Wyoming Chronic Wasting Disease Advisory Group
24 July 2019

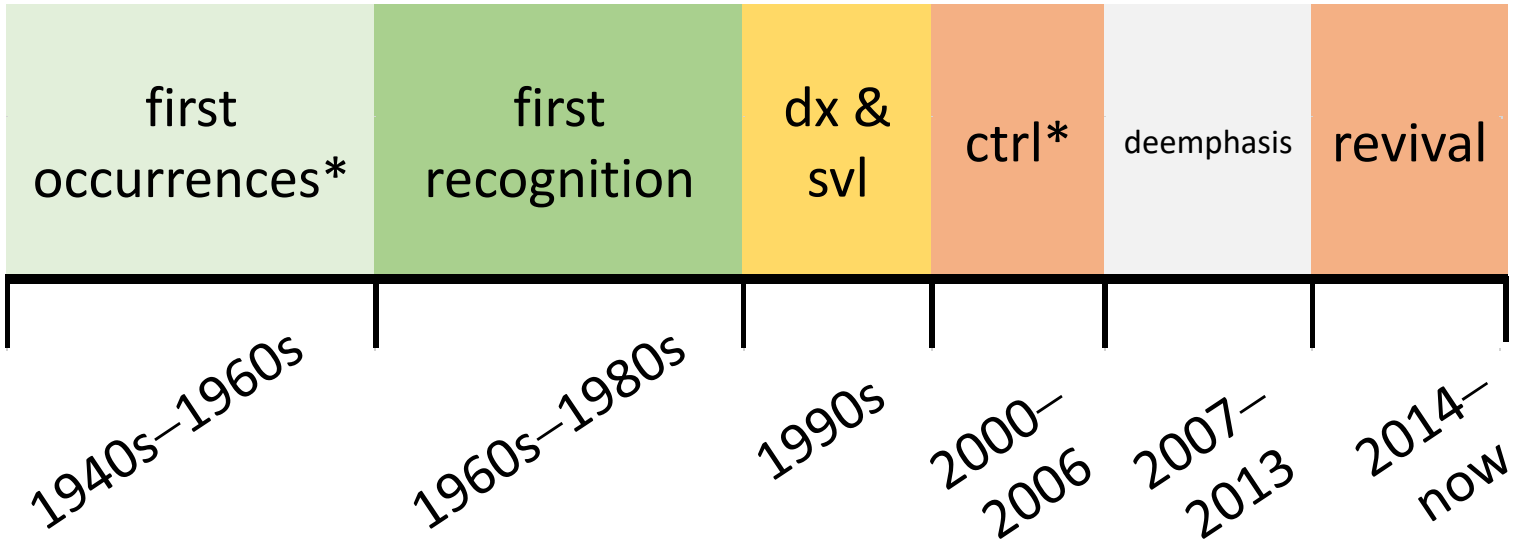
Chronic Wasting Disease in Colorado:

Past, Present, & Future

LIVE LIFE OUTSIDE


Chronic Wasting Disease
Agent: prion (origin unknown)
Hosts: mule deer
white-tailed deer
elk
moose
Signs: behavior
emaciation
Epi: prolonged incubation
uniform susceptibility*
indirect, lateral transmission
environmental persistence
Photo by M. W. Miller

A brief history of chronic wasting disease in Colorado



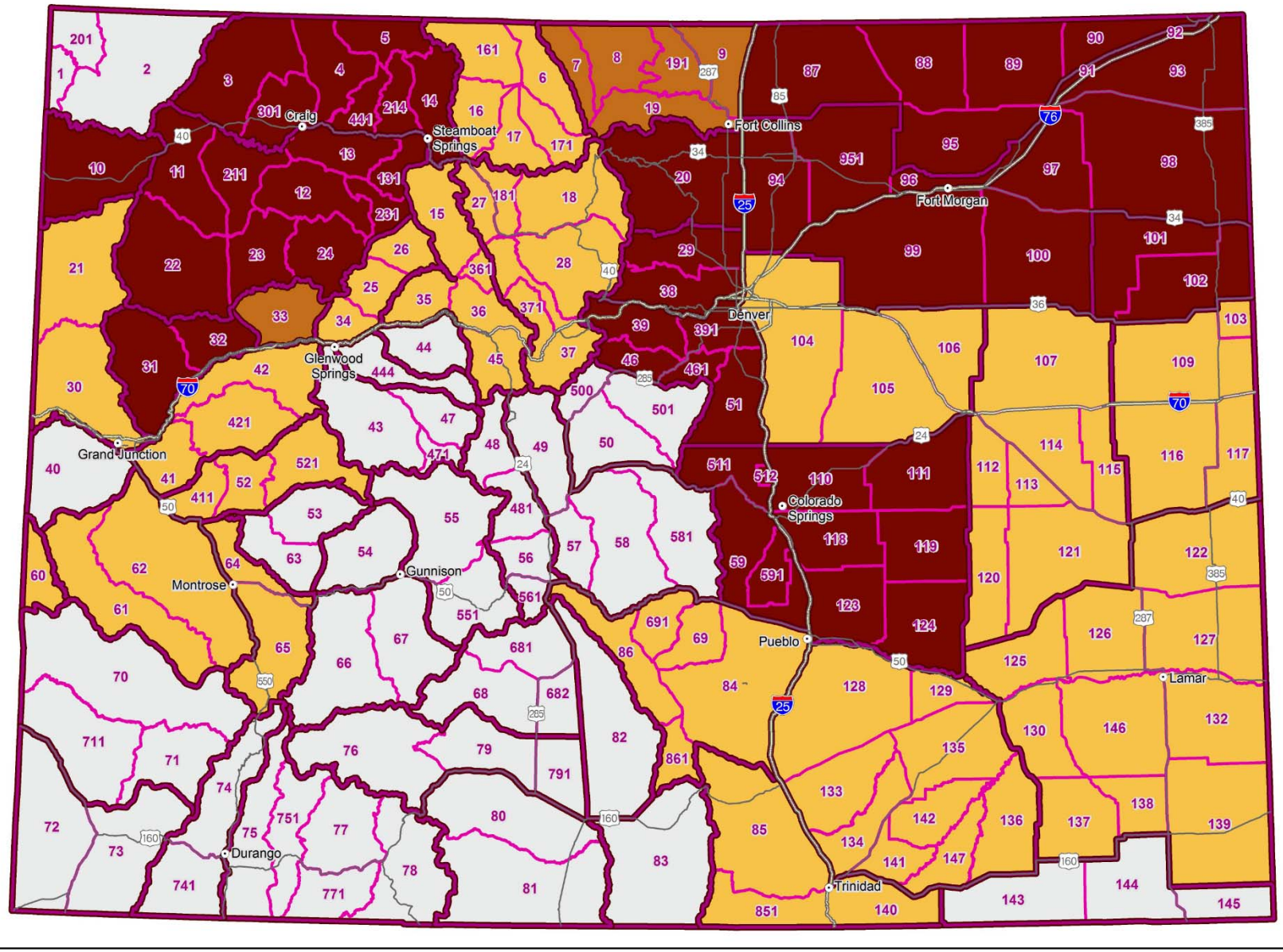
"Those who cannot remember the past are condemned to repeat it."

George Santayana *The Life of Reason: The Phases of Human Progress* (1905–1906)

Chronic Wasting Disease in Colorado

- Infects >50% of deer herds* & 33% of elk herds.
  - 4 of 5 largest deer herds & 2 of 5 largest elk herds.
- Infection within herds varies (<1 – >25%); deer>elk>> moose.
  - infection in bucks ~2× rate in does; elk sexes similar.
- ~2% of annual harvest submitted for testing.*
- Most infections unapparent; hundreds consumed each year.
- Management practices may be exacerbating CWD problem
  - e.g., high buck : doe ratios & mature buck numbers.

LIVE LIFE OUTSIDE



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GIS Unit

Detected CWD in Harvested Mule Deer Bucks

January 2019

20 0 20 40 60 80

Miles

Estimated CWD Infection Rates
Harvest Data for Colorado
2014 - 2018

GMUs
Deer DAUs
Not Detected
Detected <5%
Detected 5-10%
Detected >10%

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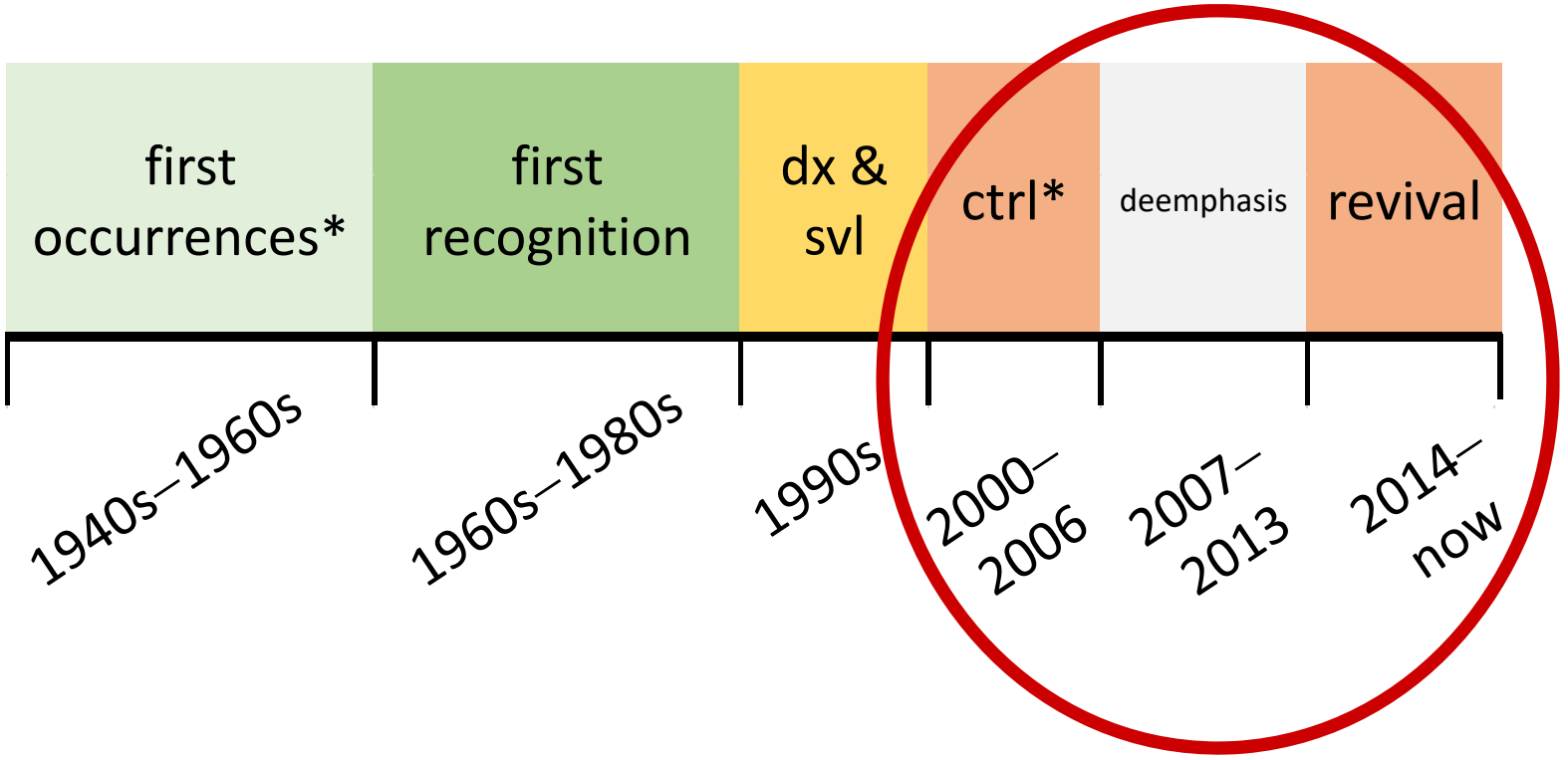

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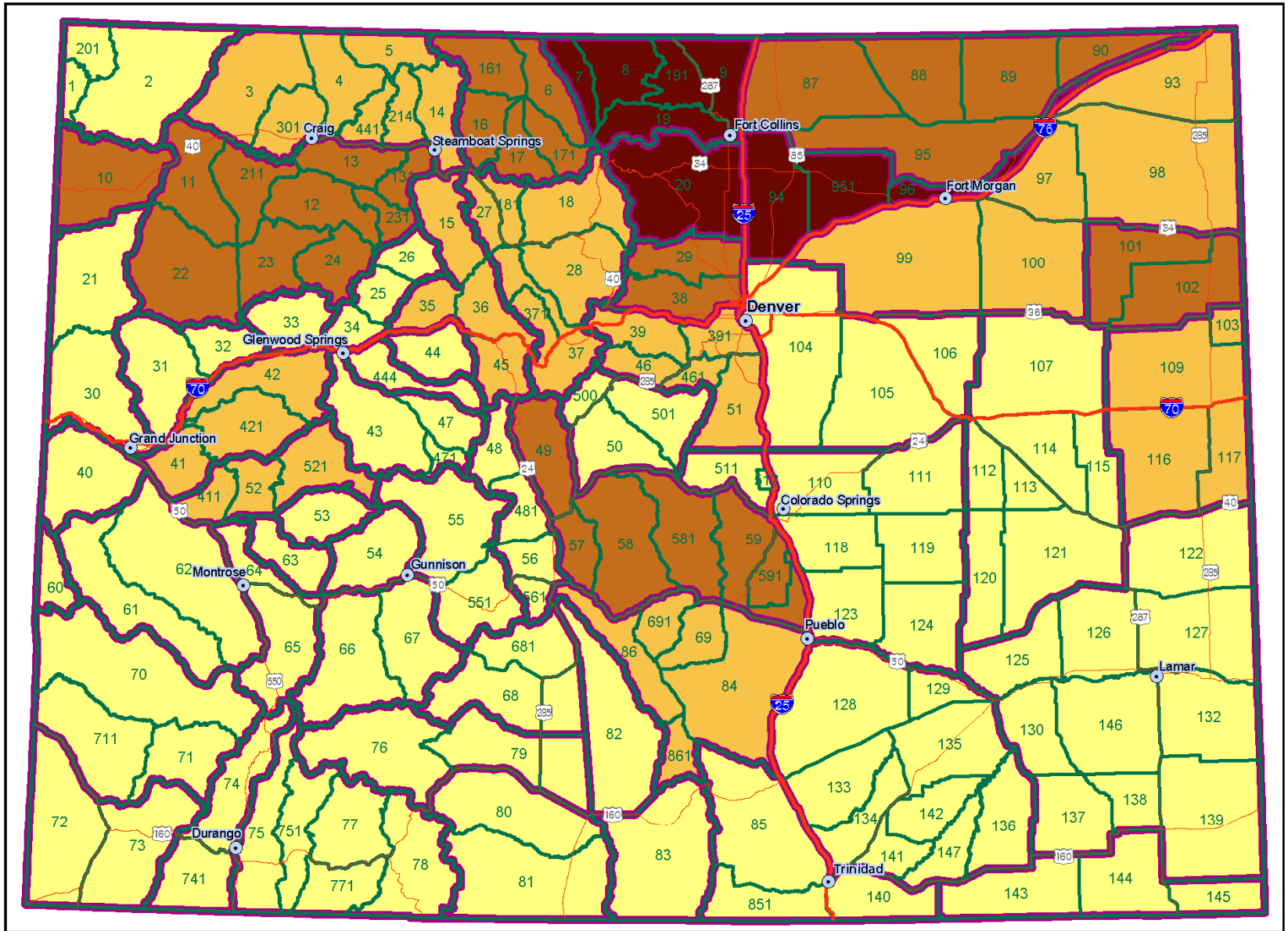

