

# Western Service Center

Operations Support Group

Reassessment of  
Title 14 CFR Volume 2 Part 95 Subpart B

## *Designated Mountainous Areas*

Aeronautical Chart Meeting  
October 27 – 29, 2020

Brian Durham – FAA WSC/OSG

Josh Haviland – NATCA National



Federal Aviation  
Administration



National  
Air Traffic Controllers  
Association



Federal Aviation  
Administration

# Overview

- Project mission statement
- Impetus for change
- Background of current DMAs
- Proposed methodology & applications
- Impact considerations to MIA, OROCA, and MVA's
- DMA Project Workflow and Timeline to Date



# Project Mission Statement

*Reassess and revise the method of determining Part 95 Designated Mountainous Areas. Application of modern analysis methods will increase the spatial detail of terrain evaluations, helping to identify low-relief areas that are currently contained within areas designated as mountainous. A reduction in Designated Mountainous Areas will optimize air traffic operations and instrument flight procedure design.*



# Impetus for Change

Founded on RTCA Tactical Operations Committee (TOC) tasking to review the Performance Based Navigation (PBN) Route System CONOPs.

## CONUS Low Altitude Recommendation 27

*“The FAA should conduct a study of all existing Part 95 designated mountainous areas to determine if these areas can be reduced in size. This study should include industry participation.”*



Federal Aviation  
Administration

# RTCA TOC

## CONUS Low Altitude Recommendation 27

*“The definition for mountainous areas in Part 95 is overly conservative and does not reflect the advanced navigation technology available today which could allow a safe reduction in their size. The FAA should investigate the safety implications of improving the granularity of these areas (reducing areas designated as mountainous) while exploring the benefits of refining the definitions to allow lower MIAs/MEAs. Notably, the VOR MON program office identified the removal of several routes in the Western US Mountainous Area after determining those areas were relatively flat and the route’s removal would not impact operators. For example, many areas of Nevada are flat. Higher quality digital elevation data is now available for Alaska. Modern analytical methods should allow increased spatial detail to identify and outline low-relief areas where reduced Required Obstacle Clearance (ROC) may be used to generate lower MEAs to help keep aircraft out of icing conditions. The FAA should revise their method of determining Part 95 mountainous areas to increase the percentage of non-mountainous areas, which impact the design of airways and FAR 91.177 (Minimum altitudes for IFR operations) altitude requirements.”*

August 2017



Federal Aviation  
Administration

# 14 CFR Chapter 1

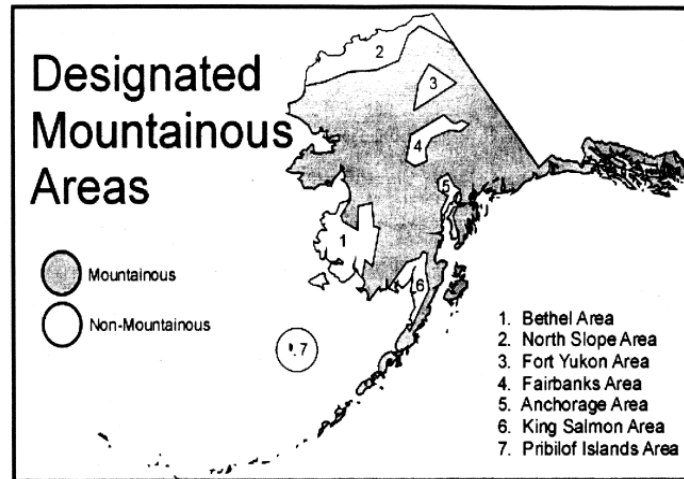
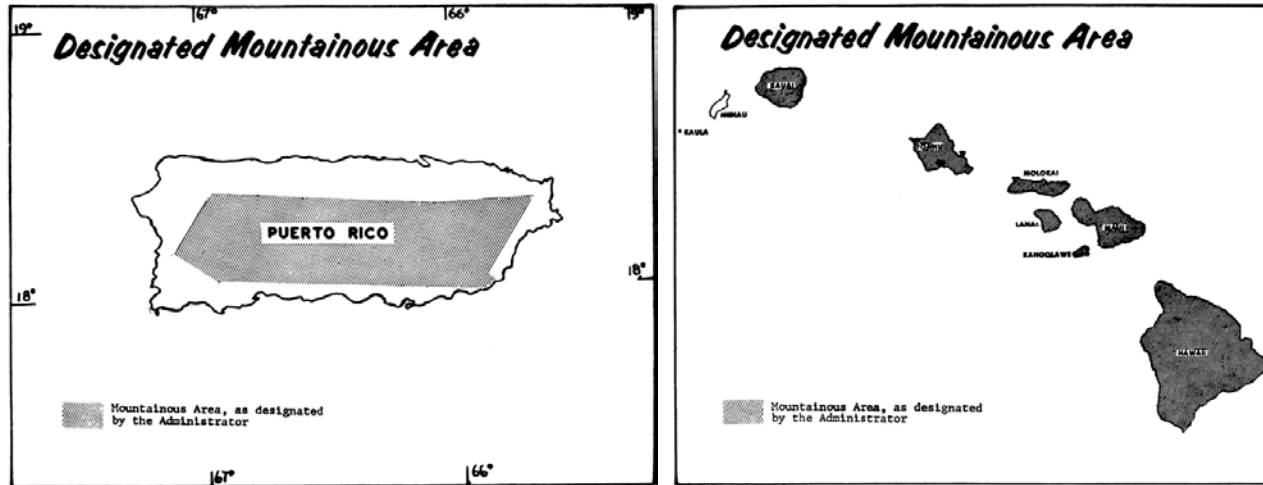
## Subpart B—Designated Mountainous Areas (Est. 1956)

