

A large group of salmon swimming in clear water over a rocky riverbed. The fish are densely packed and moving in various directions, creating a sense of a busy river. The water is clear, revealing the dark, wet rocks on the bottom. The lighting is somewhat dim, suggesting an overcast day or a shaded area of the river.

Applying modern
concepts of health to
salmon

Why think about this

- **Health – often used but rarely defined**
 - e.g. Cohen
 - 400 uses without definition
 - No shared perception of what we are striving for
 - *Same problem as the precautionary approach*
- **Current approach reflects thinking abandoned >75 years ago**

Legislated views of animal health

- **Absence of a pre-selected group of infectious or parasitic diseases**

- Trade considerations 1st
- Commercial production or public health 2nd
- Conservation largely absent
 - Wild animals outside of the animal health world

- **Problems**

- Defining something by what it is not
- Excludes many other causes of poor health
- Not linked to population performance

Assumes a
zero risk
tolerance

- No acceptable level of a listed pathogen or parasite in a population except 0
 - Feasible for exotic diseases if.....
 - Can sample to show freedom from disease
 - Absence means in a specific population and not an ecological community
 - Not feasible for endemic diseases because....
 - Pathogens and parasites are normal part of wild animal ecosystems
 - Threshold for acceptable non-zero amount will change with context
 - Ex. highly contaminated immunocompromised population vs populations in pristine environments

Implications of this model

Signal for action is a
negative signal

- Result in a reactive or narrow prevention approach

Does not reflect health as
experienced by living
organisms

- Multiple interacting health enablers and obstacles occur concurrently and change over a lifespan



"Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity."
~ World Health Organization, 1948

Next conception of health

- Adapted for herd health
- Problem
 - How do we recognize a complete state in all domains
 - Increases the likelihood of saying something is not healthy
 - Note the date

Current
concept
(40 years
old)

- **Health is** *the capacity of individuals or populations to adapt to, respond to, or control life's challenges and changes*
- Very similar to resilience

What do
you need
to be
healthy?

- **Options, resources and environments that allow you to deal with all the stuff life throws at you**
- **What gives you this?**
 - Sustainable access to the needs for daily living
 - Physiological, ecological and social resources and functions to cope with stress and change
 - Ability to meet social and ecological expectations

Examples of the social construct

DFO polices emphasize abundance for fishing as a defining feature of a healthy salmon population

