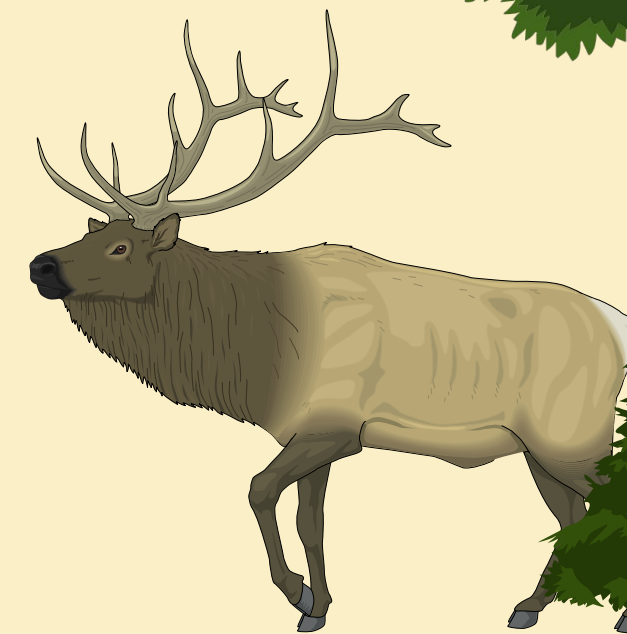


A Review of Chronic Wasting Disease Management Strategies

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What is Chronic Wasting Disease?

- Highly contagious, fatal disease of the brain and central nervous system caused by a prion protein
- Affects cervids : deer, elk, reindeer, and moose
 - Experimentally shown to infect squirrel monkeys and laboratory mice that carry some human genes
- Found in the US, Canada, Norway, and South Korea
 - 31 US states
 - 4 Canadian provinces



How does CWD affect humans?

- No reported cases in humans
 - BUT - due to risks of transmission, CWD-infected cervids should not be consumed
- Impacts hunting practices
- Impacts food sovereignty
- Impacts economies



How does CWD affect animals?

- Spread through body fluids
 - Feces, saliva, blood, urine
- Symptoms: drastic weight loss (wasting), stumbling, listlessness, and other neurologic symptoms
- May take over a year before infected cervid develops symptoms
- Always fatal



How does

the environment

play a role?

- CWD is spread to animals through either direct contact or indirect contact with the environment
- Environmental reservoir: soil, food, water
 - Evidence the disease may remain infectious in the environment for years
 - Prions can be taken up into plants
 - Challenge to managing CWD

