Announcement of such criteria shall be made by notice in the **Federal Register**. The granting agency may retain an amount up to 15 percent of total appropriation for administrative costs.

* * * * *

(g) The application shall provide assurance that non-Federal dollars will be available to share the costs of the proposed program. The Federal funds are to be matched on a basis of no less than two non-Federal dollars for each Federal dollar.

* * * * *

5. Section 401.12 is amended by revising paragraph (c) to read as follows:

§ 401.12 Program management.

* * * * *

(c)(1) Acceptance of the award document certifies the grantee's assurance that the grant will be administered in compliance with OMB regulations, policies, guidelines, and requirements as described in:

(i) Circular No. A–21, revised, Cost Principles of Educational Institutions;

(ii) Memorandum No. M–92–01, Coordination of Water Resources Information;

(iii) Circular No. A–88, revised, Indirect Cost Rates, Audit and Audit Followup at Educational Institutions;

(iv) Circular No. A–110, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals and other Nonprofit Organizations; and

(v) Circular No. A–124, Patents-Small Business Firms and Nonprofit Organizations.

(2) Copies of the documents listed in paragraph (c)(1) of this section shall be available from the granting agency.

Subpart E—Evaluation

6. Section 401.26 is revised to read as follows:

§ 401.26 Evaluation of institutes.

(a) Within 2 years of the date of its certification according to the provisions of § 401.6, each institute will be evaluated for the purpose of determining whether the national interest warrants its continued support under the provisions of the Act. That determination shall be on:

(1) The quality and relevance of its water resources research as funded under the Act;

(2) Its effectiveness as an institution for planning, conducting, or arranging for research;

(3) Its demonstrated performance in making research results available to users in the State and elsewhere; and

(4) Its demonstrated record in providing for the training of scientists through student involvement in its research program.

(b) An evaluation team, selected by the granting agency on the basis of the members' knowledge of water research and administration, shall evaluate each institute, and may with the concurrence of the granting agency, visit such institutes as it considers necessary. The team is to include at least one individual from the following categories:

(1) Employees of the Department of the Interior;

(2) University faculty or other professionals with relevant experience in the conduct of water resources research;

(3) Former directors of water research institutes; and

(4) University faculty or other professionals with relevant experience in information transfer.

(c) The granting agency may request recommendations for team selections from the National Research Council/National Academy of Sciences and from other organizations whose members include the types of individuals cited in paragraph (b) of this section.

(d) The granting agency shall, as an administrative cost, provide the funds for travel and per diem expense of the team members, within the maximum limits allowable under Federal travel regulations (41 CFR subtitle F).

(e) The granting agency has the right to select dates for evaluation visits, and notice of the team's visit shall be provided to the institute being evaluated at least 60 days in advance.

(f) It shall be the responsibility of each institute to provide such documentation of its activities and accomplishments as the granting agency and evaluation team may reasonably request. The request for this documentation shall be made at least 60 days prior to the due date of its receipt.

(g) The team shall, within 90 days after completion of its evaluation, submit a written report of its findings to the granting agency for transmittal to the institute. If an institute is found to have deficiencies in meeting the objectives of the Act, it shall be allowed 1 year to correct them and to report such action to the granting agency. The decision as to the institute's eligibility to receive further funding will rest with the granting agency.

(h) After the initial evaluation, each institute shall be reevaluated at least every 5 years.

Dated: November 16, 1992.

Harlan L. Watson,

Principal Deputy Assistant Secretary—Water and Science.

[FR Doc. 92–30471 Filed 12–16–92; 8:45 am]

BILLING CODE 4310–31–M

DEPARTMENT OF TRANSPORTATION

Coast Guard

33 CFR Part 117

[CGD7–92–112]

Drawbridge Operation Regulations; Okeechobee Waterway, Fort Myers, FL

AGENCY: Coast Guard, DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: At the request of Lee County, (the bridge owner), the Coast Guard proposes to change the regulations governing the Sanibel Causeway Drawbridge over San Carols Bay at Punta Rassa, by requiring a five (5) minute advance notice prior to opening of the bridge during certain hours. This action should relieve the bridge owner of the burden of having a bridge tender at the bridge site constantly available to open the draw, while still providing for the reasonable needs of navigation.

DATES: Comments must be received on or before February 1, 1993.

ADDRESSES: Comments may be mailed to Commander (oan), Seventh Coast Guard District, 909 SE. 1st Avenue, Miami, Florida 33131–3050, or may be delivered to room 406 at the above address between 8 a.m. and 3 p.m., Monday through Friday, except Federal holidays. The telephone number is 305–536–4103.

The Commander, Seventh Coast Guard District maintains the public docket for this rulemaking. Comments will become part of this docket and will be available for inspection or copying at the above address.

FOR FURTHER INFORMATION CONTACT: Mr. Ian MacCartney, Project Manager, Bridge Section, at (305) 536–4103.

SUPPLEMENTARY INFORMATION:

Request for Comments

The Coast Guard encourages interested persons to participate in this rulemaking by submitting written data, views, or arguments. Persons submitting comments should include their names and addresses, identify this rulemaking [CGD7–92–112] and the specific section of this proposal to which each comment applies, and give the reason for each comment. The Coast Guard requests that all comments and attachments be

submitted in an unbound format suitable for copying. If not practical, a second copy of any bound material is requested. Persons wanting acknowledgment of receipt of comments should enclose a stamped, self-addressed postcard or envelope.

The Coast Guard will consider all comments received during the comment period. It may change this proposal in view of comments.

The Coast Guard plans no public hearing. Persons may request a public hearing by writing to Mr. Ian MacCartney at the address under "ADDRESSES." The request should include reasons why a hearing would be beneficial. If it determines that the opportunity for oral presentations will aid this rulemaking, the Coast Guard will hold a public hearing at a time and place announced by a later notice in the Federal Register.

Drafting Information

The principal persons involved in drafting this document are Ian MacCartney, Project Manager, and Lieutenant J.M. Losego, Project Counsel.

Background and Purpose

The Sanibel Causeway Drawbridge which crosses San Carlos Bay, Okeechobee Waterway mile 151, presently opens on signal except that from 11 a.m. to 6 p.m., the draw opens only on the quarter hour. The bridge owner has requested that from 10 p.m. to 6 a.m., the bridge be untended and allowed to open on signal if at least a five minute advance notice is given. The purpose of the request is to reduce the burden of staffing the bridge with full time bridgetenders during nighttime hours.

Discussion of Proposed Amendments

For the nighttime hours, statistics show that the span opens only once every third night during the hours requested. The bridge owner operates a toll booth East of the draw span. It operates 24 hours per day. Personnel at the toll booth will monitor a marine radio and dispatch an attendant to the bridge to operate the drawspan. This proposal should reduce the operating costs for the owner while still providing for the reasonable needs of navigation on the Okeechobee Waterway. Public vessels of the United States, vessels owned or operated by the state, county, or local government and used for public safety purposes, or vessels in a situation where a delay would endanger life or property shall, upon proper notification, be passed at any time.

Regulatory Evaluation

This proposal is not major under Executive Order 12291 and not significant under the Department of Transportation regulatory policies and procedures (44 FR 11040; February 26, 1979.) The Coast Guard expects the economic impact of this proposal to be so minimal that a regulatory evaluation is unnecessary. We conclude this because the bridge owner has agreed to open the draw with a five minute advance notice.

Small Entities

Under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), the Coast Guard must consider whether this proposal, if adopted, will have a significant economic impact on a substantial number of small entities. "Small entities" include independently owned and operated small businesses that are not dominant in their field and that otherwise qualify as "small business concerns" under section 3 of the Small Business Act (15 U.S.C. 632.) Because it expects the impact of this proposal to be minimal, the Coast Guard certifies under 5 U.S.C. 605(b) that this proposal, if adopted, will not have a significant economic impact on a substantial number of small entities.

Collection of Information

This proposal contains no collection of information requirements under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*).

Federalism

The Coast Guard has analyzed this proposal under the principles and criteria contained in Executive Order 12612, and has determined that this proposal does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Environment

The Coast Guard considered the environmental impact of this proposal and concluded that, under section 2.B.2.g.(5) of Commandant Instruction M16475.1B, promulgation of operating requirements or procedures for drawbridges is categorically excluded from further environmental documentation. A Categorical Exclusion Determination is available in the docket for inspection or copying where indicated under "ADDRESSES."

List of Subjects in 33 CFR Part 117

Bridges.

For the reasons set out in the preamble, the Coast Guard proposes to amend 33 CFR part 117 as follows:

PART 117—DRAWBRIDGE OPERATION REGULATIONS

1. The authority citation for part 117 continues to read as follows:

Authority: 33 U.S.C. 499; 49 CFR 1.46; 33 CFR 1.05–1(g).

2. In § 117.317, paragraph (k) is revised to read as follows:

§ 117.317 Okeechobee Waterway

* * * * *

(k) *Sanibel Causeway bridge, mile 151 at Punta Rassa.* The draw shall open on signal; except that from 11 a.m. to 6 p.m., the draw need open only on the hour, quarter hour, half hour, and three quarter hour. From 10 p.m. to 6 a.m. the draw will open on signal if at least a five minute advance notice is given. Exempt vessels shall be passed at any time.

Dated: December 2, 1992.

W.P. Leahy,

Rear Admiral, U.S. Coast Guard, Commander, Seventh Coast Guard District.

[FR Doc. 92–30501 Filed 12–16–92; 8:45 am]

BILLING CODE 4910–14–M

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33 CFR Part 117

[CGD7–92–56]

Drawbridge Operation Regulations; Hillsborough River, Tampa Bay, Northern Part, FL

AGENCY: Coast Guard, DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: At the request of the City of Tampa, Hillsborough County and the Florida Department of Transportation (FDOT), (the bridge owners), the Coast Guard proposes to change the regulations governing seven drawbridges over the Hillsborough River by requiring two hour advance notice prior to opening the bridges. This action should relieve the bridge owners of the burden of having to staff the bridges with full-time bridge tenders to open the draws, while still providing for the reasonable needs of navigation.

DATES: Comments must be received on or before February 1, 1993.

ADDRESSES: Comments may be mailed to Commander (oan), Seventh Coast Guard District, 909 SE. 1st Avenue, Miami, Florida 33131–3050, or may be delivered to room 406 at the above address between 8 a.m. and 3 p.m., Monday through Friday, except Federal holidays. The telephone number is (305) 536–4103.

The Commander, Seventh Coast Guard District maintains the public docket for this rulemaking. Comments will become part of this docket and will

be available for inspection or copying at the above address.

FOR FURTHER INFORMATION CONTACT: Mr. Ian MacCartney, Project Manager, Bridge Section, at (305) 536–4103.

SUPPLEMENTARY INFORMATION:

Request for Comments

The Coast Guard encourages interested persons to participate in this rulemaking by submitting written data, views, or arguments. Persons submitting comments should include their names and addresses, identify this rulemaking (CGD7–92–56) and the specific section of this proposal to which each comment applies, and give the reason for each comment. The Coast Guard requests that all comments and attachments be submitted in an unbound format suitable for copying. If not practical, a second copy of any bound material is requested. Persons wanting acknowledgment of receipt of comments should enclose a stamped, self-addressed postcard or envelope.

The Coast Guard will consider all comments received during the comment period. It may change this proposal in view of comments.

The Coast Guard plans no public hearing. Persons may request a public hearing by writing to Mr. Ian MacCartney at the address under ADDRESSES. The request should include reasons why a hearing would be beneficial. If it determines that the opportunity for oral presentations will aid this rulemaking, the Coast Guard will hold a public hearing at a time and place announced by a later notice in the Federal Register.

Drafting Information

The principal persons involved in drafting this document are Ian MacCartney, Project Manager, and Lieutenant J.M. Losego, Project Counsel.

Background and Purpose

The drawbridges at Kennedy Blvd., Platt Street, Brorein Street, Cass Street, and Laurel Street which cross the Hillsborough River, presently open on signal from 9 a.m. to 4 p.m., Monday through Friday and from 8 a.m. to 6 p.m. Saturdays, Sundays and Federal holidays. At all other times they open on signal if at least a two hour notice is given. The West Columbus Drive Drawbridge and West Hillsborough Drive Drawbridge open on signal from 8 a.m. to 6 p.m. At all other times the draws open on signal if at least a one hour notice is given. The bridge owners have requested that all seven bridges be allowed to open on signal if at least a two hour advance notice is given. The purpose of the request is to reduce the burden of staffing the bridges with full-time bridgetenders.

Discussion of Proposed Amendments

The three bridge owners have agreed to a single point of contact (POC) for navigation to begin the bridge opening sequence within two hours of a request. Public vessels of the United States, vessels owned or operated by the state, county, or local government and used for public safety purposes, or vessels in a situation where a delay would endanger life or property shall, upon proper notification, be passed through each drawbridge as soon as possible.

A Coast Guard evaluation of the proposal concluded that none of the bridges opened more than two times per day during the last several years.

This proposal should reduce the operating costs for the owners while still providing for the reasonable needs of navigation on the Hillsborough River.

Regulatory Evaluation

This proposal is not major under Executive Order 12291 and not significant under the Department of Transportation regulatory policies and procedures (44 FR 11040; February 26, 1979). The Coast Guard expects the economic impact of this proposal to be so minimal that a regulatory evaluation is unnecessary. We conclude this because the bridges seldom open for commercial navigation and the bridge owners have agreed to open the draws as quickly as possible after notification in specified circumstances such as a situation where a delay would endanger life or property.

Small Entities

Under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), the Coast Guard must consider whether this proposal, if adopted, will have a significant economic impact on a substantial number of small entities. "Small entities" include independently owned and operated small businesses that are not dominant in their field and that otherwise qualify as "small business concerns" under section 3 of the Small Business Act (15 U.S.C. 632). Because it expects the impact of this proposal to be minimal, the Coast Guard certifies under 5 U.S.C. 605(b) that this proposed rule will not have a significant economic impact on a substantial number of small entities.

Collection of Information

This proposal contains no collection of information requirements under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*).

Federalism

The Coast Guard has analyzed this proposal under the principles and criteria contained in Executive Order 12612, and has determined that this proposal does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Environment

The Coast Guard considered the environmental impact of this proposal and concluded that, under section 2.B.2.g.(5) of Commandant Instruction M16475.1B, promulgation of operating requirements or procedures for drawbridges is categorically excluded from further environmental documentation. A Categorical Exclusion Determination is available in the docket for inspection or copying where indicated under ADDRESSES.

List of Subjects in 33 CFR Part 117

Bridges.

For the reasons set out in the preamble, the Coast Guard proposes to amend 33 CFR part 117 as follows:

PART 117—DRAWBRIDGE OPERATION REGULATIONS

1. The authority citation for part 117 continues to read as follows:

Authority: 33 U.S.C. 499; 49 CFR 1.46; 33 CFR 1.05–1(g).

2. In section 117.291, paragraph (c) is removed and paragraph (a) is revised to read as follows:

§ 117.291 Hillsborough River.

(a) The draws of the bridges at Platt Street, mile 0.0, Brorein Street, mile 0.16, Kennedy Boulevard, mile 0.4, Cass Street, mile 0.7, Laurel Street, mile 1.0, West Columbus Drive, mile 2.3, and West Hillsborough Avenue, mile 4.8, shall open on signal if at least two hours notice is given; except that, the draws shall open on signal as soon as possible after a request by a public vessel of the United States, a vessel owned or operated by the State, county or local government and used for public safety purposes, or a vessel in distress.

* * * * *

Dated: December 2, 1992.

W.P. Leahy,

Rear Admiral, U.S. Coast Guard, Commander, Seventh Coast Guard District.

[FR Doc. 92–30502 Filed 12–16–92; 8:45 am]

BILLING CODE 4910–14–M

FEDERAL EMERGENCY MANAGEMENT AGENCY

44 CFR Part 67

[Docket No. FEMA-7057]

Proposed Flood Elevation Determinations

AGENCY: Federal Insurance Administration, FEMA.

ACTION: Proposed rule.

SUMMARY: Technical information or comments are requested on the proposed base (100-year) flood elevations and proposed base flood elevation modifications for the communities listed below. The base (100-year) flood elevations are the basis for the floodplain management measures that the community is required either to adopt or to show evidence of being already in effect in order to qualify or remain qualified for participation in the National Flood Insurance Program (NFIP).

DATES: The comment period is ninety (90) days following the second publication of this proposed rule in a newspaper of local circulation in each community.

ADDRESSES: The proposed base flood elevations for each community are available for inspection at the office of the Chief Executive Officer of each community. The respective addresses are listed in the following table.

FOR FURTHER INFORMATION CONTACT: William R. Locke, Chief, Risk Studies Division, Federal Insurance Administration, 500 C Street, SW., Washington, DC 20472, (202) 646-2766.

SUPPLEMENTARY INFORMATION: The Federal Emergency Management Agency (FEMA or Agency) gives notice of the proposed determinations of base (100-year) flood elevations and modified base flood elevations for each community listed, in accordance with section 110 of the Flood Disaster Protection Act of 1973, 42 U.S.C. 4104, and 44 CFR 67.4(a).

These proposed base flood and modified base flood elevations, together with the floodplain management criteria required by 44 CFR 60.3, are the minimum that are required. They should not be construed to mean that the community must change any existing ordinances that are more stringent in their floodplain management requirements. The community may at any time enact stricter requirements of its own, or pursuant to policies established by other Federal, state or regional entities. These proposed elevations are used to meet the floodplain management requirements of the NFIP and are also used to calculate the appropriate flood insurance premium rates for new buildings built after these elevations are made final, and for the contents in these buildings.

National Environmental Policy Act

This proposed rule is categorically excluded from the requirements of 44 CFR part 10, Environmental Consideration. No environmental impact assessment has been prepared.

Regulatory Flexibility Act

The Federal Insurance Administrator has determined that this proposed rule is exempt from the requirements of the Regulatory Flexibility Act because proposed or modified base flood elevations are required by the Flood Disaster Protection Act of 1973, 42 U.S.C. 4104, and are required to establish and maintain community eligibility in the National Flood Insurance Program. As a result, a regulatory flexibility analysis has not been prepared.

Regulatory Impact Analysis

This proposed rule is not a major rule under Executive Order 12291, February 17, 1981. No regulatory impact analysis has been prepared.

Executive Order 12612, Federalism

This proposed rule involves no policies that have federalism implications under Executive Order 12612, Fedealism, dated October 26, 1987.

Executive Order 12778, Civil Justice Reform

This proposed rule meets the applicable standards of section 2(b)(2) of Executive Order 12778.

List of Subjects in 44 CFR Part 67

Administrative practice and procedure, Flood insurance, Reporting and recordkeeping requirements. Accordingly, 44 CFR part 67 is proposed to be amended as follows:

PART 67—[AMENDED]

1. The authority citation for part 67 continues to read as follows:

Authority: 42 U.S.C. 4001 *et seq.*; Reorganization Plan No. 3 of 1978, 3 CFR, 1978 Comp., p. 329; E.O. 12127, 44 FR 19367, 3 CFR 1979 Comp., p. 376.

§ 67.4 [Amended]

2. The tables published under the authority of § 67.4 are proposed to be amended as follows:

Source of flooding and location	Depth in feet above ground. *Elevation in feet (NGVD)
TENNESSEE	
Murfreesboro (City), Rutherford County	
Bear Branch:	
At Oakland School Road	*584
At Wenlon Road	*610
Maps available for inspection at the City Hall, 200 N.W. Broad Street, Murfreesboro, Tennessee.	
Send comments to The Honorable Joe B. Jackson, Mayor of the City of Murfreesboro, Rutherford County, P.O. Box 1139, Murfreesboro, Tennessee 37133-1139.	

