NOAA's National Ocean Service / Office of Response & Restoration

OR&R

Ecological Revitalization Resources at NOAA

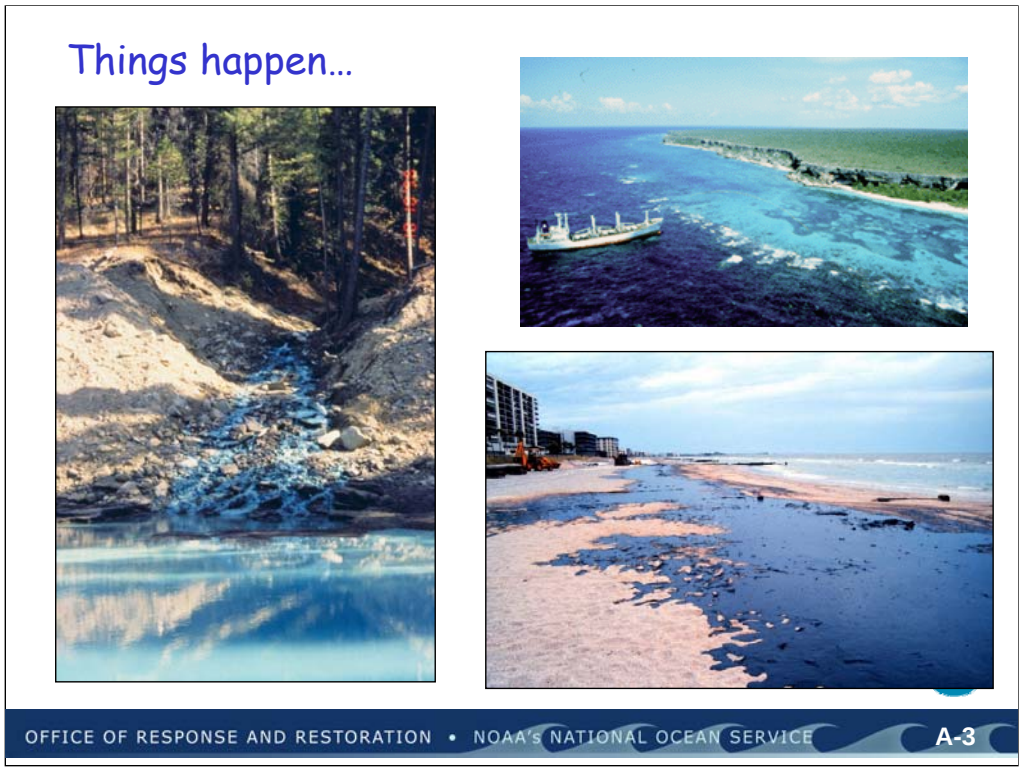
27 November 2007

Ken Finkelstein
Tom Brosnan
NOAA

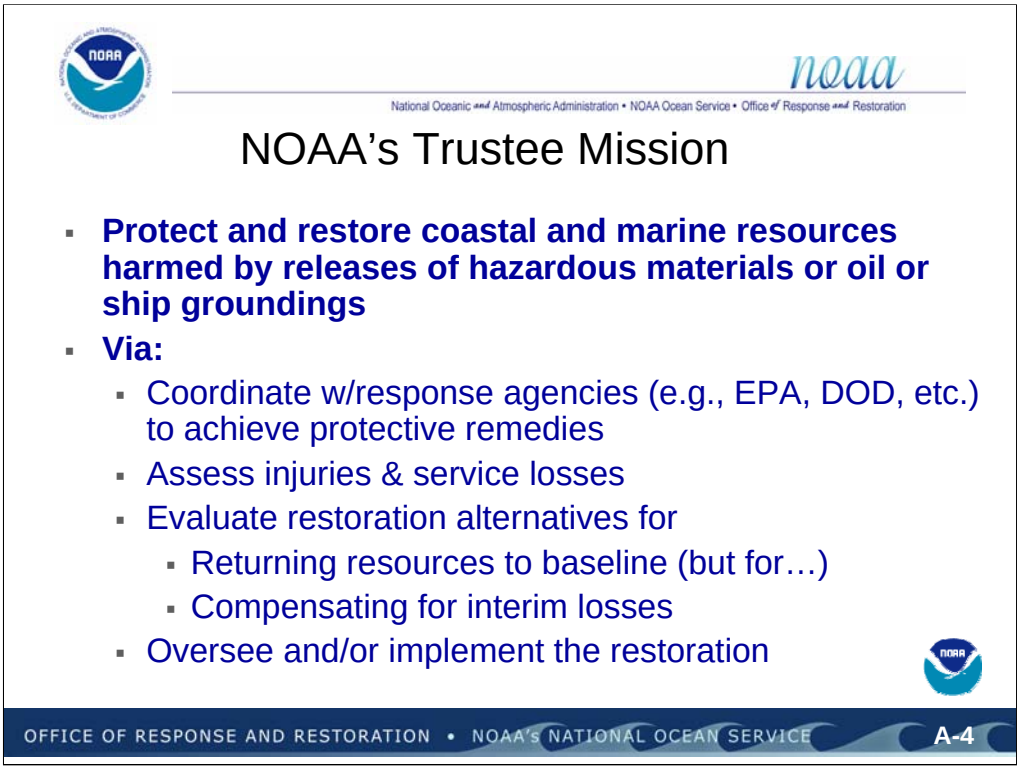
OFFICE OF RESPONSE AND RESTORATION • NOAA's NATIONAL OCEAN SERVICE

Topics for Today

- Overview of NOAA Role and Responsibilities Under CERCLA
- NOAA Remediation and Restoration Technical Support
- Site Examples



During the production and transport of goods and services, Things happen…and the public's resources (or the use of them) can be injured.



Trustees are stewards of the public's natural resources, now and for the future.

As part of this responsibility, trustees may pursue claims for natural resource damages for injury to, destruction of, or loss of publicly held natural resources resulting from the discharge of hazardous substances to the environment. Trustees do not seek compensation for private party claims. Claims may be pursued against those responsible for the discharges.

Using the NRDA process, the trustees will:

—Assess the effects of PCB contamination on the Hudson's natural resources

—Identify and evaluate alternatives for:

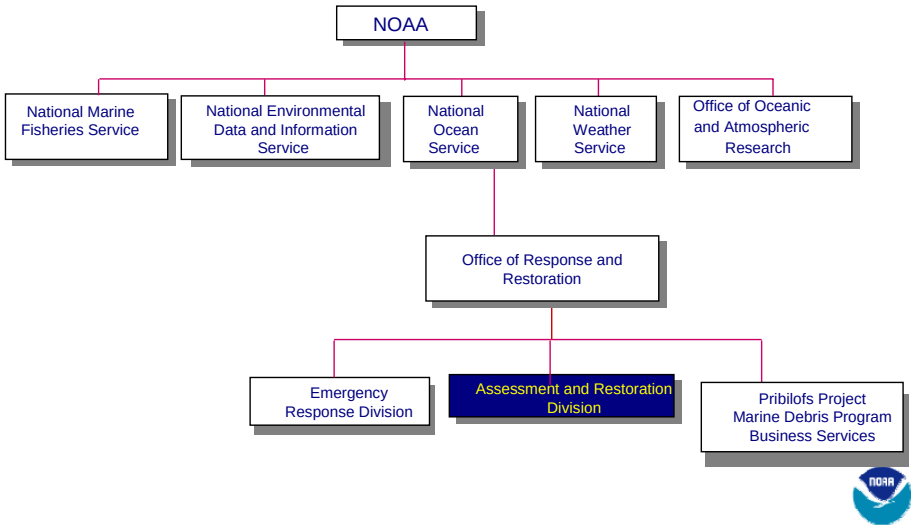
1. Returning injured resources to baseline (that is, the condition of the resource in the absence of the release)
2. Compensating for the lost resources from the time they were injured until restoration to baseline.

—Implement the restoration projects.

Theme Areas for Protection of NOAA Trust Resources

- Reducing loading of contamination to coastal waters
- Protecting sensitive species from contaminant effects
- Protecting the function of sensitive habitats such as wetlands and streams
- Restoring lost public uses of resources, e.g., re-opening fisheries closed due to contamination
- Allowing full use of port areas where dredging or development may be affected by the presence of contaminated sediments

Office of Response & Restoration



CERCLA

Addresses releases of hazardous substances through two types of liability:

1) Cleanup of sites by lead response agencies (EPA, DoD, etc.)

2) Restoration of injured natural resources by trustee agencies.

CERCLA §104(b)(2) - Coordination of Investigations

The President shall promptly notify the appropriate Federal and state natural resource trustees of potential damages to natural resources … and shall seek to coordinate the assessments, investigations, and planning under this section with such Federal and state trustees.

