

Biocontrol on Weeds: Overview of Biocontrol Weed Success Stories in USA

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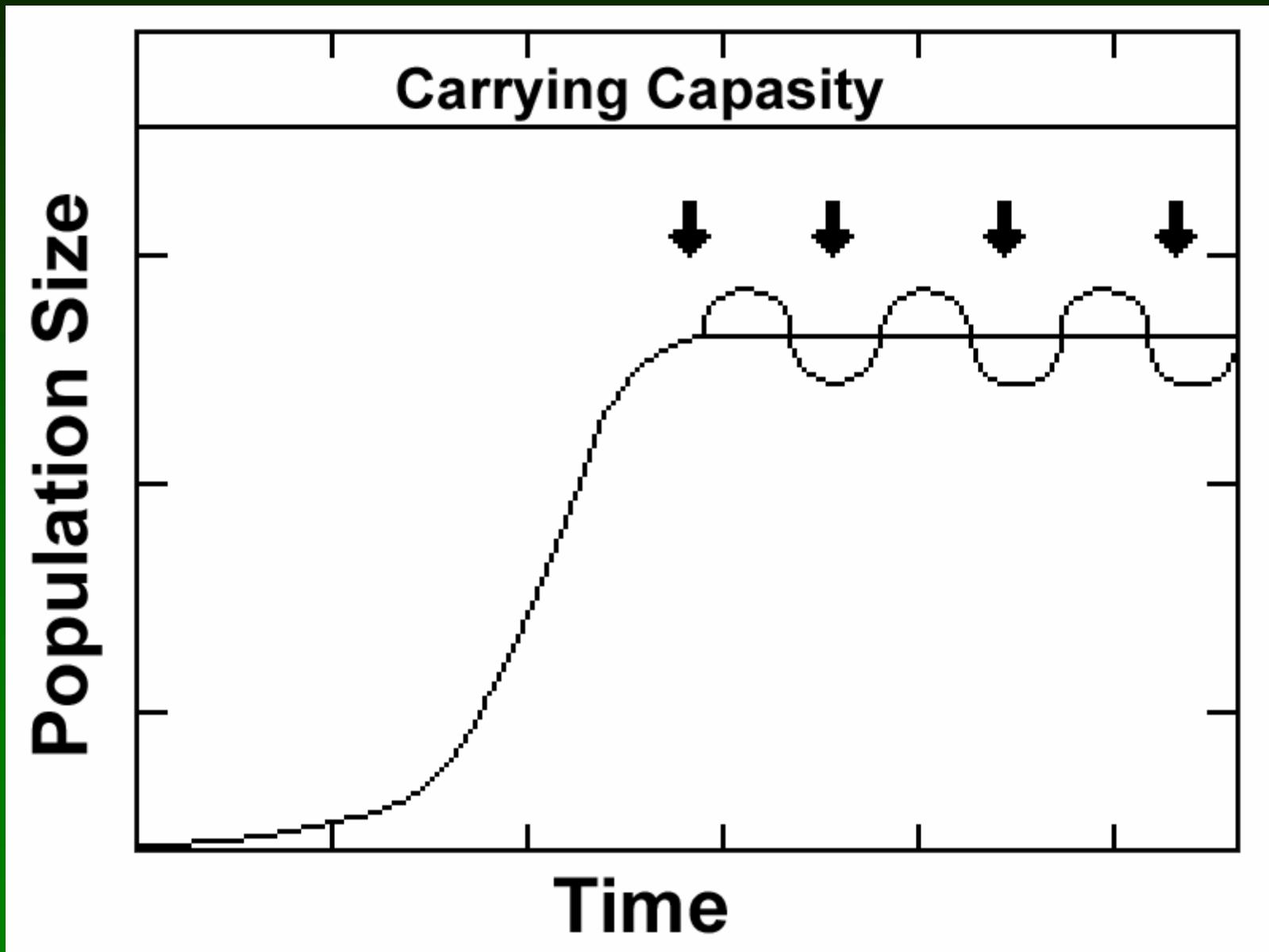
What is Biocontrol?

