the irrigation system and injector to apply the mixture, determine the following: 1) Calculate the number of acres irrigated by the system; 2) Set the irrigation rate and determine the number of minutes for the system to cover the intended treatment area; 3) Calculate the total gallons of the mixture needed to cover the desired acreage. Divide the total gallons of mixture needed by the number of minutes to cover the treated area. This value equals the gallons per minute that the injector must deliver. Convert the gallons per minute to ounces per minute. Calibrate the injector pump with the system in operation at the desired irrigation rate. It is suggested that the injector pump be calibrated at least twice before operation, and the system be monitored during operation.

If you have questions about calibration, contact State Extension Service specialists, equipment manufacturers, or other experts.

Do not connect an irrigation system (including greenhouse systems) used for pesticide application to a public water system unless the pesticide label-prescribed safety devices for public water systems are in place.

A person knowledgeable of the chemigation system and responsible for its operation or under the supervision of the responsible person, shall shut the system down and make necessary adjustments should the need arise.

CHEMIGATION SYSTEMS CONNECTED TO PUBLIC WATER SYSTEMS

If the chemigation system is connected to a public water supply, the following conditions must also be met:

- Public water systems means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.
- Chemigation systems connected to public water systems must contain a functional reduced-pressure zone, backflow preventer (RPZ) or the functional equivalent in the water supply line upstream from a point of pesticide introduction. As an option to the RPZ, the water from the public water system should be discharged into a reservoir tank prior to pesticide introduction. There shall be a complete physical break (air gap) between the flow outlet end of the fill pipe and the top or overflow rim of the reservoir tank of at least twice the inside diameter of the fill pipe.
- The pesticide injection pipeline must contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shutdown.
- The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops, or in cases where there is no water pump, when the water pressure decreases to the point where pesticide distribution is adversely affected.
- Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.
- The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection.
- Upon completion of insecticide application, remove scale, pesticide residues, and other foreign matter from the supply tank and entire injector system. Flush thoroughly with clean water.
- Do not apply when wind speed favors drift beyond the area intended for treatment.

SPRINKLER CHEMIGATION

For continuously moving systems, the mixture containing DIMILIN 2L must be injected continuously and uniformly into the irrigation water line as the sprinkler is moving. If continuously moving irrigation equipment is used, apply in no more than 0.25 inch of water. For sprinkler systems that do not move during operation, apply in no more than 0.25 inch of irrigation immediately before the end of the irrigation cycle.

Maintain continuous agitation of the pesticide supply tank for the duration of the application period.

To apply a pesticide using sprinkler chemigation, the chemigation system must meet the following specifications:

- The system must contain a functional check valve, vacuum relief valve, and low-pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from backflow.
- The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.
- The pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
- The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.
- The irrigation line or water pump must include a functional pressure switch, which will stop the water pump motor when the water pressure decreases to the point where pesticide distribution is adversely affected.
- Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.
- Do not apply when wind speed favors drift beyond the area intended for treatment.

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
ALFALFA AND ALFALFA GROWN FOR SEED	**ALFALFA RESTRICTIONS:** Do not apply more than 6 fl oz (1.5 ozs a.i.) per acre per season. Do not exceed a total of 2 fl oz per acre per cutting. Do not make more than three applications per year. For use West of the Mississippi River. Preharvest Interval (PHI): Allow at least 1 day after treatment before cutting forage or hay. Allow at least 1 day after the final treatment before harvest of alfalfa seed.		
	Grasshopper Mormon cricket	1 – 2	Apply at early instar stages (majority in the 2nd through 4th instar nymphal stages) of growth. Use a higher rate in the rate range for heavy infestations or advanced growth stage of target pest. Dimilin 2L is not effective in controlling grasshoppers once they reach the adult stage. If a large influx from neighboring fields should occur, the time to reduce that population may not be short enough to maximize extensive foliage feeding; use a tank mix with a knockdown insecticide under these conditions.
	Dilution Rate: Apply Dimilin® 2L as a foliar spray in sufficient water to provide thorough coverage of the foliage. **Aerial Application:** Apply in 2 to 5 gallons total volume per acre **Ground Application:** Apply in 5 to15 gallons of total volume per acre. Adjuvant Usage: The addition of 1 pint per acre of emulsified vegetable or paraffinic crop oil will aid canopy penetration and minimize water evaporation.		
BARLEY OATS TRITICALE WHEAT	**BARLEY, OATS, TRITICALE & WHEAT RESTRICTIONS:** Do not make more than 1 application per season. Do not exceed 4 fl oz (1.0 oz. ai.) per acre per season. Do not apply after boot stage of growth. For Use in The Following States Only: Alaska, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming, Western North & South Dakota and Western Nebraska (West of Route 281 in ND, SD & NE) **Pre-harvest Interval:** Do not harvest grain and straw within 50 days of application. Do not harvest forage within three days of application. Do not harvest hay within 15 days of application.		
	Grasshopper	1 - 2	For best results, apply when the majority of infesting grasshoppers have reached the 2nd to 3rd nymphal stage of development. DIMILIN 2L is not effective in controlling grasshoppers once they reach the adult stage. If a large influx from neighboring fields should occur, the time to reduce that population may not be short enough to minimize extensive foliage feeding; use a tank mix with a knockdown insecticide under these conditions.
	Cereal leaf beetle	4	For best results, apply at first sign of egg laying. Do not apply if infestation has advanced into later instar larvae.
	Aerial Application: Apply in 2 to 5 gallons total volume per acre. **Ground Application:** Apply in 5 to 15 gallons of total volume per acre. Use sufficient application volume to assure adequate coverage. Because of the unique mode of action of DIMILIN 2L, its visible effects on larvae and nymphs may not be seen until 5 to 7 days following application.		

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
CARROT (Not grown for seed)	**CARROT RESTRICTIONS:** Do not apply this product to carrots grown for seed. Do not apply more than 16 fl oz (0.25 lb 4.0 ozs.a.i.) per acre per year. Do not make more than 2 applications per year. Allow a minimum of 7 days between treatments. Pre-harvest Interval: Allow at least 7 days after treatment before harvest		
	Carrot weevil*	8	Apply at first sign of larval infestation.
	Ground application: Apply Dimilin 2L in sufficient water using 20 to 50 gallons of water per acre. *** Not registered for use in California**		
CITRUS FRUIT GROUP 10-10 Australian desert lime; Australian finger-lime; Australian round lime; Brown River finger lime; calamondin; citron; citrus hybrids; grapefruit; Japanese summer grapefruit; kumquat; lemon; lime; Mediterranean mandarin; mount white lime; New Guinea wild lime; orange, sour; orange, sweet; pummelo; Russell River lime; satsuma mandarin; sweet lime; tachibana orange; Tahiti lime; tangelo; tangerine (mandarin); tangor; trifoliate orange; uniq fruit; cultivars, varieties, and/or hybrids of these	**RESTRICTIONS:** **Maximum Dimilin 2L allowed per year:** Do not apply more than 60 fluid ounces (15 oz. ai.) per acre per year. Dimilin 2L may be applied as three full rate applications of 20 fluid ounces per acre per year, or six split applications of 10 fluid ounces per acre per year, or a combination of full and split applications. **Maximum number of applications allowed per year:** three full rate applications or six split applications, not to exceed 60 fluid ounces (15 oz. ai.) per acre per year. **Re-treatment interval:** Repeat applications no closer than 30 days apart, except where split applications are used. See pest specific sections below for split application directions. **Pre-harvest interval:** Do not apply within 7 days of harvest. Do not harvest cover crops for animal feed or graze livestock in treated groves. **Ground Application:** Dimilin 2L may be applied by ground using hand-held, hand gun, air blast or air assisted equipment. Do not apply within 25 feet of bodies of water such as lakes, reservoirs, rivers, permanent streams, natural ponds, marshes or estuaries. **In the State of Florida**, do not apply within 100 feet of estuarine/marine bodies of water. Spray last three rows windward of surface water using nozzles on one side only, with spray directed away from surface water. Avoid spray going over tops of trees by adjusting or turning off top nozzles. Shut off nozzles on the side away from the grove when spraying the outside row. Shut off nozzles when turning at ends of rows and passing tree gaps in rows. **Aerial Application:** Use fixed-wing or rotary equipment. Do not apply within 150 feet of bodies of water such as lakes, reservoirs, rivers, permanent streams, natural ponds, marshes or estuaries. **In the State of Florida**, do not apply within 1000 feet of estuarine/marine bodies of water. **DIRECTIONS FOR USE** **Spray Volumes:** Use sufficient spray volume for thorough coverage of leaf surfaces. For High Volume: Ground = 50 to 1,000 gallons per acre; Aerial = 5 to 20 gallons per acre. For low volume application: Spray nozzles that product a droplet size with a volume median diameter of 90 microns or larger are required (see pest specific sections above). * 1 fl oz Dimilin 2L per acre equals 0.0156 pounds active ingredient per acre		
	Asian Citrus Psyllid (ACP) (Diaphorina citri)	20	Apply 20 fluid ounces of Dimilin 2L per acre when very early-feather leaf flush is present, or oviposition by Asian citrus psyllid (ACP) is expected or seen, or leaf distortion is evident. **Split Application:** Applying split applications of Dimilin 2L will maximize spray coverage of the entire citrus leaf flush. Spray 10 fluid ounces per acre when very early-feather leaf flush is present, or oviposition by ACP is expected or seen, or leaf distortion is evident. Apply the second application of Dimilin 2L at 10 fluid ounces per acre as needed to protect new flushes of growth. Do not apply subsequent applications of Dimilin 2L for at least 30 days. **Low Volume Application:** Except in California, apply in 3.0 to 5.0 gallons of finished spray solution per acre by ground using air-blast or air-assisted spray equipment. **Spray nozzles that produce a droplet size with a volume median diameter of 90 microns or larger are required.** In California, do not apply in a volume of less than 10 gallons per acre. The addition of petroleum spray oil, such as FC435-66, enhances spray coverage and penetration of Dimilin 2L into ACP eggs, nymphs, and adults; improving activity on each life stage. Dimilin 2L's activity on ACP is through contact, ingestion and/or absorption. It has direct activity on eggs and nymphs of ACP. Dimilin 2L prevents eggs from hatching and nymphs from molting when exposed to treated surfaces. Adult female ACP that feed on or contact treated surfaces produce fewer eggs able to hatch. Dimilin 2L reduces the reproductive potential of an existing ACP population**. *Dimilin 2L does not control adult ACP.***.
	Citrus Rust Mite (Phyllocoptruta oleivora)	20	Apply DIMILIN 2L at 20 fluid ounces per acre when citrus rust mites (CRM) are first observed on citrus leaves and/or fruit. Rotate to a product with a different mode of action before reapplying Dimilin 2L in a CRM control program. The addition of petroleum spray oil, such as FC435-66, enhances spray coverage and penetration of Dimilin 2L into immature CRM; improving activity on each stage of instar. Petroleum spray oil also aids knockdown of the CRM population present at application. Dimilin 2L's activity is on immature stages of CRM and has its greatest activity on late-instar CRM. Dimilin 2L prevents immature CRM from molting. The full effect of Dimilin 2L on a CRM population may not be apparent for up to 14 days after application. ***Dimilin 2L does not control CRM eggs or adults***..

