Wolf harvest management in Montana, 2008-2011

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Montana Fish, Wildlife & Parks

Thanks for contributions……

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- Quentin Kujala, FWP
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- Dr. Mike Mitchell, USGS MT Coop Unit
- Dr. Betsy Glenn, USGS MT Coop Unit
- Lindsey Rich, USGS MT Coop Unit
- Dr. Jim Nichols, USGS PWRC
- Dr. Bob Ream, FWP Commission
- Ed Bangs, USFWS (Retired)
- Dr. Dave Mech, USGS NPWRC

Today's Talk

1. Season-setting context
2. Predictive modeling and forecasting
3. Monitoring and modeling directions

Hunting as part of Montana's wolf management

- 12-member Wolf Management Advisory Council convened by Governor Marc Racicot in 2000
- 26 "guiding principles" addressing public interest, public safety, maintaining wildlife populations and protecting the livestock industry delivered to Governor-elect Judy Martz in 2001; FWP directed to frame a wolf management plan
- 6,700 comments in initial scoping; 5,500 additional comments on draft EIS
- Wolf management plan in place
- Hunting recognized from the beginning

Public wolf harvest

Public wolf harvest

A STEADY FIRST STEP

What Montana learned from its first regulated wolf hunting season

"This first hunt was a learning experience. We really didn't know how it would work out, because there never had been a wolf season in the lower 48 states."

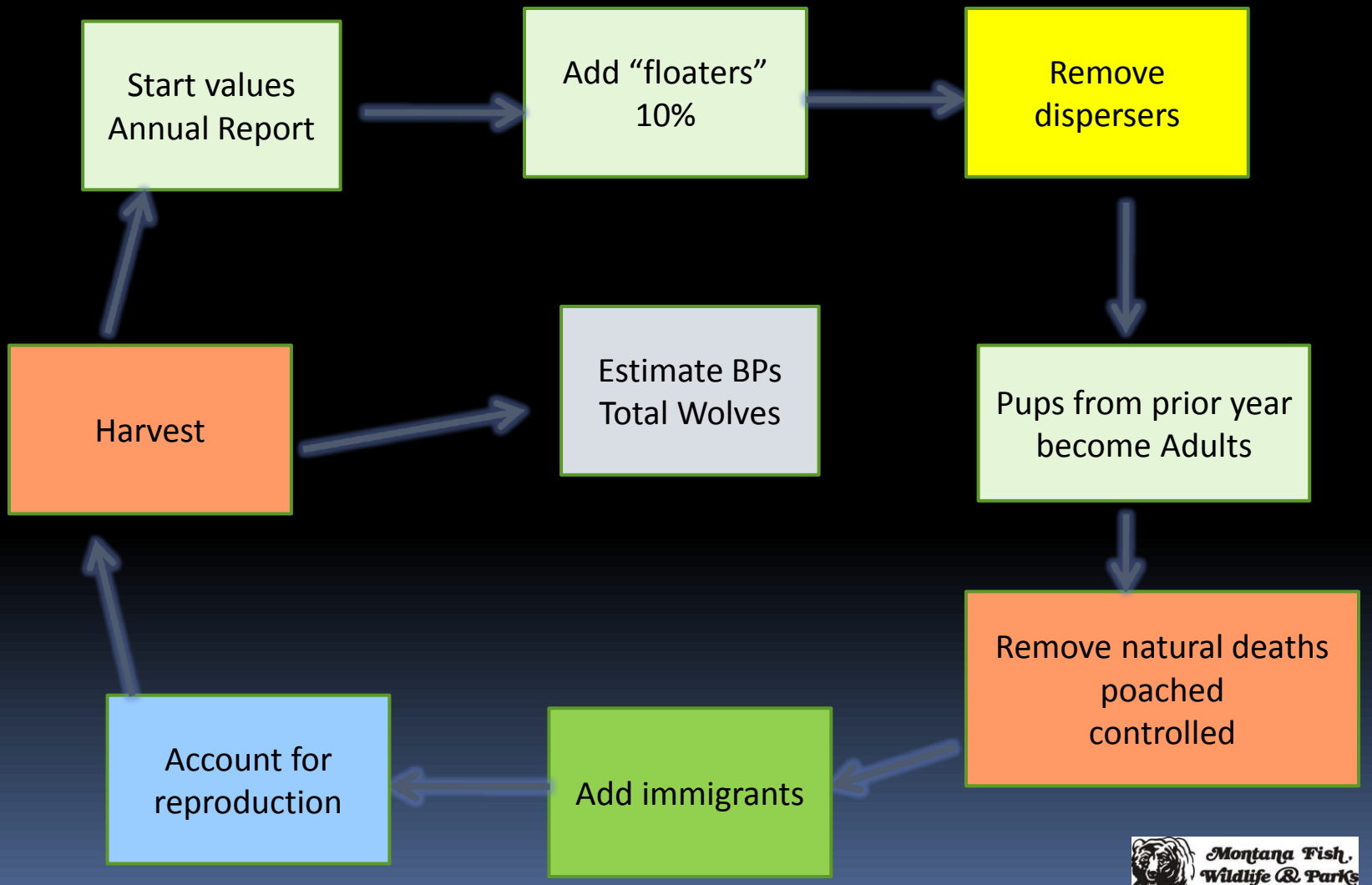
2007: preparation
2008: preparation
2009: experience
2010: preparation
2011: preparation
experience

Transparency, Communication

2008 Wolf Hunting Season

- Fundamental structure to include dates, three management units, general regulations adopted by FWP Commission Feb 2008; 1183 public comments
- Quota of 75 tentatively adopted June 12, 2008
- Model used to evaluate different harvest levels, predicted increasing wolf population

Births-Deaths +Immigration-Emigration



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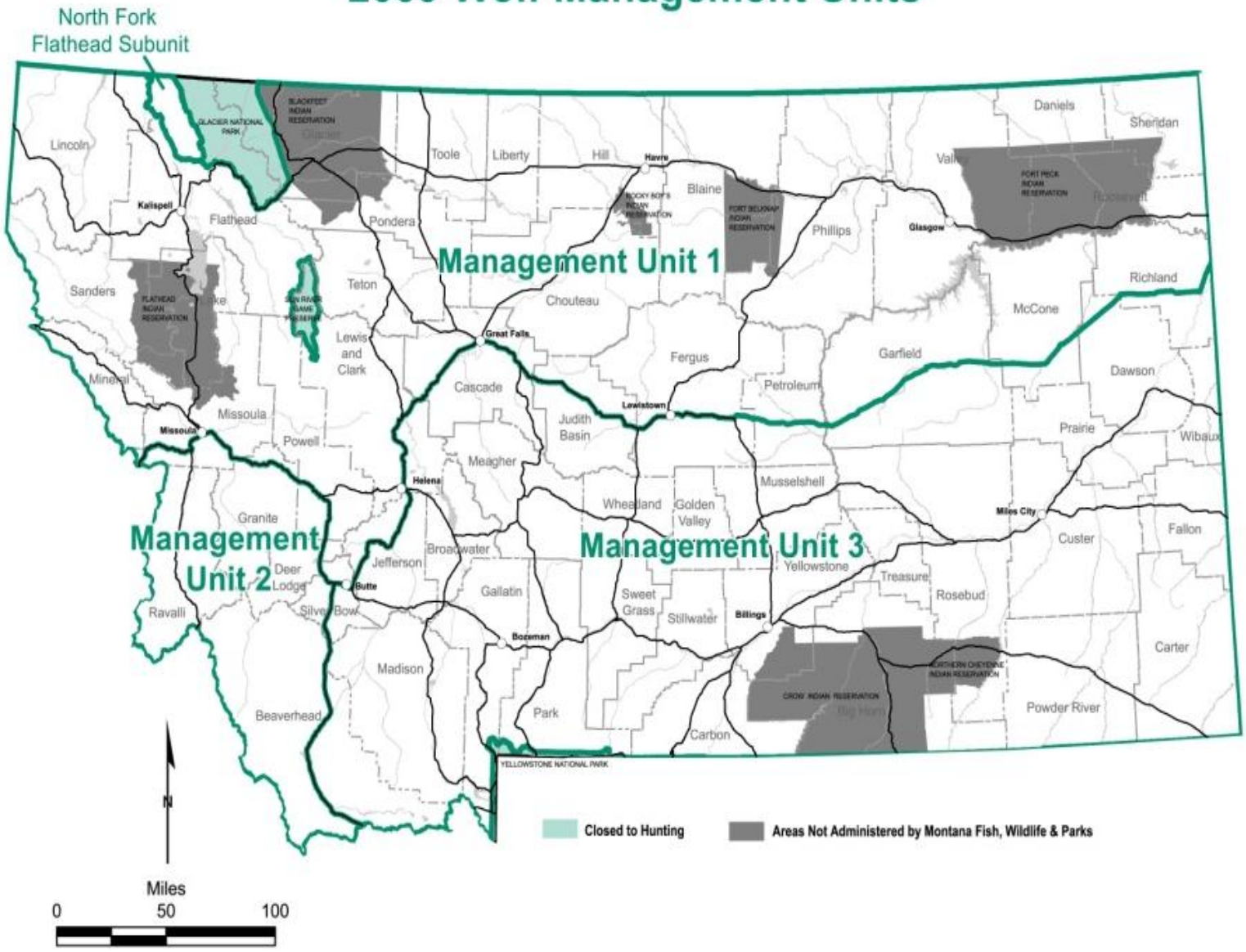
2008 Wolf Hunting Season Summary

