



Adequacy of Existing Range Resources to Meet Training Requirements

NDA Section 366(a)(2)(B) requires DoD to evaluate the adequacy of current range resources. Additionally, NDA Sections 366(c)(1)(B) and (C) require DoD to identify training capabilities and existing constraints. In response, DoD has further developed its annual assessment process to evaluate the adequacy of ranges to provide the required training support and the current impacts of encroachment in terms of risk to the assigned training missions conducted at each range.

In 2007, DoD began assessing the adequacy of ranges to support required training as well as the actual impacts of encroachment. In 2008, DoD and the Military Services worked together to build a common set of capability attributes, encroachment factors, and standard evaluation criteria for the purposes of this report. Use of common attributes, factors, and standard evaluation criteria led to a consistent assessment and analysis across the Military Services. A discussion of the assessments and the results of the standardization efforts is presented in the following sections.

3.1 Assessment Methodology and Examples

DoD has continued to improve its methodology for assessing range capabilities and encroachment. DoD uses 13 common capability attributes and 12 common encroachment factors to create a unified reporting and analytical framework that integrates data from each of the Military Services. The Military Services have been responsible for providing data on capability and encroachment on an annual basis.

3.1.1 Capability Assessment

Beginning in 2008, the Military Services developed and identified the following 13 common capability attributes for the range assessment and reporting processes:

- ▶ **Landspace**—Physical land area that has the necessary features, such as topography, vegetative cover, configuration, proximity, capacity, usability, and acreage
- ▶ **Airspace**—Physical volume of airspace that has the necessary features, such as types of use, configuration, proximity, capacity, and amount
- ▶ **Seaspace**—Physical sea-surface area that has the necessary features, such as types of use, configuration, proximity, capacity, and amount
- ▶ **Underseaspace**—Physical volume of underseaspace that has the necessary features, such as ocean bottom type, depth, types of use, configuration, proximity, capacity, and amount
- ▶ **Targets**—Various land, air, sea, and undersea presentations designed for live or simulated weapons engagement
- ▶ **Threats**—Various physical and simulated threat presentations, such as emitters, opposing adversary forces, and battlefield effect simulators
- ▶ **Scoring & Feedback Systems**—Equipment that provides information for training event reconstruction, debriefing, and replay, whether virtual or live, through the collection

and storage of time and space position information (TSPI), weapons accuracy, systems and operator accuracy, assessment and monitoring of operator performance, and command, control, communications, computers and intelligence (C4I) network information flow

- ▶ **Infrastructure**—Buildings, structures, or linear structures (e.g., roads, rail lines, pipelines, fences, pavement)
- ▶ **Range Support**—Personnel, software, and hardware that support such functions as daily range operations, maintenance (including range clearance), and communication networks for C2, scheduling, and range safety. Communications networks include: inter- and intra-range systems; point-to-point; range support networks; fiber optic and microwave backbones; information protection systems (e.g., encryption, radio, data link); and instrumentation frequency management systems
- ▶ **Small Arms Ranges**—Ranges that accommodate weapons systems firing rounds up through 40mm and produce duds
- ▶ **Collective Ranges**—Ranges that provide proficiency at the team or unit level for battlefield operations
- ▶ **Military Operations in Urban Terrain (MOUT) Facilities**—Terrain complexes that replicate urban environments
- ▶ **Suite of Ranges**—A nominal make-up of range attributes, intended to provide the baseline requirement for each level of training. The elements include various types of ranges such as maneuver/training area, impact areas, live fire ranges, aviation ranges, and MOUT complexes that must be coordinated to conduct required training events

The Military Services assessed and evaluated their specific mission areas (as listed in Chapter 2 and defined in Appendix B) against these 13 capability attributes for accessibility and usability during normal operations using the following color rating scheme:

- ▶ **Red**—The range is not mission capable. It is unable to support required training tasks for a given mission area to prescribed doctrinal standards and conditions.
- ▶ **Yellow**—The range is partially mission capable. It can partially support required training tasks for a given mission area to prescribed doctrinal standards and conditions, resulting in marginalized training for the range users.
- ▶ **Green**—The range is fully mission capable. It can support required training tasks for a given mission area to prescribed doctrinal standards and conditions.
- ▶ **White (Blank)**—White (blank) represents a situation where an assessment for a given mission area is not

performed against a particular attribute. If a complete mission area is “white,” there is no requirement for the range to provide training in this area. When conducting the encroachment assessment for this same range, no encroachment factors will be assessed for this mission area.