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
CITRUS FRUIT GROUP (cont.)	Lepidopterous Miners: Citrus Leafminer (CLM) (Phyllocnistis citrella)	20	Apply 20 fluid ounces of Dimilin 2L per acre when leaf flush is present and the oldest leaf is approximately one-quarter expanded, or when oviposition by citrus leafminer (CLM) is expected or seen, or when leaf mining is evident. **Split Application:** Applying a split application of Dimilin 2L will maximize spray coverage of the entire citrus leaf flush. Spray 10 fluid ounces per acre when leaf flush is present and the oldest leaf is approximately one-quarter expanded, or when oviposition by CLM is expected or seen, or leaf mining is evident. Apply the second application of Dimilin 2L at 10 fluid ounces per acre as needed to protect new flushes of growth. Do not apply subsequent applications of Dimilin 2L for at least 30 days. **Low Volume Application:** Apply in 3.0 to 5.0 gallons of finished spray solution per acre by ground using air-blast or air-assisted spray equipment. **Spray nozzles that produce a droplet size with a volume median diameter of 90 microns or larger are required.** In California, do not apply in a volume of less than 10 gallons per acre. The addition of petroleum spray oil, such as FC435-66, enhances spray coverage and penetration of Dimilin 2L into CLM mines, eggs, larvae, and pupae; improving activity on each life stage. Dimilin 2L's activity on CLM is through contact, ingestion and/or absorption. It has direct activity on eggs, larvae and pupae of CLM by preventing eggs from hatching, larvae from molting, and moths from emerging from pupae exposed to treated surfaces. Dimilin 2L reduces the reproductive potential of an existing CLM population. ***Dimilin 2L does not control CLM moths***.
	Lepidopterous Miners: Citrus Peel Miner (CPM) (Marmara spp.)	20	Apply 20 fluid ounces of Dimilin 2L per acre when oviposition on citrus peel surfaces by citrus peel miner (CPM) is expected or seen. **Split Application:** Applying a split application of Dimilin 2L will maximize spray coverage of the fruit surface. Spray 10 fluid ounces per acre when peelminer oviposition begins. Apply the second application of Dimilin 2L at 10 fluid ounces per acre as needed to protect expanded fruit growth. Do not apply subsequent applications of Dimilin 2L for at least 30 days. The addition of petroleum spray oil, such as FC435-66, enhances spray coverage and penetration of Dimilin 2L into CPM eggs; improving activity on this life stage. Dimilin 2L's activity on CPM is through absorption into eggs. It prevents eggs from hatching. Protection from fruit damage by CPM larvae may last up to several weeks. CPM larval control will lessen over time as new, unprotected tissue develops as a result of fruit expansion. ***Dimilin 2L does not control CPM moths.***
	Citrus Root Weevil Complex: West Indian Sugarcane Rootstalk Borer Weevil (Diaprepes abbreviatus), Southern Blue-green Citrus Root Weevil (Pachnaeus litus) Blue-green Citrus Weevil (Pachnaeus opalus) Fuller Rose Beetle (Asynonychus godmani, Little Leaf Notcher (Artipus floridanus)	20	Apply 20 fluid ounces of Dimilin 2L per acre to citrus leaf flush when the oldest leaf is approximately one-half expanded, or when adult citrus root weevils (CRW) are seen, or recent leaf feeding is evident. The addition of petroleum spray oil, such as FC435-66, enhances coverage and penetration of Dimilin 2L into adult CRW and eggs; improving activity on each life stage. Petroleum spray oil also reduces the attachment of CRW egg masses to citrus leaf surfaces. Dimilin 2L's activity is through contact, ingestion, and/or absorption. It has direct activity on eggs laid on treated surfaces by preventing them from hatching. Adult female CRW that feed on or contact treated surfaces produce fewer eggs able to hatch. Dimilin 2L reduces the reproductive potential of citrus root weevil populations. ***Dimilin 2L does not control adult citrus root weevils.***
	Katydids Grasshoppers	20	Apply 20 fluid ounces of DIMILIN 2L per acre when katydids or grasshoppers are first observed or recent leaf and/or fruit feeding is seen. **Split Application:** Applying a split application of Dimilin 2L may be useful in maximizing spray coverage and protection of fruit and leaves from katydid and/or grasshopper damage. Spray 10 fluid ounce per acre when katydids and/or grasshoppers are first observed, or recent leaf and/or fruit feeding is seen. Apply the second application of Dimilin 2L at 10 fluid ounces per acre as needed to protect new growth. Do not apply subsequent applications of Dimilin 2L for at least 30 days. The addition of petroleum spray oil, such as FC435-66, enhances spray coverage and penetration of Dimilin 2L into katydid and grasshopper eggs, nymphs, and adults; improving activity on each life stage. Dimilin 2L's activity on katydids and grasshoppers is through contact, ingestion, and/or absorption. It has direct activity on eggs and nymphs by preventing eggs from hatching and nymphs from molting. Adult female katydids and grasshoppers that feed on or contact treated surfaces produce fewer eggs able to hatch. Dimilin 2L reduces the reproductive potential of an existing katydid and/or grasshopper population**.** ***Dimilin 2L does not control adult katydids or grasshoppers.***
Dimilin 2L may be applied to citrus during any time of the year, but will have greatest impact on the largest spectrum of pests when new flush is emerging and/or present.			

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
COTTONSEED SUBGROUP 20C Cultivars, varieties and/or hybrids of these	**COTTON RESTRICTIONS:** Do not exceed 6 applications per season. Do not exceed 24 fl oz (6 ozs. ai.) per acre per year. Do not exceed 3 applications and 12 fl oz (3 ozs.ai) per acre per year post boll opening. **Pre-harvest Interval:** Do not harvest within 14 days of application.		
	Beet armyworm -early season before first bloom	2 - 4	For early infestations on young cotton, apply DIMILIN 2L at the first sign of beet armyworm activity (2 egg masses or hatch outs/100 feet of row) in multiple applications, either as directed or broadcast spray. Use on a 5 to 7 day interval until 8 fl oz per acre have been applied. Multiple applications of DIMILIN 2L will provide acceptable beet armyworm control and because it has little activity on beneficial insects (parasites and predators) and has good persistence, will help prevent populations of beet armyworm from building up later in the growing season. Use of DIMILIN 2L in this way allows for more complete coverage of new foliage during the period of rapid vegetative growth.
	Beet armyworm - mid season	4 - 8	Apply starting around first bloom and through mid-bloom. Repeat application until up to 8 fl oz per acre have been applied, using a 5 to 7 day interval between applications. Use higher application rate on larger cotton and/or under conditions of greater larval pressure. Apply first application to coincide with peak beet armyworm moth catches in pheromone traps, indicating another generation of larvae is imminent. DIMILIN 2L is more effective on early stages of larval development, therefore treat cotton leaves before populations become established.
	Beet armyworm - late season	6 - 8	Apply after mid-bloom and prior to 14 days before harvest. Use higher application rate on larger cotton and/or under conditions of greater larval pressure. Coincide application with peak beet armyworm moth catches in pheromone traps. Additional applications may be needed if larval pressure continues.
	Fall armyworm Yellowstriped armyworm Southern armyworm Suppression only: Soybean looper Cabbage looper Saltmarsh caterpillar	4-8	Apply during early stages of larval development. Repeat application until at least 8 fl oz per acre have been applied using a 5 to 7 day interval.
	Boll weevil - early season (before first bloom)	4 - 8	DIMILIN 2L will control boll weevil by suppressing reproduction. Apply with 2 to 4 qt of emulsified cottonseed oil, vegetable oil, or paraffinic crop oil. A compatibility agent may be needed if a non-emulsified cotton-seed oil is used. Consult your supplier or company representative for oil specifications. For best suppression of boll weevil reproduction, make first application at pinhead square stage of cotton growth when overwintering boll weevils are entering the fields. Repeat applications must allow a minimum of 7 days between applications. DIMILIN 2L does not kill the adult boll weevil, however, eggs deposited by affected female weevils will not hatch, thus limiting reproduction. The control of egg hatch and larval development within the square prevents its shedding and will then allow normal boll development. After the initial treatment of the female weevil, 7 to 10 days are required before non-hatching eggs are laid; however, once affected, non-hatching eggs will be laid for approximately 10 days, and longer if the female encounters more DIMILIN 2L. Thus treat early and use multiple applications.
	Boll weevil	2 - 4	DIMILIN 2L will reduce the number of weevils that emerge in the following spring if applications are made when adult weevils are going into diapuase to overwinter. Apply when cotton plant has reached full vegetative growth or when it begins blooming out the top. For LV application spray in combination with 2 to 4 qt of an emulsifiable vegetable or paraffinic oil per acre. A compatibility agent may be needed if a non-emulsified cottonseed oil is used. Apply at least 2, but not more than 3, applications at 7 to 14 day intervals.

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
COTTONSEED SUBGROUP 20C (cont.)	Grasshopper	2	Apply when the majority of infesting grasshoppers have reached the 2nd to 3rd nymphal stage of development. DIMILIN 2L is not effective in controlling grasshoppers once they reach the adult stage. If a large influx from neighboring fields should occur, the time to reduce that population may not be short enough to minimize extensive foliage feeding; use a tank mix with a knockdown insecticide under these conditions.
	Aerial application: Apply in 3 to 5 gallons total volume per acre. **Ground application:** Apply in 10 to 20 gallons of total volume per acre. **Adjuvant usage:** Always use oil (1 to 2 qt) with DIMILIN 2L for larval/nymphal control if conditions are favorable for water evaporation (e.g. high air temperature and/or low humidity). For ground or aerial LV application, use 1 pt to 2 qt of emulsified vegetable or paraffinic crop oil to enhance canopy penetration and to reduce spray droplet evaporation and subsequent drift. A compatibility agent may be needed if non-emulsified cottonseed oil is used. Consult your supplier or company representative for oil specifications. Use sufficient application volume to assure adequate coverage. DIMILIN 2L may be mixed with other insecticides being applied for other cotton insects. When emulsifiable concentrate insecticide formulations are used with oil and DIMILIN 2L in tank mixes, they may result in phytotoxicity. Care must be taken where such mixture is used. Because of the unique mode of action of DIMILIN 2L, its visible effects on larvae/nymphs may not be seen for 5 to 7 days following application.		
GRASSLAND (includes rangeland, pastures, improved pastures and similar areas used for production of native, domesticated forage grasses for harvest for livestock primarily for grazing or mechanical harvest, grasses/forages grown for biofuel, biomass or bioenergy production)	**GRASSLAND RESTRICTIONS:** Do not exceed a total of 2 fl oz (0.5 ozs. ai.) per acre per cutting. Do not exceed a total of 6 fl. oz. (1.5 ozs. ai.) per acre per year. Allow at least 1 day after treatment before cutting grass. Apply only when the potential for drift to adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when wind is blowing away from the sensitive areas).		
	Grasshopper	1 - 2	Use 1 application on early instar (majority in the 2nd through 4th instar nymphal stages); use high rate for pastureland.
	Mormon cricket	0.75 - 1	Use on rangeland only, in a RAATs (Reduced Area and Agent Treatment) application on early instars. A RAATs application is an IPM strategy that takes advantage of grasshopper movement and conservation biological, control to allow DIMILIN 2L to be applied on rangeland on a reduced treated area and at reduced rates, while sustaining acceptable control. RAATs may provide ranchers with an economic means to reduce competition by these insects on their rangeland, depending on insect age and plant canopy. Using this program DIMILIN 2L may be applied on as little as 50% of the infested acreage (e.g. skipping a 100 ft swath for every 100 ft treated), up to 100% infested acreage. The rate range to use per acre and amount of area treated will depend on grasshopper/Mormon cricket age, plant canopy and topography. Skip up to 50% of the infested area and use the lower rate under uniform topography with early instar ages and sparse vegetation. If the majority of the population is late instars, vegetation is dense, terrain is considered rough, and conditions are hot during treatment, increase the coverage and rate of DIMILIN 2L up to a blanket (100%) coverage with 1 fl oz per acre.
		0.5 - 1	If a second application is made, typically apply 2 to 3 weeks after the first application.
	Lepidopteran foliage feeding caterpillars such as: Fall armyworm Striped grass looper	2	For maximum control use DIMILIN 2L at first sign of hatch outs and prior to larvae reaching fourth instars (<1/2 inch). DIMILIN 2L must be ingested and larvae must molt before populations are reduced.
	Horn fly Face fly	2	Apply Dimilin 2L for the control of Horn fly and face fly emergence from cattle manure patties for two weeks or longer.
	Apply Dimilin 2L at 2 fl oz/acre to biofuel, biomass, or bioenergy grown grasses/forages/cellulosic crops (such as switchgrass, miscanthus sp., etc.) for control of Lepidopteran foliage feeding caterpillars (armyworms, grass looper, etc.), grasshoppers, or Mormon crickets. **Aerial application:** For low/high volume application, apply in 2 to 10 gallons of water per acre. For rangeland ULV application, apply in a minimum of 12 fl. ozs. total volume per acre. **Ground application:** For low/high volume application, apply in 2 to 30 gallons of water per acre. For rangeland ULV application, apply in a minimum of 12 fl. ozs. total volume per acre. Regardless of application type, total spray volume used must ensure thorough coverage of the target crop. For aerial and ULV spray mixtures include an evaporation/drift retardant product at use rates prescribed on the specific product label, particularly when conditions are favorable for water evaporation (e.g., high air temperature and/or low humidity). When using oil type evaporation/drift retardant products, be sure to maintain a ratio of at least 2 parts water to 1 part oil. For low volume and ULV applications, make sure that the spray mixture in the boom contains the correct concentration of Dimilin 2L before application begins, and be sure that good agitation is maintained throughout mixing and application. Higher listed rates and gallonages are suggested for areas with dense vegetation, when nymphs are beyond the 3rd instar stage, and when climatic conditions are favorable for grasshopper/Mormon cricket survival and increase. Apply anytime after eggs begin to hatch through early instars. DIMILIN 2L remains active on the foliage and will continue to control larvae and grasshoppers/Mormon crickets that hatch later in the season. DIMILIN 2L is not effective in controlling larvae and grasshoppers/Mormon crickets once they have reached the adult stage. Since it is an insect growth regulator, effects may not be seen until these insects have molted at least once. If adult grasshoppers/Mormon crickets from early hatching and/or overwintering species are present, tank-mix DIMILIN 2L with a registered adulticide to control later hatching species. Check mixing compatibility and sprayability prior to transferring to the main spray tank. Besides a fatal incomplete molting, adult grasshoppers/Mormon crickets may exhibit missing posterior legs, hernias, abdominal segments malformed, twisted antennae, hemolymph exudation, and wrinkled wings. Additionally, they may move slower, have limited jumps and unsteady landings, show a reduction in feeding, have atrophy of posterior legs or be unable to fl y. Any nymph/adult possessing these symptoms is likely more susceptible to predatory insects, birds and mammals.		

