Developing an
Invasive Plant Management Plan
for Your Organization

Land Manager's Guide to Developing an Invasive Plant Management Plan

December 2018

Why plan?

Lack of:

➔ understanding about invasive plants

➔ prevention and EDRR

➔ inventory and monitoring

➔ integrative approach

➔ SMART objectives and adaptation

➔ proactive action

➔ staff continuity

Guide Section 1.3, p.5-7: Doug Johnson

strategic… (i.e. thinking it through well)

adaptive… (i.e. evaluating and adjusting)

Integrated Pest Management!
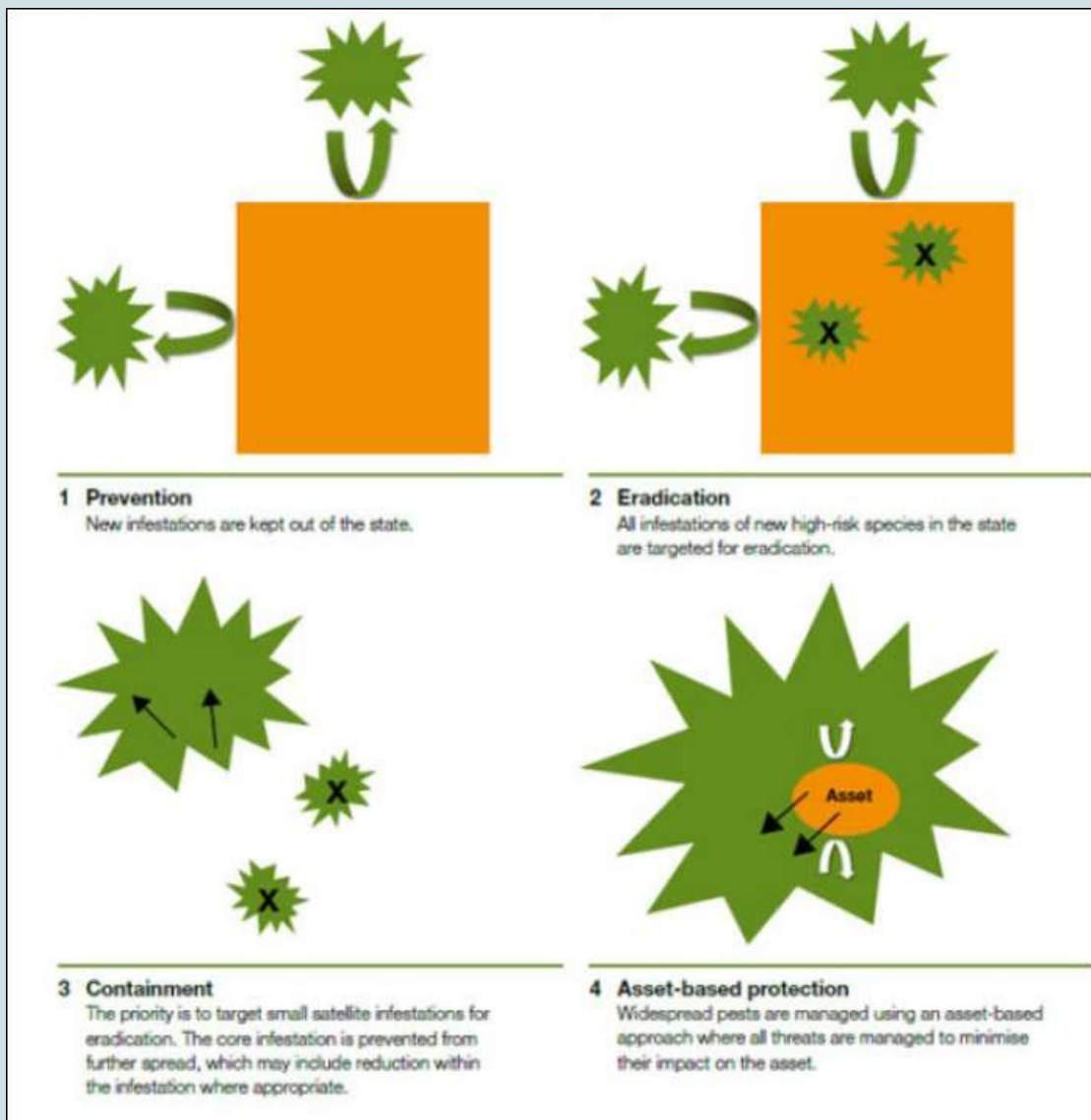
Define your management terms
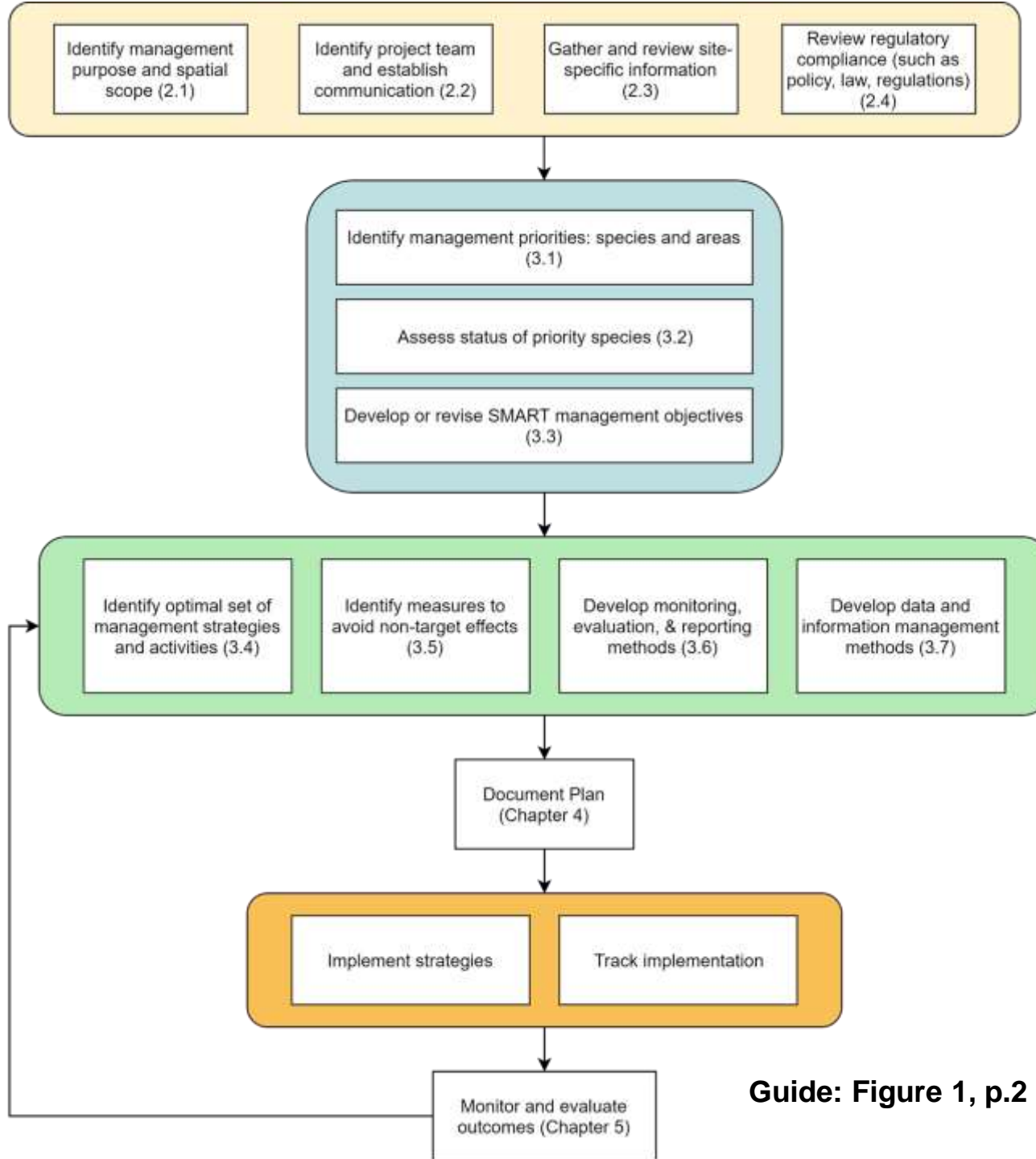
1. Prevention

2. Eradication*

3. Containment

4. Asset-based protection

including:
- detection surveys
- surveillance

1 **Prevention**
New infestations are kept out of the state.

2 **Eradication**
All infestations of new high-risk species in the state are targeted for eradication.

3 **Containment**
The priority is to target small satellite infestations for eradication. The core infestation is prevented from further spread, which may include reduction within the infestation where appropriate.

4 **Asset-based protection**
Widespread pests are managed using an asset-based approach where all threats are managed to minimise their impact on the asset.

