Ecosystem Restoration Program - 2002 Proposal Solicitation Package (PSP): Signature Page

Each applicant submitting a proposal to the CALFED Bay-Delta Program Ecosystem Restoration Program must submit a signed Signature Page.

Failure to sign and submit this form will result in the application not being considered for funding.

The individual signing below declares the following:

- the truthfulness of all representations in this proposal;
- the individual signing the form is authorized to submit the application on behalf of the applicant (if applicant is an entity or organization; and
- the applicant has read and understood the conflict of interest and confidentiality discussion in the PSP Section 2.4 and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in this PSP.

Proposal Title:

Expanded Prevention, Detection, and Control of Purple Loosestrife in the California Bay-Delta Authority Watershed

Faxed to Dan Ray on 11.26.2003

_____

Authorized Signature

J Robert Carlton Leavitt
Printed Name

California Department of Food and Agriculture
Organization

Ecosystem Restoration Program - 2002 Proposal Solicitation Package (PSP): Form I - Project Information

All applicants must complete this form for their proposals. *Failure to answer these questions will result in the application not being considered for funding.*

1. Proposal Title:

Expanded Prevention, Detection, and Control of Purple Loosestrife in the California Bay-Delta Authority Watershed

2. Proposal Applicants:

J Robert Leavitt, California Department of Food and Agriculture
Steve Schoenig, California Department of Food and Agriculture
Carri Pirosko, California Department of Food and Agriculture
Baldo Villegas, California Department of Food and Agriculture

3. Corresponding Contact Person:

J Robert Leavitt
California Department of Food and Agriculture
Integrated Pest Control Branch
1220 "N" Street, Room A-357
Sacramento, CA 95814

4. Project Keywords:

Aquatic Plants
Natural Resource Management
Non-native Invasive Species
Purple Loosestrife
Lythrum salicaria

5. Type of project:

Implementation_Full

6. Does the project involve land acquisition, either in fee or through a conservation easement?

No

7. If yes, is there an existing specific restoration plan for this site?

8. Topic Area

Non-native Invasive Species

9. Type of applicant

State Agency

10. Location – GIS coordinates

Latitude: 38.0103
Longitude: 121.5519
Datum: NAD 27

Describe project location using information such as water bodies, river miles, road intersections, landmarks, and size in acres.

The proposed project crosses many ecozones. It stretches from the heart of the Sacramento-San Joaquin River Delta (Contra Costa, San Joaquin, and Solano counties) to as far north as Shasta County and as far south as Fresno County. Major waterways impacted are as follows: Fall River, Sacramento River, Feather River, Bear River, Cache Creek, San Joaquin River, Calaveras River, Tuolumne River, Old River, Middle River, and Kings River.

11. Location – Ecozone

3.3 Chico Landing to Colusa, 3.4 Colusa to Verona, 3.5 Verona to Sacramento, 6.4 Colusa Basin, 7.7 Butte Sink, 8.1 Feather River, 8.3 Bear River and Honcut Creek, 8.4 Sutter Bypass, 10.1 Cache Creek, 12.2 Merced River to Mendota Pool, 12.3 Mendota Pool to Gravelly Ford, 132. Tuolumne River, 1.1 North Delta, 1.2 East Delta, 1.3 South Delta, 1.4 Central and West Delta, 11.3 Calaveras River

12. Location – County

Alameda, Butte, Contra Costa, Fresno, Nevada, Placer, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Yolo, Yuba

13. Location – City. Does your project fall within a city jurisdiction?

No

14. If yes, please list the city:

15. Location – Tribal Lands. Does your project fall on or adjacent to tribal lands?

No

16. Location – Congressional District.

2, 3, 4, 5, 6, 11, 18, 20

17. Location – California State Senate District & California Assembly District

California State Senate District Number: 1, 3, 4, 5, 6, 12, 14
California Assembly District Number: 2, 3, 4, 5, 7, 8, 10, 11, 15, 17, 26, 32

18. How many years of funding are you requesting?

3

19. Requested Funds:

a. Are your overhead rates different depending on whether funds are state or federal?

No

b. If yes, list the different overhead rates and total requested funds.

c. If no, list single overhead rate and total requested funds.

Single Overhead Rate: 20.31%

Total Requested Funds: $457,162.00

d. Do you have cost share partners already identified?

No

If yes, list partners and amount contributed by each.

e. Do you have potential cost share partners?

No

If yes, list partners and amount contributed by each.

f. Are you specifically seeking non-federal cost share funds through this solicitation?

No

If yes, list total non-federal funds requested.

g. If the total non-federal cost share funds requested above does not match the total state funds requested in 19a, please explain the difference.

20. Is this proposal for next-phase funding of an ongoing project funded by CALFED?

No

If yes, identify project number(s), title(s) and CALFED program.

21. Have you previously received funding from CALFED for other projects not listed above?

Yes

If yes, identify project number(s), title, and CALFED program.

99-F08, Purple Loosestrife Prevention, Detection, and Control Actions for the Sacramento-San Joaquin Delta and Associated Hydrological Units, ERP

99-N11, Purple Loosestrife Prevention, Detection and Control Actions for the Sacramento-San Joaquin Delta System and Associated Hydrological Units, ERP

99-N11B, Purple Loosestrife Prevention, Detection, and Control Actions for the Sacramento-San Joaquin River Delta System and Associated Hydrological Units Emergency Funding to Control Purple Loosestrife in California for Year 2003, ERP

22. Is this proposal for next-phase funding of an ongoing project funded by CVPIA?

No

If yes, identify project number(s), title, and CVPIA program.

23. Have you previously received funding from CVPIA for other projects not listed above?

No

24. Is this proposal for next-phase of an ongoing project funded by an entity other than CALFED or CVPIA?

No

If yes, identify project number(s), title, and funding source.

25. Please list suggested reviewers for your proposal. (optional)

Name	Organization	Phone	Email
Kim Webb	U.S. Fish and Wildlife Service	209-946-6400	kwebb@delta.dfg.gov
Erin Williams	U.S. Fish and Wildlife Service	209-946-6400	erin_williams@r1.fws.gov
David Spencer	USDA-ARS	530-752.1096	dfspencer@ucdavis.edu
Susan Ellis	California Dept. Fish and Game	916-653-8983	sellis@dfg.ca.gov

26. Comments.

Ecosystem Restoration Program - 2002 Proposal Solicitation Package (PSP): Form II - Executive Summary

All applicants must complete this form for their proposals. ***Failure to answer these questions will result in the application not being considered for funding.***

Proposal Title:

Expanded Prevention, Detection, and Control of Purple Loosestrife in the California Bay-Delta Authority Watershed

Summary Description. Purple loosestrife is an aggressive, non-native, noxious weed that has invaded California, where it exists in mostly small, but growing infestations, which pose a threat to riparian habitats. To address this problem, the CALFED Bay-Delta Program (now the California Bay-Delta Authority), Ecosystem Restoration Program, Non-native Invasive Species Program awarded a three-year grant in 1999 to the California Department of Food and Agriculture (CDFA) for the survey, monitoring, public outreach and education, and control of purple loosestrife. The Ecosystem Restoration Program extended this grant for one year in 2003. This proposal is for continued funding for another three years. (This proposal was originally submitted to the Ecosystem Restoration Program in 2001 and was approved as a "directed action.") With additional years of treatment, purple loosestrife can be significantly reduced or eradicated from the Bay-Delta watershed.

Hypothesis

Part 1. Replicated Trials. It is hypothesized that spraying the established purple loosestrife infestations two times per year (early summer and fall) with glyphosate will exhaust the purple loosestrife seed bank in three years, allowing the reintroduction of native flora and fauna, and will be more effective than alternative treatments.

Part 2. Survey, Control and Monitoring Program. It is hypothesized that two applications per year of glyphosate herbicide will reduce the density of adult purple loosestrife plants at each site 25 percent each year allowing for recolonization by native and/or more desirable plant species. It is further hypothesized that two applications per year of glyphosate herbicide will reduce the density of purple loosestrife seedlings at each site 25 percent starting the second year after treatment begins. Where two applications of glyphosate are not feasible, alternative treatments will be used but are expected to be less effective.

Part 3. Public Outreach and Education. It is hypothesized that a public outreach and education program will increase public awareness of the environmental harm that purple loosestrife can cause and decrease the spread via the human vector.

Relationship to Ecosystem Restoration Program Goals

Restoration priorities for the Multi-Regional Bay-Delta Areas #1
Sacramento Region #5
San Joaquin Region #1
Delta Region #5

Ecosystem Restoration Program - 2002 Proposal Solicitation Package (PSP): Form III - Environmental Compliance Checklist

All applicants must complete this form for their proposals. *Failure to answer these questions will result in the application not being considered for funding.*

Successful applicants are responsible for complying with all applicable laws and regulations for their projects, including the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

Any necessary NEPA or CEQA documents for an approved project must tier from the CALFED Programmatic Record of Decision and Programmatic EIS/EIR to avoid or minimize the projects adverse environmental impacts. Applicants are encouraged to review the Programmatic EIS/EIR and incorporate the applicable mitigation strategies from Appendix A of the Programmatic Record of Decision in developing their projects and the NEPA/CEQA documents for their projects.

1. **CEQA or NEPA Compliance**
   a. Will this project require compliance with CEQA? Yes
   b. Will this project require compliance with NEPA? No

   If neither CEQA or NEPA compliance is required, please explain why compliance is not required for the actions in this proposal.

2. **If the project will require CEQA and/or NEPA compliance, identify the lead agency(ies). Please write out all words in the agency title other than United States (use the abbreviation US) or California (use the abbreviation CA). If not applicable, put None.**

   CEQA Lead Agency: ***California Department of Food and Agriculture***
   NEPA Lead Agency (or co-lead:)
   NEPA Co-Lead Agency (if applicable):

3. **Please check which type of CEQA/NEPA documentation is anticipated.**

   CEQA
   X Categorical Exemption
   ☐ Negative Declaration or Mitigated Negative Declaration
   ☐ EIR
   none

   NEPA
   ☐ Categorical Exclusion
   ☐ Environmental Assessment/FONSI

☐ EIS

☉ none

If you anticipate relying on either the Categorical Exemption or Categorical Exclusion for this project, please specifically identify the exemption and/or exclusion that you believe covers this project.

