California MLPA Master Plan Science Advisory Team
Summary of potential impacts of the Round 3 North Coast Regional Stakeholder Group MPA Proposal on commercial and recreational fisheries in the North Coast Study Region

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1. INTRODUCTION

The purpose of this project is to analyze the relative effects of the Round 3 Marine Life Protection Act (MLPA) North Coast Regional Stakeholder Group (NCRSG) Marine Protected Area (MPA) Proposal on commercial and recreational fisheries in the MLPA North Coast Study Region (NCSR). For detailed information on how data were collected and/or analyzed, please see our *Draft Survey Methods and Summary Statistics for Ecotrust's North Coast Study Region Fishery Uses and Values Project*. For information on the methods used to evaluate these data, please see Chapter 11 of the MLPA Science Advisory Team (SAT) *Draft Methods Used to Evaluate Marine Protected Area Proposals in the MLPA North Coast Study Region.* Additional information about potential fishery-specific impacts (to the study region and to total area and value) for each MPA in the Round 3 proposal is available in the series of Excel files that will be posted online at: http://www.dfg.ca.gov/mlpa/mpaproposals_nc.asp.

To analyze the NCSR fisheries, we used data layers characterizing the spatial extent and relative importance of fishing grounds for ten commercial and five commercial passenger fishing vessel (CPFV) and six recreational fisheries. We collected this information during the summer and fall of 2009 (June through October) using a stratified, representative sample of 219 commercial fishermen and a stratified, solicited sample[1] of 22 CPFV and 574 recreational fishermen. Individual responses regarding the relative importance of ocean areas for each fishery were standardized using a 100-point scale and normalized to the reported fishing grounds. Based on these data, we evaluate the potential economic impacts on the commercial, commercial passenger fishing vessel (CPFV), and recreational fishing grounds in terms of both total area and total stated value under the single Round 3 MPA proposal, also referred to as the NCRSG MPA Proposal or NCP.

Some proposed MPAs within the NCP include proposed recreational take intended only to accommodate tribal activities. According to the California Secretary for Natural Resources, the State lacks legal authority to allow exclusive tribal gathering activities in MPAs. Unless and until legal authority can be established for exclusive tribal gathering activities in MPAs, it is understood that proposed recreational take intended to only accommodate tribal activities in MPAs will be allowable for all recreational users. Thus, the standard evaluation for commercial, CPFV and recreational fisheries included in this report and supplemental materials treats all recreational take intended to only accommodate tribal activities as allowed for all recreational users. That is, these areas confer no potential negative impacts to recreational users for the species and gear types proposed.

To provide additional information to decision-makers in Round 3, a supplemental evaluation (SUP) has been conducted for the NCRSG MPA Proposal. This supplemental evaluation has been conducted for CPFV and recreational fisheries and treats MPAs that propose recreational take intended to only accommodate tribal activities as though those proposed uses intended to accommodate tribal activities were prohibited for all users. Thus, within the supplemental evaluation, MPAs that propose recreational take intended to only accommodate tribal activities do confer impacts to recreational users for the species

[1] The use of a solicited sample may cause traditional statistical measures (e.g., confidence intervals) to be less precise. Nevertheless, it does allow us to make generalizations about preferences of the overall recreational fishing population and about the three user groups within the study area. We feel that this adds thematic resolution to the MLPA Initiative MPA planning process.

and gear types proposed. The supplemental evaluation does not include commercial fisheries because no commercial take was proposed as intended to only accommodate tribal activities.
The standard evaluation of potential impacts to commercial, CPFV and recreational fisheries, as well as the supplemental evaluation of CPFV and recreational fisheries, is provided in this report. MPAs that include proposed recreational take intended to only accommodate tribal activities are indicated in red in the Excel tables that accompany this report. We also conduct first-order impact and disproportionate impact analyses for the commercial and CPFV fisheries.

Table 1. Analyses conducted

	Commercial	CPFV	Recreational
Potential impacts on fishing grounds (area & value)	✓	✓	✓
Potential net economic impacts	✓	✓	
Potential gross economic impacts	✓		
Disproportionate impacts on fisheries	✓	✓	
Disproportionate impacts on individuals	✓		

A key assumption of our analysis is that each of the MPA proposals completely eliminates opportunities for specific types of fishing in areas closed to those fisheries and that fishermen are unable to adjust or mitigate in any way. In other words, the analysis assumes that all fishing in an area affected by an MPA is lost completely, when in reality it is more likely that fishermen will shift their efforts to areas outside of the MPA. The effect of such an assumption is most likely an overestimation of the impacts, or a "worst case scenario."

The remaining sections of this document summarize the potential impacts. We report commercial and CPFV results by port group. We report recreational results by port group and by user group (i.e., dive, kayak and private vessel). For a description of the ports included in each port group, please see our *Draft Survey Methods and Summary Statistics for Ecotrust's North Coast Study Region Fishery Uses and Values Project.*

In all tables presented, a 'dashed line' represents a fishery that does not occur or a fishery for which insufficient data were collected to merit presentation. For more detailed statistics, please see the tables in Appendix A.

2. RESULTS FOR COMMERCIAL FISHERIES

We summarize here our analysis of the potential impacts on the ten commercial fisheries:

- anchovy/sardine – lampara net
- Dungeness crab – trap
- herring – gillnet
- rockfish – fixed gear
- salmon – troll
- seaweed – hand harvest[2]
- shrimp – trap
- smelt – brail (dip net)
- surfperch – hook and line
- urchin – dive[3]

[2] Seaweed – hand harvest is excluded from the potential net economic impact analysis. For reporting purposes, four seaweed survey respondents who operate across the Fort Bragg, Albion and Elk areas were indicated as operating out of Fort Bragg and one survey respondent who operates out of both Crescent City and Trinidad was indicated as operating out of Crescent City.

The rockfish fishery includes the nearshore, deeper nearshore and lingcod fisheries, which were combined at the recommendation of the NCSR fishing community into a single fishery. The results for commercial fisheries are broken out by port group (i.e., Crescent City, Trinidad, Eureka, Shelter Cove, Fort Bragg and Albion).

2.1. Potential Impacts on Commercial Fishing Grounds (Area and Stated Value)

The Round 3 NCRSG MPA proposal varies considerably in its potential impacts to commercial fisheries, both between and across fisheries. As mentioned previously, this report only presents results of the evaluation of the Round 3 NCRSG MPA Proposal. Evaluation methods are presented in a separate document.

For information on the potential impacts (in terms of both total area and total stated value) on commercial fishing grounds for the port-fishery combinations considered, please see Tables A.1–2 in Appendix A.

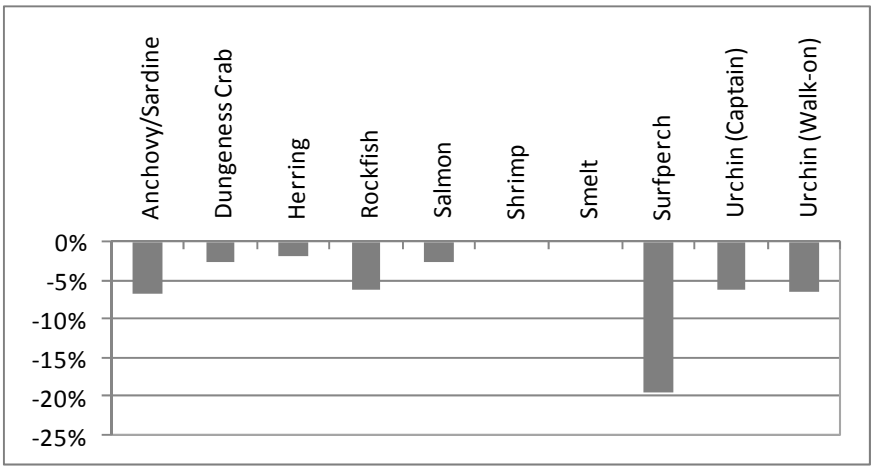
2.2. Potential Net Economic Impacts on Commercial Fisheries

Figure 1 summarizes the potential net economic impact (NEI) on commercial fisheries under the NCRSG MPA Proposal, calculated as a percentage reduction in annual net economic revenue (i.e., profit; for associated values, see Table 3).