Asset

| Identify management purpose and spatial scope (2.1) | Identify project team and establish communication (2.2) | Gather and review site-specific information (2.3) | Review regulatory compliance (such as policy, law, regulations) (2.4) |

Identify management priorities: species and areas (3.1)

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Document Plan (Chapter 4)

| Implement strategies | Track implementation |

Monitor and evaluate outcomes (Chapter 5)

Guide: Figure 1, p.2 and Table 1, p.3

Vegetation of Near-shore Dunes 1992

Humboldt Bay Coastal Dune Restoration

Scope: Humboldt Bay National Wildlife Refuge

Conservation focus: coastal sand dune ecosystem

Priority invasive species: European beachgrass, iceplant

Baseline: field-based mapping

Objective: maintenance levels (<1%)*

Integrated set of strategies:

Approach: prevention, containment, suppression

Techniques: manual, burning, herbicides, active & passive restoration

Monitoring: post-treatment mapping, plots: % cover invasive and native species

Learning/adaptation: funding decline, shifts in public opinion>change techniques

San Francisco Estuary Invasive Spartina Project

Scope: San Francisco Estuary

Conservation focus: tidal marsh ecosystem

Priority invasive species: Invasive *Spartina species* and hybrids

Baseline: field-based mapping, genetic sampling

Objective: eradication

Integrated set of strategies:
approach: prevention, eradication
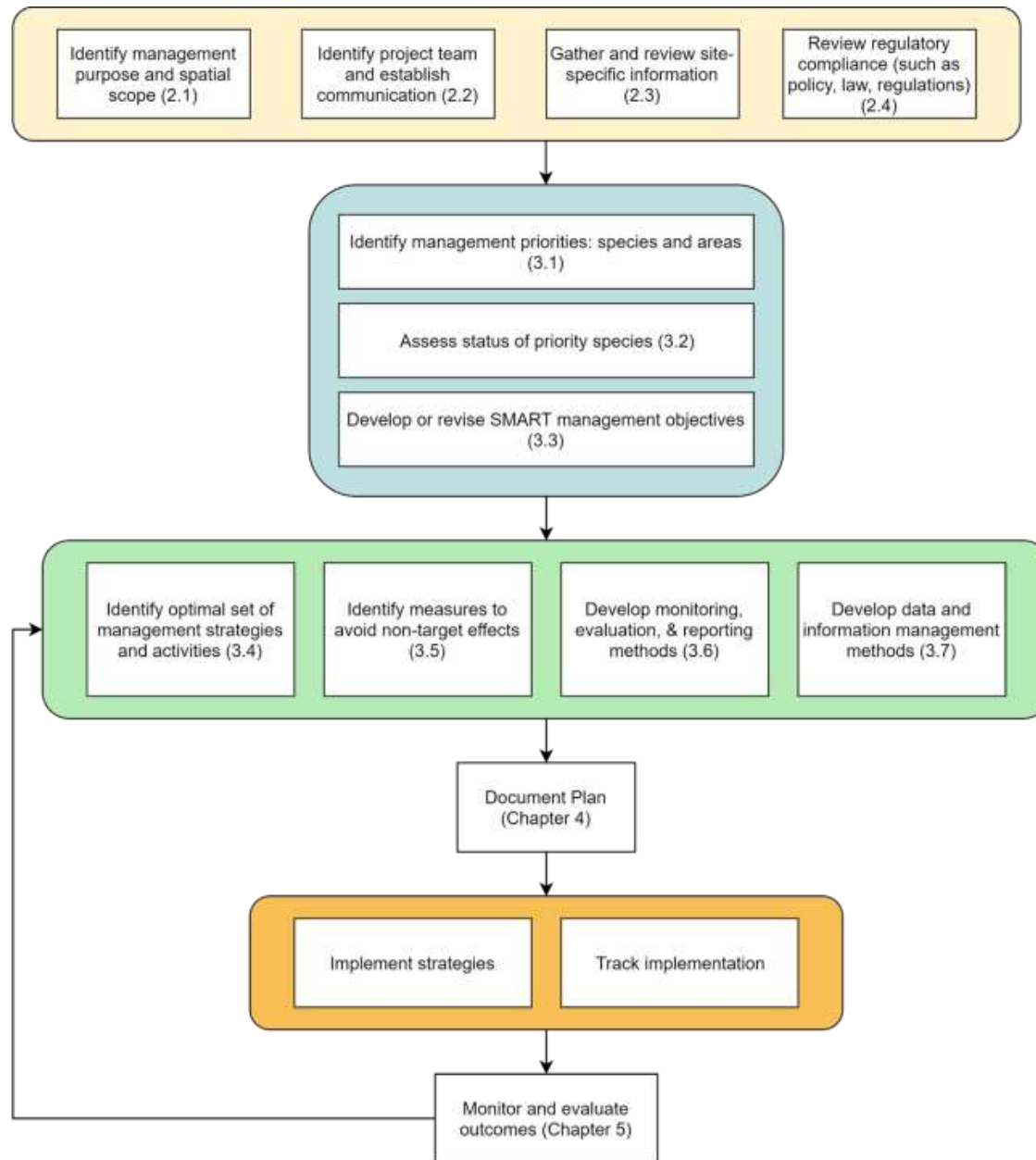techniques: eradication-manual, herbicides, restoration

Monitoring: *Spartina* distribution and abundance, native plant response, wildlife response

Learning/adaptation: unacceptable levels of non-target-effects>increased restoration efforts, treatment phasing

Terminology

Invasive species *are **non-native** organisms whose introduction causes or is likely to **cause economic or environmental harm** or harm to human, animal, or plant health* (Executive Order No. 13751, 2016)

Other terms: nuisance species, pest, weed, alien, non-native…...

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Preparing to Write a Plan

- Identify Purpose & Scope
- Identify Team
- Gather site-specific information
- Review Compliance

Guide Section 2.1, p.9

Identify Purpose

Purpose: The Plan should present a compelling case for why invasive plant management is needed and how it is impeding your ability to achieve your organization's mission and conservation goals.

Identify Scope

<u>Scope of Activities</u>: What does the plan cover? What doesn't it cover?

<u>Spatial</u>: Establish geographic area where activities will occur.

<u>Thematic</u>: May cover a certain type of community or system.

Pinnacles National Park
Habitat Restoration Program
Invasive Plant Infestation Zones

Legend:
- — — Trails
- —— Roads
- ▭ Park Boundary

Map labels:
- Bear Valley School
- Highway 25
- North Wilderness
- Marion Canyon
- East Entrance Canyon
- Bottomlands
- East Side Road
- Butterfield Canyon
- Crowley Canyon
- WetlandRose Canyon
- Pig Fence
- Old Pinnacles
- Balconies
- Pig Canyon
- McCabe Canyon
- Bacon Homestead
- High Peaks Trail
- Chalone Housing
- Campground
- Chaparral
- Westside Road
- Tunnel Trail
- Entrance Meadow
- Grassy Canyon
- Double Gates
- Bear Gulch Road
- Juniper Canyon
- Bear Gulch Creek
- Chalone Creek
- Condor Gulch
- Curious Gorge
- Jawbone Canyon
- Moses Springs
- Sandy Creek
- Westside Entrance
- Homestead
- Rim Trail
- Reservoir Canyon R. Side
- Reservoir
- South Wilderness
- Reservoir Canyon L. Side
- North Chalone

0   0.35 0.7   1.4 Miles

Pinnacles National Monument
California

National Park Service
U.S. Department of the Interior

Bottomland Infestation Zones

Legend:
- Bottomlands (BOT)
- Sandy Creek (SAC)
- East Side Entrance (EEC)
- Butterfield Canyon (BUC)
- Wetland (WET)
- Rose Canyon (ROC)
- Bacon Barn (BAC)
- East Side Road (ESR)
- Streams
- Roads
- Structures

North

0   150   300 Meters

BOT01
BOT02
BOT03
BUC01
Butterfield Barn
BUC00
BOT04
BOT05
BOT06
BOT07
BOT08
BOT09
BAC01

Identify Team

- People who will develop the Plan
- People who will implement the Plan
- Key decision-makers
- Partners or other important stakeholders*
- Technical advisors

*Check with your agency/organization regarding who is permitted to be a part of a planning team
(e.g. Federal Agencies & FACA).

Gather site-specific information

- Personal Knowledge/ Expertise
- Site Surveys
- Management Plans/Records
- Spatially Referenced Information
- Invasive Plant Lists
- Early Detection Plant Lists
- Non-native plant rankings/legal status

Laws and Regs. Compliance

Migratory Bird Treaty Act
Wild and Scenic Rivers Act

CEQA   NEPA

State & Local Air Quality Regs

Clean Water Act

State Water Quality Board

NAGPRA

Architectural Barriers, Rehabilitation, and Americans with Disabilities Acts

Rivers and Harbors Appropriation Act

Magnuson–Stevens Fishery Conservation and Management Act

Coastal Zone Man. Act

NHPA

Wilderness Act

Rivers and Harbors Appropriation Act

Endangered Species Act

Compliance Overview

- Consider all possible compliance / permitting needs.
- Start processes early. Some processes may take longer than expected.

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│ │ Identify     │  │ Identify     │  │ Gather and   │  │ Review       │       │
│ │ management   │  │ project team │  │ review site- │  │ regulatory   │       │
│ │ purpose and  │  │ and establish│  │ specific     │  │ compliance   │       │
│ │ spatial      │  │ communication│  │ information  │  │ (such as     │       │
│ │ scope (2.1)  │  │ (2.2)        │  │ (2.3)        │  │ policy, law, │       │
│ └──────────────┘  └──────────────┘  └──────────────┘  │ regulations) │       │
│                                                        │ (2.4)        │       │
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Guide: Figure 1, p.2 and Table 1, p.3

Identify Priorities

Challenge: not enough resources to adequately address all invasive plant species everywhere

The distinction between damaging and innocuous species is critical for management and policy purposes, as it is impractical [and infeasible] *to react to every species...., or to manage all established alien species*

Rejmánek & Pitcairn 2002

Guide Section: 3.1, pp.13-22

Why Prioritize?

