# NAVAL POSTGRADUATE SCHOOL

## MONTEREY, CALIFORNIA

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### MBA PROFESSIONAL PROJECT

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## SELECTED MARINE CORPS RESERVE ANNUAL TRAINING BUDGET VOLATILITY AND PARTICIPATION

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**December 2023**

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Significant volatility in the execution of the 1108 Reserve Personnel Marine Corps (RPMC) appropriation over the past ten years has caused lost funding opportunities and may pose a risk to individual, unit, and service readiness. Recently, systemic under-obligation has caused a loss of funding through reprogramming, fund reversion, and negative congressional budget marks. The most budget volatility has been in Selected Marine Corps Reserve (SMCR) Annual Training (AT). Accurately forecasting remaining AT participation in the year execution remains difficult, causing reprogramming uncertainty during mid-year review (MYR). There are varying definitions of participation, depending on the perspective of different stakeholders, which may contribute to the difficulty in forecasting. Additionally, current policy allows periods of Active Duty for Operational Support (ADOS) to be used in lieu of AT. In our study we compared different stakeholder perspectives and participation rate formulations, then considered the impact of ADOS on AT participation rates. By examining the stakeholder perspectives of Programs and Resources, Marine Forces Reserve, and SMCR Marines, relevant differences in AT participation surfaced. To compare participation rate formulations and ADOS, we analyzed data from SMCR AT and ADOS orders from FY2017-FY2022.

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VOLATILITY AND PARTICIPATION**

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# SELECTED MARINE CORPS RESERVE ANNUAL TRAINING BUDGET VOLATILITY AND PARTICIPATION

# ABSTRACT

Significant volatility in the execution of the 1108 Reserve Personnel Marine Corps (RPMC) appropriation over the past ten years has caused lost funding opportunities and may pose a risk to individual, unit, and service readiness. Recently, systemic under-obligation has caused a loss of funding through reprogramming, fund reversion, and negative congressional budget marks. The most budget volatility has been in Selected Marine Corps Reserve (SMCR) Annual Training (AT). Accurately forecasting remaining AT participation in the year execution remains difficult, causing reprogramming uncertainty during mid-year review (MYR). There are varying definitions of participation, depending on the perspective of different stakeholders, which may contribute to the difficulty in forecasting. Additionally, current policy allows periods of Active Duty for Operational Support (ADOS) to be used in lieu of AT. In our study we compared different stakeholder perspectives and participation rate formulations, then considered the impact of ADOS on AT participation rates. By examining the stakeholder perspectives of Programs and Resources, Marine Forces Reserve, and SMCR Marines, relevant differences in AT participation surfaced. To compare participation rate formulations and ADOS, we analyzed data from SMCR AT and ADOS orders from FY2017–FY2022.

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# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AC | Active Component |
| AD | Active Duty |
| ADT | Active Duty Training |
| ADA | Anti-Deficiency Act |
| ADOS | Active Duty for Operational Support |
| ADOT | Active Duty Other Than for Training |
| ADSW | Active Duty for Special Work |
| AR | Active Reserve |
| ASL | Active Status List |
| ASR | Authorized Strength Report |
| AT | Annual Training |
| BAH | Basic Allowance for Housing |
| BAS | Basic Allowance for Subsistence |
| BLI | Budget Line Item |
| CD&I | Combat Development and Integration |
| COCOM | Combatant Commander |
| COMMARFORRES | Commander, Marine Forces Reserve |
| CONUS | Continental United States |
| DAI | Defense Agencies Initiative |
| DMM | Drill Management Module |
| DOD | Department of Defense |
| DSCA | Defense Support of Civilian Authorities |
| ECI | Employment Cost Index |
| FICA | Federal Insurance Contribution Act |
| FHD | Funeral Honor Detail |
| FTS | Full-Time Support |
| FYDP | Future Years Defense Program |
| GAO | Government Accountability Office |
| GAR | Grade Adjusted Recapitulation |
| HTC | Home Training Center |

| | |
|---|---|
| IADT | Initial Active Duty for Training |
| ID | Inactive Duty |
| IDT | Inactive Duty Training |
| I&I | Inspector and Instructor |
| IMA | Individual Mobilization Augmentees |
| IRR | Individual Ready Reserve |
| ISL | Inactive Status List |
| ITX | Integrated Training Exercise |
| J-book | Presidential Budget Justification Book |
| M&RA | Manpower and Reserve Affairs |
| MAGTF | Marine Air Ground Task Force |
| MARFORRES | Marine Forces Reserve |
| MCRAMM | Marine Corps Reserve Administrative Management Manual |
| MCRC | Marine Corps Recruiting Command |
| MCTFS | Marine Corps Total Force System |
| MD | Muster Duty |
| METS | Mission Essential Tasks |
| MILPERS | Military Personnel |
| MOS | Military Occupation Specialty |
| MPMC | Military Personnel Marine Corps |
| MROWS | Marine Reserve Orders Writing System |
| MYR | Mid-year Review |
| OCONUS | Outside Continental United States |
| OSD | Office of the Secretary of Defense |
| PB | Presidential Budget |
| PCS | Permanent Change of Station |
| PME | Professional Military Education |
| POM | Program Objective Memorandum |
| PPBE | Planning, Programming, Budgeting and Execution |
| P&R | HQMC Programs and Resources |
| RC | Reserve Component |
| RFM | Military Personnel Branch, Fiscal Division |

| | |
|---|---|
| RPA | Retirement Fund Contributions |
| RPMC | Reserve Personnel Marine Corps |
| SELRES | Selected Reserve |
| SIK | Subsistence in Kind |
| SMCR | Selected Marine Corps Reserve |
| TFSP | Total Force Structure Process |
| TM1 | Table Manager 1 |
| TO | Table of Organization |
| UA | Unauthorized Absence |
| USERRA | Uniformed Services Employment and Reemployment Rights Act |
| USMCR | United States Marine Corps Reserve |

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# I.     INTRODUCTION

## A.     PURPOSE

The primary purpose of this MBA project is to examine the context and underlying factors contributing to the volatility in the 1108 Reserve Personnel Marine Corps (RPMC) appropriation, primarily focusing on the effects of differing definitions of Annual Training (AT) participation within the Selected Marine Corps Reserve (SMCR), and their implications for budget forecasting. We also examine the potential impact of Active Duty for Operational Support (ADOS) on AT participation. Our primary and secondary research questions examine the relationships between policy, AT participation, and budget forecasting models. This project is intended to offer insights to Headquarters Marine Corps Program and Resources (P&R) Military Personnel Branch, Fiscal Division (RFM), and Marine Corps Forces Reserve (MARFORRES), in an effort to improve forecasting models and financial performance.

Significant volatility in the execution of the 1108 Reserve Personnel Marine Corps (RPMC) appropriation over the past ten years has caused lost funding opportunities and may pose a risk to individual, unit, and service readiness. Year over year, there are wide deviations between budget estimates and actual expenditure (Headquarters Marine Corps Program Programs and Resources [P&R], PowerPoint slides, January 19–20, 2023). In some years, this poses a risk of over-obligation, which could trigger an Antideficiency Act violation (ADA). In recent years, systemic under-obligation has caused a loss of funding through reprogramming, fund reversion, and negative congressional budget marks (P&R, PowerPoint slides, June 28, 2021). The SMCR, referred to as Pay Group A in the RMPC appropriation, accounts for the majority of this under-obligation. In Fiscal Year (FY) 2022, for example, Pay Group A accounted for more than 50% of the nearly $21 million unobligated funds in the 1108 appropriation (P&R, PowerPoint slides, November 15, 2022). When comparing the FY2022 Presidential Budget (PB) request to actual execution, Pay Group A accounted for $47.9 million of the total $74.7 million under-executed obligation authority (P&R, PowerPoint slides, November 15, 2022).

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The primary cost driver of all military personnel (MILPERS) appropriations is personnel end-strength, with the additional variable of member participation among the Reserve Component (RC). However, the definition and meaning of AT participation can vary among the perspectives of statute requirements, financial management, personnel administration, operations, and individual Marines themselves. Therefore, understanding these differences is essential to accurately forecast AT participation and cost modeling. MARFORRES has had difficulty accurately forecasting remaining AT participation in the year execution, which causes uncertainty during mid-year review (MYR) and reprogramming. Current reserve AT policy permits SMCR Marines to fulfill the AT requirement with periods of ADOS, which may introduce additional uncertainty to AT forecasts.

## B.  RESEARCH QUESTIONS

The following research questions form the foundation of our project.

### (1)  Primary Research Question

How do differing definitions of AT participation impact Marine Corps Reserve budget forecasting models?

### (2)  Secondary Research Question

How does ADOS impact AT participation?

## C.  BENEFITS OF THE STUDY

Current literature related to the RC and MILPERS focuses primarily on end-strength and high-level economic factors, many of which aim to improve end-strength forecasting models. There is minimal research that addresses the Marine Corps Reserve's ability to forecast AT participation and its impact on the MILPERS appropriation. Examining AT participation can provide insights that inform reserve administrative policies and operational procedures that may stabilize AT participation forecasts, and thereby reduce the likelihood of unfavorable congressional marks, reprogramming, and fund reversion.

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**D.     OUTLINE OF THE THESIS**

Chapter II includes detailed background information related to the Marine Corps RC, 1108 RPMC appropriation, and the manpower budgeting process. Chapter III comprises a literature review encompassing RC factors that impact operational readiness and budget, increasing personnel costs, studies related to SMCR manpower forecasts and budgeting, and concludes addressing the gap in existing literature. In Chapter IV, we discuss stakeholders' perspectives which examine the separate conflicting definition of terms, interests, methods, and risks. Chapter V provides the data and analysis portion of our project, with a focus on AT participation. Chapter VI includes a summary of the research objectives, findings, limitations, and recommendations for future research.

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## II. BACKGROUND

### A. INTRODUCTION

This chapter lays the groundwork for our project's subsequent analysis by offering essential context regarding the Marine Corps Reserve and manpower budgeting process. The first half of the chapter centers on the Marine Corps Reserve. Such topics include the RC organizational structure, reserve duty types, and key policies. The second half of the chapter focuses on the manpower budgeting process. Topics include the 1108 RPMC appropriation, RPMC budget model, and historic budget data and trends.

### B. RESERVE MISSION AND ORGANIZATIONAL STRUCTURE

The Marine Corps Administrative Management Manual (MCRAMM) states that the Marine Corps Reserve's mission is to "augment, reinforce, and sustain the Active Component (AC) with trained units and qualified individuals in times of war or national emergency and at other such times as national security may require" (Department of the Navy [DON], 2018, p. 1-1). The RC mirrors the force structure and capabilities of the AC. The RC is capable of augmenting or reinforcing active forces, as well as task-organizing as a RC Marine Air-Ground Task Force (MAGTF; DON, 2018). Figure 1 shows the organization of the RC into three major components: the Ready Reserve, Standby Reserve, and Retired Reserve.

| Marine Corps Reserve | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Ready Reserve | | | | Standby Reserve | | Retired Reserve | | |
| Selected Reserve (SelRes) | | | Individual Ready Reserve (IRR) | Active Standby List | Inactive Standby List | Active Duty Retirees | Fleet Marine Corps Reserve | Non-Regular Retirees |
| Selected Marine Corps Reserve | Individual Mobilization Augmentees | Active Reserve | | | | | | |

Figure 1.    Marine Corps Reserve Components. Source: DON (2013).

## 1.    Ready Reserve

The Ready Reserve is composed of the Selected Reserve (SelRes), Individual Mobilization Augmentees (IMA), Active Reserve (AR), and the Individual Ready Reserve (IRR), which are subject to mobilization during times of war or national emergency (DON, 2018). It is important to note that Marines may move between different components of the active and reserve forces throughout the course of their career and within a given year. For example, a Marine may be affiliated with an SMCR unit for a period, switch to the IRR, and return to the SMCR or IMA at a later date.

### a.    *Selected Reserve*

SelRes is comprised of Marines of SMCR, AR, IMA, and Initial Active Duty for Training (IADT), which currently total approximately 33,070 Marines (DON, 2022).

#### (1)    Selected Marine Corps Reserve

All SMCR units are commanded by the Commander, Marine Forces Reserve (COMMARFORRES), when not allocated to the AC (DON, 2018, p.1-1). Members of the SMCR are commonly referred to as "drilling reservist," who participate in monthly inactive duty training (IDT) and AT. It is important to note that the SMCR is comprised of mandatory participants who have contractually obligated service, and non-mandatory participants, who have fulfilled their initial service contract and may transfer at any time to the IRR upon request. Our project is focused solely on the SMCR.

#### (2)    Active Reserve

AR Marines provide full-time active duty (AD) support to the reserve component and facilitate the total force integration. Members are assigned to both AC and RC units at various levels to support the organization, administration, training, and support of the RC (DON, 2018, p.1-2).

#### (3)    Individual Mobilization Augmentees

IMA Marines are "drilling reservist that are assigned to AC units for the purpose of facilitating the rapid expansion of AC organization to meet wartime military manpower

requirements during the initial stages of an emerging crisis, prior to mobilization of the IRR" (DON, 2018, p. 1-2).

### b. *Individual Ready Reserve*

The MCRAMM defines the IRR as "comprised primarily of individuals who have completed training, have served previously in the AC or SelRes, and are available for mobilization" (DON, 2018, p. 1-2). Marines in the IRR are not obligated to participate in SelRes activities like AT.

### 2. Standby and Retired Reserve

The Standby Reserve is comprised of two categories: active status list (ASL), and inactive status list (ISL). The Retired Reserve consists of active duty retirees, fleet Marine Corps Reserve, and Non-Regular Retirees. Both the Standby Reserve and Retired Reserve are outside the scope of this project.

## C. RESERVE DUTY TYPES

Understanding the various duty types within the RC is foundational to the administrative management and employment of Reserve Marines, as well as the reserve manpower budgeting process. RC duty types fall into two categories: inactive duty (ID) and active duty (AD). The MCRAMM further states, "ID is authorized duty performed by Reserve Marines not in an AD status and consists of inactive duty training (IDT), commonly known as drill, muster duty (MD), and funeral honors duty" (FHD; DON, 2018, p. 3-3). AD is full-time duty in active military status, which includes AT, active duty other than for training (ADOT), Active Duty for Operational Support (ADOS), and involuntary active duty (DON, 2018). Under each category, the various duty types are impacted by different statute authorities, active and reserve appropriations, entitlements, policies, and administrative management. The two order types relevant to our project are AT and ADOS. Figure 2 provides an organizational chart that illustrates the different reserve duty types.
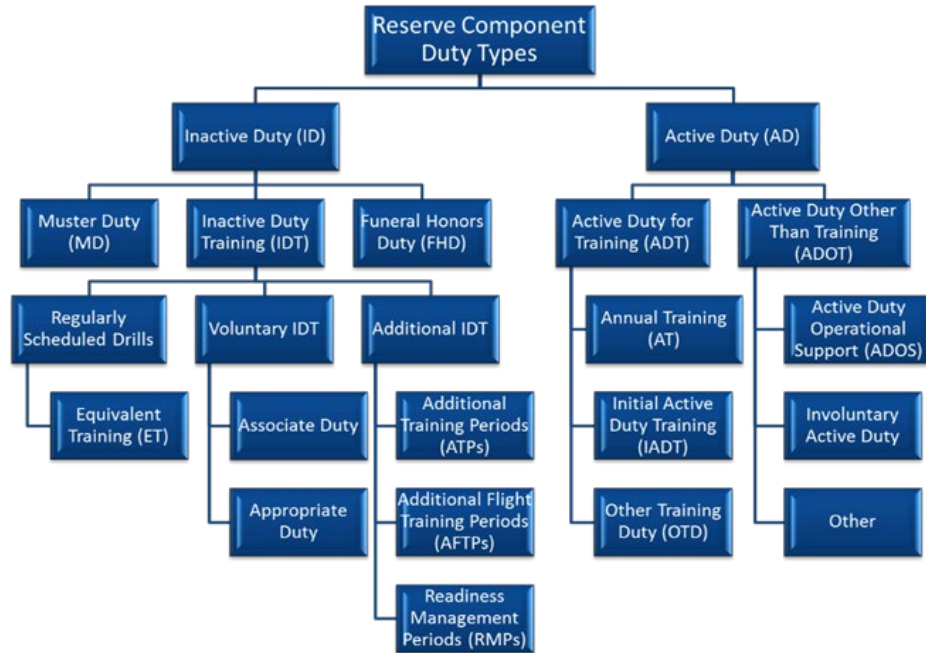
Figure 2.    Reserve Component Duty Types. Source: DON (2018).

### 1.    Annual Training

According to MCO 1001R.1L (DON, 2018), "AT is the minimum period of active duty training (ADT) that reserve members must perform each year to satisfy the training associated with their respective unit/individual assignments. The primary purpose of AT is to provide individual and/or unit readiness training" (p. 55). AT is typically 14 days and is predominately conducted in the summer. The specific type of training activity conducted during AT varies widely but may include on-the-job military occupational specialty (MOS) training, large scale exercises, humanitarian projects, annual physical fitness testing, rifle qualification, and small unit level training.

### 2.    Active Duty for Operational Support

ADOS, formerly known as active duty for special work (ADSW), is intended to provide "Marine Corps Reserve personnel augmentation for both Active and Reserve components, in support of existing and emerging requirements of the Marine Corps Total Force to meet short-term administrative, operational, and exercise support requirements" (DON, 2011, p. 2).

**D.     KEY POLICIES**

Title 10 U.S.C Subtitle E establishes requirements for IDT and AT participation in the Reserve, and the MCRAMM provides service specific guidance related to these requirements. The intent, interpretation, and practical application of key terms and requirements contained in the following authorities and policies play a crucial role in operational and financial forecasting of AT.

**1.     Title 10 U.S.C Subtitle E–Reserve Components**

Title 10 of U.S. Code governs all aspects of the United States Armed Services and Subtitle E pertains specifically to the RC. The authorities established in 10 U.S.C and its subsections form the basis for all Marine Corps Reserve policy, administration, utilization authorities, and appropriations.

**a.     *Training Requirements***

According to the training requirements outlined in 10 U.S.C §10147, members of the Ready Reserve shall be required to:

"(1) participate in at least 48 scheduled drills or training periods during each year and serve on AD for training of not less than 14 days (exclusive of travel time) during each year; or

(2) serve on AD for training not more than 30 days during each year."

This is the basis for the mandatory participation requirement for SMCR Marines to complete 48 IDT periods, or drills, and 14 days of AT. The following paragraph explains that although required by law, individual reservists can earn enough retirement points to reach a qualifying retirement year without serving on AD for training.

**b.     *Retirement Points***

Section 12732 of Title 10 establishes the requirements and computation for RC retirement pay, which is based on a point system for qualifying periods of service. Members of the RC achieve one year of qualifying service towards retirement pay by earning a minimum of 50 points per year (DON, 2018). A total of 20 qualifying years of

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service is required to be eligible for Reserve retirement pay. One point is earned for each day of AD or attendance at one drill or equivalent duty period. Members of the RC also receive 15 points each year for membership with a SelRes unit. This means, that under the current retirement point construct, members of the SelRes will meet the 50-point minimum for a qualifying retirement year by completing monthly IDT and earning membership points for being affiliated with a SelRes unit. This holds significance for our project as it implies that individual reservists could meet the criteria for a qualifying retirement year, regardless of participation in AT. This important distinction will be examined in greater detail in Chapter IV's stakeholder analysis.

### c. *Satisfactory Participation vs. Satisfactory Year*

The terms "satisfactory participation" and "satisfactory year" are also central to any discussion about AT participation. The distinctions between these terms, frequently labeled as "sat participation" and "sat year," are clear and separate. However, they are frequently subject to misinterpretation and confusion, even within the RC. "Sat participation" refers to meeting the required 48 periods of IDT and 14 days AT (not including travel) required by the MCRAMM and Title 10 U.S.C. A "qualifying" or "sat year," however, refers to an individual SelRes Marine earning the minimum of 50 points in an anniversary year to gain a qualifying year of service for retirement.

### d. *Reserve Component Utilization Authorities*

Section 12302 of Title 10 permits members of the Ready Reserve to be involuntarily ordered to active service, during a declared national emergency, for a period of not more than 24 months; see Figure 3. This type of active service is commonly referred to "activation," and constitutes the majority of ADOS-AC orders.
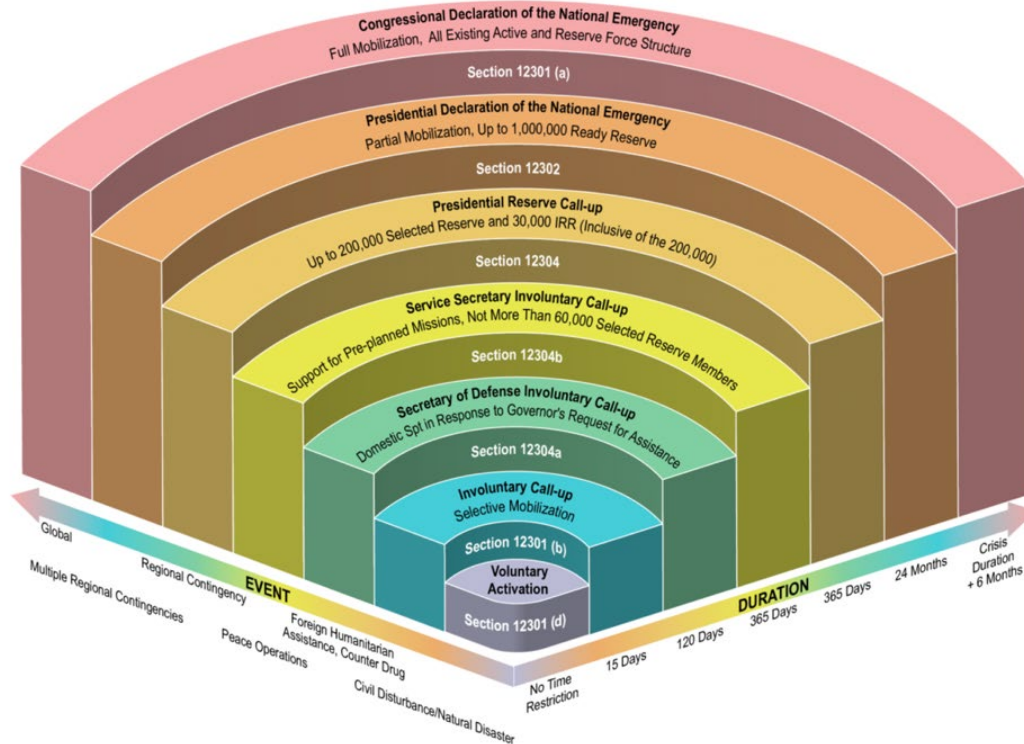
Figure 3.    Mobilization Authorities. Source: DON (2013).

Section 12304 of Title 10 permits members of the Ready Reserve to be involuntarily ordered to active service to augment active forces during a period other than war or national emergency, for a period not more than 365 days. Section 12304a permits such activation in response to a Governor's request for Federal Assistance during a major emergency, and Subsection 12304b is for preplanned missions in support of the combatant commands (COCOM). Defense Support of Civilian Authorities (DSCA) missions to aid in hurricane evacuation and recovery missions are one example of this.

Section 10148 of Title 10 permits that a member of Ready Reserve who fails to perform the annual training requirements stipulated in Subsection 10147, may be involuntarily ordered to active service to perform up to 45 days of training. This provision also states that if the failure to complete annual training occurs in the member's last year of obligated service, the period of obligated service may be extended to perform the additional period of AD for training, not to exceed six months. This section of Title 10 is not commonly evoked or widely known among the Reserve community. However, it is

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illustrative of the seriousness with which Congress has enacted the requirements of AT and provides important context to discussions about participation.

### 2. Marine Corps Reserve Administrative Management Manual

The MCRAMM is predicated on Title 10 U.S.C. and, "establishes and codifies the policies and responsibilities associated with the administration and management of SelRes personnel" (DON, 2018, p.1). This manual, widely disseminated across the Total Force, is the primary reference for unit level management of the United States Marine Corps Reserve (USMCR). The MCRAMM provides guidance regarding the IDT and AT requirements identified in Section 10147 of Title 10.

> Commanders may grant exceptions for individuals who are subject to the annual participation requirements provided that: (1) the number of unexcused absences does not exceed 9 scheduled IDT periods in the preceding 12 months; or (2) the member has performed an equivalent or greater amount of ADT/ADOS to the annual AT requirement. (DON, 2018, p. 4-3)

Only unit commanders may excuse an SMCR Marine from AT, and if excused, the MCRAMM states that the member will be notified in writing (DON, 2018). The significance of this provision, which allows ADOS to be used in lieu of AT, is a point of interest related to our inquiry of AT participation. The intent of this policy is to allow commanders the discretion to employ their Marines as they deem necessary to meet unit training and readiness requirements. Within SelRes, there are often unique constraints and restraints to each unit or individual's circumstance that preclude overly proscriptive policy. Although the authority granted to commanders permits ADOS to be used to meet AT requirements is warranted and necessary, it presents unique challenges in operational and financial forecasting for AT participation, which will be discussed further in Chapters IV through VI.

### E. 1108 RESERVE PERSONNEL, MARINE CORPS APPROPRIATION

The DON FY2024 PB Justification Book (J-book) states that the 1108 RPMC appropriation "provides the required resources to assure accomplishment of the Marine Corps Reserve mission to augment and reinforce the active component with trained units

and individual Marines as a sustainable and ready operational reserve…Funding is provided for pay, allowances, clothing, subsistence, gratuities, travel, and related expenses for personnel of the Marine Corps Reserve on active duty or undergoing Reserve Training, or performing drills or equivalent duty as authorized by law under Title 10, U.S.C" (p.7). The appropriation includes retirement fund contributions (RPA) and employer contributions to Federal Insurance Contribution Act (FICA) payroll taxes.

### 1.  Budget Line Items

The 1108 appropriation is comprised of specific budget line items (BLI) for ID and AD pay and allowances, per diem and travel, as well as other entitlements and incentives. Figure 4 depicts each BLI that comprises the 1108 RMPC appropriation and are detailed in the PB. The BLI's are subdivided into individual Pay Groups, which correspond to SelRes components as depicted in Table 1. It is important to note that AT for each pay group is a separate and distinct BLI from ADOS.
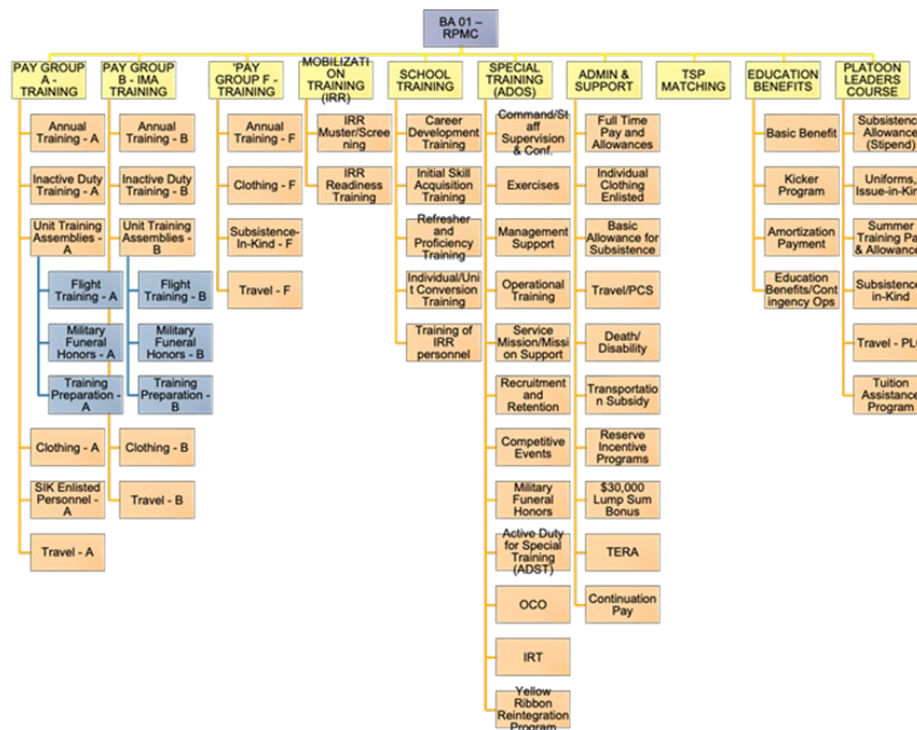


Figure 4.    1108 RMPC Pay Groups and Budget Line Items. Adapted from DON (2021, p. 18-23).

