Risk Evaluation for Aquaculture Biosecurity Planning

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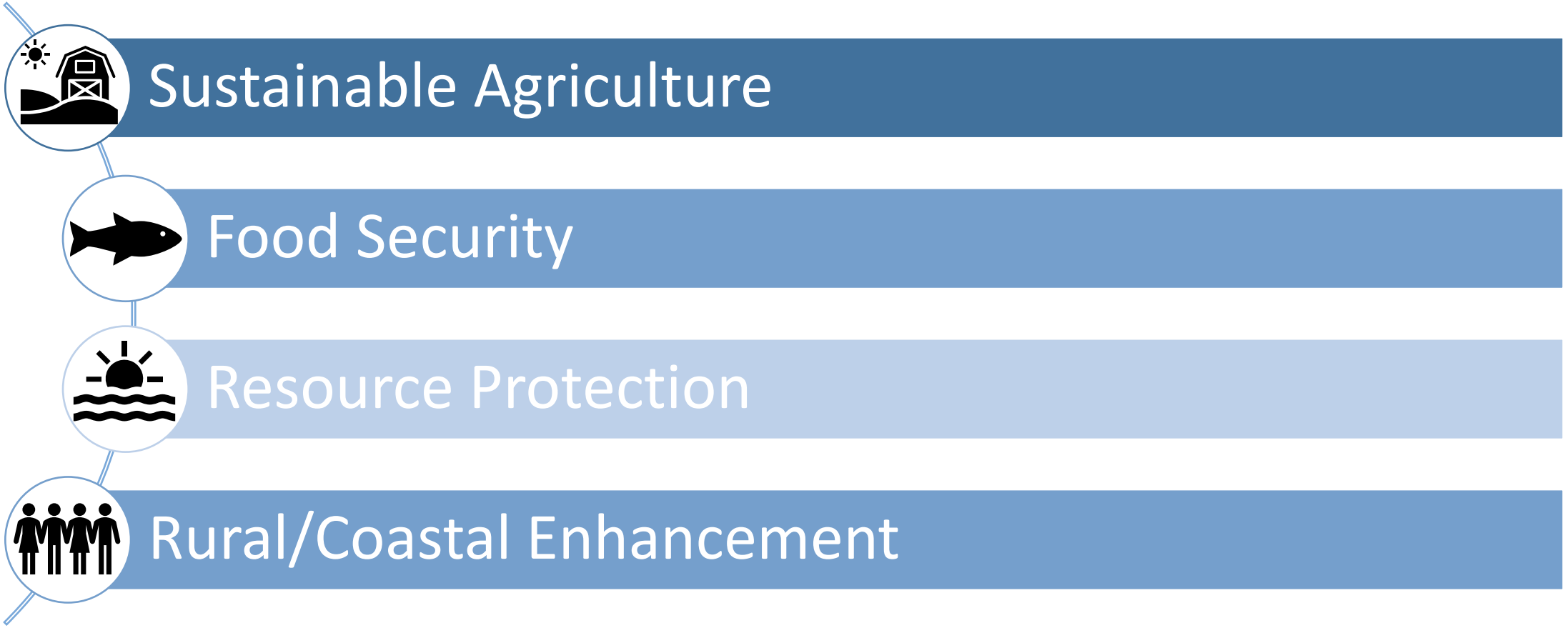
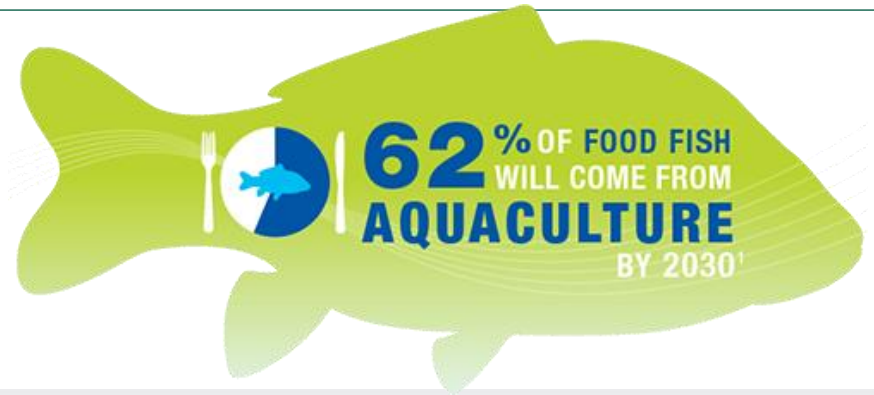
Aquaculture is…

