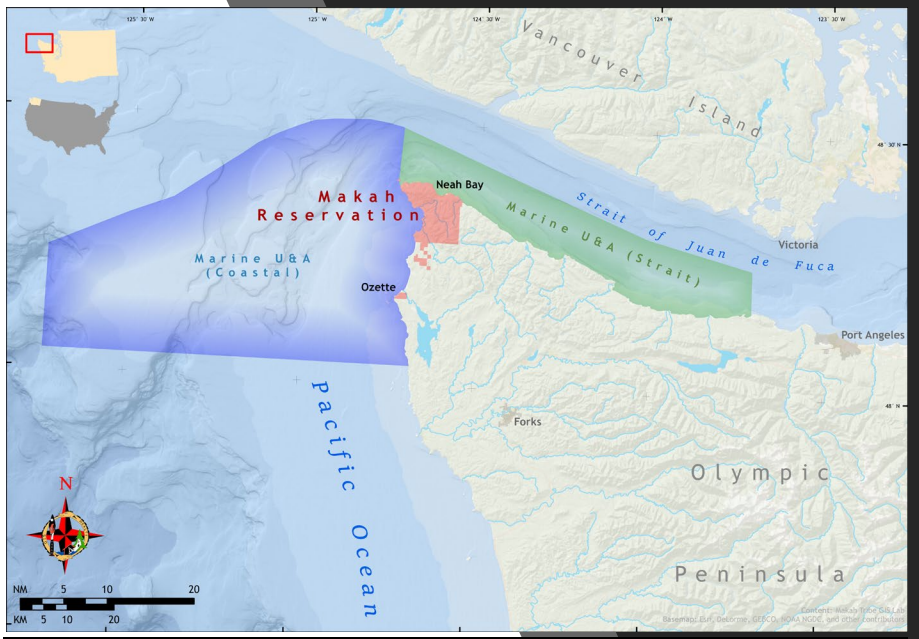
Makah Climate Adaptation Planning

Katie Wrubel
Natural Resource Policy Analyst
Makah Tribe

Department of Energy Office of Indian Energy
Programmatic Review
November 21, 2019



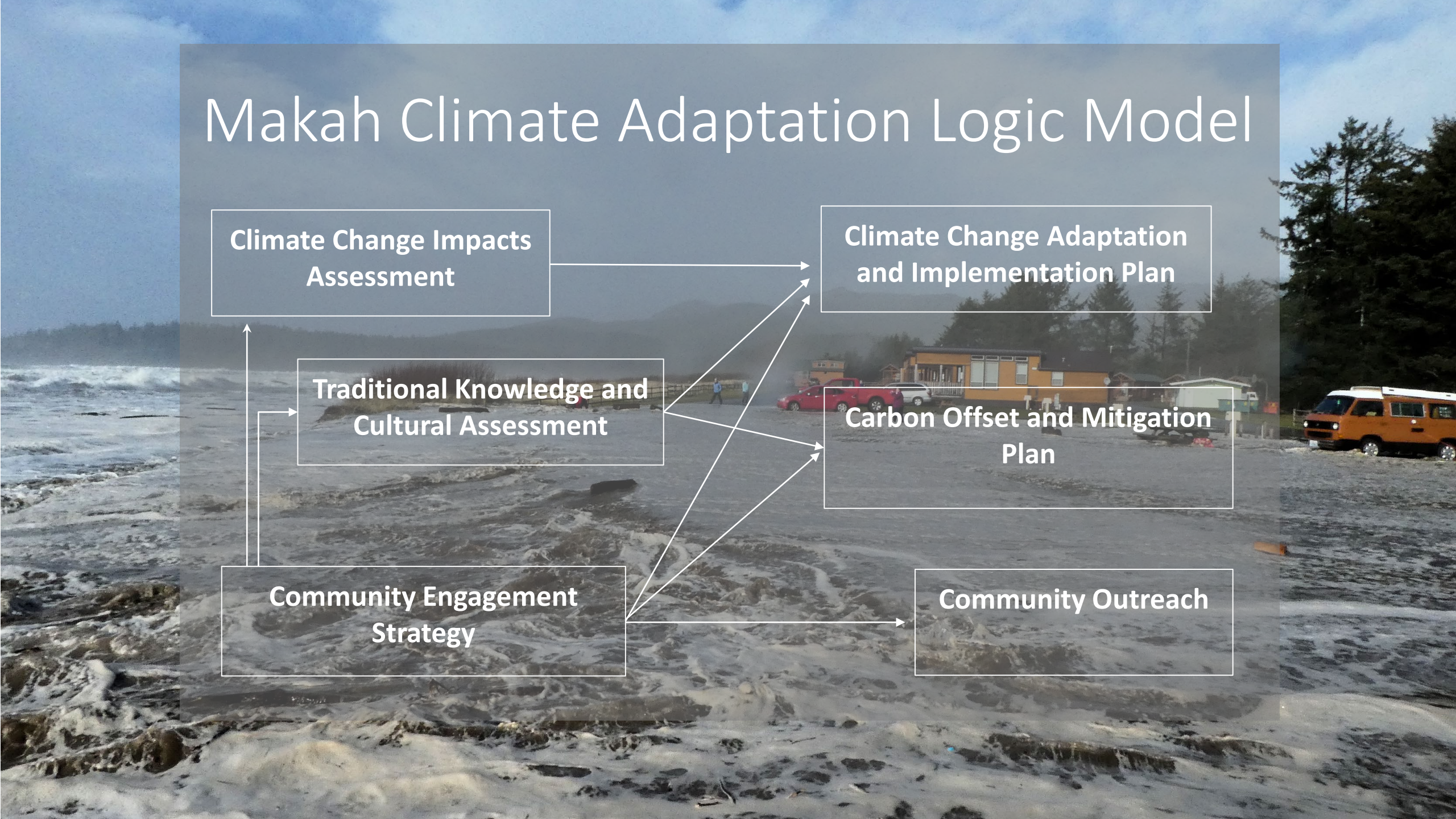
Overview of the Makah Tribe

- Q^{w}idicca?a'tx - "People of the Cape"
- 1855 Treaty of Neah Bay
- Ceded 300,000 acres of land to the U.S. and reserved the rights to fish, whale, seal, hunt and gather within surrounding Usual and Accustomed Areas
  - U&A extends ~40 miles offshore and east to Tongue Point, approximately 1,550 sq mi marine area
- 2,900 registered Makah Tribal Members
  - 1,400 live on Reservation, 200-300 non-tribal members on reservation
- Makah identity, culture, and economy are dependent on natural resources, especially from the ocean
  - Fishing comprises ~50% of the Neah Bay economy
  - Subsistence and ceremonial use

