

ISRAP

Invasive Species Risk Assessment and Planning USFWS



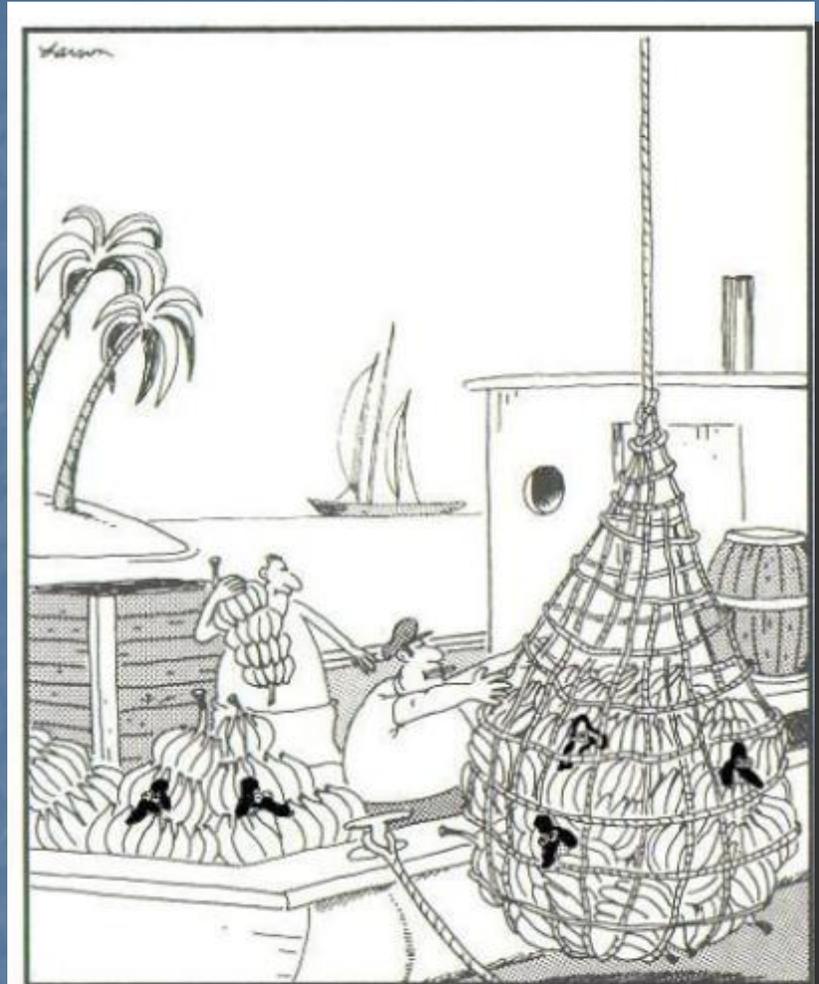
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Presentation OUTLINE

Define the Problem:
Invasive Species and Pathways

Provide a Solution: ISRAP

- ISRAP and HACCP History and Overview
- ISRAP Forms and Function

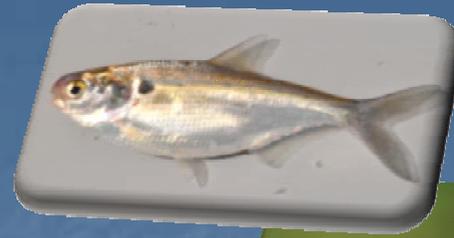


How Poodles Came to America

Define Terminology

Non-target species (NTS) – any species of plant, animal, disease, pathogen, or parasite that may be present in the action area but is not the species for which an action was initiated; synonymous with hazards in the industry's application of HACCP planning.

Target – Whatever is intentionally being moved from place to place



The problem with non-native invasive species...

Worldwide Cost = \$1.4 trillion

U.S. = \$138 billion

(International Congress on Bioinvasions 2009)



2nd leading cause of native species' endangerment/extinction

(Wilcove, 1998)



Non-target Vertebrates

Fish

Reptiles

Amphibians

Other



Non-target Invertebrates

Quagga and Zebra mussels

Crayfish

New Zealand mudsnail

Chinese mitten crab

Asian clam



Non-target Plants

Eurasian water milfoil
Curly leaf pondweed
Salt cedar, tamarisk
Water hyacinth
Giant salvinia
Arundo
Hyrilla



Eichhornia crassipes
water hyacinth
Photo by Ian Richard
Copyright 2006, Univ. of Florida

Hydrilla
Hydrilla verticillata
Photo by Vic Raney
© 2006 University of Florida

Salvinia natans
giant salvinia
Photo by Ian Richard
Copyright 2006 Univ. Florida

Other Non-target Biologics

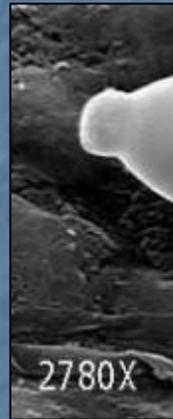
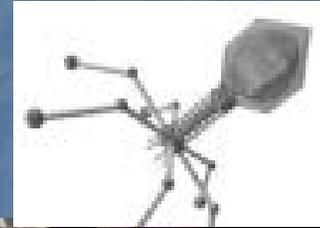
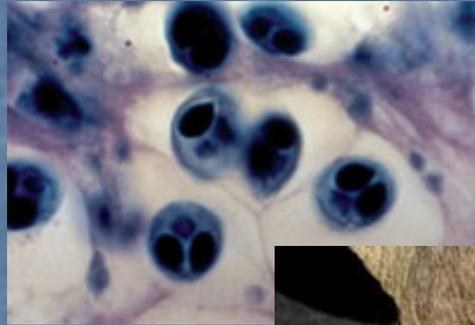
Diseases

