

# Biocontrol of Saltcedar

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Saltcedar Biological Control  
Consortium

# History of Saltcedar Biocontrol Is ...

- A longish history of “conflicts of interest”:
  - Initial project in 1970’s dropped:
    - Honey bees and honey
    - White-winged doves and hunting
  - Project revisited in late 1980’s:
    - Earlier conflicts resolved
    - Two biocontrol agents approved in 1994
    - But ...

# Southwestern Willow Flycatcher

- Federal endangered species
- Nests in saltcedar in some areas



- Will biocontrol put SWFL at further risk by reducing suitable nesting habitat?

# Genus *Frankenia* (Frankeniaceae)

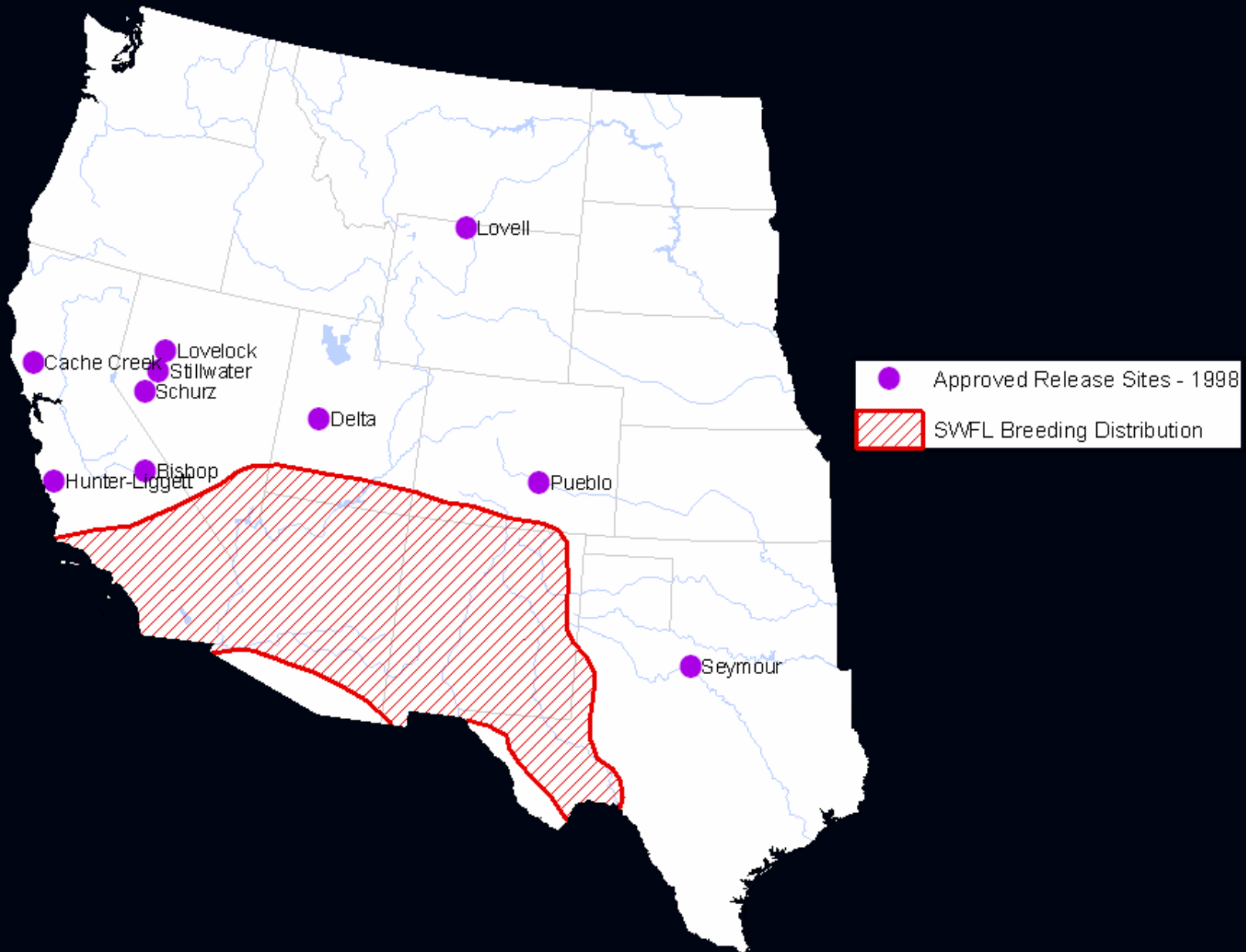
- Four native species:
  - *F. johnstonii*
    - Federal endangered species until 2003
    - Texas