CERCLA § 122(j) – NRDA Settlements

Trustees may grant a covenant not to sue

<u>if:</u>

"the potentially responsible party agrees to undertake appropriate actions to protect and restore the natural resources damaged by such release or threatened release …"

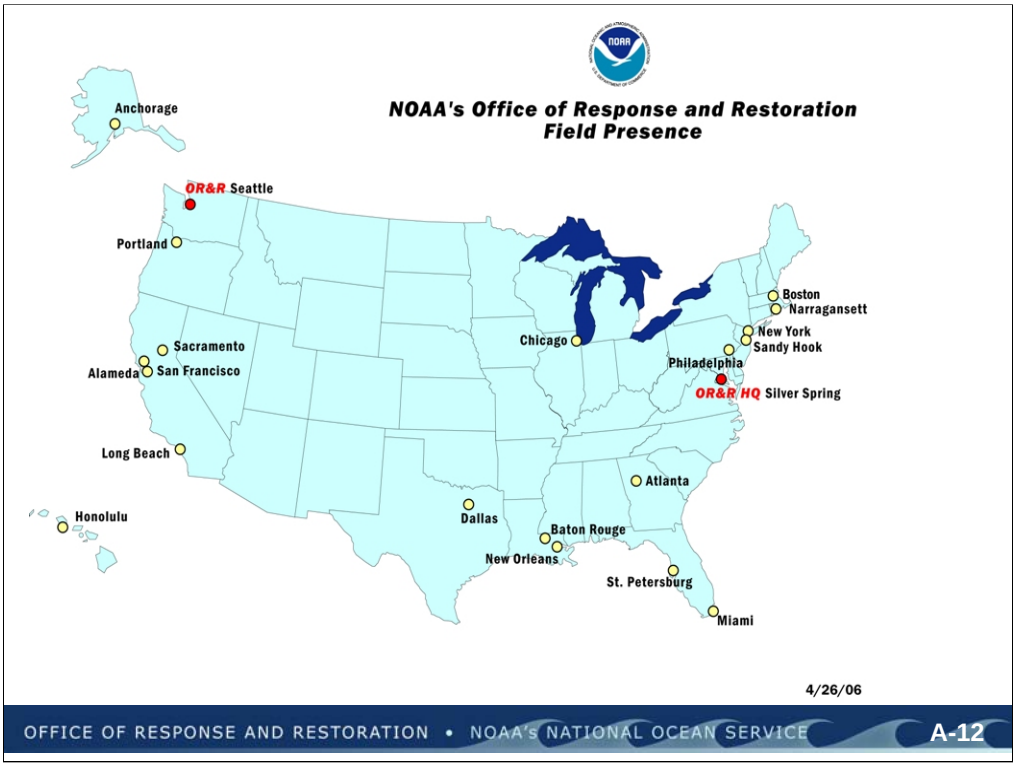
CERCLA Remediation/Restoration Coordination

- As Congress intended under CERCLA, NOAA seeks to coordinate with EPA to use our combined efforts and tools, as a unified governmental effort, to maximize cleanup, protection, and restoration for the long-term benefit of the public and achieve Global Settlements to resolve both cleanup and restoration liabilities.

MOU between EPA and NOAA

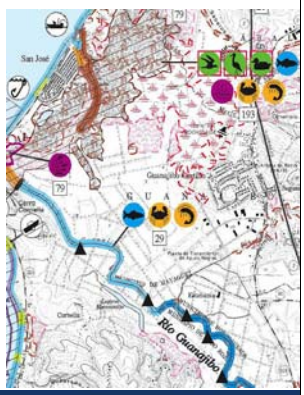
- Facilitate coordination on cleanup
- Provide technical assistance for all aspects of the cleanup, especially for ERA
- Help coordinate co-trustees for global settlement

Unfortunately funding under this MOA was cut 50% in FY2008 to $1M


NOAA's Office of Response and Restoration
Field Presence
Anchorage
OR&R Seattle
Portland
Sacramento
Alameda
San Francisco
Long Beach
Honolulu
Chicago
Boston
Narragansett
New York
Sandy Hook
Philadelphia
OR&R HQ Silver Spring
Atlanta
Dallas
Baton Rouge
New Orleans
St. Petersburg
Miami
4/26/06
OFFICE OF RESPONSE AND RESTORATION • NOAA's NATIONAL OCEAN SERVICE
A-12

Environmental Sensitivity Index (ESI) Maps

- **Designed for spill responders and coastal managers**
- **Indicate shoreline types and sensitivity**
- **Show locations of sensitive species & habitats**
  - Seabird colonies, shellfish beds, spawning areas, nesting beaches…
  - T & E species
- **Population numbers**
- **Seasonal information**
  - Life stages info for each month
  - Breeding season dates
- **Identify sensitive human-use areas**
  - Water intakes, marinas, swimming beaches
- **Available for most of U.S.**
  - Print & electronic formats
  - Download from OR&R Web Site
  - www.response.restoration/esi



Watershed Database and Mapping Projects

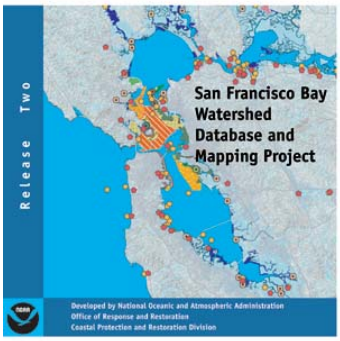
•Contaminant Data – EPA Coastal Regions
(Sediment, Tissue, Toxicity)

•Guidelines/Criteria
(ERL/ERM, PEL/TEL, SQG, others)

•Standard GIS Basemap/Custom Data

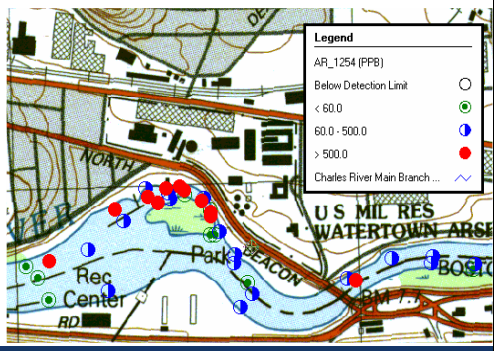
•Delivered via CD publication and Online

(http://response.restoration.noaa.gov)



Watershed Database and Mapping Projects

- **Provide Decision Support Tool for:**
  - **Remediation**
    - Extent/magnitude of contamination
    - Source identification
  - **Restoration**
    - Habitat/site identification
  - **Dredging**
    - Maintenance
    - Beneficial re-use



OFFICE OF RESPONSE AND RESTORATION • NOAA's NATIONAL OCEAN SERVICE A-15

Another important initiative that ORR has pursued in recent years is the development of Decision Support Tools for Restoration Planning, such as CPRD's WDMP.

-facilitates evaluation of complex env. Issues by combining scientific data and watershed characteristics into a GIS.

-this database mapping allows users to:

-evaluate multiple data sets w/in a geographic area

-ID chemical concentrations and tox gradients

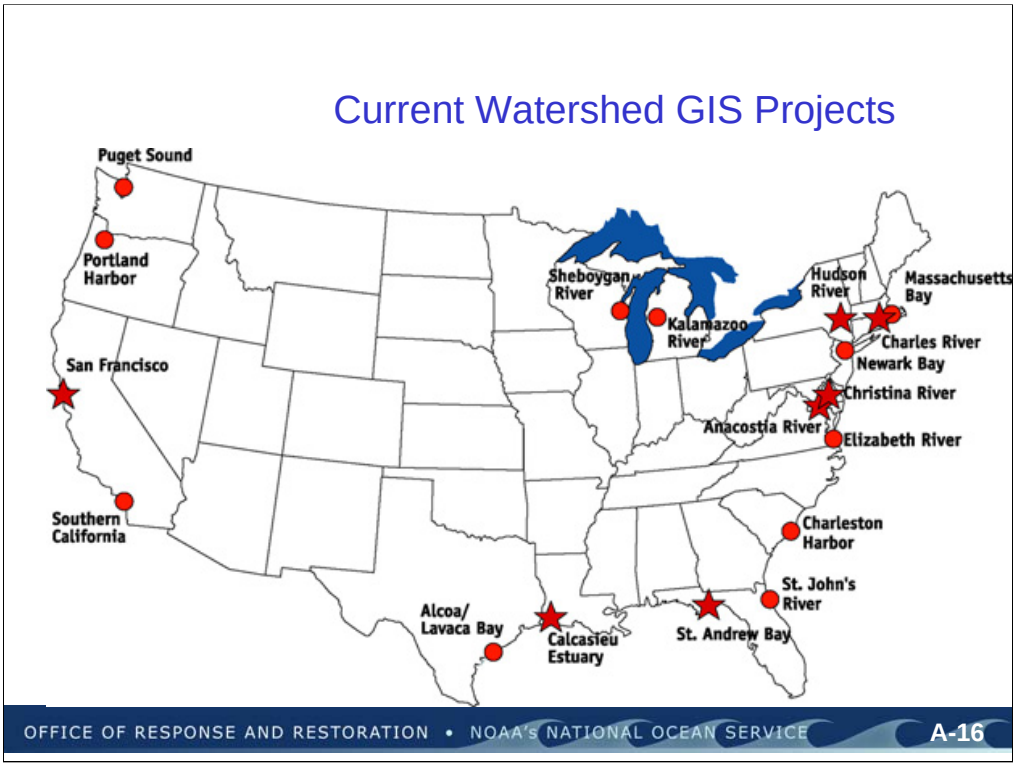
-prioritize problem areas

-ID data gaps

-catalog and evaluate potential habitats for restoration

-inventory planned, ongoing, and completed restoration projects.

