

# *Consultation on Ozone Monitoring Network Design*

*CASAC AAMMS Consultation - February 10, 2009*

## *Outline*

- Status of associated monitoring proposal
- Monitoring requirements
  - Urban network requirements
  - Non-urban network requirements
  - Required O<sub>3</sub> monitoring season

## Status

- O<sub>3</sub> NAAQS final rule published March 27, 2008
  - Primary standard level reduced to 0.075 ppm
  - Secondary standard level made identical to primary standard
- Preamble stated intention for a distinct O<sub>3</sub> monitoring rule to deal with issues related to urban monitoring, rural monitoring, and O<sub>3</sub> monitoring season
- Proposal status
  - Waiting for OPEI transmittal to OMB for 90 day review period (as of February, 2009)

## Monitoring in Urban Areas – Current Requirements

MSA population <sup>1,2</sup>	Most recent 3-year design value concentrations $\geq 85\%$ of any O <sub>3</sub> NAAQS <sup>3</sup>	Most recent 3-year design value concentrations $< 85\%$ of any O <sub>3</sub> NAAQS <sup>3,4</sup>
>10 million	4	2
4 - 10 million	3	1
350,000 - <4 million	2	1
50,000 - <350,000 <sup>5</sup>	1	0

<sup>1</sup> Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

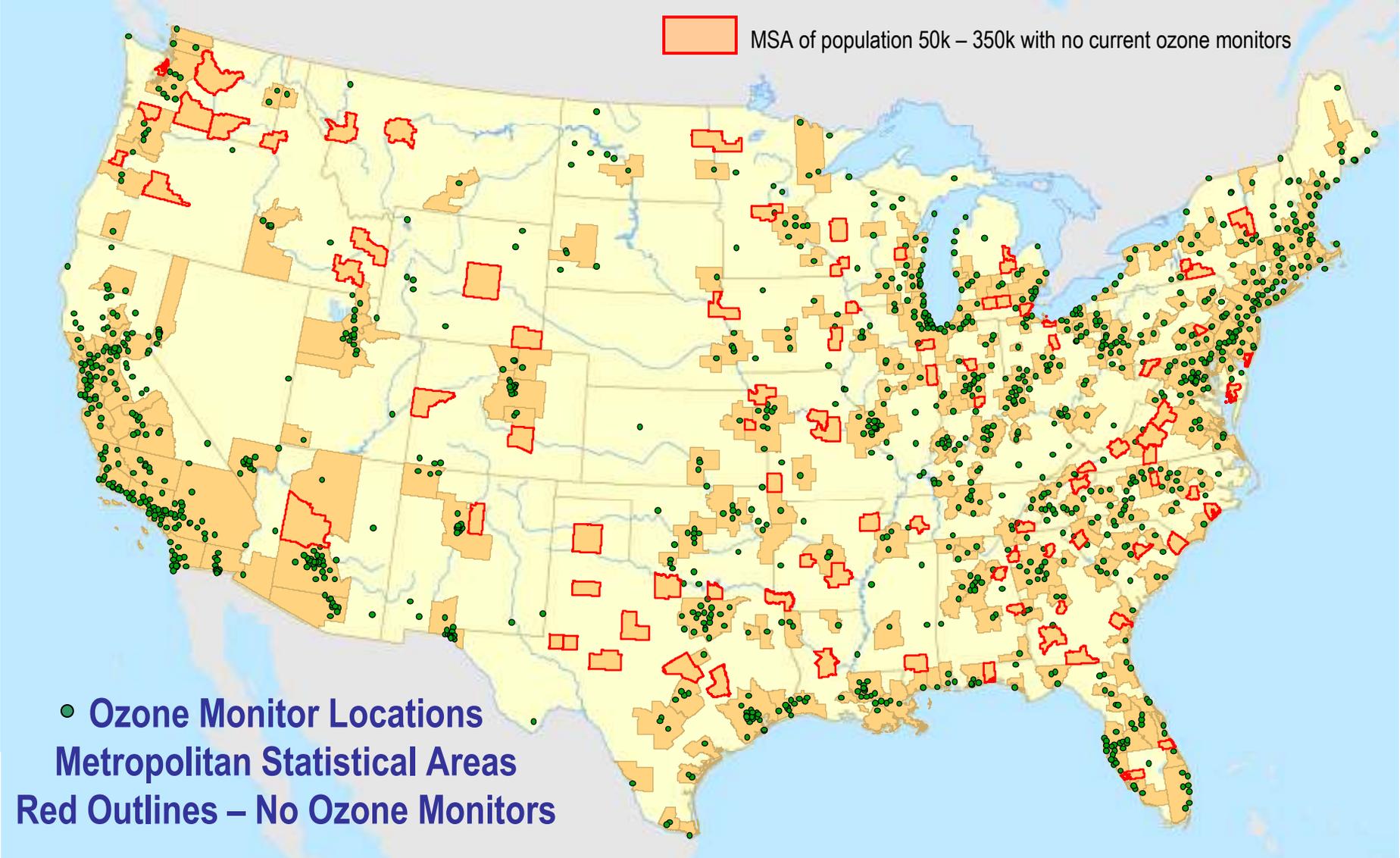
<sup>2</sup> Population based on latest available census figures.