Table 1.    Table 1108 Pay Group Code

| Pay Group | SelRes Component |
|-----------|------------------|
| A | Selected Marine Corps Reserve (SMCR) |
| B | Individual Mobilization Augmentee (IMA) |
| F | SelRes personnel attending IADT |
| Q | Active Reserve |

### 2.    ADOS Budget Line Items

There are two types of ADOS, which are discretional BLIs under separate appropriations. ADOS-RC is within the 1108 RPMC appropriations and ADOS-AC is within the 1105 Military Personnel Marine Corps (MPMC) appropriation. It is important to note that ADOS-RC and ADOS-AC are not separated by Pay Group and are reported in different units of measure. The budget and expenditure of ADOS-RC for schools and special training contained in the J-book is reported in mandays and combines IRR, IMA, and SMCR. ADOS-AC is reported in work years under average end-strength in the MPMC J-books, which also does not differentiate between Pay Groups. *(Note: One manday represents of one day of work for one Marine, meaning that 365 mandays is the equivalent of one Marine for one year, or 365 Marines for one day each. One workyear is the full-time equivalent of one Marine for 365 days.)*

### 3.    1108 RPMC Appropriation History

The 1108 RPMC PB Requests have consistently increased from $650 million to nearly $900 million between FY2011 to FY2022, reflecting rising costs. However, Figure 5 demonstrates the increasing deviation between PB requests and actual execution that has occurred since 2019. From FY2011 to FY2016, the RPMC account was trending towards over-obligation, which was mitigated by reprogramming into the appropriation, as depicted in Figure 6. FY2016-FY2019 was generally stable, with the budget aligning with execution. However, the impact of the COVID-19 pandemic was dramatic, and the account has yet to return to pre-pandemic stability. In FY2020, Pay Group A significantly under executed because of training cancelations and travel restrictions which required $45 million in negative reprogramming (P&R, PowerPoint slides, November 15, 2022). However,

post-end of year execution of the FY2020 appropriation has required additional reprograming to increase the account to prevent an ADA violation (P&R, 2023). FY2021, saw $25 million of mid-year reprogramming into the account, but by FY closeout it had an unobligated asset of $21 million, even after $19 million had been reprogrammed to MPMC (P&R, PowerPoint slides, November 15, 2022). For FY2022, the total under-executed variance compared to PB was $74.7 million, which was an 8.5% deviation. Pay Group A accounted more than 50% ($47.9 million) of this variance to the PB. As result of the FY2022 budget performance, heavy negative marks were received for FY2023, totaling $79 million, leaving Pay Group A underfunded by $10–$20 million, based on costing forecasts (P&R, PowerPoint slides, November 15, 2022).
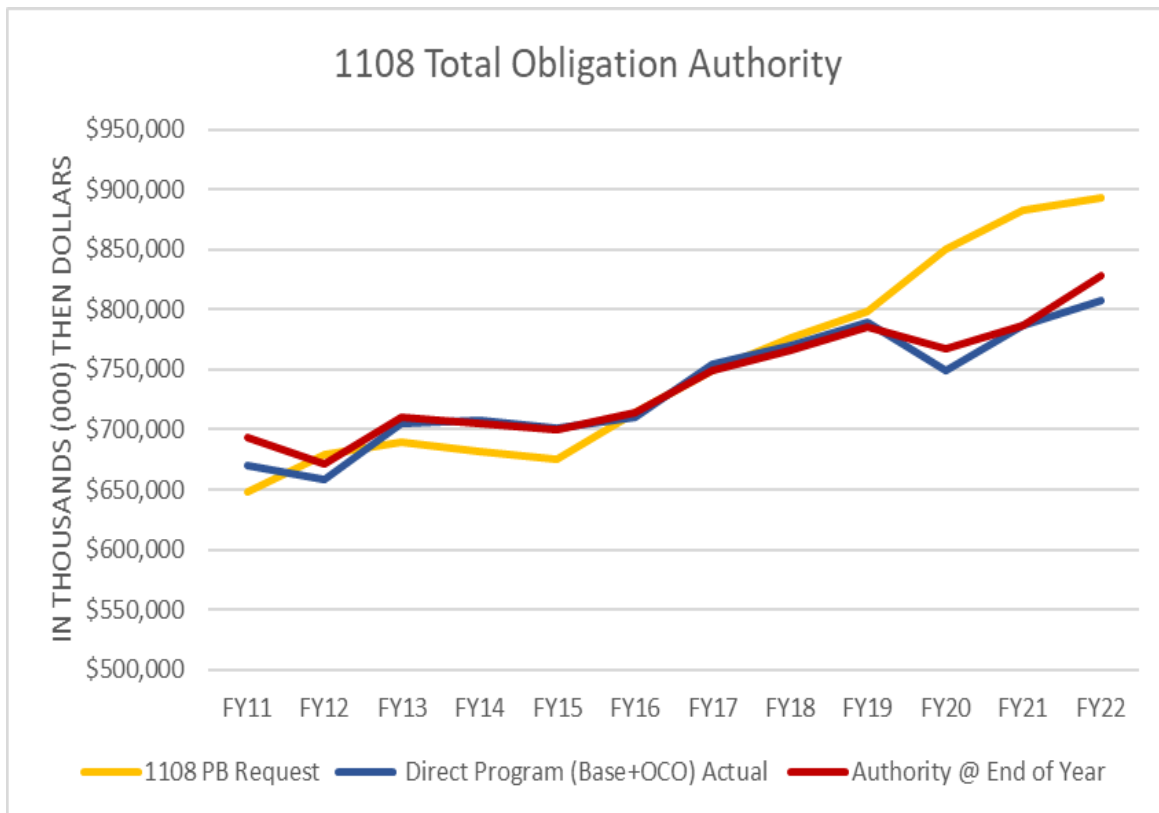


Figure 5.    FY2011-FY2022 1108 Total Obligation Authority. (All Pay Groups) Adapted from Programs and Resources [P&R] (2023).
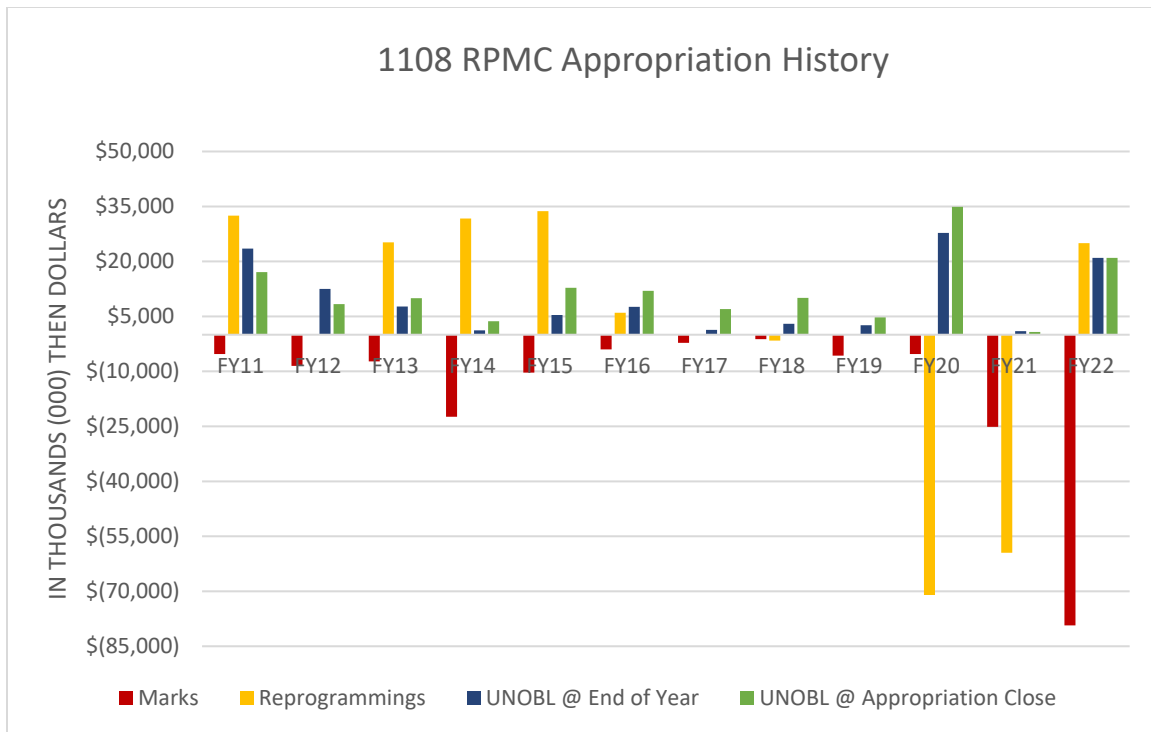
Figure 6.    FY2011-FY2022 1108 Appropriation History. (All Pay Groups)
Adapted from P&R (2023).

### a.    ADOS-RC Trends

Figure 7 contrasts FY2017-FY2022 Pay Group A AT mandays with the total ADOS-RC mandays for all Pay Groups. During this period there is an observable decrease in Pay Group A AT mandays and a corresponding increase in ADOS-RC mandays for all Pay Groups. Figure 8 depicts the same trend in total dollars, which ranges from approximately $40 million–$60 million. This inverse relationship between AT and ADOS has been recognized by P&R, and the apparent negative correlation has been suggested as a potential contributor to AT under-obligation. However, given that data related specifically to Pay Group A ADOS-RC is not readily available, further analysis or investigation has not been conducted.

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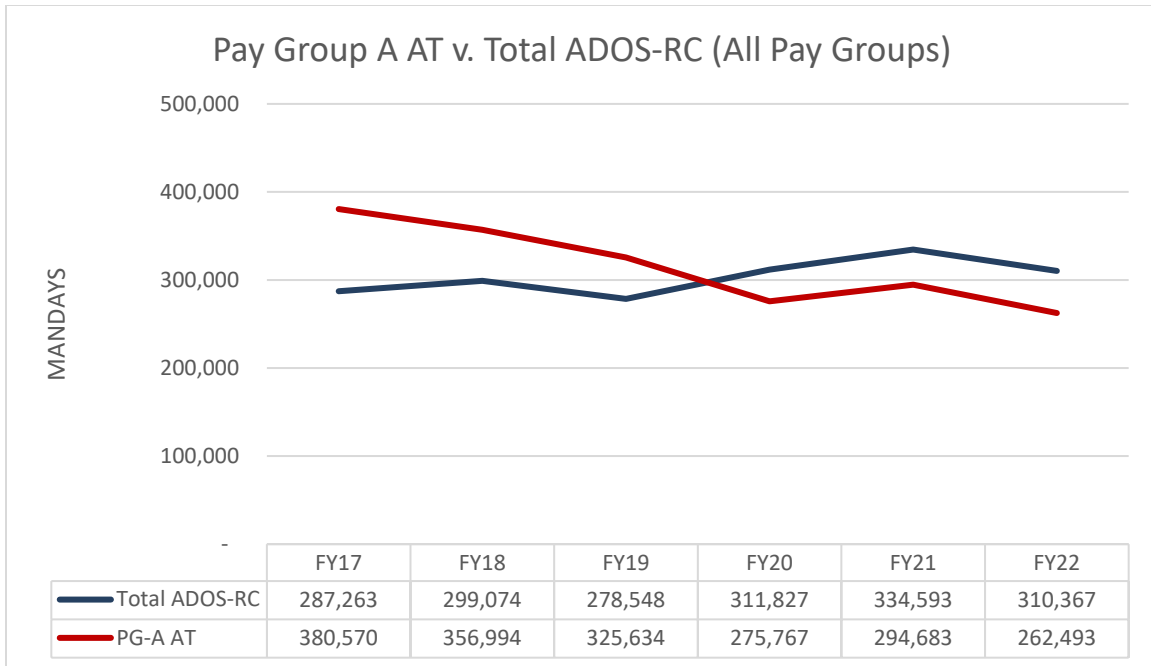
Figure 7.  FY2017-FY2022 Pay Group A AT v. Total ADOS-RC. Adapted from P&R (2023).

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| Total ADOS-RC | 287,263 | 299,074 | 278,548 | 311,827 | 334,593 | 310,367 |
| PG-A AT | 380,570 | 356,994 | 325,634 | 275,767 | 294,683 | 262,493 |
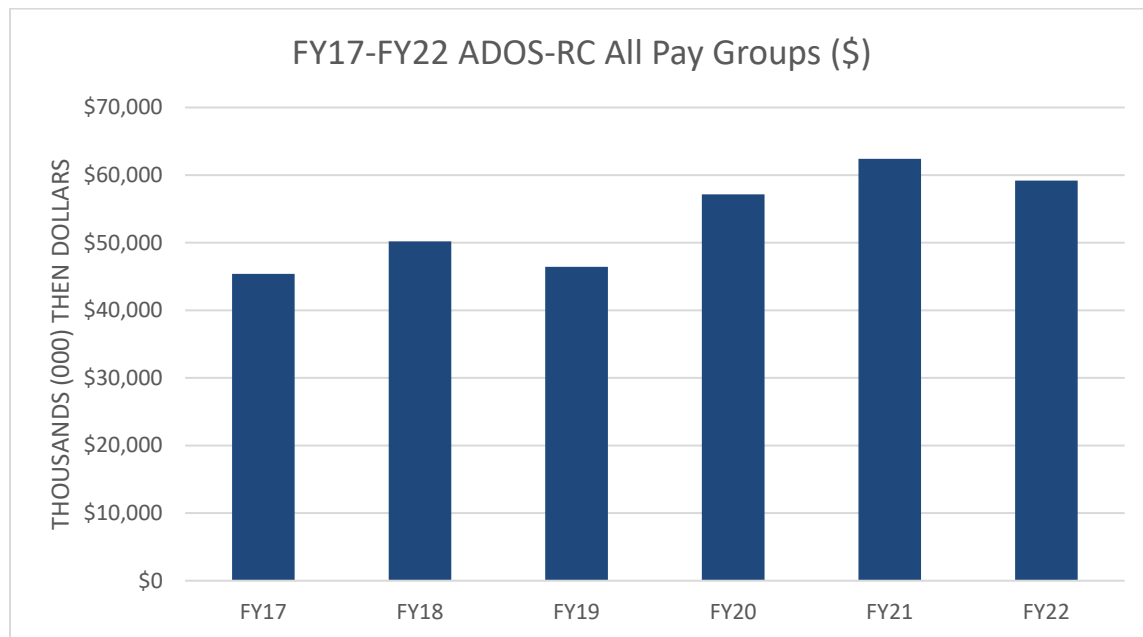


Figure 8.  FY2017-FY2022 ADOS-RC All Pay Groups ($). Adapted from DON J-books (FY2019-FY2024).

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### b. ADOS-AC Trends

Figure 9 depicts ADOS-AC workyears from FY2017-FY2022, which as stated, cannot be directly compared to mandays. However, there is a significant increase in ADOS-AC between FY2017 and FY2019, which corresponds to the decline in Pay Group A AT during the same period. As with ADOS-RC, a possible correlation between ADOS-AC and AT participation has been suggested, but the lack of equivalent units and Pay Group specific data has precluded further examination.

**ADOS-AC Workyears (All Pay Groups)**

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| ADOS-AC Workyears | 368 | 886 | 1,609 | 1,252 | 1,147 | 1,328 |
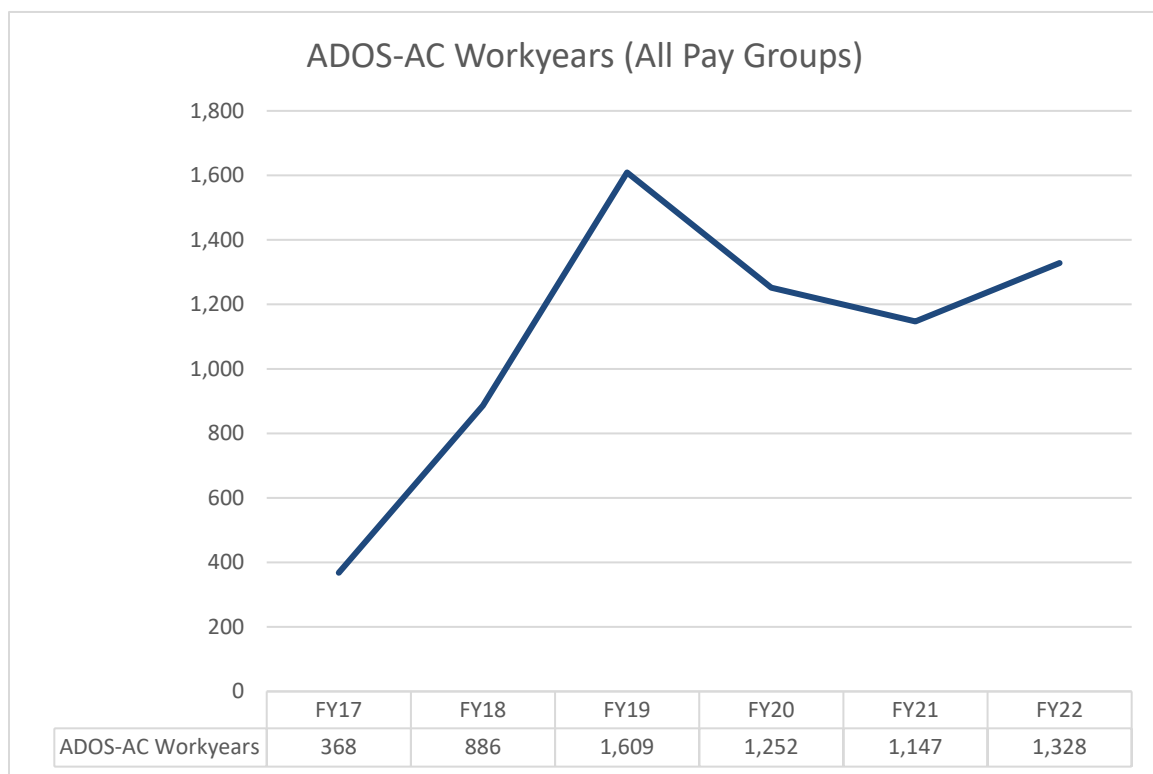
Figure 9. FY2017-FY2022 ADOS-AC Workyears (All Pay Groups). Adapted from DON MPMC J-books (FY2019-FY2024).

## F. MANPOWER AND BUDGET PLANNING PROCESS

The 1108 MILPERS budget is derived from the manpower and budget planning process, through which manpower requirements are identified and strength plans are developed. The primary stakeholders involved in the process are Combat Development and Integration (CD&I), Manpower and Reserve Affairs (M&RA), P&R, and Marine Corps

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Recruiting Command (MCRC). P&R is responsible for MILPERS cost forecasts, based on end-strength plans, but does not have direct involvement in establishing end-strength goals. MARFORRES has vested interest in the process, given that it is responsible for most of the personnel of the Marine Corps Reserve and the preponderance of the reserve mission. However, MARFORRES is not directly involved in manpower and budget planning process.

Manpower planning and budgeting is a cyclical and concurrent set of processes designed to translate service level strategic guidance into requirements for training, organizational structure, and equipment. Force Design and the Total Force Structure Process (TFSP) led by CD&I is the primary driver of manpower requirements. Through this process, staffing and manning levels necessary to accomplish the mission of the Marine Corps form the basis for accessions, promotions, and retention by grade and MOS (BPN, 2022). It is important to note that in the year of execution, actual average end-strength and reserve participation will drive financial expenditure by MARFORRES.

P&R is responsible for the full scope of the Marine Corps MILPERS Planning, Programming, Budgeting, and Execution (PPB&E) process, to include 1517 Administrative Funds Authority. 1517 Authority refers to the funds control responsibilities set forth in 31 U.S.C. § 1517, to include prevention of ADA violations (FMR, 2021). P&R develops the Program Objective Memorandum (POM) and PB request based on end-strength goals. Once the budget is enacted by Congress, P&R issues funding controls to MARFORRES via M&RA, in both dollar amount and mandays. In the year of execution, P&R uses the monthly on-hand strength report from M&RA and actual financial execution data to generate a revised financial position forecast within the costing model.

The difficult recruiting and retention environment, particularly since the COVID-19 pandemic in FY2020, has resulted in a widening gap between the authorized end-strength and the actual on-hand strength. Inflation has caused total MILPERS costs to rise even as end-strength has decreased, as depicted in Figure 10. Regardless, the growing delta between planned and actual end-strength appears to be corealated with increased negative marks and reprogrammings, as depicted in Figure 11.

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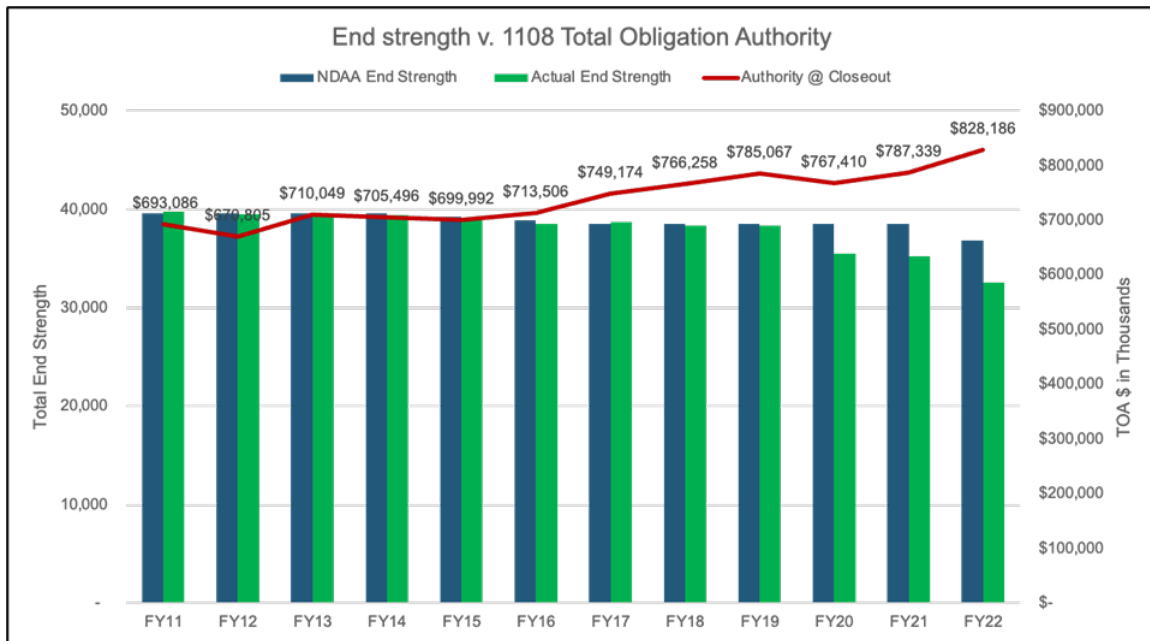
Figure 10.   FY2011–FY2022 End Strength vs. Total Obligation Authority.
Adapted from (J-books, 2012–2023).
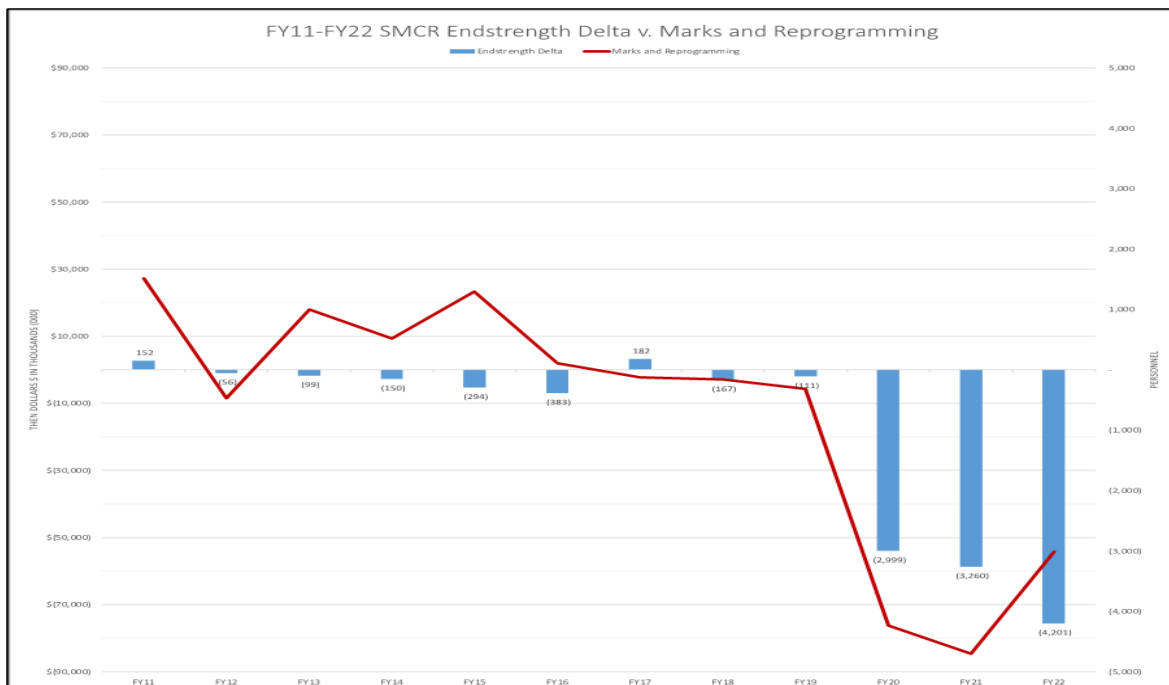


Figure 11.   FY2011–FY2022 SMCR End-strength Delta v. Marks and
Reprogramming. Adapted from P&R (2023).

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## G.    CHAPTER SUMMARY

The United States Marine Corps RC's mission is to "augment, reinforce, and sustain the AC with trained units and qualified individuals in times of war or national emergency and at other such times as national security may require" (DON, 2018, p. 1-1). Our project centers on SelRes, specifically SMCR (Pay Group A) within the SelRes population. Title 10 U.S.C. is the legal statute that governs all aspects of the United States Armed Services, and Subtitle E pertains specifically to the RC. The MCRAAM is the primary reference for unit-level management of the USMCR. AT consists of 14 days of ADT and is required for members of the SelRes. The two types of ADOS are ADOS-RC, which is funded through 1108 RPMC, and ADOS-AC, which is funded through 1105 MPMC. A provision within the MCRAMM permits members to perform an equivalent or greater amount of ADT/ADOS to substitute the AT requirement. Marines who successfully meet either of these requirements can be said to have met the "legal" participation requirement. The 1108 RMPC appropriation consists of pay, allowances, clothing, subsistence, gratuities, travel, and related expenses for Reserve personnel while on AD for AT, IDT, or equivalent duty as authorized by law under Title 10 U.S.C. The two BLIs relevant to our project are AT and ADOS. Over the past decade the appropriation has experienced significant volatility.

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# III. LITERATURE REVIEW

This literature review examines various aspects related to 1108 RPMC MILPERS appropriation, and its implications for P&R and MARFORRES. The intent is to establish a connection between the RC, increasing personnel costs, and previous research on manpower forecast models.

## A. MILITARY PERSONNEL APPROPRIATIONS

Military personnel budget appropriations provide financial resources to support the compensation of military personnel, encompassing pay and allowances, subsistence for personnel, funding for permanent-change-of-station travel, and other related costs. The increasing costs of military personnel is a growing concern for the Department of Defense. Daniels's (2021) report in the Center for Strategic & International Studies observed military personnel trends in data ranging from FY1985 to FY2021. Daniels found that between FY2000 and FY2012, the average cost per service member increased 64% adjusted for inflation, or at a compound annual growth rate of 4.2%. In contrast, between the years of 1985 and 2000 the compound annual growth rate was 2.2%. Some of the cost drivers included the increased ratio of officers to enlisted personnel, military pay raises above the Employment Cost Index (ECI), and an increased housing allowance. Daniels (2021) stated, "Left unaddressed, high personnel costs may limit resources for Department of Defense (DOD) modernization initiatives and could threaten the long-term sustainability of the force" (p. 1). This is consistent with a report from the United States Government Accountability Office [GAO] (2009), which stated in its opening letter to Congressional Committees, "In 2005 and 2007, we assessed the active duty and reserve compensation systems and found the cost to provide compensation was substantial and rising" (p. 1). Budget constraints, rising healthcare and benefit expenses, retirement obligations and other financial concerns all highlight the importance of effectively managing the military personnel appropriation.

In a 2023 RAND report, Conley et al. researched historic MILPERS spending in the Air Force. The authors state that,

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Spending on MILPERS has grown at an average annual rate of 3.3 percent per year since fiscal year (FY) 2000, to approximately $36 billion in 2021. Growth in MILPERS spending at this rate threatens to undermine readiness and crowd out future efforts to modernize key military capabilities. (p. iii)

This supports the trend we have observed, that although the total average end-strength is decreasing, personnel costs and the 1108 appropriation continue to grow.

The Congressional Budget Office (CBO) has also studied increases in personnel costs while addressing other budget factors in their report of the long-term implications of the 2023 future years defense program. The CBO (2023) stated that,

Although total [operating and support] O&S funding would be $12 billion lower in 2027, military personnel costs would be $12 billion higher; those costs would increase sharply in 2024—by $10 billion—and then rise by an additional $2 billion for 2025 through 2027. (p. 9)

This report highlights that military personnel costs are going to continue to increase. This implies that financial managers need to effectively manage these costs to ensure fiscal resources are not lost or mismanaged, which could severely impact mission readiness and financial stability within the United States Marine Corps and DOD writ large.

In addition to the rising costs, the challenges of effectively managing MILPERS appropriations was demonstrated in a 2012 study by the Department of Defense, Office of Inspector General [IG], which reported ADA violations within various Military Departments. In its report, the IG stated,

We recognize that the MILPERS appropriations do not have the same operational flexibility as most DOD appropriations. However, reducing the risk of future ADA violations in the MILPERS appropriations depends principally on implementing strong automated procedures and controls over establishing financial obligations as well as the prompt and accurate recording and reporting of execution information. (p. 13)

In essence, the statement by the IG highlights the need for strong internal controls in the management of MILPERS appropriations, particularly to mitigate the risk of ADA violations.