CEQA Guidelines, Section 15308, Class 8 Categorical Exemption

CEQA/NEPA Process

a. Is the CEQA/NEPA process complete? Yes
b. If the CEQA/NEPA process is not complete, please describe the dates for completing draft and/or final CEQA/NEPA documents.
c. If the CEQA/NEPA document has been completed, please list document name(s):

4. **Environmental Permitting and Approvals**

Successful applicants must tier their project's permitting from the CALFED Record of Decision and attachments providing programmatic guidance on complying with the state and federal endangered species acts, the Coastal Zone Management Act, and sections 404 and 401 of the Clean Water Act. The CALFED Program will provide assistance with project permitting through its newly established permit clearing house.

Please indicate what permits or other approvals may be required for the activities contained in your proposal and also which have already been obtained. Please check all that apply. If a permit is *not* required, leave both Required? and Obtained? check boxes blank.

LOCAL PERMITS AND APPROVALS

Conditional use permit

Variance

Subdivision Map Act

Grading Permit

General Plan Amendment

Specific Plan Approval

Rezone

Williamson Act Contract Cancellation

Other

STATE PERMITS AND APPROVALS

Scientific Collecting Permit

CESA Compliance: 2081

CESA Compliance: NCCP

1601/03

CWA 401 certification

Coastal Development Permit

Reclamation Board Approval

Notification of DPC or BCDC

Other

FEDERAL PERMITS AND APPROVALS

ESA Compliance Section 7 Consultation

ESA Compliance Section 10 Permit

Rivers and Harbors Act

CWA 404

Other

PERMISSION TO ACCESS PROPERTY

Permission to access city, county or other local agency land.
Agency Name:

Permission to access state land.
Agency Name:

Permission to access federal land.
Agency Name:

Permission to access private land.
Landowner Name:

Comments. If you have comments on any of the above questions, please enter the question number followed by a specific comment.

Question 1. For CEQA compliance with the Endangered Species Act, the CDFA will survey every area for Threatened and Endangered Species immediately prior to making any control treatments. The California Department of Pesticide Regulation's County Bulletins will be used as a guide.

Ecosystem Restoration Program - 2002 Proposal Solicitation Package (PSP): Form IV - Land Use Checklist

All applicants must complete this form for their proposals. Failure to answer these questions will result in the application not being considered for funding.

1. Does the project involve land acquisition, either in fee or through a conservation easement?

No

2. If you answered yes to #1, please answer the following questions:

a. How many acres will be acquired?

b. Will existing water rights be acquired?

c. Are any changes to water rights or delivery of water proposed?

d. If yes, please describe proposed changes.

e. **Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?**

Yes

3. Do the actions in the proposal involve physical changes in the land use?

No

4. If you answered no to #3, explain what type of actions are involved in the proposal (i.e., research only, planning only).

Nonnative invasive and noxious plant control on relatively small areas.

5. If you answered yes to #3, please answer the following questions:

a. How many acres of land will be subject to a land use change under the proposal?

b. Describe what changes will occur on the land involved in the proposal.

c. List current and proposed land use, zoning and general plan designations of the area subject to a land use change under the proposal.

d. **Is the land currently under a Williamson Act contract?** *(For multiple sites, answer Yes if true for any parcel, and provide an explanation in the Comments box below)*

e. **Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?** For more information, contact the California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program (http://www.consrv.ca.gov/dlrp/FMMP/index.htm). (For multiple sites, answer Yes if true for any parcel, and provide an explanation in the Comments box below)

f. If yes, please list classification:

g. Describe what entity or organization will manage the property and provide operations and maintenance services.

6. Comments.

Ecosystem Restoration Program - 2002 Proposal Solicitation Package (PSP): Form V - Conflict of Interest Checklist

All applicants must complete this form for their proposals. *Failure to answer these questions will result in the application not being considered for funding.*

You may update your information at any time. The [update proposal] button is located at the bottom of this form.

Please list below the full names and organizations of all individuals in the following categories:

- Applicants listed in the proposal who wrote the proposal, will be performing the tasks listed in the proposal or who will benefit financially if the proposal is funded.
- Subcontractors listed in the proposal who will perform some tasks listed in the proposal and will benefit financially if the proposal is funded.
- Individuals not listed in the proposal who helped with proposal development, for example by reviewing drafts, or by providing critical suggestions or ideas contained within the proposal.

The information provided on this form will be used to select appropriate and unbiased reviewers for your proposal.

Applicant(s):

J Robert Leavitt, California Department of Food and Agriculture
Steve Schoenig, California Department of Food and Agriculture
Carri Pirosko, California Department of Food and Agriculture
Baldo Villegas, California Department of Food and Agriculture

Subcontractor(s):

Are specific subcontractors identified in this proposal?

No

If yes, please list the name(s) and organization(s):

Helped with proposal development

Are there persons who helped with proposal development?

No

If yes, please list the name(s) and organization(s):

Ecosystem Restoration Program - 2002 Proposal Solicitation Package (PSP):
Form VI: Budget Summary

YEAR 1

Task No.	Task Description	Direct Labor Hours	Salary (*per year*)	Benefits (*per year*)	Travel	Supplies & Expendables	Services or Consultants	Equipment	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Cost
1	Public Education and Outreach	110	$3,014.00	$854.88	$500.00	$200.00	$0.00	$0.00	$0.00	$4,568.88	$927.94	$5,496.82
2	Ongoing Training of Professionals	90	$2,282.60	$628.15	$300.00	$200.00	$0.00	$0.00	$0.00	$3,410.75	$692.72	$4,103.47
3	Delta Survey	580	$9,075.20	$1,474.48	$2,000.00	$500.00	$0.00	$5,000.00	$1,500.00	$19,549.68	$3,970.54	$23,520.22
4	Contiguous Basin Survey	520	$8,248.20	$1,385.74	$2,000.00	$500.00	$0.00	$0.00	$1,500.00	$13,633.94	$2,769.05	$16,402.99
5	Update Maps	140	$3,427.50	$899.25	$200.00	$500.00	$0.00	$6,000.00	$500.00	$11,526.75	$2,341.08	$13,867.83
6	Update Plans	100	$2,890.50	$841.63	$500.00	$200.00	$0.00	$0.00	$500.00	$4,932.13	$1,001.72	$5,933.85
7	Control Program	720	$11,773.00	$2,060.46	$1,000.00	$1,000.00	$0.00	$8,000.00	$500.00	$24,333.46	$4,942.13	$29,275.59
8	Replicated Trials	600	$9,806.60	$1,701.21	$1,000.00	$1,500.00	$0.00	$0.00	$1,000.00	$15,007.81	$3,048.09	$18,055.90
9	Monitor Control Program	580	$9,227.00	$1,521.54	$1,000.00	$200.00	$0.00	$0.00	$500.00	$12,448.54	$2,528.30	$14,976.83
10	Recolonization by natives	380	$6,390.20	$1,186.38	$1,000.00	$200.00	$0.00	$0.00	$1,200.00	$9,976.58	$2,026.24	$12,002.82
11	Monitor Seed Bank in Replicated Trials	280	$5,112.20	$1,049.25	$1,500.00	$1,000.00	$2,000.00	$0.00	$1,200.00	$11,861.45	$2,409.06	$14,270.51
12	Report Results	220	$6,071.00	$1,714.38	$1,200.00	$750.00	$0.00	$0.00	$500.00	$10,235.38	$2,078.81	$12,314.18
	TOTALS	4,320	$77,318.00	$15,317.34	$12,200.00	$6,750.00	$2,000.00	$19,000.00	$8,900.00	$141,485.34	$28,735.67	$170,221.02

Form VI: Budget Summary

YEAR 2

Task No.	Task Description	Direct Labor Hours	Salary (per year)	Benefits (per year)	Travel	Supplies & Expendables	Services or Consultants	Equipment	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Cost
1	Public Education and Outreach	110	$3,014.00	$854.88	$500.00	$200.00	$0.00	$0.00	$0.00	$4,568.88	$927.94	$5,496.82
2	Ongoing Training of Professionals	90	$2,282.60	$628.15	$300.00	$200.00	$0.00	$0.00	$0.00	$3,410.75	$692.72	$4,103.47
3	Delta Survey	580	$9,075.20	$1,474.48	$2,000.00	$500.00	$0.00	$0.00	$1,000.00	$14,049.68	$2,853.49	$16,903.17
4	Contiguous Basin Survey	520	$8,248.20	$1,385.74	$2,000.00	$500.00	$0.00	$0.00	$1,000.00	$13,133.94	$2,667.50	$15,801.44
5	Update Maps	140	$3,427.50	$899.25	$200.00	$500.00	$0.00	$0.00	$500.00	$5,526.75	$1,122.48	$6,649.23
6	Update Plans	100	$2,890.50	$841.63	$500.00	$200.00	$0.00	$0.00	$500.00	$4,932.13	$1,001.72	$5,933.85
7	Control Program	720	$11,773.00	$2,060.46	$1,000.00	$1,000.00	$0.00	$0.00	$500.00	$16,333.46	$3,317.33	$19,650.79
8	Replicated Trials	600	$9,806.60	$1,701.21	$1,000.00	$1,000.00	$0.00	$0.00	$1,000.00	$14,507.81	$2,946.54	$17,454.35
9	Monitor Control Program	580	$9,227.00	$1,521.54	$1,000.00	$200.00	$0.00	$0.00	$500.00	$12,448.54	$2,528.30	$14,976.83
10	Recolonization by natives	380	$6,390.20	$1,186.38	$1,000.00	$200.00	$0.00	$0.00	$1,000.00	$9,776.58	$1,985.62	$11,762.20
11	Monitor Seed Bank in Replicated Trials	280	$5,112.20	$1,049.25	$1,500.00	$1,000.00	$500.00	$0.00	$500.00	$9,661.45	$1,962.24	$11,623.69
12	Report Results	220	$6,071.00	$1,714.38	$1,500.00	$750.00	$0.00	$0.00	$500.00	$10,535.38	$2,139.74	$12,675.11
	TOTALS	4,320	$77,318.00	$15,317.34	$12,500.00	$6,250.00	$500.00	$0.00	$7,000.00	$118,885.34	$24,145.61	$143,030.96

