# Resource Capability Evaluation Model Pilot Test

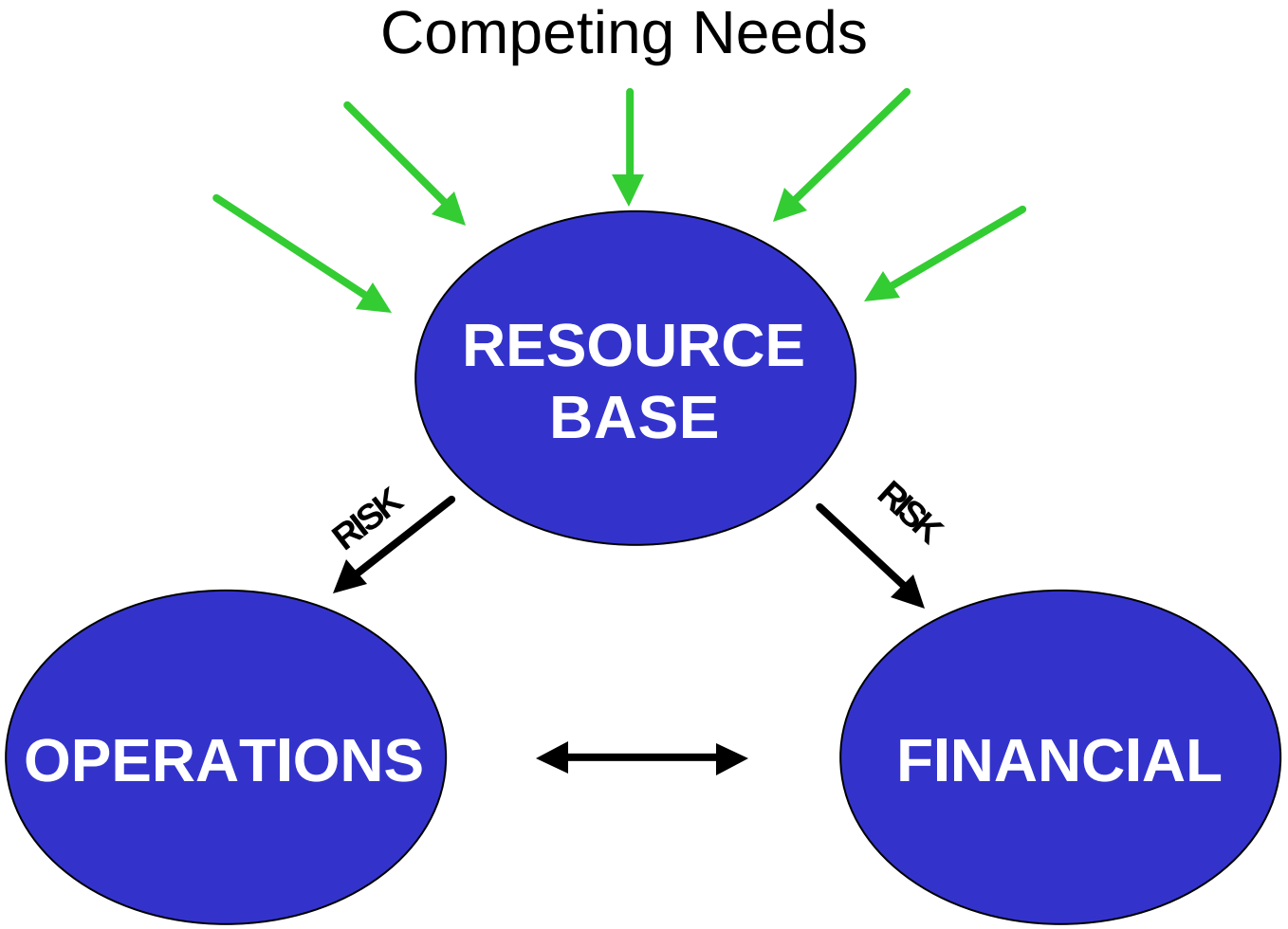
## Measuring the Adequacy of Air, Land, Water, and Spectrum Resources to Meet Operational Requirements