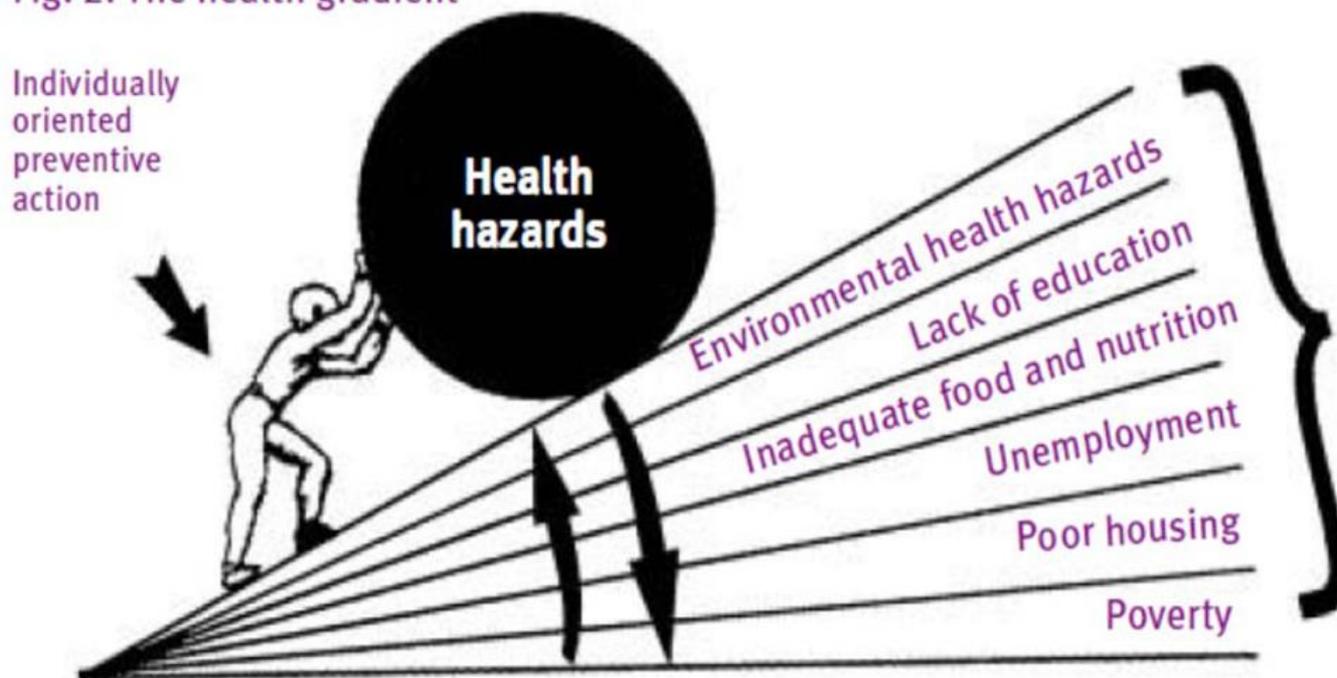
- Human needs for economic and cultural purposes supersede the inherent value of salmon or their ecological functions