# Compromise

- 3-year Experimental Release Program for *Diorhabda elongata*:
  - Fukang (China) and Chilik (Kazakhstan) ecotypes
  - Intensive monitoring of the agent, its impact on saltcedar as well as other vegetation and wildlife including birds, bats, small mammals, reptiles and amphibians
  - Year 1 (1999) – Field cage releases
  - Years 2 & 3 (2000-2001) – Open field releases

# Approved Experimental Release Sites



Saltcedar Leaf Beetle  
*Diorhabda elongata*



A close-up photograph of a saltcedar leaf beetle egg cluster. The cluster consists of approximately 15 small, round, light-brown eggs arranged in a dense, elongated group on a green, woody stem. The background is a blurred green, suggesting a natural outdoor setting. The image is framed by a dark blue border on the right side.

**Saltcedar Leaf Beetle  
Egg Cluster**



# Saltcedar Leaf Beetle Larvae

2<sup>nd</sup> Instar

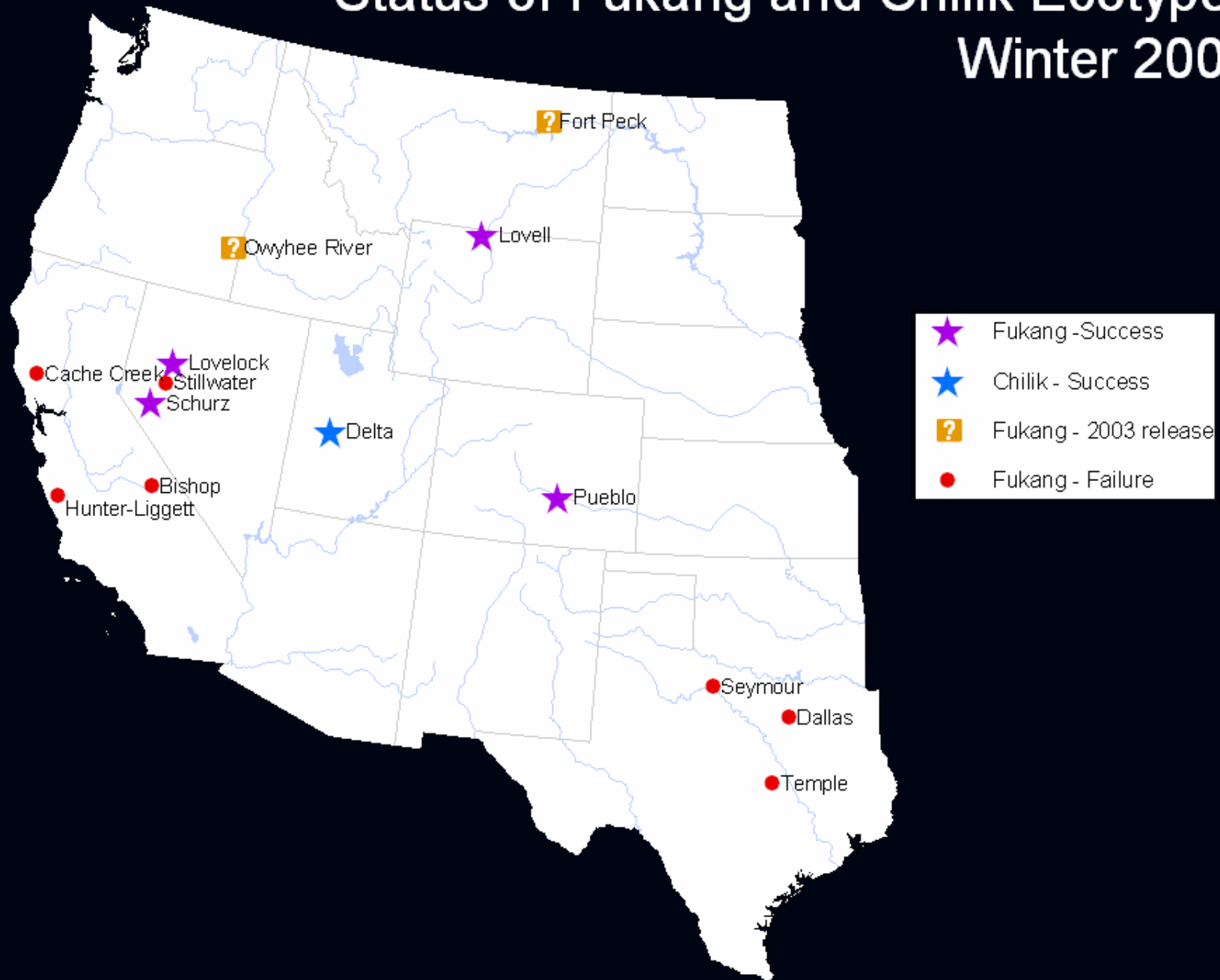
1<sup>st</sup> Instar



Saltcedar Leaf Beetle  
3<sup>rd</sup> Instar Larva



# Status of Fukang and Chilik Ecotypes Winter 2004



# “Successful” Sites

Fukang & Chilik Ecotypes



**Lovell, WY Field Cage Site**

# Field Cage Results – Lovell, WY

- First released in 1999 (Fukang strain)
- Successfully overwintered 4 of 4 years
- Two generations per year
  - Adults are overwintering stage
- Overwintering adults become active shortly after bud break (early- to mid-May)
- Larvae/adults present through mid-September