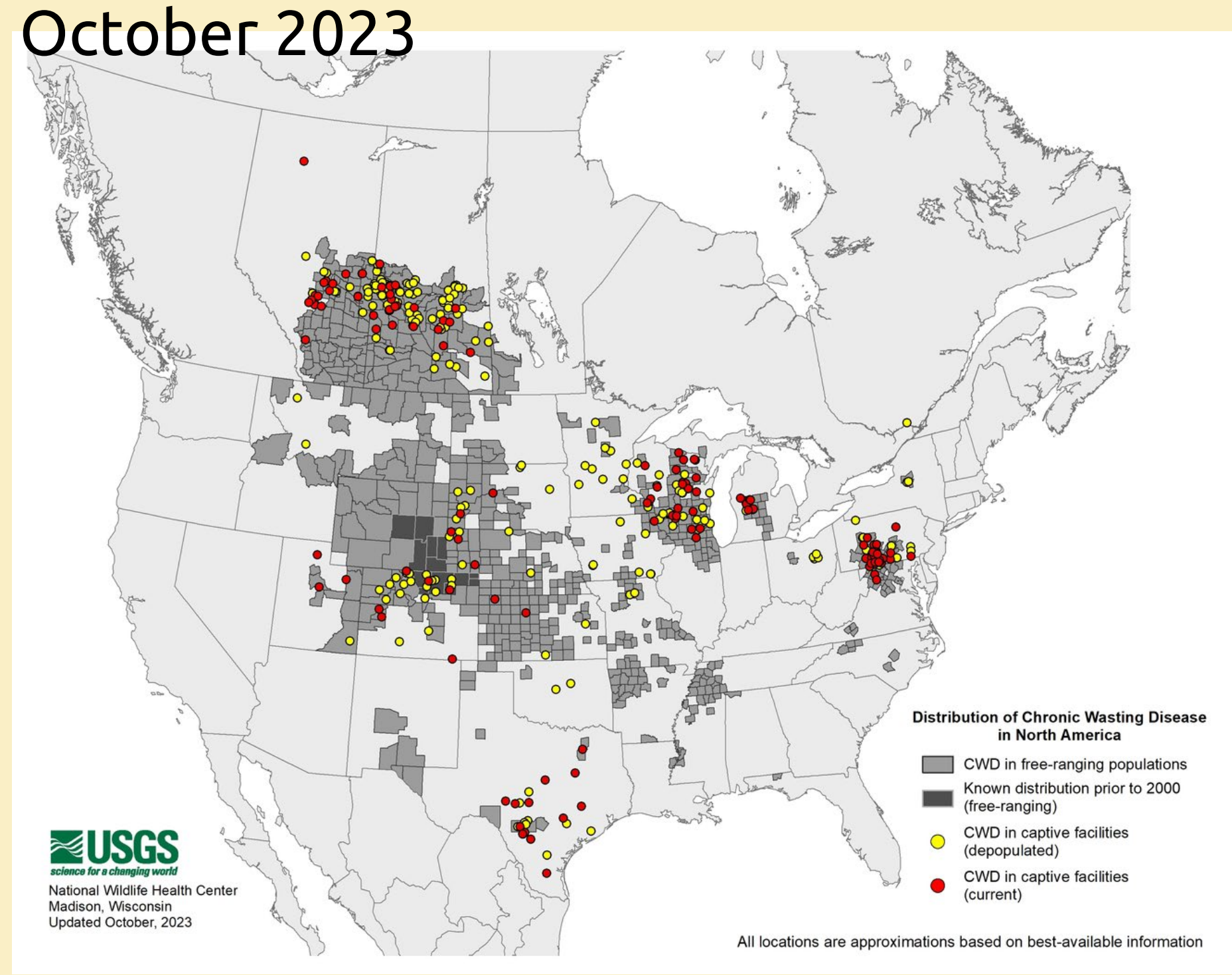
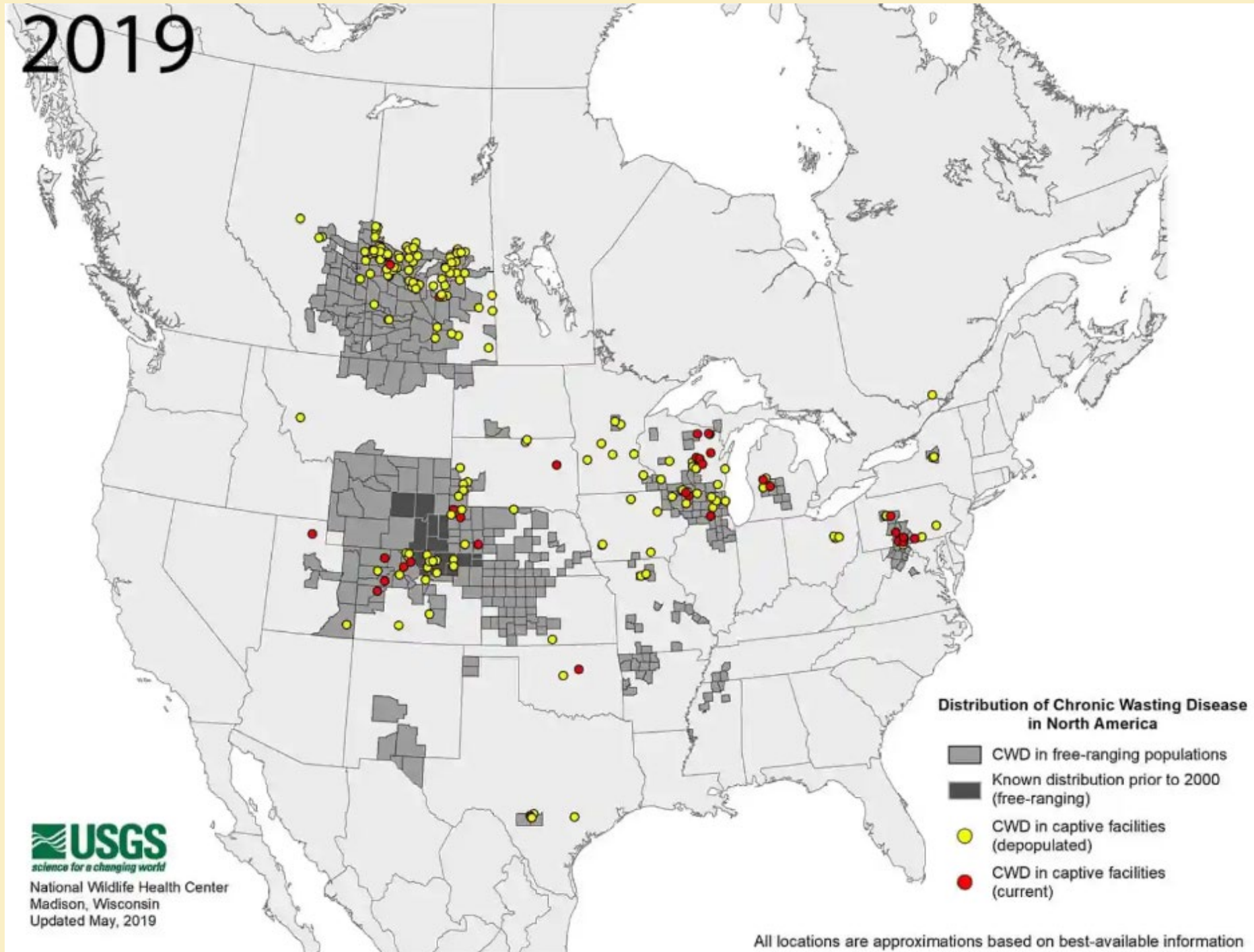


