Preserving Military Readiness in the Eastern Gulf of Mexico

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Report to Congress

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1. Introduction

This report replies to House Report 115-200, page 103, accompanying H.R. 2810, the National Defense Authorization Act for Fiscal Year 2018, requesting the Secretary of Defense to deliver a report to the House Committee on Armed Services and House Committee on Natural Resources addressing: (1) the scope of military test and training events conducted east of the Military Mission Line (MML) in the Gulf of Mexico (GOMEX); (2) comparable testing and training areas within the United States and its territories that can replicate the capabilities of the ranges and operating areas east of the MML in the GOMEX; (3) comparable testing and training areas outside the United States that are available for U.S. military testing and training activities and can replicate the capabilities of the ranges and operating areas east of the MML in the GOMEX; (4) the number of test events, exercises, and military operations conducted annually in the ranges and operating areas east of the MML in the GOMEX from 2006 to the time of the report; and (5) the extent to which the Services are unable to meet training and test requirements necessary to support operational plans should the moratorium on oil and gas leasing, pre-leasing, or any related activity east of the MML in the GOMEX not be extended.

The eastern Gulf of Mexico (EGOMEX) is an irreplaceable national asset used by the Department of Defense (DoD) to develop and maintain the readiness of our combat forces and is critical to achieving the objectives contained in the 2018 National Defense Strategy. The unique capabilities present in the region have been developed over decades through the investment of billions of taxpayer dollars and countless hours of effort by federal, state, and private organizations and local citizens. No other area in the world provides the U.S. military with ready access to a highly instrumented, network-connected, surrogate environment for military operations in the Northern Arabian Gulf and Indo-Pacific Theater. If oil and gas development were to extend east over the MML, without sufficient surface limiting stipulations and/or oil and gas activity restrictions mutually agreed by the DoD and Department of Interior (DoI), military flexibility in the region would be lost and test activities severely affected.

This report considered the DoD common understanding of oil and gas technologies and existing stipulations at the time of drafting. Additional information and understanding of potential oil and gas activities is being gained through DoD and DoI interdepartmental working group activities being held in support of the Bureau of Ocean and Energy Management (BOEM) 2019-2024 Outer Continental Shelf (OCS) Oil and Gas Lease Sale Plan. These discussion are being held to assist DoD with an updated assessment.

This report answers the five questions Congress asked the Department to address.

2. Scope of Military Operations East of the MML

Military operations east of the MML directly support the development and operations of new technologies; i.e., autonomy, directed energy and hypersonics. Technical advancements are critical to modernizing capabilities and maintaining the U.S. military advantage, a key part of the current National Defense Strategy. This area provides unique access to the installation and range capabilities needed to integrate advanced weapons systems and precision strike weapons in order to succeed in an increasingly complex security environment. The area east of the MML in the EGOMEX provides approximately 101,000 square miles of surface and airspace, making it the largest over-water DoD test and training area in the continental United States. When coupled with approximately 465,000 acres of land managed by Eglin Air Force Base (AFB), Florida, and the surrounding installations of the Naval Surface Warfare Center (NSWC) Panama City, Tyndall AFB, MacDill AFB, and Naval Air Station (NAS) Key West, this area cannot be replicated as it provides one of the DoD's most diverse, highly instrumented areas. Unique features of the EGOMEX provide a surrogate environment for military operations in the Northern Arabian Gulf and Indo-Pacific Theater. EGOMEX supports the mission of the Major Range and Test Facility Base (MRTFB), which is a designated core set of the DoD test and evaluation (T&E) infrastructure and workforce needed to support the DoD acquisition system. DoD considers the MRTFB capabilities national assets, and has implemented unique policies to ensure it continues to meet DoD requirements and is available to non-DoD users as military priorities permit. Missions which utilize the EGOMEX include support for joint urgent operational need solutions (JUONs); advanced concept technology demonstrations; research, development, and engineering activity; special operations training; air-to-air and air-to-ground (surface) missile testing, including the use of drone targets; high-altitude supersonic air combat maneuver training; large force exercises; vessel evaluations, to include combat surface ship qualification trials (CSSQT) on ship classes such as the Littoral Combat Ship, the San Antonio-class amphibious transport, and the Arleigh Burke-class guided missile destroyer; air, surface, and sub-surface mine warfare testing and training; explosive ordnance disposal training; amphibious/expeditionary maneuver warfare systems development; and electronic warfare. Airspace in the EGOMEX is subdivided to facilitate airspace scheduling and deconfliction. Operations areas (OPAREAs) are also established to facilitate scheduling surface and sub-surface activities. Figure 1 depicts military scheduling areas: Navy surface/subsurface operating areas, Air Force and Navy aircraft scheduling area, and existing oil and gas surface and sub-surface development in the EGOMEX. The historical annual airspace usage is included in Attachment 1.

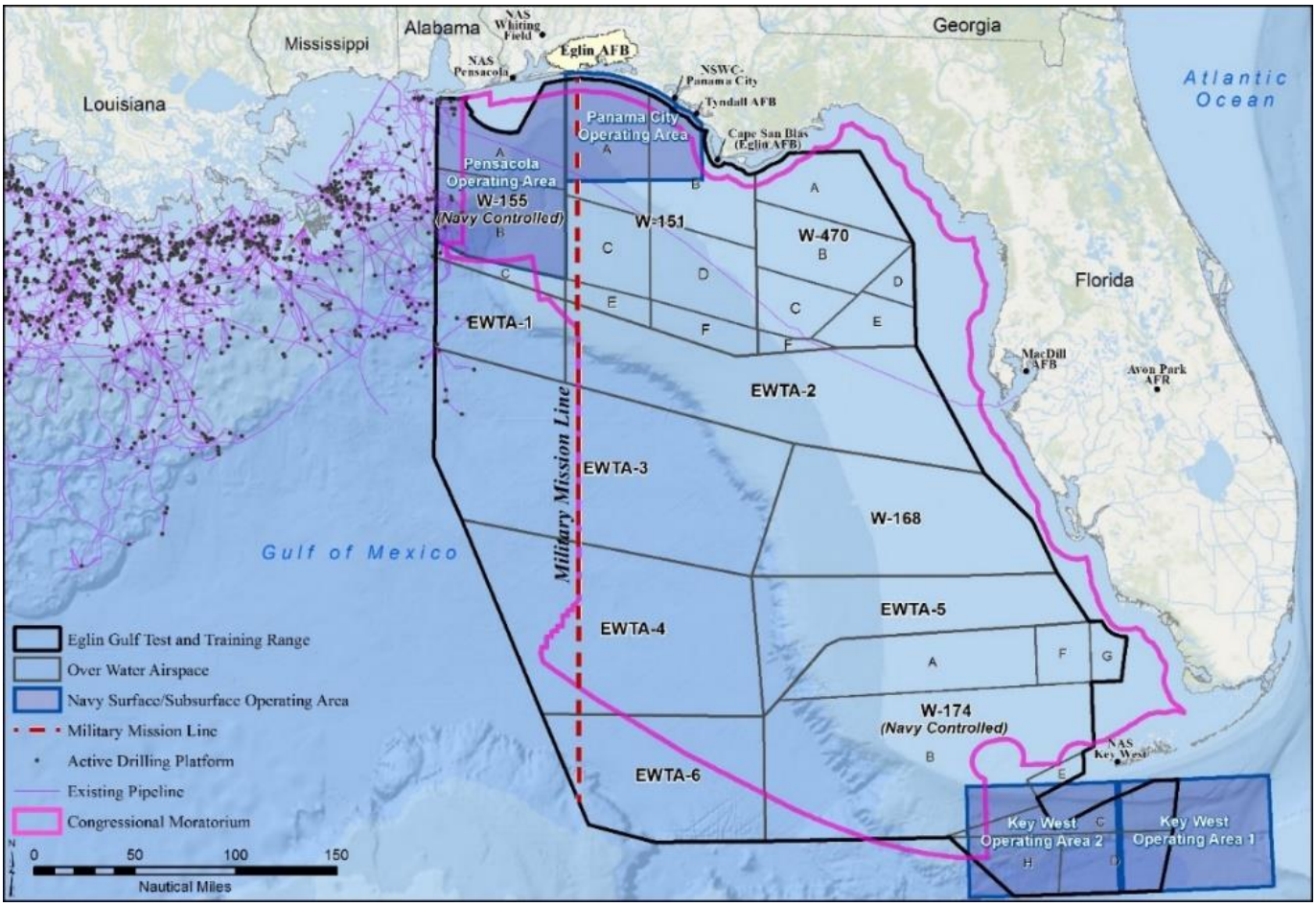


Figure 1: Military Scheduling Areas and Oil and Gas Development in the EGOMEX

2a. Support for JUONs, Advanced Concept Technology Demonstrations, and Research, Development, Test, and Evaluation (RDT&E)

To defeat our adversaries and respond quickly to changes in the battlefield, DoD must have the resources to put the right equipment into the hands of our Service members. The ability to rapidly experiment, prototype, assess, and field new capabilities and operational concepts that create decisive advantages and eliminate those of our adversaries depends on ready access to skilled personnel, infrastructure, and ranges. Establishing the trained workforce, infrastructure, and range procedures (which includes spectrum access) needed to rapidly field innovative solutions is an evolving process that has taken years to establish. The EGOMEX has been critical to the development of advanced weapons and new tactics needed to protect forces against violent extremist organizations and succeed against our adversaries. DoD currently conducts demonstrations, assessments, and RDT&E activities of hypersonics, directed energy, long-range weapons, unmanned vehicles, and autonomy technologies to sustain our capability to defeat, deter, and disrupt our enemies.