- ❑ Optimally allocate limited resources
- ❑ Get buy-in/agreement from stakeholders
- ❑ Establish repeatable/defensible process
- ❑ Reflect on current management priorities
- ❑ Understand data gaps to address in future iterations

Prioritization Example

USFWS: Klamath National Wildlife Refuge Complex

❑ Limited resources, competing priorities (natural resources vs farming)

❑ 2-day workshop: refuge staff + ag community

❑ Mgt history review + prioritization

❑ Invasive Plant Inventory and Early Detection Prioritization tool

❑ **Result:** consensus>increased collaboration, shift in mgt focus, extant + ED targets, lead to 1st ever baseline inventory

Total Score

Lythrum salicaria
Lepidium latifolium
Onopordum acanthium
Conium maculatum
Phragmites australis
Cirsium arvense
Cuscuta pentagona
Iris pseudacorus
Lepidium draba
Phalaris arundinacea
Kochia scoparia
Elymus repens
Bromus tectorum
Salvia aethiopis
Tribulus terrestris
Cirsium vulgare

0   2   4   6
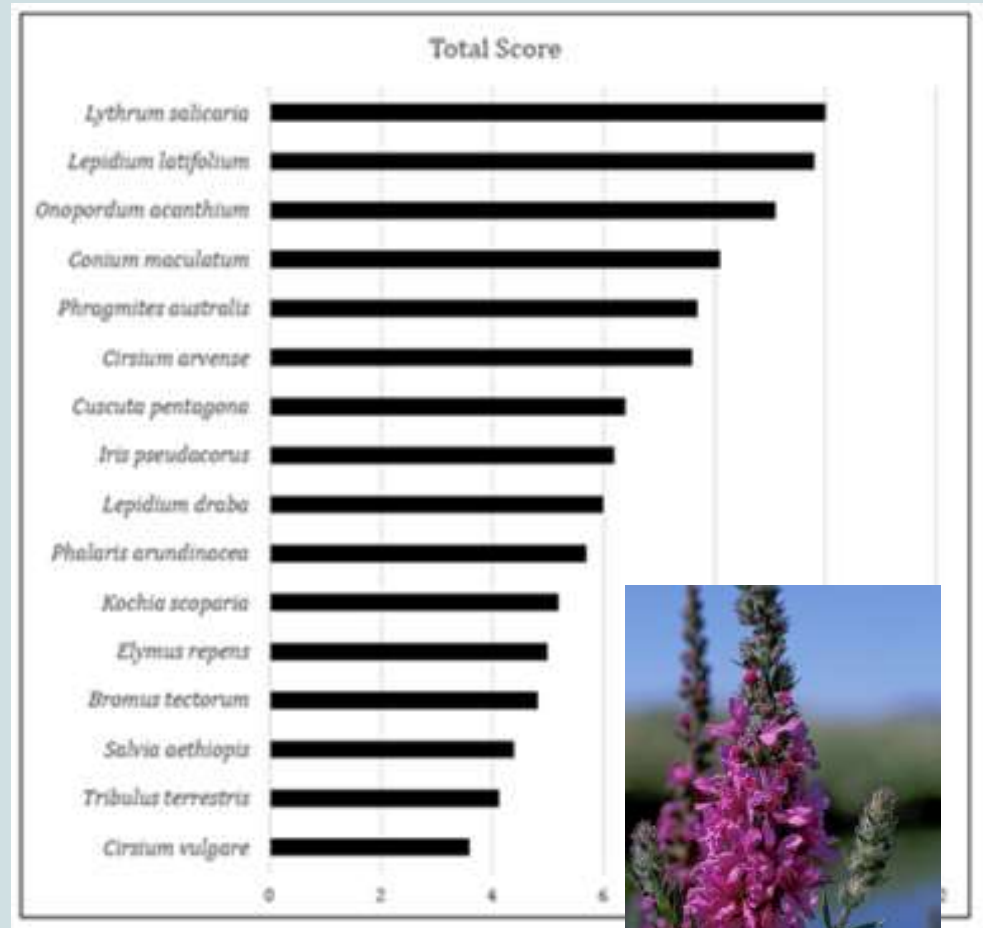
Prioritization Example

NPS: San Francisco Bay Area Network

- ❏ Rare species and habitats
- ❏ Number of invasive guilds present
- ❏ Risk of invasion (infrastructure and veg type)
- ❏ Prior management effort
- ❏ Result: guides early detection and inventory efforts
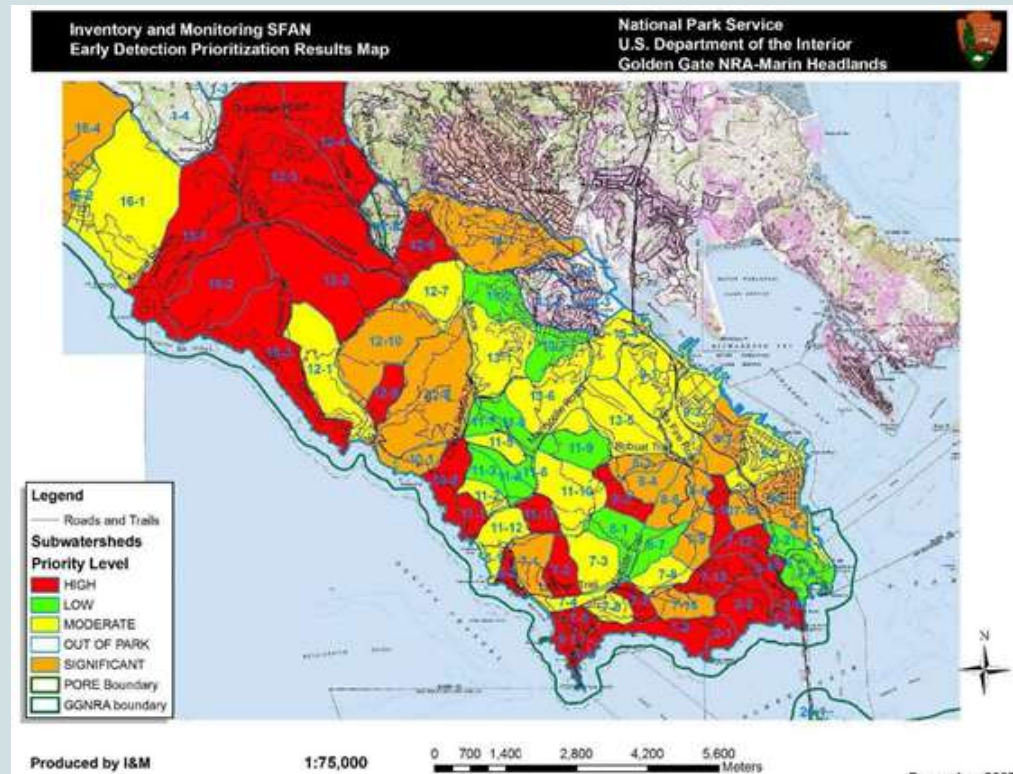
Area prioritization; species prioritization done separately

Data Gaps

What do you know?

What do you think you know?

What do you not know?

How can you address these gaps?

Certainty / Identification	Certain (Known)	Uncertain (Unknown)	
		Impact	Occurrence
Identified (Known)	Known known (identified knowledge)	Known unknown (identified risk)	
Unidentified (Unknown) — Consequence / Event	Unknown known (untapped knowledge)	Unknown unknown (unidentified risk)	

Kim, S. D. (2012). Characterizing unknown unknowns. Paper presented at PMI® Global Congress 2012—North America, Vancouver, British Columbia, Canada. Newtown Square, PA: Project Management Institute.

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Guide: Figure 1, p.2 and Table 1, p.3

Describing the Invasive Plant Problem:
Inventory and Early Detection Surveys

"*An inventory serves to **diagnose the weed problems** within a landscape, and not until the diagnosis is complete can comprehensive and complete management actions be taken. In a sense, weed inventories [or early detection] are as critical to land health as medical exams are to human health, and a tangible weed map is just as vital to a land manager as an x-ray would be to a medical professional.*"

Andersen and Dewey (2007)

Describing the Invasive Plant Problem:
Inventory and Early Detection Surveys

Is it worth it? **YES!!!**

❏ Understand patterns of spread
❏ Inform management strategies
❏ Guide on-the-ground management
❏ Increase support
❏ Essential for SMART objectives

In order to ask *"Where are we now?"*
we must know *"Where did we start*?"

2018 Broom Mapping on Mt. Tamalpais Watershed Lands

TOTAL BROOM EXTENT
Increased by over 100 acres, or approximately 7%, at a rate of around 20 acres a year, less than half the rate of spread from 2008-2013.