To analyze the potential net economic impacts across the study region, we focus on the top four commercial species (i.e., Dungeness crab, salmon, urchin, and rockfish), as they comprise approximately 98.1% of the total NCSR ex-vessel revenue. Several patterns emerge from our analysis:

- The Dungeness crab fishery sees the highest potential impacts in total dollars, while the surfperch fishery sees the highest potential impact by percentage.
- The shrimp and smelt fisheries both see zero potential impacts (in dollars and by percentage).

Figure 1: Estimated annual net economic impact on commercial fisheries (% reduction in profit)



[3] For the purposes of the potential net economic impact analysis, urchin – dive is broken into two sub-groups due to differences in operating costs (i.e., urchin – dive captain (those who own or operate a boat) and urchin – walk-on dive). Based on communication with NCSR urchin divers, we determined that the most reasonable estimate of operating costs for walk-on divers was a fixed 30% of gross economic revenue. For dive captains, we estimated average operating costs using data from the interview process. It should be noted that the ex-vessel revenue reported for dive captains does not include the 30% of walk-on divers' gross landings that captains receive for boat operating costs.

The potential impacts from each proposal are broken out by port in Table 2 and Figure 2. On average, Fort Bragg is the port estimated to see the highest potential net economic impact (as a percentage), while Shelter Cove is estimated to see the lowest potential impact.

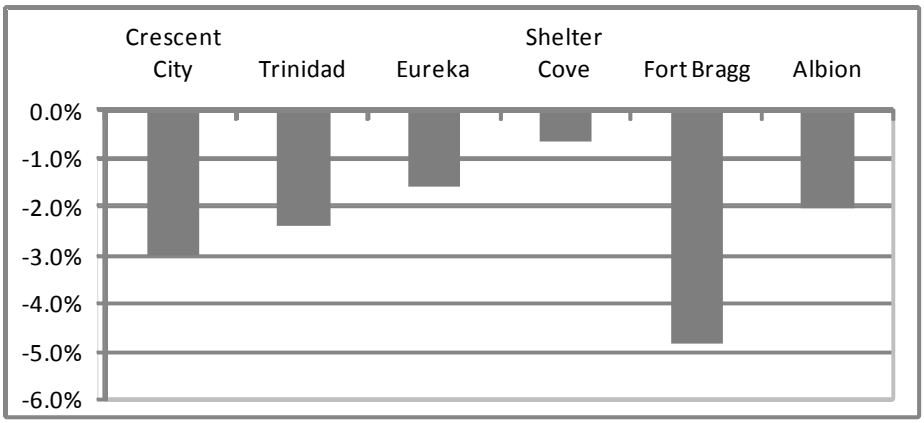
Tables 3–9 show potential baseline gross economic revenue (GER), baseline net economic revenue (NER) and potential net economic impacts[4] by fishery for each port and for the NCSR.

Table 2: Estimated annual net economic impact on commercial fisheries by port (reduction in profit)

	NCP
Port	**$ Reduction in Profit**
Crescent City	$128,129
Trinidad	$15,724
Eureka	$32,064
Shelter Cove	$250
Fort Bragg	$97,892
Albion	$4,118
NCSR	**$278,177**

	% Reduction in Profit
Crescent City	3.0%
Trinidad	2.4%
Eureka	1.6%
Shelter Cove	0.6%
Fort Bragg	4.8%
Albion	2.0%
NCSR	**3.0%**

Figure 2: Estimated annual net economic impact on commercial fisheries by port (% reduction in profit)



[4] For an explanation of why net economic impacts can exceed 100%, please see Appendix A.

Table 3: Estimated annual net economic impact for Crescent City

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	NCP $ Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	$10,615,878	$6,677,468	$3,938,410	$124,347
Herring (Gillnet)	$2,127	$1,234	$893	$0
Rockfish (Fixed Gear)	$391,258	$210,877	$180,381	$1,261
Salmon (Troll)	$189,503	$111,297	$78,206	$2,281
Shrimp (Trap)	$251,315	$158,029	$93,286	$0
Smelt (Brail – Dip Net)	$16,532	$10,015	$6,517	$0
Surfperch (Hook and Line)	$5,986	$3,230	$2,755	$241
Urchin (Dive Captain)	—	—	—	—
Urchin (Walk-on Dive)	—	—	—	—
All Fisheries	**$11,472,598**	**$7,172,150**	**$4,300,448**	**$128,129**

				% Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	100%	63%	37%	3.2%
Herring (Gillnet)	100%	58%	42%	0.0%
Rockfish (Fixed Gear)	100%	54%	46%	0.7%
Salmon (Troll)	100%	59%	41%	2.9%
Shrimp (Trap)	100%	63%	37%	0.0%
Smelt (Brail – Dip Net)	100%	61%	39%	0.0%
Surfperch (Hook and Line)	100%	54%	46%	8.7%
Urchin (Dive Captain)	—	—	—	—
Urchin (Walk-on Dive)	—	—	—	—
All Fisheries	**—**	**—**	**—**	**3.0%**

Table 4: Estimated annual net economic impact for Trinidad

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	NCP $ Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	$1,756,959	$1,105,140	$651,818	$13,464
Herring (Gillnet)	—	—	—	—
Rockfish (Fixed Gear)	$19,776	$10,659	$9,117	$2,093
Salmon (Troll)	$11,671	$6,854	$4,816	$167
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	—	—	—	—
Surfperch (Hook and Line)	—	—	—	—
Urchin (Dive Captain)	—	—	—	—
Urchin (Walk-on Dive)	—	—	—	—
All Fisheries	**$1,788,406**	**$1,122,654**	**$665,752**	**$15,724**

				% Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	100%	63%	37%	2.1%
Herring (Gillnet)	—	—	—	—
Rockfish (Fixed Gear)	100%	54%	46%	23.0%
Salmon (Troll)	100%	59%	41%	3.5%
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	—	—	—	—
Surfperch (Hook and Line)	—	—	—	—
Urchin (Dive Captain)	—	—	—	—
Urchin (Walk-on Dive)	—	—	—	—
All Fisheries	**—**	**—**	**—**	**2.4%**

Table 5: Estimated annual net economic impact for Eureka

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	NCP $ Reduction in Profit
Anchovy/Sardine (Lampara Net)	$44,428	$36,875	$7,553	$506
Dungeness Crab (Trap)	$5,062,040	$3,184,061	$1,877,978	$21,762
Herring (Gillnet)	$9,574	$5,553	$4,021	$96
Rockfish (Fixed Gear)	$51,344	$27,673	$23,671	$5,361
Salmon (Troll)	$202,095	$118,692	$83,402	$2,192
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	$106,148	$64,306	$41,842	$0
Surfperch (Hook and Line)	$20,445	$11,034	$9,411	$2,149
Urchin (Dive Captain)	—	—	—	—
Urchin (Walk-on Dive)	—	—	—	—
All Fisheries	**$5,496,074**	**$3,448,196**	**$2,047,879**	**$32,064**