Form VI: Budget Summary
YEAR 3

Task No.	Task Description	Direct Labor Hours	Salary (per year)	Benefits (per year)	Travel	Supplies & Expendables	Services or Consultants	Equipment	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Cost
1	Public Education and Outreach	110	$3,014.00	$854.88	$500.00	$200.00	$0.00	$0.00	$0.00	$4,568.88	$927.94	$5,496.82
2	Ongoing Training of Professionals	90	$2,282.60	$628.15	$300.00	$200.00	$0.00	$0.00	$0.00	$3,410.75	$692.72	$4,103.47
3	Delta Survey	580	$9,075.20	$1,474.48	$2,000.00	$500.00	$0.00	$0.00	$1,000.00	$14,049.68	$2,853.49	$16,903.17
4	Contiguous Basin Survey	520	$8,248.20	$1,385.74	$2,000.00	$500.00	$0.00	$0.00	$1,000.00	$13,133.94	$2,667.50	$15,801.44
5	Update Maps	140	$3,427.50	$899.25	$200.00	$500.00	$0.00	$0.00	$500.00	$5,526.75	$1,122.48	$6,649.23
6	Update Plans	100	$2,890.50	$841.63	$500.00	$200.00	$0.00	$0.00	$500.00	$4,932.13	$1,001.72	$5,933.85
7	Control Program	720	$11,773.00	$2,060.46	$1,000.00	$1,000.00	$0.00	$0.00	$500.00	$16,333.46	$3,317.33	$19,650.79
8	Replicated Trials	600	$9,806.60	$1,701.21	$1,000.00	$1,000.00	$0.00	$0.00	$1,000.00	$14,507.81	$2,946.54	$17,454.35
9	Monitor Control Program	580	$9,227.00	$1,521.54	$1,000.00	$200.00	$0.00	$0.00	$500.00	$12,448.54	$2,528.30	$14,976.83
10	Recolonization by natives	380	$6,390.20	$1,186.38	$1,000.00	$200.00	$0.00	$0.00	$1,000.00	$9,776.58	$1,985.62	$11,762.20
11	Monitor Seed Bank in Replicated Trials	280	$5,112.20	$1,049.25	$1,000.00	$500.00	$2,000.00	$0.00	$1,000.00	$10,661.45	$2,165.34	$12,826.79
12	Report Results	220	$6,071.00	$1,714.38	$1,230.68	$750.00	$0.00	$0.00	$500.00	$10,266.06	$2,085.04	$12,351.09
	TOTALS	4,320	$77,318.00	$15,317.34	$11,730.68	$5,750.00	$2,000.00	$0.00	$7,500.00	$119,616.02	$24,294.01	$143,910.04

Ecosystem Restoration Program - 2002 Proposal Solicitation Package (PSP): Form VII - Budget Justification

All applicants must complete this form for their proposals. ***Failure to answer these questions will result in the application not being considered for funding.***

Direct Labor Hours. Provide estimated hours proposed for each individual.

Senior Environmental Research Scientist – 440 hours per year
Associate Agricultural Biologist – 640 hours per year
Agricultural Technician III – 1240 hours per year
(2) Agricultural Technician I – 2000 hours per year total

Salary. Provide estimated rate of compensation proposed for each individual.

Senior Environmental Research Scientist - $36.57 per hour
Associate Agricultural Biologist - $28.98 per hour
(1) Agricultural Technician III – $14.50 per hour
(2) Agricultural Technician I - $12.35 per hour

Benefits. Provide the overall benefit rate applicable to each category of employee proposed in the project.

Senior Environmental Research Scientist and Associate Agricultural Biologist – 31%
Agricultural Technician III and Agricultural Technician I – 10.73%

Travel. Provide purpose and estimate costs for all non-local travel.

Some purple loosestrife infestations are located beyond a day's commute and therefore require overnight travel. Travel costs are typically $124 per day per person ($84.00 accommodation at State rate plus $40.00 *per diem*.) Travel costs based on two Agricultural Technicians and one Senior Environmental Research Scientist and/or one Associate Agricultural Biologist traveling throughout the field season. Travel costs also include one Agricultural Technician and one Senior Environmental Scientist and/or one Associate Agricultural Biologist traveling to give training and educational outreach presentations. Travel costs also include vehicle mileage to and from worksites, meetings, and conferences, etc. Travel costs also include airfare to scientific meetings to report results.

Supplies & Expendables. Indicate separately the amounts proposed for office, laboratory, computing, and field supplies.

Expenses will include: safety supplies/gear (gloves, goggles, soap, towels, labels, first aide, etc.), small plot sprayers and supplies, monitoring supplies (tapes, film, stakes, etc.), replacement control equipment (shovels, shears, hand-cans, backpack sprayers, bags,

etc.), waders and other miscellaneous gear/expendables; chemical (glyphosate) costs ($70/gallon of product) and surfactant ($30/gallon).

Services or Consultants. Identify the specific tasks for which these services would be used. Estimate amount of time required and the hourly or daily rate.

None

Equipment. Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items.

Trimble GPS unit (sub-meter) - $5000 including unit, accessories, software
Truck mounted sprayer to treat several remote, non-boat access sites - $8000 including spray unit ($5000), mounting system ($2000), and hoses, nozzles, attachments ($1000)
Workstation for computing, mapping, etc. - $6000

Project Management. Describe the specific costs associated with insuring accomplishment of a specific project, such as inspection of work in progress, validation of costs, report preparation, giving presentations, response to project specific questions and necessary costs directly associated with specific project oversight.

Project management will be conducted by the Senior Environmental Research Scientist and the Associate Agricultural Biologist.

Other Direct Costs. Provide any other direct costs not already covered.

Boat and airboat vehicle maintenance and repair, services..

Indirect Costs. Explain what is encompassed in the overhead rate (indirect costs). Overhead should include costs associated with general office requirements such as rent, phones, furniture, general office staff, etc., generally distributed by a predetermined percentage (or surcharge) of specific costs. *[CORRECTION: If overhead costs are different for State and Federal funds, note the different overhead rates and corresponding total requested funds on Form I - Project Information, Question 17a. On Form VI - Budget Summary, fill out one detailed budget for each year of requested funds, indicating on the form whether you are presenting the indirect costs based on the Federal overhead rate or State overhead rate. Our assumption is that line items other than indirect costs will remain the same whether funds come from State or Federal sources. If this assumption is not true for your budget, provide an explanation on the Budget Justification form.]* Agencies should include any internal costs associated with the management of project funds.

Indirect costs include all of the above mentioned, all costs needed in operating a state program, general office requirements, administration, contracting, etc. Note: The

Department submites a proposal/memo each year to determine what overhead needs are, a set rate is determined/set each year for all agencies. All forms can be filled out as requested.

Expanded Prevention, Detection, and Control of Purple Loosestrife in the California Bay-Delta Authority Watershed

J Robert Leavitt, California Department of Food and Agriculture
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A. Project Description: Project Goals and Scope of Work

1. Problem:

Purple loosestrife is an aggressive, nonnative plant from the European Continent that has invaded California. This nonnative plant was first introduced into North America through contaminated ship ballast water in the 1800s, as an herbal and ornamental plant, and by beekeepers (Bossard et. al. 2000). It has since made its way westward causing immense ecological destruction to wetlands from New York to Washington State (Plate 1). Purple loosestrife was recently included on the Global Invasive Species Program's list of "100 of the World's Worst Invasive Alien Species."[a] In California, purple loosestrife is still in the incipient phase of invasion (that is, currently exists in mostly small, but growing infestations). If allowed to spread, purple loosestrife poses an escalating threat to almost all wetland and riparian habitats in California and could become established and integrated into the environment. This threat is of greatest concern in the Sacramento-San Joaquin Delta where there are a number of threatened and declining species due to a multitude of environmental stressors.

To specifically address the spread of this aggressive wetland invasive weed, in 1999 the CDFA submitted two 3-year proposals to the CALFED Bay-Delta Program (now the California Bay-Delta Authority Program) Ecosystem Restoration Program, Nonnative Invasive Species Program. One of these proposals was a Directed Action Solicitation and the other a General Solicitation. Both grants were awarded. In 2003, the Ecosystem Restoration Program granted the CDFA a one-year emergency extension. Through a highly collaborative effort with many state (California Department of Fish and Game, California Department of Boating and Waterways, California Department of Water Resources, California State Parks) and federal (United States Fish and Wildlife Services, United States Department of Agriculture, United States Bureau of Reclamation) agency partners, as well as cooperation of local watershed and weed management area groups, accomplishments over the past four years have included:

- Nine additional populations have been located in the heart of the Delta (Contra Costa, San Joaquin and Solano counties-Plates 2, 3, 4, 5, and 6a

[a] http://issg.appfa.auckland.ac.nz/database/species/search

through 6f). (At the start of project, White Slough in San Joaquin County was the only known purple loosestrife infestation in the heart of the Delta.)

- An extensive infestation was found in the Tuolumne River ---this infestation is a direct seed source threatening further expansion in the south Delta.

- Seventeen new infestations were also found in associated rivers, streams, and lakes within the entire Bay-Delta watershed (Butte, Fresno, Nevada, Placer, Sacramento, Shasta, Solano, Stanislaus, Sutter, Yuba, and Yolo counties).

- A integrated pest management control program was initiated that included physical removal of plants; clipping, bagging, and disposal of seed heads; release of biological control agents, and spraying plants with glyphosate herbicide. All infestations have been treated with one or more of these alternative treatments, depending upon the site-specific parameters.

- Best Management Practices have been written for the survey and control program.

- A far-reaching education outreach campaign: development and distribution of a brochure, launching and updating of a website, and presentations/training to over 60 groups.

- Development of Regional Adaptive Management Plans through collaborative meetings.