Introduction, by man, of parasitoids,
predators, and/or pathogenic
microorganisms to

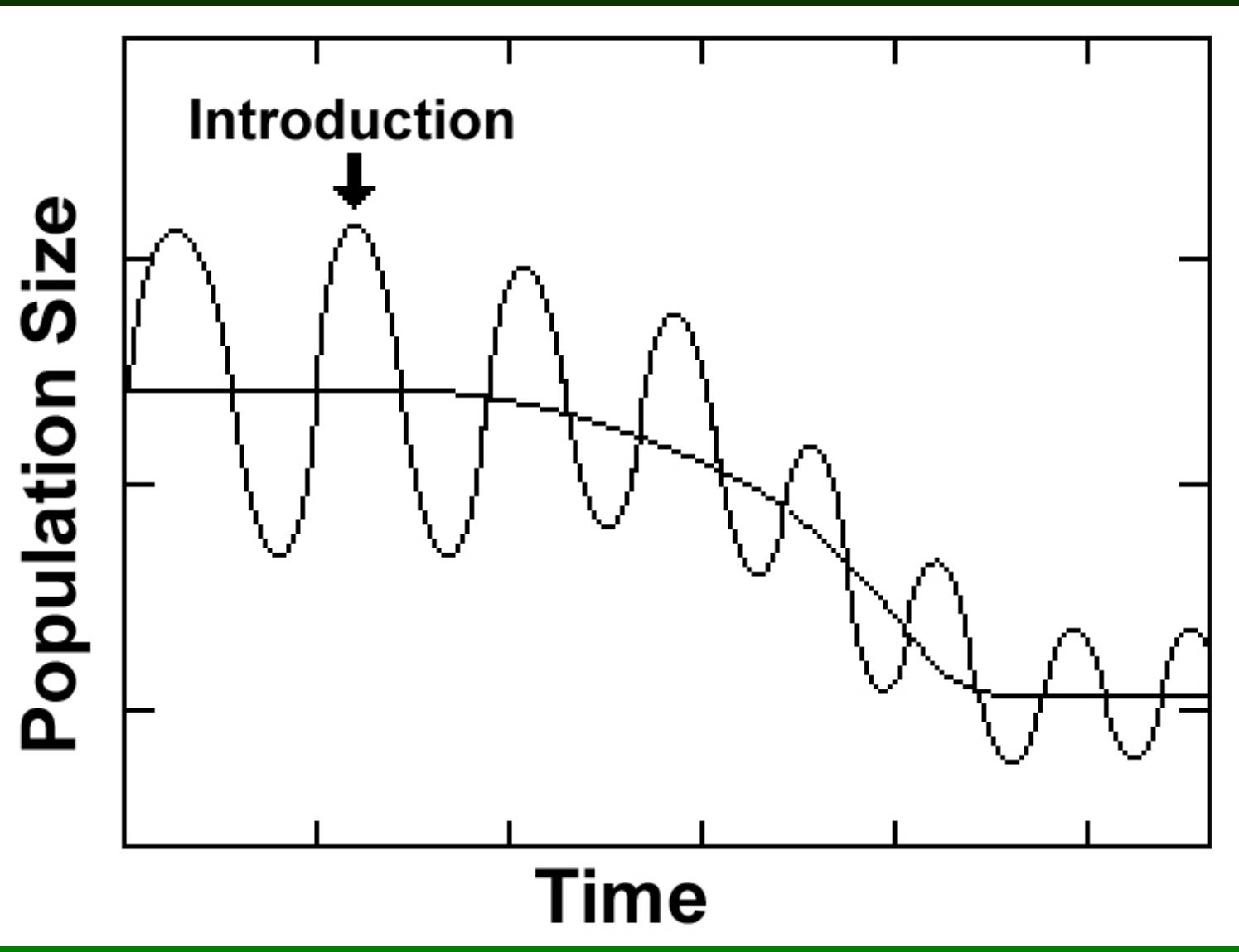
SUPPRESS

populations of plant or animal pests.

