

FISH COMMISSION OF OREGON  
TRAWL INVESTIGATION

Cruise Report 67-2, Phase A-Shrimp

Vessel: MV Sunrise

Dates: February 20-May 4, 1967.

- Objectives:
1. Determine distribution and abundance of pink shrimp (Pandalus jordani) off Oregon.
  2. Determine size, sex ratio, and age composition of shrimp caught.
  3. Determine shrimp gravidity.
  4. Identify, count, weigh, and collect incidentally caught fish and invertebrates as requested.
  5. Collect length data for Dover sole and age-length data for juvenile Dover, English, and petrale sole as time permits.

Methods: The vessel made 173 tows with a 41-foot headrope Gulf semi-balloon trawl. The trawl was made of 1-1/8-inch stretch mesh netting in the body and intermediate, 1-1/2-inch mesh in the codend, and a 1-1/8-inch innerliner in the anterior one-third of the codend. A 1/2-inch knotless innerliner was in the posterior two-thirds of the codend. Plastic rollers and a 1/4-inch galvanized chain, hung loop-style, were attached to the 52-foot footrope. A 5/16-inch proof steel tickler chain completed the trawl net, which was attached to the otter boards by 30 feet of bridle.

The catch was sorted after each tow. Fish were either counted or weighed, or both, by species as time permitted. Dover sole were measured to the nearest lower cm, and Dover sole shorter than 160 mm were preserved. A one-half to one pound random shrimp sample was drawn, measured, and sexed. Sample weight and spawning condition of female shrimp were noted. We preserved requested or unique fish and invertebrate species as time permitted.

Results: Of the 173 total tows, 26, 35, 19, 38, and 55 tows were made in areas 1 through 5, respectively. Area 1 tows were between the California-Oregon border and Cape Blanco in 46 to 138 fathoms. Area 2 tows were between Cape Blanco and the Umpqua River in 50 to 132 fathoms. Area 3 tows were between the Umpqua River and lower Heceta Bank (44°02' N. Latitude) in 54 to 126 fathoms. Area 4 tows covered the area between Stonewall Bank (44°20' N. Latitude) and Cape Kiwanda in 50 to 125 fathoms. Area 5 tows were between Cape Kiwanda and the Astoria Canyon in 49 to 123 fathoms. Figure 1 shows location of areas surveyed and tows. No tows were made on Heceta Bank because of rough bottom. In general, we found shrimp in abundance in all areas surveyed. A very large 1966 year class was present in all areas, but

especially from Newport south. Attached tables give location of tows, depth, catch of shrimp, average shrimp size per tow, and other data. Tows 35 to 61 were in area 1; tows 1-34 and 62 in area 2; tows 63 to 80 in area 3; tows 81 to 118 in area 4; and tows 119 to 173 in area 5. Results by area are summarized below.

Area 1. We caught shrimp at an average rate of 292 pounds per hour tow with a range of 0 to 5,520 lbs/hr. Three tows produced catches greater than 400 lbs/hr; two tows were between 100 and 400 lbs/hr. The age composition was:

<u>Year class</u>	<u>By number</u>
1966	86%
1965	9%
1964	5%

Only a trace of 1963 year-class shrimp was captured. Shrimp size ranged from 80 to 217 shrimp per pound with a mean size of 186 shrimp per pound. The catch was composed of 76% male, 19% transitional, and 5% female shrimp. Twenty-nine per cent of the females were gravid during the period March 27-April 4, 1967. Age composition between the Rogue River and the California-Oregon border differed from that between the Rogue River and Cape Blanco. South of the Rogue River, catches averaged 91%, 8%, 1%, and 0%, respectively, for the 1966, 1965, 1964, and 1963 year classes. North of the Rogue River, catches were 30%, 26%, 43%, and 2%, respectively. Average sizes were 203 and 102 shrimp per pound south and north of the Rogue River, respectively. Most shrimp were concentrated off Brookings.

