What do we do when it burns

SEEDING AND ITS MANY CONSIDERATIONS

Three Basic Options

1) Don't Seed

2) Seed

3) Seed in select areas that meet criteria

PERSISITENT ISSUE:

DISONNECT BETWEEN THOSE WHO DESIRE NATIVE PLANT MATERIALS AND THOSE WHO DON"T BELIEVE IT WILL GIVE THEM THE RESULTS THEY DESIRE

"ALL NATIVES ALL THE TIME"

"IT DEPENDS"

The four basic personality types

"NATIVES NEVER WORK"

"I DON'T UNDERSTAND THE QUESTION"

QUICK SURVEY

1. Seeding Doesn't work
2. Seeding Works
3. Seeding sometimes works

Three Basic Options

1) Don't Seed

- Easiest "default" position to fall into
- Pressure to not "interfere" with nature
- CNPS and other "environmental" voices
- Save money
- Studies show seeding "doesn't work" (*really*?)

Three Basic Options

2) Seed

- Vegetation stabilizes soil the best
- Vegetation increases infiltration
- Vegetation stabilizes soil for many years until natives can get re-established
- Prevent type conversion or weed invasion
- Seeding methodology has improved dramatically in past 20 years

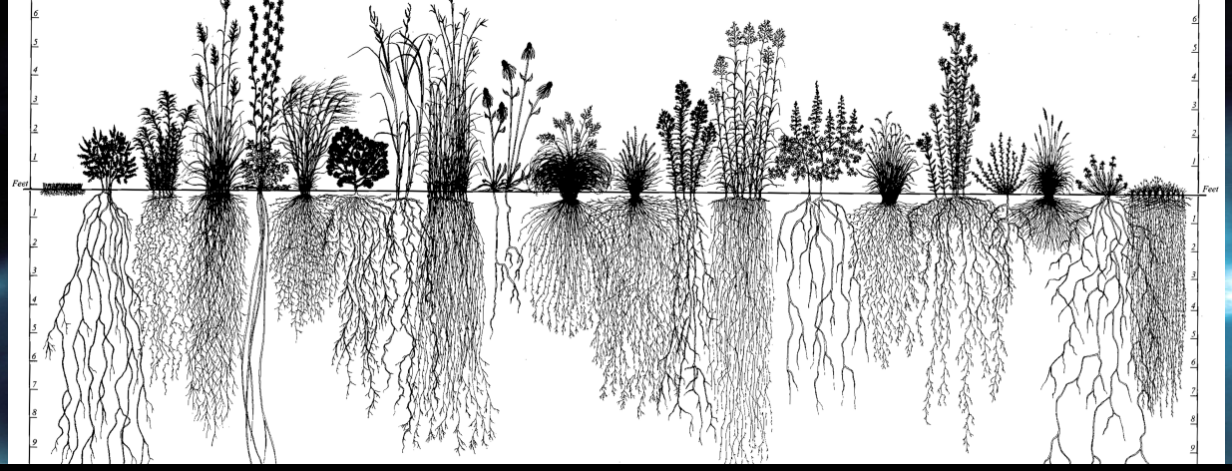
Three Basic Options

3) Seed in select areas that meet criteria

- Isolate specific areas where imminent threats to life, infrastructure, or habitat are clear.

- Use appropriate species that meet CNPS approval and are either native to the area or will not interfere with native plant regrowth.

- Make informed decisions about realistic timeframes, well-defined and tight specifications, and monitoring and measurement of objectives.



Vegetation is one of the most important factors influencing soil erosion. It helps control erosion by shielding the soil from the impact of raindrops, maintaining a soil surface capable of absorbing water, and slowing the amount and velocity of runoff.

Vegetation is *the key*

CHAPARRAL *IS* RESILIENT

The fire cycle in chaparral and coastal sage scrub is distinctive and characterized by an herbaceous phase in the first wet season after fire. Many of the native herbs are adapted specifically to the fire cycle and can survive high intensity fires with their germination being enhanced by various fire effects such as heat and charcoal (e.g., Keeley 1991, 1994).

Bruce Berlin / S&S SEEDS

Characteristics of Chaparral

- **Specialized annual flora takes advantage of light, space & soil nutrients available immediately after a fire.** **(Sweeney1956; Keeley et al 1981)**

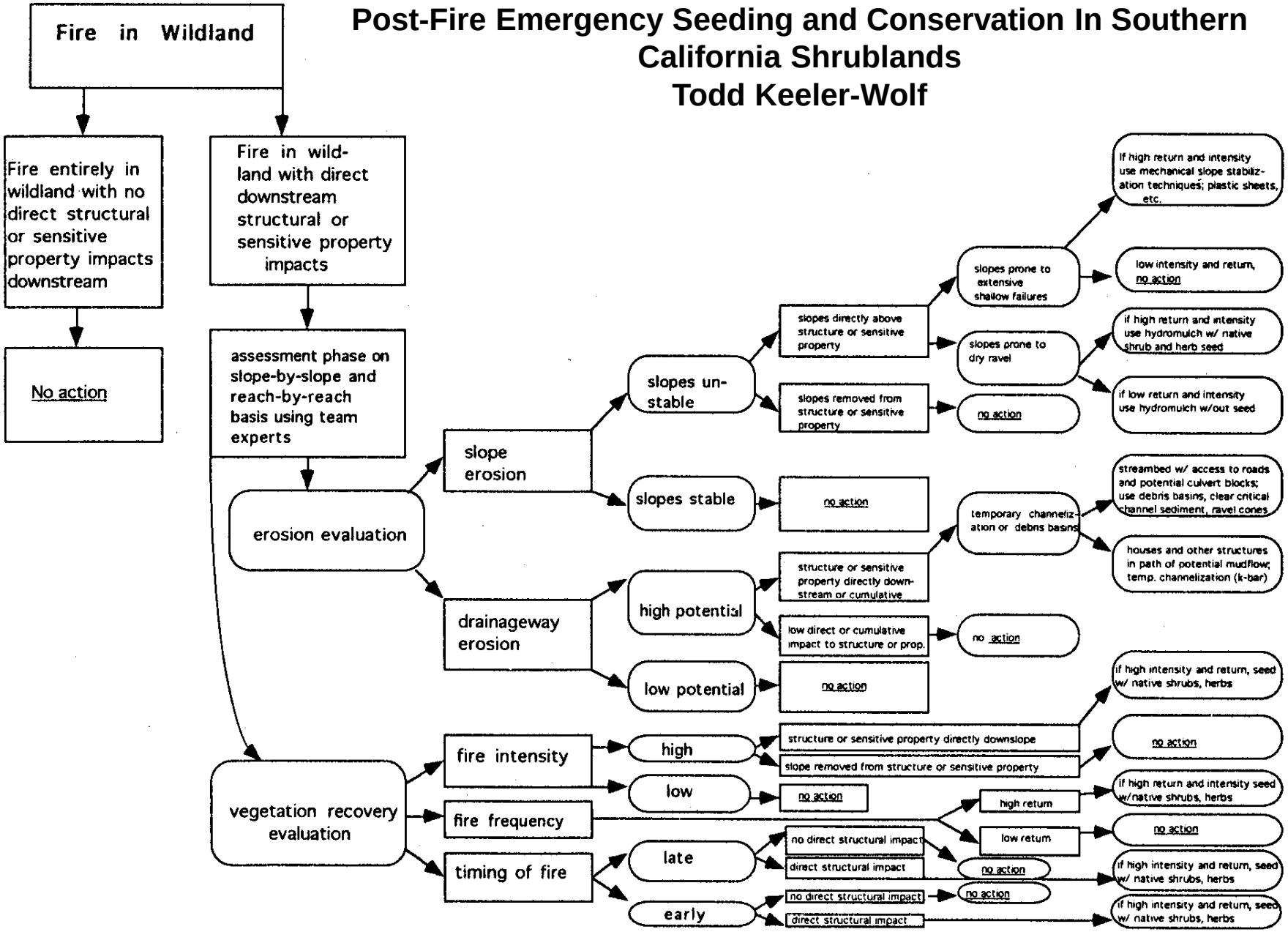
- **Some dominant chaparral species regenerate *only* from seed *only* after a fire.**
  (Sampson 1944;Keeley 1991)