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WildlifeGIS

Detected CWD in Wild Deer

August 1, 2006

25 0 25 50 75 100

Miles

CWD Prevalence Estimates
Harvest Data for Colorado
2003 - 2005

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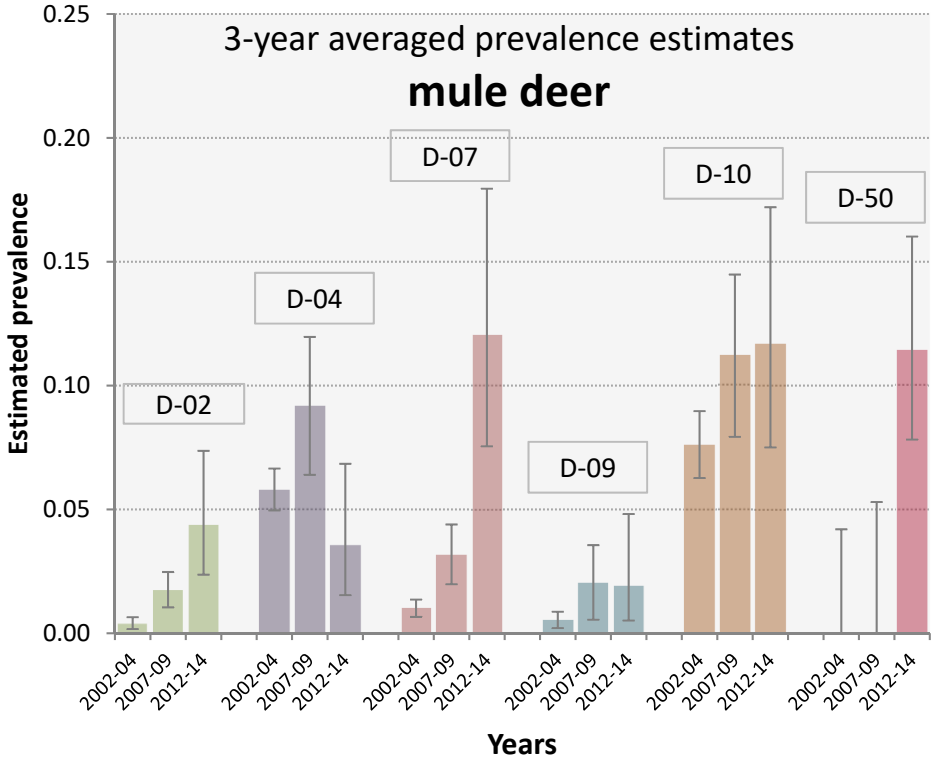
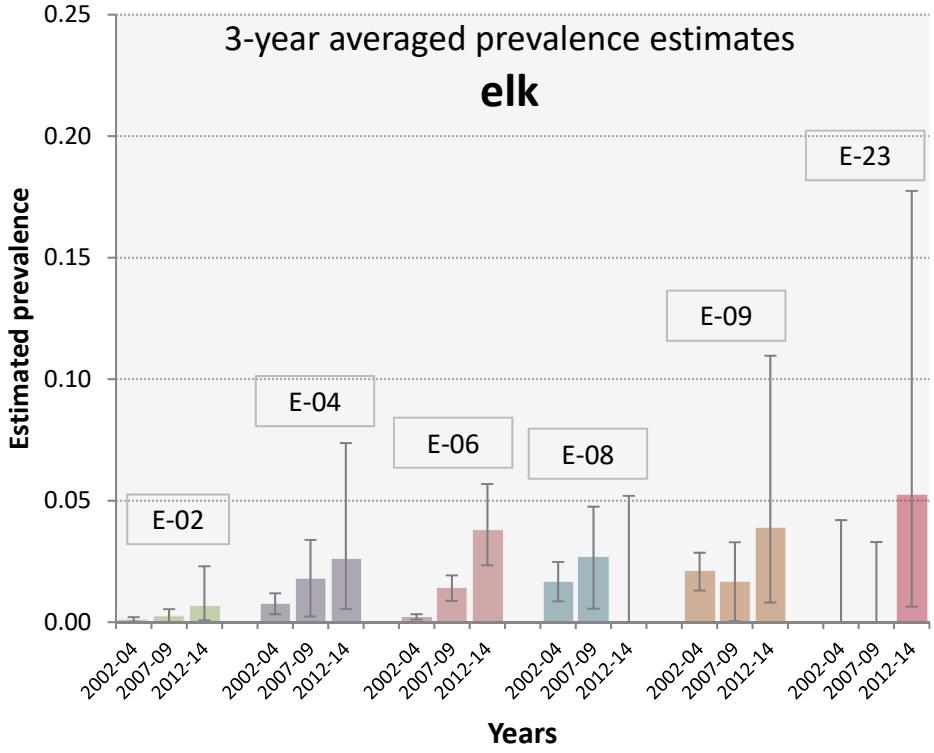
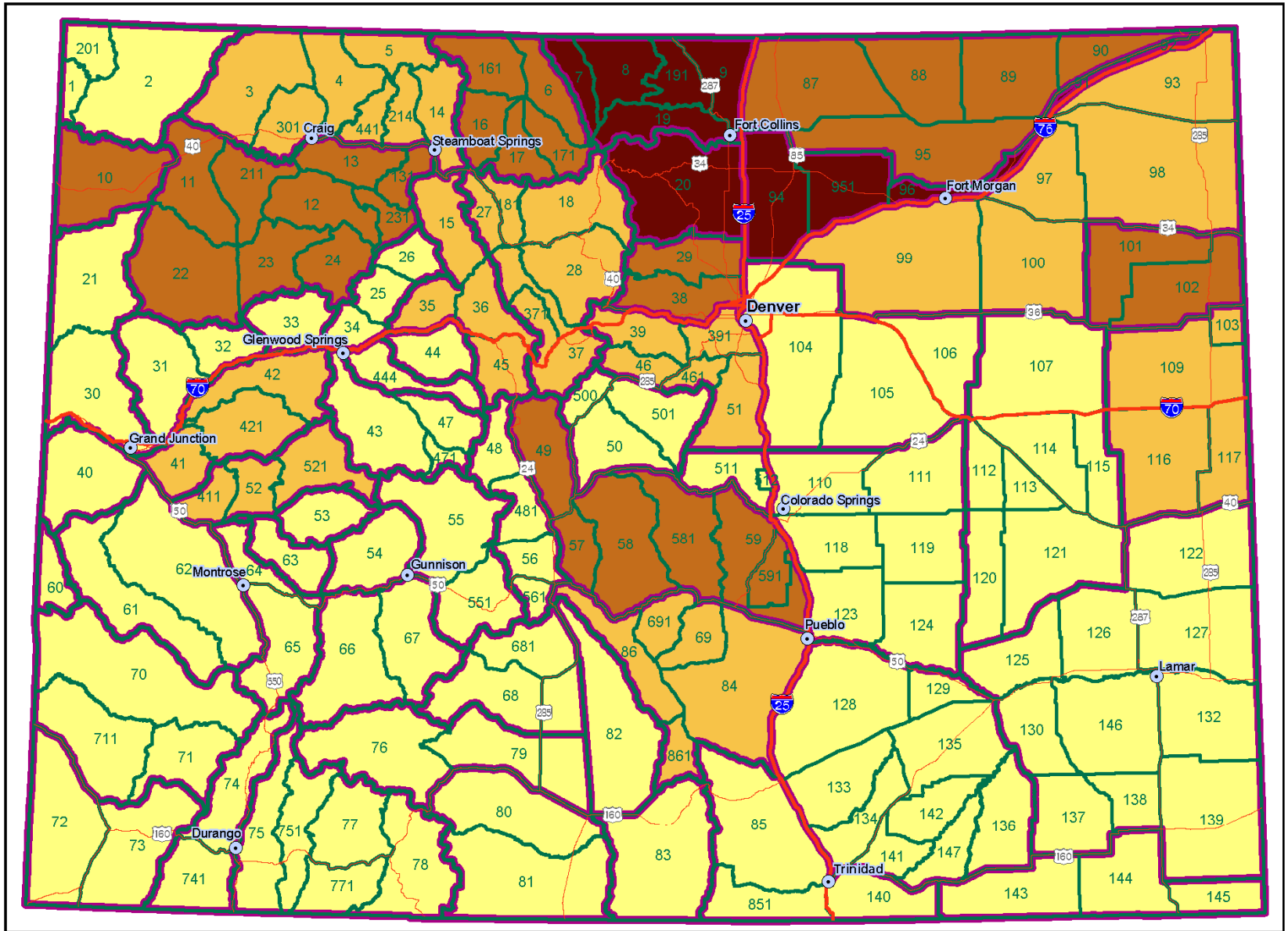
Detected 1 - 5%
Detected > 5%

Chronic wasting disease prevalence trends in Colorado
(harvest-based estimates)





LIVE LIFE OUTSIDE



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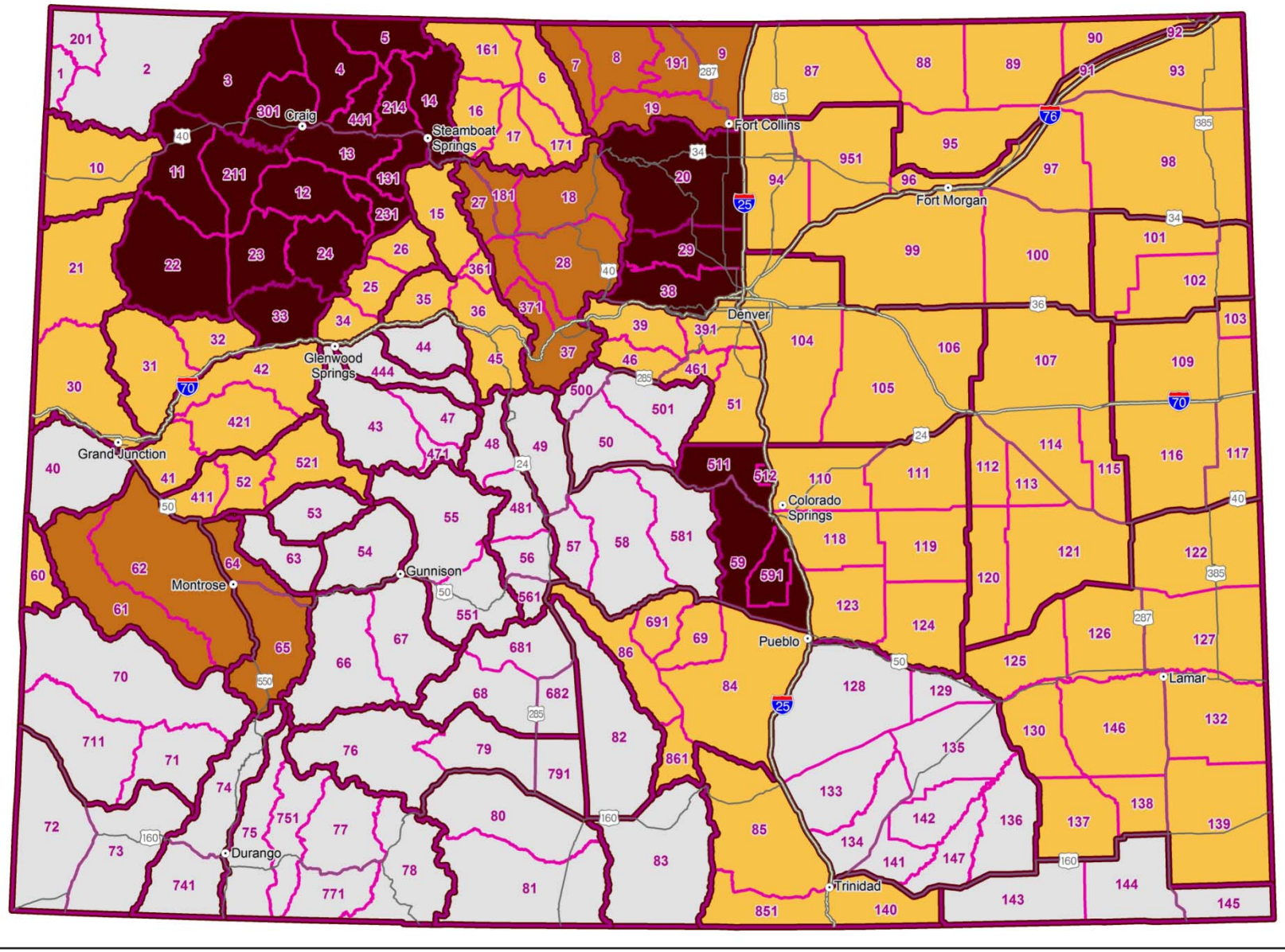

Detected CWD in Harvested Mule Deer Bucks

January 2018

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GIS Unit

20 0 20 40 60 80

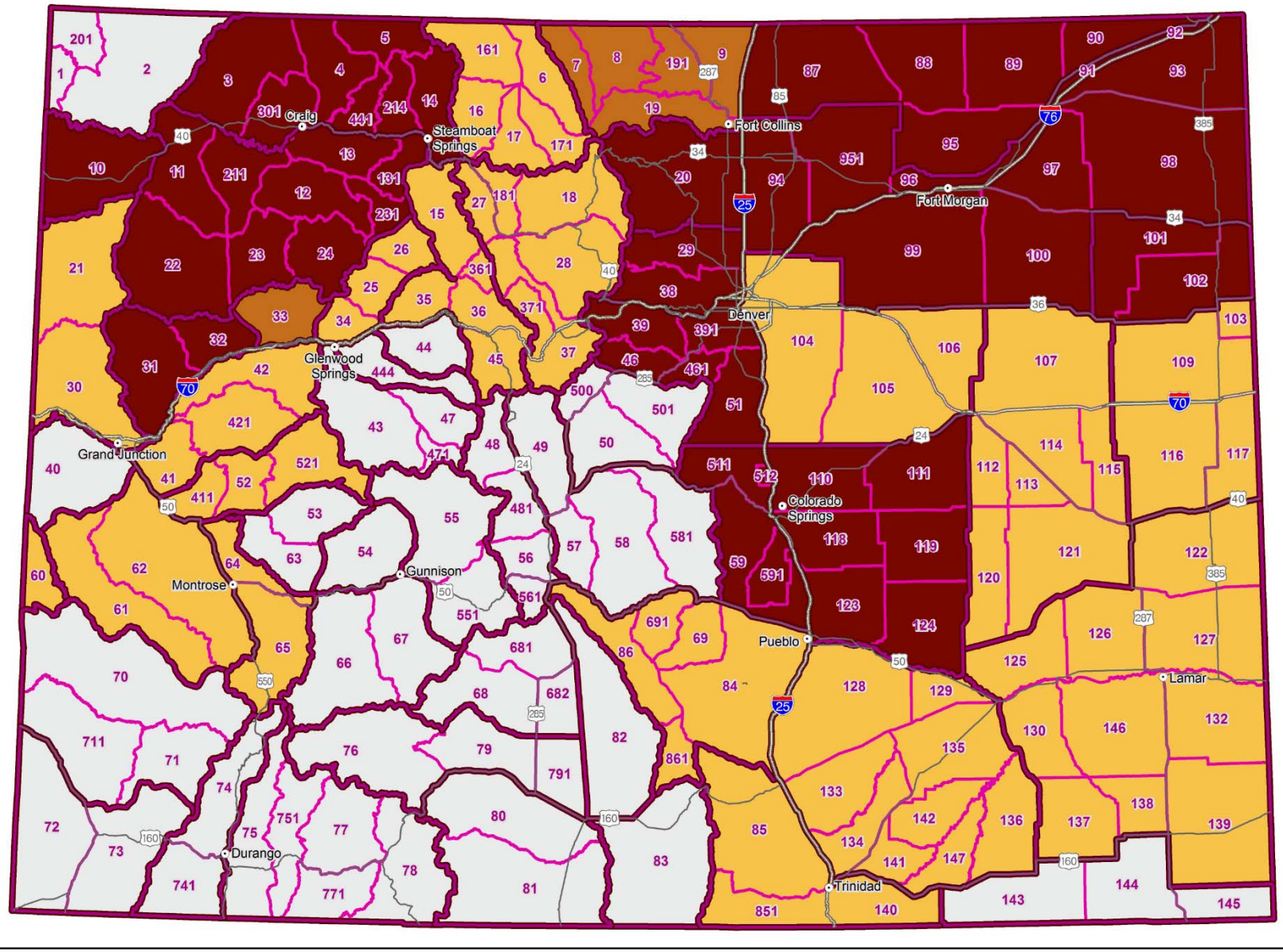
Miles

GMUs

Deer DAUs

Estimated CWD Infection Rates
Harvest Data for Colorado
2014 - 2017

- Detected <1%
- Insufficient Data
- Detected (% Unknown)
- Detected 1-5%
- Detected 5-10%
- Detected >10%