**Dr. William Rowe**
**Booz Allen Hamilton**
**27 February 2003**

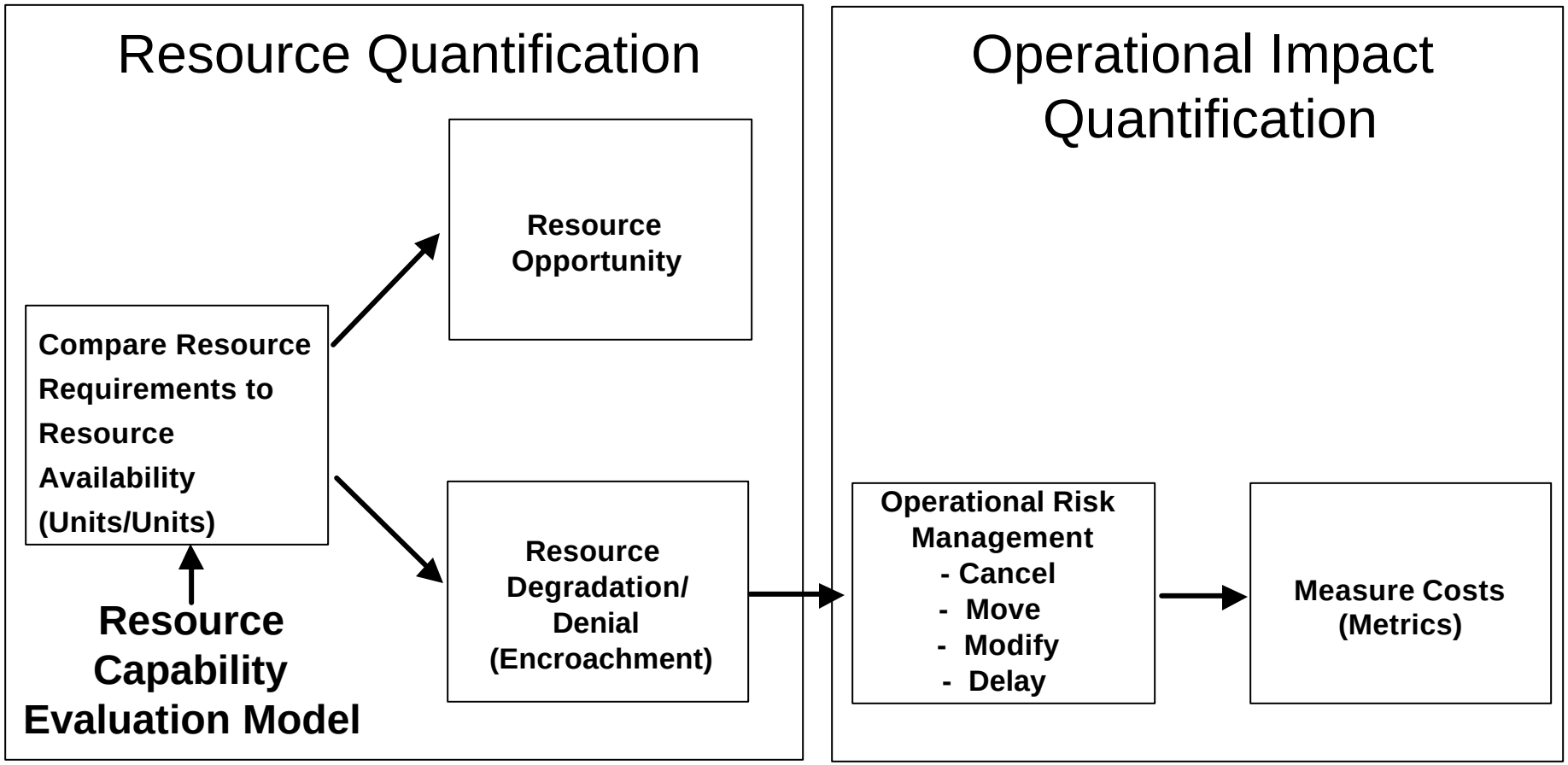
# Charter

- **Develop/pilot test methodology to measure the readiness/adequacy of air, land, water, and spectrum to meet operational needs**
- **Identify/quantify encroachments denying/degrading resource availability**
- **Identify/quantify resource opportunities to support operations**

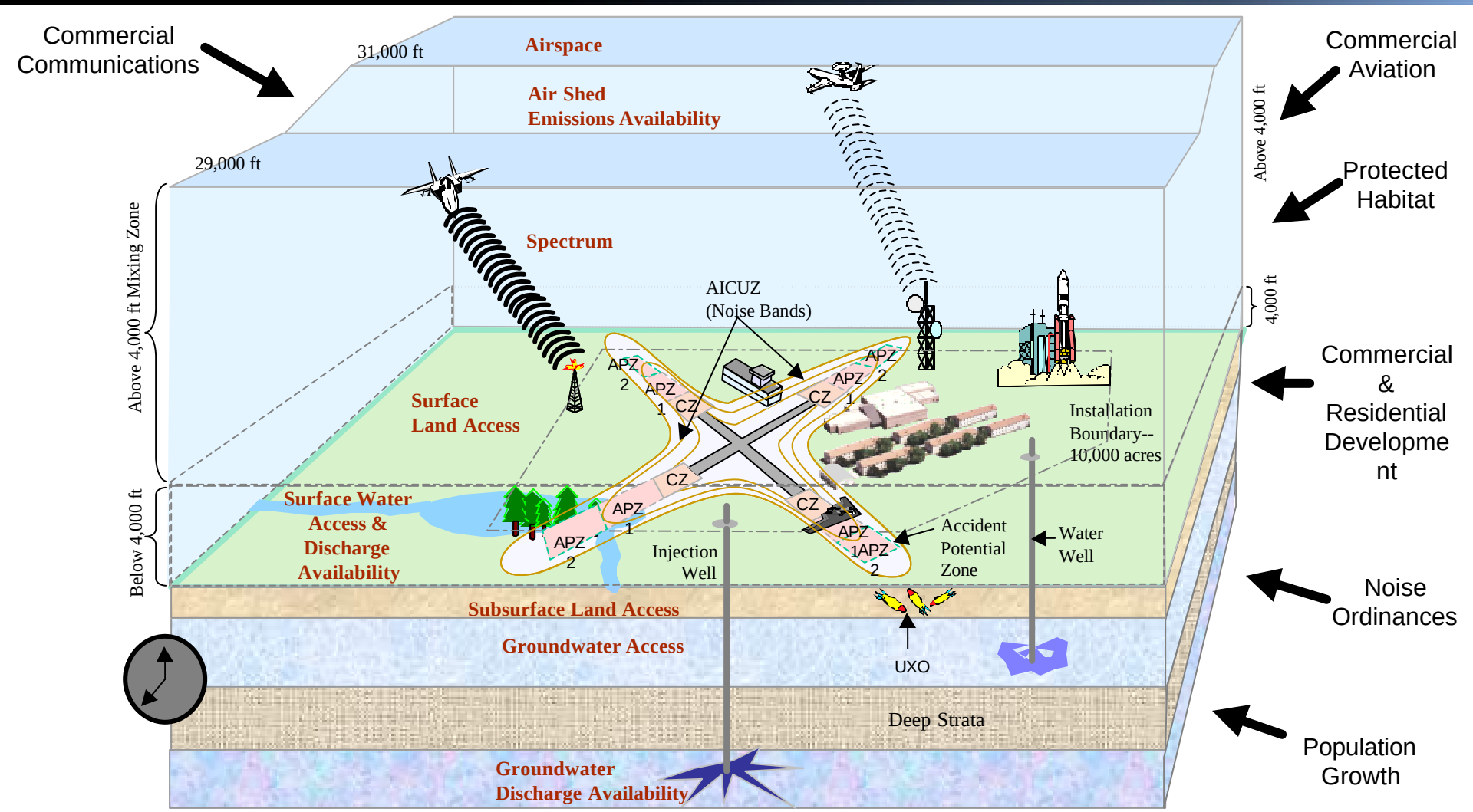
# Encroachment 101



# Relationship: Resource Base and Operational Risk



# Depiction of Resources and Encroachment at Installation Level



# Methodology for Measuring Resource Readiness

**Determine Operational Requirements**

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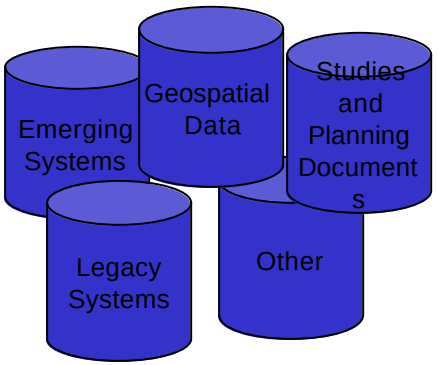
**Determine Corresponding Resource Requirements**

**Determine Resource Availability**




Compare resource requirements against resource availability for each resource category

Resource categories:

- Airspace
- Air Shed Emissions Availability
- Surface Land Access
- Subsurface Land Access
- Sea Space Access
- Surface Water Access (Supply)
- Surface Water Discharge Availability
- Groundwater Access (Supply)
- Groundwater Discharge Availability
- Spectrum

## Resource Readiness Ratings*

**RO3 – Major opportunities**

**RO2 -- Significant opportunities**

**RO1 – Some opportunities**

**RR – Adequate (Minor opportunities or deficiencies)**

**RD1 -- Some deficiencies**

**RD2 -- Significant deficiencies**

**RD3 -- Major deficiencies**

*RO = Resource Opportunity

*RD = Resource Deficiency

# Framework: Availability vs. Requirements Comparison

| Resource Category | Requirements | | Capacity | | Resource Readiness Rating | Competing Needs |
|---|---|---|---|---|---|---|
| | Operational Requirements | Resource Requirements | Resource Availability (currently available) | Operational Capability (currently provided) | RO 1-3<br>RR<br>RD 1-3 | |
| Airspace | | | | | | |
| Air Shed Emissions Availability | | | | | | |
| Surface Land Access | | | | | | |
| Subsurface Land Access | | | | | | |
| Sea Space | | | | | | |
| Surface Water Access (Supply) | | | | | | |
| Surface Water Discharge Availability | | | | | | |
| Groundwater Access (Supply) | | | | | | |
| Groundwater Discharge Availability | | | | | | |
| Spectrum | | | | | | |

# Resource Readiness Ratings*

Opportunity

Adequate

Degraded

| | Descriptive Rating | Rating Code |
|---|---|---|
| > 140% | | RO3 |
| > 120-140% | | RO2 |
| >110 -120% | | RO1 |
| 110 - 90% | | RR |
| < 90- 80% | | RD1 |
| < 80 - 60% | | RD2 |
| < 60% | | RD3 |

RO = Resource Opportunity
RD = Resource Degradation

* Percentages results from comparison of resource availability to resource requirements, using 100% as the baseline for breakpoints.