PLANT GROWTH



PLANT GROWTH



Important Aspects

- Host-Specific Agents
- Target Exotic Plants
- Release Small Numbers
 - Population increase
 - Expansion in distribution
- Suppression is Key
 - Long-term process
 - Stress the target
 - Bring into equilibrium



Historical

- Began in 1945 in Continental US (Intentional Release)
 - Target: *Hypericum perforatum* (*Klamath Weed*)
 - Agent : *Chrysolina hyperici*
- Early Accidental Introductions:
 - Dalmatian Toadflax – 1919 -- *Brachypterus pulicarius* (Beetle)
 - Gorse -- 1920 – *Agonopterix nervosa* (moth)
- Biological Control has been used for over 60 years

Historical

- Intentional Release Hawaii (1902)
 - Target: *Lantana camara* (*Lantana*)
 - Agents : 3 -- Coleoptera species and 2-- *Lepidoptera species*
- Other Early Introductions in Hawaii
 - Purple Nut Sedge --1925 -- *Bactra venosana* (moth)
- Biological Control has been used for over 100 years

Chrysolina hyperici (Forster)



First released in 1945 – Continental USA



Chrysolina quadrigemina (Suffrian)
- "Klamath Weed Beetle"

First released in 1946

Klamath Weed In Northern California

Chrysolina quadrigemina (Suffrian) –
“Klamath Weed Beetle” released in 1946

1948



1949



Historical

- Began in 1964 in US (Aquatic Plants)
 - Target: *Alternanthera philoxeroides*
 - Agent : *Agasicles hygrophila*
- Released in 1967 in US
 - Target: *Alternanthera philoxeroides*
 - Agent : *Arcola malloi*

Alternanthera philoxeroides (Mart.) Griseb.
(Alligatorweed)



Agasicles hygrophila – "Alligatorweed Flea Beetle"



Released in 1964 in US

Arcola malloi - "Alligatorweed Stem Borer"



Formerly
Vogtia malloi

Released in
1967 in US

Biocontrol Impact in Florida



Biocontrol Impact in Alabama



**How do we
Get agents
Released?**



Overseas Quarantine Release/
Establishment Evaluation Technology
Technology Transfer

Foundational Research

Biological Control "Pipeline"

Approval for Release

- Approval comes from APHIS, PPQ
 - Animal and Plant Health Inspection Service
Plant Protection and Quarantine
- APHIS, PPQ solicits recommendations from Technical Advisory Group (TAG) which was established in 1987
- The TAG was developed from an organization established in 1957 by the USDA
- A review process has been in place for almost 50 years

Major Areas of Concern

- Taxonomy
- Test Plant List
- Host Range Tests
- Impact to Non-Target Plants

Technical Advisory Group - TAG

- TAG Membership
 - Bureau of Land Management
 - Bureau of Reclamation
 - Fish and Wildlife Service
 - National Park Service
 - U.S. Geological Service
 - USDA, ARS
 - USDA, APHIS

TAG Membership Continued

- USDA, CSREES**
- Forest Service**
- Documentation Center**
- Corps of Engineers**
- Environmental Protection Agency**
- Weed Science Society**
- National Plant Board**
- Bureau of Indian Affairs**

TAG Membership Continued

Comments are also requested from:

Canada

&

Mexico

TAG Reviews Two Type of Petitions

- Plant Test List Petition
- Release Petition



United States
Department of
Agriculture

Marketing and
Regulatory
Programs

Animal and
Plant Health
Inspection
Service

Plant Protection
and Quarantine

Reviewer's Manual for the Technical Advisory Group for Biological Control Agents of Weeds

Guidelines for Evaluating the Safety of
Candidate Biological Control Agents



Petitioner

- Consults with USFWS
- Prepares petition for release or test plant list
- Sends to APHIS-PPQ

TAG Executive Secretary

- Establishes time lines
- Sends to TAG members

TAG Members

- Review and evaluate
- Synthesize comments from subject matter specialists
- Submit comments and recommendations

Subject matter specialists evaluate

TAG Executive Secretary

- Logs and files comments and recommendations
- Sends to Chair

TAG Chair

- Consolidates recommendations
- Submits TAG recommendations to APHIS-PPQ, Petitioner, and others

No

Does TAG recommend release?