Parasites

Fungus (SOD, Chytrid)

Bacteria

Viruses (Whirling disease)



List of Invasive Species from www.invasivespeciesinfo.gov

Alligatorweed (*Alternanthera philoxeroides*)
Brazilian Waterweed (*Egeria densa*)
Caulerpa, Mediterranean Clone (*Caulerpa taxifolia*)
Common Reed (*Phragmites australis*)
Eurasian Watermilfoil (*Myriophyllum spicatum*)
Didymo (*Didymosphenia geminata*)
Giant Reed (*Arundo donax*)
Giant Salvinia (*Salvinia molesta*)
Hydrilla (*Hydrilla verticillata*)
Melaleuca (*Melaleuca quinquenervia*)
Purple Loosestrife (*Lythrum salicaria*)
Water Chestnut (*Trapa natans*)
Water Hyacinth (*Eichhornia crassipes*)
Water Lettuce (*Pistia stratiotes*)
Water Spinach (*Ipomoea aquatica*)
Alewife (*Alosa pseudoharengus*)
Asian Carps
Asian Swamp Eel (*Monopterus albus*)
Bullfrog (*Rana catesbeiana*)
Chinese Mitten Crab (*Eriocheir sinensis*)
Clubbed Tunicate (*Styela clava*) New(Jun 16, 2009)
Eurasian Ruffe (*Gymnocephalus cernuus*)
European Green Crab (*Carcinus maenas*)
Flathead Catfish (*Pylodictus olivaris*)
Lionfish (*Pterois volitans*)
Northern Snakehead (*Channa argus*)
New Zealand Mud Snail (*Potamopyrgus antipodarum*)
Nutria (*Myocastor coypus*)
Quagga Mussel (*Dreissena bugensis*)
Round Goby (*Neogobius melanostomus*)
Rusty Crayfish (*Orconectes rusticus*)
Sea Lamprey (*Petromyzon marinus*)
Sea Squirt (*Didemnum vexillum*)
Spiny Water Flea (*Bythotrephes longimanus*)
Veined Rapa Whelk (*Rapana venosa*)
Zebra Mussel (*Dreissena polymorpha*)
Air Potato (*Dioscorea bulbifera*) New(May 26, 2009)
Autumn Olive (*Elaeagnus umbellata*)
Beach Vitex (*Vitex rotundifolia*)
Common Teasel (*Dipsacus fullonum*)
Dalmatian Toadflax (*Linaria dalmatica*)
Diffuse Knapweed (*Centaurea diffusa*)
Downy Brome (*Bromus tectorum*)
Fig Buttercup (*Ranunculus ficaria*)
Garlic Mustard (*Alliaria petiolata*)
Giant Hogweed (*Heracleum mantegazzianum*)
Hairy Whitetop (*Lepidium appelianum*)
Houndstongue (*Cynoglossum officinale*)
Japanese Stilt Grass (*Microstegium vimineum*)
Japanese World Climbing Fern (*Lygodium japonicum*)
Japanese Honeysuckle (*Lonicera japonica*)
Japanese Knotweed (*Fallopia japonica*)
Japanese Spiraea (*Spiraea japonica*) New(Jun 25, 2009)
Johnsongrass (*Sorghum halepense*)
Kudzu (*Pueraria montana* var. *lobata*)
Leafy Spurge (*Euphorbia esula*)
Medusahead (*Taeniatherum caput-medusae*)
Mile-A-Minute Weed (*Persicaria perfoliata*)
Multiflora Rose (*Rosa multiflora*)
Musk Thistle (*Carduus nutans*)
Old Russian Olive (*Elaeagnus angustifolia*)
Saltcedar (*Tamarix* spp.)
St. Johnswort (*Hypericum perforatum*)
Scotch Broom (*Cytisus scoparius*)
Scotch Thistle (*Onopordum acanthium*)
Spotted Knapweed (*Centaurea stoebe*)
Tree-of-Heaven (*Ailanthus altissima*)
Tropical Soda Apple (*Solanum viarum*)
Whitetop (*Lepidium draba*)
Witchweed (*Striga asiatica*) New(Apr 9, 2009)
Yellow Star Thistle (*Centaurea solstitialis*)
Yellow Toadflax (*Linaria vulgaris*)
Africanized Honeybee (*Apis mellifera scutellata*)
Asian Citrus Psyllid (*Diaphorina citri*)
Asian Long-Horned Beetle (*Anoplophora glabripennis*)
Asian Tiger Mosquito (*Aedes albopictus*)
Cactus Moth (*Cactoblastis cactorum*)
Chillip Thrips (*Scirtothrips dorsalis*) New(Jul 30, 2009)
Citrus Longhorned Beetle (*Anoplophora chinensis*)
Emerald Ash Borer (*Agrilus planipennis*)
European Gypsy Moth (*Lymantria dispar*)
European Spruce Bark Beetle (*Ips typographus*)
Formosan Subterranean Termite (*Coptotermes formosanus*)
Giant African Snail (*Achatina fulica*)
Glassy-Winged Sharpshooter (*Homalodisca coagulata*)
Hemlock Woolly Adelgid (*Adelges tsugae*)
Light Brown Apple Moth (*Epiphyas postvittana*)
Mediterranean Fruit Fly (*Ceratitis capitata*)
Mexican Fruit Fly (*Anastrepha ludens*)
Pink Hibiscus Mealybug (*Maconellicoccus hirsutus*)
Red Imported Fire Ant (*Solenopsis invicta*)
Russian Wheat Aphid (*Diuraphis noxia*)
Silverleaf Whitefly (*Bemisia argentifolii*)
Sirex Woodwasp (*Sirex noctilio*)
Soybean Cyst Nematode (*Heterodera glycines*)
Brown Tree Snake (*Boiga irregularis*)
Cane Toad (*Bufo marinus*)
European Starling (*Sturnus vulgaris*)
Wild Boar (*Sus scrofa*)
Avian Influenza (*Orthomyxoviridae*)
Exotic Newcastle Disease (*Paramyxovirus*)
Fowlpox (*Avipoxvirus*)
Viral Hemorrhagic Septicemia (*Novirhabdovirus*)
West Nile Virus (*Flavivirus*)
Whirling Disease (*Myxobolus cerebralis*)
Citrus Canker (*Xanthomonas axonopodis*)
Citrus Greening (*Liberibacter asiaticus*)
Dogwood Anthracnose (*Discula destructiva*)
Gladiolus Rust (*Uromyces transversalis*) (Jun 11, 2009)
Late Blight (*Phytophthora infestans*) (Jul 9, 2009)
Laurel Wilt (*Raffaelea lauricola*) (Aug 13, 2009)
Plum Pox (*Potyvirus*: *Potyvirus*)
Southern Bacterial Wilt (*Ralstonia solanacearum*)
Soybean Rust (*Phakopsora meibomia*)
Sudden Oak Death (*Phytophthora ramorum*)
White Pine Blister Rust (*Cronartium ribicola*)
Brazilian Peppertree (*Schinus terebinthifolius*)
Canada Thistle (*Cirsium arvense*)
Chinese Tallow (*Triadica sebifera*)
Cogongrass (*Imperata cylindrica*)