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
LEAFY BRASSICA SUBGROUP 5B_ includes: Broccoli raab Cabbage Chinese (bok choy) Collards Kale Mizuna Mustard greens Mustard spinach Rape greens Turnip greens	**LEAFY BRASSICA RESTRICTIONS:** Do not make more than 4 applications per season. Do not exceed 16 fl oz (4 ozs. ai.) per acre per year. Do not use on turnip cultivars or varieties which produce a harvestable root. **Pre-harvest Interval:** Do not harvest within 7 days of application.		
	Grasshopper	2 - 4	Apply to grasshoppers in the 2nd to 3rd nymphal stage of development. Reapply in 7 day intervals if nymphal hatchout/crop reinfestation continues. DIMILIN 2L is not effective in controlling grasshoppers once they reach the adult stage. Use the higher listed rate in the range if the area has a history of heavy infestations, dense foliage is present, or greater residual control is desired. If a large influx from neighboring fields should occur, the time to reduce that population may not be short enough to minimize extensive foliage feeding; use a tank mix with a knockdown insecticide under these conditions.
	Ground Application: Use a minimum of 30 gallons of water per acre to give uniform coverage. Additional applications allow for more complete coverage of newly expanding foliage. Since DIMILIN 2L is an insect growth regulator, larvae and nymphs must ingest treated plant material and then molt before populations are reduced. Thus initial signs of control may not be seen until 5 to 7 days after treatment.		
LIVESTOCK / POULTRY PREMISES includes: - Litter - Stale / waste feed - Manure - Manure / straw mixtures - Feed muck / spoilage - Spoiled organic refuse - Bedding material - Floors - Walls / wall footings - Posts - Cage frames - Ceilings	**RESTRICTIONS:** Do not apply directly to livestock or poultry. Do not contaminate feed or water through application- cover or remove exposed feed and water from the area to be treated. Band and broadcast applications (for indoor use only) - Apply only once per production cycle at a rate not to exceed 520 fl. ozs. per year. Spot treatment applications - For outdoor use, do not apply more than7.5 fl. ozs. per acre per application and do not exceed 17 applications per year. For indoor use, do not apply more than 520 fl. ozs. per acre per year. Manure and process wastewater shall not be applied closer than 100 feet to any down gradient surface waters, open tile line intake structures, sinkholes, agricultural or domestic well heads, or other conduits to surface waters, unless a 35-foot wide vegetated buffer or physical barrier is substituted for the 100-foot setback or alternative conservation practices or field-specific conditions will provide pollutant reductions equivalent or better than the reductions achieved by the 100-foot setback.		
	Carrion Beetle Darkling Beetle Hide Beetle	12 fl . ozs./ 1000 ft. 2 in 2 - 20 gals. water per 1000 ft. 2	**Broadcast Application:** Apply as a whole house broadcast spray to the litter following de-caking, as well as to floors, walls, posts, cage frames, and cracks and crevices around insulation. When treating the litter, pay particular attention to areas under feed and water lines. Apply in sufficient volume to uniformly and thoroughly wet the litter and other surfaces- spray volume will vary depending on the depth of litter being treated.
			Band Application: When the whole house is not being treated, application can be made to areas where pests are concentrated, such as under feed and water lines, as well as along perimeter walls and side / end walks. Apply in sufficient volume to thoroughly wet litter following de-caking in a 2-4 foot wide band under and next to these areas- spray volume will vary depending on depth of litter. Lower sections of walls, posts and cage frames should also be treated at least 1 foot up from the floor.
	House fly Stable fly Face Fly Horn Fly	12 fl. ozs./ 1000 ft.^{2} in 2 - 20 gals. water per 1000 ft.^{2}	**Broadcast Application:** Apply as a whole house broadcast spray or spot treatment to the litter between production cycles following clean out or de-caking, as well as to floors, walls, posts, cage frames and ceilings. When treating the litter, pay particular attention to moist areas under feed and water lines. Apply in sufficient volume to uniformly and thoroughly wet the litter and other surfaces- spray volume will vary depending on the depth of litter being treated.
		7.5 fl. ozs. in 15 gals. water	**Spot Treatments:** Apply as a directed spray at a volume of 1 quart of spray solution to 10 sq. ft. of surface area. 15 gallons of spray solution will treat 600 sq. ft. Begin applications when flies first appear. Additional applications may be made at 3 week intervals as needed, if adult fly numbers begin to increase, typically at 2- 3 week intervals. For spot treatment in poultry houses, make applications only between production cycles, and not while birds are in the houses.
	Livestock / poultry operations includes farms, farm buildings, barns, feedlots, dairies, equine facilities, poultry houses, and other production facilities. Application sites within these operations also include fence lines of holding pens, feed troughs, feed bunks, hay bale feeders, water troughs; and marginal areas of waste retention ponds. For insect control around hay feeding sites, treat the entire area where manure and waste hay are mixed at the soil surface by livestock activity. DIMILIN 2L will not control adult or pupal stages, but does provide extended control of eggs and developing larvae. Exposure to adults, however, through contact or ingestion, does impact their reproductive potential, resulting in reduced numbers and viability of eggs. If a large adult population already exists at the time treatment is to be made, application with a knockdown insecticide either alone or in a tank mix with DIMILIN 2L may be desirable to achieve rapid reduction of that population.		
NON-CROP AREAS [includes field border, fence rows, roadsides, farmsteads, ditchbanks, wasteland, Conservation Reserve Program CRP Land]	**NON-CROP AREA RESTRICTIONS:** See Grassland section for restrictions.		
	Grasshopper Mormon cricket	2	Apply DIMILIN 2L to manage these insects in their breeding areas before they move into cropland. See Grassland section for timing of application.
	Lepidopteran foliage feeding caterpillars such as: Fall Armyworms Striped Grass Looper	2	For maximum control use DIMILIN 2L at first sign of hatch outs and prior to larvae reaching fourth instars (<1/2 inch). DIMILIN 2L must be ingested and larvae must molt before populations are reduced.
	Aerial application: See **Aerial application** section of Grassland **Ground application:** See **Ground application** section of Grassland.		

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
PEACH SUBGROUP 12-12B includes: nectarine and peach and cultivars, varieties and hybrids of these. PLUM SUBGROUP 12-12C includes: apricot Japanese apricot Chinese jujube plum American plum Beach plum Canada plum cherry plum Chickasaw plum Damson plum, Japanese plum Klamath plum plum prune plumcot sloe cultivars, varieties and hybrids of these	**PEACH AND PLUM RESTRICTIONS:** Do not make more than two applications per calendar year Do not apply more than 32 fl oz (0.5 lb a.i.) of Dimilin 2L per acre per season. Allow at least 14 days between applications. **Pre-Harvest Interval:** Allow at least 14 days after treatment before harvest.		
	Peach twig borer	12 - 16	Apply Dimilin 2L at a rate 12 to 16 fl oz/acre (0.1875 lb a.i. to 0.25 lb a.i./acre). Two applications can be made with a 14 day interval between applications. **Dormant/delayed dormant:** Apply DIMILIN 2L with 4 to 6 gallons per acre (1.5 to 2.0 gallons per 100 gallons in a dilute spray) narrow range oil. Always use the higher listed rate of DIMILIN 2L if the crop has a history of heavy infestations. **Bloom to Harvest:** Apply starting at early bloom. Vegetable oil may be used during bloom at the rate of 1 qt per acre. Always use the higher listed rate in the range if the crop has a history of heavy infestations.
	Fall webworm Filbert leafroller Oblique banded leafroller Omniverous leafroller Omniverous leaftier Oriental fruit moth Redhumped caterpillar Variegated leafroller Walnut caterpillar Winter moth Codling moth* Katydids* Plum cucurlio*	8 - 16	Apply Dimilin 2L at a rate of 8 to 16 fl oz/acre (0.125 lb a.i. to 0.25 lb a.i/acre). Two applications can be made with a 14 day interval between applications. Apply Dimilin 2L at first sign of larval infestation. Use the higher listed rate for longer residual control, higher pest infestations, low crop load, larger trees or heavy, dense foliage. For adult control of plum cuculio, tank mix with an adulticide.
	Ground applications must be made in sufficient water for thorough coverage, using at least 50 gallons per acre for small trees (10 feet tall) and at least 100 gallons per acre for larger trees. Using insufficient water for thorough coverage and/or using an uneven spray pattern across the canopy will likely result in less than desired efficacy. Adjuvant: Crop oil at a rate of 0.25% v/v may be included in the tank mixture.		
PEANUTS	**PEANUT RESTRICTIONS:** Do not make more than 3 applications per season. Do not exceed 24 fl oz (6 ozs. ai.) per acre per year. **Pre-harvest Interval:** Do not harvest within 28 days of application.		
	Velvet bean caterpillar Mexican bean beetle Green cloverworm	2 - 4	Make applications when larvae are small (< 0.5 inches) to give greater control and minimum insect damage to leaves. Repeat application if damaging numbers reappear. The minimum reapplication interval is 14 days. Use the higher listed rate in the range if the crop has a history of heavy infestations, dense foliage is present, or greater residual control is desired.
	Armyworms, such as: Beet armyworm Fall armyworm Southern armyworm Yellow-striped armyworm Lesser cornstalk borer Soybean looper (suppression)	4 - 8	
	Grasshopper	2	For best results, apply when the majority of infesting grasshoppers have reached the 2nd to 3rd nymphal stage of development. DIMILIN 2L is not effective in controlling grasshoppers once they reach the adult stage. If a large influx from neighboring fields should occur, the time to reduce that population may not be short enough to minimize extensive foliage feeding. Use a tank mix with a knockdown insecticide under these conditions.
	Aerial Application: Apply in sufficient water (3 to 5 gallons per acre) to achieve uniform coverage of foliage. **Ground Application:** Apply in 9 to 35 gallons of water per acre to give uniform coverage. **Adjuvant Usage:** See Cotton section. Since Dimilin 2L is an insect growth regulator, larvae/nymphs must ingest treated plant material and then molt before populations are reduced. Thus initial signs of control may not be seen until 5 to 7 days after treatment.		

*Not registered for use in California

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
PEAR	**PEAR RESTRICTIONS:** Do not apply more than 4 applications per year. Do not apply more than 64 fl oz (16 ozs. ai.) per acre per year. **Pre-harvest Interval:** Do not harvest within 14 days of application. Do not use oil in tank mix in late season treatments (3rd and 4th applications).		
	Pear psylla (pre-bloom)	40 - 48	Apply in 80 to 400 gallons of water per acre during the delayed dormant to the popcorn stage period. Complete uniform coverage of the tree is essential to achieve insect control. A horticultural mineral oil should be used at a rate of 4 to 6 gallons per acre during the delayed dormant period. After this period and through the popcorn stage, apply oil at a concentration of 0.25%, but use no more than 1 gallon per acre. A surfactant may be used to improve coverage. Follow manufacturer's label specifications. DIMILIN 2L should be applied during egg deposition so that it will come in contact with pear psylla eggs and/or 1st and 2nd instar nymphs.
	Pear psylla (post-bloom)	12 - 16	Applications at normal codling moth rates and timings will provide suppression of pear psylla.
	Pear rust mite (pre-bloom)	40 - 48	Apply in 80 to 400 gallons of water per acre from delayed dormant to the popcorn stage. See 'Pear psylla (pre-bloom)' for the use of oil.
	Codling moth	12 - 16	Apply in a minimum of 80 gallons of water per acre. Use the lower rate where there is light codling moth pressure and/or on small trees. Complete coverage of the fruit and foliage in all areas of the trees is essential for insect control. Timing of application is extremely important because DIMILIN 2L controls codling moth by prohibiting the hatching of eggs. It must be applied prior to egg laying so that eggs are laid on treated plant parts. Apply first application as soon as possible after first moths are caught (biofix) or observed, or about 50-75 degree-days after biofix. This timing can be determined by your local pest control consultant and/or fruit specialist with the aid of pheromone traps. Normally this timing occurs at late petal fall or about 10-14 days earlier than the timing used for organophosphate insecticides. Apply second application about 14-18 days after the first. If necessary, apply third and fourth application, timed prior to egg laying of the 2nd generation by using the same method as for the 1st generation. If traps are not used, make the 3rd application 21-30 days after the second, followed by the 4th application 21-30 days later. If a degree-day model is used the 3rd spray should be timed at 1000 degree-days after biofix. Combination with organophosphates for codling moth control: DIMILIN 2L can be used in combination with an organophosphate insecticide, to save a trip through the orchard and to make timing of the DIMILIN 2L sprays easier. The combination is more effective than DIMILIN 2L alone when controlling moderate to heavy codling moth infestations and/or treating large trees. The combination will provide residual control of eggs laid after application. Apply DIMILIN 2L and the organophosphates at their labeled rates. Apply at the beginning of egg hatch of 1st generation codling moth. This is the normal timing for the first organophosphate cover spray (250 degree-days following biofix for 1st generation and 1250 degree days for the 2nd generation). This program can be repeated for the 2nd or 3rd generation of codling moth or use DIMILIN 2L alone prior to egg laying. Do not use oil in tank mix with DIMILIN 2L in late season treatments. With light codling moth populations, as indicated by monitoring, this combination may offer control of an entire generation with 1 application. When populations are heavy, this combination will improve control, but it may not control an entire generation with one spray. A second spray of DIMILIN 2L alone or in combination may be applied 14-18 days later.
	Leafminer	8 - 16	Apply in a minimum of 80 gallons of water just prior or during egg laying to control eggs and larvae. Timing for control of the 1st or 2nd generation can be determined by your local pest control consultant or fruit specialist. Should later generations of leafminers occur, apply DIMILIN 2L in the same manner. It is desirable to have DIMILIN 2L in place at the time of egg laying. It will continue to give control through the early sap feeding stage. Complete coverage of the foliage is essential to achieve control of the larvae through the early sap feeding stage.
	Oil may cause injury to certain pear varieties. Check compatibility of oil mixtures with your local tree fruit specialist.		
PEPPER/ EGGPLANT SUBGROUP 8-10B includes: African eggplant; bell pepper; eggplant; martynia; nonbell pepper; okra; pea eggplant; pepino; roselle; scarlet eggplant; cultivars, varieties, and/or hybrids of these	**PEPPER RESTRICTIONS:** Up to five applications per growing season may be made, but do not exceed 24 fl oz. (6 ozs. ai.) per acre, per season. Allow a minimum of seven days between any two applications. **Pre-harvest interval:** Do not apply within seven days of harvest.		
	Beet armyworm Fall armyworm Southern armyworm and other foliage feeding Lepidopteran insects	4 - 8	Make initial application of 4 to 8 fl oz. DIMILIN 2L per acre when larvae are small to give greater control and minimum damage to leaves and/or to fruit. Use a higher listed rate if being applied alone and/or infestation is considered heavy. A knockdown tank-mix partner should be used if late instar larvae are present. Use a minimum of 30 gallons of water per acre to give uniform coverage. Additional applications allow for more complete coverage of new foliage and expanding fruit.
	Pepper weevil	4 - 8	Apply DIMILIN 2L at 4 to 8 fl oz. per acre starting at initial flowering. Use at the higher listed rate if adult infestation is considered moderate to heavy. Apply additional applications at 7 day intervals up to 7 days before harvest. Additional applications allow for more complete coverage of new foliage and expanding fruit. Note that DIMILIN 2L will not control adults; however eggs laid by adults will exhibit reduced hatching in fruits once adults have consumed or contacted residues of DIMILIN 2L on pepper tissue.
	Aerial application: Apply in sufficient water (3 to 10 gallons per acre) to achieve uniform coverage of foliage. **Ground application**: Use a minimum of 30 gallons of water per acre to give uniform coverage. **Adjuvant Usage:** See Cotton Section. Since DIMILIN 2L is an insect growth regulator, larvae and nymphs must ingest treated plant material and then molt before populations are reduced. Thus initial signs of control may not be seen until 5 to 7 days after treatment.		