- § 95.13 *Eastern United States Mountainous Area.*
  - Exception Area(s):
    - Eastern NY State (Est. 2008)
- § 95.15 *Western United States Mountainous Area.*
  - Exception Area(s):
    - San Joaquin Valley (Est. 1963)
    - Puget Sound (Est. 1975)
- § 95.17 *Alaska Mountainous Area.*
  - Exception Area(s) (Est. 2005):
    - Fairbanks-Nenana
    - Anchorage-Homer
    - King Salmon-Port Heiden
    - Bethel-Aniak Puget Sound
    - North Slope
    - Fort Yukon
    - Pribilof Islands
- § 95.19 *Hawaii Mountainous Area.* (Est. 1962, Amended 1963)
- § 95.21 *Puerto Rico Mountainous Area.* (Est. 1962, Amended 1963)





# Current Designated Mountainous Areas Puerto Rico – Hawaii - Alaska



# Background

- **Required Obstacle Clearance in Established DMAs is 2,000'**
- **Difficult to obtain historical information on original criteria used to establish DMAs**
- **Assumptions for established criteria:**
  - **Availability of weather services and/or altimeter setting sources**
  - **Navigational aid reception**
  - **Mountainous weather phenomena**



# Proposed Methodology & Definition

## ***Definition:***

***Designated mountainous areas include those areas having a terrain differential exceeding 3'000 feet within 10 nautical miles within those one arc-second quadrangles overlying terrain or U.S. territorial waters. (Integrates existing ICAO definition with quantitative methods)***

## ***“Mountainous Terrain Identification Area” (MTIA):***

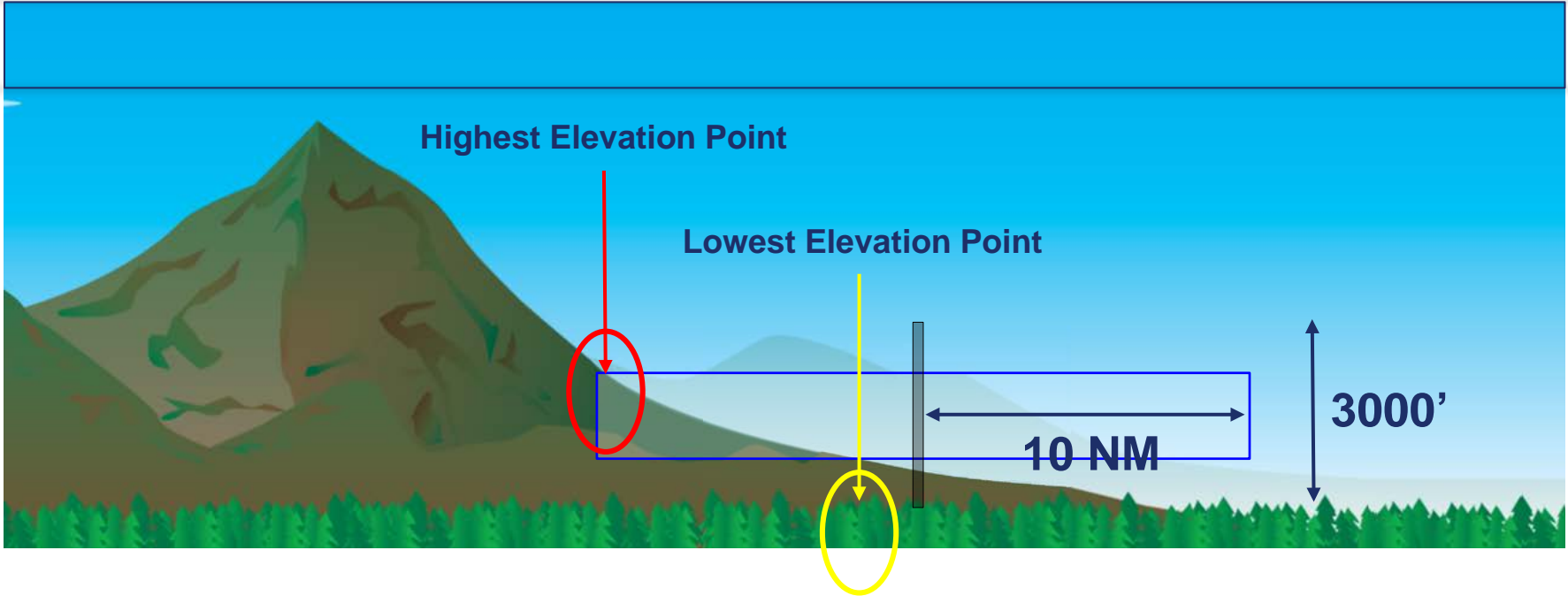
An area used to identify a terrain elevation differential exceeding 3,000 ft within:

1. A 10 NM radius from a specified point (“*Grid Method*”); or,
2. 10 NM from the centerline of a route or transition (“*Route Method*”).