Pathways of Introduction

How do they get here:

Aquaria

Aquaculture

Ballast

Intentional Stocking

- Recreational
- Environmental
- Food (seafood)

Landscaping



Pathways of Introduction/VECTORS How they are spread once there are here:

A single pathway may have many non-target vertebrates, plants, invertebrates, microbes, and others...

- Natural Resource Management Activities
- Fire Management
- Restoration, Construction, Utilities, etc
- Outdoor Recreation (hiking, fishing...)
- Recreational Watercraft and Trailers
- Assisted Migration



Natural Resource Management Activities

- Fisheries Surveys
- Restoration
- Hatcheries
- Water Monitoring
- Terrestrial Surveys



Fire Management



Restoration, Construction, and Utilities



Outdoor Recreation

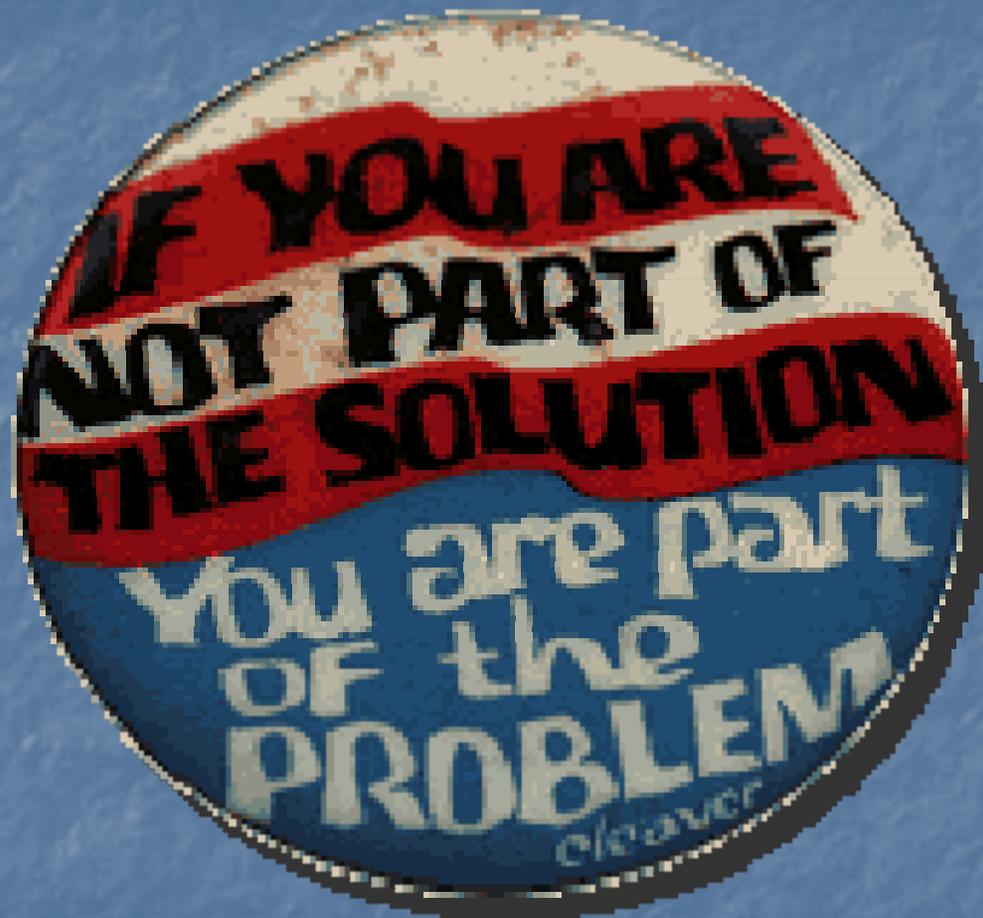


Recreational Watercraft and Trailers



Assisted Migration





What can you do?

Identify the Non-targets

Determine the Pathway(s)

Assess Invasive Species Risk

Identify, Implement, and Evaluate controls

Risk Assessment and HACCP = ISRAP



History, Value, and Overview

HAZARD ANALYSIS & CRITICAL CONTROL POINT PLANNING FOR NATURAL RESOURCE MANAGEMENT

WWW.HACCP-NRM.ORG

Planning is Everything!