- ESA protections reinstated June 18, 2008; hunt precluded without final quota adoptions or harvest experience

2009 Wolf Hunting Season

- 2008 season structure re-used
- Quotas tentatively adopted May 14, 2009; finalized July 8, 2009; 180 public comments
- Intentionally conservative quota of 75
- Same model used to evaluate different harvest levels, again predicted increase

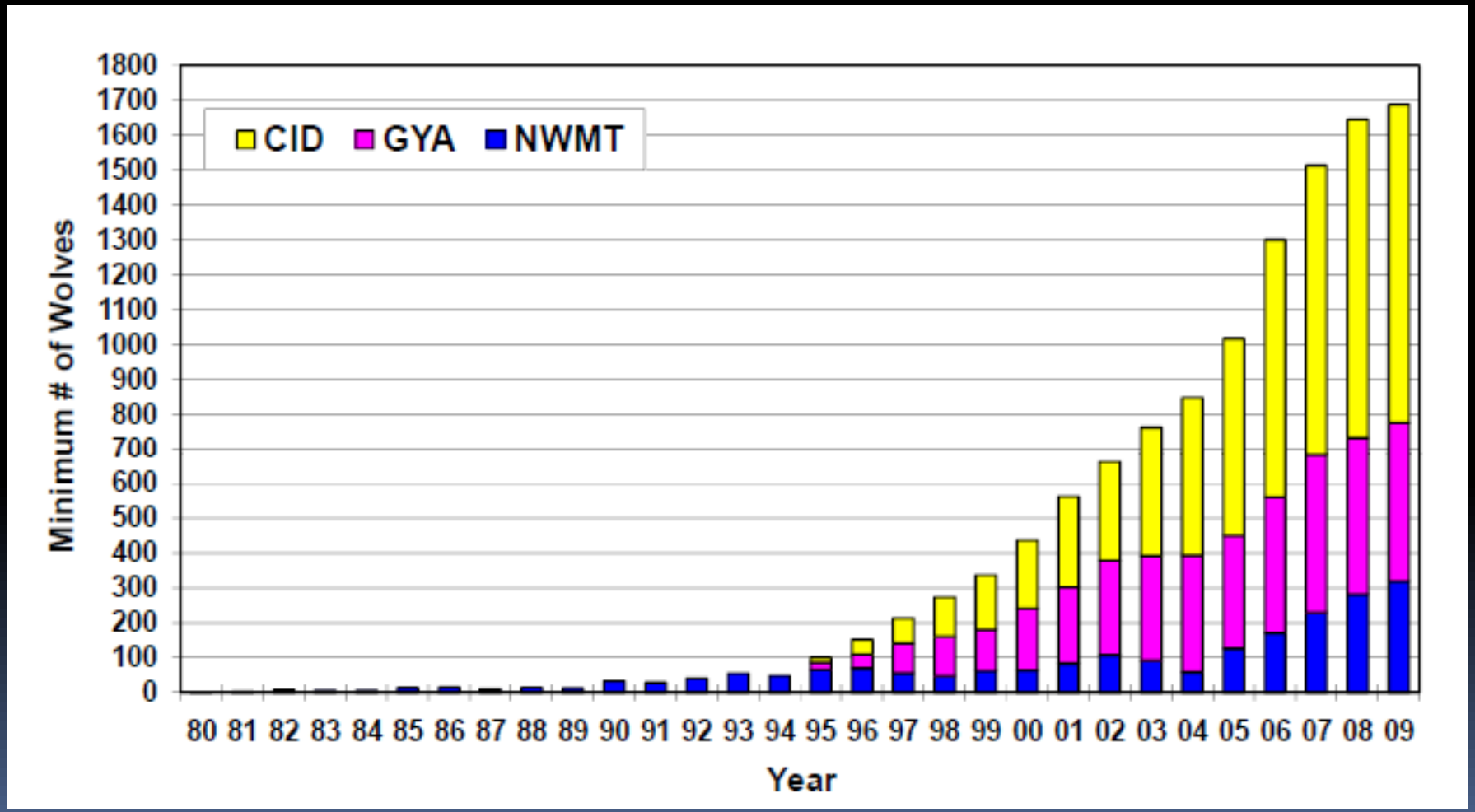
2009 Wolf Management Units



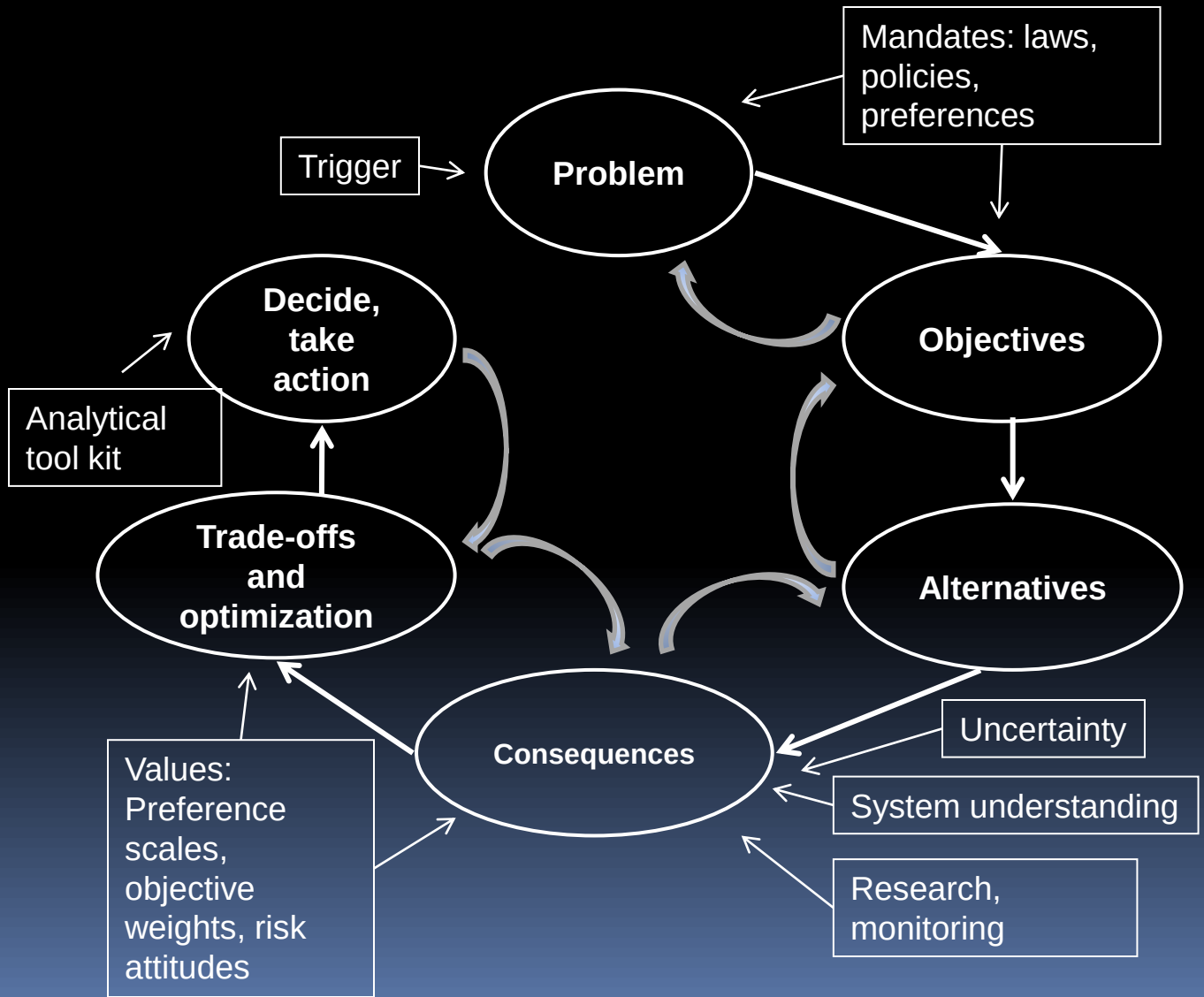
2009 Wolf Hunting Season Summary

- Quota of 75 → 72 taken
  - WMU 1 = NW MT = 38/41
  - WMU 2 = W MT = 21/22
  - WMU 3 = SW MT = 13/12
- Season closed on November 16 as quota was quickly approached (SW MT previously closed on 10/26/09)
- 78% opportunistically harvested by deer/elk hunters