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
RICE	**RICE RESTRICTIONS:** Do not exceed 16 fl. ozs. (4 ozs.ai.) per acre per year. **Pre-harvest Interval:** Do not harvest within 80 days of application. Do not use on rice fields in which crayfish (crawfish) farming is included in the cultural practice. Do not drain treated water into fields where crayfish farming is intended Do not apply to rice immediately adjacent to sites of crayfish aquaculture. Do not use treated rice flood waters for irrigated crops except for uses currently established for Dimilin 2L. Do not impregnate on granular materials. Do not use on wild rice *(Zizania spp.)*.		
	Rice water weevil (Southern U.S. Rice Belt) -for drill seeded; dry seeded; or water seeded, delayed flood rice	12 - 16	Make a single application of DIMILIN 2L per acre per year to control larvae when adult infestations reach economic threshold and/or at initial oviposition, usually within a time frame of 2-5 days after permanent flood establishment. If adult weevil infestations are historically high and/or migration into the field is prolonged, use the higher listed application rate.
	Rice water weevil (Southern U.S. Rice Belt) water seeded, pinpoint flood, or continuous flood rice	8 + 8	To control larvae, apply split applications. Apply 8 fl oz per acre after the permanent flood when adult infestations reach economic threshold and/or at initial oviposition, usually when rice leaves are exposed above the water surface. The 2nd 8 fl oz treatment must be made 5-7 days after the 1st application. Failure to make the second application within the above time frame could result in inadequate control of rice water weevil larvae, especially if adult infestations are high and/or migration into the field is prolonged.
	Rice water weevil (California)	8 - 16	To control larvae apply DIMILIN 2L once per year at initiation of oviposition by adults. During a typical year this coincides with 2 to 8 days after rice emergence above the water. Target the application for 2 to 5 days after rice emergence above the water (2 to 4 leaf stage). Use 12 to 16 fl oz DIMILIN 2L if infestations have been historically high.
	Consult your local extension service for determination of economic threshold and/or determination of oviposition. Dimilin 2L does not appear to control adult weevils. It controls rice water weevil by preventing larval emergence from the egg. Eggs laid under the surface of treated water are controlled. Additionally, adults feeding on treated plant surfaces do not lay viable eggs. Apply DIMILIN 2L by air using at least 5 gallons total volume per acre. Do not apply DIMILIN 2L if flooding is in progress. Activity will be reduced. Since DIMILIN 2L is water active, the entire field must be treated. For maximum activity of DIMILIN 2L do not disturb flood after a single application for at least 7 days. With split applications in water seeded, pinpoint or continuous flood rice, flood must not be disturbed for a minimum of 4 days following the 1st treatment and 7 days following the 2nd application. Hold treated water at least 14 days to allow for dissipation of DIMILIN 2L. DIMILIN 2L is not phytotoxic to rice. DIMILIN 2L can be safely applied in combination with post permanent flood herbicides such as FACET®, GRANDSTAND® and LONDAX®. However, before using a tank-mix combination, read each product label carefully and follow Precautionary Statements on each label. ®Facet is a registered trademark of BASF AG; ®Grandstand is a registered trademark of Dow AgroSciences; ®Londax is a registered trademark of E.I. DuPont de Nemours and Company.		
SOYBEAN (Except California)	**SOYBEAN RESTRICTIONS:** Use on soybeans not registered by the California Department of Pesticide Regulation. Do not make more than 2 applications per season. Do not exceed 8 fl.ozs. (2 ozs. ai.) per acre per year. **Pre-Harvest Interval:** Do not harvest within 21 days of application.		
	Velvet bean caterpillar Mexican bean beetle Green cloverworm	2-4	Make applications when larvae are small (< 0.5 inches) to give greater control and minimum insect damage to leaves. Repeat application if damaging numbers reappear. The minimum reapplication interval is 30 days. DIMILIN 2L may be applied at the lower rate (2 fl oz) to prevent velvetbean caterpillar build-up when the vegetative growth of soybeans is completed and as pod formation begins. Consult local Extension Service regarding infestation levels requiring treatment.
	Beet armyworm Fall armyworm Soybean looper (suppression)	4	Application must be made when worms are small before populations build.
	Grasshopper	2	Apply when the majority of infesting grasshoppers have reached the 2nd to 3rd nymphal stage of development. DIMILIN 2L is not effective in controlling grasshoppers once they reach the adult stage. If a large influx from neighboring fields should occur, the time to reduce that population may not be short enough to minimize extensive foliage feeding; use a tank mix with a knockdown insecticide under these conditions.
	Aerial application: apply in sufficient water (3 to 5 gallons per acre) to achieve uniform coverage of foliage. **Ground application:** apply in 9 to 35 gallons of water per acre to give uniform coverage. **Adjuvant usage:** See Cotton Section. Since DIMILIN 2L is an insect growth regulator, larvae/nymphs must feed on it and then molt before populations are reduced. Thus initial signs of control may not be seen until several days after treatment. **Soybean yield enhancement:** In the absence of significant insect pressure and under certain growing conditions, an increase in soybean seed yield has been demonstrated with DIMILIN 2L under field conditions on both determinate and indeterminate cultivars. Application of 2 to 4 fl oz per acre to high yield potential soybean plants at the R3 to R3.5 growth stage period has been more consistent in increasing yields than applications at other reproductive stages of the soybean plant. This reproductive period represents beginning pod growth (pod 3/16 inch long at one of the uppermost nodes on the main stem with a fully developed leaf) to just prior to full pod elongation (pod 3/4 inch long at one of the 4 uppermost nodes on the main stem with a fully developed leaf).		

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
TREE NUTS GROUP 14-12 includes: African tree nut Almond Beech nut Brazil nut Butternut Brazilian pine Bunya Bur oak Cajou nut Candlenut Cashew Chestnut Chinquapin Coconut Coquito nut Dika nut Filbert (hazelnut) Ginkgo Guiana chestnut Heartnut Hickory nut Japanese horse chestnut Macadamia nut (bush nut) Mongongo nut Pecan Pistachio Sapucaia nut Tropical almond Walnut (black & English) Yellowhorn Cultivars, varieties, and/or hybrids of these	**TREE NUT RESTRICTIONS:** Do not exceed 4 (3 for walnuts) applications. Do not exceed 64 fl. oz. (16 ozs. ai.) per acre per growing season. **Pre-harvest Interval:** Do not harvest within 28 days of application.		
	Codling moth	16	DIMILIN 2L is most effective when applied prior to egg laying. DIMILIN 2L must be present on the surface upon which eggs are laid; therefore, full coverage spray is necessary. Apply first application when moth flights begin or when moths are found in pheromone traps. Apply the 2nd application approximately 21 days after the 1st application. For control of the 2nd brood, application should be timed prior to egg laying, similar to 1st brood. Because of fluctuations in temperature, the emergence and moth flights of the over-wintering population may be extended over a long period of time. Under such circumstances, DIMILIN 2L should be tank mixed with an organophosphate insecticide at its lowest label rate. This tank mix should be applied at normal 1st organophosphate timing. Later in the season, if egg laying has already occurred before application of DIMILIN 2L, tank mix DIMILIN 2L with an organophosphate as previously described.
	Filbert worm	12 - 16	The lower rate may be used where filbert worm pressure is low and/or the trees are small. The higher listed rate is necessary when worm pressure is moderate to high and/or the trees are large. Apply DIMILIN 2L 2 to 3 days after the 1st moth is caught in pheromone detection traps. Mating takes place within several days of emergence and egg laying begins the next day. DIMILIN 2L must be applied prior to egg deposition on the treated foliage. Good uniform coverage of the tree is essential to achieve optimum control of filbert worm with DIMILIN 2L. Normally DIMILIN 2L will give season long control. If moth pressure remains high, additional applications should be made.
	Hickory shuckworm	8 - 16	Apply split applications of DIMILIN 2L at 4 to 8 fl. oz. per acre when hickory shuckworm moth emergence begins or larval feeding is detected and then again two weeks later for maximum nut protection and hickory shuckworm control. Apply DIMILIN 2L starting at half-shell hardening. Make subsequent applications at 21-day intervals to shuck split, or while nuts are susceptible to hickory shuckworm under heavy infestations. Use the higher listed rate under higher pest infestations, low crop load, larger trees or heavy, dense foliage.
	Peach twig borer	12 - 16	**Dormant/delayed dormant:** Apply DIMILIN 2L at the rate of 12 to 16 fl oz per acre with 4 to 8 gallons per acre (1.5 to 2.0 gallons per 100 gallons in a dilute spray) narrow range oil. Always use the higher listed rate of DIMILIN 2L in the rate range if the crop has a history of heavy infestations. **Bloom:** Apply DIMILIN 2L at the rate of 12 to 16 fl oz per acre starting at early bloom. Always use the higher listed rate of DIMILIN 2L in the rate range if the crop has a history of heavy infestations. **Spring flight ("May Spray"):** Using pheromone traps to determine flight activity, apply DIMILIN 2L at the rate of 16 fl oz per acre at initial flight activity. **Summer flight:** Using pheromone traps to determine flight activity, apply DIMILIN 2L at the rate of 16 fl oz per acre at initial flight activity.
	Pecan nut casebearer	8 - 16	Apply split applications of DIMILIN 2L at 4-8 fl. oz. per acre beginning at bud break and then again two weeks later for maximum nut set and pecan nut case bearer control. Normal timing in southeastern US would be from mid-April for bud break and then two weeks later (early May). Apply DIMILIN 2L in split applications at the initiation of each adult generation to target egg hatch. Note for the 1st generation this is approximately 8 to 15 days following the first prolonged moth catch (biofix which is defined as the date on which the total of 5 moths are captured in 3 pheromone traps within a 7-day period). States may have a different recommendation for initiation of spraying; please consult authorities such as county and university extension specialists on current recommendations. Use the higher listed rate for longer residual control, higher pest infestations, low crop load, larger trees or heavy, dense foliage.
	Pecan weevil (suppression)	8 - 16	Use the higher listed rate if weevils are attacking fruit and for higher infestations.
	Others, including: Fall webworm Filbert leafroller Oblique banded leafroller Omniverous leafroller Omniverous leaftier Oriental fruit moth Redhumped caterpillar Variegated leafroller Walnut caterpillar Winter moth	8 - 16	Apply DIMILIN 2L at the first sign of larval infestations. Use the higher listed rate for longer residual control, higher pest infestations, low crop load, larger trees or heavy, dense foliage.
	Apply ground applications in sufficient water for thorough coverage, using at least 50 gallons per acre for small trees (10 feet tall) and at least 100 to 300 gallons per acre for larger trees. Using insufficient water for thorough coverage and/or using an uneven spray pattern across the canopy will likely result in less than desired efficacy. If 4 applications are used, application timing should correspond to dormant to pre-bud swell, bloom to petal fall, and at leaves/immature nut fruit formation and at hull split.		

