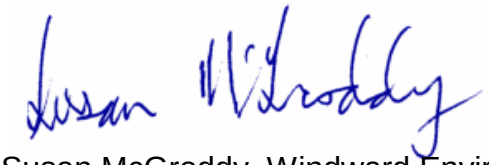
APPENDIX B

Fish Compositing Memorandum

MEMORANDUM

To: EPA

From: 

Susan McGroddy, Windward Environmental on behalf of EWG

Subject: Proposed Fish and crab tissue compositing schemes

Date: October 28, 2008

This memo provides the proposed compositing strategy for fish and shellfish that were recently collected in EW. Fish and shellfish were collected throughout the waterway (Figure 1). For several target species, we caught only the number of specimens necessary to create the composite samples, so all specimens were included in the composite samples. For some species, there are specimens remaining that are not included in the compositing scheme. In the following discussions for each species the number of specimens remaining is noted.

Where applicable, the proposed compositing methods were the same as those used for compositing fish and crab in the LDW in 2004, 2005, and 2007 (Windward 2005, 2006, in prep). In general for fish and crab, specimens collected from throughout the EW were distributed to composites to minimize the differences in specimen weights, genders, and collection locations between composites of a given species. All specimens of a given species were divided into three size classes and were distributed to each composite sample proportional to the total number of specimens in each size class. Specimens were divided into size categories based on the weight distribution of all specimens of a given species collected, with equal weight intervals in each size category. After distributing specimens by weight, composites were examined for distribution of gender and locations among composites and specimens were then redistributed within size class to equalize genders and collection locations to the extent possible.

Homogenization method

The samples will be homogenized completely. The homogenization method will be consistent with the method utilized for the LDW tissue collection efforts. Thawed or partially thawed whole fish will be homogenized as composite samples or individual fish, depending on the size of the fish. Large fish may need to be homogenized individually and then the individual homogenates combined to form the composite sample. Smaller fish may be composited prior to homogenization. For fillet samples, partially-thawed whole fish will be filleted (skin-on) and the fillets will then be homogenized. The whole organism or fillet will be combined into the homogenate.

PROPOSED COMPOSITING STRATEGIES FOR EACH SPECIES

Dungeness crab

A total of five female and two males collected during field sampling. One edible meat composite sample and one hepatopancreas composite sample is proposed using the same crabs (Table 1). All seven crabs would be included in the hepatopancreas and edible meat samples. Specimens from throughout the EW would be included in the composite.

Table 1. Dungeness crab edible meat and hepatopancreas compositing scheme

COMPOSITE AND SAMPLE ID	LENGTH (mm)	WEIGHT (g)	SEX
EW-08-DC-EM-comp1 and EW-08-DC-HP-comp1			
EW-08-CT001-DC-01	160	800	Female
EW-08-TR002-DC-01	157	508	Male
EW-08-TR008-DC-03	158	470	Female
EW-08-CT008-DC-01	161	420	Female
EW-08-CT007-DC-01	133	390	Female
EW-08-CT008-DC-02	136	360	Male
EW-08-TR004-DC-02	127	218	Female

Red rock crab

A total of 18 female, 41 male, and one unknown sex crab were collected during field sampling. Eight corresponding edible meat and heptopancreas compositing samples are proposed using 56 of the 60 Red rock crabs obtained during field sampling (Table 2). All red rock crabs were divided into three weight categories, small (≤300 g), medium

(301-480 g), and large (>480 g). Two crabs from the small size category, three from the medium size category and two from the large size category were selected for inclusion in the edible meat composite sample. In each composite sample, five males and two females were included. Specimens from throughout the EW would be included in all composites. The specific crab trap from which the crab was collected is identified in the sample ID following the CT (i.e. sample EW-08-CT002-RR-01 was collected from CT002). The crab trap locations are indicated on Figure 1.