2b. Advanced Weapons Testing

The ability to deliver lethal effects rapidly and accurately is key to deterring and succeeding in war. The capabilities in the EGOMEX have been used to test the advanced weapons that support our conventional and special operations forces, as well as those of our allies. Weapons such as the Joint Air-to Surface Standoff Missile (JASSM) AGM-158, Joint Direct Attack Munition (JDAM) GBU-31, Small Diameter Bomb (SDB I, SDB II) GBU-39/GBU-53, Advanced Medium-Range Air-to-Air Missile (AMRAAM) AIM-120, Miniature Air Launched Decoy (MALD), B-61 smart weapon, Air Intercept Missile (AIM-9X), Massive Ordnance Air Blast (MOAB) GBU-43, Massive Ordnance Penetrator (MOP) GBU-57, and the Tomahawk Land-Attack Cruise Missile (TLAM) BGM-109 are some of the programs that have benefitted from those capabilities and will continue to benefit as long as modifications or replacements are required. The Air Force currently expends approximately 550 bombs, 580 missiles, 1,218,000 rounds, and 637,000 countermeasures annually in the Eglin Gulf Test and Training Range. In most cases these activities currently occur in W-151 scheduling areas. These expenditure rates are at approximately 87 percent of the levels currently authorized under the National Environmental Policy Act.

Hazardous weapons testing activity in the EGOMEX does not require a Notice to Airmen (NOTAM) since commercial and instrument flight rules stipulate aircraft traffic is not allowed into this airspace by air traffic control when the warning areas are active. Under visual flight rules, traffic typically avoids the warning areas, but in the rare instance non-participating aircraft enter the active airspace, range safety procedures ensure that weapons activity does not occur until the aircraft departs the hazard area.

The lack of vessel traffic in the EGOMEX allows DoD operations to work around transiting vessels in many cases. Figure 2 shows the annual vessel traffic for 2017, as displayed on the website MarineTraffic.com, illustrating the ease and flexibility DoD has in deconflicting operations requiring large safety footprints from vessel traffic in the EGOMEX.

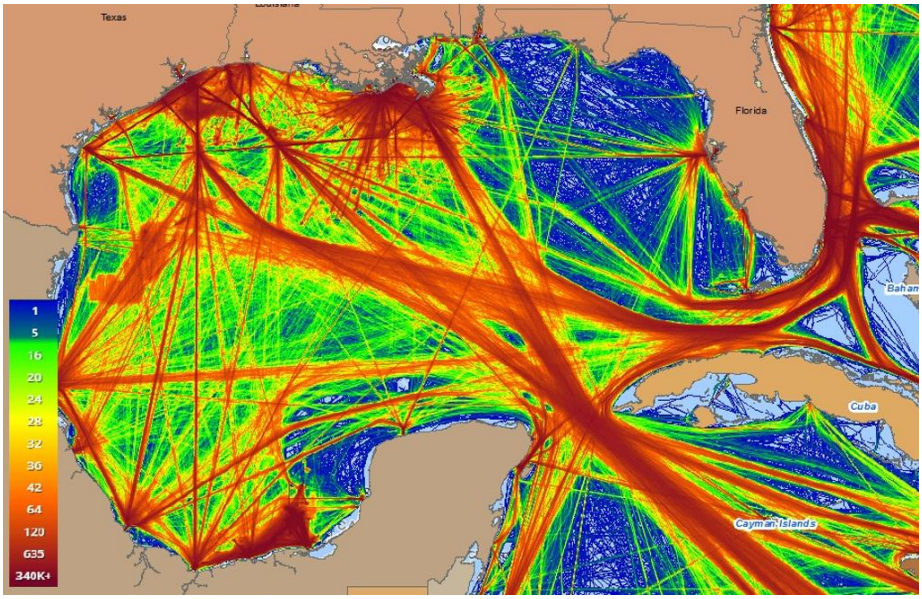


Figure 2: 2017 Vessel Traffic in the GOMEX

Figure 3 (adapted from a 2016 Center for Naval Analyses (CNA) report) shows that the vessel types driving preponderance of traffic operating in the GOMEX in 2009 were oil-related; tankers (black) and service vessels (generally those transporting equipment and personnel to offshore oil rigs). However, in the EGOMEX, the traffic was predominantly tugs and cargo vessels. Increases in vessel traffic in the EGOMEX would significantly impact range clearance procedures needed for military operations.

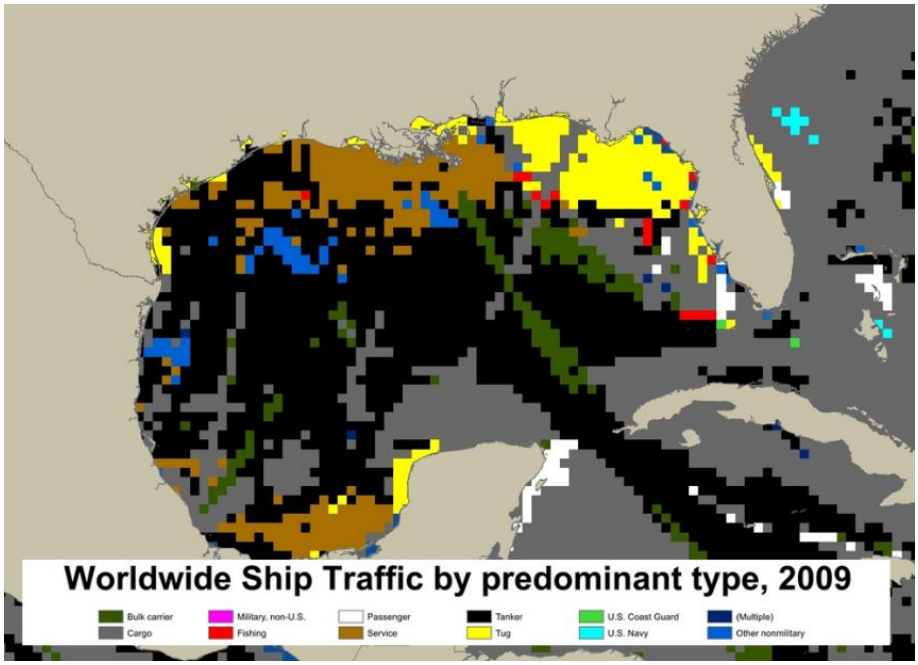


Figure 3: Traffic by Vessel Type in the GOMEX

A Local Notice to Mariners (LNM), issued by the Coast Guard, is primarily used to disseminate information to mariners concerning near-shore hazardous activity and are not an accurate measure of munition expenditures in the EGOMEX. Since it is much harder to clear near-shore areas due to significant boat activity, a LNM is issued to help clear an acceptable area for these operations. Most missions can be performed further out in the EGOMEX where acceptable "shot boxes" devoid of boats can be found. Munitions release operations find clear water area during the mission using surveillance aircraft and other means. The size of the water area is determined by the type of weapon being expended and the release parameters (i.e., altitude, airspeed, directions). As weapon footprints expand, the clear area for these operations increase and extend further into the EGOMEX.

2c. Weapon System Evaluation Program (WSEP)

Once fielded, the inventory of weapons requires periodic evaluation to ensure all configurations continue to perform as needed to support current platform and tactics requirements. The Air Combat Command (ACC) executes the WSEP to evaluate a unit's operational capability and readiness to employ these weapons and assess current tactics' effectiveness. The WSEP is also critical to strengthening alliances with U.S. allies. Canadian forces participate in WSEP activities annually, not only to improve the collaboration and teamwork of our combined forces, but due to the recognition that Canadian test infrastructure is not adequate to meet the test requirements of Canadian military forces. The 53rd Weapons Evaluation Group (WEG), 83rd Fighter Weapons Squadron (FWS) at Tyndall AFB, Florida, and the 86th FWS at Eglin AFB, Florida, conduct multiple air-to-air (A-A) and air-to-ground/surface (A-G) events annually. WSEP events evaluate Air Force A-A and A-G missile capabilities, weapons and maintenance operational procedures employment, and provide live missile training to operational aircrew and maintainers that travel to the region. The A-A WSEP event (COMBAT ARCHER) can exercise the actual aircraft platform, munition configuration, and tactics and training against a full-scale aerial target (QF-16) to evaluate the lethality of weapons delivery techniques. Since only a limited number of missile shots and guns are available per temporary duty unit, aircrew will utilize the EGOMEX ranges for A-A training if not conducting a live missile or gun shot. COMBAT ARCHER executes up to 10-12 times per year. The A-G WSEP event (COMBAT HAMMER) evaluates manned aircraft and unmanned aircraft against surface targets, which could include remotely piloted surface boats (swarms), as depicted in Figure 4, and provides full-scale precision guided munitions employment training for aircrew and maintainers. Current WSEP maritime activities have occurred approximately 17 miles offshore in waters of the OCS and utilizing W-151 scheduling areas. In conjunction with a recent 2017 COMBAT HAMMER exercise, a swarm vulnerability event was conducted in the Choctawhatchee Bay to train air squadrons in countering adversaries that employ swarm tactics with small fast boats.