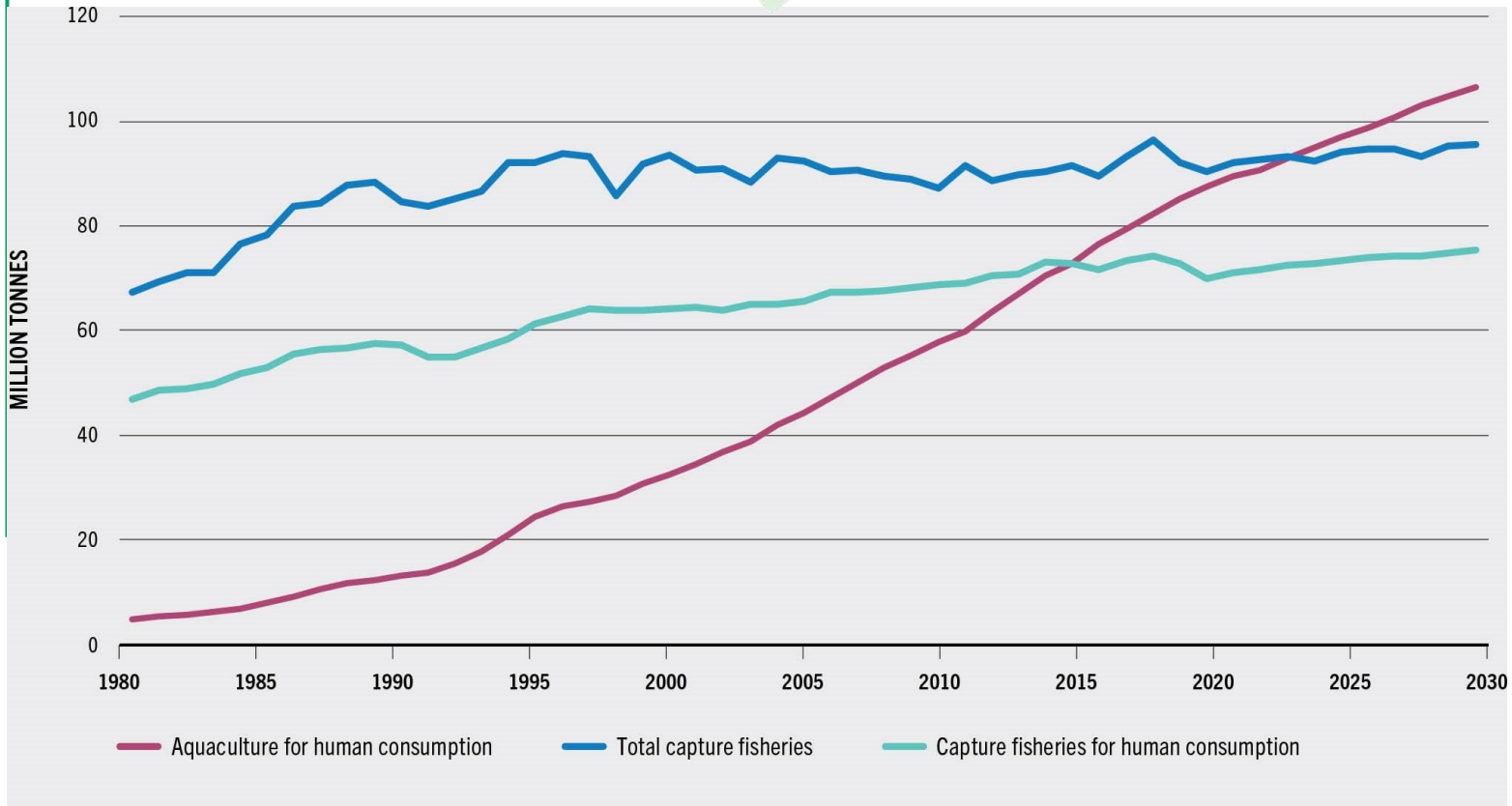


Aquaculture Production is Resource Efficient

				
Feed conversion ratio	1.1	2.2	3.0	7.5
Fresh water consumption	1 gallon	2,000 gallons	3,500 gallons	2,500 gallons
Carbon footprint (kg of CO_2,per edible part of product)	2.9	2.7	5.9	30.0
Protein retention	31%	21%	18%	15%
Edible meat/100 kg fed	61 kg	21 kg	17 kg	4-10 kg


