



**Pacific Northwest**  
NATIONAL LABORATORY

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# Prioritizing and Managing Risk across the Organization

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# Pacific Northwest National Laboratory

## A Non-Profit Science and Technology Enterprise

- ▶ 4,900 staff members
- ▶ 2000 research users annually
- ▶ \$1.1B business volume
- ▶ 600 acres / 101 Buildings
- ▶ Broad portfolio of research
- ▶ Basic unit of research is the project
- ▶ 2000 projects/year



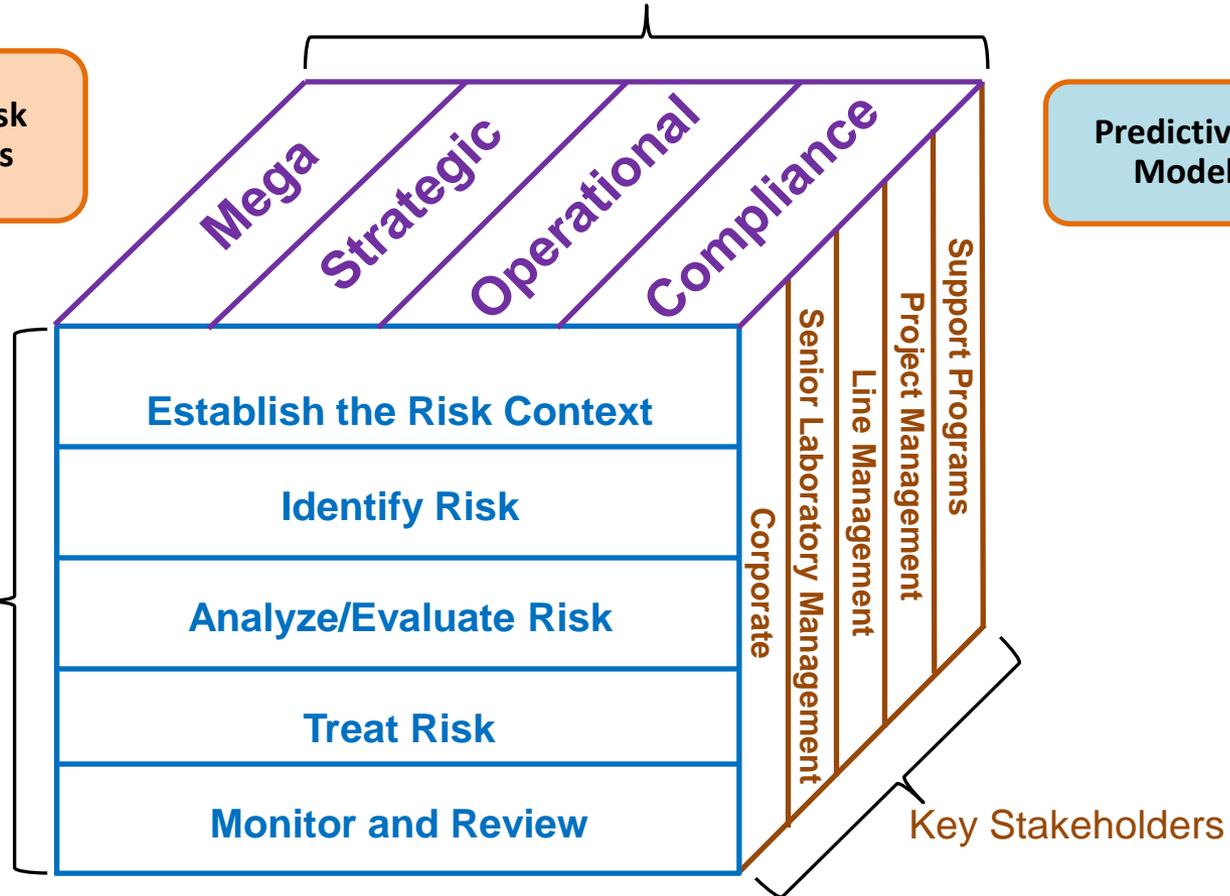
# Risk Management Framework

Risk Categories (Adapted from COSO Model)