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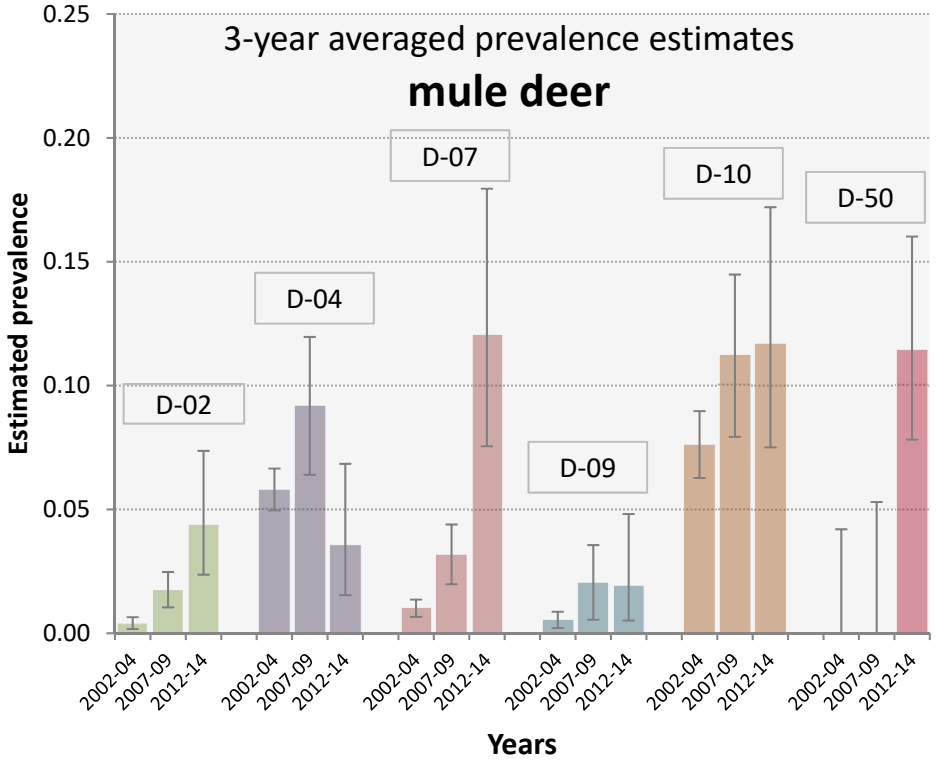
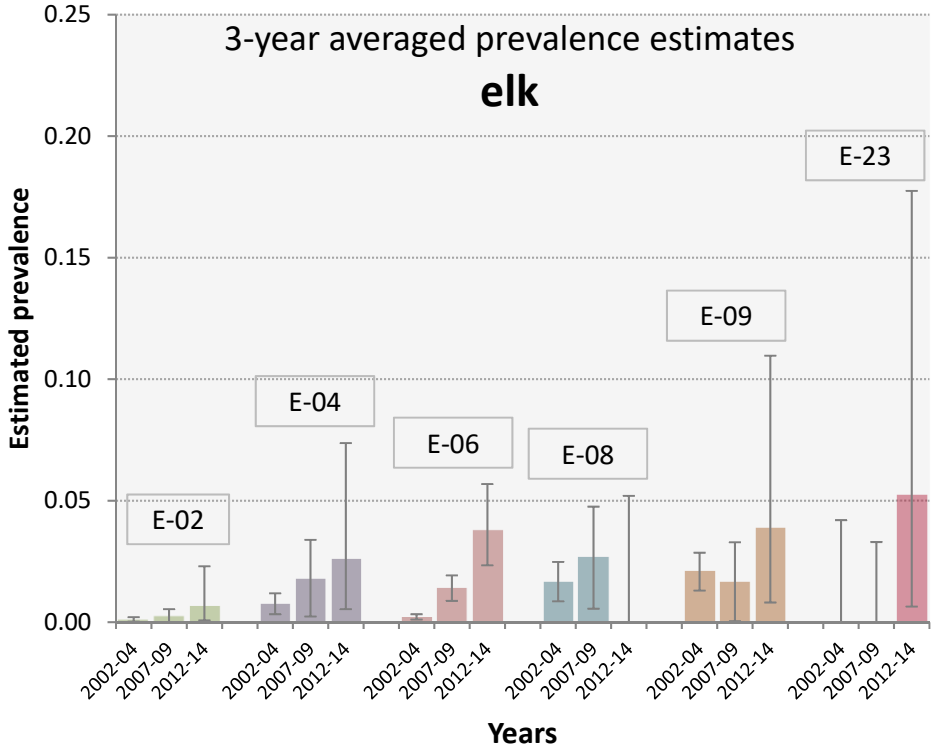
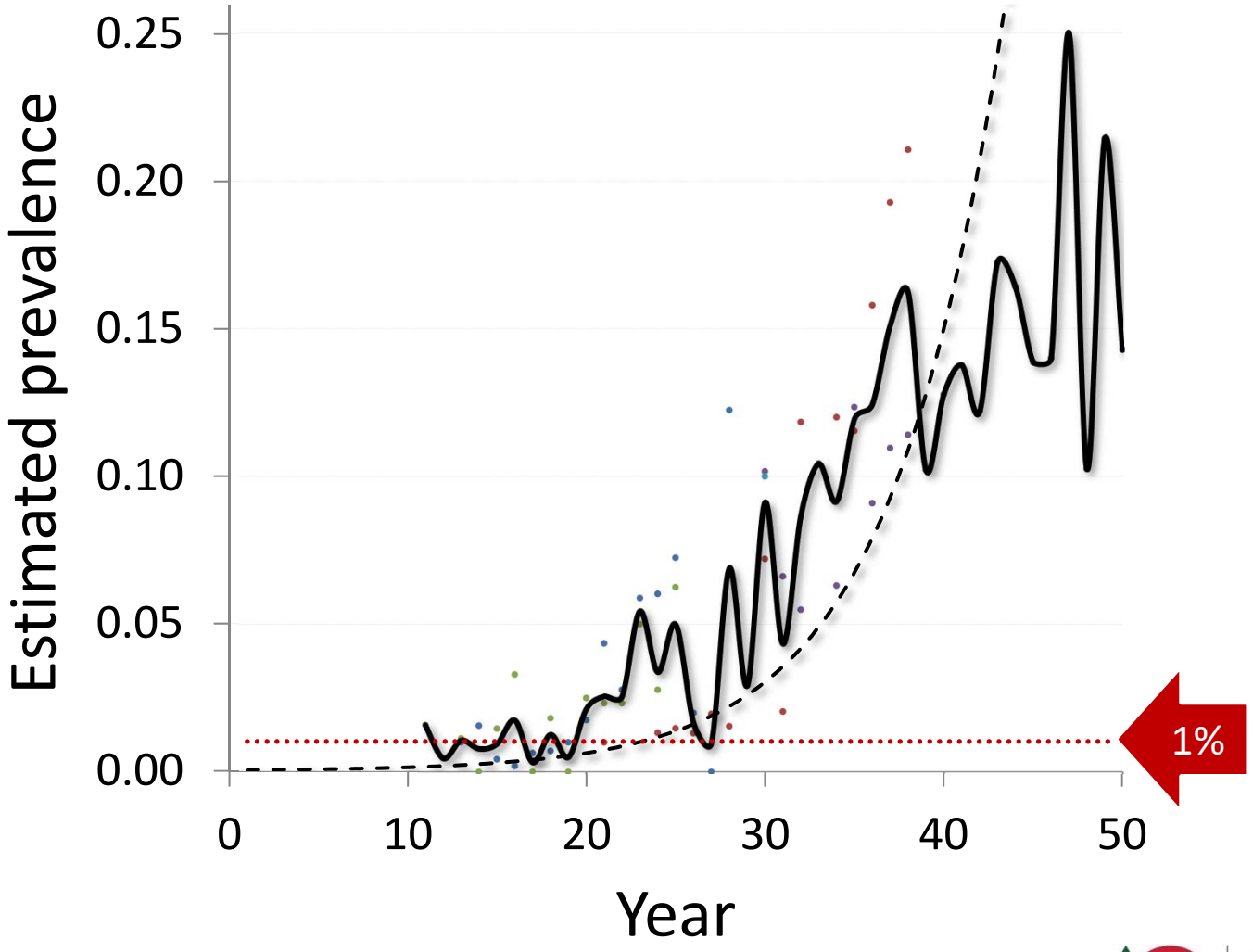




LIVE LIFE OUTSIDE

Composite epidemic curve (field data vs. model)



Sex, Age, & CWD

Infection rates higher (~2×) in bucks than in does from the same herd. (Not so for elk.)

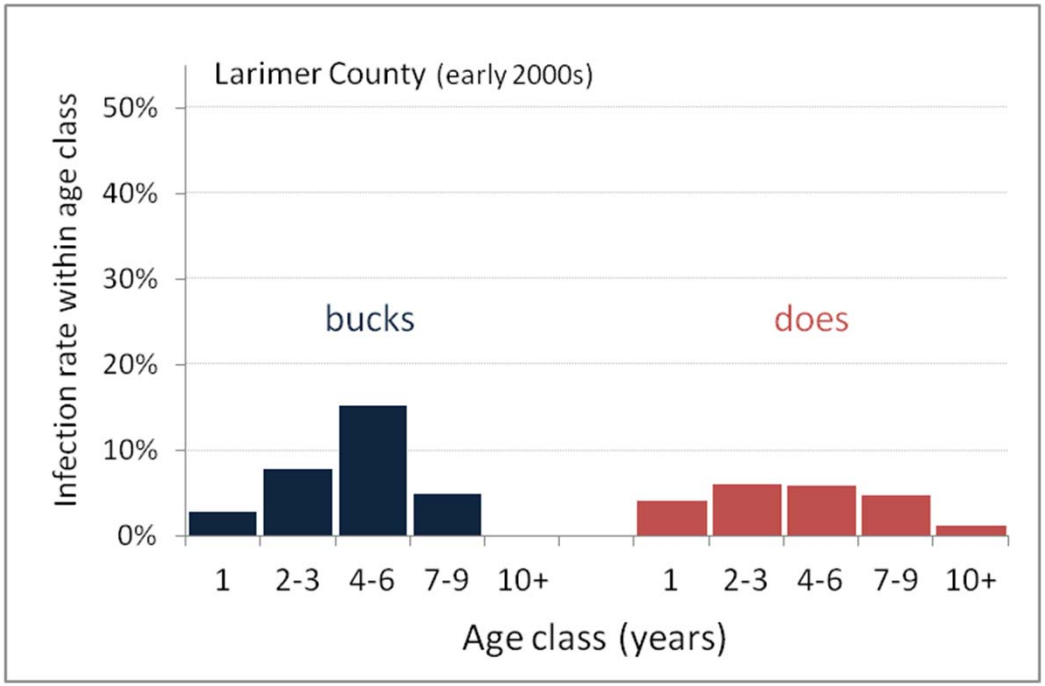
"Prime aged" adults show higher infection rates than very young or very old deer.

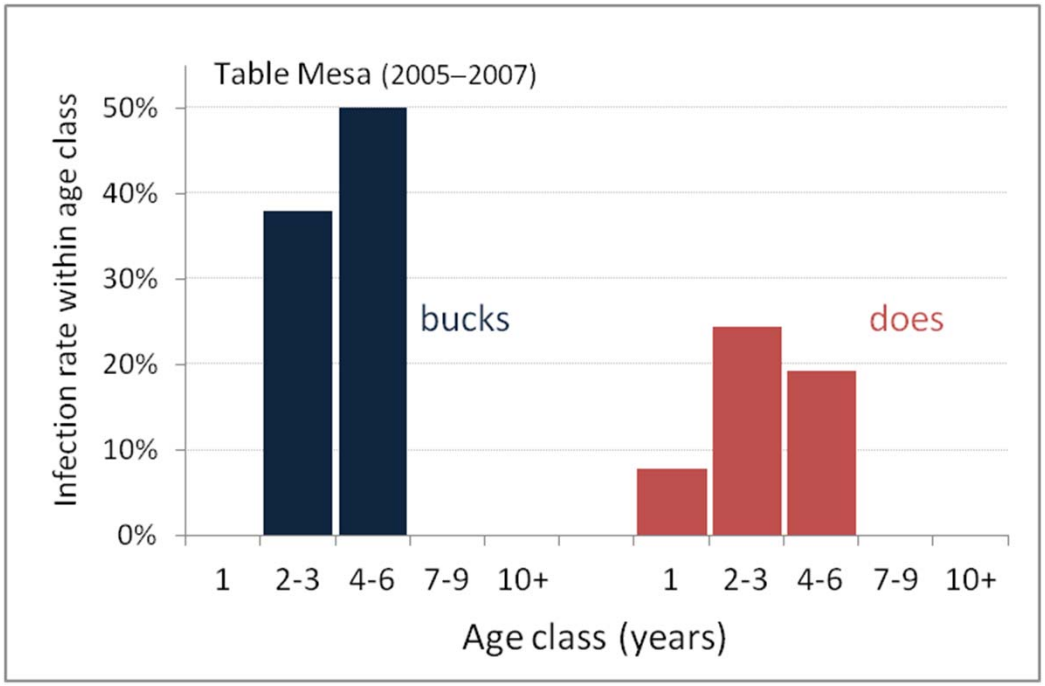
As the overall rate of infection in a herd increases, mule deer are infected & succumb at younger ages. Older aged deer become rare.

Examples shown at right:

In heavily hunted Larimer County herds, 25% of does & 4% of bucks were over 6 years old.

In the *unhunted* Table Mesa herd where infection rates were much higher, only 6% of does & 2% of bucks were over 6 years old.





Lessons in chronic wasting disease

Miller & Fischer 2016

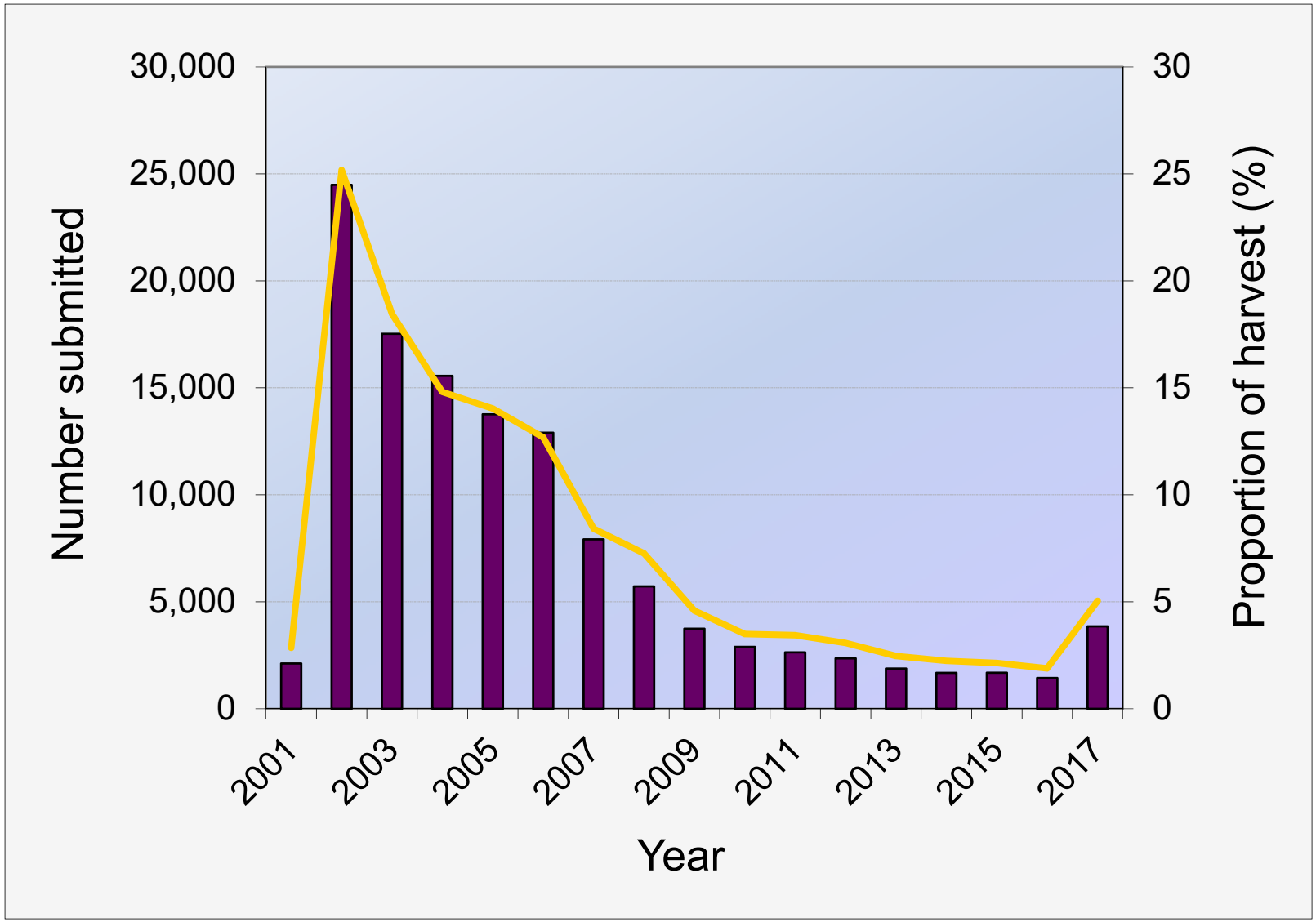
Five lessons:

- Longer than you think
- At least two good stories
- Looking hard/hardly looking
- The five phases
- Sustained & sustainable effort