Makah Project Overview

- Develop a Climate Adaptation Plan
- Interview key segments of the community and develop a TK report
- Conduct an Energy Audit and carbon footprint assessment

Makah Climate Adaptation Logic Model



Makah Climate Change Workgroup

Core Team

- Katie Wrubel: Natural Resources Policy Analyst
- Seraphina Gagnon: Former Project Coordinator I
- Michael Chang: Climate Change Consultant
- Haley Kennard: Environmental Policy Consultant
- Adrianne Akmajian: Marine Ecologist
- Stephanie Martin: Habitat Division Manager
- Courtney Winck: Air Quality Specialist
- Riley Smith, Water Quality Specialist
- Chad Bowechop: Office of Marine Affairs Manager
- Laura Nelson: Marine Affairs Consultant
- Rob McCoy: Forestry Manager
- Shannon Murphie: Wildlife Biologist
- Dave Herda: GIS Manager
- Rebekah Monette: Historic Preservation Officer
- Tricia DePoe: Planner III
- Rickson Kanichy: Emergency Management Coordinator
- Patty Manuel: Operations Director
- Dave Lucas: Public Works Manager
- Roxanna Phillips: Makah Clinic

Former Contributors

- Zak Greene: Climate Change Consultant
- Dana Sarff: Environmental Division Manage
- Aaron Parker: Water Quality Specialist
- Forrest Howk: Hershman Marine Policy Fellow
- Jerry Gardener: Emergency Management Coordinator
- Patrick Anderson: Makah Clinic Director

Advisors

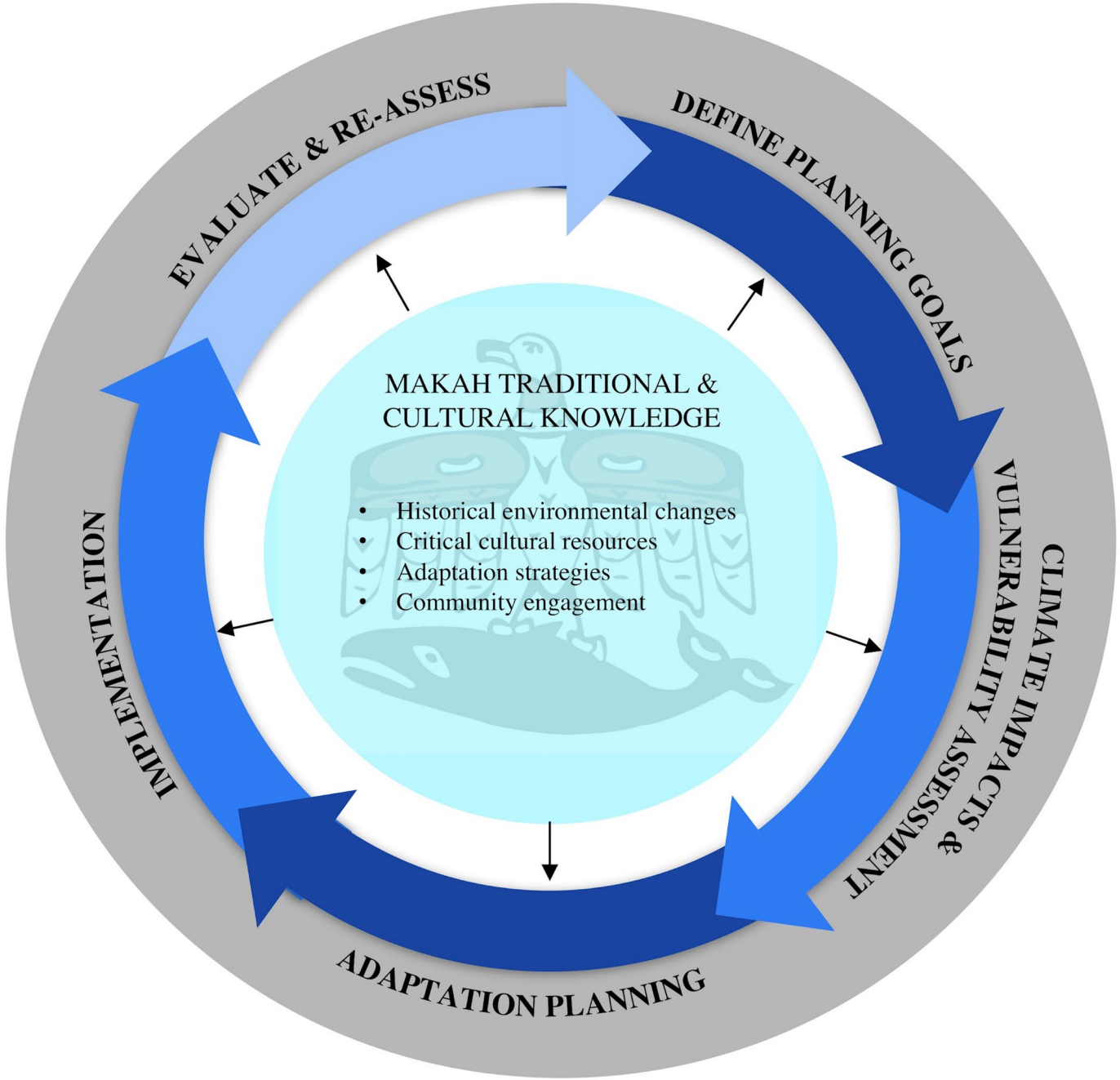
Russell Svec: Fisheries Director

Ray Colby: Assistant Fisheries Director

Hap Leon: Fisheries Biometrician

Makah Traditional and Local Knowledge Framework

- Define historical baselines and observational environmental changes;
- Identify critical cultural resources;
- Identify culturally—relevant adaptation strategies;
- And be able to engage the community into the climate planning process.



Surveys and Interviews!