## B.    FACTORS THAT IMPACT RESERVE OPERATIONS AND BUDGET

### 1.    Strategic Versus Operational Reserve

The notion of an active operational reserve, involving the routine and regular involvement of Reserve forces in ongoing military missions, is perceived as a relatively modern advancement. This idea of an "operational reserve," differs from an earlier perspective that predominantly regarded the RC as a "strategic reserve," which was primarily tasked with augmenting and reinforcing the AC during large-scale wars. Wormuth et al. (2006) outlined the major events that helped spark the transition from a "strategic reserve" throughout the cold war, in which the RC forces were organized, trained, and equipped to support the AC in large-scale conventional campaigns, to an "operational reserve" stemming from the summer of 1990, when President George H.W. Bush mobilized much of the RC as the U.S. prepared for Operation Desert Storm.

The increasing reliance on reservists' helped facilitate the AC in peacekeeping missions around the world in the 1990s and grew exponentially following the terrorist attacks on the World Trade Center and Pentagon on September 11, 2001. According to Wormuth et al. (2006),

> While, during the 1980s, the number of duty days served by RC members was about a million days per year, from 1996 to 2000, the average annual number of duty days climbed to about 12 million. The RC, or at least parts of it, seemed to be taking on a more operational role. (p. 2)

This change in reserve utilization forced policymakers to decide if the U.S. should continue to rely more heavily on the RC in the coming years as it would require allocating additional resources.

Total Force integration between the AC and RC comes with an increased demand on resources. While this integration enhances the operational capabilities of the Total Force, it also creates new demands and requirements that may lead to increased financial resources for the Reserves. The expanded scope of responsibilities may necessitate additional funding for joint exercises, deployment for training, humanitarian support, and participation in regional partnerships like UNITAS. While these activities contribute to achieving and sustaining strategic objectives, they also require adequate funding to ensure

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the readiness and training of Reserve units and personnel. As MARFORRES seeks to effectively support the AC and fulfill its mission of augmenting active forces during crises and global engagements, ADOS utilization may increase. In short, proper financial planning and resource allocation between AT and ADOS is critical to ensure that the Marine Corps Reserve maintains its operational readiness and effectively fulfills its obligations within the context of the Total Force integration.

### 2.     Individual Factors Affecting Marine Corps Reservists' Affiliation

DiRenzo and Aten (2015) conducted a mixed-method study that included interviews and a survey to gain a deeper understanding of individual reservist's motivations and rationale for affiliating with the Reserve. Their work was a continuation of the contributions of Volkmann et al. (2014). Phase I included semi-structured interviews with former USMC reservists. Phase II of the study consisted of a survey of Reserve Marines who had a remaining contractual service obligations and those that did not; commonly referred to as obligors and non-obligors. The survey addressed the themes of relationships, opportunities, and role conflict, while also assessing the influence of financial incentives in re-affiliation decisions. The findings of DiRenzo and Aten (2015) suggested that financial incentives had little effect on re-affiliation decisions. Rather, intentions to remain affiliated with the Reserves was correlated with stronger feelings of meaning/purpose and participation in worthwhile training exercises. Furthermore, the authors observed that interview subjects repeatedly communicated their disappointment in having limited opportunities to conduct interesting training exercises or lacking the funds to acquire sufficient training:

> As such, it may be more valuable, and potentially less costly, if the USMCR redirect funds away from re-affiliation bonuses and use that money to provide better training exercises and opportunities. Essentially, it appears that Reservists would rather do meaningful, fun, and genuinely 'Marine' activities, than be paid more money… As such, it is recommended that the USMCR dedicate greater fiscal resources toward providing Reservists with the experience they signed up for rather than using those resources as a means to retain unsatisfied workers. Put simply, use funds to make the job more enjoyable and the need to offer bonuses will be significantly reduced. (pp. 23–24)

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The logical connection between the work of DiRenzo and Aten (2015) and our project lies in the individual factors that influence USMCR Marines. The block quote above essentially states that Marines want to conduct meaningful training. DiRenzo and Aten(2015) found that interesting and meaningful training is an incentive that influences retention. Given this finding, it is possible that a similar correlation exists between worthwhile training and AT participation.

## C.    SELECTED MARINE CORPS MANPOWER FORECASTING

MILPERS budgeting is predicated on personnel endstrength and manpower planning. There is some existing literature that pertains directly to forecasting and modeling SMCR Manpower. While literature related to AT is limited, there is a study specifically on AT participation within the Navy Reserve.

Licari's (2013) thesis aimed to develop a manpower planning model for prior service and non-prior service SMCR officers. The study examined data from September 30, 1998, through October 31, 2012, in the SMCR officer population. Licari (2013) highlighted the growing use of Markov models in manpower planning, due to their accurate and mathematical ability of modeling the behavior of a system. Information from this study is relevant to our research because it demonstrates the growing need to accurately forecast manpower. Licari (2013) stated:

> Consistency and accuracy are important because budget planners and recruiting command rely on manpower estimates during the fiscal year. In fact, Programs and Resources (P&R), Marine Corps Recruiting Command, and Manpower & Reserve Affairs all rely on the most accurate manpower estimates to conduct programming, budgeting, mission planning, and execution. (p. 47)

A relevant takeaway from this study addresses the impact of seasonality. In his literature review, Licari (2013) cited the work of Bruce Erhardt Jr., who developed a Markov model to determine continuation rates for prior service and non-prior service enlisted population in the SMCR. Erhardt (2012) discovered his model that used annual aggregate monthly transition rates did not satisfy the stationarity assumption required of Markov models. Licari pointed out that although Erhardt's use of the Markov model was

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sound, it did not incorporate monthly transition probabilities (seasonality). Licari noted that attrition is cyclical, and a large percentage of Marines join during the June-September months. Using seasonality in a forecast model is beneficial because execution of AT has a discernable seasonal component, with most of the execution occurring during the summer months. Despite the emphasis on seasonality, Licari's research concluded that the FY2012 aggregate monthly rate model performed the best.

Streetzel (2018) also explored ways to estimate the future population of the SMCR. Streetzel identified that future SMCR population comes from two distinct subsets: the known population, and unknown population, which consists of personnel who are not part of the known population but will be during the period of interest. This is similar to our study, in that we have two distinct subsets of AT participants: Those who have met legal requirement, and those who have not. Due to significant variability and factors outside manpower planners' control, it is difficult to accurately assess the unknown population. Instead, Streetzel focused on constructing an algorithm that improved M&RA's forecast models on the known population. He goes on to state limitations of past studies which used Markov modeling techniques. The first is that they are limited to a few explanatory variables. The second is that the Markov modeling techniques are limited by the need for relationships to remain constant over time. Streetzel also highlighted the limitations observed in previous projection models regarding accuracy, seasonality, and the utilization of available data, needed for an improved approach to support decision-making within the M&RA context. Furthermore, his research utilized decision trees to mitigate uncertainty in projections, which aids future decision-making in the field of recruiting, retention, and budgeting.

## D. RESERVE ANNUAL TRAINING PARTICIPATION

In the context of the Naval Reserve, Cornwall and Council (2017) explored a model to forecast the participation rate for AT based on dollars expended, and average dollar rate for each AT. In the process they observed a similar volatility issue of the relationship between participation rates and AT dollars executed. The goal of their thesis was to create a model that accurately forecasts SELRES participation rates to more accurately predict

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the cost of AT requirements. Cornwall and Council (2017) also provided relevant information in their methodology and budget rate formula. Total cost of AT was divided by total mandays, which equaled the daily rate. This daily rate was multiplied by 15 to account for total days reservist would conduct AT. Cornwall and Council (2017) then used various forecasting models to determine which model would best predict funding for AT. The authors go on to explain how they used the Moving Average, Weighted Moving Average, Exponential Smoothing, Linear Trend Analysis, and Seasonality Analysis models to find which best facilitated budgetary planning. Through their detailed analysis, Cornwall and Council (2017) determined that the Seasonality Analysis forecast model was the best predictive model that projected AT execution rates. Using seasonality in a forecast model is beneficial because AT has a discernable seasonal component, with most of the execution occurring during the summer months.

## E.     KNOWLEDGE GAP IN LITERATURE

While research has been conducted investigating forecasting models that seek to improve end strength projections (Licari, 2013; Streetzel, 2018), outside of Cornwall and Council (2017), there remains a clear lack of knowledge in the ability to forecast AT in the year of execution. The complexity and unique nature of this problem, across multiple organizational stakeholders, has likely contributed to a lack of specific research on the subject. Although MILPERS has been extensively studied, much of the research and analysis has focused on broad implications to the DOD, primarily related to the active component. Research addressing the Total Force is generally focused solely on cost comparisons between components and not budget performance. While existing research tangentially addresses some aspects of Reserve manpower budgeting, there is not a holistic examination of the causal factors of the Marine Corps Reserve MILPERS budget costing process and budget execution volatility. The current manpower budget costing model used by P&R is based on historic financial data, however, accurately forecasting AT in the year of execution remains a challenge. This suggests that there are factors contributing to volatility that are outside of the costing model, or randomness that is distorting projections. To identify these factors, our next chapter consists of a stakeholder analysis which seeks to understand the perspectives of P&R, MARFORRES, and individual reservists.

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# IV. STAKEHOLDER ANALYSIS

## A. INTRODUCTION

The primary stakeholders in this study are P&R, MARFORRES, and SMCR Marines themselves. These stakeholders were selected because they have direct interest in AT, yet possess distinct barriers, risks, and incentives that align in some areas and diverge in others. In the case of P&R and MARFORRES, they employ different data analysis tools and methods to track and forecast budget performance. Of particular importance, all three stakeholders have different perspectives on AT participation.

The data collection methods used for the stakeholder component of our project consisted primarily of informal interviews, personal communication, and document analysis. Interviews and personal communication were conducted with the selected stakeholders from M&RA, P&R RFM, and MARFORRES in compliance with NPS Institutional Review Board protocols. During the informal interviews, we had the opportunity to directly interact with the stakeholders to gather their perspectives, insights, and experiences related to manpower planning, budget execution, and data collection tools for Reserve AT. Additionally, one of the authors has personal insight from serving in the SMCR for five years in various roles and is currently affiliated with the Active Reserve.

## B. PROGRAMS AND RESOURCES FINANCIAL MANAGEMENT BRANCH

As discussed in Chapter II, P&R RFM is responsible for the 1108 RPMC PPB&E process, to include the prevention of ADA violations under 1517 Authority. Their focus is on producing budget estimates, requests, and exhibits to support Reserve manpower requirements across the Future Years Defense Program (FYDP) and adjusting costing forecasts based actual expenditure in the year of execution. They are continuously monitoring changes in end-strength as well economic variables that impact the performance of the appropriation. Projected end-strength and reserve participation rates are the primary cost drivers in forecasting the end of year financial position and are critical to the mid-year and omnibus reprogramming process. P&R has recognized that the inability to reliably forecast AT execution has caused under-execution in recent years, prompting

negative Congressional budget marks that could threaten individual, and unit, readiness if training is cancelled. P&R's goal is to be able to forecast the AT ending position at MYR within a 5% margin of error (P&R, PowerPoint slides, January 19–20, 2023).

### 1. Reserve Personnel Marine Corps Manpower Budget Model

MILPERS budgeting is impacted by a set of cost drivers that are distinct from the procurement of materiel and services, particularly for Reserve personnel. The primary cost drivers of MILPERS, whether AC or RC, are the on-hand end-strength of personnel, and economic cost variables such as pay rates and inflation. The RC, however, has a third variable that complicates the equation, which is the participation rate of reservists. At its core, the RPMC manpower budget model, particularly in its connection to AT, can be summarized as follows:

$$\textbf{\textit{Endstrength} } \times \textbf{ \textit{Cost per Marine} } \times \textbf{ \textit{Participation Rate}}$$

These high-level cost drivers, which can be decomposed into more granular variables, provide a useful construct for introducing the organizational stakeholders, sources of volatility in the MILPERS budget, as well "levers" for MILPERS budget forecasting and execution. The following paragraphs provide greater detail into their influence on the budget model.

### a. End-strength

End-strength is the aggregate total of personnel plus the in-flow of new accessions, minus outflows from attrition. For budgeting purposes, end-strength is often represented as the average on-hand strength for a month or year. For a given end-strength population, the distribution of grade and time in service significantly impacts total personnel costs, referred to as "grade and longevity." Manpower strength plans, which determine the required number of personnel by grade, are developed through the manpower and budget planning process to meet service-level strategic objectives.

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### b.    Cost

The cost variable of the MILPERS equation refers to the dollar rate per Marine, which for AT, primarily includes pay and allowances and per diem and travel. Pay and allowances include base pay, RPA and FICA contributions, basic allowance for housing (BAH), basic allowance for subsistence (BAS), and any special pay. Annual guidance for rate changes is provided by the Office of the Secretary of Defense (OSD) for budgeting purposes and are included as "economic assumptions" in the PB Justification Book. Travel costs for AT include the travel from the member's home record to their assigned Reserve home training center (HTC) and/or to the location of the training event. Travel costs are highly dependent on the operational training plan and can vary widely based on the location, distance, and modes of travel. Changes in fuel costs, air fare, and other market conditions have a significant impact on total cost. Other costs associated with Pay Group A include clothing and subsistence in kind (SIK), but these are typically forecasted as fixed costs that do not fluctuate significantly year-over-year.

### c.    Participation Rate

The third component of the RMPC AT budget model is participation. Whereas AC MILPERS costing can assume full-time equivalent of workyears based on end-strength, the part-time nature of the RC means that most RPMC AT costs are only incurred when Marines are on active orders. The following AT participation rate formula is calculated by P&R and included in the PB J-books:

$$AT\ Participation\ =\ \frac{Total\ AT\ Mandays}{Avg\ Endstrength\ X\ 15}$$

The participation rate derived from this formula represents the proportion of AT mandays used out the total possible AT mandays available, based on average end-strength. (The multiple of 15 accounts for a day of travel). Figure 12 shows the FY2015-FY2022 annual AT participation rate for Pay Group A, which has averaged ~72% and is trending downwards.

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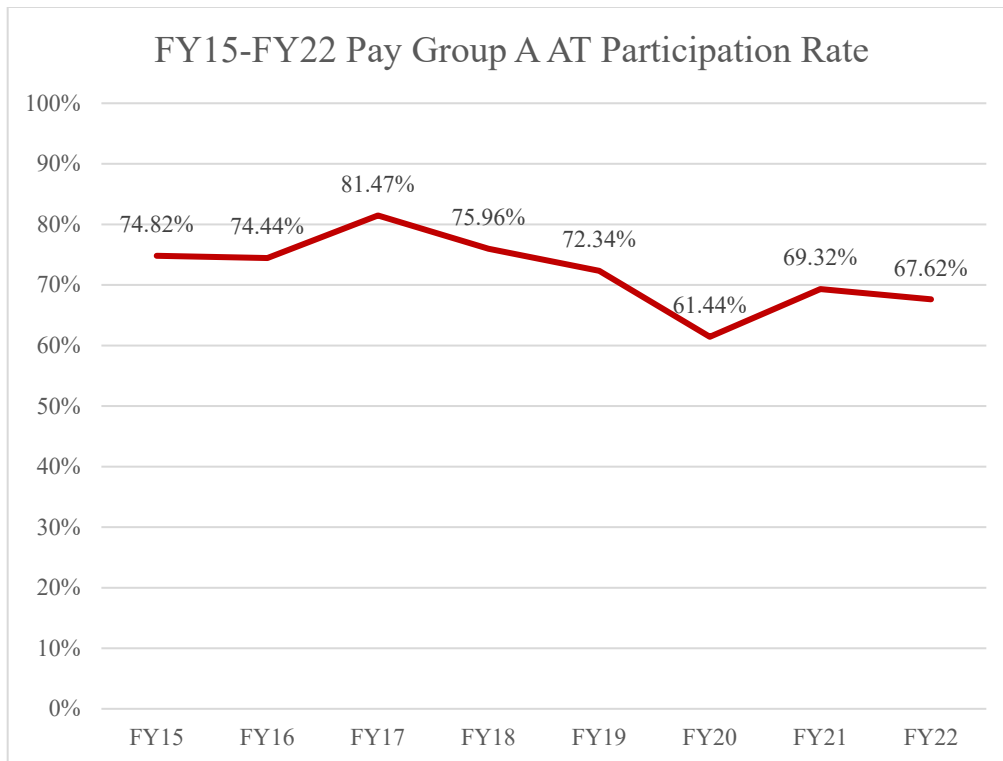
Figure 12.  FY2015-FY2022 Pay Group A AT Participation Rates. Adapted
from DON RPMC J-book(2017-2024).

### 2.  AT Participation Perspective: AT "Pure"

It is essential to note that the AT participation rate calculated by P&R is an expression of AT manday usage and not the proportion of individual Marines who have fulfilled the annual requirement of 14 days of active duty for training in accordance with Title 10 and the MCRAMM. For this reason, it is commonly referred to as AT "pure" participation to signify the relation to the AT BLI only. From a financial management perspective, it is irrelevant whether individual Marines have completed more or less than 14 days. Tracking and reporting aggregate BLI execution is what is required of P&R.

### 3.  Barriers and Risks

The following section describes and explains the barriers and risks that P&R faces in the effective management of the 1108 RPMC appropriation.

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### a. Principal Agent Problem

The first barrier is a form of moral hazard similar to that of the Principal Agent Problem. This dilemma arises when an "agent" has "control over resources that are not their own," but do not have the proper obligation to act within the best interest of the "principal" who owns the resource (Johnson, n.d.). In this case, P&R is the "principal" which assumes the fiduciary responsibility for the execution of the 1108 appropriation as the 1517 Authority, yet other "agents" within in the organization control these resources, both directly and indirectly, without assuming the risk. A case can be made that there two principal agent problems facing P&R. One exists in the relationship with M&RA regarding manpower planning and the other with MARFORRES regarding budget execution. As discussed in the background, CD&I establishes the Reserve end-strength requirements, from which M&RA develops the manpower plans for recruiting and retention to meet end-strength goals. Based on this goal, P&R submits a budget request to Congress and then is held accountable for budget performance when funds are enacted, to include any ADA violation that may arise. End-strength is the primary driver of MILPERS execution, but M&RA is not accountable for budget performance, despite having the primary responsibility over requirements and the execution of manpower plans. Under this construct, there is the potential for excessive budget risk to be assumed in manpower plans. The disconnect between authority and risk within the Marine Corps manpower budgeting process was the focus of Barry and Gillikin's (2005) study, which examined the risk of having planning and budgeting under two separate commands. An additional risk of this organizational structure separating P&R and M&RA is that there are limited "levers" to quickly obligate surplus funds in the form of bonuses or other vehicles. Regarding budget execution, funds are held by P&R, but controlled by MARFORRES through the execution of Pay Group A IDT and AT. Again, P&R assumes the fiduciary risks as the 1517 authority.

### b. Deviation from Future Years Defense Program in the Year of Execution

As we have discussed, manpower plans developed across the FYDP may or may not correlate to the actual end-strength or grade and longevity inventory in the year of execution. In the same manner, operational and emerging requirements may arise in the

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year of execution that were not anticipated in the budget plans. Compounding this problem is the fact that the majority of AT occurs during the fourth quarter of the FY, which leaves little to no opportunity to reprogram if execution deviates from earlier estimates. Figure 13 illustrates that the majority of AT mandays occur in quarter four, which requires high-fidelity in MYR forecasting to prevent significant under-performance and excessive late-year reprogramming.

### % of Fiscal Year AT Man Days (By Month)

| FY | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | 0.01% | 0.14% | 0.36% | 0.96% | 0.93% | 1.23% | 1.81% | 3.05% | 42.82% | 25.55% | 21.30% | 1.86% | 100.00% |
| 2015 | 0.19% | 0.24% | 0.12% | 0.55% | 0.80% | 1.25% | 4.04% | 7.36% | 50.28% | 21.80% | 12.08% | 1.29% | 100.00% |
| 2016 | 0.92% | 2.02% | 0.94% | 3.74% | 1.42% | 3.37% | 3.37% | 3.71% | 36.28% | 22.80% | 19.88% | 1.57% | 100.00% |
| 2017 | 0.12% | 0.06% | 0.43% | 3.06% | 2.70% | 2.13% | 4.22% | 7.15% | 40.57% | 24.04% | 12.71% | 2.80% | 100.00% |
| 2018 | 0.48% | 0.19% | 1.65% | 2.31% | 4.00% | 2.85% | 4.01% | 5.57% | 44.26% | 18.81% | 14.28% | 1.59% | 100.00% |
| 2019 | 1.66% | 2.99% | 1.45% | 2.04% | 2.64% | 6.33% | 2.35% | 4.28% | 41.00% | 19.26% | 13.73% | 2.26% | 100.00% |
| 2020 | 0.71% | 1.18% | 0.92% | 2.64% | 2.16% | 3.41% | 0.80% | 0.23% | 0.93% | 30.39% | 46.23% | 10.39% | 100.00% |
| 2021 | 1.10% | 1.05% | 0.55% | 0.41% | 0.77% | 1.76% | 2.70% | 9.88% | 11.35% | 33.03% | 34.24% | 3.17% | 100.00% |
| 2022 | 0.24% | 0.19% | 1.02% | 0.39% | 1.63% | 2.68% | 2.68% | 4.47% | 23.02% | 31.25% | 24.63% | 7.80% | 100.00% |
| Total | 0.58% | 0.87% | 0.81% | 1.84% | 1.92% | 2.74% | 2.96% | 5.16% | 33.84% | 24.79% | 21.14% | 3.34% | 100.00% |

Figure 13. Percentage of AT Mandays by Month. Source: (Marine Forces Reserve [MARFORRES] PowerPoint slides, January 27, 2023).

### c. Forecasting Model Limitations

Current AT forecasting models are based on historical regression analysis from prior year AT "pure" rates with monthly costing updates based off budget execution data. To produce 1108 MILPERS budget estimates across the FYDP and to reconcile current year actuals, P&R uses an IBM TM1 (Table Manager 1) model, which is a functional database model designed for analyzing large volumes of multidimensional data (IBM, n.d.). Within TM1, the budget analyst inputs economic rate assumptions, end-strength and grade/longevity plans, and the number of drills and AT. The TM1 model output will calculate basic pay, RPA, FICA, BAH, BAS, participation rates, with the estimated total cost and number of mandays. The monthly costing reconciliation is based on paid obligations posted to the financial accounting system and does not account for known pending obligations. As with any historical regression, it is only as accurate in as much as

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the future looks like the past. This requires considerable "art" and professional experience on the part of the analyst to adjust and modify input rates to account for known anomalies in the historic data or extenuating events such as COVID, natural disasters, large scale activations, etc.

### d.    *Antideficiency Act Risk*

The primary risk for P&R, as we have alluded to, is the risk of committing an ADA violation in which financial obligations exceeds the amount appropriated Congress. The Deputy Commandant of P&R is accountable for the 1108 appropriation under the 1517 Authority but given M&RA's role in setting manpower strength plans, and MARFORRES' expenditure of funds via IDT and AT execution, P&R has no direct control over budget performance beyond reprogramming. This dynamic has the potential to lower the risk tolerance in the management of the budget for fear of over-obligation. In 2002, following a rapid and chaotic surge of Reserve activations in the wake of 9/11, P&R was found liable for an ADA violation exceeding $20 million in 1108 RPMC (IG, 2012). In large part, much of the current costing and reconciliation procedures are the result of corrective action from that violation.

### e.    *Budget Risk (PPBE/Congressional Marks)*

On one hand, the risk of ADA violation may incentivize P&R to retain an excessive reserve of funds, and yet the potential for under-obligation presents another risk in the form of negative Congressional budget marks. As we've demonstrated in Chapter II, the recent history of the 1108 appropriation has been characterized by an inability to appropriately reprogram at MYR, which resulted in heavily budget marks in subsequent years in response to under execution.

## C.    MARINE FORCES RESERVE

In contrast to the budgetary concerns of P&R, MARFORRES is primarily concerned with meeting the operational requirements of the Reserve mission. The mission of MARFORRES is "to augment and reinforce active Marine forces in time of war, national emergency or contingency operations, provide personnel and operational tempo relief for

the active forces in peacetime, and provide service to the community (United States Marine Corps, n.d.).” According to the mission page, MARFORRES has a “talent pool of roughly 100,000 Marines [including IMA and IRR], to augment the AC in a myriad of ways; from support to training, to participation in bilateral exercises with our partner nations and allies, to service-level experimentation and refinement of new tactics, techniques, and procedures” (n.d.). In the context of AT participation and forecasting, the primary concern of MARFORRES is to ensure Marines are meeting their AT requirements in support of the Reserve Mission. However, considering the recent budget volatility in 1108 RMPC, there has also been an increased incentive for MARFORRES to develop detailed and accurate AT spending forecasts in the year of execution. MARFORRES has the dual requirement to forecast the AT participation of individual Marines and to forecast the number of AT mandays that will be used. However, two different AT participation constructs are needed to meet each of those requirements.

Informal interviews and personal conversations with representatives from MARFORRES in the Operations and Comptroller offices provided the basis for the following analysis.

### 1. AT Participation Perspective: “Legal” Requirement

The term “legal” requirement is commonly used in the Reserve community to refer to meeting the participation requirement of Title 10, which as we’ve discussed, may be fulfilled through AT or ADOS according to the MCRAMM. Unlike AT “pure,” which pertains to manday utilization, “legal” requirement pertains to the activity of individuals. This definition of participation produces a binary metric of whether an individual did or did not complete 14 days of active duty within a given fiscal year, regardless of duty type. It does not account for individuals who may have completed a period of active duty less than 14 days. Conversely, it also does not account for those who may have completed more than 14 days. The metric of “legal” requirement participation is useful for managing personnel activity to determine who has fulfilled the minimum requirement, but it is insufficient for determining the number of AT mandays that are needed in a given year.

## 2. Barriers and Risks

The following section describes and explains the barriers and risks that MARFORRES faces in effectively forecasting and managing AT participation.

### a. *Historically Inaccurate AT Participation Forecasting*

MARFORRES has not historically applied a standard methodology or business process to forecasting AT participation rates. Methods for generating MYR deliverables were often ad hoc and not aligned with the format or details required by P&R. Various approaches were attempted to estimate AT participation to generate cost estimates, but were often inaccurate for a variety of reasons, whether based on flawed assumptions or a lack of sufficient and accessible data. There is also not a standard for the desired or optimal participation rate.

### b. *Seasonality and Operational Planning Considerations*

The seasonality of AT occurring predominately in the fourth quarter presents several barriers and limitations to determining which personnel will be attending. Some AT training events have stable and predictable manpower requirements, such as integrated training exercise (ITX) and other similar exercises. However, other requirements such as support to AD forces or outside continental U.S. (OCONUS) exercises require significant time and operational planning to generate, and as a result, manning rosters may not be finalized until closer to execution. Personnel turnover through attrition and new accessions also occurs predominately in the fourth quarter. For these reasons, it is difficult for operational planners to determine who, by name, will be participating in AT.

### c. *Significant Unplanned Events*

Unforeseen events, such as COVID-19, destructive weather, and other DSCA requirements in the year of execution present a two-fold challenge to forecasting AT participation. First, the occurrence of the event disrupts operational plans and introduces uncertainty into any effort to forecast the end of year participation and financial position. Second, it confounds historical data sets which makes future regression models unreliable if not properly controlled.

### d. Differences in Inactive Duty Training Participation and Management

Pay Group A IDT participation has been less volatile than AT participation in recent years, as depicted in Figure 14. Although IDT participation rates are declining, it is noticeably higher and more stable than historic AT participation. There are several reasons why this is the case, of which we will examine the most likely causes. Operationally, IDT is simpler and easier to plan. The IDT schedule is generated for the entire year and is widely disseminated. Although there may be varying degrees of complexity in the training plan for each month, it is primarily controlled and managed at the unit level without the uncertainty involved in AT requirements.



**Pay Group A Drill & AT Participation**

|            | FY17   | FY18   | FY19   | FY20   | FY21   | FY22   |
|------------|--------|--------|--------|--------|--------|--------|
| AT "Pure"  | 82.81% | 77.69% | 71.95% | 60.93% | 69.81% | 66.87% |
| Drill      | 85.49% | 82.77% | 79.65% | 78.16% | 79.81% | 75.92% |
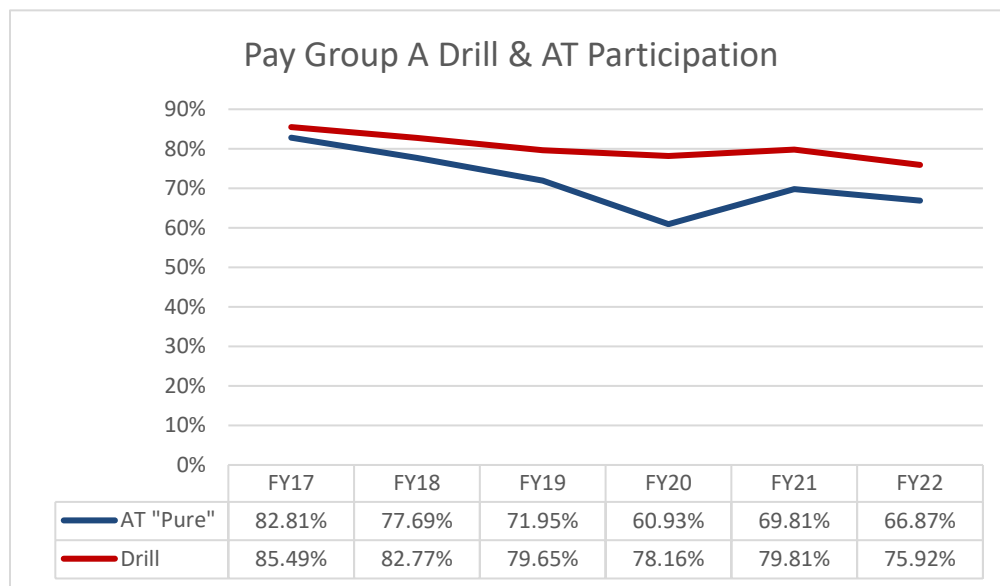
Figure 14.   FY2017-FY2022 Pay Group A Drill & AT Participation. Adapted from P&R (2023).

