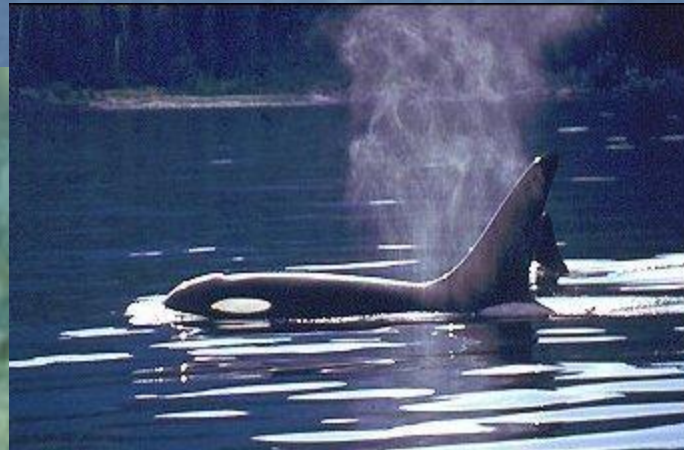


Indirect Effects of Pesticides to Listed Species: Key Statutory and Regulatory Considerations



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National Marine Fisheries Service/Office of Protected Resources
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Tampa Bay, FL



Listed Species

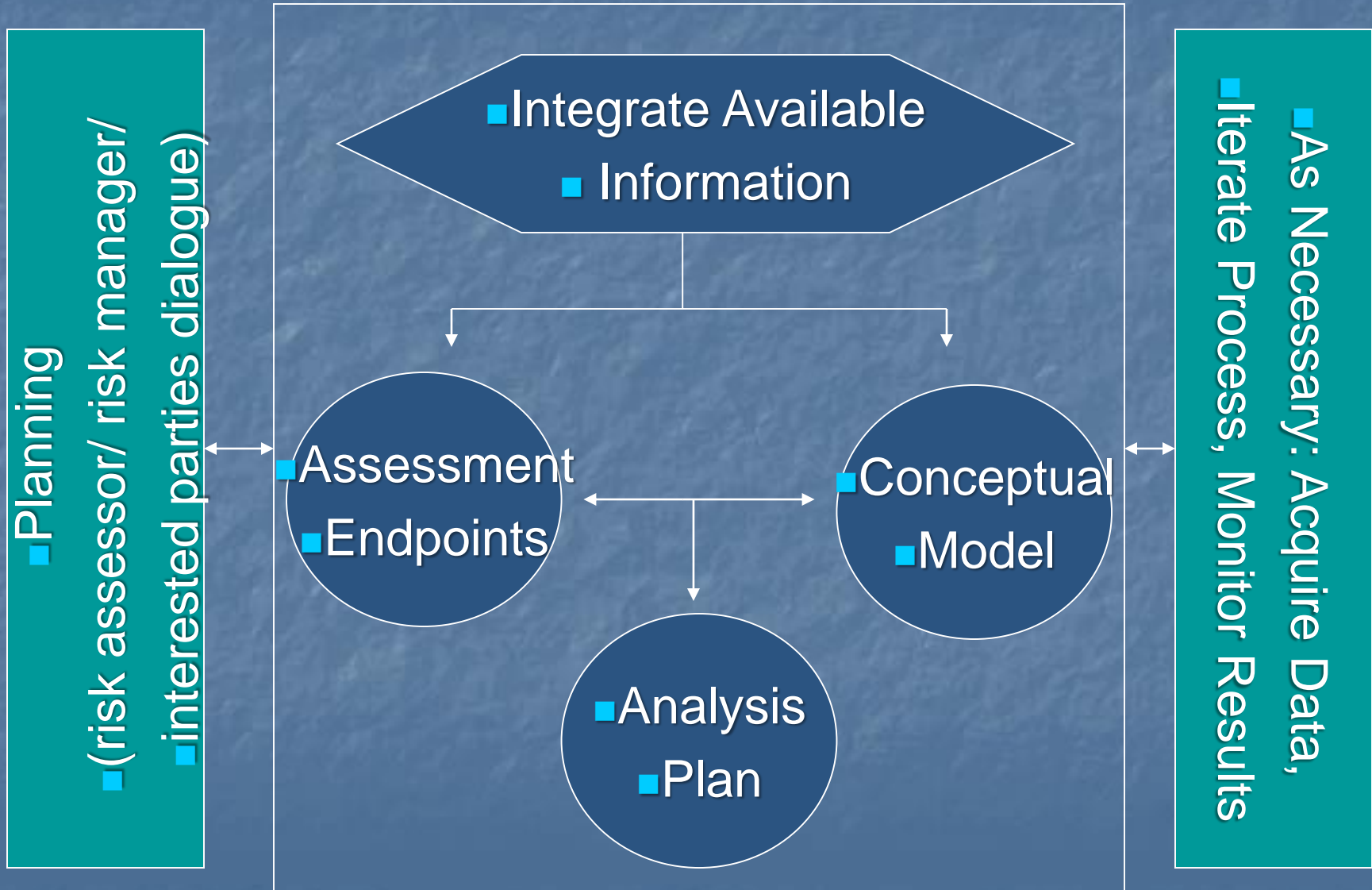
- More than 1900 listed under ESA
- USFWS manages terrestrial and freshwater species
- NMFS manages marine and anadromous species.
- NMFS currently has jurisdiction over 67 listed species