Area 2. Shrimp were caught at a rate of 619 pounds per hour tow with a range of 0 to 8,400 lbs/hr. Twelve of 35 tows yielded catches between 100 and 400 lbs/hr; eight tows produced catches exceeding 400 lbs/hr. The age composition was:

<u>Year class</u>	<u>By number</u>
1966	78%
1965	17%
1964	5%
1963	Trace

Shrimp size ranged from 90 to 293 shrimp per pound with an average of 223. The catch sex ratio was 92% male, 3% transitional, and 5% females. During the period February 20, to March 26, 1967, 74% of females were gravid. By March 26, however, only about 4% were gravid.

Area 3. We caught shrimp at an average 180 pounds per hour tow catch rate, which ranged from 0 to 1,609 lbs/hr. Catch rates exceeding 100 lbs/hr. were made on three tows. The age composition was:

<u>Year class</u>	<u>By number</u>	<u>By Weight</u>
1966	90%	Trace
1965	7%	18
1964	3%	81
1963	Trace	Trace

Shrimp size ranged from 176 to 310 shrimp per pound with an average of 265. Sex composition was 83% males, 13% transitionals, and 4% females. Shrimp gravidity was 14% during April 6-8, 1967.

Area 4. We caught shrimp at an average 285 pounds per hour tow, ranging from 0 to 2,250 pounds per hour. Catch rates between 100 and 400 lbs/hr. tow were achieved on six tows; seven tows exceeded 400 lbs/hr. The age composition was:

<u>Year class</u>	<u>By number</u>
1966	50%
1965	14%
1964	36%
1963	Trace

Shrimp size ranged from 85 to 193 shrimp per pound with an average of 134. Sex composition was 48% males, 22% transitionals, and 30% females. During the period April 18-23, 1967, no females were gravid. Shrimp were found in abundance from Depoe Bay to Cape Kiwanda; none was found off Stonewall Bank.

Area 5. We caught shrimp at the rate of 569 pounds per hour tow, ranging from 0 to 3,750 pounds per hour tow. Twenty-one tows were greater than 400 lbs/hr. An additional 11 tows were between 100 and 400 lbs/hr. The age composition was:

<u>Year class</u>	<u>By number</u>
1966	60%
1965	19%
1964	20%
1963	1%

Shrimp size ranged from 90 to 213 shrimp per pound and averaged 155. During the period April 24 to May 4, 1967, no females were gravid. Shrimp were abundant throughout the area.

Miscellaneous. Fish were common in many of the tows. Rex sole, slender sole, smelt, hake, dogfish shark, and arrowtooth flounder were most common. Many small rockfish (Scorpaenidae) were also caught. Juvenile hake were captured in several tows in Area 4. Lampreys, agonids, and ratfish were collected for Oregon State University. A number of bottom-type samples and salinity samples were collected. Length and sex were recorded from Dover sole (see cruise report 67-2, phase B-fish).

Personnel: Jack Robinson, Party Chief, 2/20-3/19, 3/29-5/2/67  
Robert Demory, Party Chief, 3/20-3/28, 5/3-4/67  
Rudy Lovvold, Vessel Captain  
Gary Milburn, Aquatic Biologist, 2/20-5/4/67  
Roland Montagne, Aquatic Biologist, 2/25-26/67  
Terry Link, Biology Technician, 2/20-23/67  
Robert Thompson, Trainee, 4/2-11/67  
Tom Lovvold, Crewman

Jack Robinson  
June 8, 1967

Distribution:

Astoria Lab - 12  
Newport Lab - 5  
Charleston Lab  
Library  
OFC - Portland  
Dahlstrom - CFG  
Gotshall - CFG  
Lindsey - WDF  
BCF - Seattle  
    Alverson  
    Moore  
BCF - Auke Bay  
WDF - Olympia  
ADFG - Juneau  
Van Hyning  
Verhoeven - PMFC  
Percy - OSU  
Brookings