During live or inert drops near the shore, Eglin's 96th Range Group coordinates with the Coast Guard to issue notices to mariners and employs local commercial fisherman to augment military boats to clear and patrol an octagon around the targets in order to keep civilian traffic

approximately 12 nautical miles from the impact area. W151 A/B/C/D/E/F, over-land restricted areas, and additional connecting airspace are required for COMBAT HAMMER to provide sufficient maneuvering space and safety footprints for current weapons evaluations. As newer weapon systems and weapons are developed and fielded, current practices will have to evolve. Approximately 300 live missile shots, to include aerial gun employment, are conducted by the WSEP overwater on the Gulf of Mexico ranges annually.



Figure 4: COMBAT HAMMER Air-to-Surface Engagement

2d. Training Activities East of the MML

"Preserve peace through strength," the third pillar detailed in the National Security Strategy, requires the resources necessary for our military to respond quickly and decisively when called upon. One priority action necessary to achieve this strength is a renewed focus on training. "Train the way we fight" is a fundamental tenet of military training and the EGOMEX provides a unique location for all levels of military training. The physical geography of the EGOMEX, coupled with the proximity to assigned forces, makes access to the region critical to force readiness. Bathymetry and seabed conditions are analogous to areas where forward deployed forces operate, allowing units to train in conditions close to those they will be expected to fight in. These unique natural attributes allow the Warfighter to train seamlessly in open ocean, littoral, and land environments. The Gulf's fair weather conditions makes year round flight training at all proficiency levels possible. The EGOMEX provides access to necessary special use airspace to safely deconflict potentially hazardous flight operations related to advanced fighter aircraft, such as the F-35, and unmanned aircraft system training from non-participating aircraft. All Military Services conduct training in the EGOMEX, ranging from institutional and initial qualification training to large force air exercises.

2e. Institutional, Initial Qualification, and Unit Level Training

The Air Force conducts a heavy volume of combat aircrew training for both A-A and A-G activity in the Gulf of Mexico. Day to day A-A training events include 1v1, 2vX, 4vX, 8vX (X = variable number of aircraft) and large force employment (greater than 8 blue aircraft) conducting A-A training simulating missile and gun employment. A-G training is primarily conducted on overland ranges, although the interest in A-G training involving surface vessels has increased

since 2012 when renewed emphasis was placed on defending U.S. interests in the Asia-Pacific region.

The 325th Fighter Wing (FW) based at Tyndall AFB provides operational control and command guidance for three fighter squadrons utilizing the Gulf of Mexico training ranges in primarily an A-A role. The 95th Fighter Squadron (FS), in conjunction with the 301st FS, fly the F-22 Raptor and are part of the Total Force Integration concept, combining active duty and reserve pilots. The 43rd FS provides initial F-22 pilot training. The 2nd Fighter Training Squadron provides T-38C Talon adversary support to the 95th/301st/43rd FSs. While the F-22 executes both A-A and A-G roles, the bulk of its training is A-A conducted over the EGOMEX.

The 33rd FW based at Eglin AFB provides operational control and command guidance for F-35 initial pilot training. The 53rd Wing, also based at Eglin, provides operational test and evaluation for the F-15 and F-16 aircraft. The 58th FS, which flies the F-35A, and the 82nd Test and Evaluation Squadron, which flies the F-15 and F-16, both use the EGOMEX overwater ranges for the bulk of their A-A training.

The 93rd FS based at Homestead Air Reserve Base, Florida, operates the F-16C Viper and the 59th FW at Joint Reserve Base New Orleans, Louisiana, operates the F-15C Eagle. While there is no A-G training for the F-15C, both units use EGOMEX overwater ranges for A-A training use. The 93rd FS also uses overland ranges to support A-G training.

The Navy conducts a significant number of training activities in the EGOMEX. Strike Fighter Squadron (VFA) 101 is a U.S. Navy Fleet Replacement Squadron (FRS) based at Eglin AFB. VFA 101 operates 15 F-35C aircraft and uses the EGOMEX overwater ranges for the bulk of its A-A training.

Warning Area W-151B/D/F supports A-A missile exercises and supersonic air combat maneuver training in support of the Navy's required Strike Fighter Advanced Readiness Program. These training operations include live A-A rounds, missiles, military aircraft, and targets that routinely traverse the airspace at high speeds, and can result in debris, including depleted cannon rounds, missiles, target fragments, and destroyed target aircraft falling into the water beneath the W-151 airspace. These operations require large amounts of area to be cleared due to the large variability of the debris pattern dispersion associated with live munition activity.

NAS Key West is considered one of the Navy's premier pilot training facilities due to its ideal weather conditions and proximity to local air ranges within minutes of takeoff. The air station supports transient tactical aviation and training squadron detachments from across the United States. Warning Area W-174 and the Key West OPAREA in the southern half of the EGOMEX support a large number of sensitive and unique airborne training activities, including Special Warfare Command (SPECWAR) High Altitude Low Opening (HALO) operations. In addition to pilot training activities out of NAS Key West, W-174 supports F/A-18 joint training operations with the Royal Canadian Air Force for approximately six weeks per year.

East Coast Navy fighter attack squadrons will send six to 10 aircraft on a detachment and more than one detachment per year. FRSs often send as many as 10 detachments per year. West Coast FRSs generally send one detachment per year. During final work-ups before a deployment, a squadron may send 12 to 14 aircraft, half of which will serve as an aggressor squadron. Navy strike detachments usually train for 12 days in the region.

Air Force fighter squadrons tend to send six to eight aircraft per detachment to NAS Key West, and generally stay for 5 to 14 days, but may stay longer. Squadrons may send one to four detachments per year. The Air National Guard (ANG), along with Reserve squadron detachments from both Services, generally have six to eight aircraft, train 10 to 12 days in the region, and normally send one to two detachments per year. Air Force logistical and medical squadron detachments generally have one or two aircraft and stay two to five days. Naval logistical aircraft detachments are similar in size and length of stay. Medical squadron detachments typically have a full complement of medical personnel. Logistical and medical squadrons usually send only one detachment per year.

Aviation training squadrons may have 5 to 16 aircraft in their detachments, with 6 being the norm, and stay at NAS Key West for about one week. Since most of these squadrons are homebased at NAS Pensacola, Florida, they may send four to eight detachments per year. Helicopter squadron detachments usually consist of one to three aircraft and stay for three to six days. Most often these aircraft are from ships operating in the region, with one or two detachments per year originating from their home base. Electronic warfare squadrons may send two to six aircraft per detachment and stay for 6 to 12 days from four to six times per year.

On an average day in a busy month (February through June, September and October), NAS Key West will host more than 50 aircraft from 6 to 8 different squadrons, and 500 personnel requiring berthing and other support services from the airfield.

2f. Surface and Sub-surface Operations

The Panama City Operations Area (OPAREA) (Figure 5) supports air, surface, and sub-surface mine warfare and explosive ordnance disposal (EOD) test and training, including EOD and underwater detonation operations, unmanned underwater vehicle operations, diving operations, and mine countermeasures operations. This expansive and operationally realistic environment is ideal for full-scale testing of naval mines and mine countermeasures, operations of low signature surface craft (such as zodiacs) to support maritime surveillance training, and annual training for helicopter mine countermeasures squadrons. This OPAREA supports the activities of the National Unmanned Systems Shared Resource Center (NUSSRC), which serves to increase the participation of young engineering talent to advance the Navy's Unmanned Underwater Vehicle (UUV) priorities.