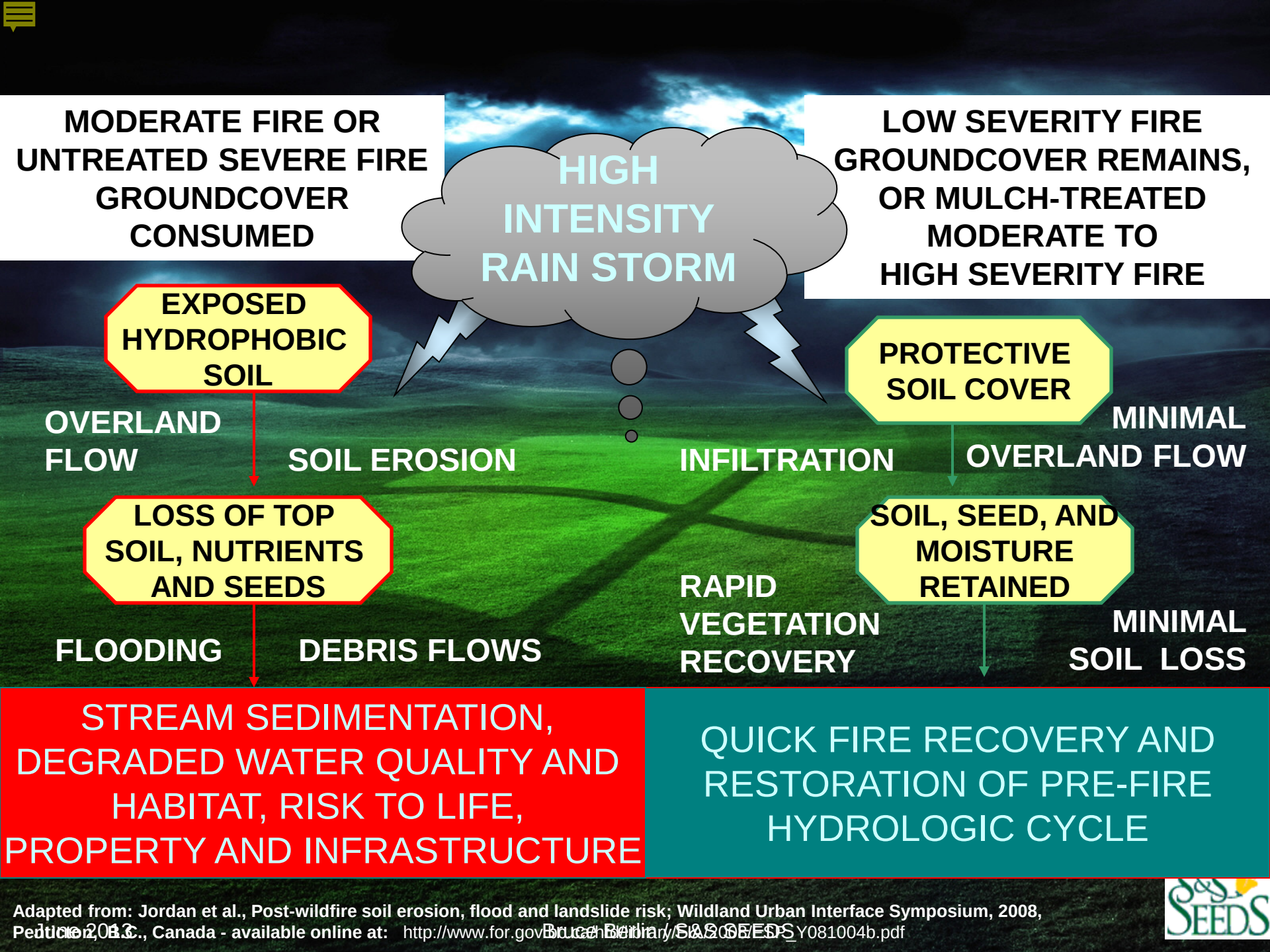
5 Main classes of Shrubs & plant material- in relation to survival strategies after a fire-

1. **Obligate Resprouters- Only stump sprouts- ie Toyon and Scrub oak**
2. **Obligate Seeders- Adult plants die in fire; New generation of seedlings require fire to germinate- Ceanothus**
3. **Endemic Fire followers- Annuals. Seeds require fire to germinate ie Whispering Bells**
4. **Facultative Seeders- Adult plants resprout & seeds enhanced germination with fire- ie Chamise**
5. **Frequent Fire Followers- Annuals- Seeds readily germinate in response to some fire cue.**

Post-Fire Emergency Seeding and Conservation In Southern California Shrublands

Todd Keeler-Wolf





Adapted from: Jordan et al., Post-wildfire soil erosion, flood and landslide risk; Wildland Urban Interface Symposium, 2008, Peduzzi, B.C., Canada - available online at: http://www.for.gov.bc.ca/hfd/library/FIA2008/FIAY081004b.pdf

June 2013 Bruce Barker / S&S SEEDS

Soil Evaluation:
Burn Severity

Table 1—Burn severity classification based on postfire appearances of litter and soil and soil temperature profiles (Hungerford 1996, DeBano et al. 1998).

Soil and Litter Parameter	Burn Severity		
	Low	Moderate	High
Litter	Scorched, Charred, Consumed	Consumed	Consumed
Duff	Intact, Surface Char	Deep Char, Consumed	Consumed
Woody Debris - Small	Partly Consumed, Charred	Consumed	Consumed
Woody Debris - Logs	Charred	Charred	Consumed, Deeply Charred
Ash Color	Black	Light Colored	Reddish, Orange
Mineral Soil	Not Changed	Not Changed	Altered Structure, Porosity, etc
Soil Temp. at 0.4 in (10 mm)	<120 °F (<50 °C)	210-390 °F (100-200 °C)	>480 °F (>250 °C)
Soil Organism Lethal Temp.	To 0.4 in (10 mm)	To 2 in (50 mm)	To 6 in (160 mm)

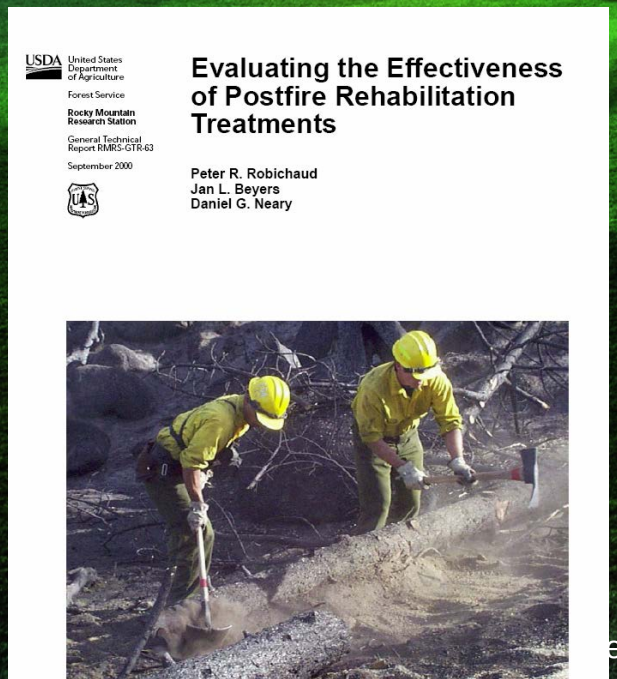


History of post fire seeding

TIME PERIOD	PRACTICE
1920's-1930's	Native shrub species Collected in adjacent areas & hand planted
1930's-1940's	Annual grasses/ Barley/ Mustard fibrous roots; quick establishing; temporary
1940's-1970's	Annual ryegrass & other grains fibrous roots; quick establishing; temporary
1980's to present	Mulching and/or Native plants federal directive; most appropriate to the site or DO NOTHING

This evaluation covers 470 fires and 321 BAER projects, from 1973 through 1998 in USDA Forest Service Regions 1 through 6.