Managing Natural Resource Pathways

HACCP



What is ISRAP

Invasive Species Risk Assessment and Planning

- Assess risk of activity to spread non-targets
- Planning tool to remove non-targets (HACCP)
- Focuses attention on critical control points where non-targets can be removed.
- Evaluates control measures

ISRAP and HACCP

- ISRAP couples Risk Assessment with Risk Planning (HACCP)
- HACCP - ASTM standard and a recognizable brand

ISRAP = Invasive Species Risk Assessment and Planning

HACCP = Hazard Analysis and Critical Control Point Planning



Origin of HACCP



30 years ago—"...a program for the astronauts focuses on **preventing** hazards that could cause food-borne illnesses by applying science-based **controls**, from raw material to finished products." U.S. FDA website

<http://www.cfsan.fda.gov/~lrd/bghaccp.html>



HACCP for NRM

- Sea Grant develops ANS-HACCP (wild bait fish)



AIS-HACCP

Alien Invasive Species - Hazard Analysis and Critical Control Point



- USFWS modified HACCP (Inks Dam)



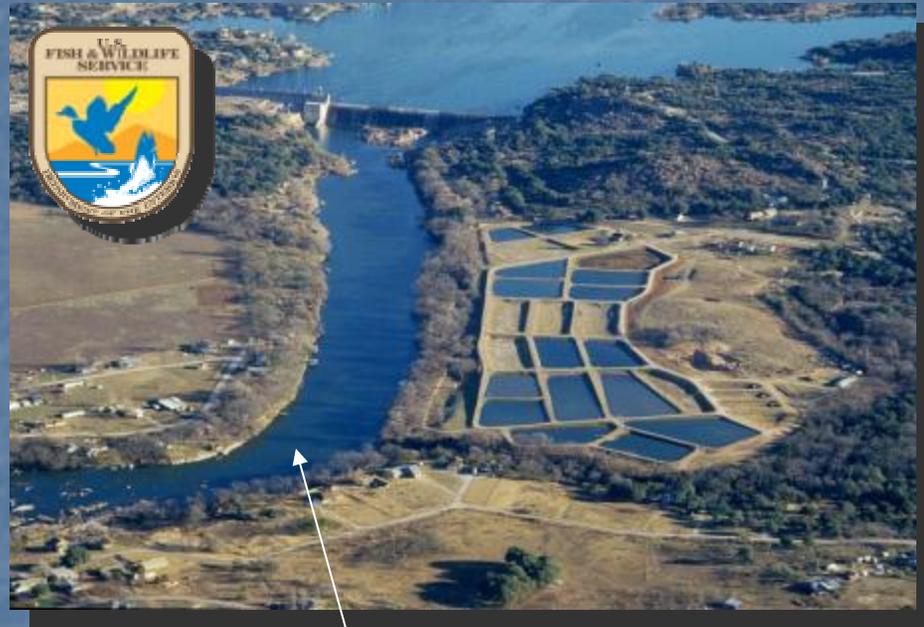
USFWS Example

Inks Dam National Fish Hatchery

NFH located in TX near the CO River

Raises and stocks bass
(Target)

Gizzard shad abundant in water
used by NFH
(Non-Target)



Inks Dam NFH

Provides largemouth bass fingerlings to
New Mexico's Morgan Lake



Gizzard Shad



How not to run a media campaign:

Gizzard shad reported in
Lake Powell in 2000

Likely from Morgan Lake
population.

Bad Press

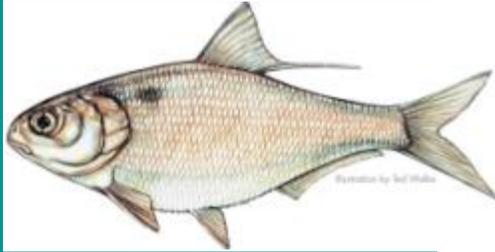
Fish and Wildlife Blunders in Lake Powell