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
TURFGRASS (For use in sod farms only)	**Turfgrass Restrictions:** Do not exceed a total of 4 applications per year. Do not exceed 8 fl. ozs. (2 ozs.ai.) per acre per year.		
	Lepidopteran foliage feeding caterpillars such as: Sod webworm Armyworms, including: Fall, True, Southern, Beet, Yellow-striped, Striped Grass Looper, Granulate Cutworm	2	Apply Dimilin 2L at first sign of hatchouts and prior to larvae reaching 4th instars (>1/2 inch). Apply in 20 to 50 gallons of water per acre depending on density of turf and caterpillar pressure. Dimilin 2L must be ingested and larvae must molt before populations are reduced. Repeat applications at 14 day intervals or as needed to protect new foliage growth.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.
PESTICIDE STORAGE - Store in original container only.
PESTICIDE DISPOSAL - Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.
CONTAINER HANDLING
Plastic containers: Nonrefillable container. Do not reuse or refill this container. Triple rinse or pressure rinse (or equivalent) promptly after emptying.
Triple rinse as follows: For containers small enough to shake: Empty the remaining contents into a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and then recap. Shake for 10 seconds. Pour rinsate into a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.
For containers too large to shake: Empty remaining contents into a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Empty the rinsate into a mix tank or store for later use or disposal. Repeat this procedure two more times.
Pressure rinse as follows: Empty the remaining contents into a mix tank and continue to drain for 10 seconds after the flow continues to drip. Hold container upside down over mix tank to collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container and rinse about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.
Then offer container for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, by incineration or if allowed by State and local authorities, by burning. If burned, stay out of smoke.
Recycling: Once cleaned, some agricultural plastic pesticide containers can be taken to a container collection site or picked up for recycling. To find the nearest site, contact your chemical dealer or manufacturer or contact the Ag Container Recycling Council (ACRC) at 1-877-952-2272 (toll free) or www.acrecycle.org.

IMPORTANT NOTICE—To the extent consistent with applicable law, seller warrants that this product conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with the directions and instructions specified on the label under normal conditions of use, but neither this warranty nor any other warranty of merchantability or fitness for a particular purpose, express or implied, extends to the use of this product, contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and the buyer assumes the risk of any such use.

Restricted Use Pesticide. Due to toxicity to aquatic invertebrate animals.
For retail sale to and use by Certified Applicators, or persons under their direct supervision, and only for those uses covered by the Certified Applicator's. certification.

SUPPLEMENTAL LABEL

This supplemental label expires on February 4, 2019 and must not be used or distributed after this date.

Dimilin® 2L

Insect Growth Regulator

EPA Reg. No. 400-461

For Use on alfalfa, carrot (not grown for seed), peach subgroup 12-12B, plum subgroup 12-12C, peppers/eggplant subgroup 8-10B

Active Ingredients: (% by weight)	
diflubenzuron	
N-[[(4-Chlorophenyl)amino]carbonyl]-2,6-difluorobenzamide*	22%
Other Ingredients:	78%
TOTAL	100%

*Contains 2 lbs. diflubenzuron per gallon.
*U.S. Patent Number: 6,057,370; and 6,376,430B1 and other patents pending.

KEEP OUT OF REACH OF CHILDREN

CAUTION

THIS LABEL IS IN ADDITION TO THE STANDARD FEDERAL LABEL ON THE CONTAINER

Follow all applicable directions, restrictions and precautions on this supplemental labeling and the main EPA registered label. It is a violation of Federal law to use this product in a manner inconsistent with its labeling. This label and the federal label for this product must be in the possession of the user at the time of the pesticide application.

Read the label affixed to the container for Dimilin2L, EPA Reg. No. 400-461, before applying. Use of Dimilin 2L according to this labeling is subject to the use precautions and limitations imposed on the label affixed to the container for Dimilin 2L, EPA Reg. No. 400-461.

Manufactured for:
MacDermid Agricultural Solutions, Inc.
245 Freight Street
Waterbury, CT 06702-1818

ENVIRONMENTAL HAZARDS

This pesticide is toxic to terrestrial juvenile insects and aquatic invertebrates/mollusks/insects. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. Do not contaminate water when disposing of equipment washwaters or rinsate.

This product may contaminate water through drift of spray in wind. This product has a potential for runoff for several months or more after application. Poorly draining soils and soils with shallow water tables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential for contamination or water from rainfall-runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours. Sound erosion control practices will reduce this product's contribution to surface water contamination.

Bees and other insect pollinators can be exposed to this pesticide from:

• Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications

• Ingestion of residues in nectar and pollen when the pesticide is applied as a foliar application.

When Using This Product Take Steps To:

• Minimize exposure of this product to bees.

• Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in reducing immature bee viability.

DIRECTIONS FOR USE

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
ALFALFA AND ALFALFA GROWN FOR SEED	**ALFALFA RESTRICTIONS:** Do not apply more than 6 fl oz (1.5 ozs a.i.) per acre per season. Do not exceed a total of 2 fl oz per acre per cutting. Do not make more than three applications per year. For use West of the Mississippi River. Preharvest Interval (PHI): Allow at least 1 day after treatment before cutting forage or hay. Allow at least 1 day after the final treatment before harvest of alfalfa seed.		
	Grasshopper Mormon cricket	1 – 2	Apply at early instar stages (majority in the 2nd through 4th instar nymphal stages) of growth. Use a higher rate in the rate range for heavy infestations or advanced growth stage of target pest. Dimilin 2L is not effective in controlling grasshoppers once they reach the adult stage. If a large influx from neighboring fields should occur, the time to reduce that population may not be short enough to maximize extensive foliage feeding; use a tank mix with a knockdown insecticide under these conditions.
	Dilution Rate: Apply Dimilin® 2L as a foliar spray in sufficient water to provide thorough coverage of the foliage. **Aerial Application:** Apply in 2 to 5 gallons total volume per acre. **Ground Application:** Apply in 5 to15 gallons of total volume per acre. Adjuvant Usage: The addition of 1 pint per acre of emulsified vegetable or paraffinic crop oil will aid canopy penetration and minimize water evaporation.		
CARROT* (NOT GROWN FOR SEED)	**CARROT RESTRICTIONS:** Do not apply this product to carrots grown for seed. Do not apply more than 16 fl oz (0.25 lb 4.0 ozs.a.i.) per acre per year. Do not make more than 2 applications per year. Allow a minimum of 7 days between treatments. Pre-harvest Interval: Allow at least 7 days after treatment before harvest.		
	Carrot weevil*	8	Apply at first sign of larval infestation.
	Ground application: Apply Dimilin 2L in sufficient water using 20 to 50 gallons of water per acre. ***** Not registered for use in California		

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
PEACH SUBGROUP 12-12B INCLUDES: nectarine and peach and cultivars, varieties and hybrids of these. Plum subgroup 12-12C includes: apricot Japanese apricot Chinese jujube plum American plum Beach plum Canada plum cherry plum Chickasaw plum Damson plum, Japanese plum Klamath plum plum prune plumcot sloe cultivars, varieties and hybrids of these	**PEACH AND PLUM RESTRICTIONS:** Do not make more than two applications per calendar year Do not apply more than 32 fl oz (0.5 lb a.i.) of Dimilin 2L per acre per season. Allow at least 14 days between applications. **Pre-Harvest Interval:** Allow at least 14 days after treatment before harvest.		
	Peach twig borer	12 - 16	Apply Dimilin 2L at a rate 12 to 16 fl oz/acre (0.1875 lb a.i. to 0.25 lb a.i./acre). Two applications can be made with a 14 day interval between applications. **Dormant/delayed dormant:** Apply DIMILIN 2L with 4 to 6 gallons per acre (1.5 to 2.0 gallons per 100 gallons in a dilute spray) narrow range oil. Always use the higher listed rate of DIMILIN 2L if the crop has a history of heavy infestations. **Bloom to Harvest:** Apply starting at early bloom. Vegetable oil may be used during bloom at the rate of 1 qt per acre. Always use the higher listed rate in the range if the crop has a history of heavy infestations.
	Fall webworm Filbert leafroller Oblique banded leafroller Omniverous leafroller Omniverous leaftier Oriental fruit moth Redhumped caterpillar Variegated leafroller Walnut caterpillar Winter moth Codling moth* Katydids* Plum curculio*	8 - 16	Apply Dimilin 2L at a rate of 8 to 16 fl oz/acre (0.125 lb a.i. to 0.25 lb a.i/acre). Two applications can be made with a 14 day interval between applications. Apply Dimilin 2L at first sign of larval infestation. Use the higher listed rate for longer residual control, higher pest infestations, low crop load, larger trees or heavy, dense foliage. For adult control of plum curculio, tank mix with an adulticide.
	Ground applications must be made in sufficient water for thorough coverage, using at least 50 gallons per acre for small trees (10 feet tall) and at least 100 gallons per acre for larger trees. Using insufficient water for thorough coverage and/or using an uneven spray pattern across the canopy will likely result in less than desired efficacy. Adjuvant: Crop oil at a rate of 0.25% v/v may be included in the tank mixture. *Not registered for use in California		

The Pepper/Eggplant Subgroup 8-10B includes the following crops:

Crops	Pests	Application Rate (fl oz/acre)	Application Timing
PEPPER/ EGGPLANT SUBGROUP 8-10B includes: African eggplant; bell pepper; eggplant; martynia; nonbell pepper; okra; pea eggplant; pepino; roselle; scarlet eggplant; cultivars, varieties, and/or hybrids of these	**PEPPER RESTRICTIONS:** Up to five applications per growing season may be made, but do not exceed 24 fl oz. (6 ozs. ai.) per acre, per season. Allow a minimum of seven days between any two applications. **Pre-harvest interval:** Do not apply within seven days of harvest.		
	Beet armyworm Fall armyworm Southern armyworm and other foliage feeding Lepidopteran insects	4 - 8	Make initial application of 4 to 8 fl oz. Dimilin 2L per acre when larvae are small to give greater control and minimum damage to leaves and/or to fruit. Use a higher listed rate if being applied alone and/or infestation is considered heavy. A knockdown tank-mix partner should be used if late instar larvae are present. Use a minimum of 30 gallons of water per acre to give uniform coverage. Additional applications allow for more complete coverage of new foliage and expanding fruit.
	Pepper weevil	4 - 8	Apply Dimilin 2L at 4 to 8 fl oz. per acre starting at initial flowering. Use at the higher listed rate if adult infestation is considered moderate to heavy. Apply additional applications at 7 day intervals up to 7 days before harvest. Additional applications allow for more complete coverage of new foliage and expanding fruit. Note that Dimilin 2L will not control adults; however eggs laid by adults will exhibit reduced hatching in fruits once adults have consumed or contacted residues of Dimilin 2L on pepper tissue.
	Aerial application: Apply in sufficient water (3 to 10 gallons per acre) to achieve uniform coverage of foliage. **Ground application**: Use a minimum of 30 gallons of water per acre to give uniform coverage. **Adjuvant Usage:** See Cotton Section. Since DIMILIN 2L is an insect growth regulator, larvae and nymphs must ingest treated plant material and then molt before populations are reduced. Thus initial signs of control may not be seen until 5 to 7 days after treatment.		

RESTRICTED USE PESTICIDE

Toxic to fish and aquatic organisms.

For retail sale to and use only by certified applicators, or persons under their direct supervision and only for the uses covered by the certified applicator's certification.

Bifenthrin 2EC

ACTIVE INGREDIENT:	**By Wt.**
Bifenthrin: (2 methyl[1,1'-biphenyl]-3-yl) methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2, 2-dimethyl-cyclopropanecarboxylate*	25.1%
OTHER INGREDIENTS:**	74.9%
Total	100.0%

* Cis isomers 97% minimum, trans isomers 3% maximum.
** Contains xylene range aromatic solvents.

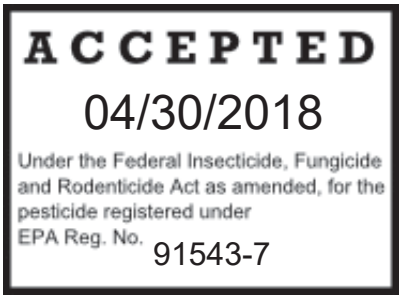
Bifenthrin 2EC contains 2 pounds active ingredient per gallon.

KEEP OUT OF REACH OF CHILDREN
WARNING -- AVISO

See other/side/back panels for additional precautionary information.
This label must be in possession of the user at the time of application.

