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09/21/23

**CMR Community Working Group**

**Rangeland Grasshoppers**

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**USDA, APHIS  
 Animal and Plant  
 Health Inspection Service**

AC: Animal Care  
 BRS: Biotechnology Regulatory Services  
 PPQ: Plant Protection and Quarantine  
 WS: Wildlife Services  
 VS: Veterinary Services

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 Animal and Plant Health Inspection Service  
 Plant Protection and Quarantine**

**Plant  
 Protection  
 and  
 Quarantine**

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**PPQ Mission**

to safeguard American agriculture and natural resources from the risks associated with the entry, establishment, or spread of animal and plant pests and noxious weeds.

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**Examples Programs**

- ▶ Closing Pathways
- ▶ Exotic Pest Surveys
- ▶ Quarantine and eradication
- ▶ Spongy Moth/Japanese Beetle
- ▶ Biological Control
- ▶ Facilitate safe trade
- ▶ Grasshopper & Mormon Cricket

**Kernal Bunt**  
(Cereus strictus, etc., Cereus strictus)

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- Grasshopper biology and Identification
- Suppression products used by USDA
- Survey Methods, results and 2024 predictions
- USDA Rangeland Grasshopper/Mormon Cricket Suppression Program.

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## Grasshopper and Mormon Cricket

