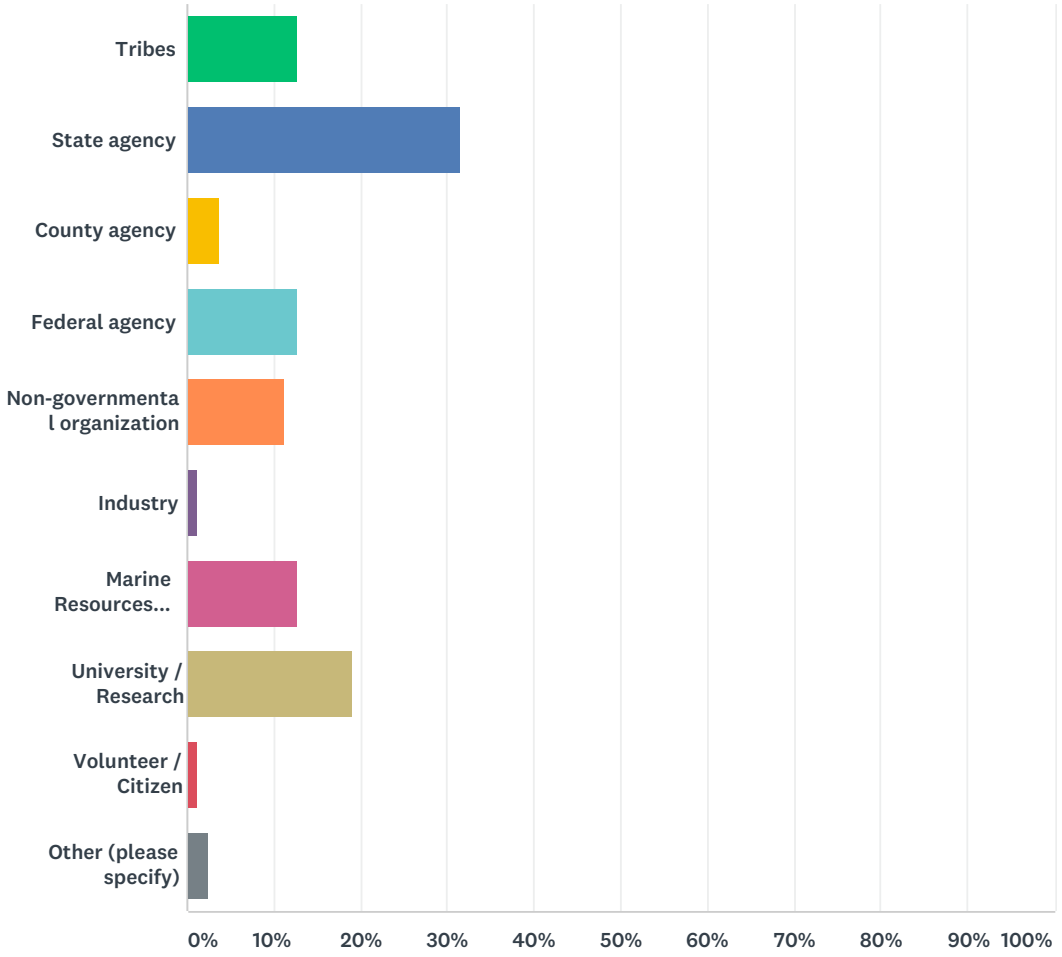
Q1 What role or entity best describes your job or perspective on kelp conservation and recovery?

Answered: 79 Skipped: 0



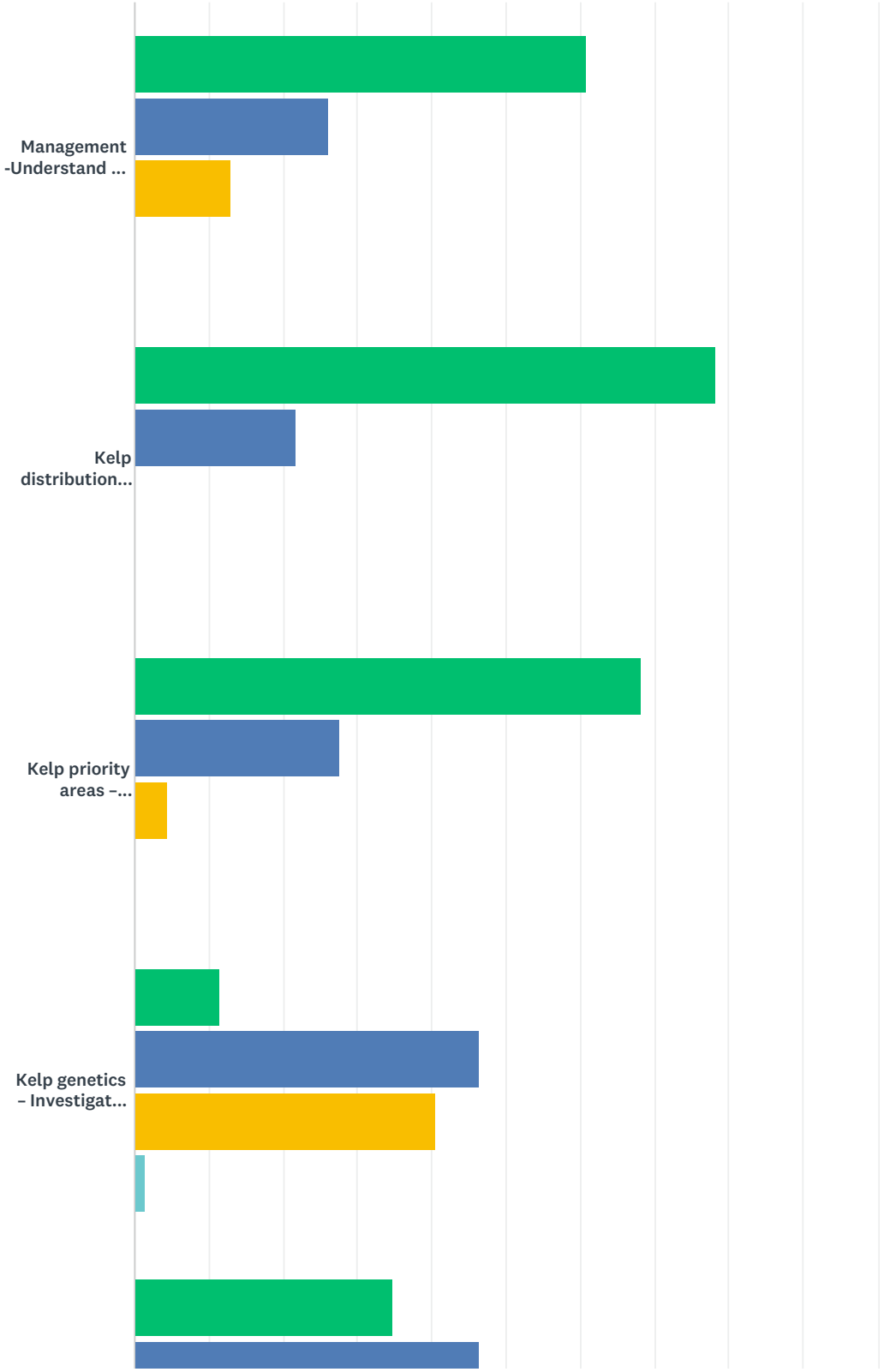
ANSWER CHOICES	RESPONSES	
Tribes	12.66%	10
State agency	31.65%	25
County agency	3.80%	3
Federal agency	12.66%	10
Non-governmental organization	11.39%	9
Industry	1.27%	1
Marine Resources Committee / Northwest Straits Initiative	12.66%	10
University / Research	18.99%	15
Volunteer / Citizen	1.27%	1
Other (please specify)	2.53%	2