§ 67.4 [Amended]

3. The tables published under the authority of § 67.4 are proposed to be amended as follows:

State	City/Town/County	Source of flooding	Location	#Depth in feet above ground *Elevation in feet (NGVD)	
				Existing	Modified
Arizona	Town of Carefree, Maricopa County.	Grapevine Wash	Approximately 1,300 feet upstream of the confluence with Rowe Wash.	None	*2,517
			Approximately 0.51 mile upstream of Father Kino Trail.	None	*2,725
		Galloway Wash-North Tributary.	Approximately 0.73 mile upstream of the confluence with Unnamed Tributary to Galloway Wash.	None	*2,311
			Approximately 0.53 mile downstream of Father Kino Trail.	None	*2,449
			Approximately 0.44 mile downstream of Father Kino Trail.	None	*2,462

State	City/Town/County	Source of flooding	Location	#Depth in feet above ground *Elevation in feet (NGVD)	
				Existing	Modified
			Approximately 0.8 mile upstream of Father Kino Trail.	None	*2,629
		Rowe Wash	Approximately 100 feet downstream of the confluence with Rowe Wash-Tributary 1.	None	*2,537
			Approximately 0.8 mile upstream of the confluence with Rowe Wash-Tributary 1.	None	*2,704
Maps are available for review at Town Hall, 100 Easy Street, Carefree, Arizona.					
Send comments to The Honorable Robert Anderson, Mayor, Town of Carefree, P.O. Box 740, Carefree, Arizona 85377.					
Arizona	Town of Cave Creek, Maricopa County.	Grapevine Wash	At the confluence with Rowe Wash	None	*2,482
			Approximately 1,300 feet upstream of the confluence with Rowe Wash.	None	*2,517
		Galloway Wash-North Tributary.	At the confluence with Unnamed Tributary to Galloway Wash.	*2,216	*2,216
			Approximately 0.73 mile upstream of the confluence with Unnamed Tributary to Galloway Wash.	None	*2,311
			Approximately 0.53 mile downstream of Father Kino Trail.	None	*2,449
			Approximately 0.44 mile downstream of Father Kino Trail.	None	*2,462
		Ocotillo Wash-Tributary 1	Approximately 450 feet upstream of the confluence with Ocotillo Wash.	None	*2,291
			Approximately 0.84 mile upstream of the confluence with Ocotillo Wash-Tributary 1A.	None	*2,450
		Ocotillo Wash-Tributary 1A	At the confluence with Ocotillo Wash-Tributary 1.	None	*2,319
			Approximately 0.7 mile upstream of the confluence with Ocotillo Wash-Tributary 1.	None	*2,453
		Ocotillo Wash-Tributary 2	At the confluence with Ocotillo Wash	*2,228	*2,228
			At Echo Canyon Road: Approximately 0.73 mile upstream of Echo Canyon Road.	None	*2,274
		Ocotillo Wash-Tributary 3	At the confluence with Ocotillo Wash	*2,164	*2,164
			At Echo Canyon Road	None	*2,284
			Just upstream of Highland Road (upper crossing).	None	*2,374
		Ocotillo Wash-Tributary 4	At the confluence with Ocotillo Wash	*2,124	*2,124
			Approximately 100 feet upstream of Schoolhouse Road.	None	*2,215
			Approximately 700 feet upstream of Echo Canyon Road.	None	*2,314
		Rowe Wash	Approximately 1,900 feet upstream of Echo Canyon Road.	*2,315	*2,315
			At the confluence with Grapevine Wash	None	*2,484
			Approximately 100 feet downstream of the confluence with Rowe Wash-Tributary 1.	None	*2,537
		Willow Springs Wash	Approximately 700 feet downstream of the confluence with Willow Springs Wash-Tributary 2.	*2,188	*2,188
			Approximately 275 feet upstream of the confluence with Willow Springs Wash-Tributary 2.	None	*2,218
			Approximately 2,000 feet upstream of the confluence with Willow Springs Wash-Tributary 2.	None	*2,255
			Approximately 2,550 feet downstream of Sierra Vista Drive (lower crossing).	None	*2,273
		Willow Springs Wash-Tributary 1.	At the confluence with Willow Springs Wash	*2,101	*2,101
			Approximately 1,250 feet downstream of Morningstar Road.	None	*2,162
		Willow Springs Wash-Tributary 2.	At the confluence with Willow Springs Wash	None	*2,211
			Approximately 100 feet upstream of the confluence with Willow Springs Wash.	None	*2,211
		Willow Springs Wash-Tributary 5.	At the confluence with Willow Springs Wash	*2,063	*2,063
			Approximately 100 feet upstream of Spur Cross Road.	None	*2,118
			Just downstream of Schoolhouse Road	None	*2,200
			Just downstream of Rockway Hills Drive	None	*2,251
		Willow Springs Wash-Tributary 5A.	At the confluence with Willow Springs Wash-Tributary 5.	None	*2,119
			Approximately 0.6 mile upstream of the confluence with Willow Springs Wash-Tributary 5.	None	*2,194
Maps are available for review at the Planning Department, Town Hall, 37622 North Cave Creek Road, Cave Creek, Arizona.					
Send comments to The Honorable James N. Threadgill, Mayor, Town of Cave Creek, 37622 North Cave Creek Road, Cave Creek, Arizona 85331.					
Arizona	Town of Gila Bend, Maricopa County.	Gila Bend Canal	Approximately 300 feet east of the intersection of Old U.S. Highway 80 and Papago Street.	None	#3

State	City/Town/County	Source of flooding	Location	#Depth in feet above ground *Elevation in feet (NGVD)	
				Existing	Modified
			Approximately 100 feet east of the intersection of Watermelon Road and Gila Bend Canal.	None	#2

Maps are available for review at the Town Administration Office, 644 West Pima Street, Gila Bend, Arizona.

Send comments to The Honorable Duke Fox, Mayor, Town of Gila Bend, P.O. Box A, Gila Bend, Arizona 85337.

Connecticut	Darien, Town, Fairfield County.	Noroton River	Approximately 340 feet downstream of U.S. Route 1.	*13	*11
			Approximately 1.1 miles upstream of Woodway Road.	None	*110

Maps available for inspection at the Town Hall, 2 Renshaw Road, Darien, Connecticut.

Send comments to The Honorable Fred R. Sammis, Mayor of the Town of Darien, Fairfield County, Town Hall, 2 Renshaw Road, Darien, Connecticut 06820–5397.

Connecticut	Manchester, Town, Hartford County.	Hop Brook	At a point approximately 1,525 feet upstream of South Main Street Ramp "E".	*224	*225
			At a point approximately 600 feet upstream of the confluence with Hockanum River.	*705	*706
		Porter Brook	At the confluence with Hop Brook	*224	*225
			At a point approximately 120 feet upstream of the confluence with Hop Brook.	*226	*227
		Birch Mountain Brook	At the confluence with Hop Brook	*224	*225
			At a point approximately 70 feet upstream of the confluence with Hop Brook.	*224	*225

Maps available for inspection at the Department of Planning, 494 Main Street, Manchester, Connecticut 06045.

Send comments to The Honorable Stephen T. Cassano, Mayor of the Town of Manchester, Hartford County, 41 Center Street, P.O. Box 191, Manchester, Connecticut 06045–0191.

New Jersey–	Paramus, Borough, Bergen County.	Saddle River–	At the downstream corporate limits	*46	*44
			Approximately 340 feet downstream of confluence of Hohokus Brook.	*57	*56

Maps available for inspection at the Borough Engineer's Office, Jockish Square, Paramus, New Jersey.

Send comments to The Honorable Clifford Gennarelli, Mayor of the Borough of Paramus, Bergen County, Jockish Square, Paramus, New Jersey 07652.

New York	Chatham, Town, Columbia County.	Kinderhook Creek	At confluence with Kline Kill	None	*260
			Approximately .74 mile downstream of Bachus Road.	None–	*415

Maps available for inspection at the Chatham Town Hall, Zoning Office, Chatham Center, New York.

Send comments to Mr. William Hogencamp, Chatham Town Supervisor, Columbia County, R.D. 2, P.O. Box 190, Valatie, New York 12184.

New York	Ellicottville, Village, Cattaraugus County.	Great Valley Creek	Approximately 670 feet downstream of confluence of Holiday Valley Creek.	*20	*19
			Approximately 0.2 mile upstream of Mill Street	*1,540	*1,542
		Elk Creek	At confluence with Great Valley Creek	*1,535	*1,536
			Approximately 400 feet upstream of Park Drive	*1,547	*1,548
		Plum Creek	At confluence with Great Valley Creek	*1,530	*1,533
			Approximately 0.8 mile upstream of confluence with Great Valley Creek.	*1,597	*1,598
		Holiday Valley Creek	Approximately 160 feet upstream of corporate limits.	None	*1,521
			Approximately 140 feet upstream of upstream corporate limits.	None	*1,525

Maps available for inspection at the Ellicottville Village Hall, 1 W. Washington, Ellicottville, New York.

Send comments to The Honorable John Burrell, Mayor of the Village of Ellicottville, Cattaraugus County, P.O. Box 478, Ellicottville, New York 14731.

New York	Moreau, Town, Sullivan County.	Hudson River (Upper Reach)	Approximately .5 mile downstream of Feeder Dam.	*275	*276
			Approximately .75 mile upstream of Spier Falls Dam.	None	*440
		Hudson River Bypass	Confluence with Hudson River	None	*283
			Divergence from Hudson River	None	*301

Maps available for review at the Town Hall, 61 Hudson Street, South Glens Falls, New York.

Send comments to Mr. Michael Sullivan, Supervisor of the Town of Moreau, Saratoga County, P.O. Box 1349, South Glens Falls, New York 12803.

New York	Philadelphia, Village, Jefferson County.	Indian River	Approximately 250 feet downstream of downstream corporate limits.	None	*423
			Upstream corporate limits	None	*485
		Black Creek	Confluence with Indian River	None	*485
			Upstream corporate limits	None	*485

State	City/Town/County	Source of flooding	Location	#Depth in feet above ground *Elevation in feet (NGVD)	
				Existing	Modified
Maps available for inspection at the Philadelphia Village Hall, 56 Main Street, Philadelphia, New York.					
Send comments to The Honorable Wayne L. Huntress, Mayor of the Village of Philadelphia, Jefferson County, P.O. Box 70, Philadelphia, New York 13673.					
Pennsylvania	Bensalem, Township, Bucks County.	Neshaminy Creek	Approximately 600 feet downstream of Hulmeville Road.	*29	*30
			Approximately 0.5 mile upstream of Hulmeville Road.	*36	*35
Maps available for inspection at the Code Enforcement Office, 2400 Byberry Road, Bensalem, Pennsylvania.					
Send comments to The Honorable Edward Burns, Mayor of the Township of Bensalem, Bucks County, 3800 Hulmeville Road, Bensalem, Pennsylvania 19020.					
Pennsylvania	Hulmeville, Borough, Bucks County.	Neshaminy Creek	Approximately 1,100 feet downstream of Hulmeville Road.	*28	*29
			At Hulmeville corporate limits	*35	*34
Maps available for inspection at the Hulmeville Borough Hall, 517 Lincoln Avenue, Hulmeville, Pennsylvania.					
Send comments to The Honorable Mark Shapcott, Jr., Mayor of the Borough of Hulmeville, Bucks County, 517 Lincoln Avenue, Hulmeville, Pennsylvania 19047.					
Tennessee	Erin City, Houston County.	Erin Branch	At confluence with Wells Creek	None	*410
			At upstream corporate limits	None	*566
		Musterground Creek	At confluence with Wells Creek	None	*410
			Approximately 50 feet upstream of State Highway 49.	None	*415
		Wells Creek	At downstream corporate limits	None	*407
			At upstream corporate limits	None	*416
		Owl Hollow	At confluence with Erin Branch	None	*453
			Approximately 820 feet upstream of Owl Hollow Road.	None	*484
		Rocky Hollow	At confluence with Erin Branch	None	*459
			At upstream corporate limits	None	*499
Maps available for inspection at the City Hall, Erin, Tennessee.					
Send comments to The Honorable E. E. Betsy Ligon, Mayor of the City of Erin, Houston County, P.O. Box 270, Erin, Tennessee 37061.					
Texas	Johnson County, Unincorporated Areas.	Hurst Creek	Approximately 150 feet downstream of County Route 601.	None	*725
			Approximately 40 feet downstream of Frontage Road to Westbound Interstate Route 35.	None	*751
		South Shannon	Approximately 0.89 mile upstream of County Route 920.	*785	*786
			Approximately 100 feet upstream of Atchison, Topeka, & Santa Fe Railway.	None	*810
Maps available for inspection at the Public Works Department, Johnson County Courthouse, 2 Main Street, Cleburne, Texas.					
Send comments to The Honorable Joe Durham, Johnson County Judge, Johnson County Courthouse, 2 Main Street, 3rd Floor, Cleburne, Texas 76031.					
Washington	Cowlitz County, Unincorporated Areas.	Cowlitz River	At Longview and Portland Northern Railroad	None	*17
			Approximately 3,600 feet upstream of State Highway 4.	*21	*21
			Approximately 1,000 feet downstream of Hazel Dell Creek.	None	*26
			At Hoyer Road	None	*41
			Just upstream of Permanent Highway 10	None	*47
			Approximately 16,500 feet upstream of the confluence of Toutle River.	None	*61
		Toutle River	At the confluence with Cowlitz River	None	*55
			Just upstream of State Highway 29	None	*70
			Approximately 12,000 feet upstream of State Highway 29.	None	*88
Maps are available for review at Department of Community Development, 207 Fourth Avenue North, Kelso, Washington.					
Send comments to The Honorable Mrs. Joan Lemieux, Chairperson, Board of Commissioners, 207 Fourth Avenue North, Kelso, Washington 98626.					
Washington	City of Kelso, Cowlitz County.	Cowlitz River	Just upstream of Burlington Northern Railroad	None	*17
			Approximately 2,500 feet upstream of State Highway 432.	None	*18
			At Milwaukee Place extended	None	*19
			At Allen Street Bridge	None	*20
			Approximately 3,600 feet upstream of Allen Street.	None	*21
Maps are available for review at Department of Public Works, 312 Allen Street, Kelso, Washington 98626.					
Send comments to The Honorable Don Gregory, Mayor, City of Kelso, 105 Allen Street, P.O. Box A, Kelso, Washington 98626.					
Washington	City of Longview, Cowlitz County.	Cowlitz River	Just upstream of State Highway 432	None	*17
			Approximately 1,000 feet downstream of Main Street.	None	*20

State	City/Town/County	Source of flooding	Location	#Depth in feet above ground *Elevation in feet (NGVD)	
				Existing	Modified
			At upstream corporate limits, approximately 5,000 feet upstream of State Highway 4.	None	*21

Maps are available for review at Department of Planning, City Hall, 1525 Broadway, Longview, Washington.

Send comments to The Honorable Mark Hoehne, Mayor, City of Longview, 1525 Broadway, P.O. Box 128, Longview, Washington 98632.

Wisconsin	Outagamie County, Unincorporated Areas.	Mud Creek	Just upstream of County Route BB	None	*745
		Mud Creek Tributary 2	At confluence of Mud Creek Tributary	None	*759
			At confluence with Mud Creek	None	*759
			Approximately 0.4 mile upstream of Marquette Street.	None	*791
		Mud Creek Tributary (backwater from Fox River).	Just upstream of County Route BB	None	*743
			Approximately 1,200 feet upstream of County Route BB.	None	*743

Maps available for inspection at the County Zoning Administration, 410 South Walnut Street, Appleton, Wisconsin.

Send comments to Mr. Ronald L. Van De Hey, Outagamie County Executive, 410 South Walnut Street, Appleton, Wisconsin 54911.

(Catalog of Federal Domestic Assistance No. 83.100, "Flood Insurance.")

Issued: December 9, 1992.

C.M. "Bud" Schauerte,

Administrator, Federal Insurance Administration.

[FR Doc. 92-30490 Filed 12-16-92; 8:45 am]

BILLING CODE 6718-03-M

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 97

[PR Docket No. 92-289; FCC 92-533]

Notice of Creation of 222-225 MHz and 1240-1300 MHz Frequency Bands

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: This proposal would create a small new sub-band and at 222.00-222.15 MHz where repeaters would be prohibited. It would also authorize frequency privileges for Novice Class operators in the entire 222-225 MHz band. Further, it would allow Novice Class operators to be licensees and control operators of repeaters in the 222-225 MHz band as well as in the 1270-1295 MHz segment of the 1240-1300 MHz band. The proposed rules are necessary so that there will be a small segment in the 222-225 MHz band where frequencies need not be shared with repeaters. Also, the proposed rules are needed to improve the operational standards for the amateur service. The effects of the proposed rule changes are to enhance experimentation possibilities, to provide Novices with opportunities to become more proficient in amateur service operations, and to use available spectrum more efficiently

DATES: Comments are due on or before February 23, 1993. Reply comments are due on or before March 23, 1993.

ADDRESSES: Federal Communications Commission, Washington, DC 20554.

FOR FURTHER INFORMATION CONTACT: Maurice J. DePont, Federal Communications Commission, Private Radio Bureau, Washington, DC 20554, (202) 632-4964.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's Notice of Proposed Rule Making, adopted November 30, 1992, and released December 11, 1992. The complete text of this Commission action, including the proposed rule amendments, is available for inspection and copying during normal business hours in the FCC Reference Center (room 239), 1919 M Street, NW., Washington, DC. The complete text of this Notice of Proposed Rule Making, including the proposed rule amendments, may also be purchased from the Commission's copy contractor, Downtown Copy Center (DCC), (202) 452-1422, 1990 M Street, NW., suite 640, Washington, DC 20036. DCC's FAX number is (202) 296-3780.

SUMMARY OF NOTICE OF PROPOSED RULE MAKING: 1. The proposed rule changes respond to petitions filed by The American Radio Relay League, Inc. (ARRL) and Dr. Michael C. Trahos. The ARRL requests that 222.00-222.15 MHz be designated as a frequency segment where repeaters are not allowed. The ARRL believes that a rule is needed to protect experimentation and other operations from repeater interference. In response to this request, some commenters argue that such a matter should be decided by the local frequency coordinator. The ARRL also requests expansion of the frequency privileges for Novice Class operators to encompass the entire 222-225 MHz band. Dr. Trahos requests that Novice Class operators be authorized to be licensees and control operators of repeaters in the 222-225 MHz band and in the 1270-1295 MHz Novice subband.

2. The proposed rules offer improvements in the operational standards for the amateur service. Experimentation would be facilitated. Novice Class operators could become more proficient in a wider variety of amateur service operations. They would also have more flexibility in selecting the mode of transmission. Choosing the appropriate mode would result in spectrum efficiency.

3. Comments are invited on the effect that the proposed rule changes would have on Novice Class licensees.

4. The proposed rules are set forth at the end of this document.

5. This is a non-restricted notice and comment rule making proceeding. *Ex parte* presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in Commission rules. See generally 47 CFR 1.1202, 1.1203, and 1.1206(a).

6. In accordance with Section 605(b) of the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that the proposed rules would not, if promulgated, have a significant economic impact on a substantial number of small business entities because the amateur stations that are the subject of this proceeding would not be authorized to transmit any communications that facilitate the business or commercial affairs of any party. See 47 CFR 97.113(a).

7. The proposal contained herein has been analyzed with respect to the Paperwork Reduction Act of 1980, 44 U.S.C. 3501-3520, and found to contain

no new or modified form, information collection and/or record retention requirements, and will not increase or decrease burden hours imposed on the public.

8. This Notice of Proposed Rule Making and the proposed rule amendments are issued under the authority of sections 4(i) and 303 (c), (f), and (r) of the Communications Act of 1934, as amended, 47 U.S.C. 154(i) and 303 (c), (f), and (r).

9. A copy of this Notice of Proposed Rule Making will be forwarded to the Chief Counsel for Advocacy of the Small Business Administration.

List of Subjects in 47 CFR Part 97

License privileges, Radio, Subbands.

Federal Communications Commission.

Donna R. Searcy,

Secretary.

Proposed Rules

Part 97 of Chapter I of Title 47 of the Code of Federal Regulations is proposed to be amended as follows:

PART 97—AMATEUR RADIO SERVICE

1. The authority citation for Part 97 continues to read as follows:

Authority citation: 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303. Interpret or apply 48 Stat. 1064–1068, 1081–1105, as amended; 47 U.S.C. 151–155, 301–609, unless otherwise noted.

2. Section 97.201(b) is revised to read as follows:

§ 97.201 Auxiliary station.

* * * * *

(b) An auxiliary station may transmit only on the 1.25 m and shorter wavelength frequency bands, except the 222.00–222.15 MHz, 431–433 MHz, and 435–438 MHz segments.

* * * * *

3. Paragraphs (a) and (b) of § 97.205 are revised to read as follows:

§ 97.205 Repeater station.

(a) Any amateur station may be a repeater. A holder of any class operator license may be the control operator of a repeater, subject to the privileges of the class of operator license held.

(b) A repeater may receive and retransmit only on the 10 m and shorter wavelength frequency bands except the 28.0–29.5 MHz, 50.0–51.0 MHz, 144.0–144.5 MHz, 145.5–146.0 MHz, 222.00–222.15 MHz, 431.0–433.0 MHz, and 435.0–438.0 MHz segments.

* * * * *

4. The entry under VHF in § 97.301(f) is amended by revising the frequencies authorized for use by Novice Class operators in ITU Region 2 to read as follows:

§ 97.301 Authorized frequency bands.

* * * * *

(f) For a station having a control operator holding a Novice Class operator license:

Wavelength band	ITU region 1	ITU region 2	ITU region 3	Sharing requirements see § 97.303, paragraph:
VHF				
1.25 m	MHz	MHz 222–225	MHz	(a)
• • • • • • •				

[FR Doc. 92–30533 Filed 12–16–92; 8:45 am]

BILLING CODE 6712–01–M

INTERSTATE COMMERCE COMMISSION

49 CFR Parts 1152 and 1201

[Ex Parte No. 274 (Sub-No. 26)]

Abandonment Proceedings: Elimination of the Review and Cost Data For All Years Prior to the Base Year Period

AGENCY: Interstate Commerce Commission.

