

Chapter 2: Estimating Population Size and Growth Rates

Foundational Data for Horse Management

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Foundational Data for Horse Management

Objectives:

- Review current methods used to inventory horse populations
- Provide recommendations for improving population monitoring
- Review evidence to determine typical growth rates of horse populations

Estimating Population Size

- ~ 1% WHB Program budget spent annually to inventory horse populations
- Horses in each 'Herd Management Area' are periodically counted

Estimating Population Size

- ~ 1% WHB Program budget spent annually to inventory horse populations
- Horses in each 'Herd Management Area' are periodically counted
- Scientific population surveys
 - Rigorous/standardized methodology
 - Statistical basis
 - Consistently applied
 - Well documented
 - Data complete, organized, accessible

Expectation: Individual HMA Data

Year	Pop. Est.	Count
2001		
2002		
2003		
2004		

Expectation: Individual HMA Data

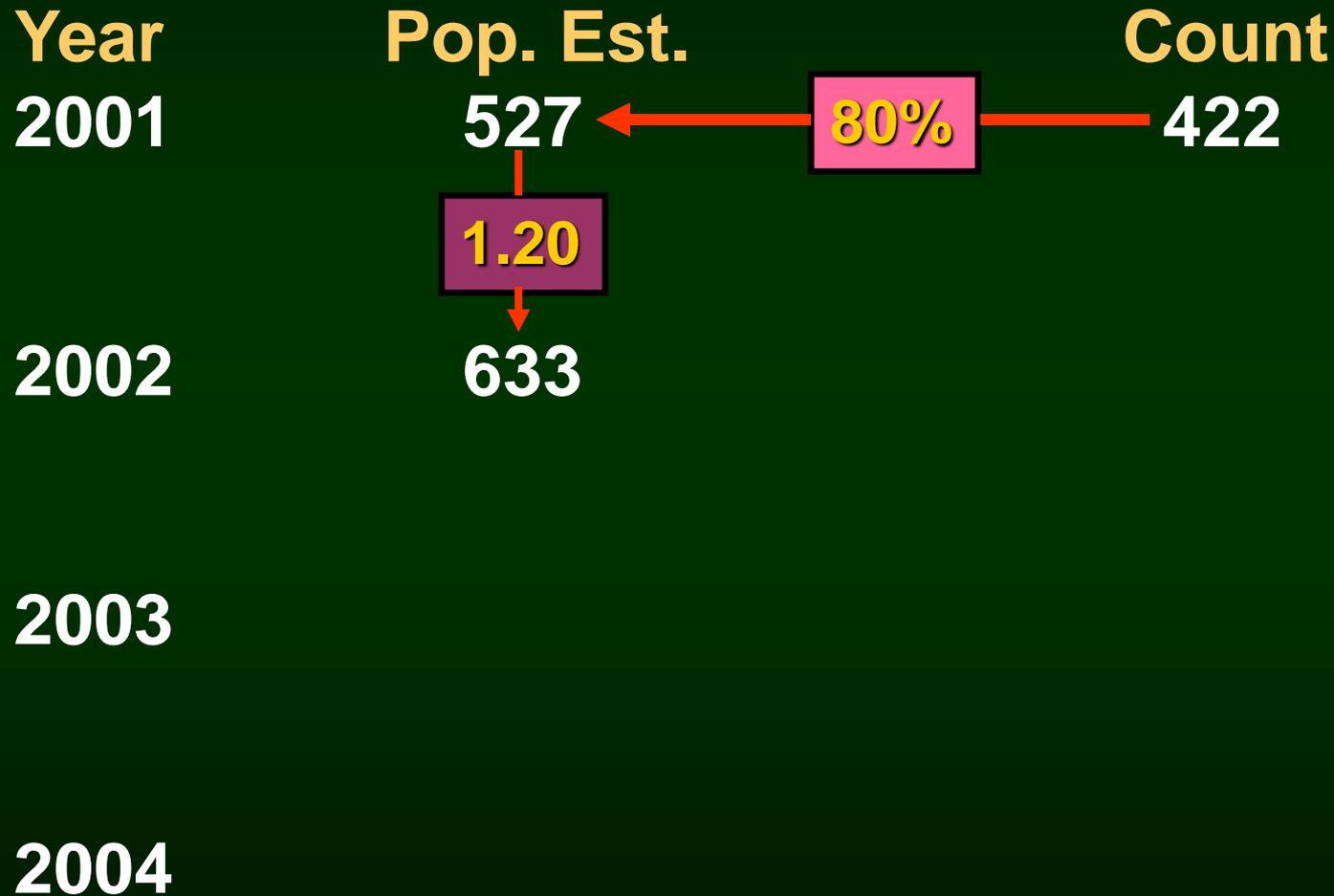
Year	Pop. Est.	Count
2001		422
2002		
2003		
2004		