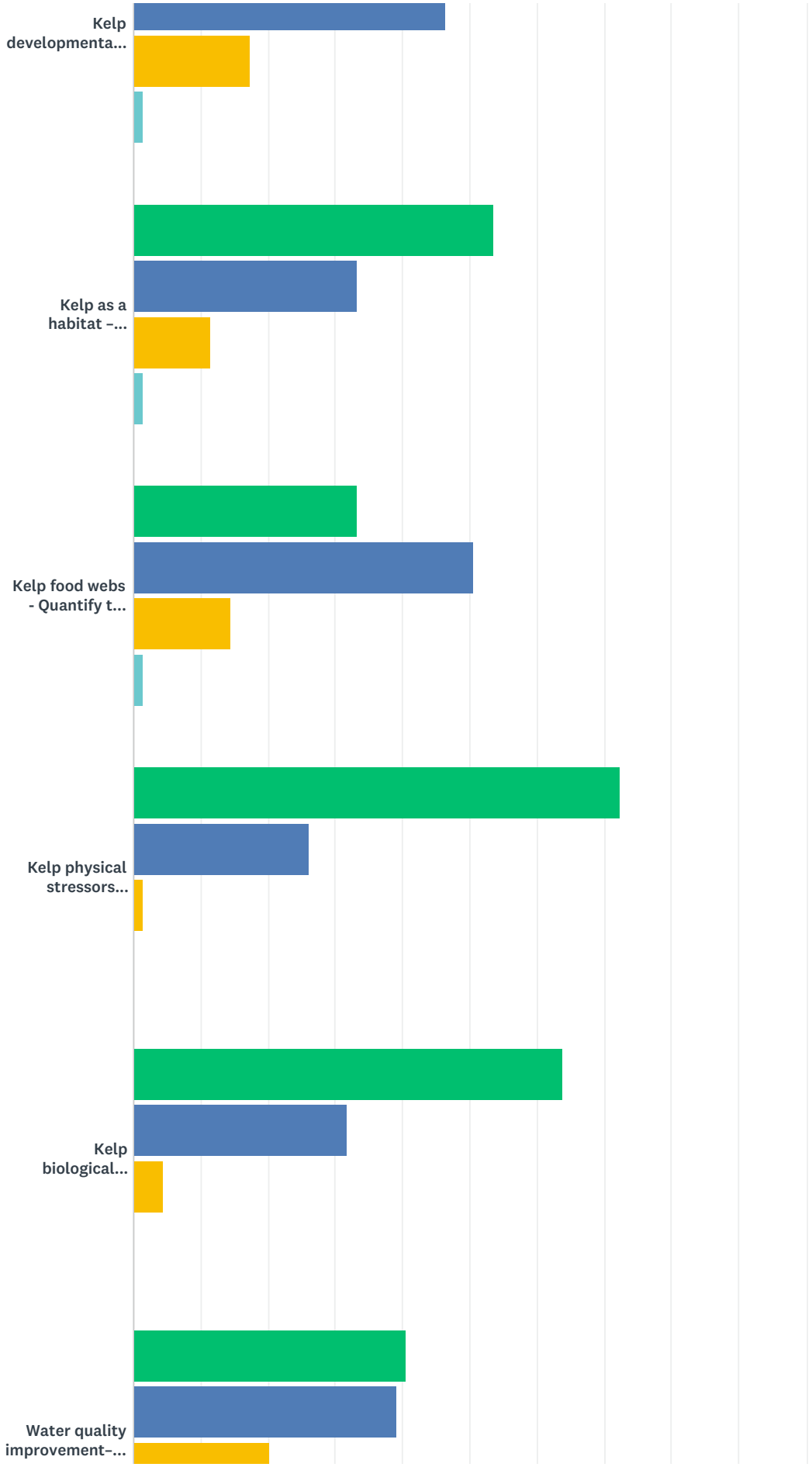
Total Respondents: 79

#	OTHER (PLEASE SPECIFY)	DATE
1	Former MRC member	1/22/2019 11:17 AM
2	Seattle Aquarium volunteer/beach naturalist	1/8/2019 2:14 PM

Q2 On a scale of High to Low what is the potential value of addressing each data gap toward understanding and guiding decisions around kelp conservation and recovery strategies.

Answered: 69 Skipped: 10

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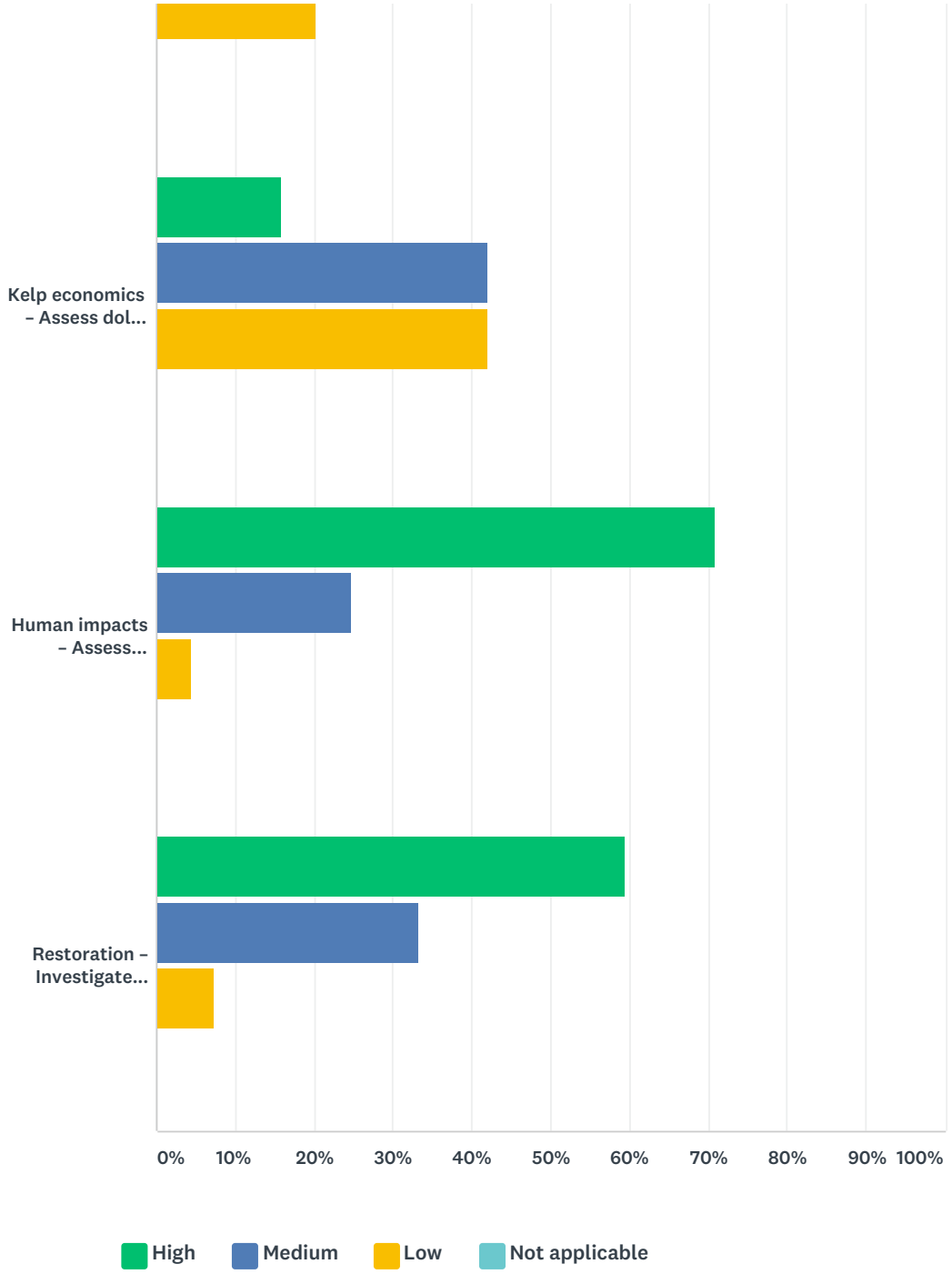
Kelp as a habitat –...
Kelp food webs - Quantify t...
Kelp physical stressors...
Kelp biological...
Water quality improvement–...