Broom Acreage Change
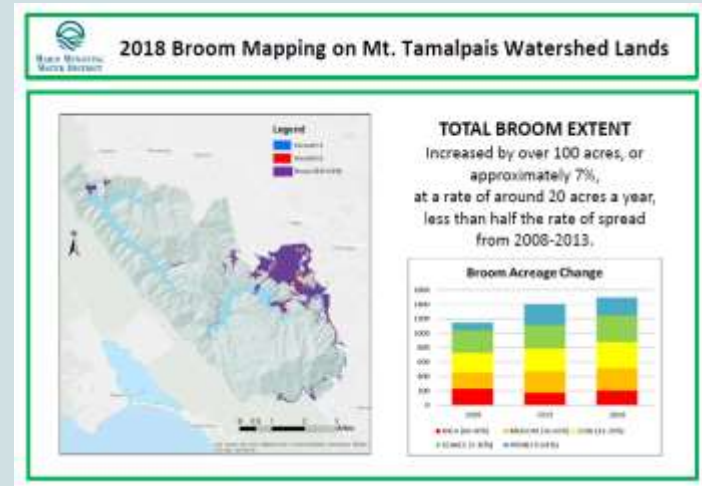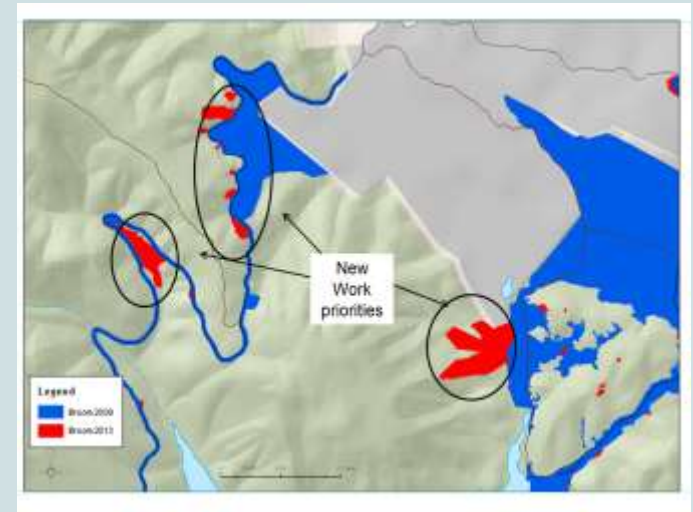
Methods:
Inventory & Early Detection

Common considerations

❏ Survey objectives
❏ Safety
❏ Budget
❏ Spatial scale and frequency
❏ Expertise and training
❏ Access and timing (terrestrial/ aquatic, topography, phenology)
❏ Species characteristics (rarity, size, phenology, +)
❏ Disturbance (sensitive species, weed spread/trail creation)

Single Plants   0.001-Acre Patches   0.01-Acre Patches

https://www.nps.gov/im/sfan/invasive-plants.htm

Daniels Lake
Perimeter: 15821.20 m (9.83 miles)
Segments: 316.42 m (1038.13 ft)
Area: 621 acres (251 hectares)
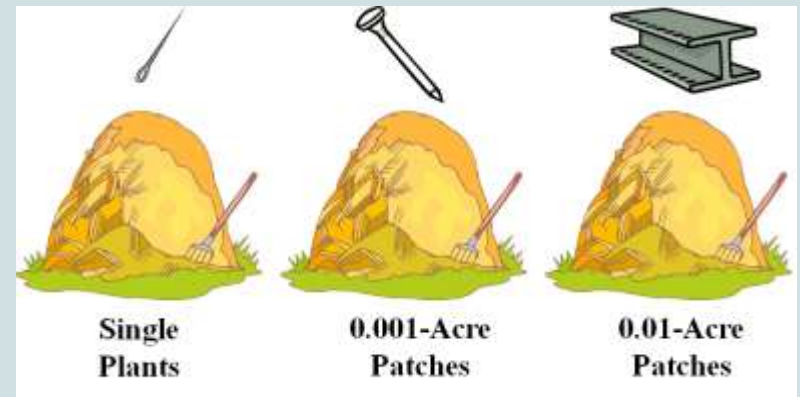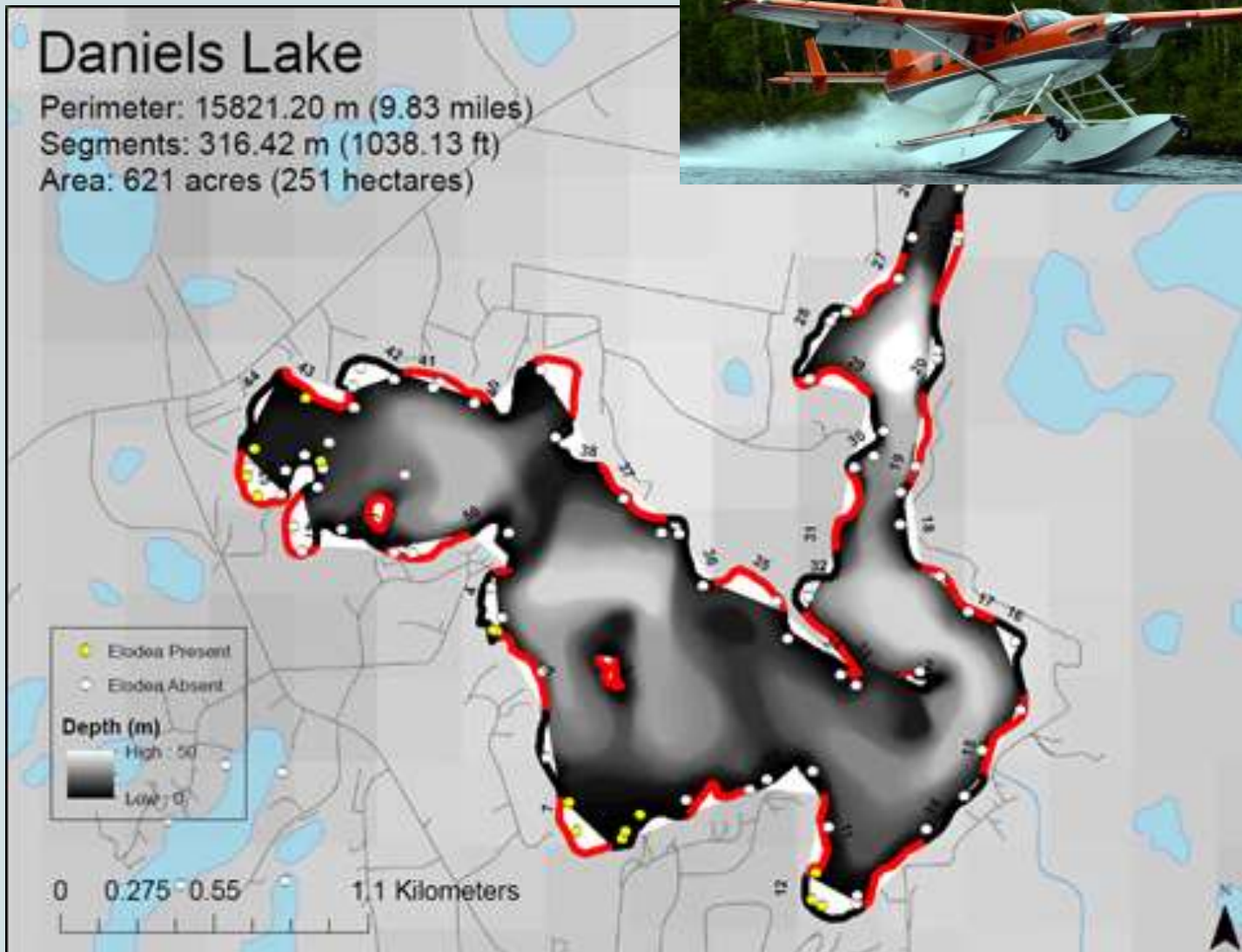
❑ Early detection surveys (eDNA) for Elodea, Kenai Peninsula, AK.
❑ Utility: rapid response/eradication, prevent spread, modeling future spread, increasing support

Describing the Invasive Plant Problem

Early detection at Marin Municipal Water District:

- ❑ Found 9 new weed species when populations fewer than 100 plants

- ❑ Worked towards extirpation of medusahead, cheatgrass

- ❑ **Mapped survey areas so we know where we've looked and for what**

- ❑ Garnered additional resources based on broom spread mapping
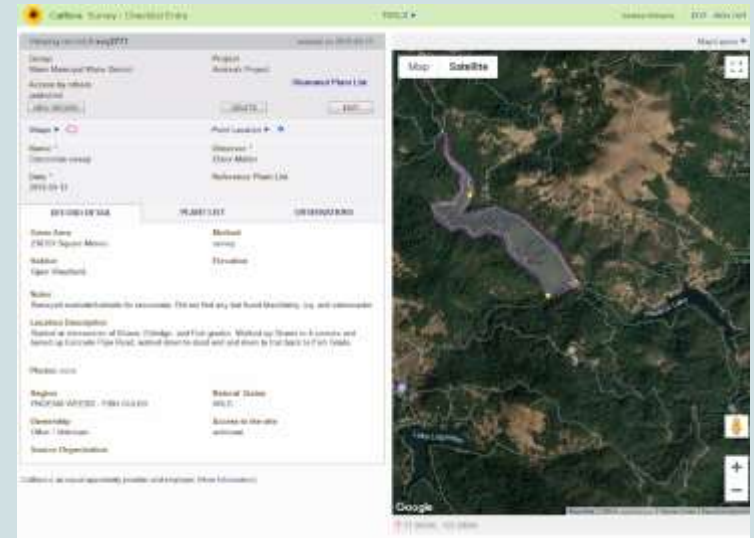
QUESTIONS?

Breakout Session I

Goal: Compile the basic information necessary to begin drafting an Invasive Plant Management Plan

1. Dangermond Preserve, Santa Barbara County

Andrea

Doug

2. San Diego County EDRR

Tom

Jason

3. Farallon Islands, San Francisco

Steve

Giselle
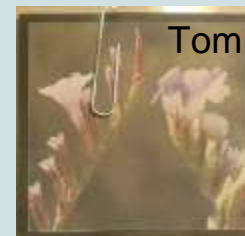
BREAK!

Breakout Session I Summary

1. Dangermond Preserve, Santa Barbara County

2. San Diego County Early Detection / Rapid Response

3. Farallon Islands, San Francisco

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Guide: Figure 1, p.2 and Table 1, p.3

Management Objectives

If your invasive plant management strategies were successful, what would that look like?

SMART objectives…..