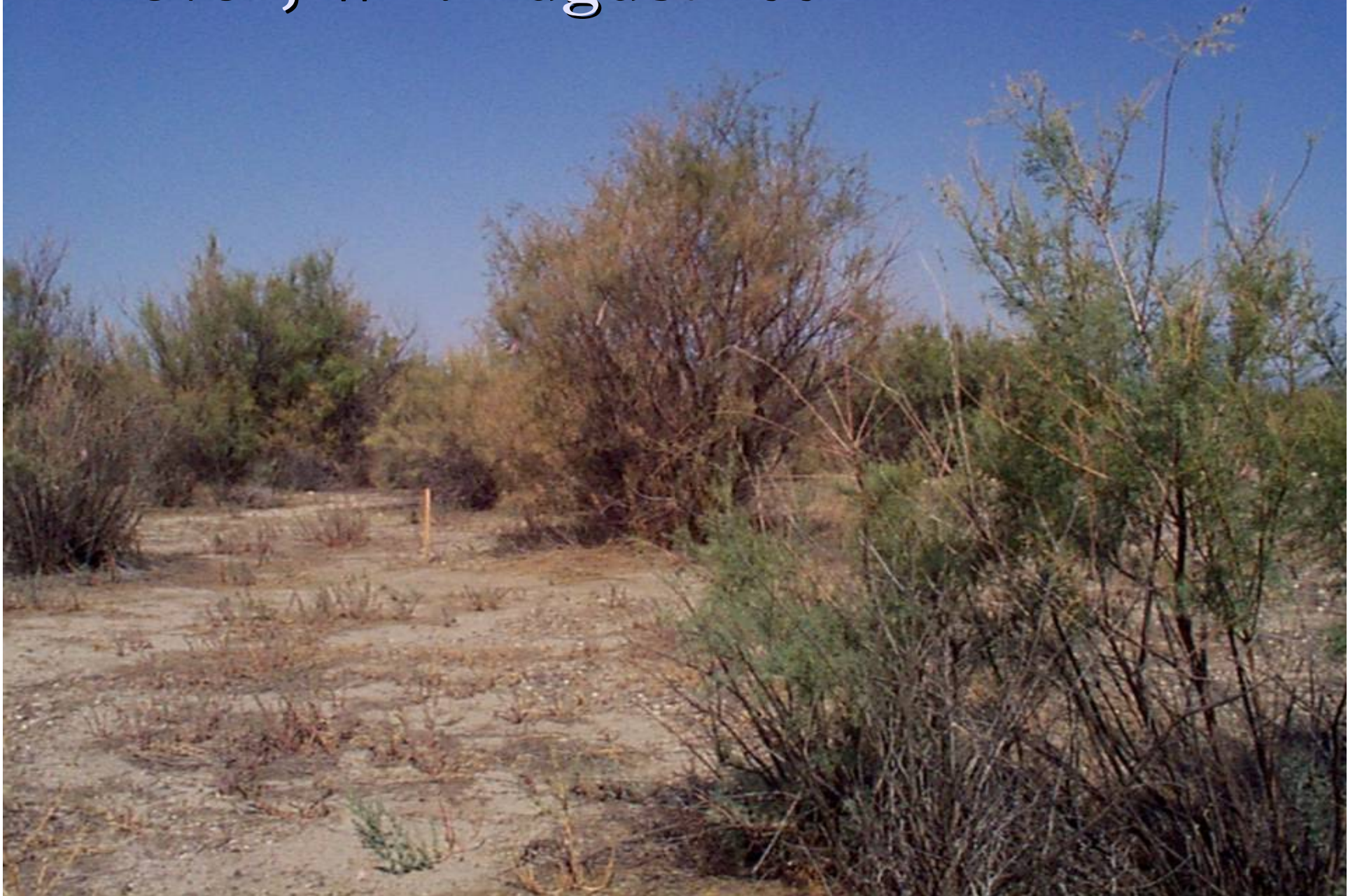


# Open Field Releases – Lovell, WY

- 2001 releases:
  - *Late-May*: 750 overwintering adults
  - *Late-July to mid-August*: 12,645 1<sup>st</sup> generation adults and 14,750 2<sup>nd</sup> generation larvae
  - *Total*: 28, 145
- How NOT to release!!!
- Adults/larvae found up to 40 meters from release point in 2001