ACTION: Proposed rule; extension of comment due date.

SUMMARY: By decision served November 9, 1992 (57 FR 53307, November 9, 1992), the Commission sought public comment by December 24, 1992, on the proposal to eliminate the requirement that abandonment applications include revenue and cost data for the two prior calendar years and that part of the current year prior to the filing of the application. By letter filed December 4, 1992, the Association of American Railroads (AAR) requests a 30-day extension until January 25, 1993, of the comment due date. AAR indicates additional time is needed because the current schedules of AAR's counsel and member road personnel do not permit sufficient time for an adequate and coordinated response on behalf of the railroad industry. The request will be granted.

DATES: Comments on the proposed changes are due on or before January 25, 1993.

ADDRESSES: Send an original and 10 copies of comments, referring to Ex Parte No. 274 (sub-No. 26), to: Office of the Secretary, Case Control Branch, Interstate Commerce Commission, Washington, DC 20423.

FOR FURTHER INFORMATION CONTACT: William T. Bono, (202) 927–5720; James R. Wells, (202) 927–6238 [TDD for hearing impaired: (2) 927–5721]

Decided: December 11, 1992.

By the Commission, Sidney L. Strickland, Jr., Secretary.

Sidney L. Strickland, Jr.,

Secretary.

[FR Doc. 92–30662 Filed 12–16–92; 8:45 am]

BILLING CODE 7035–01–M

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018—AB89

Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for 22 Plants From the Island of Hawaii, State of Hawaii

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) proposes endangered status pursuant to the Endangered Species Act of 1973, as amended (Act), for 22 plants: *Clermontia lindseyana* ('oha wai), *Clermontia peleana* ('oha wai), *Clermontia pyrularia* ('oha wai),

Colubrina oppositifolia (kauila), *Cyanea copelandii* ssp. *copelandii* (haha), *Cyanea hamatiflora* ssp. *carlsonii* (haha), *Cyanea shipmanii* (haha), *Cyanea stictophylla* (haha), *Cyrtandra giffardii* (ha'iwale), *Cyrtandra tintinnabula* (ha'iwale), *Hesperocnide sandwicensis* (no common name (NCN)), *Ischaemum byrone* (Hilo ischaemum), *Isodendrion pyrifolium* (wahine noho kula), *Mariscus fauriei* (NCN), *Nothocestrum breviflorum* ('aiea), *Ochrosia kilaueaensis* (holei), *Plantago hawaiensis* (laukahi kuahiwi), *Portulaca sclerocarpa* (po'e), *Pritchardia affinis* (loulu), *Silene hawaiiensis* (NCN), *Tetramolopium arenarium* (NCN), and *Zanthoxylum hawaiiense* (a'e). All but seven of the taxa are or were endemic to the island of Hawaii, Hawaiian Islands; the exceptions are or were found on the islands of Niihau, Kauai, Oahu, Molokai, Lanai, and/or Maui as well as Hawaii. The 22 plant taxa and their habitats have been variously affected or are currently threatened by one or more of the following: competition for space, light, water, and nutrients by naturalized, introduced vegetation; habitat degradation by wild, feral, or domestic animals (axis deer, cattle, goats, pigs, and sheep); agricultural, military, and recreational activities; habitat loss and damage to plants from fires; predation by animals (cattle, goats, insects, and rats); and natural disasters (flooding and volcanic activity). Due to the small number of existing individuals and their very narrow distributions, these taxa and most of their populations are subject to an increased likelihood of extinction and/or reduced reproductive vigor from stochastic events. This proposal, if made final, would implement the Federal protection and recovery provisions provided by the Act. If made final, it would also make operative State regulations protecting these plants as endangered species. Comments and materials related to this proposal are solicited.

DATES: Comments from all interested parties must be received by February 16, 1993. Public hearing requests must be received by February 1, 1993.

ADDRESSES: Comments and materials concerning this proposal should be sent to Robert P. Smith, Field Supervisor, Pacific Islands Office, U.S. Fish Wildlife Service, 300 Ala Moana Boulevard, room 6307, P.O. Box 50167, Honolulu, Hawaii 96850. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the above address.

FOR FURTHER INFORMATION CONTACT: Derral R. Herbst, at the above address (808/541–2749).

SUPPLEMENTARY INFORMATION:

Background

Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea copelandii ssp. *copelandii, Cyanea hamatiflora* ssp. *carlsonii, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Hesperocnide sandwicensis, Ischaemum byrone, Isodendrion pyrifolium, Mariscus fauriei, Nothocestrum breviflorum, Ochrosia kilaueaensis, Plantago hawaiiensis, Portulaca sclerocarpa, Pritchardia affinis, Silene hawaiiensis, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense* are endemic to or have the majority of their populations on the island of Hawaii, Hawaiian islands. Thirteen of these taxa are endemic to the island of Hawaii; three additional taxa are now found only on Hawaii. One of these taxa is now or was previously also known from Niihau, one from Kauai, two from Oahu, four from Molokai, four from Lanai, and six from Maui.

The island of Hawaii is the southernmost, furthest east, and the youngest of the eight major Hawaiian Islands. This largest island of the Hawaiian archipelago comprises 4,038 square miles (sq mi) (10,458 sq kilometers (km)), or two-thirds of the land area of the State of Hawaii, giving rise to its common name, the "Big Island." The Hawaiian Islands are volcanic islands formed over a "hot spot," a fixed area of pressurized molten rock deep within the Earth. As the Pacific Plate, a section of the Earth's surface many miles thick, has moved to the northwest, the islands of the chain have separated. Currently, this hot spot is centered under the southeast part of the island of Hawaii, which is one of the most active volcanic areas on Earth. Five large shield volcanoes make up the island of Hawaii: Mauna Kea at 13,796 feet (ft) (4,205 meters (m)) and Kohala at 5,480 ft (1,670 m), both extinct; Hualalai, at 8,271 ft (2,521 m), which is dormant and will probably erupt again; and Mauna Loa, at 13,677 ft (4,169 m) and Kilauea, at 4,093 ft (1,248 m), both of which are currently active and adding land area to the island. Compared to Kauai, which is the oldest of the main islands and was formed about 5.6 million years ago, Hawaii is very young, with fresh lava and land up to 0.5 million years old (Cuddihy and Stone 1990, Culliney 1988, Department of Geography 1983, Macdonald *et al.* 1983).

Because of the large size and range of elevation of the island, Hawaii has a great diversity of climates. Windward (northeastern) slopes of Mauna Loa have rainfall up to 300 inches (in) (762 centimeters (cm)) per year in some areas. The leeward coast, shielded by the mountains from rain brought by trade winds, has areas classified as desert and receiving as little as 7.9 in (20 cm) of rain annually. The summits of Mauna Loa and Mauna Kea experience snowfall each year, and Mauna Kea was glaciated during the last Ice Age (Culliney 1988, Department of Geography 1983, Macdonald *et al*, 1983, Wagner *et al.* 1990).

Plant communities on Hawaii include those in various stages of primary succession on the slopes of active and dormant volcanoes, ones in stages of secondary succession following disturbance, and relatively stable climax communities. On Hawaii, vegetation is found in all classifications: Coastal, dryland, montane, subalpine, and alpine; dry, mesic, and wet; and herblands, grasslands, shrublands, forests, and mixed communities. The vegetation and land of the island of Hawaii have undergone much change through the Island's history. Since it is an area of active volcanism, vegetated areas are periodically replaced with bare lava. Polynesian immigrants, first settling on Hawaii by 750 A.D., made extensive alterations in lowland areas for agriculture and habitation. European contact with Hawaii brought intentional and inadvertent introductions of alien plant and animal species. In 1960, 65 percent of the total land area of the island of Hawaii was used for grazing, and much land has also been converted to modern cropland (Cuddihy and Stone 1990, Gagne and Cuddihy 1990).

The 22 taxa proposed in this rule occur between sea level and 8,600 ft (0 and 2,260 m) in elevation in various portions of the island of Hawaii. A few taxa are also found in central Kauai (one taxon), in the Waianae Mountains of Oahu (one taxon), on Eastern Molokai (three taxa), in central and southern Lanai (two taxa), and on East Maui (three taxa). Most of the proposed species exist as remnant plants persisting in grazed areas or in higher elevations which have only recently been heavily invaded by alien plant and animal species. The proposed taxa grow in a variety of vegetation communities (herbland, shrublands, and forests), elevational zones (coastal, lowland, montane, and subalpine), and moisture regimes (dry, mesic, and wet). One

taxon is found in each of two coastal habitats: Dry shrubland and mesic forest. In lowland habitats, five taxa are found in dry forest, four in mesic forest, and two in wet forest. In montane habitats, one taxon is found in wet herbland, three taxa in dry shrubland, three in dry forest, four in mesic forest, and five in wet forest. In the subalpine area, one taxon is found in dry shrubland and two taxa in dry forest.

The land on which these 22 plant taxa are found is owned by various private parties, the State of Hawaii (including conservation district lands, forest reserves, natural area reserves, State parks, and the State seabird sanctuary), or is owned or managed by the Federal government (including a U.S. Fish and Wildlife Service refuge, a U.S. Army military reservation and a military training area, a National Park, and a U.S. Coast Guard lighthouse area).

Discussion of the 22 Taxa Proposed for Listing

Rock (1957) named *Clermontia hawaiiensis* var. *grandis* on the basis of sterile specimens collected on the island of Hawaii in the 1950s. Later, after examining fertile material, he named the taxon *C. lindseyana* and also described a variety, var. *livida* (Rock 1962). The specific epithet commemorates Thomas Lindsey, a naturalist who brought the species to Rock's attention. St. John (1987a) described two other species, *C. albimontis* and *C. viridis*, but the author of the current treatment of the genus (Lammers 1990, 1991) considers St. John's species to fall within the range of *C. lindseyana* and recognizes no subspecific taxa.

Clermontia lindseyana of the bellflower family (Campanulaceae) is a terrestrial or epiphytic (not rooted in the soil) branched shrub or tree 8.2 to 20 ft (2.5 to 6 m) tall. The alternate, stalked, toothed leaves are 5 to 9 in (13 to 24 cm) long and 1.5 to 2.6 in (3.8 to 6.5 cm) wide. Two flowers, each with a stalk 0.4 to 1 in (1 to 2.5 cm) long, are positioned at the end of a main flower stalk 1 to 1.6 in (2.5 to 4 cm) long. The calyx (fused sepals) and corolla (fused petals) are similar in size and appearance, and each forms a slightly curved, five-lobed tube 2.2 to 2.6 in (5.5 to 6.5 cm) long and 0.4 to 0.7 in (0.9 to 1.8 cm) wide which is greenish white or purplish on the outside and white or cream-colored on the inside. The berries are orange and 1 to 1.6 in (2.5 to 4 cm) in diameter. This species is distinguished from others in this endemic Hawaiian genus by larger leaves and flowers, similar sepals and petals, and spreading floral lobes (Cuddihy *et al.* 1983; Lammers 1990, 1991).

Historically, *Clermontia lindseyana* was known from the island of Maui on the southern slope of Haleakala and from the island of Hawaii on the eastern slope of Mauna Kea and the eastern, southeastern, and southwestern slopes of Mauna Loa. One population of the species is known to be extant on Maui in Wailaulau Gulch on State-owned land. The 13 known populations on the island of Hawaii extend over a distance of about 53 by 13 mi (85 by 21 km). Populations are found near Laupahoehoe, in Piha, in Makahanaloa, near Puaakala, near Puu Oo, near Kulani Correctional Facility, near Kapapala, in Waiea Tract, near Kaapuna Lava Flow, and near Kahuku on privately and State-owned land. Approximately 125 to 175 individuals exist (Hawaii Heritage Program (HHP) 1991a1 to 1991a13). This species typically grows in *Acacia koa* (koa)—and *Metrosideros polymorpha* ('ohi'a)—dominated Montane Mesic Forests, often epiphytically, at elevations between 4,000 and 7,050 ft (1,220 and 2,150 m) (Gagne and Cuddihy 1990; HHP 1991a1 to 1991a13; Hawaii Plant Conservation Center (HPCC) 1991a; Lammers 1990, 1991). Associated species include *Coprosma* sp. (pilo), *Ilex anomala* (kawa'u), and *Myrsine* sp. (kolea) (HHP 1991a2, 1991a5; HPCC 1991a; Fern Duvall, Olinda Endangered Species Propagation Facility, pers. comm., 1992). The major threats to *Clermontia lindseyana* are competition from alien plant species such as *Passiflora mollissima* (banana poka) and *Pennisetum clandestinum* (Kikuyu grass), grazing and trampling by *Bos taurus* (cattle), and habitat disturbance by feral *Sus scrofa* (pigs) Cuddihy *et al.* 1983; HPCC 1991a; Pratt and Cuddihy 1991; F. Duvall and Arthur Medeiros, Haleakala National Park, pers. comms., 1992).

Clermontia peleana was first collected by John Lydgate at Hamakua, island of Hawaii, and listed as an unnamed variety of *C. gaudichaudii* by Hillebrand (1888). Rock later collected a specimen of the taxon near Kilauea, the volcano home of the Hawaiian goddess Pele, after whom he named the species (Rock 1913). Other names by which the species has been known include: *Clermontia gaudichaudii* var. *singuliflora* (Rock 1919b), *C. singuliflora* (Rock 1919b), *C. gaudichaudii* var. *barbata* (Rock 1919b), *C. clermontioides* var. *singuliflora* (Hochreutiner 1934); *C. clermontioides* var. *mauiensis*, a superfluous name (Hochreutiner 1934); and *C. clermontioides* var. *barbata* (St. John 1973). In the most recent treatment of the species (Lammers 1991), two subspecies of *C. peleana*, ssp. *singuliflora* and ssp. *peleana*, are recognized.

Clermontia peleana of the bellflower family is an epiphytic shrub or tree 5 to 20 ft (1.5 to 6 m) tall which grows on 'ohi'a, koa, *Cheirodendron trigynum* ('olapa), and *Sadleria* spp. (ama'u). The alternate, stalked, oblong or oval, toothed leaves reach a length of 3 to 8 in (8 to 20 cm) and a width of 1.2 to 2 in (3 to 5 cm). Flowers are single or paired, each on a stalk 1.2 to 1.8 in (3 to 4.5 cm) long with a main stalk 0.3 to 0.7 in (0.8 to 1.7 cm) long. Five small green calyx lobes top the hypanthium (basal portion of the flower). The blackish-purple (ssp. *peleana*) or greenish-white (ssp. *singuliflora*) petals, 2 to 2.8 in (5 to 7 cm) long and 0.3 to 0.5 in (0.8 to 1.3 cm) wide, are fused into a one-lipped, arching tube with five downcurved lobes. Berries of ssp. *peleana* are orange and 1 to 1.2 in (2.5 to 3 cm) in diameter; berries of ssp. *singuliflora* are unknown. This species is distinguished from others of the genus by its epiphytic growth habit; its small green calyx lobes; and its one-lipped, blackish-purple or greenish-white corolla (Lammers 1990, 1991).

Historically, *Clermontia peleana* ssp. *peleana* has been found only on the island of Hawaii on the eastern slope of Mauna Loa and the northeastern and southeastern slopes of Mauna Kea. Today, the taxon is found near Waiakaumalo Stream, by the Wailuku River, near Saddle Road, and between the towns of Glenwood and Volcano. The six known populations, which extend over a distance of about 12 by 5 mi (19 by 8 km), are located on State and Federally owned land and contain a total of approximately eight known individuals (HHP 1991b1 to 1991b7). *Clermontia peleana* ssp. *singuliflora* was formerly found on the island of Hawaii on the northern slope of Mauna Kea and on East Maui on the northwestern slope of Haleakala, but the taxon has not been seen in either place since early in the century and is believed to be extinct (HHP 1991c1 to 1991c3, Wagner *et al.* 1990). This species typically grows epiphytically in Montane Wet Forests dominated by koa, 'ohi'a, and *Cibotium* spp. and/or *Sadleria* spp. (tree ferns) at elevations between 1,740 and 3,800 ft (530 and 1,160m) (HHP 1991b1 to 1991b4, 1991b6, 1991b7; Lammers 1990, 1991). Associated species include 'olapa, *Melicope clusiifolia* (kolokolo mokihana), and *Scaevola chamissoniana* (naupaka kuahiwi) (HHP 1991b1; Warren L. Wagner, Smithsonian Institution, pers. comm., 1992). The major threats to *Clermontia peleana* are

habitat disturbance caused by feral pigs and illegal cultivation of *Cannabis sativa* (marijuana), *Rattus rattus* (roof or black rat) damage, flooding, and stochastic extinction and/or reduced reproductive vigor due to the small number of existing individuals (Bruegmann 1990, Center for Plant Conservation (CPC) 1990b).

A sterile specimen of *Clermontia pyrularia* was first collected on Mauna Kea, island of Hawaii, during the United States Exploring Expedition of 1840 and 1841 and was named *Delissea obtusa* var. ? *mollis* by Gray (1861b). Later, Hillebrand (1888) collected fertile specimens of the taxon and named it *C. pyrularia*, referring in the specific epithet to the fruits, which are sometimes shaped like those of *Pyrus* (pear).

Clermontia pyrularia of the bellflower family, a terrestrial tree 10 to 13 ft (3 to 4 m) tall, has alternate toothed leaves 5.9 to 11 in (15 to 28 cm) long and 1 to 2 in (2.5 to 5 cm) wide with winged petioles. A cluster of two, three, or sometimes up to five flowers has a main stalk 1.1 to 2.4 in (2.8 to 6 cm) long; each flower has a stalk 0.3 to 0.8 in (0.8 to 2 cm) long. Five small green calyx lobes top the hypanthium. The white or greenish-white petals are covered with fine hairs, measure 1.6 to 1.8 in (4 to 4.5 cm) long, and are fused into a curved two-lipped tube 0.2 to 0.3 in (5 to 8 mm) wide with five spreading lobes. The orange berry is inversely ovoid or inversely pear-shaped. This species is distinguished from others of the genus by its winged petioles; its small, green calyx lobes; its two-lipped flowers with white or greenish-white petals; and the shape of its berry (Lammers 1990, 1991).

Historically, *Clermontia pyrularia* has been found only on the island of Hawaii on the northeastern slope of Mauna Kea, the western slope of Mauna Loa, and the saddle area between the two mountains. Today, the species is found near the Humuula-Laupahoehoe boundary, near Hakalau Gulch, near Kealakekua, and near Kaawaloa. The five extant populations, which extend over a distance of about 47 by 6 mi (76 by 10 km), are located on privately, State, and Federally owned land. Although the exact number of individuals is not known, it is likely that not more than five individuals exist (HHP 1991d1 to 1991d6). This species typically grows in koa- and/or'ohi'a-dominated Montane Wet Forests and Subalpine Dry Forests at elevations between 3,000 and 7,000 ft (910 and 2,130 m) (HHP 1991d2 to 1991d5; Lammers 1990, 1991). Associated species include pilo, *Lythrum maritium* (pukamole), and *Rubus hawaiensis* ('akala) (HHP 1991d2, 1991aa). The major threat to *Clermontia pyrularia* is competition from alien grasses and shrubs in the forest understory and banana poka as well as stochastic extinction and/or reduced reproductive vigor due to the small number of existing populations and individuals (HHP 1991d2).

Colubrina oppositifolia was first collected by Remy in the 1850s and was named in 1867 by Adolphe Theodore Brongniart (Mann 1867). The specific epithet describes the plant's opposite leaf arrangement. St. John (1979) called Oahu plants *C. oppositifolia* var. *obatae*, but no subspecific taxa are recognized in the current treatment of the genus (Wagner *et al.* 1990).

Colubrina oppositifolia of the buckthorn family (Rhamnaceae), a tree 16 to 43 ft (5 to 13m) tall, has opposite, stalked, oval, thin, pinnately veined, toothless leaves with glands on the lower surface. Leaves measure 2.4 to 4.7 in (6 to 12 cm) long and 1.2 to 2.8 in (3 to 7 cm) wide in mature plants and are larger in seedlings. Ten to 12 bisexual flowers are clustered at the end of a main stalk 0.1 to 0.3 in (3 to 8 millimeters (mm)) long; each flower has a stalk about 0.07 to 0.1 in (2 to 3 mm) long which elongates in fruit. The five triangular sepals measure about 0.06 to 0.08 in (1.5 to 2 mm) long, and the five greenish-yellow or white petals are about 0.06 in (1.5 mm) long. The somewhat spherical fruit, 0.3 to 0.4 in (8 to 11 mm) long, is similar to a capsule and opens explosively when mature. This species can be distinguished from the one other species of the genus in Hawaii by its growth habit and the arrangement, texture, venation, and margins of its leaves (Wagner *et al.* 1990).