Specific

Measureable

Achievable

Results-oriented

Time-bound

Management Objectives

Essential ingredient for learning and adapting

Did I achieve what I expected? If not, why not?

– Strategies implemented as planned?
– Strategies worked as expected?

What needs to change, if anything?

Management Objectives

Over the next 10 years (2020-2030), prevent the establishment (reproduce and spread) of *Elodea* species within the Arctic National Wildlife Refuge

Specific: check
Measurable: check
Achievable: check
Results-oriented: check
Time-bound: check

Management Objectives

Reduce the cover of *Arundo donax*

Specific: X
Measurable: X
Achievable: check
Results-oriented: check
Time-bound: X

Management Objectives

Annually treat perennial pepperweed (*Lepidium latifolium*) populations at the Bear Valley National Recreation Area

Specific: check

Measurable: check

Achievable: check

Results-oriented: X

Time-bound: check

Management Objectives

Eradicate cheatgrass from the Ruby Grassland Nature Preserve by 2025

Smart: check

Measurable: check

Achievable: X

Results-oriented: check

Time-bound: check

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Guide: Figure 1, p.2 and Table 1, p.3

Integrated Pest Management

Selecting Optimal Strategies

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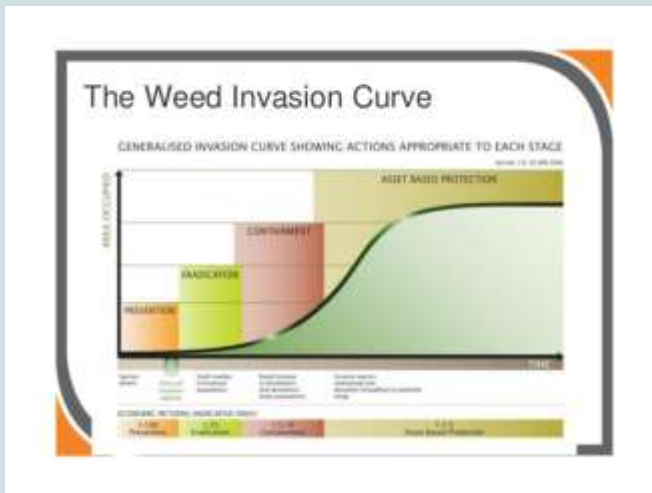
Approach:

Prevention, eradication, containment, suppression

Technique:

Integrated set of techniques

Designing a Management Strategy

- Initial planning steps
  - Gathering site specific information
  - Prioritization
  - Assessing status
  - Developing SMART objectives
- What approaches and techniques should be employed to achieve objectives?
- Have you set yourself up for success?

Guide Section 3.4, p.30-33

Designing a Management Strategy

1 Prevention
New infestations are kept out of the state.
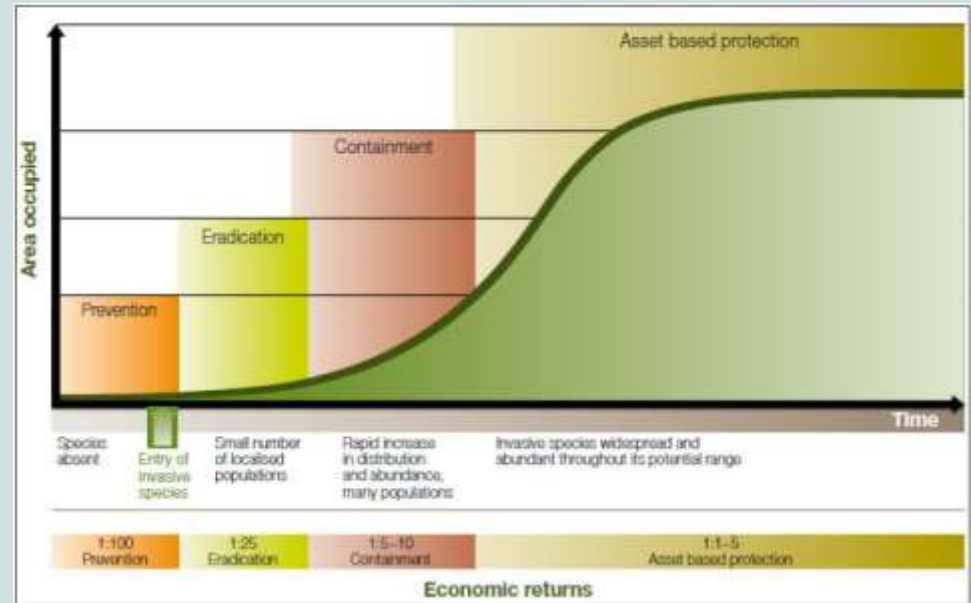
Prevention

- Frontline defense against invasive species

- Understand vector pathways
  - Natural
  - Anthropogenic

- Address areas vulnerable to invasion

- Surveillance / EDRR is a must!
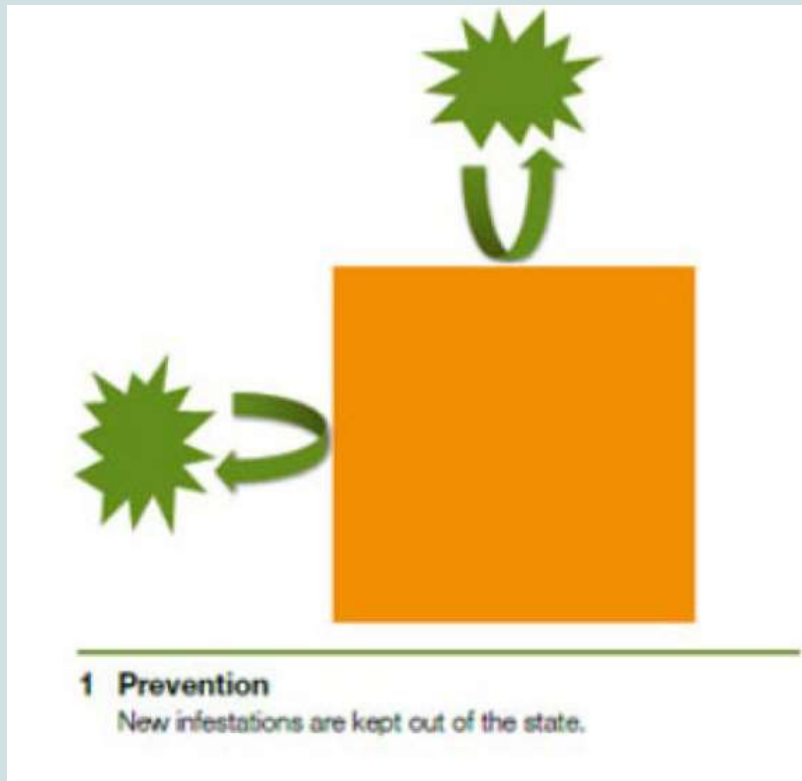
Designing a Management Strategy
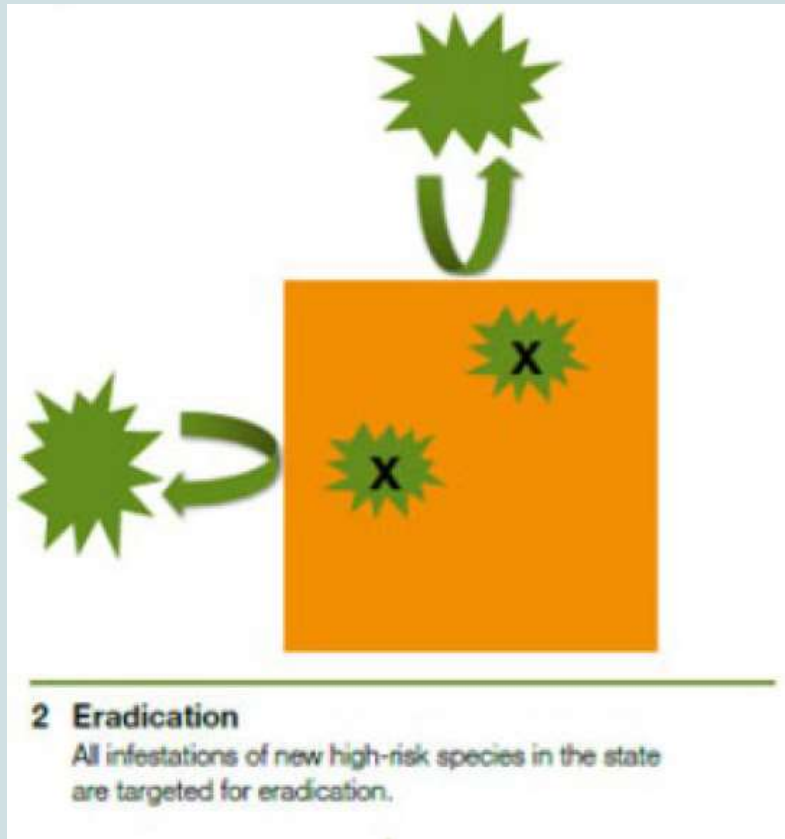
Eradication

- Must have adequate resources

- Follow-up!

- Ability to detect at low density

- **Surveillance / EDRR** is a must!

2 **Eradication**
All infestations of new high-risk species in the state are targeted for eradication.