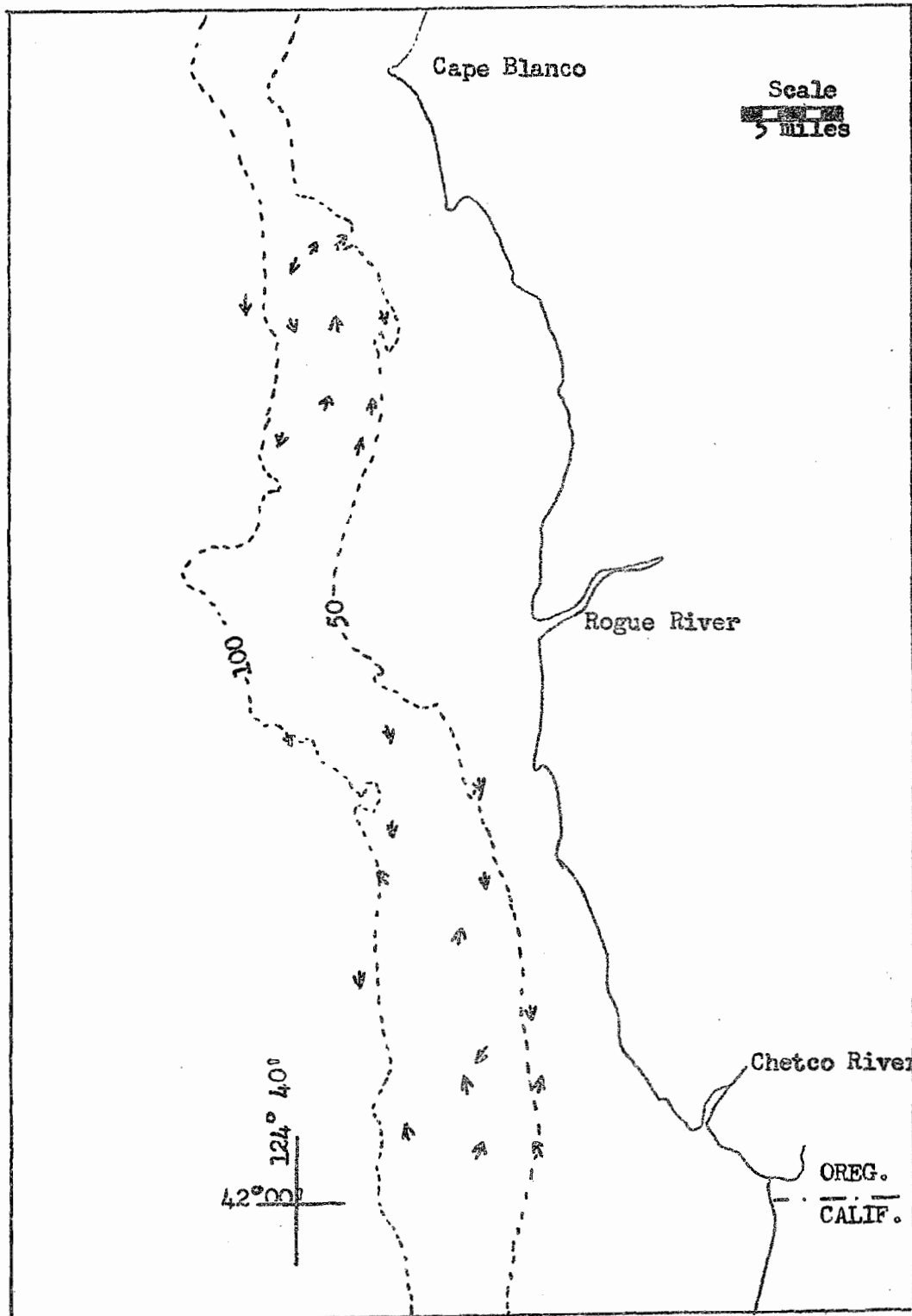


Figure 1. Area 1 tow locations.