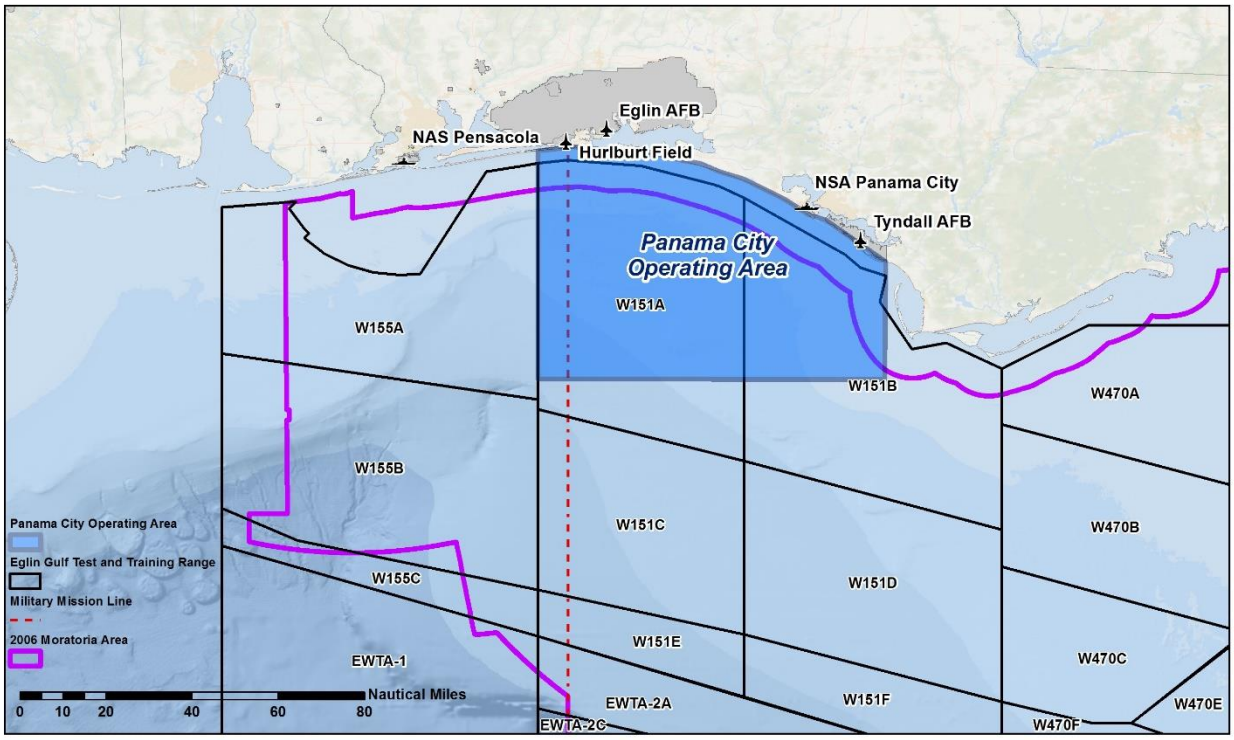


Figure 5: Panama City Operating Area (OPAREA)

The Panama City OPAREA has been used to support the AQS-24B Minehunting System, the MK18 Kingfish UUV, the Quickstrike J, the MH-60 Launch and Handling System, the MH-60 Airborne Laser Mine Detection System Field, and the MH-60 Airborne Mine Neutralization System. The Navy's EOD Group Two uses the Panama City OPAREA for training six to nine weeks per year, while the Center for Explosive Ordnance Disposal and Diving, which includes the Navy Diving and Salvage Training Center and the Navy School for Explosive Ordnance Disposal, uses the OPAREA on an almost daily basis. The Panama City OPAREA provides established training areas and minefields with the required water depths to support this training.

2g. Large Force Exercises

CHECKERED FLAG (CF) is the Combat Air Forces "spin-up" exercise for preparing Global Response Force (GRF) units to rapidly deploy and respond to contingencies worldwide. The exercise takes place in the six-month window prior to GRF tasking. CF is an air superiority, large force, live-fly exercise providing realistic and relevant air combat training in preparation for assigned GRF mission sets. CF emphasizes high-end 4th and 5th generation fighter integration and air dominance, and utilizes W-151 and W-470 in the Tyndall and Eglin AFB ranges over the Gulf of Mexico. CF is held twice a year in conjunction with the ACC's A-A WSEP COMBAT ARCHER at Tyndall AFB, Florida.

Six to eight units (40-60 aircraft) typically participate in CF, including four core GRF participants comprised of F-22, F-15E, F-16CJ, and E-3 units. Other GRF units (B-2s, B-52s, and E-8s) have participated from their home station. Additional Active Duty and Reserve Component participants in the region from the operational, training and T&E communities may include F-35s (Air Education and Training Command), F-22/F-15/F-16s (ACC), F-15s (ANG), and F/A-18s (Navy) flying on a day-to-day availability basis.

The Air Force Special Operations Command (AFSOC) exercise EMERALD WARRIOR (EW) is held annually during the February-March timeframe. EW is a Special Operations Command-directed, AFSOC-executed, air-centric exercise supporting a "4+1" scenario with Geographic Combatant Command (GCC) and Theater Special Operations Command focus. EW is a Joint National Training Capability accredited and Joint Live Virtual and Constructive site certified exercise. Starting in FY 2019, EW will be conducted twice a year and align with the Naval Special Warfare Command exercise TRIDENT to improve exercise resource efficiencies and provide enhanced readiness training.

EW trains AFSOC forces at the tactical and operational levels. Each EW established a lead Air Force Special Operations Forces (SOF) wing that stands up a Combined/Joint Special Operations Air Component (CJSOAC). This directly supports CJSOAC commander and staff training for relief-in-place of contingency CJSOACs stood up in support of current and future contingencies. At the tactical level, the exercise trains SOF air commandos on common AFSOC mission essential tasks required by all GCCs.

Seven of the nine Special Operations Wings, to include guard and reserve wings, provide 20 live and virtual aircraft as well as battlefield airmen to the exercise. An additional 21 live and virtual aircraft from the Air Force participate in the exercise (KC-135R, RC-135 RJ, E-8A Joint Surveillance Target Attack Radar System, F-16C+, B-1B, B-52H, F-22A, MQ-9). Finally, about 25 live and virtual aircraft from other services (Army, Marine Corps, Navy) participate in the exercise. EW typically executes the annual exercise with three to four partner nation participants providing ground and air assets to properly represent the current warfighting environment and the SOF tenet of working "by, with and through" our international partners for warfighting activities.

3. Comparable Areas in the United States and Territories

The EGOMEX is an irreplaceable national asset. No other area offers the DoD a comparable combination of air space, water space, and existing infrastructure to support military activities. The following illustrations (Figures 6, 7, 8, and 9) compare the special use airspace associated with the Point Mugu Sea Range off the coast of California, the combined airspace associated with the R-2508 complex, the Nevada Test and Training Range, and the White Sands Missile Range, and the Pacific Missile Range Facility (PMRF) Warning Area with the Eglin Gulf Test and Training Range (EGTTR) scheduling area.

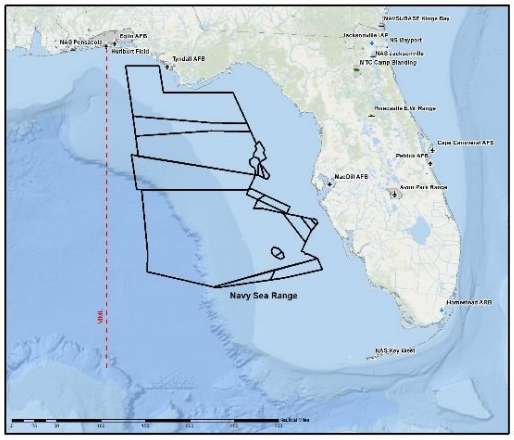


Figure 6: Navy Sea Range Area

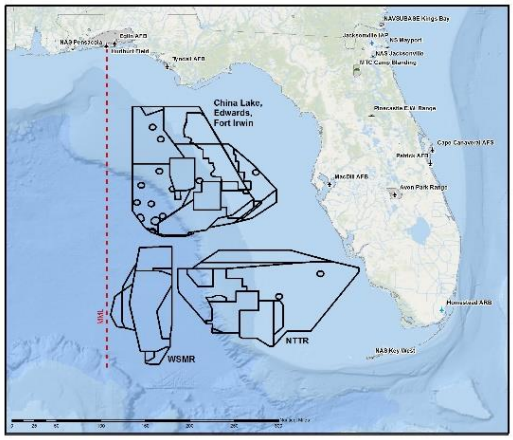


Figure 7: Land Range Area

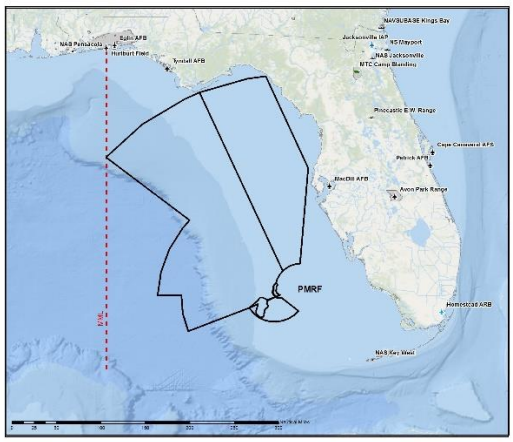


Figure 8: PMRF Warning Area

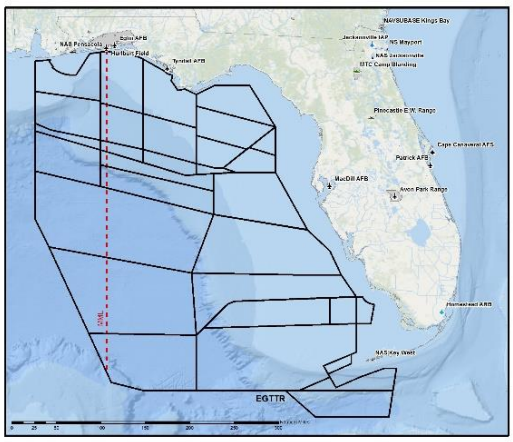


Figure 9: EGTTR Scheduling Area

While the PMRF and the Navy Sea Range can schedule additional airspace when required to support extended range weapons activities, the PMRF does not have overland navigation routes for cruise missile navigation or an instrumented land live impact area for end-game testing.