Lovell, WY: August 2001



# Lovelock, NV – August 2002



# Lovelock, NV – September 2003



# Lovell, WY – August 2003



**Lovell, WY – September 2003**



# Lovell, WY: August 2003



# Pueblo, CO





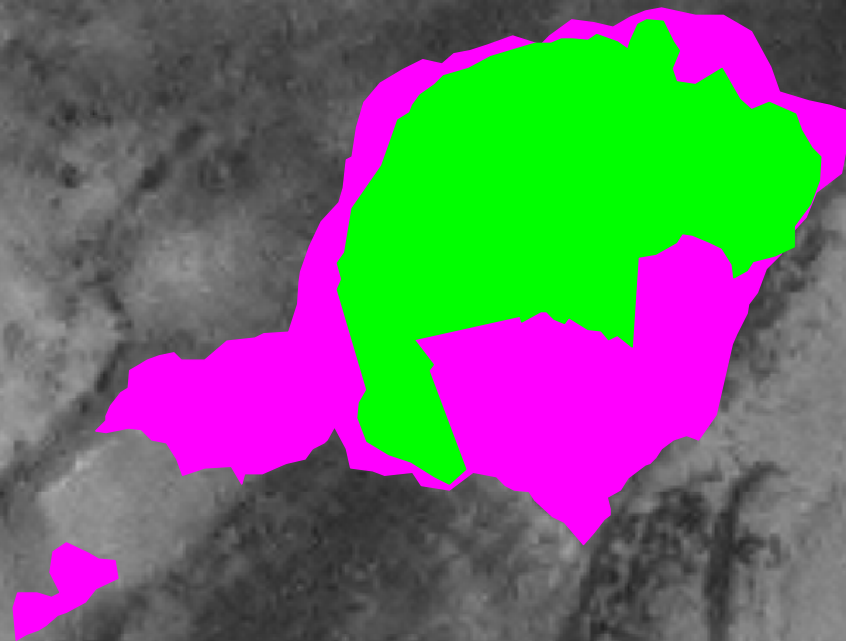


Lovell, WY: September 2003



# Hotspot Expansion

Lovell, WY: 2003