Another causal factor that is potentially leading to higher IDT participation is the difference between how IDT and AT attendance is planned, tracked, and supervised. For IDT, there is a computer based system called Drill Manager, previously called Drill Management Module (DMM), in which the entire process life cycle of IDT allocation, scheduling, mustering, reporting, and payment is managed (DON, 2018). Unit leaders schedule Marines by name for specific dates and times within Drill Manager for the entire

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FY. When Marines complete the drill period, unit leaders record their satisfactory attendance in Drill Manager, which initiates the payment process for pay and allowances. Excused and unexcused IDT absences are also accurately tracked in Drill Manager. If a Marine has more than nine unexcused absences in a year, they may be processed for administrative separation from the Marine Corps. This effective system of internal control for IDT attendance is a likely a contributor to higher rates of IDT participation. Conversely, there is no equivalent system to track, report, or manage AT attendance. Historically, there has not been a formal method or requirement for subordinate commands to report AT participation to MARFORRES, therefore tracking and enforcement of AT attendance has been dependent on the processes and initiative of individual Commanders. This lack of systematic enforcement, combined with the fact that AT is not required for an individual to complete a satisfactory year for retirement, may create the potential for Marines to have more incentive to attend IDT than AT.

### 3.    Recent Innovation: MARFORRES Drill and AT Tracker

In response to many of the challenges we have described, MARFORRES has undertaken an ambitious and promising project of developing a business intelligence tool to track and forecast Pay Group A operational activity and budget performance. The project is called the MARFORRES Drill and AT Tracker (MDATT) and is a Microsoft PowerBI platform designed to present actionable analysis through dynamic data visualization dashboards (MARFORRES, PowerPoint slides, January 27, 2023). The data uploads used by MDATT are drawn from raw feeder systems like MROWS, MCTFS, and others. Several events and conditions within the operating environment provided the impetus for MARFORRES to initiate the MDATT project, as the need for more accurate and actionable SMCR program performance information became apparent. The first of these catalysts were events that caused drills and AT to be cancelled, such as COVID-19 and government shutdowns; events that had significant impact on readiness and the budget. Secondly, significant hazardous weather events that required evacuations or negatively affected HTC sites had unplanned impacts on Drill and AT. Thirdly, MARFORRES recognized the need to have accurate financial forecasting in preparation for mid-year review in a format and language that is compatible with P&R. Without methodical and repeatable processes and

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systems to analyze program performance, staff sections were left continuously generating ad hoc estimates and products with varying degrees of success (MARFORRES, PowerPoint slides, January 27, 2023). This shortfall became increasingly apparent as Pay Group A budget performance volatility increased in recent years and significant disparities existed between MARFORRES mid-year review forecasts and actual end of year positions. Lastly, under the current model of operating, there was little to no means of adjusting forecasts in the year of execution for unplanned emerging requirements impacting AT.

The MDATT project team identified that IDT costs comprise the largest proportion of Pay Group A cost but does not demonstrate the volatility observed in AT. Figure 15 depicts the difficulty in forecasting the cost elements associated with Pay Group A. This highlights the variability of AT expenses and the central role participation rates have in both pay and allowances and per diem and travel.
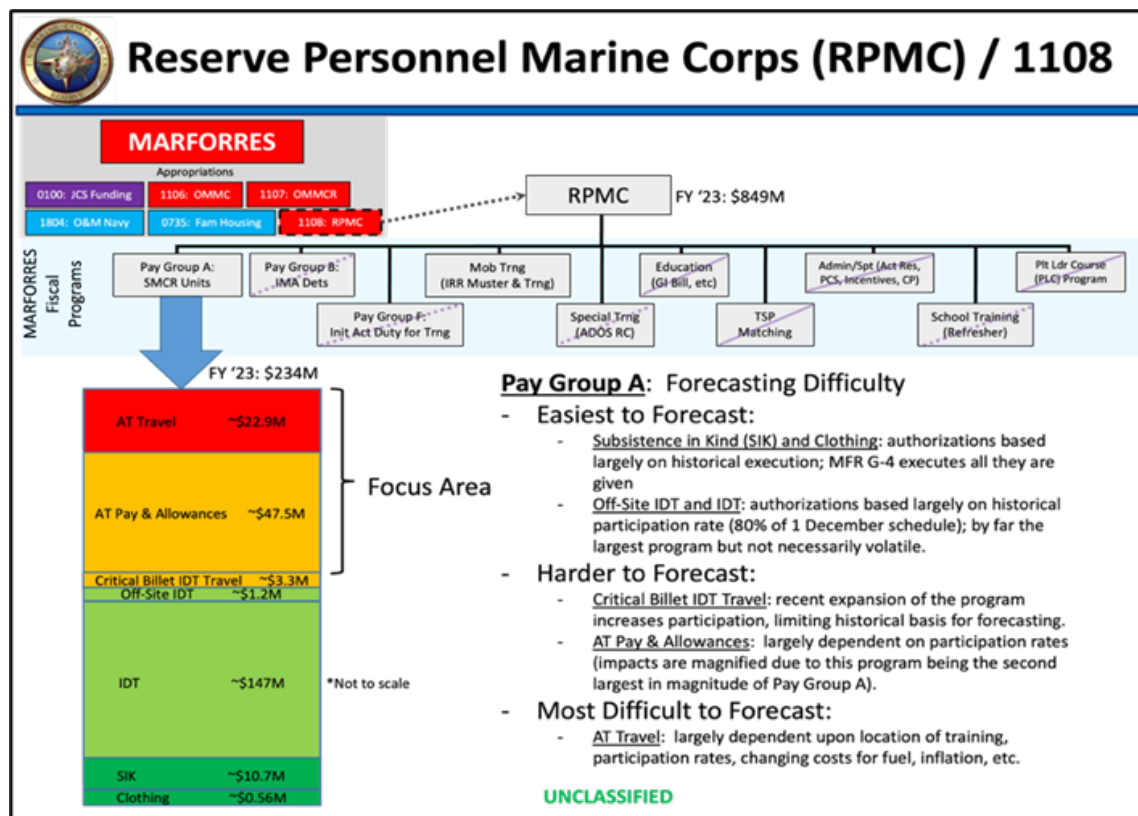


Figure 15.   MDATT Pay Group A Forecasting Difficulty. Source:
(MARFORRES, PowerPoint slides, January 27, 2023).

Figure 16 depicts the basic concept behind the MDATT model to forecast the end of year (EoY) financial position for Pay Group A at a given time in the year of execution. The model considers current year to date execution and historical data to project expected costs for the remainder of the year. As discussed, Clothing, SIK, and IDT expenses are less difficult to forecast and are outside the scope of our project. The elements relevant to the discussion of AT participation are "AT Pay & Allowances" and "AT Travel," which both are calculated as:

**Remaining Expected Participation × Avg AT mandays × Avg Cost per AT manday**

"Remaining Expected Participation" is expressed as a count of personnel and is calculated as:

**On-hand Strength × Historic Participation % − Executed Legal Requirement**

The "on-hand strength" value used in this formula is the forecasted endstrength based on M&RA EoY projection. The "historic participation" rate used in this equation is based on the AT "pure" rate published by P&R, which again is an expression of manday utilization. The term "Executed Legal Requirement" refers to those Marines who have already completed 14 days of AT and/or ADOS. The resultant value of "Remaining Expected Participation" is intended to represent the number of Marines who are expected to complete AT.

"Average AT Mandays" is derived from historic AT Mandays divided by Total Average Endstrength, as reported by P&R. "Average Cost per AT Mandays" is the total historic cost of AT Pay & Allowances or AT Per Diem & Travel, divided by Average AT Mandays.

The limitations of this forecast model will be discussed in Chapter V.

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**Pay Group A**

Fiscal Execution (y-axis) / Time (x-axis)

$E_1 = \sum$ All current execution within Pay Group A

$E_{EY} = \sum$ All execution by end of the fiscal year within Pay Group A

$E_F = \sum$ All forecasted execution between now and the end of the FY within Pay Group A

$E_{EY}$ — End of FY

$E_F$

$E_1$ — Now

$E_1 = (\text{AT Pay \& Allowances}_1)+(\text{AT Travel}_1)+(\text{Clothing}_1)+(\text{SIK}_1)+(\text{Crit Billet IDT Trav}_1)+(\text{IDT}_1)+(\text{Off-Site IDT}_1)$

$E_{EY} = E_1 + (\text{AT Pay \& Allowances}_F)+(\text{AT Travel}_F)+(\text{Clothing}_F)+(\text{SIK}_F)+(\text{Crit Billet IDT Trav}_F)+(\text{IDT}_F)+(\text{Off-Site IDT}_F)$

**Remaining Expected Participation** × Avg AT mandays × Avg Cost per AT manday

On-hand strength X Historic Participation %* - Executed Legal Requirement

\* Historic P&R AT "pure" rate

Figure 16.   MDATT Pay Group A Forecast Model. Adapted from
(MARFORRES, PowerPoint slides, January 27, 2023).

## D.  INDIVIDUAL SELECTED MARINE CORPS RESERVE MARINES

This stakeholder section examines the individual Reserve Marines who directly participate in IDT, AT, and other periods of active duty within the SMCR. Their interests include worthwhile training, professional development, and career progression while balancing the often competing demands of civilian employment or college, along with family responsibilities. We will examine how the policies and requirements discussed previously impact the population most directly involved.

### 1.  AT Participation Perspective: Satisfactory Participation versus Satisfactory Year

In Chapter II we briefly identified the difference between "satisfactory participation" and a "satisfactory year." This distinction is commonly overlooked or misunderstood, even among reservist and Reserve command staffs. Satisfactory

participation refers to the minimum required IDT and AT to remain affiliated as a member of the SMCR. A satisfactory year refers to the minimum of 50 points that an individual Marine needs to have a qualifying year of service towards retirement. One way of differentiating the two conceptually is to think of satisfactory participation as primarily an obligation to the unit, whereas a satisfactory year is for the benefit of the Marine. Marines earn 15 membership points per year for affiliation with the SMCR, which means that an individual will earn enough points to qualify for a satisfactory retirement year by only attending IDT. Since AT has no bearing on a Marine's ability to earn a satisfactory retirement year which, combined with the lack of enforcement of AT participation, produces a weak personal incentive to attend training. Of course, there is still the intrinsic value of the training itself and the sense of purpose or comradery derived from it, as well as the pay and additional retirement points that are earned during AT.

## 2.    Individual Participation Factors

A Marine's interest or ability to participate in Reserve duty, particularly above the minimum requirement, is largely predicated on idiosyncratic factors. Such factors may include employment or student status, wage or salary rate of civilian employment, employer's policies and attitude towards military service, and obligor or non-obligor status. A Marine who earns more while on reserve duty has more incentive to attend drill and AT than a Marine who may earn more through civilian employment. Similarly, some employers dock a Marine's salary for periods of AT or AD, while others offer differential pay or even full pay during such periods. These differences in employer policy make participation in the Reserves financially burdensome for some or advantageous for others. Although more difficult to quantify, Marines' knowledge of their rights and responsibilities under the Uniformed Services Employment and Reemployment Rights Act (USERRA) may influence their willingness to participate in the minimum requirement or pursue opportunities for additional periods of AD. For example, Marines may not realize that USERRA protections apply equally to both voluntary and involuntary periods of service, and that a Marine does not need "permission" from their employer to attend AT or ADOS. Beyond meeting the mere legal requirements of USERRA, the attitude and perceived support of the civilian employer towards military service in the Reserves factors heavily in

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an individual's willingness to participate. Certainly, command climate and the quality of experience during training periods are likely to influence a Marine's propensity to participate. It is also probable that the findings of DiRenzo and Aten (2015), which showed that high-quality training and experiences are strong determinants of individual propensity to continue participation in the Marine Corps Reserve, also apply to personal incentives to attend AT.

## E.    CHAPTER SUMMARY

The key stakeholders involved with AT participation are P&R, MARFORRES, and SMCR Marines. Through our analysis we identified areas of alignment and divergence among the stakeholders regarding AT participation formulation, risks, and interests. By recognizing and addressing the needs and concerns of each stakeholder, the parties involved can better identify policy, procedures and forecasting methods that reduce barriers, mitigate risks, and increase alignment of interests.

P&R's focus is on producing budget estimates and requests to support Reserve manpower requirements across the FYDP and adjusting costing forecasts based actual expenditure in the year of execution. They continuously monitor changes in end-strength as well economic variables that impact the performance of the appropriation. Projected end-strength and Reserve participation rates are the primary cost drivers in forecasting the end of year financial position and are critical to MYR and reprogramming. ADA violations and Congressional budget marks are the major risks to P&R. As the 1517 Authority, P&R assumes the liability of funds control and is accountable for budget performance but lacks control of the cost drivers and execution. P&R uses the AT "pure" participation formula for forecasting the AT BLI, which is an expression of AT manday usage and not the proportion of individual Marines who have met the participation requirement of Title 10 and the MCRAMM.

MARFORRES is primarily concerned with meeting the operational requirements of the Reserve mission. In the context of AT participation and forecasting, the primary concern of MARFORRES is to ensure Marines are meeting their AT requirements. Recent budget volatility in 1108 RMPC and operational events have increased the need for

MARFORRES to develop detailed and accurate AT participation and budget forecasts in the year of execution. MARFORRES has not historically applied a standard methodology or business process to forecasting. As a result, MARFORRES has developed the MDATT to facilitate operational planning and AT spending forecasts. The primary challenge identified in the MDATT project is forecasting Pay Group A AT, which is heavily dependent on participation rates.

Unlike organizational stakeholders, SMCR Marines are personally impacted by the Reserve AT policy. The risks and incentives are often unique to individual circumstances. SMCR Marines can earn a qualifying year toward retirement without completing AT and there are weak internal controls to verify and enforce participation. These forces create conditions that may lower individual incentives to attend AT and as a result, introduce volatility in participation rates.

The RPMC budget model presented is a high-level depiction of the variables associated with MILPERS costing. The primary cost drivers of the RPMC budget model are personnel end-strength, economic cost variables such as pay rates and inflation, and the participation rate of reservists. The AT participation rate is calculated as the percentage of AT mandays utilized out of the total AT mandays available, based on average end-strength. The primary determinant of MILPERS budget performance is the difference between approved end-strength and actual end-strength but is outside of the direct control of both P&R and MARFORRES. While economic costs are rising, they are generally predetermined within a given year and again, are not within the direct influence of P&R or MARFORRES. While IDT is the largest proportion of pay group A costs, AT is more volatile and difficult to forecast. For these reasons, we focus our attention in this study on AT participation as the cost variable with the greatest capacity to be influenced through policy and personnel management.

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# V. DATA AND ANALYSIS

## A. INTRODUCTION

In this chapter, we describe the data and analysis we used to compare the different AT participation rate formulations and examine the influence of ADOS. First, we outline the steps we took to clean and organize the data, ensuring its validity for examination. Next, we present an overview of high-level statistics from the SMCR population that conducted some form of AD. Our data analysis uncovers valuable insights into population behaviors and correlations relevant to decision-makers. By examining data on end-strengths, AT participation rates, manday execution, ADOS utilization, and other pertinent variables, we shed light on the intricate relationships and influences that impact volatility of Pay Group A SMCR.

## B. DATA SOURCES

The primary source of data used in our analysis was a historic report of individual level activity generated from the Marine Reserve Order Writing System (MROWS). MROWS is the official computer-based system used to automate the full life cycle of Marine Corps Reserve Active Duty orders from initial request and funds approval, to final settlement of travel claims. Relevant order types managed through MROWS are AT, ADOS-RC, and ADOS-AC, to include Mobilization. (MROWS is also used for off-site IDT travel orders and IDT travel reimbursement, which are outside of the scope of this study.) The historic data repository within MROWS is the primary data analyzed by the MARFORRES MDATT initiative.

The MROWS generated data used in this study was provided by Marine Corps Programs and Resources, Resources, Fiscal & Finance–Kansas City & Indianapolis (RFF-KCI). The data set includes all valid SMCR Pay Group A orders written from FY2017-FY2022 with the following data fields: Fiscal Year, Electronic Data Interchange Personal Identifier (EDIPI), Present Grade Code, Order Tracking Number, Start Date, End Date, Mandays, Order Type, ADOS Description, Activity Description, and Special Interest Code (SIC): see Appendix A for a full breakdown. Each row of data represents one set of orders,

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which may span more than one fiscal year. Each individual, represented by EDIPI, may have more than one set of orders per fiscal year and may have more than one Present Grade Code per year. The data set included 155,966 discrete Order Tracking Numbers, representing 51,272 individuals, which averages 77% of the total Pay Group A population based on average endstrength.

Prior to analysis, we took specific steps to clean and organize the MROWS data. To safeguard Personally Identifiable Information (PII), all EDIPIs were redacted and replaced with random unique numeric values. The data included 3,738 off-IDT travel orders, which are not relevant to the study and were removed. Order Types were consolidated into one of three categories, which include AT, ADOS-RC, and ADOS-AC. Given that one set of orders may span across multiple fiscal years, the data was transformed to split such orders into multiple rows so that mandays were appropriately allocated to the respective fiscal year. The resultant data included ADOS orders that extended into FY2023 and FY2024, which were then removed. To aid in identifying rank specific participation behavior, we inserted an additional data field to group individuals by Officer and Enlisted, and Rank Group as follows: E1-E5, E6-E9, W1-O3, and O4-O6. General Officer data was incomplete within the data set and was removed. The resultant data includes 152,228 discrete Order Tracking Numbers, representing 51,214 individual Marines with the grade distribution as listed in Table 2. (Note that the total personnel by grade is higher than the total individual count due to commissions and promotions).

Table 2.    MROWS Personnel Counts by Rank Group

| Enlisted | | Officers | |
|---|---|---|---|
| E1-E5 | 44,758 | W1-O3 | 1,920 |
| E6-E9 | 3,558 | O4-O6 | 2,672 |
| Total | 48,316 | Total | 4,592 |

Of the various ADOS Descriptions and Activity Descriptions, we grouped DSCA, COVID-19, and Hurricane related ADOS as "Unplanned" and compiled the total mandays. Isolating these specific activities may provide useful information about unplanned

emergency events that arise during a given FY that may impact AT participation and ADOS usage. We then pivoted the dataset so that each row represented one individual per year, with a summary of total mandays by order category and binary variables for each combination of ADOS and AT, as described in Appendix B.

To analyze the impact of ADOS on AT participation we performed additional transformation of the dataset to derive monthly level details. For orders greater than 30 days, we split the data for each individual into multiple rows so that the mandays were appropriately allocated to the respective month. We then added binary columns to indicate if 14 days or more of ADOS had been completed at the beginning of the month, and whether 14 days or more of AT were completed by the end of the fiscal year.

Data collected from the MROWS system provides important benefits as well as limitations in relation to other sources of data. MROWS data provides Pay Group level manday data for ADOS-RC and ADOS-AC, which is not collected or reported elsewhere. ADOS-RC, which is reported in the RPMC Budget J-books is aggregated for all Pay Groups, and usage is not differentiated between IMA, SMCR and IRR. The MPMC Budget J-books reports ADOS-AC in workyears, and also does not differentiate between pay groups. This means that MROWS, along with MCTFS, are the only data sources that can provide individual and Pay Group level data regarding AT and ADOS. Note that financial information related to pay and allowance or per diem and travel were not included in this data and is not relevant to our examination of participation. Lastly, the Pay Group code associated with a Marine for a given set of orders is based on the point in time that the orders were written. Given that Marines may switch between different SelRes Pay Groups in a given FY, there may be some differences in SMCR end-strength and mandays between MROWS, MCTFS, and P&R's historic data.

Historic monthly and annual average end-strength, AT mandays and AT participation rates of Pay Group A are publicly available in the RPMC Budget Justification Books and were provided by P&R. P&R also provided annual summaries that report average end-strength by pay grade and AT mandays. As previously discussed, this AT Participation rate is calculated as *Total AT Mandays/(Average End-strength X 15)*. Appendix C shows a breakdown of this historic data.

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## C.     ANALYSIS

Based on the MROWS data, we segmented the population by order type (AT/ADOS) and rank to determine personnel counts, mandays, and average mandays for each. From these segments, we calculated participation rates, as a proportion of average endstrength, for AT "pure" (mandays), AT "pure" (Personnel), and "legal requirement." In the following sections, we compare the emerging trends. (Note: All figures and tables in this chapter were generated from MROWS data provided by P&R RFF-KCI)

### 1.     Personnel Counts and Mandays

In this section, the analysis on personnel counts and mandays by order type is based on Figure 17 and Figure 18, respectively. Appendices D and E provide further detail by rank group.



**FY2017-FY2022 Personnel Counts by Order Type**

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| AT | 23,340 | 22,616 | 20,765 | 19,884 | 19,398 | 16,808 |
| ADOS-RC | 3,112 | 2,121 | 1,713 | 1,989 | 2,221 | 1,200 |
| ADOS-AC | 1,286 | 2,770 | 4,082 | 2,942 | 2,187 | 2,487 |
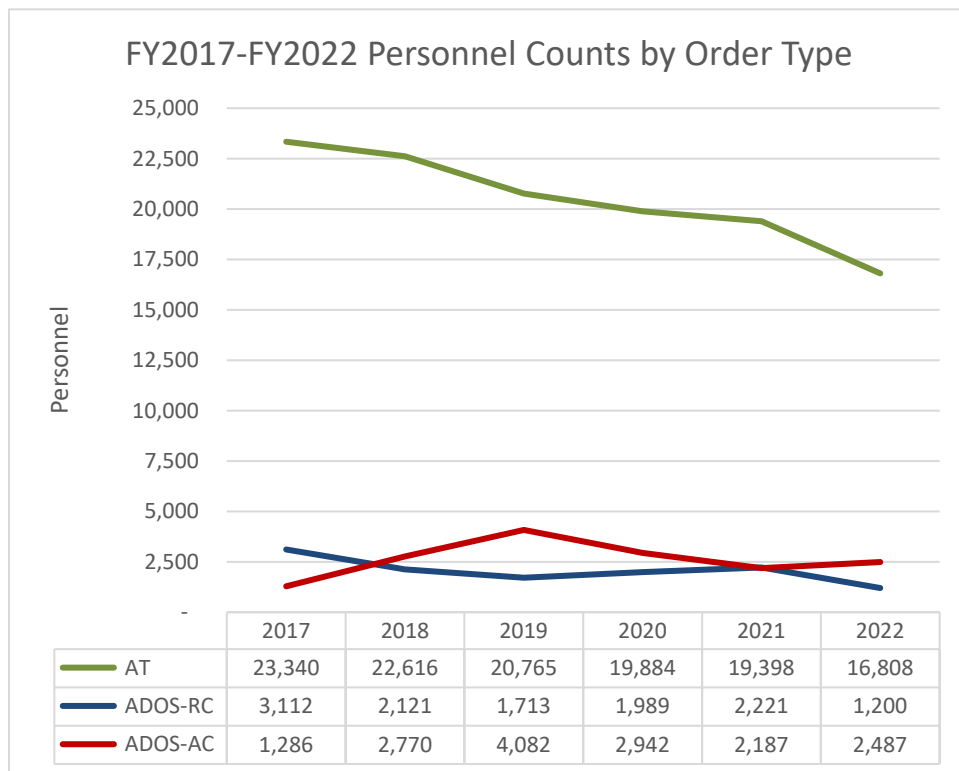
Figure 17.     FY2017-FY2022 Personnel Counts by Order Type.

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| AT | 385,339 | 362,959 | 329,491 | 283,907 | 304,071 | 271,290 |
| ADOS-RC | 69,935 | 56,869 | 47,901 | 48,435 | 67,308 | 47,338 |
| ADOS-AC | 163,258 | 422,319 | 754,199 | 522,192 | 375,795 | 383,679 |
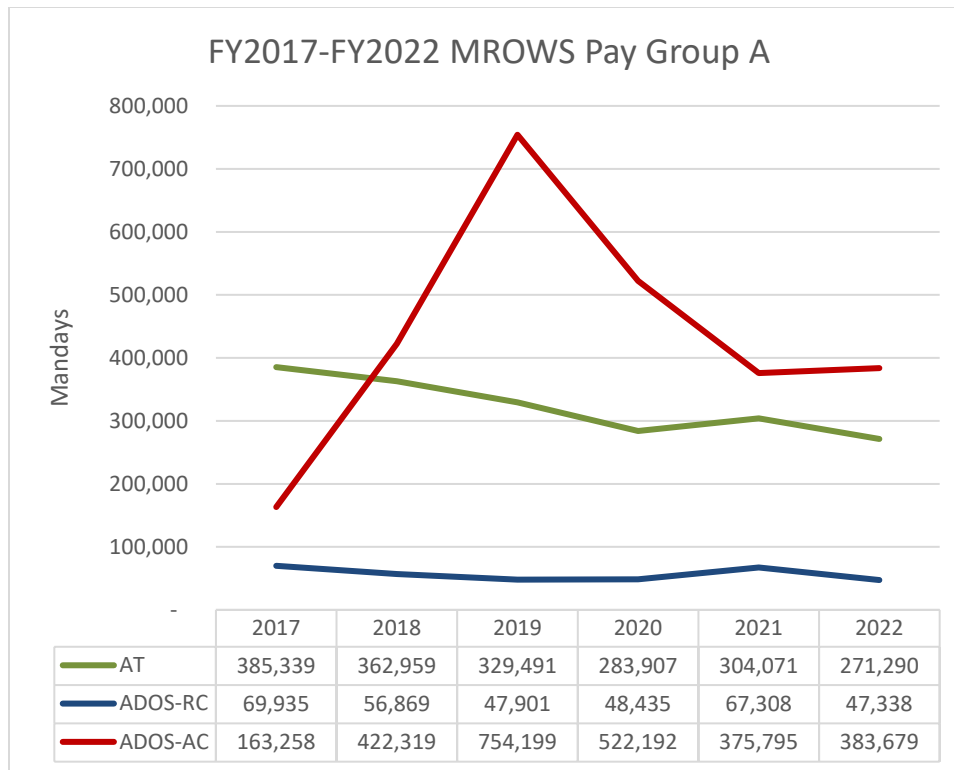
Figure 18.   FY2017-FY2022 AT and ADOS Mandays AT.

### a.   *Annual Training*

There was a steady decline from FY2017-FY2021 in the number of personnel attending AT, regardless of the number of days. In FY2022 there was a sharp decrease, for a total reduction of ~28% during the period. The grand total for this segment is 122,811 personnel, with an average of 20,468 per year. This trend is expected, given the progressive decrease in average endstrength over the same period, as discussed in Chapter II.

There's a general decrease in AT mandays from FY2017 to FY20 showing a decline of ~26% over this period. There is a small uptick in FY2021, but it decreases slightly again in FY2022, culminating in a total decrease of about 30% from FY2017 to FY2022. An interesting observation is that AT mandays had a more significant drop than the number of personnel attending AT in FY2020 during COVID-19. This suggests that the average number of days of AT per individual were less during that time.

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### b. Active Duty for Operational Support

ADOS-RC saw a moderate decline in personnel counts from FY2017-FY2019, decreasing by 45%. Starting in FY2020 there was an increase, which continued through FY2021, followed by a significant drop in FY2022. The cumulative total for this segment is 12,356 personnel, averaging 2,059 per year.

ADOS-RC Mandays also declined from FY2017 to FY2019, with a decrease of 31%. From FY2019 to FY2021, ADOS-RC mandays increased by approximately 40% then stabilizes in FY2022, where figures are similar to FY2021. The most significant fluctuations are found in ADOS-AC. From FY2017 to FY2019, there's a significant increase of ~339%, reaching its peak in FY2019. Afterward, there's a drop by approximately 30% in FY2020, and this decrease continues into FY2021 and stabilizes in FY2022.

This comparison of Pay Group A AT and Pay Group ADOS-RC is in sharp contrast to the trend depicted in Chapter II, Figure 8, which suggested that AT decreases as ADOS-RC increases. Pay Group A comprised only 19% of the total ADOS-RC mandays without the dramatic increase in ADOS-RC that has characterized the entire appropriation. From FY2017-FY2022, Pay Group A ADOS-RC is relatively stable and generally mirrors AT trends.

ADOS-AC more than doubled from FY2017 to FY2018 with a significant surge in FY2019 to a peak of 4,082. From FY2020-FY2021, ADOS-AC declined to 2,187, with a slight increase in FY2022. The grand total for this segment is 15,754 personnel, with an average of 2,625 per year.

Lastly, regarding the unplanned ADOS, which includes missions related to COVID-19 support, hurricane recovery, and DSCA, the number of personnel varies widely year to year based on significant events. Table 3 and Appendix D illustrate the total personnel counts for unplanned ADOS. It is interesting to note that there was no unplanned ADOS in FY2019, which had the highest number of ADOS-AC mandays. Given the low number of personnel participating in unplanned ADOS during this period, any impact on AT participation is negligible.