Besides just physical area, ranges must be located, protected, instrumented, continuously improved and modernized, and have the attributes necessary to support current and future military operations. DoD requires multiple test and training ranges to provide sufficient capacity to meet the test and training requirements of our military. A unique feature of the EGOMEX is that it provides a surrogate environment for military operations in the Northern Arabian Gulf and other littoral regions. Its temperate-to-subtropical conditions, bottom conditions, and sea states are all necessary to ensure that the impact of the operational environment can be accounted for in systems development, T&E, and theater operations. Sustained operations in the EGOMEX will identify issues not previously encountered with systems coming from the laboratory or desert test areas that could significantly impact lethality in certain operations.

Moving or consolidating missions within DoD is a deliberate process to ensure that risks and impacts are understood. As part of the process supporting Base Realignment and Closure 2005, a Technical Joint Cross Service Group (TJCSG) was formed to develop recommendations pertaining to integrated research, development and acquisition, and T&E supporting weapons and armaments. TJCSG recommendations helped establish Eglin AFB, Florida; China Lake, California; and Redstone Arsenal, Alabama, as the Department's core centers for this activity. The TJCSG recognized that Eglin had the largest concentration of integrated technical facilities across these three functional areas and realigned missions from other locations as part of this deliberate process, strengthening the Department's capability and improving efficiencies.

Infrastructure in the EGOMEX required to support the development and operations of today's modern weapon systems is extensive. Since 2006, DoD has worked closely with local communities and invested millions of dollars to create and sustain resilient secure communications capability, implement spectral efficient instrumentation and data collection systems, field highly sensitive underwater measuring equipment, and create effective resource management strategies to support military operations in the EGOMEX. The Eastern Gulf region is one of the most heavily instrumented, infrastructure-intensive test ranges to which the United States has access.

Some examples include the following:

- From 2009-2014, the Eglin range improved the resiliency of off installation instrumentation by installing hundreds of miles of fiber optic cable to ensure inadvertent construction damage or severe weather would not disrupt service to the range.
- From 2012-2014, the Air Force worked with a hotel developer leasing property on Okaloosa Island to provide space in the building for instrumentation used to receive data from planes and weapon systems operating in the Gulf.
- In 2017, six new Air Traffic Controlled Assigned Airspace corridors were established as a result of the 2008 Gulf Range Airspace Strategic Initiative. This collaborative effort with federal, state, and private stakeholders (such as the Federal Aviation Administration Regional Administrator, the Florida Department of Transportation, the National Business Aviation Association, and the Aircraft Owners and Pilots Association) modeled the region's future airspace usage and developed procedures enhancing the overall airspace operations in the EGOMEX, improving the efficiency and operational realism of military activity and ensuring continued economic prosperity for the Gulf Coast.
- Starting in FY 2017, the Air Force began planning funding for the Gulf Range Enhancement (GRE) project. In FY 2019, the $44 million project begins measured implementation to improve and extend instrumentation capabilities relevant to the strategic attack, counter-air, counter-land, counter-sea and command and control mission areas. Initial phases extend the existing fiber optic network to W-470 to improve current data reliability and throughput, as well as decrease operational costs by reducing satellite communication dependencies.

- To improve and extend over water weapons impact scoring and assessment of large footprint weapons capabilities, Eglin's 96th Test Systems Squadron has been developing operational concepts and exploring technologies necessary to implement the Over Water Impact Location (OWIL) project. Although still in the early concept development phase, OWIL would leverage wave gliders and unmanned vehicles integrated with existing range infrastructure to deploy instrumentation in the Gulf for extended periods of time and require minimal personnel support while deployed.
- From 2006 to the present, the Navy has invested to improve a shore-based range control building, telemetry tower, and miles of sub-sea cables to support mine countermeasure test operations.
- The Navy has invested more than $300 million in NAS Key West infrastructure improvements in support of the Fleet Forces Command's Training Resource Strategy and restoration and replacement of facilities.
- Investment plans for a new hangar for 5th generation aircraft, a learning annex, expanded billeting, and range expansion are currently being staffed to enable NAS Key West to continue as the Navy's premier East Coast tactical air combat training range supporting 5th and 6th generation weapons platforms.
- In 2005, the Navy initiated activity to replace aging current test support aircraft telemetry capability with technologies required to track multiple targets at greater ranges, requiring increased data processing and relay capabilities. Today, the Commercial Derivative Aircraft Based Instrumentation Telemetry System has begun design to modify a Gulfstream 550 (G550) aircraft with a modern active electronically scanned array system capable of tracking multiple simultaneous targets operating in different frequency bands. Currently estimated to provide initial operational capability in late 2021, this aircraft can be positioned to support long-range weapons testing worldwide.

Highly skilled and trained personnel familiar with the systems, instrumentation, and range environment are required to efficiently and effectively support cutting-edge DoD military activities. Hallmarks of the DoD professionals engaged in the EGOMEX test and training activities include knowledge of previous range problems due to complex interactions between and among multiple technologies under simultaneous development and operations; experience with the orchestration of mission execution, data collection, post-mission analysis and event reconstruction; and skill in executing calculated high risk activities.

4. Comparable Areas Outside the United States

Under limited circumstances, the United States may use test facilities and ranges in foreign countries. The controlling consideration in all cases is that the needed test capability does not exist at any U.S. test facility or range. In order to use any foreign-owned test facilities or ranges to satisfy U.S. test requirements, an international agreement between the United States and the potential partner nation is required. These agreements typically take two to three years

to negotiate, and in some cases as long as 10 years. Currently, the United States has 10 such bilateral agreements in force and one multinational agreement to support T&E. Testing under these agreements is conducted on the basis of project arrangements. These documents are analogous to a contract for services. Depending upon the type of testing contemplated, project arrangements usually take 6 months to 2 years to negotiate. Presently, the United States has no international agreement in force with a partner nation that would provide access to any foreign-owned range fully replicating the range and test facilities in the EGOMEX. Other factors affecting the United States' use of an international partner's test range or facility with whom the United States has an international agreement permitting testing include: the cost to test, equipment shipping costs, personnel availability for out-of-area assignment, and the international partner's ability to support the U.S. test requirement.

An additional challenge with testing at areas outside the United States is the infrastructure necessary to support near real-time data collection and post-mission analysis. Eglin AFB has the capability to network with other test and training networks, such as the Joint Mission Environment Test Capability Secret Network. These networks provide robust distributed infrastructure (networks, enterprise resources, integration software, tools, and reuse repositories) and technical expertise to integrate live, virtual, and constructive systems to government and commercial laboratories and facilities, as well as access to cyber ranges. While DoD works to improve interoperability with foreign partners, current capability is not adequate to conduct comparable levels of test and training activities outside the United States.