Map shown is concentrations of Aroclor 1254 in the back channel near the AMTL site compared to concentrations up-and downstream.



23 currently, not shown is Vieques and Pearl Harbor, St. Lawrence R.

Screening Quick Reference Table for Inorganics in Sediment

These tables were developed for internal use for screening purposes only; they do not represent official NOAA policy and do not constitute criteria or clean-up levels.
All attempts have been made to ensure accuracy; however, NOAA is not liable for errors. Values are subject to changes as new data become available.

Analyte		Freshwater Sediment									Marine Sediment						
All concentrations in parts per billion unless specified otherwise		"Background"	ARCS *H. azteca* TEL [a]	Consensus TEC [c]	TEL [b]	LEL [g]	Consensus PEC [c]	PEL [b]	SEL [g]	UET	T20 [c]	TEL [d]	ERL [f]	T90 [c]	PEL [d]	ERM [f]	AET [h]
Aluminum (%)	Al	0.26%	2.55%							3,000 M	630			2,400			1.8% N
Antimony	Sb	160															9,300 E
Arsenic	As	1,100	10,798	9,790	5,900	6,000	33,000	17,000	33,000	17,000 I	7,400	7,240	8,200	20,000	41,600	70,000	35,000 B
Barium	Ba	700										130,100#					48,000 A
Cadmium	Cd	100-300	583	990	596	600	4,980	3,530	10,000	3,000 I	380	680	1,200	1,400	4,210	9,600	3,000 N
Chromium	Cr	7,000-13,000	36,286	43,400	37,300	26,000	111,000	90,000	110,000	95,000 H	49,000	52,300	81,000	141,000	160,000	370,000	62,000 N
Cobalt	Co	10,000				50,000+											10,000 N
Copper	Cu	10,000-25,000	28,012	31,600	35,700	16,000	149,000	197,000	110,000	86,000 I	32,000	18,700	34,000	94,000	108,000	270,000	390,000 MO
Iron (%)	Fe	0.99-1.8 %	18.84%			2%			4%	4% I							22% N
Lead	Pb	4,000-17,000	37,000	35,800	35,000	31,000	128,000	91,300	250,000	127,000 H	30,000	30,240	46,700	94,000	112,000	218,000	400,000 B
Manganese	Mn	400,000	630,000			460,000			1,100,000	1,100,000 I							260,000 N
Mercury	Hg	4-51		180	174	200	1,060	486	2,000	560 M	140	130	150	480	700	710	410 M
Nickel	Ni	9,900	19,514	22,700	18,000	16,000	48,600	36,000	75,000	43,000 H	15,000	15,900	20,900	47,000	42,800	51,600	110,000 EL
Selenium	Se	290															1,000 A
Silver	Ag	<500				500 +				4,500 H	230	730	1,000	1,100	1,770	3,700	3,100 B
Strontium	Sr	49,000															
Tin	Sn	5,000										48 *					> 3,400 N
Vanadium	V	50,000															57,000 N
Zinc	Zn	7,000-38,000	98,000	121,000	123,000	120,000	459,000	315,000	820,000	520,000 M	94,000	124,000	150,000	245,000	271,000	410,000	410,000 I
Lead 210 $bq/_g$ dw						0.5 ^			< 9.7 ^								
Polonium 210 $bq/_g$ dw						0.6 ^			< 8.7 ^								
Radium 226 $bq/_g$ dw						0.1 ^			< 13 ^								
Sulfides										130,000 M							4,500 MO

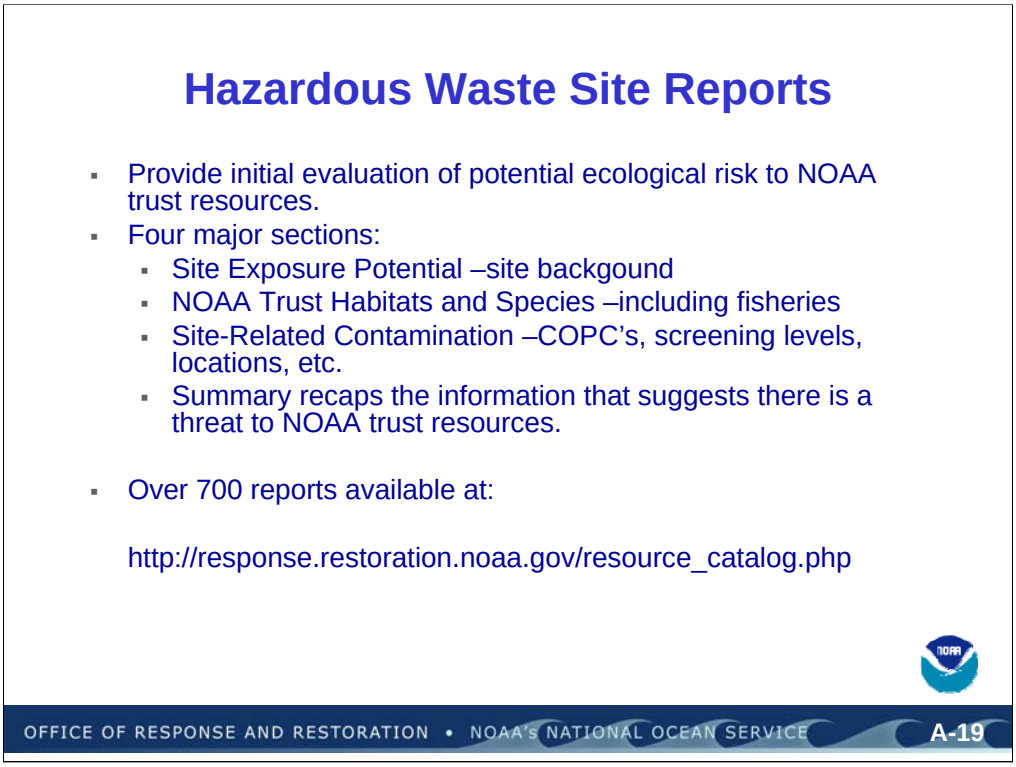
- Based on SLC approach using sensitive species HC5%; ES&T 2005 39(14):5148-5156.
* - Based upon EQp approach using current AWQC CCC
^ - Based on SLC approach to derive LEL and SEL; Env'al Monitor & Ass'ment 2005 110:71-85
+ - Carried over from Open Water disposal Guidelines; treated as if LEL for management decisions.
I – Infaunal community impacts
Bioassay endpoints: M – Microtox; B – Bivalve; E – Echinoderm larvae; O – Oyster larvae; A – Amphipod;

a EPA 905-R96-008
b Arch ETSC 2000, 39(1)20- Also known as Canadian ISQGs and PELs
c ET&C 2002, 21(9)1993-
d Ecotox. 1996, 5(4):253-
e EPA 905/R-00/007
f Env'al Mang 1995, 19(1):81-
g Guidelines for the protection and management of aquatic sediment quality in Ontario Aug 1993

Logistic Regression Model p(toxicity)

- Predicts probability of amphipod mortality from surface sediment concentrations
- Based on 10-d survival tests for Ampelisca abdita and Rhepoxynius abronius
- Logistic regression models were developed for 37 chemicals of potential concern
- Combined into single models:
  - P-Max: maximum probability of mortality
  - P-Avg: average probability of mortality

From: Field, L. et al. Predicting amphipod toxicity from sediment chemistry using logistic regression models. Environmental Toxicology and Chemistry / SETAC 21(9):1993-2005 September 2002



The Coastal Hazardous Waste Site Reports are an initial evaluation of the potential for injury to NOAA trust resources resulting from recently identified hazardous waste sites. NOAA uses this information to establish priorities for investigating sites.

contain four major sections:

"Site Exposure Potential" describes activities at the site that caused the release of contaminants, local topography, and potential contaminant migration.

"NOAA Trust Habitats and Species" describes the types of habitats and species at risk of injury from releases at the site. The life stages of organisms using habitats near the site are discussed, as are commercial and recreational fisheries.

