

EMRS Saturation Model

A practical tool for evaluating resource requirements in response to hypothetical animal disease outbreak scenarios

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What is the EMRS Saturation Model (SaM)?

- **Simplified representation** of the number of personnel resources required to respond to highly contagious disease outbreaks
- Includes **assumptions** about how the system works
 - Epidemiological models were used to mimic the spread and control of infectious diseases
 - Subject matter experts provided knowledge on the emergency management response process
- Enables us to answer “**What if?**” questions

What is the purpose of SaM?

- Developed to facilitate analysis and planning for resource requirements in response to hypothetical highly contagious disease outbreaks
- Identify supply chain vulnerabilities

Why use models?

- Analyze and better explain the behavior of a complete system
- Highlight gaps in existing knowledge about a system
 - Through the process of constructing models, the understanding of the system being modeled is often improved

Applications of SaM

- How many people might be required to respond during each day of a hypothetical disease outbreak scenario?
- Are there a sufficient number of deployable, qualified people in ROSS?
 - Veterinary Medical Officers
 - Animal Health Technicians
 - Administrative personnel
 - *etc.*
- When might shortages in available personnel occur?
- What might be the projected shortage?
 - What if a vaccination campaign was initiated?
 - What if pre-emptive depopulation was requested?
 - What if the surveillance area was expanded?
- What is the impact on personnel resources if you adjusted the number of personnel resources and time dedicated to a given task?
 - What if you asked people to do more with less?

When should SaM be used?

- Planning

- Simulation model that functions as a strategic planning tool for planners to assess and evaluate the number of resources anticipated

- Not a tactical tool

- Not intended or recommended for use during an outbreak
- Not suitable for informing policy decisions during an outbreak

Challenges associated with modeling

- Assumptions are made to overcome lack of knowledge and data
- Accuracy of results depend on:
 - Validity of assumptions made
 - Which components are included/excluded
 - Accuracy of modeling interactions between components

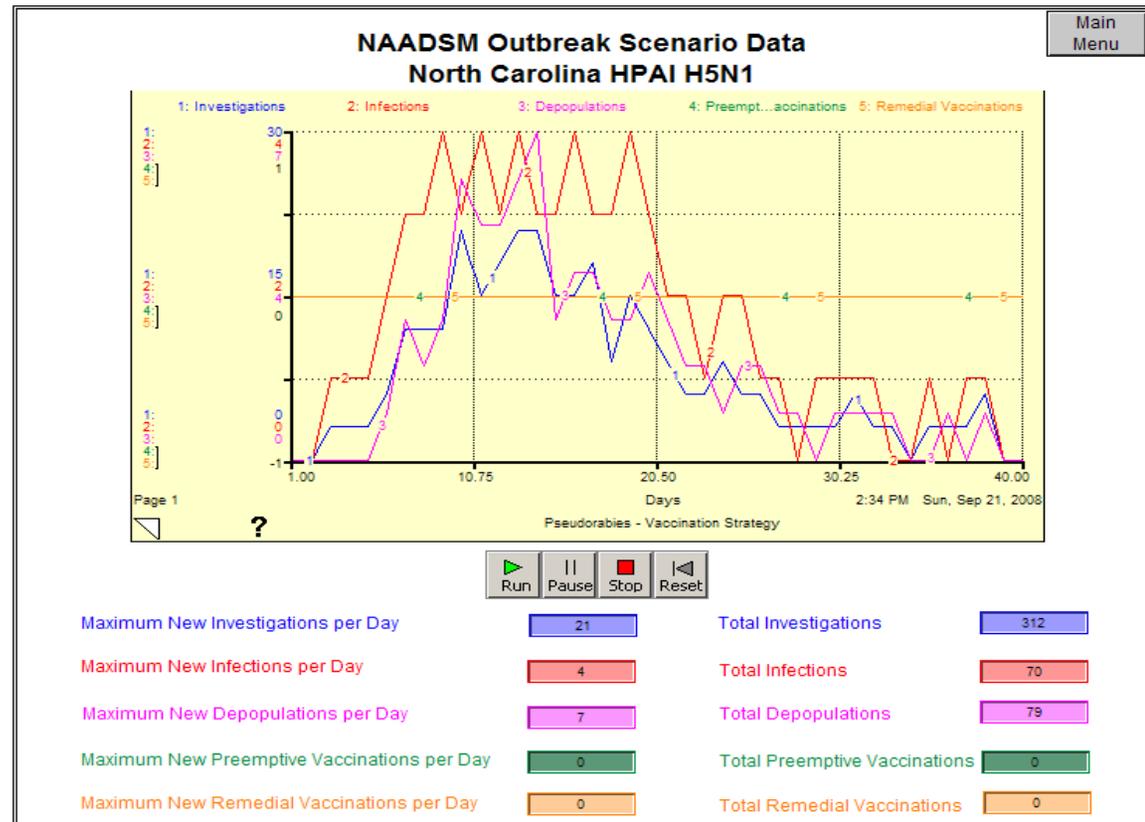
How does SaM work?

