Montana Invasive Species Summit 2018

Species with Potential Economic Benefits, Known Environmental Impacts: Russian olive

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Russian olive introduction: how and why

- earliest U.S. introductions attributed to German settlers who brought plant material from Russia to South Dakota in the late 1800s (Hansen 1901)
- endorsement by western, southwestern state horticulturalists in the early 1900s led to widespread planting (Christensen 1963)
- used as an ornamental and shade tree, in windbreaks, for erosion control, and more recently, for wildlife habitat enhancement and as a nectar source for honey bees (Olson and Knopf 1986; Zouhar 2005)

Bulletin No. 194 March, 1941

Shelter Belts for Montana

By

E. E. Isaac, Extension Forester

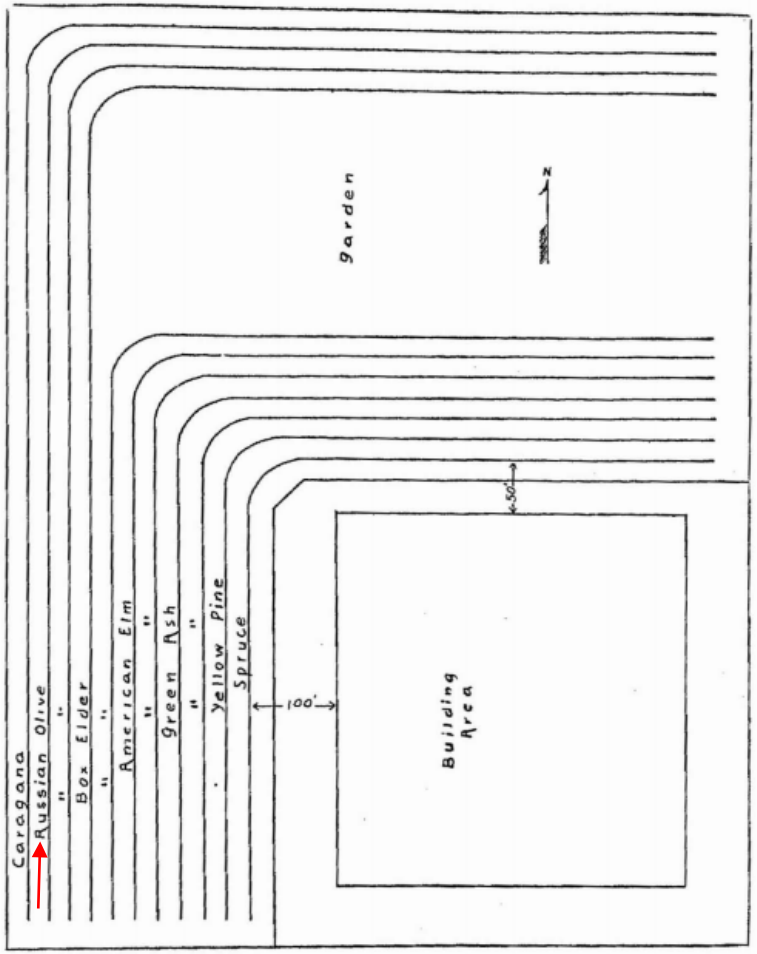


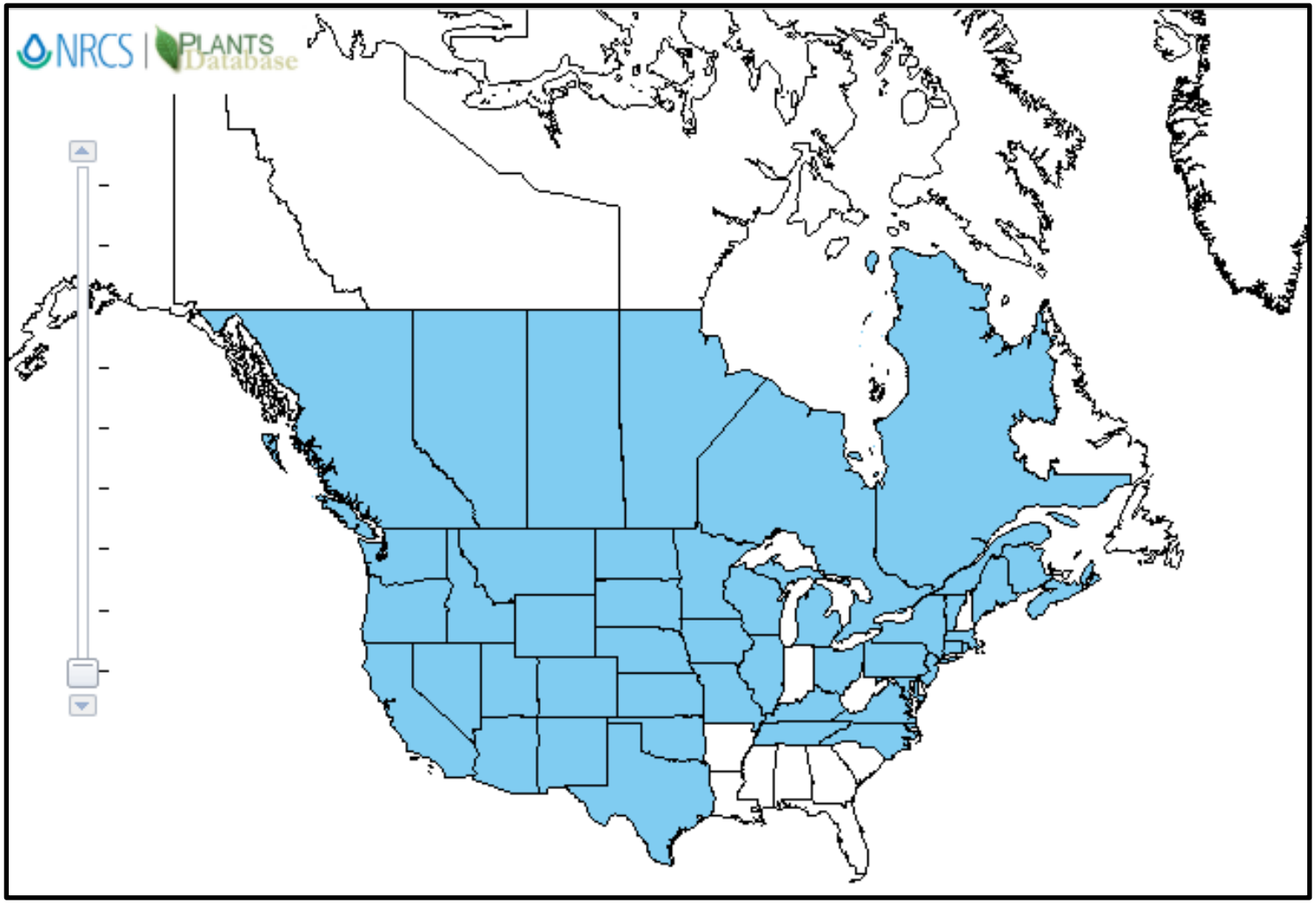
Fig. 1—Showing arrangement of tree species for protection of buildings and garden.

Russian Olive—The Russian Olive is a small tree, winter hardy in most parts of the state, and very drouth resistant. So far it has not been bothered by insects to the extent that other species have. It is by far the most satisfactory species for dry locations in eastern Montana where it may be used to plant in the outside row in place of the caragana.