Robichaud, Peter R.; Beyers, Jan L.; Neary, Daniel G. 2000.
Evaluating the effectiveness of postfire rehabilitation treatments.
Gen. Tech. Rep. RMRS-GTR-63.
Fort Collins: U.S. Department of Agriculture, Forest Service Rocky Mountain Research Station. **85 p.**


USDA United States Department of Agriculture
Forest Service
Rocky Mountain Research Station
General Technical Report RMRS-GTR-63
September 2000

Evaluating the Effectiveness of Postfire Rehabilitation Treatments

Peter R. Robichaud
Jan L. Beyers
Daniel G. Neary

Publications from RMRS

Robichaud, Peter R.; Beyers, Jan L.; Neary, Daniel G. 2000.

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ABSTRACT

Spending on postfire emergency watershed rehabilitation has increased during the past decade. A west-wide evaluation of USDA Forest Service burned area emergency rehabilitation (BAER) treatment effectiveness was undertaken as a joint project by USDA Forest Service Research and National Forest System staffs. This evaluation covers 470 fires and 321 BAER projects, from 1973 through 1998 in USDA Forest Service Regions 1 through 6. A literature review, interviews with key Regional and Forest BAER specialists, analysis of burned area reports, and review of Forest and District monitoring reports were used in the evaluation.

USDA FOREST SERVICE- SEEDING ANALYSIS
USING MORE CURRENT DATA – NOT 1970's and 1980's Ryegrass studies

91% of Ground Seeding efforts were deemed to be excellent or good.

81% of Aerial seeding efforts were deemed to be fair, good, or excellent.

Seeded grass may also inhibit growth of noxious weeds that invade sites after fire, a beneficial outcome.

Where they were directly compared, seeded plots had greater cover than unseeded plots **64 percent** of the time at the end of the first growing season after fire.

http://www.fs.fed.us/rm/pubs/rmrs_gtr63.pdf

General Technical Report RMRS-GTR-63 – Year 2000

Evaluating the Effectiveness of Postfire Rehabilitation Treatments

Peter R. Robichaud, Jan L. Beyers, Daniel G. Neary

81.2% of all 32 evaluated USFS seeded projects in California were deemed Fair, Good, or Excellent

Table 1. Effectiveness ratings for aerial grass seeding provided by burned-area rehabilitation specialists of the U.S. Department of Agriculture Forest Service (USFS), based on particular projects, by USFS region.*

Region	*No. of replies*	*Excellent (%)*	*Good (%)*	*Fair (%)*	*Poor (%)*
1	8	62.5	12.5	12.5	12.5
2	6	33.3	33.3	0	33.3
3	16	6.3	18.7	37.5	37.5
4	11	63.6	18.2	0	18.2
5	32	3.0	34.4	43.8	18.8
6	10	40.0	40.0	20.0	0

**Less than 1 in 5 of all 32 evaluated USFS seeded projects were deemed "poor".*

*Percentages of replies in each rating class are shown. Regions: 1, northern (northern Idaho, Montana, North Dakota); 2, Rocky Mountain (Wyoming, South Dakota, Colorado, Nebraska); 3, southwestern (New Mexico, Arizona); 4, intermountain (southern Idaho, Nevada, Utah); 5, Pacific Southwest (California); 6, Pacific Northwest (Oregon, Washington). (Modified from Robichaud et al. 2000.)

Rapid vegetation establishment has been regarded as *the* most cost-effective method to mitigate the risks of increased runoff and soil erosion and establishment of non-native species over large areas (Beyers, 2004).

Federal policy in the U.S. currently mandates use of seed from native species for post-fire rehabilitation when available and economically feasible (Richards et al., 1998)

Although the use of native species has increased (Beyers 2004; Wolfson and Sieg, in press), high costs and inadequate availability often limit inclusion of native plants in post-fire seedings.

Communication and collaboration with commercial seed suppliers will be necessary to develop an adequate supply of native seed and, more specifically, improve availability of genetic sources that meet agency requirements.

Implementation of stronger native plant policies has stimulated the development of new certified seed categories that accommodate the use of native plant germplasm (Jones &Young 2005).

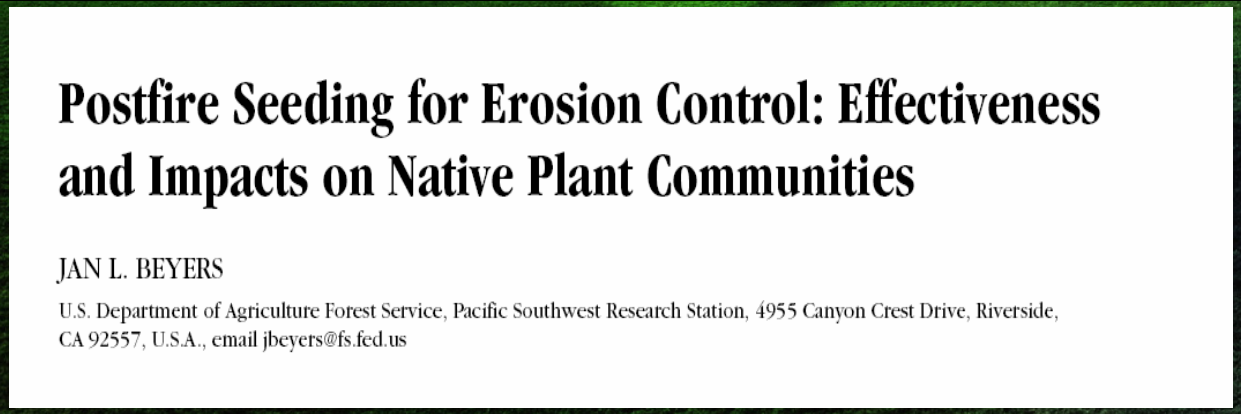
These categories provide accurate documentation of collection sites and/or cultivated production to buyers seeking site-appropriate native plant materials (AOSCA 2003).

According to recent literature, suppliers are beginning to offer certified native seed as the demand for it has increased (Loftin 2004; Jones & Young 2005

Provide good soil cover with plants

•It is estimated that it costs *<u>way more</u>* (upto 100-1000X) the money to install and maintain sediment control than it does to utilize effective erosion control; **<u>Keep the soil from moving in the first place- it saves big money.</u>**

•Sediment production from burned or otherwise sites is inversely related to vegetative cover, with <u>minimum erosion noted when plant cover was 60-70%</u> (Noble 1965;Orr, 1970), making vegetation enhancement a logical practice for reducing erosion at its source.



Postfire Seeding for Erosion Control: Effectiveness and Impacts on Native Plant Communities

JAN L. BEYERS

U.S. Department of Agriculture Forest Service, Pacific Southwest Research Station, 4955 Canyon Crest Drive, Riverside, CA 92557, U.S.A., email jbeyers@fs.fed.us

Published in *<u>Conservation Biology</u>* Volume 18 # 4, 2004

For the land manager concerned primarily with erosion, seeding may be a reasonable gamble for trying to increase plant cover during the first year after fire (Table 2). Seedling is likely to stabilize a site more quickly than natural regeneration. Where control of erosion for

Postfire Seeding for Erosion Control: Effectiveness and Impacts on Native Plant Communities

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Table 2. Percentage of study sites in publications and monitoring reports reviewed by Robichaud et al. (2000) that had at least 30% and 60% cover by the end of the first and second growing seasons after fire.*

	Sites with >30% cover (%)		*Sites with >60% cover (%)*	
Study	*seeded*	*unseeded*	*seeded*	*unseeded*
1 year after fire				
19 publications	42	26	26	10.5
21 reports	74	38	35	8
2 years after fire				
18 publications	78	67	56	17
4 reports	75	75	25	50

**All published studies contained data from both seeded and unseeded plots. Monitoring reports did not always contain both treatments. Multiple sites within one publication or report are tabulated separately (modified from Robichaud et al. 2000).*

Published studies/ evaluations indicated increased cover on *on all but one of* the seeded sites VS. unseeded sites.