<sup>3</sup> The ozone (O<sub>3</sub>) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

<sup>4</sup> **These minimum monitoring requirements apply in the absence of a design value.**

<sup>5</sup> Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

- Requirements based on population and design value
- No monitors required in smaller MSAs where no design value exists
- PAMS regulations may require additional O<sub>3</sub> monitors



## Monitoring in Urban Areas – Proposed Requirements

MSA population <sup>1,2</sup>	Most recent 3-year design value concentrations $\geq 85\%$ of any O <sub>3</sub> NAAQS <sup>3, 4</sup>	Most recent 3-year design value concentrations $< 85\%$ of any O <sub>3</sub> NAAQS <sup>3</sup>
>10 million	4	2
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<sup>4</sup> *These minimum monitoring requirements apply in the absence of a design value.*

<sup>5</sup> Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

- Requirements based on population and design value
- Minimum of one monitor required in smaller MSAs where no design value exists

*This option would require ozone monitoring in MSA's with an urbanized area population of at least 50,000 if the ozone design value was  $\geq 85\%$  of any NAAQS **OR if there was no design value***

## *Impact of Proposed Urban Requirements*

- Approximately 105 MSAs would have to add monitors (these MSAs have a population of approximately 18 million)
  - We believe that the actual number of new urban monitors will be considerably less due to proposed flexibility
  - Also, 15 to 20 of these MSAs have O<sub>3</sub> monitors but they have been producing incomplete data for design value calculations
- Implementation schedule assuming NFR in 2009:
  - Documentation in Annual Monitoring Network Plans – July 1, 2010
  - Full operation - January 1, 2011
    - Considering taking comment on 2-year deployment schedule

## *Monitoring in Urban Areas – Proposed Flexibility*

- States can do the following to meet proposed new requirements
  - Establish new monitors
  - Relocate existing monitors (that are in excess of minimum requirements) according to 40 CFR part 58 requirements (with R.A. approval)
  - Propose that an existing, nearby monitor be used to represent ambient levels in the unmonitored MSA (with R.A. approval)
  - Comment requested on option to use nearby monitors.