Table 2. Red rock crab edible meat and hepatopancreas compositing scheme

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-RR-EM-comp1 and EW-08-RR-HP-comp1				
EW-08-CT002-RR-01	700	164	Large	Male
EW-08-CT002-RR-09	500	151	Large	Male
EW-08-CT010-RR-04	410	141	Medium	Male
EW-08-CT001-RR-03	320	120	Medium	Female
EW-08-CT005-RR-04	390	133	Medium	Male
EW-08-ST002-RR-01	160	106	small	Male
EW-08-CT009-RR-01	240	116	small	Female
EW-08-RR-EM-comp2 and EW-08-RR-HP-comp2				
EW-08-CT002-RR-08	620	157	Large	Male
EW-08-CT005-RR-01	520	150	Large	Male
EW-08-CT007-RR-06	480	146	Medium	Male
EW-08-CT004-RR-01	410	143	Medium	Male
EW-08-CT002-RR-04	420	138	Medium	Male
EW-08-ST002-RR-02	190	110	small	Female
EW-08-CT010-RR-02	190	115	small	Female
EW-08-RR-EM-comp3 and EW-08-RR-HP-comp3				
EW-08-CT002-RR-06	600	156	Large	Male
EW-08-CT005-RR-02	520	152	Large	Male
EW-08-CT010-RR-05	440	144	Medium	Male
EW-08-CT001-RR-05	340	130	Medium	Female
EW-08-CT002-RR-12	310	129	Medium	Male
EW-08-CT009-RR-05	250	120	small	Male
EW-08-CT001-RR-06	250	120	small	Female

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-RR-EM-comp4 and EW-08-RR-HP-comp4				
EW-08-CT005-RR-03	570	154	Large	Male
EW-08-CT002-RR-03	520	153	Large	Male
EW-08-CT007-RR-04	415	142	Medium	Male
EW-08-CT001-RR-08	340	135	Medium	Female
EW-08-CT003-RR-02	460	141	Medium	Male
EW-08-CT009-RR-02	250	120	small	Male
EW-08-CT010-RR-01	291	125	small	Female
EW-08-RR-EM-comp5 and EW-08-RR-HP-comp5				
EW-08-CT002-RR-11	550	155	Large	Male
EW-08-CT007-RR-05	495	146	Large	Male
EW-08-CT001-RR-07	330	131	Medium	Female
EW-08-CT011-RR-02	330	157	Medium	Male
EW-08-CT002-RR-14	410	147	Medium	Male
EW-08-CT005-RR-06	300	125	small	Male
EW-08-CT009-RR-03	280	123	small	Female
EW-08-RR-EM-comp6 and EW-08-RR-HP-comp6				
EW-08-CT005-RR-05	550	156	Large	Male
EW-08-CT002-RR-05	520	142	Large	Male
EW-08-CT002-RR-16	470	141	Medium	Male
EW-08-CT007-RR-02	410	136	Medium	Male
EW-08-CT002-RR-10	460	147	Medium	Male
EW-08-CT010-RR-03	250	125	small	Female
EW-08-CT001-RR-02	300	120	small	Female
EW-08-RR-EM-comp7 and EW-08-RR-HP-comp7				
EW-08-CT002-RR-07	500	153	Large	Male
EW-08-CT003-RR-03	530	148	Large	Male
EW-08-CT002-RR-02	452	148	Medium	Male
EW-08-CT007-RR-03	460	141	Medium	Male
EW-08-CT011-RR-01	360	136	Medium	Male
EW-08-CT009-RR-06	220	122	small	Female

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-CT001-RR-01	220	110	small	Female
EW-08-RR-EM-comp8 and EW-08-RR-HP-comp8				
EW-08-CT002-RR-13	510	149	Large	Male
EW-08-CT007-RR-01	490	147	Large	Male
EW-08-CT001-RR-04	370	132	Medium	Female
EW-08-CT002-RR-15	400	136	Medium	Male
EW-08-CT003-RR-01	400	135	Medium	Male
EW-08-CT009-RR-07	215	113	small	Female
EW-08-ST002-RR-03	280	115	small	Male