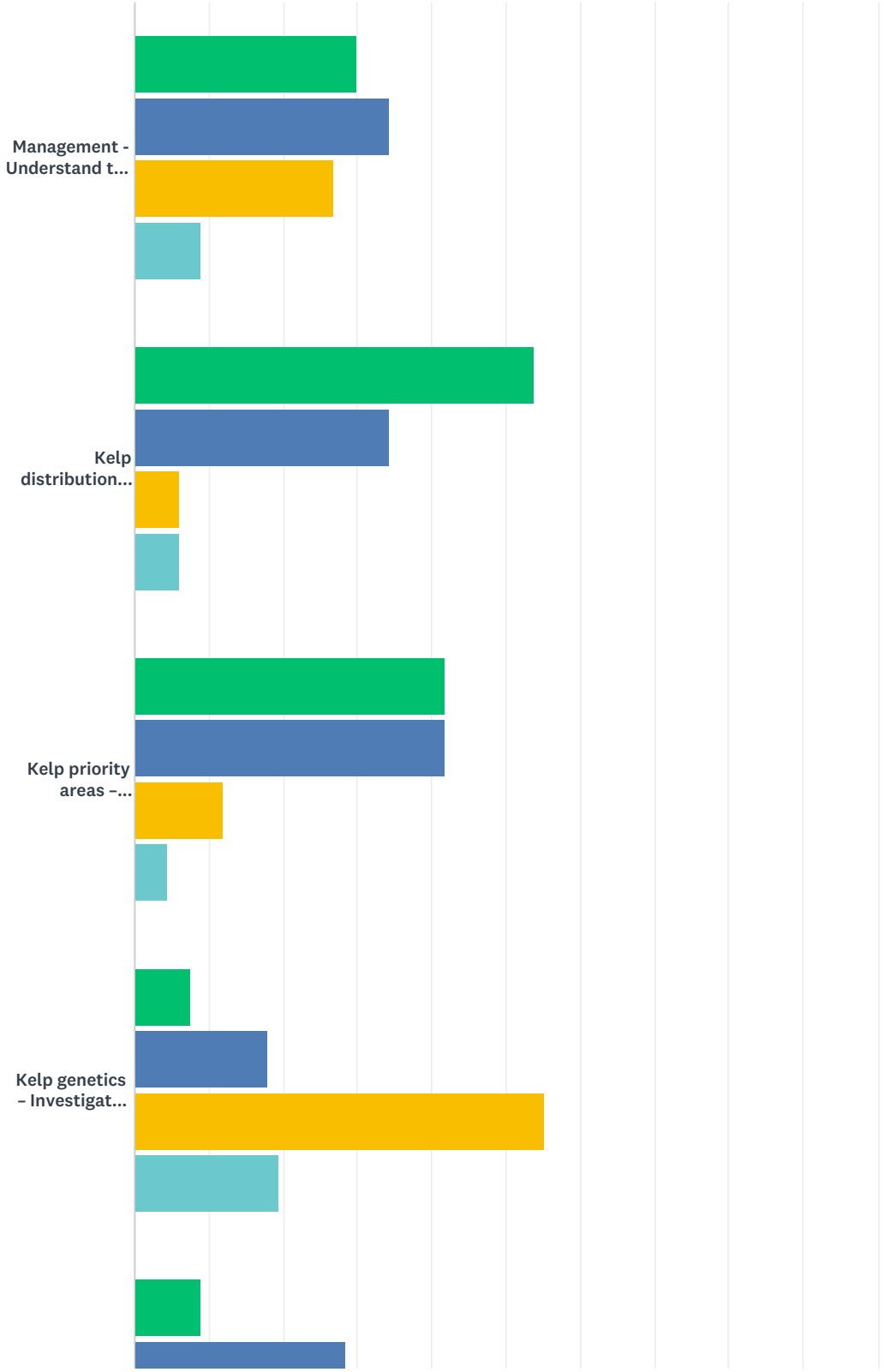
	HIGH	MEDIUM	LOW	NOT APPLICABLE	TOTAL
Management -Understand the effectiveness of current management policies relating to protection/mitigation of kelp from construction, harvest, and other activities in Puget Sound.	60.87% 42	26.09% 18	13.04% 9	0.00% 0	69
Kelp distribution and trends - Assess and monitor current species' distributions and changes through time in Puget Sound.	78.26% 54	21.74% 15	0.00% 0	0.00% 0	69
Kelp priority areas – Identify priority geographic areas for recovery/conservation measures in Puget Sound.	68.12% 47	27.54% 19	4.35% 3	0.00% 0	69
Kelp genetics – Investigate genetic diversity and connectivity of Puget Sound kelp beds.	11.59% 8	46.38% 32	40.58% 28	1.45% 1	69