by Skip Knowles
The Salt Lake Tribune

Tuesday,
August 27, 2002

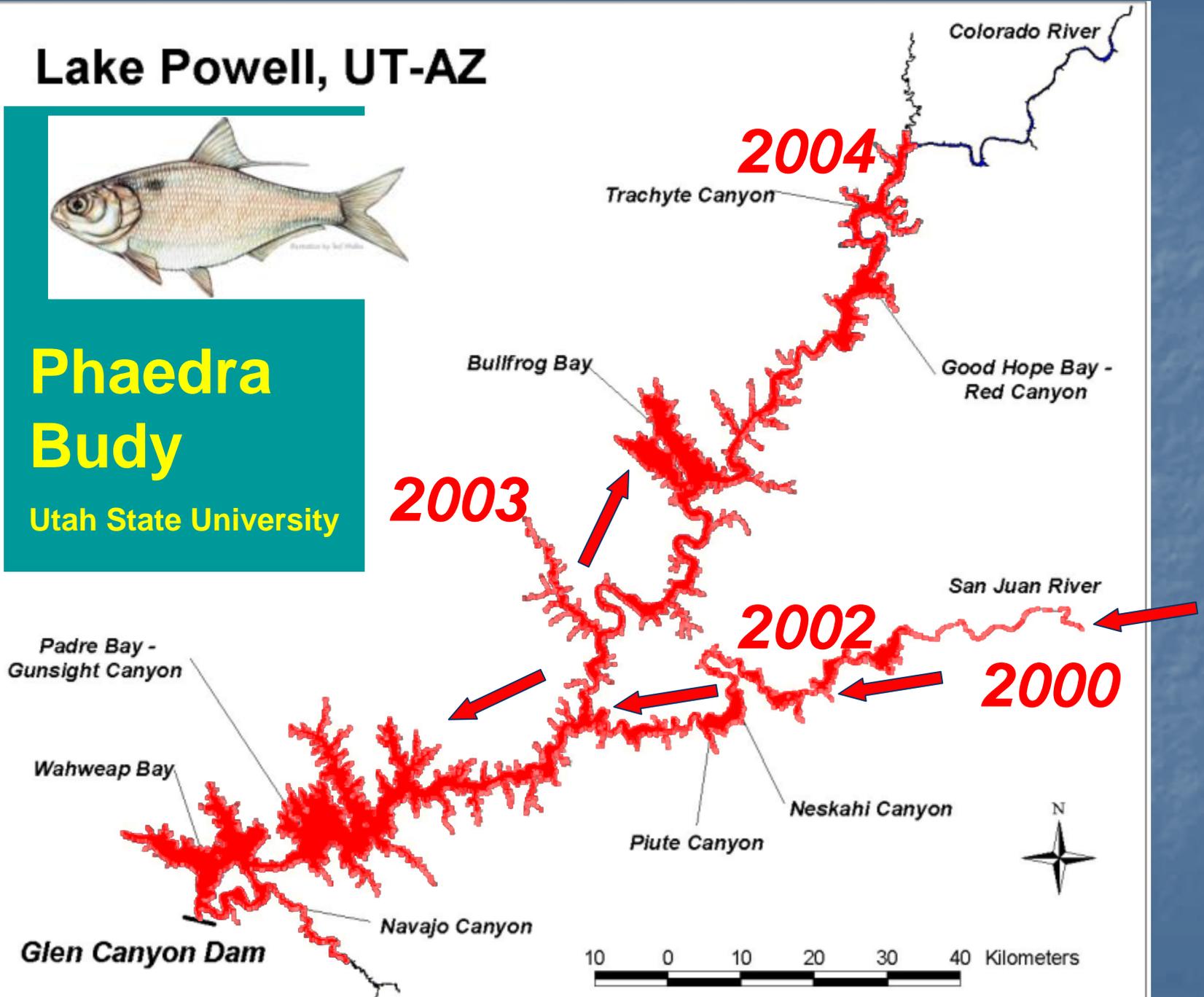
After years of telling Utah biologists to forget about stocking gizzard shad in Lake Powell because of concern for sensitive species, the U.S. Fish and Wildlife Service accidentally did just that.

Lake Powell, UT-AZ



**Phaedra
Budy**

Utah State University



Five EASY Steps of ISRAP

Step 1 – Activity Description

Step 2 – Identify Potential Non-Targets

Step 3 – Activity Flow Chart

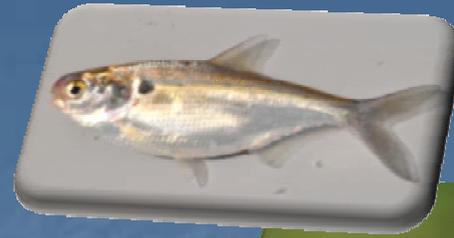
Step 4 – Risk Assessment Matrix, Decision Tree, Non Target Assessment Worksheet

Step 5 – Non Target Risk Assessment Plan (NTRAP)

Define Terminology

Non-target species (NTS) – any species of plant, animal, disease, pathogen, or parasite that may be present in the action area but is not the species for which an action was initiated; synonymous with hazards in the industry's application of HACCP planning.

Target – Whatever is intentionally being moved from place to place



Step 1 - Activity Description

ISRAP Step 1 – Activity Description

Management Objective & Contact Information	
Management Objective:	Contact Person:
	Phone:
	Email:

Activity Description i.e. Who; What; Where; When; How; Why

ISRAP Step 1 – Activity Description

Management Objective & Contact Information	
Management Objective: Implement the Anadromous Fish Restoration Program by performing reconnaissance investigations and touring for fish habitat restoration project planning.	Contact Person: Tricia Parker
	Phone: 530-527-3043 x248
	Email: Tricia_Parker@fws.gov

Activity Description i.e. Who; What; Where; When; How; Why
<p>Who: AFRP staff biologists and associated project partners.</p> <p>What: Field touring, planning, and monitoring of restoration sites.</p> <p>Where: Northern California Central Valley streams under purview of the CVPIA</p> <p>When: Variable.</p> <p>How: Utilize inflatable watercraft and/or snorkeling and/or wading gear to navigate stream reaches. Take equipment to site, unload, use, reload, return to office.</p> <p>Why: To observe river and fish habitat conditions and investigate and monitor restoration sites</p>

Step 2 – Identify Potential Hazards=Non-targets

ISRAP Step 2 – Identify Potential Non-Targets

(to be transferred to column 2 of ISRAP Step 4 – Non-Target Analysis Worksheet)

Non-Targets That May Potentially Be Moved/Introduced
Vertebrates:
Invertebrates:
Plants:
Other Biologics (pathogens, parasites, etc.):

ISRAP Step 2 – Identify Potential Non-Targets

(to be transferred to column 2 of ISRAP Step 4 – Non-Target Analysis Worksheet)

Non-Targets That May Potentially Be Moved/Introduced
Vertebrates: Bullfrogs (<i>Rana catesbeiana</i>), all exotic and invasive fish species
Invertebrates: New Zealand Mudsnail (<i>Potamopyrgus antipodarum</i>), Zebra Mussel (<i>Dreissena polymorpha</i>), Asian Clam (<i>Corbicula fluminea</i>), Siberian Prawn (<i>Exopalaemon modestus</i>), Bubble Snail (<i>Haminoea japonica</i>), Jellyfish (any sp.), Crawdads (any sp.), Mitten Crabs (<i>Eriocheir sinensis</i>), Green Crabs (<i>Carcinus maenas</i>)
Plants: Purple Loosestrife (<i>Lythrum salicaria</i>), Broadleaved pepperweed (<i>Lepidium latifolium</i>), Brazilian Waterweed (<i>Egeria densa</i>), Water Hyacinth (<i>Eichhornia crassipes</i>), Watermilfoil (<i>Myriophyllum aquaticum</i>), Giant Arundo (<i>Arundo donax</i>), Yellow Flag Iris (<i>Iris pseudacorus</i>), Scarlet Wisteria (<i>Sesbania punicea</i>), Hydrilla (<i>Hydrilla verticillata</i>), Canadian Waterweed (<i>Elodea Canadensis</i>), Ludwigia (<i>Ludwigia grandiflora</i>)
Other Biologics (pathogens, parasites, etc.): None.