An Expansion of Project Goals

Because of the success of this program to date, the CDFA proposes to expand this program to “Implementation, Full Scale” status. For the reason that most infestations are small and scattered, and that control efforts to date have been successful, it is anticipated that a full scale project can eliminate the infestations in White Slough, Ryer Island, Old, Middle, Calaveras, and San Joaquin Rivers within three years. (These infestations should still be monitored for regrowth for another three years after the last plant is detected.) In contrast, the Tuolumne River infestation serves as the biggest challenge and will require the most time and resources to eradicate. Treatments at this infestation done to date have significantly reduced plant numbers/densities and, with three more years of treatment, will continue to shrink populations and exhaust the seed bank.

This project is needed to continue to build on the control, containment, and local eradication successes accomplished to date. Otherwise, purple loosestrife will start to spread again, and the situation will revert to what it was in 1999. With additional funding, purple loosestrife can be prevented from taking over

California's Bay-Delta waterways, and thereby avoid the establishment and integration of purple loosestrife into the natural environment, as has happened in the northeastern United States.

Ecological Effects of Purple Loosestrife

The ecological integrity of the Bay-Delta system is threatened by the looming invasion of purple loosestrife. Purple loosestrife is listed by the CDFA as a "B" rated noxious weed and as a "species with potential to spread explosively" by the California Invasive Plant Council. Purple loosestrife, which spreads primarily by copious production of seed the size of ground-pepper, becomes established and forms dense stands that crowd out native wetland vegetation and associated wildlife, thus threatening the overall biodiversity of aquatic, wetland, and riparian areas.

The displacement of valued flora and fauna, and the diminishment of critical fish and wildlife habitats have been well documented throughout the United States. In many states, purple loosestrife makes up more than 50 percent of the biomass of emergent vegetation in many wetlands causing canopy closure that results in a virtual biological "desert" underneath. Research has shown that common emergent aquatics such as cattails (*Typha* spp.), sedges (*Carex* spp.), and smartweed (*Polygonum* spp.), and floating plants such as *Potamogeton spp.,* and *Lemna minor* cannot successfully compete with loosestrife (Thompson et al. 1987; Weihe and Neely 1997; Fernberg 1998). A literature review also reveals that dramatic changes in the physical as well as the trophic structure of wetland habitat has threatened the following wildlife species: muskrat, mink, Canada goose, fox, wood duck, mallard, black tern, canvasback, and sandhill crane (Coddington and Field 1978; Malecki et al. 1993; Skinner et al. 1994). Complex food webs that are maintained by a diversity of native wetland plants and aquatic habitats become simplified or excluded. Animals that rely on the native vegetation for food, shelter, breeding and nesting areas cannot use these heavily infested areas (Skinner et al. 1994; Thompson et al. 1987).

Fish species will also be affected. The rapid decay rate of purple loosestrife leaves has been shown to supply detritus to the ecosystem in autumn, whereas a much slower decay rate of resident vegetation supplies detritus throughout the winter and early spring (Grout et al. 1997). Consumer organisms, important in juvenile salmon food webs, appear to be adapted to take advantage of the detritus provided in these later seasons. In addition, submersed terrestrial vegetation that provides habitat for spawning and zooplankton critical to early survival, will be crowded-out by the establishment of purple loosestrife (Skinner et al. 1994).

Purple loosestrife has also jeopardized various threatened and endangered native wetland plants and wildlife such as a local bulrush (*Scirpus longii*) in Massachusetts, rare inland populations of dwarf spike rush (*Eleocharis parvula*)

in New York, and native flatsedge (*Cyperus erythrorhizos*) and the bog turtle (*Clemmys muhlenbergi*) in the northeastern United States (Rawinski 1982; Thompson et al. 1987; Malecki et al. 1993; Skinner et al. 1994). Diverse wildlife and wetland vegetation, including Delta special status plant species and listed wetland-dependent species could similarly be threatened.

The complex interface between farm land and water in the Bay-Delta estuary provides rich and varied habitat for wildlife, especially birds. In the Delta, the principle attraction for waterfowl is winter-flooded agricultural fields. During fall and winter, fields provide a food source and a resting area for migratory birds. Waterways, irrigation canals, and channels feeding these unique systems are at risk. Small mammals also find suitable habitat in the Bay-Delta. Vegetated levees, remnants of riparian forest, and undeveloped islands provide some of the best mammalian habitat in the region. The area also supports a variety of non-game wildlife, including songbirds, hawks, owls, reptiles, and amphibians. In addition, it has been documented that purple loosestrife can diminish wildlife-related recreation opportunities such as bird watching, fishing, and hunting (Skinner et al. 1994; Piper 1996).

The fact that purple loosestrife impedes the rate of natural water flow, causing increased silt deposition and reduction in water quality has generated substantial concern in western states (Malecki et al. 1993). Purple loosestrife infestations would also decrease storage capacities of impounded waterbodies.

Ecological/Biological Objectives

- To protect the Sacramento-San Joaquin River Delta from invasion by the noxious weed, purple loosestrife.

- To detect all newly established populations of purple loosestrife in the "incipient" invasion stage (that is, early detection).

- To treat each population with the goal toward eradication (that is, rapid response).

- To research the best treatment options available.

System-Wide Ecosystem Benefits

Both established and future floodplain/restoration and watershed stewardship projects will be seriously jeopardized if purple loosestrife is allowed to spread further throughout the Bay-Delta. In addition, experienced crews conducting extensive purple loosestrife surveys in the Delta will be equipped to identify the occurrence of any other aggressive invasive weed populations not previously recorded.

Why the CDFA can't do this project alone

The CDFA's noxious weed survey and eradication program has suffered severe budget cuts over the last several years. At the present time, the CDFA only has a small "A" rated noxious weed eradication program and does not have any program for the control or eradication of "B" rated weeds, such as purple loosestrife. The local county agricultural commissioners have the authority to control and/or eradicate "B" rated weeds in their counties, but since the passage of Proposition 13 (Property Tax Initiative) about 25 years ago, most counties have had to severely restrict or eliminate their weed programs. The Weed Management Areas are another resource for weed control, but the funding for this program sunsets in the middle of 2004. Therefore, the CDFA is requesting the assistance of the Ecosystem Restoration Program, through this grant proposal, to control and/or eradicate this invasive, noxious weed from the Bay-Delta watershed.

2. Justification:

Conceptual Model- Survey and Control of Purple Loosestrife

Vectors for spread of purple loosestrife.

Natural vectors (water, wind).

Human vector (vehicles, boats, clothing, horticultural planting).

Public education to prevent spread.

Survey to locate, delimit, and map.

Public education to report infestations to local agricultural commissioner. Survey to confirm, delimit, and map.

Site-Specific Control Program to control or eradicate existing infestations. Monitor effectiveness vs. performance measures. Repeat treatments for a minimum of three years to exhaust seedbank. Monitor for a period of at least three years after last plant find in order to confirm eradication.

Recolonization by native and/or more desirable plant species - monitoring.

Adaptive Management Adopt the most effective control methods from replicated trials and key learnings from control program.

Hypothesis

Part 1. Replicated Trials. It is hypothesized that spraying the established purple loosestrife infestations two times per year (early summer and fall) with glyphosate will exhaust the purple loosestrife seed bank in three years, allowing the reintroduction of native flora and fauna, and will be more effective than alternative treatments.

Alternative treatments can include:

- Spraying once per year in the spring or early summer, or the late summer or fall.
- Physically removing the plants (digging).
- Clipping seed heads.
- Releasing biological control agents, where feasible.

Part 2. Survey, Control and Monitoring Program. It is hypothesized that two applications per year of glyphosate herbicide will reduce the density of adult purple loosestrife plants at each site 25 percent each year allowing for recolonization by native and/or more desirable plant species. It is further hypothesized that two applications per year of glyphosate herbicide will reduce the density of purple loosestrife seedlings at each site 25 percent starting the second year after treatment begins. Where two applications of glyphosate are not feasible, alternative treatments will be used but are expected to be less effective.

Part 3. Public Outreach and Education. It is hypothesized that a public outreach and education program will increase public awareness of the environmental harm that purple loosestrife can cause and decrease the spread via the human vector.

Project Type: Full-Scale Implementation/Control Project

3. Approach:

Project Design, Implementation, and Monitoring

Replicated Trials. Replicated trials will be installed and conducted using standard small plot techniques. Trials will be located in areas of easy to moderate accessibility and that have purple loosestrife infestations (as uniform as possible) over the trial area. Plot size will be adjusted to the size of the infested area, but will be no larger than 40 square meters and no smaller than 10 square meters each. Each treatment will be replicated a minimum of three times, four preferable, in a randomized complete block design. The physical removal treatment (digging) will only be used where permitted by the California Department of Fish and Game. The biological control treatment will only be used where (and if) feasible to cage these plots in order to restrict the biological control agents to the appropriate test plots. Project personnel will monitor the following

endpoints using appropriate visual estimation, counting, or sampling techniques (quadrats): control of purple loosestrife adults and seedlings, density of purple loosestrife adults and seedlings, and identity and density of native and/or more desirable plant species. After the third year of treatments, soil samples will be taken and examined for viable purple loosestrife seeds. The CDFA Plant Pest Diagnostic Botany Laboratory will identify the purple loosestrife plants. The CDFA Plant Pest Diagnostic Seed Laboratory will identify seeds. The Project Statistician will analyze the results, comparing treatments to changes in purple loosestrife populations densities, native plant densities, and other measured parameters.

Survey, Control, and Monitoring Program. At least one thorough survey of the Sacramento-San Joaquin River Delta will be conducted each year. This survey will be primarily from boats, but road surveys will be included where appropriate. In addition, all leads from the public as to the location of possible purple loosestrife infestations will be investigated. The location and delimitation (size) of each infestation will be determined using the global positioning system and standard mapping techniques. Visual estimates or measurements of the density of purple loosestrife adults and seedlings will be made using appropriate counting or sampling techniques (transects and quadrats). Photopoints will be established and photos will be taken recording the history of each site during the project.

All purple loosestrife infestations will be treated in some fashion, if feasible. Certain infestations in highly environmentally sensitive areas may not be amenable to treatment, and will be surveyed only. Treatments will be site-specific, according to the project's Best Management Practices. The preferred treatment is application of glyphosate herbicide twice per year (early summer and fall). This treatment will be used wherever possible. However, in environmentally sensitive areas, or near the known habitat of Threatened and Endangered Species, this treatment might not be possible. Alternate treatments can include physical removal of plants (digging), clipping seed heads to prevent seed production and dispersal, and release of biological control agents. At all locations, the CDFA will survey for Threatened and Endangered Species immediately prior to conducting any control treatment. The California Department of Pesticide Regulation's County Bulletins will be used as a guide. The Project Statistician will estimate the efficacy of the various treatments by comparing the change in infestation size and density to treatments applied and site-specific parameters such as location, distance from water, susceptibility to spring flooding, etc.