- Personnel resource estimates derived from the Resource Ordering Status System (**ROSS**) and the Employee Qualification System (**EQS**)
- Outbreak scenarios created using the North American Animal Disease Spread Model (**NAADSM**)
- Efficiency and performance of emergency management functions can be changed by the user

SaM: Visual display of information

- Key metrics derived from disease outbreak scenarios

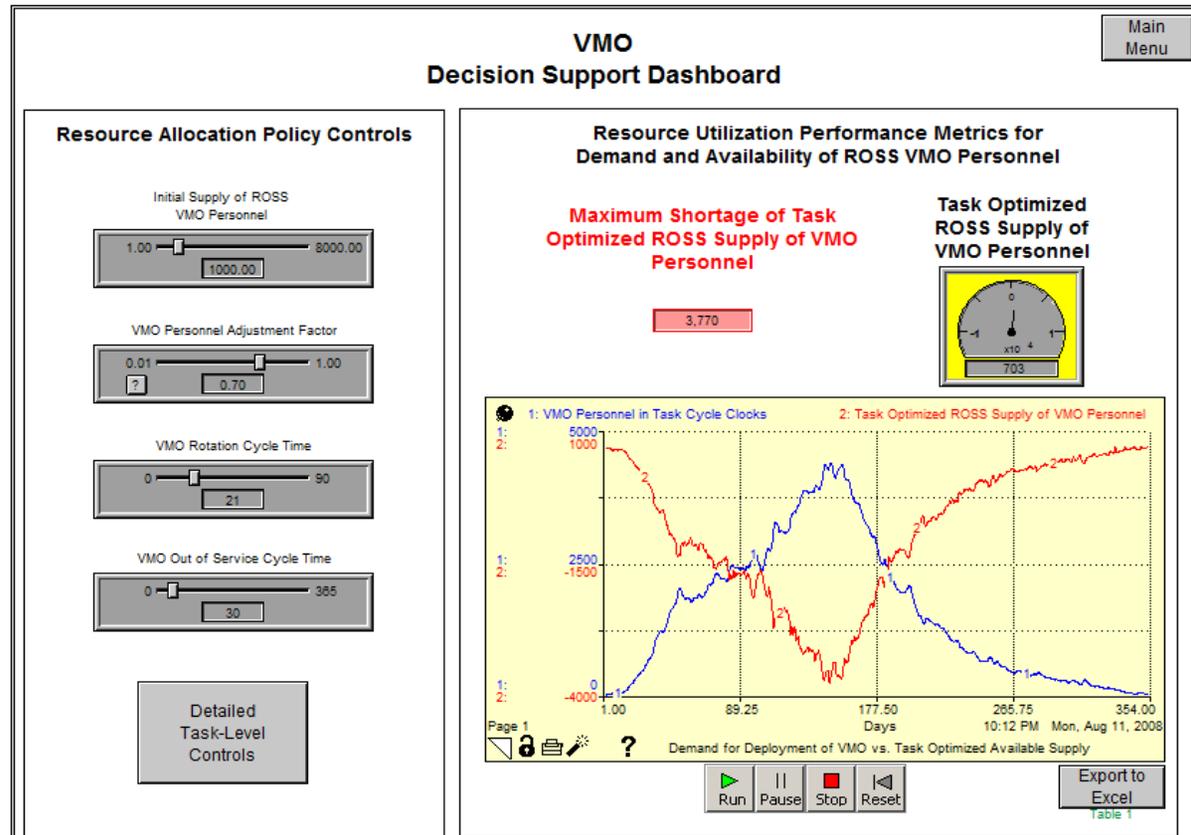
SaM will display the maximum number of new premises detected, depopulated, and vaccinated each day based on hypothetical disease outbreak scenarios