# Definition (cont.)

## General — Profile View

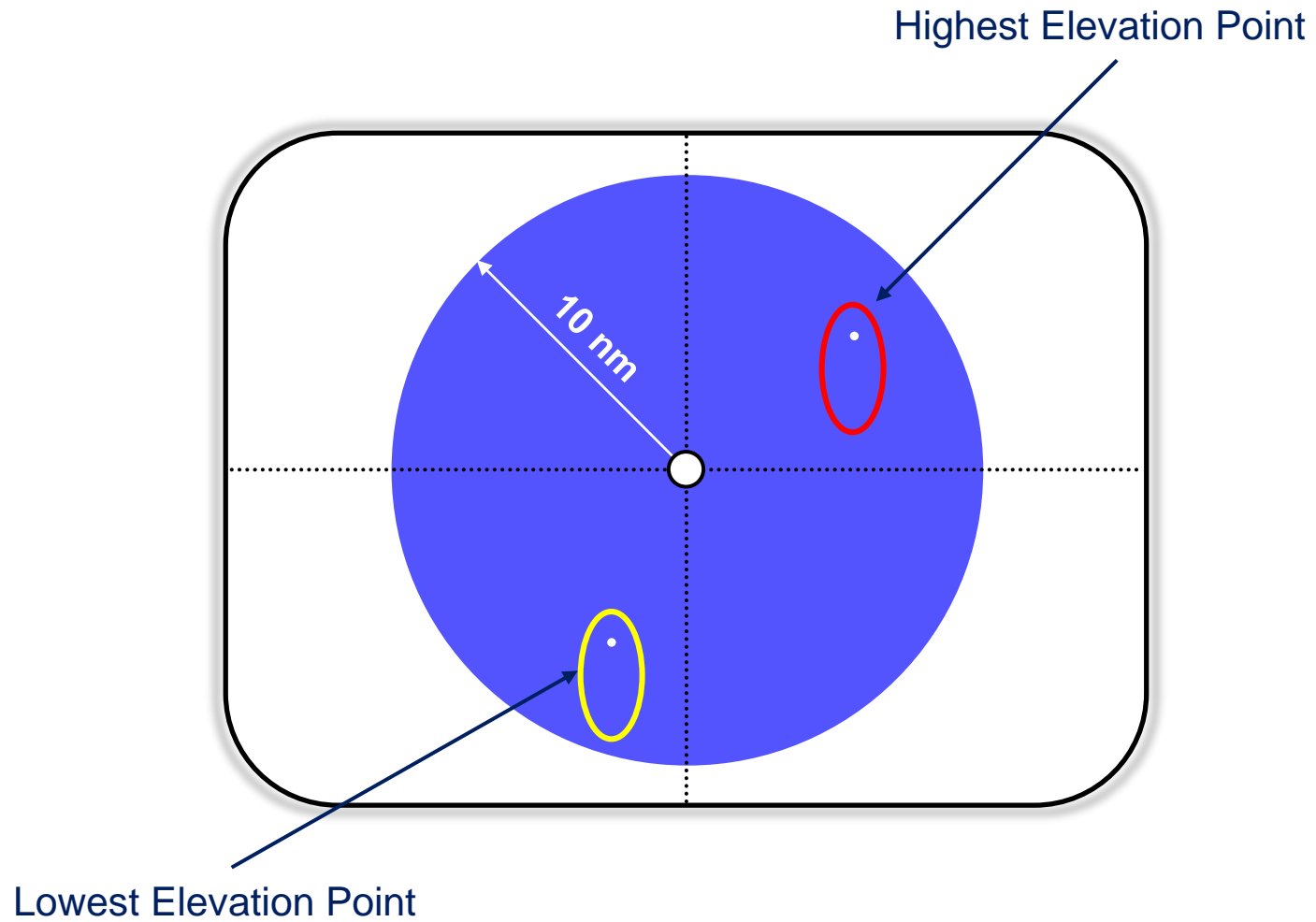


\*Not to scale

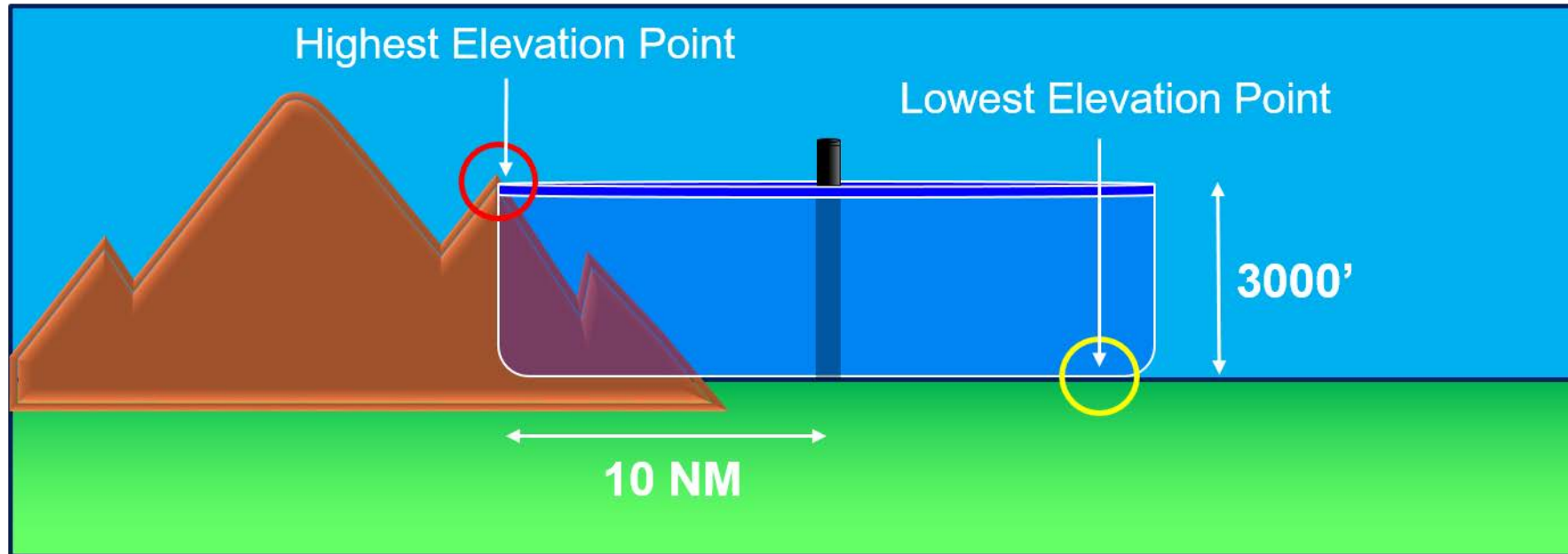


Federal Aviation Administration

# MTIA Plan View



# MTIA Profile View

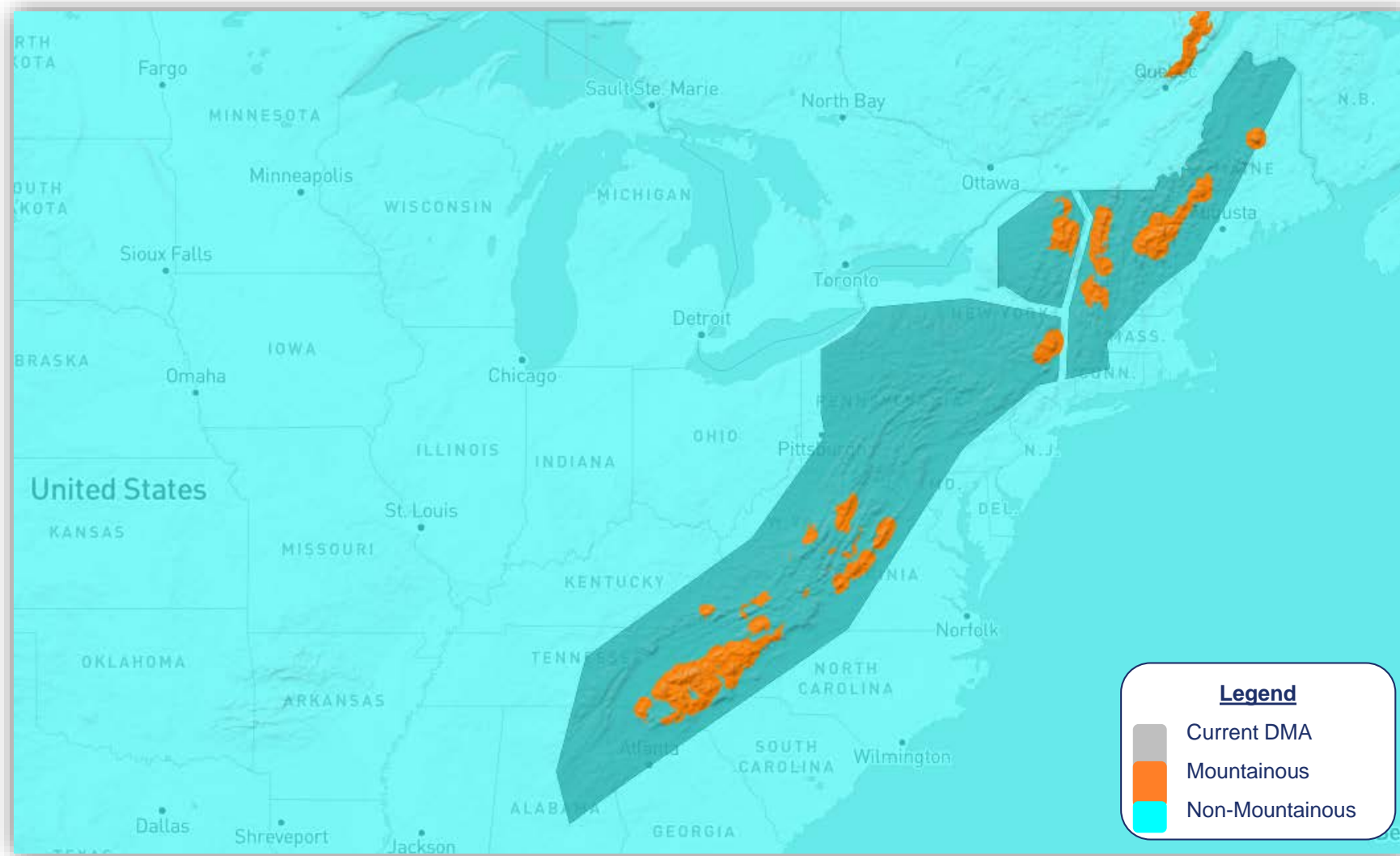


# DMA Analysis/Visualization Tool



Federal Aviation  
Administration