Species Under NMFS Jurisdiction

- Marine Mammals (21)
- Marine Turtles (8)
- Marine and Anadromous Fish (34)
- Marine Invertebrates (3)
- Marine Plants (1)

NMFS/OPR Approach for Assessing Indirect Effects of Pesticides to Listed Species

Problem Formulation from US EPA 1998 Guidelines for Ecological Risk Assessment



Purpose of the Endangered Species Act

- “The purposes... are to **provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved**, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in subsection (b) of this section”
- Section 2(b) of the Endangered Species Act

Section 7 Requires:

All federal agencies to consult with the Services (USFWS, NMFS) to **insure any action they authorize, fund, or carry out is not likely to jeopardize** the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat

Risk Framework

Action Stressors

Pesticide, metabolites, degradates, adjuvants

Exposure Analysis

Response Analysis

Co-occurrence: Stressors
& listed resources

Effects of Stressors on ESA-listed
Species and their habitat

Distribution of
individuals

Distribution of
habitat

Individual
responses

Habitat
responses

Exposure Profile

Response Profile

Risk Characterization

Risk Characterization

Effects on individuals

Effects of habitat

Effects on populations

Effects on primary
constituent elements

Effects on species
(ESU or DPS)

Effects on conservation value of
designated critical habitat

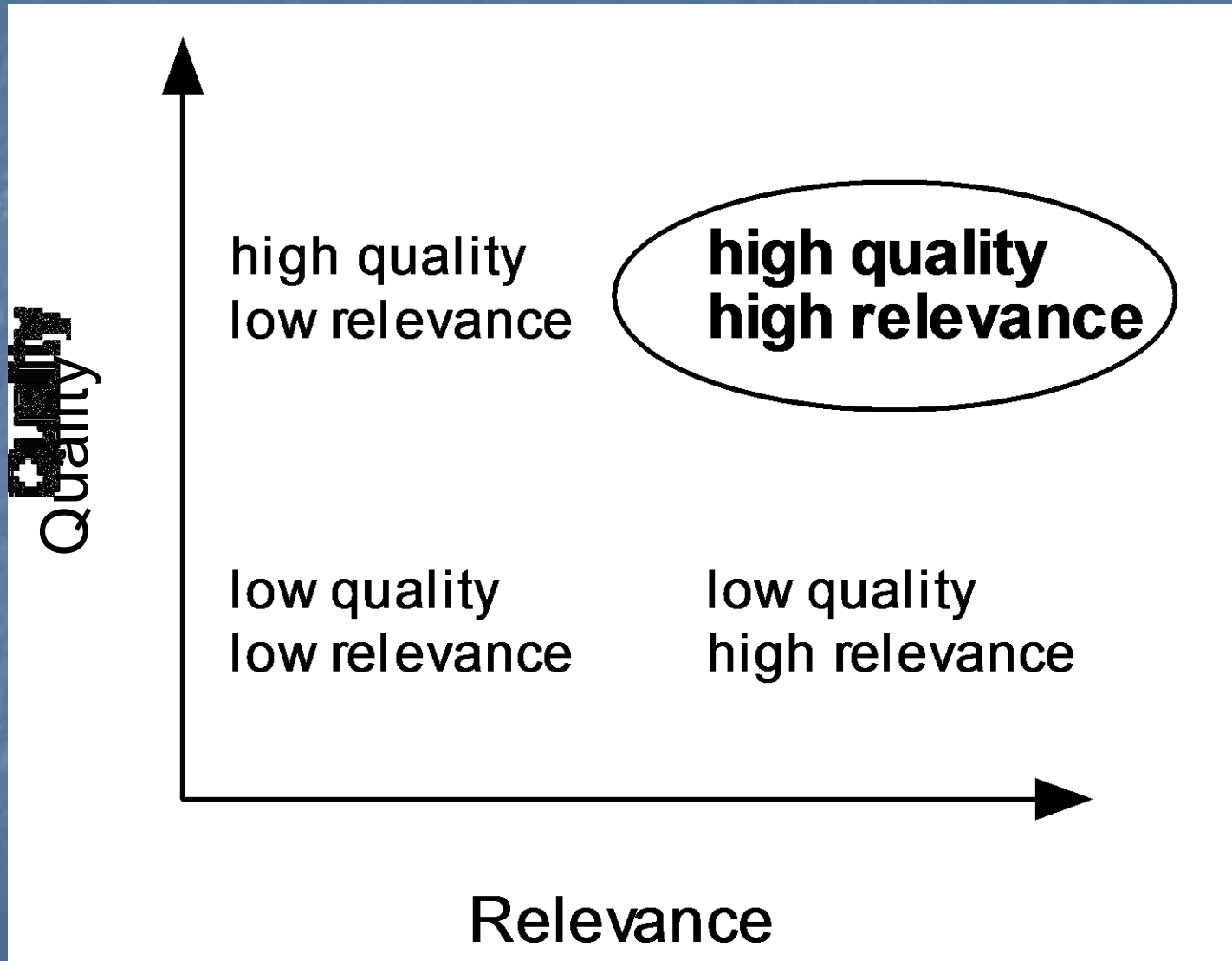
Can we insure that pesticide
actions are not likely to
jeopardize the continued
existence of
the species?