				% Reduction in Profit
Anchovy/Sardine (Lampara Net)	100%	83%	17%	6.7%
Dungeness Crab (Trap)	100%	63%	37%	1.2%
Herring (Gillnet)	100%	58%	42%	2.4%
Rockfish (Fixed Gear)	100%	54%	46%	22.6%
Salmon (Troll)	100%	59%	41%	2.6%
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	100%	61%	39%	0.0%
Surfperch (Hook and Line)	100%	54%	46%	22.8%
Urchin (Dive Captain)	—	—	—	—
Urchin (Walk-on Dive)	—	—	—	—
All Fisheries	**—**	**—**	**—**	**1.6%**

Table 6: Estimated annual net economic impact for Shelter Cove

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	NCP $ Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	$18,626	$11,716	$6,910	$0
Herring (Gillnet)	—	—	—	—
Rockfish (Fixed Gear)	$14,575	$7,856	$6,720	$108
Salmon (Troll)	$63,003	$37,003	$26,001	$142
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	—	—	—	—
Surfperch (Hook and Line)	—	—	—	—
Urchin (Dive Captain)	—	—	—	—
Urchin (Walk-on Dive)	—	—	—	—
All Fisheries	**$96,205**	**$56,574**	**$39,630**	**$250**

				% Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	100%	63%	37%	0.0%
Herring (Gillnet)	—	—	—	—
Rockfish (Fixed Gear)	100%	54%	46%	1.6%
Salmon (Troll)	100%	59%	41%	0.5%
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	—	—	—	—
Surfperch (Hook and Line)	—	—	—	—
Urchin (Dive Captain)	—	—	—	—
Urchin (Walk-on Dive)	—	—	—	—
All Fisheries	**—**	**—**	**—**	**0.6%**

Table 7: Estimated annual net economic impact for Fort Bragg

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	NCP $ Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	$1,015,833	$638,967	$376,866	$18,165
Herring (Gillnet)	—	—	—	—
Rockfish (Fixed Gear)	$143,137	$77,147	$65,990	$9,579
Salmon (Troll)	$2,556,982	$1,501,744	$1,055,238	$27,560
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	—	—	—	—
Surfperch (Hook and Line)	—	—	—	—
Urchin (Dive Captain)	$670,057	$322,505	$347,552	$27,318
Urchin (Walk-on Dive)	$264,179	$79,254	$184,926	$15,270
All Fisheries	**$4,650,189**	**$2,619,617**	**$2,030,572**	**$97,892**

				% Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	100%	63%	37%	4.8%
Herring (Gillnet)	—	—	—	—
Rockfish (Fixed Gear)	100%	54%	46%	14.5%
Salmon (Troll)	100%	59%	41%	2.6%
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	—	—	—	—
Surfperch (Hook and Line)	—	—	—	—
Urchin (Dive Captain)	100%	48%	52%	7.9%
Urchin (Walk-on Dive)	100%	30%	70%	8.3%
All Fisheries	**—**	**—**	**—**	**4.8%**

Table 8: Estimated annual net economic impact for Albion

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	NCP $ Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	$2,401	$1,510	$891	$0
Herring (Gillnet)	—	—	—	—
Rockfish (Fixed Gear)	$22,362	$12,053	$10,310	$238
Salmon (Troll)	$4,362	$2,562	$1,800	$25
Shrimp (Trap)	—	—	—	—
Smelt (Brail – Dip Net)	—	—	—	—
Surfperch (Hook and Line)	—	—	—	—
Urchin (Dive Captain)	$226,722	$109,124	$117,599	$2,319
Urchin (Walk-on Dive)	$105,897	$31,769	$74,128	$1,536
All Fisheries	**$361,745**	**$157,018**	**$204,727**	**$4,118**

				% Reduction in Profit
Anchovy/Sardine (Lampara Net)	—	—	—	—
Dungeness Crab (Trap)	100%	63%	37%	0.0%
Herring (Gillnet)	—	—	—	—
Rockfish (Fixed Gear)	100%	54%	46%	2.3%
Salmon (Troll)	100%	59%	41%	1.4%
Shrimp (Trap)	100%	63%	37%	—
Smelt (Brail – Dip Net)	—	—	—	—
Surfperch (Hook and Line)	—	—	—	—
Urchin (Dive Captain)	100%	48%	52%	2.0%
Urchin (Walk-on Dive)	100%	30%	70%	2.1%
All Fisheries	**—**	**—**	**—**	**2.0%**

Table 9: Estimated annual net economic impact for the NCSR

Fishery	Baseline GER	Estimated Costs	Baseline NER (Profit)	NCP $ Reduction in Profit
Anchovy/Sardine (Lampara Net)	$44,428	$36,875	$7,553	$506
Dungeness Crab (Trap)	$18,471,736	$11,618,862	$6,852,874	$177,737
Herring (Gillnet)	$11,701	$6,787	$4,915	$96
Rockfish (Fixed Gear)	$642,453	$346,264	$296,189	$18,640
Salmon (Troll)	$3,027,616	$1,778,153	$1,249,463	$32,366
Shrimp (Trap)	$251,315	$158,029	$93,286	$0
Smelt (Brail – Dip Net)	$122,680	$74,322	$48,358	$0
Surfperch (Hook and Line)	$26,431	$14,264	$12,167	$2,389
Urchin (Dive Captain)	$896,780	$431,629	$465,151	$29,637
Urchin (Walk-on Dive)	$370,076	$111,023	$259,053	$16,805
All Fisheries	**$23,865,216**	**$14,576,208**	**$9,289,008**	**$278,177**

				% Reduction in Profit
Anchovy/Sardine (Lampara Net)	100%	83%	17%	6.7%
Dungeness Crab (Trap)	100%	63%	37%	2.6%
Herring (Gillnet)	100%	58%	42%	1.9%
Rockfish (Fixed Gear)	100%	54%	46%	6.3%
Salmon (Troll)	100%	59%	41%	2.6%
Shrimp (Trap)	100%	63%	37%	0.0%
Smelt (Brail – Dip Net)	100%	61%	39%	0.0%
Surfperch (Hook and Line)	100%	54%	46%	19.6%
Urchin (Dive Captain)	100%	48%	52%	6.4%
Urchin (Walk-on Dive)	100%	30%	70%	6.5%
All Fisheries	**—**	**—**	**—**	**3.0%**

2.3. Potential Gross Economic Impacts on Commercial Fisheries

Potential gross economic impact (GEI) is calculated as a percentage reduction in annual gross economic revenue. Unlike net economic impact (NEI), GEI does not account for fishermen's operating costs. Therefore, the percentage reduction in gross economic revenue is less than the percentage reduction in net economic revenue (i.e., profit). However, the dollar reduction in gross economic revenue is greater than the dollar reduction in net economic revenue.

To analyze the potential gross economic impacts across the study region, we focus on the top four commercial species (i.e., Dungeness crab, salmon, urchin, and rockfish), as they comprise approximately 98.1% of the total NCSR ex-vessel revenue. Several patterns emerge from our analysis:

- The Dungeness crab fishery sees the highest range of potential impacts (in dollars).
- Salmon, seaweed and smelt lowest range of potential impacts (in dollars).
- The rank order and relative differences are similar for both GEI and NEI (in section 2.2); however, the magnitude of the impacts differs.

Table 10 compares the potential annual GEI with the potential annual NEI on the commercial fisheries considered.

Table 10: Comparison of potential net economic impact and gross economic impact

	$ Reduction	% Reduction
Net economic impact (NEI)	$278,177	3.0%
Gross economic impact (GEI)	$424,334	1.8%

The potential impacts from each proposal are broken out by port in Table 11 and Figure 3. On average, Fort Bragg is the port estimated to see the highest potential GEI (as a percentage), while Shelter Cove is estimated to see the lowest potential impact.