3.1.2 Encroachment Assessment

Measuring the impact of encroachment on mission readiness can be difficult. Encroachment causes range users to find workarounds to complete required training. While some adaptation by the Military Services’ operational forces can be expected, excessive workarounds resulting from encroachment can increase mission risk due to unrealistic, segmented, or irrelevant training, and may result in a deterioration of training content and/or quality. Therefore, as part of DoD’s efforts to standardize the assessment of encroachment on training ranges, the Military Services were tasked to assess the current impacts of the following 12 encroachment factors against their Military Service mission areas.

- ▶ **Threatened & Endangered Species**—Constraints placed on training due to regulatory requirements and/or Military Service guidance to manage at-risk, threatened, or endangered species or associated habitat
- ▶ **Munitions Restrictions**—Constraints placed on training due to regulatory requirements and/or Military Service guidance on munitions use, munitions constituents, or residue, to include range clearance (Restrictions placed on munitions use due to weapon safety footprint requirements are assessed as capability attributes under Landspace, Airspace, Seaspaces, and Underseaspaces. Other constraints from munitions use that have an encroachment factor available, such as Noise, Air Quality, Water Quality, and Transients, are assessed under those factors.)
- ▶ **Spectrum**—Constraints placed on training due to unavailability of or interference with required electromagnetic spectrum
- ▶ **Maritime Sustainability**—Constraints placed on training due to regulatory requirements and/or Military Service guidance to protect and sustain the maritime environment, including marine mammals and sonar issues
- ▶ **Airspace**—Constraints placed on training due to the availability of airspace (These constraints may be spatial or temporal.)
- ▶ **Air Quality**—Constraints placed on training due to regulatory requirements and/or Military Service guidance to maintain air quality (This includes any restrictions placed on prescribed burning.)

- ▶ **Noise Restrictions**—Constraints placed on training as a result of mitigation measures for unwanted sound generated from the operations of military weapons or weapon systems that affect people, animals (domestic or wild), or structures on or in proximity to military training areas (Noise restrictions do not include occupational noise exposure or underwater sound.)
- ▶ **Adjacent Land Use**—Constraints placed on training due to incompatible development in proximity to military training areas
- ▶ **Cultural Resources**—Constraints placed on training due to legal and/or regulatory requirements and/or Military Service guidance to manage and maintain cultural resources
- ▶ **Water Quality/Supply**—Constraints placed on training due to legal and/or regulatory requirements and/or Military Service guidance to manage water quality and supply
- ▶ **Wetlands**—Constraints placed on training due to legal and/or regulatory requirements and/or Military Service guidance to manage wetlands
- ▶ **Range Transients**—Constraints placed on training due to the unannounced or unauthorized presence of individuals, livestock, aircraft, or watercraft transiting range

The Military Services assessed the impact from each of these factors on their range and range complexes' capabilities to support assigned training missions. The assessments were based on range availability and use using the following color rating scale:

- ▶ **Red**—The encroachment factor has a severe effect or high risk to the range's ability to support its assigned mission training, and would likely cause the training mission to fail. Mitigating the encroachment would involve prohibitive costs or actions for the range.
- ▶ **Yellow**—The encroachment factor has a moderate impact or medium risk on the range's ability to support its assigned mission training. Workarounds have a moderate impact on training content, procedure, or outcome. Addressing the encroachment results in additional burdens or requires additional actions by the range to mitigate the impact of the encroachment.
- ▶ **Green**—The encroachment factor has minimal impact or low risk on the range's ability to support its assigned mission training. Workarounds detract minimally or not at all from training content, procedure, or outcome. Costs are not incurred by the range or range users to address the encroachment factor.

- ▶ **White (Blank)**—An encroachment factor does not exist for a given mission area.

