

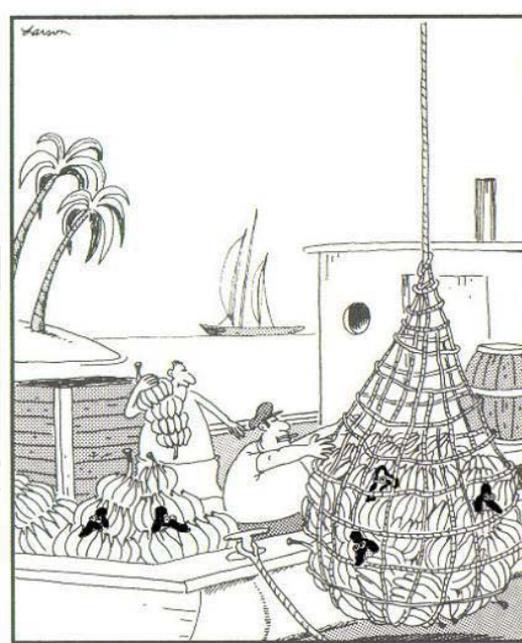
ISRAP

Invasive Specie Risk Assessment and Planning
USFWS



WORKSHOP OUTLINE

- Introductions
- Regional Invasive Sp Pathways
- ISRAP and HACCP I and Overview
- ISRAP Form and Fur



How Poodles Came to America

Introductions

1. Name
2. Present Position and Location
3. Your Biggest Invasive Species or Non-target Concern
4. What You Want to Accomplish with ISRAP

Session Objectives

- Discuss invasive species issues including:
 - Historical evidence
 - Economic loss
 - Legislative actions and initiatives resulting from invasive or non-target species movements that have occurred.
- Define what a pathway is and identify possible pathways of introducing non-target species to the natural resource.

Session Objectives

- Define species terminology and their use in invasive species management.
- Describe the relationship between risk assessment and risk management.
- Relate the 5 steps of HACCP and how it is integrated with Invasive Species Risk Assessment & Planning (ISRAP).

Session Objectives

- Explain the necessity of teamwork and team diversity.
- Recognize the importance of agency commitment in developing an ISRAP process.

Define Terminology

- **Native**

vs.

- **Invasive (aka...)**

- **Nuisance species**
- **Established / Naturalized**
- **Introduced / Alien / Foreign**
Non-native / Exotic

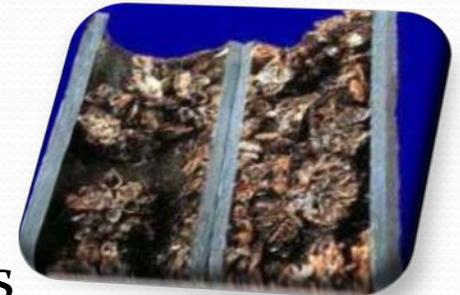
- **ISRAP definitions:**

- **Non-target species (NTS)**
- **Target Species**



The problem with non-native invasive species...

- Severe, Irreversible Environmental Impacts
 - 2nd leading cause of native species' Global biodiversity loss
- Costly Economic Impacts
 - Worldwide Cost = \$1.4 trillion
 - U.S. = \$138 billion (International Congress on Bioinvasions 2009)
- Risk to Human Health



Hydrilla

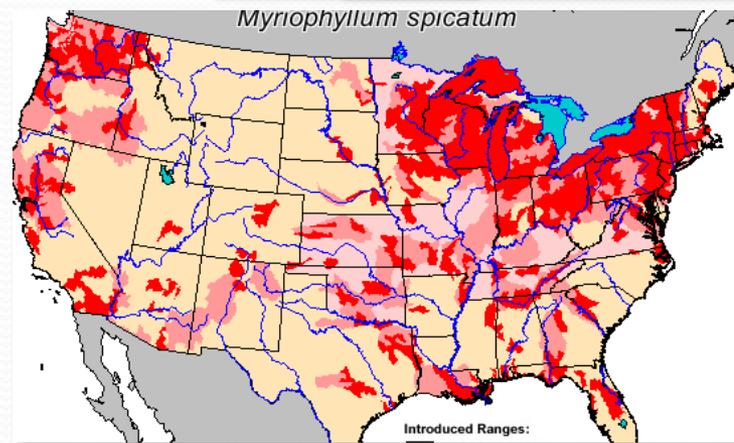
- One fragment can lead to introduction
- Shades out competitors
- Millions of dollars are spent in Florida and California on control.
- Clogs water delivery canals



Eurasian Watermilfoil

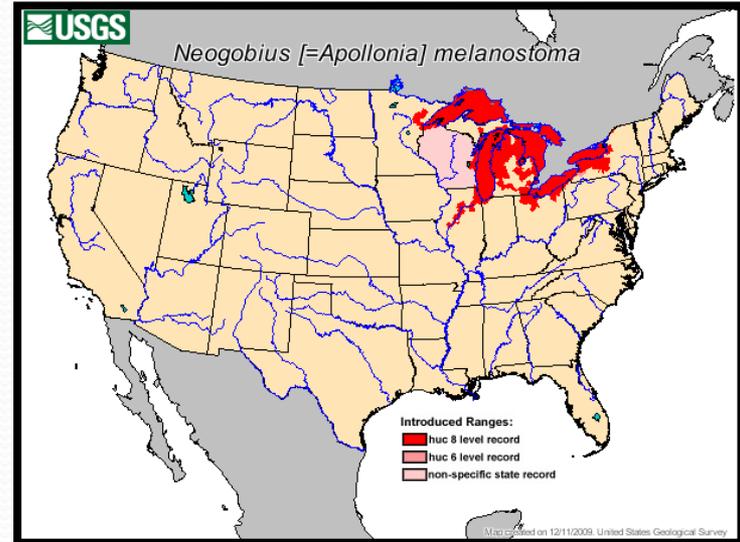
(*Myriophyllum spicatum*)

- Competes aggressively to displace and reduce the diversity of native aquatic plants
- Less valuable food source for waterfowl than native plants
- Depletes dissolved oxygen levels
- Restricts swimming, fishing and boating
- Clog water intakes



Round Goby

- Found in the Great Lakes
- Food Chain – competition and predation
- Contaminants Transfer
- Recreational Fishermen



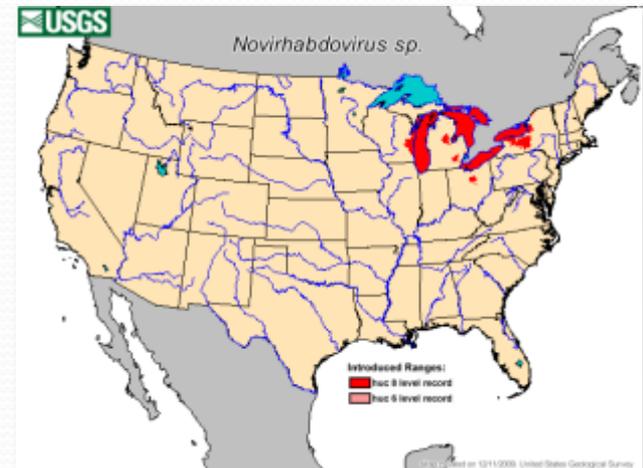
Asian Carp (Black, Silver, Grass, Bighead)

- Reach extremely high population densities
- Impact populations of native mussels and snails (black carp)
- Have the potential to deplete zooplankton populations (silver and bighead)



VHS (Viral Hemorrhagic Septicemia)

- Viral hemorrhagic septicemia is a severe disease of freshwater and marine fish.
- Nearly 50 species of fish are known to be susceptible to VHS.
- behavior that involves swimming erratically in circles or in a corkscrew pattern
- Fishes are susceptible to infection at any age



Whirling Disease

- Whirling?
- All species of trout and salmon may be susceptible to whirling disease.
- live infected fish are the main vector for the spread of the disease.



Illustration by Randy Bright Provided by Montana Fish, Wildlife, and Parks

Caulerpa taxifolia

“killer seaweed”

- Threatens kelp forests and associated animals
- Fast growth, spreads easily from fragments to form dense blankets
- Grows in shallow or deep water (up to 100 ft)
- Inedible or toxic to most fish
- Discovered June 2000 in Carlsbad, CA in a coastal lagoon
- Declared eradicated 2006 through chemical control



Kudzu

- Crowds out native species
- 1876 Centennial Exposition in Philadelphia
- Originally a erosion control and garden plant
- Kudzu Clubs honoring miracle vine
- Declared a weed in 1972
- Noxious Weed in 1997
- 7 million acres
- Grows 1 foot per day



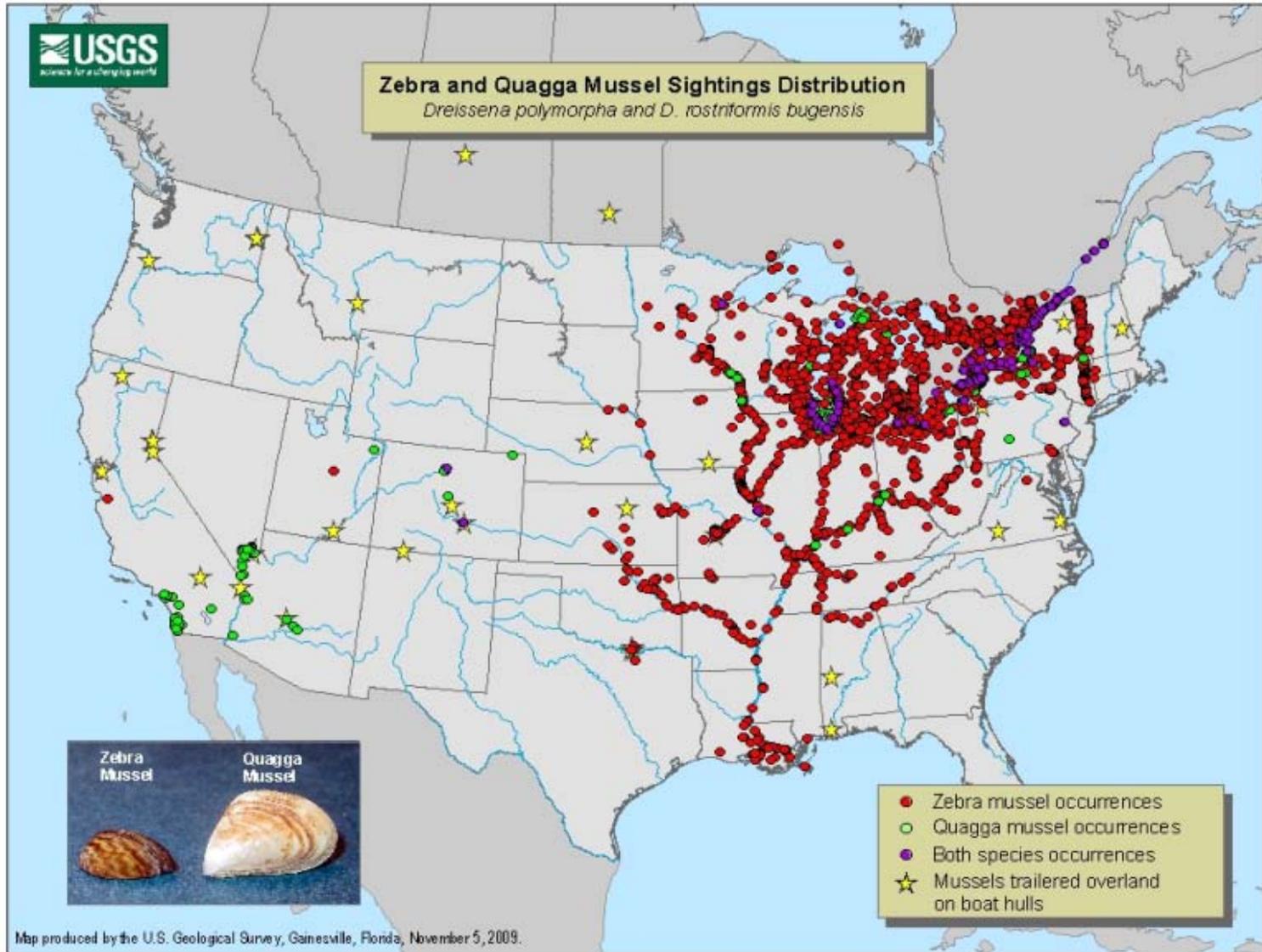
Quagga and Zebra Mussels

• Identification

- Freshwater, bivalve mollusks
- Typically have a dark and white (zebra-like) pattern on their shells.
- Minor morphological and ecological differences, both species are very similar and pose a significant threat to our waters
- Usually about an inch or less long, but may be larger
- Attach to hard substrates much like marine mussels but unlike any native freshwater bivalve
- They are often found in clusters



Quagga and Zebra Mussels



Quagga and Zebra Mussels

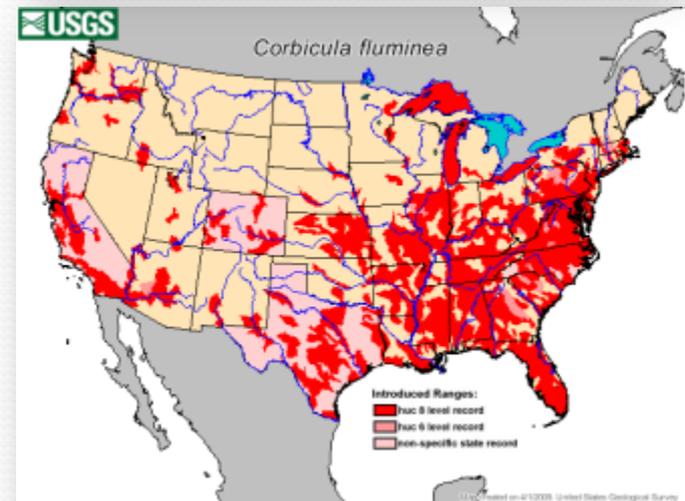
• Impacts/Economic

- Clog water intakes and pipes
- Damage pump
- Decrease power production
- Increase maintenance costs
- Harm commercial fisheries
- Damage boat engines
- Increase watercraft maintenance
- Sharp shells hurt!
- Foul odor



Asian Clam (*Corbicula fluminea*)

- Relatively small 1 – 1.5 inches
- Yellowish brown to black shell
- Numerous, evenly spaced, concentric, elevated ridges on the surface
- Spreads rapidly
- Limits phytoplankton biomass
- Fouls water intakes
- Alters benthic habitats
- Adds nitrogen and phosphorous to aquatic ecosystems
- Impacts aesthetic and recreational value



New Zealand Mudsnail (*Potamopyrgus antipodarum*)

- Max size 5 mm
- 5 - 6 Whorls
- Confirm identification with an expert
- Outcompete native aquatic snails and insects
- Not a viable source of food for trout



Are those felt soles?