Step 3 – Activity Flow Chart

ISRAP Step 3 – Activity Flow Chart

Outline Sequential Tasks of Activity
(to be transferred to column 1 of the ISRAP Step 4 – Non-Target Analysis Worksheet)

Task 1	Title:
	Description:
⇓	
Task 2	Title:
	Description:
⇓	
Task 3	Title:
	Description:
⇓	
Task 4	Title:
	Description:
⇓	
Task 5	Title:
	Description:

ISRAP Step 3 – Activity Flow Chart

Outline Sequential Tasks of Activity
(to be transferred to column 1 of the ISRAP Step 4 – Non-Target Analysis Worksheet)

Task 1	Title: Load gear
	Description: Unload stored equipment; load truck and drive to site. Drop shuttle vehicle at take out site.
⇓	
Task 2	Title: Unload gear
	Description: Once at site, unload equipment, assemble/inflate watercraft, put waders or wetsuit on, and prepare for survey.
⇓	
Task 3	Title: Use gear
	Description: Launch watercraft into stream and float downstream, or snorkel downstream, occasionally stopping at bank sites while conducting survey. Also foot surveys.
⇓	
Task 4	Title: Re-load gear
	Description: At the end of survey, disassemble/deflate watercraft, remove waders or wetsuit, and load into trucks and drive back to the original launch site to pick up first vehicle.
⇓	
Task 5	Title: Store gear
	Description: Drive back to office, remove and store equipment.

Step 4 – Non-Target Analysis Worksheet

ISRAP Step 4 – Non-Target Analysis Worksheet

1 Tasks (from ISRAP Step 3 - Activity Flow Chart)	2 Potential non-targets identified in ISRAP Step 2	3 Are any potential non-targets significant? Yes or No	4 Justify Risk Assessment	5 If you have decided that this is a Control Point, what Control Measures can be applied to stop the spread of non-targets?	6 Is this task a critical control point? Yes or No
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Task 1 – (Title)	Vertebrates				
	Invertebrates				
	Plants				
	Other Biologics				

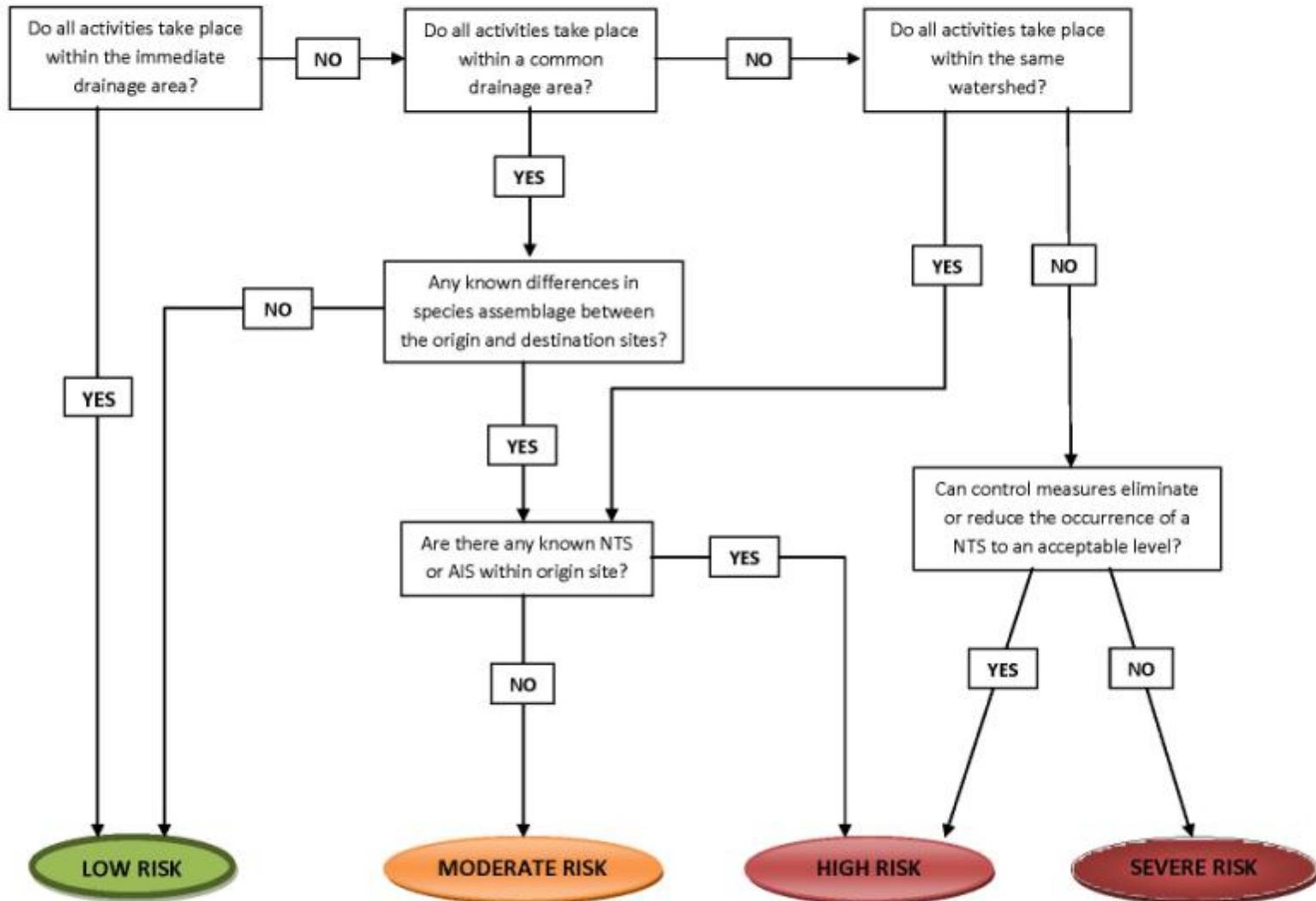
Task 2 – (Title)	Vertebrates				
	Invertebrates				
	Plants				
	Other Biologics				