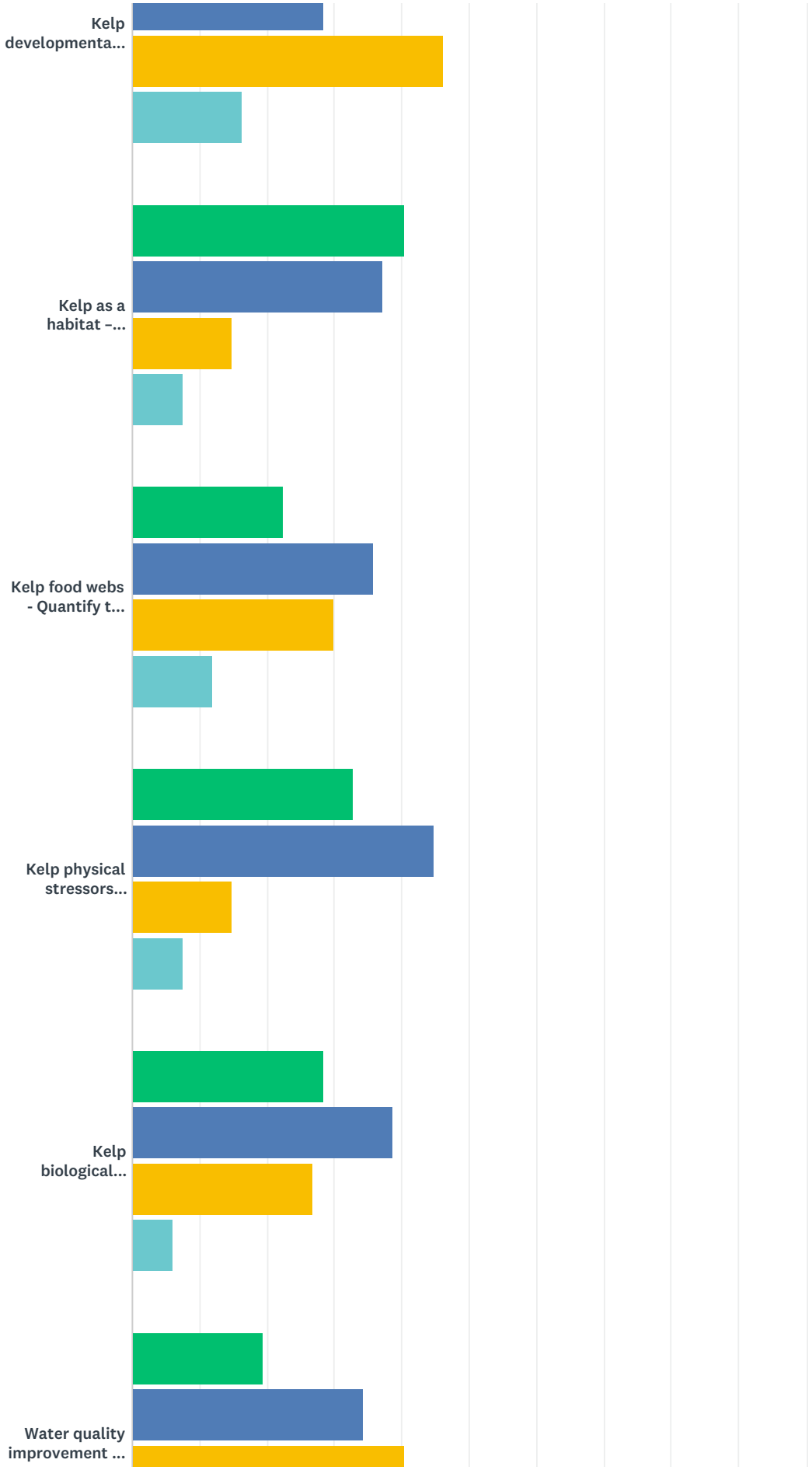
Kelp developmental biology– Understand environmental thresholds of microscopic lifestages and dispersal distances of spores in Puget Sound.	34.78% 24	46.38% 32	17.39% 12	1.45% 1	69
Kelp as a habitat – Investigate functional roles of floating and understory kelp beds as habitat and nursery grounds for marine invertebrates, salmon, rockfish, and forage fish in Puget Sound.	53.62% 37	33.33% 23	11.59% 8	1.45% 1	69
Kelp food webs - Quantify the contributions and describe pathways of kelp biomass in Puget Sound food webs.	33.33% 23	50.72% 35	14.49% 10	1.45% 1	69
Kelp physical stressors –Determine how physical stressors impact kelp reproduction, growth and survival/mortality in Puget Sound. Physical stressors include temperature, light availability, suspended sediment, sediment deposition and erosion, nutrient availability and hydrodynamics.	72.46% 50	26.09% 18	1.45% 1	0.00% 0	69
Kelp biological stressors –Determine how biological stressors impact kelp reproduction, growth and survival/mortality in Puget Sound. Biological stressors include competition with other seaweeds, grazing impacts (urchin, kelp crab, smaller invertebrates), disease, and microbiome.	63.77% 44	31.88% 22	4.35% 3	0.00% 0	69
Water quality improvement– Understand potential of kelp beds to mitigate nutrient pollution and ocean acidification conditions in Puget Sound.	40.58% 28	39.13% 27	20.29% 14	0.00% 0	69
Kelp economics – Assess dollar value of kelp from ecosystem services and role as foundation species in Puget Sound.	15.94% 11	42.03% 29	42.03% 29	0.00% 0	69
Human impacts – Assess impacts of shoreline armoring, overwater structures, pollution, boat traffic, waster water effluent and other human impacts on floating and subtidal kelp beds in Puget Sound.	71.01% 49	24.64% 17	4.35% 3	0.00% 0	69
Restoration – Investigate methods to enhance and restore persistent, floating kelp canopies which have documented declines and understory beds if declines are documented in Puget Sound.	59.42% 41	33.33% 23	7.25% 5	0.00% 0	69

#	IF OTHER (PLEASE SPECIFY) HIGH PRIORITY DATA GAPS	DATE
1	Assess the biodiversity of understory kelp species in Puget Sound (such as by using the NaGISA survey protocol)	1/23/2019 12:44 PM
2	Suitable substrate needs to be understood and must be present for any restoration to work.	1/22/2019 11:25 AM
3	I'm new to the region and basing answers off of limited exposure to presentations on kelp in Puget Sound, my understanding is there is pretty limited knowledge overall, so I was inclined to rank all areas pretty high.	1/10/2019 1:31 PM
4	Note: That's alot of high priority work! As a scientist and natural resource manager, I will defer to coastal ecologists who study kelp to advise best on how these items should be prioritized.	1/9/2019 11:04 AM
5	Please note that I said understanding kelp as habitat is less important because I think this is relatively well-studied and well-documented already (recognizing there will always be data gaps).	1/7/2019 11:45 AM
6	I assume it's critical habatat, which is why rated low	12/22/2018 9:55 AM

Q3 On a scale of High to Low, please rate the ability / interest of your agency, organization or working group in helping address and close data gaps for kelp conservation, restoration and recovery.

Answered: 67 Skipped: 12

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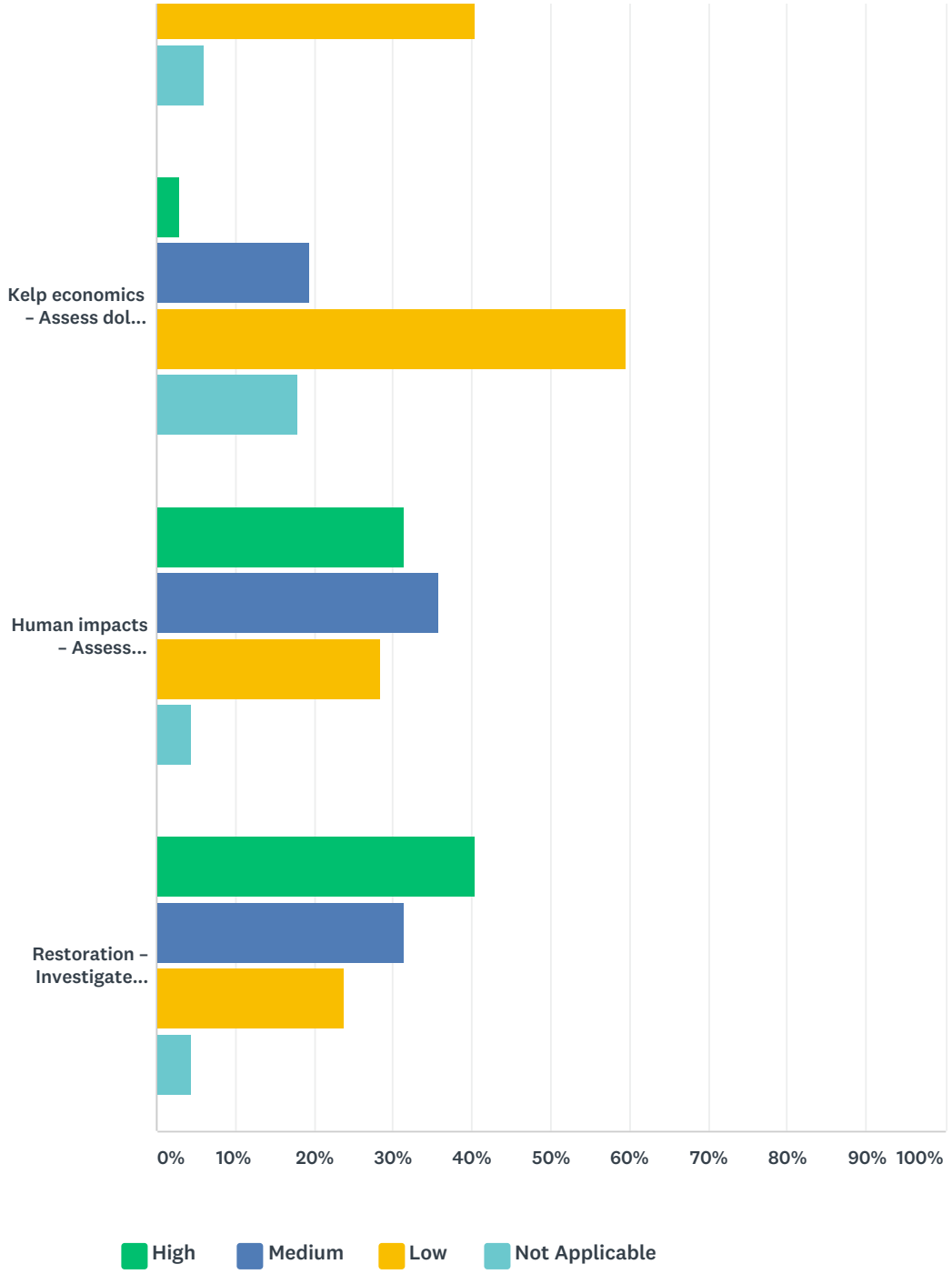
Kelp biological...
Water quality improvement ...