Operational Program Risk  
Analysis and Heat Maps

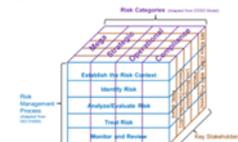
Predictive Risk  
Modeling

Risk  
Management  
Process  
(Adapted from  
ISO 31000)



# Operational Program Risk Analysis and Heat Map

- ▶ Operational Programs
  - Radiological, Security, Environmental, Worker Safety, Nuclear Safety
- ▶ Facilitated group discussion of each program:
  - Program Objectives
  - Risk events
  - Controls
  - Risk Level
    - *Based on Consequence X Likelihood*
    - *Looked at both inherent & residual risk*
- ▶ Two-part risk analysis:
  - Individual program
  - Across programs



# Operational Program Risk Analysis and Heat Map: Risk Significance

## Likelihood/Consequence Matrix

<b>Consequence</b> Considers: - Mission Impact - Project Interruption - Reputation & Image - Asset loss	<b>Catastrophic</b>	Well Controlled	Weakly Controlled	Uncontrolled	Uncontrolled	Uncontrolled
	<b>Disastrous</b>	Well Controlled	Weakly Controlled	Uncontrolled	Uncontrolled	Uncontrolled
	<b>Serious</b>	Well Controlled	Well Controlled	Weakly Controlled	Weakly Controlled	Uncontrolled
	<b>Minor</b>	Highly Controlled	Highly Controlled	Well Controlled	Well Controlled	Well Controlled
	<b>Minimal</b>	Highly Controlled	Highly Controlled	Highly Controlled	Well Controlled	Well Controlled
		<b>Highly Unlikely</b>	<b>Unlikely</b>	<b>Possible</b>	<b>Likely</b>	<b>Almost Certain</b>
		<b>Likelihood</b>				



# Operational Program Risk Analysis and Heat Map: Example Results Boating

## Program

### W25: Boating

#### Objective:

Safe and compliant boating during the performance of research operations

#### Risk Events:

- Staff injury or loss of critical equipment
- Fines/penalties due to non-compliance

#### Controls:

- Procedures
- Offsite ES&H work plan
- Staff qualification
- Boater Education card
- Float Plan
- Inspections
- Personal Protective Equipment

## Risk Profile

#### Risk Event:

Staff injury/Loss of Critical Equipment

#### “Likelihood” X “Consequence”

“Possible” X “Serious” (*Current Controls*)

“Possible” X “Disastrous” (*Uncontrolled*)

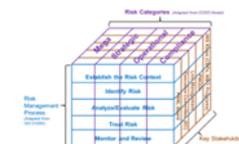
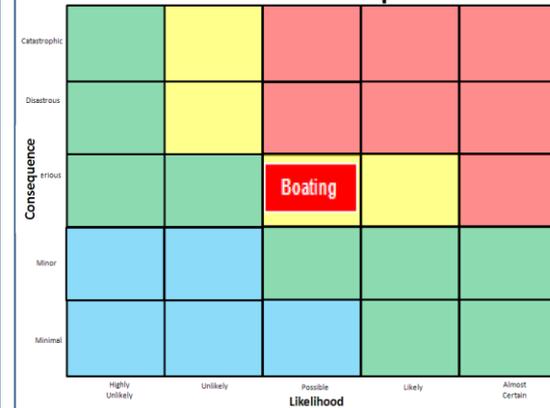
#### Critical Controls:

- Procedures
- Offsite ES&H work plan
- Staff qualification
- Inspections

#### Other factors:

- All work is conducted offsite
- Client vessels
- No trigger in automated project proposal or acquisition systems