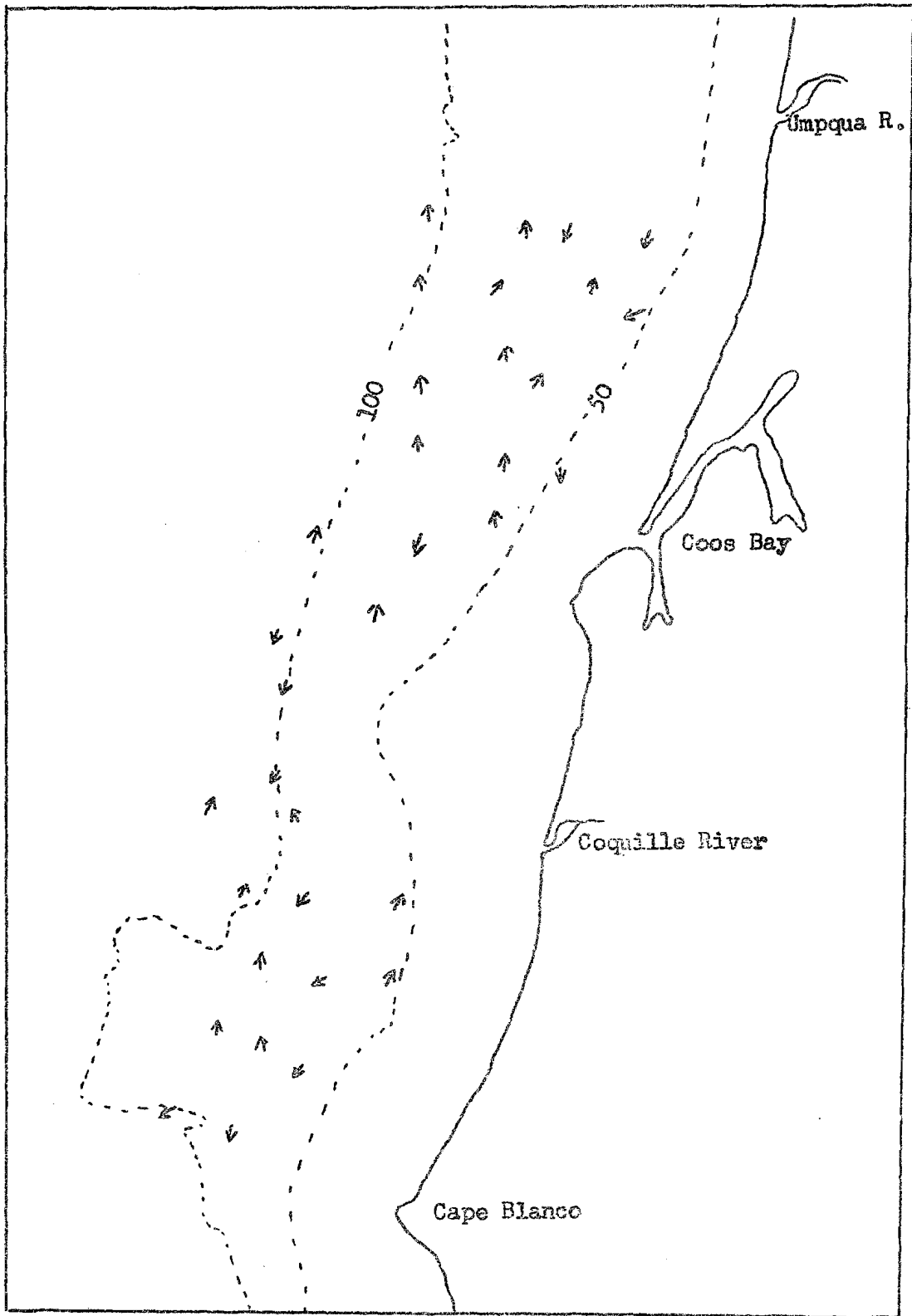


Figure 1 (continued). Area 2 tow locations.