Guide Section 3.4, p.32-33
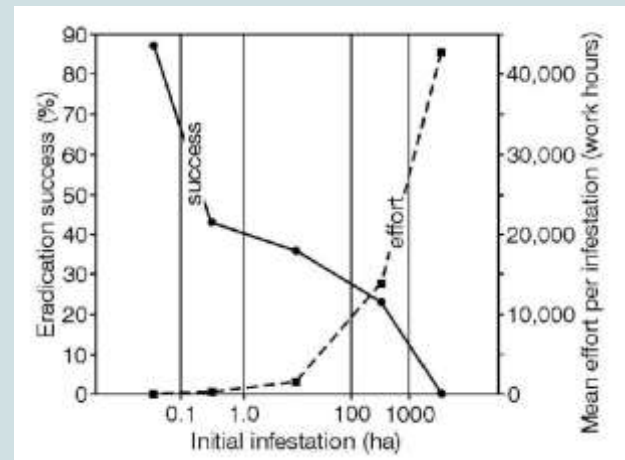
Designing a Management Strategy

Containment
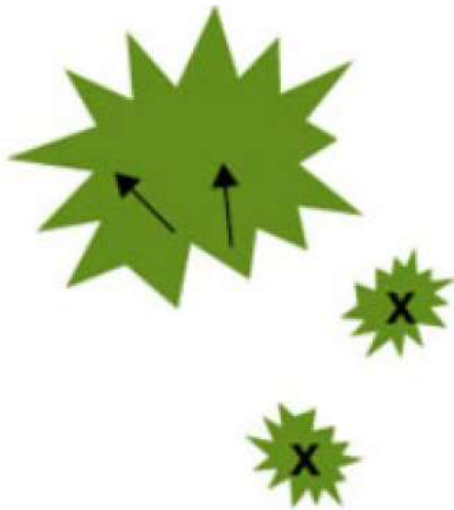
3 **Containment**
The priority is to target small satellite infestations for eradication. The core infestation is prevented from further spread, which may include reduction within the infestation where appropriate.

- Define a containment unit

- Define a buffer zone free of invasive species, but may receive propagules

- **Surveillance / EDRR** within buffer zone!

Designing a Management Strategy

4 **Asset-based protection**
Widespread pests are managed using an asset-based approach where all threats are managed to minimise their impact on the asset.

Asset-Based Protection
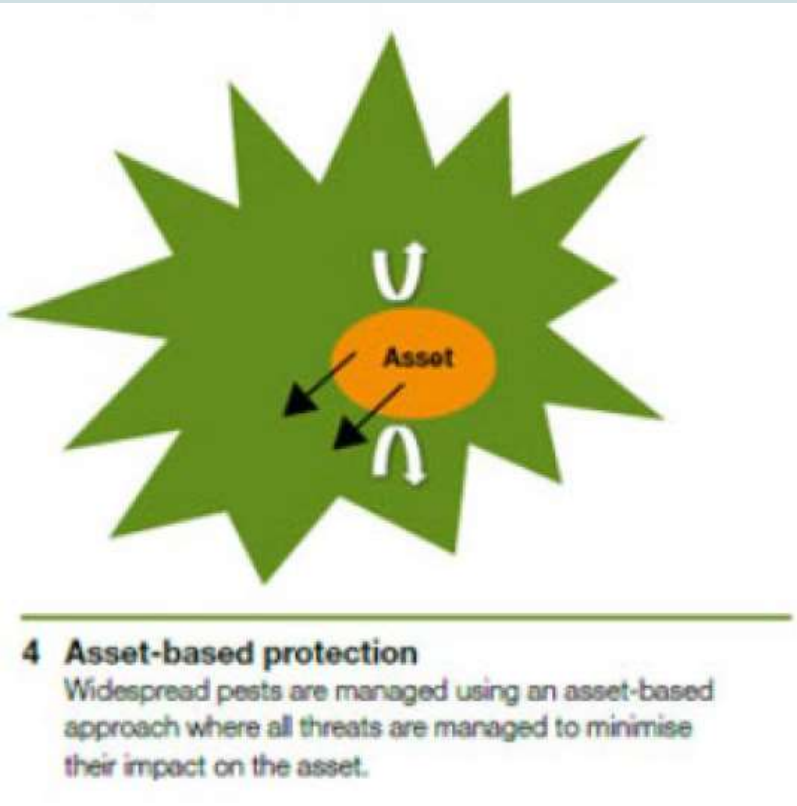
- Little hope of eradication

- Protect sensitive habitats and resources

- Control / suppression of invasive species

- What are your SMART objectives?

Designing a Management Strategy

Designing a Management Strategy

Factors to consider when choosing among techniques

- Management objectives—what you are trying to achieve
- Target species ecology, distribution, and abundance
- Capacity to implement—people, cost, and technical capacity
- Site characteristics such as scale, accessibility, and politics
- Potential non-target effects
- Likelihood of success

Guide Section 3.4.3, p.36-40

Designing a Management Strategy

Avoiding/mitigating non-target effects

- Soil disturbance, compaction, or erosion
- Water quality
- Impacts to non-target plants
- Direct/Indirect harm to wildlife
- Direct/indirect harm to cultural resources
- Further spread invasive plants

Breakout Session II

Goal: Develop strategic goals and methods to achieve them

1. Dangermond Preserve, Santa Barbara County

2. San Diego County Early Detection / Rapid Response

3. Farallon Islands, San Francisco

Plan Implementation and Work Planning

You've got a plan. Now what?

- ## Who will do the work?
  - Staff? Contractors? Volunteers?
- ## When and where will treatment actions occur?
  - Where to do what?
  - Phenology
  - Seasonal restrictions
  - Repeat treatments
- ## What are the costs?
  - Labor
  - Equipment rental
  - Tools and Supplies
  - Herbicide
  - Permit fees
- ## Evaluate! Revise!
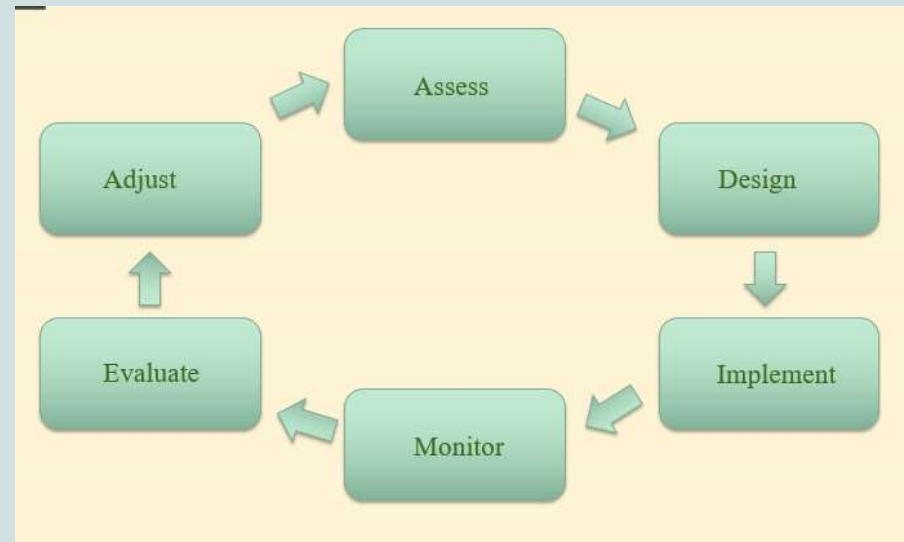
Plan Implementation and Work Planning

Case Study: Dangermond Preserve

- Who will implement the plan?
    - Volunteer is mapping weeds
    - Limited, but skilled staff time available
    - Contractors will implement management

- When and where will they occur?
    - Difficult to write a plan without comprehensive plant data

- What are the costs?
    - Potential for long-term funding once project begins

- How to track performance?

Plan Implementation and Work Planning

Case Study: San Diego EDRR

- Regional long-term management approaches for each target species
- Specific techniques not described
- Includes Early Detection surveillance
- Funding is tracked for each treatment location
- Designed to be a **living document**

<u>Hypericum canariense</u> (Canary Island St. John's wort)

SD PAF score: 5.9

Current condition: This species typically invades coastal scrub and grassland habitats. It forms dense stands over time. Although abiotic impacts have not yet been documented, this species has the potential to alter vegetation structure and displace native species. Populations can expand rapidly and dominate invaded habitats (as seen in the three larger populations).

Management information: This perennial woody shrub produces a large quantity of seed that could be viable up to 5 years. It is primarily gravity-dispersed, but long distance dispersal occurs via vehicles and human activities and along drainages. Plants are moderately difficult to control, with re-sprouting observed. Control of the seed bank and re-sprouting adults will require an effort >5 years in duration.

Recommendations: Regional Priority = High; NCCP Action = Fund management

Without aggressive, coordinated management, this species will soon reach the point where it is no longer controllable within the region. Estimated initial cost $145K, annual re-treatment $17K.

- Initiate treatment and monitoring on populations # 2b, 4, 9, and 10. Estimated annual cost: $4K.
- Monitor populations #1, 2a, 5, 6, 7, and 8 to assure work is occurring.

Populations of *Hypericum canariense* (Canary Island St. John's wort)

#	Location	Size	Status	Duration	Funding Status	Lead
1	Lusardi Creek, Black Mountain	<1 acre in 200-acre area, mostly seedlings	Re-treatments	Since 2008	Funded: <$3K	City of San Diego
2	Lake Murray, La Mesa: a) City of SD b) San Diego Public Utilities	a) <1 acre in 200- ac area, mostly seedlings b) ~5 acres, 5,000-10,000 scattered plants	a) Re-treatments b) Not treated	a) Since 2009 b) not treated	a) Funded: <$2K b) Unfunded: Initial cost: ~$30K Annual re-treatment ~$5K	a) City of SD b) San Diego Public Utilities
3	MCAS Miramar	Eradicated	Eradicated	Completed	N/A	MCAS Miramar
4	Florida Canyon, Balboa Park	~10 acres	Not treated	Not treated	Unfunded: Initial cost: ~$50K Annual re-treatment ~$5K	City of San Diego
5	Naval Base Point Loma Fuel Yard	1 acre, many sites	Ongoing	Since 2008	Funded	Naval Base Point Loma
6	Naval Base Point Loma @ Steam Plant Rd	1 acre, many sites	Ongoing	Since 2008	Funded	Naval Base Point Loma

Plan Implementation and Work Planning

Case Study: Farallon Islands

- What tasks are needed?