### Risk Heat Map



# Operational Program Risk Analysis and Heat Map: Dashboard

Program	FY12 (1T)	FY12 (2T)	Program	FY12 (1T)	FY12 (2T)
<b>Hazardous Energy Control Programs</b>					
Pressure (Pressure, Cryogenics, Compressed Gases)	Green	Green	Lockout and Tagout	Green	Green
Electrical Safety	Green	Green			
<b>Industrial Hygiene Programs</b>					
Asbestos	Green	Green	NIR/Magnetic Field	N/A	Green
Beryllium	Green	Green	Noise	Green	Green
Biological	Green	Green	Respiratory Protection	Green	Green
Bloodborne Pathogens	Green	Green	Thermal	Green	Green
Lasers	Green	Green	Local Exhaust Ventilation	Green	Green
Lead	Green	Green	Chemical Management	Green	Green
Nanotechnology	Yellow	Yellow	IH Equipment Calibration	Green	Green
<b>Occupational Health Programs</b>					
Ergonomic	Green	Green	OSHA Recordkeeping	Green	Green
Industrial Hygiene & Occupational Safety Records	Yellow	Yellow	Wellness	Green	Green
Occ Med (Case Mgt, Medical Scheduling, EJTA)	Green	Green			
<b>Occupational Safety Programs</b>					
Aviation	Green	Green	Firearms	Green	Green
Confined Space	Green	Green	Hoisting & Rigging	Green	Green
Construction	Green	Green	Ladders	Green	Green
Fall Protection	Yellow	Green	Motor Vehicles	Green	Green
Swimming in Open Water	N/A	Green	Scaffolding	Green	Green
Underwater Diving	Green	Green	Tools & Machinery	Green	Green
<a href="#">Vessel Operation (Boating)</a>	Green	Green			
<b>Other WSH Programs</b>					
Animal Care Program	Green	Green	VPP	Green	Green
Explosives Safety	Green	Green	ISM	Green	Green
Fire Protection	Green	Green	Commercial Motor Vehicles	Yellow	Yellow
Human Subjects	Green	Green			

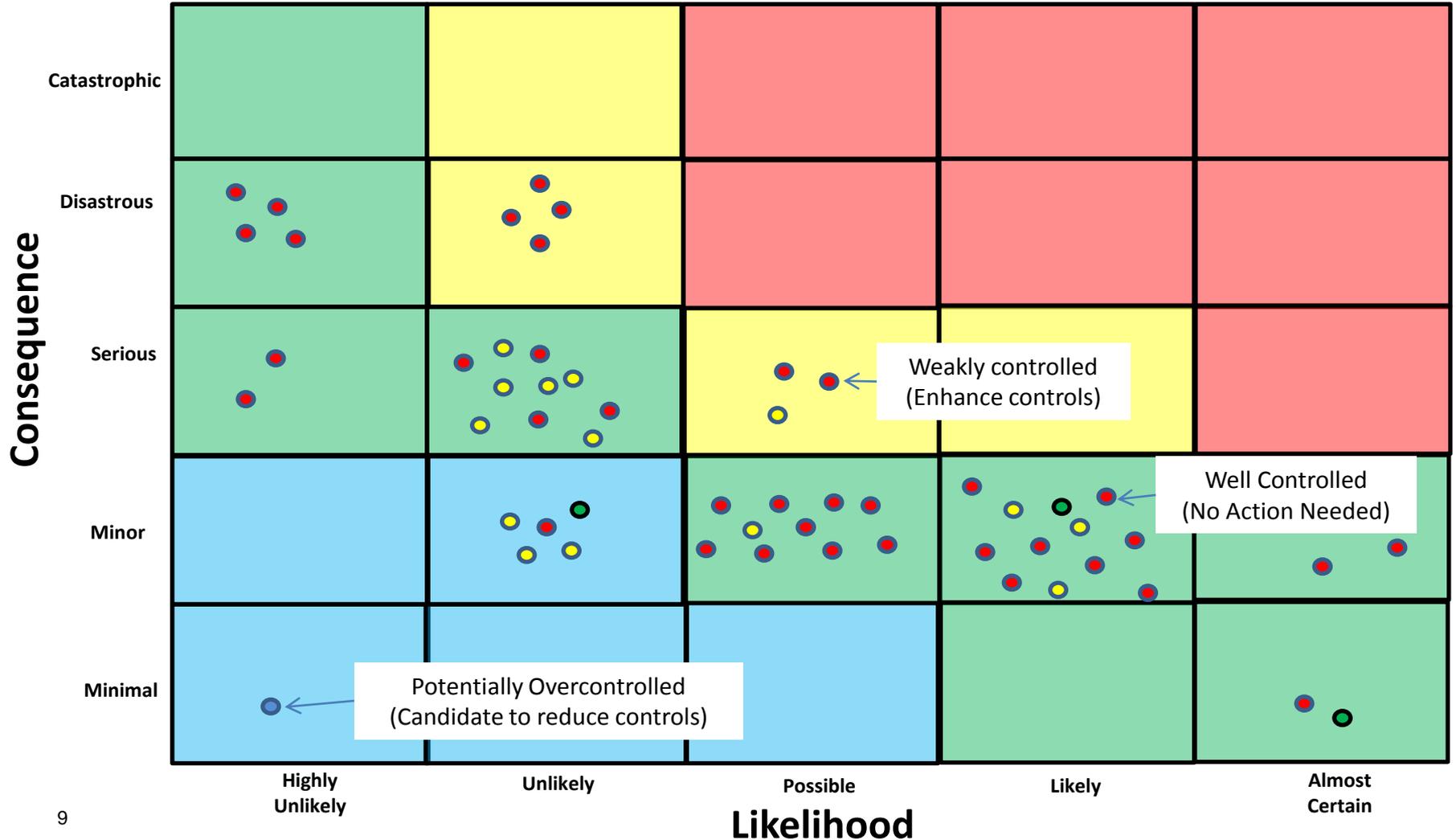
# Operational Program Risk Analysis and Heat Map: Essential Indicators Boating