Russian olive establishment: how and where

- escape from cultivation first reported in 1924 (Christensen 1963)
- now estimated to be the fifth most abundant riparian plant species in the western United States (Friedman et al. 2005)
- naturalized in at least 17 U.S. states (Olson and Knopf 1986) and five Canadian provinces (Katz and Shafroth 2003)
- >$600,000 invested 2005-07 to mitigate negative effects of Russian olive on Montana agricultural production (Montana Audubon 2010)

Russian olive invasion: current distribution

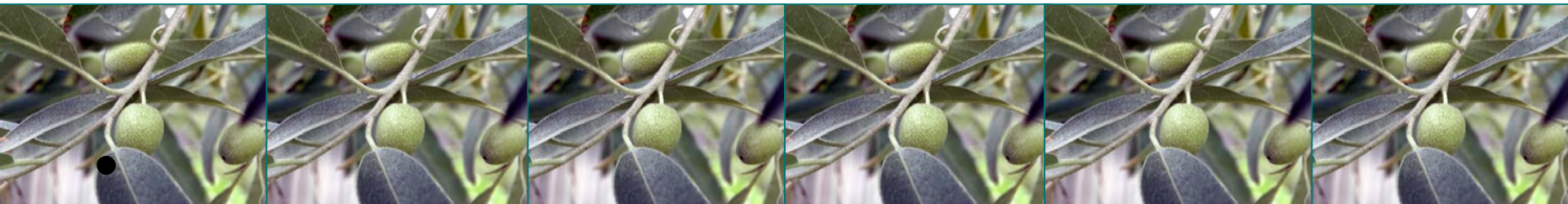


Life history traits contributing to the invasive success of Russian olive:

- brief juvenile period (3-5 years)
- colonizes sites where soil is nutrient-poor due to nitrogen fixation by symbiotic *Frankia* actinobacteria in root nodules
- efficient seed dispersal from the parent plant
- phytochemical or mechanical (thorns) protection from predation/parasitism
- wide latitudinal native (western to central Asia) and adopted (northern Canada to southern Texas) range

Conflict of Interest

- deliberately introduced to NA, now invasive in western US and Canada
- noxious weed status in 4 states
- 2010 became priority 3 regulated plant in MT
- conflict of interest:
  - wildlife, livestock and horticultural benefits vs. ecological and economic costs



Benefits

- shade tree
- wind break/shelter belt
- food resource for wildlife
- provides shelter and protective cover for wildlife and livestock
- nectar source for bees

Detriments

- displaces native plant species
- reduces wildlife and livestock access to water, forage
- high cost of removal from irrigation canals
- water loss

Photo: Randy Westbrooks

UGA1299200

Detriments

- focuses beaver attack on cottonwoods ✓
- increases risk of West Nile Virus infection ✓
- increases risk of hantavirus ✓
- increases risk of avian predation ✓
- compromises habitat quality of bats and other cavity nesting species ✓

focuses beaver attack on native cottonwoods:

- 77% cottonwoods <50m from river channels on the Marias River or Yellowstone River were damaged by beavers, while beaver injury to Russian olive was typically absent or insignificant (Lesica and Miles 1999, 2001)
- cottonwood establishment is often restricted to lower terrace sites along regulated rivers, precisely where beaver activity is most concentrated (Lesica and Miles 2004)

increases potential for West Nile virus infection:

- Russian olive understory provides a cool, moist microhabitat favoring mosquito longevity
- increased lifespan increases potential for mosquitos infected with West Nile virus to become infectious and able to transmit the virus to avian, equine and human hosts