Historically, *Colubrina oppositifolia* was found on the island of Oahu in the central and southern Waianae Mountains and on the island of Hawaii in the following areas: The Kohala Mountains; the northern slope of Hualalai; and the western, southwestern, and southern slopes of Mauna Loa. Today, the species is known on Oahu in eastern Makaleha Valley, Mokuleia Forest Reserve, and Makua Valley; on Mt. Kaala; and near Honouliuli Contour Trail on private, State-owned, and Federally managed land. The 6 extant populations on Oahu, which extend over a distance of about 9 by 4 mi (14 by 6 km), contain approximately 94 known individuals (HHP 1991e1, 1991e2, 1991e5, 1991e9 to 1991e12). On the island of Hawaii, there are 7 extant populations which extend over a distance of about 16 by 4 mi (26 by 6 km), are located on privately and State-owned land, and contain about 185 to 205 known individuals. The species occurs along the Mamalahoa Highway on the northern slope of Hualalai as well as in Kapua and Puueo in the southernmost portion of the island (HHP 1991e3, 1991e4, 1001e6 to 1991e8, 1991e13 to 1991e16). This species typically grows in *Diospyros sandwicensis* (lama)-dominated Lowland Dry and Mesic Forests, often on a lava, at elevations between 800 and 3,000 ft (240 and 910m). Associated species include *Canthium odoratum* (alahe'e) and *Reynoldsia sandwicensis* ('ohe) (HHP 1991e3, 1991e8, 1991e9, 1991e15, 1991e16, HPCC 1991b). The major threats to *Colubrina oppositifolia* are competition from alien plant species such as *Lantana camara* (lantana), *Pennisetum setaceum* (fountain grass), and *Schinus terebinthifolius* (Christmas berry); habitat disturbance by feral pigs; plant damage and death from *Xylosandrus compactus* (black twig borer); fire; damage and disturbance from military exercises; and limited regeneration (HHP 1991e4, 1991e8, 1991e9, 1991e15, 1991e16; Joel Q. Lau, The Nature Conservancy of Hawaii, pers. comm., 1992).

Rock (1917) named *Cyanea copelandii* to honor his collecting companion, M.L. Copeland, with whom he first collected the species in 1914 on the island of Hawaii (Rock 1917). St. John (1987b, St. John and Takeuchi 1987), believing there to be no generic distinction between *Cyanea* and *Delissea*, transferred the species to the genus *Delissea*, the older of the two generic names, creating *D. copelandii*. The current treatment of the family (Lammers 1990), however, maintains the separation of the two genera, and plants found on the island of Hawaii are considered to be *C. copelandii* ssp. *copelandii*. Subspecies *haleakalaensis*, found on Maui, is not as rare.

Cyanea copelandii ssp. *copelandii* of the bellflower family is a shrub with a habit similar to that of a woody vine. The alternate, stalked, toothed leaves are 7.9 to 10.6 in (20 to 27 cm) long and 1.4 to 3.3 in (3.5 to 8.5 cm) wide and have fine hairs on the lower surface. Five to 12 flowers are clustered on the end of a main stalk 0.8 to 1.8 in (2 to 4.5 cm) long; each flower has a stalk 0.2 to 0.6 in (0.4 to 1.6 cm) long. The slightly hairy hypanthium is topped by five small, triangular calyx lobes. Petals, which are yellowish but appear rose-colored because of a covering of dark red hairs, are fused into a curved tube with five spreading lobes; the corolla is 1.5 to 1.7 in (3.7 to 4.2 cm) long about 0.2 in (4 to 5 mm) wide. Berries are dark orange and measure 0.3 to 0.6 in (0.7 to

1.5 cm) long. This subspecies is distinguished from ssp. *haleakalaensis*, the only other subspecies of *Cyanea copelandii*, by its narrower leaves. The species differs from others in this endemic Hawaiian genus by its growth habit and the size, shape, and dark red pubescence of its corolla (Lammers 1990).

Cyanea copelandii ssp. *copelandii*, which has been collected only at two sites on the southeastern slope of Mauna Kea near Glenwood, was last seen in 1957. This population, located on State-owned land, is still considered extant and contains an unknown number of individuals (HHP 1991f; Thomas Lammers, Field Museum, pers. comm., 1992). This taxon often grows epiphytically and is typically found in Montane Wet Forests at elevations between 2,200 and 2,900 ft (660 and 880 m) (Lammers 1990). Associated species include tree ferns (HHP 1991f). The major known threat to *Cyanea copelandii* ssp. *copelandii* is stochastic extinction and/or reduced reproductive vigor due to the single known population.

Using sterile type material, Rock (1957) named *Cyanea carlsonii* to honor Norman K. Carlson, who first saw the taxon (Degener *et al.* 1969). Carlson cultivated a plant of the taxon in his garden, from which Rock later described the flowers and fruit (Rock 1962). Recently, St. John (1987b, St. John and Takeuchi 1987) placed the genus *Cyanea* in synonymy with *Delissea*, resulting in the new combination *Delissea carlsonii*, but Lammers (1990) retains both genera in the currently accepted treatment of the family. He also considers the taxon to be a subspecies of another species, resulting in the name *C. hamatiflora* ssp. *carlsonii* (Lammers 1988).

Cyanea hamatiflora ssp. *carlsonii* of the bellflower family, a palm-like tree, grows 9.8 to 26 ft (3 to 8 m) tall and has alternate stalkless leaves 20 to 31 in (50 to 80 cm) long and 3 to 5.5 in (8 to 14 cm) wide. Clusters of 5 to 10 flowers have a main stalk 0.6 to 1.2 in (1.5 to 3 cm) long; each flower has a stalk 0.2 to 0.5 in (0.5 to 1.2 cm) long. The hypanthium is topped with five small narrow calyx lobes. The magenta petals are fused into a one-lipped tube 2.3 to 3.1 in (6 to 8 cm) long and 0.2 to 0.4 in (0.6 to 1.1 cm) wide with five downcurved lobes. The purplish-red berries are topped by the persistent calyx lobes. This subspecies is distinguished from ssp. *hamatiflora*, the only other subspecies, by its long flower stalks and larger calyx lobes. The species differs from others in the genus by its growth habit, its stalkless leaves, the number of flowers in each cluster, and the size and shape of the corolla and calyx (Lammers 1990).

Cyanea hamatiflora ssp. *carlsonii* is only known to have occurred at two sites on the island of Hawaii, on the western slope of Hualalai and the southwestern slope of Mauna Loa. These 2 extant populations, located on privately and State-owned land at Honuaulu Forest Reserve and Keokea, are about 28 mi (45 km) apart and contain approximately 19 individuals (HHP 1991gl, 1991g2; HPCC 1991c1 to 1991c3). This taxon typically grows in 'ohi'a-dominated Montane Wet Forests at elevations between 4,000 and 5,700 ft (1,220 and 1,740 m) (HHP 1991g1, 1991g2; Lammers 1990). Associated species include kawa'u, pilo and *Myoporum sandwicense* (naio) (HHP 1991g1). The major threats to *Cyanea hamatiflora* ssp. *carlsonii* are competition from alien plant species such as banana poka, grazing and trampling by cattle, and stochastic extinction and/or reduced reproductive vigor due to the small number of existing populations and individuals (HHP 1991g2; Carolyn Corn, Hawaii Department of Land and Natural Resources (Hawaii DLNR), *in litt.*, 1991).

Based on sterile specimens collected on the island of Hawaii during the United States Exploring Expedition of 1840 and 1841, Gray (1861b) noted *Cyanea grimesiana* var. ? *citrullifolia*. Rock collected the plant in 1955 in the company of Herbert Shipman, after whom he named it as a species, resulting in *Cyanea shipmanii* (Rock 1957).

Cyanea shipmanii of the bellflower family is an unbranched or few-branched shrub 8 to 13 ft (2.5 to 4 m) tall with small sharp projections, especially in young plants. The alternate, stalked leaves are 6.7 to 12 in (17 to 30 cm) long, 2.8 to 5.5 in (7 to 14 cm) wide, and deeply cut into 20 to 30 lobes per leaf. Flowers are covered with fine hairs and are clustered in groups of 10 to 15, the main stalk 0.4 to 1.2 in (1 to 3 cm) long and each flower stalk 0.4 to 0.6 in (1 to 1.5 cm) long. The hypanthium is topped with five small calyx lobes. The pale greenish-white petals, 1.2 to 1.4 in (3 to 3.6 cm) long, are fused into a curved five-lobed tube 0.1 to 0.2 in (3 to 4 mm) wide. The fruit is an ellipsoid berry. This species differs from others in the genus by its slender stems; stalked, pinnately lobed leaves; and smaller flowers (Lammers 1990).

Cyanea shipmanii has only been known from one population, located on the island of Hawaii on the eastern slope of Mauna Kea on privately owned land. When originally discovered, only 1 mature plant was found, with a total population size of less than 50 individuals (HHP 1991h). This species typically grows in koa- and 'ohi'a-dominated Montane Mesic Forests at elevations between 5,400 and 6,200 ft (1,650 and 1,900 m) (HHP 1991h, Lammers 1990). Associated species include kawa'u and kolea (HHP 1991h). The major threat to *Cyanea shipmanii* is stochastic extinction and/or reduced reproductive vigor due to the single existing population and the small number of known individuals.

Based on a specimen he collected in 1912 on Mauna Loa, island of Hawaii, Rock (1913) described *Cyanea stictophylla*, choosing the specific epithet to refer to the long and narrow leaves. Other names by which the taxon has been known include: *Cyanea palakea* (Forbes 1916), *C. quercifolia* var. *atropurpurea* (Wimmer 1953), *C. stictophylla var. inermis* (Rock 1957), and *C. nelsonii* (St. John 1976). St. John (St. John and Takeuchi 1987), believing there to be no generic distinction between *Cyanea* and *Delissea*, transferred the species to the genus *Delissea*, the older of the two generic names, creating *D. nelsonii*, *D. palakea*, *D. quercifolia* var. *atropurpurea*, *D. stictophylla*, and *D. stictophylla* var. *inermis* (St. John 1987b). The separation of the two genera is maintained in the current treatment of the family (Lammers 1990), and all the above listed taxa are considered to fall within the range of variation of *C. stictophylla*.

Cyanea stictophylla of the bellflower family is a shrub or tree 2 to 20 ft (0.6 to 6 m) tall, sometimes covered with small, sharp projections. The alternate, stalked, oblong, shallowly lobed, toothed leaves are 7.8 to 15 in (20 to 38 cm) long and 1.6 to 3.1 in (4 to 8 cm) wide. Clusters of five or six flowers have main flowering stalks 0.4 to 1.6 in (1 to 4 cm) long; each flower has a stalk 0.3 to 0.9 in (0.7 to 2.2 cm) long. The hypanthium is topped with five calyx lobes 0.1 to 0.2 in (2 to 4 mm) long and 0.04 and 0.1 in (1 to 2 mm) wide. The yellowish-white or purple petals, 1.4 to 2 in (3.5 to 5 cm) long, are fused into an arched, five-lobed tube about 0.2 in (5 to 6 mm) wide. The spherical berries are orange. This species differs from others in the genus by its lobed, toothed leaves and its larger flowers with small calyx lobes and deeply lobed corollas (Lammers 1990).

Historically, *Cyanea stictophylla* was known only from the island of Hawaii on the western, southern, southeastern, and eastern slopes of Mauna Loa. Today, the species is known to be extant near Keauhou and in South Kona on privately owned land. The 3 known

populations, which extend over a distance of about 38 by 10 mi (61 by 16 km), contain a total of approximately 15 individuals (HHP 1991i1 to 1991i3). This species, sometimes growing epiphytically, is found in koa- and 'ohi'a-dominated Lowland Mesic and Wet Forests at elevations between 3,500 and 6,400 ft (1,070 and 1,950 m) (HHP 1991i1 to 1991i3, Lammers 1990). Associated species include tree ferns, *Melicope volcanica* (alani), and *Urera glabra* (opuhe) (HHP 1991i1 to 1991i3). The major threat to *Cyanea stictophylla* is grazing and trampling by feral cattle as well as stochastic extinction and/or reduced reproductive vigor due to the small number of existing populations and individuals (F. Duvall, pers. comm., 1992).

Cyrtandra giffardii was first collected in 1911 on the island of Hawaii by Rock, who named the species to honor Walter M. Giffard, who collected a flowering specimen in 1918 (Rock 1919a).

Cyrtandra giffardii of the African violet family (Gesneriaceae) is a shrubby tree usually 10 to 20 ft (3 to 6 m) tall. The opposite, stalked, papery-textured, toothed leaves are usually 2.4 to 4.7 in (6 to 12 cm) long and 1 to 1.8 in (2.5 to 4.6 cm) wide and have a few tiny, coarse hairs on the upper surface. Clusters of three to five flowers have a moderate amount of short brown hairs throughout the cluster, a main stalk 1 to 1.4 in (2.5 to 3.5 cm) long, two linear bracts about 0.25 in (6 to 7 mm) long, and individual flower stalks 0.6 to 1.2 in (1.5 to 3 cm) long. The calyx, 0.1 to 0.4 in (3 to 9 mm) long, has an outer covering of short, soft brown hairs and is divided into five narrowly triangular lobes. The corolla consists of five fused white petals about 0.5 in (12 mm) long, with lobes about 0.08 to 0.1 in (2 to 3 mm) long. Only immature berries have been observed, and they were white and about 0.4 in (1 cm) long. Both this species and *Cyrtandra tintinnabula* are distinguished from others of the genus and others on the island of Hawaii by a combination of the following characteristics: The opposite, more or less elliptic, papery leaves; the presence of some hairs on the leaves and more on the inflorescences; the presence of three to six flowers per inflorescence; and the size and shape of the flowers and flower parts (Wagner *et al.* 1990).

Historically, *Cyrtandra giffardii* was found on the island of Hawaii on the northeastern slope of Mauna Kea near Kilau Stream and south to the eastern slope of Mauna Loa near Kilauea Center. The 3 extant populations on State-owned land are located near Kilau Stream, Stainback Highway, and Puu Makaala, extending over a distance of approximately 31 by 3 mi (50 by 5 km) and containing a total of about 14 to 20 plants (HHP 1991j1 to 1991j5; W. Wagner, pers. comm., 1992). This species typically grows in shady koa-,'ohi'a-, and tree fern-dominated Montane Wet Forests at elevations between 2,400 and 4,900 ft (720 and 1,500 m) (HHP 1991j1 to 1991j3; HPCC 1991d1, 1991d2, Wagner *et al.* 1990). Associated species include other taxa of *Cyrtandra* (ha'iwale), *Hedyotis* spp., and *Perrottetia sandwicensis* (olomea) (HHP 1991j1 to 1991j3; HPCC 1991d1; W. Wagner, pers. comm., 1992). The major threats to *Cyrtandra giffardii* are habitat disturbance and plant damage by feral pigs as well as stochastic extinction and/or reduced reproductive vigor due to the small number of existing populations (Stone 1985; W. Wagner, pers. comm., 1992).

Based on a plant he collected in 1909 on Mauna Kea, island of Hawaii, Rock named *Cyrtandra tintinnabula*. The specific ephithet describes the bell-shaped calyx of the plant (Rock 1919a).

Cyrtandra tintinnabula of the African violet family is a shrub 3.3 to 6.6 ft (1 to 2 m) tall with opposite, stalked, elliptical or oval, papery-textured leaves 5 to 10 in (13 to 26 cm) long and 2 to 4.8 in (5 to 12.3 cm) wide. Leaves, especially the lower surfaces, have yellowish-brown hairs. Flower clusters, densely covered with long soft hairs, comprise three to six flowers, a main stalk 0.4 to 0.7 in (1 to 1.8 cm) long, individual flower stalks 0.2 to 0.6 in (0.5 to 1.5 cm) long, and leaflike bracts. The green bell-shaped calyx is about 0.4 in (9 to 10 mm) long and has triangular lobes. The hairy white corolla, about 0.5 in (12 mm) long and about 0.2 in (5 mm) in diameter, is divided into five lobes, each about 0.1 in (3 mm) long. Fruit and seeds have not been observed. This species differs from *Cyrtandra giffardii* by its habit, its larger leaves, and its shorter flower stalks (Wagner *et al* 1990).

Historically, *Cyrtandra tintinnabula* was found only on the island of Hawaii on the northern to the eastern slopes of Mauna Kea. Today, 3 populations of the species are known to occur on State-owned land extending over approximately 6 by 1 mi (10 by 3 km) from Kilau Stream to Honohina Gulch and containing approximately 18 known individuals (HHP 1991k1 to 1991k6). This species typically grows in dense koa-, 'ohi'a-, and tree fern-dominated Lowland Wet Forests at elevations between 2,100 and 3,400 ft (650 and 1,040 m) (HHP 1991k3, 1991k4, 1991k6; Wagner *et al.* 1990). Associated species include other kinds of ha'iwale and *Hedyotis* sp. The major threats to *Cyrtandra tintinnabula* are habitat disturbance and plant damage by feral pigs and stochastic extinction and/or reduced reproductive vigor due to the small number of existing populations and individuals.

Based on a specimen collected on Mauna Loa by James Macrae in 1825, Weddell (1856–57) described *Urtica sandwicensis*, choosing the specific epithet to refer to the Sandwich Islands, on older name for the Hawaiian Islands. Later (1869), he transferred the species to another genus, resulting in *Hesperocnide sandwicensis*.

Hesperocnide sandwicensis of the nettle family (Urticaceae) is an erect annual herb 8 to 24 in (20 to 60 cm) tall covered with coarse stinging hairs as well as shorter non-stinging hairs. The opposite, stalked, thin toothed leaves are 0.6 to 3 in (1.5 to 7 cm) long and 0.4 to 1 in (0.9 to 2.5 cm) wide. Most of the small petalless flowers are male, but they are mixed with some female flowers in clusters 0.08 to 0.2 in (2 to 5 mm) long which originate in the leaf axils. Sepals of male flowers are fused into a four-lobed calyx about 0.02 in (0.5 mm) long which encloses four stamens. The calyx of the female flower, about 0.04 in (1 mm) long and enclosing an unstalked stigma, swells slightly in fruit and encloses a flattened achene (dry, one-celled, unopening fruit) about 0.04 in (1.1 mm) long. The only Hawaiian member of the genus, *Hesperocnide sandwicensis* is distinguished from other native Hawaiian genera of its family by its annual herbaceous habit and its stinging hairs. It is distinguished from the alien species *Urtica urens* by the lack of calyx lobes (Wagner *et al.* 1990).

Historically, *Hesperocnide sandwicensis* occurred on the island of Hawaii on the eastern and western slopes of Mauna Kea, the northern to western slopes of Mauna Loa, the Humuula Saddle between Mauna Kea and Mauna Loa, and the southeastern slope of Hualalai. Twelve extant populations are known, extending over a distance of approximately 38 by 15 mi (61 by 24 km) in much of the historic range of the species. It has not been seen on Hualalai for some time and is presumed extinct there. Known populations now occur on or near the following areas: Puu Kanakaleonui, Puu Laau, Ahumoa Cone, Pohakuloa Training Area (PTA), and Sulphur Cone. Because the species is an annual plant, the total number of individuals varies with the time of year and amount of rainfall. Several hundred to a thousand individuals have been found on PTA, a State and Federally owned area of land which is managed by the U.S. Army.

Other, smaller populations totalling approximately 80 to 130 plants are located on privately and State-owned land (HHP 199111 to 199117, HPCC 1991e; Robert Shaw, Colorado State University, pers. comm., 1992). This species typically grows in open mamane- and naio-dominated Subalpine Dry Forests at elevations between 5,840 and 8,600 ft (1,780 and 2,620 m) (Gagne and Cuddihy 1990; HHP 199111 to 199113, 199116; HPCC 1991e; Wagner *et al.* 1990). Associated species include *Asplenium fragile*, *Santalum paniculatum* ('iliahi), and the naturalized *Urtica urens* (dwarf nettle) (HHP 199111, 199116; R. Shaw, pers. comm., 1992). The major threats to *Hesperocnide sandwicensis* are competition from alien grasses such as *Anthoxanthum odoratum* (sweet vernalgrass) and *Holcus lanatus* (common velvet grass); grazing by feral pigs, *Capra hircus* (goats), and *Ovis aries* (sheep); habitat disturbance and damage to plants as a result of military exercises; and fire (HHP 199116; HPCC 1991e; Ken Nagata, U.S. Department of Agriculture, pers. comm., 1992).

Ischaemum byrone was first collected by James Macrae during the expedition of the *Blonde* in 1825 and named *Spodiopogon byronis* by Trinius in 1832. The specific epithet refers to Byron's Bay, now called Hilo Bay, where this specimen was collected. Steudel (1855) transferred the species to the genus *Andropogon*, and in 1889, Hackel redescribed the species, naming it *Ischaemum lutescens*, a superfluous name. In 1922, Hitchcock published *Ischaemum byrone*, the currently accepted name (O'Connor 1990).