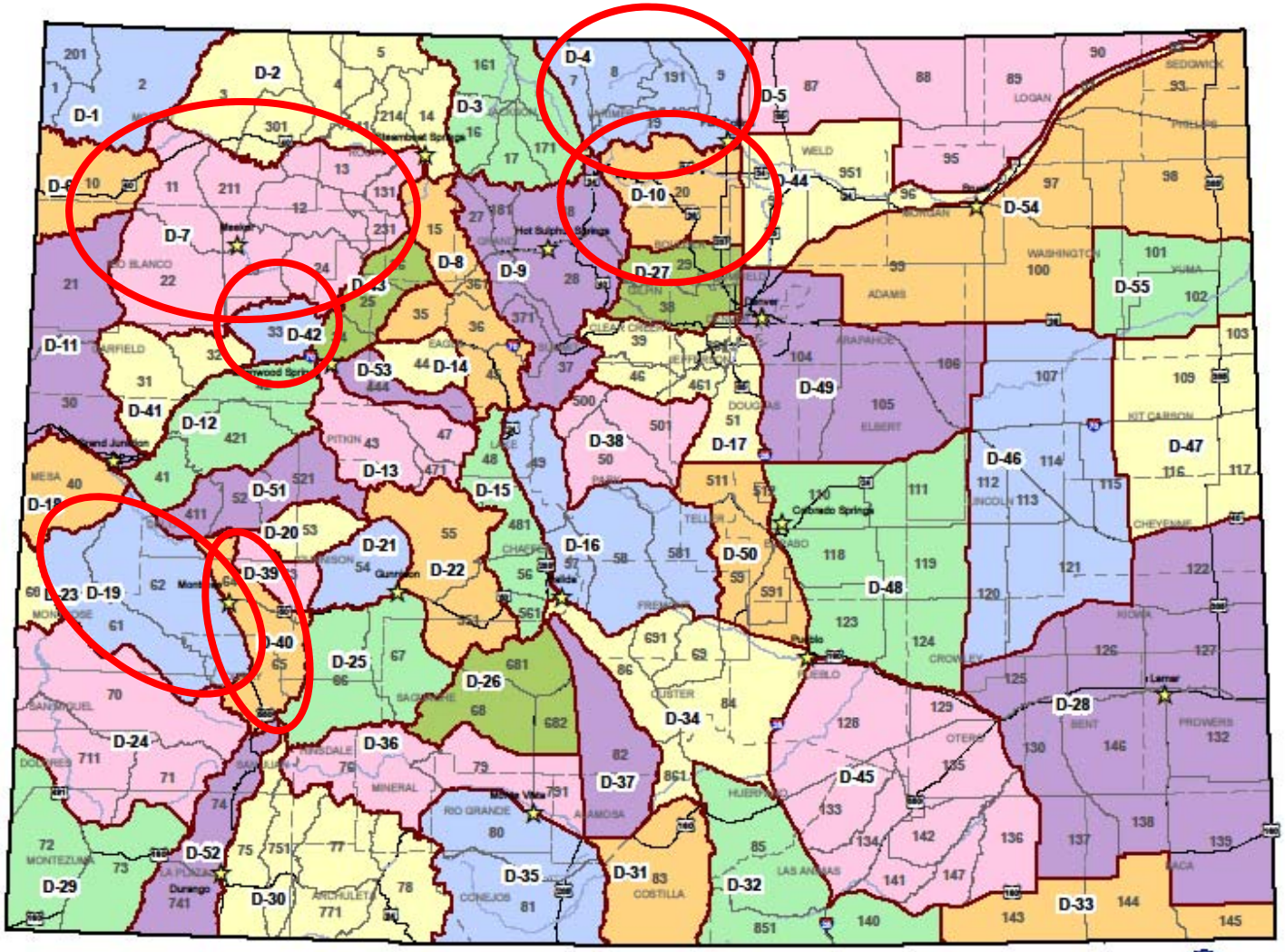
Sustained & sustainable effort...

- surveillance
- monitoring
- control

Colorado deer & elk chronic wasting disease testing: harvest submission trends

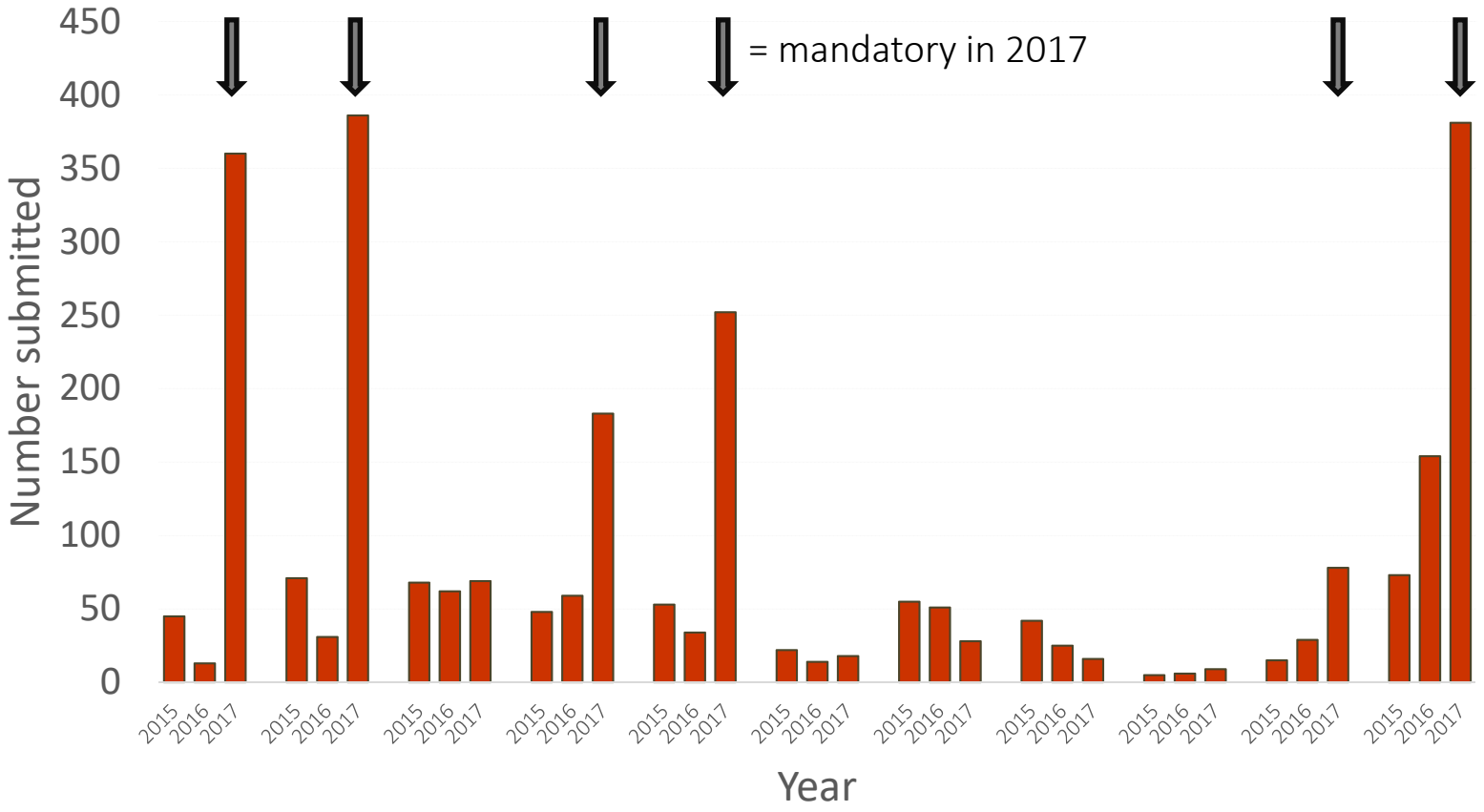


2017 mandatory testing herds



Mandatory head submission improves sample size

(submissions by hunt code for 2015–2016 vs. 2017)

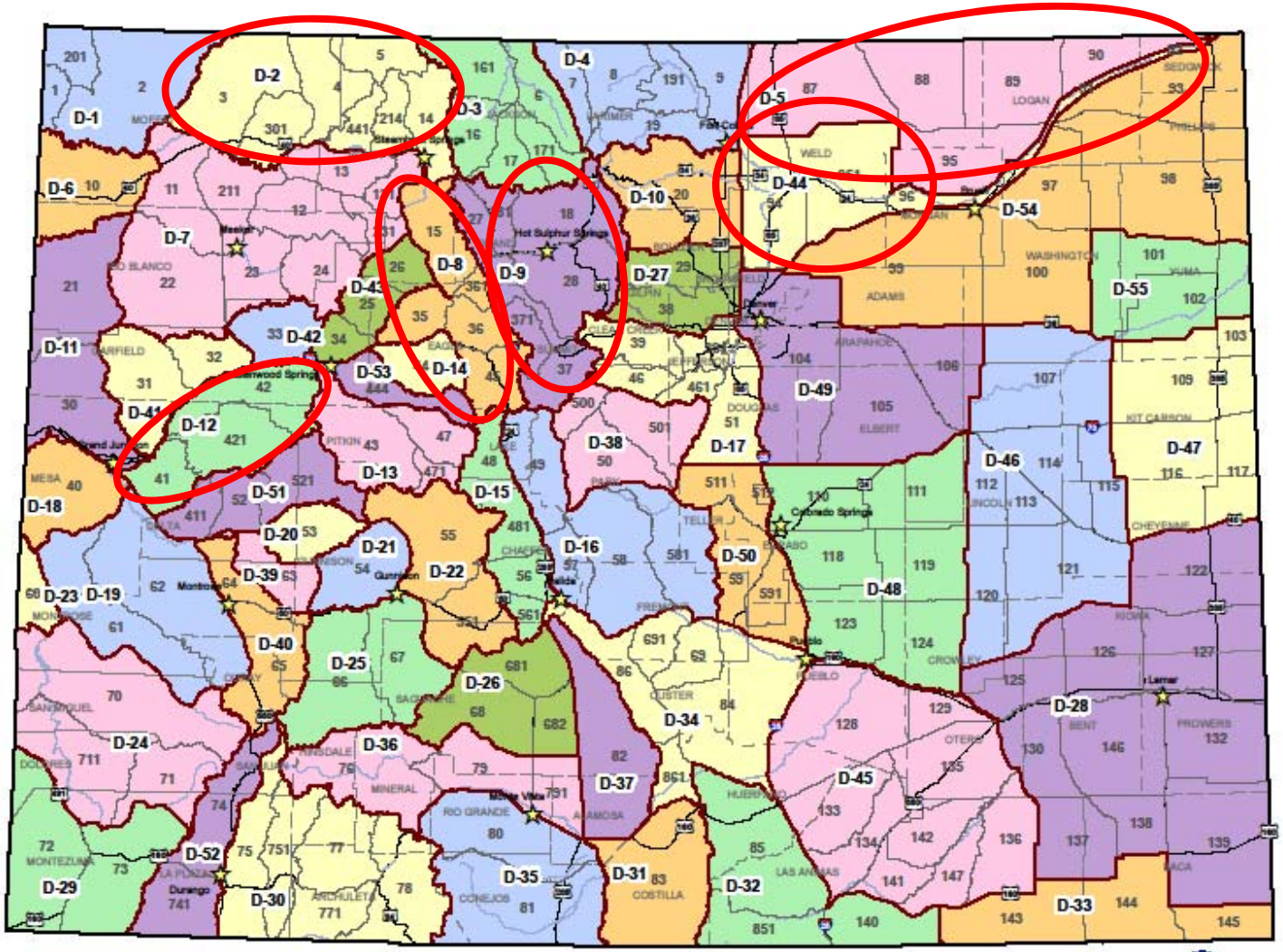


LIVE LIFE OUTSIDE

2017 mandatory testing results

DAU	Sample size	Prevalence (%) adult buck	95% confidence interval (%)
D-07	931	15	13–18
D-42	230	10	6–15
D-04	410	6	4–8
D-10	208	12	8–17
D-19	258	4	2–7
D-40	268	2	0.4–4

2018 mandatory testing herds



Sustained & sustainable effort...

- surveillance
- monitoring
- control

LIVE LIFE OUTSIDE

Recommendations for Adaptive Management of Chronic Wasting Disease in the West

Potential Management Strategies

- Reduce Artificial Points of Host Congregation

  Identify artificial point-sources of food/minerals/water; remove/reduce density of point-sources.

- Harvest Management

  Increase male harvest, bias harvest toward infected males, &/or shift timing of harvest to post rut.

- Harvest Targeting Disease Foci

  Targeted harvest strategy built upon ongoing fall harvest to maximize removal of infected individuals.

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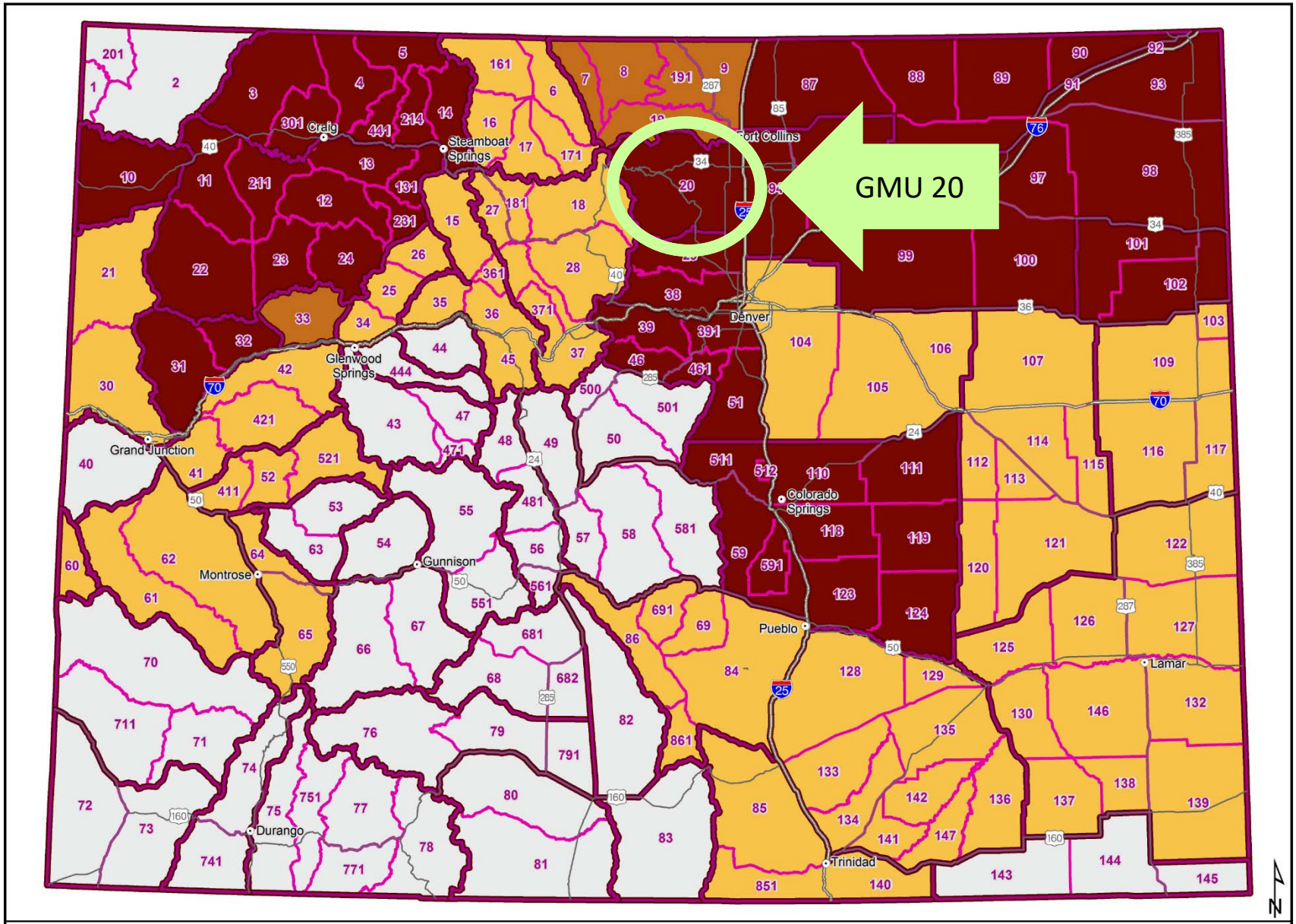