Surveys

- 2018 climate survey, given out during 2018 community event and 2018 Makah Days
- 90 respondents
- Assessed priorities of community members to address a variety of potential climate impacts (33 total)
  - Likert scale

Interviews

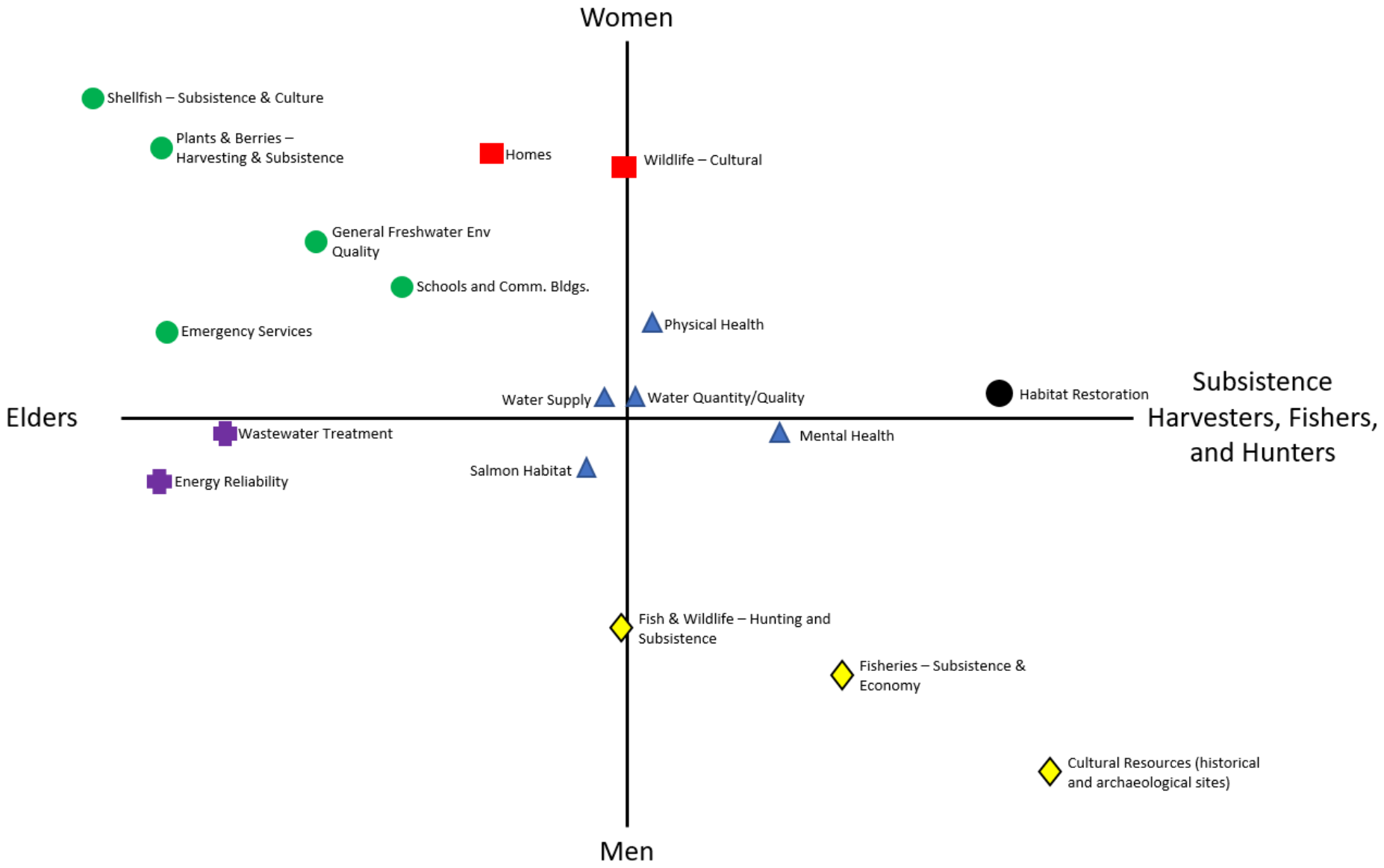
- 2018 Traditional and Cultural Knowledge Interviews, conducted by Makah Cultural Research Center
- 13 interviewees
- Historical baselines, observed environmental changes, culturally-appropriate resilience strategies

Understanding the nuance, relative priorities

	Women (n=53)	Men (n=32)	Elders (n=28)	Subsistence harvesters, fishermen, and hunters (n=31)
Water quantity & quality	1st	2nd	2nd	3rd
Water supply	2nd	3rd	1st	5th
Salmon habitat	5th	1st	5th	1st
Wildlife hunting & subsistence	3rd		3rd	4th
General – freshwater quality		5th		
Plants & berries	4th		4th	
Cultural sites		4th		2nd

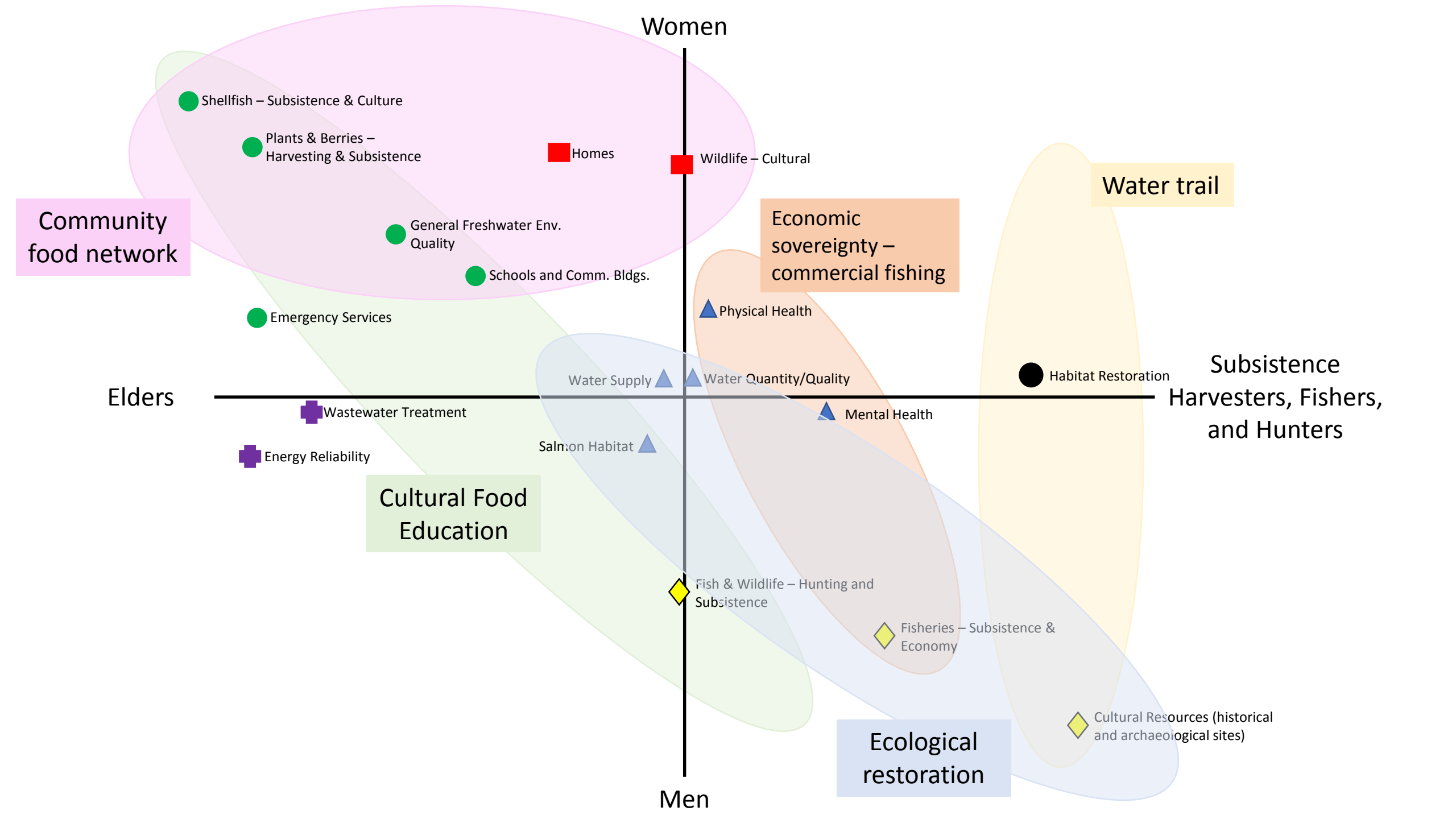
Understanding the nuance, relative priorities