# Pilot Test Chronology

- **November 02**
  - **Briefed Framework to XOO, XI, ILE, SAF/IE, Navy, OSD**
  - **Identified pilot test location per XOO**
- **December 02**
  - **Prepared draft metrics and questionnaire**
  - **Visited HQ ACC, 17-18 Dec.: DOR, DOT, CEVP, CEVQ, CEO, CEP, SCC, PA**
  - **Received/reviewed pilot test documents**
- **January 03**
  - **Updated metrics and questionnaire based on HQ**
  - **Visited pilot test location to review/populate metrics and questionnaire, 7-9 Jan.**
  - **Developed executive summary, reviewed with HQ ACC and pilot test location**
  - **Briefed executive summary to XOO, SAF/IEE, XIC, ESOH Committee, DoD ESOH Policy Board, RRPI Executive Group and WIPT**

# Current Pilot Test Location Operations and Mission

- 20th Fighter Wing
  - 78 F-16 CJ aircraft
  - 32,000 airfield operations in FY02
- Defense Suppression Operations
  - Anti-radiation missiles
  - Gravity bombs
  - “Maverick” missiles
  - GPS-aided munitions
- Air-to-Air Operations

***Provide, project, and sustain combat ready air forces***

***Any challenge, Anytime, Anywhere***

# Pilot Test Operations Areas

- **Operations Areas Evaluated**
  - *Installation*
  - *Poinsett Range*
  - *MOA Gamecock D*
  - *MTR VR-088*
  - *MOA Bulldog A/B*
  - *Warning Area 177A/B*
- **Resource Categories Measured**
  - Airspace
  - Air Shed Emissions Availability
  - Surface Land Access
  - Groundwater Supply
  - Surface Water Discharge Availability
  - Frequency Spectrum

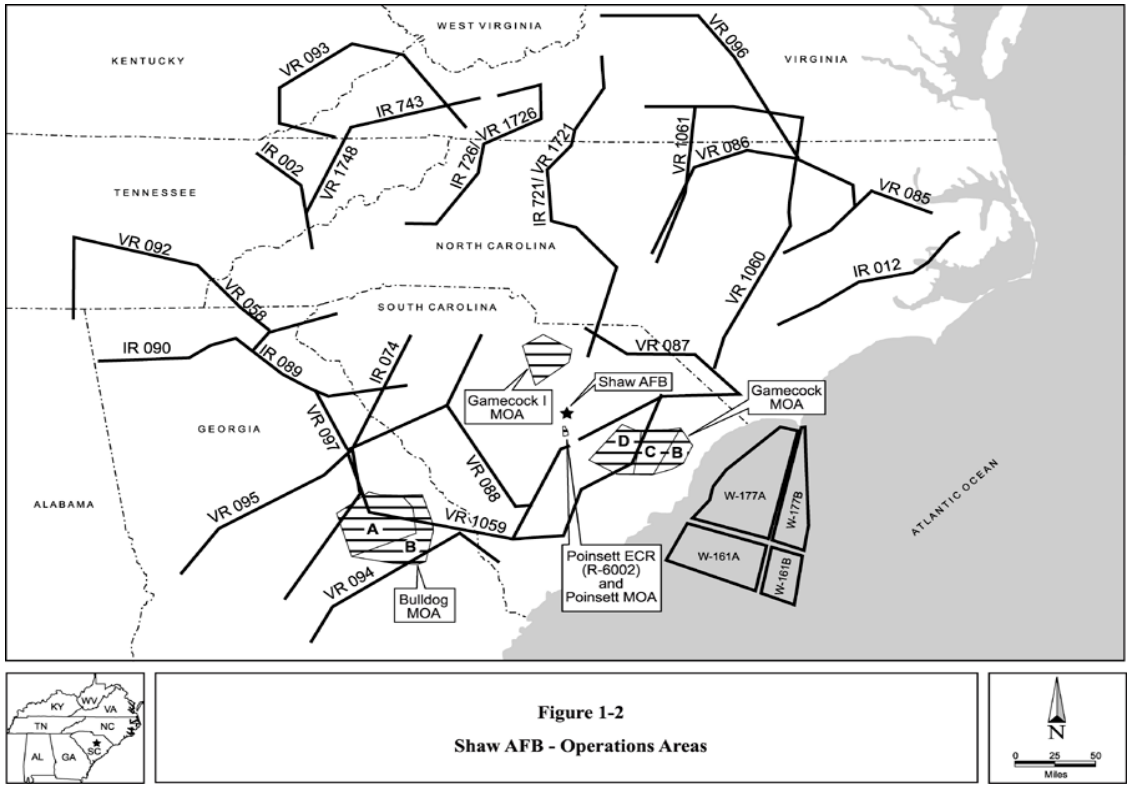



**Figure 1-2**

**Shaw AFB - Operations Areas**

Source: Shaw AFB Environmental Assessment, 2002

# Key Metrics to be Tested – Page 1 of 2

(Draft – January 7, 2003)

| Resource Category | Metric 1* | Metric 2* | Metric 3* | Metric 4* |
|---|---|---|---|---|
| Airspace | *Compatible* Volume in MOA, MTR, or WA **divided by** *Required* Volume in MOA, MTR, or WA (cubic miles)** | *Available* Sorties, Hours, Operations (aerodrome) **divided by** *Required* Sorties, Hours, Operations Per Year | *Optimum* Distance of Airspace Unit from Using Installation **divided by** *Actual* Distance (miles) | *Available* width, altitude, and length **divided by** *minimum required* length, altitude, width; use most restrictive dimension (miles or feet) |
| Air Shed Emissions Availability | *Available* Emissions [Potential to Emit in TPY] **divided by** *Required* Emissions [Emissions Inventory in TPY]; use most restrictive pollutant | NA | NA | NA |
| Surface Land Access | *Compatible* Surface Land (acres) **divided by** *Required* Surface Land (acres) | *Developable* Surface Land (acres) **divided by** *Total Base or Range* Surface Land (acres) | 1997 Range Metric Used by ACC (for Poinsett ECR only) | NA |
| Subsurface Land Access | *Compatible* Subsurface Land (cubic yards) **divided by** *Required* Subsurface Land (cubic yards). | *Developable* Subsurface Land (cubic yards) **divided by** *Total Base or Range* Subsurface Land (cubic yards). | NA | NA |
| Sea Space Access | *Compatible* Surface Area (acres) **divided by** *Required* Surface Area (acres) Within WA | NA | NA | NA |
| Surface Water Access (supply) | *Available* Water from Current Supply **divided by** *Required* Water (Average Gallons Per Day) | NA | NA | NA |

*Multiply the Product of each Operation by 100 to convert decimal into a % value.