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Table 3.    Unplanned ADOS Personnel Counts

| Unplanned ADOS | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|
| | 17 | 9 | 0 | 1,169 | 930 | 181 | 2,360 |

**2.      Average Mandays by Order Type**

Figure 19 depicts the average mandays by order type, as well as unplanned ADOS. In FY2020 there was significant increase to the average mandays of unplanned ADOS, which remained elevated in subsequent years. Had there been more participants, the negative impact on AT participation may have been significant, given that many of these orders were for the majority, if not the entirety of the year. This is an important observation to consider because a large number of personnel supporting unplanned ADOS events is likely to reduce AT participation. Appendices F and G provides further details on Officer and Enlisted and rank groups.



**FY17-FY22 Average Mandays per Order Type**

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
|---|---|---|---|---|---|---|---|
| AT | 15.79 | 15.07 | 13.89 | 12.88 | 14.24 | 14.26 | 14.39 |
| ADOS-RC | 2.87 | 2.36 | 2.02 | 2.20 | 3.15 | 2.49 | 2.51 |
| ADOS- AC | 6.69 | 17.54 | 31.78 | 23.68 | 17.60 | 20.17 | 19.47 |
| UNPLANNED ADOS | 60.07 | 63.44 | - | 206.21 | 172.38 | 107.60 | 180.37 |
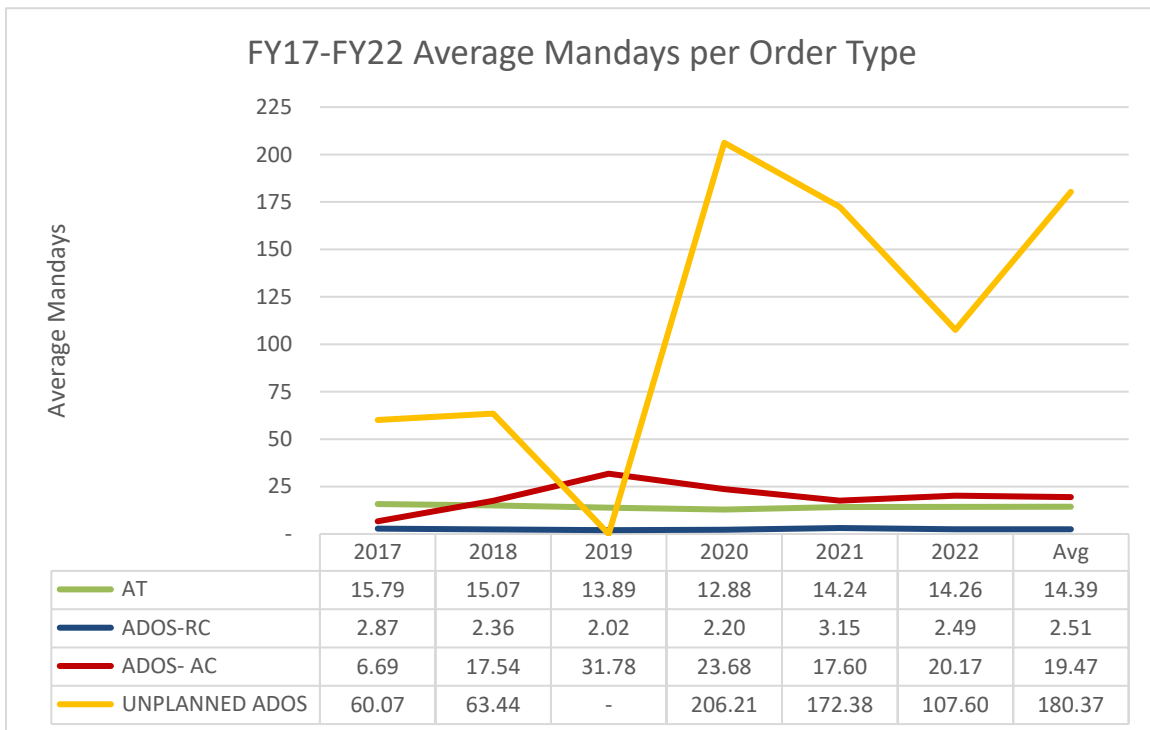
Figure 19.   FY2017-FY2022 Average Mandays per Order Type

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### a. Annual Training

The average length of AT has decreased over the period, starting at 15.79 days in FY2017 dropping to a low of 12.88 days in FY2020, followed by a slight increase to 14.26 days by FY2022. The overall average across these years is 14.39 days. The slight decrease could signify a potential shift in the type of AT events, number of travel days or other changing requirements.

### b. Active Duty for Operational Support

ADOS-RC assignments are relatively short compared to the other categories, averaging between 2 to 3 days over the period. These shorter durations may suggest that ADOS-RC tasks are of a more immediate and short-term nature.

Average duration of unplanned ADOS assignments displays the greatest fluctuations, from 60.07 days in FY2017 to 206.21 in FY2020. The durations then decrease but remain substantial, concluding at 107.60 days in FY2022. The average for this period is 180.37 days. This is in line with the nature of "unplanned" assignments, which may arise due to sudden events or emergencies that demand extended durations. Notably, the unplanned segment of ADOS-AC drives up the overall average. See Appendix H for details on ADOS event categories.

It is important to consider a specific limitation in the MROWS data that may distort the average number of mandays per order. Some MROWS orders covering an extended period may have been split into separate, shorter periods that would lower overall averages.

### 3. Total Population Activity of Pay Group A

Based on the preceding data pertaining to the personnel and mandays, we have binned the total population of Pay Group A into each of the possible combinations of AT and ADOS, as depicted in Table 4. See Appendix I for further details.

Table 4. Total Population Pay Group A

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| Avg Endstrength | 30,637 | 30,633 | 30,169 | 30,174 | 28,144 | 26,168 |
| MROWS Population | 24,408 | 24,077 | 23,726 | 22,050 | 21,354 | 19,020 |
| 1.   Did not complete any AT or ADOS | 6,229 | 6,556 | 6,443 | 8,124 | 6,790 | 7,148 |
| 2.   Completed only AT | 20,386 | 19,495 | 18,141 | 17,239 | 17,089 | 15,440 |
| 3.   Completed only ADOS | 1,068 | 1,461 | 2,961 | 2,166 | 1,956 | 2,212 |
| 4.   Completed AT and ADOS | 2,954 | 3,121 | 2,624 | 2,645 | 2,309 | 1,368 |
| Met Legal Requirement | 23,754 | 23,540 | 23,242 | 19,918 | 20,710 | 18,395 |
| Met Legal Requirement % | 78% | 77% | 77% | 66% | 74% | 70% |
| Total AT Pure Participation % (Mandays) | 84% | 79% | 73% | 63% | 72% | 69% |
| Total AT Pure Participation % (Personnel 14+ days AT) | 75% | 72% | 67% | 58% | 67% | 62% |

Marines can be grouped into the following four categories: 1) Did not complete any AT or ADOS, 2) Completed only AT, 3) Completed only ADOS, or 4) Completed AT and ADOS. Figure 20 depicts the proportions of these four categories during the period for the entire population, based on average end-strength.
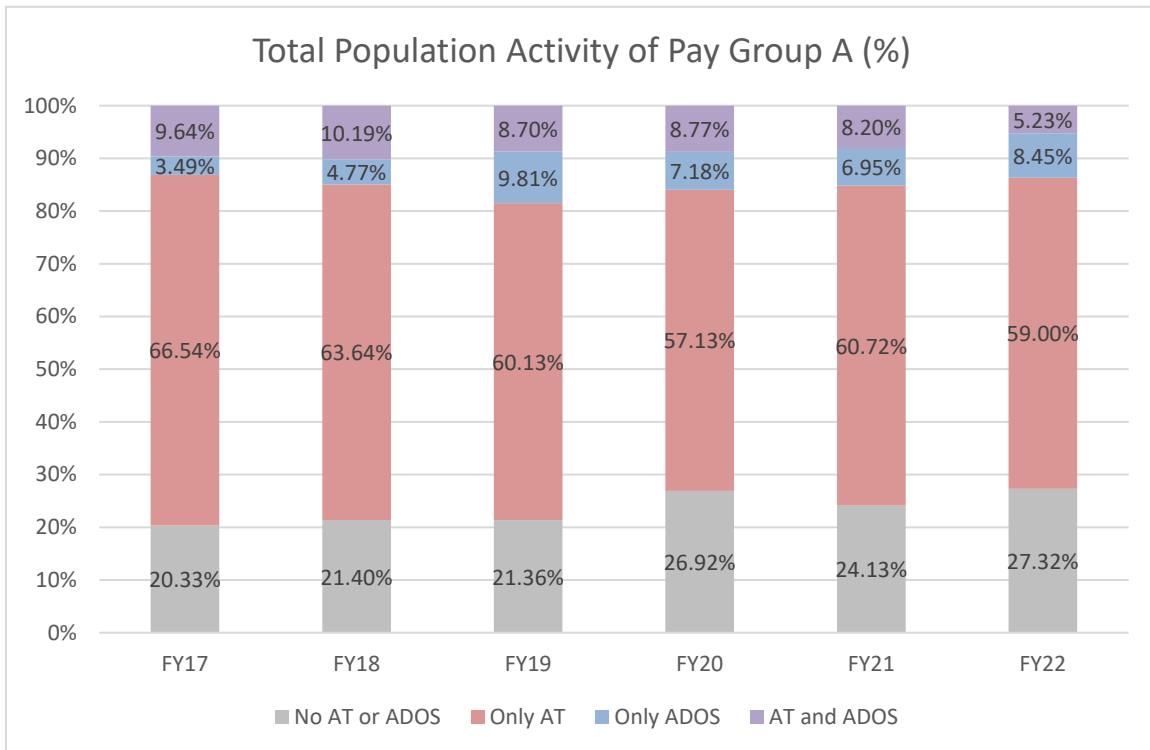


Figure 20.   FY2017-FY2022 Total Population Activity of Pay

### 4. Participation Rate Formulations

The emphasis of the analysis in the subsequent sections centers on the comparison of AT participation rates, as a percentage of the total population, in the following three formulations: 1) Met "legal" requirement, 2) P&R's AT "pure" (mandays), and 3) AT "pure" (PAX), which is the count of personnel who have completed at least 14 days of AT. These three rates, listed in the bottom three rows of Table 4, present observable differences that will be explored further.

#### a. AT "Pure" Participation Based on Mandays

Figure 21 compares the P&R's historic AT "pure" participation rate against the rates we derived from the MROWS dataset using the same AT "pure" participation formula of *AT mandays/ (Average ES x 15)*. Note that the rates are similar and have the same trends, but the MROWS rate is 1–2 percentage points higher. Although we can't state with certainty, there are several factors that may explain this discrepancy. First, the P&R rate is based on completed mandays posted in MCTFS and DAI, which has latency that causes some data to post after the end of the FY and may not have been captured; see Appendix C. Secondly, the MROWS data provided was filtered for SMCR, but there may be a portion of individuals that subsequently changed components or were erroneously coded as SMCR. Given the small margin of error, this discrepancy is not significant for the purposes of our project. However, future research that may seek a greater degree of accuracy that would need to reconcile payroll data from MCTFS by EDIPI with the MROWS data to validate accuracy.

AT "Pure" Participation (Mandays): MROWS vs. P&R

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| Avg Endstrength | 30,637 | 30,633 | 30,171 | 30,173 | 28,143 | 26,168 |
| MROWS | 83.85% | 78.99% | 72.81% | 62.73% | 72.03% | 69.11% |
| P&R | 82.81% | 77.69% | 71.95% | 60.93% | 69.81% | 66.87% |
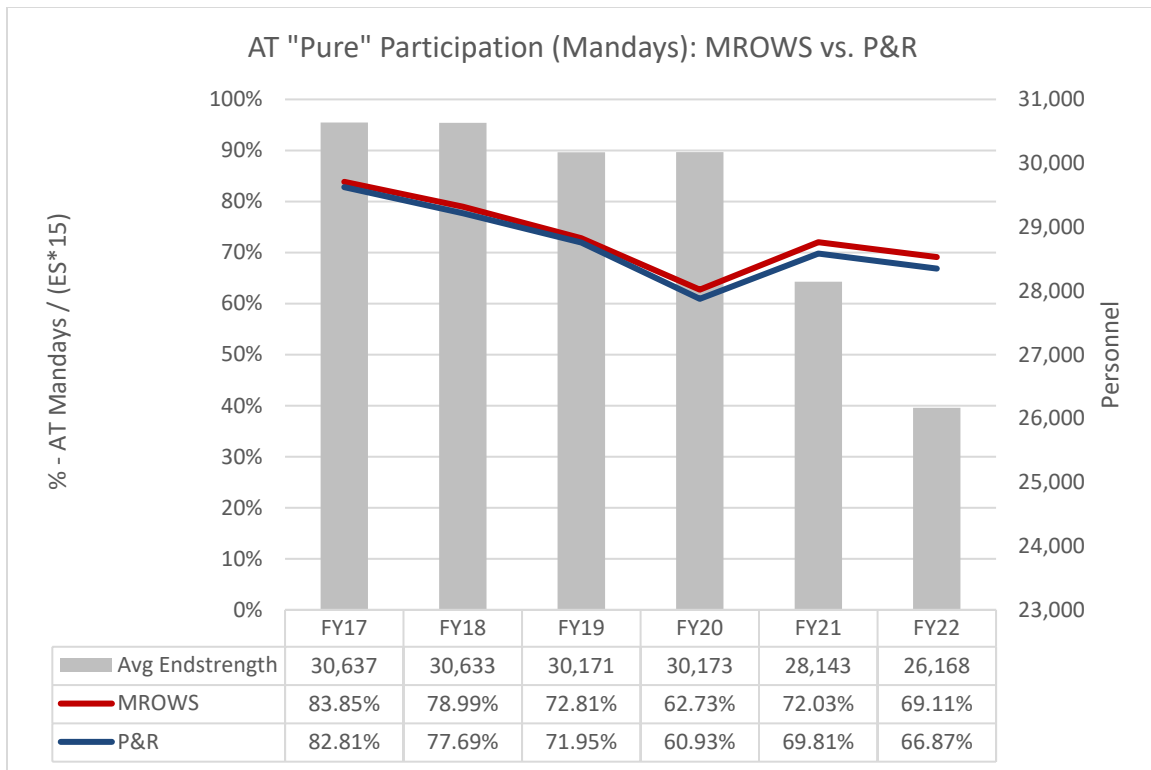
Figure 21.   Comparison of Historic AT "Pure" Participation Rates and MROWS Data

(1)      Differences in Officer and Enlisted AT "Pure" Participation

There are distinct and observable differences between Officer and Enlisted participation. Enlisted participation surpassed Officers between FY2017-FY2019, but steadily declined with a significant drop of 21 percentage points by FY2020. After a slight rebound in FY2021, Enlisted participation drops again while Officer participation continues to increase, suggesting a divergence in trends between the two groups, as depicted in Figure 22.

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**AT "Pure" Participation (Mandays): Officer & Enlisted**

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| Officer | 79% | 73% | 74% | 64% | 70% | 73% |
| Enlisted | 84% | 79% | 73% | 63% | 72% | 69% |
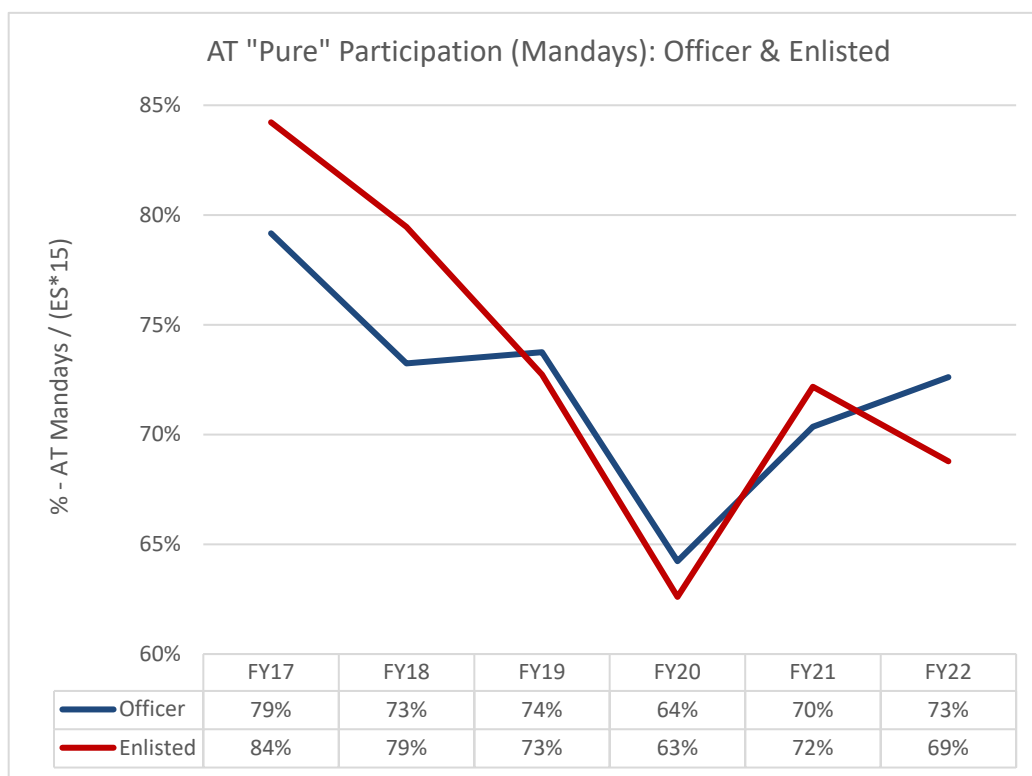
Figure 22.   FY2017-FY2022 Officer and Enlisted AT "Pure" Participation
(MROWS Data)

(2)      Differences in Rank Group AT "pure" participation

Among rank groups, there is even more pronounced differences in participation, as seen in Figure 23. E1-E5 follows a very similar trend as the overall Enlisted participation, which is expected given the high representation of this group in the overall Enlisted population. Similarly, O4-O6 participation appears to drive the overall Officer participation trend. The U-shaped curve of E6-E9 participation is surprising in that it does not match the general trends of the rest of the population, both Officer and Enlisted. The Officer and Staff Non-Commissioned Officers populations combined are ~15% of the total population. Therefore, the unique differences between rank groups are important to consider, but the behavior of the entire population primarily follows E1-E5 participation.

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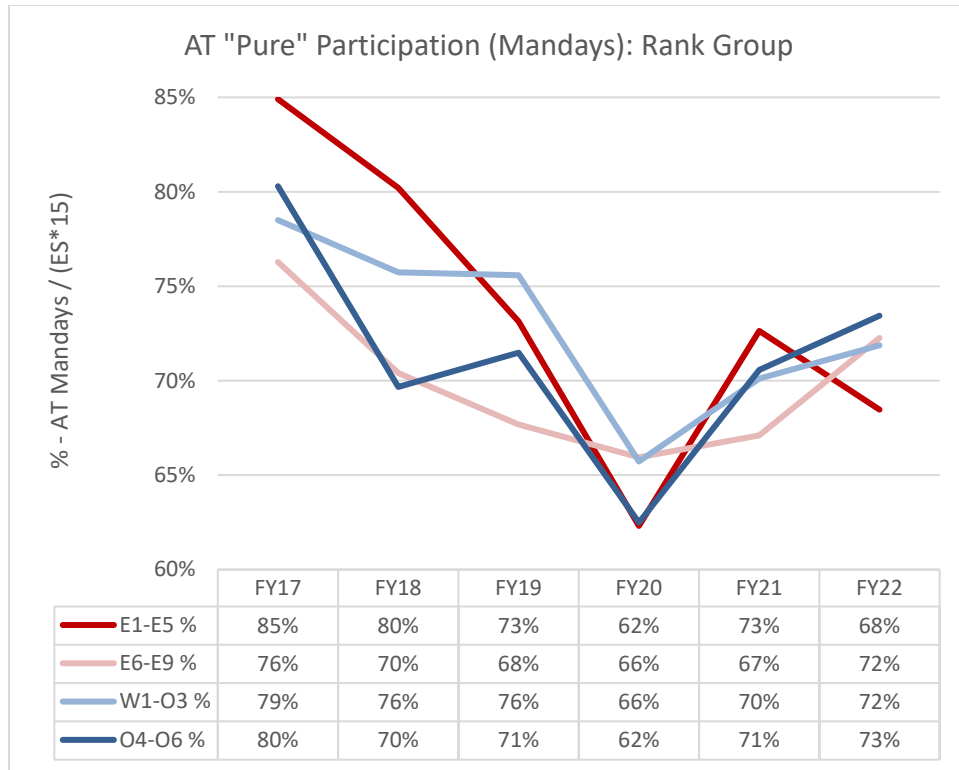
Figure 23.   FY2017-FY2022 AT "Pure" Participation Rank Group (MROWS Data)

### b.     AT "Pure" Participation Based on Personnel

Figure 24 depicts the proportion of Marines who completed 14 or more days of AT "pure" out the average end-strength. This is different from P&R's AT "pure" manday calculation in that it represents the number of personnel who completed 14 or more days of AT, as calculated in the following formula:

$$\frac{Number\ of\ Personnel\ w/\ 14+\ days\ of\ AT}{Average\ Endstrength}$$

AT "Pure" Participation (Personnel)

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| Avg Endstrength | 30,637 | 30,633 | 30,171 | 30,173 | 28,143 | 26,168 |
| AT "Pure" (#) | 22,852 | 22,094 | 20,194 | 17,605 | 18,830 | 16,220 |
| AT "Pure" % | 75% | 72% | 67% | 58% | 67% | 62% |
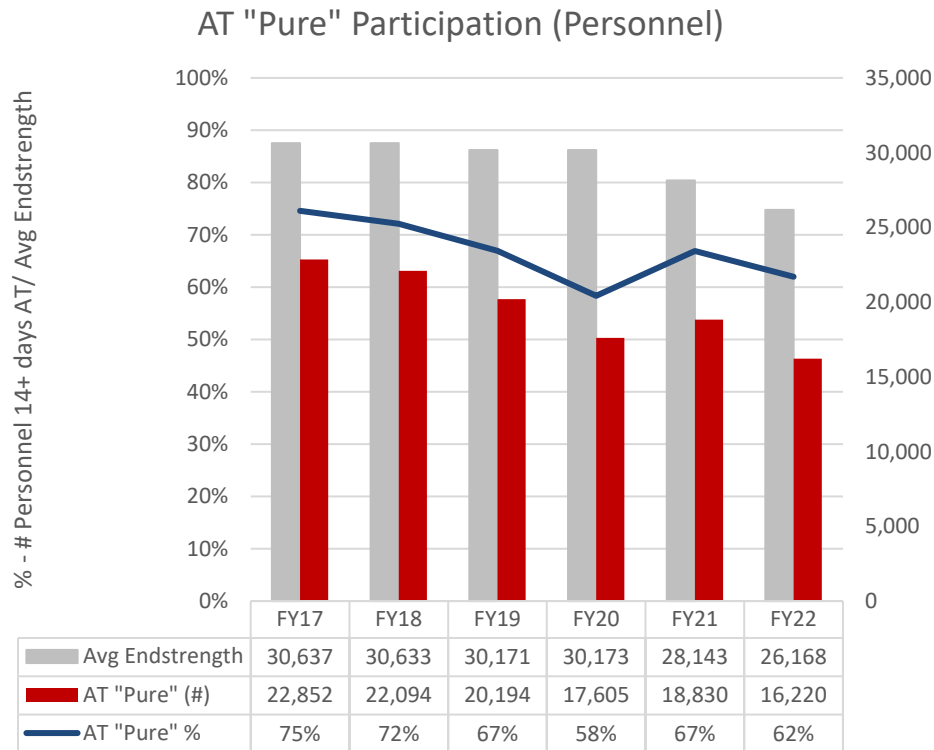
Figure 24.   FY2017-FY2022 AT "Pure" Participation Based on Personnel

This reflects a similar pattern as P&R's AT "pure" rate, with a steady decline from FY2017 to a low in FY2020 with a slight increase in FY2021, followed by a decline in FY2022. Apart from FY2017, AT "pure" participation based on personnel is lower than P&R's participation rate. This is expected given that it does not include individuals who have completed less than 14 days of AT. This reinforces our assumption that the AT "pure" manday formula does not reflect the actual participation behaviors of individuals.

(1)     Differences in Officer and Enlisted AT "Pure" Participation (Personnel)

Figure 25 depicts the AT "pure" completion rates based on personnel counts for both Officers and Enlisted. What is interesting in this formulation, compared with P&R's AT "pure" rate, is that both Officer and Enlisted follow parallel trends and Enlisted Participation is consistently higher than Officers. One cause for this is that the average length of AT for Officers is below 14 days, see Appendix F.

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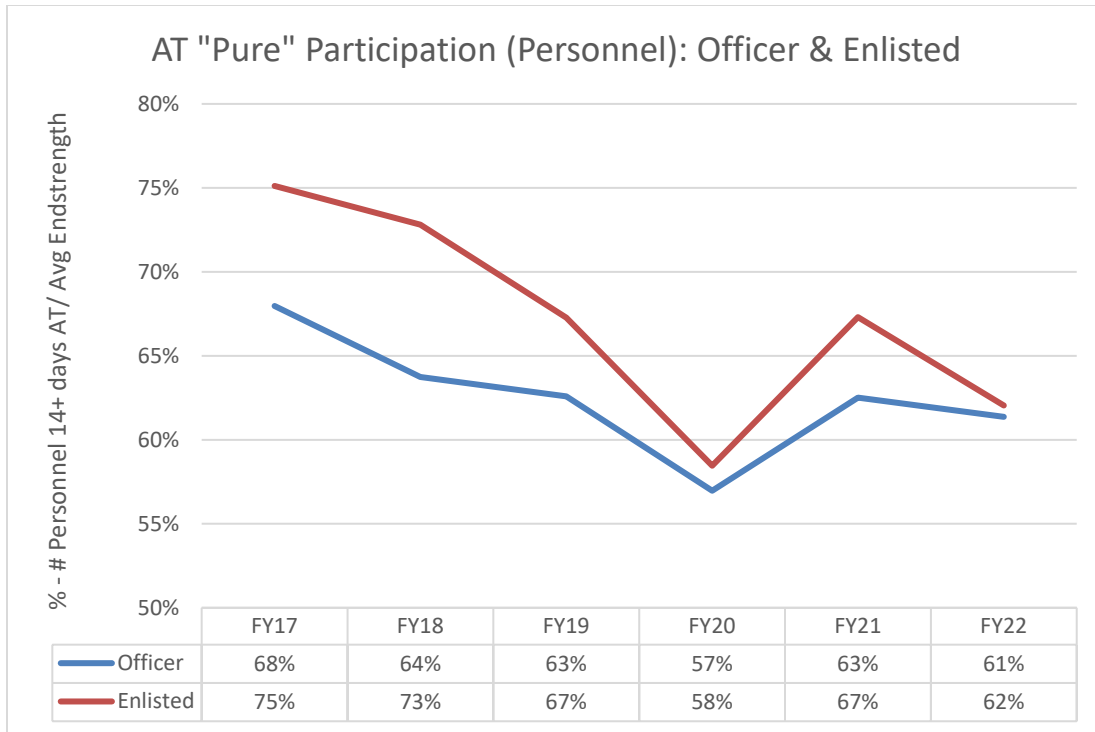
Figure 25.   FY2017-FY2022 Officer and Enlisted AT "Pure" Participation
Based on Personnel

(2)      Differences in Rank Groups AT "Pure" Participation (Personnel)

Figure 26 depicts differences between rank groups in participation rates based on the completion of 14 days or more of AT. As seen with P&R's participation rates, there is significant differences among ranks. In this formulation, the O4-O6 group demonstrates and more pronounced dip in FY2020 than others rank groups, and there is more convergence in FY2022 among the whole population. Again, these differences are largely attributed to the differences in average days of AT between groups.