	Women (n=53)	Men (n=32)	Elders (n=28)	Subsistence harvesters, fishers, and hunters (n=31)
Water quantity & quality	1st	2nd	2nd	3rd
Water supply	2nd	3rd	1st	5th
Salmon habitat	5th	1st	5th	1st
Wildlife hunting & subsistence	3rd	13th	3rd	4th
General – freshwater quality	10th	5th	15th	6th
Plants & berries	4th	24th	4th	16th
Cultural sites	22nd	4th	23rd	2nd


Women
Men
Elders
Subsistence Harvesters, Fishers, and Hunters
Shellfish – Subsistence & Culture
Plants & Berries – Harvesting & Subsistence
Homes
Wildlife – Cultural
General Freshwater Env Quality
Schools and Comm. Bldgs.
Emergency Services
Physical Health
Water Supply
Water Quantity/Quality
Habitat Restoration
Wastewater Treatment
Mental Health
Salmon Habitat
Energy Reliability
Fish & Wildlife – Hunting and Subsistence
Fisheries – Subsistence & Economy
Cultural Resources (historical and archaeological sites)

Culturally-appropriate resilience strategies

- **Economic sovereignty and commercial fishing**: boat efficiency, marine spatial planning, diversifying the fishing fleet, enhance market
- **Ecological restoration of important harvest and cultural sites**
- **Cultural food classes**: teaching harvest, storage, and preparation of cultural foods to the community
- **Community food network**: taking care of elders by providing healthy and nutritious cultural foods
- **Water-trail**: restoration of old coastal campsites for canoe paddlers and an educational opportunity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Salmon Habitat
Energy Reliability
Fish & Wildlife – Hunting and Subsistence
Fisheries – Subsistence & Economy
Cultural Resources (historical and archaeological sites)
Community food network
Economic sovereignty – commercial fishing
Water trail
Cultural Food Education
Ecological restoration

Goal 1: Preserve cultural activities and traditions	Goal 2: Protect economic sovereignty	Goal 3: Ensure the reliability of infrastructure, support systems, and services to disruptive extreme events	Goal 4: Maintain and improve community and cultural health	Goal 5: Ensure we are leaving the world a better place
a. Subsistence fishing b. Subsistence shellfish harvesting c. Subsistence harvesting of plants/berries/roots d. Subsistence hunting e. Endangered or threatened species	a. Commercial fishing b. Commercial forestry and timber c. Salmon and habitat restoration d. Invasive species and noxious weeds. e. Commercial shellfish	a. Water supply b. Transportation c. Food access d. Tourism e. School and community buildings f. Energy reliability g. Tribal businesses h. Waste treatment i. Relocation j. Coastal erosion	a. Community networks b. Emergency preparedness for families for earthquakes/tsunamis c. Youth education d. Local air quality e. Mental health f. Historical and archaeological sites g. Cultural arts	a. Carbon mitigation b. Carbon sequestration c. Climate change policy d. Oil spill preparedness

Makah Tribe Energy Audit & Carbon Footprint

PRELIMINARY FINDINGS

CASCADIA CONSULTING GROUP

MARCH 27, 2019

Introductions

Michael Laurie

- 30 years of experience carrying out energy and water saving assessments
- Lead on Makah Tribe energy audit and analysis of savings, costs, rebates, and paybacks from lighting and water equipment replacements

Britain Richardson

- 7 years of experience in sustainability data analysis with a Master of Environmental Management from Yale F&ES
- Lead on carbon footprinting and emissions mitigation strategies related to Makah building energy

360 Analytics

360 Analytics

- Engineering professionals with over 10 years of experience in energy savings analysis
- Lead on modeling of savings, costs, and paybacks related to insulation, window, and heating improvements at Makah facilities