3.1.3 Explanation of Individual Range Assessment Details and Observations

Each Military Service's individual ranges/range complexes were assessed for its ability to support assigned training missions using the 13 common capability attributes and 12 common encroachment factors using the red, yellow, and green rating scales discussed above. An explanation for how to read and interpret these charts is discussed further below. Major elements of each presentation, in the order in which they appear, are as follows:

- ▶ Pie charts depicting the overall distribution of red, yellow, and green ratings are presented with calculated rating scores on a scale of 0 to 10. The overall rating scores for both capability and encroachment assessments are weighted average scores with 0 assigned for each red rating, 5 for each yellow rating, and 10 for each green rating.
- ▶ Summary Observations, located below the charts and scores, provide information on what encroachment factors and capability attributes are most impacting each range's ability to perform its assigned mission, along with those mission areas most severely impacted.
- ▶ Historical Information, Results, and Future Projections provides a more qualitative assessment with several pieces of information. Overall rating scores from prior years are presented along with comments as to whether the range complex's capabilities or encroachment pressures have been improving or degrading over the years and the outlook for the future.
- ▶ Detailed Comments for each range grouped by capability observations and encroachment observations. These observations describe the red and yellow assessment ratings, explaining the problem or shortfall, the impacts to training activities, and any planned remedial actions.

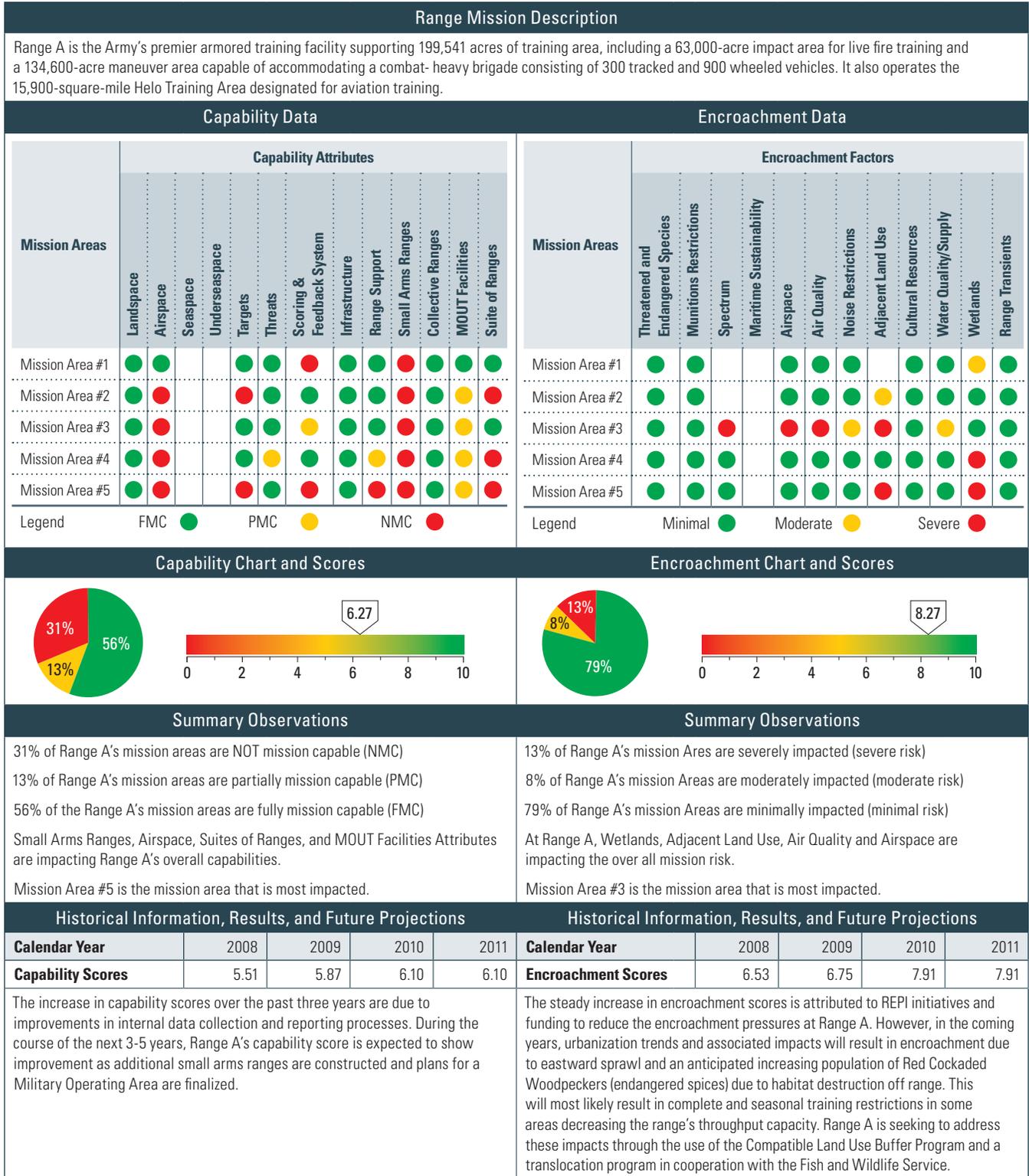
3.1.3.1 Example Capability Assessment and Analysis