AT "Pure" Completion (14+ Days)

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| E1-E5 | 76% | 74% | 68% | 58% | 68% | 62% |
| E6-E9 | 67% | 63% | 58% | 59% | 61% | 63% |
| W1-O3 | 68% | 67% | 64% | 59% | 62% | 61% |
| O4-O6 | 67% | 60% | 60% | 54% | 63% | 61% |
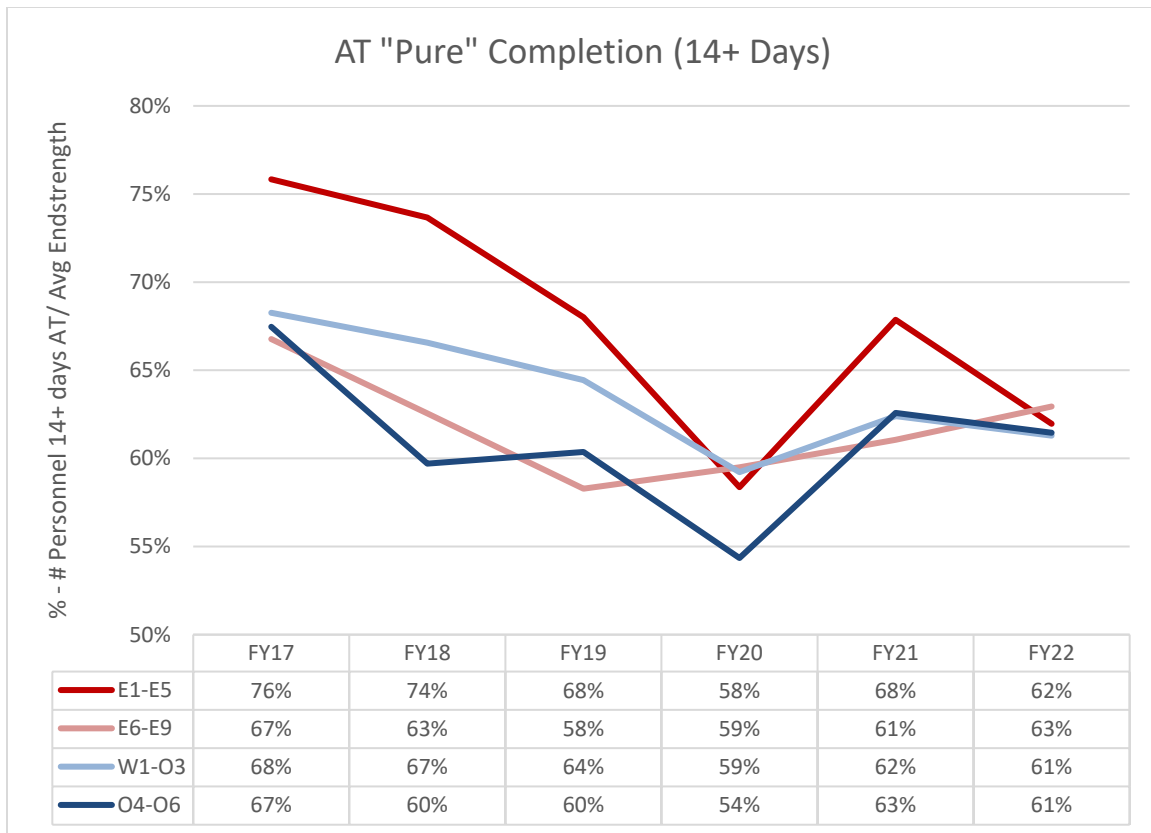
Figure 26.   FY2017-FY2022 AT "Pure" Completion based on Personnel by Rank Group

### c.       *Completion Of "Legal" Requirement Based on Personnel*

Figure 27 depicts the proportion of Marines who have met the "legal" requirement out of the average end-strength, regardless of AT or ADOS. This rate is noticeably more stable than other formulations, with virtually no change from FY2017-FY2019. There was a dip in FY2020 due to COVID-19 with a slight recovery in FY2021, but still not reaching the consistency previously observed. The percentage of personnel meeting the "legal" requirement has not maintained a consistent relationship with the average end strength, suggesting that factors other than just total strength influence the participation rate. See Appendix J for more details on "legal" requirement completion.

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**"Legal Requirement" Completion**

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| Avg Endstrength | 30,637 | 30,633 | 30,171 | 30,173 | 28,143 | 26,168 |
| LEGAL REQ (#) | 23,754 | 23,540 | 23,242 | 19,918 | 20,710 | 18,395 |
| LEGAL REQ (%) | 78% | 77% | 77% | 66% | 74% | 70% |
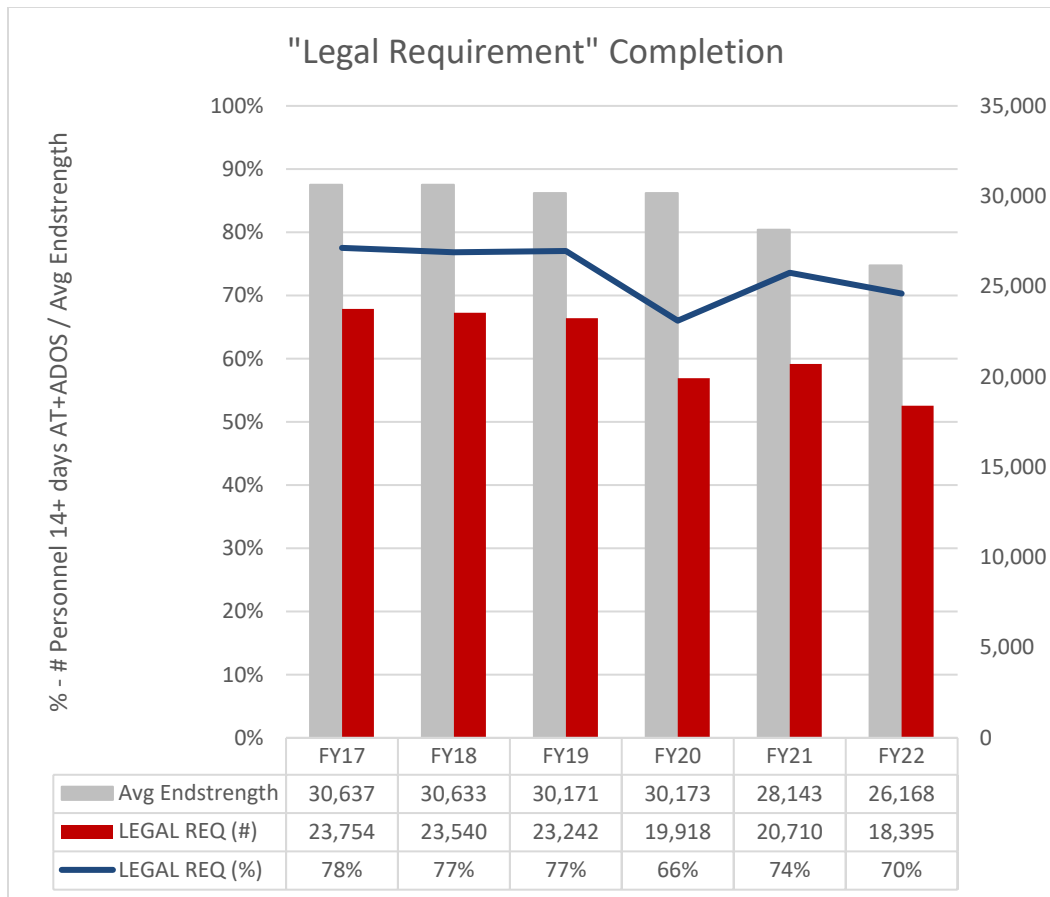
Figure 27.    FY2017-FY2022 "Legal" Requirement Completion

#### d.        *Comparing Annual Training Formulations*

In Figure 28, we compare the three distinct methodologies of computing participation. The intuitive interpretation of the term "AT Participation" is the proportion of personnel who have met the Title 10 requirement of 14 days of Active Duty for training. If the participation rate reported by P&R is interpreted in this sense, incorrect conclusions will be drawn, based on the differences we have observed between formulations. When we compare P&R's AT "pure" rate based on mandays to the AT participation rate based on personnel counts, the number of Marines meeting the Title 10 requirement with "pure" AT is consistently lower than P&R's rate. In this sense, P&R's participation rate overstates the completion of the Title 10 AT requirement. When comparing the P&R rate to the percentage of those who meet the "legal" requirement including ADOS, the "legal"

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requirement rate is generally higher. In this sense, P&R's participation rate under-represents the completion of the Title 10 AT requirement.

It also interesting to note that P&R Participation rates, which are based on AT "pure" manday usage, was higher than the "legal" requirement rate in FY2017, after which the trend reversed, and "legal" requirement exceeded P&R's rate by roughly 5% a year. Additionally, AT "pure" (personnel) and "legal" requirement begin to diverge between FY2018 and FY2019. Both observations are reflective of lower AT manday usage and higher ADOS, suggesting that a substitution effect is present.



### Contrasting AT Participation Rate Formulations

| | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| P&R Participation % | 83% | 78% | 72% | 61% | 70% | 67% |
| LEGAL REQ (%) | 78% | 77% | 77% | 66% | 74% | 70% |
| AT "Pure" % | 75% | 72% | 67% | 58% | 67% | 62% |
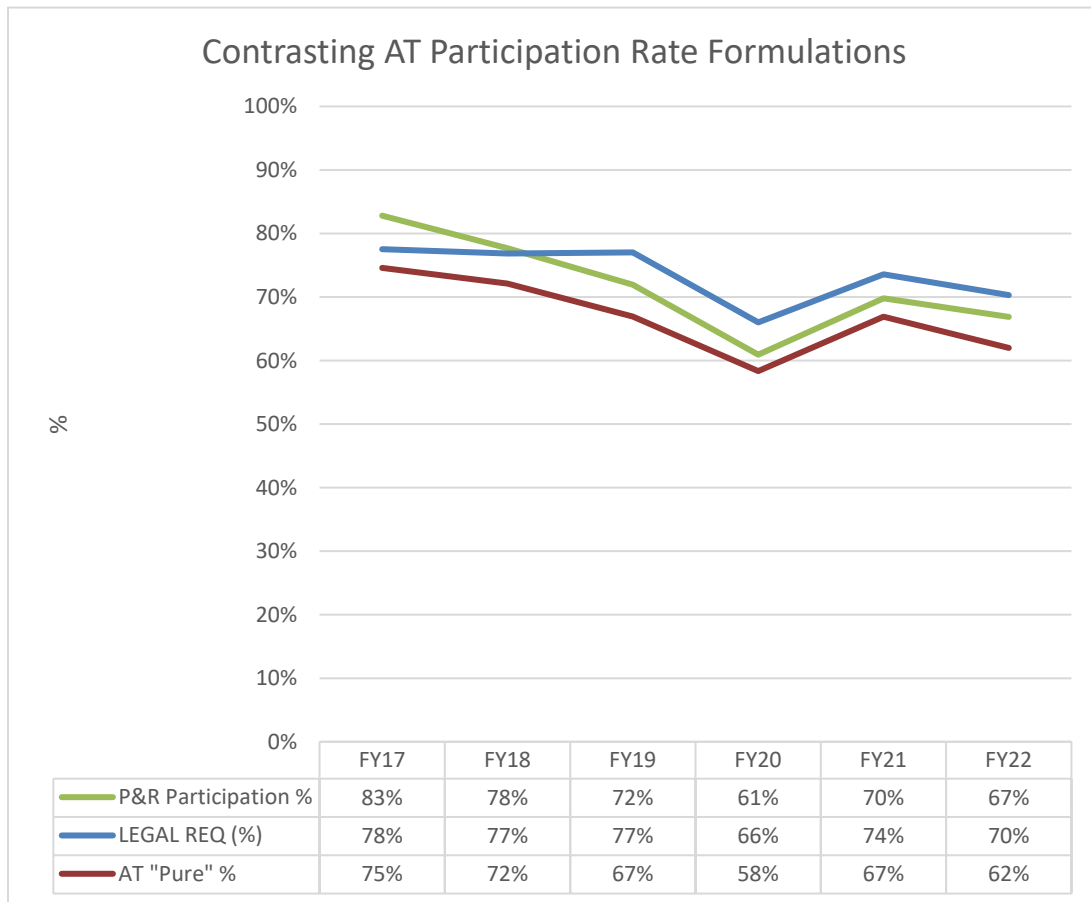
Figure 28.   FY2017-FY2022 Comparison of Participation Rates

### 5. Probability of Completing AT, Given ADOS Has Been Completed

Figures 29 and 30 depict the probability of completing 14 or more days of AT by the end of the fiscal year, given that 14 or more days of ADOS had already been completed at the beginning of the month. In other words, if a Marine had already met the "legal" requirement with ADOS in a given month, what is the probability that he or she will also complete AT in the future? This probability is referred to as $P_{ados,i,m}$.

$P_{ados,i,m}$ : AT participation rate for those in group $i$ who have already met the "legal" requirement via ADOS in month $m$



FY2017 - FY2019 $P_{ados,i,m}$

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E1-E5 | 0 | 0.41 | 0.48 | 0.51 | 0.62 | 0.64 | 0.69 | 0.70 | 0.72 | 0.72 | 0.75 | 0.75 |
| E6-E9 | 0 | 0.20 | 0.23 | 0.24 | 0.31 | 0.32 | 0.39 | 0.41 | 0.42 | 0.42 | 0.44 | 0.45 |
| W1-O3 | 0 | 0.17 | 0.18 | 0.18 | 0.25 | 0.28 | 0.35 | 0.37 | 0.38 | 0.39 | 0.40 | 0.42 |
| O4-O6 | 0 | 0.21 | 0.24 | 0.25 | 0.28 | 0.31 | 0.35 | 0.37 | 0.36 | 0.38 | 0.40 | 0.42 |
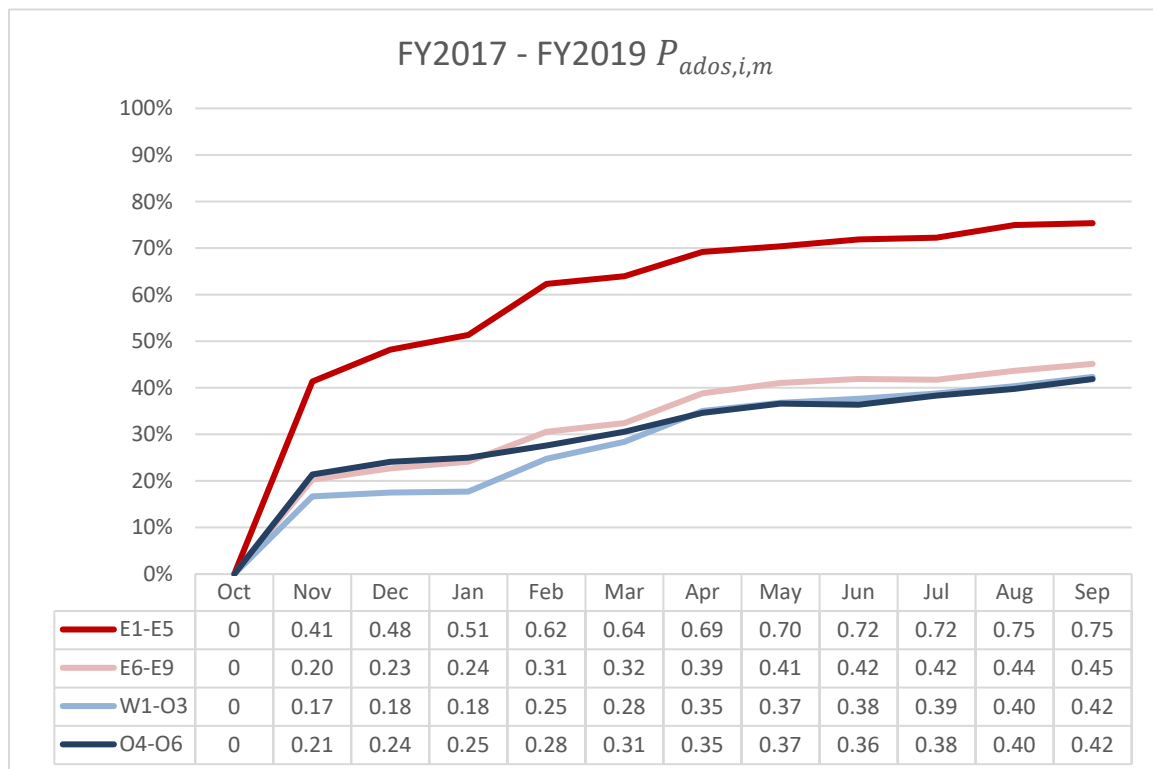
Figure 29.   FY2017–FY2019 $P_{ados,i,m}$

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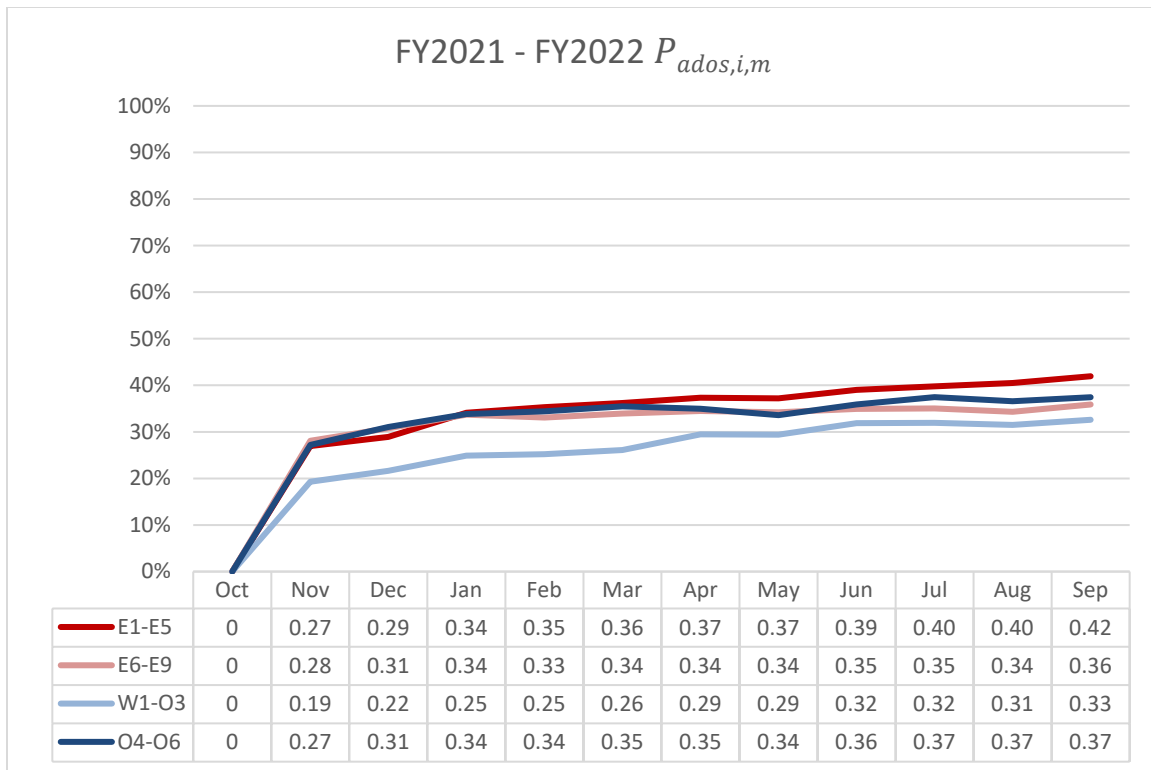
Figure 30.   FY2021–FY2022 $P_{ados,i,m}$

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E1-E5 | 0 | 0.27 | 0.29 | 0.34 | 0.35 | 0.36 | 0.37 | 0.37 | 0.39 | 0.40 | 0.40 | 0.42 |
| E6-E9 | 0 | 0.28 | 0.31 | 0.34 | 0.33 | 0.34 | 0.34 | 0.34 | 0.35 | 0.35 | 0.34 | 0.36 |
| W1-O3 | 0 | 0.19 | 0.22 | 0.25 | 0.25 | 0.26 | 0.29 | 0.29 | 0.32 | 0.32 | 0.31 | 0.33 |
| O4-O6 | 0 | 0.27 | 0.31 | 0.34 | 0.34 | 0.35 | 0.35 | 0.34 | 0.36 | 0.37 | 0.37 | 0.37 |

Note that FY2020 was excluded because the impact of COVID-19 on AT participation and the length of AT periods may distort the results. Also, the probability calculation is based on whether ADOS has been completed at the beginning of the month, therefore October values are zero because it would not be possible to have already completed ADOS in that FY.

There are observable differences in the trends of $P_{ados,i,m}$ before and after FY2020. From FY2017 to FY2019, the probability of completing AT, given ADOS had been completed, increased approximately 20–30 percentage points from November to September. This means that the later in the FY ADOS was completed, the greater probability that AT would also be completed. The same trend occurred from FY2021 to FY2022, but to much a lesser degree, with a difference of approximately 10–15 percentage points. The most dramatic difference between the two periods is the change of behavior of the E1-E5 group, which had a $P_{ados,i,m}$ approximately 30 percentage points higher than the other groups during FY2017 to FY2019 but was relatively similar to the other groups after

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FY2020. Regardless of rank group, completing 14 days or more of ADOS reduces the probability of completing AT later in the year.

The most likely explanation for these distinct differences in $P_{ados,i,m}$ before and after FY2020 is the corresponding increase in average ADOS days. As we've seen with Average Mandays by Order Type, the average days of ADOS orders has increased significantly during this period. This increase may have reduced the incentive, or precluded the possibility, of also completing AT in the same FY.

6.      Conclusion

The trends in AT and ADOS observed from FY2017-FY2022 demonstrate fluctuations that reflect the dynamic nature of factors influencing these activities, which are difficult to isolate. Expectedly, the number of personnel attending AT generally decreases as end-strength declines. However, by all measures, AT participation rates are declining precipitously during the period, which cannot be explained directly by endstrength losses. The potential negative correlation between ADOS-RC and AT participation we sought to examine is significantly less apparent after isolating ADOS-RC to Pay Group A. Regarding ADOS-AC, there appears to be a stronger negative correlation with AT participation, as AT mandays declined during periods of rising ADOS-AC mandays. This trend may suggest potential manpower reallocations influenced by internal and external factors such as organizational changes, strategic shifts, operational requirements, or changes in personnel behavior. The steady reduction in average AT mandays per person during the period might also indicate changes in training events or resource allocations, especially notable during the COVID-19 disruption in FY2020. The increase in ADOS mandays in later years compared to FY2017 suggest a potential shift toward more active duty days compared to traditional AT, highlighting a potential shift towards a more operational Reserve.

Our analysis also compared AT participation rates using different methodologies, focusing on three formulations: Met "legal" requirement, P&R's AT "pure" (mandays), and AT "pure" (PAX)–detailing observable disparities between Officer and Enlisted, in addition to rank groups. Of the observations, the E1-E5 rank group follows a very similar

trend as the overall Enlisted participation in both manday and personnel counts. Similarly, O4-O6 participation appears to drive the overall Officer participation trend. The U-shaped curve of E6-E9 participation is surprising in that it does not match the general trends of the rest of the population, both Officer and Enlisted. These differences are important to note, given that the current MDATT AT forecast model uses aggregate averages and does not differentiate between groups.

When comparing participation rate formulations, the AT "pure" participation based on personnel consistently demonstrates lower rates in contrast to P&R's "pure" manday calculation, primarily because the AT "pure" calculation excludes individuals with fewer than 14 days of AT. This confirms that the manday formula does not accurately represent individual participation behaviors. P&R's participation rate overstates the completion of Title 10 AT requirement based on "pure" AT mandays but under-represents participation it when compared to the "legal" requirement, which includes ADOS. The divergence between P&R participation and "legal" requirement percentages in FY2018-FY2019 suggests a substitution effect with lower AT manday usage and higher ADOS. Additionally, "legal" requirement rates have remained relatively stable compared with AT "pure," which further supports this observation.

Lastly, we have examined the impact of ADOS on an individual's probability of completing AT in the same FY. We've demonstrated that there was a marked decrease after FY2020 in the probability of completing AT, given that ADOS had already been completed. Despite the trends in participation, differences by rank group suggest that a forecast model with more granularity could improve forecasts.

# VI. CONCLUSION

## A.    SUMMARY OF THE RESEARCH OBJECTIVES

The purpose of this MBA project is to learn how SMCR AT participation and the use of ADOS introduce uncertainty in budget forecasting, which contributes to volatility in budget performance. Our primary research question sought to identify the how differing definitions of AT participation impacts budget forecasting. Our secondary research question sought to understand the impact of ADOS on AT participation. To answer these questions, we conducted a qualitative stakeholder analysis to compare competing interpretations of AT participation among P&R, MARFORRES, and individual SMCR Marines. We then calculated the different participation formulations using historic MROWS data and analyzed ADOS and AT participation trends.

## B.    FINDINGS

We derive the following findings that range from differences in stakeholders interests, participation rate formulation, the impact of ADOS, constraints on MYR, and forecast modeling limitations.

### 1.    Stakeholder Interests and Responsibilities are not Fully Aligned

Different definitions of AT participation exist for budget costing and operational management. There is also a misalignment in the need to accurately forecast and manage AT budget execution, yet policy allows ADOS to be used in lieu of AT. From P&R's perspective, AT participation, or AT "pure," is an expression of AT manday usage and not the proportion of individual Marines who have met the satisfactory participation requirements of Title 10 and the MCRAMM. P&R is held accountable to budget performance under the requirements of 1517 Authority, but has no direct influence on AT participation or financial execution. From MARFORRES perspective, AT participation is synonymous with the proportion of individual Marines who have met the "legal" requirement, either through AT or ADOS. This definition of AT participation is necessary for the administrative management of training, but is not congruent with the requirement

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to forecast AT "pure" financial execution. MARFORRES is best positioned to forecast the end of year financial position for Pay Group A, but does not have the same level of responsibility or pressure for financial performance as P&R. For the individual Marine, reaching a satisfactory year for retirement can be accomplished without participating in AT. There are also significant differences between the management and oversight of AT compared with IDT, which may contribute to lower rates of AT participation. The result of the misalignment among stakeholder interests and responsibilities is a lack of stability or predictability in AT participation.

## 2.    AT "Pure" Participation Rate does not Represent Individual Activity

The AT "pure" participation rate, based on average AT mandays, does not reflect the proportion of Marines who complete 14 days or more of AT. As a result, the percentage of Marines who meet the Title 10 annual training requirement with the AT BLI, as opposed to ADOS, is less than the AT "pure" rate. However, when the AT "pure" rate is compared to the "legal" requirement rate, the proportion of Marines who have met the Title 10 annual training requirement is in fact higher. The importance of these differences depends on the interpretation of the intended audience. Congress relies on the PB J-books to make resources allocation decisions; in which case the AT "pure" rate correctly reflects the execution of AT mandays as it relates to average endstrength. However, if the AT "pure" rate is used to evaluate the SMCR's compliance with the Title 10 AT requirement, it under-represents the proportion of Marines that are actually meeting the requirement because it does not include ADOS.

## 3.    Pay Group A ADOS-RC Usage is Low Source of Volatility

Initially, available data for ADOS-RC in the 1108 PB J-books, based on all pay groups, appeared to suggest that Pay Group A AT participation is negatively correlated with overall increases in ADOS-RC. However, our analysis of MROWS data revealed that when isolated to Pay Group A, ADOS-RC is relatively low, stable, and generally mirrors AT trends.

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### 4. Pay Group A ADOS-AC is a Potential Source of Volatility

Between FY2017-FY2022, ADOS-AC displays significant fluctuations and greatly outweighed AT in terms of total mandays. Although the number of Marines was relatively low, there does appear to be a correlation between periods of increasing ADOS-AC and decreasing AT participation. ADOS-AC is within the 1105 appropriation and managed in workyears, rather than mandays, which can make analysis difficult. Combined with the fact that many requirements may be unplanned, ADOS-AC has the potential to cause uncertainty and volatility in budget forecasting. The majority of unplanned ADOS during the period evaluated was COVID-19 related, which did not correlate with the peak years of ADOS-AC mandays, given the relatively low number of personnel impacted. However, the average mandays for these unplanned periods was very high and would likely have had a significant negative impact on AT participation if large numbers of personnel been activated.

### 5. Inherent Constraints of Fourth Quarter Annual Training Execution

As discussed, the preponderance of 1108 AT execution occurs in Q4, with less than 20% of total AT mandays executed by the end of May. This significantly limits the execution data available for trend analysis to facilitate accurate end of year forecasts during MYR. During the year of execution, actual average endstrength, personnel turnover, emerging requirements, and delayed AT manning requirements drive much of the uncertainty in forecasting, which is not easily accounted for in regression analysis.

### 6. Limitations of "Remaining Expected Participation" Forecast

The MDATT project has successfully produced a comprehensive data analysis tool that provides operational visibility on AT and IDT that was not available prior to FY2023. Future releases will continue to refine the model with the intent of developing a capability to conduct "what if" analysis for various scenarios.

#### a. *Does Not Account for Those Who Will Complete AT And ADOS*

The current MDATT "Remaining Expected Participation" formula subtracts the number of Marines that have already completed the "legal" requirement. However, the data

shows that 5–10% of Marines completed both AT and ADOS, and that those who complete both had a higher average AT mandays per person. Additionally, the probability of completing AT by the end of the year, given that ADOS has been completed, increases each month. This means that the forecasting model is not counting Marines who have completed ADOS earlier in the year, even though he or she may still conduct an AT later.

### b.    *Forecast does not Differentiate Between Officer and Enlisted*

The current model does not differentiate between the participation rates and costs of Officer and Enlisted Marines. The MDATT team is aware and intends to modify their approach in future iterations. Our analysis of the data confirms that there are considerable differences in participation between these groups and the future model may be more accurate if they are treated separately. Despite the considerable variation between Rank Groups, differentiation beyond Officer and Enlisted would likely have a negligible effect, given the disproportionate number of E1-E5 in the total population.

### c.    *Use of AT "Pure" Participation Rate is Sub-Optimal*

The AT "pure" participation rate provided by P&R is currently used in the MDATT formula to calculate "remaining expected participation." However, there are concerns regarding its accuracy because, as we have discussed, it does not adequately capture individual activity. Consequently, using this participation rate in conjunction with the projected average endstrength may not yield a reliable prediction of future participation.

A more precise approach may involve using data from MROWS, which tracks the amount of AT completed. Using a participation rate derived from the number of Marines who have engaged in AT may produce a participation rate that is more representative of historic activity. As a result, this method may provide a more realistic forecast of AT costs for the remainder of the fiscal year by aligning the expected participation with actual behavior patterns. The limitation at this stage may be the lack of clean and complete historic MROWS data.