**Recommended Airspace Metric by ACC (Dec. 2002)

# Metrics Tested, Continued

## Key Metrics to be Tested – Page 2 of 2

(Draft – January 7, 2003)

| Resource Category | Metric 1* | Metric 2* | Metric 3* | Metric 4* |
|---|---|---|---|---|
| Surface Water Discharge Availability | *Available* Discharges [Potential to Discharge in TPY] **divided by** *Required* Discharges [Discharge Inventory in TPY]; use most restrictive pollutant | *Available* Discharges [Potential to Discharge in gallons and concentrations] **divided by** *Required* Discharges [Discharge Inventory in gallons and concentrations]; use most restrictive pollutant | NA | NA |
| Groundwater Access (supply) | *Available* Water from Current Supply **divided by** *Required* Water (Gallons Per Year) | NA | NA | NA |
| Groundwater Discharge Availability | *Available* Discharges [Potential to Discharge in gallons and concentrations] **divided by** *Required* Discharges [Discharge Inventory in gallons and concentrations]; use most restrictive pollutant | NA | NA | NA |
| Spectrum | *Available* (i.e., requested minus denials) frequency assignments in the VHF band **divided by** *Required* (i.e., requested) base frequency assignments in the VHF band. Repeat for the UHF band. | Area Resource Headroom Metric: Total available frequency assignments in the VHF band **divided by** total frequency assignments within 100 miles of the base in the VHF band. Repeat for UHF band. | | |

*Multiply the Product of each Operation by 100 to convert decimal into a % value.

# *Example: Installation and Surface Land Access (e.g., Noise)*

- ***Operational requirements* at airfield drive need for surface land access**
  - 32,122 annual airfield operations
  - Aircraft speed, power setting, trajectory
  - Other information in NOISEFILE database
- ***Surface land requirements* determined around airfield**
  - Day-night average sound level metric
  - NOISEMAP computer model
  - 65 dB+ noise contours

# Surface Land Resource Adequacy Determination (Example)

- **Resource *Requirements* defined by acres within 65+ dB contours**
  - Total acres = 9600
  - Off-base acres = 6300
  - On-base acres = 3300
- **Resource *Availability* defined by "compatible acres"**
  - 700 - 945 incompatible acres off-base determined using FAA guidelines
  - 5355 - 5600 compatible acres off-base
  - 85.0-88.8% compatible acres off-base, or 11.2 - 15% encroachment

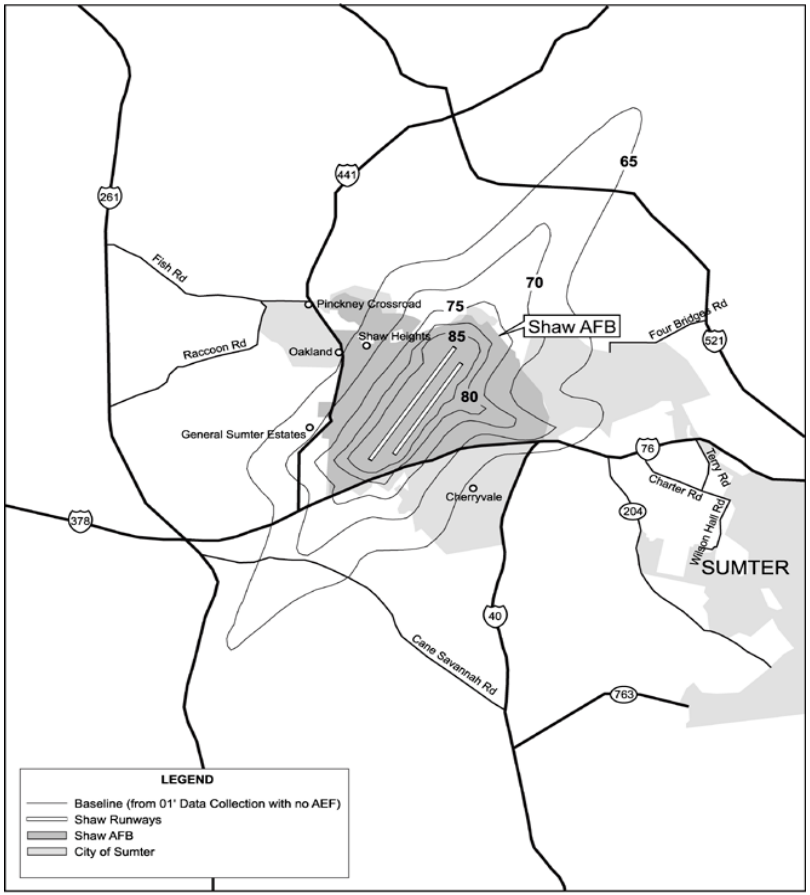
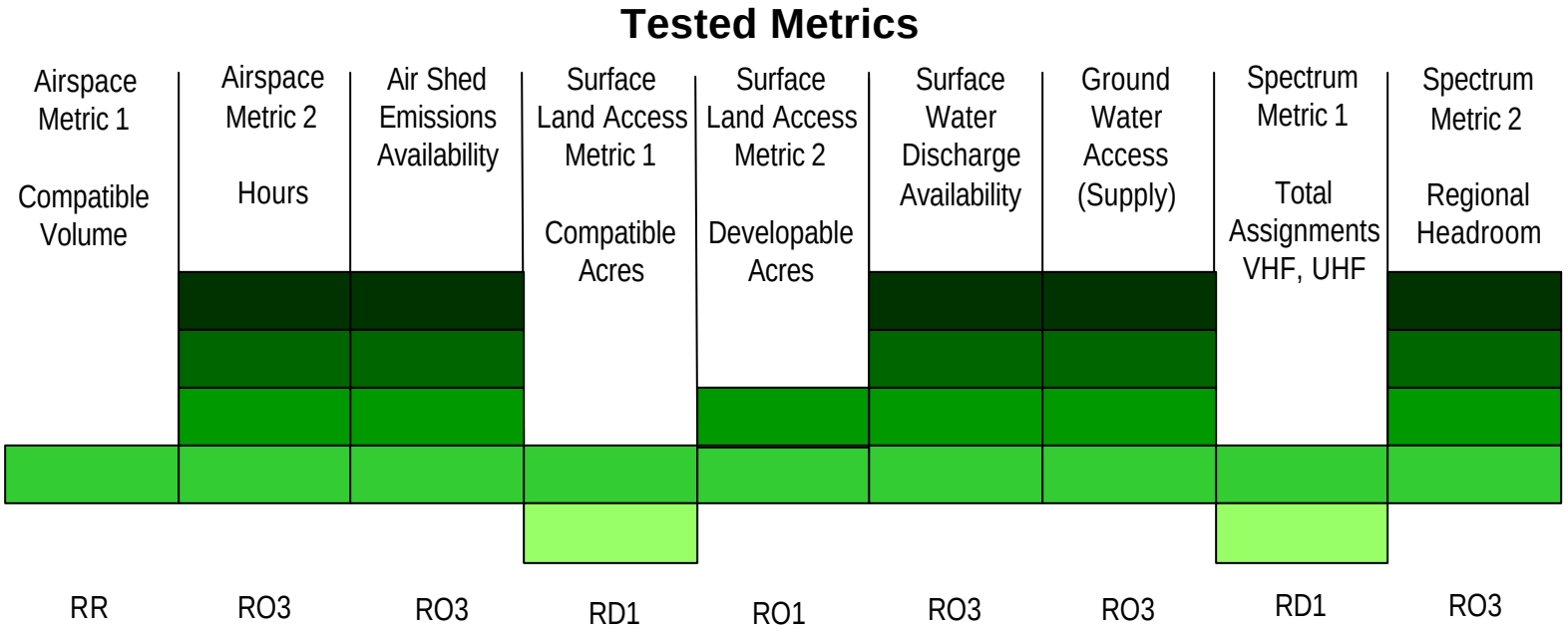