5. The Extent to Which the Services Will Be Unable to Meet Military Requirements Should the Moratorium Not Be Extended

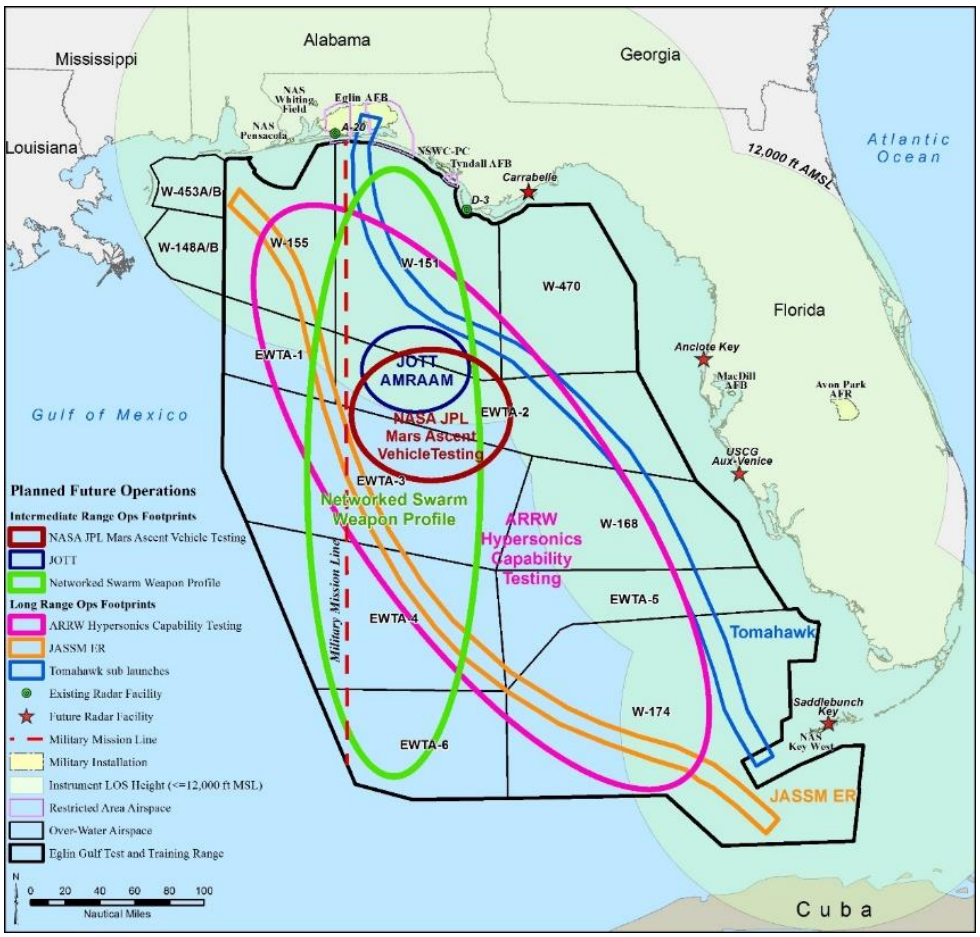


Figure 10: Long-Range Operations in the EGOMEX

5a. Long-Range Strike Weapons.

The development and integration of modern long-range strike weapons requires relatively unfettered access to sparsely populated areas, large expanses of airspace, well instrumented ranges, logistics support, and uninterrupted electromagnetic spectrum in order to ensure public safety and support efficient data collection, performance evaluations, and operational concept maturation. Without sufficient surface limiting stipulations and/or oil and gas activity restrictions mutually agreed by the DoD and DoI, oil and gas activity east of the MML is incompatible with the weapon safety footprints required for these operations. Currently, safety footprints are achieved through scheduling to ensure that any known transient shipping has exited the safety zone. While this can cause inefficiencies in the timing of test events, it allows public use of the Gulf while sufficiently maintaining the required test capability. The presence

of a platform; however, could negate our ability to effectively establish a weapon safety footprint in this manner. While some surface oil platforms can and sometimes do move, they move much more slowly than transient shipping, making this an unacceptable alternative. In addition, "hold harmless" agreements do not sufficiently mitigate for the presence of platforms in a weapons safety footprint, and the threat to platform personnel and the risk of an environmental catastrophe remain. Figure 10 depicts predicted areas where operational footprints are being developed to support technology and weapons development in the EGOMEX. The Air Force and Navy are developing and producing the Joint Advanced Tactical Missile, an air superiority missile capable of defeating current and projected enemy air threats. Due to the increased range over currently fielded weapons, the missile will be primarily tested over the GOMEX. Without sufficient surface limiting stipulations and/or oil and gas activity restrictions mutually agreed by the DoD and DoI, DoD will not be able to conduct operations in any area where oil and gas activity precludes the ability to establish the required safety footprints.

5b. Hypersonics

The current National Defense Strategy has identified hypersonics as a key technology that will change the character of war. To keep pace with our adversaries' ambitions and capabilities, and succeed in future conflicts, the DoD must invest in range infrastructure and programs to field hypersonic systems. Hypersonic-related activity in the EGOMEX will help restore the technological edge against potential rivals and enable the military to fight and win in future conflicts. Near-term hypersonic efforts focus on two different concepts: (1) boost-glide; and (2) air-breathing systems. These technologies will leverage the significant investments in DoD hardware-in-the-loop and installed systems test facilities initiated in 2017. The Air Force Research Laboratory is conducting an ongoing high-speed strike weapon technology maturation effort and the Air Force Life Cycle Management Center has established two new programs at Eglin AFB in the last year focused on delivering hypersonic capability in the early 2020 timeframe. Current studies are in progress to assess the sufficiency of range resources to provide the long-term capabilities required to transition these technologies to the Warfighter and to sustain and operate them. Operating at speeds equal to and greater than Mach 5, safety footprints associated with these technologies will exceed those of current systems, requiring more space for development and operational training to take full advantage of their capabilities. While areas even greater than the EGOMEX will be required for long range, end-to-end demonstrations, test, and evaluation of hypersonic systems, the EGOMEX is still critical to short range and segmented testing concepts to mature system components and functionality such as launch, staging events if flight test trajectories drop spent booster stages over the ocean, and terminal phase maneuvering. The presence of permanent or semi-transient platforms without sufficient surface limiting stipulations and/or oil and gas activity restrictions mutually agreed by the DoD and DoI is incompatible with the weapon safety footprints required for these operations.

5c. Directed Energy (DE)

Potential advantages of DE weapons relative to conventional kinetic munitions include speed-of-light engagement, deep shot magazine, and low cost per shot. Over the past decade, significant domestic advances have been made in enabling technologies to include high-power solid-state lasers, beam control systems, and thermal management. Concurrently, our adversaries have also made significant advances to their military capabilities. DE weapons provide a means to address many of these evolving threats, including boost-phase missile defense, armed drones, hypersonic weapons, and swarming tactics.

The call for a strategic roadmap for the development and fielding of DE weapons, included in section 219 of the National Defense Authorization Act for FY 2017 (Public Law 114-328), is designed to assist with accelerated fielding of DE systems in a coordinated and effective way across the Services. At the time of this writing, the DE strategic roadmap remains under development, with a target completion goal of March 2018. In the meantime, DoD Services and Agencies continue to aggressively execute DE science and technology (S&T) activities aimed at maturing enabling technologies and laying the foundation for transition of these technologies to eventual programs of record.

Currently, multiple Service and Agency S&T demonstrations are ongoing and planned for both high-energy laser and high-power microwave DE weapons. Based on existing S&T roadmaps, these demonstrations are likely to lead to DE programs of record within the next 5 years. One of the more notable planned DE weapon demonstrations requiring near-term test range support is the Air Force's Self-Protect High Energy Laser Demonstrator (SHiELD), which integrates a laser weapon system onto an F-15 to defeat electro-optical and infrared threats in the FY 2019-FY 2020 timeframe. The demand for range capabilities will soon expand from those needed to address specific objectives of laboratory demonstrations, to those required to address requirements for validating a weapon system for operational use. These activities point to the necessity for growth in DE test capability and workforce, increased collaboration across the DE technology development and test communities, and access to ranges that will support the development of operational employment concepts and recurring training activities. The presence of permanent or semi-transient surface platforms is incompatible with the safety footprints required for the development and operations of DE weapons.

5d. Collaborative and Autonomous Systems

DoD's autonomy roadmaps are still evolving. While exact information is not available, dollar estimates of commercial investments in research and development since 2015 (to field autonomous capabilities) easily place this figure in the billions. As a key element of the current National Defense Strategy, autonomy seeks to enable the right balance of human and machine teaming to achieve significant advantage in anti-access/area denied environments across all levels of defense. Autonomy will deliver greater performance and rapidly adapting system capabilities, integrated with human decision-making capacity, to achieve required battlefield

effects. DoD has shown the promise of autonomy in recent demonstrations using unmanned aerial systems (UASs). In 2016, the Office of Naval Research Low Cost Unmanned Swarming Technology (LoCUST) project conducted a swarm unmanned aerial vehicle test within the Panama City and Tyndall OPAREAs. Utilizing Group 1 UASs, the smallest and slowest of the five groups DoD uses to categorizes UASs, the January 2017 Perdix micro-drone demonstration showed one of the many ways autonomy might be used to deliver these effects. However, while still critical to the development of autonomy, current areas and instrumentation (while useful for Group 1 UASs demonstrations) are insufficient as the DoD transitions these concepts to larger platforms traveling at significantly higher speeds and operating in concert with manned platforms. The Department has recently initiated a number of efforts through the Special Capabilities Office and the Services to accelerate the delivery of autonomy to the Warfighter. While the requirement to test and field these systems is certain, the methodologies to evaluate successful performance are still being developed. Projects such as Gray Wolf, a low-cost collaborative missile recently awarded in December 2017, are faced with the challenge to perform nearly flawless against an increasingly complicated adversary in an operationally relevant electronic warfare environment. Without ready access to areas, facilities, and instrumentation in the EGOMEX, the flexibility needed to mature these technologies in a rapid and iterative manner threatens the affordability and the speed at which these systems can be delivered. Once fielded, the Warfighter WSEPs, exercises, and operations that use these capabilities may be unable to safely train and operate them to the fullest extent without continued access. In areas of employment, the presence of permanent or semi-transient platforms is incompatible with the flexibility required for the safe and efficient development and operations of autonomous war fighting capabilities.