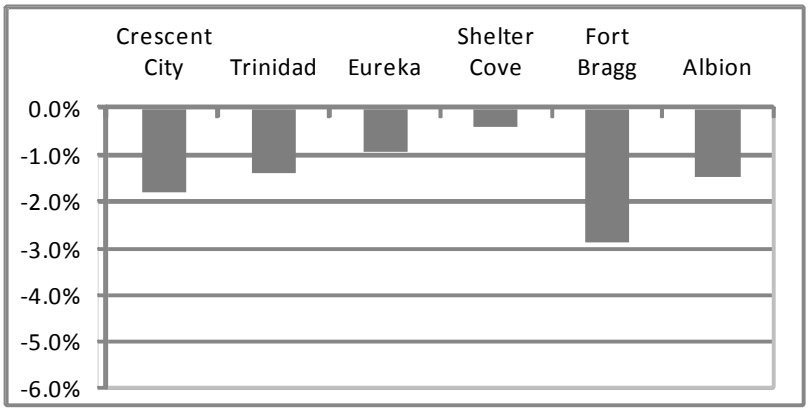
Tables 12–18 show potential gross economic impacts by fishery for each port and for the NCSR.

Table 11: Estimated annual gross economic impact on commercial fisheries by port (reduction in revenue)

Port	Baseline GER	NCP $ Reduction in Revenue
Crescent City	$11,501,714	$205,162
Trinidad	$1,788,406	$24,849
Eureka	$5,496,074	$50,251
Shelter Cove	$96,205	$369
Fort Bragg	$4,819,786	$138,502
Albion	$361,745	$5,201
NCSR	**$24,063,930**[5]	**$424,334**

		% Reduction in Revenue
Crescent City	100%	1.8%
Trinidad	100%	1.4%
Eureka	100%	0.9%
Shelter Cove	100%	0.4%
Fort Bragg	100%	2.9%
Albion	100%	1.4%
NCSR	**—**	**1.8%**

Figure 3: Estimated annual gross economic impact on commercial fisheries by port (% reduction in profit)



[5] This total includes the revenue reported by our five seaweed survey respondents, who represent approximately 69% of the total poundage of seaweed landed in the NCSR. For reporting purposes, four survey respondents who operate across the Fort Bragg, Albion, and Elk areas were indicated as operating out of Fort Bragg and one survey respondent who operates out of both Crescent City and Trinidad was indicated as operating out of Crescent City.

Table 12: Estimated annual gross economic impact for Crescent City

Fishery	Baseline GER	NCP $ Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	$10,615,878	$199,578
Herring (Seine)	$2,127	$0
Rockfish (Fixed Gear)	$391,258	$1,800
Salmon (Troll)	$189,503	$3,449
Seaweed (Hand Harvest)	$29,116[6]	$0
Shrimp (Trap)	$251,315	$0
Smelt (Brail – Dip Net)	$16,532	$0
Surfperch (Hook and Line)	$5,986	$335
Urchin (Dive)	—	—
All Fisheries	**$11,501,714**	**$205,162**

		% Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	100%	1.9%
Herring (Seine)	100%	0.0%
Rockfish (Fixed Gear)	100%	0.5%
Salmon (Troll)	100%	1.8%
Seaweed (Hand Harvest)	100%	0.0%
Shrimp (Trap)	100%	0.0%
Smelt (Brail – Dip Net)	100%	0.0%
Surfperch (Hook and Line)	100%	5.6%
Urchin (Dive)	—	—
All Fisheries	**—**	**1.8%**

[6] We obtained permission to display this value from the seaweed survey respondent who is indicated as operating out of Crescent City.

Table 13: Estimated annual gross economic impact for Trinidad

Fishery	Baseline GER	NCP $ Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	$1,756,959	$21,611
Herring (Seine)	—	—
Rockfish (Fixed Gear)	$19,776	$2,986
Salmon (Troll)	$11,671	$252
Seaweed (Hand Harvest)	—	—
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	—	—
Surfperch (Hook and Line)	—	—
Urchin (Dive)	—	—
All Fisheries	**$1,788,406**	**$24,849**

		% Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	100%	1.2%
Herring (Seine)	—	—
Rockfish (Fixed Gear)	100%	15.1%
Salmon (Troll)	100%	2.2%
Seaweed (Hand Harvest)	—	—
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	—	—
Surfperch (Hook and Line)	—	—
Urchin (Dive)	—	—
All Fisheries	**—**	**1.4%**

Table 14: Estimated annual gross economic impact for Eureka

Fishery	Baseline GER	NCP $ Reduction in Revenue
Anchovy/Sardine (Lampara Net)	$44,428	$1,204
Dungeness Crab (Trap)	$5,062,040	$34,928
Herring (Seine)	$9,574	$165
Rockfish (Fixed Gear)	$51,344	$7,650
Salmon (Troll)	$202,095	$3,314
Seaweed (Hand Harvest)	—	—
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	$106,148	$0
Surfperch (Hook and Line)	$20,445	$2,989
Urchin (Dive)	—	—
All Fisheries	**$5,496,074**	**$50,251**

		% Reduction in Revenue
Anchovy/Sardine (Lampara Net)	100%	2.7%
Dungeness Crab (Trap)	100%	0.7%
Herring (Seine)	100%	1.7%
Rockfish (Fixed Gear)	100%	14.9%
Salmon (Troll)	100%	1.6%
Seaweed (Hand Harvest)	—	—
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	100%	0.0%
Surfperch (Hook and Line)	100%	14.6%
Urchin (Dive)	—	—
All Fisheries	**—**	**0.9%**

Table 15: Estimated annual gross economic impact for Shelter Cove

Fishery	Baseline GER	NCP $ Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	$18,626	$0
Herring (Seine)	—	—
Rockfish (Fixed Gear)	$14,575	$155
Salmon (Troll)	$63,003	$214
Seaweed (Hand Harvest)	—	—
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	—	—
Surfperch (Hook and Line)	—	—
Urchin (Dive)	—	—
All Fisheries	**$96,205**	**$369**

		% Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	100%	0.0%
Herring (Seine)	—	—
Rockfish (Fixed Gear)	100%	1.1%
Salmon (Troll)	100%	0.3%
Seaweed (Hand Harvest)	—	—
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	—	—
Surfperch (Hook and Line)	—	—
Urchin (Dive)	—	—
All Fisheries	**—**	**0.4%**

Table 16: Estimated annual gross economic impact for Fort Bragg

Fishery	Baseline GER	NCP $ Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	$1,015,833	$29,154
Herring (Seine)	—	—
Rockfish (Fixed Gear)	$143,137	$13,670
Salmon (Troll)	$2,556,982	$41,679
Seaweed (Hand Harvest)	$169,597	$0
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	—	—
Surfperch (Hook and Line)	—	—
Urchin (Dive)	$934,237	$53,999
All Fisheries	**$4,819,786**	**$138,502**

		% Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	100%	2.9%
Herring (Seine)	—	—
Rockfish (Fixed Gear)	100%	9.6%
Salmon (Troll)	100%	1.6%
Seaweed (Hand Harvest)	100%	0.0%
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	—	—
Surfperch (Hook and Line)	—	—
Urchin (Dive)	100%	5.8%
All Fisheries	**—**	**2.9%**

Table 17: Estimated annual gross economic impact for Albion

Fishery	Baseline GER	NCP $ Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	$2,401	$0
Herring (Seine)	—	—
Rockfish (Fixed Gear)	$22,362	$340
Salmon (Troll)	$4,362	$38
Seaweed (Hand Harvest)	—	—
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	—	—
Surfperch (Hook and Line)	—	—
Urchin (Dive)	$332,619	$4,823
All Fisheries	**$361,745**	**$5,201**