SEEDED SITES HAD INCREASED COVERAGE RANGE of 11-39% vs. UNSEEDED

Published in *Conservation Biology* Volume 18 # 4, 2004

What criteria ?
Where is seeding appropriate?

- Areas of high-burn severity.
- Areas within or adjacent to high values at risk.
- Soils without soil cover that are highly erodible.
- Slopes up to 60 percent.
- Areas with potential for spread of known noxious and invasive plants.

From-Burned Area Emergency Response Treatments Catalog- USDA
Carolyn Napper- Forest Service 2006

What criteria ?
Where is seeding appropriate?

Slope Erosion

Slopes Unstable

Slopes directly above structures or sensitive resources

Slopes prone to dry ravel

If high return & intensity- use native herbs & shrubs w hydromulch

What criteria ?
Where is seeding appropriate?

Fire in Wildland with structural or resource threats

→ Vegetation Recovery Assesment

↓

Fire Intensity High
May have damaged natural recovery

→ Structure or Sensitive resources directly downslope

→ If high return & intensity- use native herbs & shrubs w hydromulch

What criteria ?
Where is seeding appropriate?

Fire in Wildland with structural or resource threats

Vegetation Recovery Assesment

Fire Frequency HIGH
May have damaged natural recovery

If high return & intensity- use native herbs & shrubs w hydromulch

What criteria ?
Where is seeding appropriate?

Fire in Wildland with structural or resource threats

Vegetation Recovery Assesment

TIMING OF FIRE
EARLY OR LATE
May have damaged natural recovery

Direct Structural Impact

If high return & intensity- use native herbs & shrubs w hydromulch

Soil Evaluation: seed bank value

Transects are taken across the treatment area and collected one square foot of the soil surface to a one-inch depth at five points along the transect. The soil samples are then placed in shallow propagation flats, placed in a greenhouse, and lightly irrigated for 10 days.

The seedlings present in 10 days provide an indication of seed viability per square foot of soil and how much viable seed is immediately available for erosion control when the first rain occurs.

USDA FOREST SERVICE- SEEDING ANALYSIS

Seeding Rates

Seeding rates can be calculated if you know the following:

- The total number of seeds per pounds
- The percentage of each pound that is PLS
- How many acres needing treatment
- The target PLS per square foot rate

(Typically 40-60 PLS/Sq. Ft)

- *Purpose*: Aerial seeding, usually grasses but occasionally also legumes, is carried out to increase vegetative cover on a burn site during the first few years after a fire. It is typically done where erosion hazard is high and native plant seed bank is believed to have been destroyed or severely reduced by the fire. Seed is applied by fixed-wing aircraft or helicopter.

http://fire.r9.fws.gov/ifcc/esr/Treatments/aeral-seedingi.htm

Seeding native plants

- If objectives are habitat improvement, consider native seeding.
- Consider provenance, seed quality, percent weeds in mix, and timing.
- Gather information about site characteristics, including pre-burn vegetation and animals, burn history, slope, soils.
- Utilize local collected as possible seeds from site.
- Hard to keep seeds "on the slope," choose locations carefully.
- Consider covering seed to reduce bird predation and losses during rains; could be weed-free straw, rice straw, wood chips, or hydromulch.
- Consider multi-tiered application of stabilizing soil in first year with erosion-control products, then seeding native plants in years 2 or 3.
- Reseeding with natives has been successfully done in Oakland, Laguna Beach, San Diego, Ventura, Malibu, Tahoe, and Orange county.
- Limited literature on effectiveness of post-fire seeding of native species

Effects of Hydroseeding Applications

Although aerial seeding from helicopters has been the most widely used method for applying grass seed to fire areas in recent years, because of its inaccuracy and *relative ineffectiveness*, there are other techniques that are gaining favor.

The most widely used alternative seeding technique is **hydroseeding.** This involves mixing a solution of water, seeds, and a mulch composed of various materials (most commonly, cellulose fibers with a polymer "tackifier" derived from paperpulp) and spraying this solution via high pressure hoses onto slopes. The advantages to this method include:

1. a more controlled, directed application,

2. the ability to stick seed on a steep slope without the probability of it rolling, blowing, or washing downslope, and

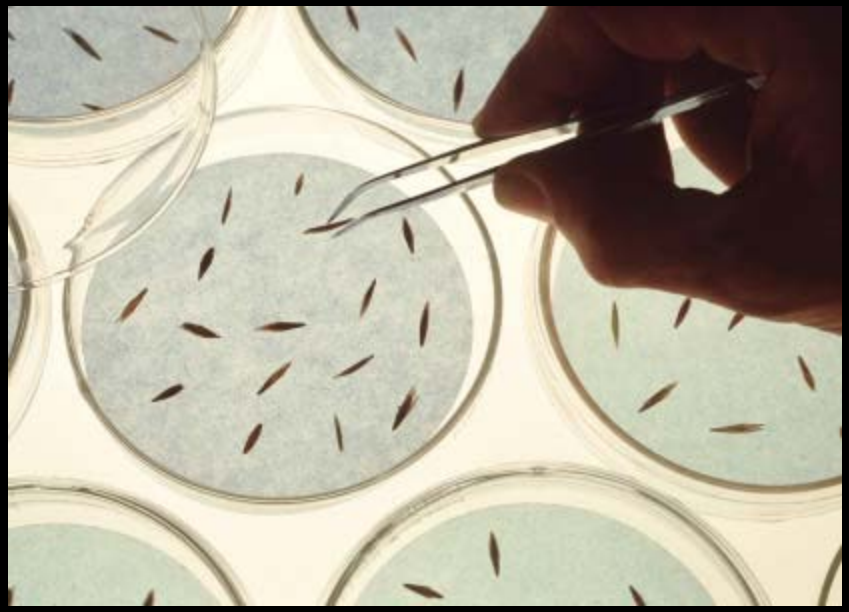
3. the possibility of enhancing germination and growth of the seed through the addition of water and fertilizer during the act of seed application.

Brushfires in California Wildlands: Ecology and Resource Management
Edited by J.E. Keeley and T. Scott. 1995. International Association of Wildland Fire, Fairfield, WA
Post-Fire Emergency Seeding and Conservation In Southern California Shrublands
Author:Todd Keeler-Wolf

Some criteria in seed selection

- Effectiveness for erosion control.
- Compatibility with other resource objectives.
- Species adaptability.
- Native versus nonnative species.
- Number of species in mix.
- Certified seed- Source identified.
- State & federal seed laws- weed content & labeling.

Seed Testing



Credit:
Tim McCabe, USDA Natural Resources Conservation Service.