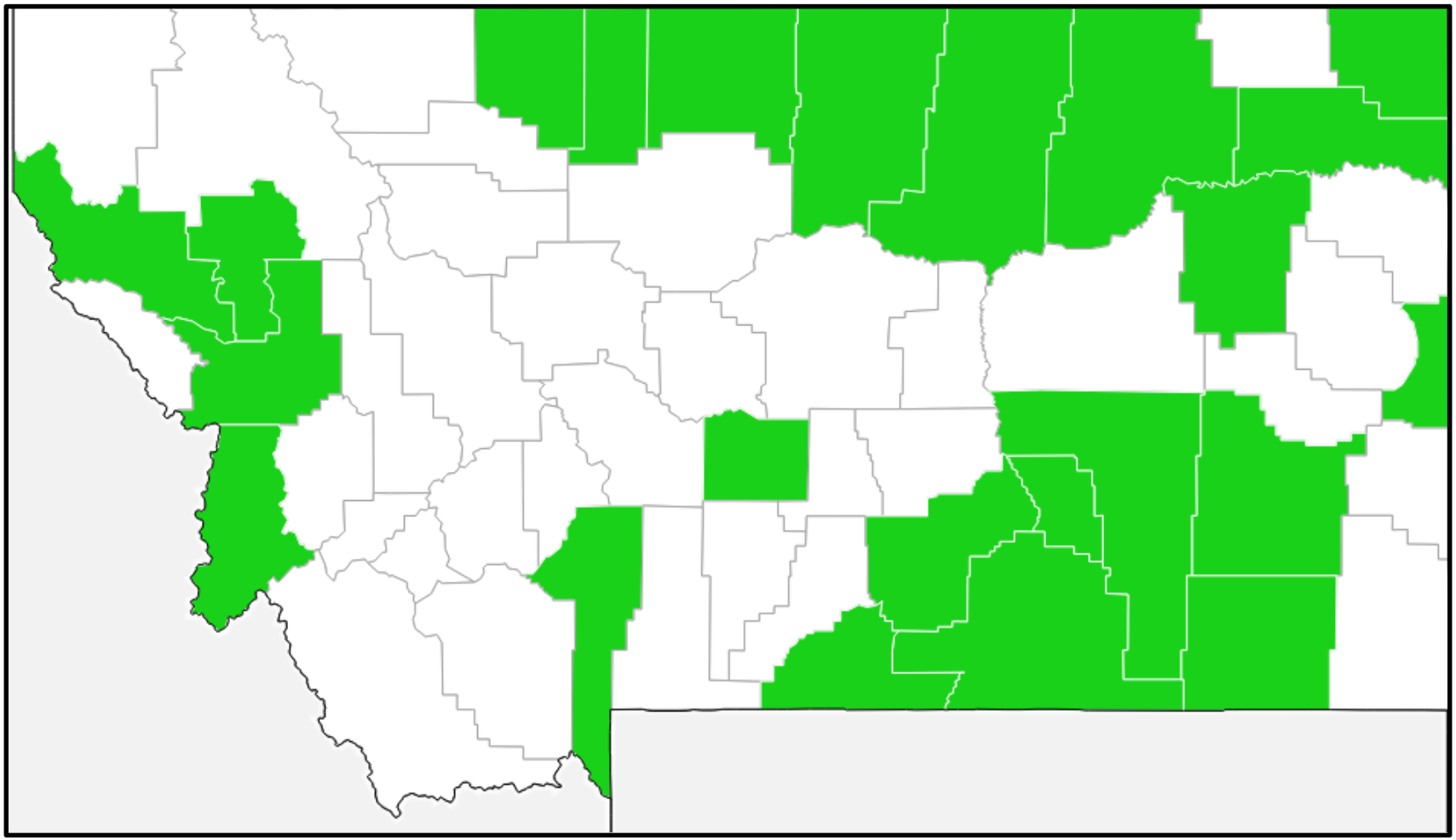
increases potential for West Nile virus infection:

- *Culex tarsalis* is a mosquito species that can be infected with and competently vector West Nile Virus (WNV)
- more *C. tarsalis* were captured in Russian olive and caragana shelterbelt (n=183) than marsh (n=7) or grass (n=0) habitats at Medicine Lake National Wildlife Refuge (Friesen and Johnson 2013)

increases potential for West Nile virus infection:

- another study found that mourning dove *Zenaida macroura* prefers to nest in Russian olive, utilizing it at a disproportionately higher rate than its relative availability (Stoleson and Finch 2001)
- the Medicine Lake National Wildlife Refuge study identified mourning dove as the wildlife species most frequently used as a host by blood-fed engorged *C. tarsalis*
- mourning dove can be infected with WNV