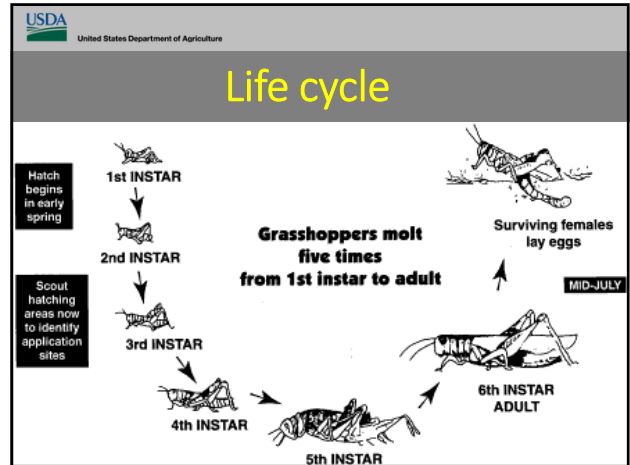
- ▶ Survey
- ▶ Technical Assistance

- ▶ Suppression Programs
  - APHIS Programs
  - RAATs



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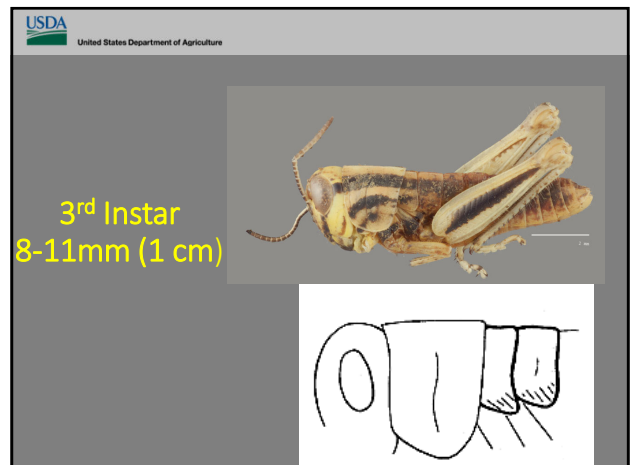
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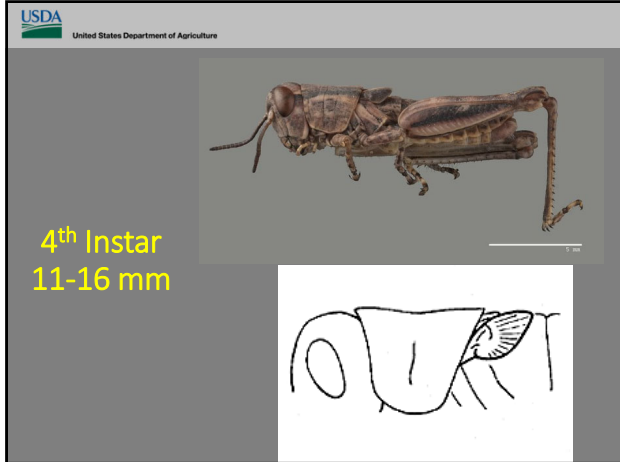
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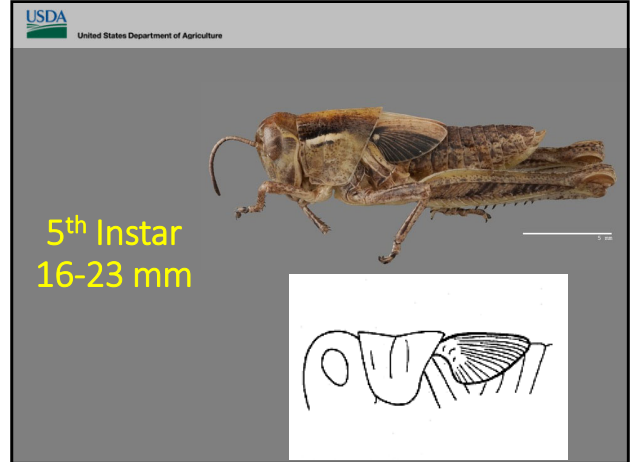
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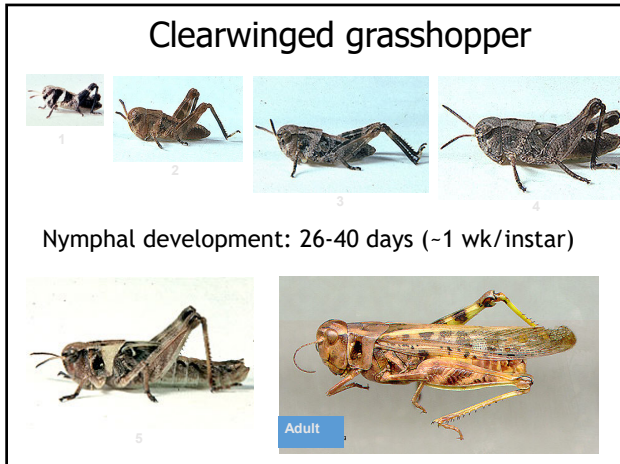
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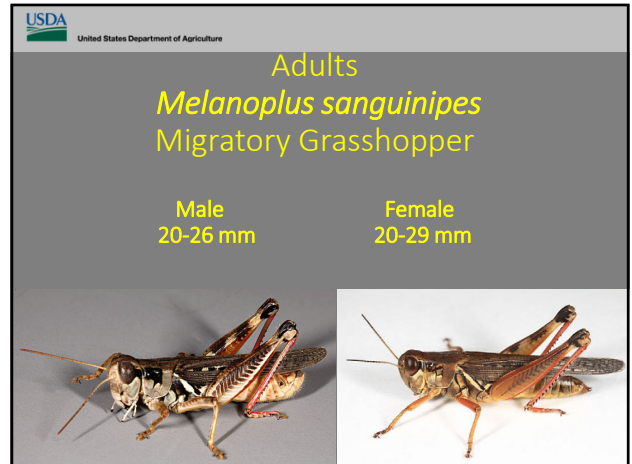
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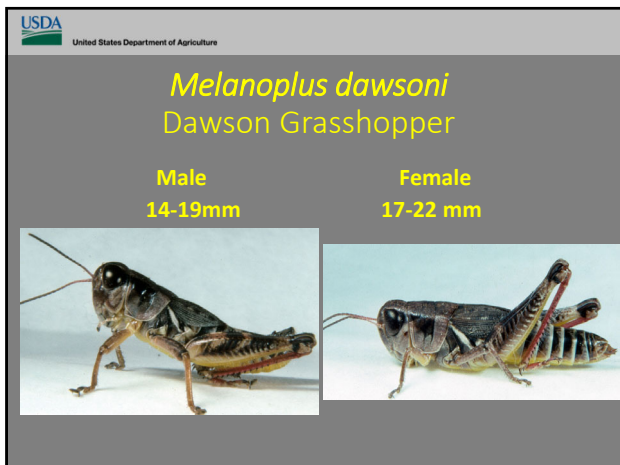