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*)
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 meibomiae*)
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:

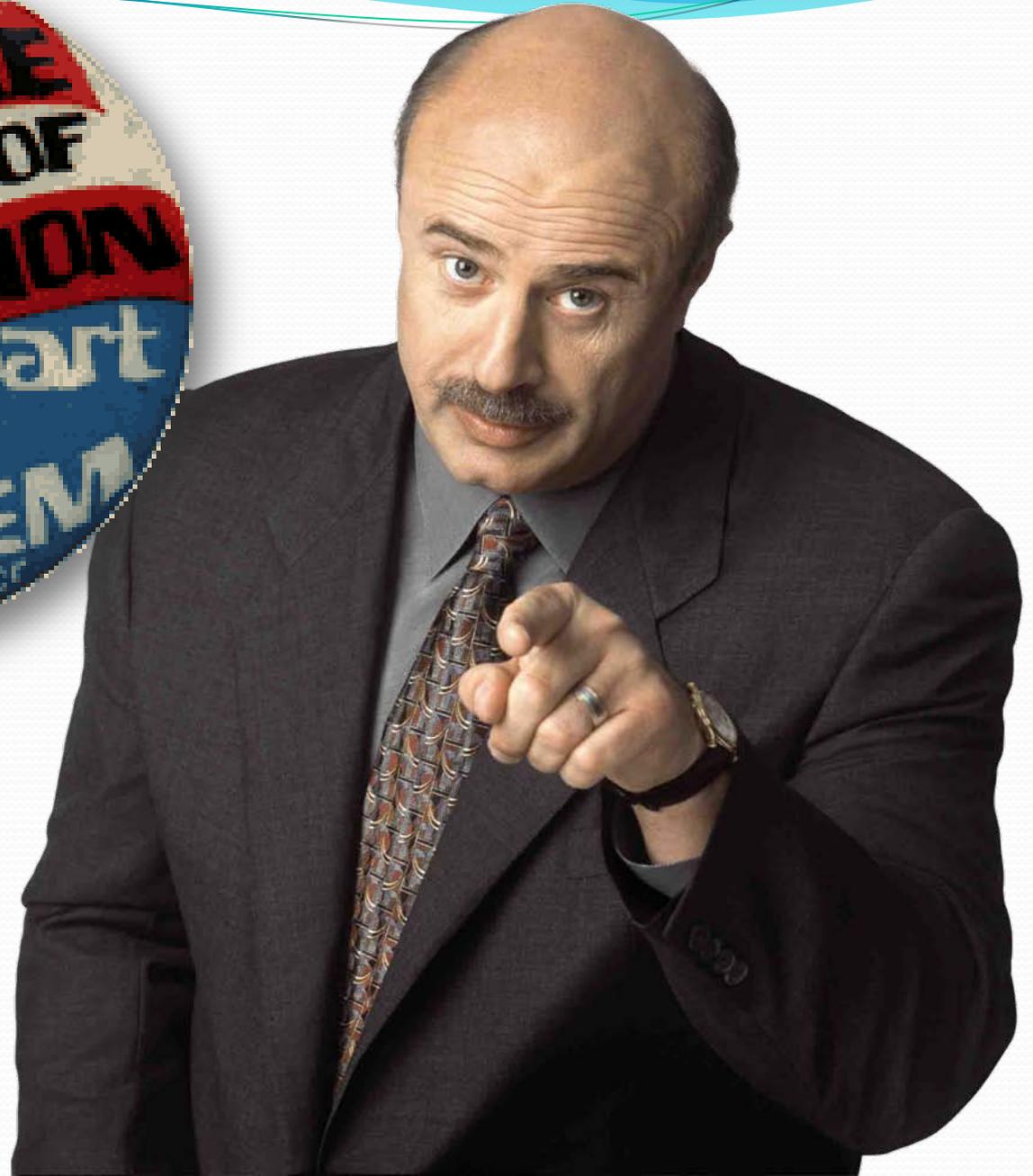
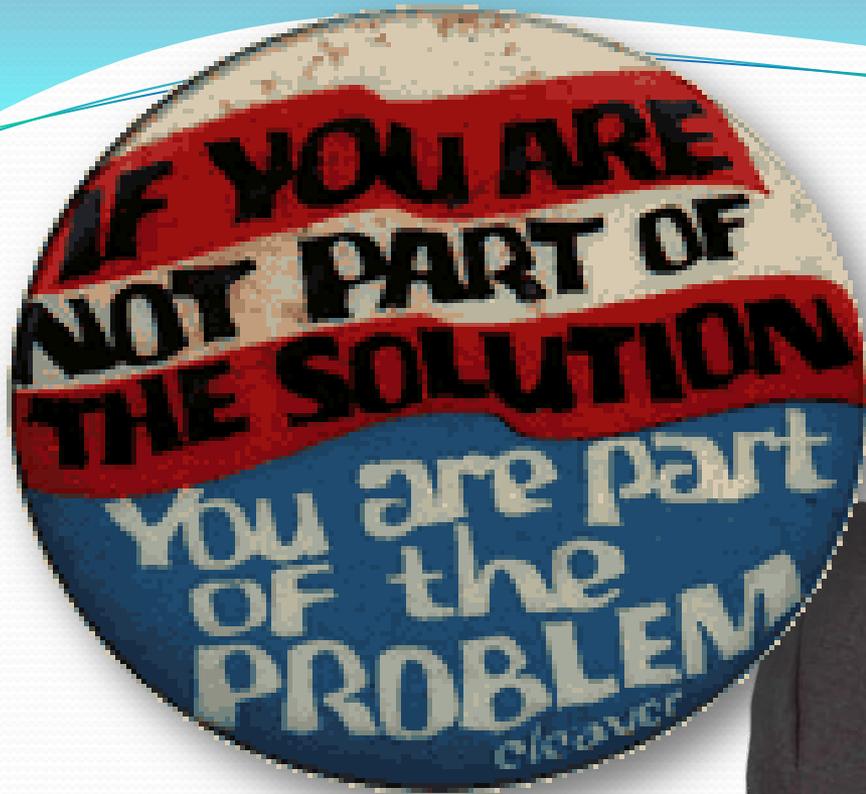
- Ballast water operations
- Biofouling of ship hulls
- Release of unwanted pets and fishing bait
- Release or escape of classroom and laboratory animals
- Escape from aquaculture facilities, nurseries, or water gardens
- Intentionally stocked as food or recreational sources
- Released as biological control of existing an existing invader
- Introduced for habitat restoration or erosion control efforts



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

- A single pathway may have many NIS vertebrates, plants, invertebrates, microbes, and others...
 - Natural Resource Management Activities
 - Fire Management
 - Restoration activities
 - Vehicles and Construction Equipment
 - Recreational Watercraft and Trailers
 - Outdoor Recreation (hiking, fishing...)



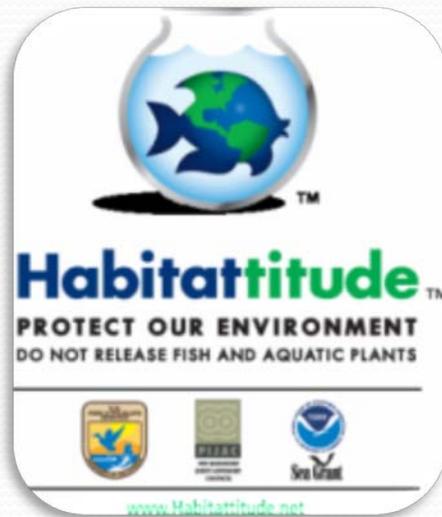


Invasive Species

National Laws and Regulations

- Lacey Act
- Non-indigenous Aquatic Nuisance Prevention and Control Act
- National Invasive Species Act
- Executive Order 13112

Invasive Species Initiatives and Campaigns



ISRAP History and Overview



- What is ISRAP
- HACCP and ISRAP
- ISRAP Example



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



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

Aquatic Invasive Species – Hazard Analysis and Critical Control Point



- USFWS modified HACCP for resource management activities

ISRAP and HACCP

- HACCP = Hazard Analysis and Critical Control Point Planning
 - Defines hazards
 - Defines the critical point in a given activity whereby the risk of a hazard can be reduced to an acceptable level.
 - Evaluates control measures
- ISRAP - couples Risk Assessment to HACCP
 - Identifies high-risk activities and focuses attention on those actions needed to close open pathways

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)

Implementing ISRAP/HACCP

On the ground:

To do or not or not to do:

A great question:

- It is essential that ISRAP and the HACCP process become not only a way of doing business but a part of our responsibilities as stewards of nature.
- This includes our professional and personal lives.

What can you do?

- Identify the non-targets
- Determine the pathway(s)
- Assess Invasive Species Risk
- Identify, Implement, and Evaluate control
- Risk Assessment and HACCP = ISRAP



USFWS Example

Inks Dam National Fish Hatchery

... Prior to HACCP

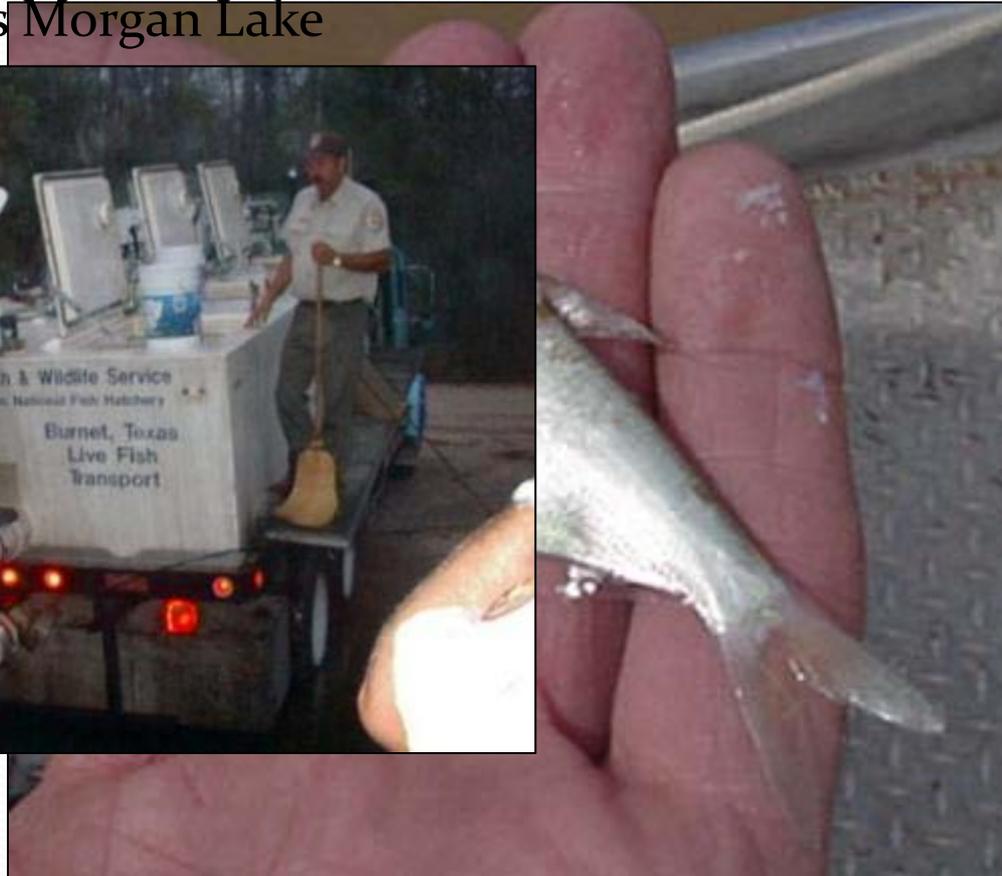
- NFH located in TX near the Colorado River
- The Hatchery raises and stocks bass (Target)
- Gizzard shad abundant in Lake Buchanan, the water source used by NFH (Non-Target)



Inks Dam National Fish Hatchery

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 - HACCP Could Have Prevented this Hatchery Introduction



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.