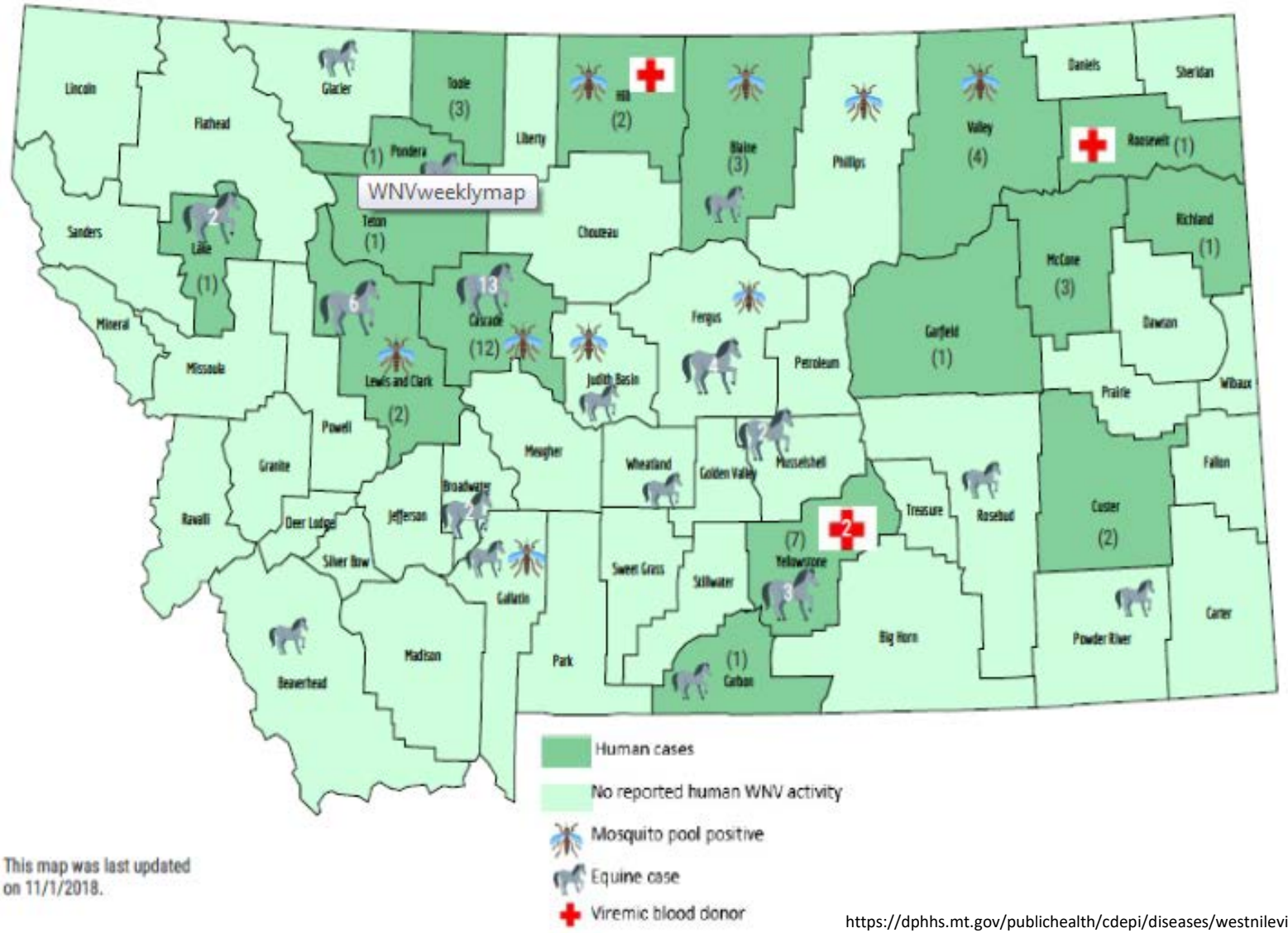
Russian olive distribution - Montana



EDDMapSWest
Early Detection & Distribution Mapping System

West Nile Virus Activity by County

Montana, 2018



This map was last updated on 11/1/2018.

