

Bill Bradbury  
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Oregon

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Oregon

W. Bill Booth  
Idaho

James A. Yost  
Idaho



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Vice-Chair  
Montana

Pat Smith  
Montana

Tom Karier  
Washington

Phil Rockefeller  
Washington

February 5, 2013

## MEMORANDUM

**TO:** Fish and Wildlife Committee members

**FROM:** Tony Grover, Fish and Wildlife Division Director

**SUBJECT:** Fish Tagging Forum Update

Therese Hampton, Chair of the Fish Tagging Forum, will be joined by Pete Hassemer, Idaho Fish and Game, Guy Norman, Washington Department of Fish and Wildlife, Tom Rien, Oregon Department of Fish and Wildlife, facilitator Kevin Kytola, Sapere Consulting, and Council staff to update the Fish and Wildlife Committee on the work of the Fish Tagging Forum.

The Fish Tagging Forum (Forum) was chartered in July 2011, to evaluate the program and cost-effectiveness of fish tagging under the Program as well as other issues discussed in the March 2009 ISAB/ISRP report regarding fish tagging technologies and programs. The Forum has held ten meetings between November 2011 and January 2013. Presentation materials, meeting summary notes, and related documentation are available at <http://www.nwcouncil.org/fw/tag/>. The meetings have been regularly attended by 20 to 30 subject matter experts from the following entities: BPA, USACE, NOAA, NPCC, USFWS, USGS, WDFW, ODFW, IDFG, PSMFC, tribes, Public Power Council, Northwest River Partners, Mid-Columbia PUDs, consultants, universities, and other interested parties.

**Tagging Technologies:** The Forum has received presentations from subject matter experts on various tagging technologies/methods including:

- Acoustic Tags
- Passive Integrated Transponder (PIT) Tags
- Genetic Marking (PBT and GSI)
- Coded Wire Tags (CWT)
- Otolith Marks and Scales
- Fin Clipping
- Radiotelemetry Tags

For each technology, the Forum has discussed the basic design/function of the tags; associated detection, recovery, and data management infrastructure; unit and life-cycle costs; relevance to specific management questions, application limitations, and potential for technological advancement. Attributes such as these will provide a basis for evaluating program and cost-effectiveness.

**Evaluation Criteria:** The two basic criteria the Forum will use to evaluate tagging technologies and investments are:

- Cost effectiveness
- Fish and Wildlife Program effectiveness, including the level of coordination

Additional criteria that may be used to help the Forum evaluate tagging technologies are:

- Amount of fish handling required
- Tag effects on fish health/behavior
- Lethal versus non-lethal tag recovery/detection
- Amount of life stage information obtained
- Geographic coverage of tag
- Proportion of technology/infrastructure investment versus labor investment
- Tag purpose - general versus specialized

Other criteria may emerge as the Forum participants work to meet the May 2013 goal of making recommendations to the Council's Fish and Wildlife Committee.

**Management Questions and Indicators:** In addition to the technology focused presentations and discussions, the Forum has identified the specific Management Questions and Indicators used in the region that are supported by fish tagging data. The Management Questions and Indicators have been organized around Hydro, Hatchery, Harvest, Habitat, Predation, and Species Recovery decision making. This effort established a clear connection between management questions and tagging efforts, including instances when more than one technology is being, or can be used, to support decision making. For the purposes of conducting analyses and developing recommendations, the management questions and indicators of importance to the Council's Fish and Wildlife Program have been identified and prioritized. Visual aids and spreadsheets have also been developed to document and communicate these relationships.

**Program and Cost-Effectiveness Evaluations:** The Forum is working through a series of analyses to define primary and secondary tagging technologies and the consequences of not having specific tag types available to support decision making. A number of information synthesis tools have been developed to support the development of recommendations, including:

1. Tag-specific summaries;
2. Tag infrastructure schematic;
3. Data collection and management schematic;
4. Management Question and Indicator Spreadsheet;
5. Management Question, Indicator, and Tagging Technology Network Diagram;

6. Tag-specific Cost Information (from BPA and USCOE).

The Independent Economic Analysis Board is exploring how they can assist the Forum in structuring the cost-effectiveness evaluation.

**Costs of Tagging:** To assist the Forum, Bonneville staff has estimated cost-related information for each tagging technology that includes all activities, including tag insertion costs, tag detection costs and analysis of data generated from the tags. For a variety of reasons, the current tagging costs in FY2012, shown in the table below, are considered generally accurate, though not precise.

CWT	\$ 7,000,000
PIT	\$ 24,500,000
	\$ 5,600,000 (or
Genetic	more)
Radio	\$ 1,800,000
Acoustic	\$ 18,000,000
<u>Others</u>	<u>\$ 1,200,000</u>
TOTAL	\$ 58,100,000

**Path Forward:** During February and March 2013, the Forum will be focused on the evaluation of program and cost-effectiveness and formulation of preliminary recommendations. Formal recommendations will be drafted, reviewed, and finalized between March 2013 and May 2013.

# Fish Tagging Forum

Update

February 12, 2013

# Significance of Tagging/Marking

- Roughly \$50M to \$60M spent in 2012 on tagging/marking related activities
  - Labor and infrastructure for application, detection/recovery, and data analysis
- 7 primary tagging/marking technologies
  - PIT, CWT, Acoustic, Radio, Genetic, Otolith, Adipose Clip
- Approximately 100 biological indicators rely on tags/marks to support decision making
  - Hydro, Habitat, Harvest, Hatchery, Predation, Population Status & Recovery

# Purpose of Fish Tagging Forum

(from the Charter)

- address costs, efficiencies and gaps for all fish tagging efforts that take place under the Council's Fish and Wildlife Program, including expense, capital and reimbursable programs.
- address the cost effectiveness and the program effectiveness of tagging under the Program as well as other issues discussed in the ISAB/ISRP report