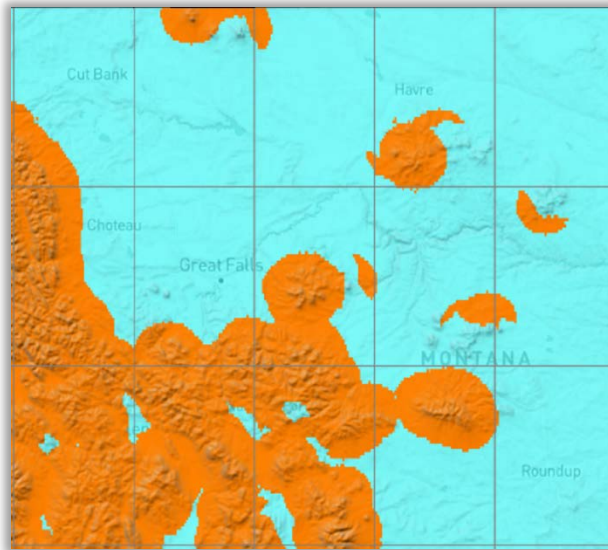
# Analysis Results — Eastern U.S.



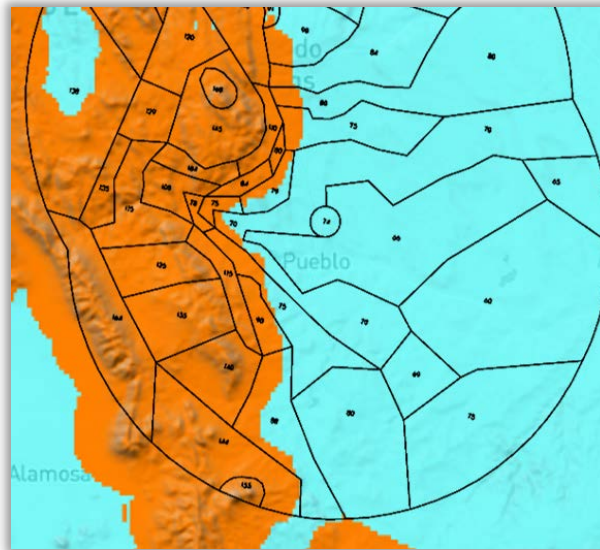


# Large Scale Applications

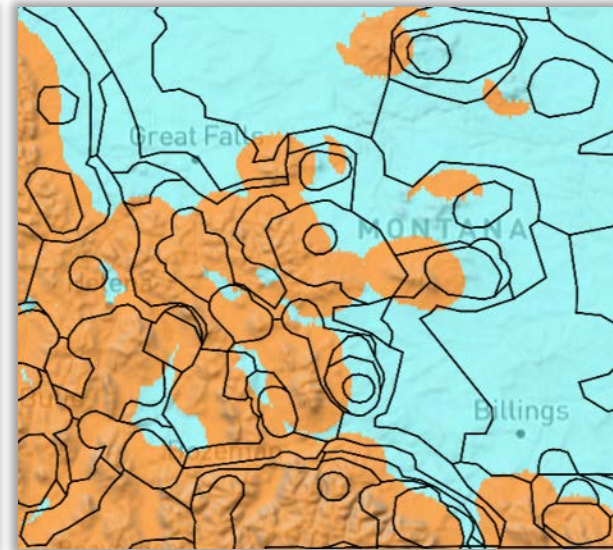
- Off-Route Obstruction Clearance Altitudes (OROCA)
- Minimum IFR Altitudes (MIA)/Terrain Alert Volume (TAV)
- Minimum Vector Altitudes (MVA)