SaM: Visual display of information

■ Personnel utilization and deployment

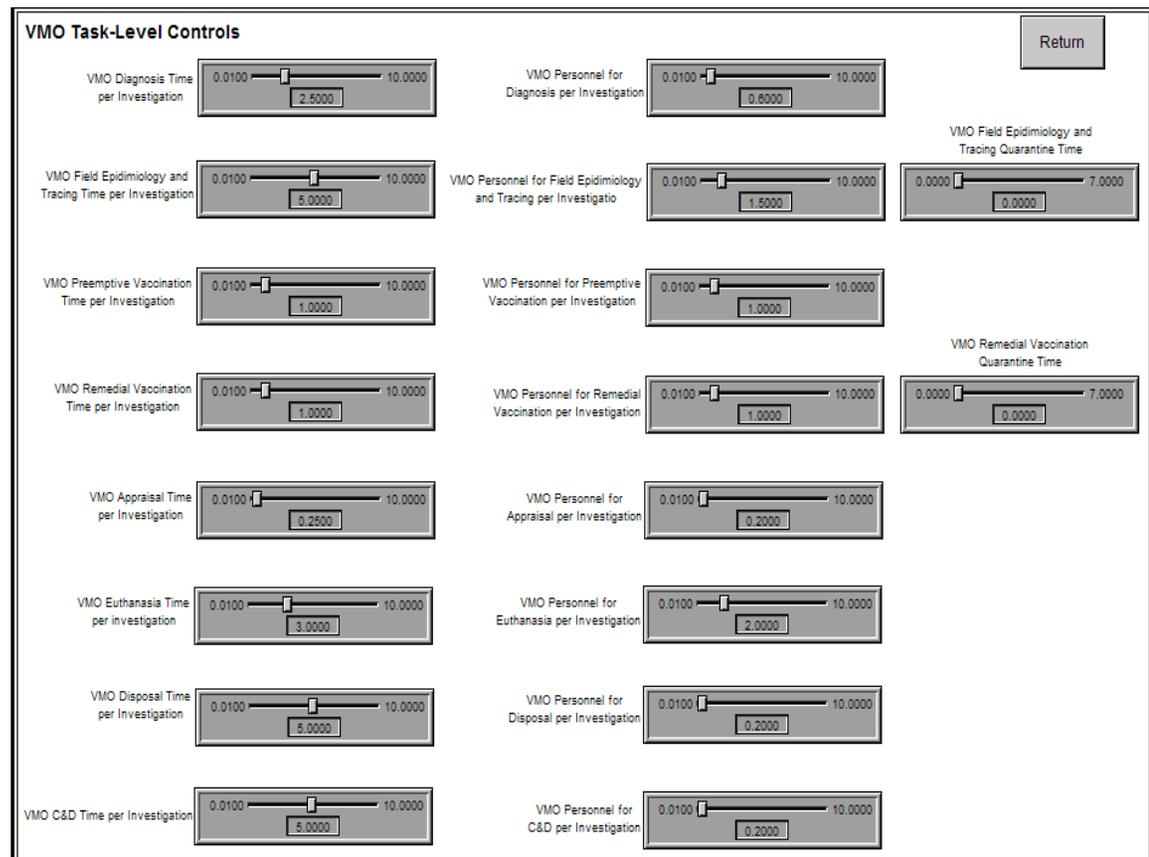
SaM will present alerts and warnings triggered by resource limitations and/or performance criteria to indicate the need for potential adjustments in the number of available personnel



SaM: Visual display of information

■ Task and work flow optimization

SaM allows users to vary the amount of time allowed for each person to carry out various tasks and the number of people required to accomplish the task in order to optimize resources as the hypothetical disease outbreak progresses



Demonstration of SaM

Limitations of SaM

- Current efforts
 - Review by select APHIS subject matter experts
 - Documentation
- Research & Development Phase
 - Limited by the number of disease spread scenarios
 - Unable to estimate the direction or magnitude of disease spread based on resource limitations

Possibilities for future application

- Create a library of disease outbreak scenarios
- Couple with NAADSM to evaluate the impact resource shortages have on the duration, extent, and size of disease outbreaks
- Introduce the NAHLN perspective
 - How many personnel resources might be required for sample collection?
 - How much diagnostic testing equipment and supplies might be needed to support sample collection?
 - How many samples might be collected each day of an outbreak?
 - How many personnel resources might be required to support the surge in incoming samples?
 - When might potential vulnerabilities occur?

Possibilities for future application

- Introduce the National Veterinary Stockpile (NVS) perspective
 - If shortages occur, when might they happen? What is the projected shortage?
 - What might be the corresponding demand on the NVS when additional people are added to the response?
 - What might be the impact if the response strategy is adjusted?
- Incorporate State and local personnel resources
- Explore the possibility of developing a tactical tool for use during an outbreak

Acknowledgements

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