If we keep fishing at the current rate all species of wild seafood will COLLAPSE within 50 years
#EatForThePlanet


62 % OF FOOD FISH WILL COME FROM AQUACULTURE BY 2030¹


MILLION TONNES
120
100
80
60
40
20
0
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
Aquaculture for human consumption
Total capture fisheries
Capture fisheries for human consumption

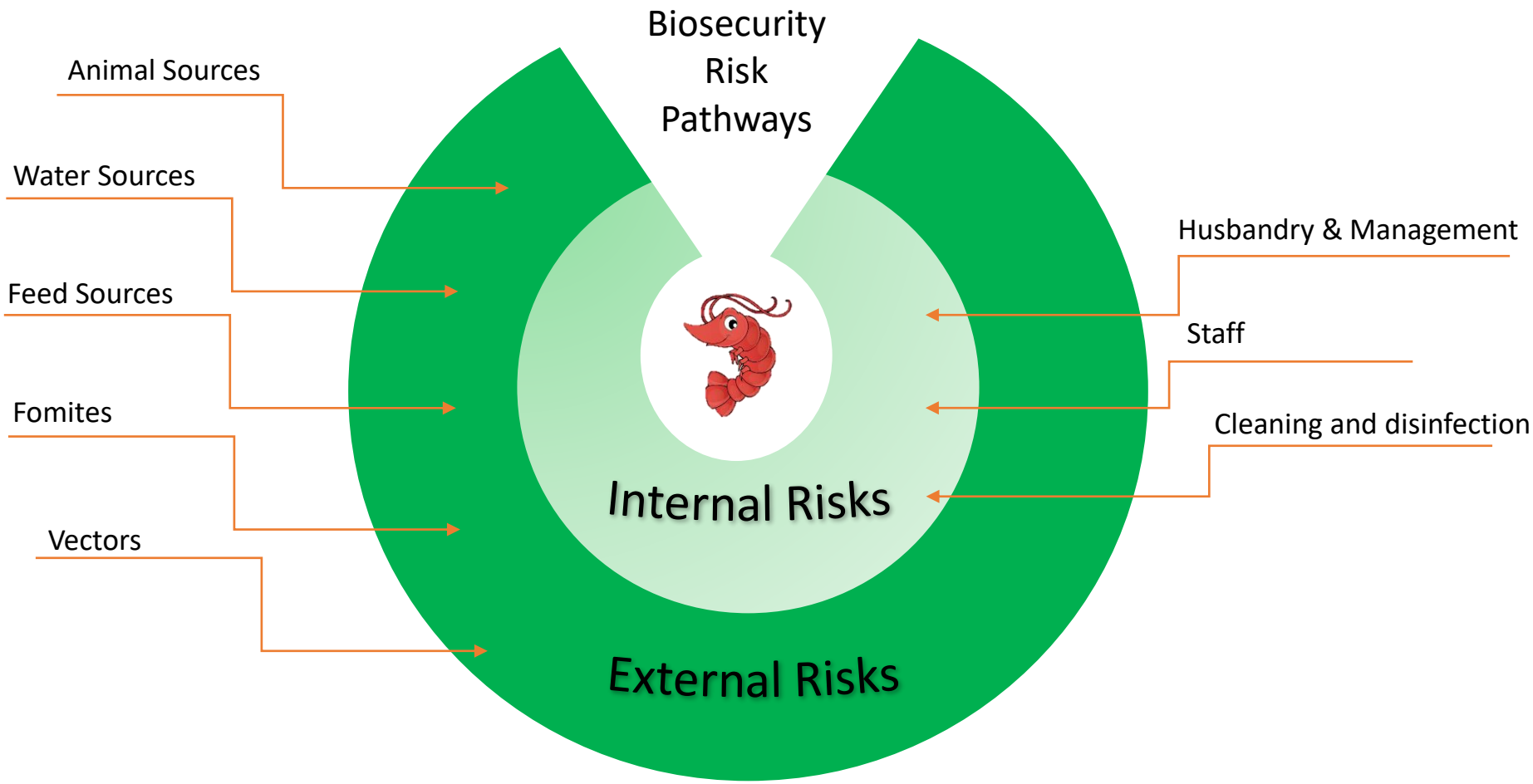
U.S. Aquaculture

- Annual $1.5 billion industry
- Supports 1.7 million jobs
- Ranked 17th in global aquaculture production
- Food fish and mollusks generate the most sales
  - Fish: catfish, sturgeon, tilapia, trout, salmon
  - Mollusks: clams, oysters, mussels
- Most diverse commodity sector
  - Number of species in production, farming methods and end-uses of animals
  - 24% of WOAH listed diseases are aquatic animal pathogens