OROCA



MVA



MIA



# Impact Considerations

- 14 CFR Part 95
- Aeronautical Charting
  - MEA, GNSS-MEA, MOCA, OROCA
- ATC RADAR Video Maps
  - Terminal MVAs
  - Enroute MIAs
- FAA Publications
  - Instrument Procedures Handbook
  - Pending Group Recommendations to FAA
  - ACs
  - FAAO 7110.65
  - AIM
  - FAAO 8260.3
  - FAAO 8260.19

Not all inclusive

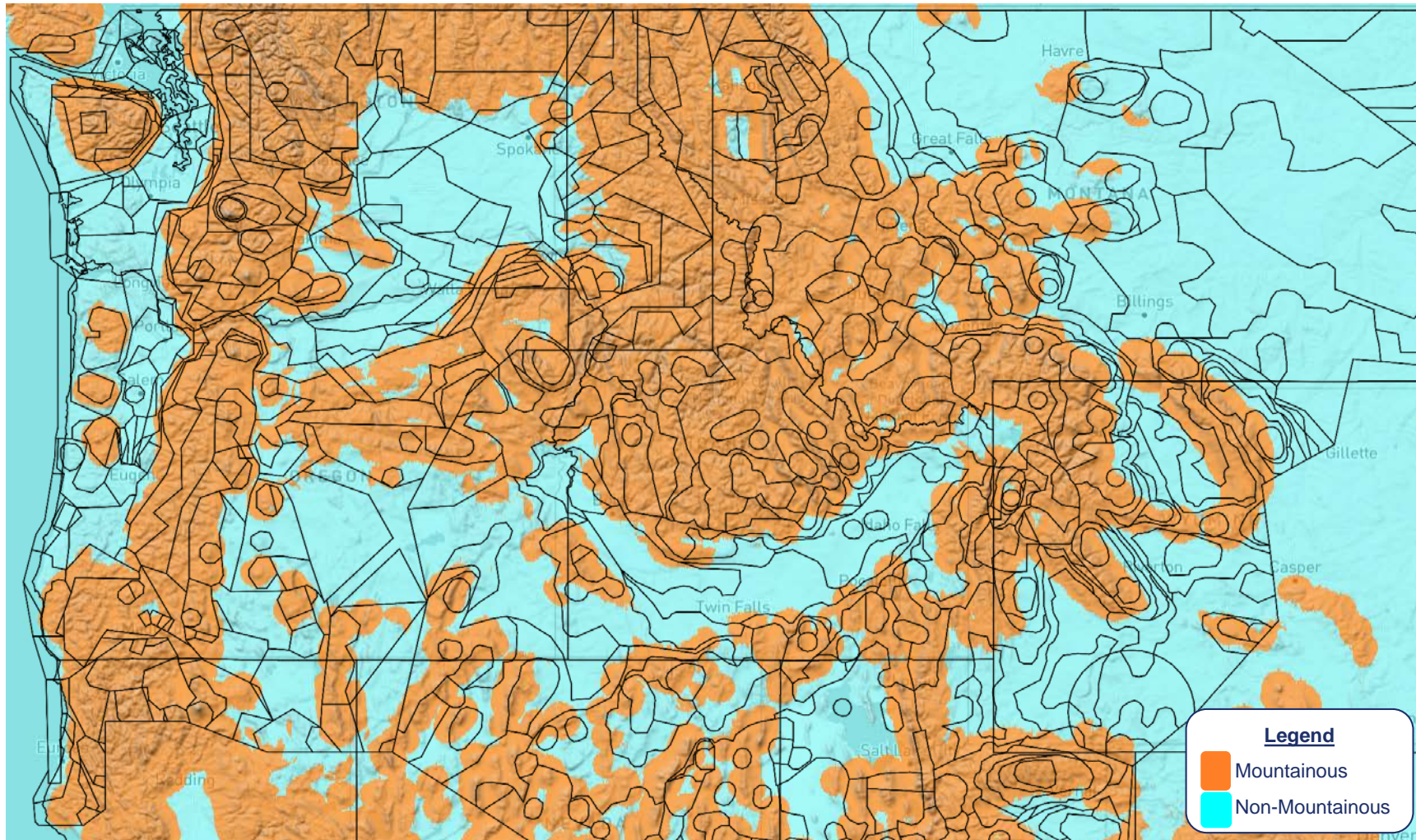


Federal Aviation  
Administration

# Practical Applications:

Minimum IFR Altitude (MIA)/Terrain Alert Volume (TAV)