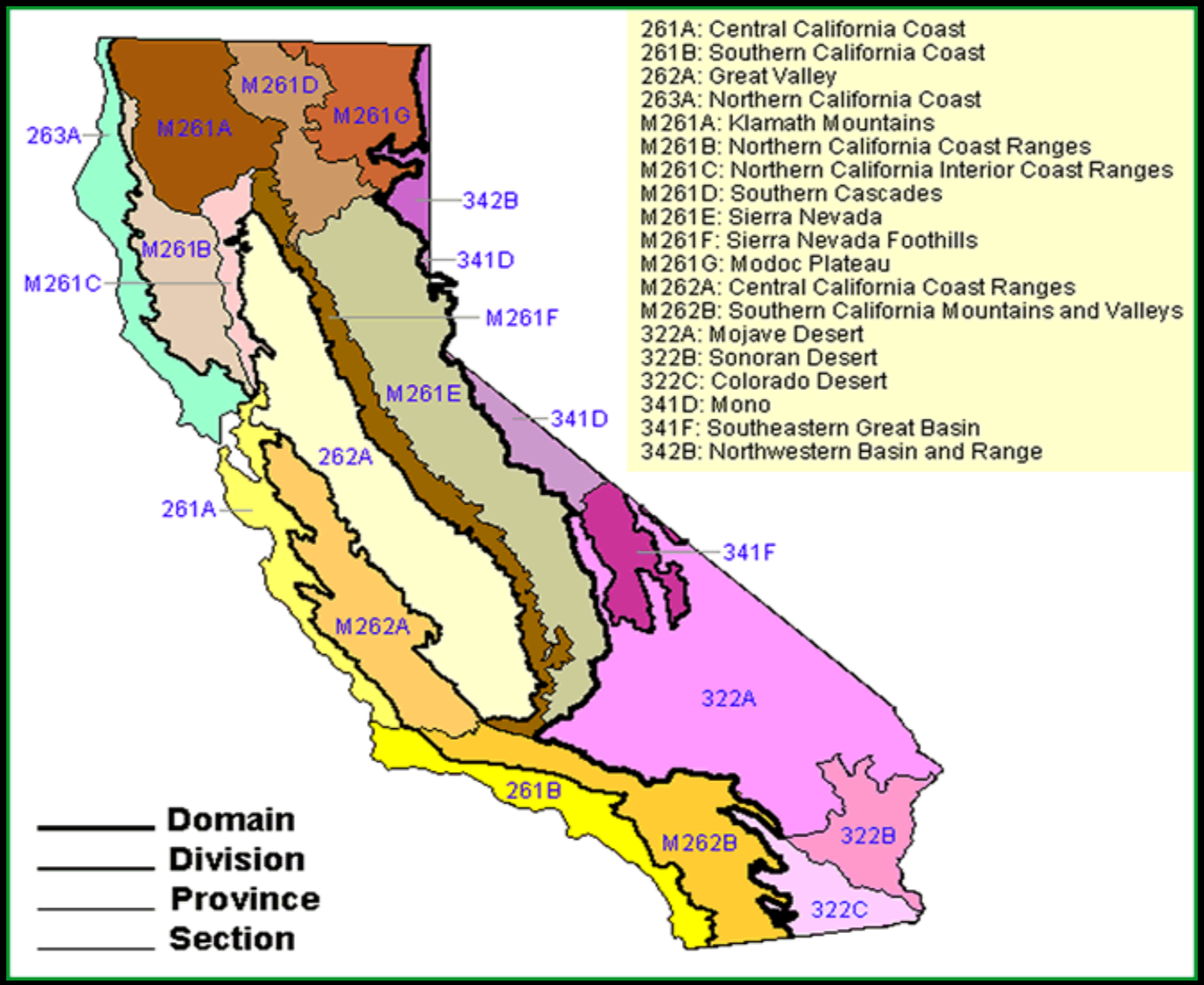
ALWAYS need to know:

- Seed Purity
- Seed Germination

Not TZ
Include dormant seed

- Weed Seed
- Seed Counts

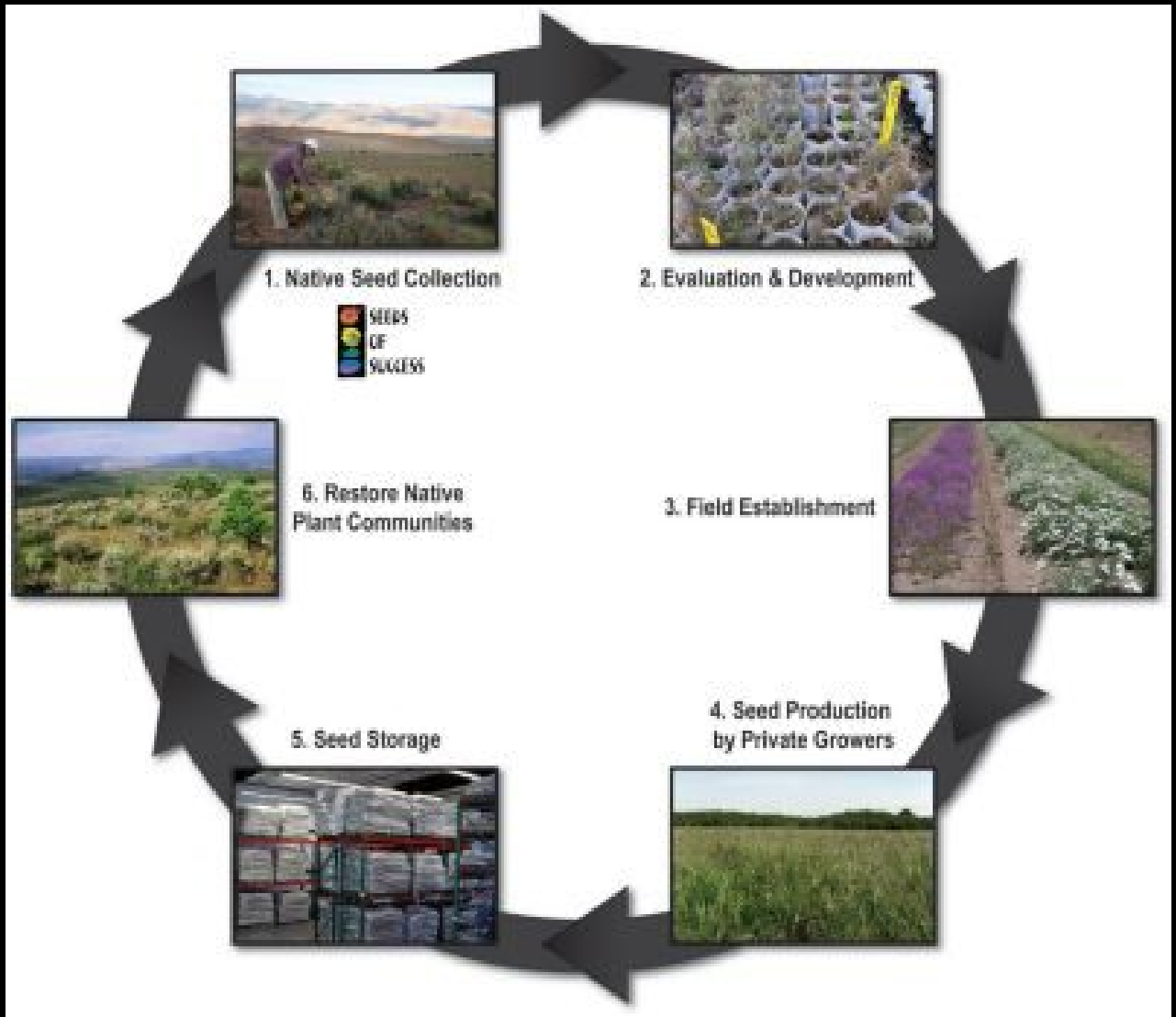
Seed Zones- What's important



- ELEVATION
- COUNTY
- WATERSHED
- COASTAL/ INLAND

ECOLOGICAL SUBREGIONS
http://interwork.sdsu.edu/fire/resources/CAHabitatsmap.htm

BLM Native Plant Materials Development



BLM Native Plant Materials Development

Step 1: Native Seed Collection The Native Plant Materials Development Program begins with seed collection through an SOS intern, agency staff or a contracted employee. The collector will find a native plant population that has the capacity to produce at least 10,000 seeds. Once, the seed is ripe, the population will be harvested and sent to the Bend Seed Extractory for cleaning and storage.

