

Chapter 6: Population Models and Evaluation of Models

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- Useful tools for understanding, explaining, and predicting dynamics of a population
- Explore management options and predict consequences of alternative actions

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Objectives:

- Brief description of population models developed for free-ranging horses
- Evaluation of WinEquus model used by BLM
- Alternative models that may be useful

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Types of Models Developed for Wild Horses:

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Types of Models Developed for Wild Horse:

- Early 1990s - Basic population models to understand and describe dynamics
- 1992-present – Population models expanded to evaluate impacts of various types of management interventions on population size and growth rates
- 2000 – Modeling horse population dynamics within the complexity of ecosystem processes

The WinEquus Model

- Contracted by BLM specifically for routine use in WHB Program
- Individual-based, age- and sex-structured model
- Output: 20-yr predictions of horse population
- Used in all HMA planning that involves management interventions

The WinEquus Model - Strengths

- Easy to use with minimal training
- Flexibility to change input parameters and basic mechanisms influencing the horse population
- Effectively simulates management scenarios of female fertility control and/or removals
- Informative output
- Well documented

The WinEquus Model – Data Requirements

- Initial age and sex distributions
- Sex- and age-specific survival probabilities
- Age-specific foaling rates
- If desired, parameter values to implement:
 - density dependence
 - environmental stochasticity (variation)
 - removals and female contraception

The WinEquus Model – How Used By BLM

- Reviewed ~10 HMA mgmt/gather plans
- Alternative mgmt actions simulated
- Basic model output presented (appendix/interpretation?)
- Committee could not determine is used:
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 - simply as 'boiler plate' requirement for mgmt plans

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- Mgmt plans typically provided NO information regarding input parameters/options used
- Without this info output cannot be critically evaluated

Alternative Models

Planning Population Management: Beyond WinEquus

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- Survival, fecundity, age-structure data better match to the target population
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 - Use demographic data from most closely matched 'sentinel' population

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- Capability to model both female- and male-oriented contraception
- Incorporate likely demographic feedbacks resulting from contraceptive treatments
 - Increased survival and longevity
 - Decreased fertility with repeated treatments

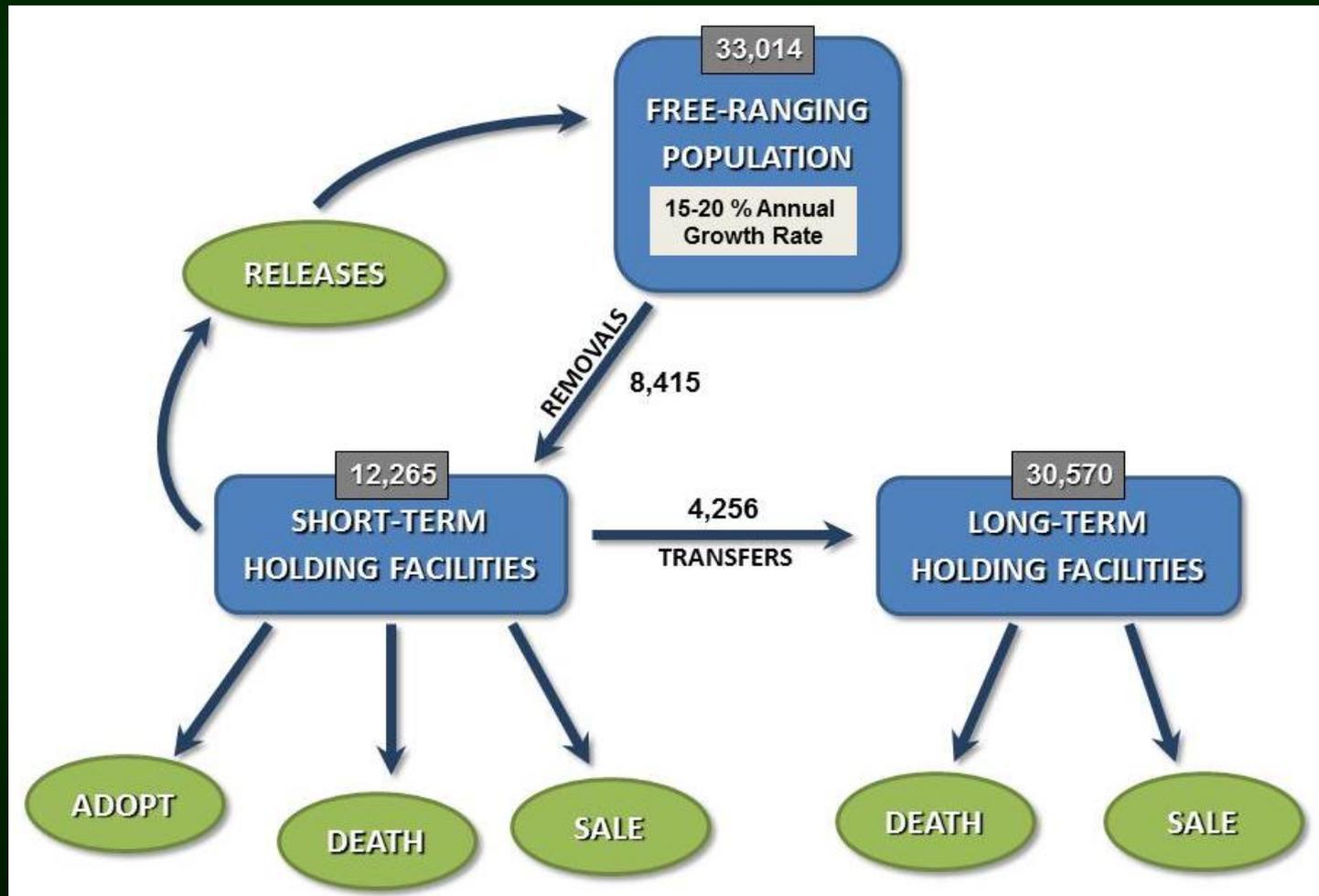
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Comprehensive Model of WHB Program



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Adaptive Resource Management Model - ARM

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- These decisions need to be made with incomplete and imperfect information about how horse populations will respond to the management action
- ARM provides a structured way to make this decisions in a scientifically creditable manner

Adaptive Resource Management – ARM

Premise

- Uncertainty exists – its reduction could improve mgmt
- Decisions must be made
 - In the face of uncertainty
 - Periodically
- Monitoring is in place or could be implemented

Adaptive Resource Management – ARM Process

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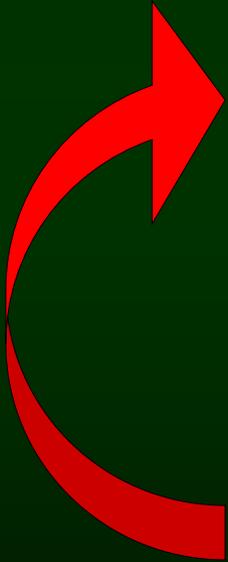
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- Models including both free-ranging and captive horse populations and costs could be helpful

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- The WinEquus model is scientifically sound but its application for informing management has been poor
- Substantial improvements could be made for planning future population management
- Models including both free-ranging and captive horse populations and costs could be helpful
- Implementing ARM would strengthen scientific creditability of WHB Program