- Who will implement the plan? When? Where?

- What are the costs?

- Performance Measures and Indicators?

South Farallon Islands Invasive Plant Inventory
All Target Species
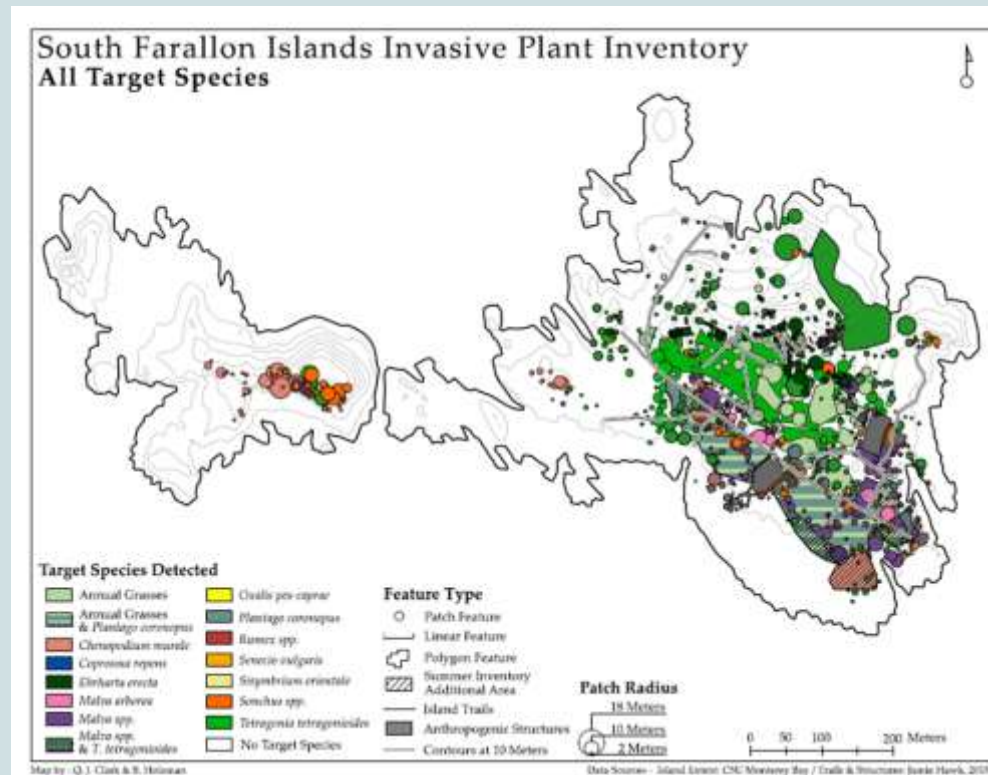
Plan Implementation and Work Planning

Bear Creek Redwoods Open Space Preserve

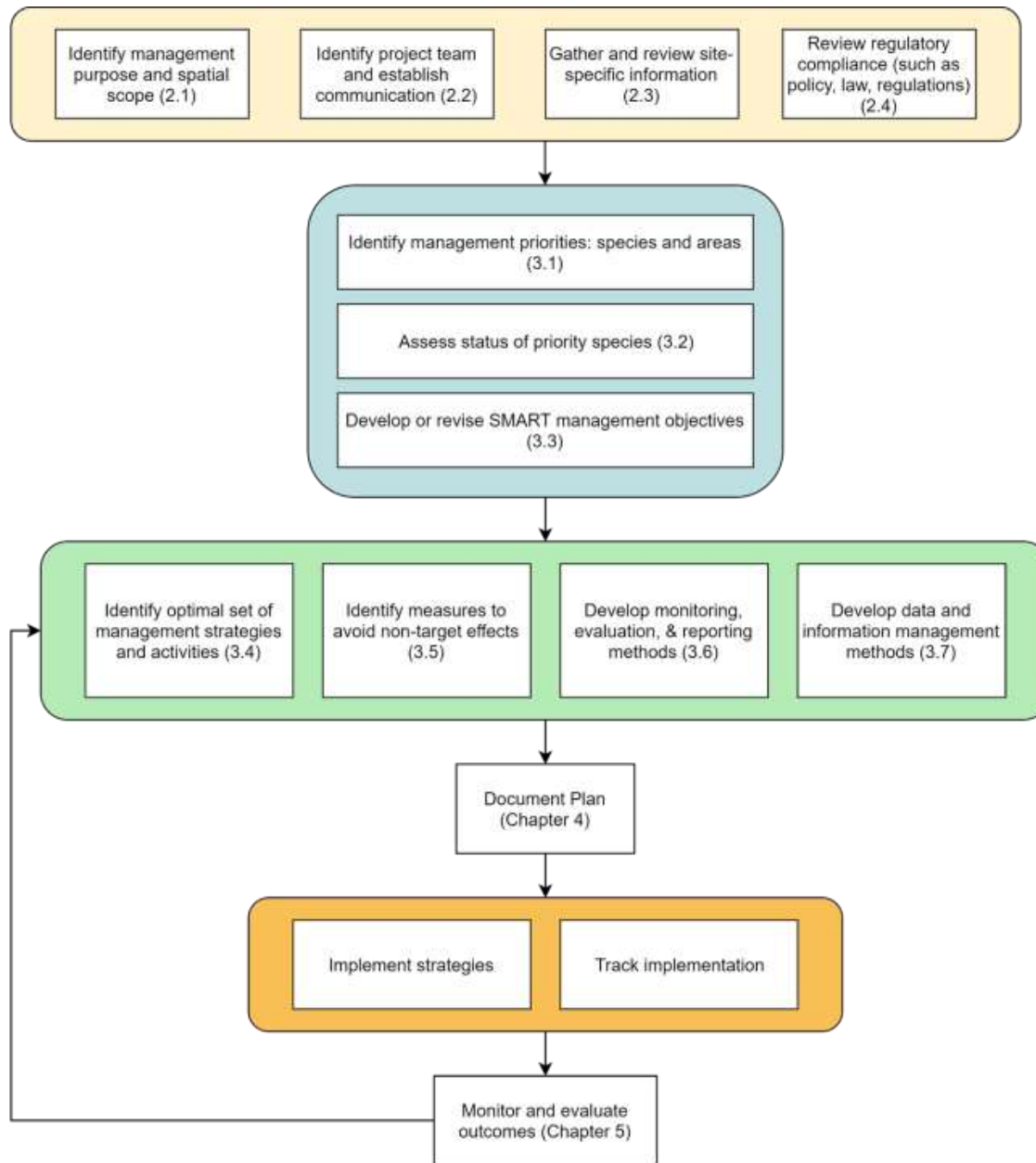| Priority	Plant Name	Site Name	Point and Polygon Numbers	Gross area (or #)	% cover in polygons	Habitat Type	Projected Budget Allocation		
							Year 1	Year 2	Year 3
1	Cape ivy	Moss Lake	Polygon: DeOd001	0.1 acres	30%	Urban/ Developed	60 hrs volunteers	60 hrs volunteers	$5,000 / 50 hrs volunteers
1	English ivy	Webb Creek	Polygons: HeHe001, 002, 004, 007, 011, 018, 019	7.6 acres	70% - 90%	Redwood/ Douglas-fir	$25,000 / 80 hrs volunteers	$10,000 / 80 hrs volunteers	$5,000 / 50 hrs volunteers
1	English ivy; periwinkle	Dyer Canyon (west)	Polygons: HeHe012, 014, 015, 016; ViMa018 Points: HeHe002*	6.6 acres	60% - 80%	Redwood/ Douglas-fir	$25,000 / 80 hrs volunteers	$10,000 / 80 hrs volunteers	$5,000 / 50 hrs volunteers
1	English ivy; periwinkle	Dyer Canyon (east)	Polygons: HeHe008, 010, 017; ViMa013	1.9 acres	ivy 5-50%; periwinkle 90%	Redwood/ Douglas-fir	$5,000 / 80 hrs volunteers	$5,000 / 80 hrs volunteers	$5,000 / 50 hrs volunteers
1	French broom	Summit Road	Polygons: GeMo016, 017, 018, 019 Points: GeMo010*	1.0 acre	5 - 40%	Roadside	$2,500	$2,500	$2,500
1	French, Scotch, & Spanish broom	Central Preserve - south of Bear Creek Rd.	Polygons: GeMo012, 014, 028, 029, 034, 095, 096, 098, 099, 100, 104, 105, 109, 125, 126; SpJu005, 006, 013, 014 Points: GeMo005*, 013*, 014*, 024*; CySc001*, 002*	4.4 acres	5 - 60%	Roadside	$15,000	$10,000	$8,500
1	French & Scotch broom	Central Preserve - north of Bear Creek Rd.	Polygons: GeMo022, 041, 049, 050, 051, 052, 053, 054, 055, 056, 058, 061, 062, 063, 065, 067, 069, 112, 117, 120 Points: GeMo009*, 015*, 018*; CySc004*, 005*	14.8 acres	2 - 60%	Roadside	$12,500	$11,500	$10,000
2	Himalayan blackberry	Dyer Canyon (west)	Points: RuAr009*, 010*	21 plants	-	Redwood/ Douglas-fir	-	$6,000	$4,000
2	Egg-leaf spurge	Collins Creek	Polygon: EuOb001	0.3 acres	20%	Scrub	60 hrs volunteers	40 hrs volunteers	40 hrs volunteers
2	French & Spanish broom	Alma College	Polygons: GeMo042, 043, 070, 071, 075, 078, 086 Points: GeMo001*, 006*, 007*, 008*, 021*, 022*, 023*, 026*, 027*, 029*; SpJu002*	1.2 acres	10 - 40%	Roadside	-	$10,000	$5,000
3	Poison hemlock	Preserve- wide	Polygons: CoMa002, 004, 005, 010	5.7 acres	10%	Various	-	staff	staff
3	Tree of Heaven	Summit Road	Point: AiAt001*	1 tree	-	Redwood/ Douglas-fir	staff	-	-
						Total Budgeted	$85,000 + 360 hours volunteer	$65,000 + 340 hours volunteer	$50,000 + 240 hours volunteer