Cohen criteria to avoid minimal risk of serious harm

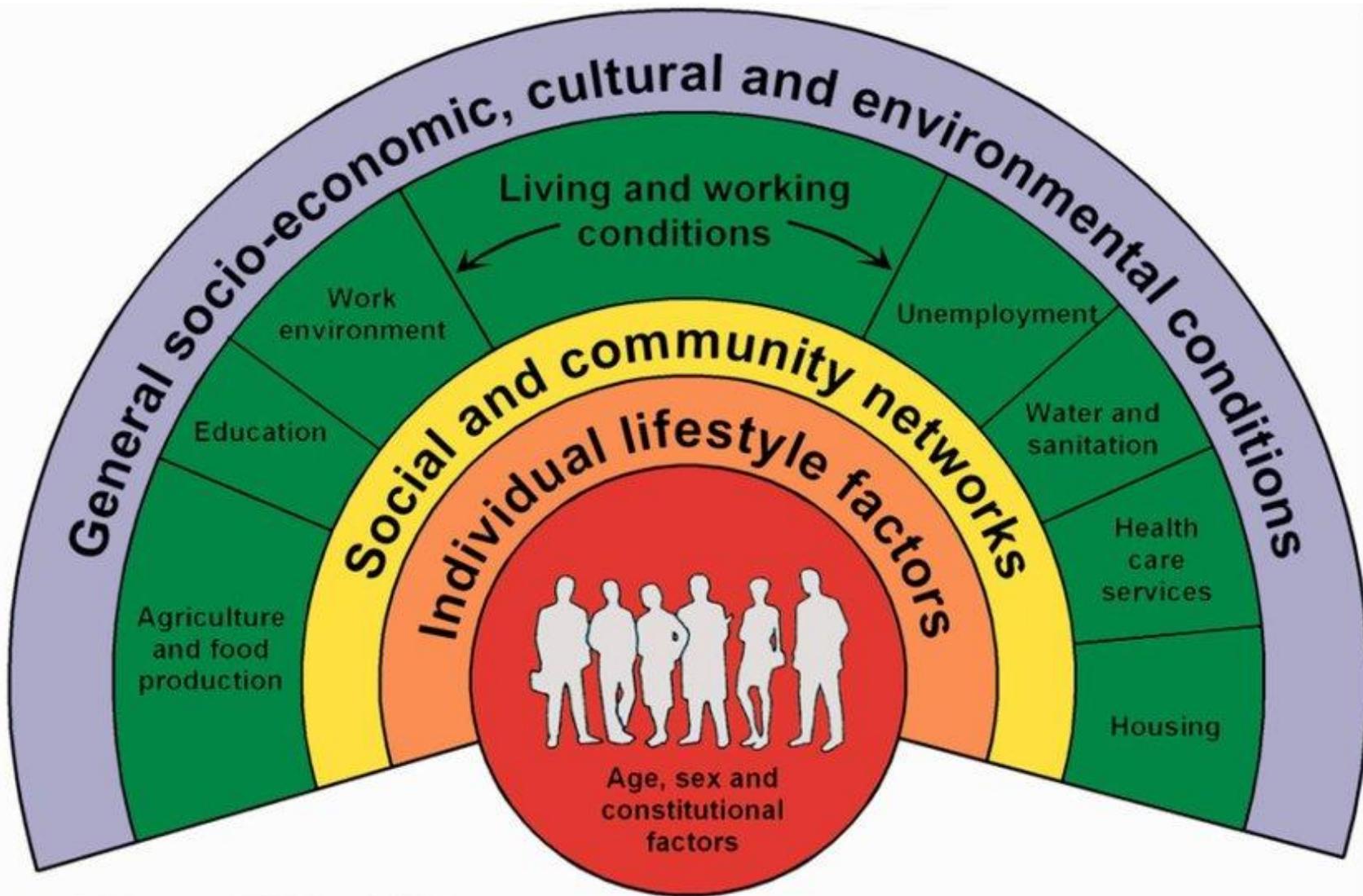
- No measurable criteria for minimal and no criteria to decide
 - Social conflict arises