Minimum No. of Wolves at End of 2009 By Recovery Area



2010 Season: Structured Decision Making



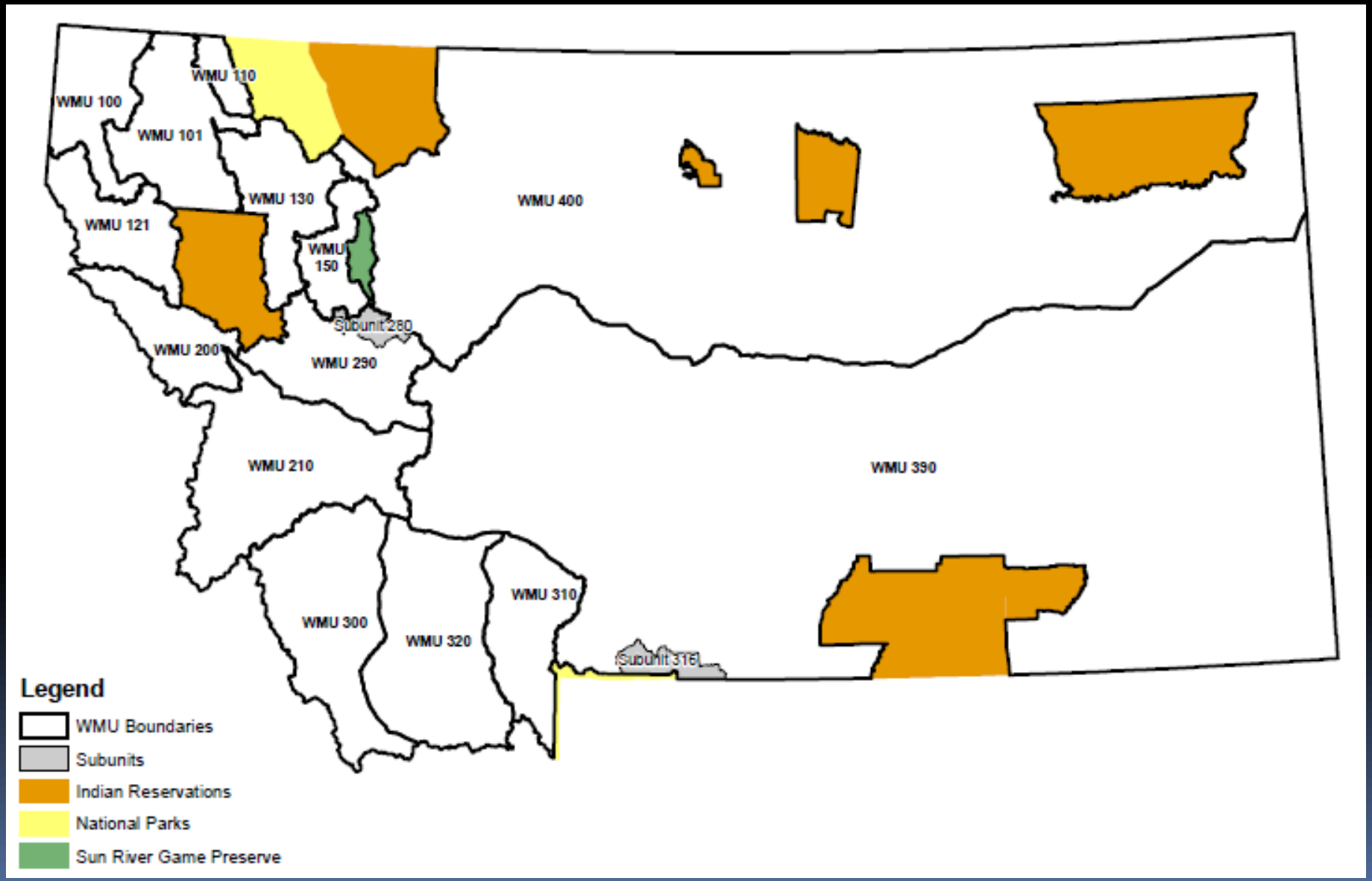
2010 Season Objectives

- *Maintain a viable and connected wolf population.*
- *Gain and maintain authority for State of Montana to manage wolves.*
- *Maintain positive and effective working relationships with livestock producers, hunters, and other stakeholders.*
- *Reduce wolf impacts on livestock.*
- *Reduce wolf impacts on big game populations.*
- *Maintain sustainable hunter opportunity for wolves.*
- *Maintain sustainable hunter opportunity for ungulates.*
- *Increase broad public acceptance of harvest and hunter opportunity as part of wolf conservation.*
- *Enhance open and effective communication to better inform decisions.*
- *Learn and improve as we go.*

2010 Wolf Hunting Season Proposed

- Quota Alternatives more aggressive; different “paces”
  - 153
  - 186
  - 216
- 14 wolf management units (not 3) in 3 recovery areas
- Season Dates
  - Archery Only – Sept 4 – Oct 17 (NTE 20%)
  - Back Country – Sept 15 – Dec 31 (Unique WMU quota or subquota)
  - General Rifle – Oct 23 – Dec 31
- Unit closed when quota/subquota filled; not later than Dec. 31st

2010 WMUs


WMU 100
WMU 101
WMU 110
WMU 121
WMU 130
WMU 150
WMU 200
WMU 210
WMU 290
WMU 300
WMU 310
WMU 320
WMU 390
WMU 400
Subunit 280
Subunit 316
Legend
WMU Boundaries
Subunits
Indian Reservations
National Parks
Sun River Game Preserve

2010 Wolf Hunting Season Predicted Results

Statewide Quota = 153	Statewide Quota = 186	Statewide Quota = 216
Estimated to reduce population by 9%	Estimated to reduce population by 13%	Estimated to reduce population by 20%
Predicted end of year population = 513	Predicted end of year population = 488	Predicted end of year population = 448
Estimated breeding pairs at end of year = 28	Estimated breeding pairs at end of year = 26	Estimated breeding pairs at end of year = 24
No simulations where breeding pairs < 15	No simulations where breeding pairs < 15	No simulations where breeding pairs < 15