Expectation: Individual HMA Data

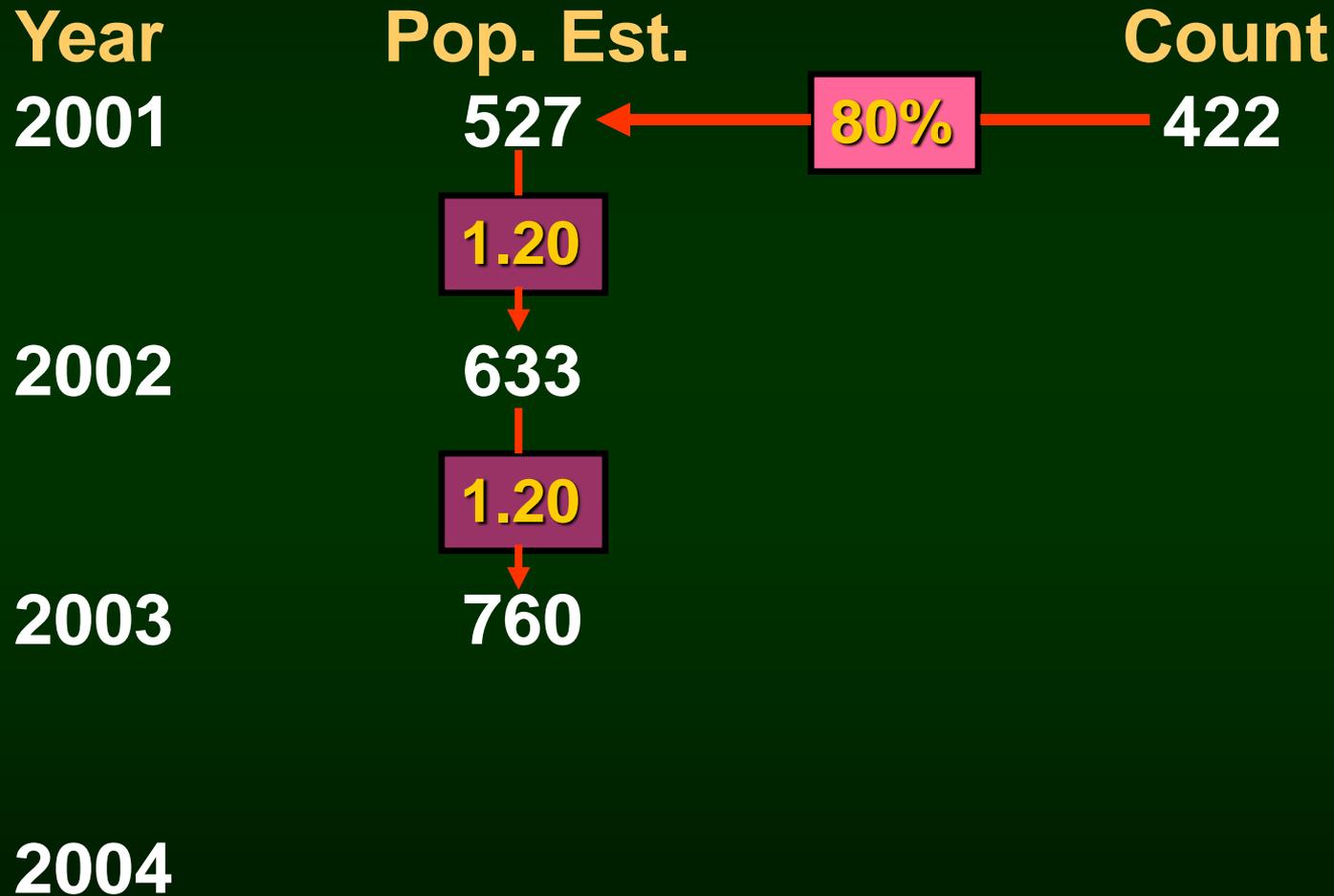
Year	Pop. Est.	Count
2001	527	422
2002		
2003		
2004		