Yes

Petitioner submits permit application to APHIS-PPQ.

Petitioner

- Conducts more research, and
- Resubmits petition or test or plant list, or
- Discontinues effort, or
- Elects to submit application to APHIS anyway

Petitioner

- Consults with USFWS
- Prepares petition for release or test plant list
- Sends to APHIS-PPQ

- Consults with USFWS
- Prepares Petition
- Sends to USDA-APHIS-PPQ

TAG Executive Secretary

- Establishes time lines
- Sends to TAG members

Executive Secretary

- Establishes time lines (Generally 60 days)
- Sends petition to TAG Members

TAG Members

- Review and evaluate
- Synthesize comments from subject matter specialists
- Submit comments and recommendations

Subject matter specialists evaluate

- **Members Review and Evaluate the Petition**
 - **Taxonomy**
 - **Test Plant List**
 - **Host Range Tests**
 - **Impact to Non-Target Plants**

Continued

TAG Members

- Review and evaluate
- Synthesize comments from subject matter specialists
- Submit comments and recommendations

Subject matter specialists evaluate

- They can request information from subject matter experts
- They usually provide the additional comments they received
- They then consolidate the information and make a recommendation

TAG Executive Secretary

- Logs and files comments and recommendations
- Sends to Chair

Executive Secretary

- Logs and files comments and recommendations
- Sends information to the Chair

TAG Chair

- Consolidates recommendations
- Submits TAG recommendations to APHIS-PPQ, Petitioner, and others

TAG Chair

- Consolidates recommendations
- Submits TAG recommendation
(Often extremely difficult)

Does TAG recommend release?

No

Petitioner

- Conducts more research, and
- Resubmits petition or test or plant list, or
- Discontinues effort, or
- Elects to submit application to APHIS anyway

- The TAG recommendation is not the final word!
- USDA-APHIS-PPQ uses this recommendation to make a decision !
- Based on comments the Researcher may conduct additional studies
- The Researcher may discontinue research
- Can submit to USDA-APHIS-PPQ

Does TAG recommend release?

Yes

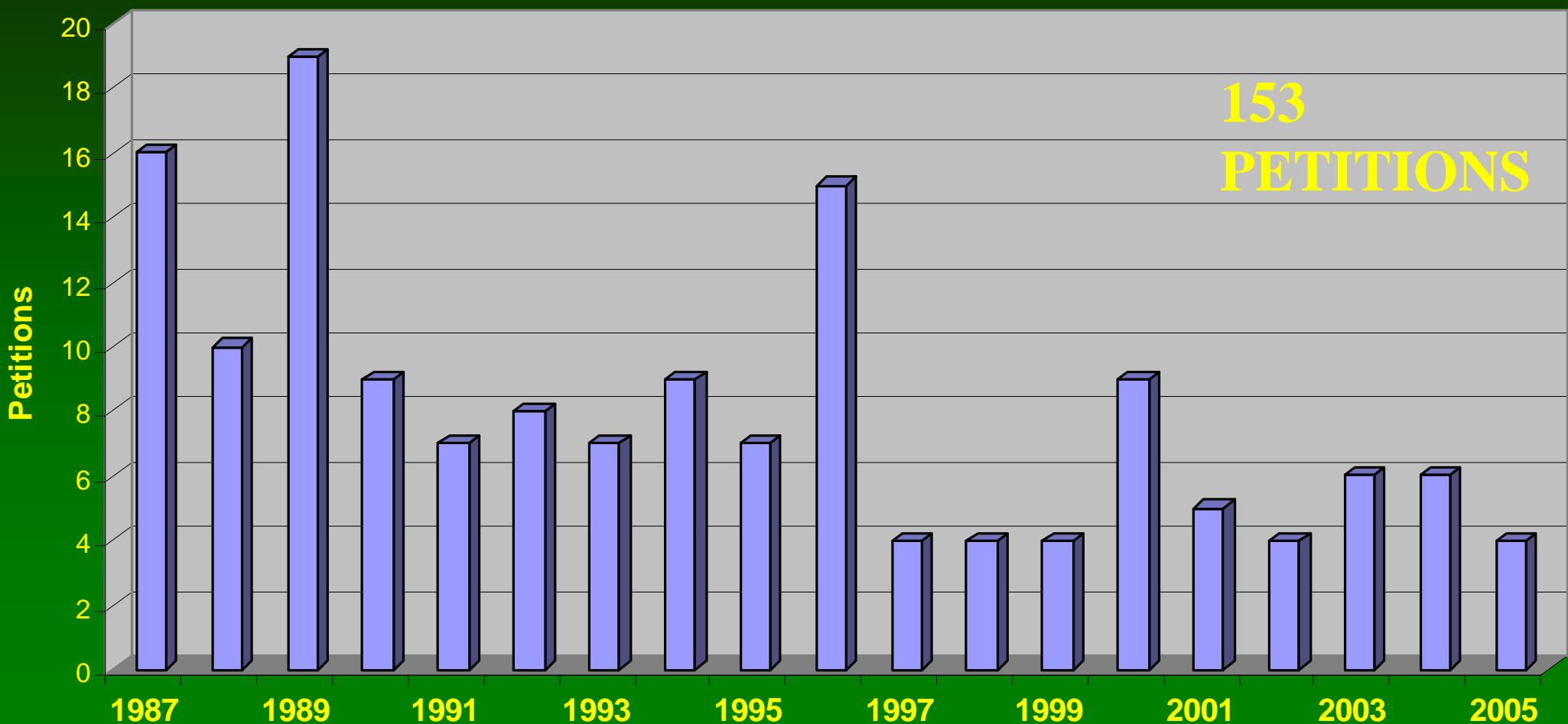
Petitioner submits permit application to USDA-APHIS-PPQ.