Remember its all about Pathways

<http://www.haccp-nrm.org/>



Ken A. Langeland, University of Florida, www.forestryimages.org

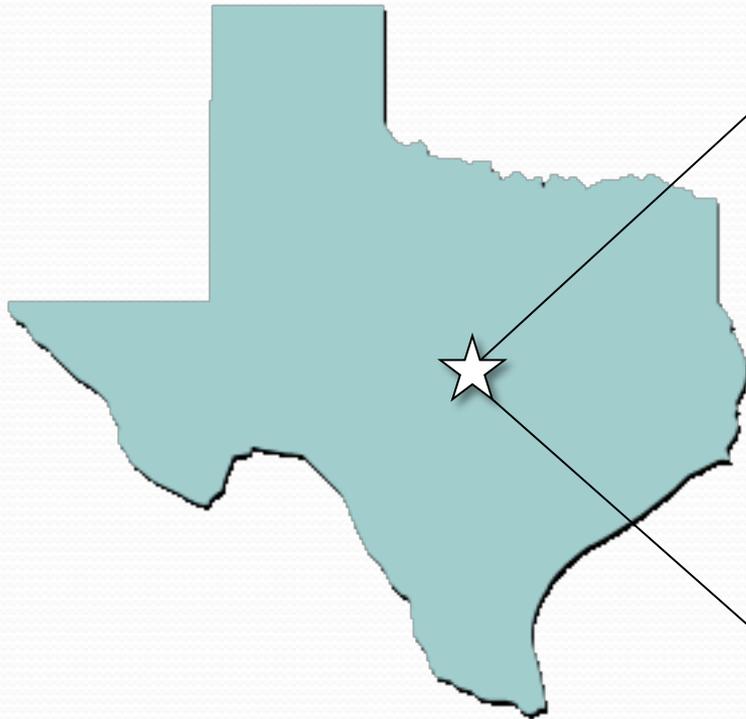
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Questions???





Inks Dam National Fish Hatchery Case Study

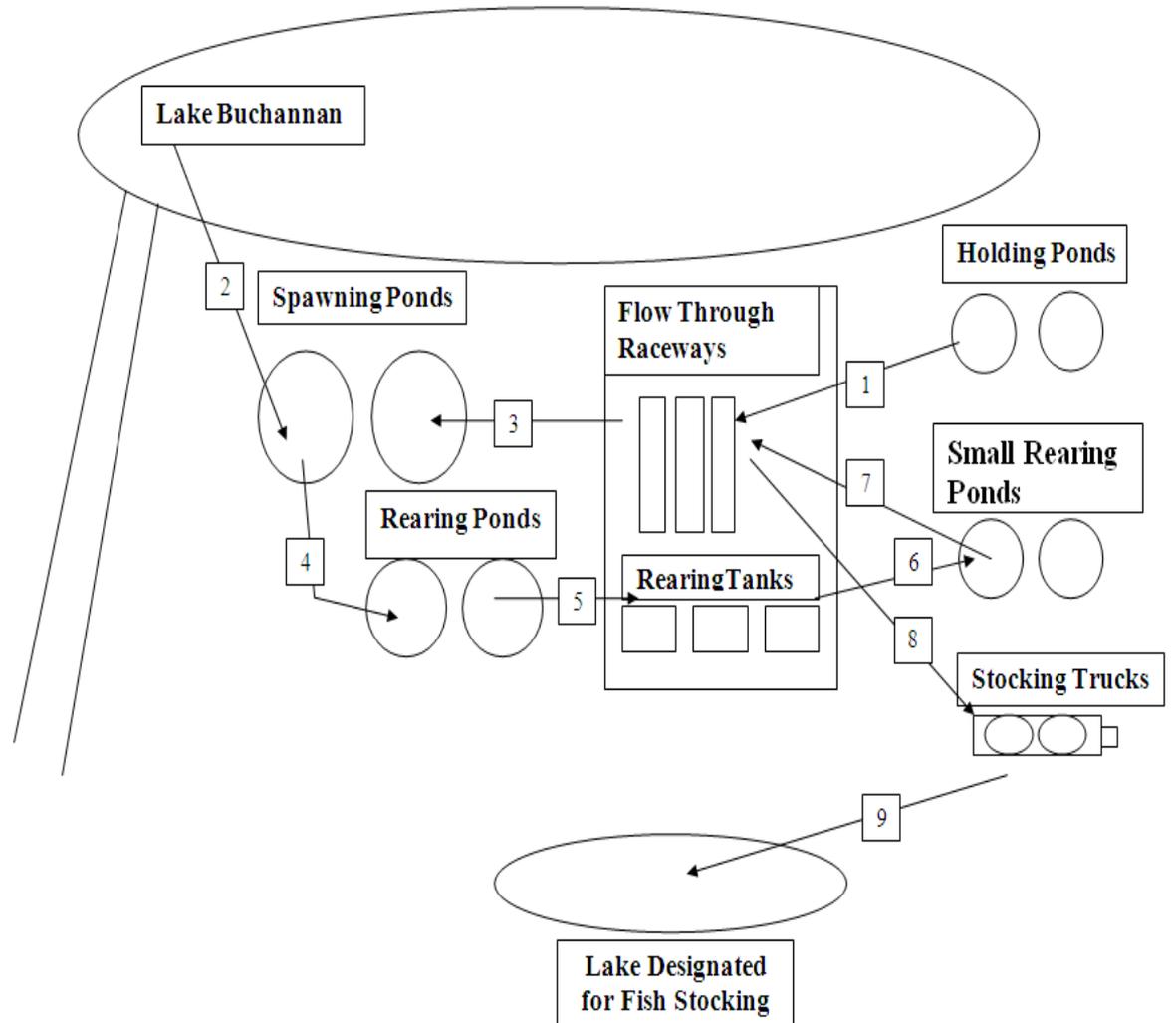


Learning Objectives

- Describe the largemouth bass production sequence for Inks Dam NFH
- Describe the potential non-target pathways
- Describe the potential non-targets
- Describe control measures implemented to prevent the spread of non-targets
- Describe the evaluation method implemented to check control measures

Inks Dam National Fish Hatchery Case Study

- Largemouth bass are spawned in ponds filled with Lake Buchanan water from late March to early May
- Fry moved and grown in separate ponds
- Harvested in September to October and held in holding tanks for 2-5 days before shipping



Inks Dam National Fish Hatchery Case Study

- Possible Invasive Species pathways:
 - Water for spawning and rearing ponds from Lake Buchanan
 - Invasion during growing season
 - Water to fill stocking truck

Inks Dam National Fish Hatchery Case Study

- Possible Non-Targets:
 - Fish
 - Other Vertebrates
 - Invertebrates
 - Plants
 - Pathogens



Inks Dam National Fish Hatchery Case Study

- Control Measures
 - Filter water coming into ponds
 - Harvest of bass using large-mesh dip nets
 - Removal of plants & invertebrates with flow-through holding tanks
 - Fill truck with well water



Pond being filled with Lake Buchanan water
with filter sock in place



Filtration system now in place at Inks Dam

Inks Dam National Fish Hatchery Case Study

- Evaluation Methods
 - Biologists on receiving end inspect every shipment before stocking

Inks Dam National Fish Hatchery Case Study

ISRAP was applied at Inks Dam to:

- Identify non-target species
- Identify potential pathways
- Identify high-risk activities
- Develop control procedures
- Evaluate the control procedures for effectiveness

Inks Dam National Fish Hatchery Case Study

Questions?



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

Description Components

Key Questions

- Who
- What
- Where
- When
- How
- Why



Description Components

- Who
 - Who is the project coordinator
 - Who is the site manager

Description Components

- What
 - What is the activity or action

Description Components

- When
 - One time occurrence – or -
 - Continuously occurring, for example:
 - Maintenance
 - Surveys or monitoring
 - Field collections
 - Seasonal fish distribution

Description Components

- Where
 - Statewide
 - Refuge
 - Watershed
- Site specific
 - Property name
 - Stream/lake name

Description Components

- Why
 - What is the need and objective of the action/activity

The Activity Description needs to be:

- Complete
- Thorough
- Accurate
- Succinct



Things to Remember

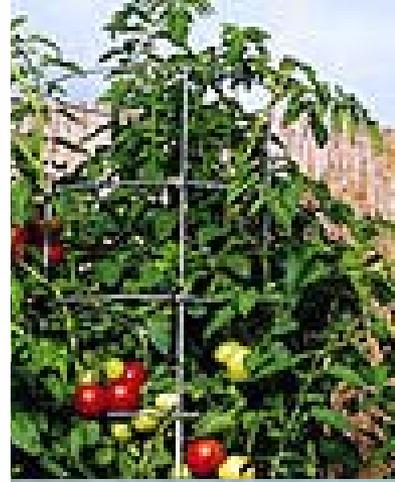
- Activity Description is important for completion of the next 2 steps
- Should be complete enough to allow someone unfamiliar with the project to assist with ISRAP plan creation.

Inks Dam Example

ISRAP Step 1 – Activity Description

Management Objective & Contact Information	
Management Objective:	Contact Person: Hatchery Manager
Rearing and distribution of largemouth bass free of non-targets.	Phone: Phone: 1-800-LUV-FISH
	Email: fishlover@tex.net

Activity Description i.e. Who; What; Where; When; How; Why
<p>Who: Inks Dam National Fish Hatchery personnel</p> <p>What: Raising 6-8" largemouth bass free of non-targets</p> <p>Where: Double-ponds at Inks Dam NFH in Burnet, TX</p> <p>When: Spawning in April, raised in ponds, & stocked in September-November</p> <p>How: In early March 4-year-old broodstock are harvested by draining the pond and moved to flow-through raceways. In 2-3 weeks, depending on temperatures, fish are sorted by sex and 50 pair are stocked into a spawning pond and allowed to spawn in cages. Most fish will spawn in 3 days. About 17 days after brood fish are stocked fry collection begins. Schools of fry are collected with seines and moved in 20-gallon tubs to filled and fertilized rearing ponds. Fry usually are kept in these rearing ponds for 3 weeks when they are harvested as 1.5 inch fingerlings and moved to holding tanks to be trained on artificial feed. After four weeks of feeding these fish are moved to small rearing ponds where artificial feeding on pellets continues throughout the rest of the rearing cycle. The 6-8 inch fish are usually equipped with oxygen and easy loading/unloading access. The yearling fish are graded, sorted, weighed, and treated, if needed, before they are loaded for distribution in two to three days. Larger fish are easier to separate from non-targets and some species have matured and left the rearing pond. Fish are then distributed to receiving waters in the southwest. Requesting Fish & Wildlife Conservation Offices meet the delivery truck to assist with stocking.</p> <p>Why: Stocking of tribal waters in Arizona</p>



Tomato Exercise

ISRAP Step 1 – Activity Description

Activity Description	
Facility: June's Tomato Farm	Site: Somewhere in West Virginia
Project Coordinator: June Mcllwain	Activity/Management Objective: Raising & selling USDA certified organic tomatoes
Site Manager: June Mcllwain	
Address: West of NCTC	
Phone: 1-EAT-TOM-ATOS	
Project Description i.e. Who; What; Where; When; How; Why	
<p>I am going to purchase some tomato plants at Home Depot in the spring. Before planting I will prepare the soil using a rented rototiller and fertilize with locally obtained horse manure. In my 20' x 20' patch, tomatoes will be planted on mounds on 3-foot centers. When the plants are in the ground, I will install a new drip irrigation system and water daily for 3 minutes. I am raising these organic tomatoes to sell at the roadside stand on Highway 2, after being certified by the USDA Organic Tomato Inspector as non-target free.</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.):

Key ISRAP Terminology

Target:

Whatever is intentionally being moved from place to place (can be species or object).



Non-target:

Any species that may be present in the action area, but is not the species for which an action was initiated



Non-target Vertebrates

Fish

Reptiles

Amphibians

Mammals



Non-target Invertebrates

Snails

Crab

Clam and Mussels

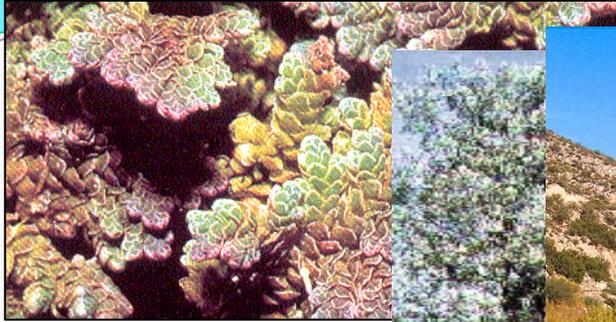
Zooplankton

Crustaceans

Insects



Non-target Plants



Other Non-target Biologics

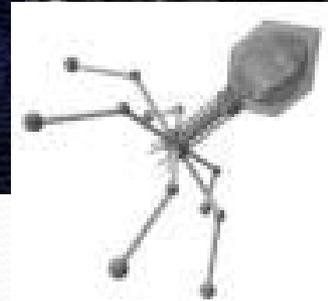
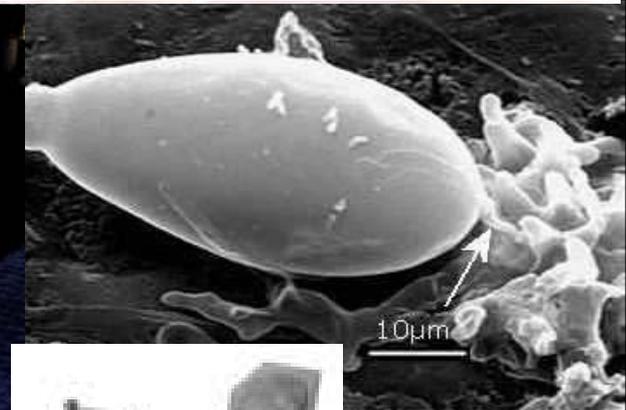
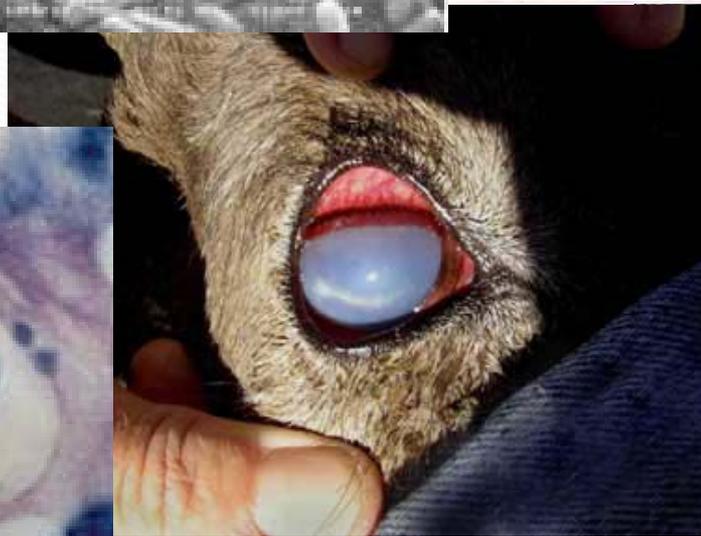
Diseases