The following discussion provides an example Capability Assessment and Analysis. Figure 3-1 illustrates the format DoD used to collect, evaluate, and analyze range capability data.

This example shows that Range A is being assessed against its ability to support training for five mission areas. The red ratings for Airspace in Mission Areas 2 through 5 indicate the airspace is insufficient to support prescribed doctrinal standards or conditions for one or more of the training tasks associated with Mission Areas 2 through 5. Other red ratings indicate capability attribute shortfalls that are severely impacting Targets for Mission Areas 2 and 5, Scoring &

Figure 3-1 Example Assessment and Analysis

Range Name: Range A



Feedback Systems for Mission Areas 1 and 5, Small Arms Ranges for all five mission areas, and Suite of Ranges for Mission Areas 2, 4, and 5.

Less severe impacts can be seen in the yellow ratings, such as those for Threats and Range Support in Mission Area 4, Scoring & Feedback Systems for Mission Area 3, and MOUT Facilities in Mission Areas 2 through 5. For yellow ratings, the shortfalls in prescribed doctrinal standards or conditions indicate training for a task(s) in a mission area will be degraded. The green ratings describing the majority of attributes for Range A indicate limited or no impact, meaning there are sufficient resources to provide training in the five mission areas according to the doctrinal conditions and standards for the assigned training tasks.

A red, yellow, or green rating is assigned wherever a capability is assessed against a mission area. Where capabilities are not required at a given range, or not assessed, the blocks are rated white. Where training for a mission area does not apply to a given range, all capabilities and encroachment factors are assessed white for that mission area.

The completed table is used to generate the pie chart and overall capabilities rating on the 0 to 10 scale for Range A's five different mission areas.

This data represents a snapshot in time for a given reporting cycle, and does not provide trend information. To assess changing conditions over time at a given range, individual range assessments must be viewed across the years with larger understanding of all the factors that can impact and change an assessment from one year to the next.

To represent the overall distribution of red, yellow, and green ratings, the pie chart shows that, of the total 55 ratings applied, 56 percent (31) are green, 13 percent (7) are yellow, and 31 percent (17) are red. In this case, this means that, of all the capability factors necessary to provide assigned training for Range A, 31 percent are so severely degraded, some facet of training cannot be accomplished to even a marginal level.

In this example, the Capability Score of 6.27 was calculated by dividing the total weighted score (345) by the number of responses (55). The weighted score was calculated using the color weightings described above (red = 0, yellow = 5, green = 10) using the 31 green, 7 yellow, and 17 red responses. Note that two attributes were not assessed (white ratings) across all five mission areas (10 blank boxes).

3.1.3.2 Example Encroachment Assessment and Analysis

The following discussion details an example of the Encroachment Assessment and Analysis process. Figure 3-1 illustrates the format DoD used to collect, evaluate, and analyze range encroachment information.

This example shows that Range A is being assessed against its ability to support training for its five mission areas. As seen in Figure 3-1, the red ratings for Adjacent Land Use in Mission Areas 3 and 5 indicate there are incompatible developments near the range that are severely affecting or putting at risk the range's ability to support training for those two mission areas. This rating signifies that mitigating the encroachment situation would involve prohibitive costs or actions. Other red ratings indicating severe encroachment situations are: Spectrum, Airspace, and Air Quality for Mission Area 3, and Wetlands for Mission Areas 4 and 5. Moderate encroachment impacts can be seen in the yellow ratings, such as those for Adjacent Land Use in Mission Area 2, Noise Restrictions and Water Quality/Supply with Mission Area 3, and Wetlands for Mission Area 1. The number of green assessments indicates most of the encroachment factors are having minimal to no impact, or present a low risk to the range's capability, and any workarounds being used detract minimally or not at all from training content, procedure, or outcome.