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### d. *Current Forecast Model Aggregates Multiple Independent Variables*

The current forecasting model integrates various independent variables into a single formula by using aggregate averages; specifically, the total number of personnel, the average number of days per person, and the average cost per person. This may mask the impact of relevant independent variables and, as a result, hinder the ability to perform a sensitivity analysis. The contributing factors affecting these averages are not distinctly isolated within the formula, thereby obscuring how changes in one variable might influence the overall forecast. For more precise and actionable insights, it would be necessary to disaggregate these averages and model each variable separately. Examples of such variables are Officer and Enlisted, continental U.S. (CONUS) and OCONUS events or training, and unplanned ADOS.

## C.    DISCUSSION ON THE OPTIMAL PARTICIPATION RATE

Throughout our study we examined the different individual, operational, financial, perspectives on Reserve AT participation, as well as examined historical rates and trends. But we did not discuss what the desired or optimal participation rate should be. The reason is that the "optimal" rate is dependent on the intended outcome and priority. Although each Reservist has a requirement under Title 10 and the MCRAMM to complete 48 IDTs and 14 days or more of active duty for training, 100% participation is not realistic. There will always be a certain percentage of Marines who do not participate in AT for number of reasons, whether due to medical restrictions, extenuating circumstances, or a small minority of unauthorized absences (UA).

From a fiscal perspective, the participation rate is essentially an expression of the obligation rate applied as a proportion of end-strength. The objective is to maximize execution of the budget and to reasonably predict deviations while there is still time to reprogram. But this does not tell us much about the activity of individuals or the training value derived from AT. If AT manday usage was maximized solely for the purpose of demonstrating a higher AT "pure" participation, i.e., obligation rate, then higher quality training opportunities and real-world operations available through ADOS might be missed.

From an operational and training perspective, the desired level of AT participation depends on the training value derived from the alternative period of ADOS. Attending professional military education (PME) or a real-world skill enhancing event though ADOS may be desirable substitutes for AT. However, it may not be desirable to assume that all periods of active duty are of equivalent training value, which is presumably why Title 10 requires 14 days or more of *active duty for training*. There are numerous requirements for operational and administrative support that do not directly relate to military occupational specialty (MOS) proficiency or unit mission essential tasks (METS), despite the importance and necessity of the requirement. This is where the professional judgement of leadership is required to assess the training and readiness value of a period of ADOS for an individual Marine. If the period of ADOS has a greater training value than the period of AT, then it may be preferred to accept a lower participation rate of AT "pure" and prioritize higher rates of "legal" requirement participation.

While balancing the tradeoffs between budget performance and operational objectives, it is also important to recognize that spending precedents may have unintended consequences on future budgets. The current AT "pure" participation rate naturally accounts for any substitution effect that may be occurring from the use of ADOS, so any significant change in ADOS usage would impact AT participation rates. If ADOS were to be significantly reduced, or the authorities governing the use ADOS became more restrictive, then a sudden increase in demand for AT funding may be met with scrutiny. However, the more likely scenario may be an increased use of ADOS to meet increasing global force requirements levied on the Reserve Component. In this case, it may be necessary to justify declining AT participation by demonstrating higher rates of Marines meeting the "legal" requirement.

Regardless of the scenario, we argue that it is prudent to understand the correlations and drivers of AT participation so that if financial or operational conditions change, there is an understanding of how to leverage policy and personnel management to influence participation. There is inherent uncertainty by allowing ADOS to be used in lieu AT, and competing demands between operational and financial priorities, which require close coordination to mitigate and reconcile. This is not to suggest that an overly prescriptive

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approach to mandating AT participation is necessary or even desirable. Commanders must continue to retain the autonomy to employ their forces as they deem necessary in support of their assigned mission.

## D.    RECOMMENDATIONS

The following recommendations are intended for consideration by P&R and MARFORRES, as well as for future academic research.

### 1.    Annual Training Policy Enforcement

We recommend that sufficient training and tools are provided to ensure that Commanders and Inspector and Instructor (I&I) staff understand and properly enforce the requirements prescribed in the MCRAMM. The nuanced differences and implications between Annul Training, "legal" requirement, satisfactory participation, and satisfactory year must be fully understood.

We do not recommend significant changes to policy regarding AT participation. As written, the MCRAMM provides sufficient guidance on the requirements of satisfactory training participation and to ensure the only Commanders may grant an exception if ADOS has been completed. As intended, this provides sufficient discretion and flexibility for Commanders to exercise professional judgement. In practice, however, misinterpretation, misapplication, and inconsistent adherence to policy may contribute to unpredictable participation outcomes.

As discussed, there is significant disparity between the processes and procedures to schedule, track, and enforce IDT drill participation, compared with AT. Consideration should be given to incorporating AT into Drill Manager to schedule, track, and report completion. This would standardize the administration of the two co-equal annual participation requirements and may contribute to more predictable AT participation.

### 2.    Incorporate ADOS into Participation Forecasting

ADOS should be incorporated into the remaining participation forecast model. The data suggests that ADOS, particularly ADOS-AC, has some influence on the likelihood of

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AT participation, as well as average AT mandays. Importantly, ADOS-AC is highly variable and dependent on emergent operational requirements. For these reasons, omitting ADOS trends from consideration in the "remaining expected participation" may reduce forecast accuracy, especially as conditions change in the year of execution.

### 3. Consolidation of Feeder System Data Sets

We recommend research on the integration of data from multiple feeder systems into one common repository to facilitate forecasting analysis. One of the primary limitations in forecasting is the difficulty in aggregating data from multiple feeder systems into a single, standardized data set. There are a number of separate feeder systems required to collect the data necessary for analysis, which each contain different data elements related accounting, payroll, training, administration, travel, and transportation. These systems contain disparate data that are not easily accessed, consolidated, and synthesized into a single common dataset that can shared be P&R and MARFORRES. Appendix K depicts each of the systems and the related functions.

### 4. Develop a Probabilistic Forecast Model

In future development of the MDATT forecasting model, we recommend considering a probabilistic approach that incorporates more independent variables. This approach will facilitate sensitivity analysis by isolating the impact of single variables on participation. For example, this could also support forecasting the probability of an individual completing AT, given that ADOS has already been completed. In our analysis we lacked individual level data about Marines who did not complete AT or ADOS, which is necessary to calculate the probability of individuals completing AT in the future. However, this data can be derived from MCTFS and merged with MROWS data to identify on-hand personnel who have not completed AT and/or ADOS. For illustrative purposes, Figure 31 is an example of how this model might be formulated to forecast the remaining participation in a given month.

$$Remaining\ Participation_m = \frac{\sum_i\left[(N_{i,m} - M_{i,m}) \times P_{not,i,m} + M_{i,m} \times P_{ados,i,m}\right]}{\sum_i(N_{i,m} - M_{i,m})}$$

*Remaining Participation$_m$:* Number of personnel expected participate in AT in the remainder of the year, after month $m$
$P_{not,i,m}$:    AT participation rate for those in group $i$ who have not yet met the "legal" requirement in month $m$
$P_{ados,i,m}$: AT participation rate for those in group $i$ who have already met the "legal" requirement via ADOS in month $m$
$N_{i,m}$:      Number of current personnel in group $i$ in month $m$
$M_{i,m}$:      Number of current personnel in group $i$ in month $m$ who have already met the "legal" requirement

Figure 31.  Sample Probabilistic Formula

The numerator sums all group $i$:

*($N_{i,m} - M_{i,m}$) x $P_{not,i,m}$* : The number of personnel who have not yet completed the "legal" requirement, multiplied by the AT participation rate for those who have not yet met the "legal" requirement.

*$M_{i,m}$ x $P_{ados,i,m}$* : The number of personnel who have already met the "legal" requirement via ADOS multiplied by the AT participation rate for those who have met the "legal" requirement via ADOS.

The denominator is the total number of personnel in group $i$ in month $m$ minus those in group $i$ who have already met the "legal" requirement by month $m$, summed over all group $i$.

Other independent variables that may affect the probability of participating in AT could be incorporated in a similar manner. These may include specific named exercises and operations, unplanned ADOS events, differences in Officers and Enlisted, CONUS and OCONUS AT, etc.

E.      LIMITATIONS

Through our project we have attempted to identify relevant factors impacting AT participation and its impact on 1108 MILPERS forecasting, however it is necessary to acknowledge inherent limitations. The following limitations are not exhaustive, but serve to inform future research. The first limitation in our study was our focus the SMCR Pay Group A. We chose this population because it comprises the majority of the SelRes

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population and has been the focus of attention for P&R and MARFORRES regarding budget volatility. However, as we discussed, Marines can and do move between different Pay Groups and components. An examination of the entire Reserve population may reveal other underlying trends and dynamics that impact AT Participation.

Another limitation was that we primarily examined aggregate yearly data, due to the complexity of the MROWS data set and the limitation of time. This was a significant limitation because yearly aggregate data is not sufficient to forecast remaining participation at monthly intervals.

Lastly, the data analyzed is a small subset of historic data, which limits how well our observations can be generalized. While we attempted to examine the role of ADOS on AT participation, there are a significant number of confounding variables, anomalies, and randomness that effect participation which were not examined.

# APPENDIX A. MROWS DATA FIELDS

| DATA FIELD | DESCRIPTION |
|---|---|
| FISCAL_YEAR | Fiscal year of order start-date |
| ID (redacted EDIPI) | Unique individual identifier |
| PRESENT_GRADE_CODE | Rank at time orders were written |
| ORDER_TRACKING_NUMBER | Unique order MROWS order number |
| START_DATE | Date orders began |
| END_DATE | Date orders ended |
| MANDAYS | Number of days, including travel |
| ORDER_TYPE | ACTIVATION<br>ADOS-RC SCHOOLS<br>ADOS-RC SPECIAL TRAINING<br>ADOS-AC<br>ANNUAL TRAINING |
| ADOS_DESCRIPTION | ADDITIONAL AT<br>ADOS CONTINGENCY 10 U.S.C. SEC 12301(D)<br>ANNUAL TRAINING<br>COMMAND/STAFF SUPERVISION<br>COUNTERDRUG DEFENSE SUPPORT OF CIVIL<br>AUTHORITIES 10 U.S.C. SEC 12304(A)<br>EXERCISE PARTICIPATION<br>EXERCISE SUPPORT<br>EXTENDED AT<br>FUNERAL HONORS<br>IIADT<br>INVOLUNTARY EXTENSION–LEGAL HOLD<br>MANAGEMENT SUPPORT<br>MEDICAL HOLD 12301h following orders 30+ days<br>MOS<br>OPERATIONAL TRAINING<br>OTHER<br>PARTIAL MOBILIZATION 10 U.S.C. SEC 12302<br>PME<br>PREPLANNED MISSION ISO COMBATANT COMMANDS(CD/CNT)<br>PREPLANNED MISSION ISO COMBATANT COMMANDS(COCOM)<br>RECRUITING AND RETENTION<br>REFRESHER AND PROFICIENCY TRAINING<br>SERVICE MISSION SUPPORT<br>SHORT TOURS<br>UNIT TRAINING<br>WARRANT OFFICER BASIC COURSE |
| ACTIVITY_DESCRIPTION | Free-form text field describing activity, event name |
| SPECIAL_INTEREST_CODE (SIC) | 3-Digit activity identifier |

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# APPENDIX B. CLEANED AND TRANSFORMED MROWS DATA FIELDS

| DATA FIELD | DESCRIPTION |
|---|---|
| FISCAL_YEAR | Multiple Year orders allocated to appropriate FY |
| ID | Unique individual identifier |
| O_E | Officer or Enlisted |
| RANK_GROUP | E1-E5, E6-E9, W1-O3, O4-O6 |
| AT | Total AT Mandays per ID, per FY |
| ADOS_RC | Total ADOS-RC Mandays per ID, per FY |
| ADOS_AC | Total ADOS-AC Mandays per ID, per FY |
| Total_ADOS | Total ADOS-AC and ADOS-RC Mandays per ID, per FY |
| UNPLANNED | Total Mandays of DSCA, COVID, and Hurricane related ADOS |
| BINARY FIELDS | |
| AT Y/N | AT > 0 |
| ADOS Y/N | AT > 0 & ADOS > 0 |
| Legal Requirement | AT+ADOS >=14 |
| ONLY_AT | AT>0 & ADOS = 0 |
| AT_GE_14 | ADOS = 0 & AT >=14 |
| AT_LT_14 | ADOS=0 & AT <14 |
| ONLY_ADOS | AT=0 & ADOS >0 |
| ADOS_TTL_GE_14 | AT=0 & ADOS>=14 |
| ADOS_TTL_LT_14 | AT=0 & ADOS<14 |
| BOTH_AT_ADOS | AT>0&ADOS>0 |
| AT_LT_14_ADOS_TTL_LT_14 | AT>0<14 & ADOS>0<14 |
| AT_ADOS_TTL_LT_14 | AT>0<14 & ADOS>0<14 & =AT+ADOS<14 |
| AT_ADOS_TTL_GT_14 | AT>0<14 & ADOS>0<14 & AT + ADOS >=14 |
| AT_GE_14_ADOS_TTL_LT_14 | AT>=14 & ADOS >0<14 |
| AT_LT_14_ADOS_TTL_GE_14 | AT>0<14 & ADOS>=14 |
| AT_GE_14_ADOS_TTL_GE_14 | AT>=14 & ADOS>=14 |

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# APPENDIX C. P&R HISTORIC END-STRENGTH, AT MANDAYS, AND PARTICIPATION RATES

| FY | CAT | OE | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | PostEOFY | Total/Avg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FY17 | Avg Strength | O | 2,218 | 2,230 | 2,222 | 2,225 | 2,244 | 2,245 | 2,259 | 2,284 | 2,287 | 2,302 | 2,293 | 2,273 | | 2,254 |
| | | E | 28,343 | 28,430 | 28,593 | 28,224 | 28,306 | 28,472 | 28,395 | 28,448 | 28,298 | 28,307 | 28,412 | 28,399 | | 28,383 |
| | | Total | 30,561 | 30,660 | 30,815 | 30,449 | 30,550 | 30,717 | 30,654 | 30,732 | 30,585 | 30,609 | 30,705 | 30,672 | | 30,637 |
| | PG-A ATMandays | O | 80 | 131 | 295 | 619 | 1,079 | 1,316 | 1,390 | 2,445 | 9,445 | 4,870 | 3,164 | 1,208 | 480 | 26,522 |
| | | E | 364 | 109 | 1,342 | 10,970 | 9,138 | 6,749 | 14,574 | 24,584 | 143,985 | 86,026 | 44,892 | 9,386 | 1,929 | 354,048 |
| | | Total | 444 | 240 | 1,637 | 11,589 | 10,217 | 8,065 | 15,964 | 27,029 | 153,430 | 90,896 | 48,056 | 10,594 | 2,409 | 380,570 |
| | ATParticipation | O | 0.24% | 0.39% | 0.89% | 1.85% | 3.21% | 3.91% | 4.10% | 7.14% | 27.53% | 14.10% | 9.20% | 3.54% | 1.41% | 78.44% |
| | | E | 0.09% | 0.03% | 0.31% | 2.59% | 2.15% | 1.58% | 3.42% | 5.76% | 33.92% | 20.26% | 10.53% | 2.20% | 0.45% | 83.16% |
| | | Total | 0.10% | 0.05% | 0.35% | 2.54% | 2.23% | 1.75% | 3.47% | 5.86% | 33.44% | 19.80% | 10.43% | 2.30% | 0.52% | 82.81% |
| FY18 | Avg Strength | O | 2,309 | 2,318 | 2,318 | 2,302 | 2,298 | 2,287 | 2,271 | 2,286 | 2,289 | 2,334 | 2,336 | 2,297 | | 2,303 |
| | | E | 28,446 | 28,472 | 28,655 | 28,452 | 28,383 | 28,411 | 28,403 | 28,258 | 28,139 | 28,053 | 28,099 | 27,975 | | 28,330 |
| | | Total | 30,755 | 30,790 | 30,973 | 30,754 | 30,681 | 30,698 | 30,674 | 30,544 | 30,428 | 30,387 | 30,435 | 30,272 | | 30,633 |
| | PG-A ATMandays | O | 220 | 210 | 447 | 500 | 1,197 | 1,282 | 1,505 | 2,206 | 8,993 | 4,036 | 3,412 | 707 | 172 | 24,887 |
| | | E | 1,498 | 477 | 5,414 | 7,695 | 13,025 | 8,830 | 12,749 | 17,592 | 148,294 | 62,829 | 47,348 | 4,926 | 1,430 | 332,107 |
| | | Total | 1,718 | 687 | 5,861 | 8,195 | 14,222 | 10,112 | 14,254 | 19,798 | 157,287 | 66,865 | 50,760 | 5,633 | 1,602 | 356,994 |
| | ATParticipation | O | 0.64% | 0.60% | 1.29% | 1.45% | 3.47% | 3.74% | 4.42% | 6.43% | 26.19% | 11.53% | 9.74% | 2.05% | 0.50% | 72.05% |
| | | E | 0.35% | 0.11% | 1.26% | 1.80% | 3.06% | 2.07% | 2.99% | 4.15% | 35.13% | 14.93% | 11.23% | 1.17% | 0.34% | 78.15% |
| | | Total | 0.37% | 0.15% | 1.26% | 1.78% | 3.09% | 2.20% | 3.10% | 4.32% | 34.46% | 14.67% | 11.12% | 1.24% | 0.35% | 77.69% |
| FY19 | Avg Strength | O | 2,282 | 2,260 | 2,244 | 2,187 | 2,210 | 2,187 | 2,185 | 2,188 | 2,186 | 2,219 | 2,254 | 2,272 | | 2,224 |
| | | E | 27,808 | 27,855 | 28,093 | 27,837 | 27,799 | 27,924 | 28,110 | 28,044 | 27,851 | 27,990 | 28,103 | 27,930 | | 27,947 |
| | | Total | 30,090 | 30,115 | 30,337 | 30,024 | 30,009 | 30,111 | 30,295 | 30,232 | 30,037 | 30,209 | 30,357 | 30,202 | | 30,171 |
| | PG-A ATMandays | O | 388 | 757 | 460 | 999 | 982 | 2,277 | 948 | 1,768 | 8,194 | 4,052 | 2,418 | 847 | 336 | 24,426 |
| | | E | 4,969 | 8,919 | 4,245 | 5,604 | 7,567 | 18,217 | 6,662 | 12,086 | 124,507 | 58,298 | 42,032 | 6,452 | 1,650 | 301,208 |
| | | Total | 5,357 | 9,676 | 4,705 | 6,603 | 8,549 | 20,494 | 7,610 | 13,854 | 132,701 | 62,350 | 44,450 | 7,299 | 1,986 | 325,634 |
| | ATParticipation | O | 1.13% | 2.23% | 1.37% | 3.05% | 2.96% | 6.94% | 2.89% | 5.39% | 24.99% | 12.17% | 7.15% | 2.49% | 0.99% | 73.22% |
| | | E | 1.19% | 2.13% | 1.01% | 1.34% | 1.81% | 4.35% | 1.58% | 2.87% | 29.80% | 13.89% | 9.97% | 1.54% | 0.39% | 71.85% |
| | | Total | 1.19% | 2.14% | 1.03% | 1.47% | 1.90% | 4.54% | 1.67% | 3.06% | 29.45% | 13.76% | 9.76% | 1.61% | 0.44% | 71.95% |
| FY20 | Avg Strength | O | 2,251 | 2,269 | 2,275 | 2,264 | 2,254 | 2,261 | 2,280 | 2,306 | 2,314 | 2,342 | 2,342 | 2,336 | | 2,289 |
| | | E | 27,909 | 27,854 | 28,012 | 27,692 | 27,637 | 27,807 | 28,033 | 28,198 | 28,132 | 27,923 | 27,757 | 27,399 | | 27,885 |
| | | Total | 30,160 | 30,123 | 30,287 | 29,956 | 29,891 | 30,068 | 30,313 | 30,504 | 30,446 | 30,265 | 30,099 | 29,735 | | 30,173 |
| | PG-A ATMandays | O | 161 | 355 | 170 | 1,001 | 633 | 825 | 291 | 156 | 327 | 6,075 | 8,700 | 2,340 | 450 | 21,484 |
| | | E | 1,755 | 2,840 | 2,311 | 6,163 | 5,235 | 8,426 | 1,886 | 474 | 2,193 | 76,315 | 116,633 | 25,826 | 4,226 | 254,283 |
| | | Total | 1,916 | 3,195 | 2,481 | 7,164 | 5,868 | 9,251 | 2,177 | 630 | 2,520 | 82,390 | 125,333 | 28,166 | 4,676 | 275,767 |
| | ATParticipation | O | 0.48% | 1.04% | 0.50% | 2.95% | 1.87% | 2.43% | 0.85% | 0.45% | 0.94% | 17.29% | 24.77% | 6.68% | 1.28% | 62.59% |
| | | E | 0.42% | 0.68% | 0.55% | 1.48% | 1.26% | 2.02% | 0.45% | 0.11% | 0.52% | 18.22% | 28.01% | 6.28% | 1.03% | 60.79% |
| | | Total | 0.42% | 0.71% | 0.55% | 1.59% | 1.31% | 2.05% | 0.48% | 0.14% | 0.55% | 18.15% | 27.76% | 6.31% | 1.05% | 60.93% |
| FY21 | Avg Strength | O | 2,318 | 2,271 | 2,284 | 2,292 | 2,312 | 2,297 | 2,289 | 2,284 | 2,289 | 2,294 | 2,288 | 2,295 | | 2,294 |
| | | E | 27,150 | 26,680 | 26,432 | 26,100 | 25,915 | 25,700 | 25,390 | 25,324 | 25,174 | 25,114 | 25,036 | 24,946 | | 25,849 |
| | | Total | 29,468 | 28,951 | 28,716 | 28,392 | 28,227 | 27,997 | 27,679 | 27,608 | 27,463 | 27,408 | 27,324 | 27,241 | | 28,143 |
| | PG-A ATMandays | O | 265 | 418 | 261 | 319 | 478 | 566 | 1,000 | 2,619 | 2,544 | 6,376 | 7,063 | 1,171 | 391 | 23,471 |
| | | E | 2,947 | 2,666 | 1,335 | 893 | 1,768 | 4,590 | 6,886 | 26,290 | 30,649 | 90,251 | 93,117 | 8,099 | 1,721 | 271,212 |
| | | Total | 3,212 | 3,084 | 1,596 | 1,212 | 2,246 | 5,156 | 7,886 | 28,909 | 33,193 | 96,627 | 100,180 | 9,270 | 2,112 | 294,683 |
| | ATParticipation | O | 0.76% | 1.23% | 0.76% | 0.93% | 1.38% | 1.64% | 2.91% | 7.64% | 7.41% | 18.53% | 20.58% | 3.40% | 1.14% | 68.20% |
| | | E | 0.72% | 0.67% | 0.34% | 0.23% | 0.45% | 1.19% | 1.81% | 6.92% | 8.12% | 23.96% | 24.80% | 2.16% | 0.46% | 69.95% |
| | | Total | 0.73% | 0.71% | 0.37% | 0.28% | 0.53% | 1.23% | 1.90% | 6.98% | 8.06% | 23.50% | 24.44% | 2.27% | 0.52% | 69.81% |
| FY22 | Avg Strength | O | 2,301 | 2,269 | 2,236 | 2,241 | 2,253 | 2,258 | 2,262 | 2,269 | 2,313 | 2,334 | 2,336 | 2,345 | | 2,283 |
| | | E | 24,824 | 24,706 | 24,567 | 24,340 | 24,053 | 23,912 | 23,659 | 23,494 | 23,197 | 23,038 | 22,948 | 22,823 | | 23,885 |
| | | Total | 27,125 | 26,975 | 26,803 | 26,581 | 26,306 | 26,170 | 25,921 | 25,763 | 25,510 | 25,372 | 25,284 | 25,168 | | 26,168 |
| | PG-A ATMandays | O | 127 | 123 | 141 | 232 | 517 | 820 | 890 | 1,187 | 5,403 | 5,999 | 5,498 | 2,806 | 0 | 23,743 |
| | | E | 491 | 383 | 2,526 | 784 | 3,765 | 6,224 | 6,136 | 10,541 | 55,031 | 76,035 | 59,153 | 17,681 | 0 | 238,750 |
| | | Total | 618 | 506 | 2,667 | 1,016 | 4,282 | 7,044 | 7,026 | 11,728 | 60,434 | 82,034 | 64,651 | 20,487 | 0 | 262,493 |
| | ATParticipation | O | 0.37% | 0.36% | 0.42% | 0.69% | 1.53% | 2.42% | 2.62% | 3.49% | 15.57% | 17.14% | 15.69% | 7.98% | 0.00% | 69.34% |
| | | E | 0.13% | 0.10% | 0.69% | 0.21% | 1.04% | 1.74% | 1.73% | 2.99% | 15.82% | 22.00% | 17.18% | 5.16% | 0.00% | 66.64% |
| | | Total | 0.15% | 0.13% | 0.66% | 0.25% | 1.09% | 1.79% | 1.81% | 3.03% | 15.79% | 21.55% | 17.05% | 5.43% | 0.00% | 66.87% |

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# APPENDIX D. PERSONNEL COUNT DATA

| PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| E | 22,541 | 22,179 | 21,871 | 20,252 | 19,526 | 17,252 | 123,621 |
| E1-E5 | 20,792 | 20,491 | 20,316 | 18,531 | 17,924 | 15,756 | 113,810 |
| E6-E9 | 1,749 | 1,688 | 1,555 | 1,721 | 1,602 | 1,496 | 9,811 |
| O | 1,867 | 1,898 | 1,855 | 1,798 | 1,828 | 1,768 | 11,014 |
| W1-O3 | 1,125 | 1,109 | 1,037 | 979 | 948 | 883 | 6,081 |
| O4-O6 | 742 | 789 | 818 | 819 | 880 | 885 | 4,933 |
| Grand Total | 24,408 | 24,077 | 23,726 | 22,050 | 21,354 | 19,020 | 134,635 |

| AT - PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| E | 21,694 | 21,014 | 19,242 | 18,396 | 17,860 | 15,252 | 113,458 |
| E1-E5 | 20,126 | 19,568 | 17,946 | 16,901 | 16,474 | 13,948 | 104,963 |
| E6-E9 | 1,568 | 1,446 | 1,296 | 1,495 | 1,386 | 1,304 | 8,495 |
| O | 1,646 | 1,602 | 1,523 | 1,488 | 1,538 | 1,556 | 9,353 |
| W1-O3 | 1,013 | 937 | 844 | 809 | 804 | 783 | 5,190 |
| O4-O6 | 633 | 665 | 679 | 679 | 734 | 773 | 4,163 |
| Grand Total | 23,340 | 22,616 | 20,765 | 19,884 | 19,398 | 16,808 | 122,811 |

| TOTAL ADOS - PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| E | 3,265 | 3,861 | 4,866 | 4,185 | 3,632 | 3,111 | 22,920 |
| E1-E5 | 2,752 | 3,285 | 4,329 | 3,679 | 3,166 | 2,758 | 19,969 |
| E6-E9 | 513 | 576 | 537 | 506 | 466 | 353 | 2,951 |
| O | 757 | 721 | 719 | 626 | 633 | 469 | 3,925 |
| W1-O3 | 398 | 399 | 416 | 335 | 287 | 225 | 2,060 |
| O4-O6 | 359 | 322 | 303 | 291 | 346 | 244 | 1,865 |
| Grand Total | 4,022 | 4,582 | 5,585 | 4,811 | 4,265 | 3,580 | 26,845 |

| ADOS-RC - PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| E | 2,536 | 1,724 | 1,403 | 1,721 | 1,819 | 896 | 10,099 |
| E1-E5 | 2,171 | 1,404 | 1,242 | 1,539 | 1,560 | 714 | 8,630 |
| E6-E9 | 365 | 320 | 161 | 182 | 259 | 182 | 1,469 |
| O | 576 | 397 | 310 | 268 | 402 | 304 | 2,257 |
| W1-O3 | 286 | 175 | 139 | 108 | 152 | 130 | 990 |
| O4-O6 | 290 | 222 | 171 | 160 | 250 | 174 | 1,267 |
| Grand Total | 3,112 | 2,121 | 1,713 | 1,989 | 2,221 | 1,200 | 12,356 |

| ADOS-AC - PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| E | 1,039 | 2,394 | 3,621 | 2,559 | 1,916 | 2,302 | 13,831 |
| E1-E5 | 848 | 2,096 | 3,217 | 2,220 | 1,692 | 2,118 | 12,191 |
| E6-E9 | 191 | 298 | 404 | 339 | 224 | 184 | 1,640 |
| O | 247 | 376 | 461 | 383 | 271 | 185 | 1,923 |
| W1-O3 | 150 | 250 | 303 | 239 | 147 | 105 | 1,194 |
| O4-O6 | 97 | 126 | 158 | 144 | 124 | 80 | 729 |
| Grand Total | 1,286 | 2,770 | 4,082 | 2,942 | 2,187 | 2,487 | 15,754 |

| UNPLANNED ADOS - PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| E | 62 | 9 | | 1,104 | 854 | 174 | 2,203 |
| E1-E5 | 50 | 9 | | 1,024 | 793 | 153 | 2,029 |
| E6-E9 | 12 | | | 80 | 61 | 21 | 174 |
| O | 9 | | | 65 | 76 | 7 | 157 |
| W1-O3 | 2 | | | 37 | 41 | 3 | 83 |
| O4-O6 | 7 | | | 28 | 35 | 4 | 74 |
| Grand Total | 71 | 9 | - | 1,169 | 930 | 181 | 2,360 |