English sole

A total of 29 female and 87 male English sole were collected during field sampling. There were six extra English sole collected that have not been included in a composite sample(s). Eleven whole body and eleven fillet composite samples are proposed with five fish per composite (Table 3 and 4 respectively). Fish were divided into three size categories based on weight and length distribution of all English sole collected. Size categories were as follows: small (<95 g), medium (95-140 g), and large (>140 g),. The exceptions to the size category are one sample of 96 g which was used in place of "small" fish in EW-08-ES-WB-comp8 and the largest (by length) sample of 140 g which was used in place of "large" fish in fillet EW-08-ES-WB-comp11. Fish from all size categories were randomly distributed to composite samples proportional to the number of specimens in each size category. For each composite sample, two English sole from the small category, two from the medium category, and one from the large category are included. After accounting for size ranges, one to two females and three to four males were included in each composite sample. Specimens from throughout the EW would be included in all composites. The specific trawl line from which the sample was collected is identified in the sample ID following the TR designation. All trawl lines are provided on Figure 1.

Table 3. English sole whole body compositing scheme

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-ES-WB-comp1				
EW-08-TR006-ES-103	212	285	Large	Female
EW-08-TR006-ES-98	102	226	medium	Male

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-TR001-ES-01	96	225	medium	Male
EW-08-TR002-ES-17	72	202	small	Male
EW-08-TR004-ES-39	78	211	small	Female
EW-08-ES-WB-comp2				
EW-08-TR004-ES-27	252	308	Large	Male
EW-08-TR006-ES-105	108	226	medium	Female
EW-08-TR006-ES-84	102	236	medium	Male
EW-08-TR002-ES-18	74	201	small	Male
EW-08-TR004-ES-21	78	204	small	Male
EW-08-ES-WB-comp3				
EW-08-TR004-ES-41	238	298	Large	Female
EW-08-TR006-ES-85	122	240	medium	Male
EW-08-TR001-ES-05	104	233	medium	Male
EW-08-TR006-ES-90	86	210	small	Male
EW-08-TR005-ES-51	72	202	small	Male
EW-08-ES-WB-comp4				
EW-08-TR007-ES-116	226	285	Large	Female
EW-08-TR001-ES-10	134	250	medium	Male
EW-08-TR006-ES-91	100	227	medium	Male
EW-08-TR006-ES-96	66	200	small	Male
EW-08-TR004-ES-30	70	202	small	Male
EW-08-ES-WB-comp5				
EW-08-TR007-ES-114	252	313	Large	Female
EW-08-TR006-ES-66	100	236	medium	Male
EW-08-TR004-ES-34	140	225	medium	Male
EW-08-TR006-ES-93	86	216	small	Male
EW-08-TR005-ES-48	54	195	small	Male
EW-08-ES-WB-comp6				
EW-08-TR007-ES-111	208	280	Large	Male
EW-08-TR004-ES-44	124	236	medium	Female
EW-08-TR006-ES-78	102	233	medium	Male
EW-08-TR006-ES-80	74	203	small	Male
EW-08-TR004-ES-36	72	200	small	Male

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-ES-WB-comp7				
EW-08-TR001-ES-15	178	275	Large	Female
EW-08-TR006-ES-94	100	215	medium	Male
EW-08-TR004-ES-33	108	230	medium	Male
EW-08-TR006-ES-82	76	200	small	Male
EW-08-TR006-ES-79	92	216	small	Male
EW-08-ES-WB-comp8				
EW-08-TR001-ES-14	170	271	Large	Female
EW-08-TR006-ES-63	100	221	medium	Male
EW-08-TR004-ES-26	138	248	medium	Male
EW-08-TR006-ES-87	78	205	small	Male
EW-08-TR006-ES-81	94	220	small	Male
EW-08-ES-WB-comp9				
EW-08-TR004-ES-42	164	259	Large	Female
EW-08-TR006-ES-88	112	243	medium	Male
EW-08-TR001-ES-03	108	226	medium	Male
EW-08-TR005-ES-49	84	211	small	Male
EW-08-TR006-ES-100	70	209	small	Female
EW-08-ES-WB-comp10				
EW-08-TR001-ES-16	148	250	Large	Female
EW-08-TR006-ES-76	132	250	medium	Male
EW-08-TR004-ES-37	96	225	medium	Male
EW-08-TR006-ES-106	62	197	small	Female
EW-08-TR005-ES-50	78	204	small	Male
EW-08-ES-WB-comp11				
EW-08-TR005-ES-53	144	243	Large	Female
EW-08-TR006-ES-108	114	239	medium	Female
EW-08-TR006-ES-75	114	235	medium	Male
EW-08-TR001-ES-07	74	204	small	Male
EW-08-TR004-ES-35	90	216	small	Male