Parasites

Fungus

Bacteria

Viruses



Step 2 – Potential Hazards

Things to Remember when developing a Potential Non-target List:

- ✓ Does not have to be a full list of non-native species.
- ✓ If there is a potential to spread even one species, ISRAP will prevent the spread of others of that type
- ✓ Can be very general
- ✓ Requires Local Experts

(Some) Resources to Identify Non-Target Species

USGS NAS (Non-indigenous Aquatic Species) Database

<http://nas.er.usgs.gov>

Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS)

<http://www.glerl.noaa.gov/res/Programs/ncrais/glansis.html>

National Exotic Marine and Estuarine Species Information System (NEMESIS)

<http://invasions.si.edu/nemesis>

USDA Plants Database

<http://plants.usda.gov/java/noxiousDriver>

NISbase - The International Nonindigenous Species Database Network

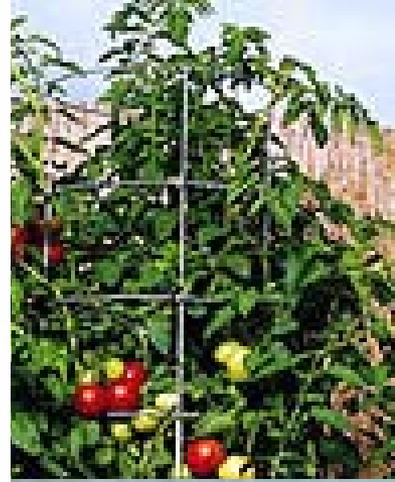
<http://www.nisbase.org>

Inks Dam National Fish Hatchery Case Study

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
<p>Vertebrates:</p> <p>Guadalupe bass (<i>Micropterus treculi</i>), logperch (<i>Percina caprodes</i>), gizzard shad (<i>Dorosoma cepedianum</i>), white bass (<i>Morone chrysops</i>), bluegill (<i>Lepomis macrochirus</i>), warmouth (<i>Lepomis gulosus</i>), green sunfish, common carp, smallmouth buffalo, redbreast sunfish, bullfrogs, tadpoles, gulf coast toad, aquatic snakes</p>
<p>Invertebrates:</p> <p>miscellaneous aquatic insects, Asian clam (<i>Corbicula spp</i>), crayfish</p>
<p>Plants:</p> <p>Hydrilla, Eurasian watermilfoil, water star thistle, water hyacinth, brushy pond week, various algae (<i>Chara, Pithophora, Hydrodicton</i>)</p>
<p>Other Biologics (pathogens, parasites, etc.):</p> <p>Largemouth bass virus</p>



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
<p>Vertebrates:</p> <p>Guadalupe bass (<i>Micropterus treculi</i>), logperch (<i>Percina caprodes</i>), gizzard shad (<i>Dorosoma cepedianum</i>), white bass (<i>Morone chrysops</i>), bluegill (<i>Lepomis macrochirus</i>), warmouth (<i>Lepomis gulosus</i>), green sunfish, common carp, smallmouth buffalo, redbreast sunfish, bullfrogs, tadpoles, gulf coast toad, aquatic snakes</p>
<p>Invertebrates:</p> <p>miscellaneous aquatic insects, Asian clam (<i>Corbicula spp</i>), crayfish</p>
<p>Plants:</p> <p>Hydrilla, Eurasian watermilfoil, water star thistle, water hyacinth, brushy pond week, various algae (<i>Chara, Pithophora, Hydrodicton</i>)</p>
<p>Other Biologics (pathogens, parasites, etc.):</p> <p>Largemouth bass virus</p>

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:

Session Objectives

- Exercise to create atmosphere of teamwork and stress importance of involving others
- Interpret what a flow diagram represents
- Be able to successfully complete a flow chart

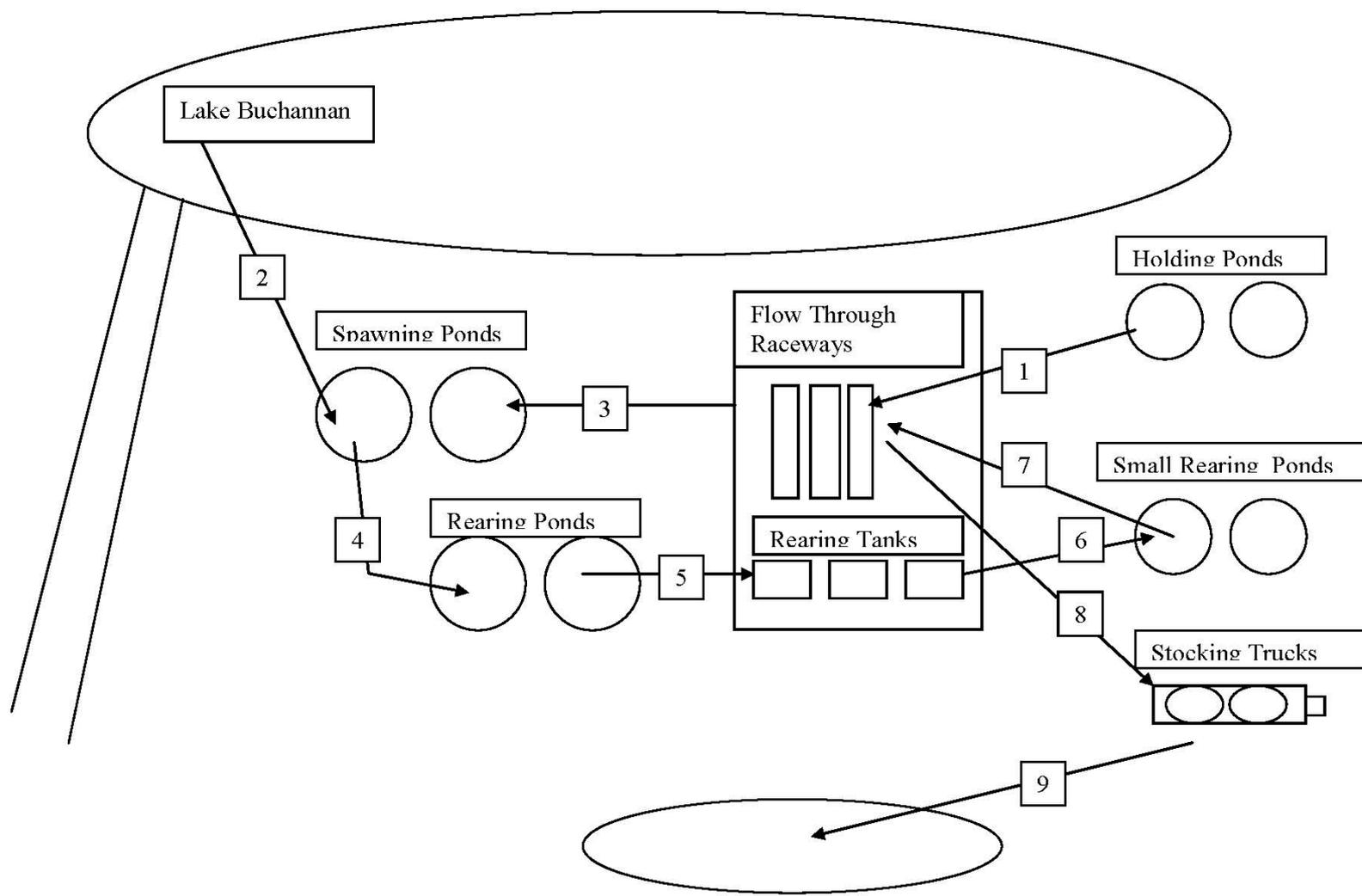
What is a Flow Chart?

- Identify mechanics of activities as tasks
- Records what should happen, not what does
- It outlines a sequence of actions
- Each task is given a number, simple title, and brief description
- Listing of most basic steps

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: Harvest and Sort Brood Description: Harvest brood fish from holding ponds & transfer to raceways. Hold fish for 2-3 weeks in raceways. Sort, grade, sex brood stock (50 pair) for spawning.
⇓	
Task 2	Title: Filling Spawning Ponds Description: Fill spawning ponds with Lake Buchanan water through gravity feed water line.
⇓	
Task 3	Title: Brood Transfer Description: Transfer broodstock (50 pair) to spawning pond.
⇓	
Task 4	Title: Harvest Fry Description: Harvest fry 17 days after brood fish are stocked out to spawn and move to rearing pond for 3 week phase I rearing.
⇓	
Task 5	Title: Harvest Phase I Fingerlings Description: Harvest phase I fingerlings (1.5 inches) and move to confined rearing tanks with flow-through water and begin 4 weeks of feeding artificial diet.
⇓	
Task 6	Title: Harvest Pre-Phase II Fingerlings Description: Harvest pre-phase II fish and move to small rearing ponds. Continue feeding until harvest in November as phase II (6-8 inch fish).
⇓	
Task 7	Title: Harvest Phase II Fingerlings Description: Harvest phase II LMB and move to flow-through raceway and complete grading, sorting, counting, weighing, and examination.
⇓	
Task 8	Title: Fill and Load Distribution Truck Description: Fill Regional Distribution Unit with well water. Load phase II largemouth and haul to stocking sites.
⇓	
Task 9	Title: Stock LMB Description: Fishery staff meets distribution unit and net fish directly or send them through the quick discharge tube into lakes or ponds.

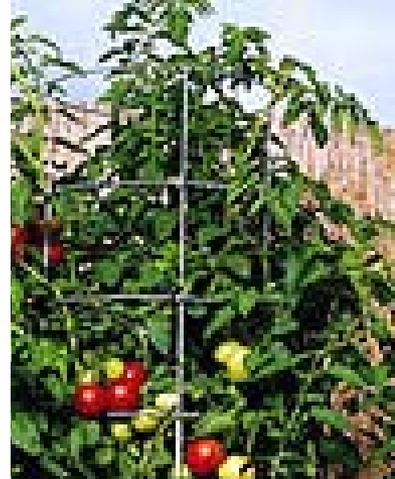


Review

- List only the primary steps
- If chart is too detailed then it can be difficult to get members to agree and may slow down the process.
- Only list the “what” does not require the who, when, where, or why:
- Does not require clarity of purpose, objectives, or who is involved or responsible

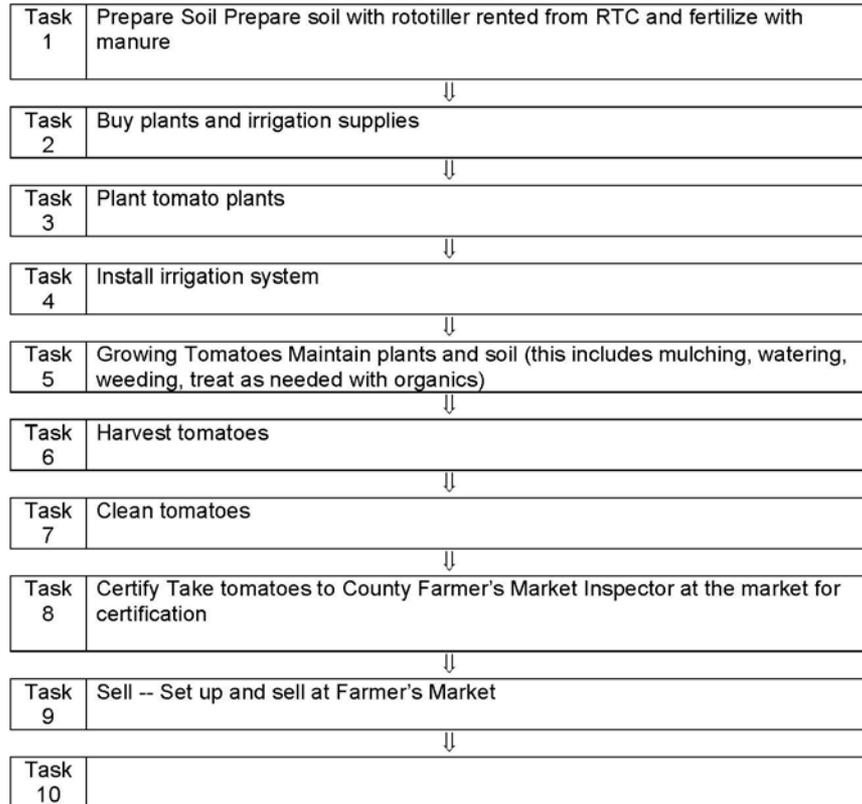
How is the Flow Chart used?