# FTF Timeline and Process



## PARTICIPANTS:

### Federal:

USACE  
BPA  
USFWS  
NOAA  
USGS

### State:

IDFG  
ODFW  
WDFW

### Tribes:

CRITFC  
Nez Perce Tribe  
CTGR  
Colville Tribes

### Regional Interests:

PSMFC  
NW River Partners  
Public Power Council  
NPCC  
Mid-C PUDs

### Other:

IEAB, ISAB, ISRP  
Consultants  
Universities

# Accomplishments to Date

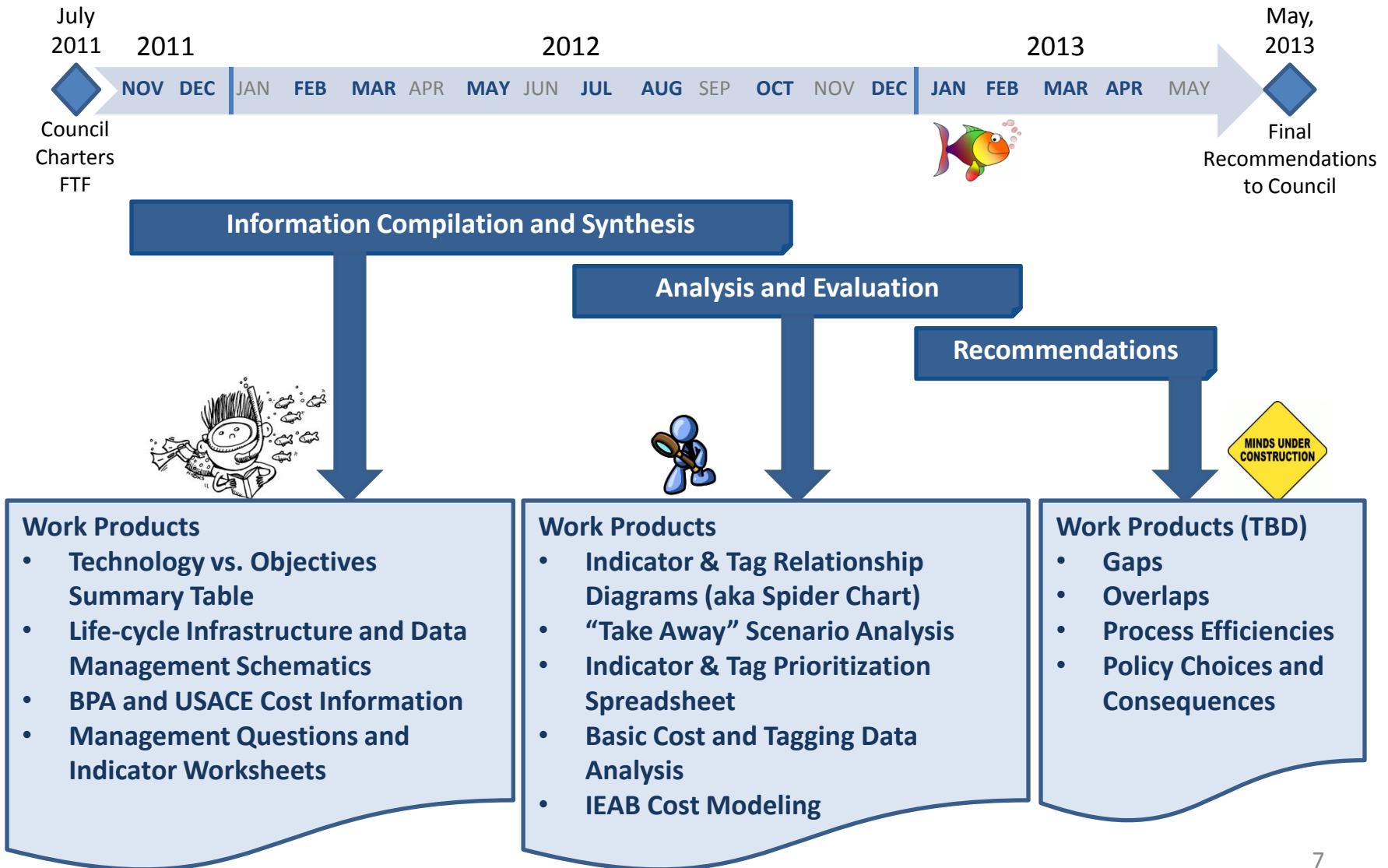
- Reviewed and summarized all major tag types.
- Developed a summary of BPA costs by tag type.
- Developed summary of management questions and indicators supported by tagging information.
- Identified which tagging technologies provide information for the management questions and indicators.
- Identified the management questions and indicators that are a priority to the Council Program.



# What's Going on Now in the Forum and What's Next?

- Evaluating the effects of removing funding for a particular tagging technology:
  - Management Questions and Indicators
  - Species
  - Geographic Coverage
  - Shared Resources
  - Cost
- Involving IEAB in cost-effectiveness evaluation
- Developing and reviewing recommendations