Can we insure that pesticide
actions
are not likely to adversely modify
or destroy designated critical
habitat?

Data Standards

- The data standard for consultation is “Best Scientific and Commercial Data Available”
- We have guidelines for what constitutes “Best Available” [59 FR 34271 (July 1, 1994)]
- We do not exclude any data from consideration including:
 - Toxicity tests that are not conducted according to standard protocols
 - Studies not conducted according to GLP

Use of Best Scientific and Commercial Data



Stressors to Consider

Federal Action

“Authorization for use or uses described in labeling of a pesticide product containing a particular pesticide active ingredient.”

Understandings reached NMFS-USFWS-USEPA meeting 12/12/2007

TOUCHDOWN
90DF

Herbicide
Nonselective Foliar Systemic
Herbicide for Weed Control

Active ingredient:
*Glyphosate:
N-(phosphonomethyl) glycine 28.3%
Inert ingredients: 71.7%
Total: 100.0%
*Contains 3 pounds of glyphosate acid in each gallon, in the diammonium salt form. See directions for use in attached booklet.

AGRICULTURAL USE REQUIREMENTS
Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. Refer to supplemental labeling under "Agricultural Use Requirements" in the Directions for Use section for information about this standard.

EPA Reg. No. 100-1121
EPA Est. 100-LA-001390
EPA Est. 100-NE-001MHA
Superscript identifies manufacturing site

Touchdown® and the Syngenta logo are trademarks of a Syngenta Group Company
U.S. Patent No. 5,468,718
©2001 Syngenta
Syngenta Crop Protection, Inc.
Greensboro, North Carolina 27409
www.syngenta-us.com
SCP 1121A-L1 0601

2.5 gallons
U.S. Standard Measure

syngenta

**KEEP OUT OF REACH OF CHILDREN.
CAUTION**

FIRST AID	
If in eyes	• Flush eyes with plenty of water. Call a physician if irritation persists.
Have the product container or label with you when calling a poison control center or doctor, or going for treatment.	
HOT LINE NUMBER For 24 Hour Medical Emergency Assistance (Human or Animal) or Chemical Emergency Assistance (Spill, Leak, Fire, or Accidents), Call 1-800-888-8372	

Precautionary Statements
Hazards to Humans and Domestic Animals
Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling.

Environmental Hazards
Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash water.

Storage and Disposal
Container Disposal
Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.

CONTAINER IS NOT SAFE FOR FOOD, FEED, OR DRINKING WATER!