Indicator	FY11	FY12 (1T)	FY12 (2T)
1. Vessel Operator Qualification (Green = $\geq 90\%$ , Yellow = $\geq 80\%$ to $89\%$ , Red = $< 80\%$ )	Green	Green	Green
2. User Feedback (qualitative assessment by SME)	Green	Green	Green
3. Activity observations and or Inspections (Green = 3-4, Yellow = 2, Red = 0-1)	TBD	TBD	Green
<b>Overall Program Health</b>	Green	Green	Green

Currently this program is ranked green on the heat map. There is no change in the rating this trimester. The spring research season has been completed and the summer season is in full swing with multiple vessel operations occurring daily releasing tagged fish on the lower Columbia and Snake rivers. There have been 161 float plans submitted from May 16<sup>th</sup> to June 12 for boat operations in the Snake and Columbia rivers. The high volume of boat use is supporting scheduled fish releases on the Snake and Columbia rivers. The high volume of boat use also necessitated the leasing of several boats for the projects. Despite the high volume of boat use there have been no boat related events.



# Operational Program Risk Analysis and Heat Map: Cross-Program Risk Profile



# Risk-Based Oversight: A DOE Site Office Approach

## PNNL Program Risk Statements

Program Title	Risk Statement
Program 1	Employee Injury
Program 2	Property damage
Program 3	Regulatory Non-Compliance
Program 4	Public Exposure
Program 5	Project Delay
Program 6	Loss of funding
Program 7	Inhibit Research

## PNNL Program Risk Profiles

Likelihood x Impact			PNNL Risk Product	PNNL Performance Data Streams
Likelihood	Impact			
5	3	15	Assessments, Reports, Metrics, etc.	
5	2	10	Assessments, Reports, Metrics, etc.	
4	3	12	Assessments, Reports, Metrics, etc.	
2	3	6	Assessments, Reports, Metrics, etc.	
3	3	9	Assessments, Reports, Metrics, etc.	
2	2	4	Assessments, Reports, Metrics, etc.	
2	3	6	Assessments, Reports, Metrics, etc.	

## PNSO Risk Informed Oversight Actions

PNSO Focus x PNNL Risk Product		PNSO Risk Product	PNSO Action OA = Operational Awareness, WT = Walkthrough, SV = Surveillance, AS = Assessment
Focus Level (1=Lo; 3=Hi)			
3	45	OA - WT - AS	
3	30	OA - WT - SV	
2	24	OA - SV	
3	18	OA - WT	
2	18	OA	
3	12	OA	
1	6	OA	

# What's next? Predictive Risk Modeling



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# Questions



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