# Expected Work Products



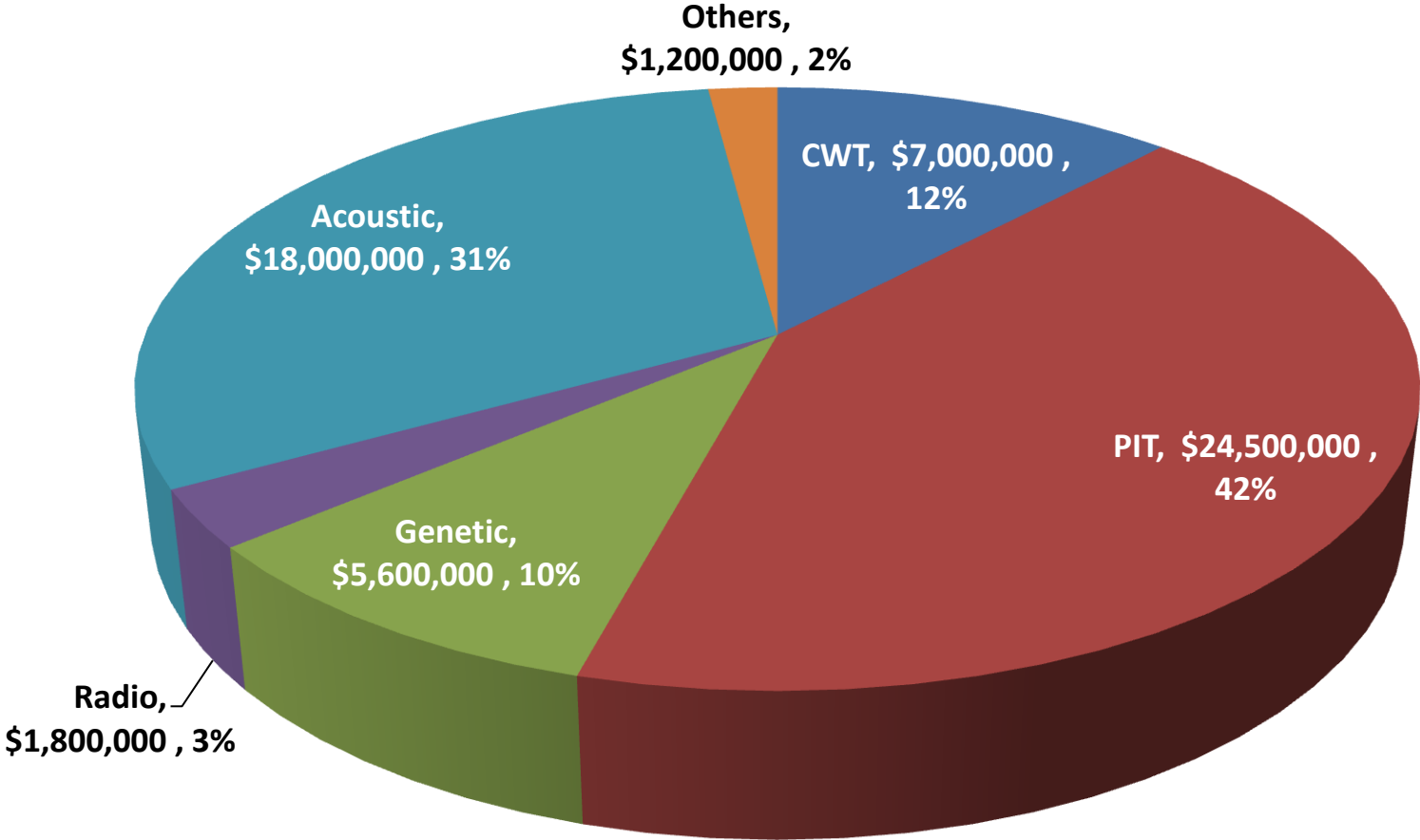
# Some Context For Costs

# BPA 2012 Estimated Costs by Tag Type

<b>CWT</b>	\$	7,000,000
<b>PIT</b>	\$	24,500,000
<b>Genetic</b>	\$	5,600,000
<b>Radio</b>	\$	1,800,000
<b>Acoustic</b>	\$	18,000,000
<b><u>Others</u></b>	<b><u>\$</u></b>	<b><u>1,200,000</u></b>
<b>TOTAL</b>	<b>\$</b>	<b>58,100,000</b>

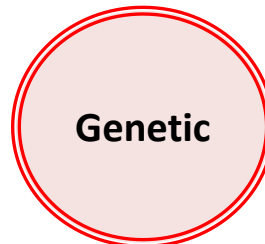
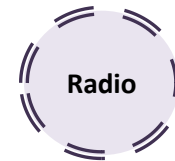
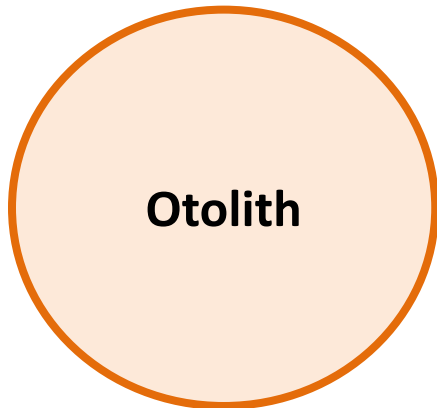
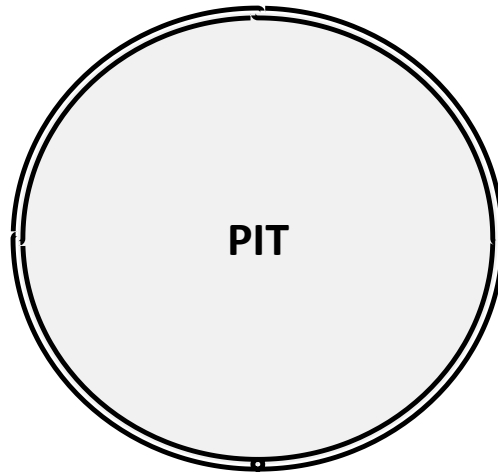
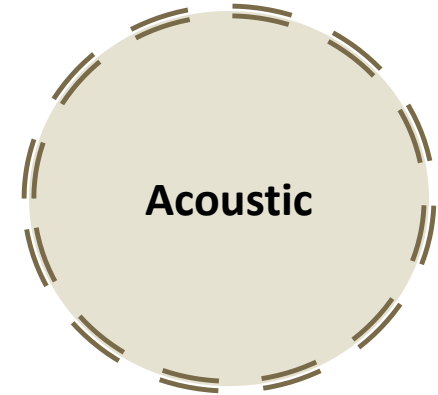
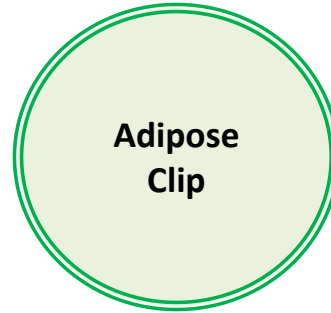
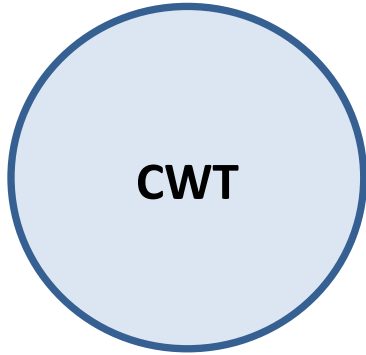
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# BPA 2012 Estimated Costs by Tag Type