5e. Vessel Evaluations

All newly built vessels require a series of tests and trials to ensure the systems aboard those vessels, and the vessels themselves, are ready for use when delivered to the Fleet. Two shipyards, Austal USA (Mobile, Alabama) and Ingalls Shipbuilding (Pascagoula, Mississippi), produce Navy vessels in the GOMEX. Ship classes such as the Littoral Combat Ship, the San Antonio-class amphibious transport, and the Arleigh Burke-class guided missile destroyer are regularly tested in the EGOMEX. Vessel evaluation tests include CSSQT, propulsion testing, and weapons testing. CSSQT and sea trails may involve the use of active sonar firing against surface targets or firing against air targets. These are dynamic operations involving multiple vessels including surface, sub-surface, and aerial participants and observers. Testing of this type requires large amounts of open space to allow vessels to maneuver and to maintain public safety, as well as the safety of the sailors and other participants involved in the tests. In addition to these weapons and sonar-related tests, vessels are required to conduct propulsion and maneuverability testing. Tests can involve vessels moving at speeds in excess of 25 knots for several hours over distances as long as 100 miles. These routes are carefully planned to avoid interacting with non-Navy vessels, infrastructure (including oil and gas platforms), and protected marine resources in accordance with Federal regulations. At the completion of many of the

vessel evaluation tests, vessels return to their place of construction for post-test evaluation. These tests require established ranges, no structural obstacles, and test engineers familiar with the test conditions. Conducting these tests at long distances away from the shipyards would be costly and inefficient, and may place crews at risk should the vessel suffer a casualty. Oil and gas activities impacting these operations in the EGOMEX affect Naval Sea Systems Command program offices and warfare centers planning and carrying out required vessel evaluation activities.

5f. Panama City Range Activities

The Panama City OPAREA conducts more than 700 missions annually supporting multiple warfare areas and domains including air, surface, and undersea warfare. NSWC Panama City facilitates dozens of testing activities representing hundreds of testing days in the EGOMEX, to include activities supported by the instrumented Coastal Test Range. Panama City supports multiple warfare areas and domains including air, surface, and undersea warfare. EGOMEX presents unique physical and environmental characteristics that are not replicated elsewhere. For example, areas of the EGOMEX bathymetry and seabed conditions are analogous to the Northern Arabian Sea, and testing in these locations allows test engineers to imitate potential in-theater conditions and evaluate a system's performance in as close to real-world conditions as possible. The Navy also takes advantage of an expansive area of shallow and littoral waters unique to this location. The NUSSRC, which serves to increase the participation of young engineering talent to advance the Navy's UUV priorities, also relies on this environment to provide hands-on learning, conduct real research, and foster innovation in navigational and control software based on artificial intelligence theories. The testing that occurs at the Panama City Test Range is largely incompatible with oil and gas exploration activities. Increased levels of ambient noise, activity levels, and surface and sub-surface obstructions have the potential to interfere with unmanned vehicle testing, aerial sensor evaluations, live fire explosives, and other requirements including mine warfare.

5g. Mine Warfare

Anti-ship mines are one of the greatest threats to modern warships. Correspondingly, the Navy invests significant resources in the development and evaluation of mine warfare systems. The EGOMEX, home to NSWC Panama City, is the primary location for testing and evaluating mine warfare systems for the Navy. Mine warfare consists of mining an area, potentially using clandestine unmanned submersible vehicles, mine classification, and mine neutralization. Mine neutralization entails a series of discrete steps: mines are detected by Naval vessels, unmanned vehicles or aircraft, the mine hunting system is deployed, the mine is reacquired and classified using high-frequency sonar, and the mine is destroyed using high-explosive charges. These activities may use either dummy or live mines, depending on the test missions. Oil and gas development activities in the EGOMEX are generally incompatible with mine warfare testing and evaluation. Introducing surface and sub-surface obstructions will reduce the area available for mine warfare testing. Increased vessel traffic and disruptive underwater noise associated

with oil and gas activities can impact the ability to use sonar effectively. Mine acquisition using lasers and neutralization using explosives requires large-perimeter safety zones. EGOMEX possesses several characteristics that make it uniquely favorable for mine warfare testing and evaluation. The relatively calm seas in the EGOMEX allow for testing year-long and with fewer potential weather delays than other areas, and the diverse bottom types and gentle bathymetry allow for a variety of testing environments, including surrogate environments.

5h. Other Considerations

Foreign observation of critical DoD activities is a growing concern for military range operations. Foreign entities that acquire long-term access or control over assets or otherwise conduct business near military ranges conducting sensitive operations present opportunities for persistent surveillance of DoD activities. Observation can be through transient vessels or by permanent structures in a position to observe military operations. In addition, increased vessel traffic in sensitive areas increases the likelihood that foreign vessels may be undetected.

6. Conclusion

EGOMEX is an irreplaceable national asset used by DoD to develop and maintain the readiness of our combat forces, and is critical to achieving the objectives contained in the National Defense Strategy. The unique capabilities and infrastructure present in the region have been developed over decades through the investment of billions of taxpayer dollars and countless hours of effort by federal, state, and private organizations and local citizens. No other area in the world provides the U.S. military with ready access to a highly instrumented, network-connected, surrogate environment for military operations in the Northern Arabian Gulf and Indo-Pacific Theater. Simply stated, if oil and gas development were to extend east of the MML, without sufficient surface limiting stipulations and/or oil and gas activity restrictions mutually agreed by the DoD and DoI, military flexibility in the region would be lost and test and training activities would be severely affected. The result would be a less capable and less prepared military force. This outcome would be in direct conflict with National Defense Strategy goals.

This report answers the five questions Congress asked the Department to address.

Attachment 1: Number of Military Air Operations Conducted Annually in the Eastern Gulf of Mexico (EGOMEX)

The Department of Defense (DoD) uses the EGOMEX for a variety of testing, training, and operational activities across the Military Services. A growing volume of test and training requirements is driving competition for range space between operational readiness priorities and fielding new system capabilities. Bed-down of the Joint Strike Fighter training program and significant increases in Air Force Special Operations Command flying activity will stress the airspace capacity of the northern half of the water ranges in the next three to five years. There is an urgent need to move operations from the congested areas in the northern parts of W-151 (water ranges south of Eglin Air Force Base (AFB), Florida, to W-470 (water ranges southeast of Tyndall AFB, Florida). Weapons systems fielding today, as well as the predominance of systems under research and development, require Major Range and Test Facility Base capabilities support. Additionally, since the strategic refocus to the Pacific was announced in 2011, the Air Combat Command's (ACC) Weapon System Evaluation Program has included air-to-surface engagements to evaluate a unit's operational capability and readiness to employ a variety of weapons and swarming tactics. To support test and evaluation capability needs, as well as ACC's focus on strategic national priorities, the Air Force has programmed funding for Gulf Range Enhancement (GRE) Increments 1 and 2 starting in FY 2019 and running through FY 2024. The GRE project will provide improved instrumentation capabilities relevant to the strategic attack, counter-air, counter-land, counter-sea, and command and control mission areas.

Table 1 provides a historical breakout of military air operations conducted in the EGOMEX (by year) going back to 2006. Data for W-151, W-168, and Eglin Water Test Areas (EWTAs) are per mission, which may include multiple aircraft. Data for W-174 are per sortie, which is a single aircraft. Navy data for W-174 areas prior to 2009 are unavailable since electronic tracking did not begin until that year, and there is no retention requirement for earlier records. Air Force data for W-168 were also not retained prior to 2013. Figure 11 provides a 5-year graphical depiction of this data for FY 2012-FY 2016.