Plan Implementation and Work Planning

Bear Creek Redwoods Open Space Preserve

Treatment Strategies for Invasive Plants at Bear Creek Redwoods Open Space Preserve
Midpeninsula Regional Open Space District

Species Name	Treatment Method(s)	Specific Conditions	Minimum Treatment Duration	WINTER			SPRING			SUMMER			FALL		
				Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
SHRUBS															
BROOMS:	Shrub -- Life cycle:			Active Growth				Flower			Fruit			Reduced Growth		
Scotch broom (Cytisus scoparius)	Manual			Hand pull small plants; weed wrench large plants												
French broom (Genista monspessulana)	Mechanical + Chemical	Flat areas					0.5-1% Roundup Pro Foliar spray; once stand has browned, cut and mulch in place with tractor/chainsaws						Drought stress reduces effectiveness		
Spanish broom (Spartium junceum)	Chemical						50% Roundup Pro Cut and immediately treat								
Himalayan blackberry (Rubus armeniacus)		Shrub -- Life cycle:		Active Growth					Flower			Fruit				
	Manual			Hand pull/dig out full root												
	Chemical										7 oz/ac Milestone + 1.2% Roundup Custom + 0.5% Liberate NIS Foliar broadcast/spot spray				

| Identify management purpose and spatial scope (2.1) | Identify project team and establish communication (2.2) | Gather and review site-specific information (2.3) | Review regulatory compliance (such as policy, law, regulations) (2.4) |

Identify management priorities: species and areas (3.1)

Assess status of priority species (3.2)

Develop or revise SMART management objectives (3.3)

| Identify optimal set of management strategies and activities (3.4) | Identify measures to avoid non-target effects (3.5) | Develop monitoring, evaluation, & reporting methods (3.6) | Develop data and information management methods (3.7) |

Document Plan (Chapter 4)

Implement strategies

Track implementation

Monitor and evaluate outcomes (Chapter 5)

Guide: Figure 1, p.2 and Table 1, p.3

Monitor, Evaluate, Adapt

Are we implementing strategies as planned?

Are we achieving what we said we would?

Are we still focused on the right things in the right places?
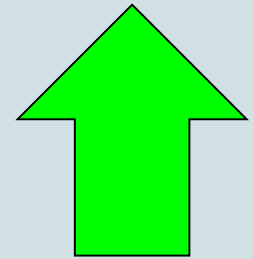
Should we do anything differently?

Monitor, Evaluate, Adapt
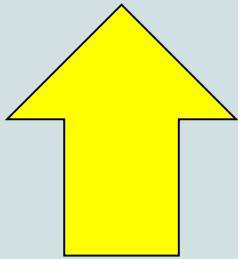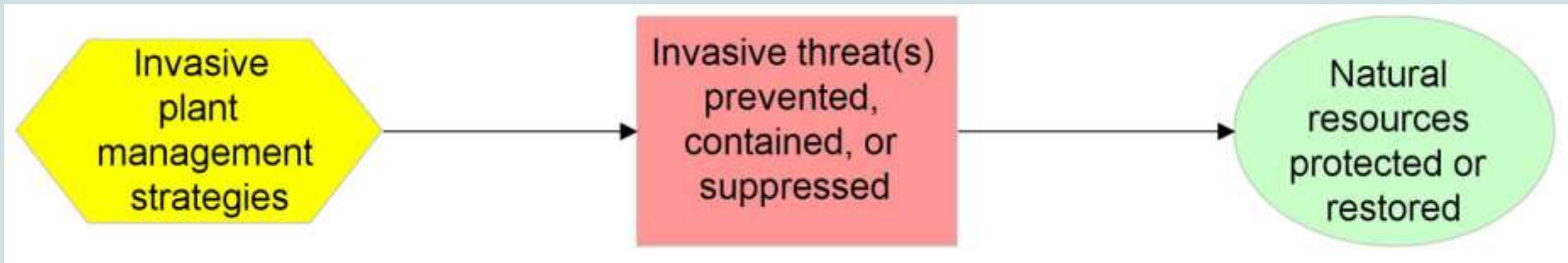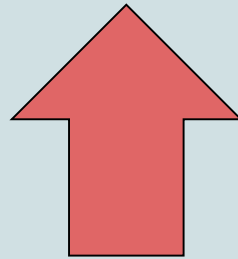
Humboldt Bay Coastal Dune Restoration

❖ Significant decline in funding - impaired implementation

❖ Shifts in public opinion about herbicide use

so.....

Added burning & herbicides to suite of techniques

Previously only physical/manual techniques

San Francisco Bay Estuary Invasive Spartina Project

Higher level of non-targets effects than originally assumed

so.........

❏ Temporarily ceased treatment in sensitive areas

❏ Accelerated native plant restoration

❏ Phase in treatment and restoration in remaining infested areas
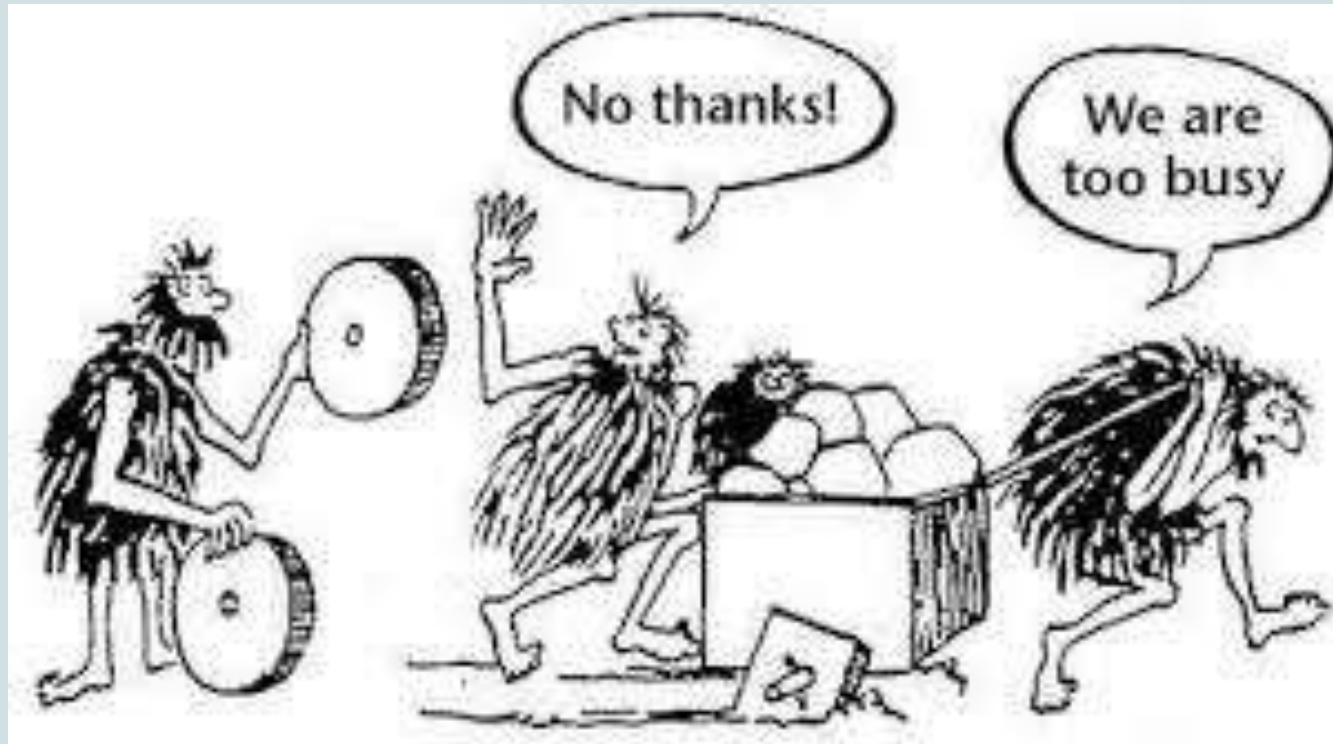
Monitor, Evaluate and Adapt!

Identify, understand, and embrace failure!

❏ Not-so-good assumptions
❏ Implementation issues
❏ Combination of the two

Failures help us learn and adapt BUT we need to detect them first

Our strategies and work plans are imperfect!

Monitor, Evaluate and Adapt!

Important to make time
Build these activities into your work plan

QUESTIONS?

Wrap-up and Evaluation

You will receive an evaluation of this training within two weeks.

PLEASE TAKE IT!

Thank You!