Helping to improve health

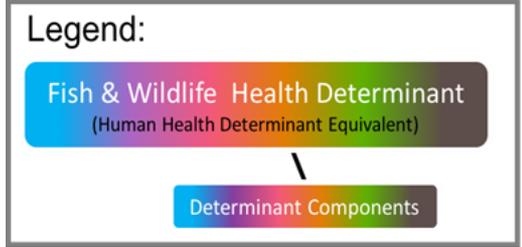
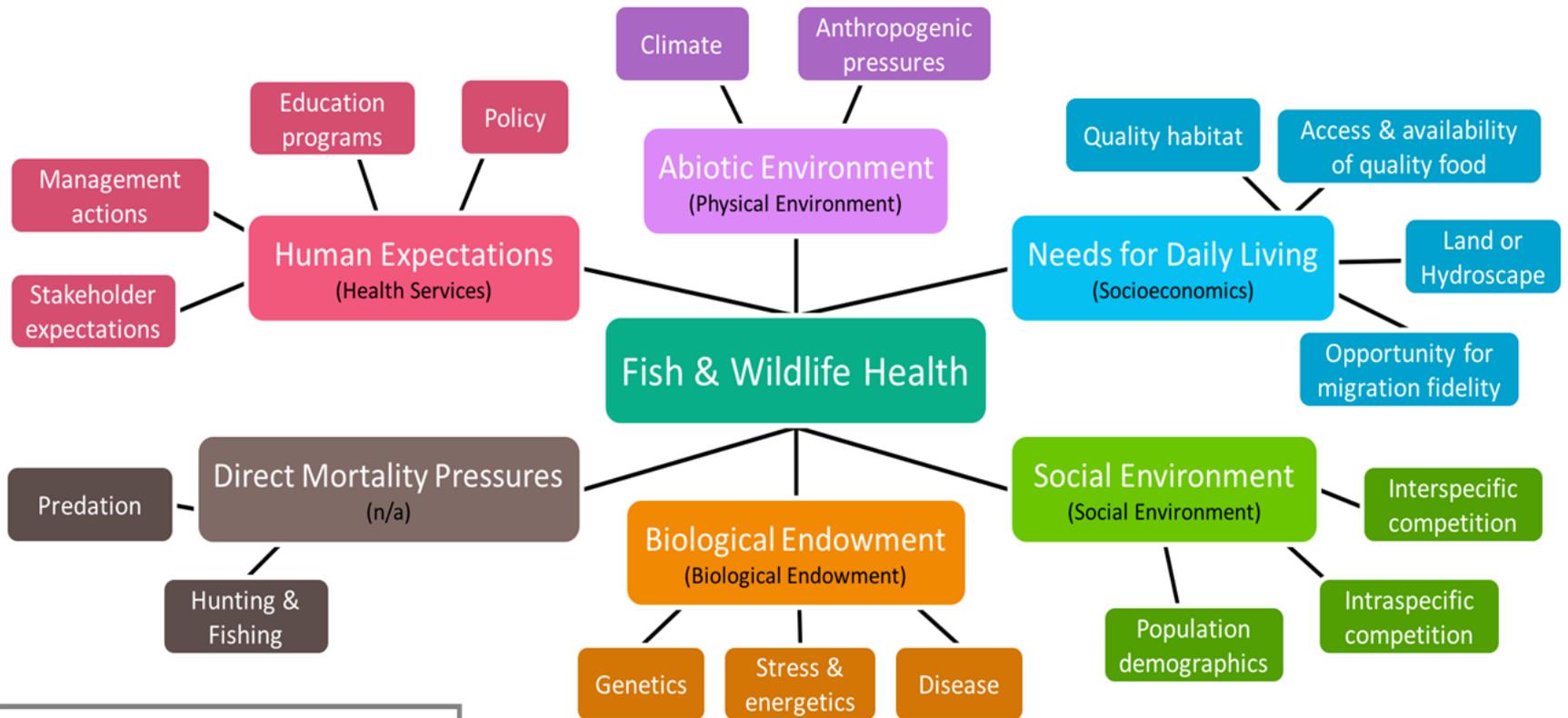
Fig. 2. The health gradient