 August 13

 September 12

# Lovell, WY: September 2003



Release Point

■ - *Diorhabda* Hotspot

# Lovelock, NV – September 2003

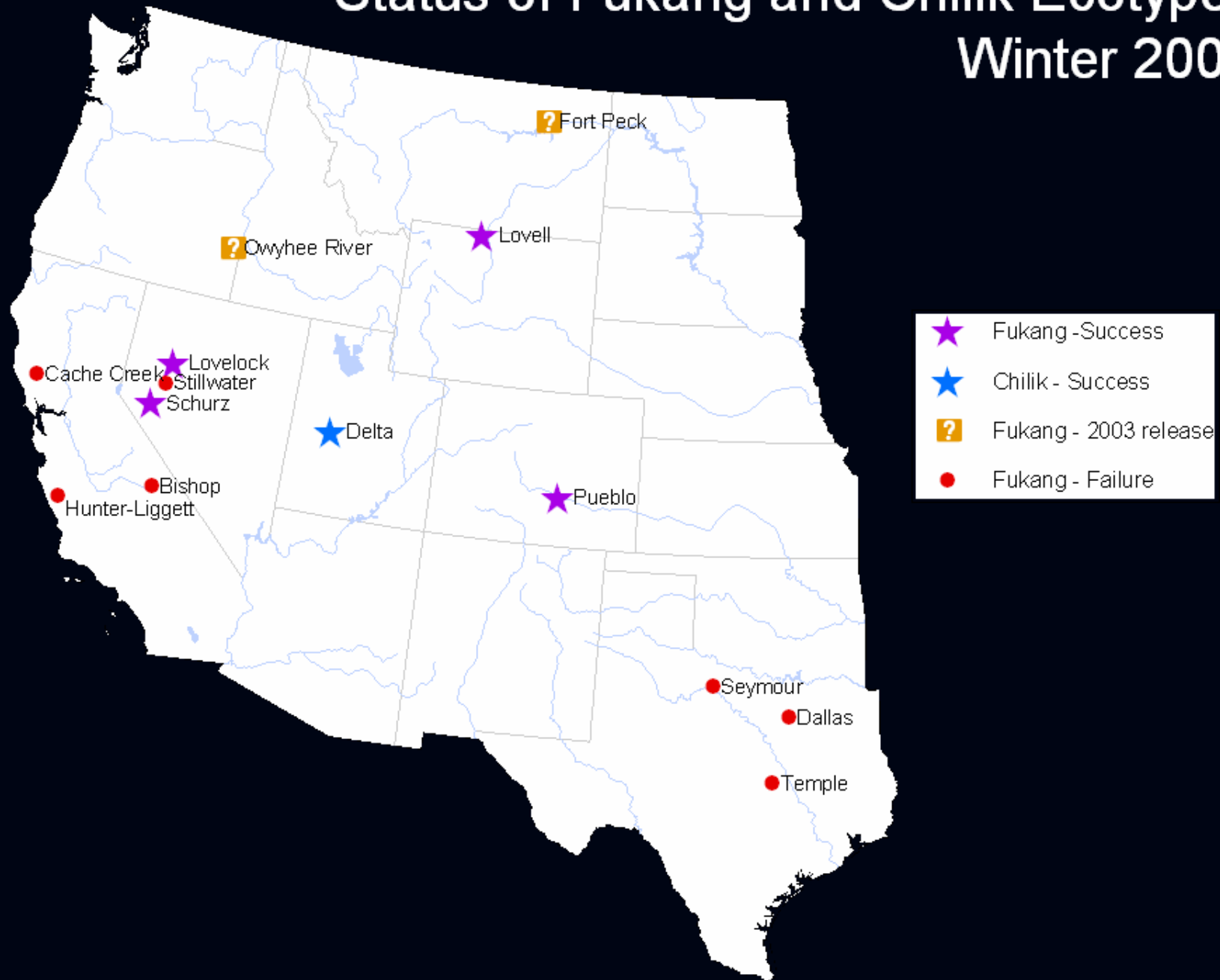


# Hectares Defoliated – 2003

## Released in 2001

■ Lovelock, NV	190 ha
■ Pueblo, CO	40 ha
■ Delta, UT	40 ha
■ Schurz, NV	15 ha
■ Lovell, WY	9 ha*