The diagram illustrates the relationship between the population estimate and the actual count for the year 2001. A pink box containing '80%' is connected to the Count value (422) by a red arrow pointing left towards the Pop. Est. value (527).

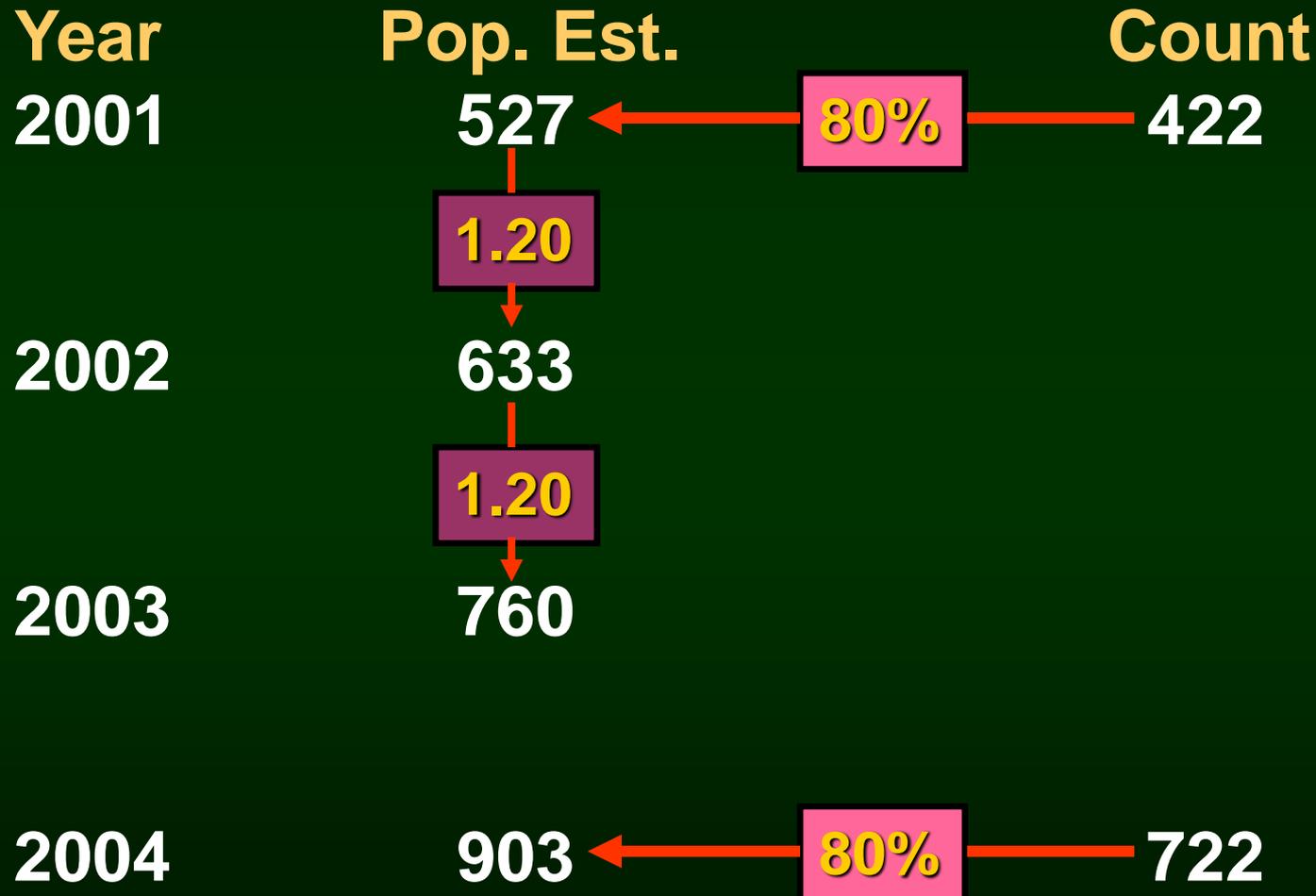
Expectation: Individual HMA Data



Expectation: Individual HMA Data



Expectation: Individual HMA Data



Expectation: Individual HMA Data

Year	Pop. Est.	Count
2001	527	422
2002	633	
2003	760	
2004	903	722

**Population estimates
summed over all HMAs to
estimate total free-ranging
horse population**

NRC Committee Data Request to BLM

- 2000-2011 records for all HMAs

NRC Committee Data Request to BLM

- 2000-2011 records for all HMAs
- BLM response:
 - No centralized database, data dispersed among field offices
 - NRC request not reasonable/manageable
 - Suggested requesting records for a sample of no more than 40 HMAs

NRC Committee Data Request to BLM

- NRC committee selected a sample of 40 HMAs

NRC Committee Data Request to BLM

- NRC committee selected a sample of 40 HMAs

State	No. HMAs	Sample
Arizona	1	0
California	15	2
Colorado	4	3
Idaho	6	1
Montana	1	1
New Mexico	2	0
Nevada	63	21
Oregon	17	6
Utah	17	2
Wyoming	16	4

Reveille Herd Management Area in Nevada

Example of 'Typical' Herd Record

Year	Annual Population Estimate	Population Count	Date of Count	Type of Craft	Percentage of Area Inventoried	Method	Adjustment of Count
2000	164	190	November	Helicopter	100	Grid	None
2001	187						
2002	96						
2003	111	9	December 23	Fixed-wing airplane	70	Grid	None
2004	61	61	October 15	Helicopter	100	Grid	None
2005	71						
2006	135	119	January 6	Helicopter	100	Grid	None
2007	57	79	January 7	Helicopter	100	Grid	None