- The TAG recommendation is not the final word!
- USDA-APHIS-PPQ uses this recommendation to make a decision!
- USDA-APHIS-PPQ may request other information
- Petitioner submit to USDA-APHIS-PPQ for permit

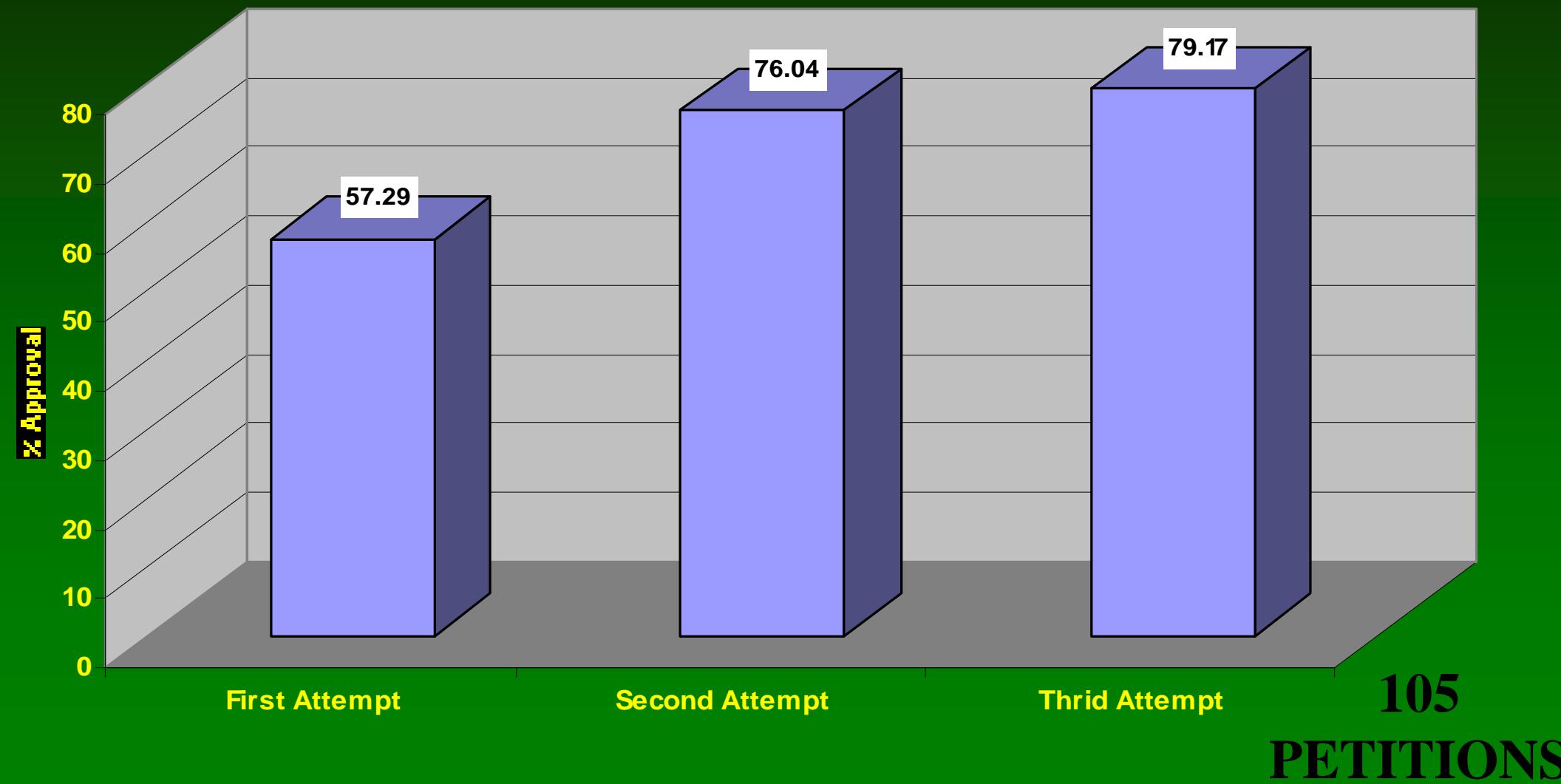
USDA-APHIS-PPQ

- **Develop an Environmental Assessment**
- **Process the request through APHIS**