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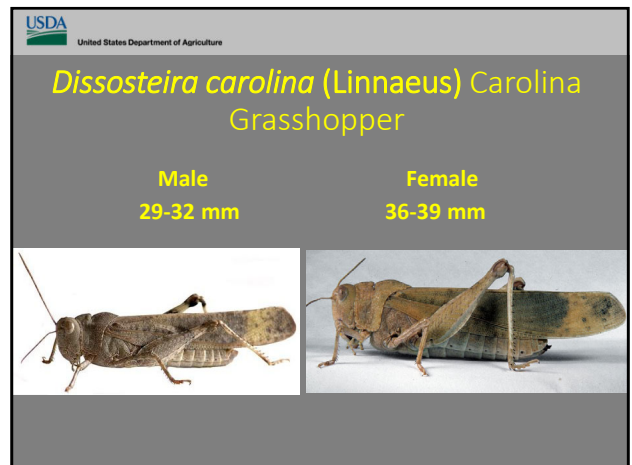
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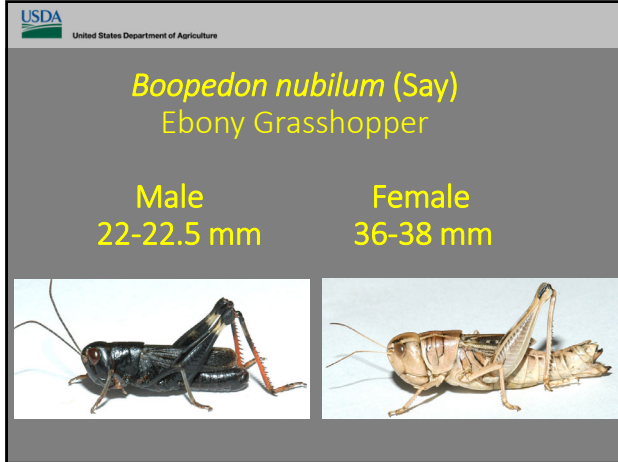
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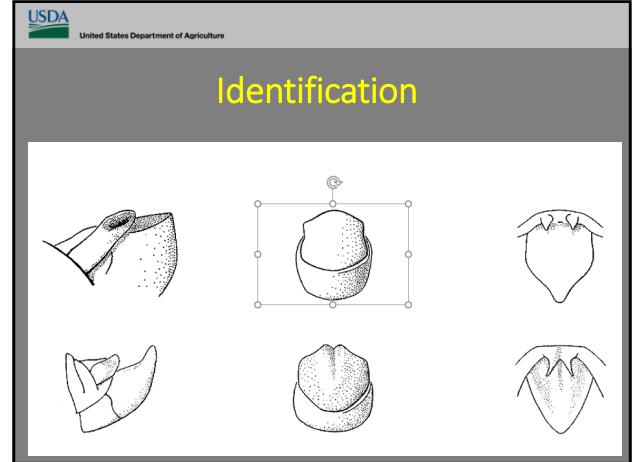
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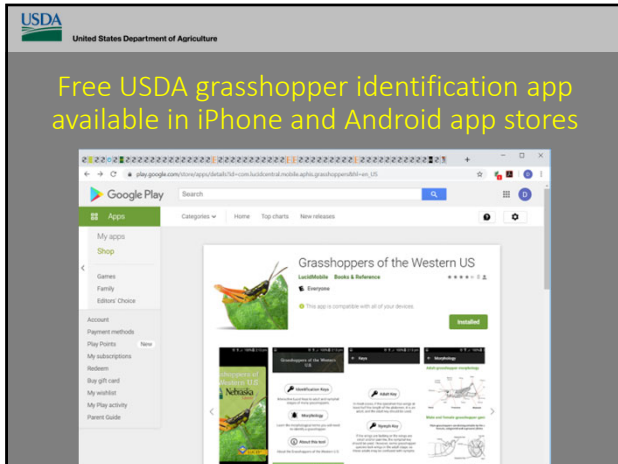
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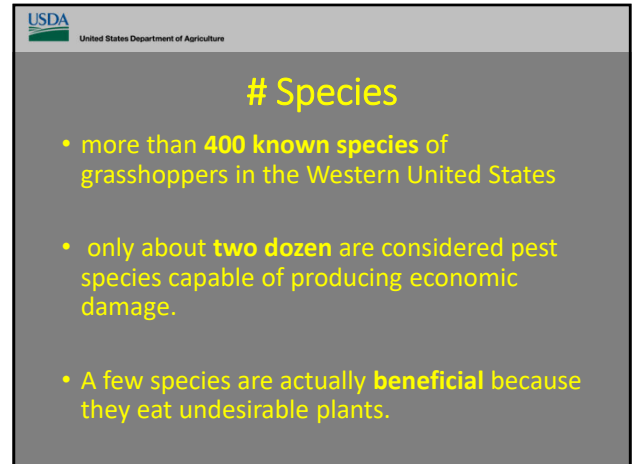
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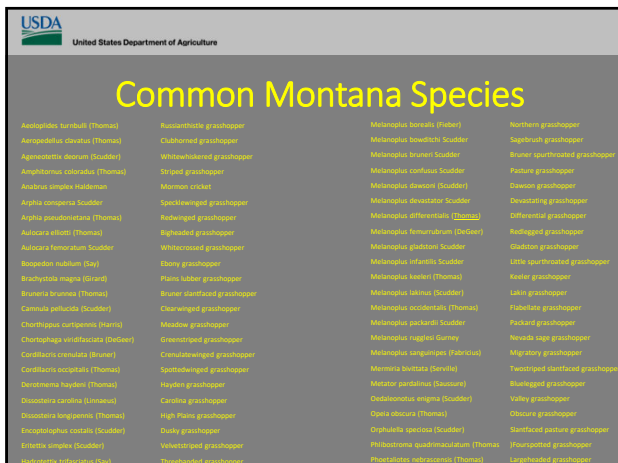
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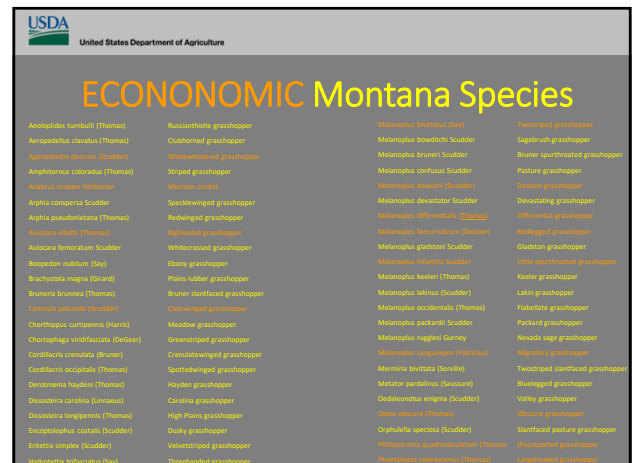
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## Economic Montana Species