2008	66						
2009	77	213	September 9	Helicopter	100	Grid	None
2010	213	231	February 10	Helicopter	100	Grid	None
2011	91						

Reveille Herd Management Area in Nevada

Inconsistent Time Interval Between Surveys

Year	Annual Population Estimate	Population Count	Date of Count	Type of Craft	Percentage of Area Inventoried	Method	Adjustment of Count
2000	164	190	November	Helicopter	100	Grid	None
2001	187						
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2011	91						

Reveille Herd Management Area in Nevada

Inconsistent Seasonal Timing of Surveys

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2000	164	190	November	Helicopter	100	Grid	None
2001	187						
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Reveille Herd Management Area in Nevada

Inconsistent Survey Platform

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Reveille Herd Management Area in Nevada

Incomplete Surveys

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Reveille Herd Management Area in Nevada

Population Estimates From Counts

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Reveille Herd Management Area in Nevada

Population Estimates in Years Without Counts

Year	Annual Population Estimate	Population Count	Date of Count	Type of Craft	Percentage of Area Inventoried	Method	Adjustment of Count
2000	164	190	November	Helicopter	100	Grid	None
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2003	111	9	December 23	Fixed-wing airplane	70	Grid	None
2004	61	61	October 15	Helicopter	100	Grid	None
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2006	135	119	January 6	Helicopter	100	Grid	None
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2011	91						