CWD management strategies

- Surveillance
 - Active
 - Passive
- Regulations
 - Consumption of CWD -infected animals
 - Import/export of live cervids & carcasses
 - Use of cervid lures and baits for hunting
 - Carcass disposal
 - Decontamination and disinfection methods for equipment
- Culling
- Planning, preparation
 - Plans should be developed before CWD is detected



Distribution of CWD in Canada & USA



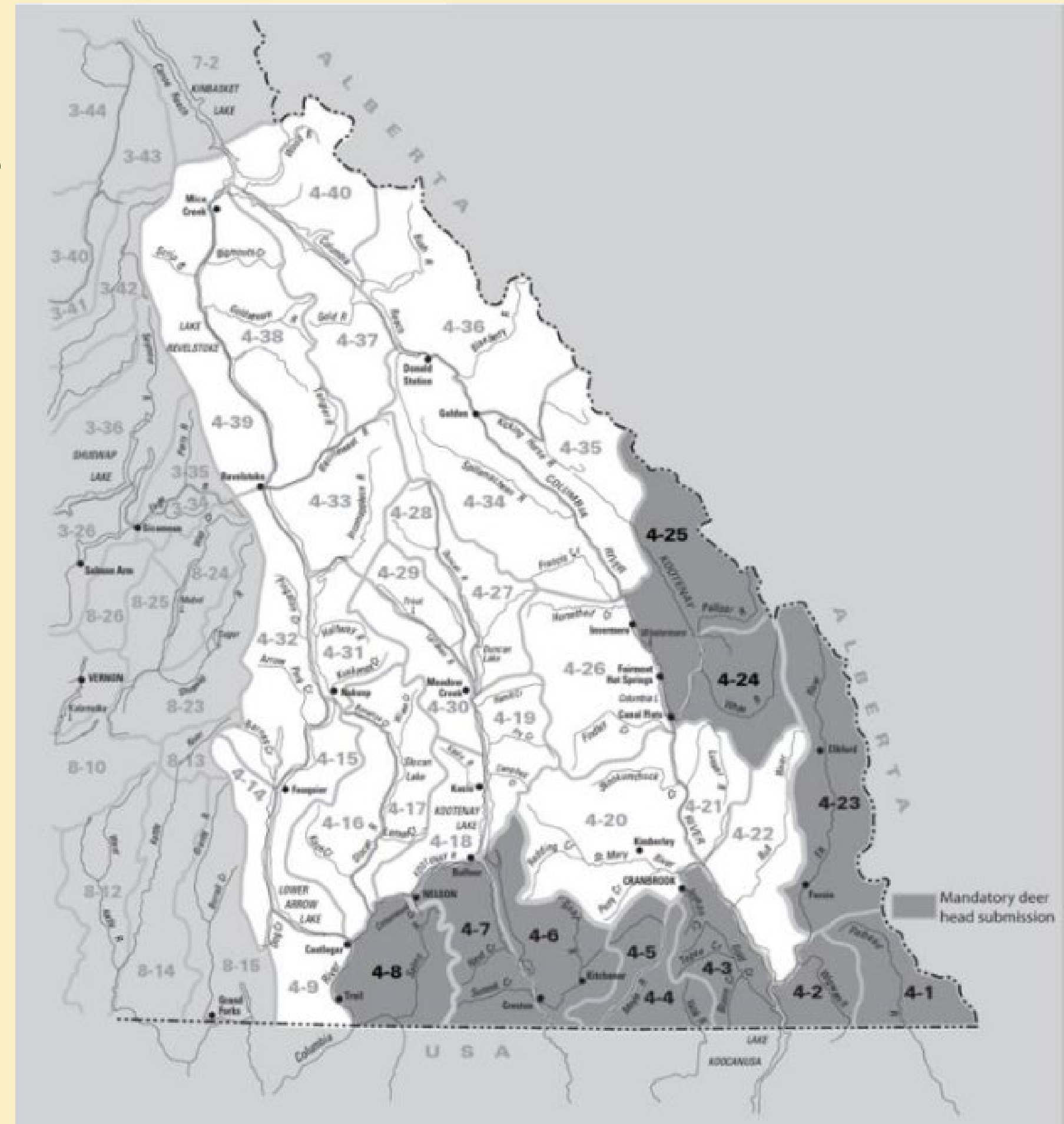
BC Surveillance Program

- Since 2002, BC CWD Program conducts CWD testing on cervids
 - No positive cases
- Hunter harvested cervids, road kills and other collected cervids



B.C. Surveillance Program

- Priority to high -risk areas, regions adjacent to CWD positive jurisdictions, and animals showing sign of CWD
- 11 management units where submission of hunted cervids is mandatory



<https://www2.gov.bc.ca/assets/gov/sports-recreation-arts-and-culture/outdoor-recreation/fishing-and-hunting/hunting/regulations/2020-2022/hunting-trapping-synopsis-2020-2022-region4.pdf>

<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wild-life/wild-life-conservation/wild-life-health/chronic-wasting-disease/cwd-surveillance-and-testing#aboutcwd>

When CWD enters BC, what should we do?