Ageneotettix deorum (Scudder)	Whitewiskered grasshopper
Aulocara ellioti (Thomas)	Bigheaded grasshopper
Camnula pellucida (Scudder)	Clearwinged grasshopper
Melanoplus bivittatus (Say)	Twostriped grasshopper
Melanoplus dawsoni (Scudder)	Dawson grasshopper
Melanoplus femurrubrum (Dallman)	Redlegged grasshopper
Melanoplus infantilis (Scudder)	Little spurthroated grasshopper
Melanoplus sanguinipes (Fabricius)	Migratory grasshopper
Opeia obscura (Thomas)	Obscure grasshopper
Phibostroma quadrimaculatum (Thomas)	Fourspotted grasshopper
Phoetaliotes nebrascensis (Thomas)	Largeheaded grasshopper
Trachyrhachys kiowa (Thomas)	Kiowa grasshopper
Anabrus simplex (Dallman)	Mormon cricket

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## Surveys

- Nymphal surveys
- Delimitation
- Pre Treatment
- Post Treatment
- Adult

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Species	May		June		July		Aug.		Sept.		Oct.	
	I	E	I	E	I	E	I	E	I	E	I	E
Ageneotettix deorum												
Aulocara ellioti												
Camnula pellucida												
Melanoplus infantilis												
Trachyrhachys kiowa												
Melanoplus dawsoni												
Phoetaliotes nebrascensis												
Arphia conspersa												

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## Conducting Surveys

- Visualize a square foot ahead of you on range
- Walk toward imaginary Ft<sup>2</sup>
- Count # GHs that jump out
- Repeat 18 times
- Divide total by 2
- Gives total GH/yd<sup>2</sup>

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## How much do they eat?



A grasshopper can eat about its own weight or destroy up to 6 times its own weight of vegetation daily

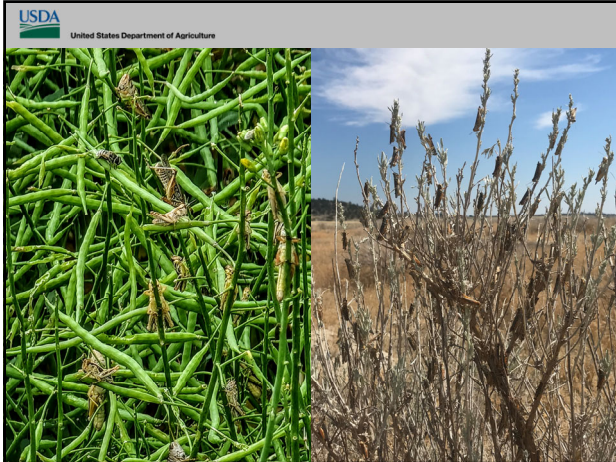
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## Do I treat?

- ≥ 8 grasshoppers per yd<sup>2</sup>
- ≥ 15 grasshoppers per yd<sup>2</sup>
- Is there grass to save? (drought)
- Should I just buy hay?
- Can I wait for mother nature?

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## Control Alternatives for PPQ

- **No Action**
- **Insecticide Applications at Conventional Rates and Complete Area Alternatives**
- **Reduced Agent Area Treatments (RAATS) Alternative**
  - **Modified RAATS**

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## No Action

- **Not asked.**
- **Non-economic levels of grasshoppers**
- **Environmental Factors**
- **Threatened or Endangered Species Factors**
- **Funding**

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## Insecticides

- **Malathion**
- **Carbaryl**
  - Liquid
  - Bait
- **Diflubenzuron: Dimilin**
- **Chlorantraniliprole: Prevathon**

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## Malathion

- **Short Residual**
  - Days
- **Mode of Action:**
  - ChE inhibitor
  - Contact
  - Ingestion
- **Available**
- **Cost**

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## Carbaryl

- **Residual**
  - Week(s)
- **Mode of Action**
  - ChE inhibitor
  - Ingestion
  - Contact
- **Available**
- **Liquid and bait formulations**
  - 2% and 5% Carbaryl bran bait
  - \$1.00-\$2.00/pound

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## Diflubenzuron (Dimilin)

- **Long Residual**
- **Mode of Action:**
  - Chitin inhibitor
  - Ingestion
- **Arthropod specific**
- **Must be used before adult stage**

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- **Long Residual**
- **Mode of Action: Anthranilic diamide**
  - Inhibits feeding
- **Pros:**
  - Safety (No caution word)
  - Ingestion and contact
  - Works on nymphs and adults
- **Cons:**
  - Unfamiliar (added to 2019 EIS)
  - Cost is unknown
  - Availability unknown
  - High Volume