Table 4. English sole fillet compositing scheme

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-ES-FL-comp1				
EW-08-TR007-ES-112	420	355	Large	Female
EW-08-TR001-ES-09	104	242	medium	Male
EW-08-TR006-ES-57	108	248	medium	Male
EW-08-TR004-ES-25	72	205	small	Male
EW-08-TR006-ES-58	88	217	small	Male
EW-08-ES-FL-comp2				
EW-08-TR007-ES-113	376	348	Large	Female
EW-08-TR001-ES-06	106	240	medium	Male
EW-08-TR006-ES-55	116	235	medium	Male
EW-08-TR006-ES-68	86	216	small	Male
EW-08-TR004-ES-22	82	207	small	Male
EW-08-ES-FL-comp3				
EW-08-TR004-ES-38	366	351	Large	Female
EW-08-TR006-ES-95	110	235	medium	Male
EW-08-TR006-ES-74	104	220	medium	Male
EW-08-TR005-ES-47	78	208	small	Male
EW-08-TR006-ES-86	92	210	small	Male
EW-08-ES-FL-comp4				
EW-08-TR007-ES-115	318	342	Large	Female
EW-08-TR004-ES-20	114	235	medium	Male
EW-08-TR006-ES-64	104	233	medium	Male
EW-08-TR006-ES-72	68	201	small	Male
EW-08-TR002-ES-19	86	211	small	Female
EW-08-ES-FL-comp5				
EW-08-TR006-ES-54	208	280	Large	Male
EW-08-TR004-ES-32	106	230	medium	Male
EW-08-TR001-ES-02	120	247	medium	Male
EW-08-TR006-ES-109	94	208	small	Female
EW-08-TR006-ES-70	90	214	small	Male
EW-08-ES-FL-comp6				

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-TR004-ES-24	188	285	Large	Male
EW-08-TR006-ES-102	134	246	medium	Female
EW-08-TR001-ES-12	102	220	medium	Male
EW-08-TR006-ES-89	86	208	small	Male
EW-08-TR006-ES-69	92	214	small	Male
EW-08-ES-FL-comp7				
EW-08-TR004-ES-29	176	273	Large	Male
EW-08-TR006-ES-99	138	246	medium	Female
EW-08-TR001-ES-04	102	236	medium	Male
EW-08-TR006-ES-60	78	200	small	Male
EW-08-TR004-ES-31	82	221	small	Male
EW-08-ES-FL-comp8				
EW-08-TR006-ES-56	168	266	Large	Male
EW-08-TR004-ES-28	96	222	medium	Male
EW-08-TR001-ES-08	114	229	medium	Male
EW-08-TR006-ES-110	74	205	small	Female
EW-08-TR006-ES-67	96	216	small	Male
EW-08-ES-FL-comp9				
EW-08-TR006-ES-65	154	259	Large	Male
EW-08-TR004-ES-23	122	233	medium	Male
EW-08-TR006-ES-104	104	226	medium	Female
EW-08-TR005-ES-46	92	227	small	Male
EW-08-TR006-ES-73	70	201	small	Male
EW-08-ES-FL-comp10				
EW-08-TR006-ES-77	144	252	Large	Male
EW-08-TR004-ES-40	102	218	medium	Female
EW-08-TR005-ES-52	116	246	medium	Male
EW-08-TR001-ES-11	88	210	small	Male
EW-08-TR006-ES-101	82	209	small	Female
EW-08-ES-FL-comp11				
EW-08-TR006-ES-61	140	259	Large	Male
EW-08-TR001-ES-13	140	249	medium	Male
EW-08-TR004-ES-43	128	235	medium	Female