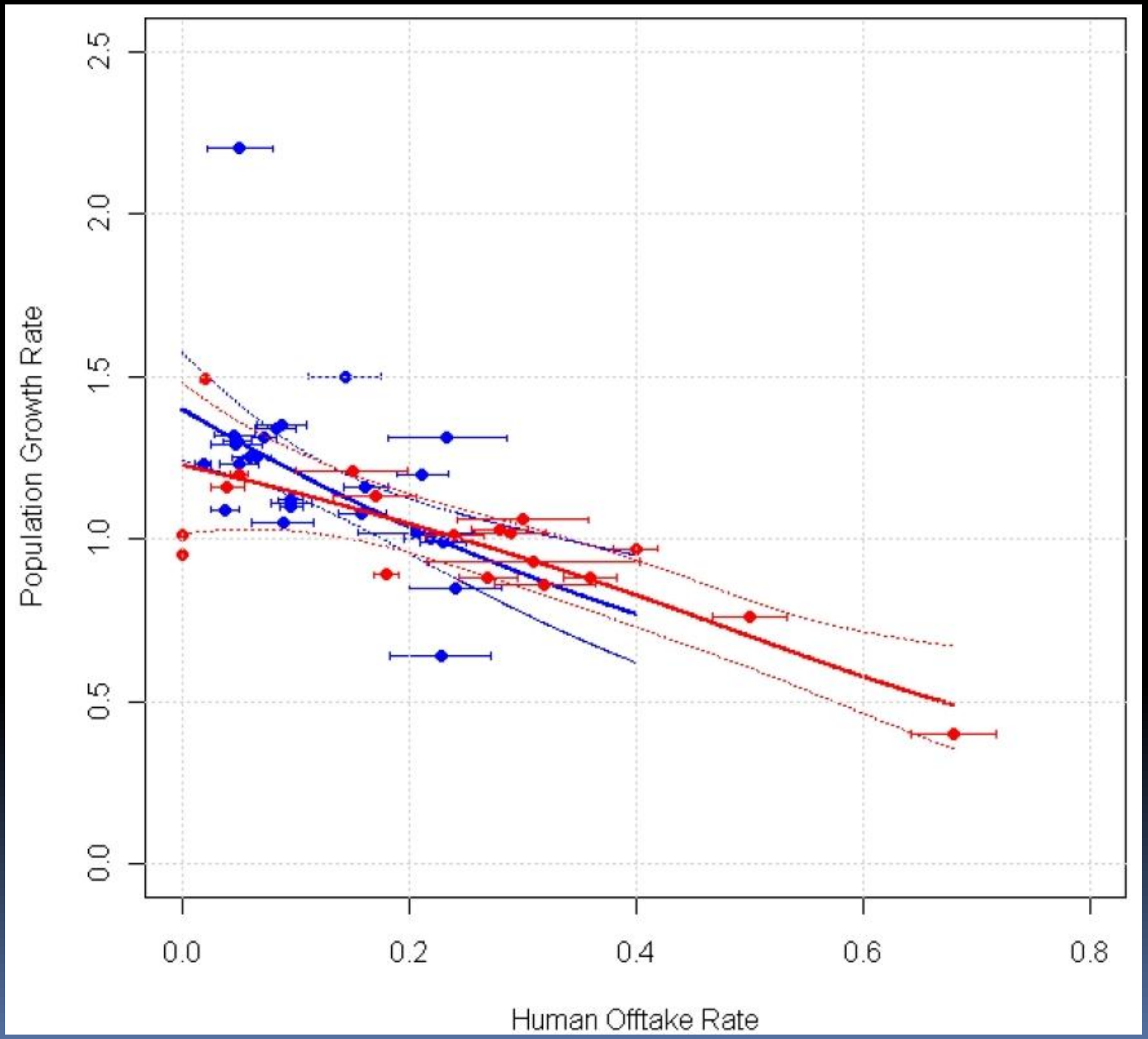
Public Comment

- Comments solicited on adopted proposal that included 3 quota alternatives
- ~1,500 comments received on adopted proposal (most via web)
- Several common themes
  - Concern over impacts to big game populations
  - Concern over impacts to livestock
  - Concern for wolf conservation
  - Liberalize-Take more/Minimize take-Don’t hunt

2010 Wolf Hunting Season Summary

- Wolf relisted August 5, 2010; hunt precluded without additional harvest experience

Wolf harvest controversy



Creel and Rotella (2010) Figure 2

Wolf Population Modeling

1. Wolf λ = f (Human-caused mortality AND recruitment)
2. Predictions for Montana wolves
   a. With validation

Wolf Monitoring Data

Population analyses using indices

1. Adjust for imperfect detection
2. Keep survey effort consistent

(Caughley 1974, Caughley et al. 1976, Johnson 2008)

Wolf Monitoring Data

Federal Register for wolf delisting in 2009, regarding Northwest Montana:

Wolf numbers in 2003 and 2004 also likely exceeded 10 breeding pairs and 100 wolves but were not documented simply due to less intensive monitoring those years (Service et al. 2007, Table 4; Service 2007a).

Wolf λ Results

Model	K	Adj. R^2	ΔAIC_c	ω
Human-caused mortality	3	0.20	10.3	0.005
Recruitment	3	0.33	5.5	0.060
Human-caused mortality + Recruitment	4	0.49	0.0	0.935

Validation

Year	Wolf quota	Model-averaged prediction	Creel and Rotella (2010)	FWP harvest simulation	Observed wolf λ
2008	0	1.17	0.88	1.21	1.18
2009	75	1.07	0.76	1.19	1.05
2010	0	1.14	0.95	1.27	1.08

Validation

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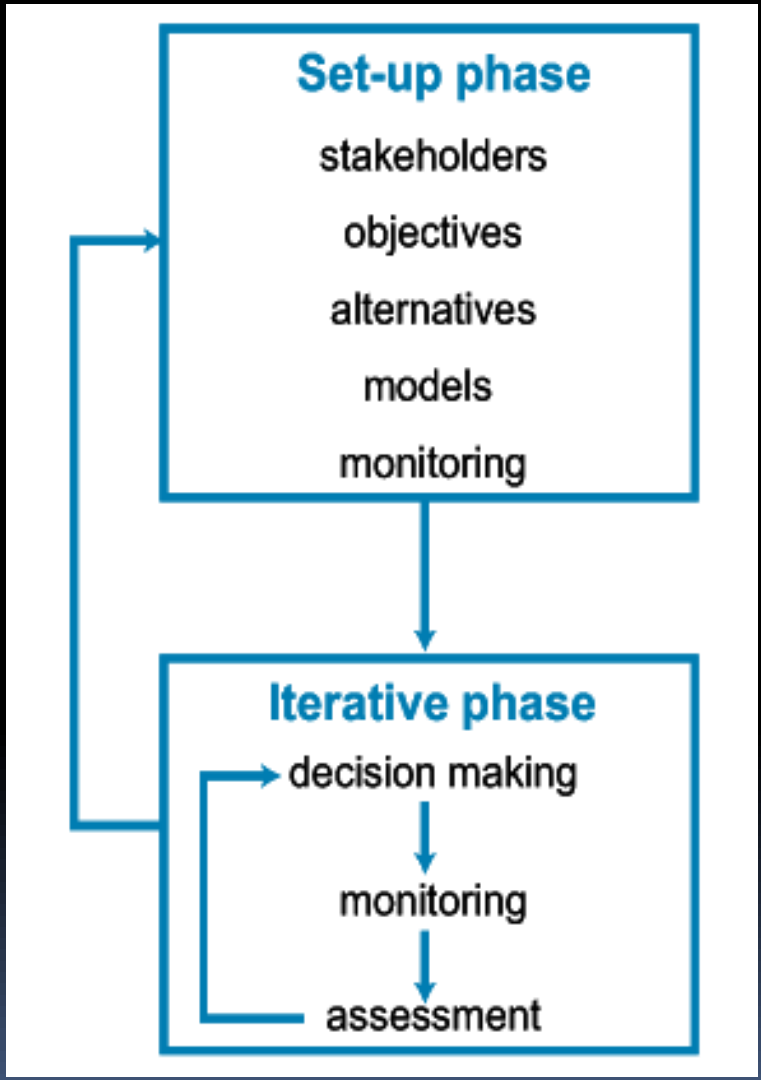
2009	75	1.07	0.76	1.19	1.05
2010	0	1.14	0.95	1.27	1.08
2010	186	0.97	0.52	0.87	

Adaptive Management



Graphic courtesy of M. Runge and J. Nichols

2011 Wolf Season

- Quota
  - 220 (40% harvest rate in each of the recovery areas)
- 14 wolf management units in 3 recovery areas
  - Subquota = 3 in HD 316 in WMU 390
  - Subquota = 4 in HD 280 in WMU 290
  - NEW → WMU 250 (W Fk Bitterroot) = 18
- Season Dates
  - Archery Only – Sept 3 – Oct 16 (NTE 20%)
  - Back Country – Sept 15 – Dec 31 (NTE 20%)
  - General Rifle – Oct 22 – Dec 31
- Unit closed when quota filled or Dec. 31st