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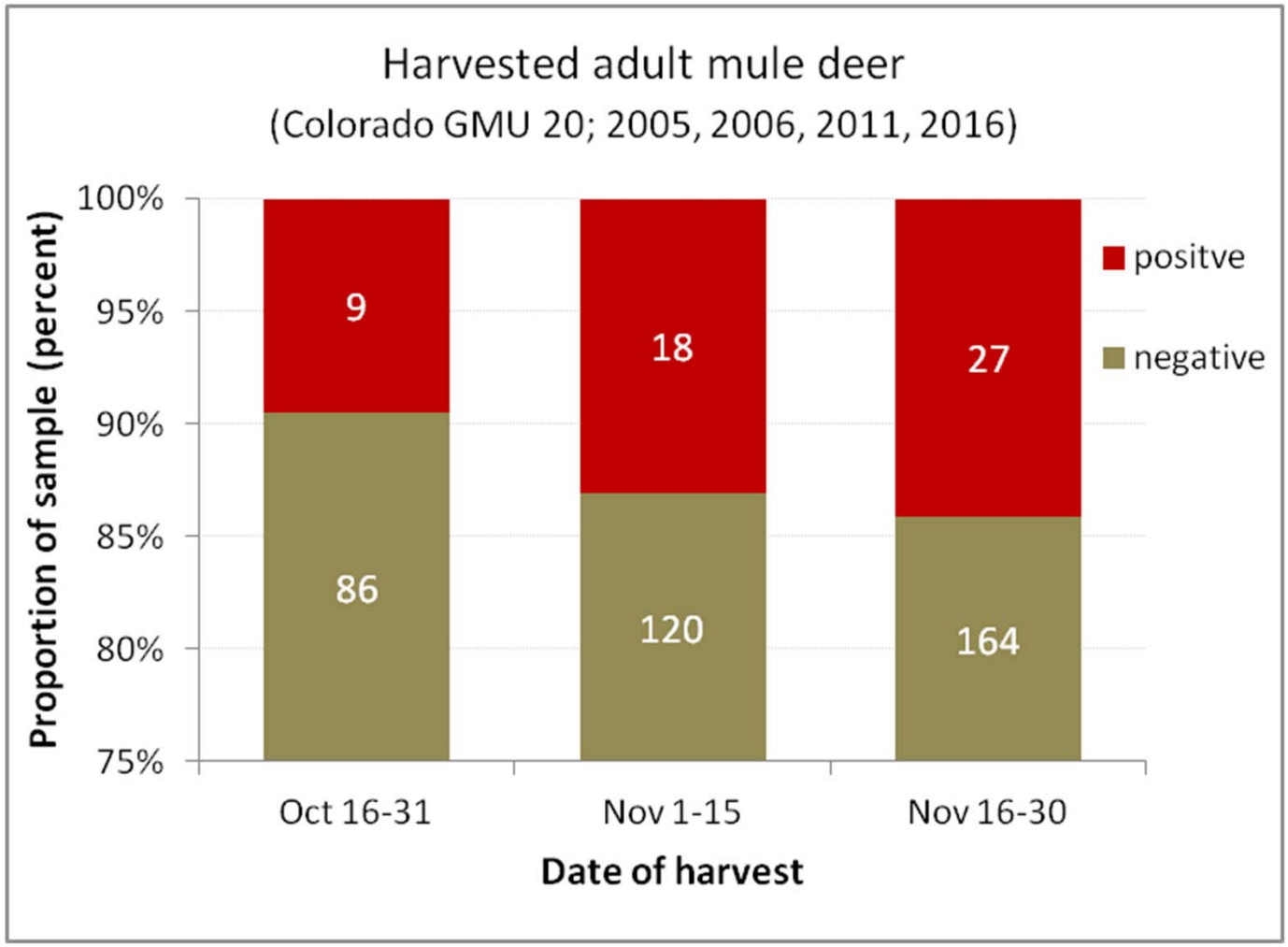


Proportionally more infected deer may be removed via harvest in later seasons.

A tale of two deer herds

White River herd (D-07)

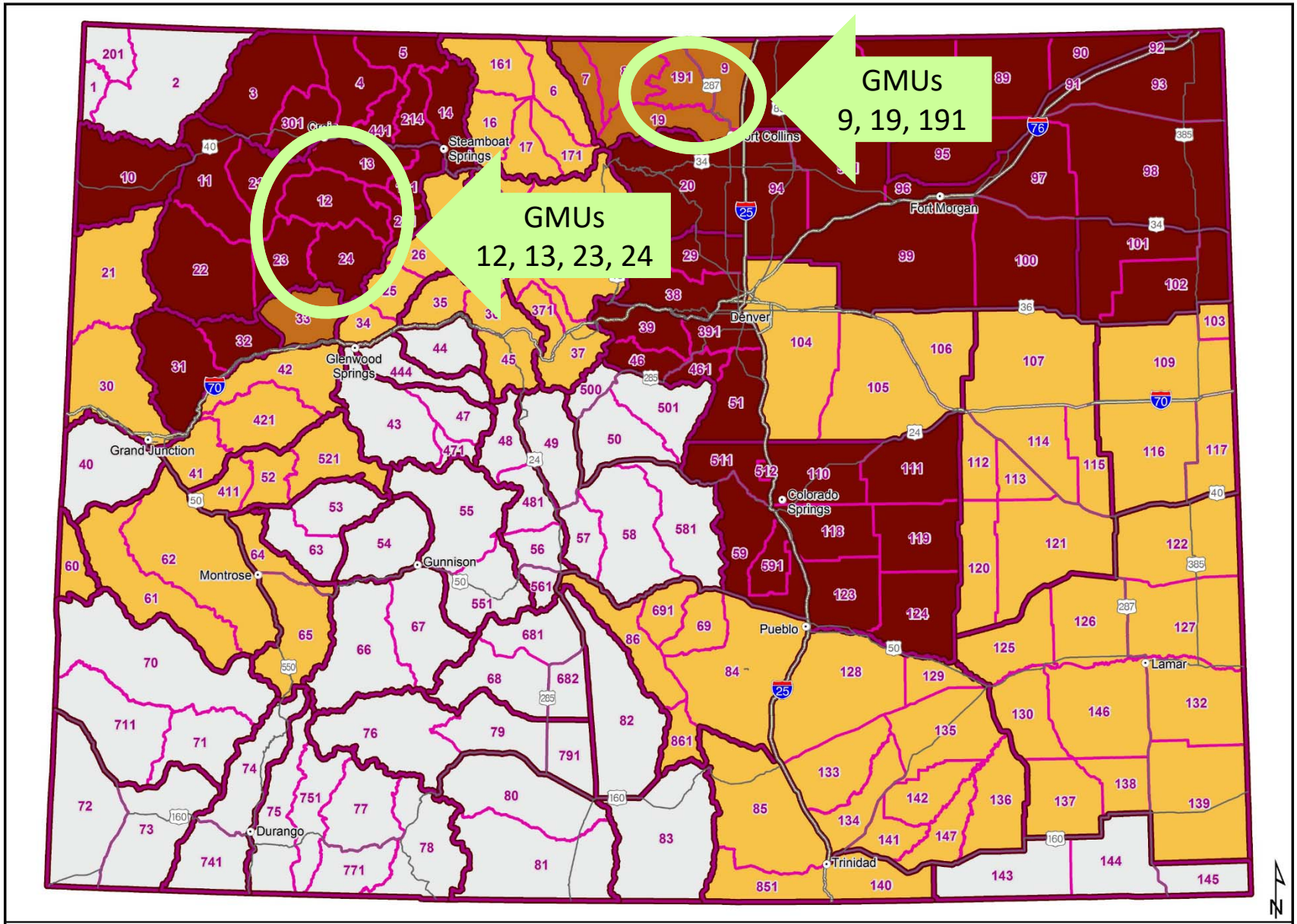
- Goal: eradication!
- Tactic: intensive but focal
- Duration: one shot
- Licensing trend: conservative
- Timing: increasingly early

Red Feather herd (D-04)

- Goal: suppression
- Tactic: extensive with focal
- Duration: ongoing (2000–05)
- Licensing trend: liberal(ish)
- Timing: proportional late

"Every man has a right to his own opinion, but no man has a right to be wrong in his facts."

Bernard M. Baruch, financier, ca. 1940s



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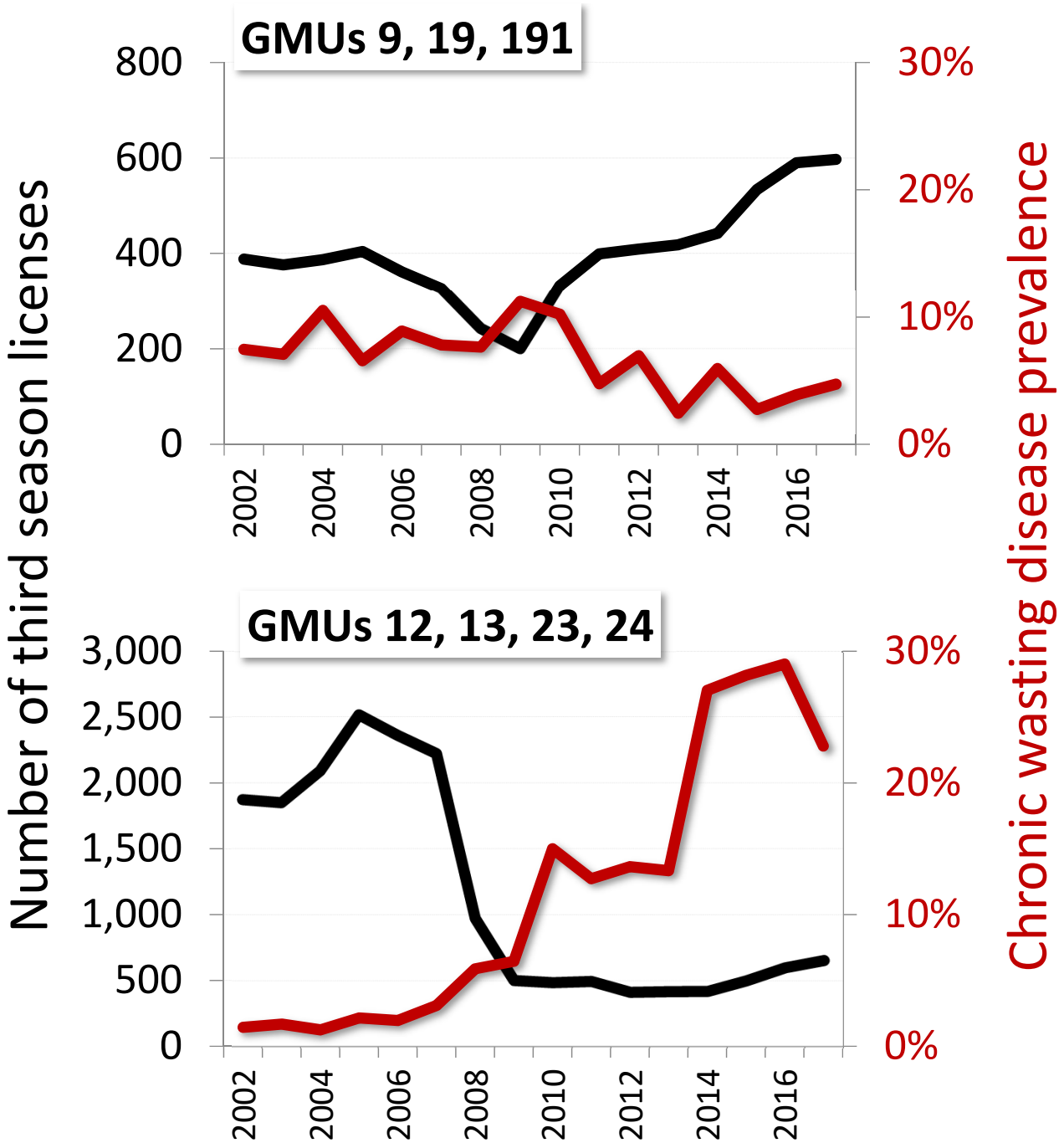
License & Prevalence Trends

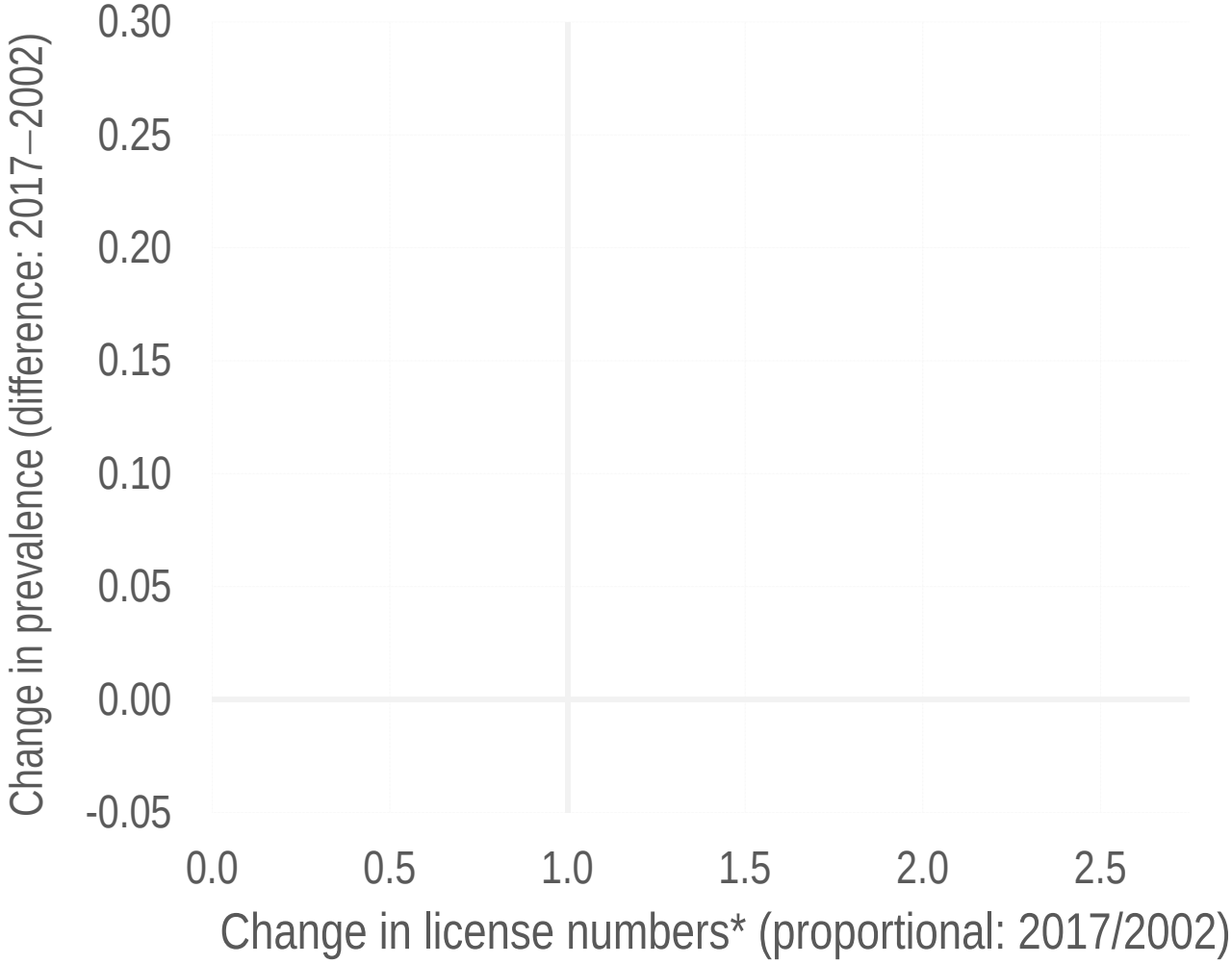
Third season license numbers strongly affect prevalence in subsequent years.