Si usted, no entiende, la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

EPA Reg. No. 91543- **EPA Est. No.**



Manufactured for:

Champion Crop Care
P.O. Box 1502
Madison, MS 39130

Net Contents: 1 gallon
Batch Code:

FIRST AID

· **If Swallowed:** Immediately call a poison control center or doctor. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give **any** liquid to the person. Do not give anything by mouth to an unconscious person.

· **If Inhaled:** Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

· **If in Eyes:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

· **If on Skin or Clothing:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

HOTLINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact: 1-800-222-1222 for emergency medical treatment information.

Note to Physician: Bifenthrin 2EC is a pyrethroid. If large amounts have been ingested, the stomach and intestines should be evacuated. Treatment is symptomatic and supportive. Digestible fats, oils, or alcohol may increase absorption and so should be avoided. Contains petroleum distillate – vomiting may cause aspiration pneumonia.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

Warning: May be fatal if swallowed. Harmful if inhaled, or absorbed through skin. Causes moderate eye irritation. Avoid breathing vapor or spray mist. Avoid contact with skin, eyes or clothing.

Personal Protective Equipment (PPE):

Some materials that are chemical-resistant to Bifenthrin 2EC are listed below. If you want more options, follow the instructions for category E on an EPA chemical resistance category selection chart.

Handlers who may be exposed to the dilute through application or other tasks must wear: long-sleeved shirt and long pants, chemical-resistant gloves, such as barrier laminate or nitrile rubber or Neoprene rubber or Viton, and shoes plus socks.

Handlers who may be exposed to the concentrate through mixing, loading, application or other tasks must wear: long-sleeved shirt and long pants, chemical-resistant gloves, such as Barrier Laminate or Nitrile Rubber or Neoprene Rubber or Viton, shoes plus socks, and protective eyewear.

Care of PPE: Discard clothing and other absorbent materials that have been drenched or heavily contaminated with Bifenthrin 2EC concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations

Users should:

Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Environmental Hazards

This pesticide is extremely toxic to fish and aquatic invertebrates. Use with care when applying in areas adjacent to any body of water. Do not apply directly to water, to areas where surface water is present or to

intertidal areas below the mean high-water mark. Do not make applications when weather conditions favor drift from treated areas. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment wash waters.

Bifenthrin 2EC is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply Bifenthrin 2EC or allow it to drift to blooming crops or weeds while bees are foraging the treatment area.

The use of bifenthrin is prohibited in areas that may result in exposure of endangered species to bifenthrin. Prior to use in a particular county, contact the local extension service for procedures and precautions to use to protect endangered species.

Physical/Chemical Hazards
Do not use or store near heat or open flame.

DIRECTIONS FOR USE
Restricted Use Pesticide
It is a violation of Federal law to use Bifenthrin 2EC in a manner inconsistent with its labeling.

APPLICATION INSTRUCTIONS

The application rate of Bifenthrin 2EC will vary according to pest pressure and timing of applications. Under light to moderate infestations, use lower rates. Under heavy insect pressure and mite infestations, use higher rates. Generally, higher rates are required for arid climates.

Cultivation within 10 feet of a water body is prohibited to allow for the growth of a vegetated filter strip.

In New York State, Bifenthrin 2EC may not be applied within 100 feet (using ground equipment) to 300 feet (using aerial equipment) of coastal marshes or steams that drain into coastal marshes.

Resistance Management: When pesticide products are used repeatedly for control, some pests are known to develop resistance to these products. Pesticide resistance cannot be forecasted and therefore, use Bifenthrin 2EC in conjunction with resistance management plans established for the region. For more information on resistance management plans, consult your local or state agricultural authorities.

Resistance may be to blame if you experience poor performance and it cannot be attributed to improper application or extreme weather conditions. Immediately consult your local or State agricultural extension specialists if you experience difficulty with control of pests for the best alternative method of controlling pests for your region.

Do not apply Bifenthrin 2EC in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use Bifenthrin 2EC only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of Bifenthrin 2EC that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is: Coveralls, Chemical-resistant gloves, such as Barrier Laminate or Nitrile Rubber or Neoprene Rubber or Viton, and Shoes plus socks.

Chemigation

Only use sprinkler irrigation systems including center pivot, lateral move, end tow, side (wheel) roll, traveler, big gun, solid set, or hand move systems. Other types of irrigation systems are prohibited. Connecting an irrigation system (including greenhouse systems) used for pesticide application to a public water system is prohibited.

It is recommended that at least 0.75 inch of water per acre be used for Low Energy Precision Application (LEPA) irrigation. Use 1 to 2 pints per acre when using non-emulsified oils as the diluent.

Improper set-up and calibration of equipment can effect control results and may cause crop injury, lack of effectiveness, or illegal residues in the crop if there is non-uniform distribution of treated water. To obtain effective results, contact your state agricultural extension specialists, equipment manufacturers or other experts to check that equipment is set-up correctly.

Undesirable residues to adjacent areas may result if a mechanical stoppage occurs and application is not stopped. Therefore, the system must be shut down and necessary adjustments be made, by a responsible person who is knowledgeable, or under supervision of a responsible person, of the chemigation system, . To prevent contamination of water sources from backflow, the system must contain a working check valve, vacuum relief valve, and low pressure drain appropriately located on the irrigation pipeline.

To prevent backflow of fluid toward the injection pump, the pesticide injection pipeline must contain a functional, automatic, quick-closing check valve.

To prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down, the pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock .

To automatically shut off the pesticide injection pump when the water pump motor stops, the system must contain functional interlocking controls.

To stop the water pump motor when the water pressure decreases to the point where pesticide distribution is adversely affected, the irrigation line or water pump must include a functional pressure switch.

A metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock must be used.

If wind speed favors drift beyond the intended area, do not make applications. See "Spray Drift Precautions" for more information on reducing drift.

Continuously apply Bifenthrin 2EC for the duration of the water application. Dilute Bifenthrin 2EC in sufficient volume to ensure accurate application over the application area. Use a minimum of 0.5 inch per acre of irrigation water when using chemigation. Although agitation generally is not required when a suitable diluent is used, perform a diluent test to ensure that phase separation will not occur during dilution and application. Undesirable residues or undesireable control may result if a uniform dilution throughout the time of application is not achieved.

Rotational Crops
If crops have a Bifenthrin tolerance, they may be rotated at any time. There is a 30-day (following the final Bifenthrin application) crop rotation for all other crops.

Tank-Mixture
Tank mixtures using Bifenthrin 2EC with other products approved for use on registered crops may be applied. All restrictions and precautions which appear on the product labels must be observed. Perform a jar compatibility test to ensure mixture will stay in solution.

Spray Drift Precautions
Properly maintain and calibrate all aerial and ground application equipment using appropriate carriers.

OBSERVE THE FOLLOWING PRECAUTIONS WHEN SPRAYING IN THE VICINITY OF AQUATIC AREAS SUCH AS LAKES, RESERVOIRS, RIVERS, PERMANENT STREAMS, MARSHES, OR NATURAL PONDS; ESTUARIES AND COMMERCIAL FISH FARM PONDS.

Do not apply by ground equipment within 25 feet, or by air within 150 feet of lakes; reservoirs, rivers, permanent streams, marshes or natural ponds, estuaries, and commercial fish farm pond. When ultra low volume (ULV) application is made in cotton, increase the buffer zone to 450 feet. ***Use of ultra low volume (ULV) application on corn and hops is prohibited***.

For aerial applications, the spray boom should be mounted on the aircraft so as to minimize drift caused by wingtip or rotor vortices. The minimum practical boom length should be used and must not exceed 75% of wing span or rotor diameter.

Droplet Size: Use the largest droplet size consistent with good pest control. Minimize the formation of very small droplets by selecting the appropriate nozzle, by orienting nozzles away from the air stream as much as possible, and by avoiding excessive pressure from the spray boom.

Spray should be released at the lowest height consistent with pest control and flight safety. Applications more than 10 feet above the crop canopy should be avoided.

Wind: Make aerial or ground applications when the wind velocity favors on target product deposition (approximately 3 to 10 mph). Do not apply when wind velocity exceeds 15 mph. Avoid applications when wind gusts approach 15 mph.

Risk of exposure to sensitive aquatic areas can be reduced by avoiding applications when wind direction is toward the aquatic area.

Do not cultivate within 10 feet of the aquatic area so as to allow growth of a vegetative filter strip.

Humidity: Low humidity and high temperatures increase the evaporation rate of spray droplets and therefore the likelihood of increased spray draft to aquatic areas. Avoid spraying during conditions of low humidity and/or high temperature.

Temperature Inversions: Do not make aerial or ground applications during temperature inversions. Do not make aerial or ground applications to corn if heavy rainfall is imminent. Inversions are characterized by stable air and increasing temperatures with height above the ground. Mist or fog may indicate the presence of an inversion in humid areas. The applicator may detect the presence of an inversion by producing smoke and observing a smoke layer near the ground surface.

ARTICHOKE

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Artichoke Plume Moth Cribrate Weevil	0.10	6.4

DIRECTIONS

Applications should be made when pest population reaches damaging thresholds.

Ground Applications: Make applications as a full cover spray in a minimum of 75 gallons of finished spray per acre.

Air Applications: Make applications at specified rate in a minimum of 10 gallons per acre.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.5 lb ai/ A/ season.

Spray interval: To maintain control, repeat applications as necessary but not more than at 15-day intervals.

Preharvest interval: 5 days.

BRASSICAS

Head and Stem Brassica Vegetables including Broccoli, Brussels sprouts, Cabbage, Cauliflower, Cavalo broccoli, Chinese broccoli (gai lon, white flowering broccoli), Chinese cabbage (napa), Chinese mustard cabbage (gai choy), Kohlrabi

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Armyworms Corn Earworm Crickets Cucumber Beetles Cutworms Diamondback Moth Flea Beetles Ground Beetles Imported Cabbageworm Leafhoppers Loopers Tobacco Budworm Saltmarsh Caterpillar Stink Bugs Thrips Whitefly Wireworm (adults)	0.033 – 0.10	2.1 – 6.4
Banks Grass Mite Carmine Mite Lygus spp Pacific Spider Mite Two-spotted Spider Mite	0.08 – 0.10	5.12 – 6.4

DIRECTIONS

Ground applications: Make applications in a minimum of 10 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 2 gallons of finished spray per acre. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.5 lb ai/A/ season (1 quart as formulated). More than 5 applications after bloom are prohibited.

Spray interval: Applications made less than 7 days apart are prohibited.

Preharvest interval: 7 days.

CANEBERRIES

Including Blackberries, Bingleberries, Dewberries, Lowberries, Marionberries, Olallieberries, Youngberries, Loganberries, Raspberries

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Leafrollers Orange Tortrix Root Weevils	0.05 – 0.10	3.2 – 6.4
Raspberry Crown Borer* Spider Mites	0.10	6.4

DIRECTIONS

Ground Application: Apply by ground equipment using sufficient water to obtain full coverage of foliage in a minimum of 50 gallons per acre.

Air Application: Apply using sufficient water to obtain full coverage of foliage in a minimum of 10 gallons per acre.

***Raspberry Crown Borer:** During post-harvest (fall) or pre-bloom (spring), apply as a drench spray directed at the crown of plants at a rate of 0.1 lb ai/a in a minimum of 200 gallon water/acre. The use of increase in water, up to 400 gallons per acre, has demonstrated increased control. Making both pre-bloom foliar and pre-bloom drench applications are prohibited.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.2 lb ai/ A/ season.

Spray interval: Applications may be made once at pre-bloom and may be made again at post-bloom.

Preharvest interval: 3 days.

CANOLA, CRAMBE, RAPESEED

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Armyworms Cutworms Diamondback Moth Flea Beetle Flea Hopper Grasshopper Loopers Other Lepidopterous Larvae Plant Bug Seedpod Weevil Stink Bugs Thrips Whitefly	0.033 – 0.04	2.1 – 2.6

DIRECTIONS

Ground applications: Make applications in a minimum of 10 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 2 gallons of finished spray per acre. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.08 ai/ A/ season (5.12 oz formulated).

Spray interval: Applications made less than 14 days apart are prohibited.

Preharvest interval: 35 days.

CITRUS 1 – FOR USE IN FLORIDA ONLY (See Citrus for other areas)

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Blue Green Citrus Root Weevil (*Pachnaeus litus*) Brown Leaf Notcher (*Epicaerus mexicanus*) Diaprepes Root Weevil (*Diaprepes abbreviatus*) Little Leaf Notcher (*Artipus floridanus*) Southern Blue Green Citrus Root Weevil (*Pachnaeus opalus*)	0.25 – 0.5	16 – 32
Asian Cockroach (*Blattella asahinae*) Fireant (*Solenopsis spp.*)	0.1 – 0.25	6.4 – 16

DIRECTIONS

Do not apply by air.

Ground application: Bifenthrin 2EC can only be applied as a ground application. Make applications at the specified rate in a minimum of 40 gallons of finished spray per acre. Do not apply through irrigation systems.

Use ground equipment to apply to bare soil beneath citrus trees. Make applications in a minimum of 40 gallons of dilute spray per acre from the trunk to the drip line of the tree, ensuring it is applied uniformly. Using an increase in spray volume should provide uniform coverage in addition to pre- and post- application irrigation.