Source: adapted from *Making partners: intersectoral action for health* (13)

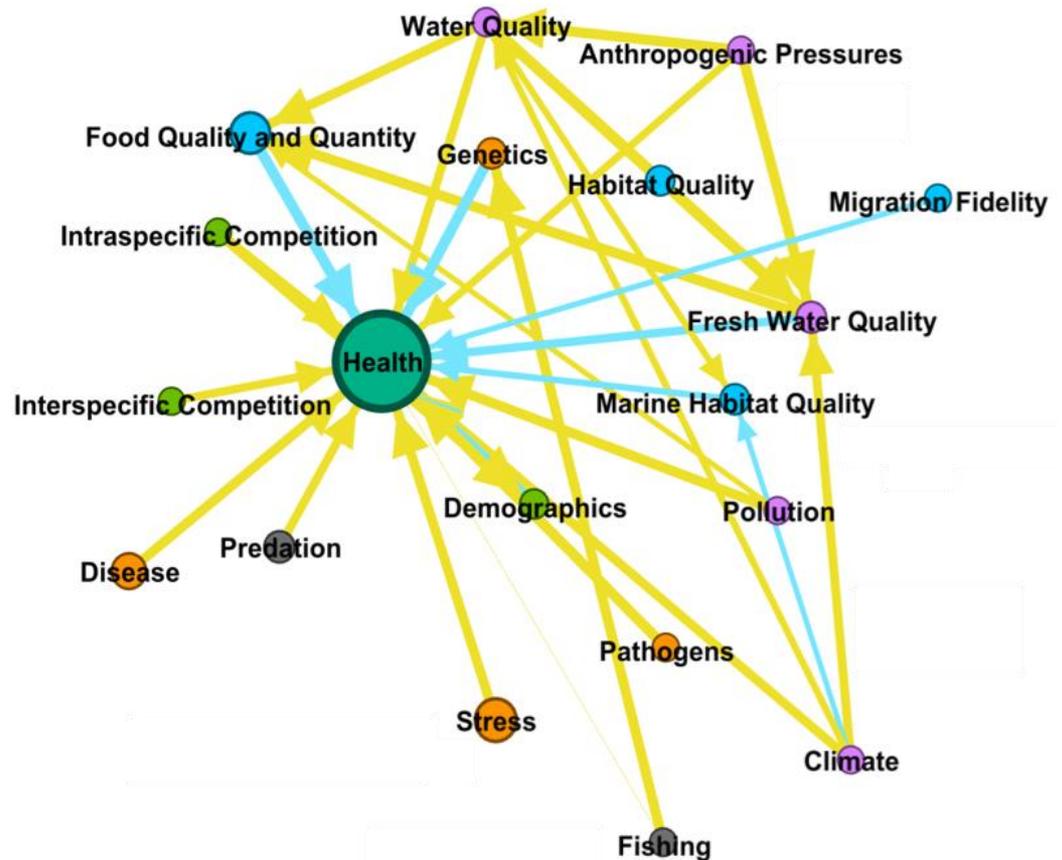


Source: Dahlgren and Whitehead, 1991



How managers saw salmon health

Cumulative effects
Socially and ecologically driven



Legend:

- | | |
|------------------------|-----------------------------|
| Biological Endowment | Social Environment |
| Needs for Daily Living | Direct Mortality Pressure |
| Human Expectation | Population Health - Outcome |
| Abiotic Environment | |

- Arrow weight represents the impact of that relationship; thick arrow = large impact, thin arrow = small impact
- Arrow colour: Positive Impact Negative Impact
- Node size depicts Eigenvector centrality