CASCADIA

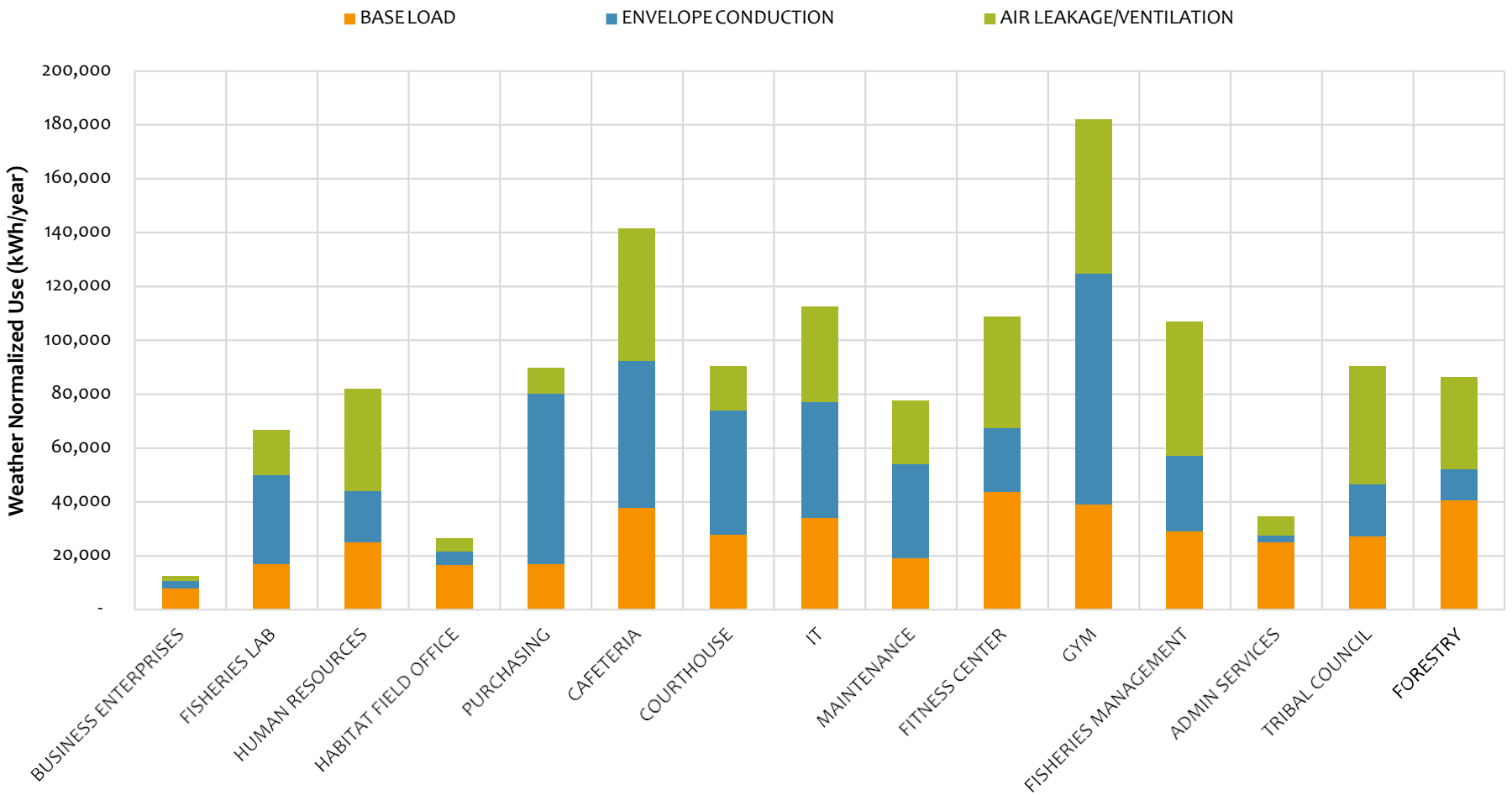
Makah Carbon Footprint Analysis and Mitigation Plan

- Selected Cascadia Consulting Group
- Energy Audit on 16 buildings
  - Tribal center (14 Buildings)
  - Forestry
  - Marina
- Electricity and water
- GHG emission mitigation plan
- Outreach materials for Makah Community

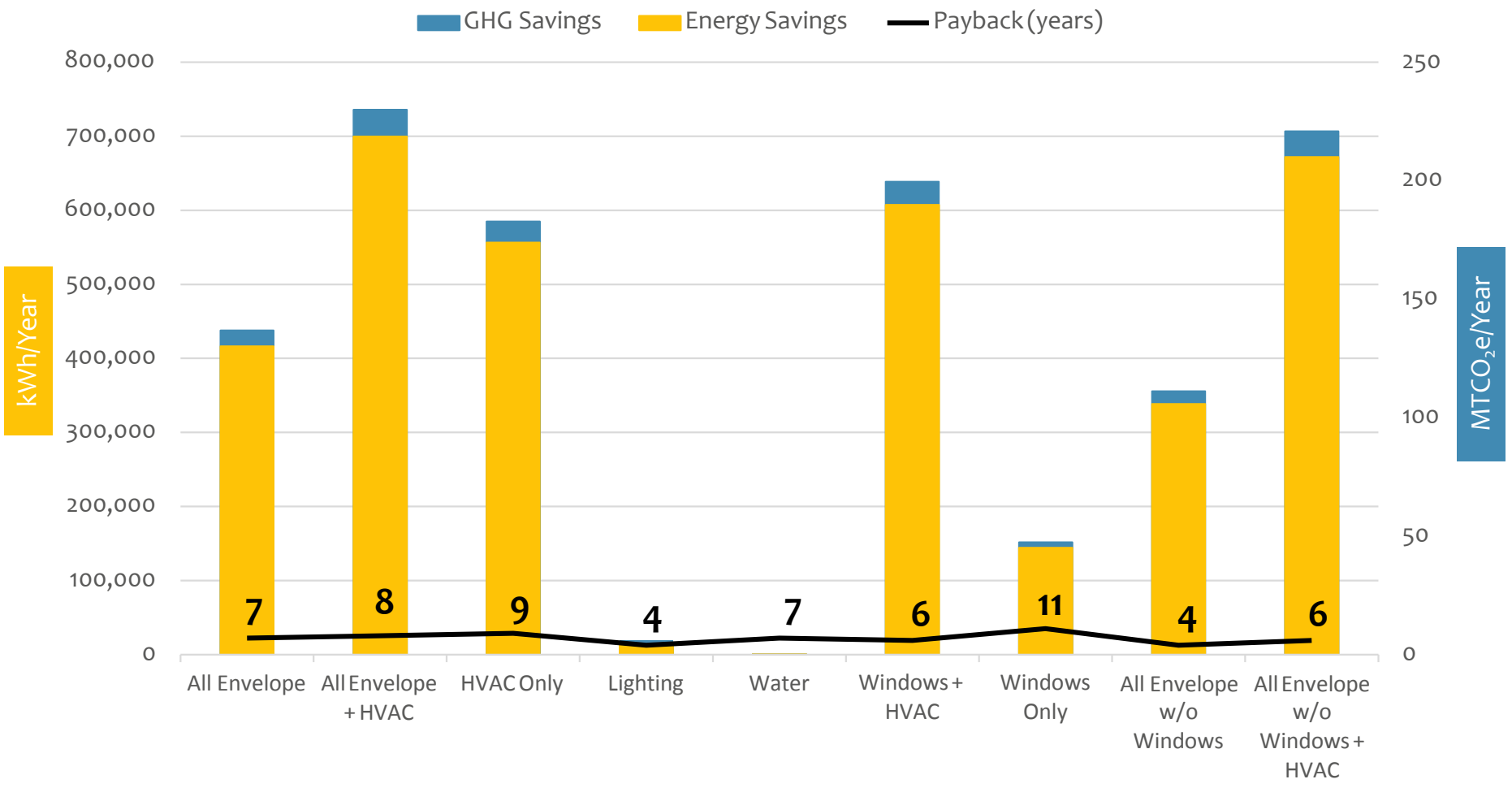
Methodology: Energy Audit

- Examined walls, ceilings, floors, windows, heating, lighting, hot water, and appliances
- Inspected insulation levels, air leakage, heating system type, and a sample of lighting fixtures
- Focused on analyzing reduction measures that have a payback of 10 years or less
- Compared energy or water use between existing components and more efficient options, and costs, rebates, paybacks, and if it had a 10-year payback it was a go