Where an encroachment factor is assessed against a mission area, a red, yellow, or green rating is assigned. Where an encroachment factor does not exist for a mission area at a given range, the blocks are rated white as previously defined.

The completed table provides the basic information used to generate the pie chart and overall rating, on the 0 to 10 scale, of the impact encroachment is currently having on Range A's ability to provide training for five different mission areas. This data represents a snapshot in time for a given reporting cycle, and does not provide trend information. To assess changing conditions over time at an individual range, individual range assessments must be viewed across the years with an understanding that all factors can change an assessment from one year to the next.

To represent the overall distribution of red, yellow, and green ratings, the pie chart shows that of the 52 ratings, 79 percent (41) are green, 8 percent (4) are yellow, and 13 percent (7) are red. This means, for example, that although Range A may be fairly unencumbered by encroachment, there are some factors (13 percent, 7 red ratings) that so severely encroach on the performance of its training mission that the range is at risk of failing to support that training.

In this example, the weighted average score provides the overall rating on a 0 to 10 scale, as previously described. The Encroachment Score 8.27 was calculated by dividing the weighted score (430) by the total number of responses (52). The weighted score was calculated using the color weightings described above (red = 0, yellow = 5, green = 10) using the 41 green, 4 yellow, and 7 red responses. Three factors were not assessed (white) for specific mission areas (eight blank boxes).

3.2 Assessment Results and Discussions

This section is divided into four parallel sections, one for each of the Military Services. Each section provides a different view of the assessment data to help eliminate any shortcomings that might result from a singular approach to describing the assessment and technique for viewing the information. After a brief statement on the assessments being presented, a footnote is provided that reconciles any differences between the ranges/range complexes located in the Military Service's inventory in Appendix C and those assessed in this chapter. Summary information is presented at the start of each Military Service section drawing on the results of the individual range/range complex assessments.

The information provided includes:

- ▶ **Assessment Data Summaries**—A composite of the capability and encroachment responses (red/yellow/green) are presented for each range in table format and scores calculated using the previously described methodology
- ▶ **Pie Charts and Scores**—The Assessment Data Summary results from above are aggregated and presented as pie charts with corresponding composite rating scores presented on a sliding scale, using the weighted average methodology previously described
- ▶ **Summary Observations**—Observations on how the scores and ratings changed from the previous year
- ▶ **Historical Information, Results, and Future Projections**—The composite scores from prior years are presented, along with the top three capability attributes/encroachment factors and associated mission areas rated yellow and red for the current year (General observations are provided by the Military Service, which can be applicable to future capabilities and encroachment issues related to the Military Service's ability to support training.)
- ▶ **Assessments by Range**—Horizontal bar charts show the overall distribution of responses by color ratings for each range
- ▶ **Assessments by Attributes/Factors**—Horizontal bar charts show the aggregated responses by color ratings for each capability attribute/encroachment factor across all ranges and mission areas
- ▶ **Assessments by Mission Areas**—Horizontal bar charts show the aggregated responses by color ratings for each mission area across all capability attributes/encroachment factors and ranges

Following the summary data, each Military Service provides additional information and perspectives on any areas of special interest that impact or may impact its training capabilities and encroachment situation.

While considering these assessments, it is important to remember that, although the information reflects a long-term enterprise view of a broad DoD training range program, each year's assessments are a snapshot in time. The magnitude of specific changes to any individual capability or encroachment factor, due to discrete actions at a specific range complex from year-to-year, needs to be considered by comparing reported assessments for that specific range and capability or factor across the years. Additionally, the impact of a capability attribute or encroachment factor differs throughout all of the Military Services and their ranges. While two ranges (even within a Military Service) may have severe encroachment concerns from the same encroachment factor, synergistic effects with other factors may be experienced at one range, but not at the other. Accordingly, the data must be carefully considered to fully understand the encroachment effects and capabilities degradations for each range. The total encroachment and capability scores for a Military Service's ranges should be considered against the backdrop of each range's individual capability and encroachment scores.

The capability and encroachment ratings merely evaluate effects on current operations; they do not predict how future operations may be affected by encroachment. Changes in assessment ratings due to changes in doctrine and equipment are not captured by the assessments. Such insights may, however, be seen in the historical information and future projection write-ups provided for each range.