	HIGH	MEDIUM	LOW	NOT APPLICABLE	TOTAL
Management - Understand the effectiveness of current management policies relating to protection/mitigation of kelp from construction, harvest, and other activities in Puget Sound.	29.85% 20	34.33% 23	26.87% 18	8.96% 6	67
Kelp distribution and trends - Assess and monitor current species' distributions and changes through time in Puget Sound.	53.73% 36	34.33% 23	5.97% 4	5.97% 4	67
Kelp priority areas – Identify priority geographic areas for recovery/conservation measures in Puget Sound.	41.79% 28	41.79% 28	11.94% 8	4.48% 3	67
Kelp genetics – Investigate genetic diversity and connectivity of Puget Sound kelp beds.	7.46% 5	17.91% 12	55.22% 37	19.40% 13	67

Kelp developmental biology– Understand environmental thresholds of microscopic lifestages and dispersal distances of spores in Puget Sound.	8.96% 6	28.36% 19	46.27% 31	16.42% 11	67
Kelp as a habitat – Investigate functional roles of floating and understory kelp beds as habitat and nursery grounds for marine invertebrates, salmon, rockfish and forage fish in Puget Sound.	40.30% 27	37.31% 25	14.93% 10	7.46% 5	67
Kelp food webs - Quantify the contributions and describe pathways of kelp biomass in Puget Sound food webs.	22.39% 15	35.82% 24	29.85% 20	11.94% 8	67
Kelp physical stressors –Determine how physical stressors impact kelp reproduction, growth and survival/mortality in Puget Sound. Physical stressors include temperature, effects of suspended sediment, sediment deposition and erosion, nutrient availability and hydrodynamics.	32.84% 22	44.78% 30	14.93% 10	7.46% 5	67
Kelp biological stressors –Determine how biological stressors impact kelp reproduction, growth and survival/mortality in Puget Sound. Biological stressors include competition with other seaweeds, grazing impacts (urchin, kelp crab, smaller invertebrates), disease, and microbiome.	28.36% 19	38.81% 26	26.87% 18	5.97% 4	67
Water quality improvement – Understand potential of kelp beds to mitigate nutrient pollution and ocean acidification conditions in Puget Sound.	19.40% 13	34.33% 23	40.30% 27	5.97% 4	67
Kelp economics – Assess dollar value of kelp from ecosystem services and role as foundation species in Puget Sound.	2.99% 2	19.40% 13	59.70% 40	17.91% 12	67
Human impacts – Assess impacts of shoreline armoring, overwater structures, pollution, boat traffic, wastewater effluent, and other human impacts on floating and subtidal kelp beds in Puget Sound.	31.34% 21	35.82% 24	28.36% 19	4.48% 3	67
Restoration – Investigate methods to enhance and restore persistent, floating kelp canopies which have documented declines and understory beds if declines are documented in Puget Sound.	40.30% 27	31.34% 21	23.88% 16	4.48% 3	67

#	IF OTHER (PLEASE SPECIFY)	DATE
1	Ability and interest are two different things, so some answers might be different if answered strictly from an ability standpoint	1/22/2019 2:49 PM
2	Support coordination, sharing, and communication of information among people studying/monitoring kelp, and to people making decisions at local and regional level that could be informed by kelp information.	1/10/2019 1:43 PM
3	identify important areas for conservation that are not currently protected	1/8/2019 2:58 PM
4	we don't work in Pugent Sound	1/8/2019 2:48 PM
5	interests and abilities are 2 different things. Rankings above are based on MRC interest.	12/26/2018 12:54 PM

Q4 In your opinion, what is the most important aspect of kelp and/or kelp management that we should be looking at?