Fast Fact: This process takes an average of 10-20 years to develop a consistent, reliable commercially available species.

BLM Native Plant Materials Development

Step 2: Evaluation & Development If more than 10,000 seeds are collected, the seed is typically sent to an NRCS Native Plant Materials Center where the seed will go through trials involved with germination and competition between species.

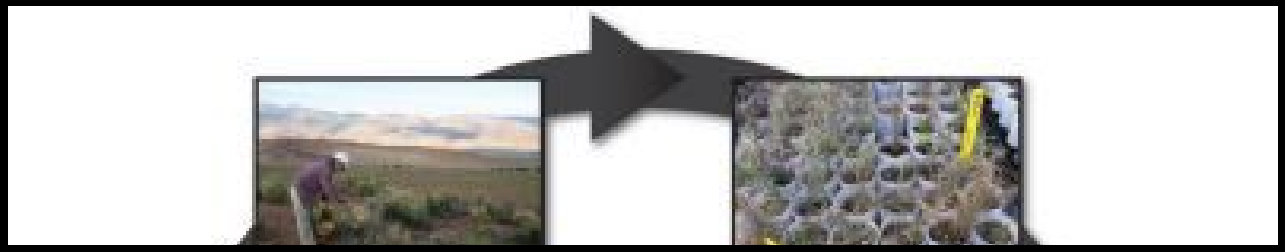
BLM Native Plant Materials Development

<u>Step 3: Field Establishment After the plant trials</u> , if the seed is deemed valuable and useful for restoration, it will be increased on a small-scale, harvested and made available for commercial use.

BLM Native Plant Materials Development

<u>Step 4: Seed Production by Private Growers</u> Private growers will take the commercial original seed stock and harvest seed in the millions of pounds for market. However, seed is not always produced in the millions of pounds. For site specific restoration purposes, it will be increased on a smaller scale.

BLM Native Plant Materials Development



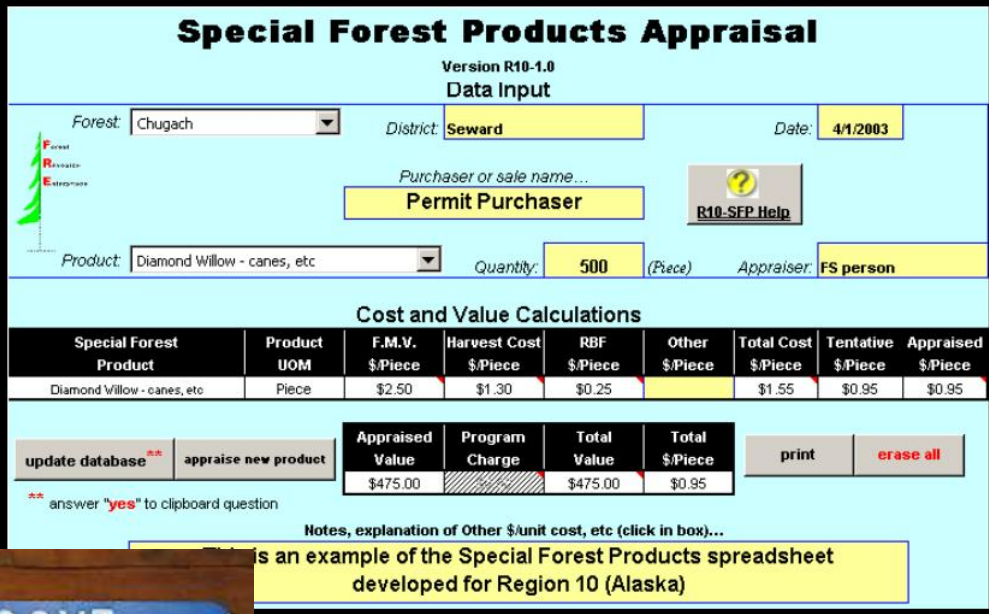
Step 5: Seed Storage The Bureau of Land Management purchases seed annually. The seed goes into its large storage facilities. As a result, fluctuations in seed stock are not as drastic between low and high fire years

BLM Native Plant Materials Development

Step 6: Restore Native Plant Communities The native seed is then used to restore, stabilize and reclaim disturbed areas on the public land

Seed Collections

- Need Permits on Public Land
- Limited access
- Limited uses
- Limited shelf life
- Limited timeframes



Special Forest Products Appraisal

Version R10-1.0

Data Input

Forest: Chugach | District: Seward | Date: 4/1/2003

Purchaser or sale name...: Permit Purchaser | R10-SFP Help

Product: Diamond Willow - canes, etc | Quantity: 500 (Piece) | Appraiser: FS person

Cost and Value Calculations

Special Forest Product	Product UOM	F.M.V. $/Piece	Harvest Cost $/Piece	RBF $/Piece	Other $/Piece	Total Cost $/Piece	Tentative $/Piece	Appraised $/Piece
Diamond Willow - canes, etc	Piece	$2.50	$1.30	$0.25		$1.55	$0.95	$0.95

update database** | appraise new product | print | erase all

Appraised Value	Program Charge	Total Value	Total $/Piece
$475.00		$475.00	$0.95

** answer "yes" to clipboard question

Notes, explanation of Other $/unit cost, etc (click in box)...

This is an example of the Special Forest Products spreadsheet developed for Region 10 (Alaska)

Evaluating the Effects and Effectiveness of Post-fire Seeding Treatments in Western Forests

- *Fire Science Brief Issue 147 December 2011 Page 1 www.fi rescience.gov*

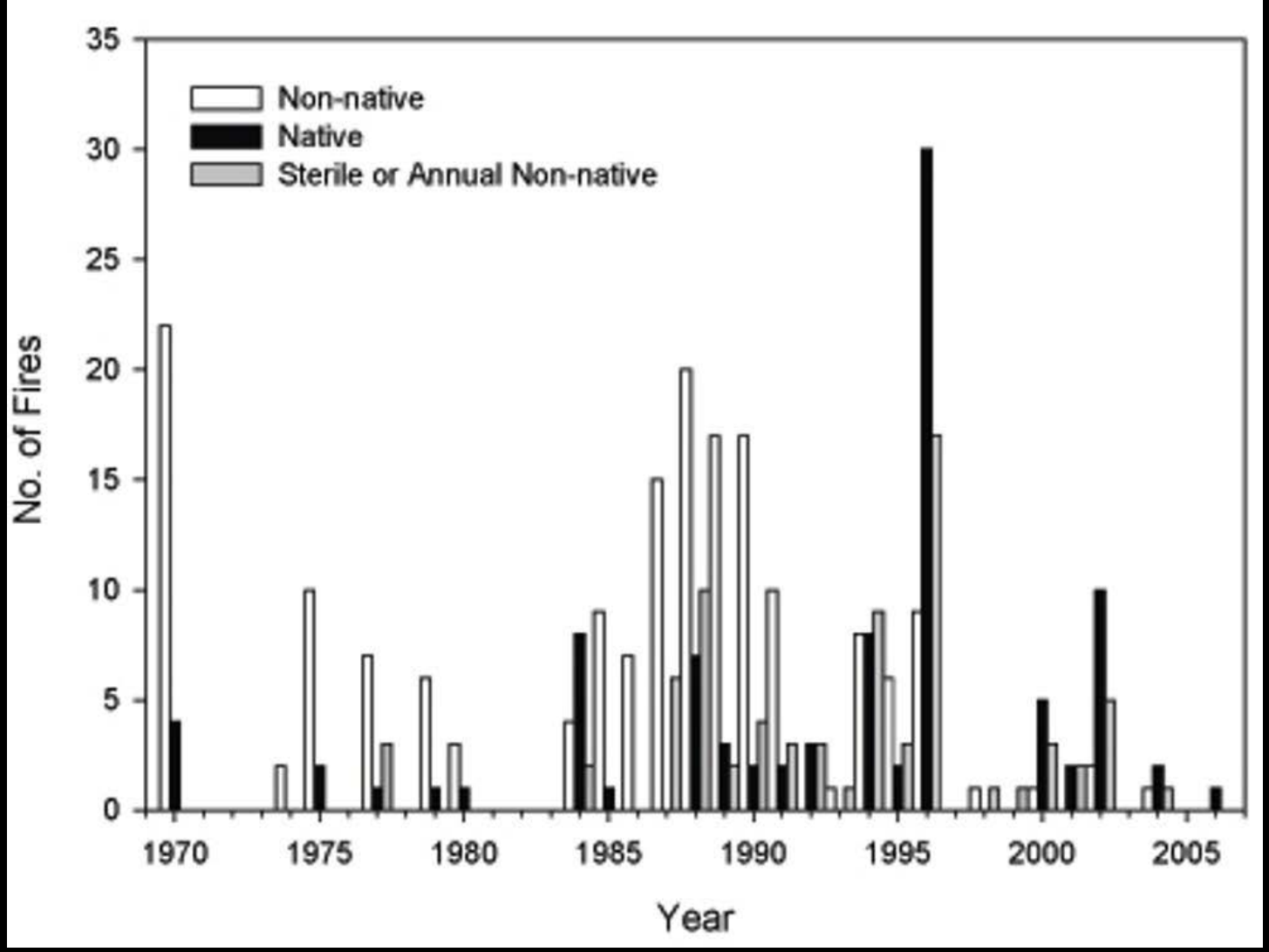
•Encourage the development of locally-adapted, genetically-appropriate seed sources and limit use of non-local, or unknown, genotypes until seed transfer zones of species used during post-fire seeding are better defined.