# Status of Fukang and Chilik Ecotypes Winter 2004



# Success/Failure of Fukang Ecotype

- Target saltcedar species:
  - Less preferred: *Tamarix parviflora*
  - More preferred: *T. chinensis*, *T. ramosissima* & their hybrids
- Predation by ants, birds, mice, etc.
- Latitude, daylength and reproductive diapause
  - Fukang ecotype marginally OK at about 38°N, better further north

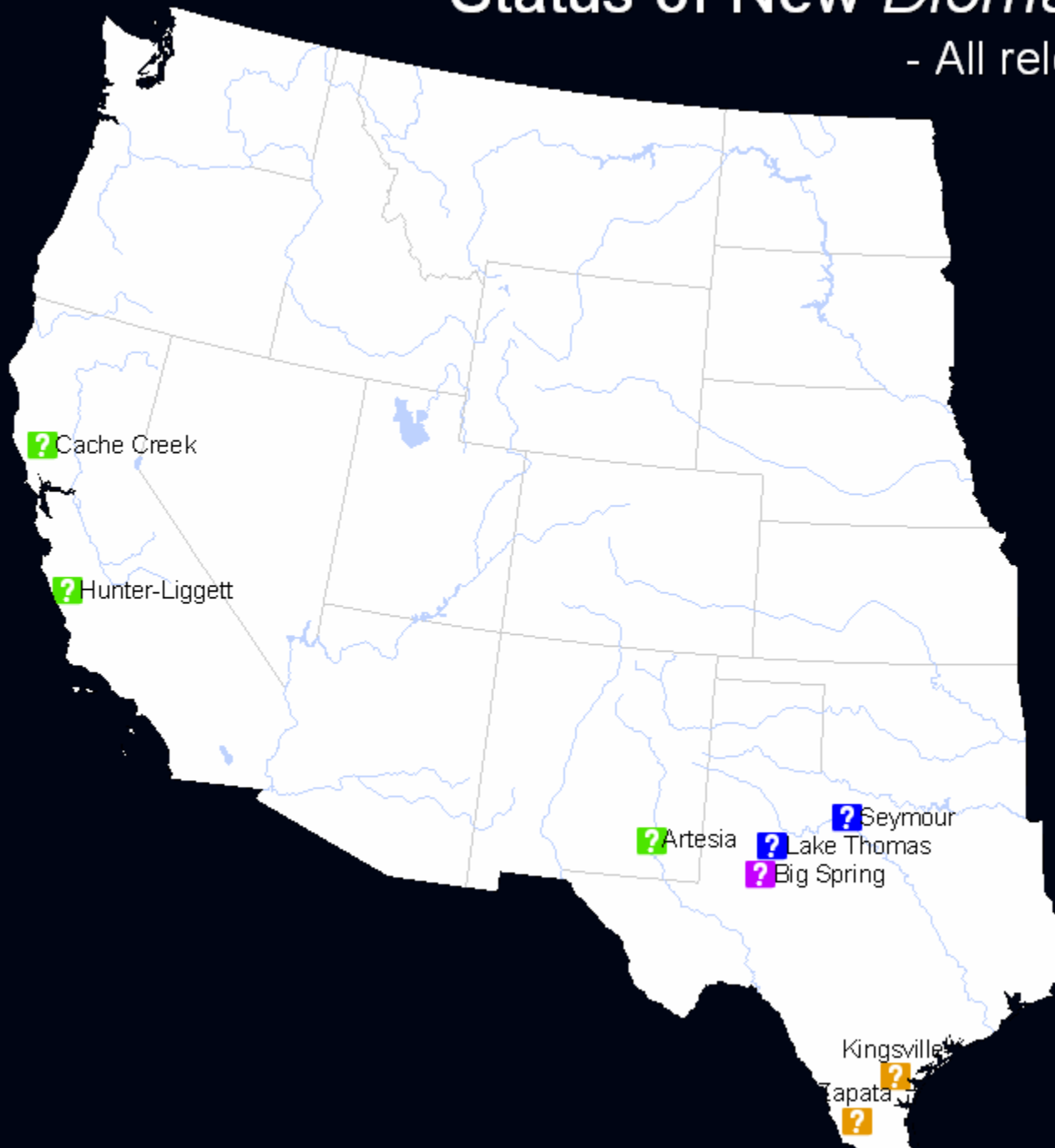
# Critical Photoperiods for Diapause Induction in Several *D. elongata* Ecotypes at Constant 25 C.