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-TR005-ES-45	80	200	small	Male
EW-08-TR006-ES-107	94	212	small	Female

Shiner surfperch

A total of 36 female, 41 male, and 3 juvenile shiner surfperch were collected during field sampling. Eight whole body composite samples, each representing 10 individuals, are proposed from fish collected throughout the EW (Table 5). All fish collected would be included in the composite samples. Fish were divided into three size categories based on weight and length distribution over the EW, with equal intervals in each size category. Size categories were as follows: small (<15 g), medium (15-20 g),, and large (>20 g). Exceptions to the size categories include one sample of 14 g which was used in place of "medium" fish in EW-08-SS-WB-comp8 and two samples of 20 g which were used in place of "large" fish in EW-08-SS-WB-comp7 and EW-08-SS-WB-comp6. In the majority of the composite samples, there was an even distribution of five female and five male included, except in three samples where there were four female, five male, and one juvenile of unknown sex. Specimens from throughout the EW would be included in all composites. The specific trawl line from which the sample was collected is identified in the sample ID following the TR designation. All trawl lines are provided on Figure 1.

Table 5. Shiner surfperch whole body compositing scheme

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-SS-WB-comp1				
EW-08-TR004-SS-17	34	131	large	Male
EW-08-TR001-SS-06	26	130	large	Female
EW-08-TR008-SS-65	22	116	large	Male
EW-08-TR006-SS-48	16	105	medium	Female
EW-08-TR008-SS-80	20	108	medium	Female
EW-08-TR002-SS-13	16	110	medium	Male
EW-08-TR008-SS-79	16	104	medium	Female
EW-08-TR001-SS-09	12	108	small	juvenile
EW-08-TR004-SS-24	14	112	small	Male
EW-08-TR006-SS-39	12	97	small	Male
EW-08-SS-WB-comp2				

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-TR004-SS-34	22	117	large	Female
EW-08-TR006-SS-41	26	131	large	Male
EW-08-TR001-SS-05	22	111	large	Male
EW-08-TR008-SS-71	20	113	medium	Female
EW-08-TR004-SS-30	16	113	medium	Female
EW-08-TR004-SS-15	18	117	medium	Male
EW-08-TR007-SS-52	16	111	medium	Male
EW-08-TR006-SS-50	14	112	small	Female
EW-08-TR001-SS-10	14	109	small	juvenile
EW-08-TR008-SS-62	14	105	small	Male
EW-08-SS-WB-comp3				
EW-08-TR001-SS-07	32	129	large	Female
EW-08-TR002-SS-11	24	120	large	Male
EW-08-TR006-SS-45	22	116	large	Male
EW-08-TR007-SS-56	20	111	medium	Female
EW-08-TR008-SS-75	18	108	medium	Female
EW-08-TR007-SS-55	16	108	medium	Male
EW-08-TR008-SS-69	16	107	medium	Female
EW-08-TR006-SS-42	12	109	small	Male
EW-08-TR008-SS-60	10	105	small	Male
EW-08-TR004-SS-20	12	102	small	Male
EW-08-SS-WB-comp4				
EW-08-TR001-SS-04	28	120	large	Male
EW-08-TR006-SS-47	24	125	large	Female
EW-08-TR004-SS-27	24	120	large	Male
EW-08-TR007-SS-59	20	112	medium	Female
EW-08-TR008-SS-72	18	106	medium	Female
EW-08-TR008-SS-64	16	106	medium	Male
EW-08-TR004-SS-21	18	113	medium	Male
EW-08-TR004-SS-33	12	104	small	Female
EW-08-TR001-SS-08	14	105	small	juvenile
EW-08-TR008-SS-63	14	105	small	Male
EW-08-SS-WB-comp5				
EW-08-TR004-SS-22	28	125	large	Male