Ischaemum byrone of the grass family (Poaceae) is a perennial plant with creeping stems and erect stems 16 to 31 in (40 to 80 cm) tall. The uppermost sheaths (portions of leaves surrounding the stems) are often inflated and sometimes partially enclose the yellow to yellowish-brown racemes (flowering clusters). The hairless leaf blade (the flat extended part of the leaf) is 2.8 to 7.9 in (7 to 20 cm) long and 1.2 to 2 in (3 to 5 cm) wide; the uppermost blades are much smaller in size. Flowers, arranged in two or sometimes three digitate (originating from one point), elongate racemes 1.6 to 3.9 in (4 to 10 cm) long, consist of two types of two-flowered awned (having bristles) spikelets (subclusters of flowers). The fruit is a caryopsis (grain) about 0.1 in (3 mm) long. The only species of the genus found in Hawaii, *Ischaemum byrone* differs from other grasses in the State by its C_4 photosynthetic pathway; its digitate racemes; and its two-flowered, awned spikelets (O'Connor 1990).

Historically, *Ischaemum byrone* was found on Oahu at an unspecified location, on the northeastern coasts of Molokai and East Maui, and along the central portion of the eastern coast of the island of Hawaii. Extant populations still occur on Molokai, Maui, and Hawaii. Two populations on East Molokai are located about 2 mi (3 km) apart at the head of Wailau Valley and on Kikipua Point on privately owned land. Six populations on East Maui are found along approximately 16 mi (26 km) of coast on private, State, and Federally owned land on Pauwalu Point, on Kalahu Point, near Hana, on Kauiki Head, and on the following offshore islets: Keopuka Islet, Mokuhuki Islet, and Puukii Islet. On Hawaii, the species is still found in two populations at Auwae and Kamoamoa on privately and federally owned land. The total distribution of the species includes 10 populations on 3 islands with approximately 1,200 to 2,200 individuals (HHP 1991o1 to 1991o10, 1991o12 to 1991o14). This species typically grows in Coastal Dry Shrublands among rocks or on basalt cliffs at elevations between sea level and 250 ft (0 and 75 m) (Gagne and Cuddihy 1990, O'Connor 1990). Associated species include *Bidens* spp. (ko'oko'olau), *Fimbristylis cymosa*, and *Scaevola sericea* (naupaka kahakai) (HHP 1991o5, 1991o7, 1991o9, 1991o11; HPCC 1991f). The major threats to *Ischaemum byrone* are competition from alien species such as *Digitaria ciliaris* (Henry's crabgrass) and habitat change from volcanic activity (HHP 1991o3; HPCC 1991f; Charles H. Lamoureux, Lyon Arboretum, pers. comm., 1992).

Isodendrion pyrifolium was first collected on Oahu during the United States Exploring Expedition in 1841 and was named by Gray in 1852. The specific epithet refers to the resemblance of the leaves of this species to those of *Pyrus* (pear). In his monograph of the genus, St. John (1952) named the following species, all of which are considered in the current treatment of the genus (Wagner *et al.* 1990) to be synonymous with *I. pyrifolium*: *I. hawaiiense*, *I. hillebrandii*, *I. lanaiense*, *I. molokaiense*, and *I. remyi*.

Isodendrion pyrifolium of the violet family (Violaceae), a shrub about 2.6 to 6.6 ft (0.8 to 2 m) tall, has persistent stipules (leaflike appendages on leaves) and alternate, stalked, elliptic or sometimes lance-shaped, papery leaves which measure 1 to 2.6 in (2.5 to 6.5 cm) long and 0.3 to 1.3 in (0.8 to 3.2 cm) wide. The solitary, bilaterally symmetrical, fragrant flowers have five lance-shaped sepals 0.1 to 0.2 in (3.5 to 5 mm) long with membranous edges fringed with white hairs and three types of clawed (with a narrow petiole-like base) greenish-yellow petals 0.4 to 0.6 in (10 to 15 mm) long with lobes about 0.2 in (4 to 5 mm) long. The three-lobed, 0.5 in (12 mm) long capsule opens to release olive-green seeds about 0.1 in (3 mm) long and about 0.08 in (2 mm) in diameter. This species differs from others in this endemic Hawaiian genus by its slightly smaller, greenish-yellow flowers and by the presence of hairs on the stipule midribs and leaf veins (Wagner *et al.* 1990).

Historically, *Isodendrion pyrifolium* was found at unspecified localities on Niihau, Molokai, and Lanai, as well as on Oahu in the central portion of the Waianae Mountains, on Maui in the northeastern to southwestern regions of the West Maui mountains, and on the island of Hawaii at the western base of Hualalai (HHP 1991p1 to 1991p5, Wagner *et al.* 1990). The species had not been collected since 1870 and was presumed extinct. However, in 1991, four plants were found on Hawaii near Kona in an area being developed as a golf course. A single plant is located about 250 ft (75 m) from a cluster of three other plants on State-owned land (C. Corn, *in litt.* 1991; Francis Blanco, Hawaii Housing and Finance Development Corporation, and K. Nagata, pers. comms., 1992). This species typically grows on dry sites in Lowland Mesic Forests at low elevations (Gagne and Cuddihy 1990, Wagner *et al.* 1990). Associated species include 'iliahi, *Sophora chrysophylla* (mamane), and *Waltheria indica* ('uhaloa) (Paul Weissich, Weissich and Associates, pers. comm., 1992). The major threats to *Isodendrion pyrifolium* are competition from alien species such as fountain grass, fire, and stochastic extinction and/or reduced reproductive vigor due to the single known population and the small number of existing individuals (C. Corn, K. Nagata, and P. Weissich, pers. comms., 1992).

In 1920, Kuekenthal described *Cyperus fauriei* based on a specimen collected by Faurie on Molokai in 1910 (Wagner *et al* 1989). Koyama (1990), in the current treatment of the genus, transferred the species to *Mariscus*, resulting in *M. fauriei*.

Mariscus fauriei of the sedge family (Cyperaceae), a perennial plant with somewhat enlarged underground stems and three-angled, single or grouped aerial stems 4 to 20 in (10 to 50 cm) tall, has leaves shorter than or the same length as the stems and 0.04 to 0.1 in (1 to 3.5 mm) wide. Three to 5 bracts, the lowest one 2.4 to 7.9 in (6 to 20 cm) long, are located under each flower

cluster, which measures 0.8 to 1.6 in (2 to 4 cm) long and 1.2 to 3.9 in (3 to 10 cm) wide and is made up of 3 to 10 spikes (unbranched clusters of unstalked flowers). Each spike measures 0.3 to 1.2 in (0.8 to 3 cm) long and 0.3 to 0.4 in (8 to 10 mm) wide and is made up of compressed spreading spikelets, each comprising seven to nine flowers. Fruits are three-angled achenes about 0.05 in (1.2 mm) long and about 0.03 in (0.7 mm) wide. This species differs from others in the genus in Hawaii by its smaller size and its narrower, flattened, and more spreading spikelets (Koyama 1990).

Historically, *Mariscus fauriei* was found on East Molokai, in the northwestern and southwestern portions of Lanai, and on the island of Hawaii on the northern slope of Hualalai and the northwestern and southernmost slopes of Mauna Loa. A total of 3 extant populations and about 33 to 43 known individuals of the species are found on Molokai and Hawaii, the species is almost certainly extinct on Lanai now. One population of about 20 to 30 plants occurs on Molokai above Kamiloloa on State-owned land. Two populations located about 45 mi (72 km) apart are known on Hawaii on the Hualalai side of Mauna Loa and in the South Point area. The land is privately owned, and there are a total of about 13 known individuals on that island (HHP 1991q1 to 1991q8; HPCC 1991g; Robert Hobdy, Hawaii DLNR, pers. comm., 1992). This species typically grows in lama-dominated Lowland Dry Forests, often on aa substrate, at elevations between 880 and 6,000 ft (300 and 1,830 m) (HHP 1991q8, HPCC 1991g, Koyama 1990). Associated species include alahe'e, *Peperomia* sp. ('ala'ala wai nui), and *Rauvolfia sandwicensis* (hao), (HHP 1991q8, HPCC 1991g). The major threat to *Mariscus fauriei* on Molokai is grazing and trampling by feral goats and *Axis axis* (axis deer), and on Hawaii, competition from alien species such as Christmas berry and *Oplismenus hirtellus* (basketgrass). On both islands, the species is faced with stochastic extinction and/or reduced reproductive vigor due to the small number of existing populations and individuals (HHP 1991q8; HPCC 1991g; R. Hobdy, pers. comm., 1992).

First collected on the island of Hawaii by Charles Pickering during the United States Exploring Expedition of 1840 and 1841, *Nothocestrum breviflorum* was named by Gray in 1862. He chose the specific epithet to refer to the short corolla of the flower of this species. In 1888, Hillebrand name var. *longipes*, but in the current treatment of the genus (Symon 1990), no varieties of the species are recognized.

Nothocestrum breviflorum of the nightshade family (Solanaceae), a stout tree 33 to 39 ft (10 to 12 m) tall with a trunk up to 18 in (45 cm) in diameter, has deciduous, alternate, stalked, oblong or elliptic-oblong, thick and papery-textured, toothless leaves which are 2 to 4.7 in (5 to 12 cm) long and 1.2 to 2.4 in (3 to 6 cm) wide. Numerous bisexual, radially symmetrical flowers are clustered at the ends of short spurs (branches with much shortened internodes) on individual stalks 0.2 to 0.4 in (4 to 10 mm) long. Each flower consists of a 0.2 to 0.4 in (6 to 11 mm) long, four-lobed tubular calyx split on one side and a greenish-yellow four-lobed corolla which barely projects beyond the calyx. The fruit, a somewhat spherical or oblong, orange-red berry about 0.2 to 0.3 in (6 to 8 mm) in diameter, is enclosed by the calyx. Seeds have not been observed. This species can be distinguished from others of this endemic Hawaiian genus by the leaf shape; the clusters of more than three flowers arranged on the ends of short branches; and the broad fruit enclosed by the calyx (Symon 1990).

Historically, *Nothocestrum breviflorum* was found only on the island of Hawaii from the southern portion of the Kohala Mountains; the northern slope of Hualalai; and the eastern, southern, and western slopes of Mauna Loa. Today, extant populations have been found in much of the species' historic range, from near Waimea, near Kiholo, in Puu Waawaa, in HVNP in Kipuka Puaulu and near Holei Pali, and in the South Point area. These 9 populations, which extend over a distance of about 63 by 41 mi (101 by 66 km), are found on privately, State-, and federally owned land and contain an estimated 53 known individuals (HHP 1991r1 to 1991r12; J. Lau and W. Wagner, pers. comms., 1992). This species typically grows in koa- and 'ohi'a- or lama-dominated Lowland Dry Forests and Montane Dry or Mesic Forests, often on a substrate, at elevations between 590 and 6,000 ft (180 and 1,830 m) (Gagne and Cuddihy 1990; HHP 1991r1, 1991r2, 1991r5, 1991r7, 1991r12, HPCC 1991h; Symon 1990). Associated species include 'iliahi, *Caesalpinia kavaiensis* (uhiuhi), and *Erythrina sandwicensis* (wiliwili) (HHP 1991r1, 1991r3, 1991r4, 1991r12; HPCC 1991h; W. Wagner, pers. comm., 1992). The major threats to *Nothocestrum breviflorum* are competition from alien species such as Christmas berry, fountain grass, lantana, and *Leucaena leucocephala* (koa haole); browsing by cattle; fire; and stochastic extinction and/or reduced reproductive vigor due to the small number of existing individuals (HHP 1991r4, 1991r6, 1991r12; Lamb 1981; W. Wagner, pers. comm., 1992).

Ochrosia kilaueaensis was first collected by Forbes in 1915 and was named by St. John in 1978. The specific epithet refers to Kilauea, the type locality of the plant on the island of Hawaii. Based on a specimen collected in 1909 by Rock, St. John (1978) named *O. konaensis*. In the current treatment of the genus (Wagner *et al.* 1990), *O. konaensis* is considered synonymous with *O. kilaueaensis*.

Ochrosia kilaueaensis of the dogbane family (Apocynaceae) is a hairless tree 49 to 59 ft (15 to 18 m) tall with milky sap. The lance- or ellipse-shaped toothless leaves are arranged three or four per node, are 2.4 to 7.5 in (6 to 19 cm) long and 0.9 to 2.6 in (2.2 to 6.5 cm) wide, and have veins arising at nearly right angles to the midrib. Open clusters of numerous flowers have main stalks 1.8 to 2.5 in (4.5 to 6.3 cm) long, secondary branches 0.4 to 1 in (1.1 to 2.5 cm) long, and individual flower stalks 0.2 to 0.3 in (5 to 7 mm) long. Each flower has a five-lobed calyx about 0.4 in (10 to 11 mm) long and a trumpet-shaped greenish-white corolla with a tube 0.3 to 0.4 in (7 to 11 mm) long and lobes 0.5 to 0.6 in (12 to 15 mm) long. The fruit is a drupe (a fruit with a firm outer layer, a fleshy inner layer, and a stony inner layer surrounding a single seed) thought to be yellowish brown at maturity, 1.8 to 1.9 in (4.5 to 4.9 cm) long, and 0.9 to 1.1 in (2.4 to 2.9 cm) wide. This species is distinguished from other Hawaiian species of the genus by the greater height of mature trees, the open flower clusters, the longer flower stalks, and the larger calyx and lobes of the corolla (Wagner *et al.* 1990).

Historically, *Ochrosia kilaueaensis* has been collected on the northern slope of Hualalai and on the eastern slope of Mauna Loa. There is one known extant population located at Puu Waawaa on State-owned land and consisting of an unknown number of individuals (HHP 1991s1, 1991s2). This species typically grows in koa- and 'ohi'a- or lama-dominated Montane Mesic Forests at elevations between 2,200 and 4,000 ft (670 and 1,220 m) (Gagne and Cuddihy 1990; HHP 1991s1, 1991s2; Wagner *et al.* 1990). Associated species include 'aiea, *Colubrina oppositifolia* (kauila), *Gardenia brighamii* (nanu), and *Psychotria hawaiiensis* (kopiko) (HHP 1991s1). The major threats to *Ochrosia kilaueaensis* are competition from alien species such as fountain grass, browsing by feral goats, fire, and stochastic extinction and/or reduced reproductive

vigor due to the single existing known population (Bruegmann 1990, CPC 1990b).

Gray (1862) named *Plantago pachyphylla* var. *hawaiiensis* and *P. pachyphylla* var. *hawaiiensis* subvar. *gracilis* based on specimens collected on the island of Hawaii during the United States Exploring Expedition of 1840 and 1841 and by Remy in the 1850s, respectively. Leveille (1911) published *P. gaudichaudiana* based on another specimen from the island of Hawaii. In 1923, Pilger raised the taxon to specific rank, resulting in *P. hawaiensis*, and also published a new variety, var. *laxa* (Pilger 1937). The specific epithet refers to the island where the plant grows. In the current treatment of the genus, only *P. hawaiensis* is accepted (Wagner *et al.* 1990).

Plantago hawaiensis of the plantain family (Plantaginaceae), a perennial herb which grows from a stout short stem, has thick, leathery, narrowly oval or oblong leaves located at the base of the plant which measure 3 to 8.7 in (7.5 to 22 cm) long and usually 0.6 to 1.3 in (1.5 to 3.2 cm) wide. The flowering stalk is 7.9 to 35 in (20 to 90 cm) long and is topped by a spike usually 5.9 to 9 in (15 to 23 cm) long. Each upward pointing flower, subtended by a single bract 0.08 to 0.1 in (2.1 to 2.6 mm) long, has a four-lobed calyx 0.06 to 0.09 in (1.6 to 2.2 mm) long and a trumpet-shaped corolla about 0.04 in (1 mm) long. The capsule, 0.1 to 0.2 in (2.6 to 4 mm) long and projecting from the calyx, opens to release four to six dull black seeds about 0.04 in (1 mm) long and winged on one end. This species is distinguished from other endemic and naturalized species of the genus in Hawaii by its perennial herbaceous habit; its thick leathery leaves; its upward pointing flowers; and its capsules which project from the calyx (Wagner *et al.* 1990).

Historically, *Plantago hawaiensis* was found only on the island of Hawaii on the southern slopes of Mauna Kea; the northeastern, southeastern, and southern slopes of Mauna Loa; and the western slope of Hualalai. Today, the species is known to occur on the Humuula Saddle, in the Upper Waiakea Forest Reserve, and near the Keapohina Upland on privately and State-owned land. The four extant populations extend over a distance of approximately 14 by 4 mi. (23 by 6 km) and contain an unknown number of individuals (HHP 1991t1 to 1991t6). This species typically grows in boggy conditions in Montane Wet Herblands or in Montane Dry Shrublands dominated by koa or 'ohi'a trees of short stature, or sometimes in lava cracks, at elevations between 5,900 and 6,400 ft (1,800 and 1,950 m) (HHP 1991t1, 1991t2, 1991t4, 1991t6; Wagner *et al.* 1990). The major threat to *Plantago hawaiensis* is stochastic extinction and/or reduced reproductive vigor due to the small number of existing populations.

Portulaca sclerocarpa was first collected during the United States Exploring Expedition of 1840 and 1841 and was named by Gray (1854). The specific epithet refers to the hardened capsule.

Portulaca sclerocarpa of the purslane family (Portulacaceae), a perennial herb with a fleshy tuberous taproot which becomes woody, has stems up to about 7.9 in. (20 cm) long. The stalkless, succulent, grayish-green leaves are almost circular in cross-section, 0.3 to 0.8 in. (8 to 21 mm) long, and about 0.06 to 0.1 in. (1.5 to 2.5 mm) wide. Dense tufts of hairs are located in each leaf axil and underneath the tight clusters of three to six stalkless flowers grouped at the ends of the stems. Sepals are about 0.2 in. (5 mm) long and have membranous edges. Petals are white, pink, or pink with a white base, about 0.4 in. (10 mm) long, and surround about 30 stamens and an 8-branched style. The hardened capsules are about 0.2 in. (4 to 4.5 mm) long, have walls 0.01 to 0.02 in. (0.18 to 0.5 mm) thick, open very late or not at all, and contain glossy, dark reddish-brown seeds about 0.02 in. (0.4 to 0.6 mm) long. This species differs from other native and naturalized species of the genus in Hawaii by its woody taproot, its narrow leaves, and the colors of its petals and seeds. Its closest relative, *Portulaca villosa*, differs mainly in its thinner-walled, opening capsule (Wagner *et al.* 1990).

Historically, *Portulaca sclerocarpa* was found on an islet off the south coast of the island of Lanai and on the island of Hawaii in the Kohala Mountains, on the northern slope of Hualalai, the northwestern slope of Mauna Loa, and near Kilauea Crater. There is 1 extant population on Poopoo Islet off the coast of Lanai which contains about 10 plants (R. Hobdy, pers. comm., 1992). On Hawaii, 11 extant populations extend over a distance of about 54 by 32 mi (87 by 51 km) and are located on 3 cinder cones in the Nohonaohae area; at PTA, including inside the Multi-Purpose Range Complex (MPRC); at Puu Anahulu; and near Puu Keanui and Puu Lehua on private, State, and Federally owned land. The 11 populations on the island of Hawaii contain a total of approximately 72 to 122 individuals (Cuddihy *et al.* 1983; HHP 1991u1 to 1991u12; R. Shaw, pers. comm., 1992). This species typically grows in Montane Dry Shrublands, often on bare cylinder and even near steam vents, at elevations between 3,380 and 5,340 ft (1,030 and 1,630 m) Gagne and Cuddihy 1990, Wagner *et al.* 1990). Associated species include mamane and 'ohi'a (HHP 1991u1, 1991u8 to 1991u10, 1991u12; HPCC 1991i). The major threats to *Portulaca sclerocarpa* are competition from alien grasses such as fountain grass and *Andropogon virginicus* (broomsedge); grazing, browsing, trampling, and habitat disturbance by feral goats, pigs, and sheep; habitat disturbance and damage to plants as a result of military exercises; and fire (HHP 1991u2, 1991u9; HPCC 1991i; R. Shaw, pers. comm., 1992).

Based on collections by Rock on the island of Hawaii, Beccari named *Pritchardia affinis* and three varieties: Var. *halophila* (misspelled as "holaphila"), var. *rhopalocarpa*, and var. *gracilis* (Beccari and Rock 1921). In the current treatment of the genus (Read and Hodel 1990), no subsequent taxa are recognized.