**Chlorantraniliprole (Prevethon)**

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## Control Alternatives

- ▶ **Biological Control**
  - ▶ **No classical biological control.**
    - ▶ Grasshoppers are native
  - ▶ ***Nosema locustae*,**
    - ▶ Naturally occurring.
    - ▶ sick, eat less, and begin to die.
    - ▶ The disease spore spreads to healthy grasshoppers through cannibalism.
    - ▶ "In 2-4 weeks, 50% of the grasshopper population will die, and most survivors will be infected to continue spreading the disease. Infected survivors eat 75% less than healthy grasshoppers and lay fewer eggs. Will NOT harm people, pets or the environment."
  - ▶ **Not considered for PPQ Suppression Programs**

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**Ask your local contractors about other options.**

**What have you used?**

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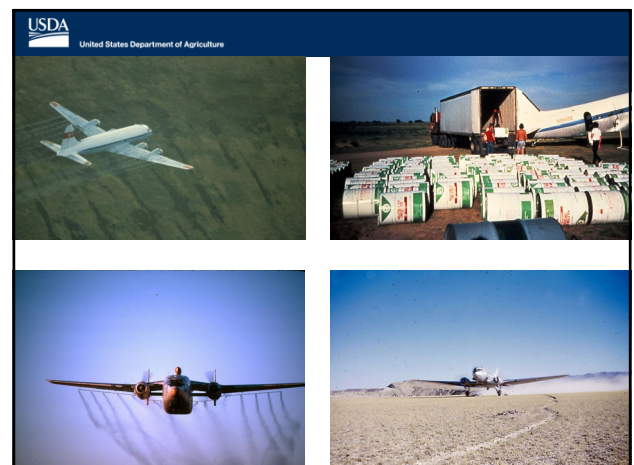
## Insecticide Applications at Conventional Rates and Complete Area Alternatives

**Malathion:**  
8 fl oz (0.62 lb a.i.)/acre

**Carbaryl:**  
Liquid: 16 fl oz (0.5 a.i.)/acre  
Bait: 10 lbs (0.50 lb a.i.) 5% bait/acre

**Diflubenzuron**  
1 fl oz (0.016 lb a.i.)/acre

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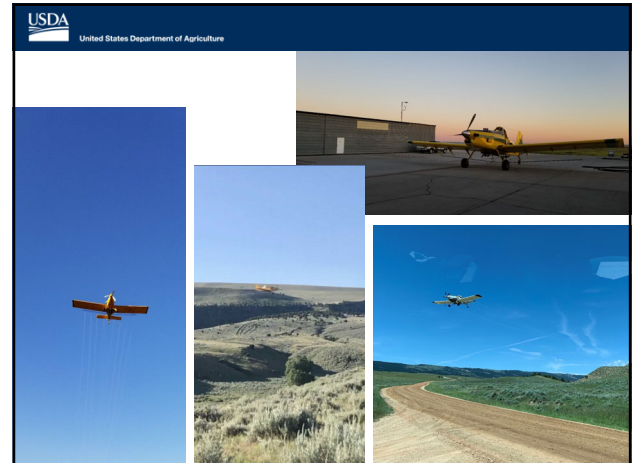
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## 2000's Treatment strategies

- New EIS - 2002
- More environmentally sound
- NEPA regulations
- Smaller planes
- Better navigation/guidance systems
- Better chemical choices
- RAATs

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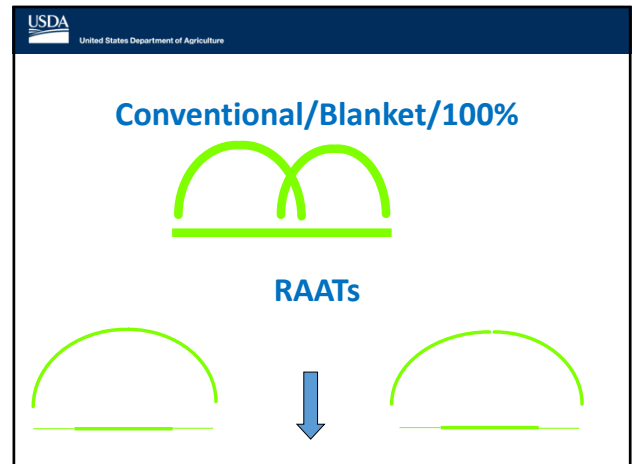
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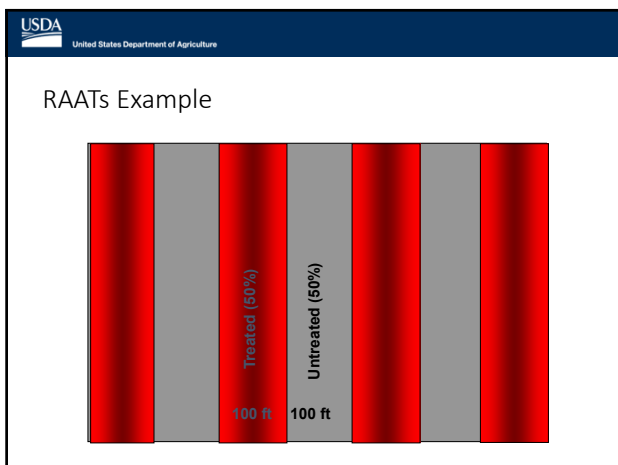
## Reduced Agent and Area Treatments (RAATs)