Deconstruction of the Action

- Stressors associated with action based on review of EPA authorized labels
 - Active ingredient
 - Metabolites and degradates
 - Other ingredients
 - Recommended tank mixtures
 - Adjuvants
 - Application restrictions/ methods

Indirect Effects: Problem Formulation

- Develop risk hypotheses based on :
 - how the species interacts with it's environment,
 - what is known about the pesticide
 - Mode/mechanism of action
 - Environmental fate
 - Adverse biological/ecological responses

Primary Constituent Elements (PCEs)

- Definition: physical and biological features that are essential to the conservation of the species
- How they are used

Southern Resident Orca Primary Constituent Elements

- Water quality – to support growth and development of the orca population
- Prey species – protecting quality, quantity, and availability of the orca's food supply
- Passage conditions –ensuring room for migration, resting, and foraging.

Are the orcas starving?

Seattle Post Intelligencer- 10/24/2008



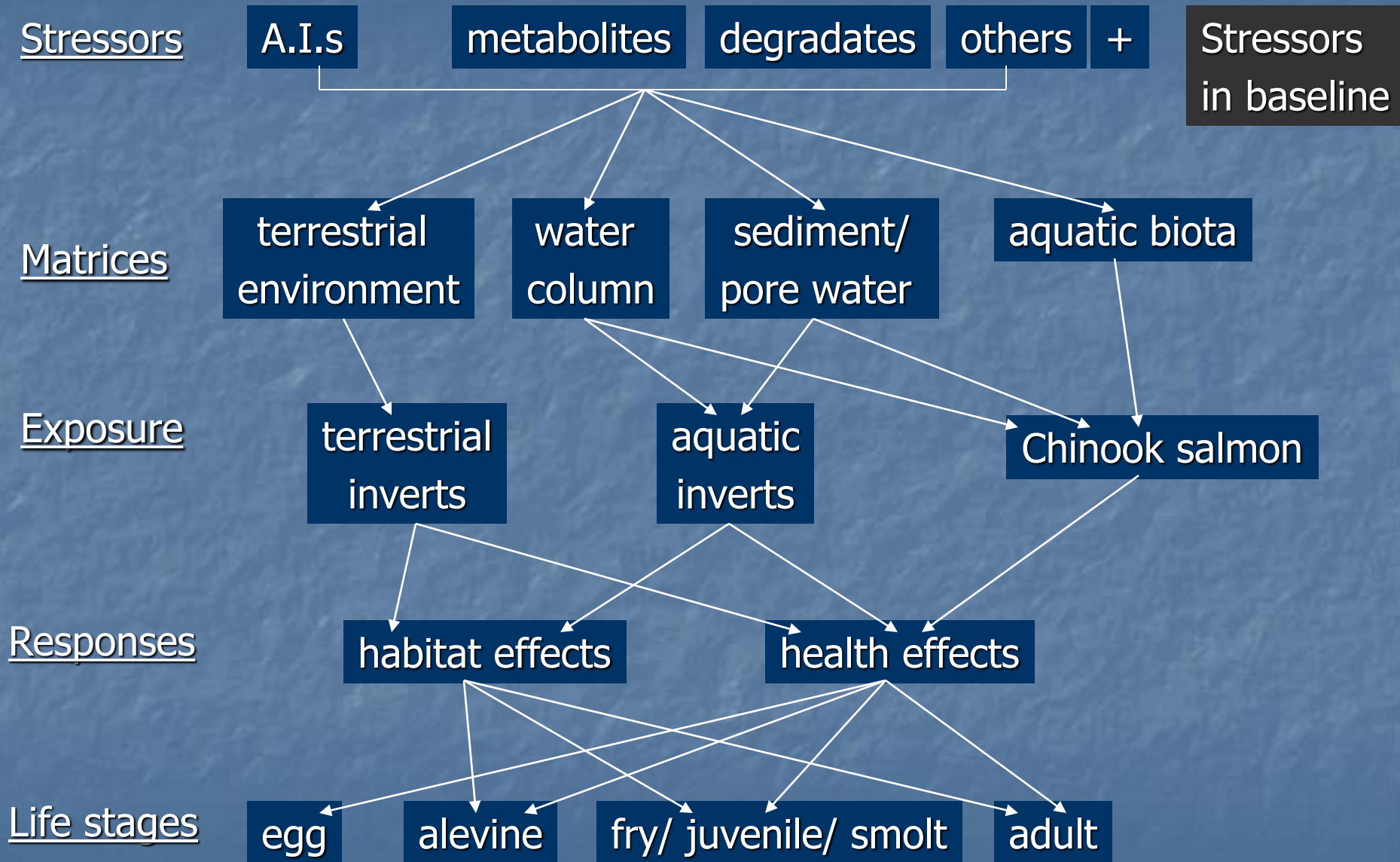
Orcas from L pod, usually seen in [Washington] state waters, surface near Cypress Point, Calif. Scientists suggest the pod may be driven to swim hundreds of miles just to meet minimum nutritional requirements. (Photo: Nancy Black / Monterey Bay Whale Watch)