Objective: To identify management strategies used in other CWD regions and their success

- Systematic review of peer-reviewed literature
 - key words: “CWD” or “chronic wasting disease” in combination with “management”
 - searched across three databases (Web of Science, Scopus, and PubMed)
- Reviewed titles and abstracts across multiple rounds of screening to identify 264 relevant papers for in-depth review

Key findings



In many cases, management considerations have been theoretical

Mathematical models can inform management by projecting outcomes

Many managers consider integrating multiple strategies

Understanding local biology and landscape factors are critical

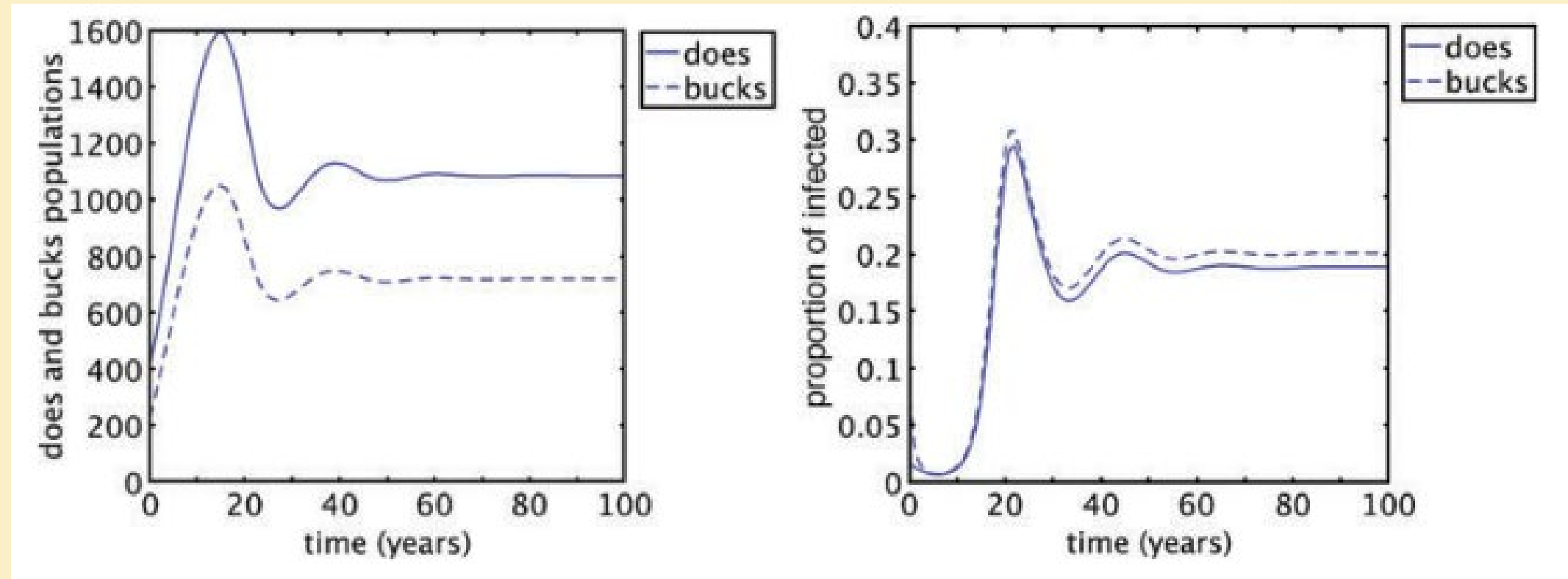
Community participation is crucial to management success

Key finding 1:

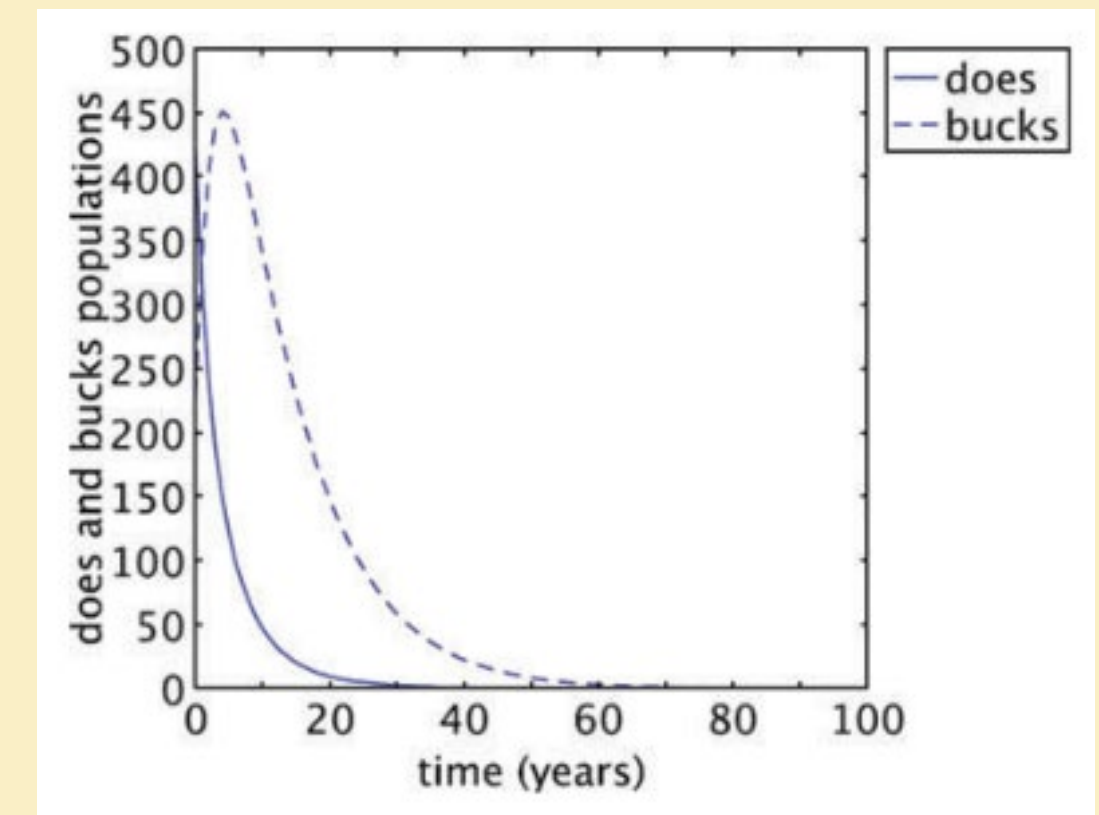
In many cases, management considerations have been theoretical, not applied in practice