- The tasks are analyzed for the risk of spreading invasive species
- The **Non-Target Analysis Worksheet (Step 4)**



ISRAP Step 3 – Flow Diagram

Flow Diagram Outlining Sequential Tasks to Complete Activity/Project
Described in ISRAP Step 1 – Activity Description
(to be transferred to column 1 of the ISRAP Step 4 –Non-Target Analysis Worksheet)



Step 4 – Non-Target Risk 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 (e.g. RAM Score)	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 # Title:	Vertebrates:				
	Invertebrates:				
	Plants:				
	Other Biologics:				

Task # Title:	Vertebrates:				
	Invertebrates:				
	Plants:				
	Other Biologics:				

Session Objectives

- Assess each task & associated Control Measures to determine if a task is a Critical Control Point
 - Incorporate information from Steps 1-3
 - Utilize a risk assessment tool – **Risk Assessment Matrix** (RAM) – to determine Risk
 - Develop **Control Measures** for each Task, if necessary
 - Assess each Task by employing a CCP Decision Tree to determine if it is a **Critical Control Point**
 - Pull all components together to move forward to Step 5

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 (e.g. RAM Score)	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: Harvest and Sort Brood	Vertebrates: Other Fish Species				
	Invertebrates: Miscellaneous aquatic insects				
	Plants: Hydrilla, water star thistle				
	Other Biologics: None				

Task # 2: Fill Spawning Pond with Inks Lake water	Vertebrates: Other Fish Species				
	Invertebrates: Miscellaneous aquatic insects				
	Plants: Hydrilla, water star thistle				
	Other Biologics: None				

Risk Assessment vs. Management

Risk Assessment

- Risk Assessment is a determination of value of risk (either quantitative or qualitative) related to a concrete situation and a recognized threat (also called hazard).
- Levels of Risk depend on the magnitude of the potential loss and the probability the loss will occur.
- Risk Assessment is only part of Risk Management



Risk Assessment vs. Management

Risk Management

- Risk management is the identification, assessment, and prioritization of risks followed by coordinated and economical application of resources and strategies to minimize, monitor, and control the probability and/or impact of unfortunate events.
- HACCP focuses mainly on identification and prioritization
- ISRAP is Risk Management
- Risk Assessment has been strengthened in ISRAP to help reach HACCP goals.



Understanding the RAM

- Each Category separated in 5 Classes:
 - No Risk (**green**)
 - Low Risk (**blue**)
 - Moderate Risk (**brown**)
 - High Risk (**orange**)
 - Severe Risk (**red**)
- Low to High Risk Classes separated further into subclasses progressively higher risk conditions

Understanding the RAM

- Each risk class has several criterion to represent conditions present for a task or activity.

Risk Level	Aquatic Management Activities
No Risk	Does Not Exist
Level 1a Low Risk	<ul style="list-style-type: none">• <u>Activities In Immediate Drainage W/O Barriers (Continuous, Tributaries Within Drainage)</u>• Like Habitat, No Differences In Known Species Assemblages• No NTS, AIS, ORVI In Origin

- The bold & underlined criterion is known as the significant criterion

Understanding the RAM

- The significant criterion identifies the noteworthy criterion for that risk level.

Risk Level	Aquatic Management Activities
No Risk	Does Not Exist
Level 1a Low Risk	<ul style="list-style-type: none"> <u>Activities In Immediate Drainage W/O Barriers (Continuous, Tributaries Within Drainage)</u> Like Habitat, No Differences In Known Species Assemblages No NTS, AIS, ORVI In Origin
Level 1b Low Risk	<ul style="list-style-type: none"> <u>Activities In Immediate Drainage W/ Barriers (Barriers Between Tributaries Within Drainage)</u> Like Habitat, No Differences In Known Species Assemblages No NTS, AIS, ORVI In Origin

- Significant criterion signify a higher level of risk from the previous level.

Understanding the RAM

- The Significance Line

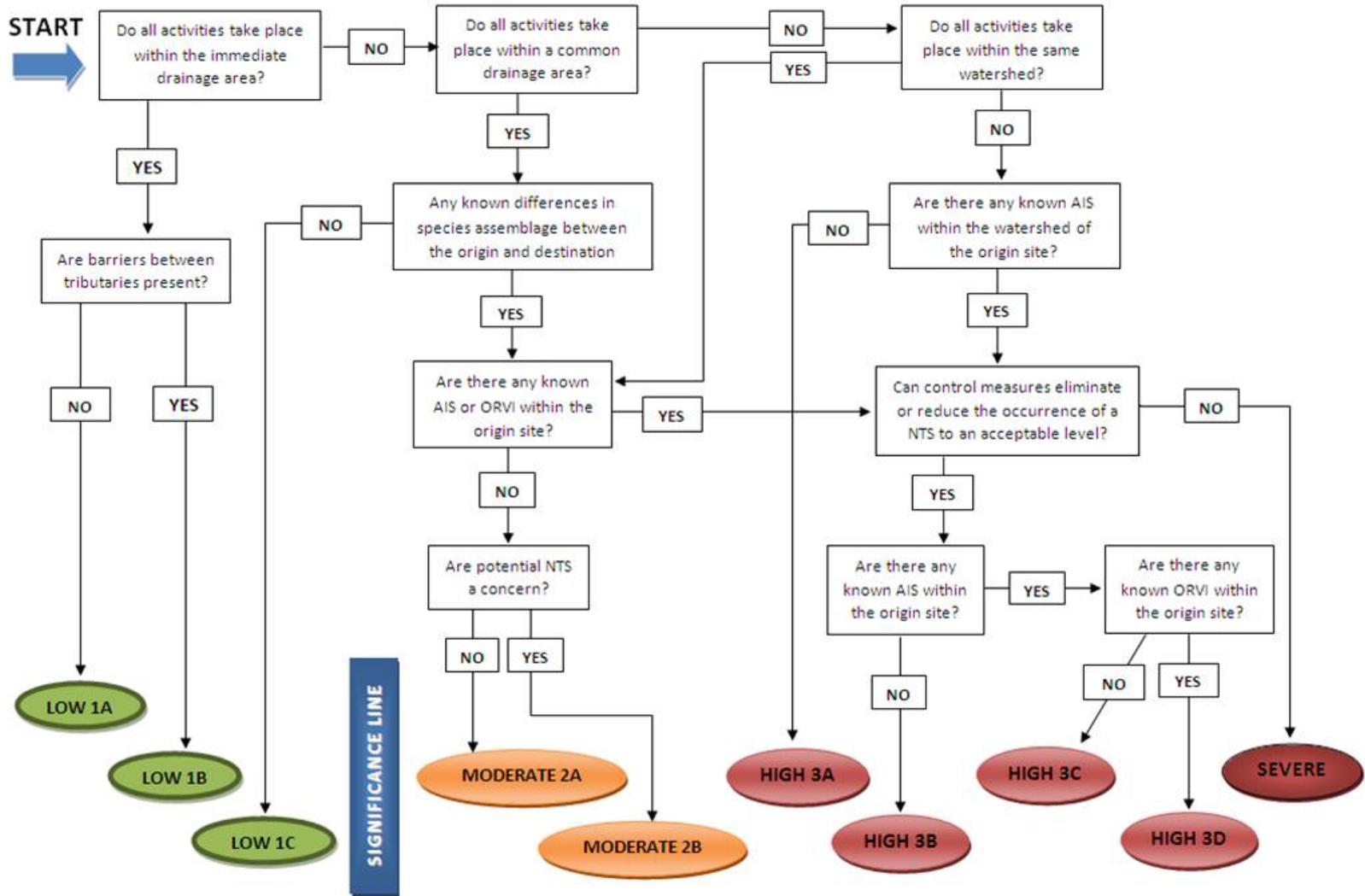
<p style="text-align: center;">Level 1c Low Risk</p>	<ul style="list-style-type: none"> <u>Activities In Common Drainage W/ Barriers Or Isolation (Non-Continuous)</u> Like Habitat, No Differences In Known Species Assemblages No NTS, AIS, ORVI In Origin
<p>Non-Target Analysis Critical Control Point Upper Limit (Significance Line)</p>	
<p style="text-align: center;">Level 2a Moderate Risk</p>	<ul style="list-style-type: none"> Activities In Common Drainage W/ Barriers Or Isolation (Non-Continuous) <u>Known Difference In Habitat And/Or In Species Assemblages From Origin To Destination</u> Potential Of NTS In Origin, But Not A Concern No AIS, ORVI In Origin

- Risk Level is high enough corrective actions are needed to reduce risk to an acceptable level.

Using the RAM

- Start at Class Level 1a Low Risk, Answer “Yes” or “No” to the Significant Criterion.
- If Answered “No”, move to the next Class Level until you answer “Yes” to the Significant Criterion.
- The first “Yes” to a Significant Criterion is the Lowest Risk Level for your task.

START



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 (e.g. RAM Score)	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: Harvest and Sort Brood	Vertebrates: Other Fish Species	No	Level 1b – Low Risk Fish are large and easily separated		
	Invertebrates: Miscellaneous aquatic insects	No	Level 1b – Low Risk Adult fish are handpicked and moved		
	Plants: Hydrilla, water star thistle	No	Level 1b – Low Risk Adult fish are handpicked and moved		
	Other Biologics: None	No	Level 1b – Low Risk		

Task # 2: Fill Spawning Pond with Inks Lake water	Vertebrates: Other Fish Species				
	Invertebrates: Miscellaneous aquatic insects				
	Plants: Hydrilla, water star thistle				
	Other Biologics: None				

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 (e.g. RAM Score)	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: Harvest and Sort Brood	Vertebrates: Other Fish Species	No	Level 1b – Low Risk Fish are large and easily separated		
	Invertebrates: Miscellaneous aquatic insects	No	Level 1b – Low Risk Adult fish are handpicked and moved		
	Plants: Hydrilla, water star thistle	No	Level 1b – Low Risk Adult fish are handpicked and moved		
	Other Biologics: None	No	Level 1b – Low Risk		

Task # 2: Fill Spawning Pond with Inks Lake water	Vertebrates: Other Fish Species	Yes	Level 2b – Moderate Risk Fish easily travel with water into ponds		
	Invertebrates: Miscellaneous aquatic insects	Yes	Level 2b – Moderate Risk Insects easily travel with water into ponds		
	Plants: Hydrilla, water star thistle	Yes	Level 2b – Moderate Risk Plants easily travel with water into ponds		
	Other Biologics: None	No	Level 1b – Low Risk		

Control Measures – Actions that can be used to control and remove identified non-targets.



Control Point – the point during a task at which potential hazards are controlled by a control measure. Control points may be optional or critical.

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 (e.g. RAM Score)	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: Harvest and Sort Brood	Vertebrates: Other Fish Species	No	Level 1b – Low Risk Fish are large and easily separated		No
	Invertebrates: Miscellaneous aquatic insects	No	Level 1b – Low Risk Adult fish are handpicked and moved		No
	Plants: Hydrilla, water star thistle	No	Level 1b – Low Risk Adult fish are handpicked and moved		No
	Other Biologics: None	No	Level 1b – Low Risk		No

Task # 2: Fill Spawning Pond with Inks Lake water	Vertebrates: Other Fish Species	Yes	Level 2b – Moderate Risk Fish easily travel with water into ponds	Filters need to be utilized	No
	Invertebrates: Miscellaneous aquatic insects	Yes	Level 2b – Moderate Risk Insects easily travel with water into ponds	Filters need to be utilized	No
	Plants: Hydrilla, water star thistle	Yes	Level 2b – Moderate Risk Plants easily travel with water into ponds	Filters need to be utilized	No
	Other Biologics: None	No	Level 1b – Low Risk		No

Optional Control Point – control point where control measures can be applied to prevent or reduce the risk of significant non-target hazards.

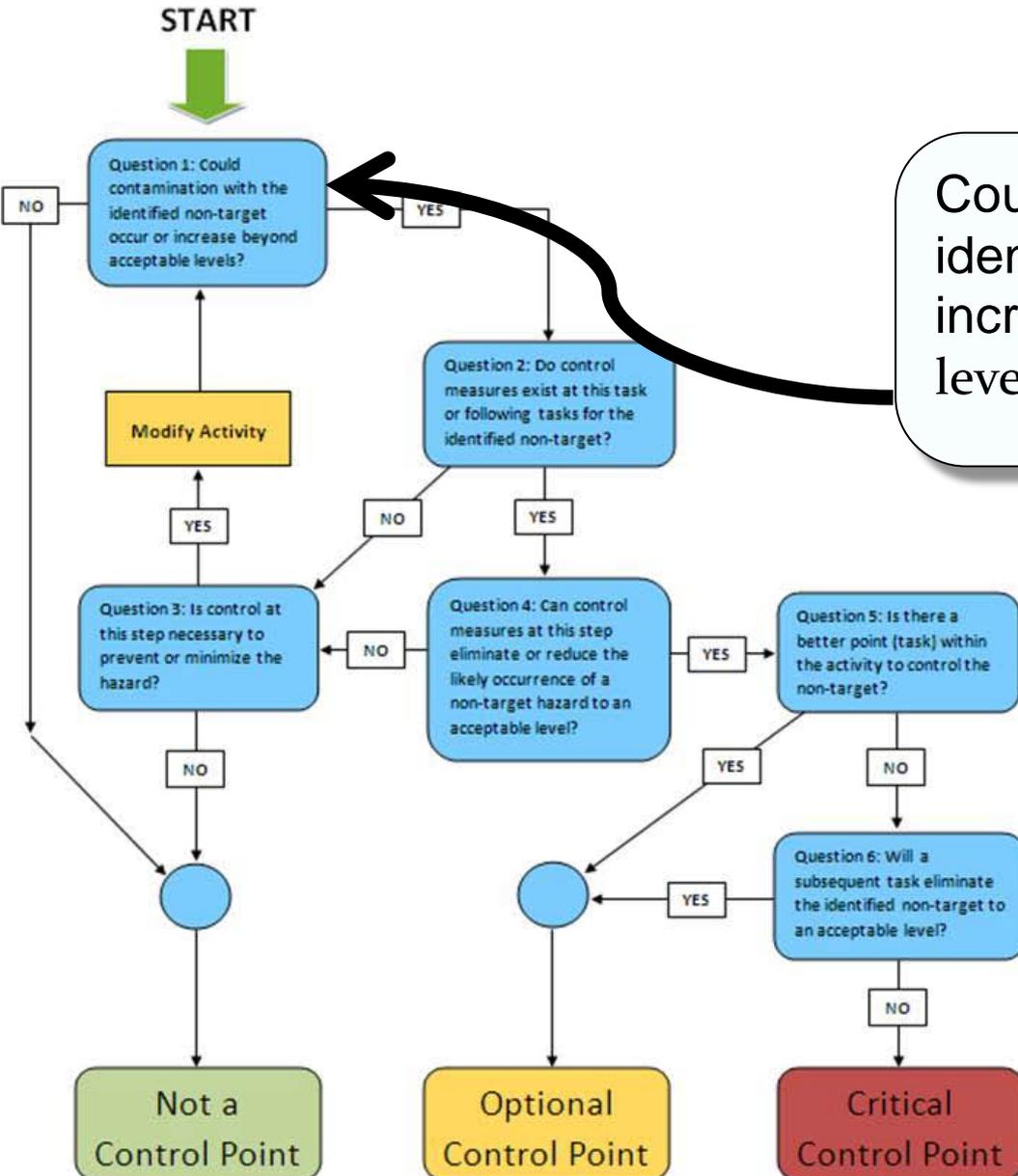
Although NOT critical, still may be important to help reducing any non-targets within the activity.