Native Seeds are available even in large quantity

The BLM regional seed warehouse in Boise, Idaho. Most seed procured by the BLM for post-fi re seeding is native.

Credit: Scott Lambert, Retired BLM

Native Seed Production
Hordeum brachyantherum



Number of fires seeded with non-native, native, and annual cereal grain species between 1970 and 2005. Graph shows only seeded species used on at least three fires for rehabilitation. For the 1970s and 80s values, there was an incomplete collection of Burned Area Reports, therefore only minimum estimates were included for those decades.

CALIFORNIA CROP IMPROVEMENT ASSOCIATION

Seed Certification

Purpose:

- To assure proper identity and purity of native grasses and forbs, reproductive material is maintained through all stages of production. Additionally, certification assures that the reproductive material is correctly labeled so that appropriate planting material can be selected for specific planting sites. The term reproductive material refers to all forms of reproductive material including seed, seedlings, cuttings, rooted cuttings and transplants.

Participation:

- Participation in the program is open to any interested party who agrees to follow the guidelines and standards as defined for both Collectors and Producers of native and naturalized species.

Procedure:

- Through a series of inspections and lab tests, the collection, handling, multiplication and cleaning is monitored by California Crop Improvement Association (CCIA). Provided all standards are met a Certification Tag is affixed to source-identified seedlots

June 13, 2011

CALIFORNIA CROP IMPROVEMENT ASSOCIATION

Wildland Collected Program

CANCELLED

- **Discontinued in 2004**
  - No stable interest or demand
  - Cost effectiveness, inventory, certification fees
- **Renewed interest**
  - Mandatory certification by BLM, CalTrans, DOT and Forestry
  - Request by: [Production fields]
    - Hedgerow Farms/Winters
    - Pacific Coast Seeds/Livermore
    - S & S Seeds/Carpinteria
    - NRCS/Lockeford

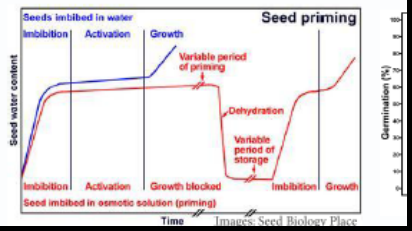
Seed Pre-Treatments

O.A. Kildisheva and A.S. Davis

SEED DORMANCY TYPES		COMMON DORMANCY BREAKING TREATMENTS FOR NATIVE PLANTS	COMMON AGRICULTURAL SEED HANDLING TECHNIQUES
PHYSICAL (PY) • Seed impermeable to water and oxygen • Specialized structure regulates water uptake	**COMBINED** PY+PD	**Pneumatic** Papilionoideae [1]	**Osmopriming** Imbibition of seed in osmotic solution, maintains seeds in the desiccation-tolerant lag phase
		Fire Some Malvaceae and Fabaceae [1, 2]	**Hydropriming/Stratification** Uses DI water or steam to imbibe seed
		Heat Fabaceae, Malvaceae, Rhamnaceae [1]	**Matric Priming** Uses a solid matrix, allowing for controlled imbibition
PHYSIOLOGICAL (PD) • Low growth potential of embryo, which cannot overcome mechanical constraint of seed coat	**CONDITIONAL** • Induced after dispersal in seed with physiological dormancy • Often associates to annual dormancy cycles in the seed bank	**Chemical** Fabaceae, Malvaceae, Rhamnaceae [1]	**Steeping** A process of prolonged hydropriming followed by drying to original moisture content
		Mechanical Fabaceae, Malvaceae, Rhamnaceae [1]	**Pre-germination** Germination is suspended after radicle emergence and seed is dried to produce high-viability lots for conventional sowing
		Stratification Most species [1]	**Coating/Pelletizing** Uses water-permeable polymer layer; can add nutrients, mycorrhizae, etc.
MORPHOLOGICAL (MD) • The seed embryo is underdeveloped at time of seed dispersal	**MORPHO-PHYSIOLOGICAL** MD+PD	**GA_3** Asteraceae, Saxifragaceae, Poaceae, Ericaceae [1,3]	
		Ethylene *Echinacea* and *Balsamorhiza* species [3]	
		Smoke Fire-adapted chaparral species [2, 4]	

Priming:

- •Matric and hydropriming a treatments
- •Useful when seed lot viabili
- •Multiple cycles of priming seed hardening (*i.e.* increase
- •Can improve germination u edaphic) conditions[5, 6]
- •Has been shown to enhanc native perennial grasses so t
- •Can be used to determine t temperature and seed-water simpler gravimetric techniq



Images: Seed Biology Place

Seed Selection & Specifications
Rules of Thumb

- **Specify seeds in PLS Lbs/Acre –this will require the seed supplier to supply highest quality seed with lab tests. PLS takes into account purity and germination.**
- **Have the seed supplier send you actual lab test results for the seed prior to purchase. The seed should be tested within the past 12 months.**
- **Pay special attention to any and all weed content- which may impact your site down the road.**
- **Accept only certified seed or with origins from your county and or state. This will help you eliminate other commercially produced seed from foreign areas.**
- **Use appropriate species that were historically shown to occur on site and in the immediate vicinity; If at all possible ask to have seed supplier send you list of seeds they have from given watershed/ county/ region.**
- **Consult with local plant ecologists/ botanists/ other experts to ask for their knowledge about what the correct plant composition should be. Online resources too such as Cal Flora/ Jepson Interchange/ SMASCH.**
- **Use a product specification that meets ASTM standards or other testing/documentation standard that is based on performance.**