Are the orcas starving?

Seattle Post Intelligencer- 10/24/2008

- Orcas strong preference for Chinook salmon
- Many of the Chinook runs faltering
- Evidence Orcas starving
- Largest reduction in orca populations since series of bad Chinook seasons in 1990s

Influence on Orca Food Resources



Scope of Effects

Informal consultations

Purpose: Insure no jeopardy
/adverse modification

Product: NLAA concurrence / non-
concurrence

Scale: individual organisms, critical
habitat, duration of project

Screening assessment: If NLAA
then no jeopardy

Scope of Effects (continued)

Informal consultations

Purpose: Insure no jeopardy
/adverse modification

Product: NLAA concurrence / non-
concurrence

Scale: individual organisms, critical
habitat, duration of project

Screening evaluation: If NLAA then
no jeopardy

Formal consultations

Purpose: Insure no jeopardy
/adverse modification

Product: Biological Opinion

Scale: individual organisms, critical
habitat, population, species

Comprehensive evaluation:
includes quantification of
amount and extent of take

Endangered Species Act definitions

ESA Consultation Handbook

- Not likely to adversely affect (NLAA) – effects on listed species are expected to be *discountable*, or *insignificant*, or *completely beneficial*.
- Discountable – Extremely unlikely to occur... can't measure or detect
- Insignificant – should never reach the scale where *take* occurs.

Endangered Species Act definitions

ESA Consultation Handbook

- Take- “to *harass, harm, pursue...*”
- Harm – “any significant habitat modification or degradation that results in death or injury... significantly impairing behavioral patterns such as breeding, feeding, or sheltering”
- Harass – “...to significantly disrupt normal behavior patterns which include but are not limited to, breeding, feeding or sheltering”

How does NMFS reach conclusions in a biological opinion?

- Our process is defined in the USFWS/NMFS Consultation Handbook (1998)
- Major Components:

Status of
Species

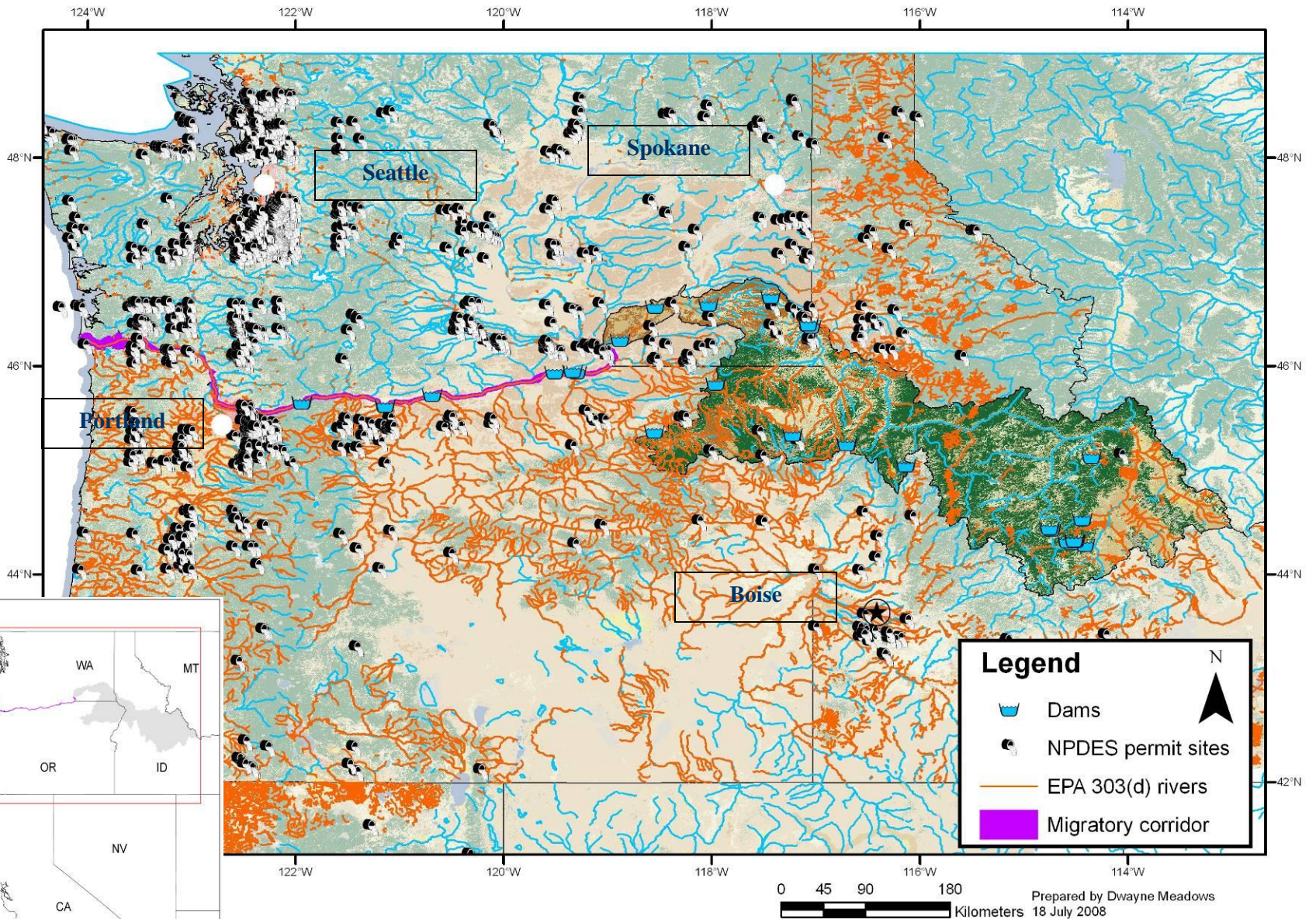
Baseline

Effects of
Action

Cumulative
Effects

Environmental Baseline

By regulation, environmental baselines for biological opinions include the past and present **impacts of all state, Federal or private actions and other human activities in the action area**, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR §402.02).



Snake River Spring/Summer-run Chinook

Contaminants detected in Puget Sound

Contaminant groups	Select example(s)	Source and Use Information
Fertilizers	Phosphorus, Nitrogen	lawns, golf courses, urban landscaping
Pesticide ingredients	Chlorpyrifos, Diazinon, Carbaryl, Atrazine, Esfenvalerate, Creosote, DDT, Copper sulfate, Metalaxyl, Nonylphenol	golf courses, right of ways, lawn and plant care products, pilings, bulkheads, fences
Pharmaceuticals, personal care products	Ethinyl estradiol Nonylphenol	municipal and industrial waste discharges
PAHs	Tricylic PAHs	fossil fuel combustion, creosote treated wood
Industrial chemicals	PCBs, PBDEs, Dioxins	utility infrastructure, flame retardants, electronic equipment

Pesticide Mixtures

- Two or more pesticides are detected in agricultural, urban, and mixed use watersheds more than 90% of the time^{*}
- Monitoring in urban streams across U.S.^{**}
 - Two or more herbicides in 85% samples
 - Two or more insecticides in 54% samples
 - Four or more herbicides were detected in 61% of the water samples.
- Monitoring by WSDA in listed salmonid habitats^{***}
 - urban sites: Averaged 3 pesticides/sample, found up to 9 pesticides in a single sample.
 - Agricultural sites: Averaged 3-5 pesticides/sample, found up to 14 pesticides in a single sample.