		% Reduction in Revenue
Anchovy/Sardine (Lampara Net)	—	—
Dungeness Crab (Trap)	100%	0.0%
Herring (Seine)	—	—
Rockfish (Fixed Gear)	100%	1.5%
Salmon (Troll)	100%	0.9%
Seaweed (Hand Harvest)	—	—
Shrimp (Trap)	—	—
Smelt (Brail – Dip Net)	—	—
Surfperch (Hook and Line)	—	—
Urchin (Dive)	100%	1.5%
All Fisheries	**—**	**1.4%**

Table 18: Estimated annual gross economic impact for the NCSR

Fishery	Baseline GER	NCP $ Reduction in Revenue
Anchovy/Sardine (Lampara Net)	$44,428	$1,204
Dungeness Crab (Trap)	$18,471,736	$285,272
Herring (Seine)	$11,701	$165
Rockfish (Fixed Gear)	$642,453	$26,600
Salmon (Troll)	$3,027,616	$48,947
Seaweed (Hand Harvest)	$198,714	$0
Shrimp (Trap)	$251,315	$0
Smelt (Brail – Dip Net)	$122,680	$0
Surfperch (Hook and Line)	$26,431	$3,324
Urchin (Dive)	$1,266,856	$58,822
All Fisheries	**$24,063,930**[7]	**$424,334**

		% Reduction in Revenue
Anchovy/Sardine (Lampara Net)	100%	2.7%
Dungeness Crab (Trap)	100%	1.5%
Herring (Seine)	100%	1.4%
Rockfish (Fixed Gear)	100%	4.1%
Salmon (Troll)	100%	1.6%
Seaweed (Hand Harvest)	100%	0.0%
Shrimp (Trap)	100%	0.0%
Smelt (Brail – Dip Net)	100%	0.0%
Surfperch (Hook and Line)	100%	12.6%
Urchin (Dive)	100%	4.6%
All Fisheries	**—**	**1.8%**

[7] This total includes the revenue reported by our five seaweed survey respondents, who represent approximately 69% of the total poundage of seaweed landed in the NCSR.

2.4. Disproportionate Impacts on Commercial Fisheries

We also evaluate whether there are port-fishery combinations that may be disproportionately affected by the Round 3 NCRSG MPA proposal.

To assess these impacts, we use a box plot analysis (see Figure A.1 in Appendix A) to identify outliers within each fishery (calculated using estimated impacts on the stated value of total fishing grounds). In a box plot analysis, outliers are defined as extreme values that deviate significantly[8] from the rest of the sample. Box plot analysis results also can inform convergence among MPA proposals within a fishery and/or relative potential impacts between fisheries.

While no port-fishery combination is disproportionately impacted at a statistically significant level, practically speaking, surf perch (as a fishery) may be disproportionately impacted relative to other fisheries. Similarly, while there are no statistically significant outliners for urchin, surfperch or herring practically speaking, the bi-modal (i.e., having two modes) nature of the potential impacts should be noted.

3. RESULTS FOR COMMERCIAL PASSENGER FISHING VESSELS (CPFV)

We summarize here our analysis of the potential impacts on the five CPFV fisheries: California halibut, Dungeness crab, Pacific halibut, rockfish/bottomfish and salmon. The rockfish/bottomfish fishery includes lingcod and the nearshore and deeper nearshore fish species, which were combined at the recommendation of the NCSR fishing community into a single fishery. The results for CPFV fisheries are broken out by port group (i.e., Crescent City, Trinidad, Eureka, Shelter Cove and Fort Bragg).

3.1. Potential Impacts on CPFV Fishing Grounds (Area and Stated Value)

The Round 3 NCRSG MPA Proposal varies considerably in its potential effects, both between and across fisheries. As mentioned previously, this report only presents results from Round 3. Evaluation methods are presented in a separate document.

For information on the potential impacts on CPFV fishing grounds for the port-fishery combinations considered, please see Tables A.2–A.3 in Appendix A.

3.2. Potential Net Economic Impacts on CPFV Fisheries

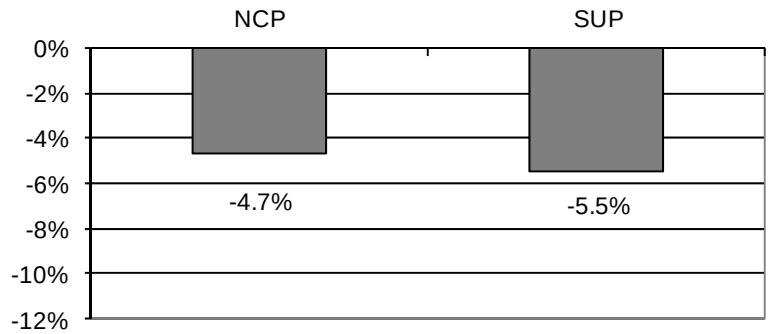
Similar to our analysis of the commercial fisheries, we calculate the potential net economic impact (NEI) on the CPFV fisheries as the average percentage reduction in net economic revenue across the fisheries considered in each port (for a list of fisheries considered in each port, please see *Draft Survey Methods and Summary Statistics for Ecotrust's North Coast Study Region Fishery Uses and Values Project)*. Unlike the commercial fisheries, however, we assume a similar cost structure across the CPFV port groups for reasons of confidentiality (i.e., n = 22).

As mentioned in the introduction, two evaluations were conducted in Round 3 for the NCP with regard to CPFV fisheries. The standard evaluation includes all recreational take proposed in each MPA including recreational take intended only to accommodate tribal uses but open to all recreational users. The NCRSG MPA Proposal - Supplemental Evaluation (SUP) for CPFV fisheries did not include proposed recreational take intended only to accommodate tribal uses. Thus, some MPAs that do not confer impacts to recreational fisheries in the standard evaluation do confer impacts to CPFV fisheries in the supplemental evaluation. Results from the standard evaluation are labeled NCP and results from the supplemental evaluation are labeled SUP.

[8] That is, the deviation is unlikely to have occurred by chance from a statistical perspective.

Figure 4 summarizes the potential net economic impact on CPFV fisheries by fishery.

Figure 4: Estimated annual net economic impact on CPFV fisheries (% reduction in profit)



The potential impacts from the NCRSG MPA Proposal in each evaluation are broken out by port in Table 20. On average, Fort Bragg is the port estimated to see the highest potential net economic impact (as a percentage), while Crescent City is estimated to see the lowest potential impact.

Table 20: Estimated annual net economic impact on CPFV fisheries by port (reduction in profit)

Port	Baseline GER	Estimated Costs	Baseline NER (Profit)	NCP	SUP
				% Reduction in Profit	
Crescent City	100%	51.8%	48.2%	0.0%	0.0%
Trinidad	100%	51.8%	48.2%	0.5%	0.6%
Eureka	100%	51.8%	48.2%	4.3%	4.5%
Shelter Cove	100%	51.8%	48.2%	9.2%	10.3%
Fort Bragg	100%	51.8%	48.2%	9.7%	12.1%
NCSR	**100%**	**51.8%**	**48.2%**	**4.7%**	**5.5%**

3.3. Disproportionate Impacts on CPFV Fisheries

For a discussion of the methods we use to identify whether there are port-fishery combinations that could be disproportionately affected by the Round 3 NCRSG MPA Proposal, please see section 2.4.

Figure A.2 in Appendix A presents the box plot analysis for the CPFV fisheries (calculated using estimated impacts on the stated value of total fishing grounds). Table 21 presents box plot analysis results.

The Fort Bragg salmon fishery is shown to be a statistically significant outlier (relative to other port-proposal combinations) for both the standard and supplemental evaluations. While there are no statistically significant outliners for Pacific halibut or Dungeness crab, practically speaking, the bi-modal (i.e., having two modes) nature of the potential impacts should be noted.