Figure 3.3-1

Baseline Noise Contours at Shaw AFB

# Resource Readiness Ratings for the Installation



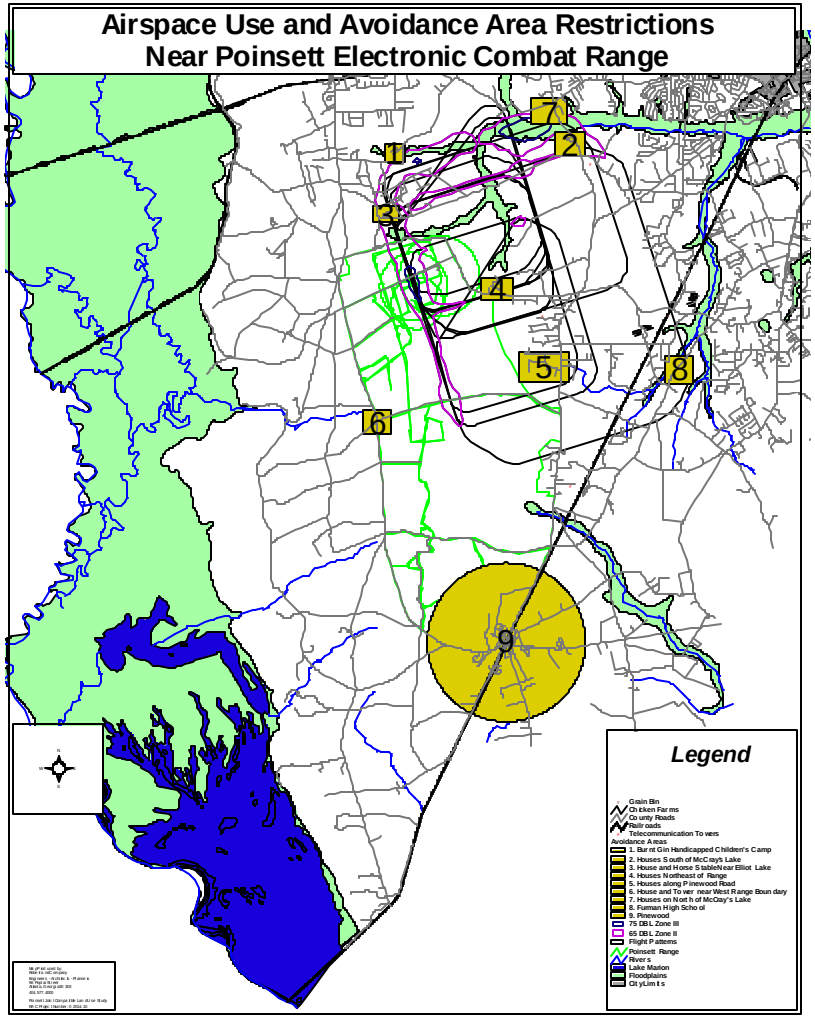

- **Installation has significant resource opportunity**
- **Approximately 9.9% airspace encroachment in the aerodrome using Metric #1**
- **Approximately 11-15% off-base surface land encroachment using Metric #1**
- **Resource Deficiency for Spectrum Metric 1 is due to NTIA denial of four requests for frequency assignments, not encroachment**

# Range and Operations

- Range located 15 miles south of the installation
- Used by F-16, A-10, F-15E, F-18
- Operations largely *Basic Surface Attack* and *Close Air Support*, including bombing with practice ordnance, strafing using training munitions

# Tested Airspace Metrics at Range

- Compatible Volume Metric: 346 *total* cubic NM vs. 340 cubic NM *available* (nine **avoidance areas** in yellow)
- Hours Metric: 653 hours *used* per year vs. 4,125 hours *available* per year
- Distance Metric: 15 actual miles vs. 75 maximum desired miles
- Minimum Size Dimensions Metric: 1,755 cubic NM *required* for Basic Surface Attack vs. 340 cubic NM *available*