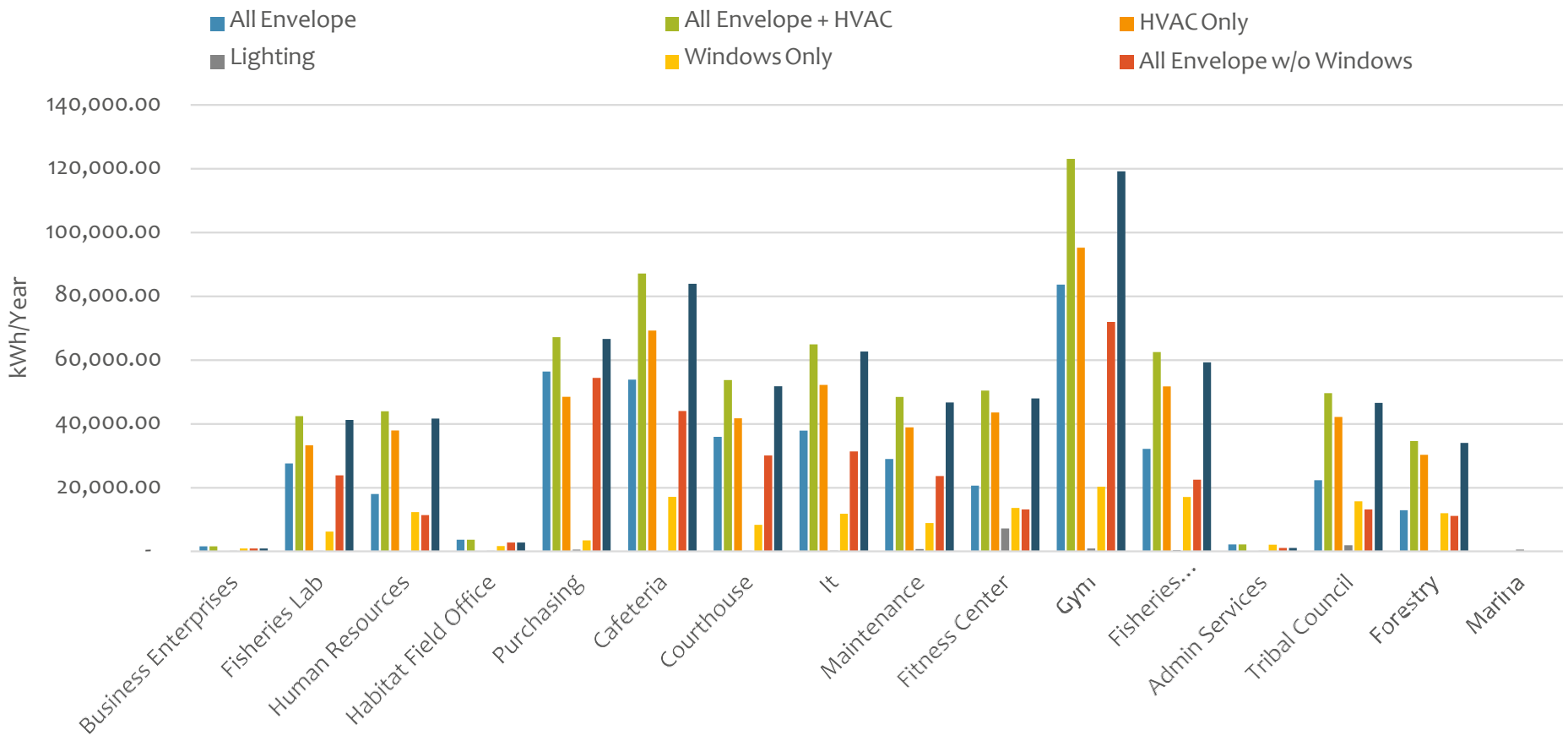
Makah Energy Usage



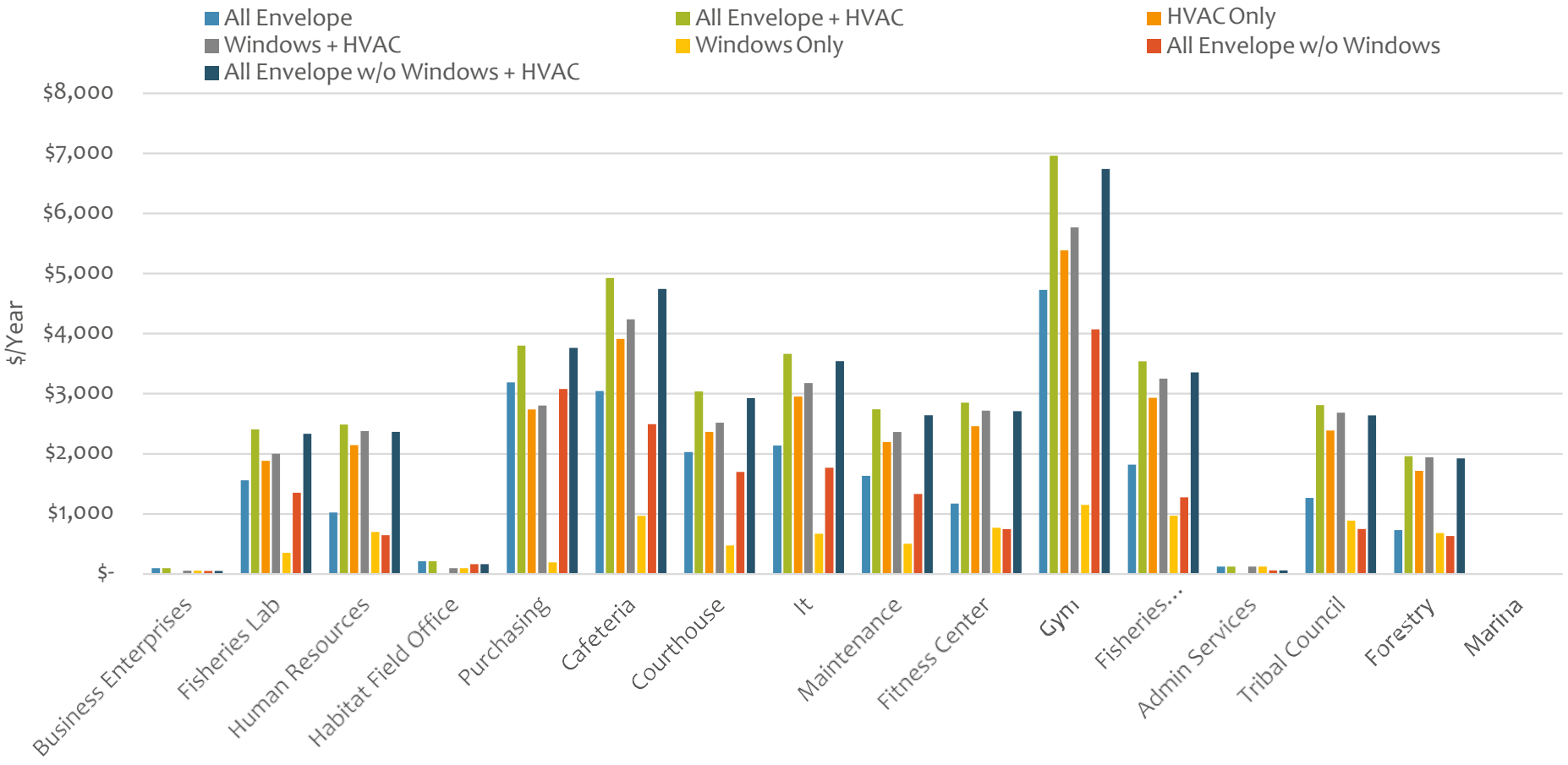
Results: All Buildings



Results: Energy Savings



Results: Cost Savings



Building	Recommended Measures						Energy Savings (kWh/ Year)	Cost Savings ($/Year)	Cost ($)	Incentives ($)	Payback Years	GHG Emissions Savings (MTCO2e/ Year)
	Windows	Doors	Walls	Ceilings	Floors	Heating						
BUSINESS ENTERPRISES	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-13 blow-in	R-38 blow- in on ceiling	R-30 batt in wood Joist	No change	1,615	$ 91	$ 9,538	$ -	100	0.5
FISHERIES LAB	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-13 blow-in	R-38 blow- in on ceiling	Uninsulated slab on grade	Ducted heat pump	42,487	$ 2,402	$ 25,455	$ 3,582	9	12.6
HUMAN RESOURCES	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-13 blow-in	R-38 blow- in on ceiling	Uninsulated slab on grade	Ducted heat pump	43,939	$ 2,484	$ 25,595	$ 1,896	10	13.1
HABITAT FIELD OFFICE	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-13 blow-in	R-38 blow- in on ceiling	R-30 Wood Joist	No change	3,728	$ 211	$ 11,073	$ -	51	1.1
PURCHASING	New double-pane vinyl LowE w/ argon	No change	Exterior R-16 c.i. Interior: R-13+R-6 ci wood stud	R-38 blow- in on ceiling	Uninsulated slab on grade	Ductless mini- split heat pump	67,236	$ 3,802	$ 17,794	$ 3,973	4	20.0
CAFETERIA	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-13 for 2x4, R-19 for 2x6	R-38 blow- in on ceiling	Uninsulated slab on grade	Ductless mini- split heat pump	87,148	$ 4,927	$ 29,654	$ 6,713	5	25.9
COURTHOUSE	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-13 blow-in	R-38 blow- in on ceiling	R-30 Wood Joist	Ducted heat pump	53,699	$ 3,036	$ 41,809	$ 4,906	12	16.0
IT	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-19 blow-in	R-38 blow- in on ceiling	Uninsulated slab on grade	Ducted heat pump	64,853	$ 3,667	$ 26,275	$ 5,413	6	19.3

Building	Recommended Measures											
	Windows	Doors	Walls	Ceilings	Floors	Heating	Energy Savings (kWh/ Year)	Cost Savings ($/Year)	Cost ($)	Incentives ($)	Payback Years	GHG Emissions Savings (MTCO2e/ Year)