*MTIA Grid Method — Assessed*

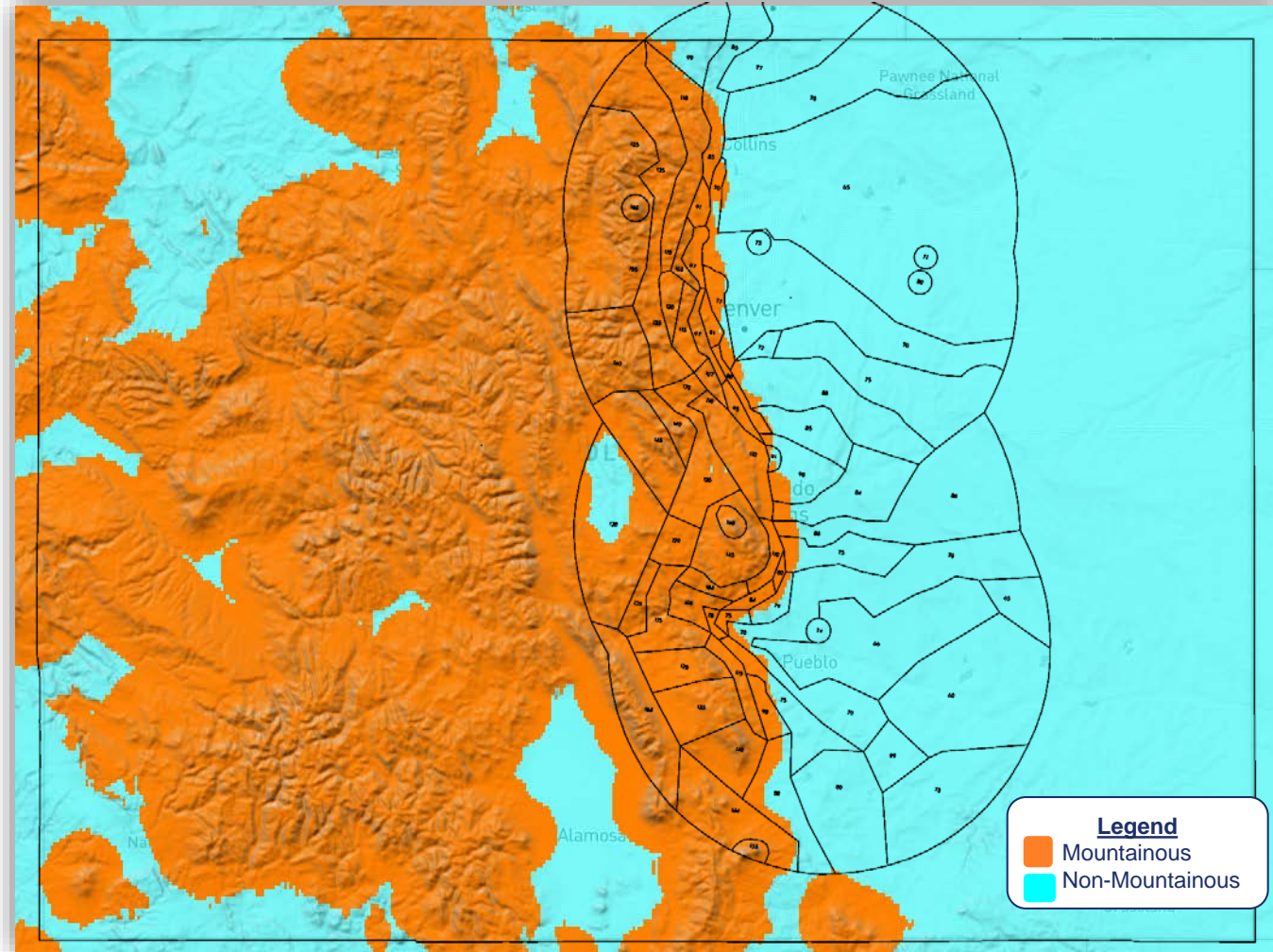


Federal Aviation  
Administration

# Practical Applications:

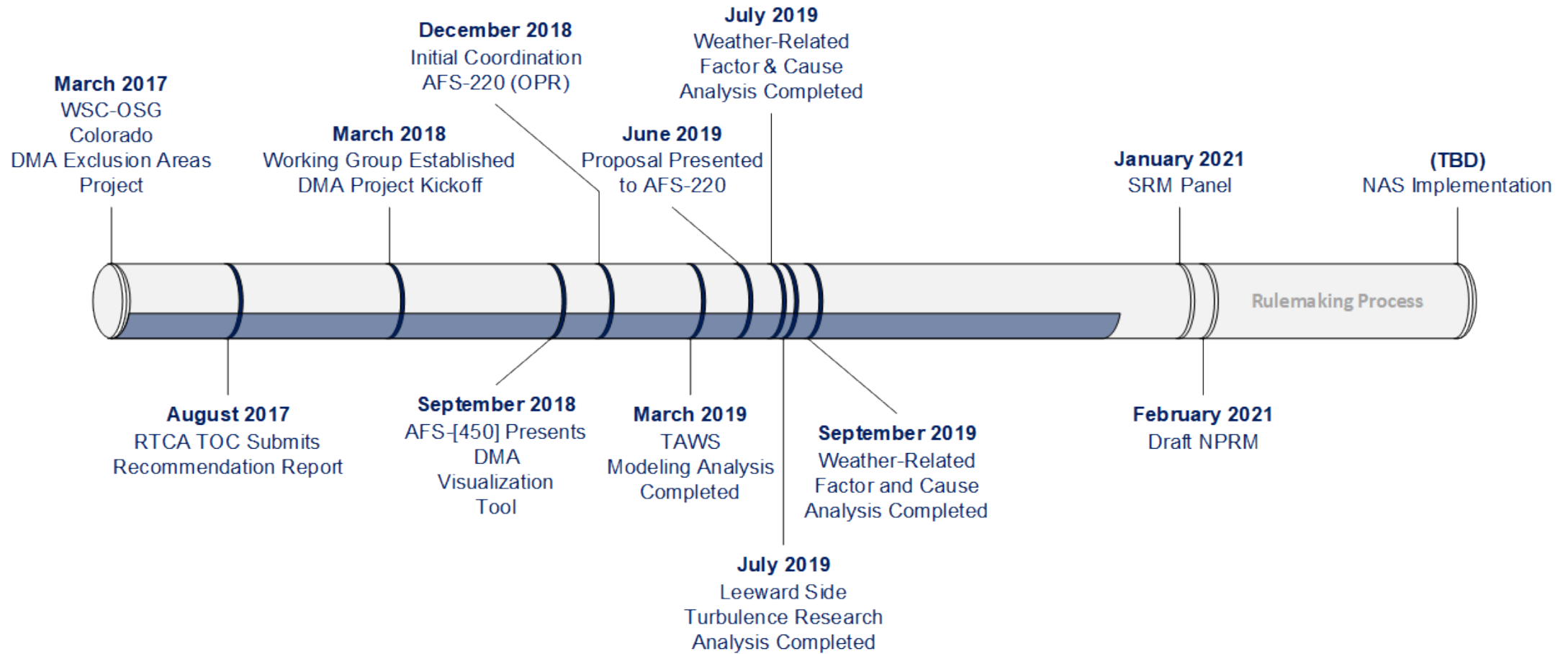
Minimum Vector Altitude (MVA)