"Site-Related Contamination" identifies contaminants of concern to NOAA, the maximum concentrations of these contaminants in soil, water, and sediment, and where on the site the contaminants were found.

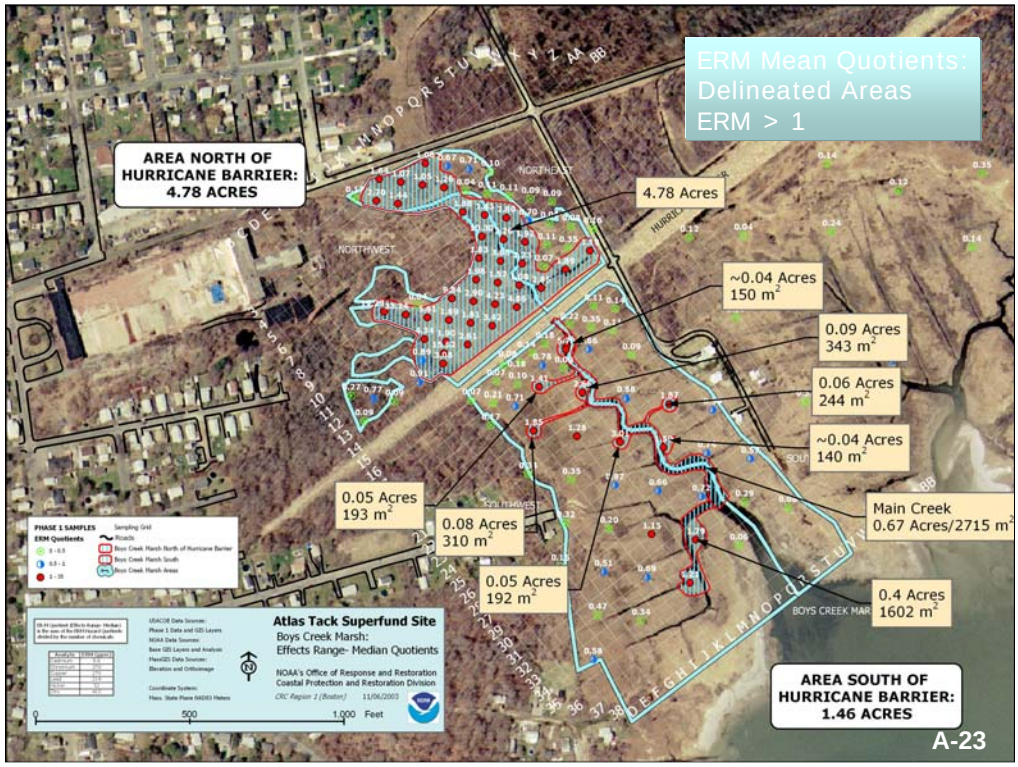
"Summary" recaps the information that suggests there is a threat to NOAA trust resources.

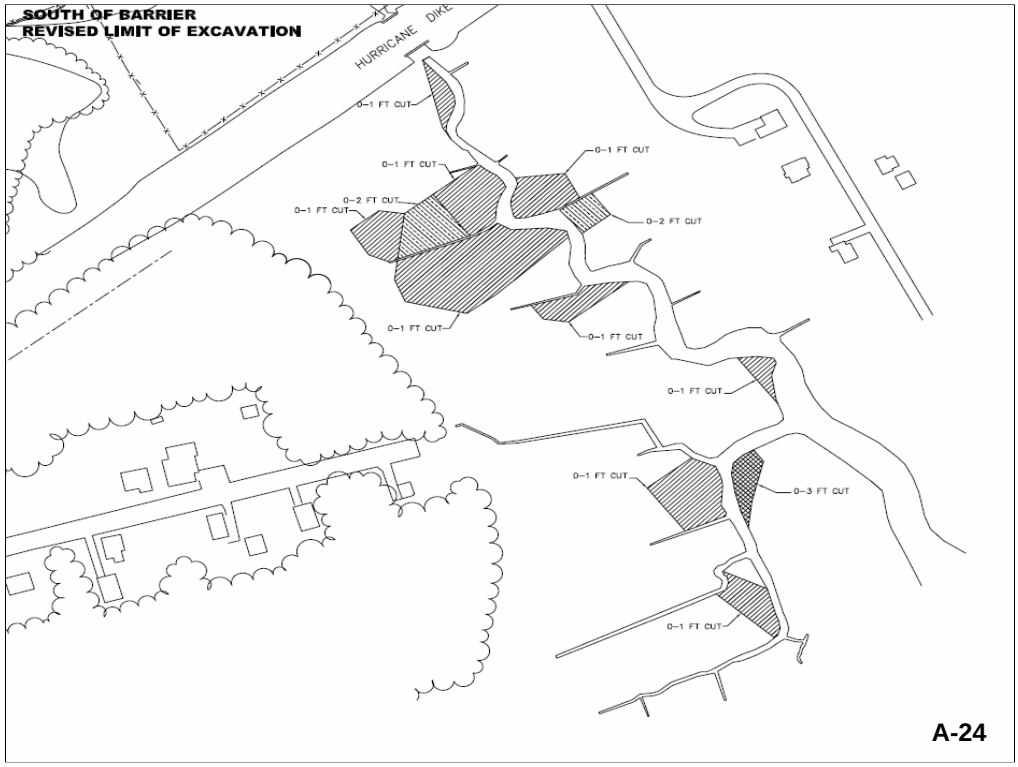
The Atlas Tack Superfund Site: an Example of Ecological Enhancement

A-20


A-21


A-22


ERM Mean Quotients:
Delineated Areas
ERM > 1
AREA NORTH OF HURRICANE BARRIER: 4.78 ACRES
4.78 Acres
~0.04 Acres 150 m²
0.09 Acres 343 m²
0.06 Acres 244 m²
~0.04 Acres 140 m²
0.05 Acres 193 m²
0.08 Acres 310 m²
0.05 Acres 192 m²
Main Creek 0.67 Acres/2715 m²
0.4 Acres 1602 m²
AREA SOUTH OF HURRICANE BARRIER: 1.46 ACRES
PHASE 1 SAMPLES
ERM Quotients
Atlas Tack Superfund Site
Boys Creek Marsh:
Effects Range- Median Quotients
NOAA's Office of Response and Restoration
Coastal Protection and Restoration Division
0
500
1,000 Feet
A-23


SOUTH OF BARRIER
REVISED LIMIT OF EXCAVATION
HURRICANE DIKE
0-1 FT CUT
0-1 FT CUT
0-1 FT CUT
0-2 FT CUT
0-1 FT CUT
0-2 FT CUT
0-1 FT CUT
0-1 FT CUT
0-1 FT CUT
0-1 FT CUT
0-3 FT CUT
0-1 FT CUT
A-24

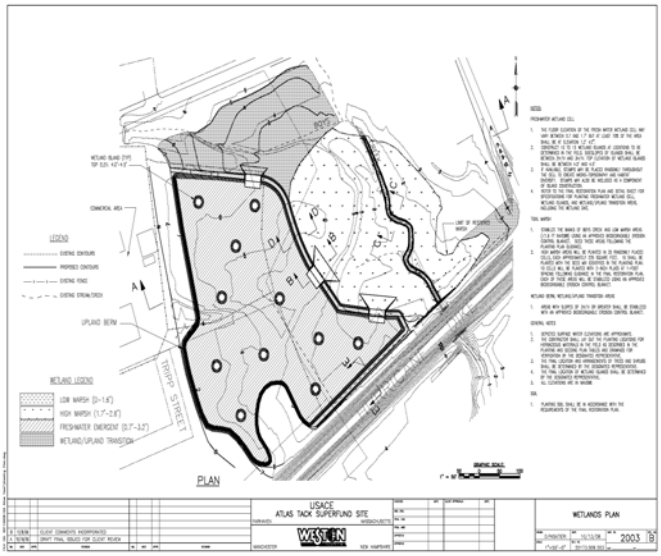

A-25

Phase III: Marsh Area – 5.4 acres

- Excavation of 36,400 cy contaminated marsh soil and creek bed sediment
- Restoration of the marsh
- Cost $5,300,000

Restoration Plan

- Fresh water wetland
- Salt water wetland
- Phragmites control
- Islands
- Man-made berm
- Spillways




CHARTER
20 1:32 PM
A-28


A-29


A-30


A-31


A-32


A-33


A-34


19 9:38 AM
A-35

4. Northeast Upland Native Warm Season Grass Mix

Code: STCMX-3

$17.20 Per Pound

1 pound will cover 2,200 sq. ft. @ 150 seeds per sq. ft.

This mix is appropriate in areas where warm season grasses are adapted by virtue of habitat and range of the component species. We do not recommend seeding this mix in areas where the component species are not native. The mix can be modified to be consistent with local floristic requirements. We recommend a seeding rate of 20 pounds per acre.