Table 21: Disproportionately impacted CPFV fisheries

Port	Fishery	MPA Proposal(s)	Estimated Impact on Stated Value of Total Fishing Grounds
Fort Bragg	Salmon	NCP, SUP	8.9%, 11.6%

4. RESULTS FOR RECREATIONAL FISHERIES

We summarize here our analysis of the potential impacts on the six recreational fisheries: abalone (dive only), California halibut, Dungeness crab, Pacific halibut, rockfish/bottomfish and salmon. The rockfish/bottomfish fishery includes lingcod and the deeper nearshore and nearshore fish species, which were combined, at the recommendation of the NCSR fishing community, into a single fishery. The results for recreational fisheries are broken out by user group (i.e., dive, kayak and private vessel) and by port group (i.e., Crescent City, Trinidad, Eureka, Shelter Cove and Fort Bragg/Albion).

4.1. Potential Impacts on Recreational Fishing Grounds (Area and Stated Value)

The Round 3 NCRSG MPA Proposal impacts recreational fishing grounds in different ways. For example, the rockfish/bottomfish fishery generally tends to see higher potential impacts across all ports and user groups. Similarly, Fort Bragg recreational fisheries generally tend to see higher impacts across the fisheries considered when compared to other ports.

As mentioned in the introduction, two evaluations were conducted in Round 3 for the NCP with regard to recreational fisheries. The standard evaluation includes all recreational take proposed in each MPA including recreational take intended only to accommodate tribal uses but open to all recreational users. The NCRSG MPA Proposal - Supplemental Evaluation (SUP) for recreational fisheries did not include proposed recreational take intended only to accommodate tribal uses. Thus some MPAs that do not confer impacts to recreational fisheries in the standard evaluation do confer impacts to recreational fisheries in the supplemental evaluation. Results from the standard evaluation are labeled NCP and results from the supplemental evaluation are labeled SUP.

Due to the large number of fisheries, user groups and port groups considered, we present potential impacts (both in terms of total area and stated value) for NCP and SUP in Tables A.4–A.7 in Appendix A.

APPENDIX A: SUMMARY TABLES OF POTENTIAL IMPACTS

Table A.1: Percentage area and value of total commercial fishing grounds affected by port

		NCP	
Port	**Fishery**	**Area**	**Value**
Crescent City	Anchovy/Sardine (Lampara Net)	---	---
	Dungeness Crab (Trap)	1.1%	1.9%
	Herring (Gillnet)	0.0%	0.0%
	Rockfish (Fixed Gear)	9.4%	0.5%
	Salmon (Troll)	0.8%	1.8%
	Seaweed (Hand Harvest)[9]	0.0%	0.0%
	Shrimp (Trap)	0.0%	0.0%
	Smelt (Brail – Dip Net)	0.0%	0.0%
	Surfperch (Hook and Line)	7.7%	5.6%
	Urchin (Dive)	---	---
Trinidad	Anchovy/Sardine (Lampara Net)	---	---
	Dungeness Crab (Trap)	2.5%	1.2%
	Herring (Gillnet)	---	---
	Rockfish (Fixed Gear)	11.8%	15.1%
	Salmon (Troll)	1.0%	2.2%
	Seaweed (Hand Harvest)	---	---
	Shrimp (Trap)	---	---
	Smelt (Brail – Dip Net)	---	---
	Surfperch (Hook and Line)	---	---
	Urchin (Dive)	---	---
Eureka	Anchovy/Sardine (Lampara Net)	7.7%	2.7%
	Dungeness Crab (Trap)	2.6%	0.7%
	Herring (Gillnet)	5.9%	1.7%
	Rockfish (Fixed Gear)	9.1%	14.9%
	Salmon (Troll)	1.0%	1.6%
	Seaweed (Hand Harvest)	---	---
	Shrimp (Trap)	---	---
	Smelt (Brail – Dip Net)	0.0%	0.0%
	Surfperch (Hook and Line)	9.5%	14.6%
	Urchin (Dive)	---	---

[9] These values represent impacts on seaweed harvesters who operate out of both Crescent City and Trinidad.

Table A.1 (continued): Percentage area and value of total commercial fishing grounds affected by port

		NCP	
Port	**Fishery**	**Area**	**Value**
Shelter Cove	Anchovy/Sardine (Lampara Net)	---	---
	Dungeness Crab (Trap)	0.0%	0.0%
	Herring (Gillnet)	---	---
	Rockfish (Fixed Gear)	9.0%	1.1%
	Salmon (Troll)	1.0%	0.3%
	Seaweed (Hand Harvest)	---	---
	Shrimp (Trap)	---	---
	Smelt (Brail – Dip Net)	---	---
	Surfperch (Hook and Line)	---	---
	Urchin (Dive)	---	---
Fort Bragg	Anchovy/Sardine (Lampara Net)	---	---
	Dungeness Crab (Trap)	3.1%	2.9%
	Herring (Gillnet)	---	---
	Rockfish (Fixed Gear)	8.6%	9.6%
	Salmon (Troll)	0.7%	1.6%
	Seaweed (Hand Harvest)[10]	0.0%	0.0%
	Shrimp (Trap)	---	---
	Smelt (Brail – Dip Net)	---	---
	Surfperch (Hook and Line)	---	---
	Urchin (Dive)	8.2%	5.8%
Albion	Anchovy/Sardine (Lampara Net)	---	---
	Dungeness Crab (Trap)	0.0%	0.0%
	Herring (Gillnet)	---	---
	Rockfish (Fixed Gear)	3.5%	1.5%
	Salmon (Troll)	0.6%	0.9%
	Seaweed (Hand Harvest)	---	---
	Shrimp (Trap)	---	---
	Smelt (Brail – Dip Net)	---	---
	Surfperch (Hook and Line)	---	---
	Urchin (Dive)	8.2%	1.5%

[10] These values represent impacts on seaweed harvesters who operate across the Fort Bragg, Albion and Elk areas.

Table A.2: Percentage area of total CPFV fishing grounds affected by port

Port	Fishery	NCP	SUP
Crescent City	California Halibut	---	---
	Dungeness Crab	0.0%	0.0%
	Pacific Halibut	---	---
	Rockfish/Bottomfish	0.0%	0.0%
	Salmon	1.2%	1.2%
Trinidad	California Halibut	0.0%	17.2%
	Dungeness Crab	0.0%	0.0%
	Pacific Halibut	2.1%	2.1%
	Rockfish/Bottomfish	0.9%	0.9%
	Salmon	2.0%	2.0%
Eureka	California Halibut	0.0%	0.0%
	Dungeness Crab	0.0%	0.0%
	Pacific Halibut	4.3%	7.6%
	Rockfish/Bottomfish	9.3%	9.3%
	Salmon	2.2%	2.2%
Shelter Cove	California Halibut	---	---
	Dungeness Crab	---	---
	Pacific Halibut	14.9%	14.9%
	Rockfish/Bottomfish	4.8%	8.9%
	Salmon	0.0%	0.0%
Fort Bragg	California Halibut	---	---
	Dungeness Crab	35.9%	35.9%
	Pacific Halibut	---	---
	Rockfish/Bottomfish	2.5%	6.4%
	Salmon	6.3%	8.0%