Petition Requests By Year



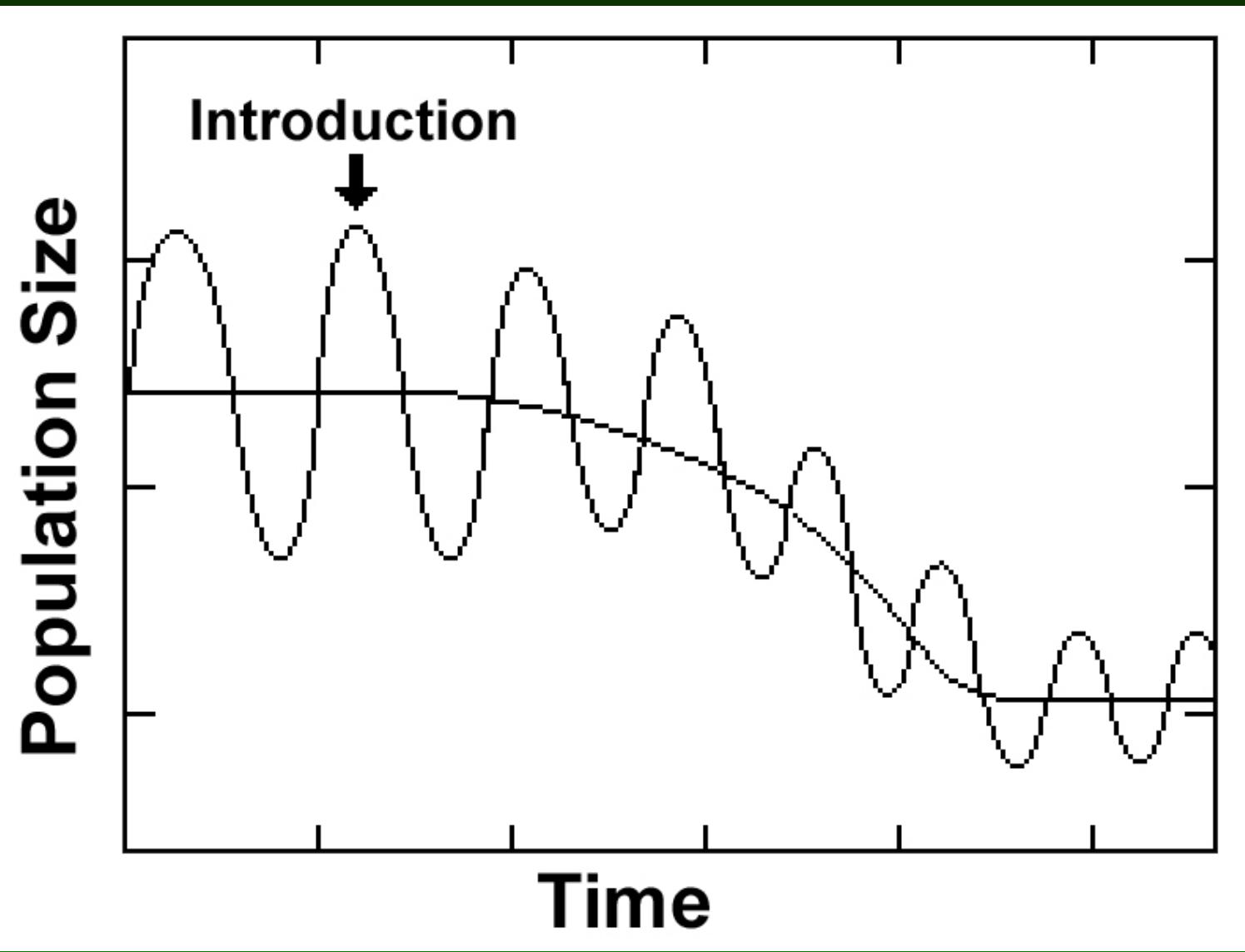
Release Petition Rate of Approval