Percent by No. of seeds (not weight)		Scientific Name	Common Name
49.9%	N	Panicum clandestinum	Deertongue
46.5%	N	Panicum virgatum	Switchgrass
3.6%	N	Andropogon virginicus	Broom Sedge

Source: http://www.southerntierconsulting.com/seedmix.htm

A-36

DARRP: Integrating Remediation and Restoration – Some Examples

- Working with EPA and DOD on design assistance on remedial sites to combine remediation and restoration
- Working jointly with EPA and PRPs to achieve cooperative settlement and capture restoration through NRD –i.e. global settlements
- Enhancing or extending restoration above and beyond remediation with other NOAA funds (Community Restoration Program)

A-37

Project Types

Fish passage

Oyster planting

Remove river blockages

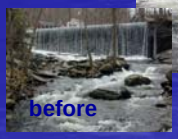
Restore oiled wetlands

Construct oyster reefs & shellfish habitat

Acquire, restore & protect waterfowl habitat

Enhance Public Access

Dam removal



A-38

Belle Isle Fish Company Site, East Boston

- 21 E Site – MBTA Station
- ~ 1 acre total
- ~1/2 acre wetland creation
- ~ ½ acre upland buffer and walking trail
- NOAA CRP Funds
- EPA Brownfields funds

A-39

Norfolk Naval Ship Yard, Norfolk, VA

- 1.3 acre site – Navy
- 45,000 tons of Calcium Hydroxide
- Cresote debris
- Filled in former tidal cove
- Worked with Navy to design wetland restoration

A-40


New Bedford, MA
Excavation “in the dry”
A-41


Flow restored and fringe saltmarsh planted (low tide)
A-42

Windrows to manage areas and tidal movement of sediment

Later moved and used to backfill behind

Post backfill beach

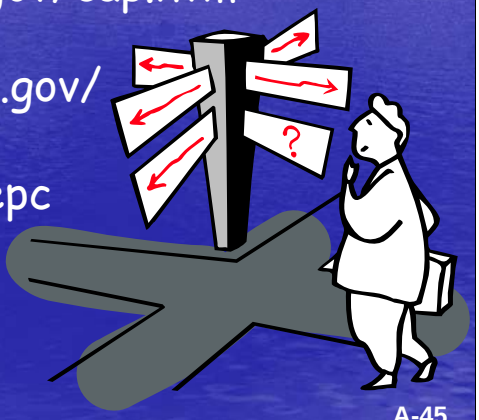
Websites

http://www.darp.noaa.gov

http://www.darp.noaa.gov/cap.htm

http://restoration.doi.gov/

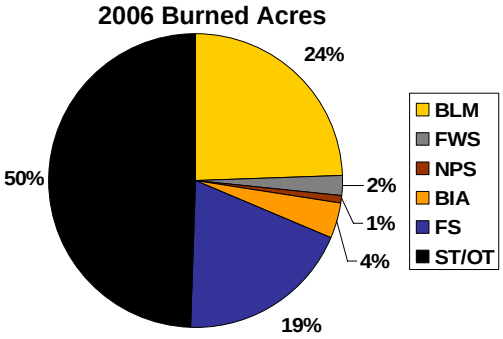
http://www.doi.gov/oepc



A-45


SEEDS
OF SUCCESS
PCA
Native Plant Materials Development and Conservation Program
Mary Byrne
Bureau of Land Management

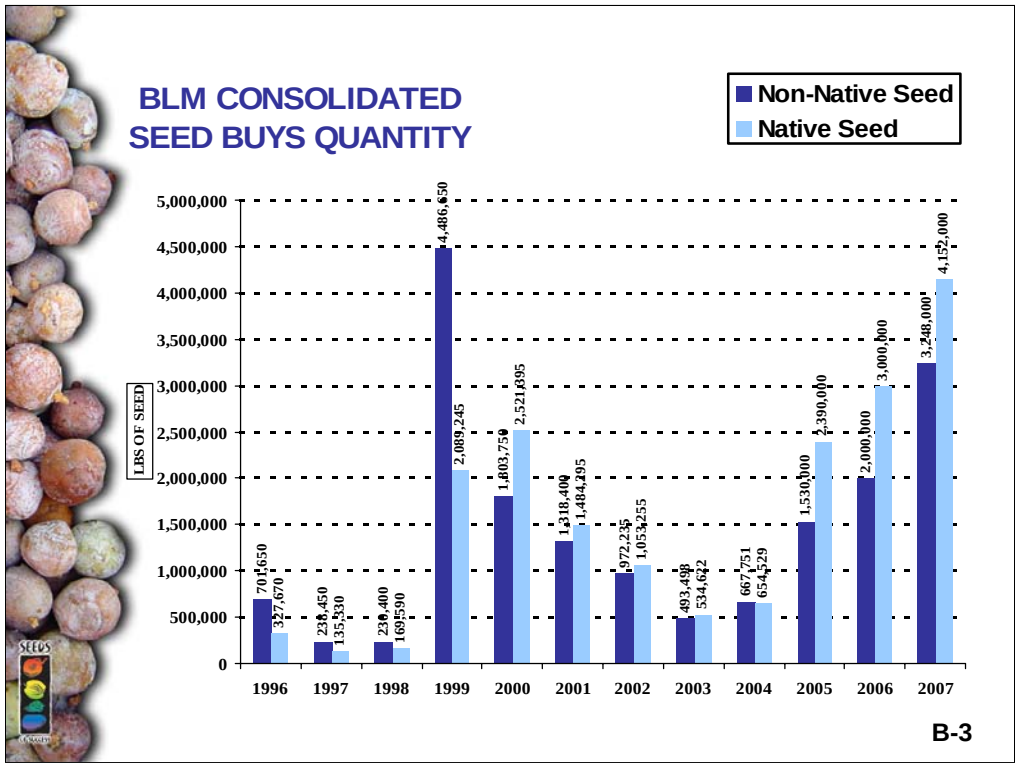
Native Plant Materials
Development and Conservation Program



House of Representatives' FY2001 Conference Report

- Directs "…the agencies to develop a long-term program to manage and supply native plant materials for various Federal land management restoration and rehabilitation needs.
- Recommends "… the interagency Plant Conservation Alliance lead this effort."

B-2

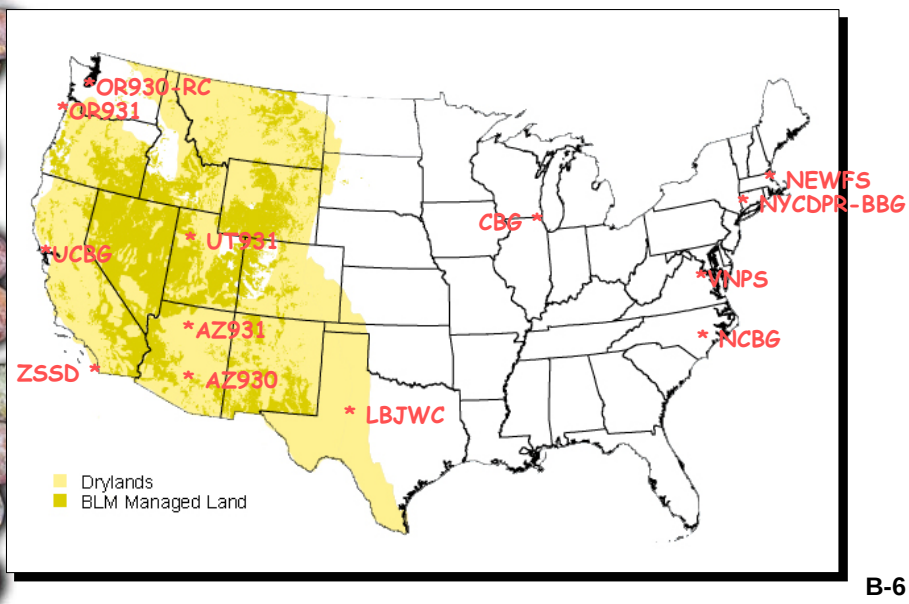

BLM CONSOLIDATED
SEED BUYS QUANTITY
Non-Native Seed
Native Seed
LBS OF SEED
5,000,000
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
701,650
327,670
238,450
135,330
230,400
169,590
4,486,650
2,089,245
1,803,759
2,521,095
1,318,400
1,484,295
972,235
1,053,255
493,498
534,622
667,751
654,529
1,530,000
2,390,000
2,000,000
3,000,000
3,248,000
4,152,000
B-3


What is SOS?
National Native Seed Collection Program
Coordinated by BLM
Part of the National Native Plant Materials Development and Conservation Program
B-4

Collecting Teams

B-5

Collecting Teams



B-6

Fire

Emergency Stabilization and Rehabilitation

B-7

Energy Development

B-8

Energy Development

Wildlife Comes Back!