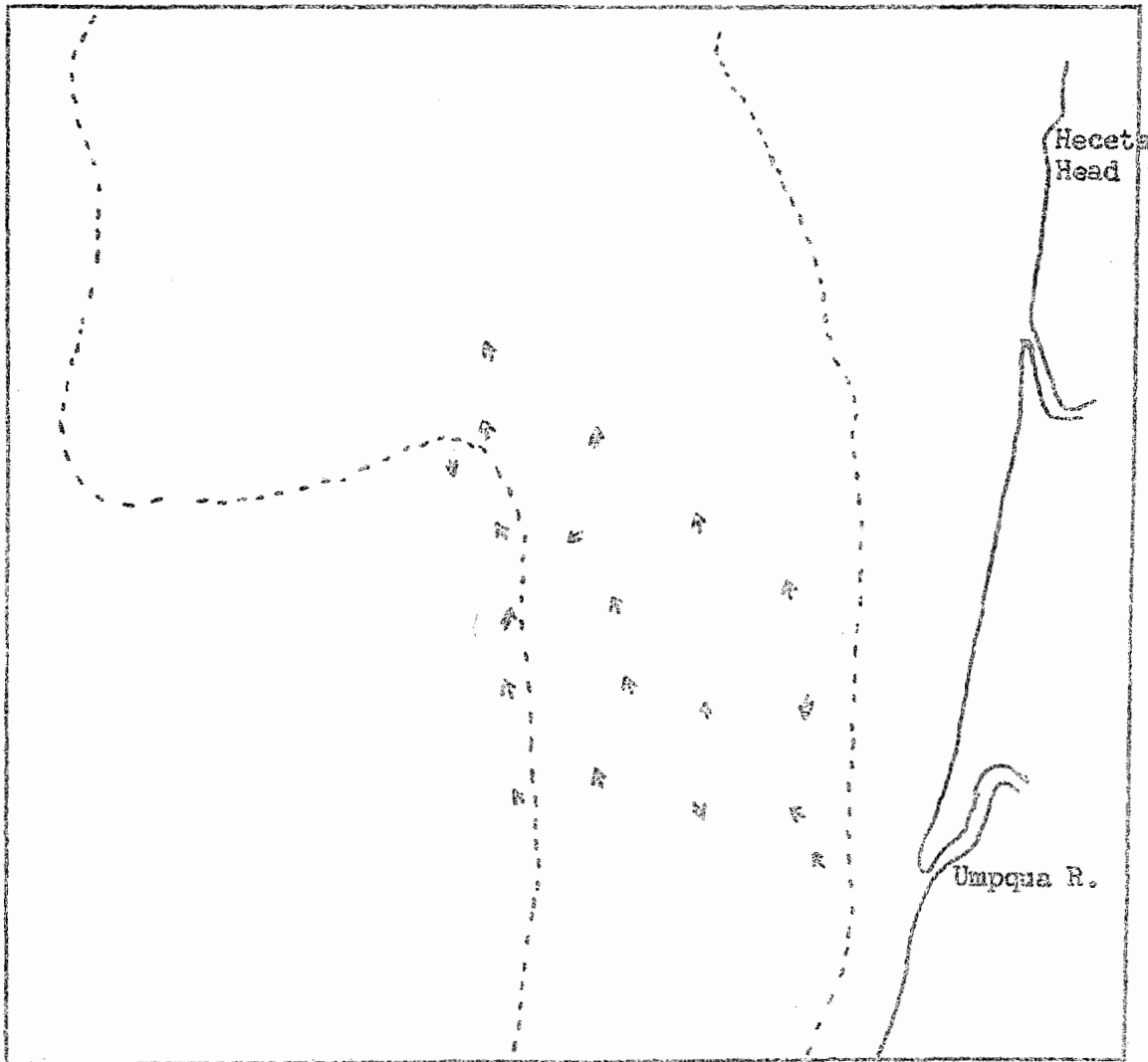


Figure 1 (continued). Area 3 tow locations.