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-TR002-SS-14	22	118	large	Female
EW-08-TR006-SS-40	22	122	large	Male
EW-08-TR008-SS-68	20	114	medium	Female
EW-08-TR006-SS-49	18	110	medium	Female
EW-08-TR001-SS-01	20	110	medium	Male
EW-08-TR008-SS-67	18	107	medium	Female
EW-08-TR004-SS-28	10	100	small	Female
EW-08-TR005-SS-37	10	101	small	Male
EW-08-TR004-SS-26	14	112	small	Male
EW-08-SS-WB-comp6				
EW-08-TR007-SS-57	28	123	large	Female
EW-08-TR004-SS-16	24	121	large	Male
EW-08-TR004-SS-19	20	116	large	Male
EW-08-TR008-SS-74	20	113	medium	Female
EW-08-TR008-SS-76	16	104	medium	Female
EW-08-TR004-SS-18	16	110	medium	Male
EW-08-TR008-SS-70	18	105	medium	Female
EW-08-TR005-SS-35	14	114	small	Male
EW-08-TR004-SS-29	14	104	small	Female
EW-08-TR002-SS-12	10	109	small	Male
EW-08-SS-WB-comp7				
EW-08-TR001-SS-02	26	123	large	Male
EW-08-TR008-SS-66	22	117	large	Female
EW-08-TR007-SS-54	20	119	large	Male
EW-08-TR008-SS-77	20	111	medium	Female
EW-08-TR005-SS-38	16	110	medium	Female
EW-08-TR004-SS-23	16	115	medium	Male
EW-08-TR006-SS-44	20	116	medium	Male
EW-08-TR004-SS-32	14	105	small	Female
EW-08-TR006-SS-51	10	110	small	Female
EW-08-TR007-SS-53	14	105	small	Male
EW-08-SS-WB-comp8				
EW-08-TR004-SS-25	24	121	large	Male
EW-08-TR008-SS-78	34	132	large	Female

Composite and Sample ID	Weight (g)	Length (mm)	Size Category	Sex
EW-08-TR001-SS-03	22	117	large	Male
EW-08-TR007-SS-58	18	113	medium	Female
EW-08-TR008-SS-73	20	114	medium	Female
EW-08-TR006-SS-43	16	110	medium	Male
EW-08-TR006-SS-46	14	115	medium	Female
EW-08-TR004-SS-31	12	120	small	Female
EW-08-TR005-SS-36	10	100	small	Male
EW-08-TR008-SS-61	10	109	small	Male

Shrimp

All shrimp collected are included in one composite (Table 6). A total of 26 shrimp were collected with a combined weight of 110 g. Seventeen shrimp were collected from three trawl lines (TR004, TR006, TR007, TR008 and TR010). Nine shrimp were collected from a shrimp trap (ST008). All trawl and shrimp trap locations are presented in Figure 1.

Table 6. Coonstripe shrimp whole body compositing scheme

Composite and Sample ID	Number Caught	Weight (g)
EW-08-SR-WB-comp1		
EW-08-TR004-SR-01	6	4
EW-08-TR006-SR-02	4	6
EW-08-TR007-SR-03	5	16
EW-08-TR008-SR-04	1	12
EW-08-TR010-SR-05	1	8
EW-08-ST008-SR-01	9	64
Total	26	110

Mussels

Sufficient mussels for analysis were collected at 11 locations throughout the waterway (Figure 1). The mussels are proposed to be composited by location (Table 7) for a total of 11 composite samples.

