

MASTER OF SCIENCE IN OPERATIONS RESEARCH

SUBMARINE PERISCOPE DEPTH COURSE SELECTION TACTICAL DECISION AID

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Coming to periscope depth is one of the most intensive of the routine submarine operations. Errors in fire control and sonar system information serve to produce uncertain contact solutions that complicate the decision of selecting a safe course. The model developed in this thesis simulates a specified number of trials on each possible course, with the measure of effectiveness for each course being the probability of the course being acceptable with respect to specified minimum range criteria. The model outputs a geographic display and a graph of the measures of effectiveness versus course.

KEYWORDS: Submarine Periscope Depth Operations, Course Selection, Tactical Decision Aid, Simulations Using Visual Basic Programming

DoD KEY TECHNOLOGY AREA: Surface/Under Surface Vehicles-Ships and Watercraft Ground Vehicles

OPTIMAL RECRUITING STRATEGY TO MINIMIZE U.S. NAVY DELAYED ENTRY PROGRAM (DEP) ATTRITION

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This thesis develops an optimization-based model to assist the Navy Recruiting Command in placing nuclear power field recruits in the Delayed Entry Program (DEP). After signing enlistment contracts, individuals are enrolled in the DEP prior to entering recruit training. During DEP, some individuals may renege on their contracts, thus becoming DEP losses. Although DEP is costly, it is a necessary and important inventory management tool since it provides a pool of recruits to meet future accession goals.

The DEP placement problem is formulated as a nonlinear program that minimizes relative recruiting costs weighted with respect to the desired recruit category. The lowest recruiting costs are assigned to recruits in DEP lengths that ensure the lowest probability of becoming a DEP loss. Increased costs are assigned to direct shippers. A large penalty cost is assigned to monthly accession deficits. Integral to the model are estimates of DEP loss probability for the various combinations of recruit categories and DEP lengths.

This research concludes that the annual new contract objective (NCO) does not support the successful attainment of the accession goal. Furthermore, a NCO increase of 20% is required to achieve the accession goal with a 95% confidence level. Finally, the thesis addresses the accession goal confidence levels associated with incremental increases of the NCO.

KEYWORDS: Optimization Modeling, Nonlinear Programming, Delayed Entry Program (DEP), Military Recruiting

DoD KEY TECHNOLOGY AREA: Manpower, Personnel, and Training

MASTER OF SCIENCE IN OPERATIONS RESEARCH

DEMONSTRATING THE REQUIREMENT FOR AMPHIBIOUS READY GROUP (ARG) REPLENISHMENT IN SEA-BASED LOGISTICS OPERATIONS

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Operational Maneuver From the Sea (OMFTS) is a new concept under development by the Marine Corps. OMFTS is a warfighting concept that revises the way combat power is projected in littoral regions in that it uses the sea as a maneuver space and safe haven for logistics, while further adopting *ship to objective* operations. Sea-Based Logistics (SBL) uses the Amphibious Ready Group (ARG) ships to provide a sea-base from which combat forces ashore are directly sustained. To function in this new capacity, the ARG units need replenishment to maintain high stockage levels of fuel, ammunition, and stores. This thesis develops a computer simulation for modeling the logistical support needed for ARG units functioning in a sea-base role for supporting combat forces ashore.

KEYWORD: Underway Replenishment (UNREP), Sea-Based (SBL), OMFTS, Amphibious Ready Group

DoD KEY TECHNOLOGY AREA: Modeling and Simulation