	Total Value of AQ Products Sold (USD$)	Total # of AQ Farms	Total Acres	Most Common Water Source
Mississippi	215,709,000	176	39,561	Groundwater
Washington	207,685,000	151	16,263	Saltwater
Louisiana	135,712,000	525	240,274	Groundwater
Virginia	112,640,000	202	17,797	Saltwater
California	106,021,000	116	11,329	Groundwater
Alabama	95,199,000	120	17,591	On-farm surface water
Hawaii	78,429,000	49	794	Saltwater
Maine	72,340,000	75	1,295	Saltwater
Florida	71,649,000	334	3,410	Saltwater
Arkansas	67,661,000	82	29,396	Groundwater
Texas	62,594,000	107	7,566	Groundwater
Idaho	44,763,000	41	498	On-farm surface water
Massachusetts	28,858,000	180	1,046	Saltwater
Maryland	28,139,000	43	2,318	Saltwater
North Carolina	26,006,000	137	2,909	Groundwater

Source: U.S. States With the Largest Aquaculture Industries - Commodity.com

Aquaculture Biosecurity



https://www.rastechmagazine.com/biosecurity-101-keys-to-keeping-your-ras-pathogen-free/

Aquaculture Biosecurity

- Aquaculture biosecurity are the practices implemented at different levels to protect susceptible livestock from pathogen introduction and spread.

- Biosecurity levels and oversight authority
  1. National/international – Federal governments/shared
  2. Regional –industry and states/shared
  3. Site/premises – company/private

- Biosecurity measures protect the animal investment
  - The health status
  - The marketability
  - The brand

- WOAH Aquatic Code "***Basic Biosecurity Conditions***"
  - Early detection System (EDS)
  - Measures to prevent the introduction and spread