https://dphhs.mt.gov/publichealth/cdepi/diseases/westnilevirus

Greater Sage-Grouse positive for WNV – Naugle et al 2004

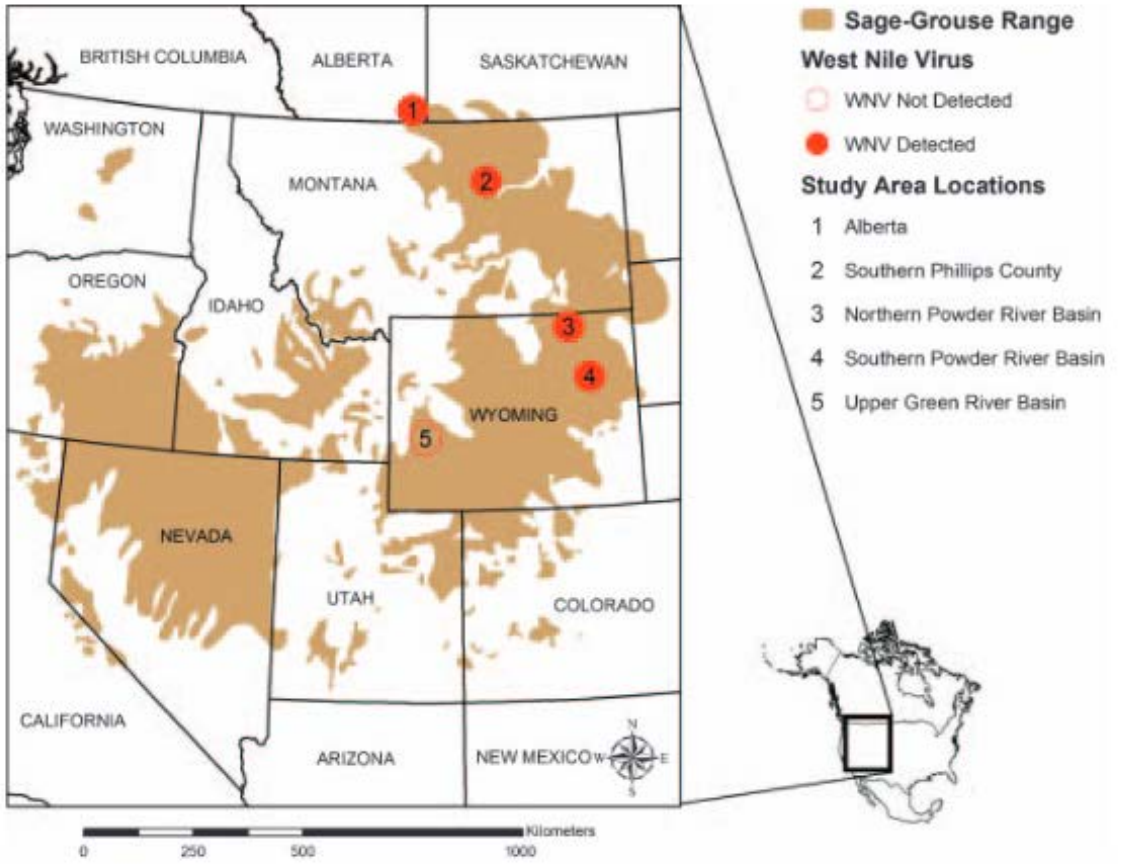


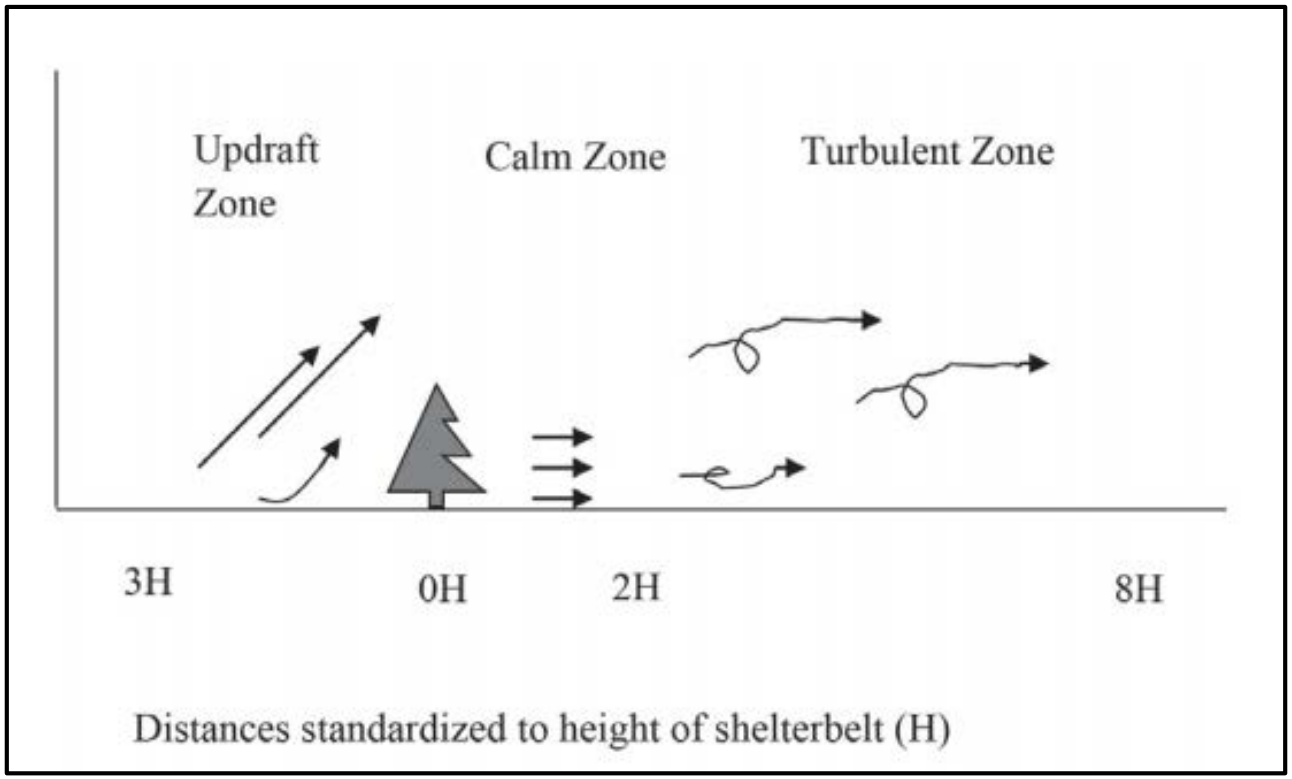
Figure 3 North American distribution of greater sage-grouse (tan) and locations of five study sites. Range map provided by Michael A. Schroeder, Washington Department of Fish and Wildlife (http://sagemap.wr.usgs.gov/).

increases risk of hantavirus:

- Knopf and Olson (1984) conducted an assessment of wildlife diversity in UT, ID and CO
- small mammal traps set up in riparian areas dominated by 1) native vegetation or 2) monotypic stands of Russian olive, for comparison to 3) adjacent upslope sites
- deer mouse was the most abundant small mammal species captured in all habitat types
- nearly twice as many deer mice captured on riparian sites dominated by RO (n=52) than on sites dominated by native plant species (n=27)

Borgo, J. S., & Conover, M. R. (2016). Influence of shelterbelts on success and density of waterfowl nests within the Prairie Pothole Region of North America. Waterbirds 39:74-80.