Critical Control Point – the best point at which significant hazards can be prevented or reduced to minimum risk.

Critical control points are those in which control measures *are essential* for preventing the spread of non-target hazards.

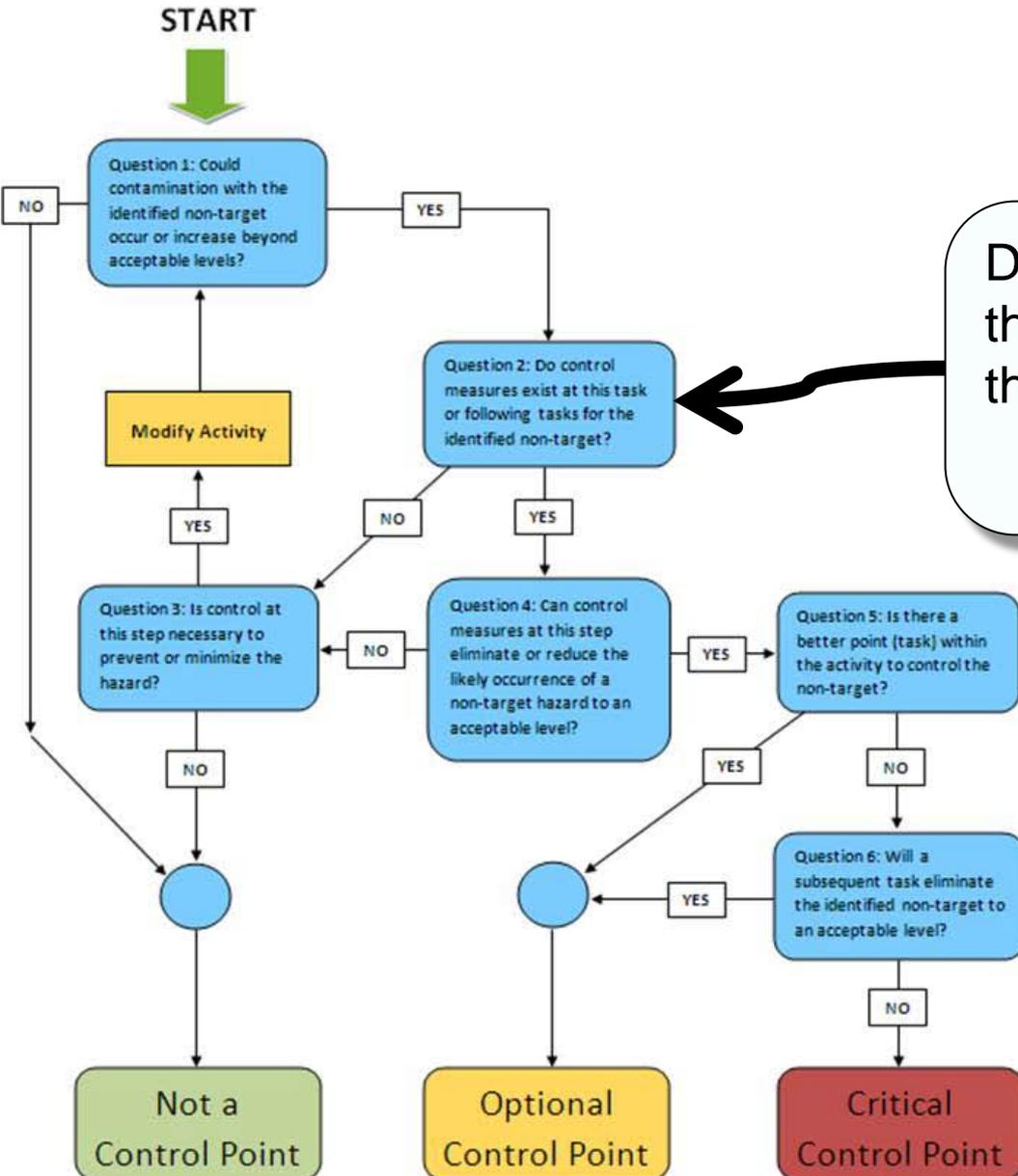
CCP Decision Tree

Could contamination with the identified non-target occur or increase beyond acceptable levels?



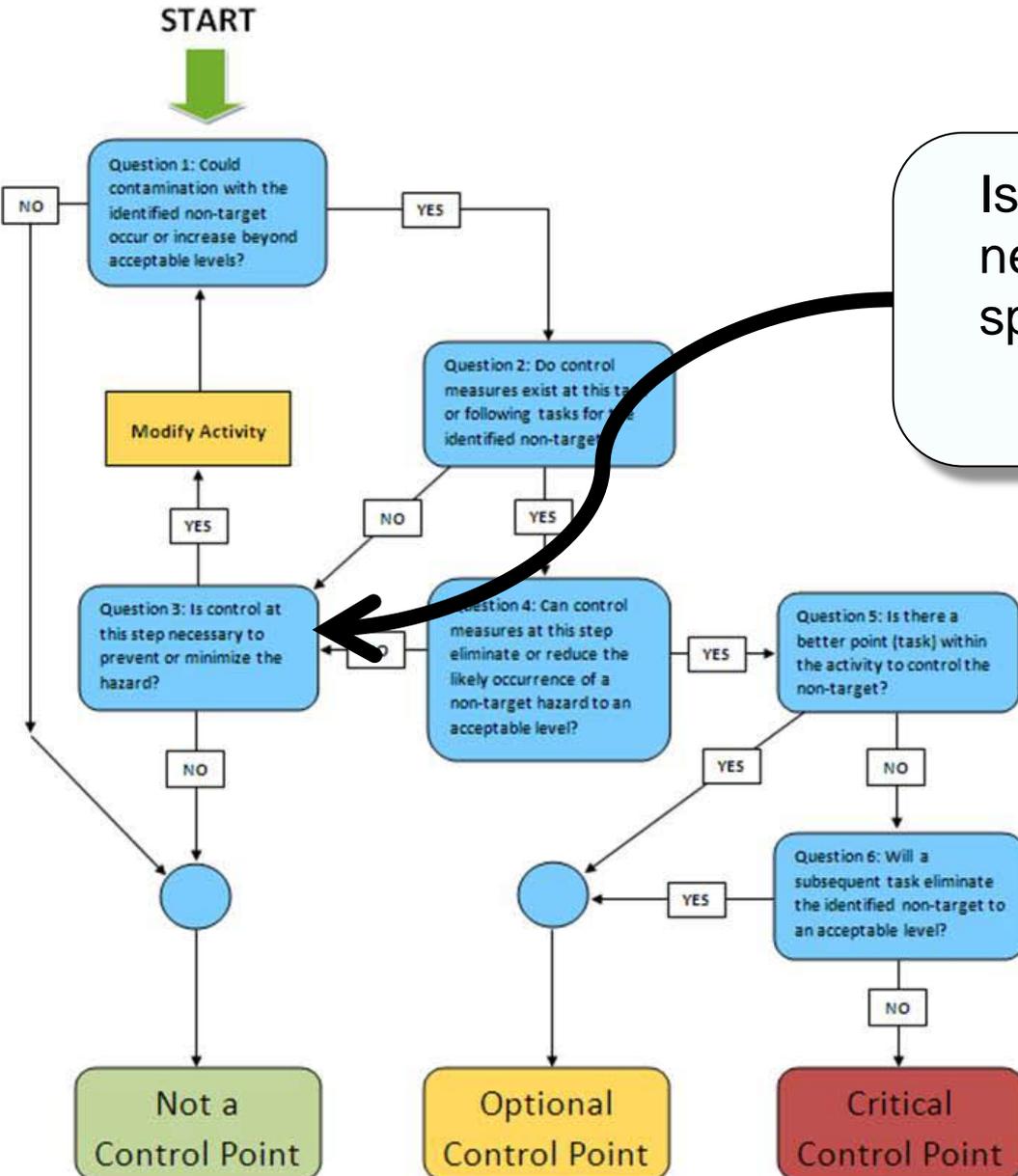
CCP Decision Tree

Do control measures exist for this task (or following tasks) for the identified non-targets?



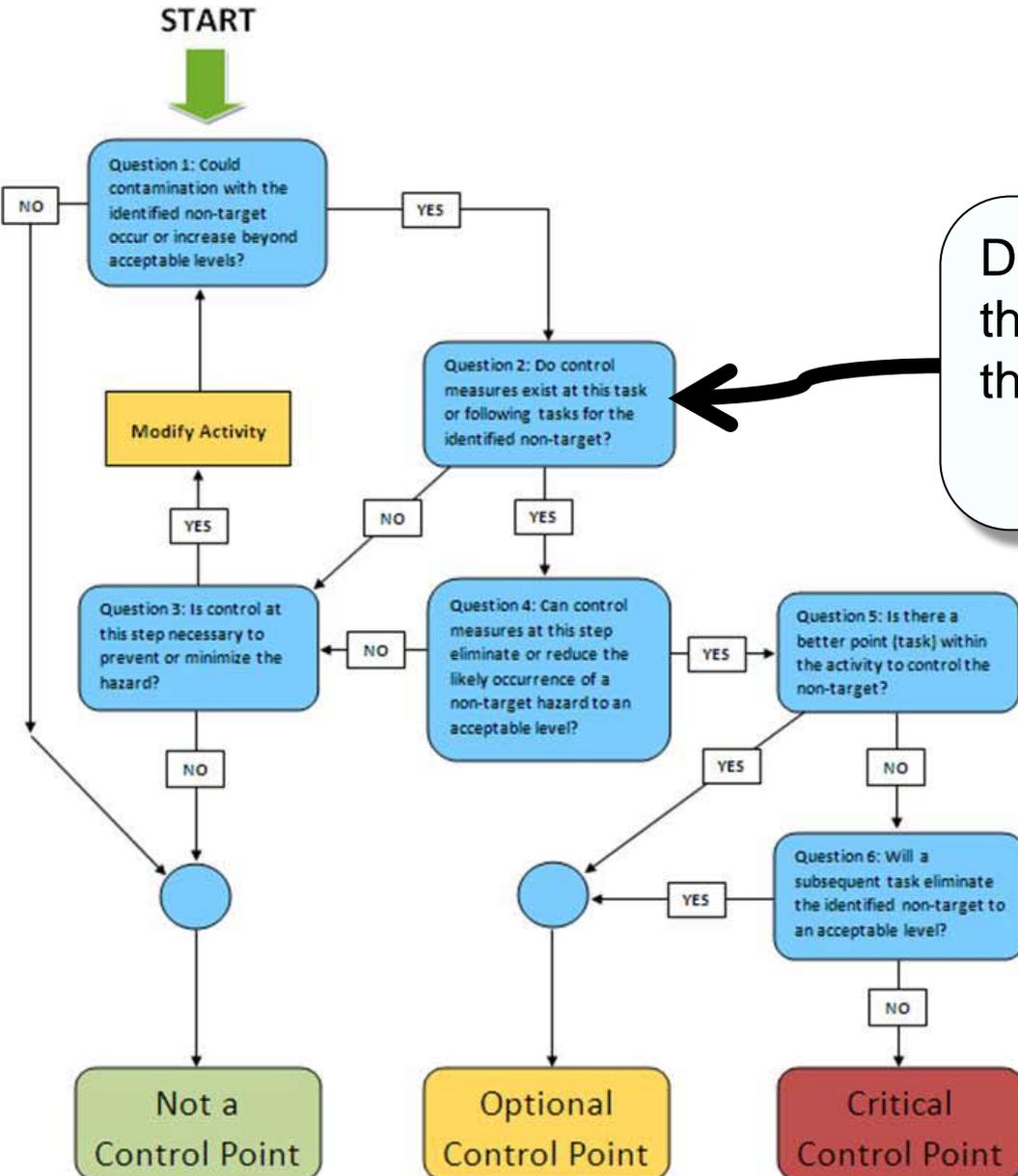
CCP Decision Tree

Is control during this task necessary to prevent the spread of the non-target?