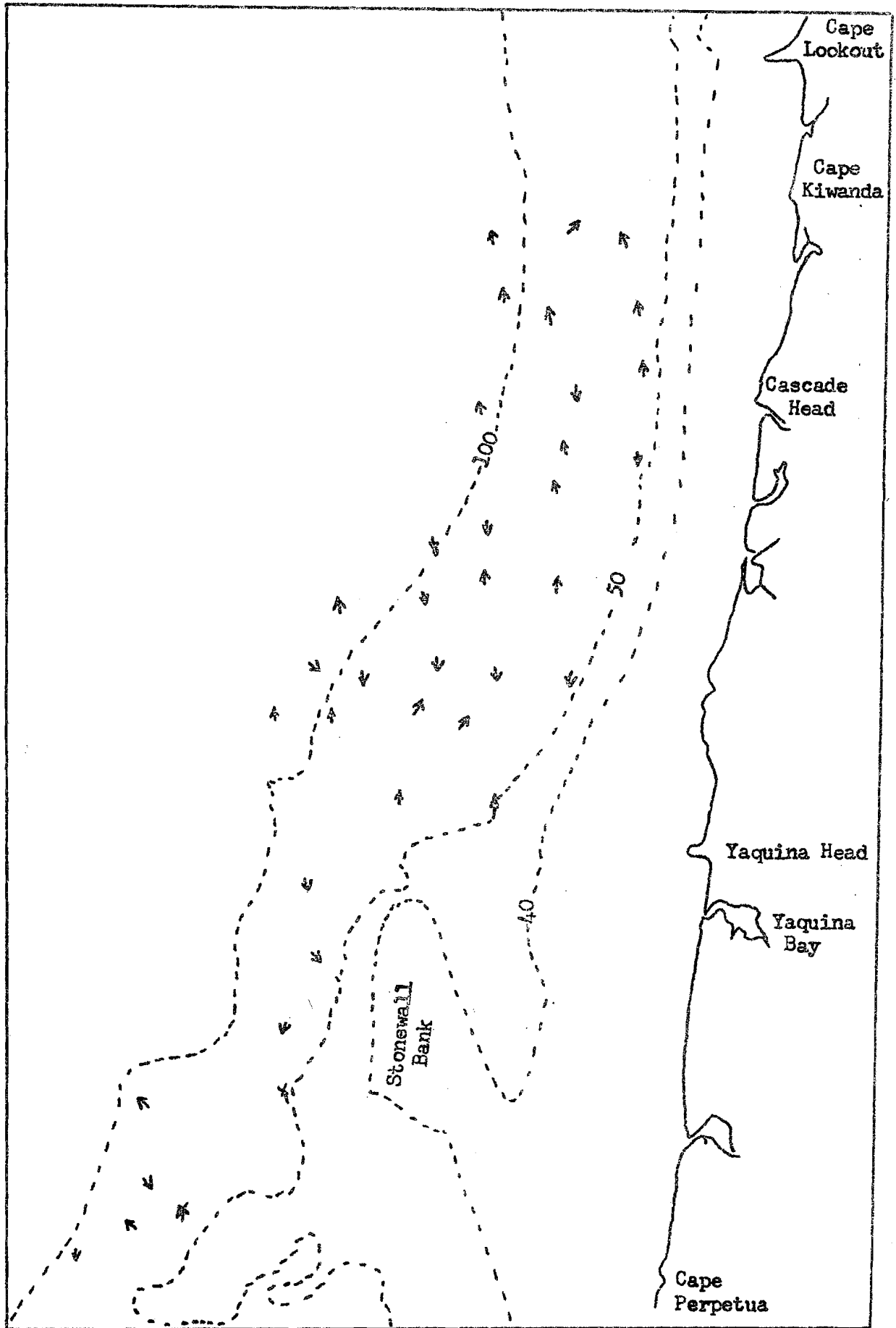


Figure 1 (continued). Area & tow locations.