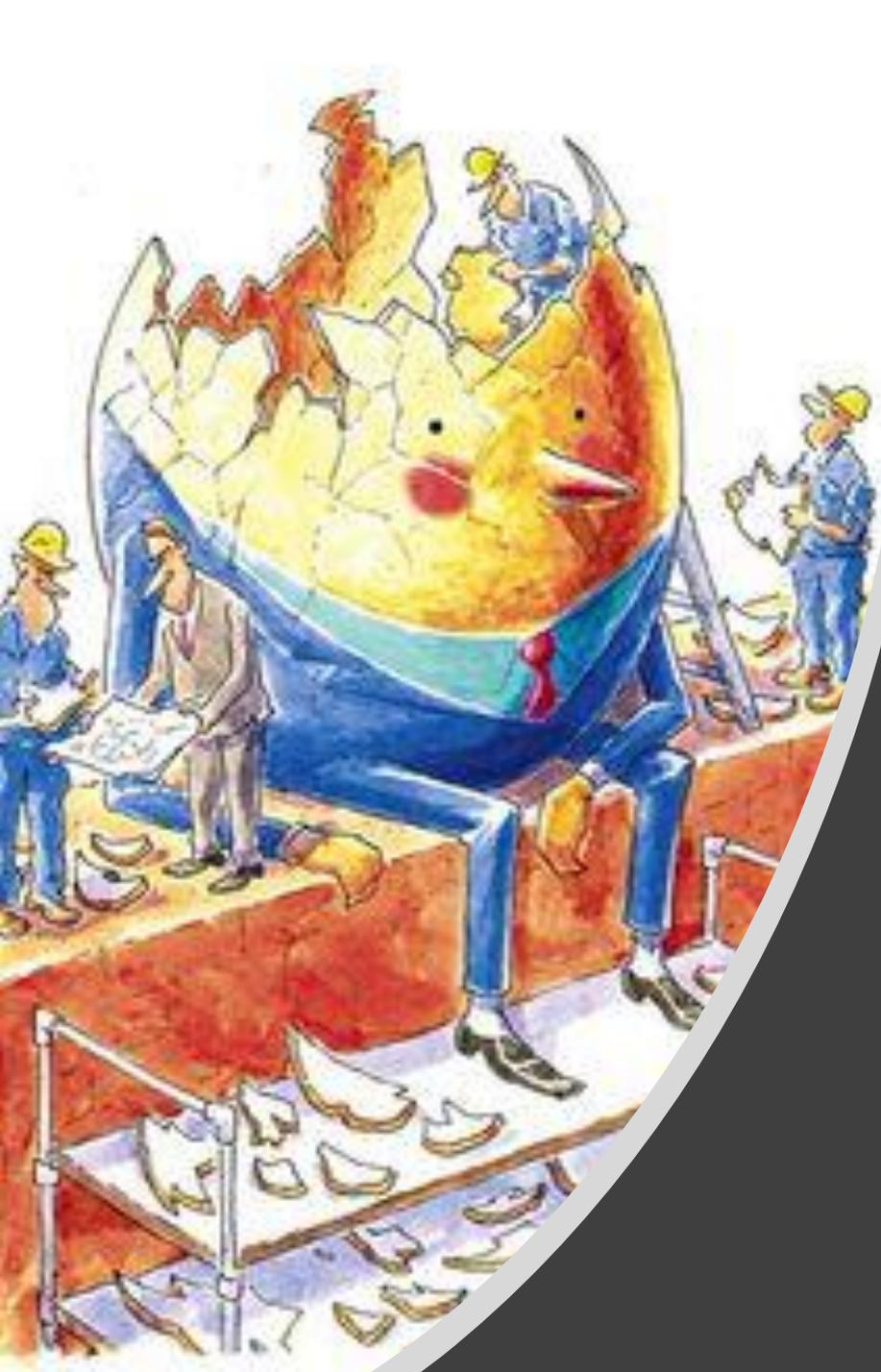
Implications of this model

Health is a multi-dimensional capacity and not a single biological state

- Cumulative effect of interacting individual, population and ecosystem attributes

Health is a social construct

- We can discover indicators of health, but we negotiate thresholds for a context



Health is a
humpty
dumpty
problem

If Canadians
wants to
evolve past
the absence
of disease
model....

- **Need new social processes to negotiate criteria to recognize when health exists**
 - Will have to recognize that this will not be established via hypothesis testing biomedical research
 - Health is a social construct
- **Major impediment to action in BC because...**
 - No shared vision of success
 - Therefore no agreement on acceptable amounts of harms or protection of health promoters
 - Trust has been fractured, impeding negotiation
 - Focus on debating disagreements than action on agreements

Implications of this model

Focus is on creating health protecting circumstances

- By promoting individual, community and environmental enabler of health

Diseases is still a part

- Impacts capacity to deal with stress, access daily needs and meet expectation
- But it is only 1 determinant

Implications of this model

There are multiple action points to protect health

- Inclusive model
- Focus on outcomes and capacities rather than hazards

Entry point to build trust

- Work on determinants we agree on and can do something about today

Implications of this model

Adaptable to context

- Not all populations treated the same

Deals with present threats while protecting against future threats

- By focusing on circumstances to build resilience rather than respond to a harm
- Critical in times of unprecedented change

Implications of this model

Makes better use of
existing information

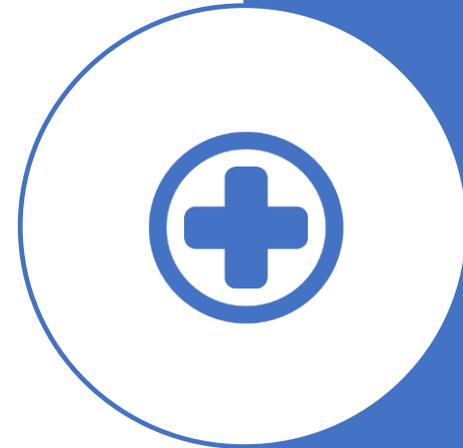
- Efficiencies
- Consistent with ecosystem management or cumulative effects approach