Risk Evaluation Steps

1. Risk Identification

2. Risk Characterization

3. Risk Management

Step 1. Risk Identification

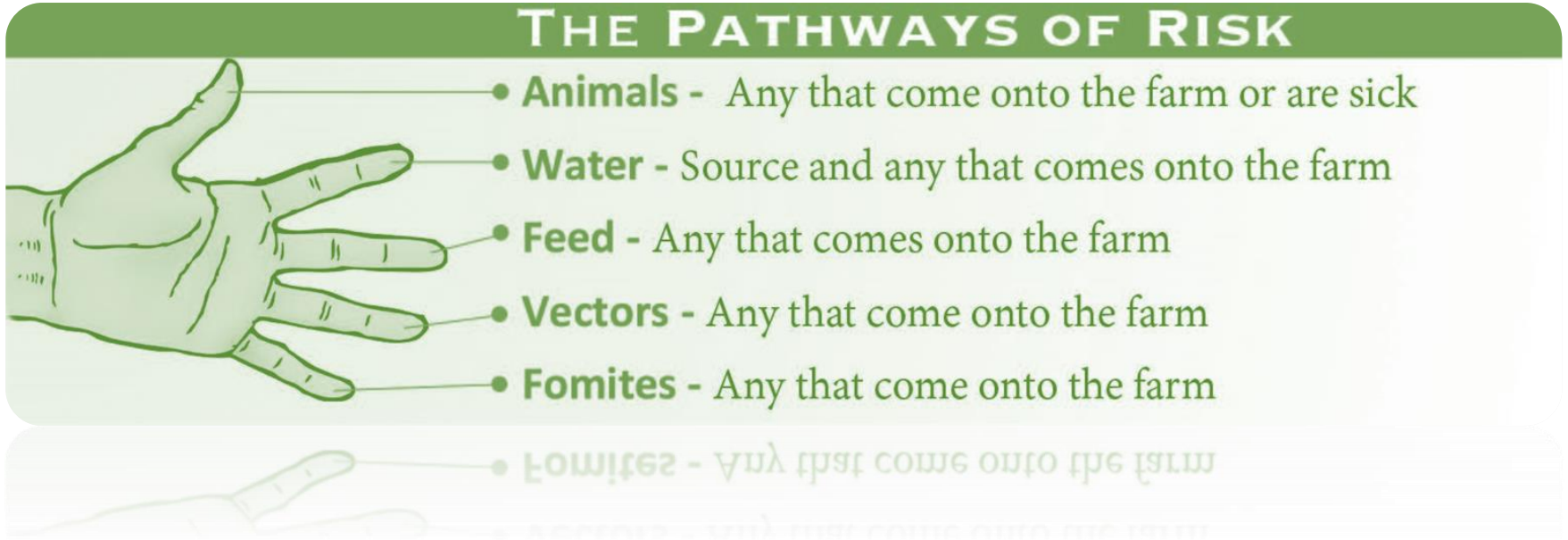
First, consider the following questions

- What pathogens are the species susceptible to?
- What culture method? (RAS, ponds, protected water, open water)
- What end use? (further grow-out, human consumption, export)

Then, what are the pathogens/threats of concern?

- Threat to animal health/production?
- Threat to food safety?
- Threat to trade opportunity?

Step 2. Risk Characterization



- For each prioritized pathogen, determine the risk of entry for each pathway.

Producer Biosecurity Survey

Pathway of pathogen transmission	Very serious	Somewhat serious	Not very serious	No concern
Animals	60.5	24.7	11.1	3.7
People	35.0	32.5	20.0	12.5
Equipment	29.6	38.3	16.0	16.0
Water supply	16.3	15.0	23.8	45.0

Step 3. Risk Management

- For each pathogen and each pathway of risk – what can be done to avoid or minimize the threat, if one exists?

Secure	Mitigate	At Risk
• Species not susceptible • Environment not conducive • Declared "free" region	• Practice implemented to reduce/eliminate risk	• Insufficient risk mitigations

Risk Evaluation - Water

	Secure		Managed		Insufficient	
	Negligible risk of pathogen introduction via pathway		Minimized risk of pathogen introduction via pathway		Pathway is UNCERTAIN (or not minimized)	
Water	AT LEAST ONE OF THE FOLLOWING:		AT LEAST ONE OF THE FOLLOWING:		AT LEAST ONE OF THE FOLLOWING:	
	> Natural absence of aquatic animals in source waters, or	☐	> Mitigations to remove or inactivate pathogens in source water, or	☐	> UNCERTAIN (or not minimized) due to none of the above, AND/OR	☐
	> Natural absence of conducive conditions for pathogens of concern, or,	☐	> Locally recognized health status of source region	☐	> NOT documented & monitored	☐
	> APHIS-recognized health status of source region (or country)	☐	AND > Documented and monitored	☐		
	AND > Documented and monitored	☐				
Examples	> Groundwater (well, spring) without surface access > Environment or host precludes pathogen persistence > Documentation includes SOPs, and records or other evidence of implementation, available during inspection		> Filter and UV treatment of source water appropriate for pathogen inactivation > Remove or test aquatic animals from source water			