Table A.3: Percentage value of total CPFV fishing grounds affected by port

Port	Fishery	NCP	SUP
Crescent City	California Halibut	---	---
	Dungeness Crab	0.0%	0.0%
	Pacific Halibut	---	---
	Rockfish/Bottomfish	0.0%	0.0%
	Salmon	0.0%	0.0%
Trinidad	California Halibut	0.0%	0.5%
	Dungeness Crab	0.0%	0.0%
	Pacific Halibut	0.0%	0.0%
	Rockfish/Bottomfish	0.1%	0.1%
	Salmon	1.7%	1.7%
Eureka	California Halibut	0.0%	0.0%
	Dungeness Crab	0.0%	0.0%
	Pacific Halibut	2.4%	3.0%
	Rockfish/Bottomfish	11.8%	11.8%
	Salmon	1.9%	1.9%
Shelter Cove	California Halibut	---	---
	Dungeness Crab	---	---
	Pacific Halibut	16.3%	16.3%
	Rockfish/Bottomfish	4.3%	6.9%
	Salmon	0.0%	0.0%
Fort Bragg	California Halibut	---	---
	Dungeness Crab	9.5%	9.5%
	Pacific Halibut	---	---
	Rockfish/Bottomfish	3.4%	5.9%
	Salmon	8.9%	11.6%

Table A.4: Percentage area of total recreational fishing grounds affected by port for NCP

Port	User Group	Abalone	California Halibut	Dungeness Crab	Pacific Halibut	Rockfish/ Bottomfish	Salmon
Crescent City	Dive	0.0%	---	---	---	1.1%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	5.4%	0.0%	2.7%	1.9%	1.4%
Trinidad	Dive	0.0%	---	---	---	0.0%	---
	Kayak	---	---	---	---	0.0%	---
	Private Vessel	---	0.0%	1.9%	0.0%	2.7%	1.1%
Eureka	Dive	1.0%	---	---	---	12.7%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	3.1%	0.2%	2.7%	9.4%	0.7%
Shelter Cove	Dive	0.0%	---	---	---	0.0%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	0.0%	0.0%	5.9%	0.3%	0.0%
Fort Bragg/ Albion	Dive	2.4%	---	0.0%	---	11.1%	---
	Kayak	---	---	---	---	2.1%	2.6%
	Private Vessel	---	6.5%	6.2%	7.2%	3.8%	0.8%

Table A.5: Percentage value of total recreational fishing grounds affected by port for NCP

Port	User Group	Abalone	California Halibut	Dungeness Crab	Pacific Halibut	Rockfish/ Bottomfish	Salmon
Crescent City	Dive	0.0%	---	---	---	0.4%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	3.2%	0.0%	3.8%	0.1%	0.4%
Trinidad	Dive	0.0%	---	---	---	0.0%	---
	Kayak	---	---	---	---	0.0%	---
	Private Vessel	---	0.0%	0.1%	0.0%	0.2%	0.4%
Eureka	Dive	0.0%	---	---	---	14.7%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	0.1%	0.0%	0.5%	12.5%	0.1%
Shelter Cove	Dive	0.0%	---	---	---	0.0%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	0.0%	0.0%	7.8%	0.1%	0.0%
Fort Bragg/ Albion	Dive	2.3%	---	0.0%	---	8.7%	---
	Kayak	---	---	---	---	1.7%	0.6%
	Private Vessel	---	4.0%	7.7%	7.5%	5.0%	3.1%

Table A.6: Percentage area of total recreational fishing grounds affected by port for SUP

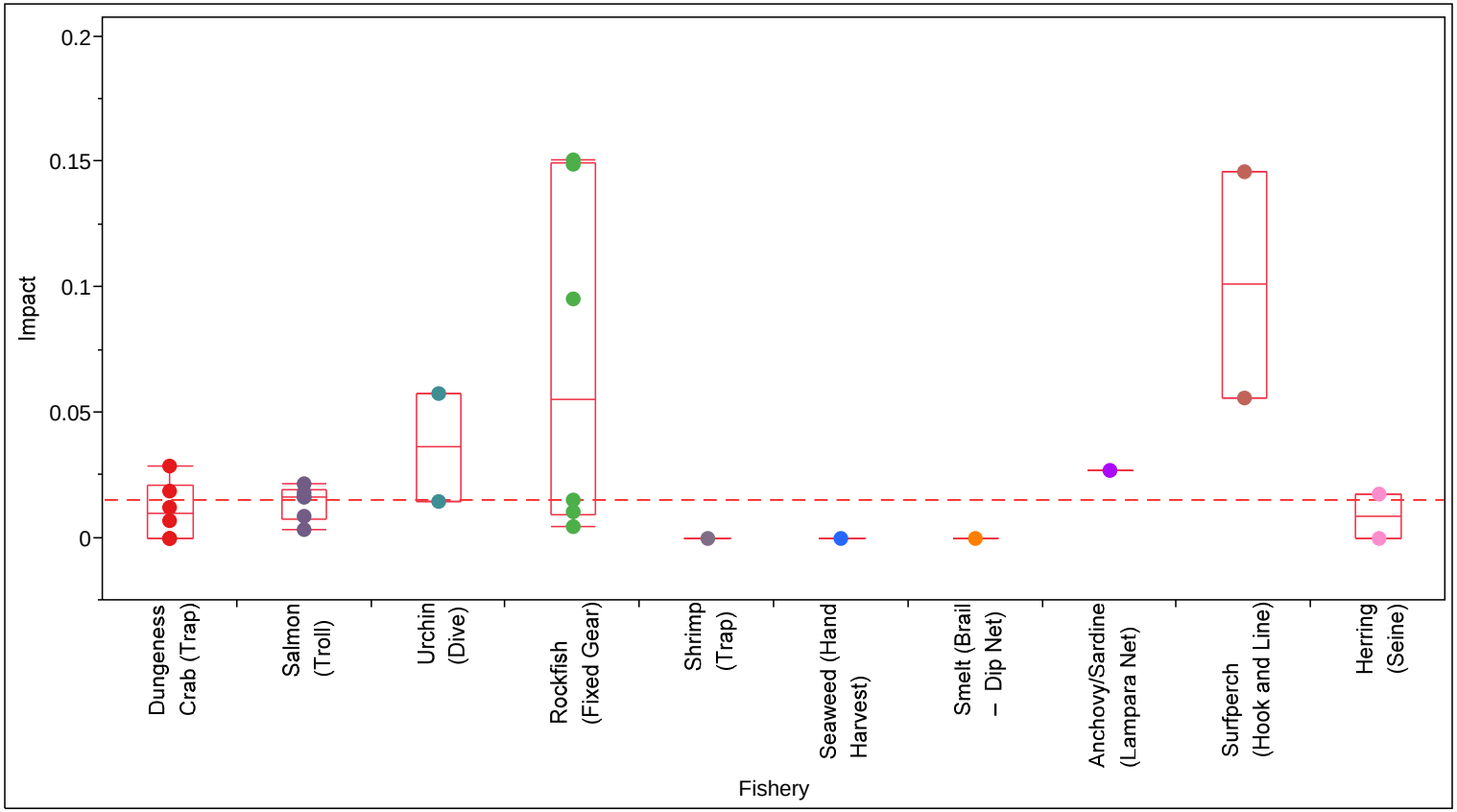
Port	User Group	Abalone	California Halibut	Dungeness Crab	Pacific Halibut	Rockfish/ Bottomfish	Salmon
Crescent City	Dive	0.0%	---	---	---	1.1%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	5.4%	0.0%	2.7%	5.2%	1.4%
Trinidad	Dive	0.0%	---	---	---	0.0%	---
	Kayak	---	---	---	---	0.0%	---
	Private Vessel	---	0.0%	1.9%	0.0%	6.3%	1.1%
Eureka	Dive	1.0%	---	---	---	12.7%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	3.1%	0.2%	3.7%	9.4%	0.7%
Shelter Cove	Dive	0.0%	---	---	---	0.0%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	0.0%	0.0%	5.9%	12.8%	0.0%
Fort Bragg/ Albion	Dive	6.3%	---	0.0%	---	11.1%	---
	Kayak	---	---	---	---	14.3%	3.5%
	Private Vessel	---	13.5%	6.2%	7.8%	6.9%	1.1%