- **Fukang, China** (44° N.) 15hr 5min
- **Turpan, China** (42° N.) 14hr 15min
- **Thessaloniki, Greece** (41° N.) 14hr +
- **Karshi, Uzbekistan** (38° N.) 13hr 45min
- **Crete, Greece** (35° N.) 13hr 30min
- **Tunis, Tunisia** (34° N.) 12hr 30min



# Status of New *Diorhabda* Ecotypes

- All releases made in 2003



- ? Crete
- ? Crete + Tunisia
- ? Crete + Turpan
- ? Crete + Uzbekistan

# What Will Defoliation By *Diorhabda* Do?

- One bout of extensive defoliation on large, mature saltcedars:
  - Will not kill the plants
  - Some regrowth in same season
    - Small, wispy growth at stem tips
    - Dense, moss-like growth along stems
  - Next season:
    - Leaf out delayed by 1-3 weeks on extant stems (?)
    - Higher stem overwintering mortality (?)
    - Increased sprouting from base (?)

# What Will Defoliation By *Diorhabda* Do?

- Small, young saltcedars:
  - Will *Diorhabda* colonize and impact new saltcedar infestations?
  - Will *Diorhabda* prefer young *vs.* mature saltcedar?
  - Will defoliation result in greater mortality of young plants
  - Generally don't know

# What Will Defoliation By *Diorhabda* Do?

- Multiple bouts of extensive defoliation:
  - Will they occur?
    - Previously attacked plants less likely to be attacked (??)
    - Do not really know yet
  - What impacts will multiple bouts have?
    - Some report saltcedar death in cages but . . .
    - Do not know yet

# How Will *Diorhabda* Function in Integrated Saltcedar Management?

- Primary control strategy for large, dense infestations?
- Primary/integrated control strategy for large, scattered infestations?
- Secondary control strategy for large, dense infestations following:
  - Chemical treatment (aerial, cut-stump, basal bark, etc.)
  - Mechanical treatment (mulching mower, root-plowing, etc.)
  - Burns
- Primary/integrated control strategy for new infestations?

How will *Diorhabda*  
interact with the saltcedar  
leafhopper (*Opsius*  
*stactogalus*)?