Pritchardia affinis of the palm family (Arecaceae) is a fan-leaved tree 33 to 82 ft (10 to 25 m) tall with pale or pinkish soft wool covering the underside of the petiole and extending onto the leaf blade. The wedge-shaped leaf has a green and smooth upper surface and a pale green lower surface with scattered yellowish scales. The branched, hairless flower clusters are located among the leaves. Each flower comprises a cup-shaped, three-lobed calyx; three petals; six stamens; and a three-lobed stigma. The spherical fruit is about 0.9 in (2.3 cm) in diameter. This species is distinguished from other species of *Pritchardia* by the long, tangled, woolly hairs on the underside of the petiole and the base of the lower leaf blade; the stout hairless flower clusters which do not extend beyond the wedge-shaped leaves; and the smaller spherical fruit (Read and Hodel 1990).

Historically, *Pritchardia affinis* was found only on the island of Hawaii in the Kohala Mountains and along the western and southeastern coasts. Today, scattered individuals of the species can be found throughout much of the historically known coastal range at Kiholo, at Kukio, near Palanai Road, on Alii Drive in Kailua, in Captain Cook, at Hookena, at Milolii, and at Punaluu. Most plants grow within areas of human habitation or development, and the trees may have been cultivated by Hawaiians or others rather than having occurred in these areas naturally. There are an estimated 50 to 65 known individuals at 8 or more localities which extend along about 110 mi (180 km) along the coast on privately and State-owned land (HHP

1991v1 to 1991v6; Norman Bezona, Hawaii Cooperative Extension Service, Brien Meilleur, Amy Greenwell Ethnobotanical Garden, and P. Weissich, pers. comms., 1992). This species typically grows in Coastal Mesic Forests at coastal sites or in gulches further inland at elevations between sea level and 2,000 ft (0 and 610 m), possibly associated with brackish water (HHP 1991v2; Read and Hodel 1990; C. Corn, pers. comm., 1992). Native associated species of this loulu are unknown, since all trees are found in cultivated zones, which have long been cleared of their native cover (B. Meilleur, pers. comm., 1992). The major threats to *Pritchardia affinis* are predation on seeds by roof rats, development of land where individuals grow, and stochastic extinction and/or reduced reproductive vigor due to the small number of existing individuals. In the past, the species' natural habitat was cleared for agriculture and housing, and feral pigs destroyed seedlings of the species, preventing regeneration (Beccari and Rock 1921; Hull 1980; C. Corn, pers. comm., 1992).

Gray (1854) mentioned an unnamed variety of *Silene struthioloides*, in reference to a specimen collected on the island of Hawaii during the United States Exploring Expedition of 1840 and 1841. Sherff named this taxon *S. struthioloides* var. *gracilis* in 1946 and later elevated it to specific rank, resulting in *S. hawaiiensis* (1949). He chose the specific epithet to refer to the island where the plant is found.

Silene hawaiiensis of the pink family (Caryophyllaceae), a sprawling shrub with slanting or climbing stems 6 to 16 in (15 to 40 cm) long originating from an enlarged root, is covered with short, often sticky hairs. The stalkless narrow leaves are 0.2 to 0.6 in (6 to 15 mm) long and 0.02 to 0.03 in (0.5 to 0.8 mm) wide. Flowers are arranged in elongate clusters. Each flower has a stalk 0.1 to 0.2 in (3 to 6 mm) long; a five-toothed purple or purple-tinged calyx 0.4 to 0.6 in (11 to 14 mm) long; and five petals, greenish white above and maroon below, with a stalk-like base and a flat, two-lobed, expanded portion about 0.2 in (4.5 to 5.5 mm) long. The fruit is a capsule about 0.3 in (6.5 to 8 mm) long which releases pale brown seeds 0.02 to 0.03 in (0.4 to 0.7 mm) long. This species differs from others of *Silene* in Hawaii by its growth habit; its covering of short, often sticky hairs; the shape of its leaves; the arrangement of its flower clusters; and the color of its petals (Wagner *et al.* 1990).

Historically, *Silene hawaiiensis* was found only on the island of Hawaii from the western slope of Mauna Kea; the summit of Hualalai; Humuula Saddle; the northern, western, and northwestern slopes of Mauna Loa; and near Kilauea Crater. Today, populations are found in Hamakua District; on Humuula Saddle; at PTA, including inside MPRC; north of Puu Keanui; and in HVNP on privately, State-, and federally owned land. The 17 populations extend over a distance of approximately 12 by 7 mi (19 by 11 km) and contain a total of between about 2,600 and 2,700 individuals (HHP 1991w1 to 1991w10; HPCC 1991j; R. Shaw, pers. comm., 1992). This species typically grows in Montane or Subalpine Dry Shrublands in decomposed lava and ash at elevations between 3,000 and 4,300 ft (900 and 1,300 m) and sometimes up to 8,353 ft (2,546 m) (Wagner *et al.* 1990). Associated species include *Dodonaea viscosa* ('a'ali'i), *Styphelia tameiameiae* (pukiawe), and *Vaccinium reticulatum* ('ohelo) (HHP 1991w6; HPCC 1991j; R. Shaw, pers. comm., 1992). The major threats to *Silene hawaiiensis* are competition with alien plant species, particularly fountain grass; grazing, browsing, and trampling by feral goats, pigs, and sheep; habitat disturbance and damage to plants as a result of military exercises; fire; and volcanic activity (HPCC 1991j; R. Shaw, pers. comm., 1992).

Gray (1861a) named a plant collected on the island of Hawaii during the United States Exploring Expedition of 1840 and 1841 *Vittadenia arenaria*. Hillebrand (1888) transferred the species to the genus *Tetramolopium* and named a second variety, var. *dentatum*. In the current treatment of the genus (Lowrey 1986, 1990), two subspecies, ssp. *arenarium* and ssp. *laxum*, are recognized. Variety *confertum*, described by Sherff in 1934, is recognized (Lowrey 1986, 1990) as a variety of spp. *arenarium*. Because of a recently recognized typification problem, ssp. *laxum* actually should be referred to as spp. *arenarium*, leaving what was called ssp. *arenarium* without a published name (Laven *et al.* 1991).

Tetramolopium arenarium of the aster family (Asteraceae), an erect tufted shrub 2.6 to 4.3 ft (0.8 to 1.3 m) tall, is covered with tiny glands and straight hairs. The alternate, toothless or shallowly toothed leaves are more or less lanced-shaped, 0.6 to 1.5 in (15 to 37 mm) long, and 0.1 to 0.4 in (3 to 9 mm) wide. Five to 11 heads (dense flower clusters) are grouped at the end of each stem. Each head comprises a bell-shaped structure of 20 to 34 bracts 0.1 to 0.2 in (2.5 to 5 mm) high and 0.2 to 0.4 in (4 to 9 mm) in diameter beneath the flowers; a single series of 22 to 45 white, male ray florets 0.05 to 0.09 in (1.3 to 2.2 mm) long; and 4 to 9 bisexual disk florets with maroon petals 0.12 to 0.17 in (3.1 to 4.4 mm) long. Fruits are compressed achenes 0.06 to 0.1 in (1.5 to 3 mm) long and 0.02 to 0.03 in (0.5 to 0.8 mm) wide. This species is distinguished from others of the genus by its erect habit; the presence and types of glands and hairs on the plant; the fewer heads per flower cluster; the larger, male ray florets; the fewer, bisexual, maroon-petalled disk florets; and the wider achenes (Lowrey 1990).

Historically, *Tetramolopium arenarium* was found on the island of Maui on the western slope of Halakeala and on the island of Hawaii from the Kohala Mountains, the northwestern slopes of Mauna Kea and Mauna Loa, and the slopes of Hualalai. Only one population is known today, and it occurs on Hawaii in Kipuka Kalawamauna at PTA on federally managed land. At last count, there were 134 plants in a 660 by 200 ft (200 by 60 m) area (HHP 1991x1 to 1991x4, 1991y; HPCC 1990a; Laven *et al.* 1991; R. Shaw, pers. comm., 1992). This species typically grows in open 'a'ali'i-dominated Lowland or Montane Dry Forest at elevations between 2,600 and 4,900 ft (800 and 1,500 m) (Lowrey 1990). Associated species include 'a'ali'i, pukiawe, *Chamaesyce olowaluana* ('akoko), and *Dubautia linearis* (na'ena'e) (HPCC 1990a). The major threats to *Tetramolopium arenarium* are competition from alien plant species, particularly fountain grass; grazing, browsing, trampling, and habitat disturbance by feral goats, pigs, and sheep; habitat disturbance and damage to plants as a result of military exercises; fire; and stochastic extinction and/or reduced reproductive vigor due to the single existing population (Douglas *et al.* 1989, HPCC 1990a, Herbst and Fay 1979).

Hillebrand (1888) described *Zanthoxylum hawaiiense* based on a specimen collected on the island of Hawaii and also indicated an unnamed variety for a specimen collected on Lanai. Other names published for portions of this taxon include: *Z. bluettianum* (Rock 1913), *Z. hawaiiense* var. *citriodora* (Rock 1913), *Z. hawaiiense* var. *velutinosum* (Rock 1913), and *Z. hawaiiense* var. *subacutum* (St. John 1976). Some authors placed Hawaiian species in the genus *Fagara*, resulting in *F. hawaiiensis* (Engler 1896) and *F. bluettiana* (Engler 1931). Sherff (1958) named *F. hawaiiensis* var. *citriodora*, *F. hawaiiensis* var. *subacutata*, and *F. hawaiiensis* var. *velutinosa*, all of which are considered within the range of

variation of *Z. hawaiiense* in the current treatment of the Hawaiian species (Stone *et al.* 1990).

Zanthoxylum hawaiiense of the rue family (Rutaceae), a thornless tree usually 10 to 26 ft (3 to 8 m) tall with a trunk up to 10 in (25 cm) in diameter, has alternate leaves comprising three leathery, triangular-oval or lance-shaped, gland-dotted, lemon-scented, toothed leaflets usually 1.3 to 3.9 in (3.4 to 10 cm) long and 0.6 to 2 in (1.5 to 5 cm) wide. The stalk of each of the two side leaflets has one joint, and the stalk of the terminal leaflet has two joints. Flowers are usually either male or female, and usually only one sex is found on a single tree. Clusters of 15 to 20 flowers 1.6 to 3.1 in (4 to 8 cm) long have a main flower stalk 0.8 to 2 in (20 to 50 mm) long and individual flower stalks 0.08 to 0.2 in (2 to 4 mm) long. Each flower has four narrowly triangular sepals about 0.04 in (1 mm) long and four hairless petals (possibly absent in male flowers) of an unknown color. The fruit is a sickle-shaped follicle (dry fruit that opens along one side) 0.3 to 0.4 in (8 to 10 mm) long, containing one black seed about 0.3 in (7 to 8 mm) in diameter. This species is distinguished from other Hawaiian species of the genus by its leaves, which are always made up of three leaflets of similar size; the presence of only one joint on some of the leaflet stalks; and the shorter follicle with a rounded tip (Stone *et al.* 1990).

Historically, *Zanthoxylum hawaiiense* was known to occur in the central portion of the island of Kauai; on East Molokai; in the central part of the island of Lanai; on East Maui on the southwestern and southern slopes of Haleakala; and on the island of Hawaii in the Kohala Mountains, on the northern slope of Hualalai, and on the northwestern slope of Mauna Loa. There is now one living individual known on Kauai in Kawaiiki Valley on State-owned land. On Molokai, three extant populations of the species occur on privately and State-owned and federally managed land in Kalaupapa National Historical Park (NHP), in Pelekunu Valley, and near Puu Kolekole. The Molokai populations extend over a distance of about 3 by 2 mi (5 by 3 km). Although the number of plants at one of the sites is uncertain, it is estimated that the 3 populations contain 5 plants. On Lanai, one population with an unknown number of individuals has been reported on privately owned property in Kaiholena Gulch. On East Maui, extant populations of *Z. hawaiiense* have been found in Kahikinui, above Lualailua, above Kanaio, and in Auwahi. These 4 populations extend over a distance of approximately 5 by 3 mi (8 by 5 km) and contain a total of fewer than 10 plants. On the island of Hawaii, individuals are found at Puu Waawaa and at PTA on State-owned and federally managed land. These 2 extant populations are located about 13 mi (21 km) apart and contain a total of about 50 plants. In summary, *Zanthoxylum hawaiiense* is currently located on 5 islands and consists of 11 populations and about 66 individuals (HHP 1991z1 to 1991z16; R. Shaw, pers. comm., 1991).

Zanthoxylum hawaiiense typically grows in 'ohi'a-dominated Lowland Dry or Mesic Forests, and Montane Dry Forests, often on aa lava, at elevations between 1,800 and 5,710 ft (550 and 1,740 m) (Gagne and Cuddihy 1990), Stone *et al.* 1990). Associated species include *Antidesma platyphyllum* (hame) on Kauai, *Pleomele auwahiensis* (hala pepe) on Molokai, a'ia'i on Maui, and mamane and naio on the island of Hawaii (HHP 1991z1, 1991z5, 1991z9, 1991z11; HPCC 1990b; R. Shaw, pers. comm., 1992). A threat to *Z. hawaiiense* on Kauai is competition from alien plant species such as lantana and *Melia azedarach* (Chinaberry) (HHP 1991z11). On Molokai, grazing, browsing, trampling, and habitat disturbance by feral goats is a threat (HHP 1991z5). On Maui, competition with Kikuyu grass, which forms a continuous mat in many areas, and grazing, browsing, trampling, and habitat disturbance by cattle and goats are threats (A. Medeiros, pers. comm., 1992). The major threats to the species on the island of Hawaii are competition from alien plant species such as fountain grass; grazing, browsing, trampling, and habitat disturbance by feral goats and sheep; habitat disturbance and damage to plants as a result of military exercises; and fire (CPC 1990b, HHP 1991z10, HPCC 1990b). In addition, the species is threatened by stochastic extinction and/or reduced reproductive vigor due to the small number of existing individuals.

Previous Federal Action

Federal action on these plants began as a result of section 12 of the Act, which directed the Secretary of the Smithsonian Institution to prepare a report on plants considered to be endangered, threatened, or extinct in the United States. This report, designated as House Document No. 94–51, was presented to Congress on January 9, 1975. In that document, *Clermontia lindseyana, Clermontia peleana, Colubrina oppositifolia, Cyanea hamatiflora* ssp. *carlsonii* (as *C. carlsonii*), *Cyanea shipmanii, Hesperocnide sandwicensis, Ischaemum byrone, Nothocestrum breviflorum* (as *N. breviflorum* var. *breviflorum*), *Portulaca sclerocarpa*, and *Zanthoxylum hawaiiense* (as *Z. hawaiiense* var. *citriodora*) were considered to be endangered. *Cyrtandra giffardii, Silene hawaiiensis* (as *S. hawaiiensis* var. *hawaiiensis*), and *Zanthoxylum hawaiiense* (as *Z. hawaiiense* var. *hawaiiense* and *Z. hawaiiense* var. *velutinosum*) were considered to be threatened. *Clermontia pyrularia, Isodendrion pyrifolium, Nothocestrum breviflorum* (as *N. breviflorum* var. *longipes*), and *Tetramolopium arenarium* (as *T. arenarium* var. *arenarium, T. arenarium* var. *confertum*, and *T. arenarium* var. *dentatum*) were considered to be extinct. On July 1975, the Service published a notice in the **Federal Register** (40 FR 27823) of its acceptance of the Smithsonian report as a petition within the context of section 4(c)(2) (now section 4(b)(3)) of the Act, and giving notice of its intention to review the status of the plant taxa named therein. As a result of that review, on June 16, 1976, the Service published a proposed rule in the **Federal Register** (41 FR 24523) to determine endangered status pursuant to section 4 of the Act for approximately 1,700 vascular plant species, including all of the above taxa considered to be endangered or thought to be extinct. The list of 1,700 plant taxa was assembled on the basis of comments and data received by the Smithsonian Institution and the Service in response to House Document No. 94–51 and the July 1, 1975, **Federal Register** publication.

General comments received in response to the 1976 proposal are summarized in an April 26, 1978, **Federal Register** publication (43 FR 17909). In 1978, amendments to the Act required that all proposals over 2 years old be withdrawn. A 1-year grace period was given to proposals already over 2 years old. On December 10, 1979, the Service published a notice in the **Federal Register** (44 FR 70796) withdrawing the portion of the June 16, 1976, proposal that had not been made final, along with four other proposals that had expired. The Service published updated notices of review for plants on December 15, 1980 (45 FR 82479), September 27, 1985 (50 FR 39525), and February 21, 1990) (55 FR 6183). In these notices, 10 of the taxa (including synonymous taxa) that had been proposed as endangered in the June 16, 1976, proposed rule were treated as Category 1 candidates for Federal listing. Category 1 taxa are those for which the Service has on file substantial information on biological vulnerability

and threats to support preparation of listing proposals. *Clermontia lindseyana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea shipmanii, Hesperocnide sandwicensis, Ischaemum byrone, Nothocestrum breviflorum, Portulaca sclerocarpa,* and *Zanthoxylum hawaiiense,* which were proposed as endangered in the June 16, 1976, proposed rule, were considered Category 1 candidates on all three notices of review; *Cyanea hamatiflora* ssp. *carlsonii* was considered a Category 1 taxon as *Cyanea carlsonii* in the 1980 and 1985 notices and as *Cyanea hamatiflora* ssp. *carlsonii* in the 1990 notice. *Cyanea stictophylla* and *Silene hawaiiensis* were considered Category 1 species in all three notices. In the 1980 and 1985 notices, *Isodendrion pyrifolium* and *Tetramolopium arenarium* were considered Category 1* species. In the 1990 notice, these two species were accorded Category 3A status, but because new information regarding their existence has become available, they are proposed herein for listing. Category 1* taxa are those which are possibly extinct, and Category 3A taxa are those for which the Service has persuasive evidence of extinction.

Cyrtandra giffardii appeared as a Category 2 species and *Clermontia peleana* as a Category 3C species in the 1980 and 1985 notices. *Ochrosia Kilaueaensis* first appeared as a Category 2 species in the 1985 notice. Category 2 taxa are those for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at the time. Category 3C taxa are those which are more abundant than previously believed. Because new information provided support for listing, the above three species were conferred Category 1 status in the 1990 notice. The 1990 notice recognized *Cyanea copelandii* spp. *copelandii, Cyrtandra tintinnabula, Mariscus fauriei, Plantago hawaiensis,* and *Pritchardia affinis* as Category 1 taxa for the first time.

Section 4(b)(3)(B) of the Act requires the Secretary to make findings on certain pending petitions within 12 months of their receipt. Section 2(b)(1) of the 1982 amendments further requires all petitions pending on October 13, 1982, be treated as having been newly submitted on that date. On October 13, 1983, the Service found that the petitioned listing of these taxa was warranted, but precluded by other pending listing actions, in accordance with section 4(b)(3)(B)(iii) of the Act; notification of this finding was published on January 20, 1984 (49 FR 2485). Such a finding requires the petition to be recycled, pursuant to section 4(b)(3)(C)(i) of the Act. The finding was reviewed in October of 1984, 1985, 1986, 1987, 1988, 1989, 1990, and 1991. Publication of the present proposed rule constitutes the final 1-year finding for these taxa.

Summary of Factors Affecting the Species

Section 4 of the Endangered Species Act (16 U.S.C. 1533) and regulations (50 CFR part 424) promulgated to implement the Act set forth the procedures for adding species to the Federal Lists. A species may be determined to be an endangered species due to one or more of the five factors described in section 4(a)(1). The threats facing these 22 taxa are summarized in Table 1.

TABLE 1.—SUMMARY OF THREATS

Species	Alien mammals						Disease/ insects	Alien plants	Fire	Natural disasters	Human impacts	Military	Limited No.*
	Cattle	Deer	Goats	Pigs	Rats	Sheep							
Clermontia lindseyana.	X			X	P			X					
Clermontia peleana				X	X					X	X		X1
Clermontia pyrularia.					P			X			P		X1, 2
Colubrina oppositifolia.				X			X	X	X		P	X	
Cyanea copelandii ssp. *copelandii.*					P						P		X1, 2
Cyanea hamatiflora ssp. *carlsonii.*	X				P			X					X2, 3
Cyanea shipmanii .					P								X2, 3
Cyanea stictophylla	X				P								X2, 3
Cyrtandra giffardii .				X							P		X2, 3
Cyrtandra tintinnabula.				X									X2, 3
Hesperocnide sandwicensis.			X	X		X		X	X		P	X	
Ischaemum byrone		P	P					X		X	P		
Isodendrion pyrifolium.								X	X		P		X1, 2
Mariscus fauriei		X	X					X					X2, 3
Nothocestrum breviflorum.	X							X	X		P		X3
Ochrosia kilaueaensis.			X		P			X	X		P		X1, 2
Plantago hawaiensis.													X1, 2
Portulaca sclerocarpa.			X	X		X		X	X		P	X	
Pritchardia affinis ..					X		P				X		X3
Silene hawaiiensis			X	X		X		X	X	X	P	X	
Tetramolopium arenarium.			X	X		X		X	X		P	X	X2
Zanthoxylum hawaiiense.	X	P	X			X		X	X		P	X	X3

KEY
X—Immediate and significant threat.
P—Potential threat.
*—No more than 100 known individuals and/or no more than 5 known populations.