- Basically skip swathing
- GH mortality in treated swaths
- GHs move from non-treated to treated swaths
- More predacious insects and parasitoids survive
- Birds and predators continue naturally feeding on GHs

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## Reduced Agent and Area Treatments (RAATs)

- Skip distance greatly depends on the chemical used
- Low residual = less skip
- Longer residual = wider skip (within limitations)

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### Reduced Agent Area Treatments (RAATS) Alternative

Not standardized:  
Determined on a case-by-case basis

**Aerial**

- Malathion: 80% coverage
- Carbaryl: 50% coverage
- Dimilin: 50% coverage

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### Reduced Agent Area Treatments (RAATS) Alternative

**Malathion:**  
4 fl oz (0.31 lb a.i.)/acre

**Carbaryl:**  
Liquid: 8 fl oz (0.25 lb a.i.)/acre  
Bait: 10 lbs (0.50 lb a.i.) 2% bait/acre

**Diflubenzuron**  
Dimilin: 0.75 fl oz (0.012 lb a.i.)/acre

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### MODIFIED Reduced Agent Area Treatments (RAATS) Alternative

- Maintain conventional rate
- Skip swaths.

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### ATV-RAATs:

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### Boomless nozzles



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### Boomless nozzle spray pattern



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## Bran Acceptance

Species Sensitive  
(>55% control)

Control is expected to average about 70%  
Worst-case and best-case scenarios will be about 55% and 85%, respectively

<ul style="list-style-type: none"> <li>▪ <i>Aulocara elliottii</i></li> <li>▪ <i>Camnula pellucida</i></li> <li>▪ <i>Hadrotettix trifasciatus</i></li> <li>▪ <i>Melanoplus bivittatus*</i></li> <li>▪ <i>Melanoplus confuses</i></li> <li>▪ <i>Melanoplus dawsonii</i></li> <li>▪ <i>Mermiria bivittata*</i></li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Melanoplus foedus</i></li> <li>▪ <i>Melanoplus infantilis*</i></li> <li>▪ <i>Melanoplus occidentalis*</i></li> <li>▪ <i>Melanoplus packardii*</i></li> <li>▪ <i>Melanoplus sanguinipes</i></li> <li>▪ <i>Sphragemon equale</i></li> <li>▪ <i>Stenobothrus brunneus</i></li> </ul>
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\*These species are not likely to suffer best-case scenario levels of control

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\*These species are not likely to suffer best-case scenario levels of control

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## Vulnerable

(30% to 55% control)

Control is expected to average about 42%  
Worst-case and best-case scenarios will be about 12% and 72%, respectively

- *Aulocara femoratum\**
- *Eritettix simplex*
- *Melanoplus femurrubrum*
- *Oedaloenotus enigma*
- *Opeia obscura*
- *Phoetaliotes nebrascensis*
- *Psoloessa delicatula*

\*These species are not likely to suffer best-case scenario levels of control

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## Nonsusceptible

(<30% control)

Control is expected to average about 15%  
Worst-case and best-case scenarios will be about 0% and 30%, respectively

- *Aeropedellus clavatus*
- *Amphitornus coloradus*
- *Cordillacris orenulata*
- *Cordillacris occipitalis*
- *Hesperotettix viridis*
- *Metator pardalinus*
- *Philbostroma quadrimaculatum\**
- *Trachyrhachys kiowa*