B-9

Recreation

B-10

Recreation

Photo Credit: BLM

Rare Species

B-11

Priority Species

- Restoration Value
- Early, late and mid successional species in classic climax theory.
- Shrubs, forbs, trees, and grasses.

B-12

Priority Species

- Browse and Forage Value

B-13

Culturally Significant Species

B-14

Species Excluded from SOS

T & E species

Candidate or Proposed species under the ESA

G1, G2, S1, or S2

Arabis mcdonaldiana

B-15

Collect

B-16

Millennium Seed Bank Project

B-17

USDA Forest Service
Bend Seed Extractory

- Cleans restoration collections
- Photographs collections
- Posts inventory on website

fsweb.f01.r6.fs.fed.us/seedextractory/extractory.shtml

B-18

USDA Forest Service
Bend Seed Extractory

B-19

National Plant Germplasm System

Long-term Storage and Distribution

B-20

Long-term Storage

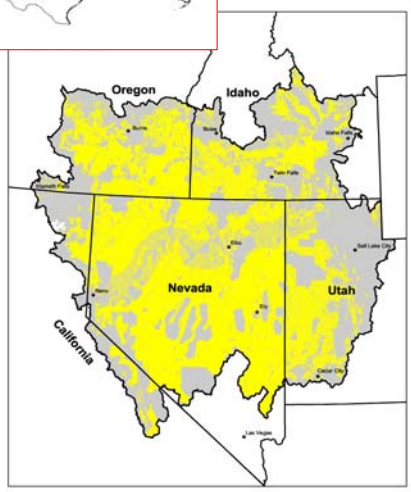
B-21

Distribution

Working Collections for Research

B-22

Great Basin Restoration Initiative



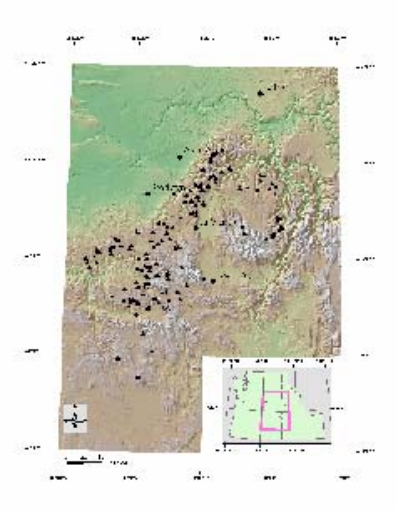
Owner	Acres
BLM	73 million
Private	29 million
FS	19 million
State	4 million
D.Def.	3 million
Tribes	2 million
Other	5 million
Total	135 million

B-23

Seed Development Process

> 20 populations across the species range

Collect from populations with > 50 individuals, sampling the entire population



B-24

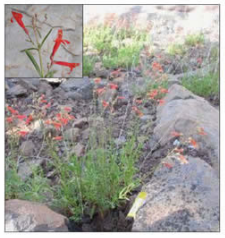
NRCS-Plant Materials Centers Common Garden Studies

Great Basin Plant Material Center, Fallon, NV

B-25

Chicago Botanic Garden

Penstemon in the Great Basin

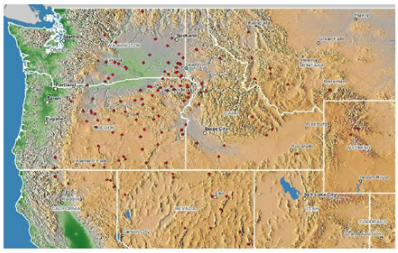
Penstemon rostriflorus	*Penstemon pachyphyllus v. congestus*	*Penstemon deustus v. pedicellatus*
		
		

B-26

U.S. Forest Service
Seed Zone Research

Bluebunch wheatgrass
(Pseudoroegneria spicata)

- PNWRS/RMRS/ARS/Region 6 (St.Clair, RC Johnson, Shaw, Erickson; FS/BLM funding)
- 127 populations, 5 cultivars
- 3 sites, 2 yrs of measurements
- Study sites established this September



B-27


pca
Plant Conservation Alliance
www.nps.gov/plant
Mary Byrne
mary_byrne@blm.gov
B-28

The USDA-NRCS Plant Materials Program

History

- In the 1930's the Soil Conservation Service established nurseries to grow and distribute plants for the stabilization of severely eroding lands.
- USDA-NRCS Plant Materials Program has evolved over 70 years in developing plant technology to address changing ecosystem/environmental needs.

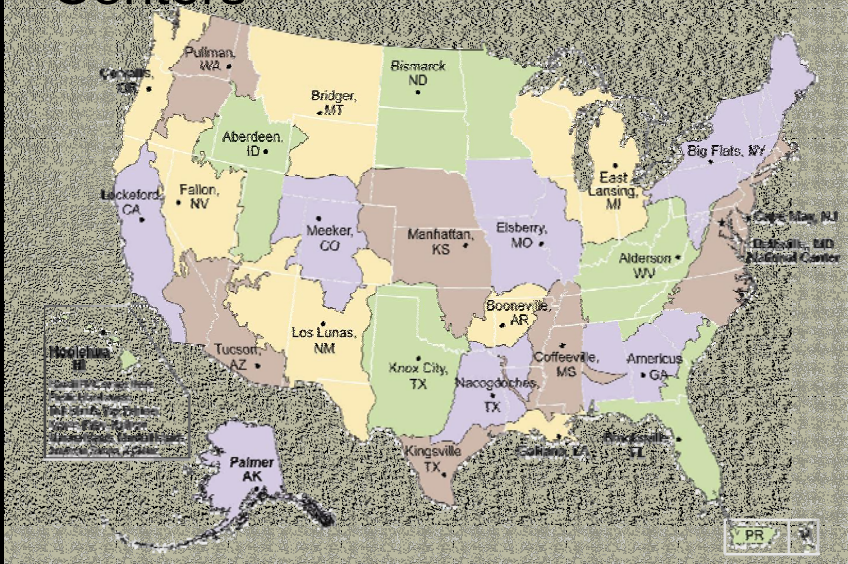
C-2

Plant Materials Program - Today

- Develops plants and plant technologies for the successful conservation of our nation's natural resources.
- Provides vital information to private landowners and public land managers to address critical land management problems.
- Is a network of 27 Plant Materials Centers and 19 Plant Materials Specialists strategically located throughout the United States. Each Center has a service area defined by ecological boundaries.

C-3

Locations of Plant Materials Centers



C-4

The Program's Mission

Finding Plant Solutions for Conservation Needs

C-5

Conservation needs include:

Critical Habitats

- Wetlands
- Riparian corridors
- Disturbed areas
- Fire Rehab

C-6

Management Practices

- Buffer strips
- Soil bioengineering
- Biofuels

C-7

Environmental Concerns

- Native plants
- Noxious/invasive plants
  - Yellow starthistle
- Drought / Flooding
- Habitat for threatened and endangered species

C-8

Environmental Concerns

- Soil erosion and sediment control
- Carbon sequestration
- Coastline stabilization

C-9

Selection of a Plant Materials Release

- Resource Concerns identified at the local/field office/state level (Advisory Committee)
- Field collection of targeted species occurs within the service area of a Plant Center
- On-Center evaluations of those accessions/local ecotypes
- Off-Center field plantings on actual problem sites

PLANT RELEASES

- Pre-varietal (local ecotype) plant releases for general conservation and restoration use for a limited geographic area (wide genetic diversity)
- Cultivars for specific uses such as: mineland reclamation, livestock forage or soil bioengineering, adapted to a wide geographic area. (limited genetic diversity)