At each purple loosestrife infestation, visual estimates, measurements, and/or photopoints will be used to document the population of native and/or desirable plant species. Population changes will be tracked for the duration of the project. Hopefully, this monitoring can be extended beyond the three-year life of this project for at least another three years. The CDFA Plant Pest Diagnostic

Laboratory, Botany Laboratory will identify the native and/or more desirable plants. The Project Statistician will compare the change in size and density of native and/or desirable plant populations to treatments applied and site-specific parameters such as location, distance from water, susceptibility to spring flooding, etc.

Public Outreach and Education. Project personnel will work with the local county agricultural commissioners to schedule public presentations on purple loosestrife identification and control. Target audiences include the Cooperative Weed Management Areas; fishing, boating, and hunting clubs; Pesticide Applicators Professional Association meetings; and company sponsored applicator training meetings.

Project personnel will work with the local county agricultural commissioners to distribute brochures and other literature about purple loosestrife identification and control to local marinas, sports equipment stores, public parks in the Delta, and other access points.

Planning

Project progress, and results versus performance measures will be evaluated every winter. Based upon these evaluations, survey and treatment plans, methods, and schedules will be updated every spring.

Equipment and Facilities

The CDFA and cooperators have most of the essential equipment and facilities necessary to carry out the project. Additional funding for a sub-meter global positioning system unit, a computer workstation for mapping using geographic informations system software, and truck based spray equipment would further facilitate the success and efficiency of the project. An airboat purchased at the start of the project has been critical to surveys in that it allows one to access shallow waterways and waterways choked with vegetation. Without an airboat, many sections of the Delta would otherwise be inaccessible.

Data Dissemination

All project data, including updated maps (paper and geographic information system formats), treatment, and monitoring results will be made widely available to all project collaborators throughout the watershed. Data will be presented in quarterly Ecosystem Restoration Program reports, as well as updated annually in regional adaptive management plans. Project status and successes will also be disseminated through talks, training, and educational outreach materials. Selected articles and abstracts will be available on the CDFA Integrated Pest Control website.

4. Feasibility:

No Action Alternative

The alternative to the current plan is to not take action. Inaction would inevitably result in the continuation of the invasion process, only postponing prevention, detection, and treatment. This alternative would likely result in continuous, and increasing displacement of native and/or desirable vegetation, and grave threats to the Bay-Delta wildlands, riparian systems, and endangered species posed by large populations of this explosive weed. For the reason that purple loosestrife can spread quickly, no action would result in larger infestations and greater numbers of infestations, eventually resulting in a greater use of herbicide treatments for control, and the decreased probability of successful, large scale control.

Biological Control-Only Alternative

The use of biological control agents for purple loosestrife (*Galerucella calmariensis, G. pusilla, Hylobius transversovittatus, and Nanophyes marmoratus*) have been approved nationally for release by the United States Department of Agriculture-Animal and Plant Health Inspection Service based on their host specificity as determined by extensive feeding trials on appropriate native and horticultural plants. They were approved for release in California after the host testing data was reviewed by CDFA scientists and regulators. The CDFA does cooperate with several County Departments of Agriculture, and the Audubon Kern River Preserve, in the release of these biological control agents for the suppression of purple loosestrife. However, these insects did not readily establish and are only now building up to population levels from which significant damage might be expected. Several more years are required to determine their potential to control purple loosestrife in California.

Proposed Project

Project leaders do not foresee any implementation issues/constraints. Glyphosate herbicide is registered in California for aquatic and riparian use and has passed review by both the United States Environmental Protection Agency and the California Department of Pesticide Regulation. In addition, the CDFA will consult with the California Department of Pesticide Regulation County Bulletin Program to determine if additional measures are needed for site-specific actions in sensitive habitats (e.g., habitats of threatened and endangered species identified in the Natural Diversity Database). The CDFA is also very experienced in operating the weed control and eradication project in aquatic, riparian, and terrestrial habitats.

5. Performance Measures:

Replicated Trials

The replicated test program will be considered successful if the following performance measures are met or exceeded:

- Draw statistically valid conclusions from replicated trials about the relative efficacy of the various treatment options.

- The purple loosestrife seed bank is exhausted by three consecutive years of treatment with glyphosate, applied twice per year.

- Native and/or desirable plants that recolonize the treated areas as purple loosestrife is controlled are identified and quantified.

Survey, Control, and Monitoring Program

The survey, control and monitoring program will be considered successful if the following performance measures are met or exceeded:

- Reduce the density of adult purple loosestrife plants at all sites (amenable to treatment with glyphosate twice per year) by 25 percent each year.

- Reduce the density of seedling purple loosestrife plants at all sites (amenable to treatment with glyphosate twice per year) by 25 percent starting the second year after treatment begins (control of adult plants may cause release of seedlings the first year after treatment starts).

- Reduction in the density of purple loosestrife infestations at sites where alternative treatments are used.

- Survey only status - no purple loosestrife plants detectable - at the following purple loosestrife sites by the end of the three year project: White Slough, Ryer Island, Old River, Middle River, Calaveras River, and the San Joaquin River.

- Increased numbers of native and/or more desirable plant species at purple loosestrife sites after treatment begins at each site.

Public Outreach and Education

The public outreach and education program will be considered successful if the following performance measures are met or exceeded:

- At least one education seminar per year on purple loosestrife identification and control is given to an appropriate target audience (such as the Weed Management Areas; Vector Control Districts; and hunting, fishing and boating groups, etc.) in each of the counties comprising the heart of the Delta (Contra Costa, San Joaquin, and Solano counties).

- Brochures are distributed to the main marinas and other access points to the Delta.

6. Data Handling and Storage:

All project mapping and monitoring data will be handled and stored by CDFA's Geographic Information System Laboratory. Data will be made available to all project cooperators at the agency, watershed and county levels.

7. Expected Products/Outcomes:

It is expected that the following products will result from the successful completion of this project:

- The Prinicpal Investigator will write articles and/or make presentations at appropriate scientific meetings (such as the Western Aquatic Plant Management Society or the California Weed Science Society), California Bay-Delta Authority conferences, and Agricultural Commissioner's meetings, on the results of the replicated tests comparing the efficacy of various methods to control purple loosestrife.

- The Prinicpal Investigator will write publications and/or make presentations at appropriate scientific meetings (such as the Western Aquatic Plant Management Society or the California Weed Science Society), California Bay-Delta Authority conferences, and Agricultural Commissioner's meetings, on the results of the survey and control program in reducing the number and size of purple loosestrife infestations in the Bay-Delta watershed, and in allowing for recolonization with native and/or more desirable plant species.

- The Principal Investigator will file quarterly and final reports with the California Bay-Delta Authority on all the activites of the project, including copies of maps, tables, and reports. Maps and tables will be distributed which show the location of current purple loosestrife infestations, and all new purple loosestrife finds. (At each location the maps and tables will show the date the infestations was first discovered, the current size and density of the infestation, and changes in size and density over the course of the project. The maps and tables will also show the extent of recolonization at each site by native and/or more desirable plant species.)

8. Work Schedule:

See Table 1.

B. Applicability to Ecosystem Restoration Program and Science Program Goals and Implementation Plan

1. Ecosystem Restoration Program, Science Program Priorities:

Nonnative invasive species, purple loosestrife in particular, are mentioned repeatedly as priorities in Strategic Goal 5, the Multi-Regional Bay-Delta Areas section, and Sacramento and San Joaquin Regions, and the Delta and Eastside Tributaries Region. Priorities call for purple loosestrife mapping, annual survey, outreach, implementation of control and eradication, assessment of control efforts, and prevention, as follows:

> "Strategic Goal 5: Nonnative Invasive Species. Prevent the establishment of additional nonnative species and reduce the negative biological and economic impacts of established nonnative species in the Bay-Delta estuary and its watershed."[b]
>
> "Multi-Regional Priorities
> 1.) Prevent the establishment of additional nonnative species and reduce the negative biological, economic, and social impacts of established nonnative species in the Bay-Delta estuary and its watersheds.
> … Focus should be on the control and eradication of nonnative invasive plants such as …*Lythrum salicaria*."[c]
>
> "Restoration Priorities for the Sacramento Region
> 5.) Implement actions to prevent, control and reduce impacts of nonnative invasive species in the region."[d]
>
> "Restoration Priorities for the San Joaquin Region
> 1.) Continue habitat restoration actions including … habitat restoration studies in collaboration with local groups.
> *Nonnative Invasive Species.* Projects are needed to implement an eradication program for purple loosestrife (*Lythrum salicaria*) along the Tuolumne River."[e]

[b] CALFED Bay-Delta Program. 2001. Ecosystem Restoration Program. Draft Stage 1 Implementation Plan. Page 35.
[c] Ibid., page 42
[d] Ibid., page 60
[e] Ibid., pages 69-70

"Restoration Priorities for the Delta and Eastside Tributaries Region
5.) Implement actions to prevent, control, and reduce impacts of nonnative invasive species."[f]

2. Relationship to Other Ecosystem Restoration Projects:

There is no direct relationship to previously funded Ecosystem Restoration Program Project.

3. Requests for Next-Phase Funding:

This proposal is for the expansion and continuation of current phases and objectives of the purple loosestrife project. It is therefore recommended that this project advance to “Implementation, Full Scale” status.

4. Previous Recipients of CALFED Program (now California Bay-Delta Authority) Funding:

To specifically address the spread of this aggressive wetland invasive weed, the CDFA submitted 3-year proposals in 1999 as both a Directed Action Solicitation and a General Solicitation. In addition, the CDFA applied for emergency interim funding for 2003.