Little Book Cliffs Wild Horse Range in Colorado

Best Herd Record

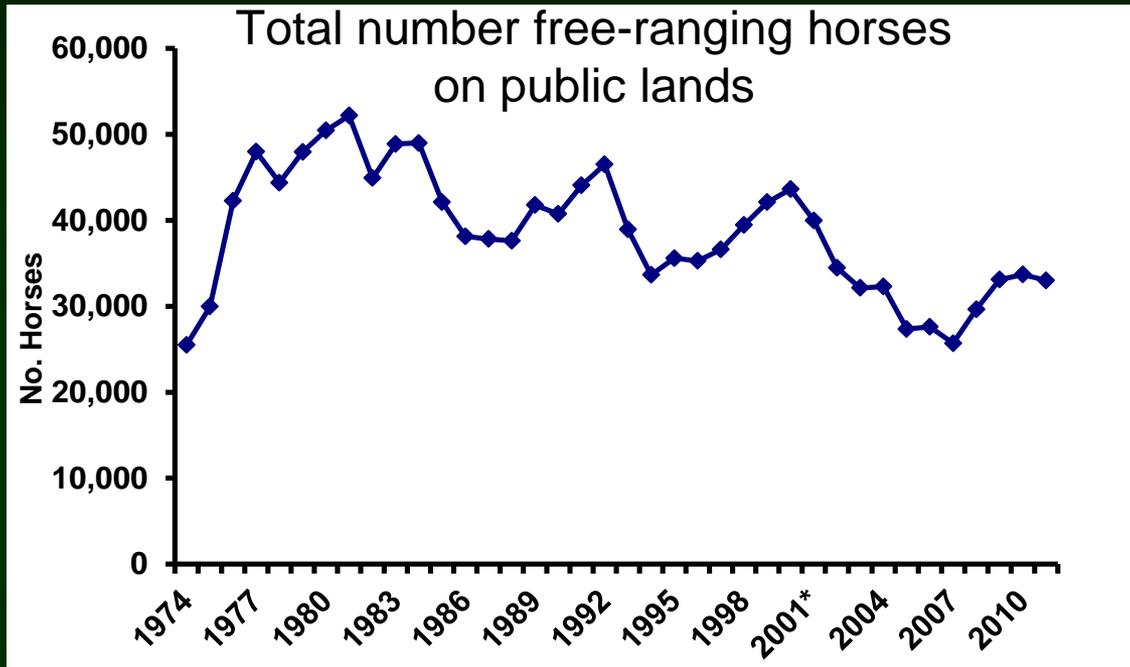
Year	Annual Population Estimate	Population Count	Date of Count	Type of Craft	Percentage of Area Inventoried	Method	Adjustment of Count
2000	153	153	August	Vehicle/horse	All	Visual	None
2001	169	169	August	Vehicle/Horse	All	Visual	None
2002	195	195	August	Vehicle/Horse	All	Visual	None
2003	154	154	August	Vehicle/Horse	All	Visual	None
2004	178	178	August	Vehicle/Horse	All	Visual	None
2005	132	132	August	Vehicle/Horse	All	Visual	None
2006	144	144	August	Vehicle/Horse	All	Visual	None
2007	165	165	August	Vehicle/Horse	All	Visual	None
2008	122	122	August	Vehicle/Horse	All	Visual	None
2009	133	133	August	Vehicle/Horse	All	Visual	None
2010	138	138	August	Vehicle/Horse	All	Visual	None
2011	142	142	August	Vehicle/Horse	All	Visual	None