But..... No one does this

- Major criticism from Cohen
- Not the social norm for salmon
 - Focus on your own 'area'

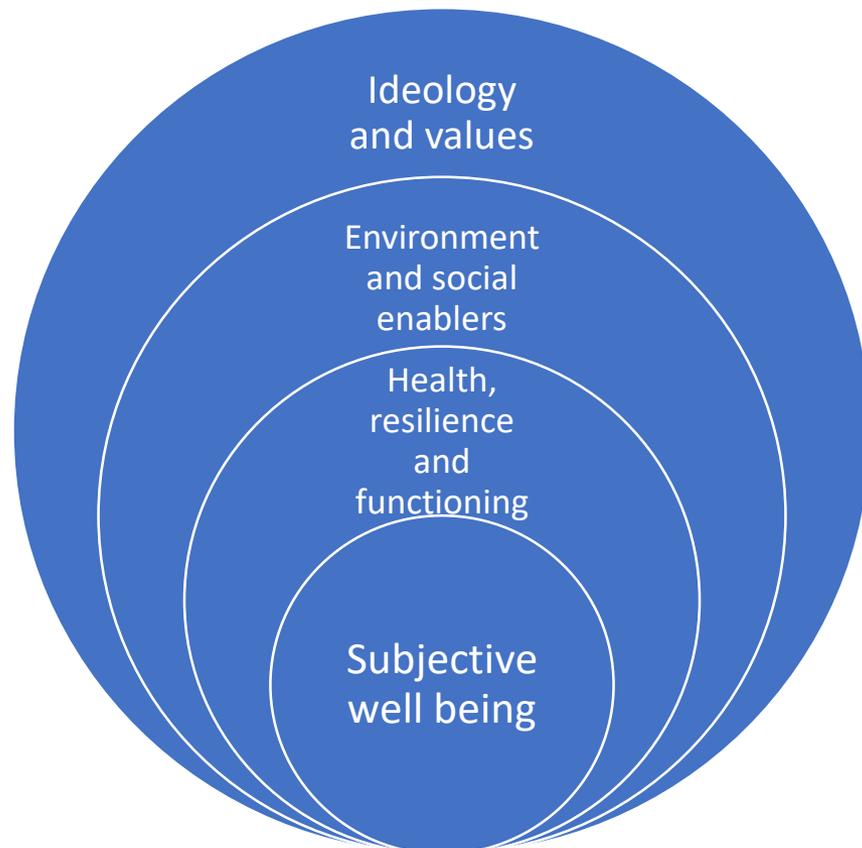
Applying this model

- **Innovation requires courage and leadership**
 - Goes against social and scientific norms in the fish health world
 - Have to commit to collaborative action as no 1 agency can build healthy populations
- **Why try it**
 - Consistent with plans for area based management
 - Cannot keep chasing hazards and expect to win under current global conditions
 - Proven successful in public health and herd health



Like it or not – health management is subjective

Do people feel good about the state of salmon health



This is the reality of health management, regardless of the species.

It is more than a question of p-values

Resources of possible interest

- Stephen C. (2014) "Toward a modernized definition of wildlife health. *J Wildlife Diseases* 50.3 (2014): 427-430.
- Wittrock J, Duncan C, Stephen C. (2019) A determinants of health conceptual model for fish and wildlife health. *J Wildlife Diseases*
- Wittrock J, Anholt M, Lee M, Stephen C. 2019. Is Fisheries and Oceans Canada policy receptive to a new Pacific salmon health perspective. *Facets*. DOI 10.1139/facets-2019-0015.
- Stephen C, Wade J. (2019) Testing the Waters of an Aquaculture Index of Well-Being. *Challenges* 10.1: 30.
- Wittrock J. (2019). *Applying cumulative effects perspective to wildlife health: Adapting a determinants of health approach to wildlife populations* (Doctoral dissertation, University of Saskatchewan).