Answered: 51 Skipped: 28

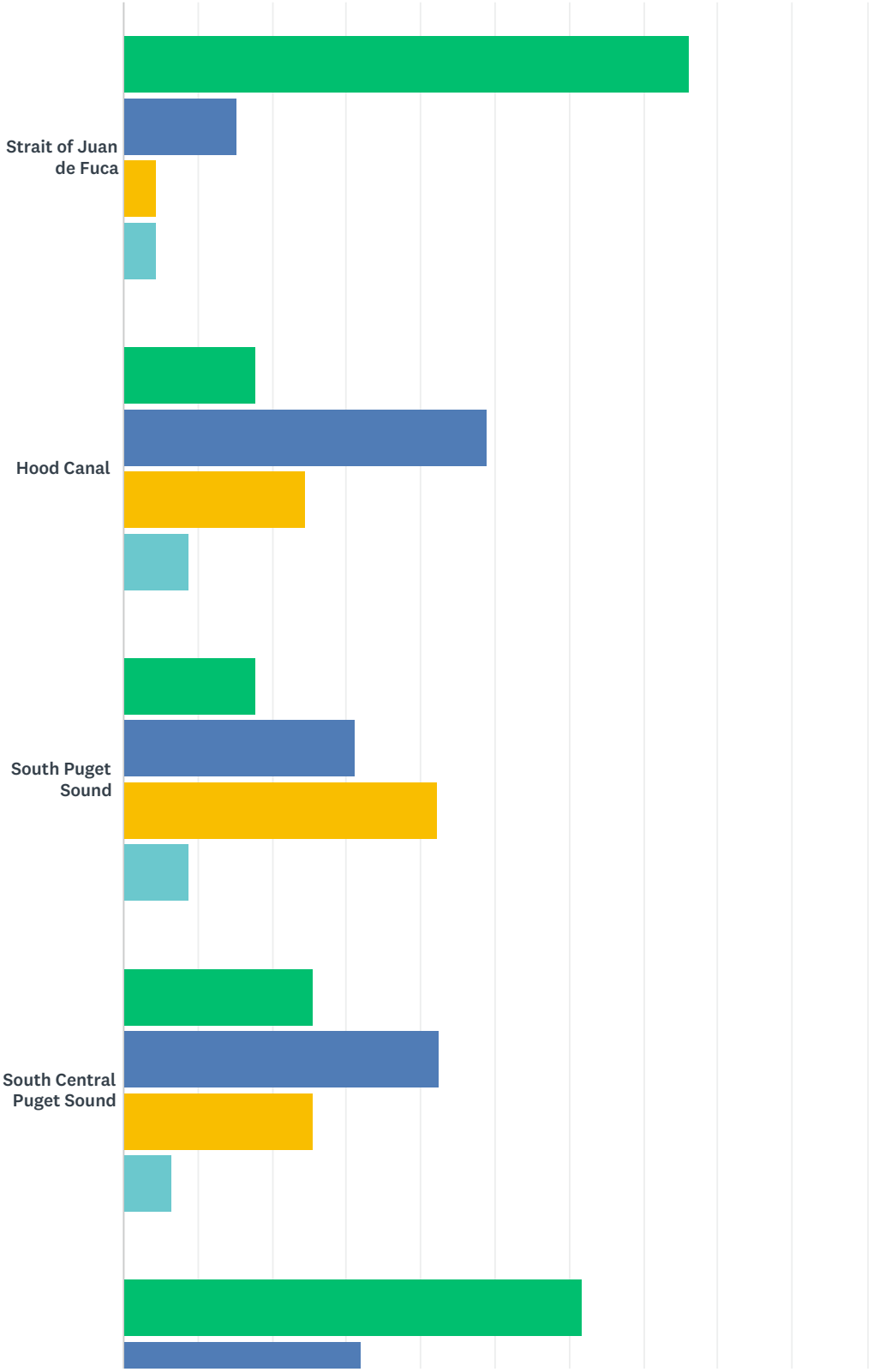
#	RESPONSES	DATE
1	Habitat provisions and quantifying ecosystem services	2/14/2019 8:30 PM
2	Physical stress, habitat conditions for potential restoration, extent and health status	2/12/2019 8:55 AM
3	Human impacts and historic distribution and trends.	2/11/2019 1:12 PM
4	Trying to pinpoint the greatest human cause of kelp decline	2/7/2019 2:20 PM
5	Restoration/Management	2/4/2019 8:01 AM
6	how bad are things for kelp given a deep historical context? what are the direct and indirect links between kelp area/density/biomass and demographic rates of living marine resources?	1/30/2019 9:11 AM
7	PROTECTION of existing understory and canopy kelp beds through regulatory and voluntary methods	1/29/2019 11:11 AM
8	ecosystem services	1/29/2019 9:47 AM
9	Human impacts and environmental stressors resulting from changing ocean conditions specifically ocean warming	1/29/2019 9:40 AM
10	Understanding which physical stressors are most responsible for loss of kelp habitat in the different basins of Puget Sound. Without understanding the processes responsible for the historic losses, I fear that any restoration efforts will be for naught in the long run.	1/28/2019 10:07 AM
11	The stressors that have caused declines for historic beds.	1/28/2019 9:21 AM
12	causative factors of abundance and density declines. Restoration effectiveness.	1/28/2019 8:37 AM
13	Mgt, kelp as habitat, human impacts, phys & bio stressors	1/25/2019 10:12 AM
14	Distribution, diversity of macroalgae and kelp habitat type (understory, subcanopy, canopy). We have info on historic distributions. To facilitate priority area discussions to identify conservation and recovery areas.	1/24/2019 2:55 PM
15	Need to better understand the environmental thresholds for all stages of kelp survival.This also addresses some physical stressors, particularly so in areas with little anthropogenic influence, such as the bull kelp bed at the south side of Squaxin Island.	1/24/2019 1:42 PM
16	Prioritizing conservation over restoration. Regulate actions which might increase temperature and nutrient loads in Puget Sound.	1/23/2019 12:55 PM
17	Identification key factors that are currently limiting kelp distribution that can be acted upon within the next 5 years that will make a measureable difference.	1/22/2019 2:49 PM
18	Suitable substrate	1/22/2019 11:37 AM
19	Identify physical or biological reasons for decline.	1/21/2019 1:51 PM
20	Trying to understand why it hasn't come back in areas it was present historically and if those reasons are related to any current actions or are just a legacy of past actions.	1/15/2019 7:08 AM
21	Education and loss prevention.	1/14/2019 9:48 AM
22	Our first step should be long term monitoring to understand which areas are most at risk	1/11/2019 4:52 PM
23	Whether there really is a kelp 'decline' or if the patterns seen are just canopy kelp being replaced by understory kelp	1/11/2019 3:34 PM
24	We are still lacking a big-picture understanding of kelp decline, notably quantifiable rates of change across the sound.	1/11/2019 9:12 AM

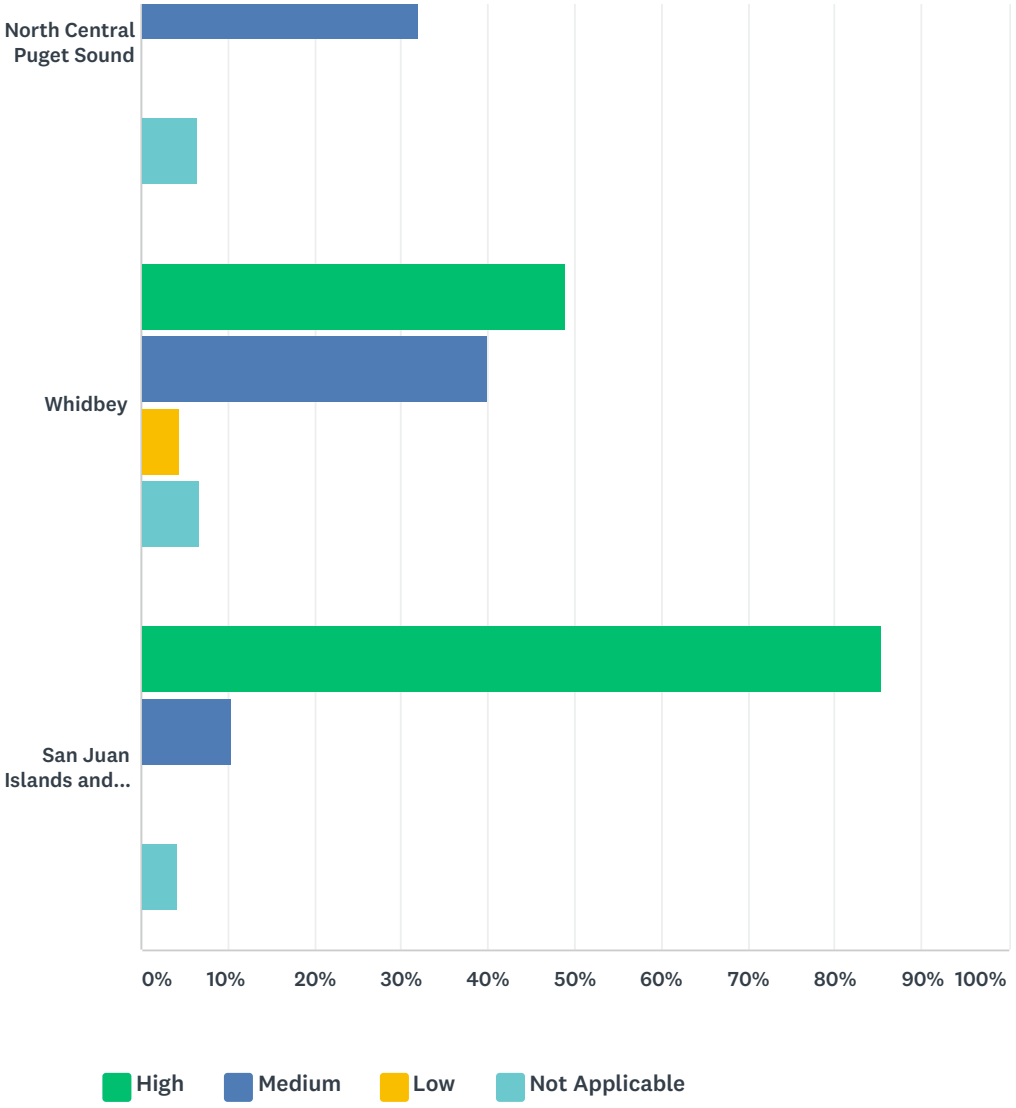
25	Understanding the ecosystem functions/benefits kelp provides (or if there are key thresholds/tipping points), linking that to stressors, and identifying strategies that preserve the functions/benefits. Also, identifying shared stressors with other parts of the ecosystem could help develop or add value to shared regional strategies that may be focused on other ecosystem elements. I do not know enough about the details of current kelp knowledge/management, so this is pretty general!	1/10/2019 1:43 PM
26	Habitat Restoration and research on stressors	1/10/2019 12:16 PM
27	The value of kelp (ecosystem services/habitat, etc). and how we can best maintain or increase kelp coverage	1/10/2019 11:38 AM
28	causes for the decline in kelp	1/10/2019 9:51 AM
29	Interactions of specific kelp species with human activity. Example: how overwater shading impacts non-floating/benthic kelp species.	1/10/2019 7:51 AM
30	Difficult to separate out, but human impacts, physical stressors and water quality are bigger picture. Kelp as habitat is also important to understand what is protected and why.	1/9/2019 12:06 PM
31	Kelp is a foundational species on many levels. We need to understand why they are declining, while also moving forward with efforts to understand better, protect and restore.	1/9/2019 11:16 AM
32	As human impacts continue to rise, we need to know how best to (1) prevent human impacts from causing further declines in kelp, and (2) plan ahead for kelp restoration and goals for the future	1/9/2019 10:37 AM
33	Practically speaking, I think understanding the physical and biological stressors is the most important.	1/8/2019 6:14 PM
34	Not my expertise.	1/8/2019 4:33 PM
35	Being from Vancouver Island - and an emeritus there is little that "my institution" can offer. My rankings are the ability not interest.	1/8/2019 4:13 PM
36	Kelp as habitat and stressors	1/8/2019 4:04 PM
37	Understanding the amount and rate of decline in floating kelp; effective and economical methods for restoration including comparative studies of restored areas to evaluate why some sites do well and others don't.My answers reflect the DNR Aquatics division capacities, not just the reserves program.	1/8/2019 2:58 PM
38	Stressors impacting kelp health.	1/8/2019 2:53 PM
39	monitoring distribution/composition/biomass of kelps and determining their drivers	1/8/2019 2:48 PM
40	Biotic and abiotic factors influencing where kelp grow	1/8/2019 2:16 PM
41	Water quality and urbanization impacts	1/8/2019 10:29 AM
42	The hot topic right now is OA. If we can show that kelp can mitigate OA impacts locally, that provides a way to increase funding efforts for kelp recovery for many, many other reasons aside from mitigation. So it seems like we should focus on that in the hopes of the effects having an even broader positive impact.	1/7/2019 11:47 AM
43	conservation and restoration	1/7/2019 9:32 AM
44	Whether or not it is truly declining and why.	1/4/2019 10:35 AM
45	Although there are regulations protecting kelp from development that would directly impact its footprint/distribution from construction and long-term shading impacts. We lack water quality regulations that sufficiently protect kelp from effects of eutrophication/nutrient loading. We need to gather research and best available science to formulate regulations that protect kelp from anthropogenic nutrient loading.	1/2/2019 10:49 AM
46	We must know where kelps are located and what limits their distribution. Understory kelps are VERY poorly documented, and overstory kelps are underdocumented. Surveys need to occur, and water quality and other environmental parameters measured for areas that both do and do not support kelps.	12/27/2018 9:50 AM
47	Don't know enough to answer this.	12/26/2018 12:54 PM
48	Analyzing all the stressors on kelp beds to determine which of them are having the greatest impact on kelp survival and to identify actions we can take that will provide the greatest benefit.	12/23/2018 7:53 PM