*Project Zones***.** The CDFA was solicited in 1999 to implement a "directed action" by the Ecosystem Restoration Program, Nonnative Invasive Species Program for the prevention and eradication of purple loosestrife with a primary focus of detection and eradication in the Delta. Because the directed action was only tentative and did not address protection of the whole Bay-Delta watershed, the CDFA was advised to submit a proposal through the General Solicitation Process for the full amount of a Bay-Delta Watershed-Wide project, but to break the proposal into two zones (previously called "phases") which separate the proposed contract for the directed action and the extra work plan to protect the whole watershed. These two zones were referred to as Phase I and Phase II, but will now be referred to as Zone I and Zone II, in order to clarify that they refer to a geographic separation that reflects distance for the Sacramento-San Joaquin Delta system and the funding limitations of the directed action.

CALFED Directed Action Solicitation (Zone 1, Core Delta)

Title: *Purple Loosestrife Prevention, Detection, and Control Actions for the Sacramento-San Joaquin Delta and Associated Hydrological Unit*s. Project number: ERP-99-F08, managed by United States Fish and Wildlife Service.

[f] Ibid., pages 84-85

CALFED General Solicitation (Zone II, Expanded to entire Bay-Delta Watershed)

Title: *Purple Loosestrife Prevention, Detection, and Control Actions for the Sacramento-San Joaquin Delta System and Associated Hydrological Units.* Project number: ERP-99-N11, managed by National Fish and Wildlife Foundation.

Through a highly collaborative effort with many state (California Department of Fish and Game, California Department of Boating and Waterways, California Department of Water Resources, California State Parks) and federal (United States Fish and Wildlife Services, United States Department of Agriculture, United States Bureau of Reclamation) agency partners, as well as cooperation of local watershed and weed management area groups, accomplishments over the three years of this project have included:

- A far-reaching education outreach campaign: development and distribution of a brochure, launching and updating of a website, and presentations/training to over 60 groups.

- A comprehensive survey and mapping effort in Shasta, Butte, Sutter, Yuba, Nevada, Placer, Sacramento, San Joaquin, Stanislaus, Fresno, and Yolo counties (see attached Bay-Delta Watershed Map).

- Development of Regional Adaptive Management Plans through collaborative meetings.

- Initiation of a treatment program: control, containment, and eradication.

Emergency Funding for Year 2003

Title: *Purple Loosestrife Prevention, Detection, and Control Actions for the Sacramento-San Joaquin River Delta System and Associated Hydrological Units Emergency Interim Funding for 2003.* Project Number: ERP-99-N11B.

A request for additional funding, and a time extension on the first Ecosystem Restorations Program grant was requested in order to continue critical purple loosestrife control activities during the growing season of 2003, while the CDFA rewrote the 2001 grant proposal, according to Ecosystem Restoration Program guidelines. The request was made in order to maintain control and monitoring activities agreed upon at the inception of the original agreement. A delay in project activities in 2003 would have resulted in a break in continuity of control for purple loosestrife in the state.

Because of emergency funding granted the CDFA controlled invasive plant spread and new seed production at 27 eradication sites, preserving the integrity

of three years of control effort. Public education with agricultural commissioners did continue and resulted in the detection of a new infestation near Colfax in Placer County, and along Martinez Creek in Contra Costa County.

5. System-Wide Ecosystem Benefits:

The displacement by purple loosestrife of valued flora and fauna and the diminishment of critical fish and wildlife habitats has been well documented throughout the United States. In many states, purple loosestrife in many wetlands makes up more than 50 percent of the biomass of emergent vegetation causing canopy closure that results in a virtual biological "desert" underneath. Purple loosestrife has also jeopardized various threatened and endangered native wetland plants and wildlife. Diverse wildlife and wetland vegetation, including Delta special status plant species and listed wetland-dependent species would similarly be threatened.

This project would first, and foremost, prevent the spread and establishment of purple loosestrife in the Sacramento-San Joaquin River Delta, thereby avoiding the impacts listed above. In addition, other system-wide ecosystem benefits would include the production of basic information and methodologies for the control of purple loosestrife that could be adopted by other investigators for other invasive plants, and a better understanding of the relationship between invasive plant control and eradication and the recolonization of previously infested areas by native and/or more desirable plant species.

6. Additional Information for Proposals Containing Land Acquisition:

Not Applicable to this project.

C. Qualifications

The CDFA

The CDFA has statutory responsibility for the prevention of exotic agricultural and environmental pests from entering the state. The CDFA is concerned with invasive weeds, insects, animals, and diseases.

Integrated Pest Control Branch

Pest prevention is a major part of the CDFA's many different functions, particularly in the Plant Health and Pest Prevention Services. The Plant Health and Pest Prevention Services is divided into four branches, including the Integrated Pest Control Branch. The Integrated Pest Control Branch has three major programs that are directly involved in weed control: 1) Hydrilla Eradication Program, 2) Biological Control Program, and 3) Noxious Weed Management Program.

Dr. J Robert Leavitt, Principal Investigator and Project Manager

Dr. Leavitt has been working in weed science and weed control since he took his first weed control course at Brigham Young University in 1973. He then completed a Master's Degree in Agronomy at the University of Arizona in 1975 and a Ph.D. in Agronomy (Weed Science) at Michigan State University in 1978. Then Dr. Leavitt taught and did research in weed science and water monitoring at the University of Nebraska until 1980 when he joined the DuPont Company working in new herbicide discovery. In early 2000, Dr. Leavitt joined the California Department of Pesticide Regulation where he was a reviewer for herbicide and plant growth regulator efficacy and phytotoxicity data. Since July of 2001, Dr. Leavitt has worked as a Senior Environmental Research Scientist (Supervisor) in aquatic and riparian weed control and eradication for the CDFA. In addition, Dr. Leavitt has an Agricultural Pest Control Advisor License and a Qualified Applicator License (aquatic weed control and research and demonstration) from the California Department of Pesticide Regulation. In addition, Dr. Leavitt is Vice-president of the California Weed Science Society in 2004 and will be President in 2005.

Mr. Steve Schoenig, Project Statistician

Mr. Schoenig has 18 years experience in the fields of biological pest control weed education and research. In 1981 he received a Bachelor of Science in Biology of Natural Resources from the University of California, Berkeley. At the University of California, Davis he earned two Master's degrees in Statistics and Entomology in 1981 and 1987, respectively. From 1991 to 1995 Mr. Schoenig provided departmental statistical consultation and implemented biological pest control projects and studies while serving as an Associate Environmental Research Scientist with the Biological Control Program at the CDFA. From 1996 to present, he serves as lead Senior Environmental Research Scientist (Supervisor) for the Noxious Weed Management Progam and the Geographic Information System Laboratory within the Integrated Pest Control Branch at the CDFA. He is currently President of the California Invasive Plant Council, and a member of the American Statistical Association, and the California Native Plant Society.

Ms. Carri (Benefield) Pirosko, Project Consultant

Ms. Pirosko graduated in 1996 from Saint Mary's College of California with a Bachelor of Science in Biology. In the spring of 1998 she earned a Master's Degree in Plant Biology, emphasis in Weed Science, from the University of California, Davis. From the fall of 1998 to fall 1999, she served as a Scientific Aid for the CDFA and as Field Crops Outreach Coordinator with the University of California Sustainable Research and Education Program, Davis. From fall of 1999 to present Ms. Pirosko serves as Associate Agricultural Biologist with the CDFA. Ms. Pirosko is currently a director of the California Invasive Plant

Council, and has conducted over 50 presentations and trainings to regional purple loosestrife working groups, agency staff, local watershed groups, Weed Management Area groups, as well as at the above-mentioned Societies. Ms. Pirosko was a contributor of a chapter on purple loosestrife to a book entitled, "Invasive Plants of California's Wildlands" (2000, UC Press).

Mr. Baldo Villegas, Biological Control Specialist

Mr. Villegas has 26 years experience in the fields of biological pest control weed education/research. In 1971 received a B.S. in Entomology from UC Davis and a M.S. in Systematic Entomology also from UC Davis. In 1977 he joined the California Department of Agriculture's new Biological Control Program where he has worked on the development of biological control program against insects and weeds and heads the implementation aspects of weed biological control projects. In such capacity, Baldo has traveled extensively in the United States and Mexico in search of available approved biological control agents for released on pest insects and weeds. Since 1994, Baldo has worked on the development of the current biological control program against purple loosestrife in California and starting in 1997 he has overseen the collections and releases of all the insects that have been released in California.

Ms. Susan Monheit, Project Coordinator

Ms. Monheit comes to the CDFA with more than ten years experience in "superfund" work including Phase I and II site investigations, remedial investigation/feasibility studies, ecological and human health risk assessment, and Toxicological Testing. Ms. Monheit possesses a Master of Science in Environmental Management from the University of San Francisco, and a Bachelor of Science in biology from the University of California at Santa Cruz. At CDFA Ms. Monheit is looking in to the toxicity of herbicides used by the Purple Loosestrife Eradication and Control Program, developing Best Management Practices, updating adaptive management plans for various counties, and investigating the presence of rare, threatened and endangered species and any restrictions put out by the California Department of Pesticide Regulation regarding the use of herbicides in areas impacted by purple loosestrife.

David Kratville, Project Field Coordinator

Mr. Kratville graduated in 2003 from California State University Sacramento with a B.A. in Environmental Studies with a minor in Biology. Mr. Kratville spent the summer of 1998 as a county trapper controlling noxious weeds and trapping agricultural pest insects for Plumas/Sierra County Agricultural Commissioner's Office. Since then, Mr. Kratville has worked a total of five years for CDFA in noxious weed detection and control, GPS/GIS mapping, airboat operation, and digital photography. In particular, Mr. Kratville spent the summer of 2003 working primarily on purple loosestrife. Mr. Kratville plans on starting graduate school in

Ecology at the University of California, Davis in the fall of 2004. In addtion, Mr. Kratville has a Qualified Applicator's Certificate from the California Department of Pesticide Regulation.

D. Cost

Budget

Budget included on web forms as required.

Cost Sharing

The project is a highly cooperative effort and cooperators provide a good deal of in-kind support. No hard-dollar matches are anticipated at this time.

E. Local Involvement

County Agricultural Commissioners

The county agricultural commissioners share or take the lead role with the CDFA on all county weed projects. In line with this historic partnership, the counties have been active participants of the project and are in full support of its continuation and expansion.