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# APPENDIX E. TOTAL MANDAY DATA

| TOTAL AT MANDAYS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| E | 358,573 | 337,659 | 304,889 | 261,854 | 279,861 | 246,424 | 298,210 |
| E1-E5 | 332,816 | 314,645 | 283,621 | 239,825 | 258,200 | 225,362 | 275,745 |
| E6-E9 | 25,757 | 23,014 | 21,268 | 22,029 | 21,661 | 21,062 | 22,465 |
| O | 26,766 | 25,300 | 24,590 | 22,053 | 24,210 | 24,866 | 24,631 |
| W1-O3 | 16,733 | 15,393 | 14,092 | 12,136 | 12,809 | 13,035 | 14,033 |
| O4-O6 | 10,033 | 9,907 | 10,498 | 9,917 | 11,401 | 11,831 | 10,598 |
| Grand Total | 385,339 | 362,959 | 329,479 | 283,907 | 304,071 | 271,290 | 322,841 |

| TOTAL ADOS MANDAYS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| E | 187,130 | 403,120 | 712,995 | 489,700 | 383,329 | 391,677 | 427,992 |
| E1-E5 | 152,099 | 343,841 | 630,902 | 429,170 | 336,701 | 356,323 | 374,839 |
| E6-E9 | 35,031 | 59,279 | 82,093 | 60,530 | 46,628 | 35,354 | 53,153 |
| O | 46,063 | 75,962 | 88,908 | 80,927 | 59,774 | 39,340 | 65,162 |
| W1-O3 | 27,556 | 51,234 | 60,130 | 47,444 | 32,981 | 22,969 | 40,386 |
| O4-O6 | 18,507 | 24,728 | 28,778 | 33,483 | 26,793 | 16,371 | 24,777 |
| Grand Total | 233,193 | 479,082 | 801,903 | 570,627 | 443,103 | 431,017 | 493,154 |

| TOTAL ADOS_RC MANDAYS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| E | 58,196 | 46,139 | 41,936 | 40,964 | 55,515 | 35,556 | 46,384 |
| E1-E5 | 50,258 | 38,454 | 37,322 | 36,341 | 47,193 | 29,621 | 39,865 |
| E6-E9 | 7,938 | 7,685 | 4,614 | 4,623 | 8,322 | 5,935 | 6,520 |
| O | 11,739 | 10,730 | 5,960 | 7,471 | 11,793 | 11,782 | 9,913 |
| W1-O3 | 6,062 | 5,203 | 2,891 | 2,374 | 5,764 | 5,611 | 4,651 |
| O4-O6 | 5,677 | 5,527 | 3,069 | 5,097 | 6,029 | 6,171 | 5,262 |
| Grand Total | 69,935 | 56,869 | 47,896 | 48,435 | 67,308 | 47,338 | 56,297 |

| TOTAL ADOS_AC MANDYS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| E | 128,934 | 356,981 | 671,059 | 448,736 | 327,814 | 356,121 | 381,608 |
| E1-E5 | 101,841 | 305,387 | 593,580 | 392,829 | 289,508 | 326,702 | 334,975 |
| E6-E9 | 27,093 | 51,594 | 77,479 | 55,907 | 38,306 | 29,419 | 46,633 |
| O | 34,324 | 65,232 | 82,948 | 73,456 | 47,981 | 27,558 | 55,250 |
| W1-O3 | 21,494 | 46,031 | 57,239 | 45,070 | 27,217 | 17,358 | 35,735 |
| O4-O6 | 12,830 | 19,201 | 25,709 | 28,386 | 20,764 | 10,200 | 19,515 |
| Grand Total | 163,258 | 422,213 | 754,007 | 522,192 | 375,795 | 383,679 | 436,857 |

| TOTAL UNPLANNED ADOS MANDAYS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| E | 4,145 | 571 | | 230,032 | 147,231 | 18,702 | 80,136 |
| E1-E5 | 3,489 | 571 | | 219,660 | 135,903 | 16,590 | 75,243 |
| E6-E9 | 656 | | | 10,372 | 11,328 | 2,112 | 6,117 |
| O | 120 | | | 11,029 | 13,081 | 773 | 6,251 |
| W1-O3 | 27 | | | 7,577 | 8,286 | 247 | 4,034 |
| O4-O6 | 93 | | | 3,452 | 4,795 | 526 | 2,217 |
| Grand Total | 4,265 | 571 | - | 241,061 | 160,312 | 19,475 | 70,947 |

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# APPENDIX F. AVERAGE MANDAY DATA

| AVERAGE LENGTH OF AT (MANDAYS) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| **E** | **15.91** | **15.22** | **13.94** | **12.93** | **14.33** | **14.28** | **14.47** |
| E1-E5 | 16.01 | 15.36 | 13.96 | 12.94 | 14.41 | 14.30 | 14.54 |
| E6-E9 | 14.73 | 13.63 | 13.68 | 12.80 | 13.52 | 14.08 | 13.74 |
| **O** | **14.34** | **13.33** | **13.26** | **12.27** | **13.24** | **14.06** | **13.42** |
| W1-O3 | 14.87 | 13.88 | 13.59 | 12.40 | 13.51 | 14.76 | 13.85 |
| O4-O6 | 13.52 | 12.56 | 12.83 | 12.11 | 12.96 | 13.37 | 12.89 |
| **Avg** | **15.79** | **15.07** | **13.89** | **12.88** | **14.24** | **14.26** | **14.39** |

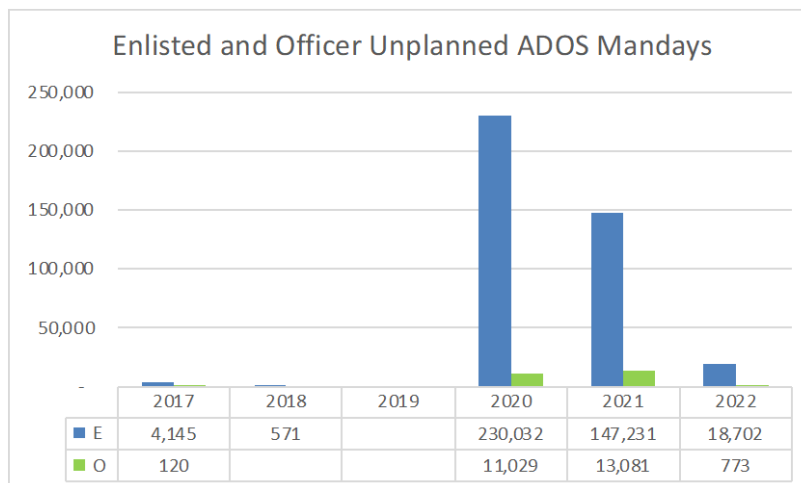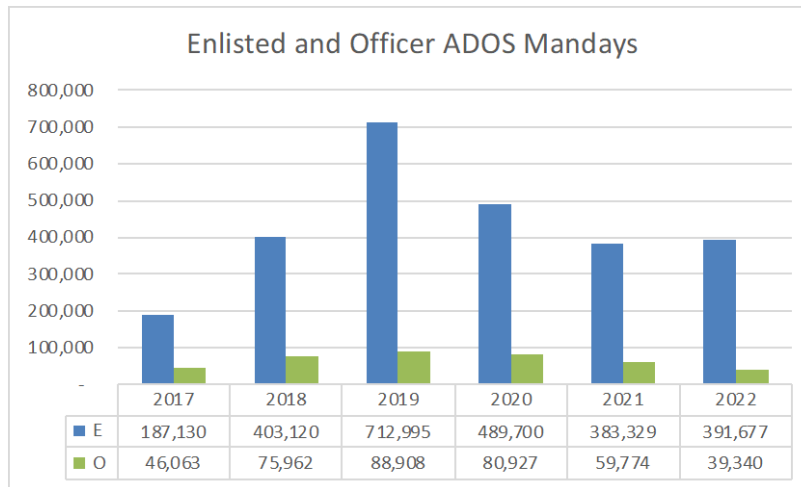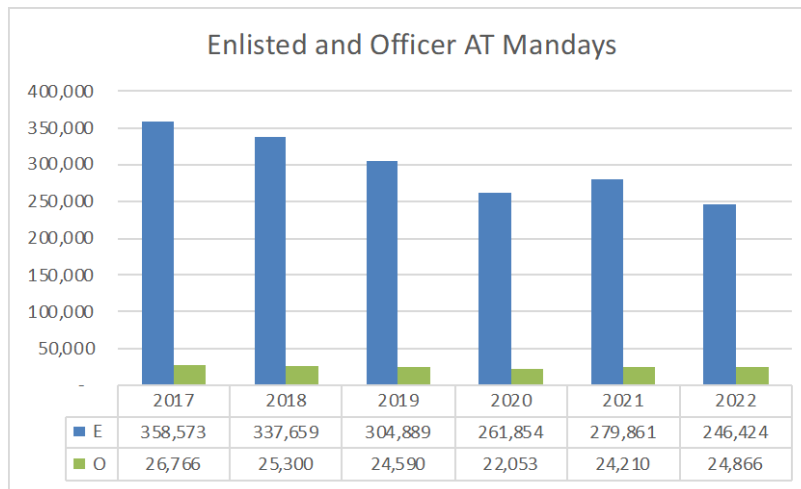| AVERAGE LENGTH OF ADOS TOTAL (MANDAYS) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| **E** | **8.30** | **18.18** | **32.60** | **24.18** | **19.63** | **22.70** | **20.77** |
| E1-E5 | 7.32 | 16.78 | 31.05 | 23.16 | 18.78 | 22.62 | 19.76 |
| E6-E9 | 20.03 | 35.12 | 52.79 | 35.17 | 29.11 | 23.63 | 32.51 |
| **O** | **24.67** | **40.02** | **47.93** | **45.01** | **32.70** | **22.25** | **35.50** |
| W1-O3 | 24.49 | 46.20 | 57.98 | 48.46 | 34.79 | 26.01 | 39.85 |
| O4-O6 | 24.94 | 31.34 | 35.18 | 40.88 | 30.45 | 18.50 | 30.14 |
| **Avg** | **9.55** | **19.90** | **33.80** | **25.88** | **20.75** | **22.66** | **21.98** |

| AVERAGE LENTH OF ADOS-RC (MANDAYS) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| **E** | **2.58** | **2.08** | **1.92** | **2.02** | **2.84** | **2.06** | **2.25** |
| E1-E5 | 2.42 | 1.88 | 1.84 | 1.96 | 2.63 | 1.88 | 2.10 |
| E6-E9 | 4.54 | 4.55 | 2.97 | 2.69 | 5.19 | 3.97 | 3.99 |
| **O** | **6.29** | **5.65** | **3.21** | **4.16** | **6.45** | **6.66** | **5.40** |
| W1-O3 | 5.39 | 4.69 | 2.79 | 2.42 | 6.08 | 6.35 | 4.59 |
| O4-O6 | 7.65 | 7.01 | 3.75 | 6.22 | 6.85 | 6.97 | 6.40 |
| **Avg** | **2.87** | **2.36** | **2.02** | **2.20** | **3.15** | **2.49** | **2.51** |

| AVERAGE LENGTH OF ADOS- AC (MANDAYS) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| **E** | **5.72** | **16.10** | **30.68** | **22.16** | **16.79** | **20.64** | **18.52** |
| E1-E5 | 4.90 | 14.90 | 29.22 | 21.20 | 16.15 | 20.74 | 17.66 |
| E6-E9 | 15.49 | 30.57 | 49.83 | 32.49 | 23.91 | 19.67 | 28.52 |
| **O** | **18.38** | **34.37** | **44.72** | **40.85** | **26.25** | **15.59** | **30.10** |
| W1-O3 | 19.11 | 41.51 | 55.20 | 46.04 | 28.71 | 19.66 | 35.26 |
| O4-O6 | 17.29 | 24.34 | 31.43 | 34.66 | 23.60 | 11.53 | 23.74 |
| **Avg** | **6.69** | **17.54** | **31.78** | **23.68** | **17.60** | **20.17** | **19.47** |

| AVERAGE LENGTH OF UNPLANNED ADOS (MANDAYS) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Avg |
| **E** | **66.85** | **63.44** | | **208.36** | **172.40** | **107.48** | **181.88** |
| E1-E5 | 69.78 | 63.44 | | 214.51 | 171.38 | 108.43 | 185.42 |
| E6-E9 | 54.67 | | | 129.65 | 185.70 | 100.57 | 140.62 |
| **O** | **13.33** | | | **169.68** | **172.12** | **110.43** | **159.25** |
| W1-O3 | 13.50 | | | 204.78 | 202.10 | 82.33 | 194.42 |
| O4-O6 | 13.29 | | | 123.29 | 137.00 | 131.50 | 119.81 |
| **Avg** | **60.07** | **63.44** | **-** | **206.21** | **172.38** | **107.60** | **180.37** |

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# APPENDIX G. AVERAGE MANDAY CHARTS

## Enlisted and Officer AT Mandays

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| E | 358,573 | 337,659 | 304,889 | 261,854 | 279,861 | 246,424 |
| O | 26,766 | 25,300 | 24,590 | 22,053 | 24,210 | 24,866 |

## Enlisted and Officer ADOS Mandays

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| E | 187,130 | 403,120 | 712,995 | 489,700 | 383,329 | 391,677 |
| O | 46,063 | 75,962 | 88,908 | 80,927 | 59,774 | 39,340 |

## Enlisted and Officer Unplanned ADOS Mandays

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| E | 4,145 | 571 | | 230,032 | 147,231 | 18,702 |
| O | 120 | | | 11,029 | 13,081 | 773 |

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# APPENDIX H. ADOS & AT EVENT CATEGORY MANDAYS

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| **ADOS - AC ACTIVATION** | **160,106** | **420,037** | **752,737** | **520,850** | **372,867** | **378,120** |
| COCOM MISSION | 46,340 | 67,188 | 28,230 | 107 | | 26 |
| CONTINGENCY OPERATION | 11,833 | 25,346 | 20,427 | 10,884 | 9,764 | 117 |
| COUNTERDRUG | 8,578 | 13,713 | 1,395 | 1,185 | | |
| COVID | | | | 47,650 | 186,204 | 25,487 |
| DSCA | 4,773 | 563 | 153 | 134 | | |
| MAGTF/SF/OAI | 222 | | 37,989 | 65,888 | 55,442 | 53,467 |
| MEU | | | 1,006 | 1,723 | 12,286 | 5,224 |
| MOBILIZATION | 78,518 | 187,250 | 277,012 | 141,884 | 54,957 | 183,233 |
| SOC | | | | | 1,008 | 1,791 |
| UDP | 9,842 | 125,977 | 386,525 | 251,395 | 53,206 | 108,775 |
| **ADOS - AC OTHER** | **3,152** | **2,282** | **1,462** | **1,342** | **2,928** | **5,559** |
| COUNTERDRUG | 100 | 517 | 351 | 1,003 | 1,469 | 2,177 |
| COVID | | | | 130 | | |
| LEGAL/MEDICAL | | | | | | 730 |
| OTHER | 6 | 260 | | | | |
| SHORT TOURS | 3,046 | 1,505 | 1,111 | 209 | 1,459 | 2,652 |
| **ADOS - RC SCHOOL** | **23,070** | **16,469** | **6,565** | **1,798** | **8,664** | **9,797** |
| IIADT | 1,170 | 1,003 | 643 | 382 | 2,233 | 1,411 |
| MOS | 2,995 | 2,876 | 993 | 680 | 1,152 | 1,522 |
| PME | 3,728 | 3,610 | 1,070 | 268 | 1,725 | 2,707 |
| REFRESHER AND PROFICIENCY TRAINING | 13,027 | 6,494 | 1,050 | 132 | 2,350 | 2,016 |
| UNIT TRAINING | 1,524 | 2,175 | 2,433 | 179 | 723 | 1,436 |
| WOBC | 626 | 311 | 376 | 157 | 481 | 705 |
| **ADOS - RC SPECIAL TRAINING** | **46,865** | **40,400** | **41,336** | **46,637** | **58,644** | **37,541** |
| COVID | | | | 12,783 | 10,251 | 234 |
| EXERCISE PARTICIPATION | 13,864 | 16,593 | 16,016 | 13,683 | 20,324 | 13,608 |
| FUNERAL HONORS | 6,000 | 4,027 | 3,790 | 2,609 | 3,417 | 4,738 |
| HURRICANES | 720 | 295 | | | | |
| OPERATIONAL TRAINING | 26,156 | 18,982 | 19,349 | 16,291 | 23,126 | 16,235 |
| OTHER SUPPORT MISSION | 125 | 503 | 2,181 | 1,271 | 1,526 | 2,726 |
| **ANNUAL TRAINING** | **385,339** | **362,959** | **329,491** | **283,907** | **304,071** | **271,290** |
| CONUS EXERCISE/IRT | 3,019 | 16,079 | 30,735 | 1,361 | 10,261 | 13,902 |
| COVID | | | | 960 | 22 | |
| OCONUS EXERCISE/IRT | 70,215 | 45,691 | 21,176 | 6,103 | 161 | 15,469 |
| OTHER | 219,611 | 227,311 | 214,280 | 274,312 | 226,735 | 180,128 |
| WTI/ITX/MX | 92,494 | 73,878 | 63,300 | 1,171 | 66,892 | 61,791 |
| **Grand Total** | **618,532** | **842,147** | **1,131,591** | **854,534** | **747,174** | **702,307** |

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# APPENDIX I. PAY GROUP A TOTAL ACTIVITY

|  | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| Avg Endstrength | 30,637 | 30,633 | 30,169 | 30,174 | 28,144 | 26,168 |
| MROWS Population | 24,408 | 24,077 | 23,726 | 22,050 | 21,354 | 19,020 |
| 1. Did not complete any AT or ADOS | 6,229 | 6,556 | 6,443 | 8,124 | 6,790 | 7,148 |
| 2. Completed only AT | 20,386 | 19,495 | 18,141 | 17,239 | 17,089 | 15,440 |
|   a. AT >= 14 | 20,004 | 19,097 | 17,824 | 15,252 | 16,615 | 14,913 |
|   b. AT < 14 | 382 | 398 | 317 | 1,987 | 474 | 527 |
| 3. Completed only ADOS | 1,068 | 1,461 | 2,961 | 2,166 | 1,956 | 2,212 |
|   a. ADOS >=14 | 808 | 1,334 | 2,797 | 2,033 | 1,791 | 2,119 |
|   b. ADOS <14 | 260 | 127 | 164 | 133 | 165 | 93 |
| 4. Completed AT and ADOS | 2,954 | 3,121 | 2,624 | 2,645 | 2,309 | 1,368 |
|   a. AT < 14 & ADOS <14 | 48 | 37 | 19 | 54 | 32 | 26 |
|     i. AT+ADOS < 14 | 12 | 12 | 3 | 12 | 5 | 5 |
|     ii. AT+ADOS >=14 | 36 | 25 | 16 | 42 | 27 | 21 |
|   b. AT >=14 & ADOS < 14 | 1,219 | 603 | 576 | 670 | 629 | 362 |
|   c. AT < 14 & ADOS >=14 | 58 | 87 | 235 | 238 | 62 | 35 |
|   d. AT >= 14 & ADOS >=14 | 1,629 | 2,394 | 1,794 | 1,683 | 1,586 | 945 |
| Legal Requirement | 23,754 | 23,540 | 23,242 | 19,918 | 20,710 | 18,395 |

| Of the Total Population (Avg Endstrength) | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| Avg Endstrength | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| MROWS Population | 79.67% | 78.60% | 78.64% | 73.08% | 75.87% | 72.68% |
| 1. Did not complete any AT or ADOS | 20.33% | 21.40% | 21.36% | 26.92% | 24.13% | 27.32% |
| 2. Completed only AT | 66.54% | 63.64% | 60.13% | 57.13% | 60.72% | 59.00% |
|   a. AT >= 14 | 65.29% | 62.34% | 59.08% | 50.55% | 59.04% | 56.99% |
|   b. AT < 14 | 1.25% | 1.30% | 1.05% | 6.59% | 1.68% | 2.01% |
| 3. Completed only ADOS | 3.49% | 4.77% | 9.81% | 7.18% | 6.95% | 8.45% |
|   a. ADOS >=14 | 2.64% | 4.35% | 9.27% | 6.74% | 6.36% | 8.10% |
|   b. ADOS <14 | 0.85% | 0.41% | 0.54% | 0.44% | 0.59% | 0.36% |
| 4. Completed AT and ADOS | 9.64% | 10.19% | 8.70% | 8.77% | 8.20% | 5.23% |
|   a. AT < 14 & ADOS <14 | 0.16% | 0.12% | 0.06% | 0.18% | 0.11% | 0.10% |
|     i. AT+ADOS < 14 | 0.04% | 0.04% | 0.01% | 0.04% | 0.02% | 0.02% |
|     ii. AT+ADOS >=14 | 0.12% | 0.08% | 0.05% | 0.14% | 0.10% | 0.08% |
|   b. AT >=14 & ADOS < 14 | 3.98% | 1.97% | 1.91% | 2.22% | 2.23% | 1.38% |
|   c. AT < 14 & ADOS >=14 | 0.19% | 0.28% | 0.78% | 0.79% | 0.22% | 0.13% |
|   d. AT >= 14 & ADOS >=14 | 5.32% | 7.82% | 5.95% | 5.58% | 5.64% | 3.61% |
| Legal Requirement | 77.53% | 76.85% | 77.04% | 66.01% | 73.59% | 70.30% |

| Of the MROWS Population | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|
| MROWS Population | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| 1. Did not complete any AT or ADOS | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| 2. Completed only AT | 83.52% | 80.97% | 76.46% | 78.18% | 80.03% | 81.18% |
|   a. AT >= 14 | 81.96% | 79.32% | 75.12% | 69.17% | 77.81% | 78.41% |
|   b. AT < 14 | 1.57% | 1.65% | 1.34% | 9.01% | 2.22% | 2.77% |
| 3. Completed only ADOS | 4.38% | 6.07% | 12.48% | 9.82% | 9.16% | 11.63% |
|   a. ADOS >=14 | 3.31% | 5.54% | 11.79% | 9.22% | 8.39% | 11.14% |
|   b. ADOS <14 | 1.07% | 0.53% | 0.69% | 0.60% | 0.77% | 0.49% |
| 4. Completed AT and ADOS | 12.10% | 12.96% | 11.06% | 12.00% | 10.81% | 7.19% |
|   a. AT < 14 & ADOS <14 | 0.20% | 0.15% | 0.08% | 0.24% | 0.15% | 0.14% |
|     i. AT+ADOS < 14 | 0.05% | 0.05% | 0.01% | 0.05% | 0.02% | 0.03% |
|     ii. AT+ADOS >=14 | 0.15% | 0.10% | 0.07% | 0.19% | 0.13% | 0.11% |
|   b. AT >=14 & ADOS < 14 | 4.99% | 2.50% | 2.43% | 3.04% | 2.95% | 1.90% |
|   c. AT < 14 & ADOS >=14 | 0.24% | 0.36% | 0.99% | 1.08% | 0.29% | 0.18% |
|   d. AT >= 14 & ADOS >=14 | 6.67% | 9.94% | 7.56% | 7.63% | 7.43% | 4.97% |
| Legal Requirement | 97.32% | 97.77% | 97.96% | 90.33% | 96.98% | 96.71% |

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# APPENDIX J. LEGAL REQUIREMENT DATA

| LEGAL REQUIREMENT - PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| **E** | **22,030** | **21,772** | **21,527** | **18,302** | **19,000** | **16,797** | **119,428** |
| E1-E5 | 20,368 | 20,163 | 20,042 | 16,736 | 17,485 | 15,398 | 110,192 |
| E6-E9 | 1,662 | 1,609 | 1,485 | 1,566 | 1,515 | 1,399 | 9,236 |
| **O** | **1,724** | **1,768** | **1,715** | **1,616** | **1,710** | **1,598** | **10,131** |
| W1-O3 | 1,064 | 1,072 | 991 | 903 | 899 | 839 | 5,768 |
| O4-O6 | 660 | 696 | 724 | 713 | 811 | 759 | 4,363 |
| **Grand Total** | **23,754** | **23,540** | **23,242** | **19,918** | **20,710** | **18,395** | **129,559** |

| LEGAL REQUIREMENT W/O AT -- PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| **E** | **655** | **1,069** | **2,514** | **1,750** | **1,535** | **1,947** | **9,470** |
| E1-E5 | 517 | 846 | 2,276 | 1,537 | 1,347 | 1,775 | 8,298 |
| E6-E9 | 138 | 223 | 238 | 213 | 188 | 172 | 1,172 |
| **O** | **153** | **265** | **283** | **283** | **256** | **172** | **1,412** |
| W1-O3 | 80 | 159 | 175 | 162 | 134 | 90 | 800 |
| O4-O6 | 73 | 106 | 108 | 121 | 122 | 82 | 612 |
| **Grand Total** | **808** | **1,334** | **2,797** | **2,033** | **1,791** | **2,119** | **10,882** |

| MET LEGAL REQUIREMENT W/O ADOS -- PERSONNEL COUNTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Grand Total |
| **E** | **18,960** | **18,010** | **16,777** | **14,229** | **15,500** | **13,741** | **97,217** |
| E1-E5 | 17,767 | 16,955 | 15,807 | 13,155 | 14,422 | 12,674 | 90,780 |
| E6-E9 | 1,193 | 1,055 | 970 | 1,074 | 1,078 | 1,067 | 6,437 |
| **O** | **1,044** | **1,087** | **1,047** | **1,023** | **1,115** | **1,172** | **6,488** |
| W1-O3 | 699 | 687 | 594 | 577 | 623 | 625 | 3,805 |
| O4-O6 | 345 | 400 | 453 | 446 | 492 | 547 | 2,683 |
| **Grand Total** | **20,004** | **19,097** | **17,824** | **15,252** | **16,615** | **14,913** | **103,705** |

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# APPENDIX K. DATA SOURCES
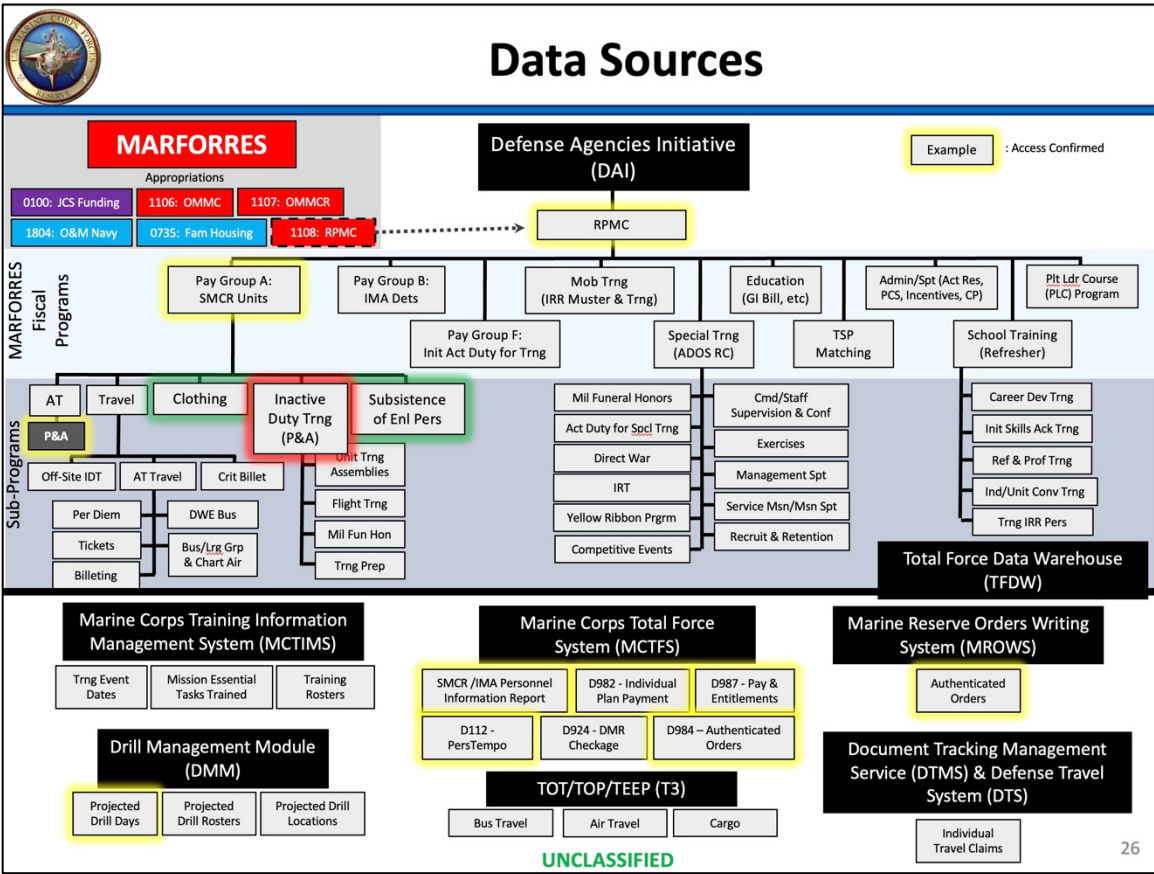


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