2011 Wolf Season Proposal
- Predicted Results -

2010 "Old" Model

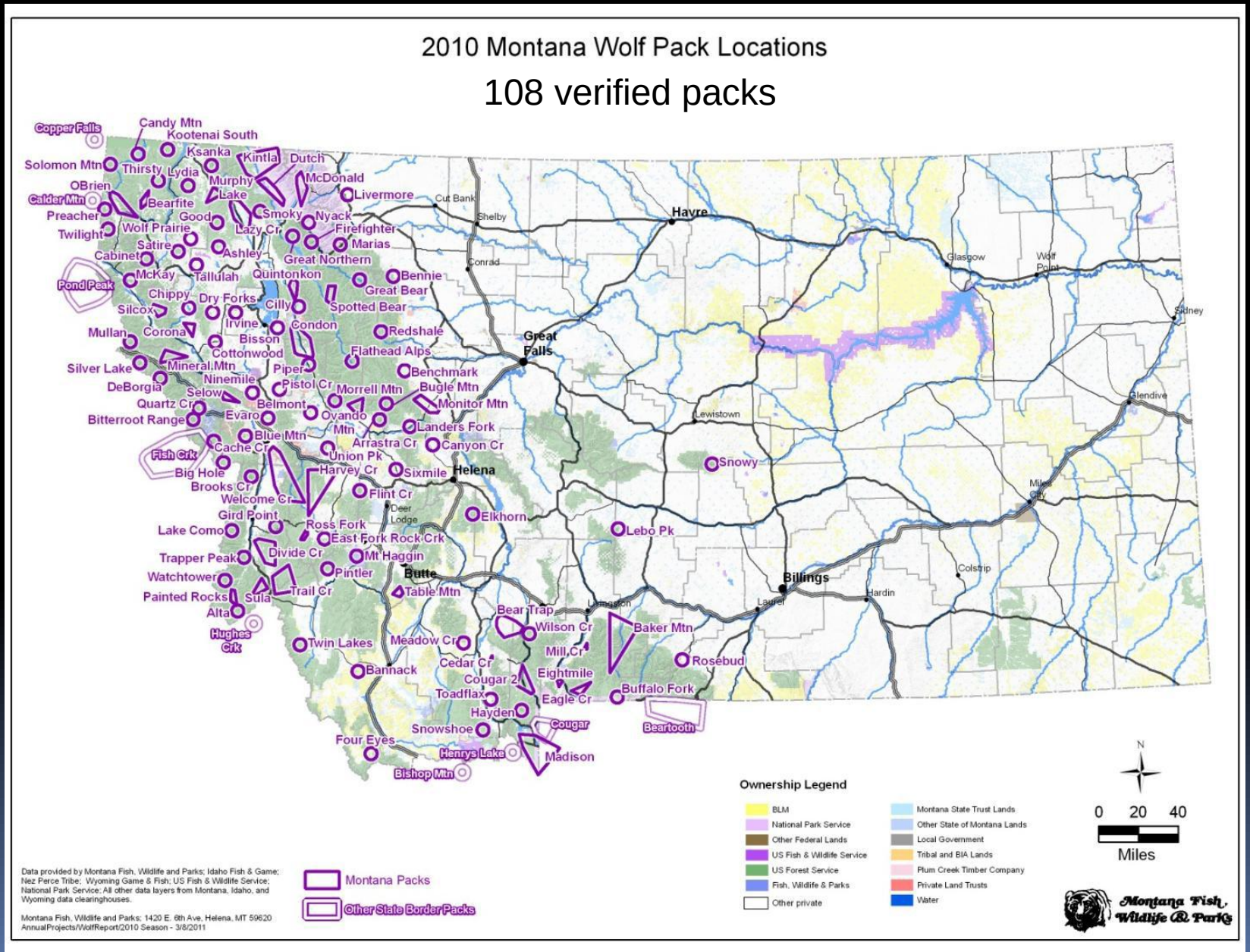
- Estimated to reduce population by 25%
- Predicted end of year minimum population = 425
- Estimated breeding pairs at end of year = 19
- Predicted pop if no harvest = 647

Assumes 100% quota fill

"New" Model

- Estimated to reduced population by 7%
- Predicted end of year min. population = 526
- Predicted pop if no harvest = 632

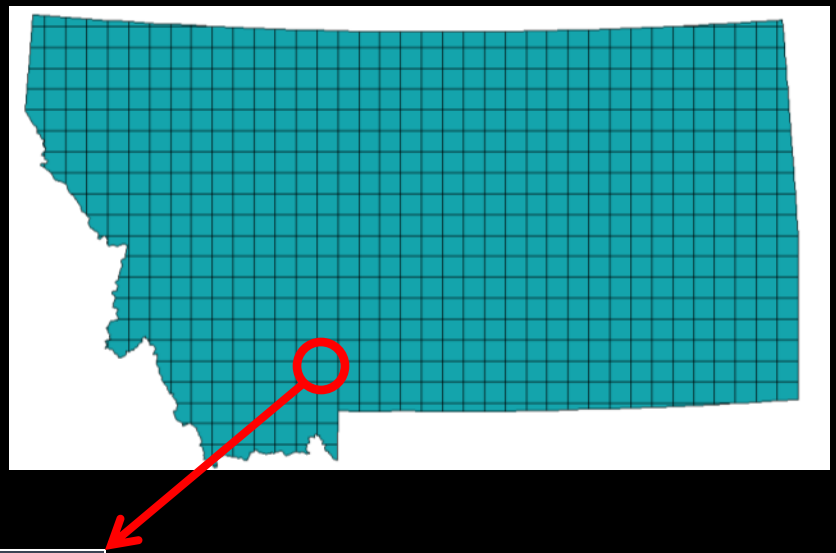
Model Assessment Issues



Direction: Patch Occupancy Models

- **Occupancy** = hunter sightings → probability that a "patch" is occupied by wolves.

- Patch Size = Territory Size (~250 miles^2)

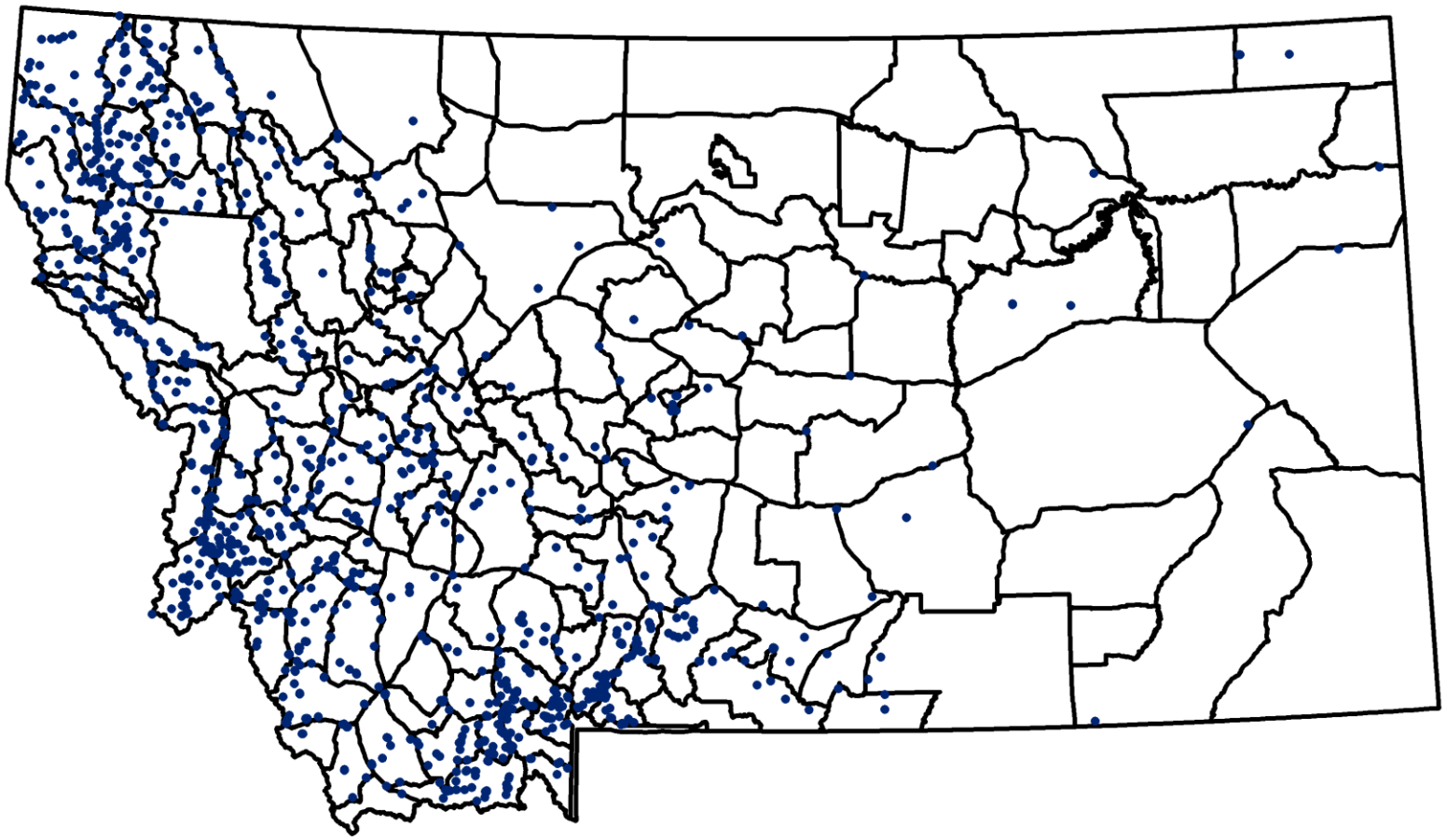


1. Estimate probability that each cell is occupied by a wolf pack.
2. Sum of estimated occupancy values= estimate of total #wolf packs.