1—No more than 10 known individuals.
2—No more than 5 known populations.
3—No more than 100 known individuals.
4—Extinct in the wild.

These factors and their application to *Clermontia lindseyana* Rock ('oha wai), *Clermontia peleana* Rock ('oha wai), *Clermontia pyrularia* Hillebr. ('oha wai), *Colubrina oppositifolia* Brongn. ex H. Mann (kauila), *Cyanea copelandii* Rock ssp. *copelandii* (haha), *Cyanea hamatiflora* ssp. *carlsonii* (Rock) - Lammers (haha), *Cyanea shipmanii* Rock (haha), *Cyanea stictophylla* Rock (haha), *Cyrtandra giffardii* Rock (ha'iwale), *Cyrtandra tintinnabula* Rock (ha'iwale), *Hesperocnide sandwicensis* (Wedd.) Wedd. (no common name (NCN)), *Ischaemum byrone* (Trin.) Hitch. (Hilo ischaemum), *Isodendrion pyrifolium* A. Gray (wahine noho kula), *Mariscus fauriei* (Kukenth.) T. Koyama (NCN), *Nothocestrum breviflorum* A. Gray ('aiea), *Ochrosia kilaueaensis* St. John (holei), *Plantago hawaiensis* (A. Gray) Pilg. (laukahi kuahiwi), *Portulaca sclerocarpa* A Gray (po'e), *Pritchardia affinis* Becc. (loulu), *Silene hawaiiensis* Sherff (NCN), *Tetramolopium arenarium* (A. Gray) Hillebr. (NCN), and *Zanthoxylum hawaiiense* Hillebr. (a'e) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

The habitat of the plants included in this proposed rule has undergone extreme alteration because of past and present land management practices, including deliberate alien animal and plant introductions; agricultural, commercial, and urban development; and military and recreational use. Natural disturbances such as flooding, landslides, and volcanic activity also destroy habitat and can have a significant effect on small populations of plants. Competition with alien plants as well as destruction of plants and modification of habitat by introduced animals are the primary threats facing 19 of the 22 taxa being proposed (See Table 1.).

Beginning with Captain James Cook in 1792, early European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. The 1848 provision for land sales to individuals allowed large-scale agricultural and ranching ventures to begin. So much land was cleared for these enterprises that climatic conditions began to change, and the amount and distribution of rainfall were altered (Wenkam 1969). Plantation owners supported reforestation programs which resulted in many alien trees being introduced in the hope that the watershed could be conserved.

Past and present activities of introduced alien mammals are the primary factor in altering and degrading vegetation and habitats on the island of Hawaii as well as on Kauai, Oahu, Molokai, and Maui, where some populations of the proposed species occur. Feral ungulates trample and eat native vegetation and disturb and open areas. This cause erosion and allows the entry of alien plant species (Cuddihy and Stone 1990, Wagner *et al.* 1990). Seventeen taxa in this proposal are directly threatened by habitat degradation resulting from introduced ungulates: 5 taxa are threatened by cattle, 1 taxon by deer, 7 taxa by goats, 9 by pigs, and 5 by sheep.

Axis deer (*Axis axis*), native to Sri Lanka and India, were first introduced to the Hawaiian Islands in 1868 as a game animal on Molokai, later to Oahu and Lanai, and finally to East Maui in 1960. Hunting of axis deer is allowed only on Molokai and Lanai during two months of the year (Hawaii DLNR 1985, Tomich 1986). The animal constitutes a threat to *Mariscus fauriei* on Molokai and a potential threat to *Ischaemum byrone* and *Zanthoxylum hawaiiense* on Molokai and Maui (HHP 1991z5; HPCC 1990b; Medeiros *et al.* 1986; R. Hobdy, pers. comm., 1992).

Cattle (*Bos taurus*), the wild progenitor of which was native to Europe, northern Africa, and southwestern Asia, were introduced to the Hawaiian Islands in 1793. Large feral herds developed as a result of restrictions on killing cattle decreed by King Kamehameha I. While small cattle ranches were developed on Kauai, Oahu, and West Maui, very large ranches of tens of thousands of acres were created on East Maui and Hawaii. Much of the land used in these private enterprises was leased from the State or was privately owned and considered Forest Reserve and/or Conservation District land. On Kauai, both sides of Waimea Canyon were supporting large cattle ranching operations by the 1870s (Ryan and Chang 1985). Feral cattle roamed Oahu, but most were removed by the early 1960s; today only a few can be found in the northwestern part of the island (J. Lau, pers. comm., 1990). Feral cattle were formerly found on Molokai and Maui and damaged the forests there. Feral cattle can presently be found on the island of Hawaii, and ranching is still a major commercial activity there. Hunting of feral cattle is no longer allowed in Hawaii (Hawaii DLNR 1985). Cattle eat native vegetation, trample roots and seedlings, cause erosion, create disturbed areas into which alien plants invade, and spread seeds of alien plants in their feces and on their bodies. The forest in areas grazed by cattle becomes degraded to grassland pasture, and plant cover is reduced for many years following removal of cattle from an area. Several alien grasses and legumes purposely introduced for cattle forage have become noxious weeds (Cuddihy and Stone 1990, Tomich 1986).

The habitats of many of the plants being proposed were degraded in the past by feral cattle, and this has had effects which still persist. Some taxa in this proposed rule are still being directly affected by cattle. These include: *Clermontia lindseyana, Cyanea hamatiflora* ssp. *carlsonii, Cyanea stictophylla, Nothocestrum breviflorum,* and *Zanthoxylum hawaiiense* (HHP 1991a1, 1991m, 1991n1, 1991r4, 1991r5; HPCC 1990b, 1991a, 1991h; F. Duvall, A. Medeiros, and S. Montgomery, pers. comms., 1992).

Goats (*Capra hircus*), a species originally native to the Middle East and India, were successfully introduced to the Hawaiian Islands in 1792, and currently there are populations on Kauai, Oahu, Molokai, Maui, and Hawaii. On Kauai, feral goats have been present in drier, more rugged areas since 1820; they still occur in Waimea Canyon. Goats have been on Oahu since about 1820, and they currently occur in the northern Waianae Mountains. On Molokai, goats degrade dry forests at low elevations. On Maui, goats have been widespread for 100 to 150 years and are common throughout the south slope of Haleakala (Medeiros *et al.* 1986). On Hawaii, goats damage low-elevation dry forest, montane parkland, subalpine woodlands, and alpine grasslands. Goats are managed in Hawaii as a game animal, but many herds populate inaccessible areas where hunting has little effect on their numbers. Goat hunting is allowed year-round or during certain months, depending on the area (Hawaii DLNR n.d., 1985). Goats browse on introduced grasses and native plants, especially in drier and more open ecosystems. They also trample roots and seedlings, cause erosion, and promote the invasion of alien plants. They are able to forage in extremely rugged terrain and have a high reproductive capacity (Cuddihy and Stone 1990, Culliney 1988, Tomich 1986). *Hesperocnide sandwicensis, Mariscus fauriei, Ochrosia kilaueaensis,*

Portulaca sclerocarpa, Silene hawaiiensis, Tetramolopium arenarium, and *Zanthoxylum hawaiiense* are currently threatened by goats (Bruegmann 1990; CPC 1990b; HHP 1991u5, 1991z5; HPCC 1990b; R. Hobdy, A. Medeiros, and R. Shaw, pers. comms., 1992), and *Ischaemum byrone* is potentially threatened by the animal (HHP 1991o11; R. Hobdy, pers. comm., 1992).

Sheep (*Ovis aries*) have become firmly established on the island of Hawaii (Tomich 1986) since their introduction almost 200 years ago (Cuddihy and Stone 1990). Like feral goats, sheep roam the upper elevation dry forests of Mauna Kea (above 3,300 ft (1,000 m)), including PTA, causing damage similar to that of goats (Stone 1985). Sheep have decimated vast areas of native forest and shrubland on Mauna Kea and continue to do so as a managed game species. Sheep threaten the habitat of at least two previously listed endangered species as well as the following proposed plant species: *Hesperocnide sandwicensis, Portulaca sclerocarpa, Silene hawaiiensis, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense* (Cuddihy and Stone 1990; HHP 1991u4, HPCC 1990a, 1990b; Shaw *et al.* 1990; Stone 1985; K. Nagata and R. Shaw, pers. comms., 1992).

Pigs (*Sus scrofa*) are originally native to Europe, northern Africa, Asia Minor, and Asia. European pigs, introduced to Hawaii by Captain James Cook in 1778, became feral and invaded forested areas, especially wet and mesic forests and dry areas at high elevations. They are currently present on Kauai, Oahu, Molokai, Maui, and Hawaii and inhabit rain forests and grasslands. Pig hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii DLNR n.d., 1985). While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil substrates and cause erosion, especially on slopes. Alien plant seeds are dispersed in their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish (Cuddihy and Stone 1990, Medeiros *et al.* 1986, Smith 1985, Stone 1985, Tomich 1986, Wagner *et al.* 1990). Feral pigs pose an immediate threat to one or more population of the following proposed taxa: *Clermontia lindseyana, Clermontia peleana, Colubrina oppositifolia, Cyrtandra giffardii, Cyrtandra tintinnabula, Hesperocnide sandwicensis, Portulaca sclerocarpa, Silene hawaiiensis,* and *Tetramolopium arenarium* (Bruegmann 1990; CPC 1990b; HPCC 1990a, 1991a, 1991d1, 1991d2; J. Lau, A. Medeiros, John Obata, Hawaii Plant Conservation Center, and W. Wagner, pers. comms., 1992).

One or more species of 12 introduced plants threaten 13 of the proposed taxa. The original native flora of Hawaii consisted of about 1,000 species, 89 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 species, 47 percent were introduced from other parts of the world and nearly 100 species have become pests (Smith 1985, Wagner *et al.* 1990). Naturalized, introduced species degrade the Hawaiian landscape and compete with native plants for space, light, water, and nutrients (Cuddihy and Stone 1990). Some of these species were brought to Hawaii by various groups of people, including the Polynesian immigrants, for food or cultural reasons. Plantation owners, alarmed at the reduction of water resources for their crops caused by the destruction of native forest cover by grazing feral animals, supported the introduction of alien tree species for reforestation. Ranchers intentionally introduced pasture grasses and other species for agriculture, and sometimes they inadvertently introduced weed seeds as well. Other plants were brought to Hawaii for their potential horticultural value (Cuddihy and Stone 1990, Wenkam 1969).

Lantana camara (lantana), brought to Hawaii as an ornamental plant, is an aggressive, thicket-forming shrub which can now be found on all of the main islands in mesic forests, dry shrublands, and other dry, disturbed habitats (Wagner *et al.* 1990). One or more populations of each of the following taxa are threatened by lantana: *Colubrina oppositifolia, Nothocestrum breviflorum,* and *Zanthoxylum hawaiiense* (HHP 1991e4, 1991e8, 1991e15, 1991e16, 1991r4, 1991r12, 1991z11; HPCC 1991b, 1991h). *Leucaena leucocephala* (koa haole), a naturalized shrub which is sometimes the dominant species in low elevation, dry, disturbed areas on all of the main Hawaiian Islands, threatens *Nothocestrum breviflorum* (Geesnick *et al.* 1990, HHP 1991r12, HPCC 1991h). *Melia azedarach* (Chinaberry), a small tree widely cultivated and naturalized on most of the main Hawaiian Islands, threatens *Zanthoxylum hawaiiense* on Kauai (HHP 1991z11, Wagner *et al.* 1990). *Passiflora mollissima* (banana poka), a woody vine, poses a serious problem to mesic forests on Kauai and Hawaii by covering trees, reducing the amount of light which reaches trees as well as understory, and causing damage and death to trees by the weight of the vines. Animals, especially feral pigs, eat the fruit and distribute the seeds (Cuddihy and Stone 1990, Escobar 1990). Banana poka threatens *Clermontia lindseyana, Clermontia pyrularia,* and *Cyanea hamatiflora* ssp. *carlsonii* (HHP 1991a3, 1991aa; HPCC 1991c1 to 1991c3). After escaping from cultivation, *Schinus terebinthifolius* (Christmas berry) became naturalized on most of the main Hawaiian Islands (Wagner *et al.* 1990). It threatens *Colubrina oppositifolia, Mariscus fauriei,* and *Nothocestrum breviflorum* (HHP 1991e8, 1991e15, 1991e16, 1991q8, 1991r12; HPCC 1991b, 1991g).

Several hundred species of grasses have been introduced to the Hawaiian Islands, many for animal forage. Of the approximately 100 grass species which have become naturalized, 7 species threaten 12 of the 22 proposed plants. *Andropogon virginicus* (broomsedge) is a perennial, tufted grass which is naturalized on Oahu and Hawaii along roadsides and in disturbed dry to mesic forest and shrubland. This is a fire-adapted grass which threatens *Portulaca sclerocarpa* (Cuddihy and Stone 1990, HPCC 1991i, O'Connor 1990). *Anthoxanthum odoratum* (sweet vernalgrass) is a perennial, tufted grass which has naturalized in pastures, disturbed areas in wet forest, and sometimes in subalpine shrubland on Molokai, Maui, and Hawaii and is a threat to *Hesperocnide sandwicensis* (HPCC 1991e, O'Connor 1990). *Digitaria ciliaris* (Henry's crabgrass) is an annual grass which forms thick mats. It has naturalized on all the main Hawaiian Islands in lawns and pastures and threatens *Ischaemum byrone* (HPCC 1991f, O'Connor 1990). *Holcus lanatus* (common velvet grass), a perennial grass naturalized on most of the main Hawaiian Islands in wet, disturbed sites, threatens *Hesperocnide sandwicensis* (HPCC 1991e, O'Connor 1990). *Oplismenus hirtellus* (basketgrass) is a perennial grass which is naturalized in shaded mesic valleys and forests and sometimes in wet forests on most of the main Hawaiian Islands. *Mariscus fauriei* is threatened by basketgrass (HPCC 1991g, O'Connor 1990). *Pennisetum clandestinum* (Kikuyu grass), an aggressive, perennial grass introduced to Hawaii as a pasture grass, withstands trampling and grazing and has naturalized on four Hawaiian Islands in dry to mesic forest. It produces thick mats which choke out other plants and prevent their seedlings from establishing and has been declared a

noxious weed by the U.S. Department of Agriculture (7 CFR 360) (Medeiros *et al.* 1986, O'Connor 1990, Smith 1985). Kikuyu grass is a threat to *Clermontia lindseyana*, and *Zanthoxylum hawaiiense* (HPCC 1991a; A. Medeiros and S. Montgomery, pers. comms., 1992). *Pennisetum setaceum* (fountain grass) is a fire-adapted bunch grass that has spread rapidly over bare lava flows and open areas on the island of Hawaii since its introduction in the early 1900s. Fountain grass is particularly detrimental to Hawaii's dry forests because it is able to invade areas once dominated by native plants, where it interferes with plant regeneration, carries fires into areas not usually prone to fires, and increases the likelihood of fires (Cuddihy and Stone 1990, O'Connor 1990, Smith 1985). Fountain grass threatens one or more populations of the following proposed taxa: *Colubrina oppositifolia, Isodendrion pyrifolium, Nothocestrum breviflorum, Ochrosia kilaueaensis, Portulaca sclerocarpa, Silene hawaiiensis, Tetramolopium arenarium*, and *Zanthoxylum hawaiiense* (HHP 1991n3, 1991r5; HPCC 1990a, 1991h; J. Lau, S. Montgomery, and P. Weissich, pers. comms., 1992).

Because Hawaiian plants were subjected to fire during their evolution only in areas of volcanic activity and from occasional lightning strikes, they are not adapted to recurring fire regimes and are unable to recover well following a fire. Alien plants are often better adapted to fire than native plant species, and some fire-adapted grasses have become widespread in Hawaii; native shrubland can thus be converted to land dominated by alien grasses. The presence of such species in Hawaiian ecosystems greatly increases the intensity, extent, and frequency of fire, especially during drier months or drought. Fire-adapted alien species can reestablish in a burned area, resulting in a reduction in the amount of native vegetation after each fire. Fire can destroy dormant seeds as well as plants, even in steep or inaccessible areas. Fires may result from natural causes, or they may be accidentally or purposely set by hunters, other people, or military ordnance or personnel. Vegetation within PTA on the northwestern slope of Mauna Loa is particularly vulnerable to fire, as this is an area managed for recreational hunting and used for military training. The only known population of *Tetramolopium arenarium* occurs in Kipuka Kalawamauna, and to protect this area from fires, the U.S. Army has installed firebreaks and now redirects ordnance firing away from that kipuka. Planned military maneuvers are now being reevaluated in light of several Category 1 and listed endangered species within the boundaries of PTA and an Environmental Impact Statement is being prepared for the area in response to a court decision (Cuddihy and Stone 1990; Herbst and Fay 1979; R. Shaw, pers. comm., 1992). Fire is a threat to one or more populations of the following proposed taxa: *Colubrina oppositifolia, Hesperocnide sandwicensis, Isodendrion pyrifolium, Nothocestrum breviflorum, Ochrosia kilaueaensis, Portulaca sclerocarpa, Silene hawaiiensis, Tetramolopium arenarium, and Zanthoxylum hawaiiense* (HHP 1991e15, 1991r5; HPCC 1990a, 1990b, 1991b, 1991h; J. Lau and K. Nagata, pers. comms., 1992).

Land development for housing and commercial activities threatens *Pritchardia affinis* and potentially threatens the continued existence of *Isodendrion pyrifolium* since it grows in an area being converted to a golf course (C. Corn, K. Nagata, and P. Weissich, pers. comms., 1992).

Illicit cultivation of *Cannabis sativa* (marijuana) occurs in isolated portions of public and private lands in the Hawaiian Islands. This agricultural practice opens areas in native forest into which alien plants invade after the patches are abandoned (Medeiros *et al.* 1988). Marijuana cultivation is considered a threat to the integrity of the habitat of *Clermontia peleana* (Bruegmann 1990, CPC 1990b).

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Unrestricted collecting for scientific or horticultural purposes and excessive visits by individuals interested in seeing rare plants could result from increased publicity. This is a potential threat to all of the proposed taxa, but especially to *Cyanea copelandii* ssp. *copelandii, Isodendrion pyrifolium*, and *Ochrosia kilaueaensis*, each of which has only 1 or 2 populations and a total of 10 or fewer known individuals or exist only as cultivated individuals. Any collection of whole plants or reproductive parts of any of these five species would cause an adverse impact on the gene pool and threaten the survival of the species.

People are more likely to come into contact with taxa which have populations near trails or roads or in recreational areas. Alien plants may be introduced into such areas as seeds on footwear, or people may cause erosion, trample plants, or start fires (Cuddihy and Stone 1990). The following proposed taxa have populations in recreational areas or close to roads or trails and are potentially threatened by human disturbance: *Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyrtandra giffardii, Hesperocnide sandwicensis, Ischaemum byrone, Nothocestrum breviflorum, Portulaca sclerocarpa, Silene hawaiiensis, Tetramolopium arenarium*, and *Zanthoxylum hawaiiense*.

C. Disease or Predation

Axis deer, cattle, goats, or sheep have been reported in areas where populations of most of the proposed taxa occur. As the taxa are not known to be unpalatable to these ungulates, predation is a probable threat where those animals have been reported, potentially affecting the following taxa: *Clermontia lindseyana, Cyanea hamatiflora* ssp. *carlsonii, Cyanea stictophylla, Hesperocnide sandwicensis, Hibiscadelphus hualalaiensis, Ischaemum byrone, Mariscus fauriei, Nothocestrum breviflorum, Ochrosia kilaueaensis, Portulaca sclerocarpa, Silene hawaiiensis, Tetramolopium arenarium*, and *Zanthoxylum hawaiiense*. The lack of seedlings of several of the taxa and the occurrence of some populations or taxa only in areas inaccessible to ungulates seem to indicate the effect that browsing mammals, especially cattle and goats, have had in restricting the distribution of these plants.

Of the four species of rodents which have been introduced to the Hawaiian Islands, the species with the greatest impact on the native flora and fauna is probably *Rattus rattus* (roof or black rat), which now occurs on all the main Hawaiian Islands around human habitations, in cultivated fields, and in dry to wet forests. Roof rats, and to a lesser extent *Mus musculus* (house mouse), *R. exulans* (Polynesian rat), and *R. norvegicus* (Norway rat) eat the fruits of some native plants, especially those with large, fleshy fruits. Many native Hawaiian plants produce their fruit over an extended period of time, and this produces a prolonged food supply which supports rodent populations. They also damage fruit of *Pritchardia affinis* (Beccari and Rock 1921). It is probable that rats damage the fruit of *Ochrosia kilaueaensis*, which has fleshy fruits and occurs in areas where rats are found. There is direct evidence that rats feed on *Clermontia peleana*, and, since rats are found in remote areas of most islands in Hawaii, it is likely that predation occurs on the other proposed taxa of *Clermontia* and *Cyanea*, potentially affecting *Clermontia*

lindseyana, Clermontia pyrularia, Cyanea copelandii ssp. *copelandii, Cyanea hamatiflora* ssp. *carlsonii, Cyanea shipmanii* and *Cyanea stictophylla* (HPCC 1990a; J. Lau, pers. comm., 1990).