For additional pages, select entire page and copy to a new page.

ISRAP Step 4 – Non-Target Analysis Worksheet

ISRAP Step 4 – Non-Target Analysis Worksheet

1 Tasks (from ISRAP Step 3 - Activity Flow Chart)	2 Potential non-targets identified in ISRAP Step 2	3 Are any potential non-targets significant? Yes or No	4 Justify Risk Assessment	5 If you have decided that this is a Control Point, what Control Measures can be applied to stop the spread of non-targets?	6 Is this task a critical control point? Yes or No
Task 1 Title Load gear	Vertebrates Fish Bullfrogs	No	Equipment was properly cleaned after previous survey.		
	Invertebrates See Step 2: Invertebrates	No	Equipment was properly cleaned after previous survey.		
	Plants See Step 2: Plants	No	Equipment was properly cleaned after previous survey.		
	Other Biologics None	No	Equipment was properly cleaned after previous survey.		
Task 2 Title Unload gear	Vertebrates Fish Bullfrogs	No	Entire task takes place with clean gear at immediate site.		
	Invertebrates See Step 2: Invertebrates	No	Entire task takes place with clean gear at immediate site.		
	Plants See Step 2: Plants	No	Entire task takes place with clean gear at immediate site.		
	Other Biologics None	No	Entire task takes place with clean gear at immediate site.		



ISRAP and Risk

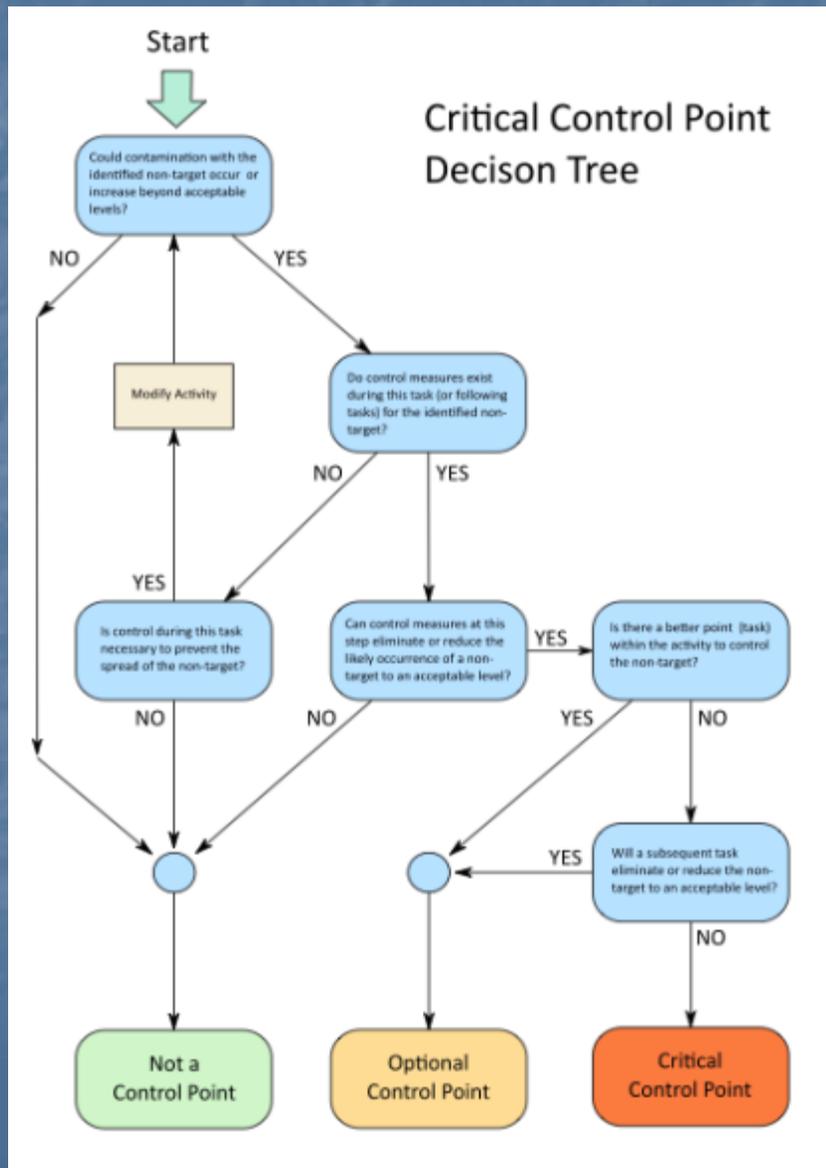
- The level of risk, of a task together with the potential non-targets, is determined by reasonable significance of risk; provide a justification.
- Remember what Risk is in this case... It's is the risk of moving species from one place to another
- Is the Risk Level is high enough that **control measures** are needed to reduce risk to an acceptable level.