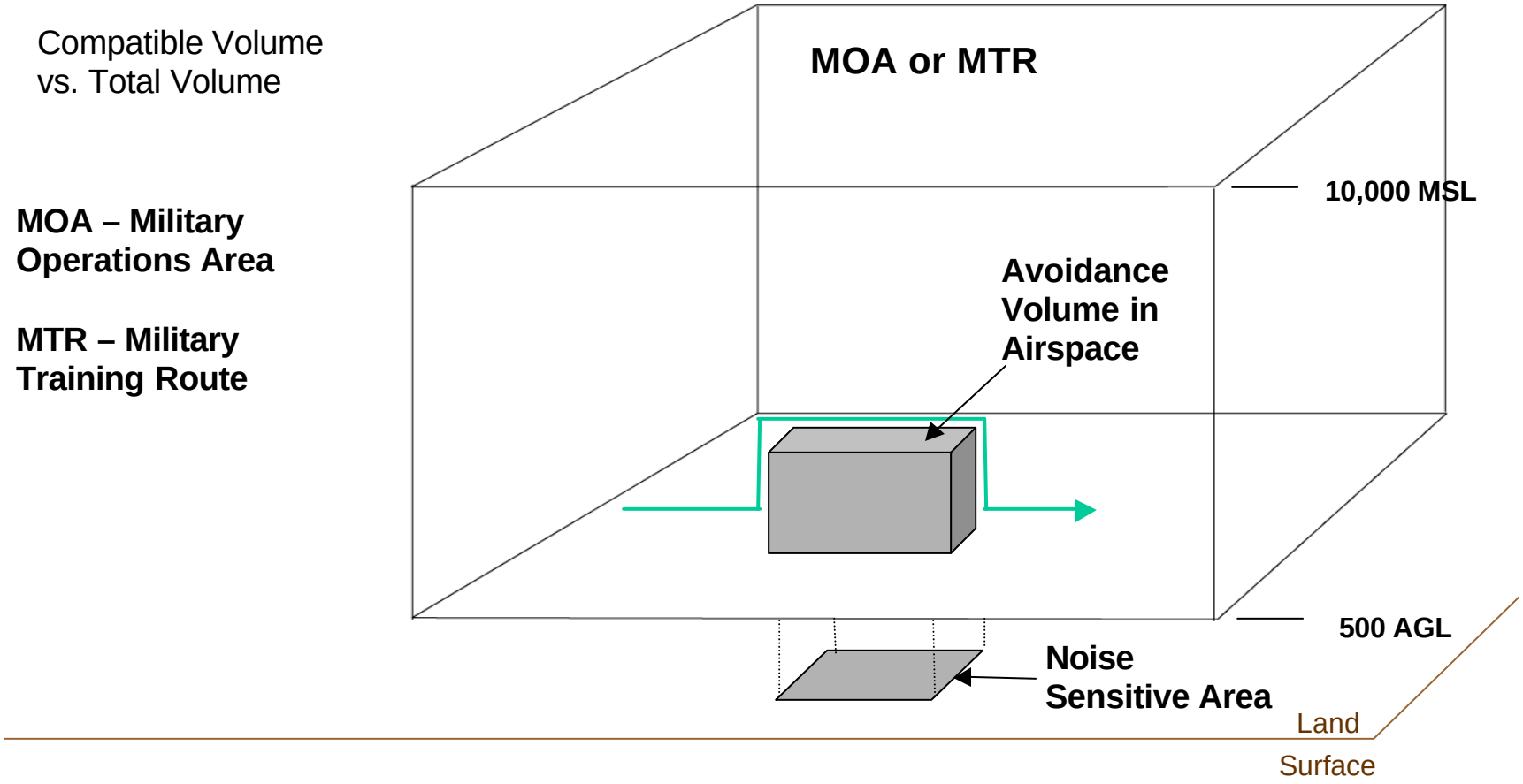
# Illustration of Compatible Volume Metric for Airspace