# Some Context For Tags

# Tags Have Varied Attributes

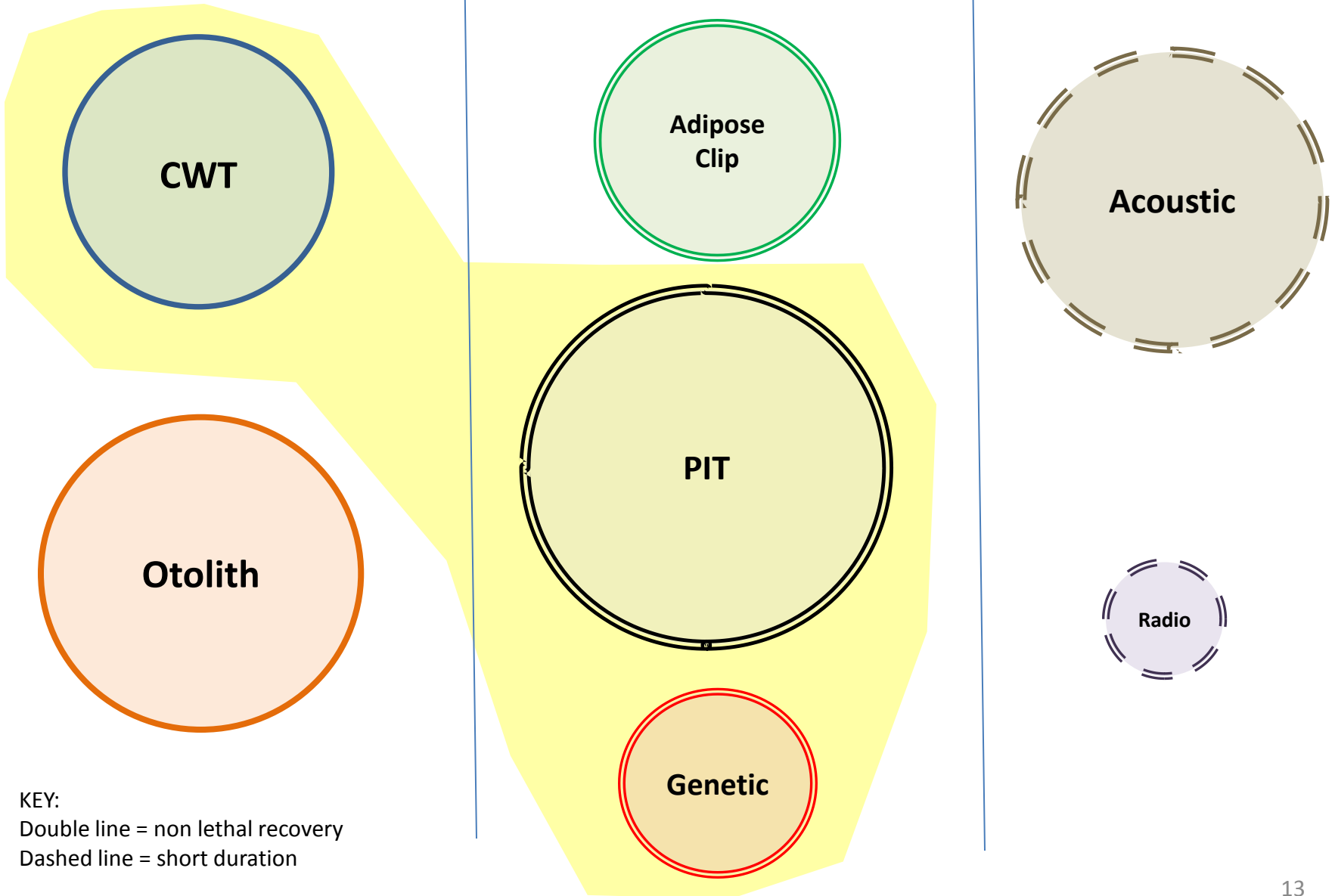


KEY:

Double line = non lethal recovery

Dashed line = short duration

# The Big 3





# The Big 3

Three long lasting tag types produce most of the information currently used to meet the Fish and Wildlife Program management objectives:

- Coded Wire tags
- PIT tags
- Genetic information

In some important ways these three tag types can be viewed as in competition to provide information to answer many management questions in the Fish and Wildlife Program

# Tag Types and General Applications

Tag Use	Data Collection Opportunity		
	Release	During Migration	Return
Short-term, special purpose tags.		Acoustic Radio	
Long-term monitoring tags.	PIT Genetics Adipose Clip CWT Otolith	PIT Genetics Adipose Clip	PIT Genetics Adipose Clip CWT* Otolith* *lethal recovery

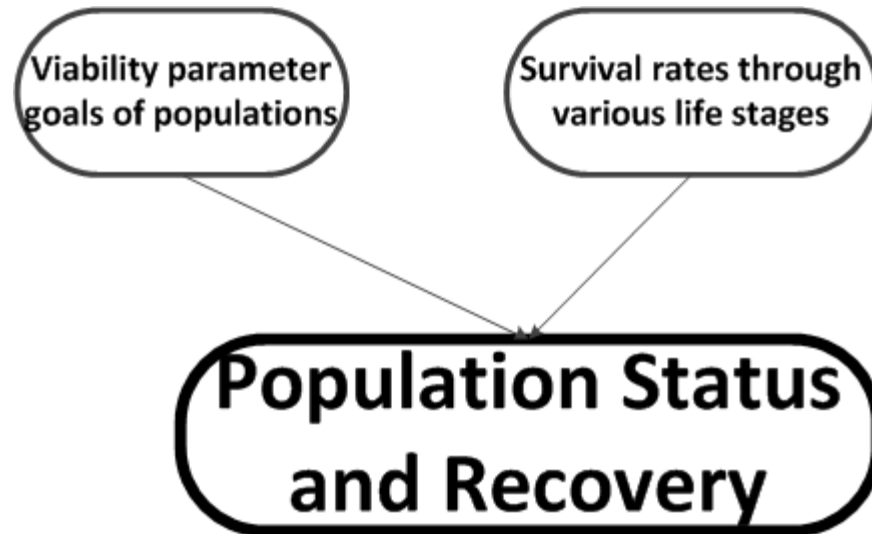
# Some Context For How Tag/Mark Data is Used