*MTIA Grid Method — Assessed*



Federal Aviation  
Administration

# DMA Workgroup – Project Timeline



# Questions?

**Contacts:**

Brian Durham, WSA/OSG AJV-W21, 206-231-2222

Josh Haviland, WSA/OSG/PBN, 206-231-4392



# Back Up Slides



# Conclusion (page 1 of 2)

## Reassessment of Title 14 CFR Volume 2 Part 95 Subpart B *Designated Mountainous Areas*

*Analysis Conclusion:  
Historical Flight Track Data and  
Terrain Awareness and Warning System(s) (TAWS) Modeling Software*

Joshua Haviland  
wpbn@natca.net

Over 600,000 flight tracks were analyzed using TAWS modeling software. The objective of the analysis was to determine if simulated TAWS events share a positive correlation with flight track data overflying areas with considerable topographic relief. Similar analyses of this type may provide further supportive evidence that low to moderate terrain relief in those areas currently designated as “mountainous” does not increase hazard when compared to similar landforms currently designated as “non-mountainous”.

The sample areas were methodically constructed using the *DMA Visualization Tool* in areas that could potentially convert to non-DMA using the *MTIA* methodology. The vertical dimensions of each area was from the surface to 15,000 MSL. Two exceptions to this criterion were the high relief areas and the sample area *W-5b* overlying the San Joaquin Valley. High relief areas were analyzed to help establish a baseline for comparison to the lower relief areas. Due to the general nature of the analysis, several variables could not be included but should be considered. Such variables include factors not specifically related to terrain relief such as special use airspace, national park/wilderness areas, areas containing a significant amount of military flight operations, and sample areas’ density/location of airports.



Federal Aviation  
Administration

# Conclusion (page 2 of 2)

Noteworthy examples discovered during the analysis occurred in sample areas *A-1c*, *E-3*, and *W-5a*. *A-1c* includes areas that extend beyond 200 nautical miles of flat terrain, yet experienced several TAWS events when compared to the other sample areas. After further analysis, it was discovered that a significant number of floatplane operations occur in the sample area and that all TAWS events occurred near a body of water. If these areas were designated as an official landing surface or floatplane base, TAWS modes would likely have been inhibited with the assumption that an approach to landing or takeoff was occurring.

Conversely, area *E-3* includes areas of significant, high-relief terrain but absent TAWS events. A further analysis indicated that while the sample area includes a considerable amount of airports, the area is mostly a corridor for en route air traffic and does not appear to host many departure and arrival operations. Moreover, a national park lies within a majority of the sample area, which is likely to prevent air traffic from operating at lower altitudes and reduce the likelihood of a TAWS event.

Overlying the Columbia River Basin, the terrain for sample area *W-5a* is a mostly flat, shrub-steppe landscape but contains a significant amount of military activity. The TAWS events that occurred were related to aircraft appearing to perform intentional low-level flight maneuvers. Unlike approach to landing configurations, TAWS modeling cannot inhibit alerting when a pilot is intentionally flying close to terrain. Specific to flight track data analyzed in *W-5a*, TAWS alerts would have otherwise been absent.

Application of TAWS modeling software is certainly not the panacea for determining if hazard is increased in low to moderate terrain relief areas designated as mountainous. However, analysis indicates that a positive correlation does exist between TAWS events and terrain relief. In the sample areas having low to moderate terrain relief, one TAWS event occurred for every 116 tracks. In the sample areas having moderate to high terrain relief, one TAWS event occurred for every 32 tracks—a 72% margin compared to low relief sample areas.



# Proposed Methodology & Definition (cont.)

## Formulas:

$$E_2 = E_H - E_L$$

Non-Mountainous Area =  $E_2 \leq 3,000$  feet

Mountainous Area =  $E_2 > 3,000$  feet

Where:

$E_H$  = Highest Elevation Point

$E_L$  = Lowest Elevation Point

$E_2$  = Elevation differential (feet) between lowest and highest elevation points within MTIA.