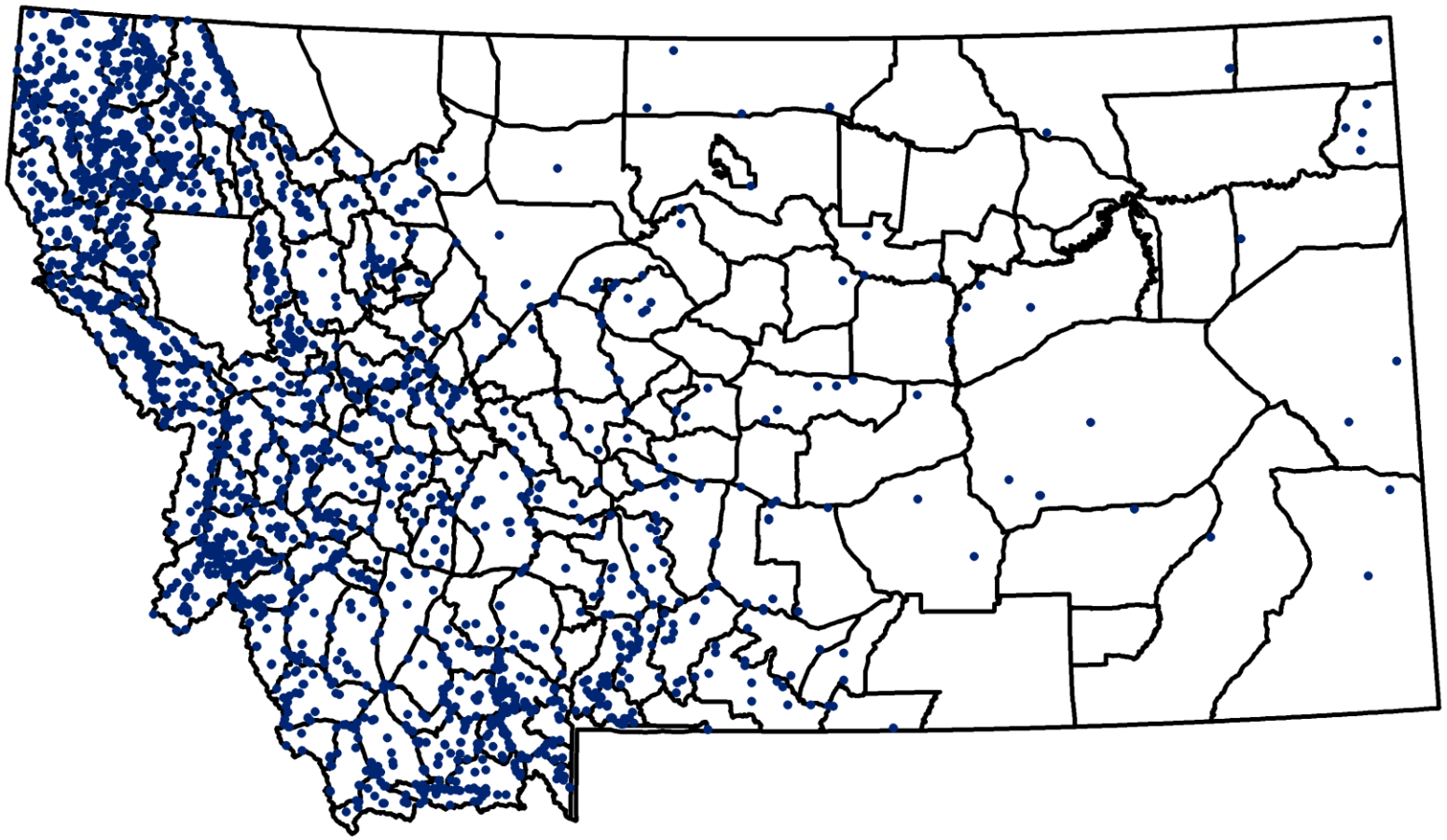
Deer/elk hunter sightings

- Statewide coverage (80,000+ hunters/ year)
- Repeated sampling of “patches”
- Phone surveys:
  - **Did you see wolves (y/n)?**
  - **Where/when did you see wolves?**
  - **How many wolves did you see?**