ISRAP Step 4 – Non-Target Analysis Worksheet

1 Tasks (from ISRAP Step 3 - Activity Flow Chart)	2 Potential non-targets identified in ISRAP Step 2	3 Are any potential non-targets significant? Yes or No	4 Justify Risk Assessment	5 If you have decided that this is a Control Point, what Control Measures can be applied to stop the spread of non-targets?	6 Is this task a critical control point? Yes or No
--	---	---	------------------------------	--	---

Task 5 Title Store gear	Vertebrates Fish Bullfrogs one	Yes	The activities have taken place in different drainages with different species assemblages.	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.	Yes
	Invertebrates See Step 2: Invertebrates	Yes	The activities have taken place in different drainages with different species assemblages.	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.	Yes
	Plants See Step 2: Plants	Yes	The activities have taken place in different drainages with different species assemblages.	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.	Yes
	Other Biologics None	Yes	The activities have taken place in different drainages with different species assemblages.	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.	Yes

Critical Control Point Decision Tree



- Control point - Any step or task at which potential hazards can be controlled
- Critical control point - (CCP) The best point, step, or procedure at which significant hazards can be prevented or reduced to minimum risk

ISRAP Step 4 – Non-Target Analysis Worksheet

1 Tasks (from ISRAP Step 3 - Activity Flow Chart)	2 Potential non-targets identified in ISRAP Step 2	3 Are any potential non-targets significant? Yes or No	4 Justify Risk Assessment	5 If you have decided that this is a Control Point, what Control Measures can be applied to stop the spread of non-targets?	6 Is this task a critical control point? Yes or No
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Task 5 Title Store gear	Vertebrates Fish Bullfrogs one	Yes	The activities have taken place in different drainages with different species assemblages.	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.	Yes
	Invertebrates See Step 2: Invertebrates	Yes	The activities have taken place in different drainages with different species assemblages.	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.	Yes
	Plants See Step 2: Plants	Yes	The activities have taken place in different drainages with different species assemblages.	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.	Yes
	Other Biologics None	Yes	The activities have taken place in different drainages with different species assemblages.	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.	Yes

ISRAP Step 5

(any "Yes" from column 6 of ISRAP Step 4 – Non-Target Analysis Worksheet) One Page for Each Critical Control Point. Use this Form for			
Management Objective from Step #1:			
Critical Control Point: Task # "Yes" from Step 4, column 6		Title:	
Significant Non-Target(s): (Step 4, column 3)			
Control Measure (Step 4, column 5):			
Prescribed range, limit, or criterion for Control Measure:			
Control Measure Monitoring: WHO?			
HOW?			
WHERE?			
HOW OFTEN?			
Evaluate Control Measure (Answer Yes or No to the following questions): Yes No <input type="checkbox"/> <input type="checkbox"/> Did the action fall outside a prescribed range, limit, or criterion? <input type="checkbox"/> <input type="checkbox"/> Did the Control Measure fail?			
Corrective Actions, if any "yes" above:			
Supporting Documents (if any): Management Plan, Checklist, Decontamination Techniques, SOPs, Scientific Journal Article, etc.			
Development Team Members:			
Date Developed:		Date(s) Reviewed:	

**ISRAP Step 5 – Non-Target Risk Action Plan Form
(NTRAP)**

(any "Yes" from column 6 of ISRAP Step 4 – Non-Target Analysis Worksheet) One Page for Each Critical Control Point. Use this Form for	
Management Objective from Step #1:	Implement the Anadromous Fish Restoration Program by performing reconnaissance investigations and touring for fish habitat restoration project planning.
Critical Control Point: Task # "Yes" from Step 4, column 6	5 Title: Store gear
Significant Non-Target(s): (Step 4, column 3)	Yes
Control Measure (Step 4, column 5):	The control measure will be proper cleaning -- defined as spraying off and thoroughly drying gear.
Prescribed range, limit, or criterion for Control Measure:	The spray used for cleaning gear will be in contact with the gear for ten minutes; it will be a 3.5% solution of <i>Sparquat 256</i> from the Spartan Chemical Company . EPA registration #5741-9. GSA (NSN No. 1025-04) = \$56 per case (4 gal) Additional info at http://www.spartanchemical.com
Control Measure Monitoring: WHO?	Tricia Parker and Brenda Olson
HOW?	The Sparquat spray will be mixed at the rate of 4.3 ounces of "Sparquat256" per gallon water. The method of producing the diluted solution will be double checked by another staff person. A timer will be used to insure that the ten minute application is met.
WHERE?	At RBFWO
HOW OFTEN?	After each use.
Evaluate Control Measure (Answer Yes or No to the following questions):	
Yes <input type="checkbox"/>	No <input type="checkbox"/> Did the action fall outside a prescribed range, limit, or criterion?
<input type="checkbox"/>	<input type="checkbox"/> Did the Control Measure fail?
Corrective Actions, if any "yes" above:	Re-apply the Sparquat spray.
Supporting Documents (if any):	
1) Revised Reclamation Equipment Inspection and Cleaning Manual http://www.usbr.gov/pps/Equipment/InspectionandCleaningManual2010.pdf 2) Preventing Spread of Aquatic Invasive Organism Common to the Intermountain Region http://www.fs.fed.us/r4/resources/aquatic/guidelines/techguidelines_fire_AIS2010.pdf	
Development Team Members:	Tricia Parker, Jonathon Thompson
Date Developed:	8/4/2010 Date(s) Reviewed:

Questions