Do not allow Bifenthrin 2EC to contact fruit or foliage.

Diaprepes and other citrus root weevil: Bifenthrin 2EC provides a barrier protecting citrus tree roots from Diaprepes and other citrus root weevil. When newly hatched larvae (neonates) fall to the soil surface, they come in contact with Bifenthrin 2EC when they attempted to burrow into the root zone. Therefore, minimize disturbing treated soil to prevent disrupting the treated barrier.

Timing of applications of Bifenthrin 2EC is crucial and should be made prior to drop of the neonates. Application timing can be predicted by observing the emergence of adults and by trapping throughout the emergence period (from spring and summer). Emergence varies seasonally and by growing region and environmental factors. After the emerging, adults will lay eggs for 8 to 10 weeks and larval invasion of the soil will begin 2-3 weeks following adult emergence. Contact local or state extension specialists for additional information on the timing of applications.

In conjunction with good cultural practices, biological control of larvae and other methods, Bifenthrin 2EC is an effective tool in an integrated pest management program for citrus root weevils. Contact local or state extension specialists for ways to protect citrus from pests including citrus root weevils using integrated pest management plan.

RESTRICTIONS

Maximum annual use rate: Do not apply more than a total of 0.5 lb ai/ A/ (32 fl oz formulated product.) year.

Preharvest interval: 1 day.

CITRUS 2 – FOR USE OUTSIDE OF FLORIDA (See next table

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Asian Cockroach (*Blattella asahinae*) Diaprepes Root Weevil (*Diaprepes abbreviatus*) Fireant (*Solenopsis spp.*)	0.25 – 0.5	16 – 32

DIRECTIONS

Do not apply by air.

Ground application: Bifenthrin 2EC can only be applied as a ground application. Make applications at the specified rate in a minimum of 30 gallons of finished spray per acre. Do not apply through irrigation systems.

Do not allow Bifenthrin 2EC to contact fruit or foliage. When not in solid planted rows, apply to individual citrus resets using hand-gun or shielded sprayer.

Diaprepes root weevil: Peak emergence generally occurs in the spring and, depending on weather conditions, a minor emergence of Diaprepes may also occur during fall. During weather conditions that are conducive to primary emergence occurring in spring, use 32 fluid ounces formulated product to obtain the longest residual management of Diaprepes root weevil. If weather conditions that will promote more than one peak of pest emergence are present, apply 16 fluid ounces formulated product during early season and apply 16 fluid ounces formulated product later in the season.

Use additional management strategies if emergence extends beyond the residual protection of Bifenthrin 2EC such as foliar adult control or soil larvae control. Contact local or state extension specialists for ways to protect citrus from pests using an integrated pest management plan that is applicable to local conditions.

RESTRICTIONS

Maximum annual use rate: Do not apply more than a total of 0.5 lb ai/ A/ (32 fl oz formulated product.) year.

Preharvest interval: 1 day.

COTTON

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
European Corn Borer Soybean (Banded) Thrips Tobacco Thrips	0.02 – 0.10	1.3 – 6.4
Boll Weevil* Bollworm Cabbage Looper Cotton Aphid** Cotton Fleahopper Cotton Leafperforator Cutworms Fall Armyworm Plant Bugs Saltmarsh Caterpillar Southern Garden Leafhopper Stink Bugs Tobacco Budworm Whitefly Yellow Striped Armyworm	0.04 – 0.10	2.6 – 6.4
Beet Armyworm Carmine Spider Mite** Lygus spp. Pink Bollworm Two-spotted Spider Mite**	0.06 – 0.10	3.8 – 6.4

DIRECTIONS

No more than 10 applications can be made per growing season using one or more synthetic pyrethroid products, such as Bifenthrin 2EC, Ambush®, Ammo®, Asana® XL, Baythroid®, Danitol®, Karate®, Mustang®, and Scout X-TRA®.

Applications of Bifenthrin 2EC may be made in water or refined vegetable oil such as soybean and cottonseed oils.

Ground applications: Make applications in a minimum of 5 gallons per acre. For ULV applications, apply at the specified rate in refined vegetable oil in a minimum of 1 quart of finished spray per acre.

Air applications: Make applications in a minimum of 1 gallon per acre. One quart of water may be substituted with 1 quart of emulsified oil in the finished spray. For ULV applications, apply at the specified rate in refined vegetable oil in a minimum of 1 quart of finished spray per acre with aircraft calibrated to provide adequate coverage.

*** Boll Weevil Control:** To reduce pests to tolerable levels, apply every 3 to 4 days.

**** Mite and Aphid Control:** Apply when pests first appear and make repeat applications as necessary to continue control. Use higher specified rates if pest populations have reached a damaging threshold.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.5 lb ai/ A/ season.

Preharvest interval: 14 days.

Do not graze livestock in treated areas or cut treated crops for feed.

CUCURBITS

Chayote (fruit), Chinese waxgourd, (Chinese preserving melon), Citron melon Cucumber Gherkin Gourd, edible (includes hyotan, cucuzza) (*Luffa* spp.) (includes hechima, Chinese okra) (*Mormordica* spp.) (includes balsam apple, balsam pear, bitter melon, Chinese cucumber) Muskmelon (hybrids and/or cultivars of Cucumis melon) (includes true cantaloupe, cantaloupe, casaba, crenshaw melon, golden pershaw melon, honeydew melon, honey balls, mango melon, Persian melon, pineapple melon, Santa Claus melon, and snake melon) Pumpkin (Cucurbita spp.) Squash, summer (includes crookneck squash, scallop squash, straightneck squash, vegetable marrow, zucchini) Squash, winter (includes butternut squash, calabaza, hubbard squash (*C. mixta; C. pepo*) (includes acorn squash, spaghetti squash) Watermelon (includes hybrids and/or varieties of Citrullus spp.)

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Armyworms Cabbage Looper Corn Earworm Cucumber Beetles Cutworms Grasshopper Leafhoppers Melonworm Pickleworm Plant Bug Rindworm Squash Bugs Squash Vine Borer Stink Bugs Tobacco Budworm	0.04 – 0.10	2.6 – 6.4
Banks Grass Mite Carmine Mite Lygus spp. Two-spotted Spider Mite Whitefly	0.08 – 0.10	5.12 – 6.4

DIRECTIONS

Ground applications: Make applications in a minimum of 20 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 5 gallons of finished spray per acre. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.3 lb ai/ A/ season (19.2 oz formulated).

Spray interval: More than 2 applications after bloom is prohibited. Applications made less than 7 days apart are prohibited.

Preharvest interval: 3 days.

EGGPLANT

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Armyworms Cabbage Looper Colorado Potato Beetle Corn Earworm Cucumber Beetle European Corn Borer Flea Beetle Plant Bug Stink Bug Thrips Tomato Hornworm Tomato Pinworm Vegetable Leafminer Whitefly	0.033 – 0.10	2.1 – 6.4
Banks Grass Mite Carmine Mite Lygus spp. Pacific Spider Mite Two-spotted Spider Mite	0.80 – 0.10	5.12 – 6.4

DIRECTIONS

Ground applications: Make applications in a minimum of 10 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 2 gallons of finished spray per acre. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.2 lb ai/ A/ season (12.8 oz formulated).

Spray interval: Applications made less than 7 days apart are prohibited.

Preharvest interval: 7 days.

FIELD CORN (GRAIN AND SILAGE), POPCORN, FIELD CORN GROWN FOR SEED (AT PLANTING)

PEST	APPLICATION RATE	
	LB AI/ 1,000 linear ft of row	**FL OZ PRODUCT/ 1,000 linear ft of row**
Corn Rootworm Larvae: Northern Southern Western	0.0046	0.30
Army Cutworm Cutworm Species Grubs Seed Corn Beetle Seen Corn Maggot True Armyworm or Armyworm Species Wireworm	0.0023 – 0.0046	0.15 – 0.30

DIRECTIONS

Do not apply more than 0.3 pound active per acre per season including pre and ppi, at planting, plus foliar applications.

Position spray nozzle behind planter shoe and in front of press wheel centered over the row, applying as a 5 to 7 inch T-band treatment over an open seed furrow. Use the following table to determine the amount needed per acre. Apply in a minimum of 3 gallons of finished spray per acre.

To mix, combine Bifenthrin 2EC with water or liquid fertilizer by first filling the spray tank ½ full with water or fertilizer, then adding the correct amount of bifenthrin, and then adding the remaining amount of water or fertilizer. Be sure there is a uniform spray mixture by constantly agitating mixture during mixing and applying.

Applications of Bifenthrin 2EC alone or in recommended tank mixtures may be used with in furrow pop-up fertilizers. First conduct a jar compatibility test to ensure mixture will stay in solution.

When there is greater than 30% cover of crop residue remaining, **do not** apply to soil.

RESTRICTIONS

Maximum seasonal use rate: At plant applications must be made at no more than 0.1 lb ai/ A/ season.

Preharvest interval: 30 days.

Do not graze livestock in treated area or cut treated crops for feed within 30 days of treatment.

Row Spacings (Inches)	(LB AI/ A)	(FL OZ PRODUCT/A)
30	0.080	5.12
36	0.069	4.4
38	0.064	4.1
40	0.060	3.9

FIELD CORN (GRAIN AND SILAGE), POPCORN, FIELD CORN GROWN FOR SEED (PRE & PPI)

PEST	APPLICATION RATE	
	LB AI/A	**FL OZ PRODUCT/A**
Armyworm spp. Black Cutworm Seedcorn Maggot Stalkborer White Grub Wireworm	0.047 – 0.062 Pre-Plant Incorporated (**PPI**)	3 – 4 Pre-Plant Incorporated (**PPI**)
Armyworm spp. Black Cutworm Stalkborer	0.040 Pre-Emergence (**PRE**)	2.56 Pre-Emergence (**PRE**)

DIRECTIONS

PPI: Applications as the 3 – 4oz/A rate must be applied as PPI. Tank mixes applications with PPI herbicides are permitted. Incorporate Bifenthrin 2EC close to the intended seed planting depth. Must not be deeper than 3 inches.

RESTRICTIONS

Do not apply more than 0.3 pound active per acre per season including pre and ppi, at planting, plus foliar applications.

PRE: Tank mixes and applications with PRE herbicides at the 2.56 oz/A rate are permitted.

FIELD CORN (GRAIN AND SILAGE), POPCORN, FIELD CORN GROWN FOR SEED (FOLIAR USE)

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Army Cutworm Beet Armyworm Cereal Leaf Beetle Chinch Bug Common Stalk Borer Corn Earworm Corn Rootworm Adults Cucumber Beetle Adults Cutworm Species European Corn Borer * Fall Armyworm Flea Beetle Grasshoppers Greenbug Japanese Beetle Adult Sap Beetle Southern Armyworm Southern Corn Leaf Beetle Southwestern Corn Borer* Stinkbugs Tarnished Plant Bug True Armyworm or Armyworm spp. Webworms Western Bean Cutworm Yellowstriped Armyworm	0.033 – 0.10	2.1 – 6.4
Banks Grass Mite ** Carmine Mite ** Two-spotted Spider Mite **	0.08 – 0.10	5.12 – 6.4

DIRECTIONS

Ear-attacking pests: Make applications just before silking, repeating as necessary to sustain control.

*** Southwestern Corn Borer and European Corn Borer:** Make initial application at or just prior to egg hatch.

Other insect pests: Make applications when pests first appear, repeating as necessary to sustain control.

**** Mites:**
Banks Grass Mite: Make applications prior to leaf damage or discoloration when colonies first form and before they disperse above the bottom third of the plant.

Two-spotted Spider Mite and Carmine Mite: Make applications prior to leaf damage or discoloration when colonies first form and before they disperse throughout the canopy.

For corn with heavier initial populations and that are under stress by heat or drought, higher rates will be needed. Under these types of conditions, field experience with the use of dimethoate at 0.5 lb. active per acre in tank mixture has demonstrated good control.

Mite control in Texas, New Mexico, Oklahoma, and Arizona: Make applications in a minimum of 10 gallons of per acre with ground equipment and 5 gallons of finished spray pre acre by air.

RESTRICTIONS

Do not apply more than 0.3 pound active per acre per season including pre and ppi, at planting, plus foliar applications.

Ultra low volume (ULV) applications on corn are prohibited.

If heavy rainfall is pending, do not make aerial or ground applications.

Do not apply Bifenthrin 2EC on corn in all coastal counties.

Ground applications: Make applications in a minimum of 10 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 2-5 gallons of finished spray per acre. When initial populations are higher, apply 5 gallons of finished spray per acre to improve control with air applications. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

Preharvest interval: 30 days.

Do not graze livestock in treated areas or cut treated crops for feed within 30 days of the last application.

GRAPES

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Cutworms Eastern Grape Leafhopper Grape Berry Moth Japanese Beetles Adults Variegated Leafhopper Western Grape Leafhopper	0.05 – 0.10	3.2 – 6.4
Black vine Weevil Glassywinged Sharpshooter Two-spotted Spider Mite	0.10	6.4

DIRECTIONS

Use higher rate when pest pressure is moderate to severe.