Desatoya Herd Management Area in Nevada

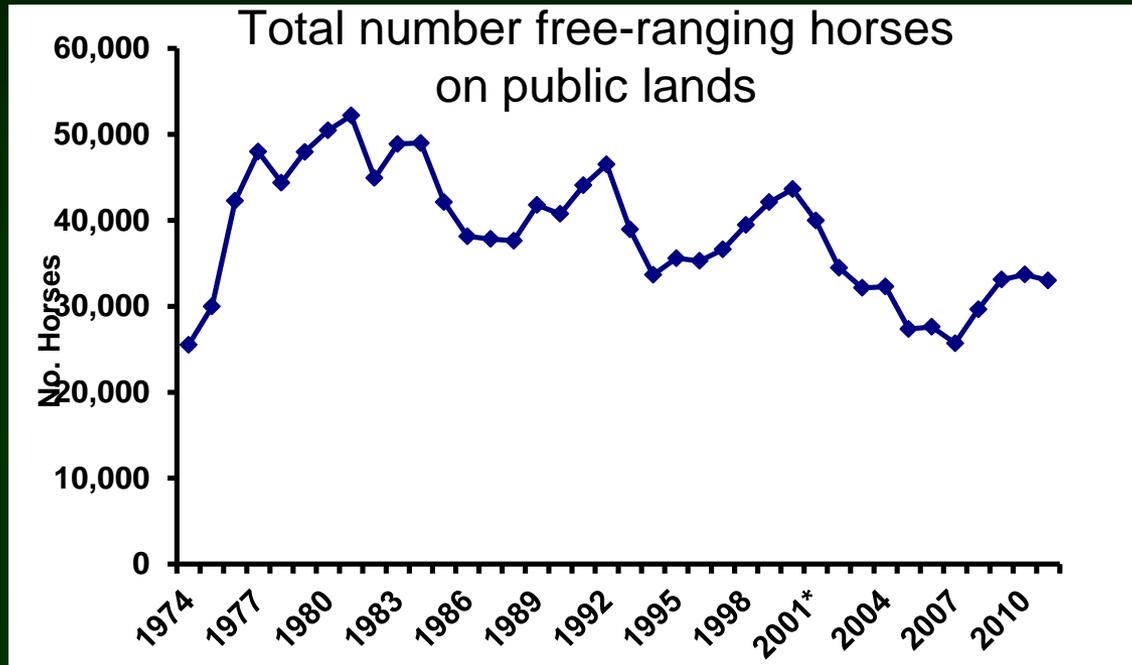
Poorest Herd Record

Year	Annual Population Estimate	Population Count	Date of Count	Type of Craft	Percentage of Area Inventoried	Method	Adjustment of Count
2000		304	August	Jet Ranger	100%	Direct	
2001		294	December 1		80%	Direct	
2002							
2003							
2004			February 4				
2005							
2006							
2007		238	April 7	Jet Ranger	100%	Direct	
2008							
2009							
2010		434	April 10	Jet Ranger	100%	Direct	
2011		543	July 11	Jet Ranger	100%	Direct	

National Statistics Reported Annually



National Statistics Reported Annually



- Interpreted by public/administrators to gauge success of program
- Used in formal government program reviews
- Foundational data for planning and budgetary decisions

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How Are National Statistics Derived From the Herd-specific data ?

- Multiple exchanges between NRC committee and BLM officials
- No documentation linking national statistics with information from field offices
- Comparison of field office data from sample of HMA's committee received with published national statistics revealed many discrepancies
- No explanation for why numbers differed

NRC Committee Conclusions Regarding BLM's Herd Inventory Procedures

- Many methodological flaws:

NRC Committee Conclusions Regarding BLM's Herd Inventory Procedures

- Many methodological flaws:
 - Inconsistent methods
 - Movement of horses among HMAs
 - No effort to quantify detection probability
 - No attempt to quantify precision of population estimates
 - Inadequate record keeping and database mgmt

NRC Committee Conclusions Regarding BLM's Herd Inventory Procedures

- Current techniques do not meet modern standards of scientific wildlife management

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Similar conclusions reached by an
NRC committee over 30 years ago

Recent BLM Initiatives to Improve Inventory Procedures

- 2010 Wild Horse and Burro Management Handbook published rigorous 'guidelines' for survey techniques