\*These species are not likely to suffer best-case scenario levels of control

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## USDA, APHIS, PPQ Program

Surveys

Technical Assistance

Treatment Programs

When funding is available

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## Surveys

Nymphal

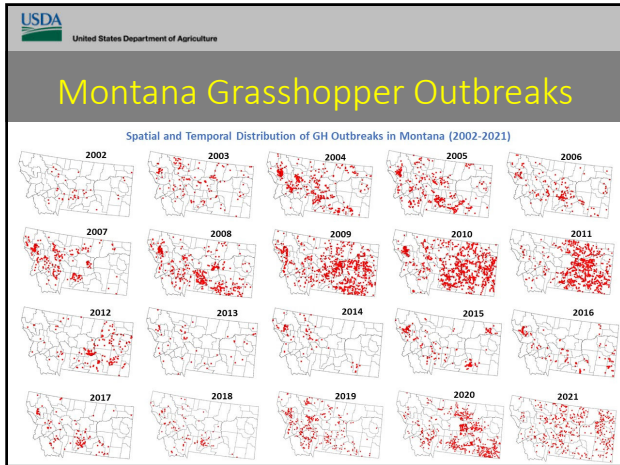
Delimiting

Pre-Treatment

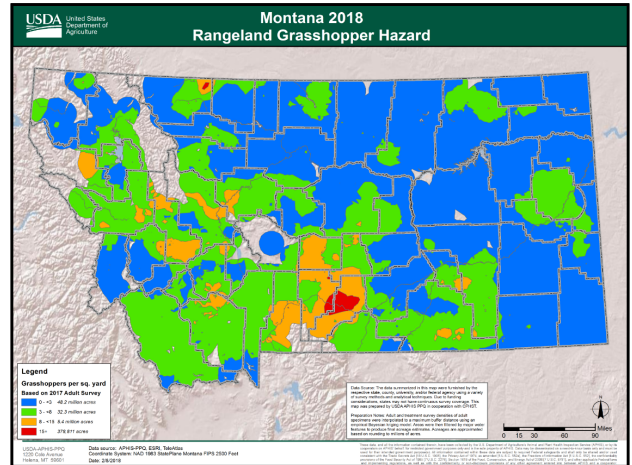
Post-Treatment

Adult/Forecast

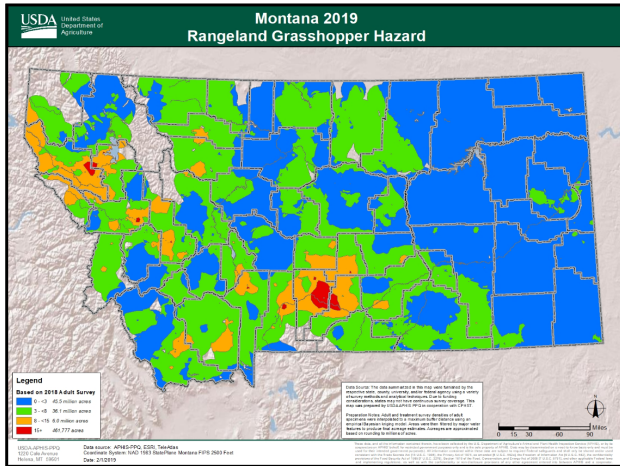
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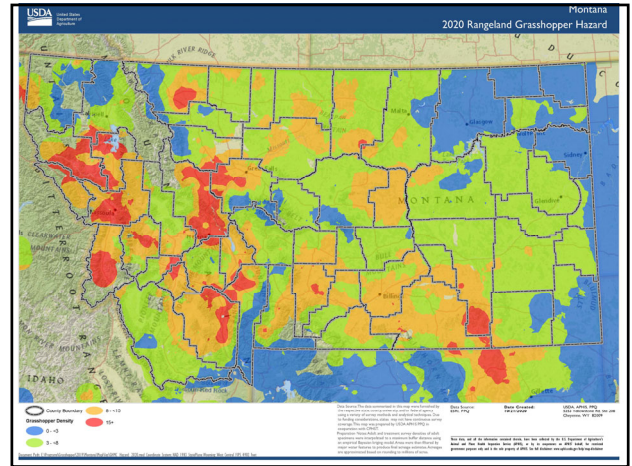
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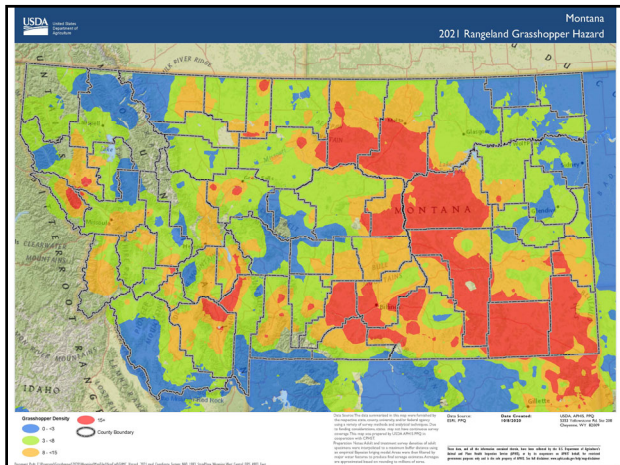
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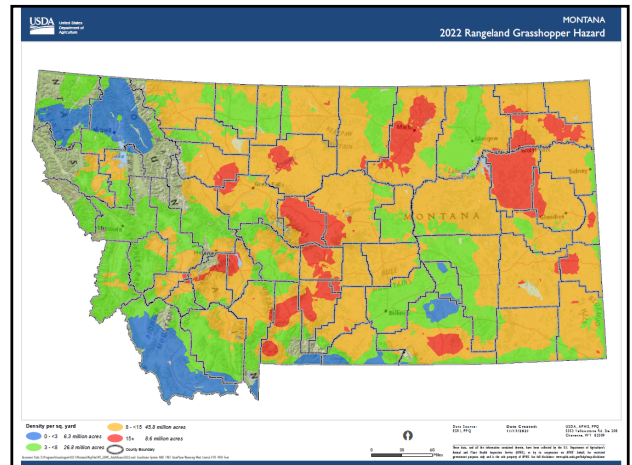
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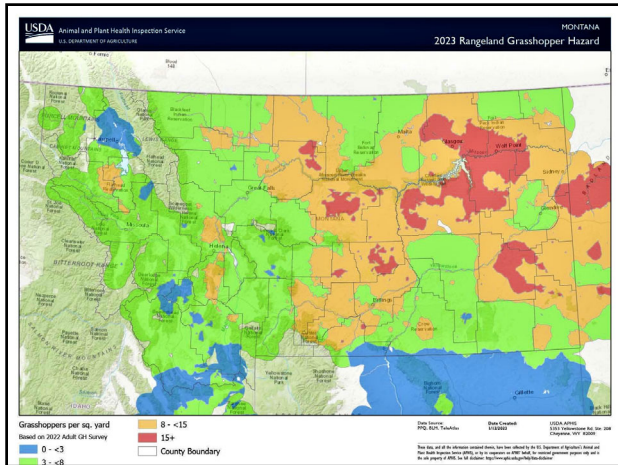
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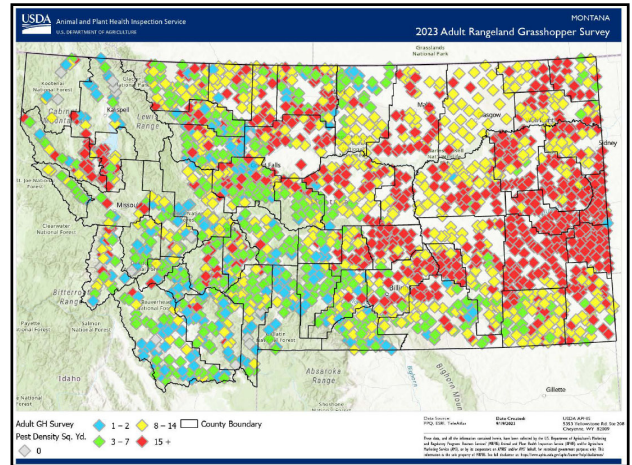
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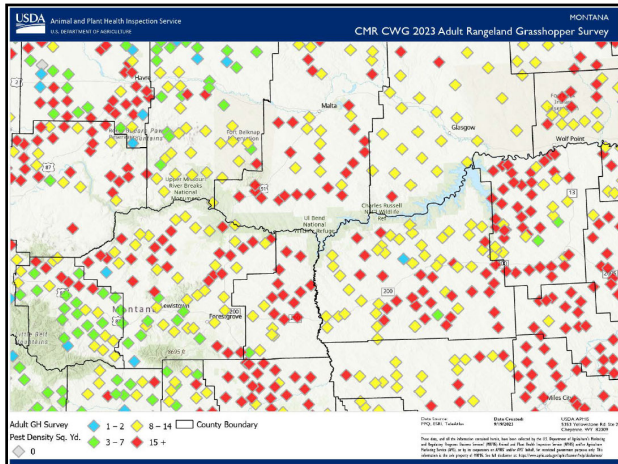
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## Technical Assistance