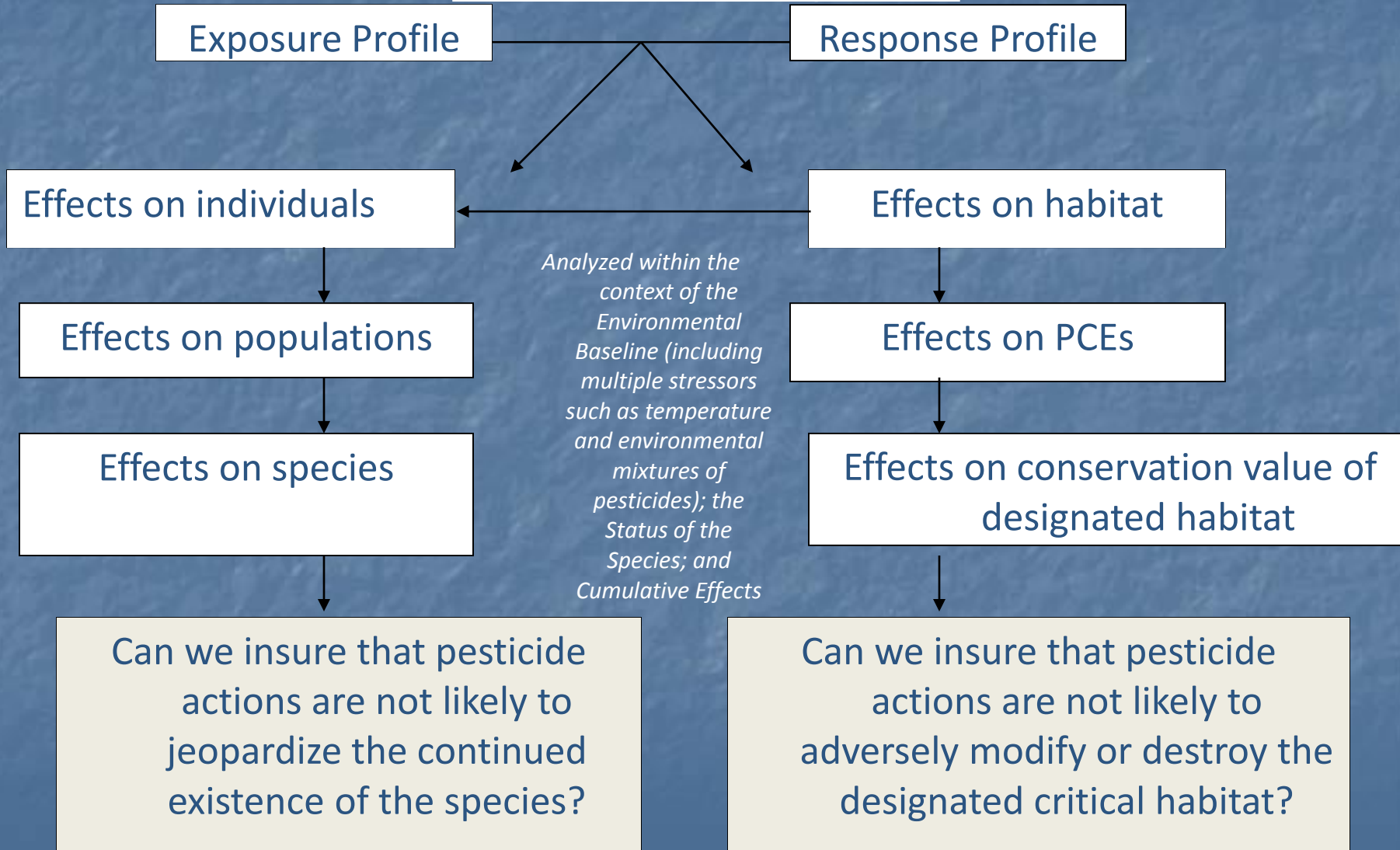
Source:

^{*}Gilliom et al. 2006. Pesticides in the nations streams and groundwater, 1991-2001. NAWQA Program Circular 1291. Unites States Geological Service.

^{**}Hoffman et al. 2000. Environmental Toxicology and Chemistry 19:2249 2258.

^{***}Burke et al. 2006. Surface water monitoring program for pesticides in salmonid-bearing streams, 2003-2005. WSDOE. Publication no. 06-03-036.

Conceptual Framework for Assessing Risk to Listed Species



Handling Uncertainty

Type 1 Error	Type 2 Error
Reject true null hypothesis - Claim an effect when none exists	Accept false null hypothesis- Claim no effect when one exists
Protect Species more than necessary	Protect species less than necessary, even lose species
Lose scientific credibility	Lose practical and scientific credibility
Increase socioeconomic costs more than necessary	Permit activities that should not have been approved

Table adapted from: Science and the Endangered Species Act. Committee on Scientific Issues in the Endangered Species Act. National Research Council. 1995.

Concluding Remarks