Table 7. Mussels whole body compositing scheme

Composite ID	Sample ID	Number mussels	Weight (g)
EW-08-MS-WB-comp1	EW-08-HC001-MS-01	89	840
EW-08-MS-WB-comp2	EW-08-HC002-MS-01	93	772
EW-08-MS-WB-comp3	EW-08-HC003-MS-01	91	760
EW-08-MS-WB-comp4	EW-08-HC004-MS-01	100	904
EW-08-MS-WB-comp5	EW-08-HC005-MS-01	101	1294
EW-08-MS-WB-comp6	EW-08-HC006-MS-01	101	1,434
EW-08-MS-WB-comp7	EW-08-HC007-MS-01	100	1,308
EW-08-MS-WB-comp8	EW-08-HC008-MS-01	100	850
EW-08-MS-WB-comp9	EW-08-HC009-MS-01	100	750
EW-08-MS-WB-comp10	EW-08-HC010-MS-01	100	618
EW-08-MS-WB-comp11	EW-08-HC011-MS-01	100	978

Brown Rockfish

Brown rockfish were collected from 12 locations (Figure 1). They will be analyzed as individuals so no compositing is required. As per the QAPP, brown rockfish will be analyzed as whole body fish.

Table 8. Brown rockfish to be analyzed as individuals

Composite and Sample ID	Length (mm)	Weight (g)
EW-08-SB002-BR-01	193	150
EW-08-SB002-BR-02	226	NR
EW-08-SB003-BR-03	228	200
EW-08-SB004-BR-04	298	415
EW-08-SB005-BR-05	298	430
EW-08-SB006-BR-06	310	490
EW-08-SB007-BR-07	278	320
EW-08-SB008-BR-08	285	370
EW-08-SB009-BR-09	245	231
EW-08-SB012-BR-10	229	230
EW-08-SB011-BR-11	230	195
EW-08-SB012-BR-12	210	140

NR – not recorded

ANALYTICAL METHODS

The specific analytical methods are detailed in the QAPP (Windward 2008). All tissue samples will be analyzed for metals (including inorganic arsenic and mercury), butyltins, organochlorine pesticide, PAHs, and PCBs (as Aroclors). A subset of samples will be analyzed for PCB congeners and dioxins and furans following a review of the PCB Aroclor results. The shrimp composite sample has very limited mass and we propose to only analyze PAHs and metals in this sample to assess the dietary exposure to the brown rockfish.

SUMMARY

The number of proposed composite samples is summarized in Table 9. The number of composites for all of the target species is consistent with the original sampling design in the QAPP with the exception of an increased number of composite samples for shiner surfperch and crab edible meat and hepatopancreas. The QAPP proposed six composite samples for these species but EPA subsequently requested that eight composite samples be created.

Table 9. Summary of Proposed Compositing Scheme

SPECIES	TISSUE TYPE	NO. OF COMPOSITES	NO. OF SPECIMENS/ SAMPLE
Dungeness crab	edible meat	1	7
	hepatopancreas	1	7
Red rock crab	edible meat	8	7
	hepatopancreas	8	7
English sole	whole body	11	5
	fillet	11	5
Shiner surfperch	whole body	8	10
Shrimp	whole body	1	26
Mussels	whole body (soft tissue only)	11	89 - 101
Brown rockfish	whole body	12[a]	1

[a] brown rockfish will be analyzed as individuals and are therefore not composite samples; they are included in this table for completeness

References

Windward. 2005. Lower Duwamish Waterway remedial investigation. Data report: Fish and crab tissue collection and chemical analyses. Prepared for Lower Duwamish Waterway Group. Windward Environmental LLC, Seattle, WA.

Windward. 2006. Lower Duwamish Waterway remedial investigation. Data report: chemical analyses of fish and crab tissue samples collected in 2005. Prepared for Lower Duwamish Waterway Group. Windward Environmental LLC, Seattle, WA.

Windward. in prep. Lower Duwamish Waterway remedial investigation. Data report: chemical analyses of fish, crab, and clam tissue samples collected in 2007. Draft. Prepared for Lower Duwamish Waterway Group. Windward Environmental LLC, Seattle, WA.