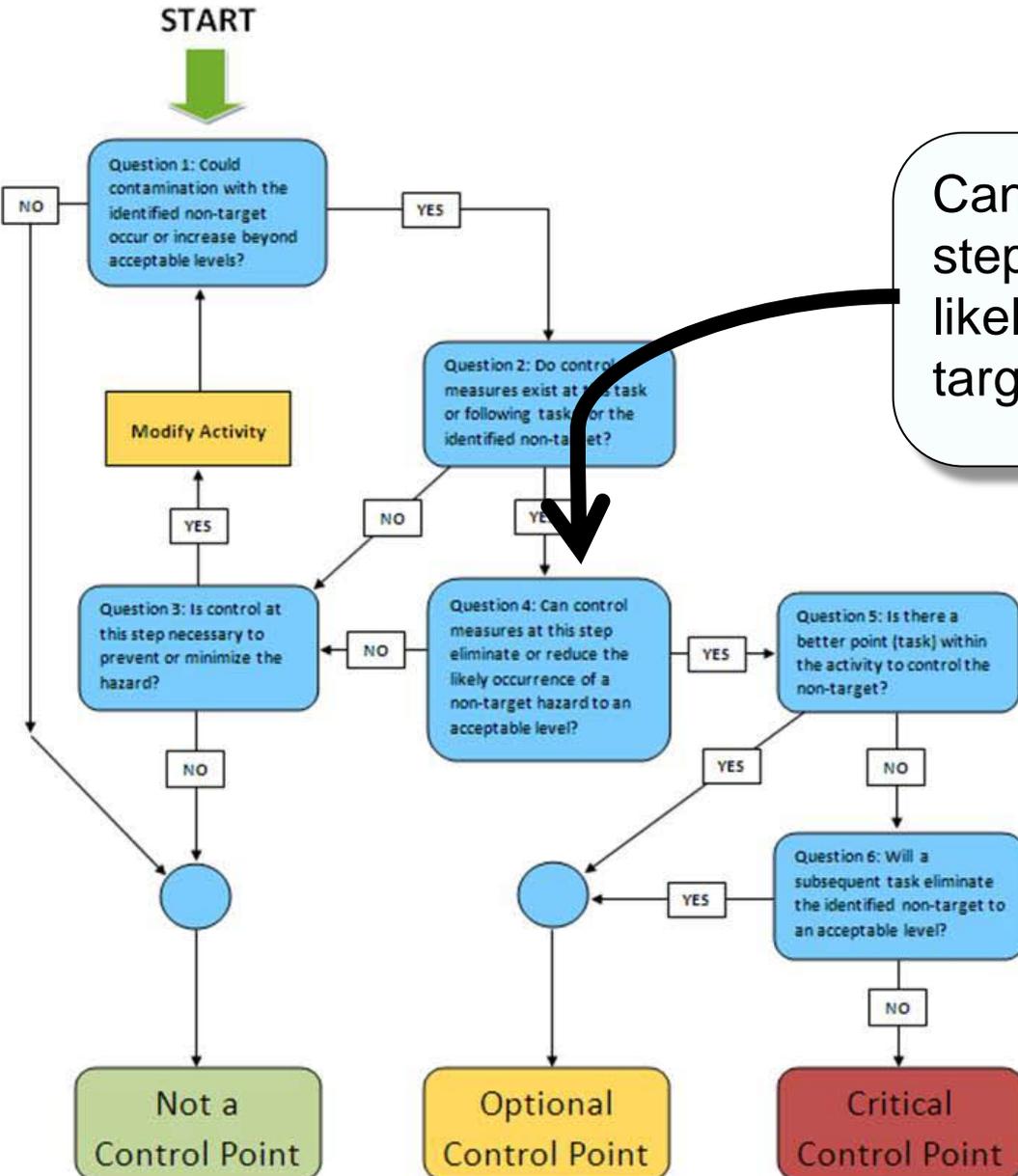
CCP Decision Tree

Do control measures exist for this task (or following tasks) for the identified non-targets?



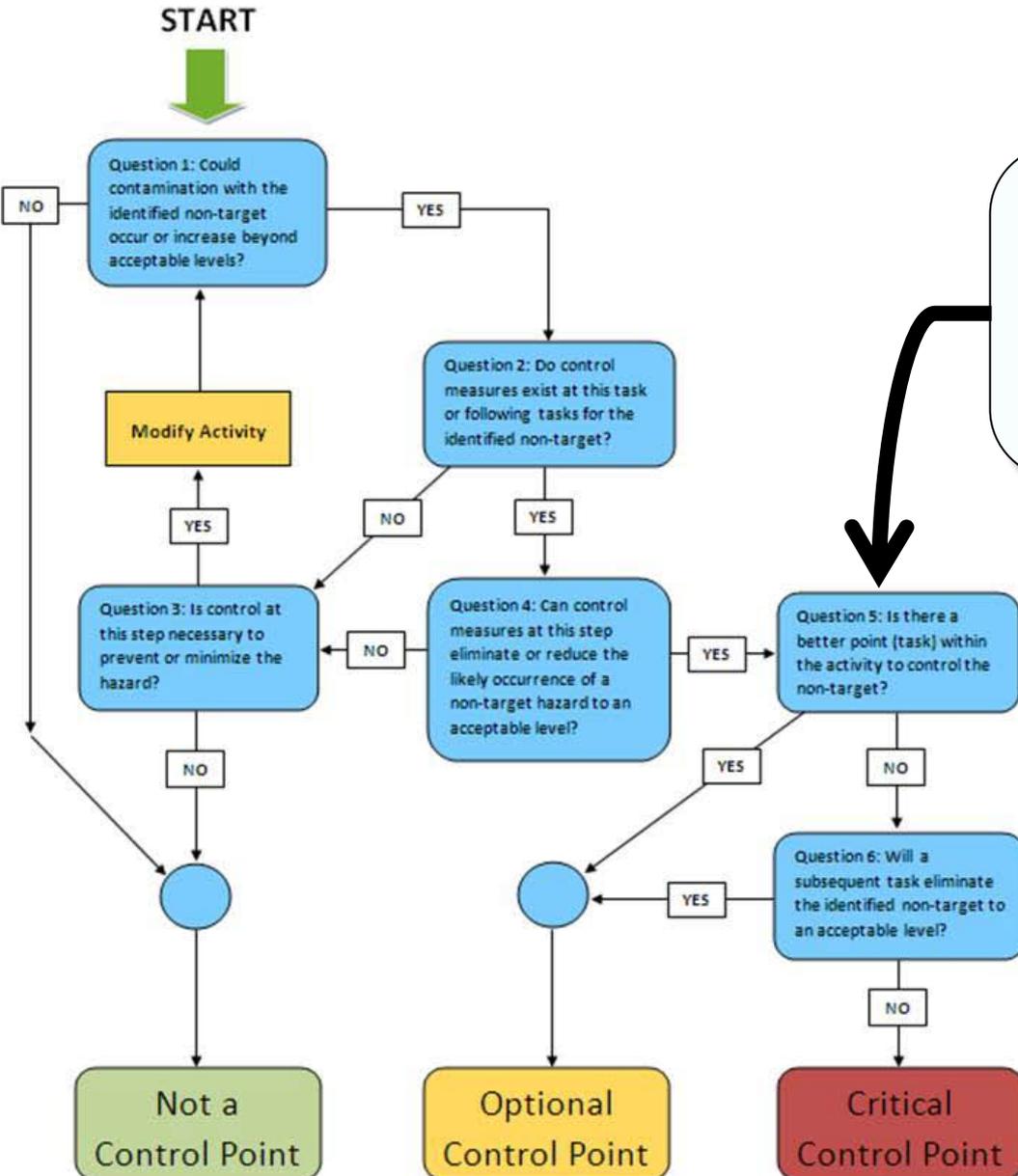
CCP Decision Tree

Can control measures at this step eliminate or reduce the likely occurrence of a non-target to an acceptable level?



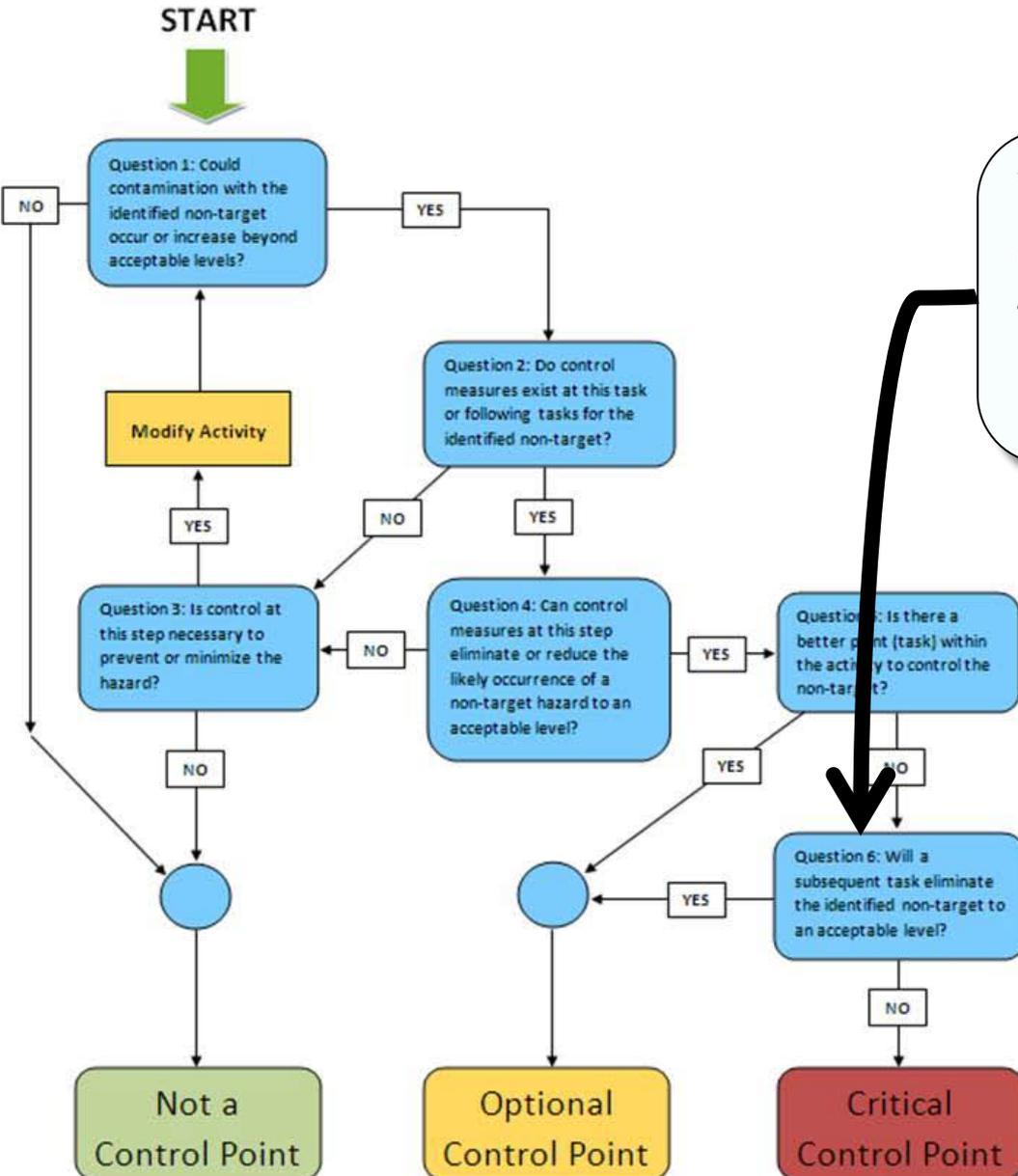
CCP Decision Tree

Is there a better place (task) within the activity to control the non-target?



CCP Decision Tree

Will a subsequent task eliminate or reduce the non-target to an acceptable level



ISRAP Step 4 – Non-Target Analysis Worksheet (continued)

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 (e.g. RAM Score)	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 # 8: Fill and Load Distribution Truck	Vertebrates: Other Fish Species	Yes	Level 2a – Moderate Risk Non-targets are potentially present	NTS removed during previous task; truck will with well water free of NTS	No
	Invertebrates: Miscellaneous aquatic insects	Yes	Level 2a – Moderate Risk Non-targets are potentially present	NTS removed during previous task; truck will with well water free of NTS	No
	Plants: Hydrilla, water star thistle	No	Level 1b – Low Risk NTS removed during previous task and truck filled with well water free; No NTS present		No
	Other Biologics: None	No	Level 1b – Low Risk		No

Task # 9: Stock LMB	Vertebrates: Other Fish Species	Yes	Level 2a – Moderate Risk NTS could have passed through control points		Yes
	Invertebrates: Miscellaneous aquatic insects	Yes	Level 2a – Moderate Risk NTS could have passed through control points		Yes
	Plants: Hydrilla, water star thistle	No	Level 1b – Low Risk NTS removed at previous CCP		No
	Other Biologics: None	No	Level 1b – Low Risk		No

Questions? / Discussion





ISRAP Step 5

Non-Target Risk Action Plan

ISRAP Step 5

- Learning Objectives:
- Apply information from Steps 1-4 to completing the Non-Target Risk Action Plan (NTRAP)
- Prescribe limits, range, or criteria for Control Measures
- Define monitoring methods for Control Measures
- Evaluate Control Measures
- Establish corrective actions if needed
- Supporting decisions with documents

**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:		Rearing and distribution of largemouth bass free of non-targets.	
Critical Control Point: Task # 7 "Yes" from Step 4, column 6		Title: Harvest Phase II Fingerlings	
Significant Non-Target(s): (Step 4, column 3)		Plants	
Control Measures (Step 4, column 5):		Water flow in raceways will remove plants after	
Prescribed range, limit, limitation or criterion for Control Measure:		24 hours >30 GPM for 20 hours & remove plant fragments from screen.	
Control Measure Monitoring: WHO?		Minimum of 2 Hatchery Staff	
HOW?		Flow meter	
WHERE?		LMB holding tank	
HOW OFTEN?		1 st and 24 th hour for flow	
<p>Evaluate Control Measure (Answer Yes or No to the following questions):</p> <p>Yes No</p> <p><input type="checkbox"/> <input type="checkbox"/> Did the action fall outside a prescribed range, limit, or criterion?</p> <p><input type="checkbox"/> <input type="checkbox"/> Did the Control Measure fail?</p>			
Corrective Actions, if any "yes" above:		Continue >30 GPM flow-through for 20 more hours	
<p>Supporting Documents (if any): Management Plan, Checklist, Decontamination Techniques, SOPs, Scientific Journal Article, etc. Control Measure checklist</p>			
Development Team Members:		June "Short-Timer" McIlwain Steve "No-Tree" Sharon Jonathan "The Diagrammer" Thompson Dave "The Wizard" Britton Stewart Jacks	
Date Developed:	11-18-09	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:	Rearing and distribution of largemouth bass free of non-targets.
Critical Control Point: Task # 7 “Yes” from Step 4, column 6	Title: Harvest Phase II Fingerlings
Significant Non-Target(s): (Step 4, column 3)	Plants
Control Measures (Step 4, column 5):	Water flow in raceways will remove plants after
Prescribed range, limit, limitation or criterion for Control Measure:	24 hours > 30 GPM for 20 hours & remove plant fragments from screen.
Control Measure Monitoring: WHO?	Minimum of 2 Hatchery Staff
HOW?	Flow meter
WHERE?	LMB holding tank
HOW OFTEN?	1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes No

Did the action fall outside a prescribed range, limit, or criterion?