Ground applications: Make applications in a minimum of 25 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 10 gallons of finished spray per acre. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

RESTRICTIONS

Maximum seasonal use rate: Do not exceed more than 0.10 ai/ A/ season.

Preharvest interval: 30 days.

HOPS

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Armyworms Cutworms Leafrollers Loopers	0.06 – 0.1	3.8 – 6.4
Root Weevils*	0.05 – 0.1	3.2 – 6.4
Two-spotted Spider Mite**	0.1	6.4

DIRECTIONS

Use of ultra low volume (ULV) application on hops is prohibited.

Ground Applications: Apply 100-150 gallons of spray per acre during early season and 200-250 gallons of spray per acre during late season. Full coverage is necessary for best control.

***Root Weevil Control:** Direct spray to base of plant, spraying up 3 feet of vine and spraying soil surface 1.5 to 2 feet around plant.

****Two-spotted spider mites:** For application by air for late season control do not apply less than 6.4 oz. (0.1 lb ai)/ application in a minimum of 10 gallons/ acre.

RESTRICTIONS

Maximum application rate: Do not apply more than 0.1 lb ai / A/ application.

Maximum seasonal use rate: Do not apply more than 0.3 lb ai/ A/ season.

Spray interval: A 21 day spray interval must be maintained.

Preharvest interval: 14 days.

LETTUCE, HEAD

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Armyworms Corn Earworm Cucumber Beetles Cutworms Diamondback Moth Flea Beetles Imported Cabbageworm Leafhoppers Loopers Salt Marsh Caterpillar Stink bug spp. Tobacco Budworm Whitefly	0.033 – 0.10	2.1 – 6.4
Lygus spp. Carmine Mite Two Spotted Spider Mite	0.08 – 0.10	5.12 – 6.4

DIRECTIONS

Ground applications: Make applications in a minimum of 15 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 5 gallons of finished spray per acre. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

RESTRICTIONS

Spray interval: Applications made less than 7 days apart are prohibited.

Maximum seasonal use rate: Do not apply more than 0.5 lb ai/ A/ season.

Preharvest interval: 7 days.

PEARS

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Codling Moth Cutworms Green Fruitworm Leafhoppers Leafminers Leafrollers Lygus spp. Plant Bugs Plum Curculio San Jose Scale (Crawlers) Stink Bugs Tarnished Plant Bugs	0.04 – 0.2	2.6 – 12.8
Two-spotted Spider Mite Yellow Mite	0.06 – 0.2	3.8 – 12.8
European Red Mite	0.08 – 0.2	5.12 – 12.8

DIRECTIONS

Ground Applications: Make dilute applications in a minimum of 200 gallons of finished spray per acre. Or, make concentrate applications in a minimum of 50 gallons of finished spray per acre. For best coverage, use sufficient water.

Air Applications: Make applications in a minimum of 10 gallons per acre.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.5 lb ai/ A/ season. Do not apply more than 0.45 lb ai/A after petal fall.

Spray interval: To maintain control, applications should be made as needed using at least a 30 day spray interval.

Preharvest interval: 14 days.

Do not graze livestock in treated orchards or cut treated cover crops for feed.

PEPPERS, BELL AND NON-BELL

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Armyworm Corn earworm Cucumber Beetles Cutworms European Corn Borer Flea Beetles Leafminers Loopers Pepper Weevil Thrips Whitefly	0.033 – 0.1	2.1 – 6.4
Lygus spp. Broad Mite Carmine Mite Two-spotted Spider Mite	0.08 – 0.10	5.12 – 6.4

DIRECTIONS

Ground applications: Make applications in a minimum of 10 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary. To achieve control, use sufficient water to obtain thorough coverage, applying as necessary.

Air applications: Make applications in a minimum of 2 gallons of finished spray per acre. To achieve control, use sufficient water to obtain thorough coverage, applying as necessary.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.2 lb ai/ A/ season.

Spray interval: Applications made less than 7 days apart are prohibited.

Preharvest interval: 7 days.

SPINACH

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Armyworms Colorado Potato Beetle Corn earworm Cucumber Beetles Cutworms European Corn Borer Flea Beetles Leafminers Loopers Pepper Weevil Thrips Tomato Hornworm Tomato Pinworm Whitefly*	0.033 – 0.10	2.1 – 6.4
Banks Grass Mite Broad Mite Carmine Mite Fire Ants** Lygus spp. Pacific Spider Mite Two-spotted Spider Mite	0.08 – 0.10	5.12 – 6.4

DIRECTIONS

Ground applications: Applications must be made in 10-50 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Applications must be made in 5-50 gallons of finished spray per acre.

***Whiteflies:** Foliar applications of Bifenthrin 2EC must be made by ground or air at rates of up to 0.4 pt. (0.1 lb active) per acre. Apply a maximum of 4 applications at minimum 7-day intervals.

****Fire ants:** Applications of Bifenthrin 2EC must be made as a soil treatment at planting or as a foliar treatment by ground or air at rates of up to 0.4 pt. (0.1 lb active) per acre. Apply a maximum of 4 applications at minimum 7-day intervals.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.4 ai/ A/ season.

Spray interval: Applications made less than 7 days apart are prohibited.

Preharvest interval: 40 days.

SUCCULENT PEAS AND BEANS

Bean (*Phaseolus* spp.): Broadbean (succulent), Lima bean (green), Runner bean, Snap bean, Wax bean; Bean (*Vigne* spp.): Asparagus bean, Blackeyed pea, Chinese longbean, Cowpea, Jackbean, Moth bean, Southern pea, Soybean (immature seed), Sword bean, Yardlong bean; Pea (*Pisum* spp.): Dwarf pea, Edible-pod pea, English pea, Garden pea, Green pea, Snow pea, Sugar snap pea, Pigeon pea

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aster Leafhopper Flea Beetle Grasshoppers Leafhoppers	0.025 – 0.10	1.6 – 6.4
Alfalfa Caterpillar Aphids Bean Leaf Beetle Beet Armyworm Cloverworm Corn Earworm Corn Rootworm Adult Cucumber Beetles Cutworms European Corn Borer Fall Armyworm Japanese Beetle Adult Loopers Pea Leaf Weevil Pea Weevil Plant Bug Sap Beetle Southern Armyworm Stink Bugs Tarnished Plant Bug Thrips Webworms Western Bean Cutworm Whitefly Yellowstriped Armyworm	0.033 – 0.10	2.1 – 6.4
Banks Grass Mite Carmine Mite Lygus Spp. Two-spotted Spider Mite	0.08 – 0.10	5.12 – 6.4

DIRECTIONS

Ground applications: Make applications in a minimum of 10 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 2 gallons of finished spray per acre. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.2 lb ai/ A/ season (12.8 fl oz. formulated).

Preharvest interval: 3 days.

SWEET CORN (GRAIN AND SILAGE) SWEET CORN GROWN FOR SEED (AT PLANTING)

PEST	APPLICATION RATE	
	LB AI/ 1,000 linear ft of row	**FL OZ PRODUCT/ 1,000 linear ft of row**
Corn Rootworm Larvae Northern Southern Western	0.0046	0.30
Army Cutworm Cutworm spp. Grubs Seed Corn Beetle Seed Corn Maggot True Armyworm or Armyworm spp. Wireworm	0.0023 – 0.0046	0.15 – 0.30

DIRECTIONS

Position spray nozzle behind planter shoe and in front of press wheel centered over the row, applying as a 5 to 7 inch T-band treatment over an open seed furrow. Use the following table to determine the amount needed per acre. Apply in a minimum of 3 gallons of finished spray per acre.

To mix, combine Bifenthrin 2EC with water or liquid fertilizer by first filling the spray tank ½ full with water or fertilizer, then adding the correct amount of bifenthrin, and then adding the remaining amount of water or fertilizer. Be sure there is a uniform spray mixture by constantly agitating mixture during mixing and applying.

Applications of Bifenthrin 2EC alone or in specified tank mixtures may be used with in furrow pop-up fertilizers. First conduct a jar compatibility test to ensure mixture will stay in solution.

When there is greater than 30% cover of crop residue remaining, **do not** apply to soil.

RESTRICTIONS

Maximum seasonal use rate: At plant applications must be made at no more than 0.1 lb ai/ A/ season.

Preharvest interval: 30 days.

Do not graze livestock in treated area or cut treated crops for feed within 30 days of treatment.

Row Spacings (Inches)	(LB AI/ A)	(FL OZ PRODUCT/A)
30	0.080	5.12
36	0.069	4.4
38	0.064	4.1
40	0.060	3.9

SWEET CORN (GRAIN AND SILAGE), SWEET CORN GROWN FOR SEED (FOLIAR USE)

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Army Cutworm Beet Armyworm Cereal Leaf Beetle Chinch Bug Common Stalk Borer Corn Earworm Corn Rootworm Adults Cucumber Beetle Adult Cutworm spp. European Corn Borer * Fall Armyworm Flea Beetle Grasshoppers Greenbug Japanese Beetle Adult Sap Beetle Southern Armyworm Southern Corn Leaf Beetle Southwestern Corn Borer * Stinkbugs Tarnished Plant Bug True Armyworm or Armyworm spp. Webworms Western Bean Cutworm Yellowstriped Armyworm	0.033 – 0.10	2.1 – 6.4
Banks Grass Mite ** Carmine Mite ** Two-spotted Spider Mite **	0.08 – 0.10	5.12 – 6.4

DIRECTIONS

Ultra low volume (ULV) applications on corn are prohibited.

If heavy rainfall is pending, do not make aerial or ground applications.

Do not apply Bifenthrin 2EC on corn in all coastal counties.

Ground applications: Make applications in a minimum of 10 gallons per acre using ground equipment. To achieve control, thorough coverage is necessary.

Air applications: Make applications in a minimum of 2 gallons of finished spray per acre. One to two quarts of water may be substituted with 1-2 quarts of emulsified oil in the finished spray. To achieve control, thorough coverage is necessary.

Ear-attacking pests: Make applications just before silking, repeating as necessary to sustain control.

* **Southwestern Corn Borer and European Corn Borer:** Make two applications with the initial application at or shortly before egg hatch.

Other insect pests: Make applications when pests first appear, repeating as necessary to sustain control.

** **Mites:**

Banks Grass Mite: Make applications prior to leaf damage or discoloration when colonies first form and before they disperse above the bottom third of the plant.

Two-spotted Spider Mite and Carmine Mite: Make applications prior to leaf damage or discoloration when colonies first form and before they disperse throughout the canopy. For corn with heavier initial populations and that are under stress by heat or drought, higher rates will be needed.

RESTRICTIONS

Maximum seasonal use rate: Do not apply more than 0.2 lb ai/A/ season (12.8 fl oz. formulated).

Preharvest interval: 1 day.

Do not graze livestock in treated areas or cut treated crops for feed within 1 day of the last application.

TOMATOES

PEST	APPLICATION RATE	
	LB AI/A	FL OZ PRODUCT/A
Aphids Armyworms Including Beet Armyworm, Fall Armyworm, Southern Yellowstriped Armyworm Bean Leaf Beetle Cabbageworm Carmine Mite Cloverworm Corn Earworm Corn Rootworm Cucumber Beetles Cutworms Diamondback Moth European Corn Borer Flea Beetle Flea Hopper Grasshopper Japanese Beetle (Adult) Leafhoppers Loopers Lygus spp. Melonworm Pea Weevil Pea Leaf Weevil Pickleworm Plant Bug Rindworm Salt Marsh Caterpillar Sap Beetle Seedpod Weevil Squash Bugs Stink bug spp. Tobacco Budworm Tarnished Plant Bug Thrips Two-spotted Spider Mite Whitefly	0.033 – 0.08	2.1 – 5.2

DIRECTIONS

Ground applications: Make applications in a minimum of 15 gallons of finished spray per acre using ground equipment. To achieve control, thorough coverage is necessary.

RESTRICTIONS

Do not apply more than 4 applications per season.

Spray interval: Applications made less than 10 days apart are prohibited.

Preharvest interval: 1 day.

STORAGE AND DISPOSAL

Do not contaminate other pesticides, fertilizers, water, food, or feed by storage or disposal.

Pesticide Storage: Do not freeze. Do not store below 40º F. If crystals are observed, warm material to above 60º F by placing container in warm location. Shake or roll container periodically to redissolve solids.

Keep out of reach of children and animals. Store in original containers only. Store in a cool, dry place and avoid excess heat. Carefully open containers. After partial use, replace lids and close tightly. Do not put concentrate or dilute material into food or drink containers.

In case of spill, avoid contact, isolate area and keep out animals and unprotected persons. Confine spills.

To confine spill: If liquid, dike surrounding area or absorb with sand, cat litter or commercial clay. If dry material, cover to prevent dispersal. Place damaged package in a holding container. Identify contents.

Pesticide Disposal: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental control Agency, or the Hazardous Waste representative of the nearest EPA Regional Office for guidance.

Container Disposal: Nonrefillable container. Do not reuse or refill this container. Offer for recycling, if available. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

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