Xylosandrus compactus (black twig borer) is a small beetle about 0.06 in (1.6 mm) in length which burrows into branches, introduces a pathogenic fungus as food for its larvae, and lays its eggs. Twigs, branches, and even the entire plant can be killed from such an infestation. Black twig borer is known to attach *Colubrina oppositifolia* and is a threat to this species (Cuddihy and Stone 1990; HHP 1991e9, 1991e16).

Pritchardia affinis is known to be susceptible to lethal yellows, which is a bacteria-like organism producing disease in many palms. This disease is not yet in Hawaii, but if it ever is accidentally introduced on plant material brought into the State, it is a potential threat to this species. In addition, cultivated loulu specimens in areas outside Hawaii may be affected by the disease (Hull 1980).

D. The Inadequacy of Existing Regulatory Mechanisms

Hawaii's Endangered Species Act states, "Any species of aquatic life, wildlife, or land plant that has been determined to be an endangered species pursuant to the (Federal) Endangered Species Act shall be deemed to be an endangered species under the provisions of this chapter * * *" (HRS, sect. 195D–4(a)). Federal listing would automatically invoke listing under Hawaii State law, which prohibits taking of endangered plants in the State and encourages conservation by State agencies (HRS, sect. 195D–4).

None of the 22 proposed taxa is presently listed as an endangered species by the State of Hawaii. Fifteen of the 22 proposed taxa have populations located on privately owned land. Two taxa, *Cyanea shipmanii* and *Cyanea stictophylla*, are found exclusively on private land. At least one population of each taxon except *Cyanea shipmanii, Cyanea stictophylla, Silene hawaiiensis*, and *Zanthoxylum hawaiiense* occurs on State land. *Colubrina oppositifolia, Cyanea copelandii* ssp. *copelandii, Cyrtandra giffardii, Cyrtandra tintinnabula*, and *Ischaemum byrone* each has one or more population located in State parks, Natural Area Reserves, or the State seabird sanctuary, which have rules and regulations for the protection of resources (Hawaii DLNR 1981; HRS, sects. 183D–4, 184–5, 195–5, and 195–8). However, the regulations are difficult to enforce because of limited personnel. One or more populations of at least 18 of the 22 proposed taxa located on land classified within conservation districts and owned by the State of Hawaii or private companies or individuals. Regardless of the owner, lands in these districts, among other purposes, are regarded as necessary for the protection of endemic biological resources and the maintenance or enhancement of the conservation of natural resources. Activities permitted in conservation districts are chosen by considering how best to make a multiple use of the land (HRS, sect. 205–2). Some uses, such as maintaining animals for hunting, are based on policy decisions, while others, such as preservation of endangered species, are mandated by both Federal and State laws. Requests for amendments to district boundaries or variances within existing classifications can be made by government agencies and private landowners (HRS, sect. 205–4). Before decisions about these requests are made, the impact of the proposed reclassification on "preservation or maintenance of important natural systems or habitat" (HRS, sects. 205–4, 205–17) as well as the maintenance of natural resources is required to be taken into account (HRS, sects. 205–2, 205–4). For any proposed land use change which will occur on county or State land, will be funded in part or whole by county or State funds, or will occur within land classified as conservation district, an environmental assessment is required to determine whether or not the environment will be significantly affected (HRS, chapt. 343). If it is found that an action will have a significant effect, preparation of a full Environmental Impact Statement is required. Hawaii environmental policy, and thus approval of land use, is required by law to safeguard "* * * the State's unique natural environmental characteristics * * *" (HRS, sect. 344–3(1)) and includes guidelines to "Protect endangered species of individual plants and animals * * *" (HRS, sect. 344–4(3)(A)). Federal listing, because it automatically invokes State listing, would also trigger these other State regulations protecting the plants.

State laws relating to the conservation of biological resources allow for the acquisition of land as well as the development and implementation of programs concerning the conservation of biological resources (HRS, sect. 195D–5(a)). The State also may enter into agreements with Federal agencies to administer and manage any area required for the conservation, management, enhancement, or protection of endangered species (HRS, sect. 195D–5(c)). If listing were to occur, funds for these activities could be made available under section 6 of the Federal Act (State Cooperative Agreements). The Hawaii DLNR is mandated to initiate changes in conservation district boundaries to include "the habitat of rare native species of flora and fauna within the conservation district" (HRS, sect. 195D–5.1). State and Federal agencies have programs to locate, eradicate, and deter marijuana cultivation, which is a threat to one of the proposed taxa (CPC 1990b). Despite the existence of various State laws and regulations which give protection to Hawaii's native plants, their enforcement is difficult due to limited funding and personnel. Listing of these 22 plant taxa would reinforce and supplement the protection available under the State Act and other laws. The Federal Act would offer additional protection to these 22 taxa because, if they were to be listed as endangered, it would be a violation of the Act for any person to remove, cut, dig up, damage, or destroy any such plant in an area not under Federal jurisdiction in knowing violation of State law or regulation or in the course of any violation of a State criminal trespass law.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

The small numbers of populations and individuals of most of these taxa increase the potential for extinction from stochastic events. The limited gene pool may depress reproductive vigor, or a single human-caused or natural environmental disturbance could destroy a significant percentage of the individuals or the only known extant population. This constitutes a major threat to 16 of the 22 taxa being proposed (See Table 1.). Five of the proposed taxa, *Cyanea copelandii* ssp. *copelandii, Cyanea shipmanii, Isodendrion pyrifolium, Ochrosia kilaueaensis*, and *Tetramolopium arenarium*, are known from a single population. Seven other proposed taxa are known from only two to five populations. Seventeen of the proposed taxa are estimated to number no more than 100 known individuals. Six of these taxa, *Clermontia peleana, Clermontia pyrularia, Cyanea copelandii* ssp. *copelandii, Isodendrion pyrifolium, Ochrosia kilaueaensis*, and *Plantago hawaiensis*, number no more than 10 known individuals.

Natural changes to habitat and substrate can result in the death of individual plants as well as the destruction of their habitat. This especially affects the continued existence of taxa or populations with

limited numbers and/or narrow ranges and is often exacerbated by human disturbance and land use practices (See Factor A.). Landslides produced by burrowing seabirds in an offshore islet population of *Ischaemum byrone* are a potential threat to that species (HHP 1991o10; R. Hobdy, pers. comm., 1992). Flooding is a threat to *Clermontia peleana*, which often grows in a riparian habitat (Bruegmann 1990, CPC 1990b). A population of *Ischaemum byrone* is presumed to have been destroyed by volcanic activity, and another population is affected by drifting black sand (HHP 1991o3; C. Lamoureux, pers. comm., 1992). *Silene hawaiiensis* is also considered to be immediately threatened by volcanic activity (HPCC 1991j).

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by these taxa in determining to propose this rule. Based on this evaluation, the preferred action is to list these 22 plant taxa as endangered. Sixteen of the taxa proposed for listing number no more than about 100 individuals and/or are known from 5 or fewer populations. The 22 taxa are threatened by one or more of the following: habitat degradation and/or predation by axis deer, cattle, goats, insects, pigs, rats, and sheep; competition from alien plants; fire and natural disasters; human and military impacts; and lack of legal protection or difficulty in enforcing laws which are already in effect. Small population size and limited distribution make these taxa particularly vulnerable to extinction and/or reduced reproductive vigor from stochastic events. Because these 22 taxa are in danger of extinction throughout all or a significant portion of their ranges, they fit the definition of endangered as defined in the Act.

Critical habitat is not being proposed for the 22 taxa included in this rule, for reasons discussed in the "Critical Habitat" section of this proposal.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered. The Service finds that designation of critical habitat is not presently prudent for these taxa. Such a determination would result in no known benefit to the taxa. As discussed under Factor B in the "Summary of Factors Affecting the Species," the taxa face numerous anthropogenic threats. The publication of precise maps and descriptions of critical habitat in the **Federal Register** and local newspapers as required in a proposal for critical habitat would increase the degree of threat to these plants from take or vandalism and, therefore, could contribute to their decline and increase enforcement problems. The listing of these taxa as endangered publicizes the rarity of the plants and, thus, can make these plants attractive to researchers, curiosity seekers, or collectors of rare plants. All involved parties and the major landowners have been notified of the location and importance of protecting the habitat of these taxa. Protection of the habitat of the taxa will be addressed through the recovery process and through the section 7 consultation process. There are several Federal activities within the currently known habitats of these plants. One or more populations of 10 of the proposed taxa are located on federally owned and/or managed land. Four taxa are located in Hawaii Volcanoes National Park on the island of Hawaii and one taxon in Kalaupapa NHP on Molokai. Six taxa are located on military lands, including one species on Makua Military Reservation on Oahu and five taxa on PTA on the island of Hawaii. Two taxa are found in Hakalau Forest National Wildlife Refuge on the island of Hawaii. A population of one taxon occurs at a U.S. Coast Guard lighthouse on Maui. Federal laws already protect all plants on federally owned and/or managed land from damage or removal. The Service finds that designation of critical habitat for these taxa is not prudent at this time. Such a designation would increase the degree of threat from vandalism, collecting, or other human activities and is unlikely to aid in the conservation of these taxa.

Available Conservation Measures

Conservation measures provided to taxa listed as endangered under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain activities. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the State and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against certain activities involving listed plants are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any taxon that is proposed or listed as endangered and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer informally with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) requires Federal agencies to insure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service. Federal agencies that would become involved if any of their activities may affect these 22 species include the National Park Service, Department of Defense, Fish and Wildlife Service, and the U.S. Coast Guard. There are no other known Federal activities that occur within the present known habitat of these 22 plant taxa.

The Act and its implementing regulations found at 50 CFR 17.61, 17.62, and 17.63 for endangered plants set forth a series of general prohibitions and exceptions that apply to all endangered plant species. With respect to the 22 plant taxa proposed to be listed as endangered, all of the prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.61, would apply. These prohibitions, in part, make it illegal with respect to any endangered plant for any person subject to the jurisdiction of the United States to import or export; transport in interstate or foreign commerce in the course of a commercial activity; sell or offer for sale in interstate or foreign commerce; remove and reduce to possession any such species from areas under Federal jurisdiction; maliciously damage or destroy any such species on any area under Federal jurisdiction; or remove, cut, dig up, damage, or destroy any such species on any other area in knowing violation of any State law or regulation or in the course of any violation of a State criminal trespass law. Certain exceptions apply to agents of the Service and State conservation agencies. The Act and 50 CFR 17.62 and 17.63 also provide for the issuance of permits to carry out otherwise prohibited activities involving endangered plant species under certain circumstances. It

is anticipated that few trade permits would ever be sought or issued. The taxa are not common in cultivation nor in the wild, and only one taxa, *Pritchardia affinis*, is known to be in an active program of cultivation.

Requests for copies of the regulations concerning listed plants and inquiries regarding prohibitions and permits may be addressed to the Office of Management Authority, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Room 432, Arlington, Virginia 22203–3507 (703/358–2104; FAX 703/358–2281).

Public Comments Solicited

The Service intends that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule are hereby solicited. Comments particularly are sought concerning:

(1) Biological, commercial trade, or other relevant data concerning any threat (or lack thereof) to these taxa;

(2) The location of any additional populations of these taxa and the reasons why any habitat should or should not be determined to be critical habitat as provided by section 4 of the Act;

(3) Additional information concerning the range, distribution, and population size of these taxa; and

(4) Current or planned activities in the subject area and their possible impacts on these taxa.

The final decision on this proposal will take into consideration the comments and any additional information received by the Service, and such communications may lead to a final regulation that differs from this proposal.

The Endangered Species Act provides for one or more public hearings on this proposal, if requested. Requests must be received within 45 days of the date of publication of the proposal. Such requests must be made in writing and addressed to the Field Supervisor (see **ADDRESSES** section).

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment or Environmental Impact Statement, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of all references cited herein is available upon request from the Pacific Islands Office (see **ADDRESSES** above).

Author

The author of this proposed rule is Zella E. Ellshoff, Fish and Wildlife Enhancement, Pacific Islands Office, U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, room 6307, P.O. Box 50167, Honolulu, Hawaii 96850 (808/541–2749).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Proposed Regulations Promulgation

PART 17—[AMENDED]

Accordingly, it is hereby proposed to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. It is proposed to amend § 17.12(h) by adding the following, in alphabetical order under the families indicated, and by adding two new families, "Plantaginaceae—Plantain family" and "Portulacaceae—Purslane family," in alphabetical order, to the List of Endangered and Threatened Plants:

§ 17.12 Endangered and threatened plants.

* * * * *

(h) * * *

Species		Historic range		Status	When listed	Critical habitat	Special rules
Scientific name	Common name						
•	•	•	•		•	•	
Apocynaceae—Dogbane family:							
•	•	•	•		•	•	
Ochrosia kilaueaensis	Holei	U.S.A. (HI)		E		NA	NA
•	•	•	•			•	
Arecaceae—Palm family:							
•	•	•	•		•	•	
Pritchardia affinis	Loulu	U.S.A. (HI)		E		NA	NA
•	•	•	•		•	•	
Asteraceae—Aster family:							
•	•	•	•		•	•	
Tetramolopium arenarium	None	U.S.A. (HI)		E		NA	NA
•	•	•	•		•	•	
Campanulacae—Bellflower family:							
•	•	•	•		•	•	
Clermontia lindseyana	'Oha wai	U.S.A. (HI)		E		NA	NA
•	•	•	•		•	•	
Clermontia peleana	'Oha wai	U.S.A. (HI)		E		NA	NA
•	•	•	•		•	•	
Clermontia pyrularia	'Oha wai	U.S.A. (HI)		E		NA	NA

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
*	*	*	*	*	*	*
Cyanea copelandii ssp. *copelandii*	Haha	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Cyanea hamatiflora ssp. *carlsonii*	Haha	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Cyanea shipmanii	Haha	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Cyanea stictophylla	Haha	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Caryophyllaceae—Pink family:						
*	*	*	*	*	*	*
Silene hawaiiensis	None	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Cyperaceae—Sedge family:						
*	*	*	*	*	*	*
Mariscus fauriei	None	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Gesneriaceae—Gesneria family:						
*	*	*	*	*	*	*
Cyrtandra giffardii	Ha'iwale	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Cyrtandra tintinnabula	Ha'iwale	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Plantaginaceae—Plantain family:						
*	*	*	*	*	*	*
Plantago hawaiensis	Laukahi kuahiwi	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Poaceae—Grass family:						
*	*	*	*	*	*	*
Ischaemum byrone	Hilo ischaemum	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Portulacaceae—Purslane family:						
*	*	*	*	*	*	*
Portulaca sclerocarpa	Po'e	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Rhamnaceae—Buckthorn family:						
*	*	*	*	*	*	*
Colubrina oppositifolia	Kauila	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Rutaceae—Citrus family:						
*	*	*	*	*	*	*
Zanthoxylum hawaiiense	A'e	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Solanaceae—Nightshade family:						
*	*	*	*	*	*	*
Nothocestrum breviflorum	'Aiea	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Urticaceae—Nettle family:						
*	*	*	*	*	*	*
Hesperocnide sandwicensis	None	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	*
Violaceae—Violet family:						

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
*	*	*	*	*	*	
Isodendrion pyrifolium	Wahine noho kula	U.S.A. (HI)	E		NA	NA
*	*	*	*	*	*	

Dated: November 27, 1992.

Bruce Blanchard,

Acting Director, Fish and Willdlife Service.

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50 CFR Part 17

RIN 1018–AB88

Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for the Plant "Pritchardia aylmer-robinsonii" (Wahane)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) proposes endangered status pursuant to the Endangered Species Act of 1973, as amended (Act), for the plant *Pritchardia aylmer-robinsonii* (wahane). The species grows only on the island of Niihau, Hawaiian Islands. The species and its habitat have been affected and are currently threatened by cattle, pigs, and sheep. Due to the small number of existing individuals and their very narrow distribution, this species is subject to reduced reproductive vigor and/or an increased likelihood of extinction from stochastic events. This proposal, if made final, would implement the Federal protection and recovery provisions provided by the Act. If made final, it would also implement State regulations protecting these plants as endangered species. Comments and materials related to this proposal are solicited.

DATES: Comments from all interested parties must be received by February 16, 1993. Public hearing requests must be received by February 1, 1993.

ADDRESSES: Comments and materials concerning this proposal should be sent to Robert P. Smith, Field Supervisor, Pacific Islands Office, U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, room 6307, P.O. Box 50167, Honolulu, Hawaii 96850. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the above address.

FOR FURTHER INFORMATION CONTACT: Derral R. Herbst, at the above address (808/541–2749).

SUPPLEMENTARY INFORMATION:

Background

In 1947, on one of his botanical collecting trips to Niihau, Harold St. John discovered a new species of the only genus of palms native to the Hawaiian Islands. He named it *Pritchardia aylmer-robinsonii* in honor of Aylmer F. Robinson, a member of the family which owns the island and a person who provided St. John with much information regarding the island's plants (St. John 1959).

Historically, *Pritchardia aylmer-robinsonii* was found at three sites in the eastern and central portions of the island of Niihau. Trees were found on Kaali Cliff and in Mokouia and Haao Valleys at elevations between 70 and 270 meters (m) (230 and 890 feet (ft)) (Hawaii Heritage Program (HHP) 1991a to 1991d). The most recent observations indicate that the only extant natural population consists of two plants still remaining on Kaali Cliff (Read and Hodel 1990). Originally a component of the Coastal Dry Forest, this species now occurs only in a rugged and steep area where it is somewhat protected from grazing animals. The substrate in the area is rocky talus, and *Prosopis pallida* (kiawe), an introduced tree, is one of the palm's few associated plant species. Other native plants which have been found in the area included *Brighamia insignis* ('olulu), *Cyperus trachysanthos* (pu'uka'a), *Lipochaeta lobata* var. *lobata* (nehe), and *Lobelia niihauensis* (no common name) HHP 1991e; St. John 1959; Keith Woolliams, Waimea Arboretum and Botanical Garden, pers. comm., 1980).

Pritchardia aylmer-robinsonii of the palm family (Arecaceae) is a fan-leaved tree about 7 to 15 m (23 to 50 ft) tall with a trunk approximately 20 to 30 centimeters (cm) (8 to 12 inches (in)) in diameter. The upper and lower leaf surfaces are green and hairless, and leaf segments are rather thin and drooping. The lower surfaces of the petiole and the leaf ribs are covered with dense, tan wool. The branched, hairless flower clusters are located among the leaves and are no longer than the petioles. Each flower comprises a cup-shaped, three-lobed calyx; three petals; six stamens; and a three-lobed stigma. The spherical, hard, black fruit is 1.8 to 2 cm (0.7 to 0.8 in) in diameter. This species is distinguished from others of the genus by the thin leaf texture and drooping leaf segments; the tan woolly hairs on the underside of the petiole and the leaf blade base; the stout hairless flower clusters which do not extend beyond the fan-shaped leaves; and the smaller spherical fruit (Read and Hodel 1990).

Hawaiian land practices prior to European contact probably destroyed most of the forest on Niihau. Grazing animals were introduced to the island beginning in the 1700s and have further decreased available habitat for *Pritchardia aylmer-robinsonii* as well as directly damaging trees, seedlings, and/or seeds. The entire island is now classified an Agricultural District, and it is managed as a cattle and sheep ranch. In addition to the two naturally occuring plants, there are approximately 200 immature cultivated individuals in existence. Reduced reproductive vigor and/or stochastic extinction due to the small number of reproductive plants are major threats. Rodents are known to eat the seeds of some palms of this genus, and they are a potential threat to this species as well, since they are found on Niihau (Beccari and Rock 1921; Cuddihy and Stone 1990; Department of Geography 1983; St. John 1959; Tomich 1986; Wagner et al. 1985; John Fay, U.S. Fish and Wildlife Service, pers. comm., 1992).

Federal action on this plant began as a result of section 12 of the Act, which directed the Secretary of the Smithsonian Institution to prepare a report on plants considered to be endangered, threatened, or extinct in the United States. This report, designated as House Document No. 94–51, was presented to Congress on January 9, 1975. In that document, *Pritchardia aylmer-robinsonii* was considered to be endangered. On July 1, 1975, the Service published a notice in the **Federal Register** (40 FR 27823) of its acceptance of the Smithsonian report as a petition within the context of section 4(c)(2) (now section 4(b)(3)) of the Act, and giving notice of its intention to review the status of the plant taxa named