Example “Spider Chart” Framework

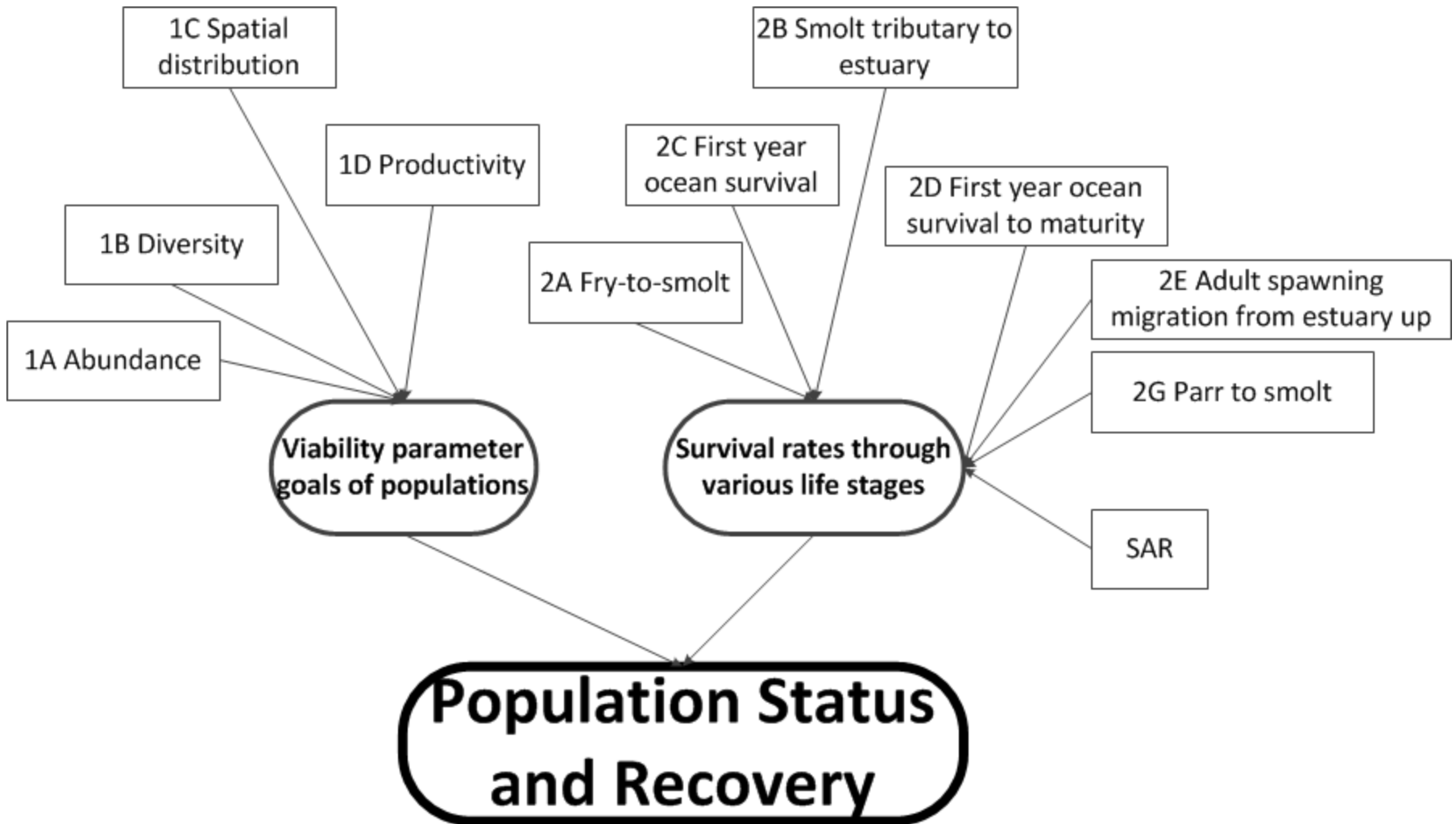
# Management Category

**Population Status  
and Recovery**

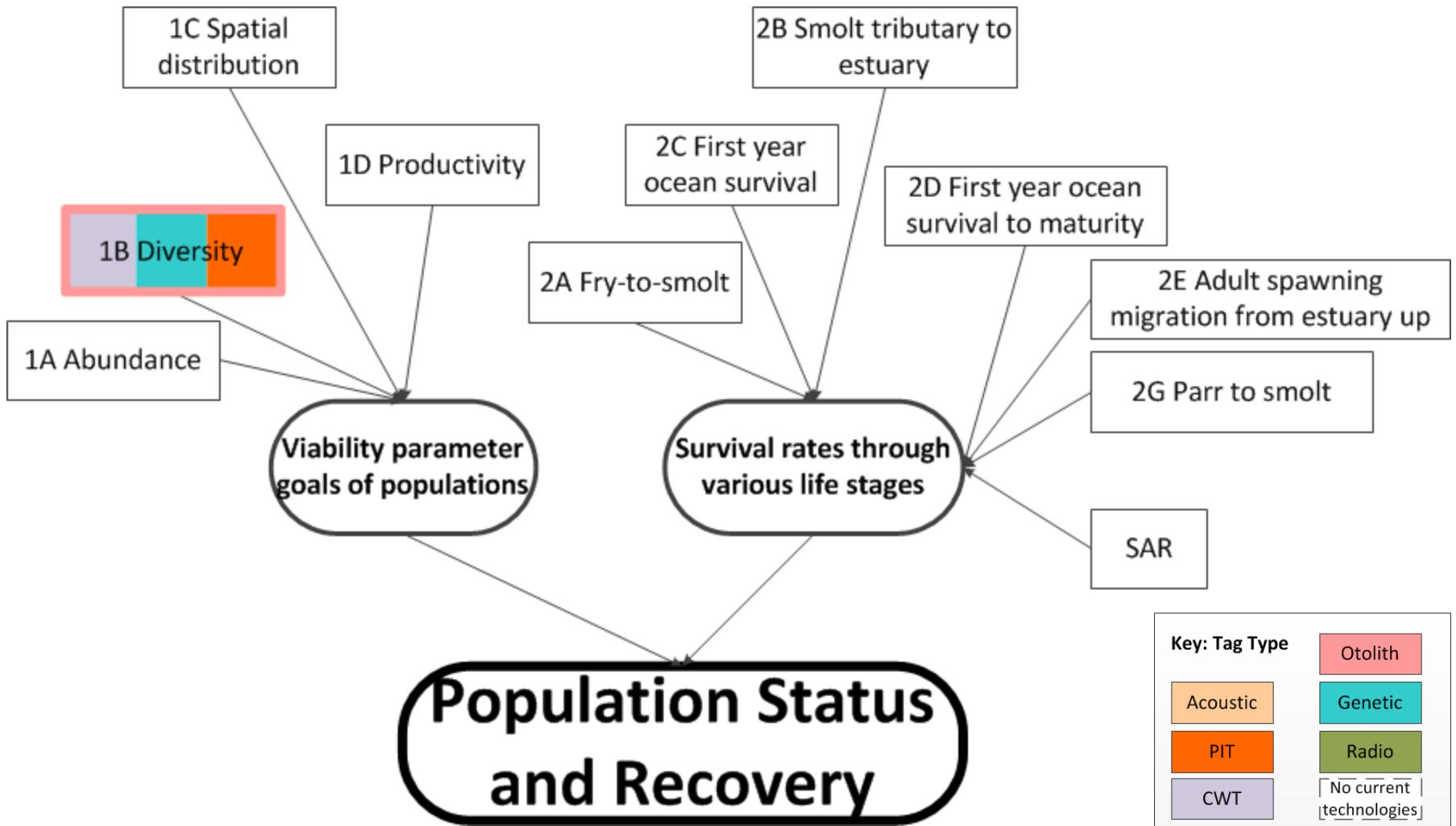
# Management Questions



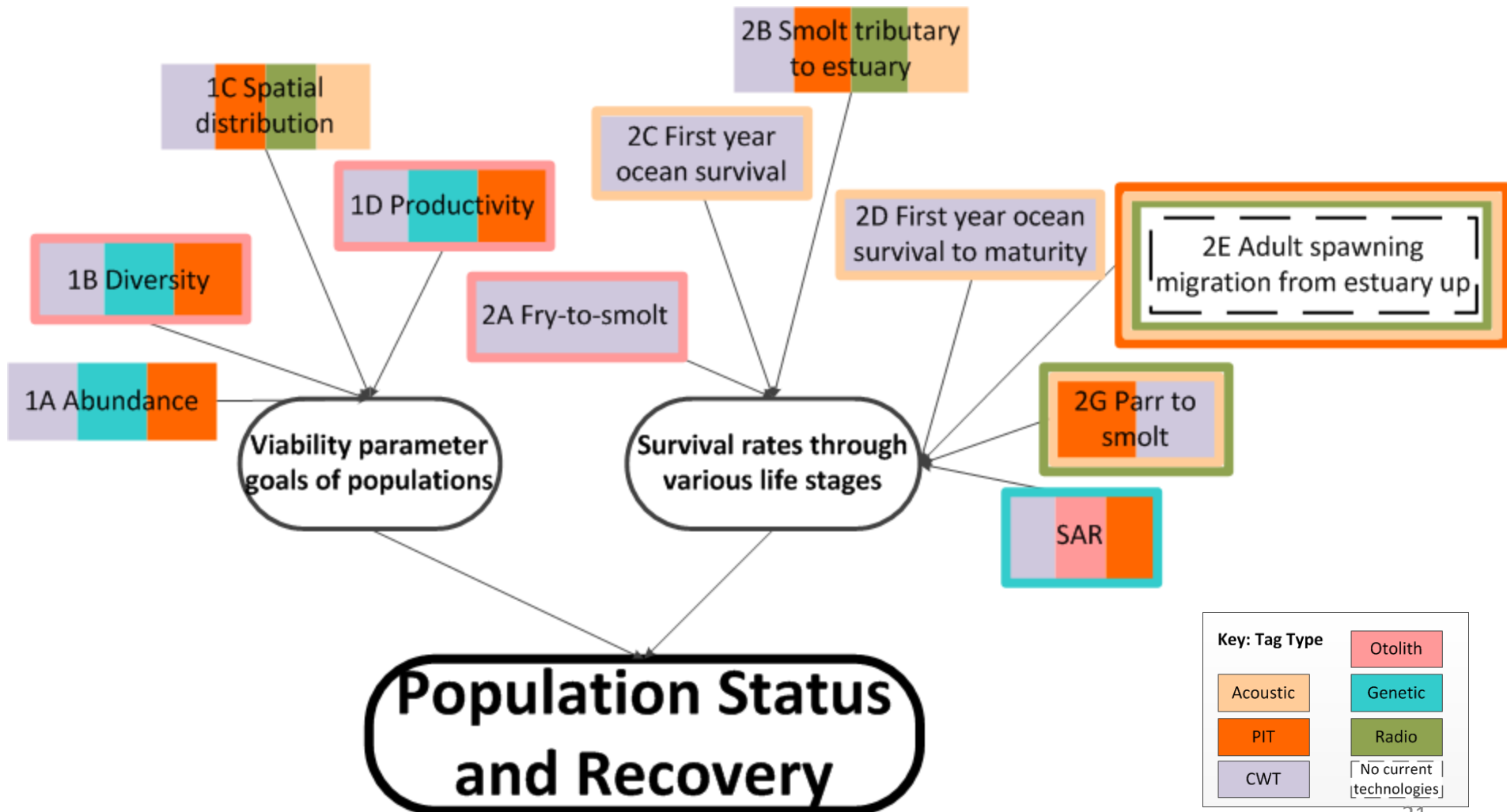
# Indicators



# Example Tag/Mark Applications

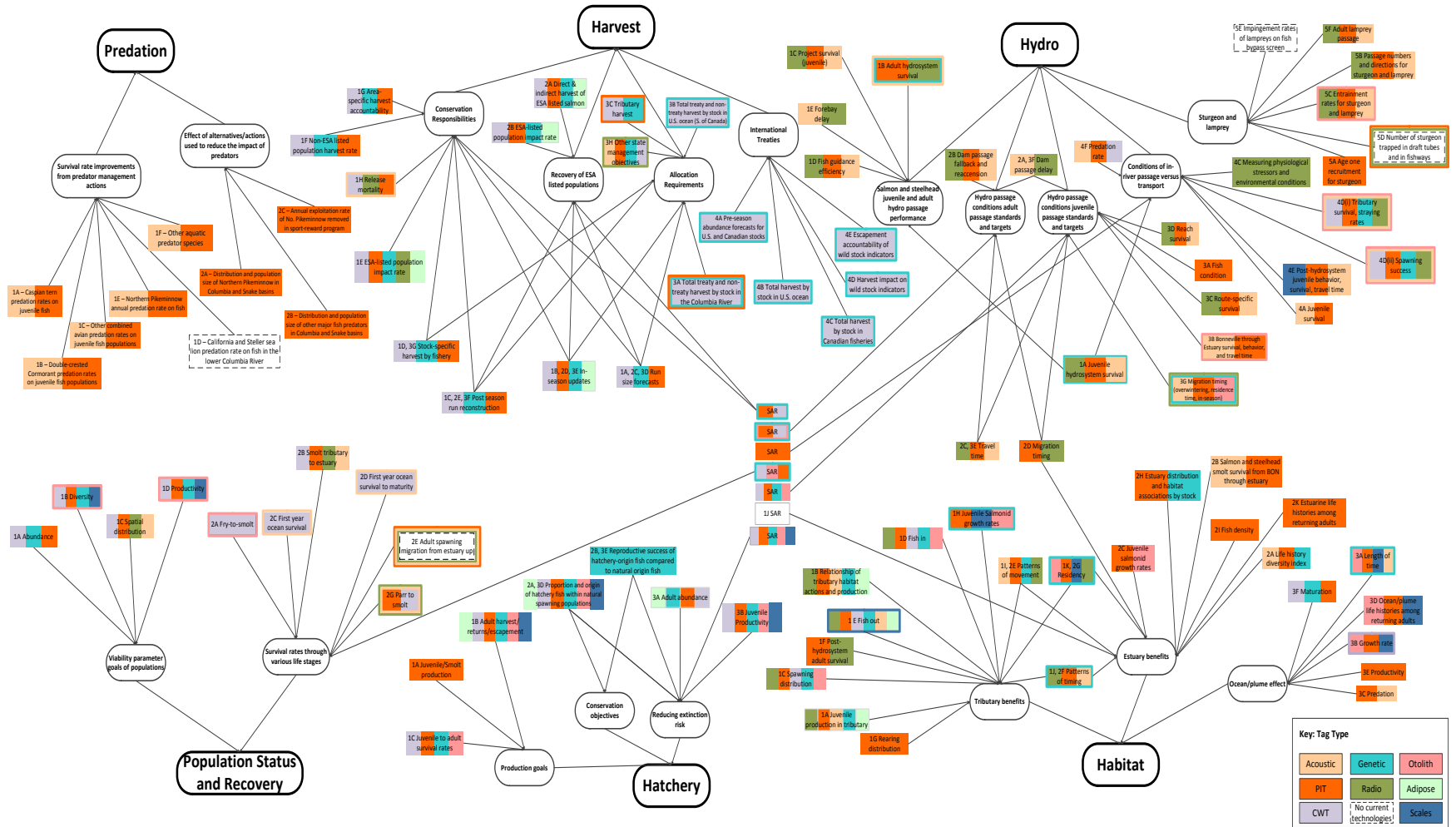


# The Full-Suite of Application





# The Whole Enchilada....

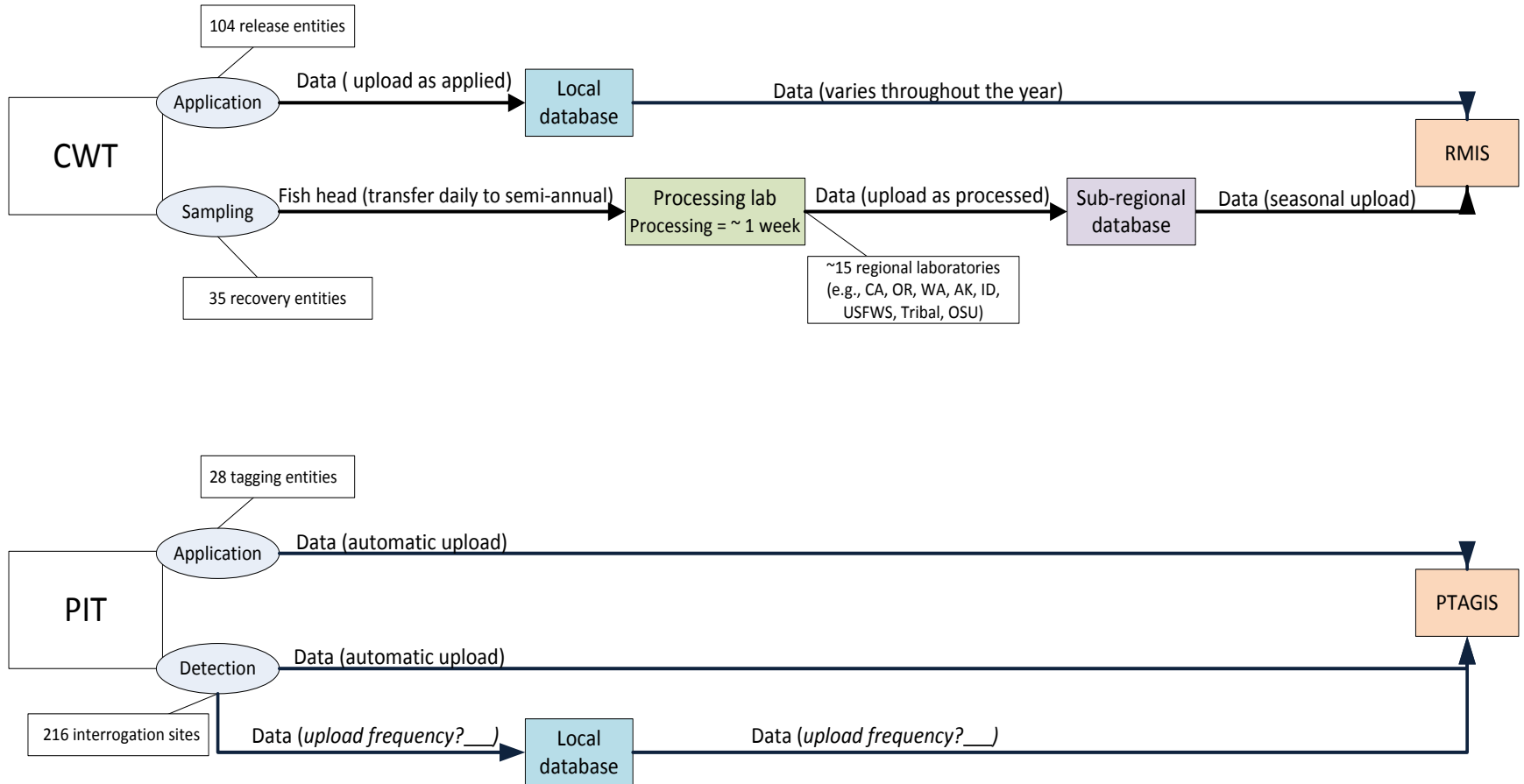


# Some Examples of Other Work Products

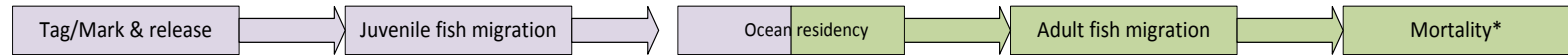
# Sample of Technology Summary Table

FTF Charter Objectives	Acoustic	Adipose Fin Clip	Coded Wire tags	Genetic Markers (PBT/GSI)
3a What fish are tagged	Acoustic tags are utilized primarily for juvenile Chinook, sockeye, lamprey, and steelhead. Acoustic tags are also used to study adult white sturgeon, walleye, bass, and pikeminnow.	Adipose fin clip is used to mark hatchery-origin fish, including Chinook, coho, and steelhead.	Emphasis of the program is on tagging Chinook and coho, with smaller numbers of steelhead and only a few sockeye tagged each year.	Genetic markers can be applied to any species of fish to allow for individual or stock identification. Standardized microsatellite baselines have been previously constructed for coastwide projects for steelhead, sockeye salmon, Chinook salmon and coho salmon.
3a Number fish marked/tagged	There are currently 65,000 unique JSATS tag codes in the Columbia and Snake river basins. At Chelan County PUD, between 4000 - 4500 juvenile fish are tagged/year per species. At Cougar Dam in 2011, USGS tagged 1000 juvenile Chinook, and at the Detroit project in 2012, the USGS will use 1200 tagged fish.	