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- 2010 Wild Horse and Burro Management Handbook published rigorous 'guidelines' for survey techniques
- Aggregated adjoining HMAs with free movement of horses into HMA 'complexes' to be surveyed and managed as a single population
- Decade of collaboration with USGS to develop and test statistically rigorous survey methods

NRC Committee Recommendations For Improving Population Monitoring

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- Implement guidelines established in 2012 WHB Management Handbook
- Implement, evaluate, and refine HMA complexes

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- Implement guidelines established in 2012 WHB Management Handbook
- Implement, evaluate, and refine HMA complexes
- Establish 'sentinel populations' for more intensive population monitoring
- Improve record-keeping and develop standardized comprehensive database
- Make inventory procedures and data readily available to the public

Wild Horse Population Growth Rates

Wild Horse Population Growth Rates

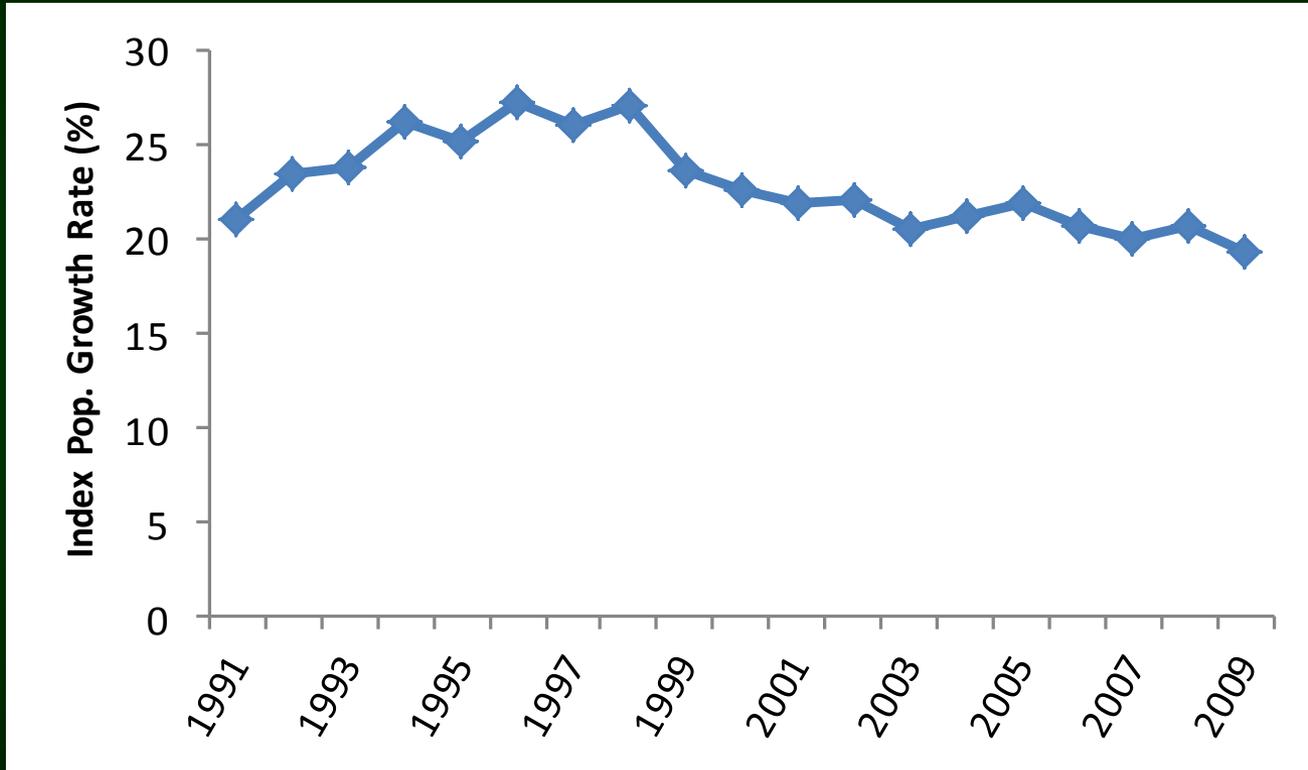
- NRC committee evaluation primarily limited to literature review and synthesis of published papers