C-10

The Plant Selection Process

- Define
- Collect
- Select
- Test
- Increase
- Release

C-11

The Plant Selection Process

- Define a need and area

C-12

The Plant Selection Process

- Collect germplasm

C-13

The Plant Selection Process

- Select for the desired tra

C-14

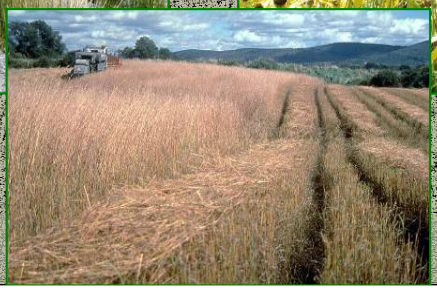
The Plant Selection Process

- Test for adaptation and applicability

C-15

The Plant Selection Process

- Increase for demonstration and



C-16

The Plant Selection Process

- Release to commercial growers for large-scale production

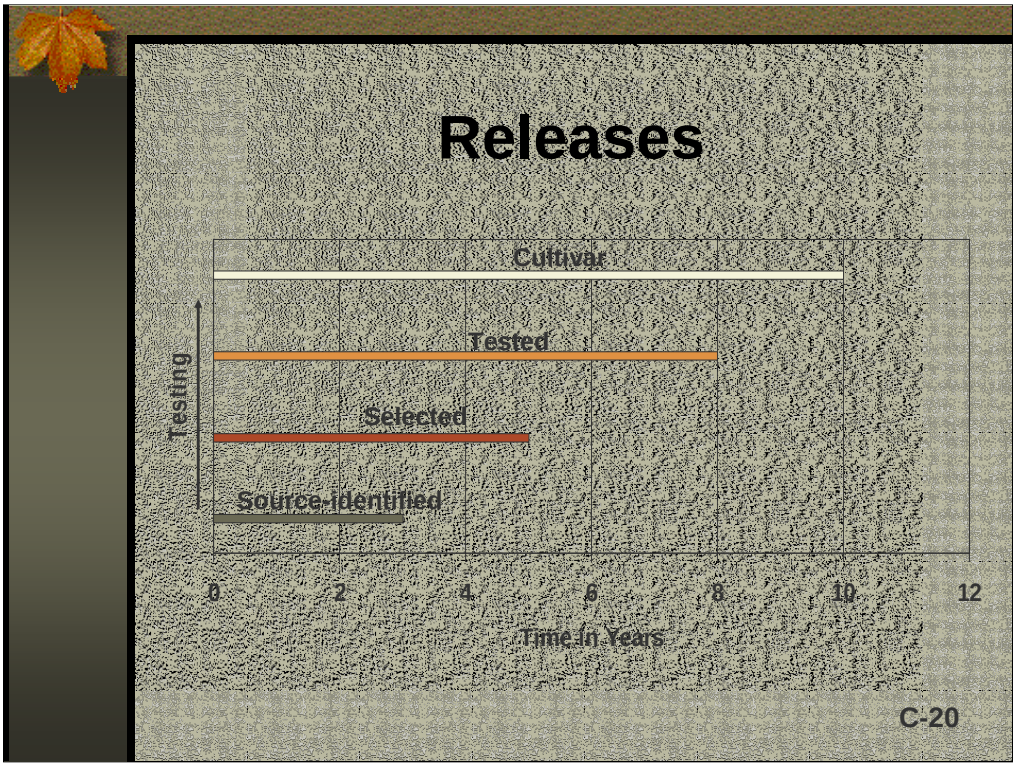
C-17

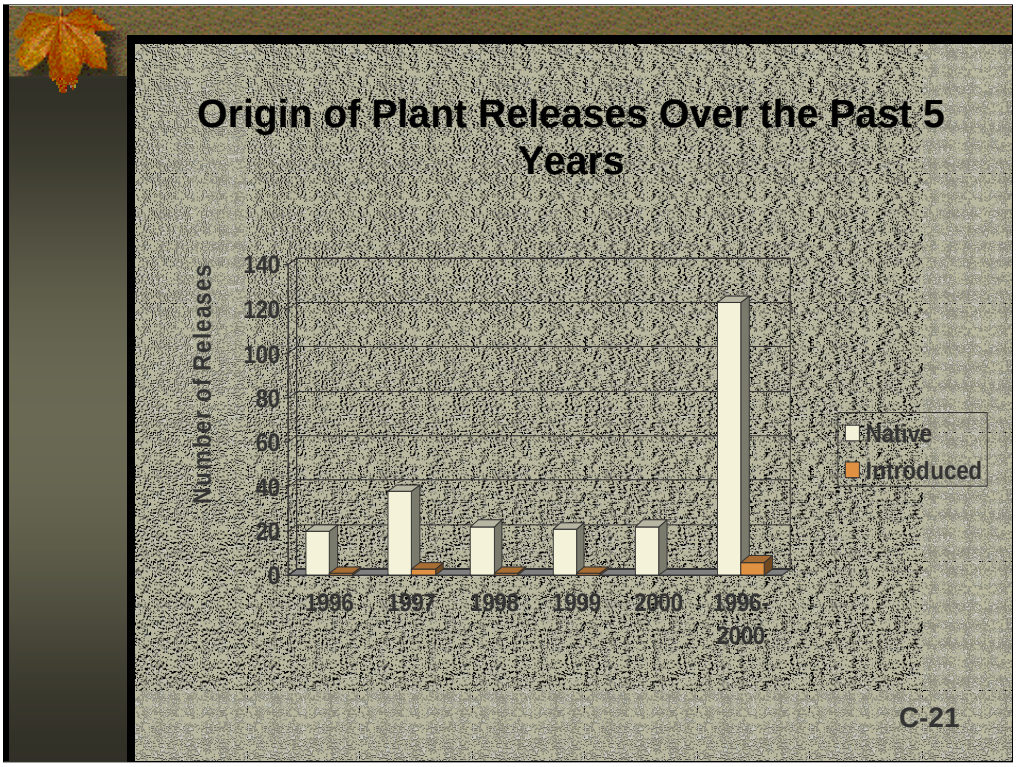
Plant Releases – The foundation of the Plant Materials Program

- Plant Selection includes:
  - Pre-varietal: Source-Identified, Selected, Tested (primarily natives)
  - Varietal: Cultivar (Native and Introduced)

C-18


"Nature does nothing uselessly."
Aristotle
"Nature has evolved a plant for every purpose."
Franklin J. Crider
C-19

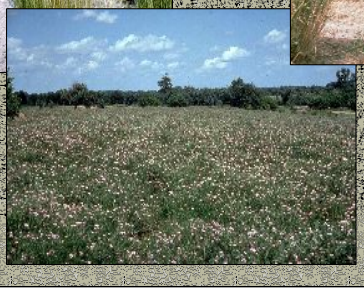

Releases
Cultivar
Tested
Selected
Source-identified
Testing
0
2
4
6
8
10
12
Time in Years
C-20


Origin of Plant Releases Over the Past 5 Years
Number of Releases
140
120
100
80
60
40
20
0
1996
1997
1998
1999
2000
1996-2000
Native
Introduced
C-21

Work with a broad range of species, including grasses, legumes, forbs (wildflowers), bs

C-22

Interface with the commercial seed and nursery industries to develop and release plant material for commercial availability



C-23

Cape May Plant Materials Center

United States Department of Agriculture — Plant Materials Program

Natural Resources Conservation Service

Proudly Serving the Conservation Needs of the U.S. Mid-Atlantic Region in Massachusetts, Connecticut, Rhode Island, Coastal New York, New Jersey, Delaware, Maryland, Virginia and North Carolina.

Commercial value of Cape May Plant Center Products

Vegetative Production- $ 3,200,000

- **Cape** american beachgrass
- **Avalon** saltmeadow cordgrass
- **Emerald Sea** shore juniper
- **Ocean View** beach plum
- **Wildwood** bayberry
- **Sandy** rugosa rose

Seed Production - $ 150,000

- **Atlantic** coastal panicgrass
- **VA-70** shrub lespedeza

C-24

Native, Sustainable Plant Communities

- Native cool season grasses/legumes for enhancing wildlife habitat
- Biofuels-screen germplasm for biomass production
- Carbon sequestration of native warm season grasses
- Plant adaptation for riparian buffers, filter strips, stormwater basins (aerenchyma roots)
- Soil Biology-mycorrhizal fungi effects on plant establishment/growth in critical area plantings
- Agroforestry applications for air/water quality
- Sustainable, low maintenance landscapes

C-25

Plant Materials Program Conservation Plant Releases

- Total of over 650 releases over the past 70 years (about 2/3 are native)
- About 450 of these are still active
- About 350 of the releases were commercially produced within the past 3 years
- Annual commercial certified seed production is enough to cover an estimated 2,000,000 acres

C-26

Commercially Released Plant Materials

- What is the **demand** for Plant Material development and releases?
  - Agriculture
  - Conservation
  - Urban Development
  - Critical Habitat
  - Recreation
  - Other

C-27

Other

- Native American Issues – Culturally significant plants (food, ceremony, basket weaving, etc.)
- Limited Resource Farmers
- Public Lands and Other Agency Needs

USFS	EPA	DOE
BLM	USGS	FEMA
NPS	BIA	DOD
BOR	DOT	USFWS

- State and Local Needs

C-28

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Conservation Plant Information from the Plant Materials Program