LIVE LIFE OUTSIDE

Licensing trends & prevalence

(Colorado 2002–2017†)



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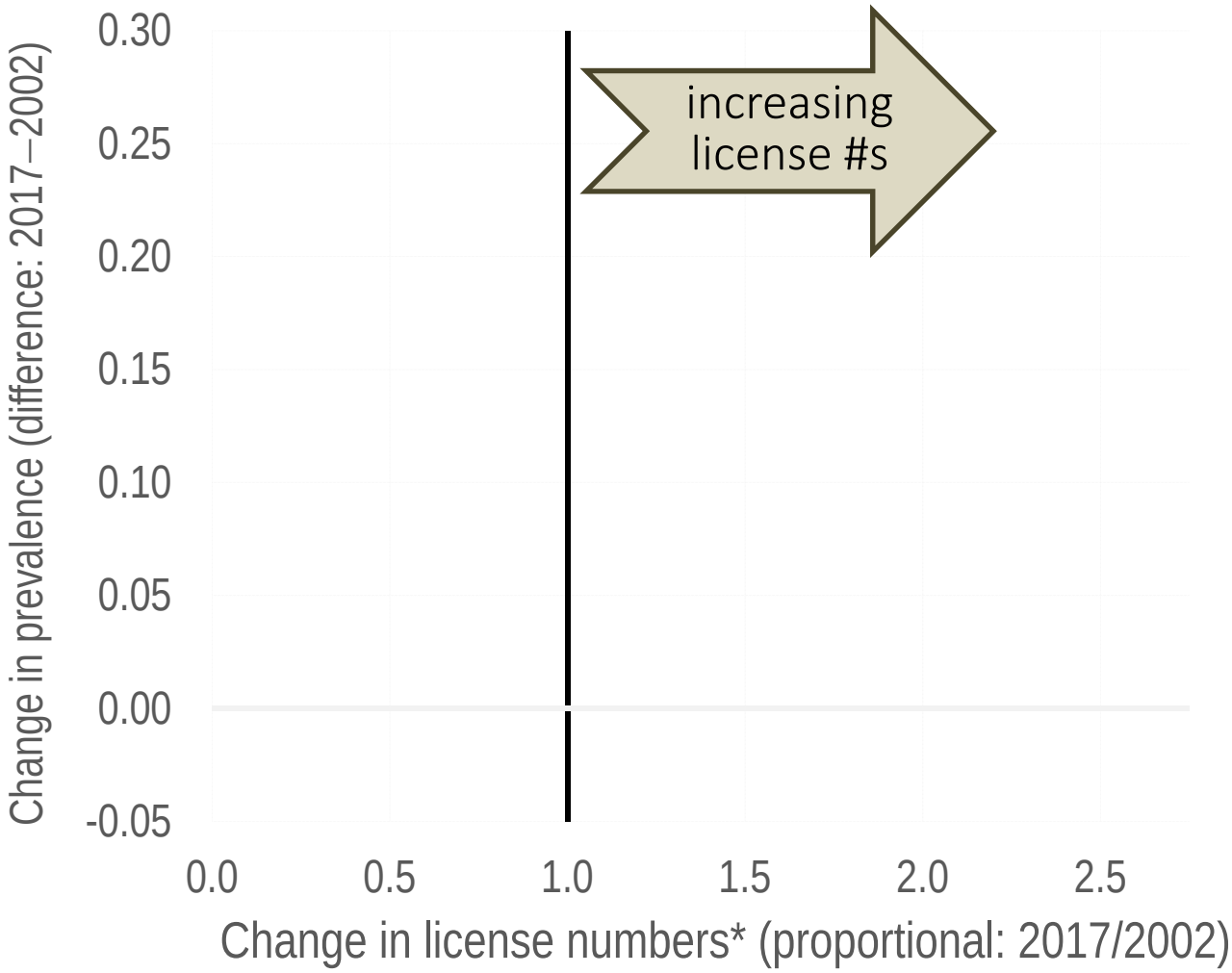

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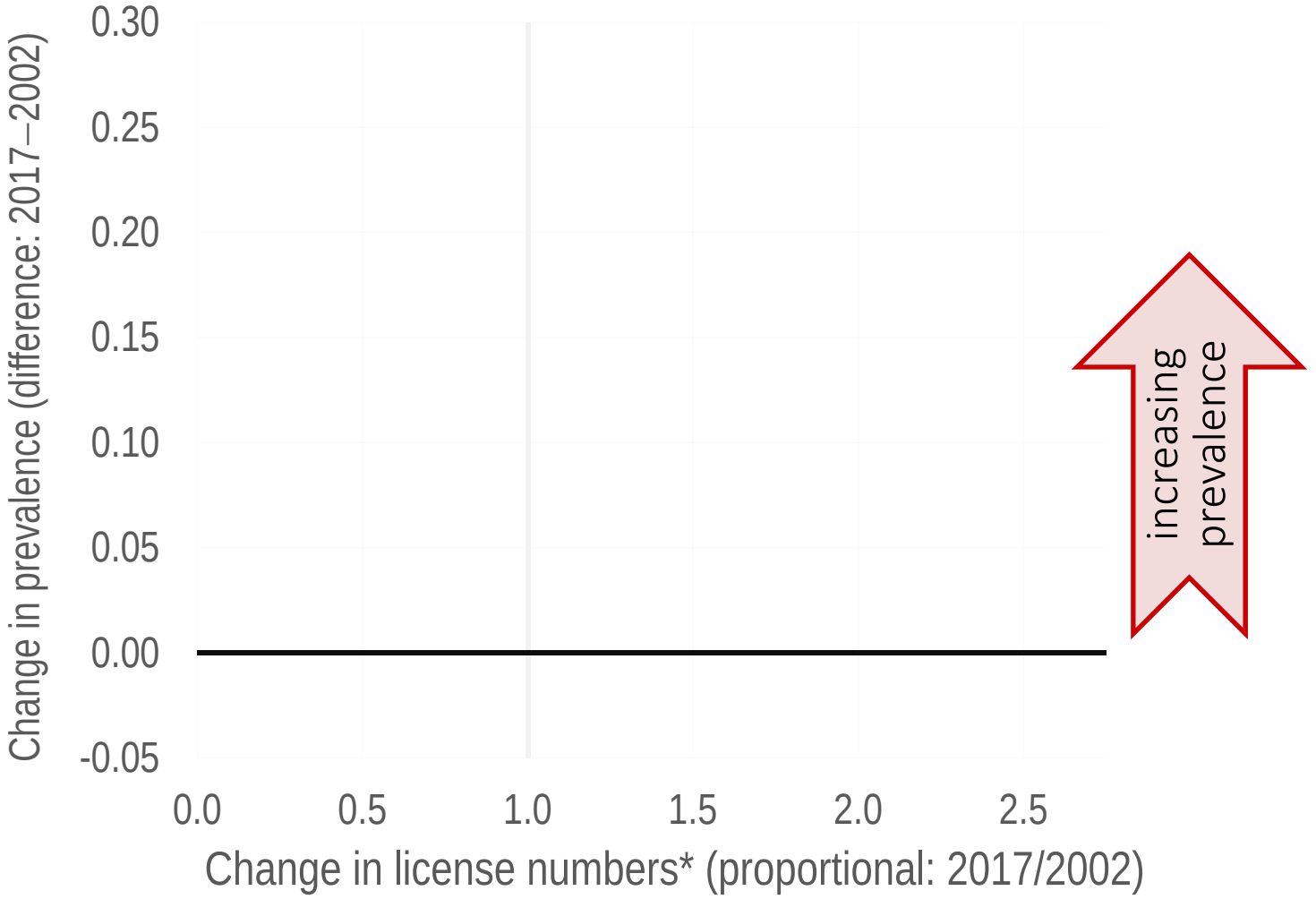

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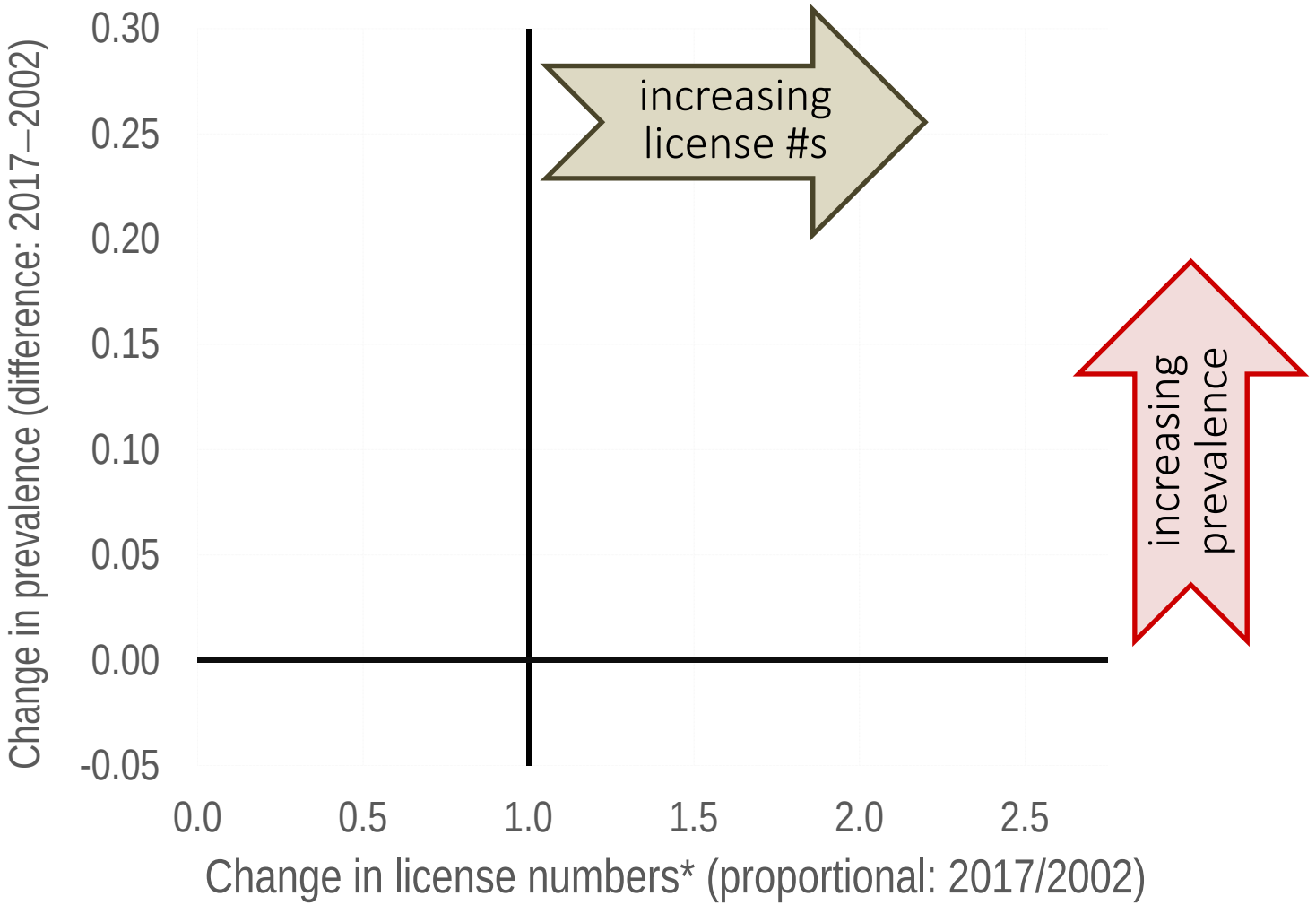

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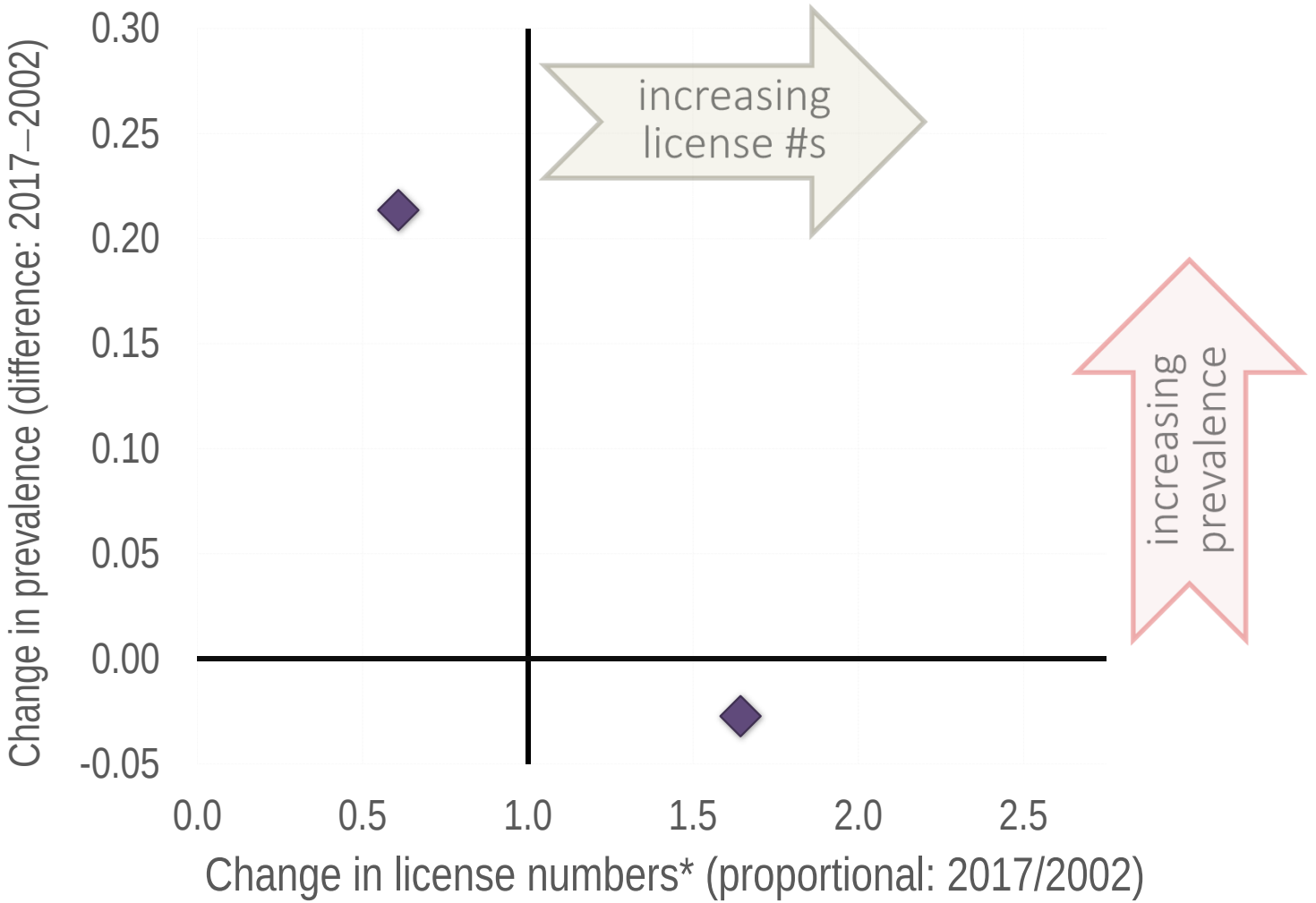
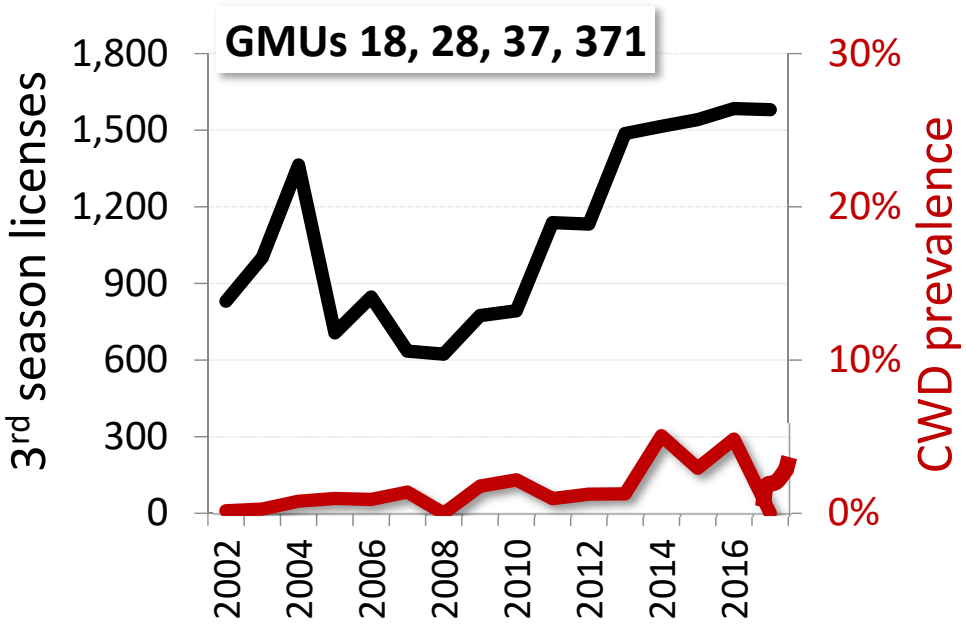


LIVE LIFE OUTSIDE

OK, a tale of ~~two~~ three deer herds

Middle Park herd (D-09)

- Goal: suppression
- Tactic: extensive (via harvest)
- Duration: ongoing
- Licensing trend: liberal(ish)
- Timing: proportional late



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How are they doing?