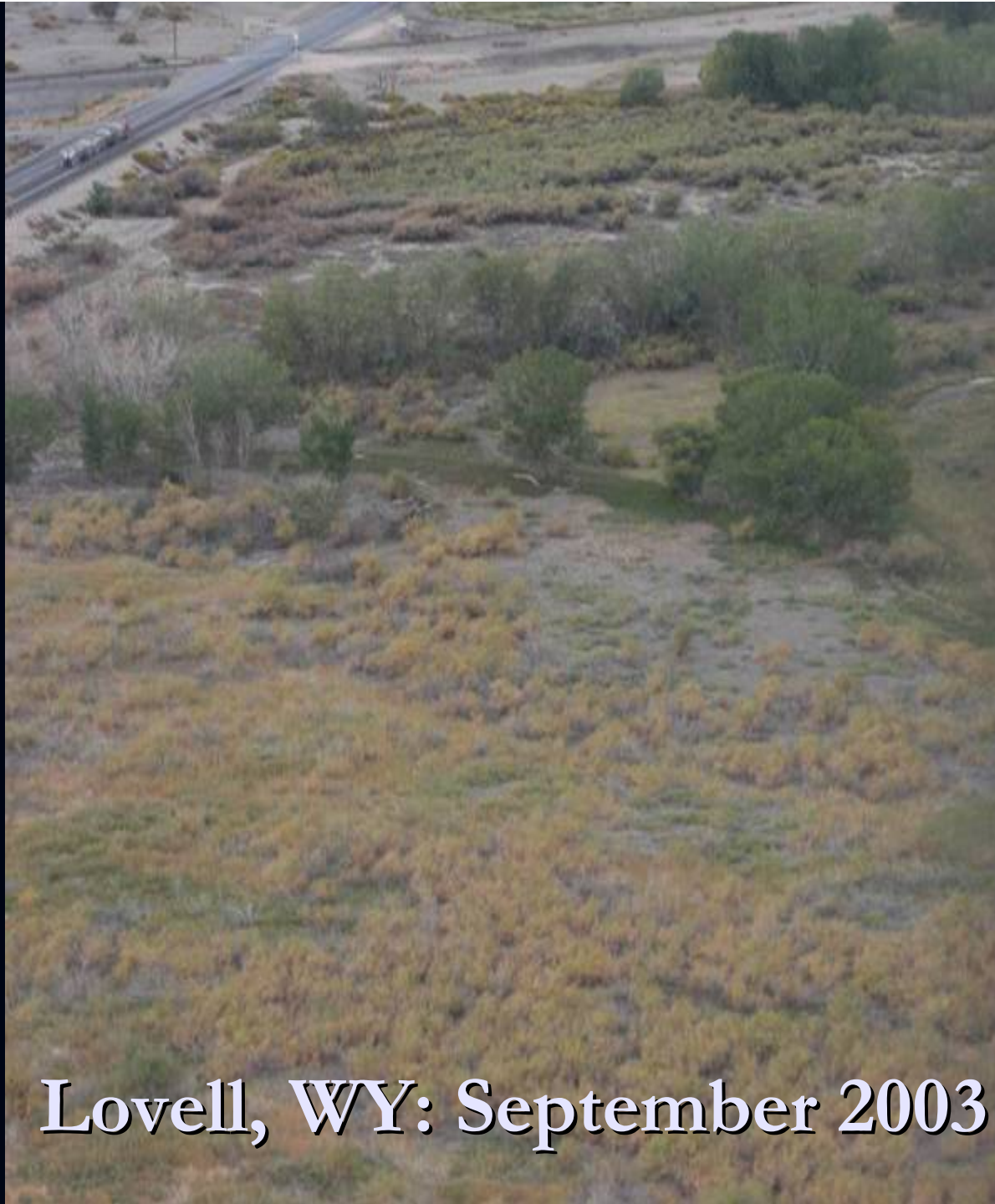
Saltcedar Leafhopper  
*Opsius stactogalus*



Lovell, WY: September 2003





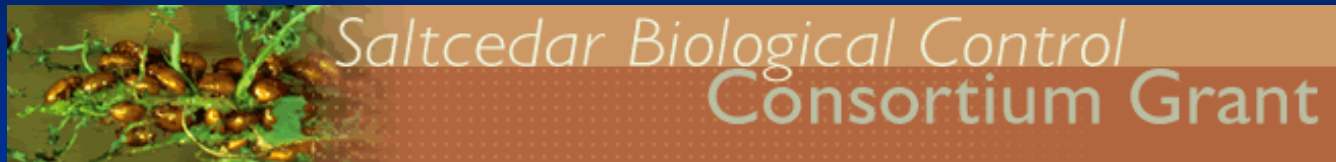


Lovell, WY: September 2003

# When Will *Diorhabda* Be Available for Unrestricted Releases?

- New EA and FONSI required
- New EA published in Federal Register
  - Comment period closed Jan. 20, 2004
  - Currently under review
  - Fukang and Chilik ecotypes
  - 14 states, north of 38°N
- Permits available for summer 2004?

# Saltcedar Biological Control Consortium



- USDA-ARS
- USDA-APHIS
- USDA-Forest Service
- USDA-NRCS
- USDI-FWS
- USDI-BOR
- USDI-NPS
- USDI-BRD
- Bureau of Indian Affairs
- Dept of Defense
- State Depts. of Agriculture
- Universities CES and AES
- State Wildlife and Envr. Depts
- Private Organizations