## *Monitoring in Urban Areas – Charge Questions*

- *Considering the ozone minimum monitoring requirements that are already promulgated through 40 CFR Part 58, is the considered change to these requirements sufficient to ensure a minimally adequate network in urban areas?*
  
- *We are considering a timeline that would require newly required ozone monitors to be operational no later than January 1, 2011, based on the expectation that final rulemaking will be completed in 2009.*
  - *Is this schedule appropriate or should EPA consider providing an additional year for new monitors to be deployed (or relocated)?*
  - *What would be the advantages or disadvantages of a staggered deployment schedule?*

## *Monitoring in Non-Urban\* Areas – Current Requirements*

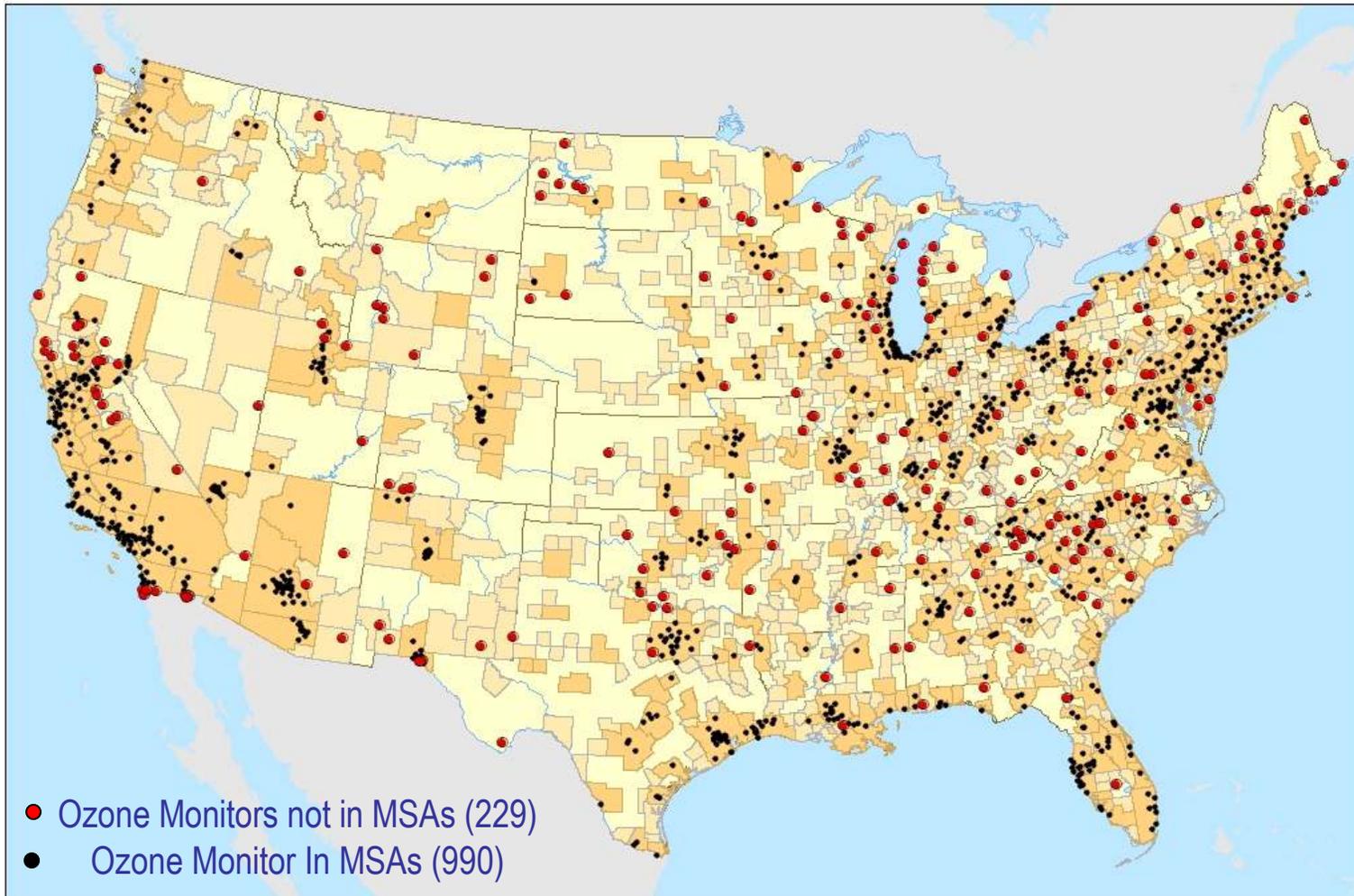
- There are no current requirements for States to characterize O<sub>3</sub> levels outside of MSAs, except for these situations:
  - Some required urban monitors located in maximum concentration areas may be physically outside (downwind) of MSAs
  - PAMS requirements in some areas for upwind and downwind characterization
- States operate discretionary monitors in non-urban areas for various objectives including assessment of transport, atmospheric chemistry, ecosystem studies
- EPA (CASTNET) and the National Park Service (NPS) operate approximately 80 O<sub>3</sub> monitors in primarily rural areas to support studies of acidic deposition and ecosystem effects.