Local Weed Management Areas

The Integrated Pest Control Branch has taken a lead role in the promotion and coordination of the county-wide Weed Management Areas. They are local weed management groups made up of concerned citizens, members from private groups, and state, federal and county agencies. Weed Management Areas have been very supportive of the project to date and have expressed a real interest in continuing to do so.

State and Federal Agencies

Collaboration has and will continue to include, employees of the following agencies: California Department of Fish and Game, California Department of Boating and Waterways, California State Parks and Recreation, United States Bureau of Reclamation, United States Fish and Wildlife Service, and United States Department of Agriculture.

Other Supporters

Support for the project has been and will continue to be wide: Chapters of the California Native Plant Society, members of the California Invasive Plant Council, many resource conservation districts, Ducks Unlimited, homeowner associations,

watershed groups, mosquito abatement districts, public works departments, and private citizens. Property access has been facilitated through the county agricultural commissioner's offices and local RCD if on private land.

F. Compliance with Standard Terms and Conditions

The CDFA will comply with standard state and federal contract terms.

G. Literature Cited

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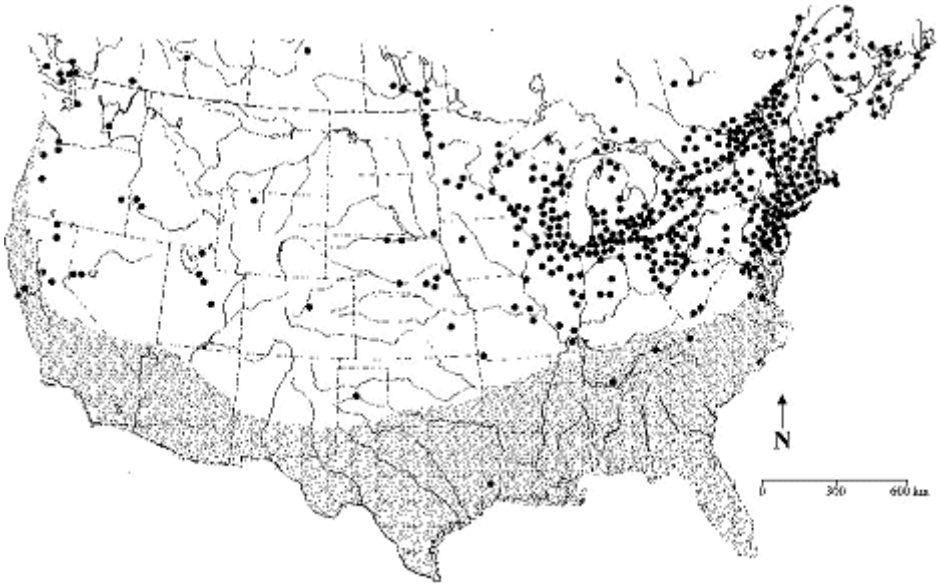
Table 1. Work Schedule

Task	Timeframe	Description of Task
1. Public education and outreach	Winter months; throughout the duration of project	Educational talks and brochures to Weed Management Areas, marinas, fishing, boating, etc. public groups.
2. Ongoing training of professionals	May-August, throughout the duration of project	Training of agency and other public employees working in or near the Bay-Delta watershed.
3. Delta survey	June-August, all three years of project	Survey for purple loosestrife in the "heart of the Delta" (waterways in Sacramento, San Joaquin, Contra Costa, and Stanislaus counties).
4. Contiguous Basin survey	June-August, all three years of project	Survey for purple loosestrife in the remainder of the Bay-Delta watershed, including waterways in Shasta, Butte, Sutter, Yuba, Nevada, Placer, Fresno, and Yolo counties.
5. Update maps	Winter, throughout the duration of the project	Update survey, treatment, and monitoring layers of purple loosestrife distribution maps.
6. Update plans	October-March, all three years of project	Evaluate results versus performance measures, update survey, monitoring, and treatment plans as appropriate to achieve targets.
7. Control program	May-October, all three years of project	Site-specific control program. The main treatment will be two applications of glyphosate per year (early and late). Where this is not feasible or appropriate, alternatives will be used. These include physical removal of plants, clipping seedheads, and release of biological control agents.
8. Replicated trials	May-October, all three years of project	Install, treat, and monitor results of replicated control trials comparing two applications of glyphosate to alternative treatments.
9. Monitor control program	May-October, all three years of project	Quantify the size and density of the purple loosestrife infestations. Separate the analysis into growth stage classes, that is, seedlings and adults.
10. Monitor recolonization of natives and/or more desirable plants	July-October, last two years of project	Identify and quantify the vegetation that colonized the treated areas as the purple loosestrife is controlled.
11. Monitor seedbank in replicated trials	August-October, last year of project	Quantify the number of purple loosestrife seeds in seedbank after three years of treatments.
12. Report Results	Quarterly, Annually, and at end of project	Report results to the Ecosystem Restoration Program and at scientific meetings

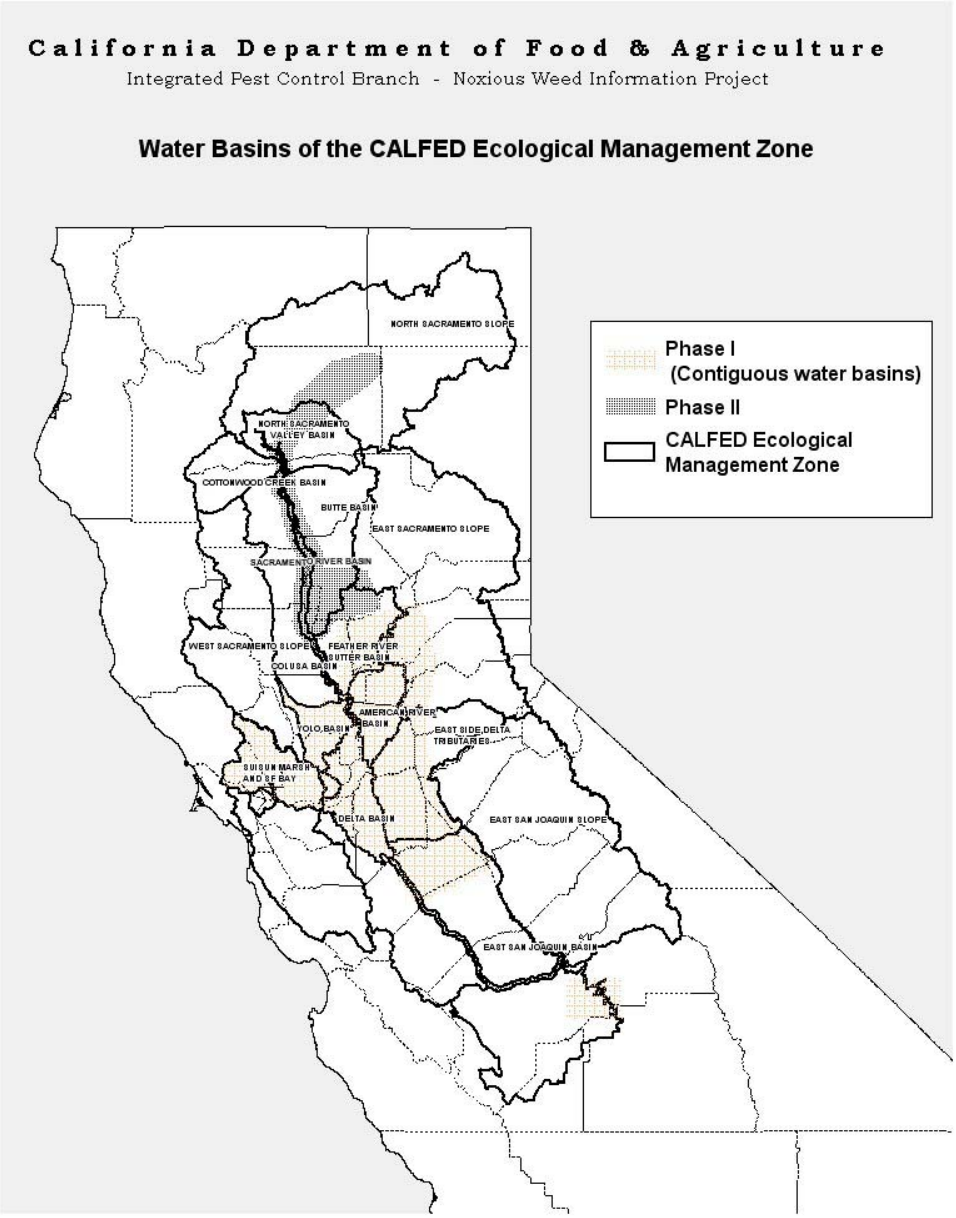
Plate 1

WHAT CALIFORNIA IS TRYING TO PREVENT:
Purple Loosestrife Invasion as Seen in the North Eastern United States