**Airspace Metric No.1:**

Compatible Volume
vs. Total Volume

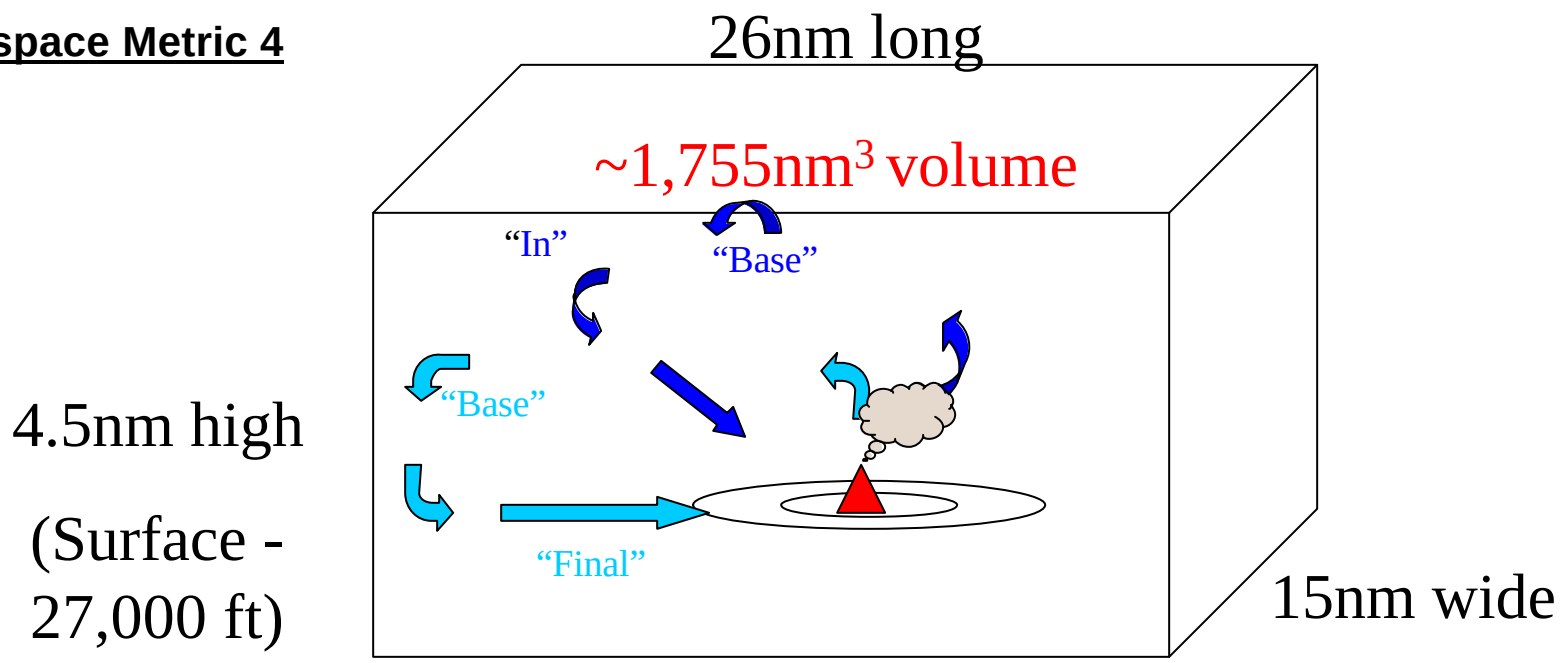
**MOA – Military Operations Area**

**MTR – Military Training Route**



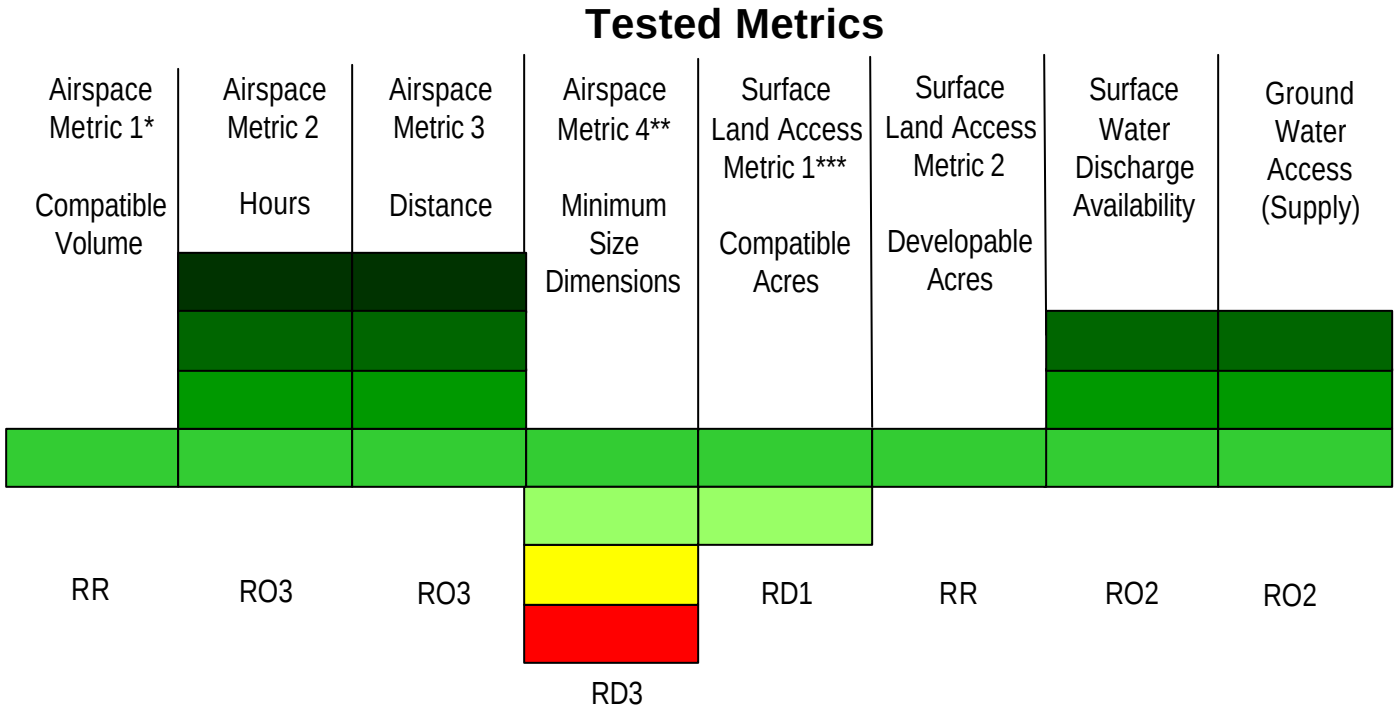
# "Minimum" Airspace to Accomplish Basic Surface Attack Training

**Airspace Metric 4**




- 10nm SLD-to-TGT range, 5nm wide container pattern, 3nm turn radius, 5nm lateral and 1nm vertical (6,000 ft above) airspace buffer distance
- Dimensions provide room to incorporate basic curvilinear and system / visual level delivery, and tactical pop-up type attack options
- Threat detection / reaction maneuvering very basic and dependent on available threat replication assets (Smokey SAMs, EW emitters, etc.)

# Resource Readiness Ratings for Range




**- Range has some resource opportunity**

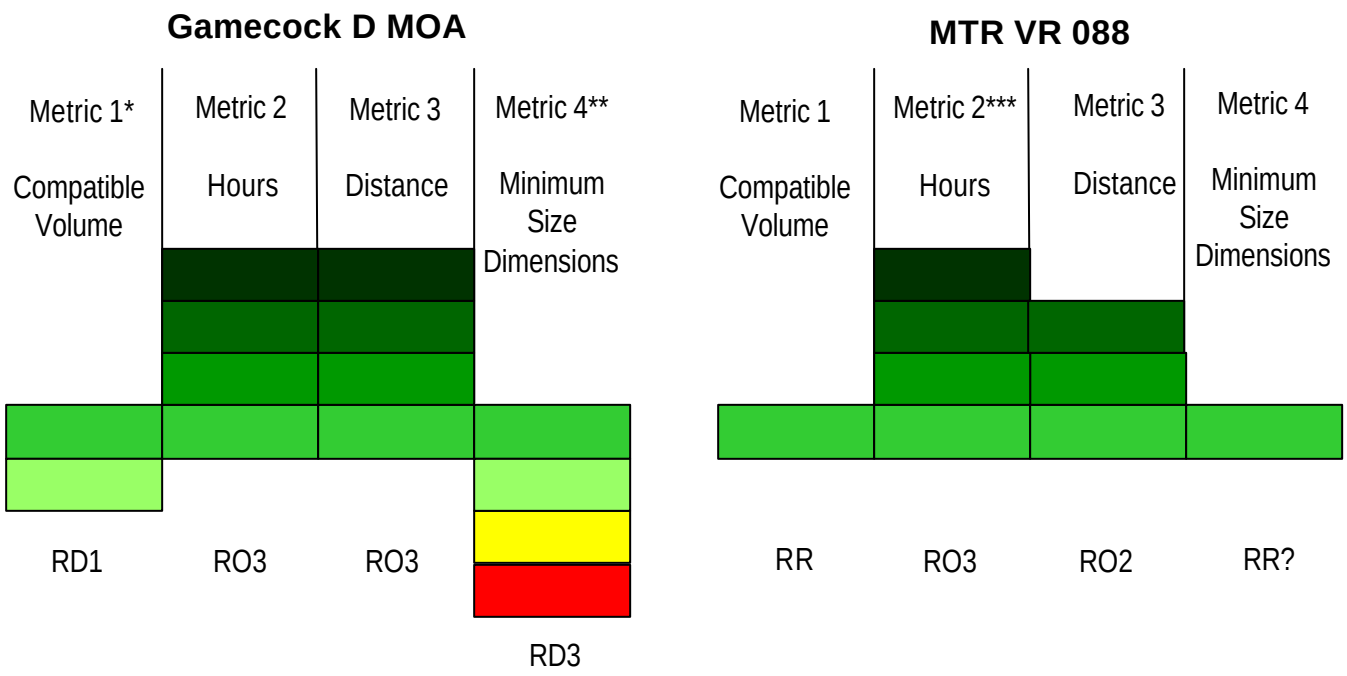
***Approximately 1.4% airspace encroachment using Metric #1 at range**

****There is no validated method in AF to size airspace for Metric 4. Required airspace dimensions generated by 20 FW staff for Basic Surface Attack (pilot test purposes)**