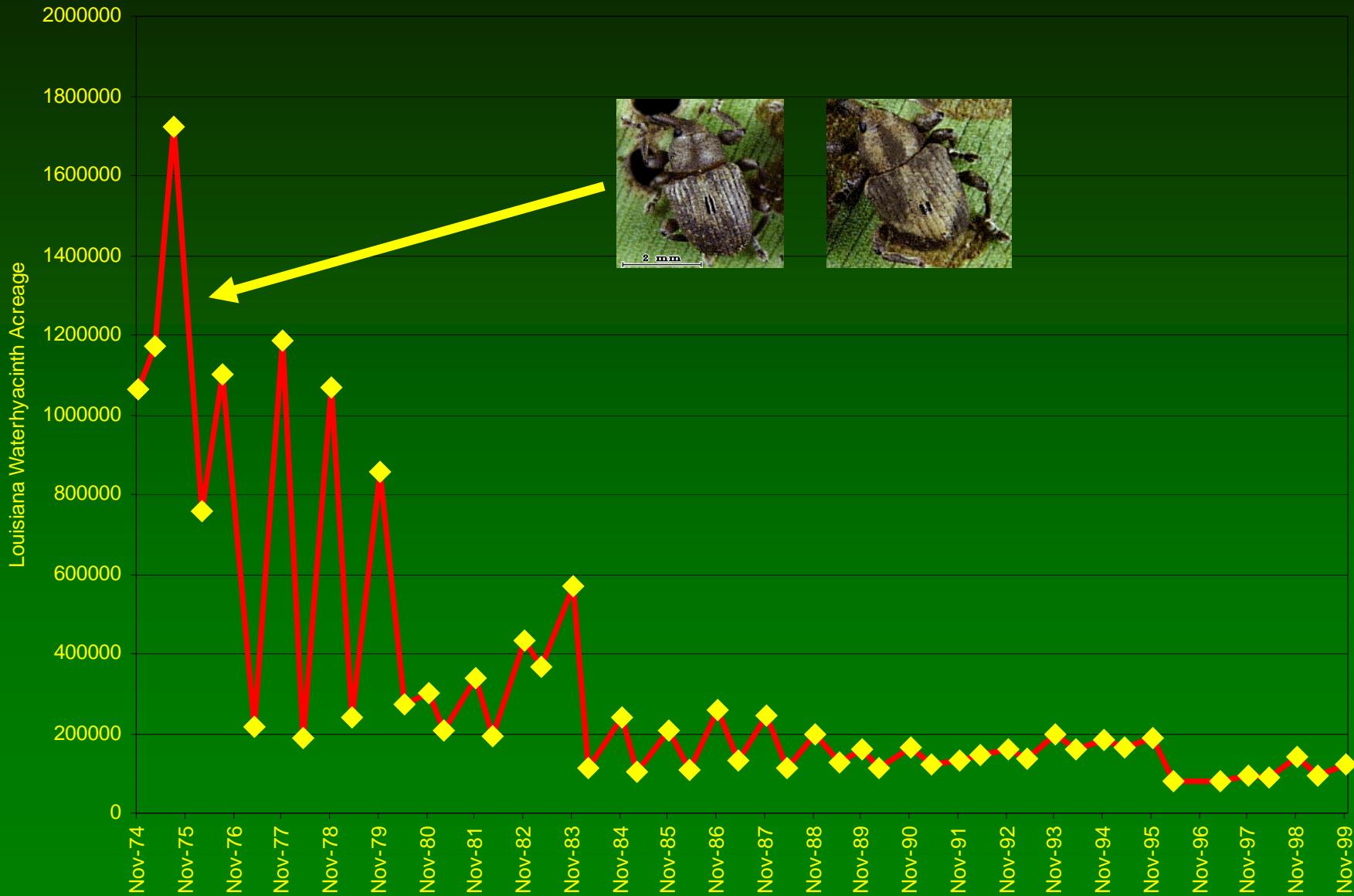
***Eichhornia crassipes* (Mart.) Solms** **(Waterhyacinth)**