*\* For the purposes of this briefing, “non-urban” means any area outside the boundaries of Metropolitan Statistical Areas of at least 50,000 urbanized area population*

## *Monitoring in Non-Urban Areas – Proposed Requirements*

- Minimum of three required monitors per State to meet the following objectives
  - Provide better characterization of O<sub>3</sub> exposures to O<sub>3</sub>-sensitive vegetation and ecosystems in wilderness areas, National Parks, and remote areas to ensure that potential secondary NAAQS violations are measured.
  - Assessment of exposure due to ambient O<sub>3</sub> levels in smaller communities (Micropolitan Statistical Areas of 10,000 to <50,000 population) with O<sub>3</sub> levels expected to reach 85% of the NAAQS. Supports enforcement of primary NAAQS in communities located outside the boundaries of MSAs that currently have minimum (urban) monitoring requirements.
    - Monitors could be discontinued after 3 years of data demonstrates concentrations less than 85% of NAAQS
  - Assessment of the location and severity of maximum O<sub>3</sub> concentrations that occur in non-urban areas to ensure compliance with primary NAAQS, support understanding of the role of urban-generated O<sub>3</sub> transport and impact in locations between MSAs, verify models used for assessing the effectiveness of control measures, and support monitoring in less-populated areas with O<sub>3</sub> levels potentially near or above NAAQS.

 Metropolitan Statistical Area (Urbanized Area  $\geq 50,000$ )     Micropolitan Statistical Area ( $10,000 < \text{Urban Cluster} \leq 50,000$ )