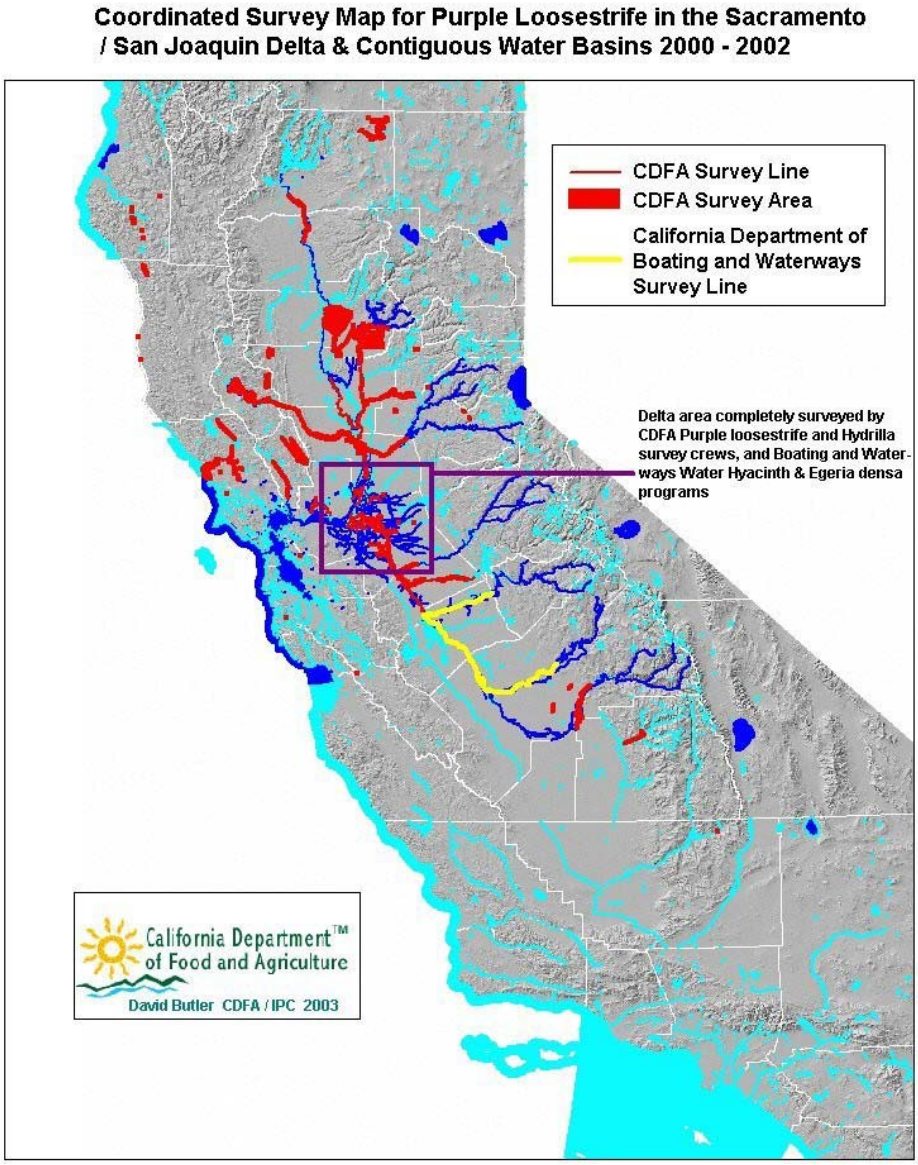
United States Distribution of Purple Loosestrife, Late 1980s.

Plate 2



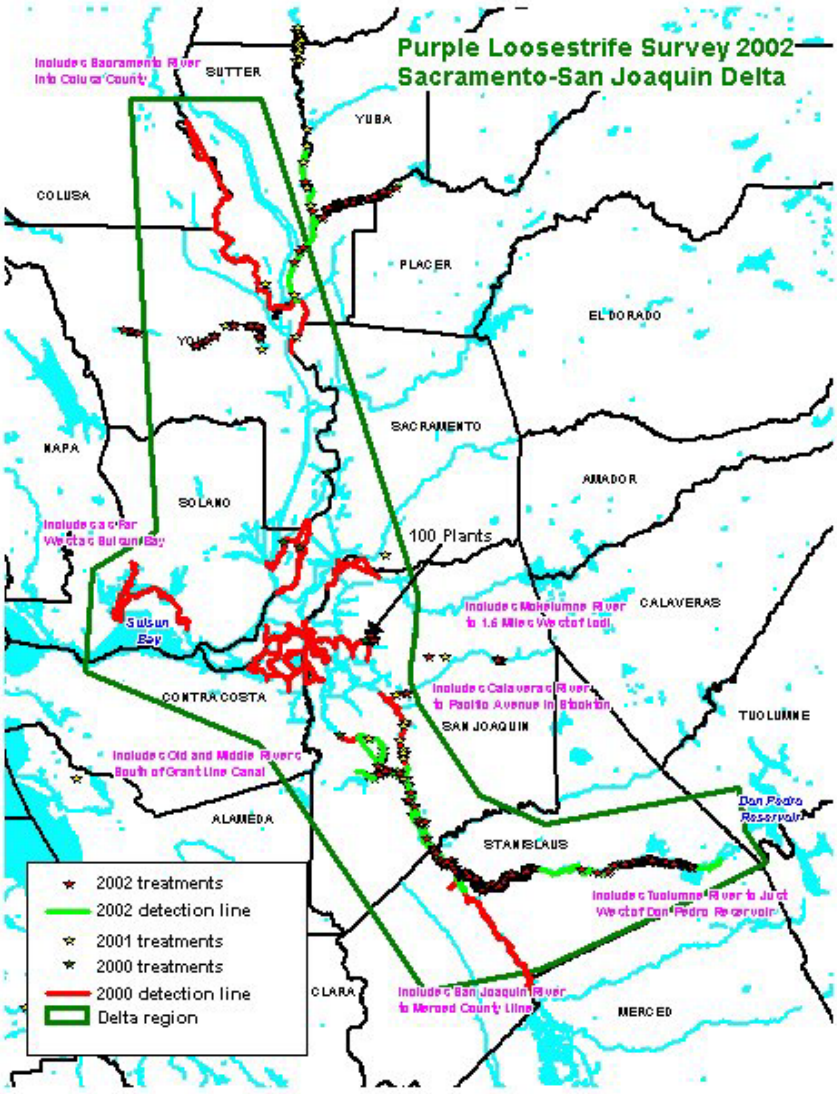
Map showing Zone I (Phase I) and Zone II (Phase II)
of the proposed eradication and survey areas for purple loosestrife.

Plate 3



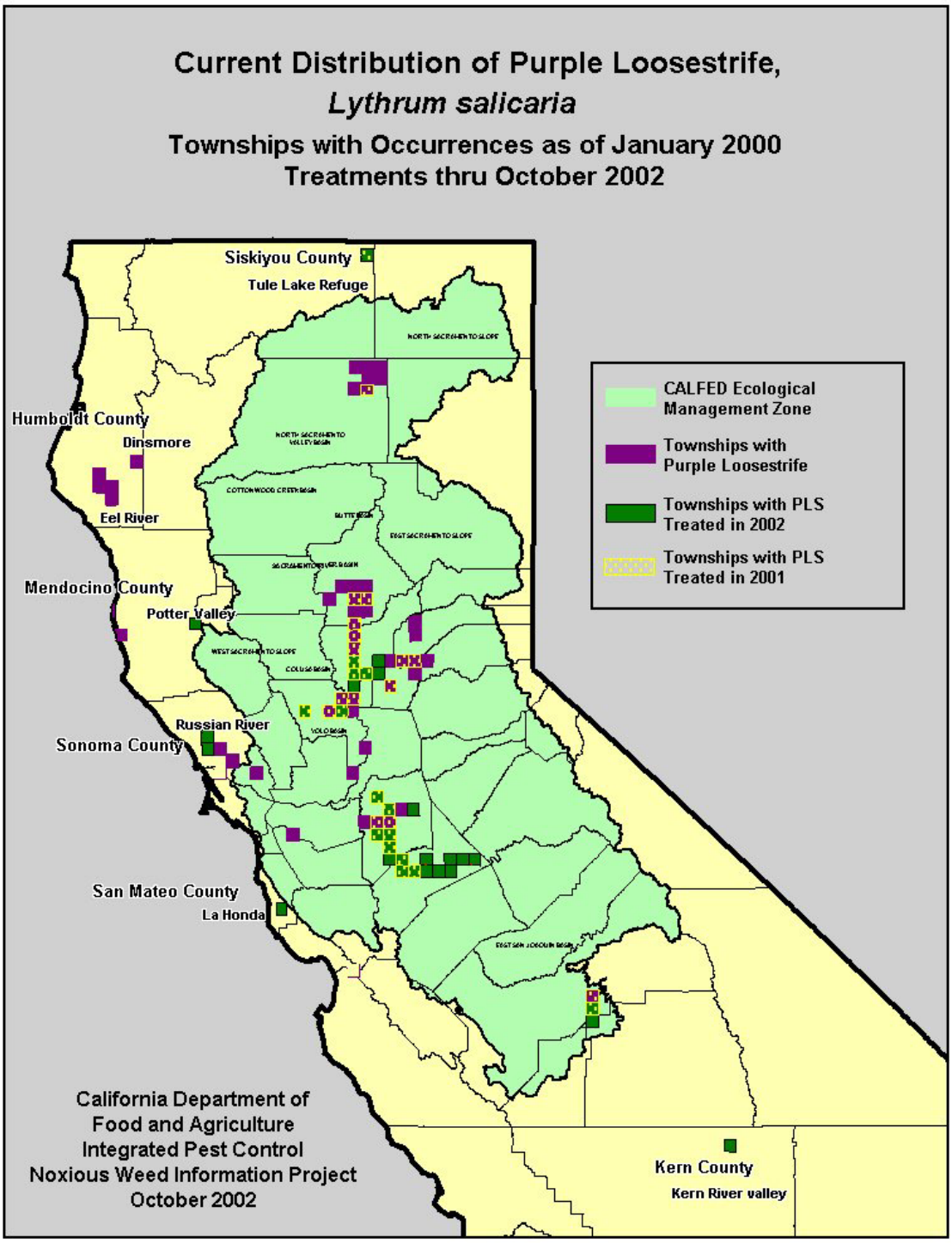
River systems and waterways surveyed from 2000-2002 for purple loosestrife.

Plate 4



An overview of purple loosestrife infestations in the heart of the Delta (Contra Costa, San Joaquin, and Solano counties) and adjacent counties.

Plate 5



Current distribution of purple loosestrife; Townships with occurences as of January 2000, Treatments through October 2002

Plates 6a-6f

New Infestations in Sacramento, San Joaquin, and Stanislaus Counties

Plate 6a

The largest infestation was found in the south Delta on the Tuolumne River---a seed source that threatens the entire south Delta if not addressed.

Plate 6b

An infestation found in a ditch near Linden.

Plate 6c

White Slough was the only know infestation prior to project surveys.

Plate 6d

Confluence of Middle and Old Rivers, San Joaquin County
July 2000 Survey and Treatment, Two very large plants.

Plates 6e (left) and 6f (right)

Confluence of Middle and Old Rivers, San Joaquin County
At the same location, close up shot and shot zoomed out, July 2001---1 year post treatment
No purple loosestrife to be found, two large plants gone, delta vegetation filled in the gaps.