A 1995 Washington State law and 2003 US Department of Interior law required visual marking of hatchery fish.	About 56 million smolts are coded wire tagged each year at about 260 hatcheries along the West Coast. In CRB, between 22-24 million fish are coded wire tagged.	Under the current BPA-funded project ~90-95% of Snake River spring/summer Chinook salmon and steelhead hatchery broodstock are successfully genotyped and all of their offspring are genetically tagged. Approximately 9 million steelhead and 12 million spring/summer Chinook salmon are tagged each year under the current Snake River PBT project.
3a Number fish or tags recovered/detected	95% detection rate through the mainstem Columbia,	N/A	There is a goal to sample about 20% from each of the fisheries for CWTs; escapement sampling goal of 5% from each spawning ground; 100% sampling of hatchery returns. Total Columbia River catch in 2010 was 616,777, with 75,774 CWTs recovered (12%).	Thousands of fish are being recovered as part of GSI projects in the Pacific Ocean and in the Columbia River basin. At least 5,000 PBT tagged steelhead and 9,000 spring/summer Chinook salmon are sampled per year.
3a Entity releasing fish	<i>USCOE; Grant County PUD; Chelan County PUD, some USGS and USFWS</i>	Virtually all coho and spring/summer Chinook raised with the intent of supporting fisheries are adipose fin clipped.	47 federal, state and tribal fish agencies and other private entities tag fish.	IDFG, ODFW, WDFW, USFWS, NPT, IPC