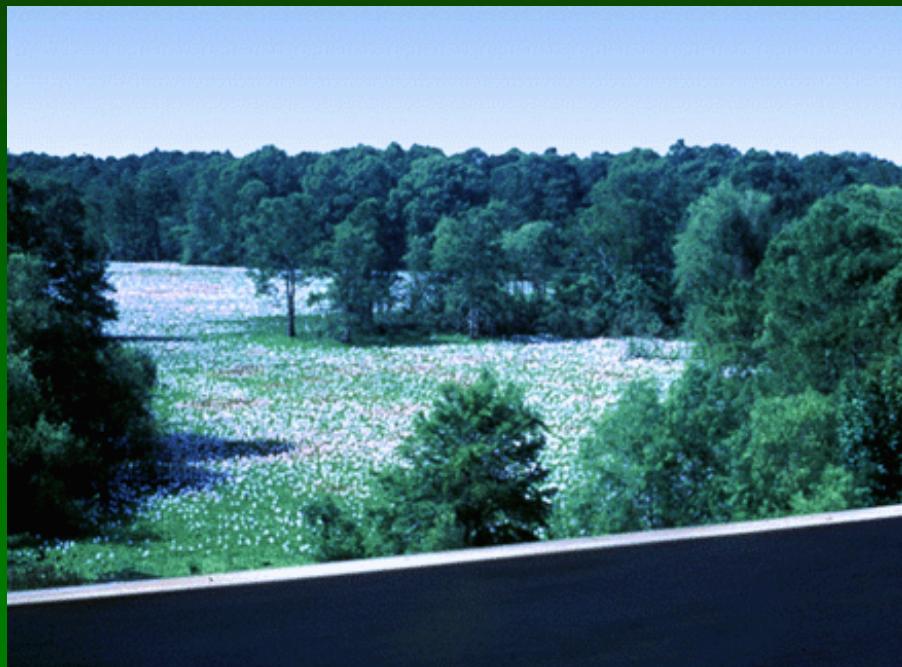
PLANT GROWTH



Waterhyacinth Acreage in Louisiana



Waterhyacinth Impacted by Biological Control Agents





Hydrellia pakistanae
Feeding on *Hydrilla*

Falcon - 2001



Falcon - 2002