### Example 1.

$$E_H = 5,300$$

$$E_L = 2,400$$

$$E_2 = 2,900$$

$$5,300 - 2,400 = 2,900 \text{ feet}$$

MTIA is *“Non-Mountainous”*

### Example 2.

$$E_H = 4,700$$

$$E_L = 1,600$$

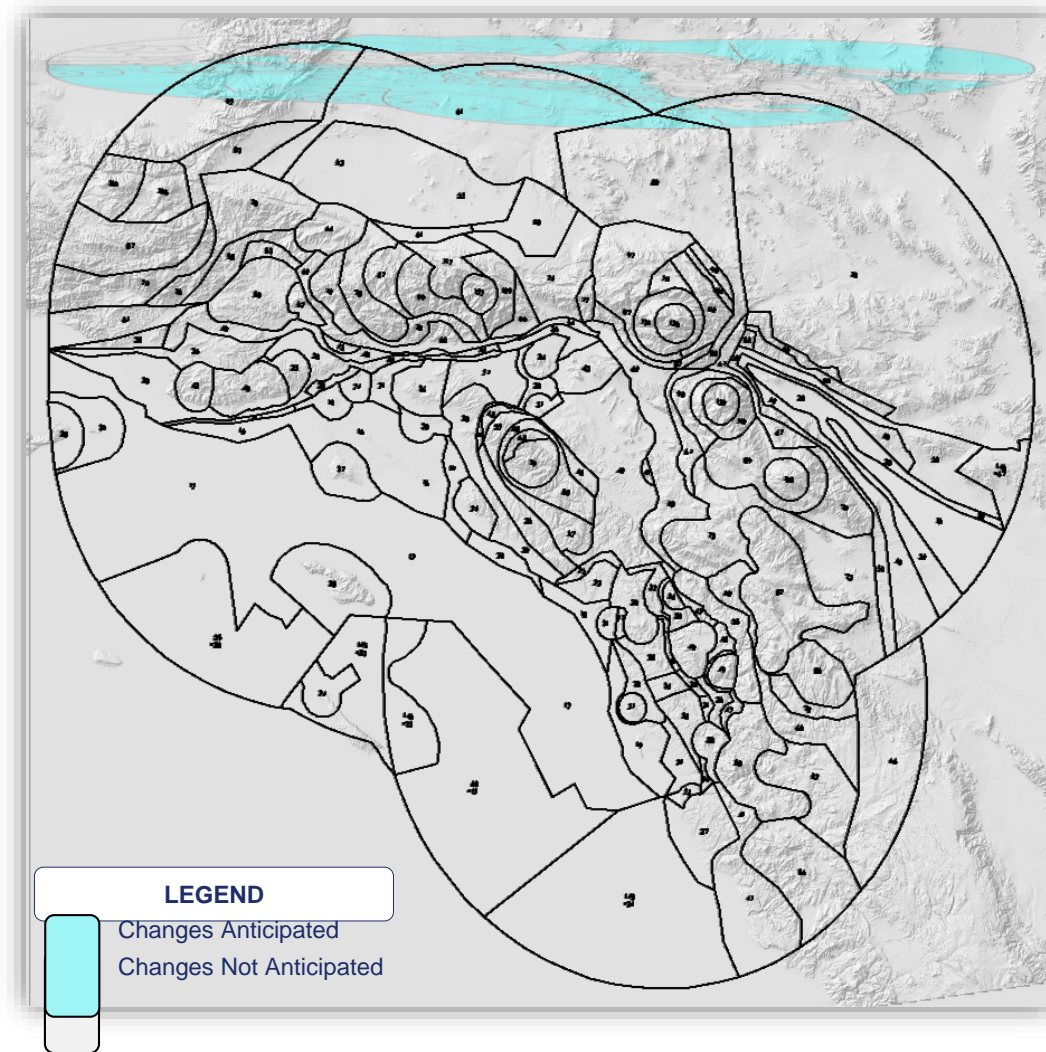
$$E_2 = 3,100$$

$$4,700 - 1,600 = 3,100 \text{ feet}$$

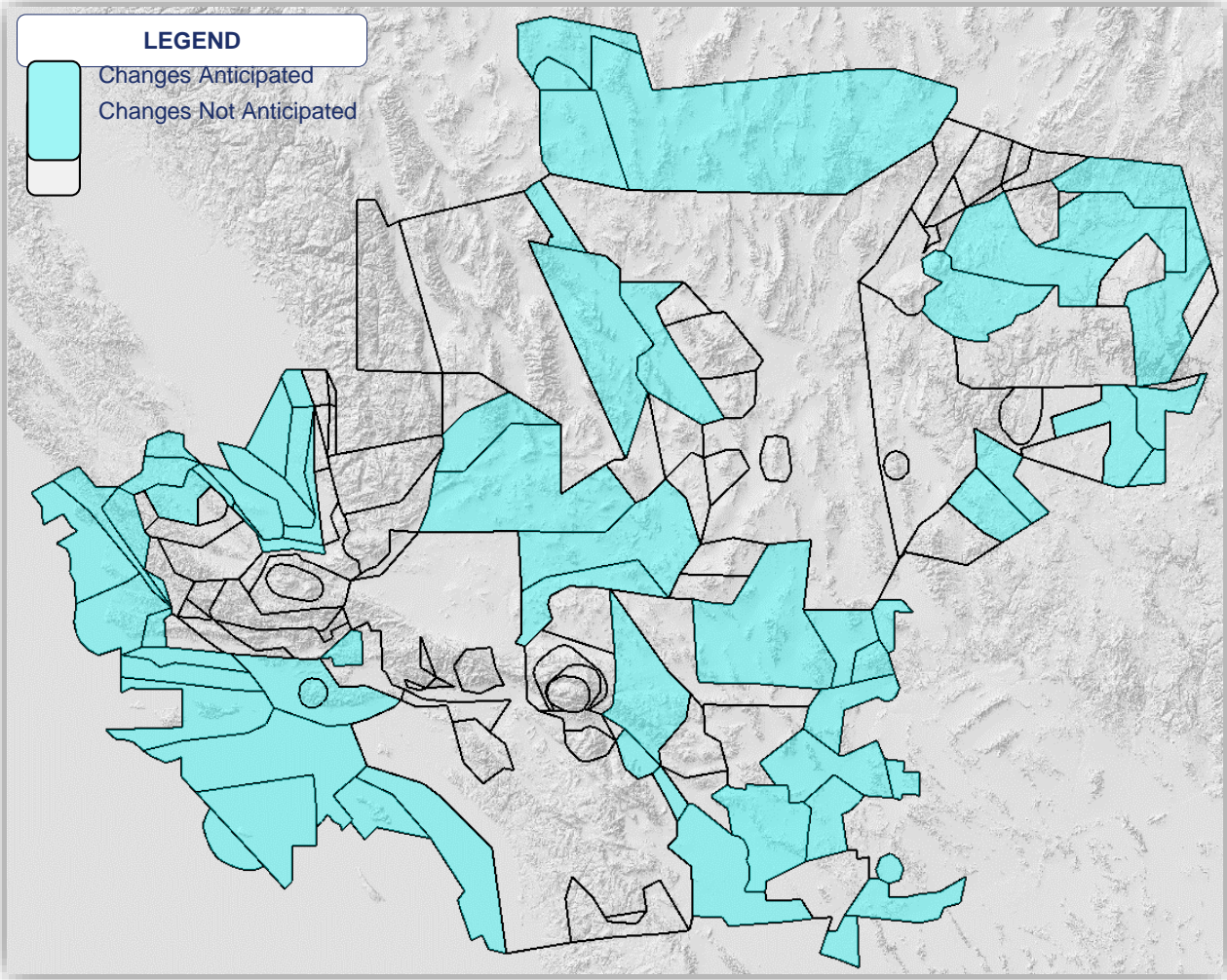
MTIA is *“Mountainous”*



# Potential Impact to SCT MVAs



# Potential Impact to ZLA MIAs





**Proposed  
Denver Exemption Area**