49	Climate change (may override everything else). Understanding causes for loss, should drive management.	12/22/2018 10:14 AM
50	Losses are already documented. Move to aggressively protect and conserve what remains.	12/21/2018 3:39 PM
51	Distribution and Trends (including understory), drivers of observed trends and then restoration actions. Kelp as habitat needs better understanding but it should be an ongoing exercise to understand this.	12/21/2018 2:29 PM

Q5 What geographic sub-basins of Puget Sound have high potential value for targeted kelp conservation and protection actions? See image above for reference.

Answered: 51 Skipped: 28





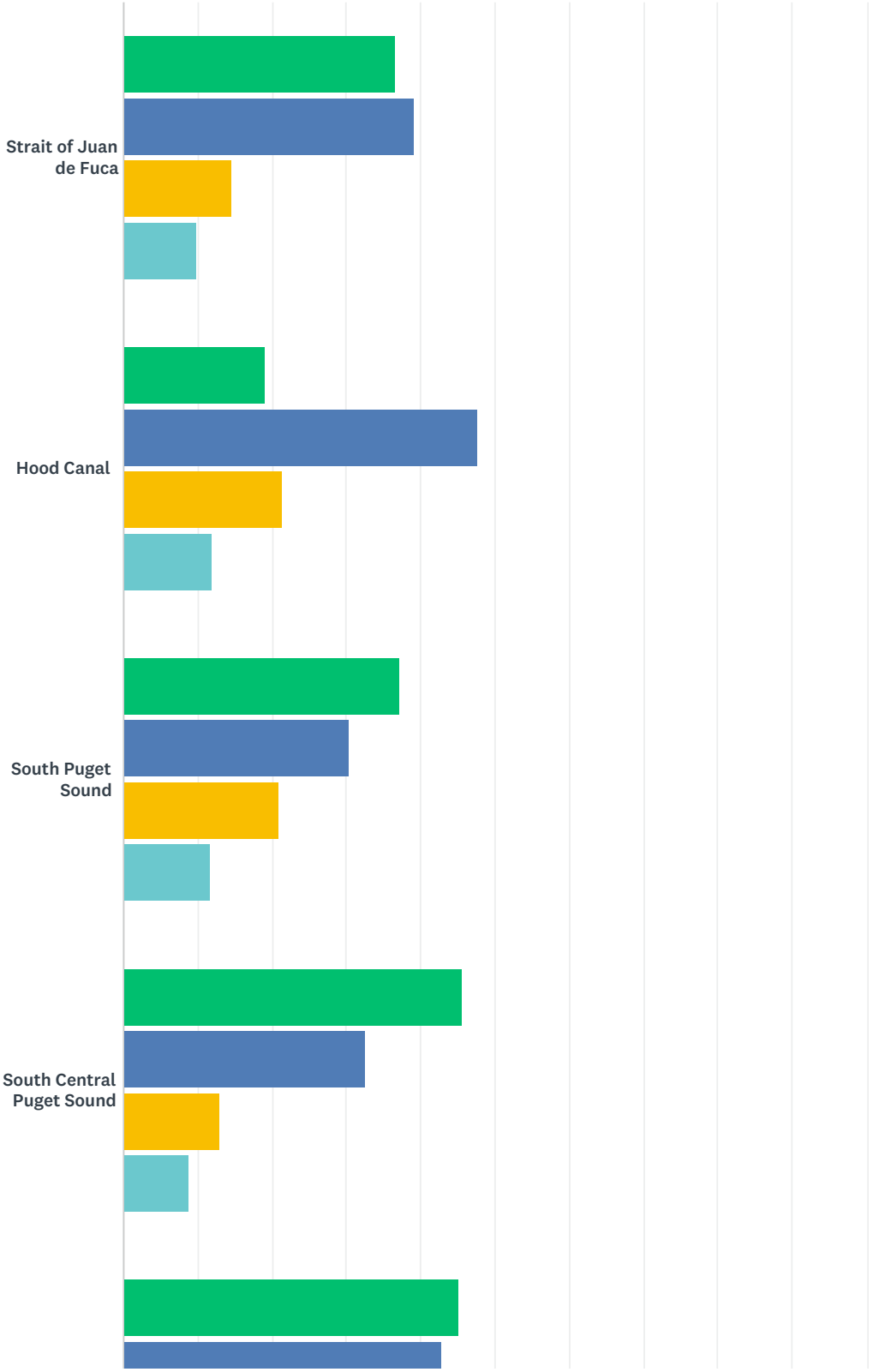
	HIGH	MEDIUM	LOW	NOT APPLICABLE	TOTAL
Strait of Juan de Fuca	76.09% 35	15.22% 7	4.35% 2	4.35% 2	46
Hood Canal	17.78% 8	48.89% 22	24.44% 11	8.89% 4	45
South Puget Sound	17.78% 8	31.11% 14	42.22% 19	8.89% 4	45
South Central Puget Sound	25.53% 12	42.55% 20	25.53% 12	6.38% 3	47
North Central Puget Sound	61.70% 29	31.91% 15	0.00% 0	6.38% 3	47
Whidbey	48.89% 22	40.00% 18	4.44% 2	6.67% 3	45
San Juan Islands and Georgia Strait	85.42% 41	10.42% 5	0.00% 0	4.17% 2	48