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:	Rearing and distribution of largemouth bass free of non-targets.
Critical Control Point: Task # 7 “Yes” from Step 4, column 6	Title: Harvest Phase II Fingerlings
Significant Non-Target(s): (Step 4, column 3)	Plants
Control Measures (Step 4, column 5):	Water flow in raceways will remove plants after
Prescribed range, limit, limitation or criterion for Control Measure:	24 hours > 30 GPM for 20 hours & remove plant fragments from screen.
Control Measure Monitoring: WHO?	Minimum of 2 Hatchery Staff
HOW?	Flow meter
WHERE?	LMB holding tank
HOW OFTEN?	1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

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:	Rearing and distribution of largemouth bass free of non-targets.
Critical Control Point: Task # 7 “Yes” from Step 4, column 6	Title: Harvest Phase II Fingerlings
Significant Non-Target(s): (Step 4, column 3)	Plants
Control Measures (Step 4, column 5):	Water flow in raceways will remove plants after
Prescribed range, limit, limitation or criterion for Control Measure:	24 hours > 30 GPM for 20 hours & remove plant fragments from screen.
Control Measure Monitoring: WHO?	Minimum of 2 Hatchery Staff
HOW?	Flow meter
WHERE?	LMB holding tank
HOW OFTEN?	1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

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:	Rearing and distribution of largemouth bass free of non-targets.
Critical Control Point: Task # 7 "Yes" from Step 4, column 6	Title: Harvest Phase II Fingerlings
Significant Non-Target(s): (Step 4, column 3)	Plants
Control Measures (Step 4, column 5):	Water flow in raceways will remove plants after
Prescribed range, limit, limitation or criterion for Control Measure:	24 hours > 30 GPM for 20 hours & remove plant fragments from screen.
Control Measure Monitoring: WHO?	Minimum of 2 Hatchery Staff
HOW?	Flow meter
WHERE?	LMB holding tank
HOW OFTEN?	1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

Control Measures

- Controls must be established for each CCP identified in the non-target analysis.
- A control represents the procedures that are used to ensure that an activity is reasonably free of non-targets.
- Each CCP must have one or more controls for each significant non-target hazard.

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:	Rearing and distribution of largemouth bass free of non-targets.
Critical Control Point: Task # 7 "Yes" from Step 4, column 6	Title: Harvest Phase II Fingerlings
Significant Non-Target(s): (Step 4, column 3)	Plants
Control Measures (Step 4, column 5):	Water flow in raceways will remove plants after
Prescribed range, limit, limitation or criterion for Control Measure:	24 hours > 30 GPM for 20 hours & remove plant fragments from screen.
Control Measure Monitoring:	WHO? Minimum of 2 Hatchery Staff
	HOW? Flow meter
	WHERE? LMB holding tank
	HOW OFTEN? 1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

Control Limits and Operating Limits

- ***Control Limit*** - A specific criterion that must be met for each control measure associated with a critical control point.
(Example: Bleach solution must be at least 200 ppm in order to kill microorganisms)
- ***Operating Limit*** - Criteria that are more stringent than critical limits and that are used to reduce the risk of non-target contamination.
(Example: Equipment should be washed with a bleach solution around 500 ppm)

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:	Rearing and distribution of largemouth bass free of non-targets.
Critical Control Point: Task # 7 "Yes" from Step 4, column 6	Title: Harvest Phase II Fingerlings
Significant Non-Target(s): (Step 4, column 3)	Plants
Control Measures (Step 4, column 5):	Water flow in raceways will remove plants after
Prescribed range, limit, limitation or criterion for Control Measure:	24 hours > 30 GPM for 20 hours & remove plant fragments from screen.
Control Measure Monitoring: WHO?	Minimum of 2 Hatchery Staff
HOW?	Flow meter
WHERE?	LMB holding tank
HOW OFTEN?	1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

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:	Rearing and distribution of largemouth bass free of non-targets.
Critical Control Point: Task # 7 “Yes” from Step 4, column 6	Title: Harvest Phase II Fingerlings
Significant Non-Target(s): (Step 4, column 3)	Plants
Control Measures (Step 4, column 5):	Water flow in raceways will remove plants after
Prescribed range, limit, limitation or criterion for Control Measure:	24 hours > 30 GPM for 20 hours & remove plant fragments from screen.
Control Measure Monitoring:	WHO? Minimum of 2 Hatchery Staff
	HOW? Flow meter
WHERE?	LMB holding tank
HOW OFTEN?	1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes No

Did the action fall outside a prescribed range, limit, or criterion?

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(any “Yes” from column 6 of ISRAP Step 4 – Non-Target Analysis Worksheet)
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	HOW? Flow meter
	WHERE? LMB holding tank
HOW OFTEN?	1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

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

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	HOW? Flow meter
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	HOW OFTEN? 1 st and 24 th hour for flow 10 th

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

Prescribed range, limit, limitation or criterion for Control Measure :	Water flow in raceways will remove plants after 24 hours >30 GPM for 20 hours & remove plant fragments from screen.
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Control Measure Monitoring:	WHO?	Minimum of 2 Hatchery Staff
	HOW?	Flow meter
	WHERE?	LMB holding tank
	HOW OFTEN?	1 st and 24 th hour for flow

Evaluate **Control Measure** (Answer Yes or No to the following questions):

Yes No

 Did the action fall outside a prescribed range, limit, or criterion?

 Did the **Control Measure** fail?

Corrective Actions , if any "yes" above:	Continue >30 GPM flow-through for 20 more hours
---	---

Supporting Documents (if any):
 Management Plan, Checklist, Decontamination Techniques, SOPs, Scientific Journal Article, etc.
 Control Measure checklist

Development Team Members:	June "Short-Timer" McIlwain Steve "No-Tree" Sharon Jonathan "The Diagrammer" Thompson Dave "The Wizard" Britten
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Criterion for Control Measure:	from screen.
Control Measure Monitoring:	WHO? Minimum of 2 Hatchery Staff
	HOW? Flow meter
	WHERE? LMB holding tank
	HOW OFTEN? 1 st and 24 th hour for flow

Evaluate Control Measure (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

Did the Control Measure fail?

Corrective Actions, if any "yes" above:

Continue >30 GPM flow-through for 20 more hours

Supporting Documents (if any):

Management Plan, Checklist, Decontamination Techniques, SOPs, Scientific Journal Article, etc.

Control Measure checklist

Development Team Members:

June "Short-Timer" McIlwain
 Steve "No-Tree" Sharon
 Jonathan "The Diagrammer" Thompson
 Dave "The Wizard" Britton
 Stewart Jacks

Control Measure Monitoring:	WHO?	Minimum of 2 Hatchery Staff
	HOW?	Flow meter
	WHERE?	LMB holding tank
	HOW OFTEN?	1 st and 24 th hour for flow

Evaluate Control Measure (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

Did the Control Measure fail?

Corrective Actions, if any "yes" above:

Continue >30 GPM flow-through for 20 more hours

Supporting Documents (if any):

Management Plan, Checklist, Decontamination Techniques, SOPs, Scientific Journal Article, etc.

Control Measure checklist

Development Team Members:

June "Short-Timer" McIlwain
 Steve "No-Tree" Sharon
 Jonathan "The Diagrammer" Thompson
 Dave "The Wizard" Britton
 Stewart Jacks

Date Developed:

11-18-09

Date(s) Reviewed:

?

Control Measure Monitoring:	WHO?	Minimum of 2 Hatchery Staff
	HOW?	Flow meter
	WHERE?	LMB holding tank
	HOW OFTEN?	1 st and 24 th hour for flow

Evaluate Control Measure (Answer Yes or No to the following questions):

Yes

No

Did the action fall outside a prescribed range, limit, or criterion?

Did the Control Measure fail?

Corrective Actions, if any "yes" above:

Continue >30 GPM flow-through for 20 more hours

Supporting Documents (if any):

Management Plan, Checklist, Decontamination Techniques, SOPs, Scientific Journal Article, etc.

Control Measure checklist

Development Team Members:

June "Short-Timer" McIlwain
 Steve "No-Tree" Sharon
 Jonathan "The Diagrammer" Thompson
 Dave "The Wizard" Britton
 Stewart Jacks

Date Developed:

11-18-09

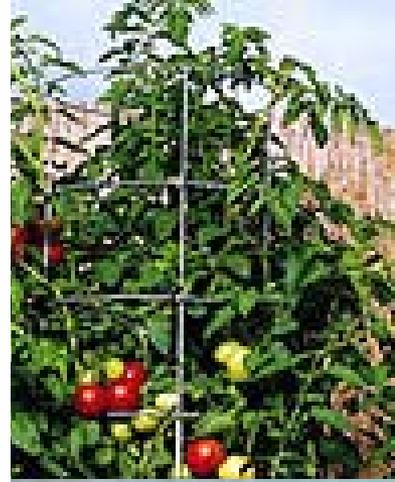
Date(s) Reviewed:

?

Questions?

When you go in for a job interview, I think a good thing to ask is if they ever press charges.

-Deep Thoughts by Jack Handey



(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:		Raising & selling selling certified certified organic organic tomatoestomatoes free of Non-Targets	
Critical Control Point: Task # 7		Title: Clean and Vacuum SealShrink Wrap Tomatoes	
"Yes" from Step 4, column 6			
Significant Non-Target(s): (Step 4, column 3)		aphids, worms, insects, fungus, blight	
Control Measure (Step 4, column 5):		Wash and inspect Discard infested fruit	
Prescribed range, limit, or criterion for Control Measure:		Monty's Organic Tomato Wash, soaking 20 fruits in 2 gallons of 2% solution for 5 minutes, then rinsse in distilled water. Inspect each tomato, discard every infested fruit away from processed tomatoes	
Control Measure Monitoring: WHO?		June	
HOW?		Visual inspection of each tomato under UV lights	
WHERE?		In the UV Shed of Truth	
HOW OFTEN?		Once	
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:		Rewash and reinspect fruit. Discard the first pass infected fruit	
Supporting Documents (if any): Management Plan, Checklist, Decontamination Techniques, SOPs, Scientific Journal Article, etc. Monty's Organic Tomato Wash Pamphlet Jefferson County Farmer's Market Certification Regulations LSafety MTWeekends			
Development Team Members:		June "Short-Timer" McIlwain Steve "No-Tree" Sharon Jonathan "The Diagrammer" Thompson Dave "The Wizard" Britton Stewart "The Lumper" Jacks	
Date Developed:	11/19/09	Date(s) Reviewed:	06/02/10

Control Measure:		of 2% solution for 5 minutes, then rinse in distilled water.	
		Inspect each tomato, discard every infested fruit away from processed tomatoes	
Control Measure Monitoring:	WHO?	June	
	HOW?	Visual inspection of each tomato under UV lights	
	WHERE?	In the UV Shed of Truth	
	HOW OFTEN?	Once	
<p>Evaluate Control Measure (Answer Yes or No to the following questions):</p> <p>Yes No</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Did the action fall outside a prescribed range, limit, or criterion?</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> Did the Control Measure fail?</p>			
Corrective Actions , if any “yes” above:		Rewash and reinspect fruit. Discard the first pass infected fruit	
<p>Supporting Documents (if any):</p> <p>Management Plan, Checklist, Decontamination Techniques, SOPs, Scientific Journal Article, etc.</p> <p>Monty’s Organic Tomato Wash Pamphlet</p> <p>Jefferson County Farmer’s Market Certification Regulations LSAafety MTWeekends</p>			
Development Team Members:		<p>June “Short-Timer” McIlwain</p> <p>Steve “No-Tree” Sharon</p> <p>Jonathan “The Diagrammer” Thompson</p> <p>Dave “The Wizard” Britton</p> <p>Stewart “The Lumper” Jacks</p>	
Date Developed:	11/19/09	Date(s) Reviewed:	06/02/10

Periodic Review

Over time, new pathways come about from new projects and procedural changes making periodic review extremely important:

- Supporting Documents – checklists, equipment manuals, standard operating procedures, decontamination literature, scientific journal articles, etc.
- Other Changes: employee turnover, change standard operating procedures, and/or add tasks...meanwhile additional invasive species continually enter new habitats.

Steward of Public Resources

- We are here to help sustain natural resources and our environment for future generations
- Not moving species that may become a nuisance when introduced is a responsibility

Professionalism

- Field staff - if you trust their work then trust that the control measures will be followed as planned
- Execute Order 13112 = Do no Harm

Sharing station ISRAPs on the HACCP-NRM.org website & other entities.

- Important: Provides examples for others & provide a way for others to provide valuable feedback.
- Similar activities may provide alternative control measures, framework, and others.