3a Entity recovering/detecting fish	<i>USCOE; Grant County PUD; Chelan County PUD, some USGS and USFWS</i>	State and tribal fishery management organizations.	<i>ADFW, DFO, ODFW, CDFG, WDFW, Northwest Indian Fisheries Commission, IDFG, Nez Perce Tribe, Quinault Nation, Quileute Tribe, Umatilla Tribes (35 different federal, state and tribal fisheries agencies and other private entities)</i>	IDFG, ODFW, WDFW, USFWS, NPT, IPC
3a Purpose of tagging	Acoustic tags address dam passage survival and dam passage behavior in 2-D and 3-D, estimate survival through the estuary, survival of transported fish, and migration and fate of adult fish (as well as lamprey). Acoustic tag studies are able to support identification and evaluation of fish passage technologies, operations, and techniques. The technology can allow managers to better understand fish passage efficiency, spill passage efficiency, route-specific survival, and dam passage survival.	The purpose of fin clipping is to identify particular stocks of fish, such as hatchery-origin fish, as recommended by ISRP. Fin clipping is also used for brood stock management to identify the hatchery-origin fish component in the hatchery and on the spawning grounds.	Provide data on stock-specific migrations, ocean distribution patterns, and migration corridors of juvenile salmonids. Currently, CWT data are used in hatchery management to evaluate rearing and release experiments, estimate adult production, estimate SAR, and manage broodstock.	Used to estimate stock-specific data of wild and hatchery origin fish on ocean abundance, harvest, distribution, survival, and migration timing; estimate direct and indirect harvest of ESA listed salmonids, hatchery adult straying, reconstruct runs, predict adult run abundance, assess stock-specific temporal and spatial distribution of juvenile salmon and steelhead in the Columbia River estuary; estimate stock-specific harvest rates by commercial, recreational, and tribal fisheries in the Columbia River.