Middle Park (2017)

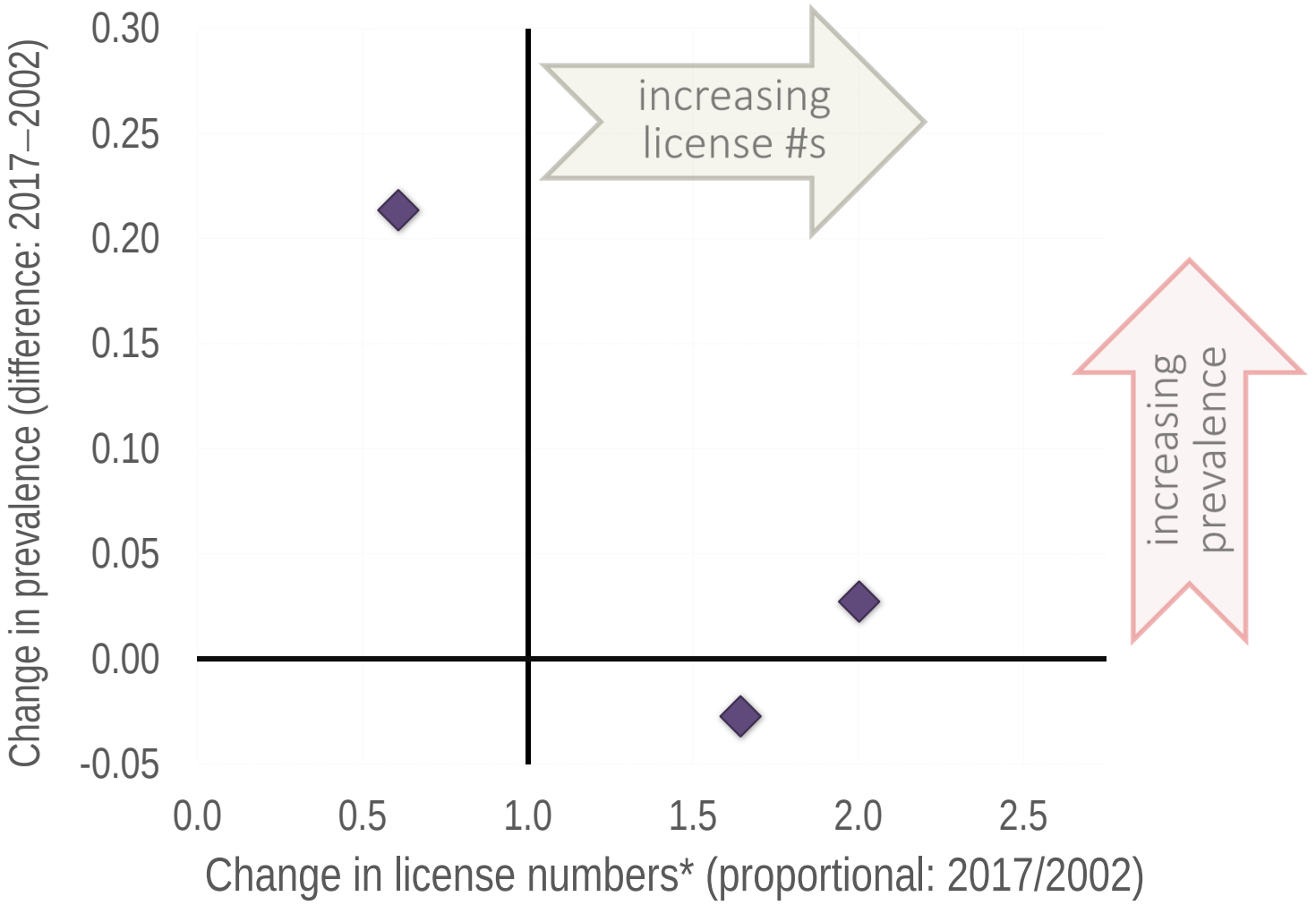
- Bucks:100 does (obs) – 40
- Fawns:100 does (obs) – 68 (!)
- Herd size trend: stable (> obj)

Red Feather (2017)

- Bucks:100 does (obs) – 39
- Fawns:100 does (obs) – 48
- Herd size trend: stable (> obj)

Licensing trends & prevalence

(Colorado 2002–2017†)



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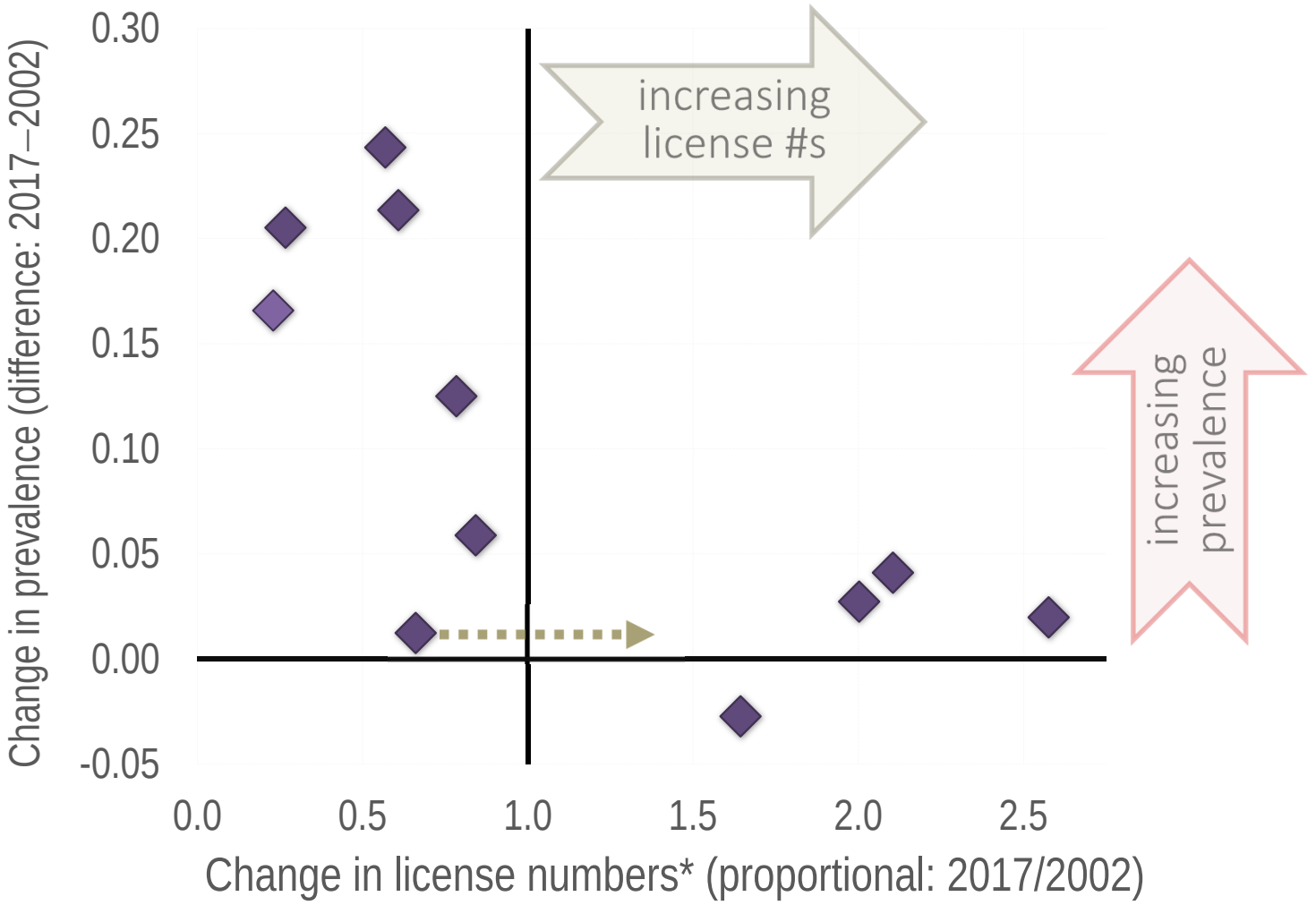

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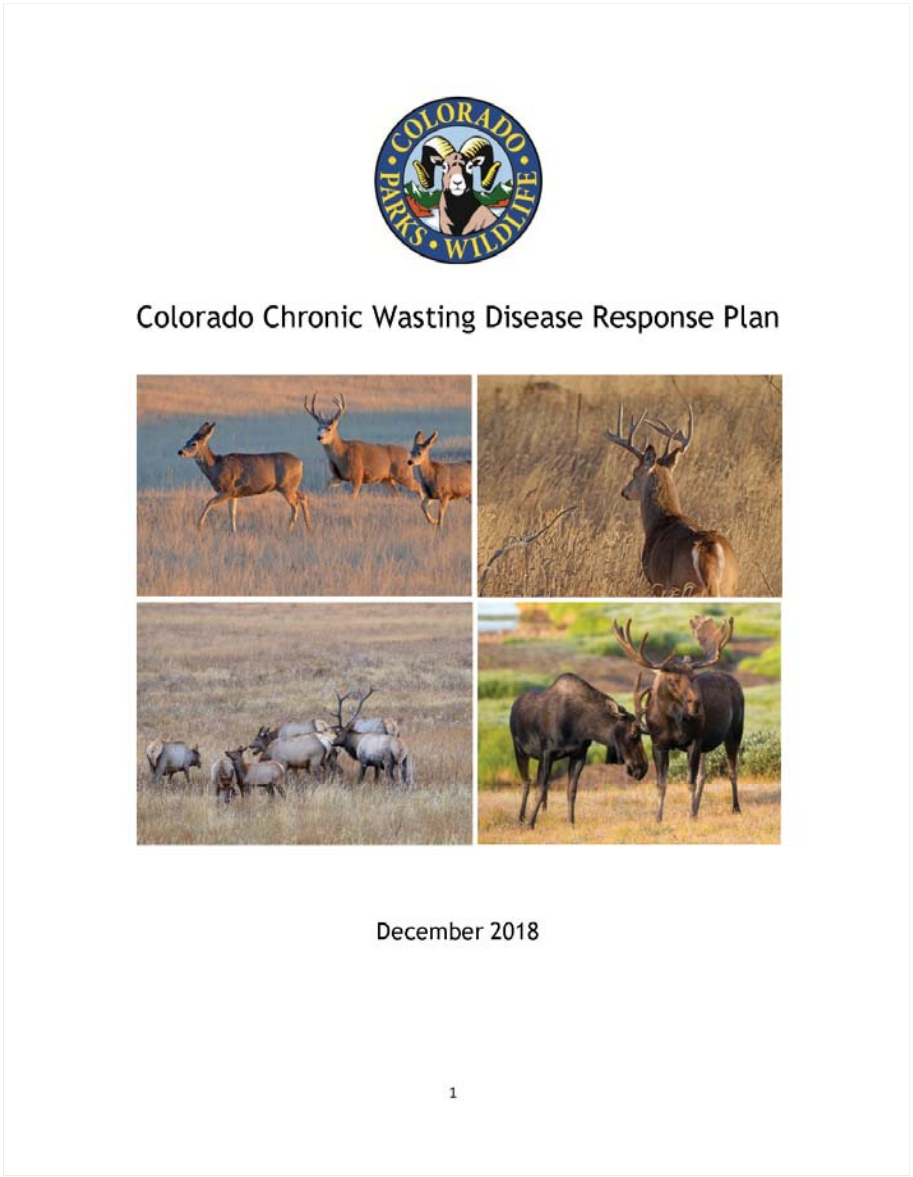


https://cpw.state.co.us/Documents/Hunting/BigGame/CWD/PDF/ColoradoChronicWastingDiseaseResponsePlan.pdf#search=cwd%20response%20plan

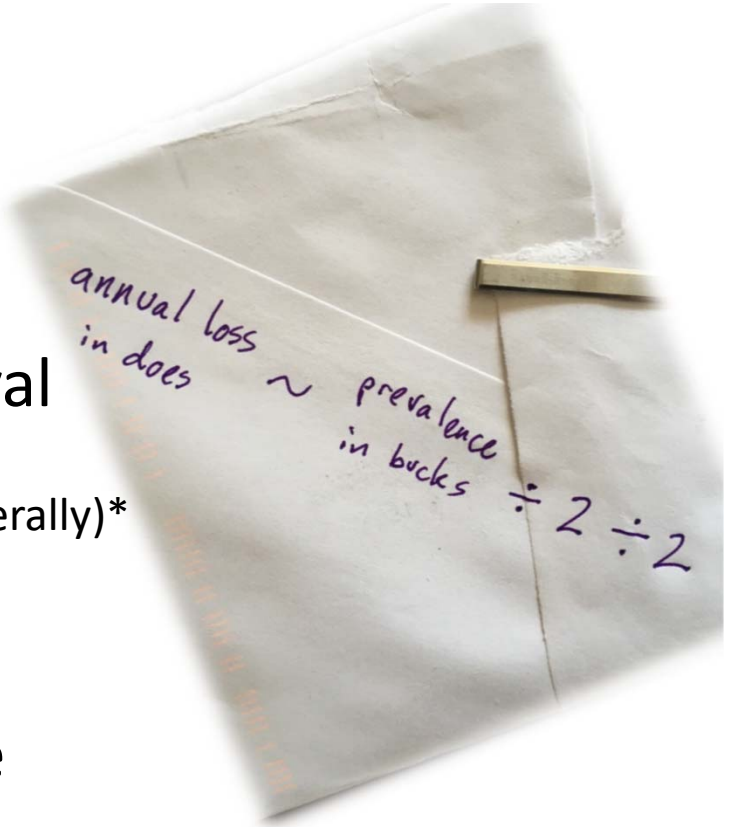
or Google: cpw cwd response plan

KEY FEATURES

- Monitoring plan
- Prevalence threshold for compulsory management
- Management actions & recommendations

LIVE LIFE OUTSIDE

Estimating CWD impacts on doe survival

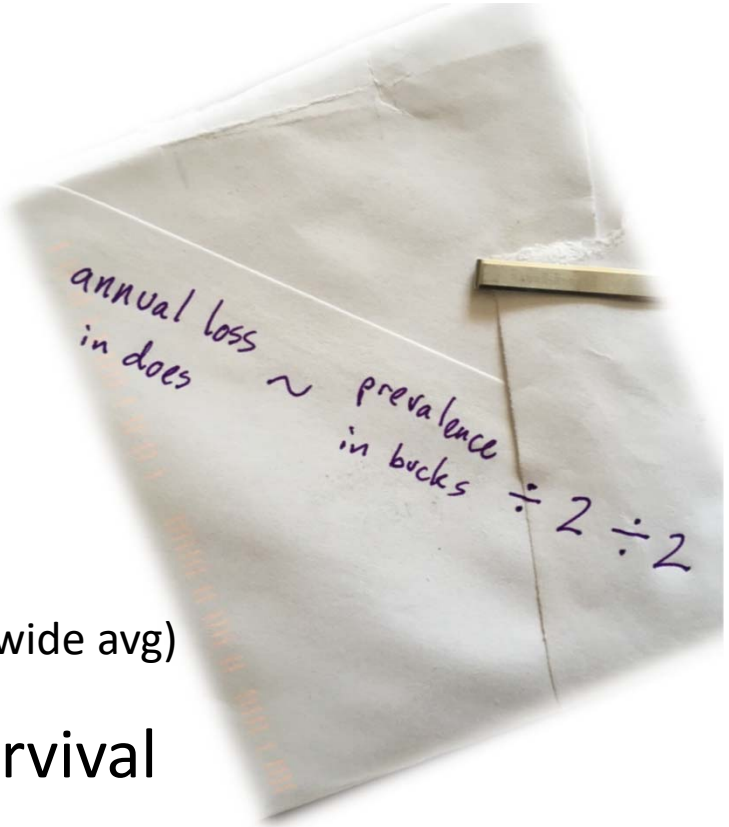


- simple calculation (back of envelope – literally)*
- based on Colorado field data
  - doe infection rate ~ ½ buck rate
  - ~ ½ infected individuals die each year (either sex)

*(originally calculated on a bar napkin…)