*****Approximately 12.1% off-range surface land encroachment using Metric #1**

# Resource Readiness Ratings for Selected Airspace Units

## Tested Metrics



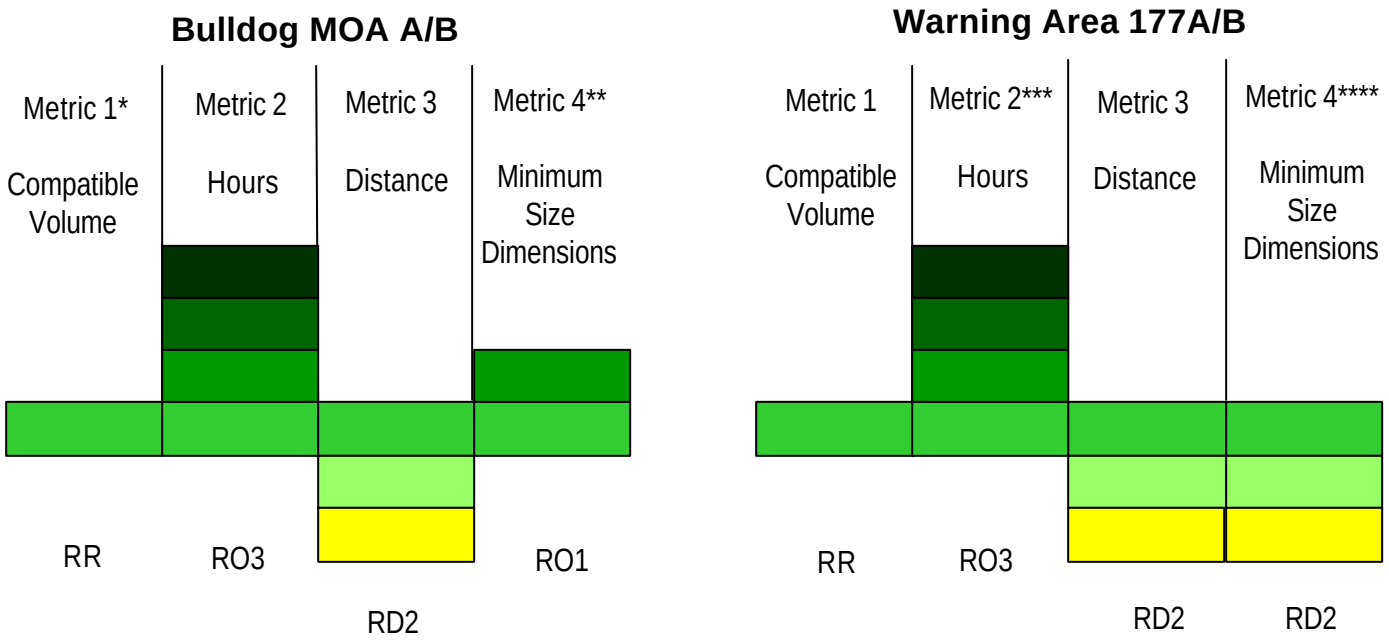

*Jacksonville ARTCC retains 10,000-12,000' per letter of agreement, 83% encroachment using Metric 1

**Metric 4 application based on dimensions calculated by 20 FW staff for Surface Attack Tactics (pilot test purposes)

***Hours for Metric 2 estimated by 2o FW staff; hours utilization is not tracked

# Resource Readiness Ratings for Selected Airspace Units

## Tested Metrics




*Approximately 1.0% airspace encroachment using Metric #1 for Gamecock MOA

**Metric 4 application for Gamecock MOA based on dimensions calculated by 20 FW staff for Surface Attack Tactics (pilot test purposes)

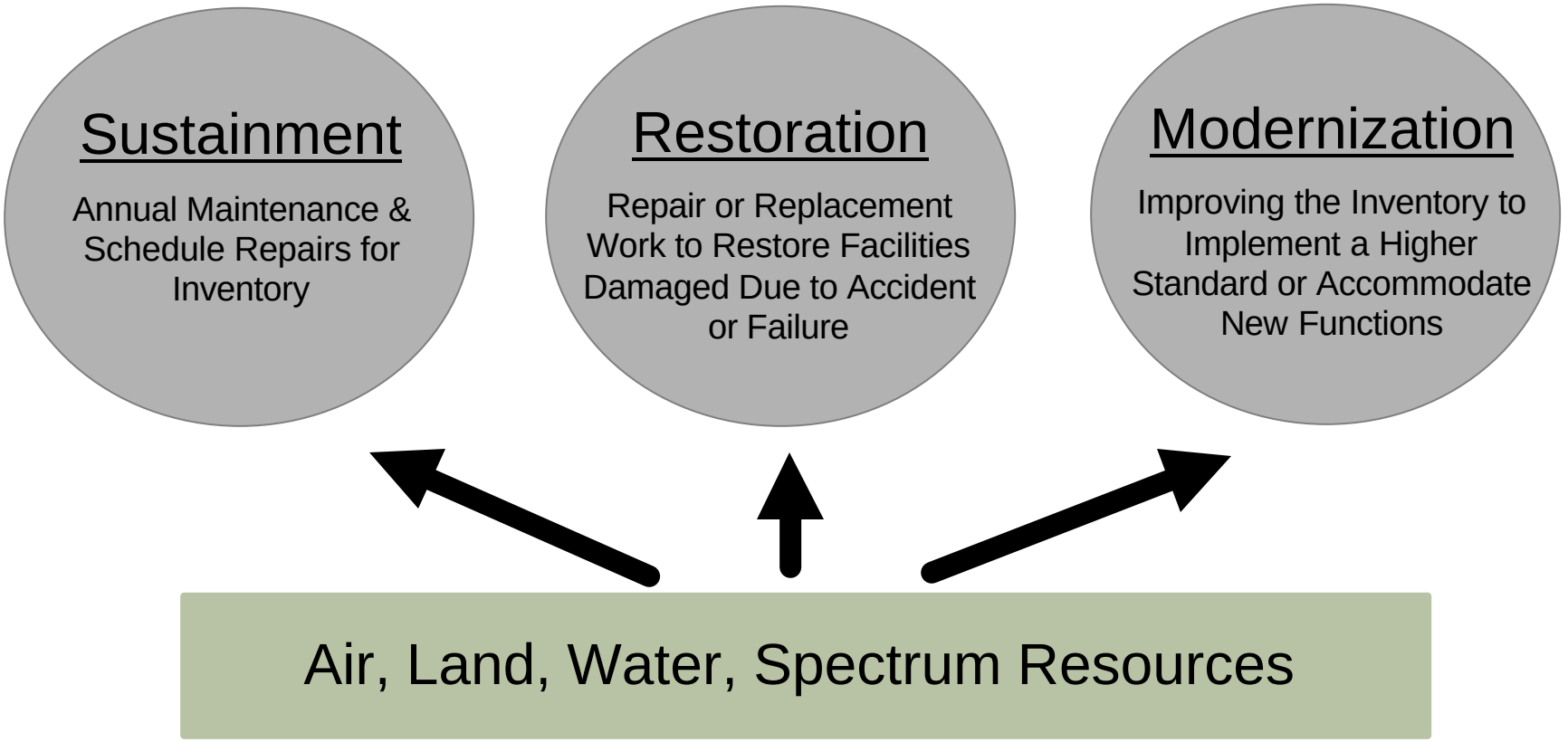
***Hours for Metric 2 estimated by 20 FW staff; hours utilization is not tracked for Warning Areas

****Metric 4 application for Warning Area 177 A/B based on dimensions calculated by 20 FW staff for Air-to-Air sortie operations (pilot test purposes)

# Preliminary Conclusions

- Framework Methodology/Metrics
  - Air, land, water, and spectrum resources are measurable
  - Metrics understood / generally accepted as useful measures by ACC and pilot test location
  - Metrics for airspace and frequency spectrum have strengths and weaknesses
- Pilot Test Results
  - Most data exists in base documents
  - Airspace data collection/resource calculation for Sizing Airspace (Metric 4) not straightforward
  - Airspace and surface land encroachments identified and can be quantified
  - Water supply, water discharge, and spectrum Resource Opportunities identified and can be quantified
  - Opportunity for additional operational capabilities exist
- Changes in operational training requires workarounds, i.e., use of Navy's Mid-Atlantic Electronic Warfare Range

# Next Steps

- Complete full results package (annotated briefing)
- Refine questionnaire with pilot test data
- Finalize general questionnaire and metrics
- Coordinate results
- Consider additional pilot test
- Provide general recommendations
- Institutionalize as part of business transformation

# Transformation: Incorporate Resource Base into SRM