# Life Cycle Data Management Schematics



# Life Cycle Infrastructure Schematics



Adipose fin clip	Marking trailers	N/A	N/A	N/A	N/A
Acoustic	Tags, trailers, smolt traps	Autonomous receivers, mobile tracking units, cable arrays	Autonomous receivers, detection wands	Autonomous receivers, mobile tracking units, cable arrays	N/A
Genetic	Juvenile: N/A	Sample collection equipment, lab processing	<i>Sample collection equipment, surface trawls, lab processing</i>	Sample collection equipment, lab processing	Sample collection equipment, lab processing
	Broodstock: sampling equipment, lab processing				
CWT	Tags, trailers, marking machines, handheld injectors	N/A	N/A	N/A	Snout collection equipment, detection wands, lab processing
Otolith	Insulated box, thermal chilling system, lab processing, smolt traps	N/A	N/A	N/A	Sample collection equipment, lab processing
PIT	Tags, trailers, smolt traps, tag application equipment	In-stream arrays, dam arrays	<i>Surface trawls</i>	In-stream arrays, dam arrays, handheld detection wands	Handheld detection wands, flat plate antennas, pole mount antennas
Radio	Tags, smolt traps, tag application equipment	Aerial and underwater antennas, mobile tracking units	N/A	<i>Adult counting weirs, tags, mobile tracking units</i>	<i>Mobile tracking units</i>

\*Fish mortality data may be collected at any stage of the fish life cycle from harvest, recovered carcasses, and predators

NOTE: Italicized text indicates data collected outside Fish Tagging Forum materials

- Indicates fish handling
- Juvenile salmonid
- Adult salmonid