## *Impact of Proposed Non-Urban Requirements*

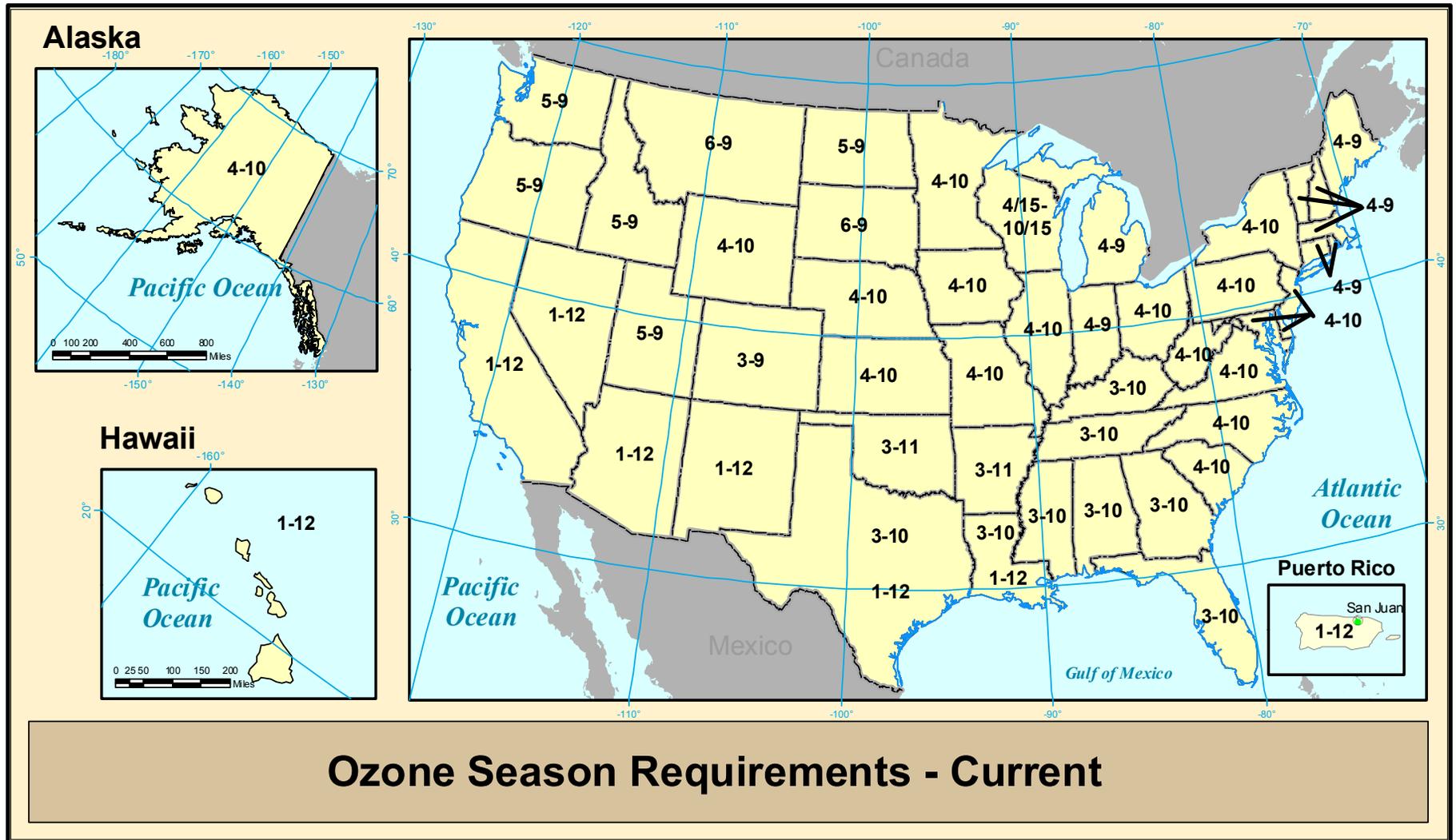
- Approximately 159 monitors would be required
  - Based on three monitors per State, D.C., Puerto Rico, Virgin Islands
  - We believe that the actual number of new non-urban monitors will be considerably less due to proposed flexibility
  - States are likely to propose that existing non-urban monitors in the eastern U.S. are already appropriately located to meet objectives
- Implementation schedule assuming NFR in 2009:
  - Documentation in Annual Monitoring Network Plans – July 1, 2010
  - Full operation - January 1, 2011
    - Considering taking comment on 2-year deployment schedule

## *Monitoring in Non-Urban Areas – Proposed Flexibility*

- States can do the following to meet proposed new requirements
  - Establish new monitors
  - Propose that appropriately sited existing non-urban monitors meet requirements
  - Relocate existing monitors (that are in excess of minimum requirements) according to 40 CFR part 58 requirements (with R.A. approval)
  - Propose that CASTNET or NPS monitors be utilized to meet State requirements (with R.A. approval and documentation of compliance with applicable monitoring regulations)
  - Request that R.A. grant deviation from requirements in certain cases where flexibility is appropriate, e.g.
    - One monitor meeting multiple objectives
    - A remote or isolated area without significant local pollution sources or likelihood of being impacted by transport of O<sub>3</sub> precursors from another area
    - Lack of non-urban location(s) in a small area subject to requirements (e.g., District of Columbia)