MAINTENANC E	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-13 for 2x4, R-19 for 2x6	Fill 2x6 with R-19	Uninsulated slab on grade	Ductless mini- split heat pump w/ 4 outdoor	48,511	$ 2,743	$ 15,987	$ 4,178	4	14.4
FITNESS CENTER	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-13 for 2x4, R-19 for 2x6	R-38 blow-in on ceiling	Uninsulated slab on grade	Ductless mini- split heat pump w/ 4 outdoor	50,399	$ 2,850	$ 28,930	$ 2,249	9	15.0
GYM	New double-pane vinyl LowE w/ argon	No change	Exterior R-16 c.i. Interior: R-13+R-6 ci wood stud	Fill 2x6 with R-19	Uninsulated slab on grade	Ductless mini- split heat pump w/ 4 outdoor	123,109	$ 6,961	$ 40,018	$ 4,868	5	36.6
FISHERIES MANAGEMEN T	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-19 blow-in	R-38 blow-in on ceiling	R-30 Wood Joist	Ducted heat pump	62,532	$ 3,536	$ 34,937	$ 2,952	9	18.6
ADMIN SERVICES	New double-pane vinyl LowE w/ argon	No change	No change	No change	R-30 Wood Joist	No change	2,149	$ 122	$ 4,800	$ -	39	0.6
TRIBAL COUNCIL	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-19 blow-in	R-38 blow-in on ceiling	R-30 Wood Joist	Ducted heat pump	49,637	$ 2,806	$ 37,131	$ 1,868	12	14.8
FORESTRY	New double-pane vinyl LowE w/ argon	No change	Insulate cavity with R-19 blow-in	add to R-38	Uninsulated slab on grade	Ducted heat pump	34,617	$ 1,957	$ 26,252	$ 1,838	12	10.3
MARINA												
Total							**735,660**	**$ 41,594**	**$ 375,247**	**$ 44,436**	**8**	**218.7**

Technical Assistance – DOE and NREL

- Relocation and Resilience Planning
  - Tsunami Relocation
  - Water Supply
  - Biomass Energy
  - Community Resilience

Key Next Steps

- Implement Energy Audit and GHG Emission Reduction recommendations, tie to Adaptation Plan
- Finalize Resilience and Relocation Plan following TA
- Finalize TK Report to more fully understand the diverse needs and considerations for climate resilience for Makah community
- Working with Tribal Council, departments and community members on finalizing an actionable Climate Adaptation Plan

Acknowledgments

- Makah Tribal Council
- Makah Community
- Department of Energy
- Bureau of Indian Affairs
- Climate Change Workgroup
- Washington Sea Grant
  - Washington State Sea Grant Fellowship