Wild Horse Population Growth Rates

- NRC committee evaluation primarily limited to literature review and synthesis of published papers
- A novel analysis of age structure of ~168,000 horses removed from the range, 1989-2011, was also performed to gain additional insight

Wild Horse Population Growth Rates

Young of Year to Adult Ratio



Modest bias toward higher rates

Wild Horse Population Growth Rates

- Conclusions:
 - Growth rates certainly vary from one herd to the next, and within herds, from year to year

Wild Horse Population Growth Rates

- Conclusions:
 - Growth rates certainly vary from one herd to the next, and within herds, from year to year
 - Both published literature and the age structure of horses removed from range are consistent with 'typical' growth rates of 15-20% annually

Wild Horse Population Growth Rates

Management Implications

	20% growth				
Year	1.2				
2013	33,000				
2014					
2015					
2016					
2017					
2018					
2019					
2020					
2021					
2022					
2023					

Wild Horse Population Growth Rates

Management Implications

	20% growth				
Year	1.2				
2013	33,000				
2014	39,600				
2015	47,520	Double 4 years			
2016	57,024				
2017	68,429				
2018	82,115				
2019	98,537				
2020	118,245				
2021	141,894				
2022	170,273				
2023	204,327				

Wild Horse Population Growth Rates

Management Implications

	20% growth				
Year	1.2				
2013	33,000				
2014	39,600				
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Wild Horse Population Growth Rates

Management Implications

	20% growth		15% growth	
Year	1.2		1.15	
2013	33,000		33,000	
2014	39,600		37,950	
2015	47,520	Double 5 years	43,643	
2016	57,024		50,189	
2017	68,429		57,717	
2018	82,115		66,375	
2019	98,537		76,331	
2020	118,245		87,781	
2021	141,894		100,948	
2022	170,273		116,090	
2023	204,327		133,503	

Wild Horse Population Growth Rates

Management Implications

	20% growth		15% growth	
Year	1.2		1.15	
2013	33,000		33,000	
2014	39,600		37,950	
2015	47,520	Triple 8 years	43,643	
2016	57,024		50,189	
2017	68,429		57,717	
2018	82,115		66,375	
2019	98,537		76,331	
2020	118,245		87,781	
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Wild Horse Population Growth Rates

Management Implications

	20% growth	Annual		15% growth	Annual
Year	1.2	Increment		1.15	Increment
2013	33,000	6,600		33,000	4,950
2014	39,600			37,950	
2015	47,520			43,643	
2016	57,024			50,189	
2017	68,429			57,717	
2018	82,115			66,375	
2019	98,537			76,331	
2020	118,245			87,781	
2021	141,894			100,948	
2022	170,273			116,090	
2023	204,327			133,503	

Wild Horse Population Growth Rates

Management Implications

	20% growth	Annual		15% growth	Annual
Year	1.2	Increment		1.15	Increment
2013	33,000	6,600		33,000	4,950
2014	39,600	7,920		37,950	5,693
2015	47,520	9,504		43,643	6,546
2016	57,024	11,405		50,189	7,528
2017	68,429	13,686		57,717	8,658
2018	82,115	16,423		66,375	9,956
2019	98,537	19,707		76,331	11,450
2020	118,245	23,649		87,781	13,167
2021	141,894	28,379		100,948	15,142
2022	170,273	34,055		116,090	17,413
2023	204,327	40,865		133,503	20,026

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Summary:

- Horse inventory procedures are not scientifically rigorous

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- Improvements of inventory procedures have been initiated but extent of implementation is uncertain
- Record keeping and database mgmt needs to be substantially improved
- There is no clear linkage between national WHB Program statistics and data from field offices
- Horse populations are growing at 15-20% annually