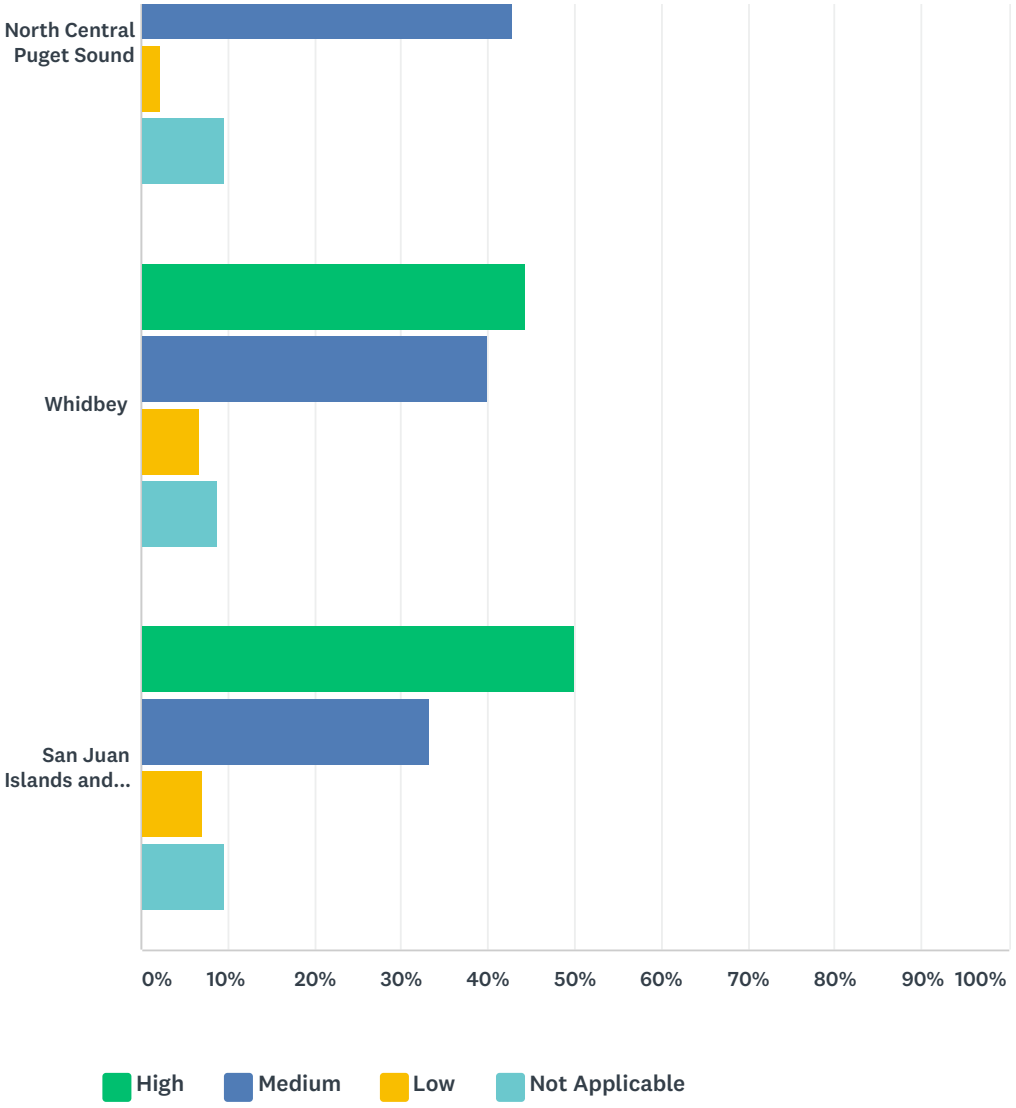
#	IF OTHER PRIORITY AREAS (PLEASE SPECIFY)	DATE
1	Don't have the basis for deciding what sub-basins have higher potential	2/14/2019 8:32 PM
2	Unsure overall, mostly guessing here	2/7/2019 2:22 PM

3	I don't know enough to answer this question	1/10/2019 1:44 PM
4	inner salish sea/georgia strait	1/10/2019 12:19 PM
5	not my area of expertise	1/8/2019 2:48 PM
6	South Central seems like a lost cause, sorry for being a downer.	1/7/2019 11:49 AM
7	this is the only area i can comment on	1/4/2019 10:37 AM
8	Must consider distribution and stressors in Canadian waters too	12/27/2018 9:53 AM
9	don't know enough about regional perspective	12/26/2018 12:55 PM
10	not qualified to answer.	12/22/2018 10:15 AM

Q6 What geographic sub-basins of Puget Sound have high potential value for targeted kelp restoration and recovery actions? See image above for reference.

Answered: 48 Skipped: 31





	HIGH	MEDIUM	LOW	NOT APPLICABLE	TOTAL
Strait of Juan de Fuca	36.59% 15	39.02% 16	14.63% 6	9.76% 4	41
Hood Canal	19.05% 8	47.62% 20	21.43% 9	11.90% 5	42
South Puget Sound	37.21% 16	30.23% 13	20.93% 9	11.63% 5	43
South Central Puget Sound	45.65% 21	32.61% 15	13.04% 6	8.70% 4	46
North Central Puget Sound	45.24% 19	42.86% 18	2.38% 1	9.52% 4	42
Whidbey	44.44% 20	40.00% 18	6.67% 3	8.89% 4	45
San Juan Islands and Georgia Strait	50.00% 21	33.33% 14	7.14% 3	9.52% 4	42

#	IF OTHER PRIORITY AREAS (PLEASE SPECIFY)	DATE
1	Don't have the basis for deciding what sub-basins have higher potential	2/14/2019 8:32 PM
2	Unsure overall, mostly guessing here	2/7/2019 2:22 PM

3	1st determine optimal physical & boilogical parameters for best success	1/24/2019 1:50 PM
4	I don't know enough to answer this question	1/10/2019 1:44 PM
5	inner salish sea/georgia strait	1/10/2019 12:19 PM
6	The loss of kelp in South Puget Sound may be primarily due to human impacts, therefore this would not be a priority restoration or recovery area until we understand and remove the impacts!	1/9/2019 11:18 AM
7	not my area of expertise	1/8/2019 2:48 PM
8	South Central seems like a lost cause, sorry for being a downer.	1/7/2019 11:49 AM
9	do not know enough to answer	1/4/2019 10:37 AM
10	don't know enough to say.	12/26/2018 12:55 PM
11	not qualified to answer	12/22/2018 10:15 AM
12	Areas that have the most monitoring data available. I think I ranked these accordingly?	12/21/2018 2:33 PM