- Al-arydah et al. (2016) model of deer harvest scenarios on disease prevalence in population
 - Low, moderate, & excessive harvest
 - Sex-stratified
 - Management unit in Alberta

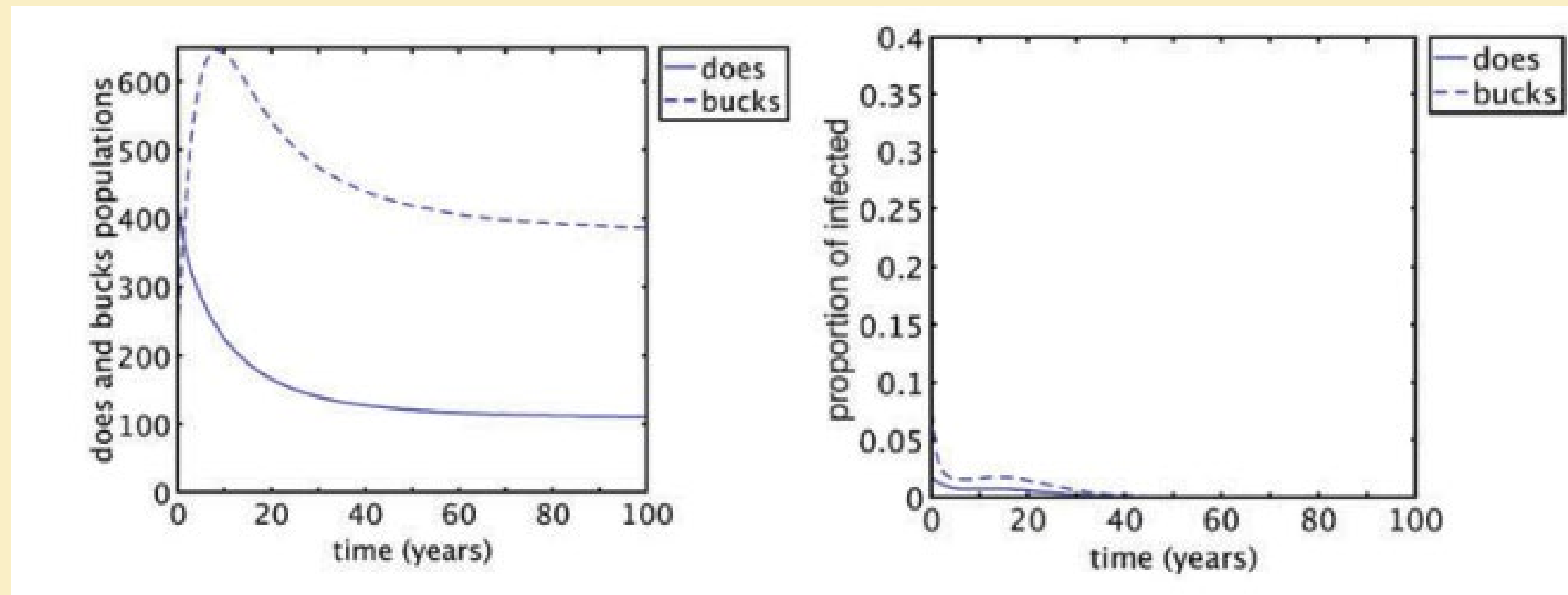
Low harvest



Excessive harvest



Moderate harvest

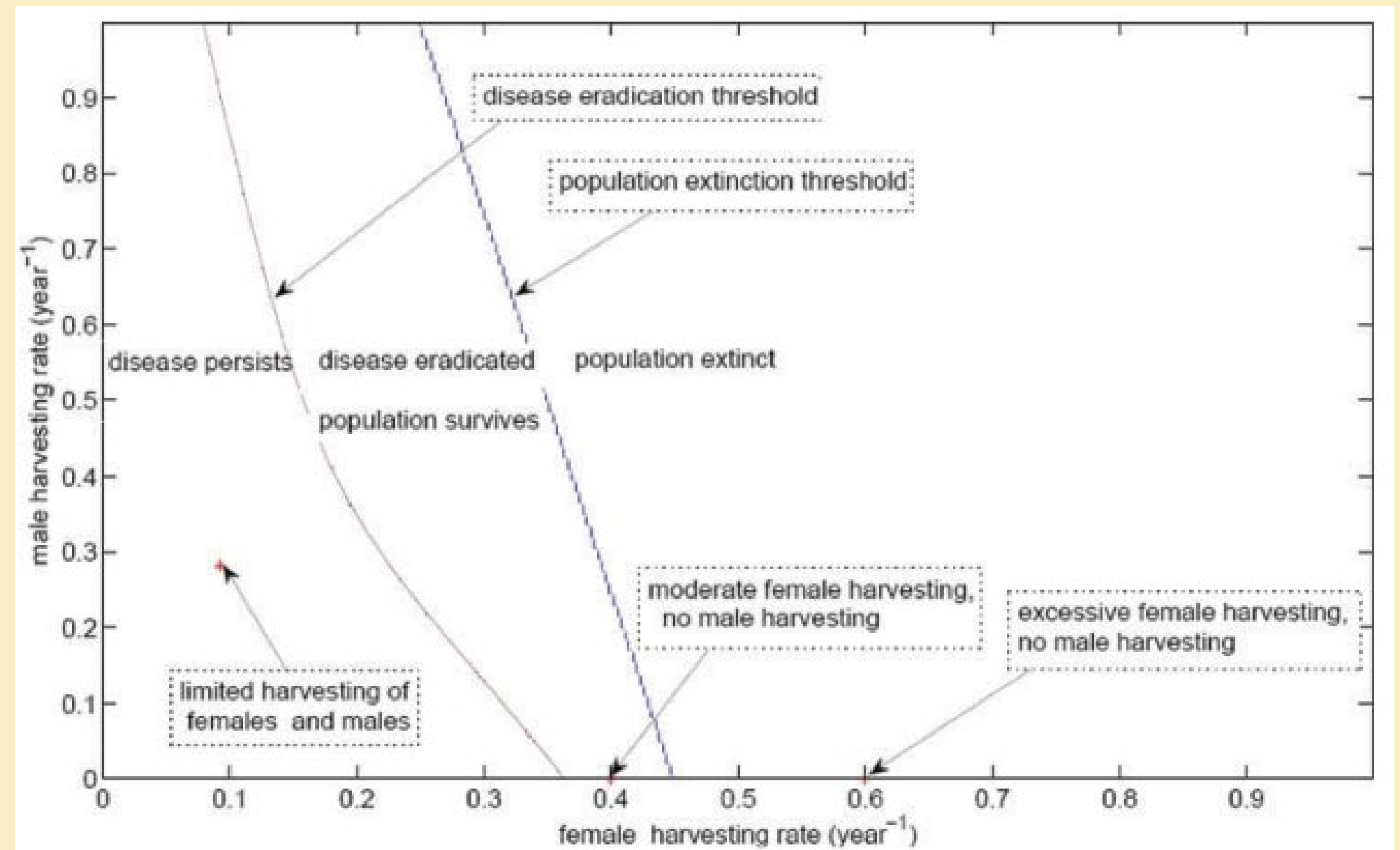


Key finding 2:

Mathematical models can be used to inform management by projecting potential outcomes

- Distribution of CWD
- Age -specific disease dynamics
- Changes in population size
- Effects of control strategies
- etc.

- Al-arydah et al. (2016) outcomes of harvesting deer by sex



Key finding 3:

Many managers consider integrating multiple strategies to manage CWD

- Complexity and difficulty of managing CWD
 - New York only state to have eliminated CWD after introduction
 - Culling
 - Import regulations
 - Containment area
- E.g. Harvest + vaccination of male deer in Wisconsin