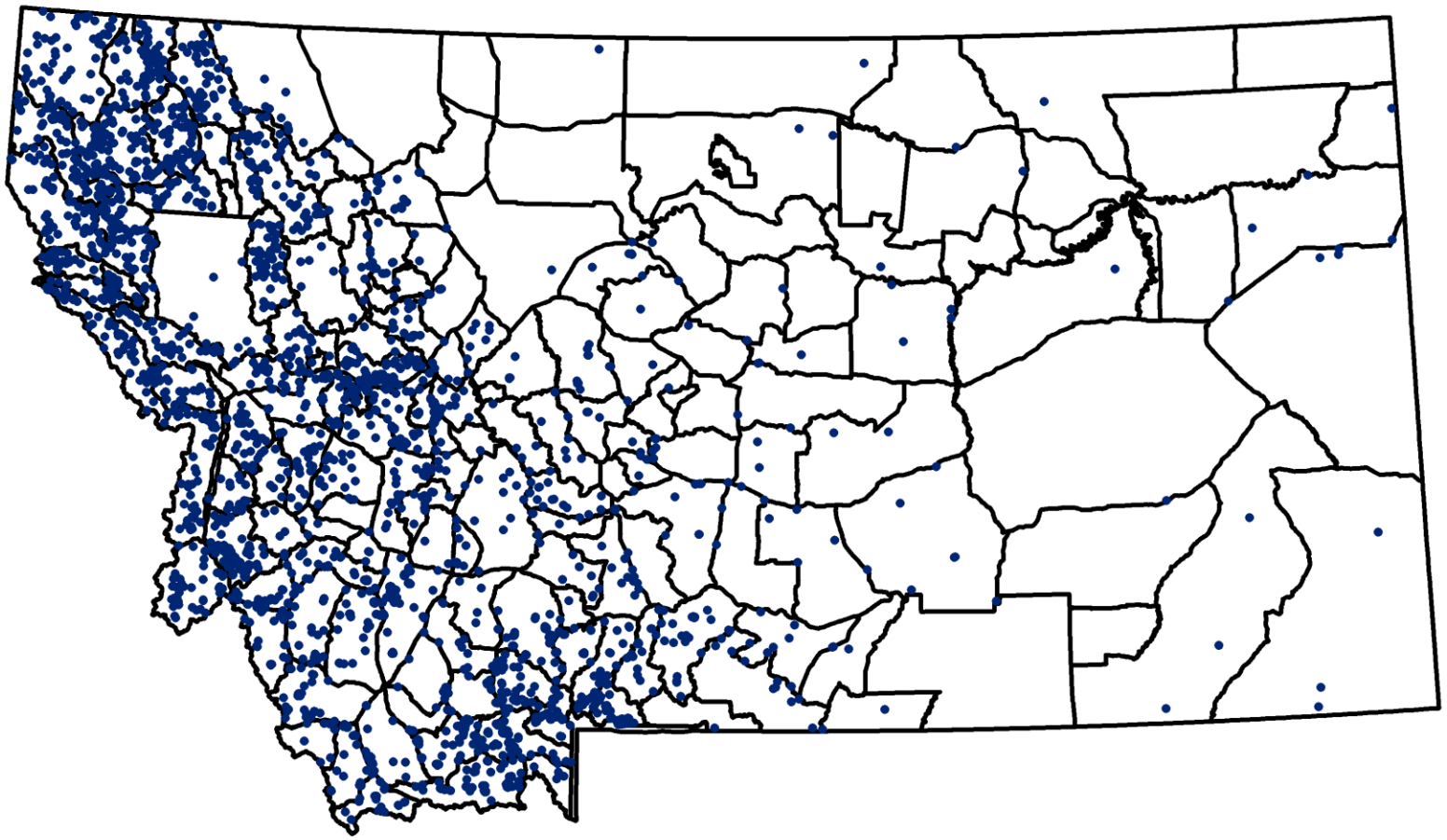
2007



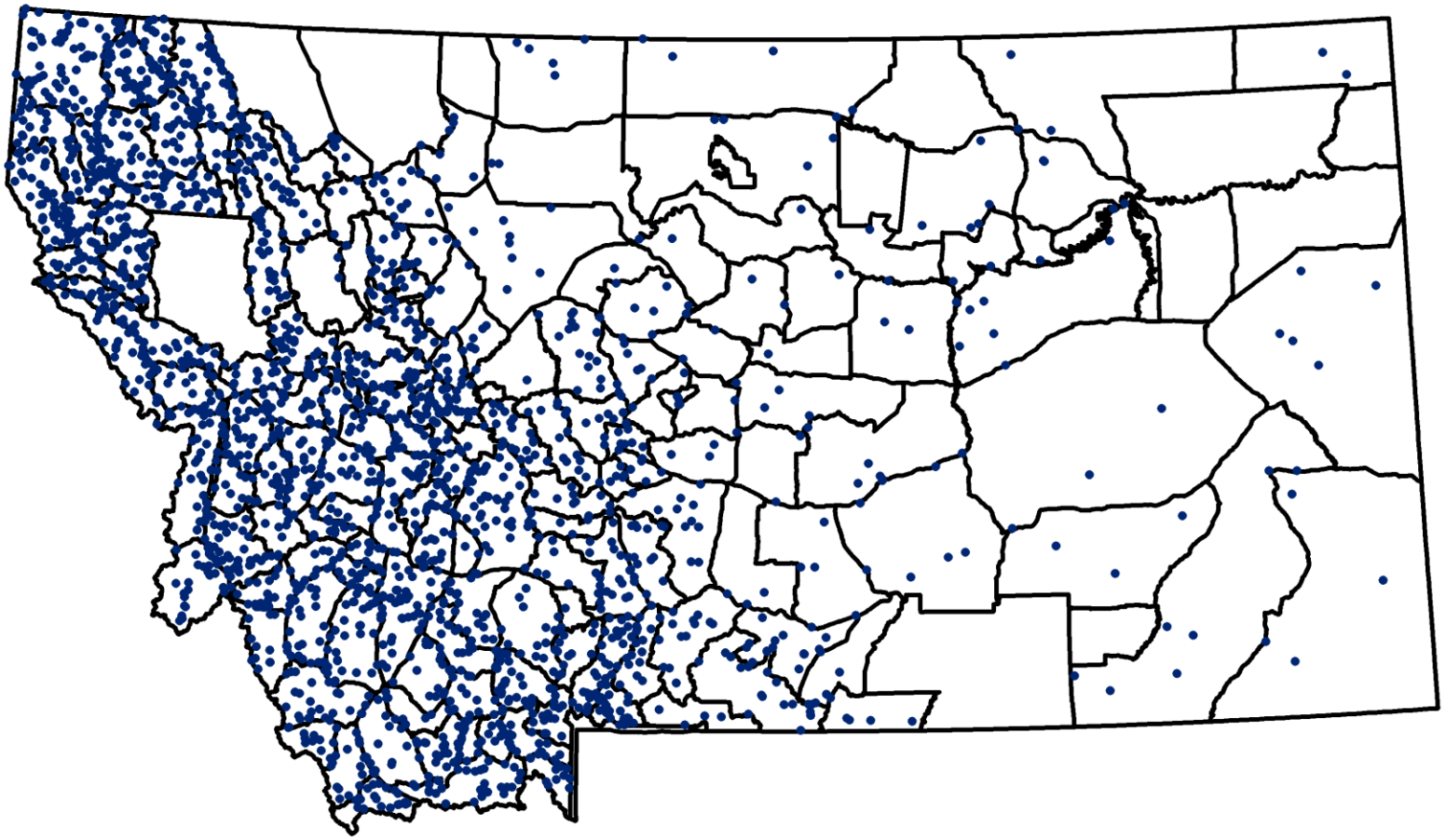
2008



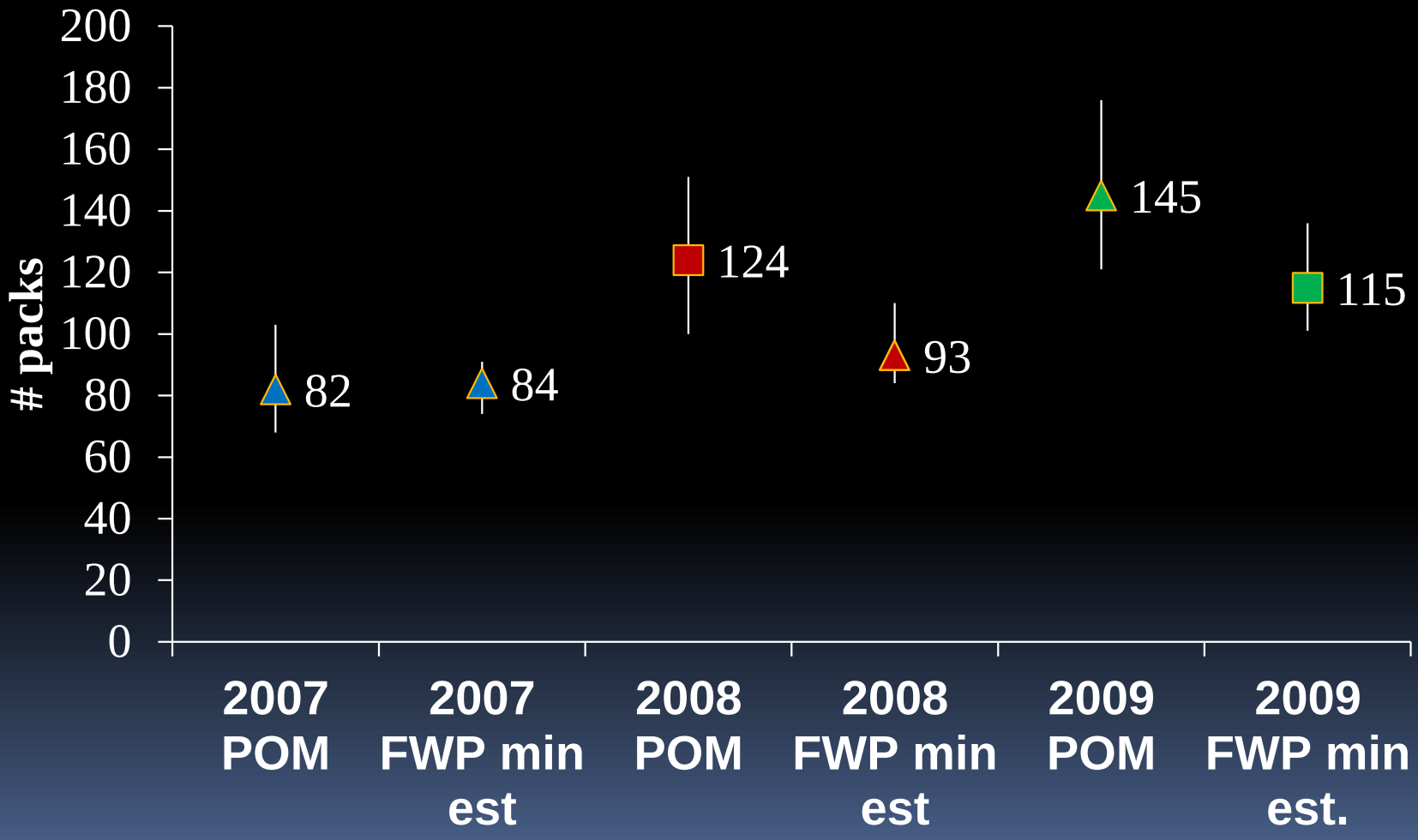
2009



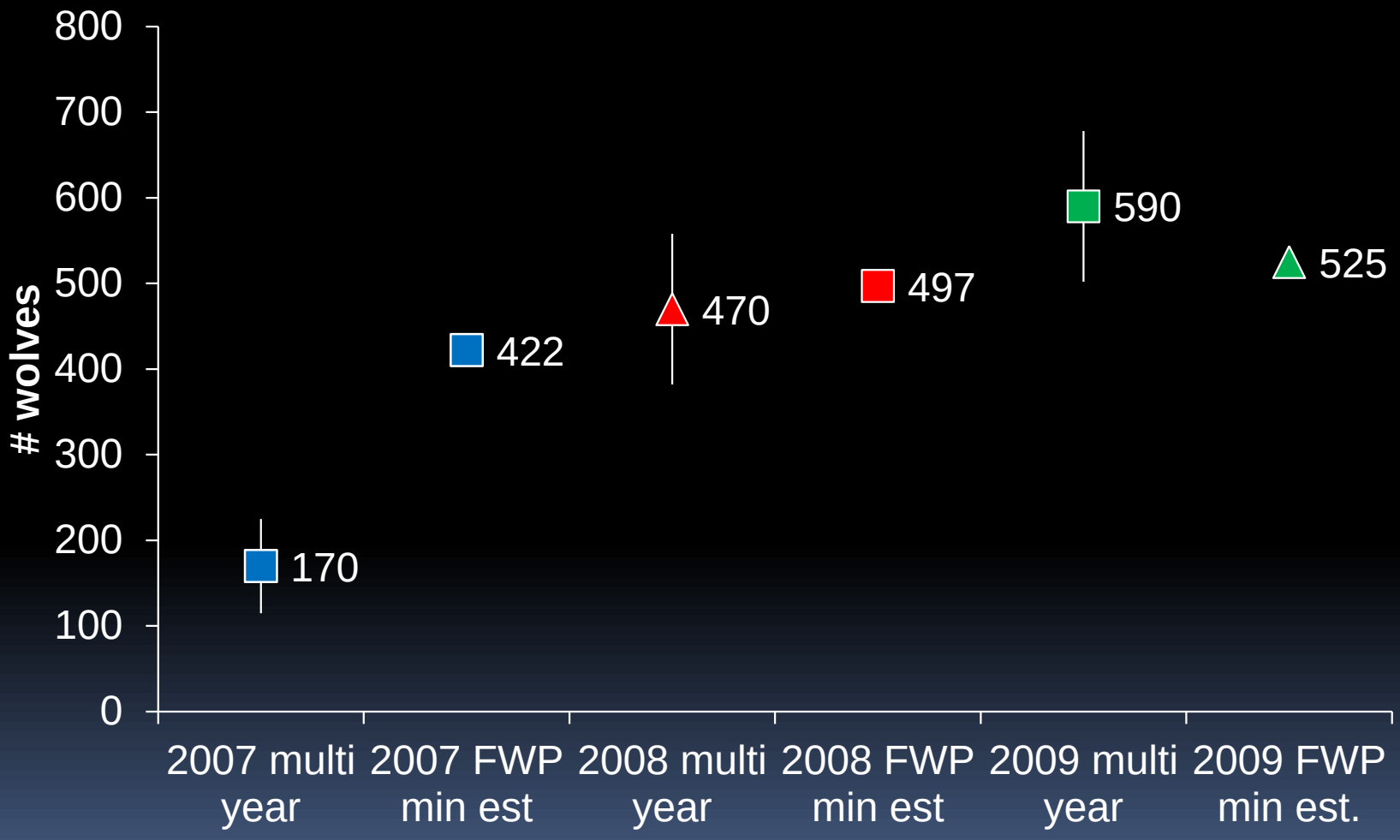
2010



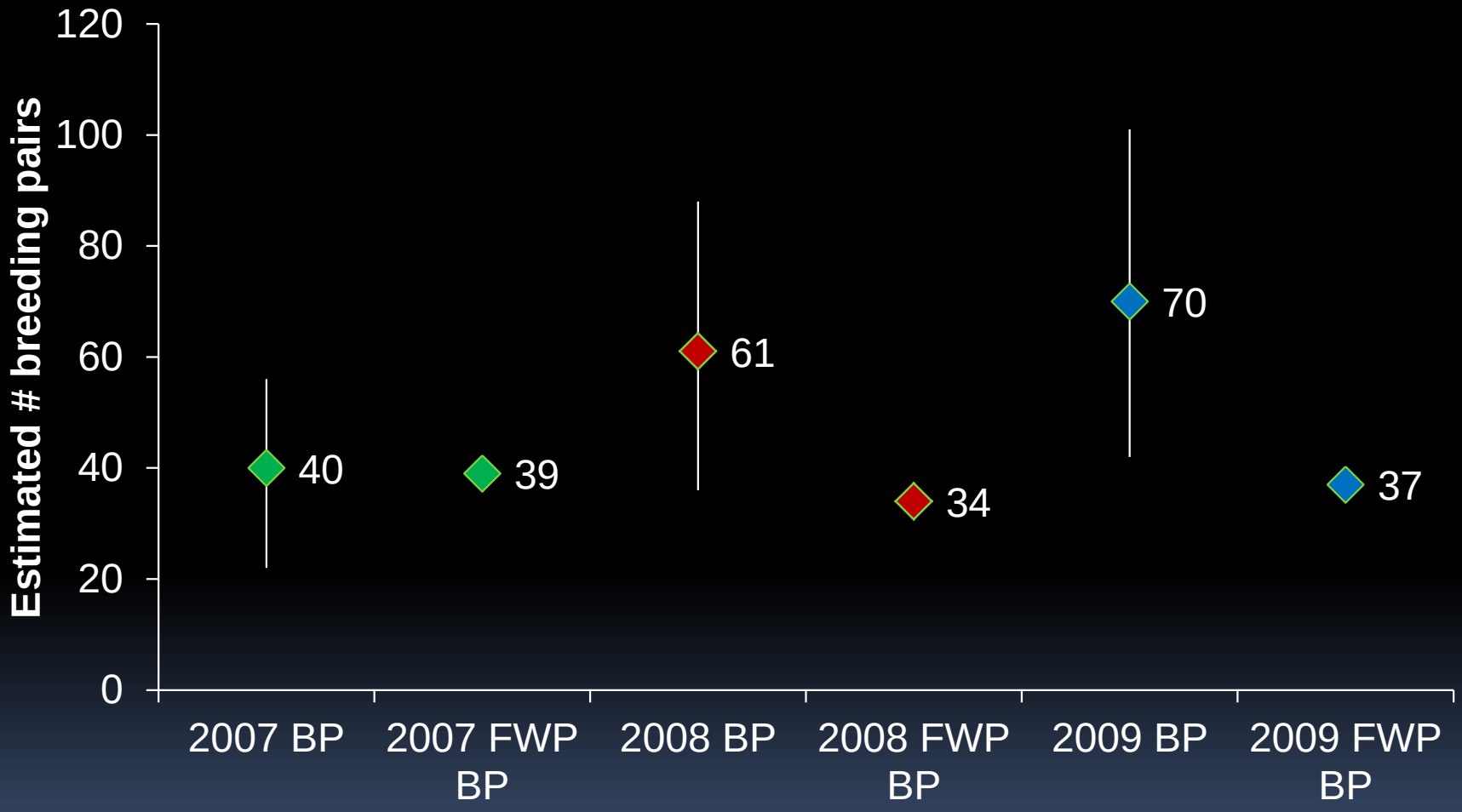
Estimates of # Packs



Estimates of # wolves



Estimated # breeding pairs



How will POMs be used to model harvest?

- Include alternative models by constructing alternative models for occupancy/ # packs, # wolves, and therefore # breeding pairs:
  - Harvest and depredation removals are additive.
  - Harvest and depredation removals are compensatory.
  - Prey density drives the number of wolf packs.
  - Combinations… etc.
- Compare forecasted estimates of all models to next year's population estimate.
  - Evaluate weight of evidence for each model.
- ***"Learn and improve as we go."***

Summary

- Public wolf harvest = part of MT wolf management from the beginning
- 5 years of work and experience
- Evolution into formal adaptive management began years ago continues
- Extensive public and regional biologist involvement
- Science has and will play a supporting role

Acknowledgements

Questions?