Table A.7: Percentage value of total recreational fishing grounds affected by port for SUP

Port	User Group	Abalone	California Halibut	Dungeness Crab	Pacific Halibut	Rockfish/ Bottomfish	Salmon
Crescent City	Dive	0.0%	---	---	---	0.4%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	3.2%	0.0%	3.8%	0.1%	0.4%
Trinidad	Dive	0.0%	---	---	---	0.0%	---
	Kayak	---	---	---	---	0.0%	---
	Private Vessel	---	0.0%	0.1%	0.0%	5.3%	0.4%
Eureka	Dive	0.0%	---	---	---	14.7%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	0.1%	0.0%	0.8%	12.5%	0.1%
Shelter Cove	Dive	0.0%	---	---	---	0.0%	---
	Kayak	---	---	---	---	---	---
	Private Vessel	---	0.0%	0.0%	7.8%	9.0%	0.0%
Fort Bragg/ Albion	Dive	4.5%	---	0.0%	---	8.7%	---
	Kayak	---	---	---	---	6.3%	0.7%
	Private Vessel	---	17.1%	7.7%	18.4%	8.0%	4.2%

Figure A.1: Disproportionate impacts on commercial fisheries

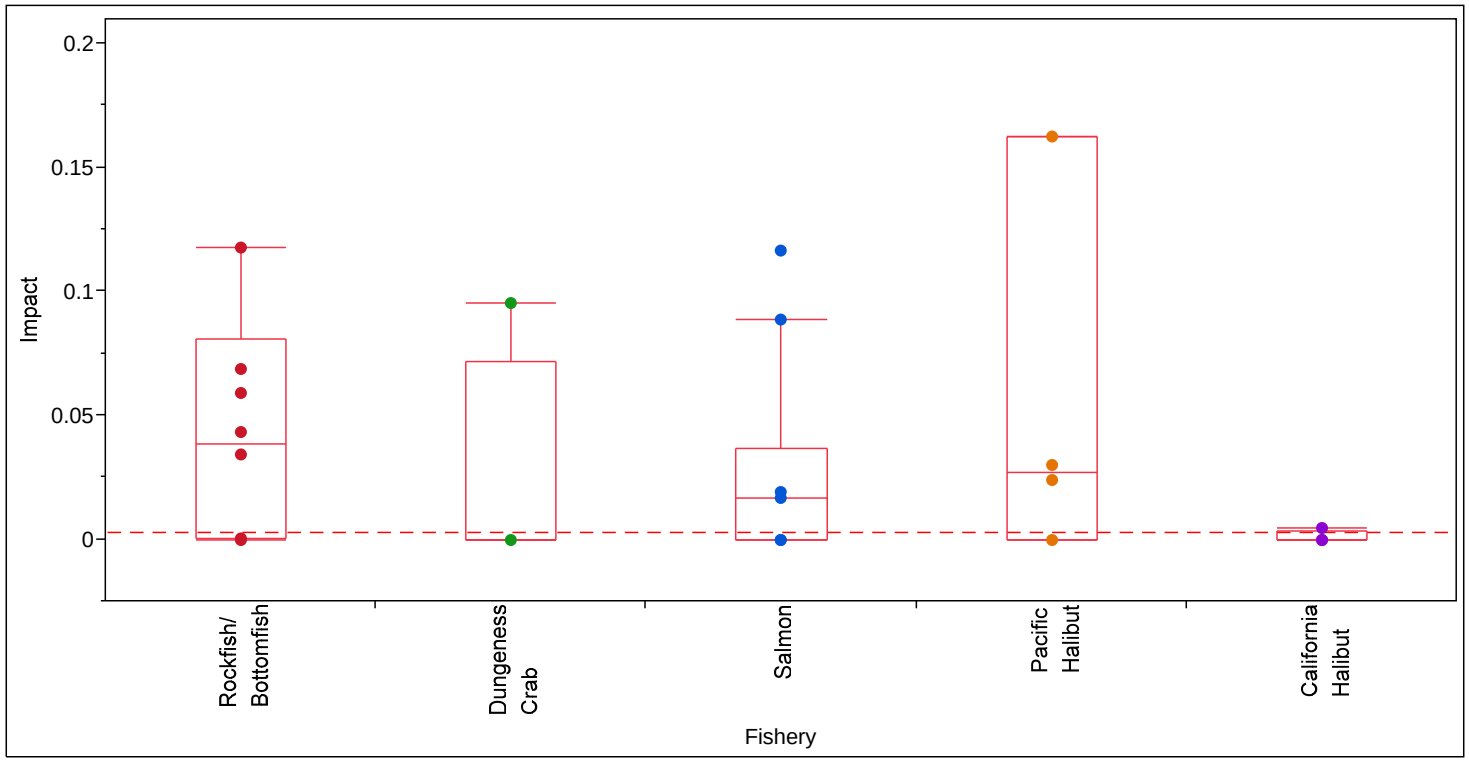
Each dot in Figure A.1 represents the potential impact of the proposal on the stated value of fishing grounds in a specific port for a specific fishery (from Table A.2). All points not in a box or on a line are considered statistically significant outliers (i.e., port-fishery combinations that may be disproportionately affected). The commercial fisheries are listed along the x-axis in descending order of importance using average baseline gross economic revenue from 2000–07 as a proxy for importance[11]. No commercial fisheries were disproportionately impacted by the Round 3 NCRSG MPA Proposal. Please see Section 2.4 for further information on box plot analysis for the commercial fisheries as well as identification of the potential outliers.



[11] For all species except seaweed – hand harvest, we used the Department of Fish and Game's landing data. For seaweed, which is recorded only by pounds landed on a region wide scale, we used the average gross economic revenue reported by our five seaweed survey respondents, who represent approximately 69% of the total poundage of seaweed landed in the NCSR.

Figure A.2: Disproportionate impacts on CPFV fisheries

Each dot in Figure A.2 represents the potential impact of the MPA proposal on the stated value of fishing grounds in a specific port for a specific fishery (from Table A.4). All points not in a box or on a line are considered statistically significant outliers (i.e., port-fishery combinations that may be disproportionately affected). The CPFV fisheries are listed along the x-axis in order of importance using the cumulative number of fish landed (by species) from 2000–07[12] as a proxy for importance. Data on the number of fish landed were obtained from the Department of Fish and Game's Annual Reports of Statewide Fish Landings by the CPFV Fleet. The Fort Bragg salmon CPFV fishery was the only fishery disproportionately impacted by the Round 3 NCRSG MPA Proposal. Please see Section 3.3 for further information on box plot analysis for the CPFV fisheries as well as identification of the potential outliers.



[12] Rockfish/bottomfish landings (2000–07) were calculated using the species groupings defined in Appendix G of the *Draft Survey Methods and Summary Statistics for Ecotrust's North Coast Study Region Fishery Uses and Values Project*. This calculation may be an underestimate as kelp greenling and blue, canary, copper, gopher, and yelloweye rockfish landings were not available in 2001. Nevertheless, the total number of rockfish/bottomfish landed was the highest out of all the CPFV fisheries. Landings of unspecified invertebrates were used as a proxy for Dungeness crab landings as the NCSR fishing community indicated that, almost exclusively, invertebrates caught by the CPFV fleet are crab. Landings of unspecified flatfish were used as a proxy for Pacific halibut landings because CPFV operators principally target or sell "halibut" trips and because landings of other flatfish such as sanddab (which is reported separately) or sole are only a minor incidental from targeting halibut.