Special Use Airspace (SUA)	**2006**	**2007**	**2008**	**2009**	**2010**
W-151A	1982	2033	2016	1176	1356
W-151B	1617	1669	1588	1362	1111
W-151C	1251	1145	1082	987	764
W-151D	1153	1203	1082	990	837
W-151E	588	693	620	538	339
W-151F	634	751	776	793	646
W-168					
W-174A				3275	5383
W-174B				4868	4168
W-174C				1560	1865
W-174D				0	0
W-174E				4868	4173

Special Use Airspace (SUA)	2006	2007	2008	2009	2010
W-174F				3275	5362
W-174G				3275	5350
W-470A	250	251	254	256	306
W-470B	250	250	254	263	311
W-470C	253	254	258	260	299
W-470D	250	250	250	251	293
W-470E	253	252	251	250	298
W-470F	253	252	251	250	297
EWTA-2	0	2	1	1	0
EWTA-3	0	0	0	0	0
EWTA-4	0	0	0	0	0
EWTA-5	0	0	0	0	0
EWTA-6	0	0	0	0	0

SUA	2011	2012	2013	2014	2015	2016	2017
W-151A	1622	1645	1997	2043	1820	1602	1673
W-151B	1052	1105	1167	1158	1231	1107	1184
W-151C	775	862	1055	1316	1117	926	1130
W-151D	642	775	857	923	900	899	930
W-151E	336	547	681	1004	853	732	875
W-151F	444	538	588	622	787	789	792
W-168			115	78	195	163	167
W-174A	5657	4169	2053	4008	3900	3065	4116
W-174B	3913	7664	4374	7941	8047	7305	6516
W-174C	1765	1486	1003	1667	1831	1713	1335
W-174D	0	0	0	0	0	0	0
W-174E	3907	4281	2930	4730	4819	5154	5788
W-174F	5657	4068	2068	3870	3768	2992	4090
W-174G	5657	2065	1899	2747	2913	2297	3928
W-470A	225	276	268	263	290	348	295
W-470B	227	278	263	259	286	340	294
W-470C	207	257	248	248	265	324	272
W-470D	208	254	244	247	266	318	271
W-470E	209	257	244	247	266	320	271
W-470F	207	253	244	246	266	320	270
EWTA-2	1	4	4	1	4	8	0
EWTA-3	0	0	0	1	2	1	0
EWTA-4	0	0	0	0	0	0	0
EWTA-5	1	0	1	1	2	1	0
EWTA-6	0	0	0	0	0	0	0

Table 1: Historical Usage of EGOMEX Special Use Airspace

Note: The Federal Aviation Administration National Flight Data Digest established W-174H on March 3, 2017. Usage for W-174H is reflected in W-174D data in Table 1. Unlike all other areas in the EGOMEX, scheduling of W-174D and W-174H must be coordinated with the U.S. State Department.

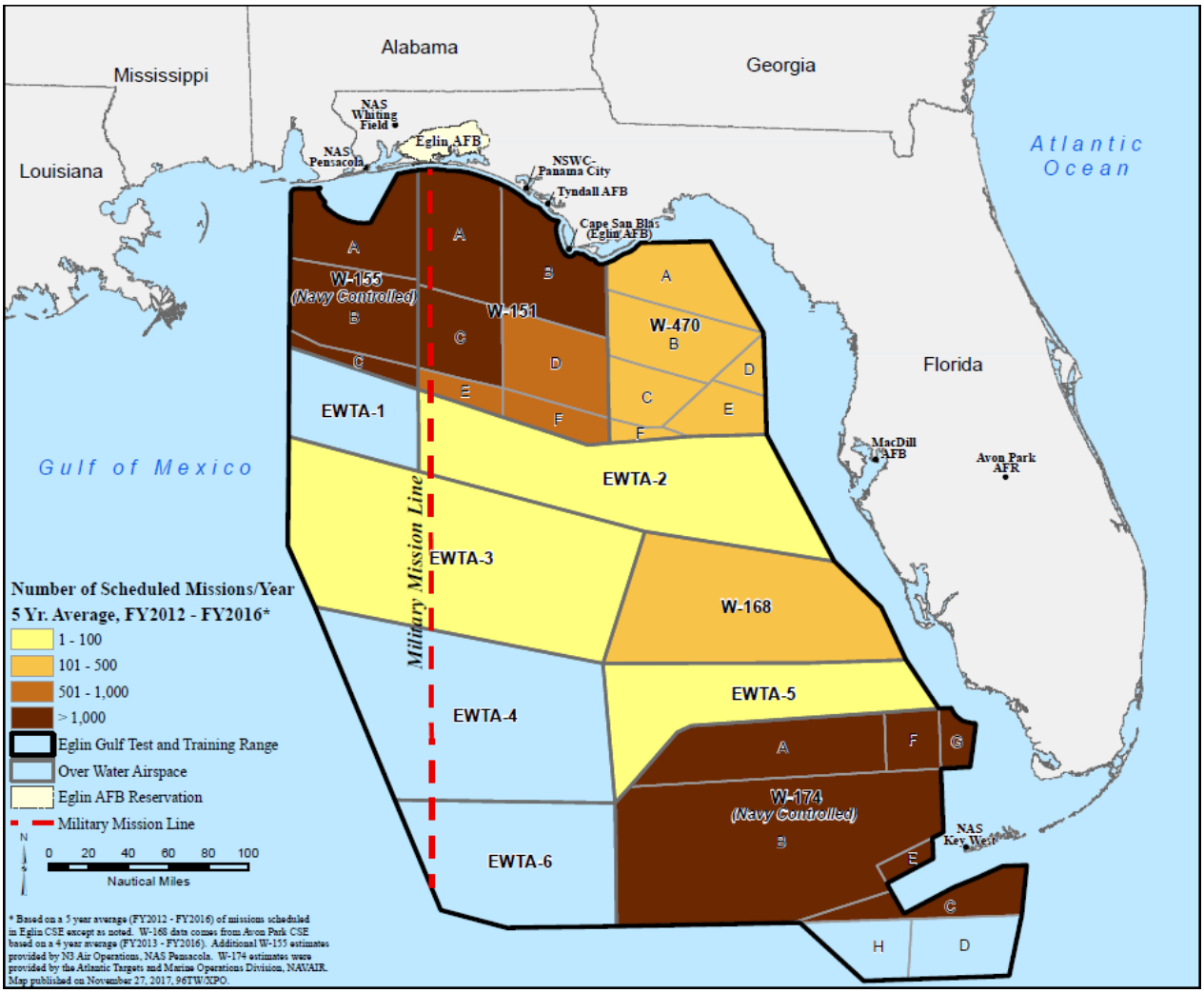


Figure 11: Five Year Average of Scheduled Missions for FY 2012-FY 2016

Notice to Airmen (NOTAM) are not used to schedule the majority of missions conducted in the EGOMEX. Hazardous activity in the warning areas does not require a NOTAM since commercial and Instrument Flight Rules stipulate aircraft traffic is not allowed into this airspace by air traffic controllers when the warning area is active. Under visual flight rules, traffic typically avoid the warning areas, but on the rare occasion non-participating aircraft enter the airspace, range safety procedures ensure that weapons activity does not occur during this time.

Notice to Mariners are primarily used for near-shore hazardous activity due to the significant amount of vessel traffic in near-shore hazard areas. Range safety procedures are used to ensure that weapons activity does not occur while ship traffic is transiting necessary weapons safety footprints, and are therefore not an accurate metric to gauge munition expenditures in the EGOMEX.

Acronyms

A-A	Air-to-Air
ACC	Air Combat Command
AFB	Air Force Base
AFSOC	Air Force Special Operations Command
A-G	Air to Ground
AIM-9X	Air Intercept Missile
AMRAAM	Advanced Medium-Range Air-to-Air Missile
ANG	Air National Guard
CF	Checkered Flag
CJSOAC	Combined/Joint Special Operations Air Component
CNA	Center for Naval Analyses
CSSQT	Combat Surface Ship Qualification Trial
DE	Directed Energy
DoD	Department of Defense
DoI	Department of Interior
EGOMEX	Eastern Gulf of Mexico
EOD	Explosive Ordnance Disposal
EmW	EMERALD WARRIOR
FRS	Fleet Replacement Squadron
FW	Fighter Wing
FWS	Fighter Weapons Squadron
GCC	Geographic Combatant Command
GOMEX	Gulf of Mexico
GRE	Gulf Range Enhancement
GRF	Global Response Force
HALO	High Altitude Low Opening
JASSM	Joint Air-to-Surface Standoff Missile
JDAM	Joint Direct Attack Munition
JUONs	Joint Urgent Operational Need Solutions
LNM	Local Notice to Mariners
MALD	Miniature Air Launched Decoy
MML	Military Mission Line
MOAB	Massive Ordnance Air Blast
MOP	Massive Ordnance Penetrator
MRTFB	Major Range and Test Facility Base
NAS	Naval Air Station
NOTAM	Notice to Airmen
NSWC	Naval Surface Warfare Center
OPAREAs	Operation Areas
OWIL	Over Water Impact Location
RDT&E	Research, Development, Test, and Evaluation
S&T	Science and Technology
SDB	Small Diameter Bomb

SOF	Air Force Special Operations Forces
SPECWAR	Special Warfare Command
T&E	Test and Evaluation
TJCSG	Technical Joint Cross Service Group
TLAM	Tomahawk Land-Attack Missile
UASs	Unmanned Aerial Systems
VFA	Strike Fighter Squadron
WEG	Weapons Evaluation Group
WSEP	Weapon System Evaluation Program