LIVE LIFE OUTSIDE

Thresholds for chronic wasting disease management

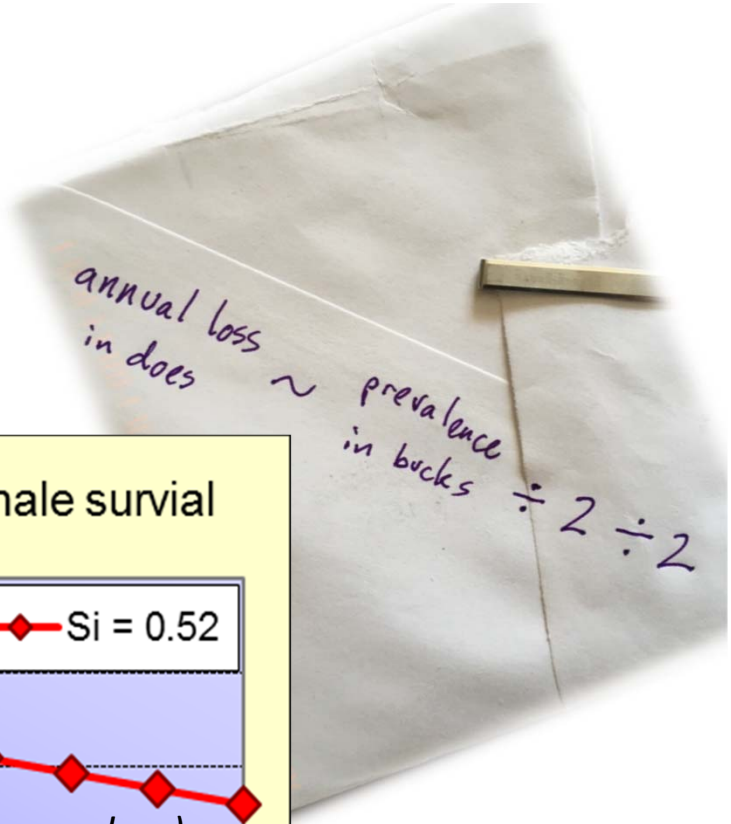


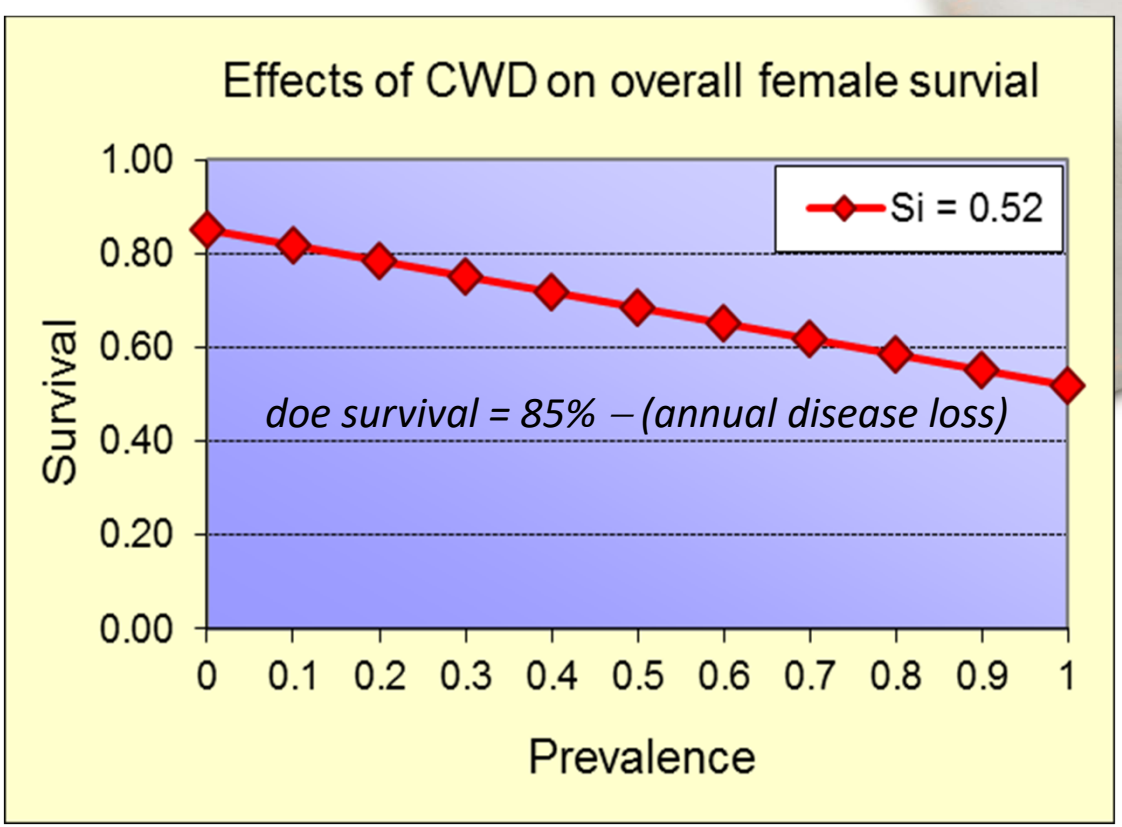
Estimating CWD population impacts

- driven by impaired doe survival
- "healthy" doe survival ~85% (range-wide avg)
- CWD losses further reduce doe survival
  - ~85% – (annual disease loss)
- sufficiently low doe survival will depress herd trends

LIVE LIFE OUTSIDE

Estimating CWD population impacts





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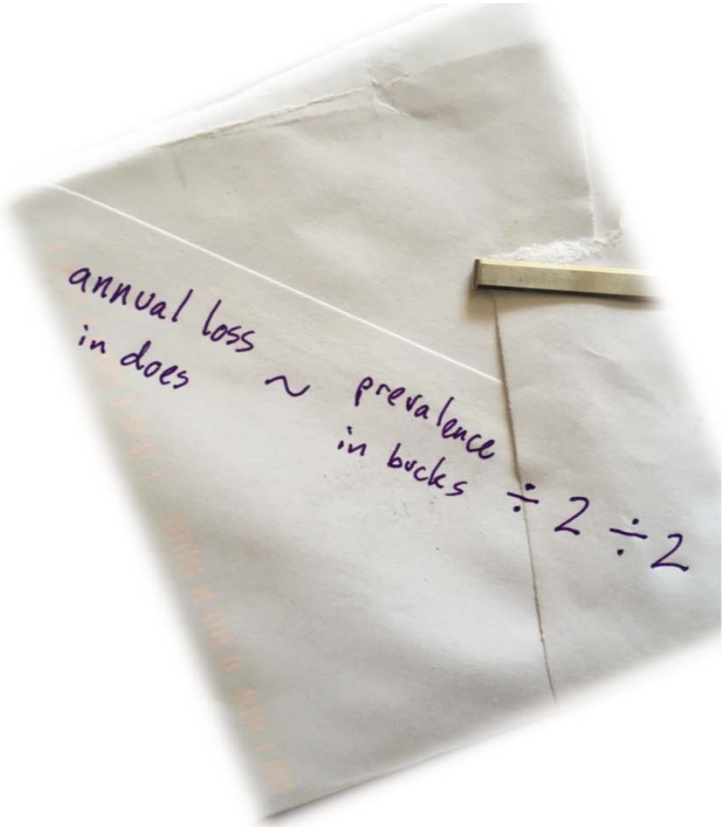
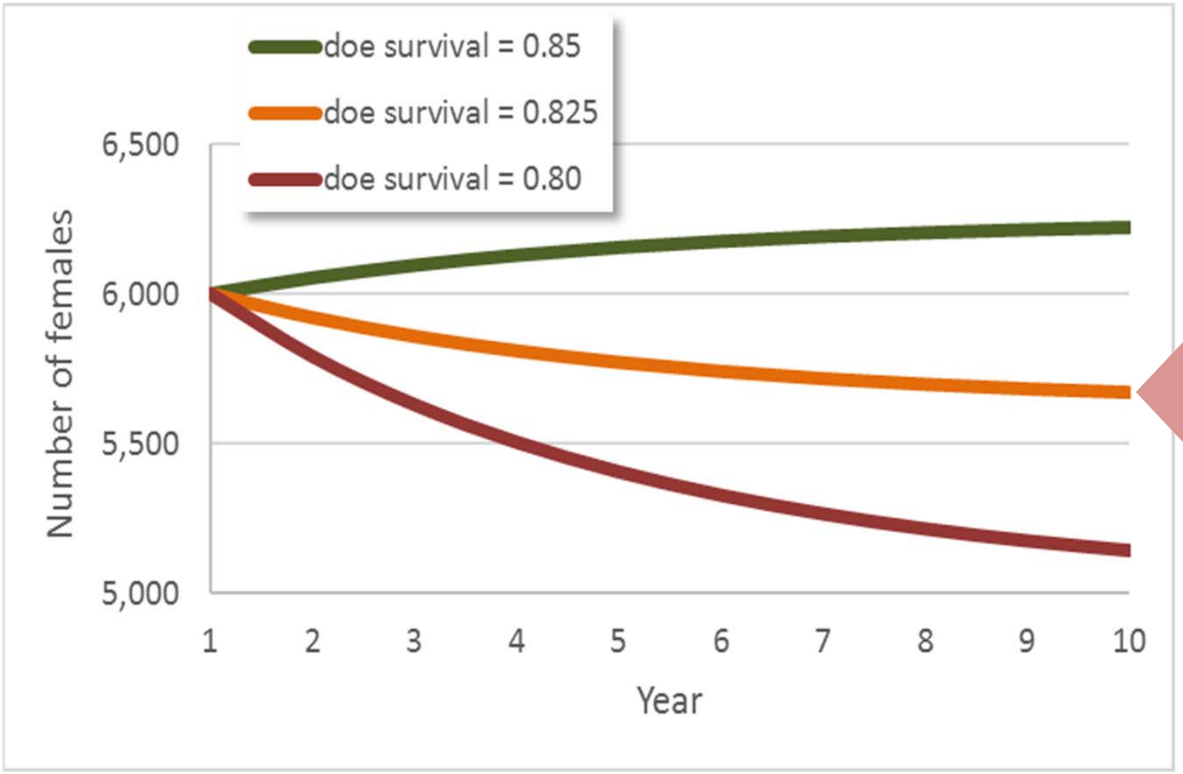
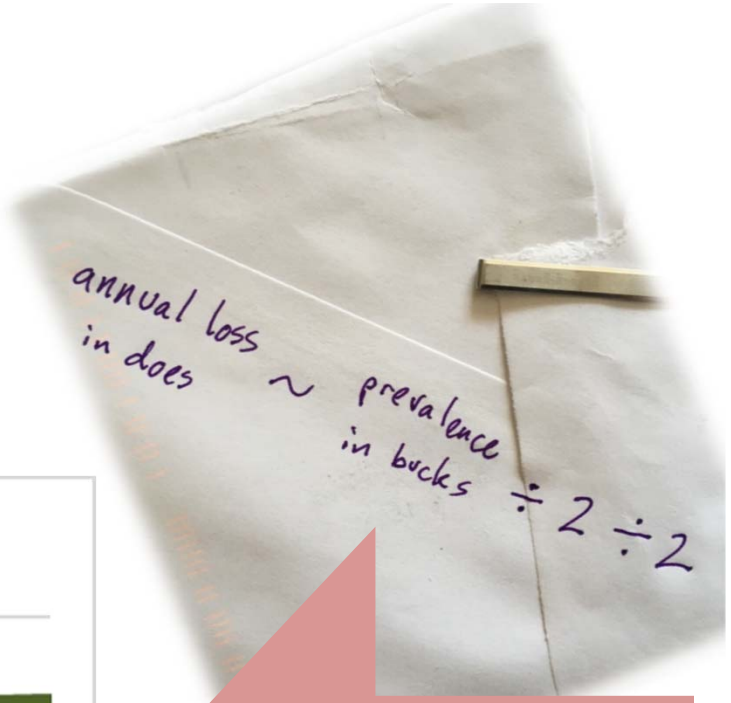


So why use a prevalence threshold?

- Here's the math:
  - $prev_{buck} \div 2 \div 2 = added\ loss_{doe}$
  - $10\% \div 2 \div 2 = 2.5\%$
  - $85\% - 2.5\% = 82.5\%$

So why use a prevalence threshold?





At the 10% prevalence (in bucks) threshold, affected herds would begin to decline.

LIVE LIFE OUTSIDE

Three Substantive Findings

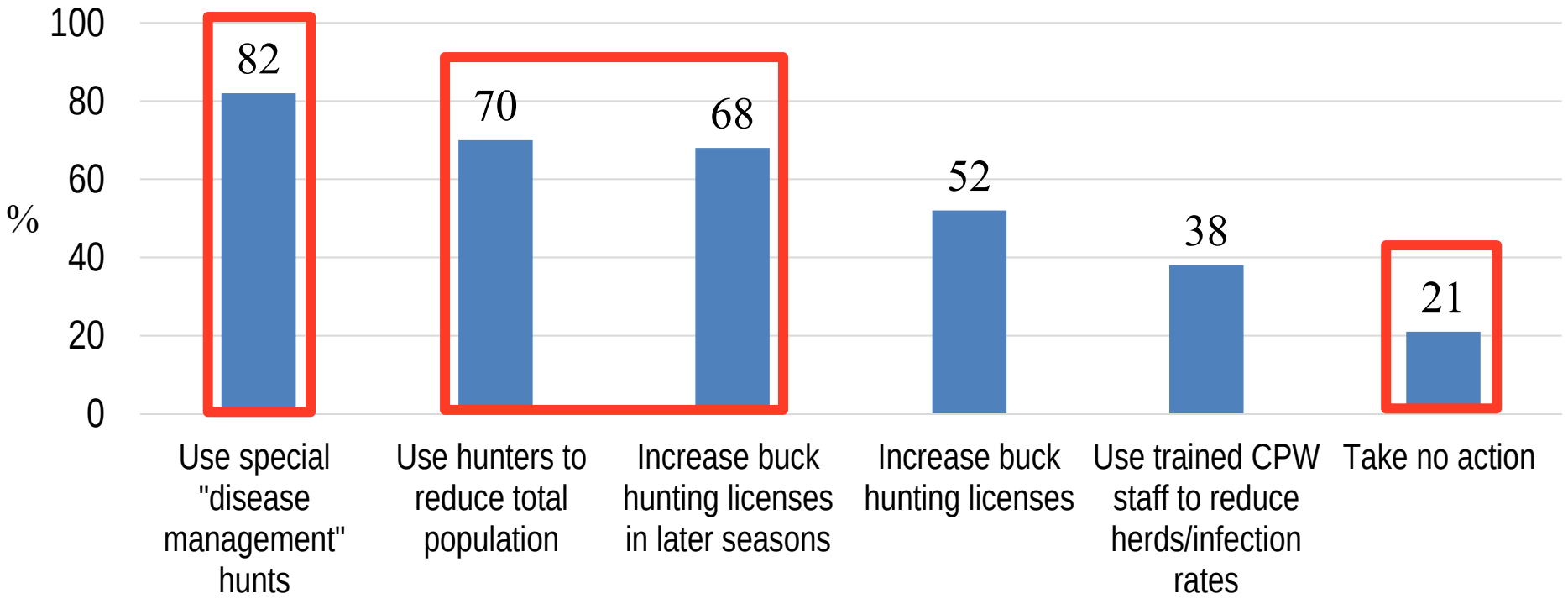
- Hunters are concerned about CWD & **strongly support** taking action to combat it.
- Hunters prefer we **balance** hunting opportunity & disease control… *but want us to err on side of control.*
- We stand to **lose hunters** in affected areas if prevalence increases.

LIVE LIFE OUTSIDE

Hunter Perspectives About Chronic Wasting Disease & Management: Preliminary Survey Results

Three Substantive Findings

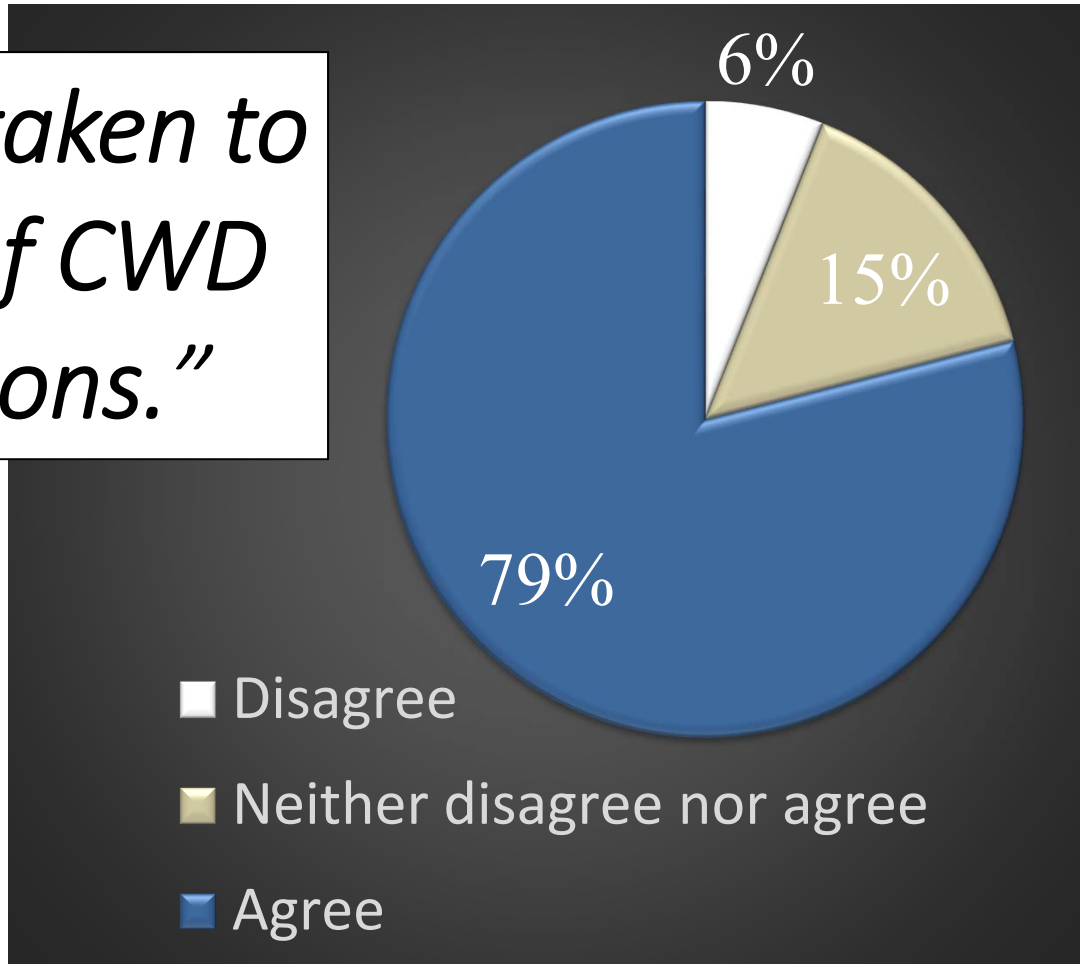
"Acceptable" actions



LIVE LIFE OUTSIDE

Three Substantive Findings

"Effort should be taken to reduce the rate of CWD in deer populations."



It is common sense to take a method and try it. If it fails, admit it frankly and try another. But above all, try something.

Franklin D. Roosevelt