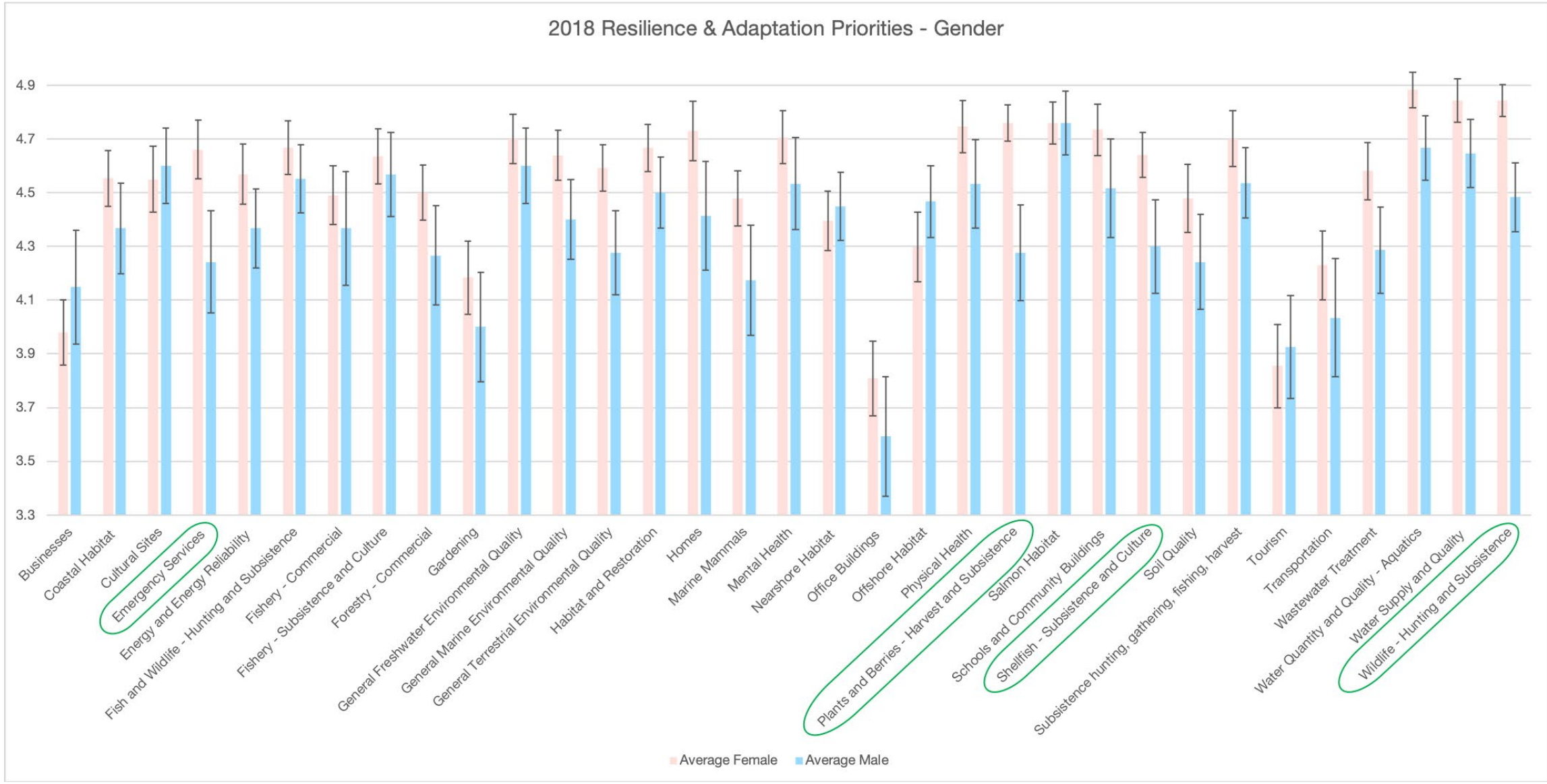
Questions?

Contact Information

Katie Wrubel

Natural Resource Policy Analyst

katie.Wrubel@makah.com


2018 Resilience & Adaptation Priorities - Gender
4.9
4.7
4.5
4.3
4.1
3.9
3.7
3.5
3.3
Businesses
Coastal Habitat
Cultural Sites
Emergency Services
Energy and Energy Reliability
Fish and Wildlife - Hunting and Subsistence
Fishery - Commercial
Fishery - Subsistence and Culture
Forestry - Commercial
Gardening
General Freshwater Environmental Quality
General Marine Environmental Quality
General Terrestrial Environmental Quality
Habitat and Restoration
Homes
Marine Mammals
Mental Health
Nearshore Habitat
Office Buildings
Offshore Habitat
Physical Health
Plants and Berries - Harvest and Subsistence
Salmon Habitat
Schools and Community Buildings
Shellfish - Subsistence and Culture
Soil Quality
Subsistence hunting, gathering, fishing, harvest
Tourism
Transportation
Wastewater Treatment
Water Quantity and Quality - Aquatics
Water Supply and Quality
Wildlife - Hunting and Subsistence
Average Female
Average Male

Historical baselines & observational changes

- Why: This directly informs Makah Tribe's planning goals and helps fill in gaps in Western science monitoring efforts.
- How: Utilized TK interviews and archival data from Makah Cultural Research Center.
- Example: Using archaeological evidence from 1969-70; 1990s subsistence surveys to determine historical resource use, abundance, and habitat

Identify critical cultural resources

Why: Help identify critical resources and relationships important for the Makah culture and community.

How: Utilized from 2018 TK interviews, 2017 & 2018 community surveys; archival research

Example: 1990s and 2018 subsistence surveys; 2018 TK interviews

> "Being on the water – I have to be. There is nothing like it. The water draws me to it. The ocean draws me to it, and I just need to be out there." – Makah commercial and subsistence fisherman, 49 y.o.

Identifying culturally-relevant adaptation strategies

Why: Provides a suite of culturally-relevant adaptation strategies that aims to address community priorities.

How: 2017 & 2018 community surveys; 2018 TK interviews

Examples: Support the teaching and learning of traditional and cultural foods at Neah Bay school; sharing of harvest methods and food preparation across generations; emphasizing community events to increase social cohesion

Community Engagement

Why: Using TK, the Makah community is able to engage and connect their experiences directly to climate change; creates “buy-in” from the community into the planning outputs

How: 2017 & 2018 community surveys

Examples: Framing climate impacts into cultural activities and subsistence activities; 80% supports climate adaptation work for the Tribe; continued engagement with speaker series on climate impacts, historical and cultural activities, and current research.

Makah Traditional and Local Knowledge Framework: Lessons Forward

- Not the end all be all – still learning and framing and changing
- Opportunistic data!
- Ethical considerations