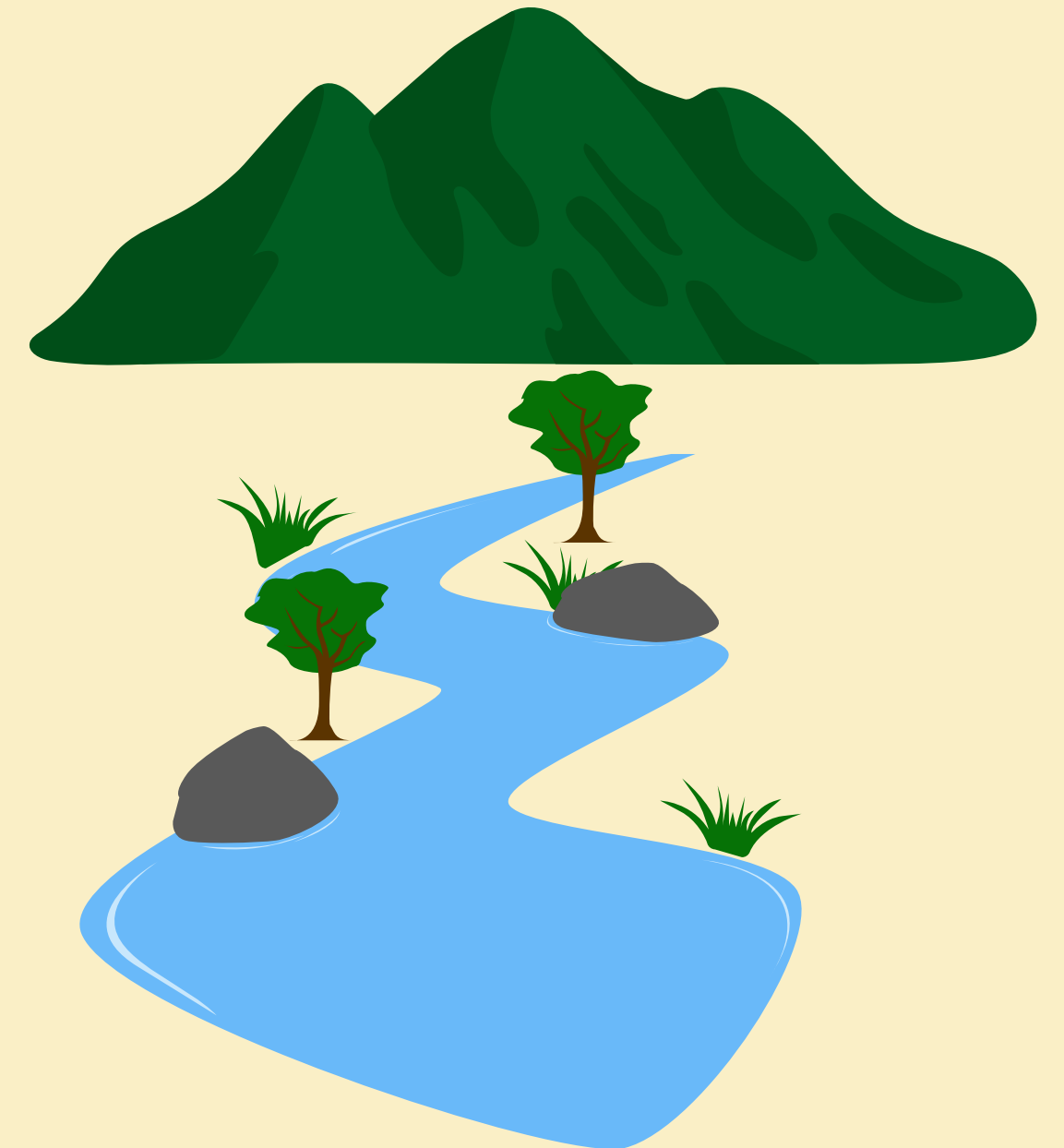
Jennelle et al. (2014)



Key finding 4:

Understanding local biology and landscape factors are important to identifying appropriate management measures

- Local transmission dynamics, population makeup, landscape factors, etc. will effect management outcomes
 - Midwestern USA study found that CWD spread is strongly influenced by highways & rivers which reduce gene flow Robinson et al. (2013)
 - Identified likely routes of disease spread
 - Prevalence of CWD by sex in Alberta Smolki et al. (2021)



Key finding 5:

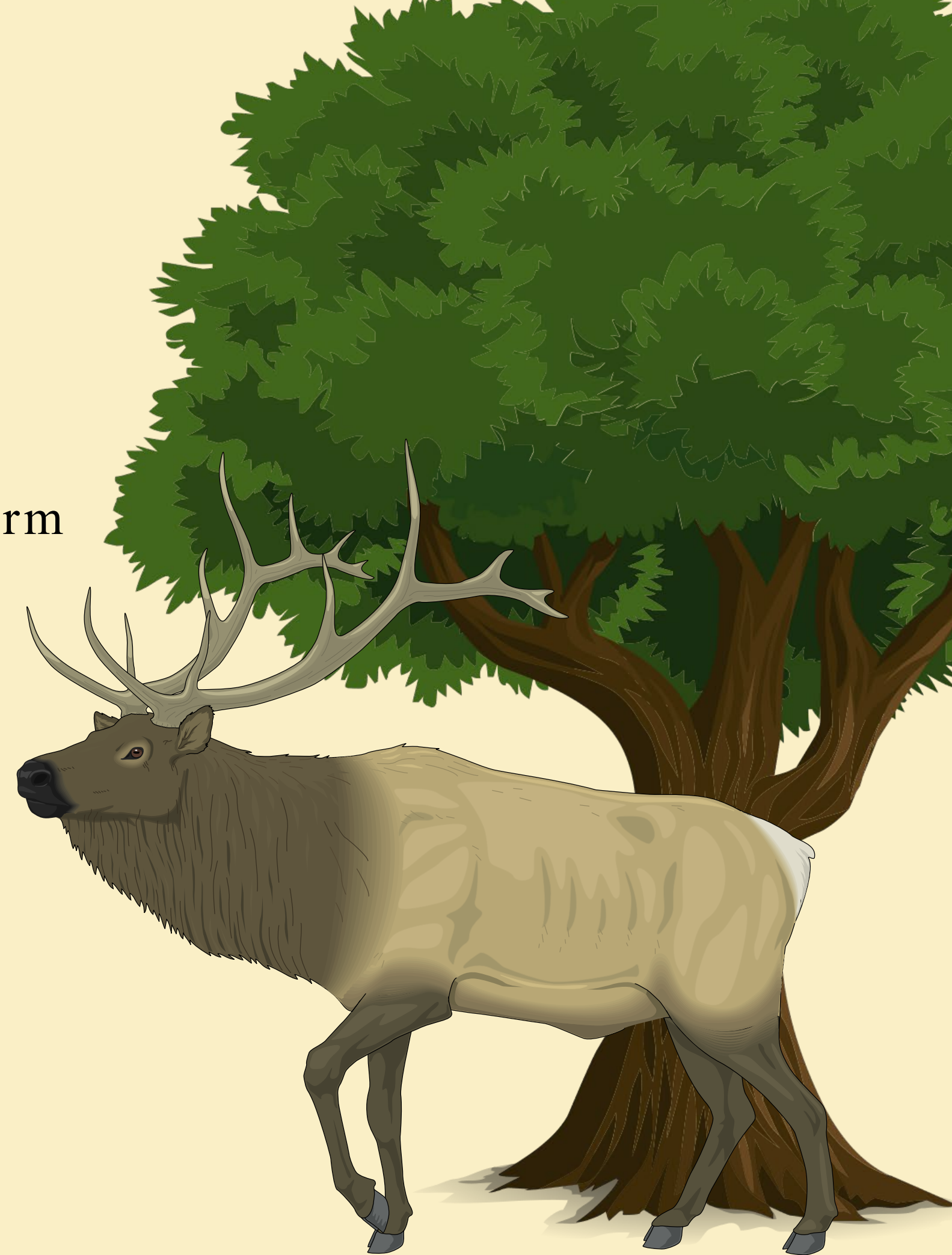


Community participation is crucial to management success

- Wisconsin: eradication program suspended due to public objections
 - Lack of community involvement Heberlein (2010)
- Studies report importance of:
 - community member's perceived risk of CWD Amick et al. (2015)
 - support and trust of CWD management agencies Cooney & Holsman (2010)
 - hunters' interest in participating in CWD surveillance, willingness to pay, barriers to participation Adhikari et al. (2022)

Summary & Next Steps

- Systematic review of CWD management to inform management decisions in BC
 - Key findings provide recommendations to management and reveal limitations in current research
- Next steps: now is the time for CWD planning in BC
 - Human dimensions research



Thank you to the
fantastic team:

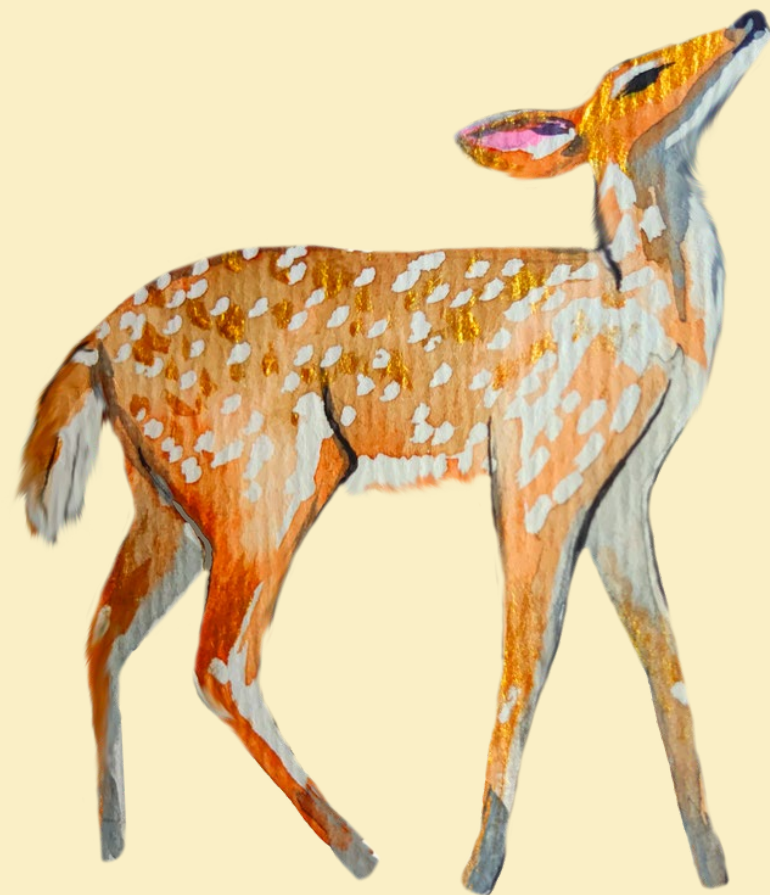
Kaylee Byers

Cait Nelson

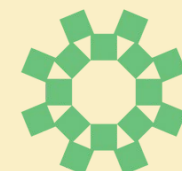
Sarah Robinson

Maeve Winchester

Caeley Thacker



Ministry of
Water, Land and
Resource Stewardship



PIPPS

Pacific Institute on Pathogens,
Pandemics and Society