- Presentations
- Meetings
- Field assistance

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## Treatment Programs

Plant Protection Act of 2000.

Border Treatments

Rangeland Treatments

Contingent on Availability of Funds

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## Border Treatments

- Federally-Administered Land Adjacent to Private Agricultural Land
- GH/MCs moving Fed → Private
- Written Request from Federal Land Manger
- PPQ treat ¼ to ½ mile buffer
  - Aerial Contractor
  - PPQ Ground

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## Rangeland Treatments

- **10,000 Acres Minimum**
  - or incipient Population
- **Rangeland only**
  - 20% cropland (paid by landowner)
- **PPQ Cost Share**
  - 100% Federal/Trust land.
  - 50% State land.
  - 33% Private land.
    - 16.15% indirect charges.

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## Rangeland Treatments

the most important slide of this presentation.

- Letter(s) of Request from all parties
- Cooperative Agreement(s) Signed
- Estimated Funds in Secured Account (Groups)
- Maps of all ownership/exclusions/boundaries.
- Sensitive sites/environmental considerations
- Planning early
- PPQ will contract with aerial applicator
  - (1-3 weeks)

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## What's it gonna cost?

- Primarily determined by Contractor Price
- Available and Competitive bids by contractors.
- Size of block
- % coverage/% exclusions.
- Ferry Distances
- Airport Location
- Water Sources
- Rates applied.
- Etc.

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## National Environmental Policy Act (NEPA)

- Final Environmental Impact Statement (FEIS) – 2019.
- Site Specific Environmental Assessments (EAs)
- Finding of No Significant Impact (FONSI)

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## Endangered Species Act ESA

- USFWS: Section 7 Consultations
- Mitigation Measures
  - Buffers
  - Treatment Alternatives

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## Environmental Monitoring

- Water
- Quality Control
- Other, as needed.

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## PPQ vs Do it yourself

- PPQ Funding
  - Needed requests/ estimates first of 2023
- Contracting
- Land-ownership/Land use
- Local applicators?
- NEPA/ESA requirements

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## Summary

- Plan now
- Survey Early
- Weigh your alternatives
- Don't wait until.....

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## Going



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## Going



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## Gone



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