Risk Evaluation - Animals

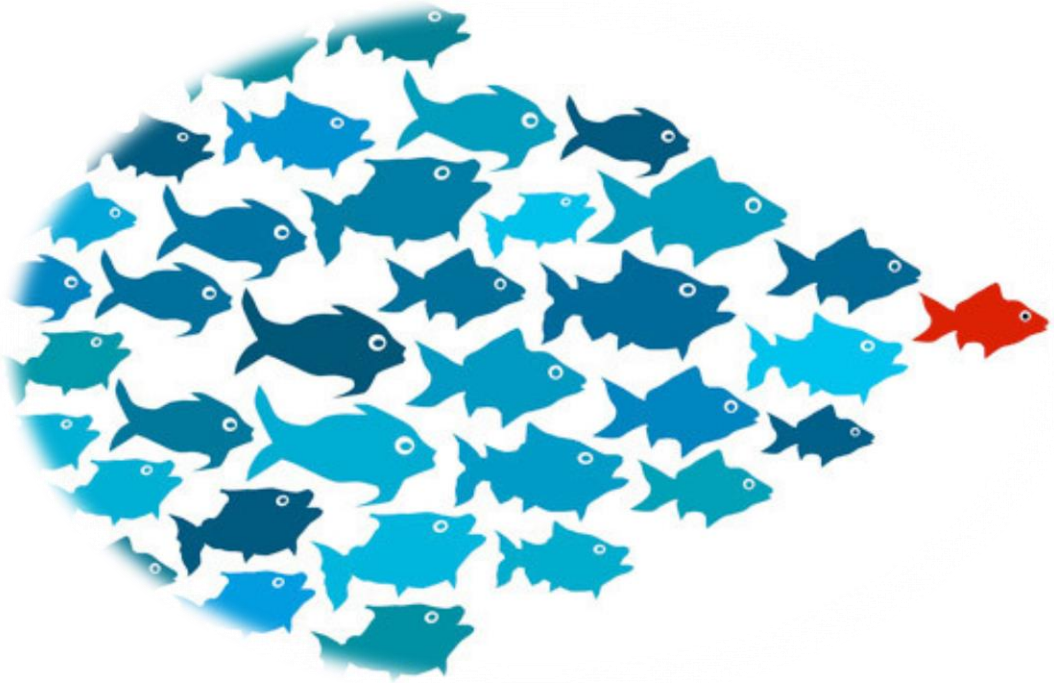
	Secure		Managed		Insufficient	
Animals	ALL OF THE FOLLOWING:		ALL OF THE FOLLOWING:		AT LEAST ONE OF THE FOLLOWING:	
	> Internally sourced animals are derived from lots with verified equal or higher health status, and,	☐	> Mitigations and/or testing demonstrate that incoming animals have a health status equal to or greater than the resident population, and	☐	> UNCERTAIN (or not minimized) due to none of the above, and/or	☐
	> Externally sourced animals are derived from a CAHPS Global Premises or from populations with APHIS-recognized disease freedom status, and	☐	> If no to all-in all-out and hard breaks, then exposure to previous life stages is only permitted if the previous life stage is verified equal or higher health status, and	☐	> NOT documented & monitored	☐
	> All-in all-out and hard breaks prevent exposure from previous life stages, and	☐	> Documented and monitored	☐		
	> Documented and monitored	☐				
Examples	> Hard break examples could include (1) All-in, all-out with c/d and synchronized (bay management) fallow between YC (this assumes no susceptible wild species in the region), or (2) All-in, all-out with c/d of tanks and fallow between YC > Documentation includes SOPs, and records or other evidence of implementation, available during inspection		> Lot based testing from a source with greater than 2-year health history of the premises verified by appropriate authority/oversight for animal health; > Quarantine animals (including stressors and/or temperature stress to ensure adequate pathogen detection if present) and repeated test negative prior to quarantine release; > Permanent quarantine with test/release of progeny; If eggs, combine one of the above with surface disinfection treatment			

From Risk Evaluation to Biosecurity Plan

- Biosecurity plan documents practices implemented to prevent or minimize pathogen introduction/spread.

- Provides justification of how measure prevents or minimizes risk.
  - E.g., In-line UV treatment for source water is 40 mJ/cm^2 which is sufficient to kill aquatic Vibrio spp.

- Pathogen surveillance and early detection systems provide verification that biosecurity practices are working.



From the Top

- Aquaculture is a critical and growing sector of US agriculture
- Biosecurity has multiple levels – nation, region, farm
- Primary risk pathways for aquaculture settings are –
  - Animals, water, feed, vectors and fomites
- Risk evaluation is the first step to developing a biosecurity plan
  - Identify risks, identify control points, identify practices/measures
  - Write biosecurity plan
  - Justify decisions

What Can Animal Health Regulators Do?

- Know aquaculture industry pathogens of concern
  - Listed pathogens, production pathogens, socio-political pathogens
- Know which pathogens are “endemic” and “absent” from your area
- Know the risks for your area
- Support language that implements “biosecurity” at the regional level
- Support national biosecurity
  - Import controls
- Support reporting of listed pathogens
  - WOAH, NLRAD and State
- Draft language that is risk and science based for movement controls

New Release & Stay Tuned!

- APHIS State Regulations map for aquatic animals
  - USDA APHIS | State Regulations for Domestic Movement of Live Aquatic Animals
  - PLEASE check information for your state!

- Declarations of pathogen freedom for the US
  - EHNV and SAV

Thank You!

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http://www.aphis.usda.gov/animal-health/aquaculture