Native seeds as post-fire stabilizers

SEED MIXES
COASTAL SAGE SCRUB AND NATIVE GRASSLAND

Species	Common Name	Associated Habitat[2]	Seed Application (lbs/acre)	% Purity/ % Germination	Seed Origin
Artemisia californica	California sagebrush	CSS	2	15/50	Otay Mesa
Bloomeria crocea	Common goldenstar	NG	0.25	90/60	San Diego
Eriogonum fasciculatum	California buckwheat	CSS	5.0	10/65	Otay Mesa
Hemizonia fasciculata	Golden tarplant	CSS/NG	1.0	10/25	Otay Mesa
Lasthenia californica	Goldfields	CSS/NG	1.5	50/60	San Diego
Nassella lepida	Foothill needlegrass	NG	5.0	60/60	Temecula
Nassella pulchra	Purple needlegrass	NG	5.0	70/60	San Diego
Plantago erecta	Dot-seed plantain	CSS/NG	5.0	95/75	Otay Mesa
Sisyrinchium bellum	Blue-eyed grass	NG	0.5	95/75	San Diego

EDAW – Cedar Fire- Lake Jennings Preserve

Native seeds as post-fire stabilizers

VEGETATION RECOVERY

Cactus species

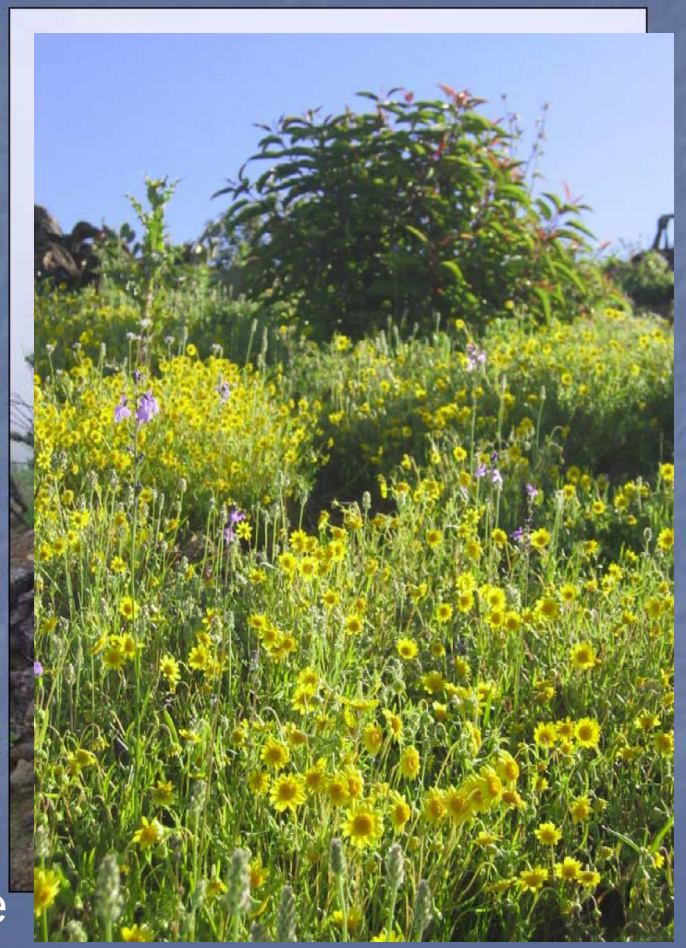
- Existing and planted cacti continuing to bud

Native annuals

- Species from the seed bank and seed mix are responding well to the rain this year

Native perennials

- Regeneration through stump re-sprouting; germination from seed bank and seed mix as well

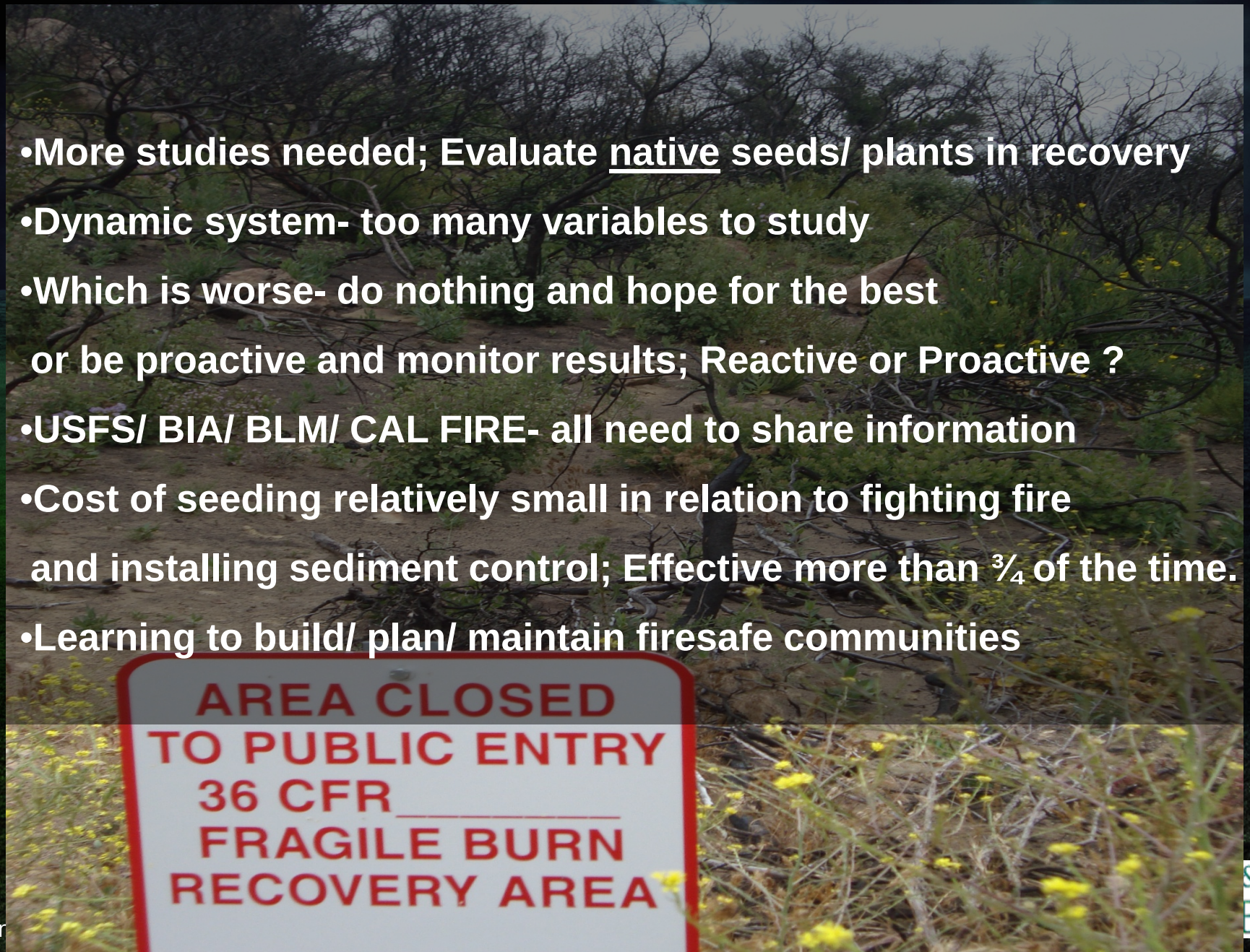


EDAW – Cedar Fire- Lake Jennings Preserve

Nat d

Joyce Schlachter, BAER – BLM- Otay Fire

Post fire vegetative recovery assessment and planning;



- More studies needed; Evaluate native seeds/ plants in recovery
- Dynamic system- too many variables to study
- Which is worse- do nothing and hope for the best
  or be proactive and monitor results; Reactive or Proactive ?
- USFS/ BIA/ BLM/ CAL FIRE- all need to share information
- Cost of seeding relatively small in relation to fighting fire
  and installing sediment control; Effective more than ¾ of the time.
- Learning to build/ plan/ maintain firesafe communities


Caltrans Highway 154
JAN 11 2005


MARCH 2005


3/15/2006
MARCH 2006


MAY 2006
05/23/2006


MAY 2008


MAY 20 2013


MAY 2013


MAY 2013

What do we do when it burns ?

Hope for the best

THANK YOU

THANK YOU FOR YOUR TIME AND ATTENTION

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