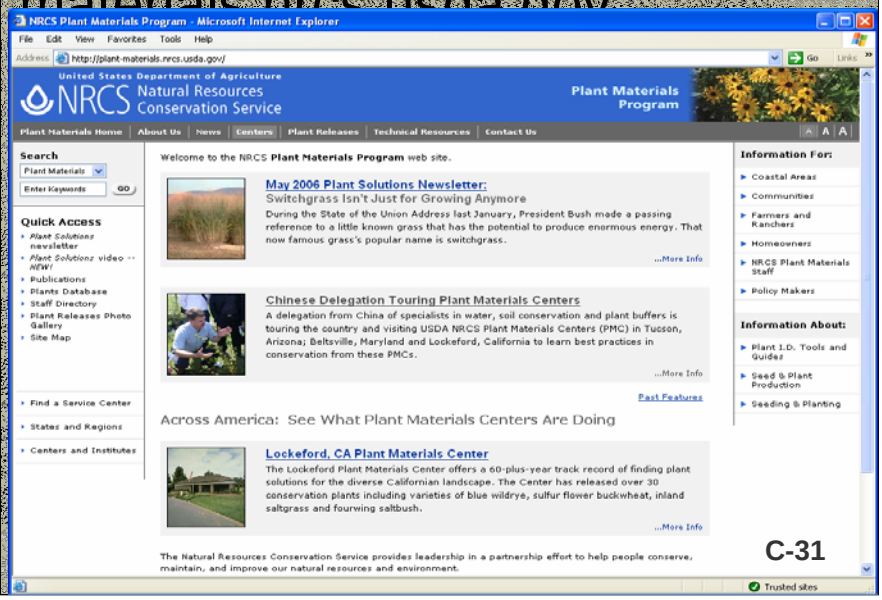
C-29

Technical Information

- Conservation Plant Releases
- Technical Documents
- Resource-Specific Web Pages
  - Coastal Restoration
  - Fire Restoration
- Conservation Plant ID Guides
- Related Web Sites

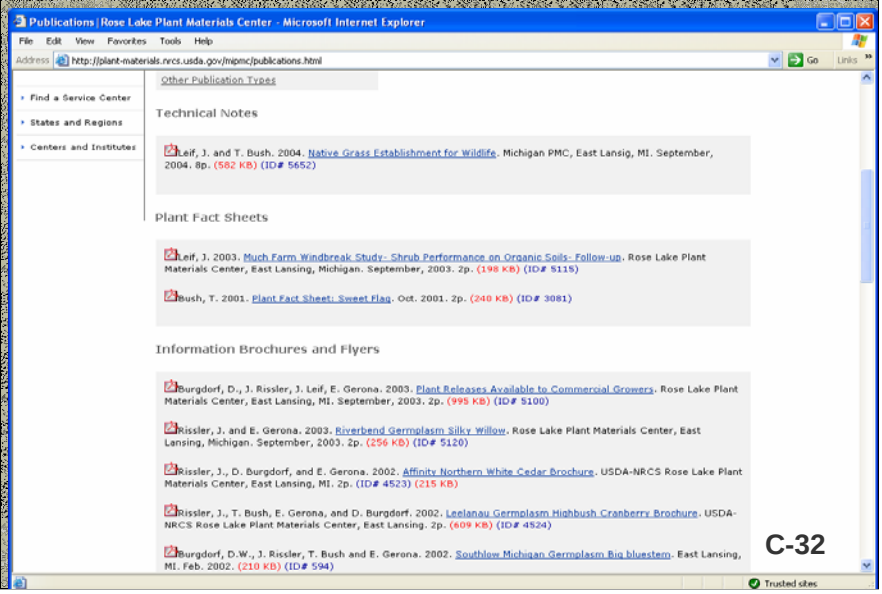
C-30

http://plant-materials.nrcs.usda.gov



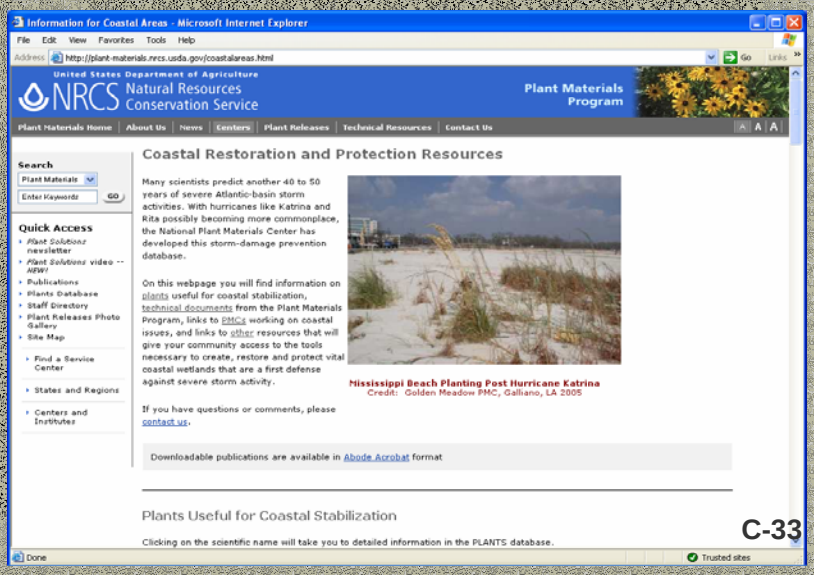
C-31

Technical Documents



C-32

Resource-Specific Pages



Conservation Plant ID Guides

Program Products

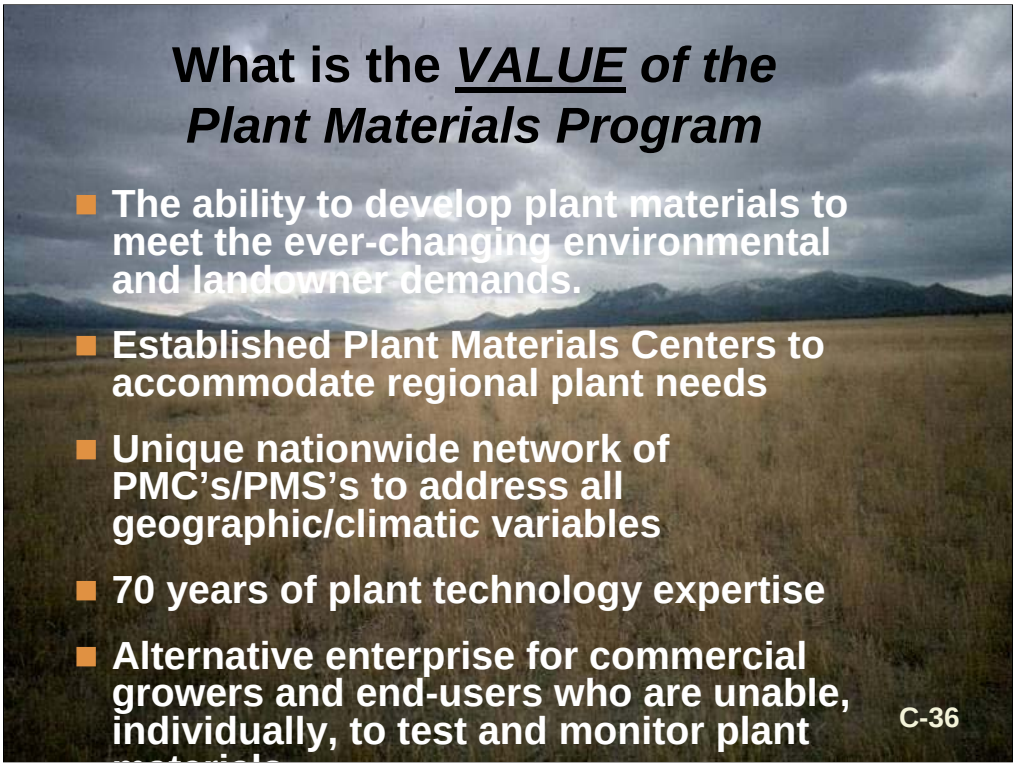
Printed Materials

Workshop Presentations / Training Sessions / Site Visits

Conservation Plant Releases

C-35

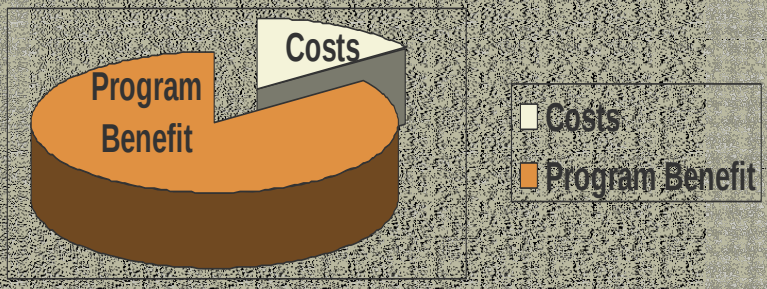
Check back on this slide ******


What is the VALUE of the Plant Materials Program
The ability to develop plant materials to meet the ever-changing environmental and landowner demands.
Established Plant Materials Centers to accommodate regional plant needs
Unique nationwide network of PMC's/PMS's to address all geographic/climatic variables
70 years of plant technology expertise
Alternative enterprise for commercial growers and end-users who are unable, individually, to test and monitor plant
C-36

Economic Program Benefit

–

6:1 ratio



C-37

The Plant Materials Program can be the most efficient and effective solution to your plant conservation needs...

Plant Materials Program