- wind contact with shelterbelts produces consistent airflow patterns



Borgo, J. S., & Conover, M. R. (2016). Influence of shelterbelts on success and density of waterfowl nests within the Prairie Pothole Region of North America. Waterbirds 39:74-80.

- because some predators use olfactory cues ('smells') to detect prey, airflow patterns in shelterbelt zones should influence predators' ability to locate prey, particularly in the calm zone
- Borgo and Conover (2016) found that waterfowl seldom located their nests in shelterbelt calm zones
- trees next to shelterbelt calm zones provide perches for avian predators, which probably also deters nesting in these locations

Gazda, R. J., Meidinger, R. R., Ball, I. J., & Connelly, J. W. (2002). Relationships between Russian olive and duck nest success in southeastern Idaho. Wildlife Society Bulletin, 337-344.

- study initiated after managers of wildlife areas in southeast Idaho reported that although breeding pairs of ducks were common, broods were not
- predation attributed to black-billed magpies, the only avian predatory species present when ducks were nesting, and to the type of pecking marks found on duck eggs
- duck nesting success varied inversely with Russian olive abundance at a regional scale:
  - 42.9% where RO abundance was low
  - 19.8% where RO abundance was moderate
  - 6.8% were RO abundance was high
- no correlation found between duck nesting success and increased distance from active magpie nests

Russian olive as bird food: the downside

- 37 avian species reportedly feed on Russian olive fruits (Van Dersal 1939, Borell 1951)
- European starling flocks in CO observed feeding continuously on Russian olive fruits in late fall/early winter (Edwards et al. 2014)
- fruits consumed by starlings had a germination rate of 57% (0% for unconsumed fruits) and 85% viability (Edwards et al. 2014)

Future of bats in Montana?

- 15 bat species in Montana – all are native
- 8 are species of concern
- 2 are potential species of concern
- all NA bats are threatened by white-nose syndrome and habitat loss or degradation
- 2 species are documented to feed on mosquitoes

Bat affinity for riparian areas dominated by cottonwood vs. Russian olive:

- trees 25-30 m tall
- forms open canopy
- branches not thorny
- wood relatively soft
- thick loose bark

- trees <15 m tall
- forms dense, closed canopy
- branches thorny
- wood very hard
- thin stringy bark

Riparian areas dominated by Russian olive:

Photo: T. Davis Sydnor

- trees <15 m tall
- forms dense, closed canopy
- branches thorny
- wood very hard
- thin stringy bark

Bat affinity for riparian areas dominated by cottonwood vs. Russian olive:

- cottonwoods provide more open understory for bat flight and foraging
- provide more roosting habitat for bats in the canopy, behind loose bark, in cavities
- attract more cavity-making birds (woodpeckers, nuthatches, chickadees) to generate cavities that can be used by bats
- insect species used by bats more abundant in cottonwood stands

Paul Hendricks, Susan Lenard and Linda Vance
– Montana Natural Heritage Program

A WEED OR A WONDER?

Non-native Russian olive trees a nuisance to some, savior to others

LORNA THACKERAY Of The Gazette Staff Aug 2, 2009

State asked to balance benefits, drawbacks of Russian olives

LORNA THACKERAY Of The Gazette Staff Aug 2, 2009

For your consideration…

- consider sources of risk to human and animal health correlated with the presence of Russian olive (WNV, hantavirus)
- consider increased predation risk to avian species by predators using Russian olive as a hunting perch
- consider the potential local extirpation of native bat species and cavity nesting birds when Russian olive displaces cottonwood
- consider that the benefit of Russian olive as a wildlife food source is tempered by increased germination rates and unchecked spread
- seriously consider if Russian olive in shelterbelts is harmless