## Monitoring in Non-Urban Areas – Charge Questions

- *We are considering a new requirement that each State operate a minimum of three non-urban ozone monitors to meet certain objectives. Considering the stated objectives of the non-urban ozone monitoring requirements, is three required monitors per state sufficient?*
- *What factors should be considered in the siting of ozone monitors to assess impacts on ozone sensitive vegetation in national parks, wilderness areas, and other ecosystems?*
- *In addition to the objectives that have been described for non-urban ozone monitors, what other objectives should be considered in the final network design? How would the consideration of additional objectives, if any, effect the minimum number of non-urban required monitors?*
- *We believe that States should have the option of designating that existing non-urban ozone monitors that are potentially operated by another agency (e.g., CASTNET monitors operated by the National Park Service) be utilized for meeting certain non-urban minimum monitoring requirements. What factors should States use to determine if such monitors are appropriate to include in their networks?*
- *Current ozone monitoring regulations (described in Appendix E of 40 CFR part 58) include requirements for station and probe siting (e.g., vertical distance of inlets, set-back distances from roadways). Are these requirements (that have been developed for urban monitors) appropriate for non-urban ozone monitors? What changes, if any, should be considered?*



## *O<sub>3</sub> Monitoring Season – Basis of Analysis*

- Utilized plentiful year-round O<sub>3</sub> monitoring sites (approximately 45 percent of network)
- Analysis used data (between 2004-2006) from months falling outside of current required O<sub>3</sub> season:
  - Frequency of exceedances of revised NAAQS (8-hour average > 0.075 ppm)
  - Frequency of occurrences of daily maximum concentrations  $\geq$  0.060 ppm. Corresponds to threshold for revised Moderate Air Quality Index level
- Frequency analysis validated by statistical prediction based on relationship between daily maximum 8-hour O<sub>3</sub> concentration and certain meteorological variables.<sup>1</sup>

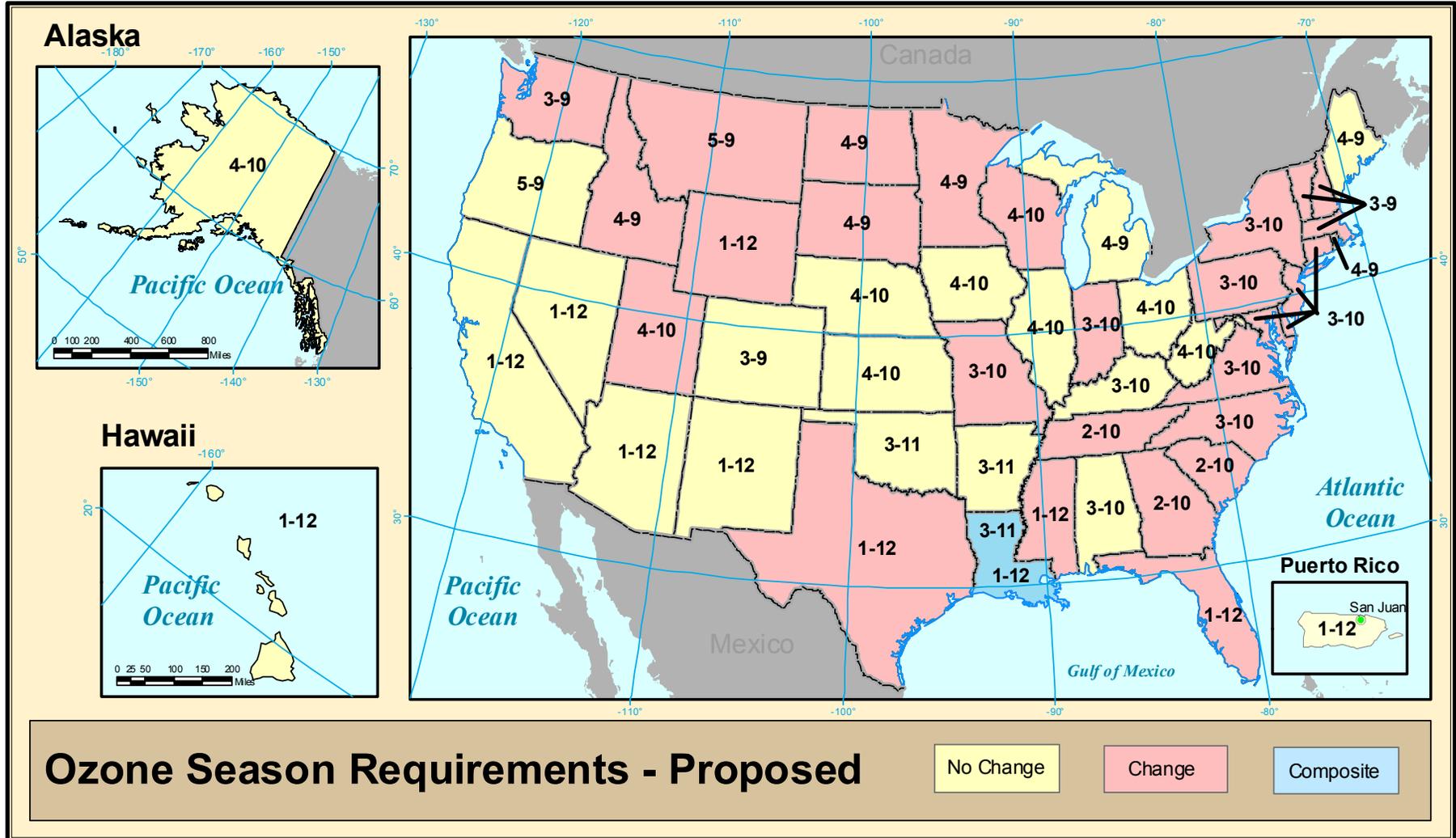
<sup>1</sup> Camalier, L., Cox, B., and Dolwick, P., 2007. *The effects of meteorology on O<sub>3</sub> in urban areas and their use in assessing O<sub>3</sub> trends. Atmospheric Environment 41, 7127-7137*  
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## *O<sub>3</sub> Monitoring Season – Analysis Results*

- Eight states experienced out-of-season exceedances of 8-hour average 0.075 ppm NAAQS during 2004-2006
  - Maine, Massachusetts, New Hampshire, New Jersey, New York, South Carolina, Vermont, Wyoming
  - These exceedances were limited in nature and occurred just before start of required season (except for Wyoming)
- 32 states experienced out-of-season occurrences of 8-hour average  $\geq 0.060$  ppm (Moderate AQI)
  - Highest frequency: Florida, South Carolina, South Dakota, Utah, Wyoming

## *O<sub>3</sub> Monitoring Season – Summary of Proposed Changes*

- No change for 23 states and 4 territories
- Increase 1 month for 19 states:
  - Delaware, D.C., Georgia, Idaho, Louisiana (by AQCR), Maryland, Massachusetts, Missouri, Montana, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Pennsylvania, Tennessee, Vermont, Virginia, Wisconsin
- Increase 2 months for 6 states:
  - Connecticut, Indiana, South Carolina, South Dakota, Utah, Washington
- Increase 4 months for 3 states:
  - Florida, Mississippi, Texas (by AQCR)
- Increase 5 months for Wyoming
- Decrease 1 month for Minnesota



## *O<sub>3</sub> Monitoring Season – Other Proposed Requirements*

- NCore stations proposed to be January – December regardless of location
- Deadline – revised season requirements proposed to be effective in 2010 for existing sites based on NFR completed in 2009

## *O<sub>3</sub> Monitoring Season – Charge Questions*

- We are considering changes to the required ozone monitoring seasons based on analyses of the patterns of ozone exceedances and occurrences of the Moderate level of the Air Quality Index, during periods outside of the currently required seasons. What other factors should be considered, if any, in the determination of the length of the required monitoring season for each State?*
- We believe that ozone monitors that are located at NCore stations should be operated on a year-round monitoring schedule. Under what circumstances might it be appropriate to require year-round monitoring at other stations beside NCore?*
- We are considering that changes to the required ozone monitoring season be applicable to existing monitors beginning in 2010, one year ahead of the deployment schedule for newly required ozone monitors. Is this schedule reasonable for existing monitors?*