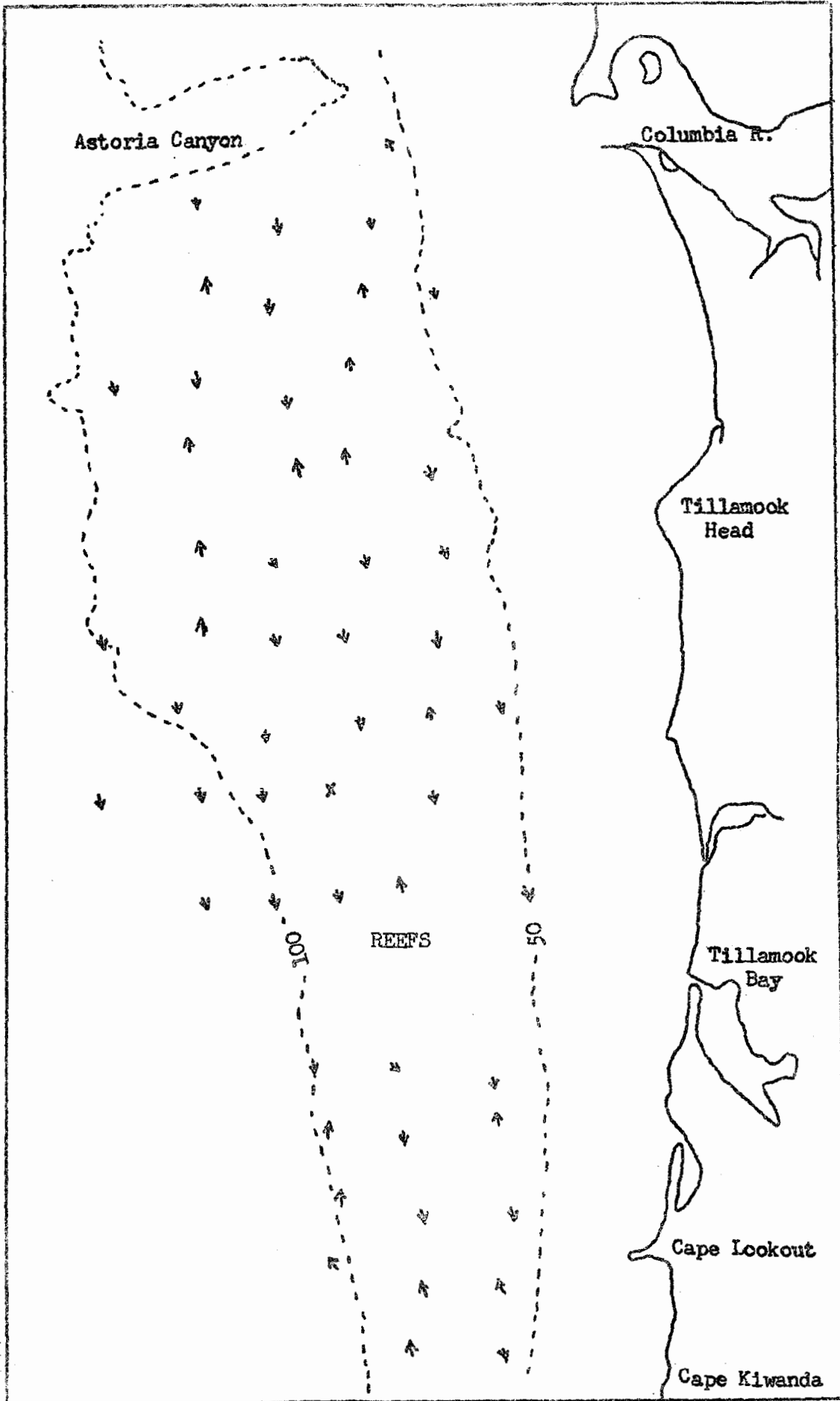


Figure 1 (continued). Area 5 tow locations.

## Oregon Fish Commission

Tow log, MV Sunrise cruise 67-2, February 20-May 4, 1967

Drag number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Date - 67	2-20	2-20	2-20	2-21	2-21	2-21	2-21	2-21	2-21	2-21	2-22	2-22	2-22	2-22	2-22	2-22	2-22	2-26
Loran 2H4																		
Start	1398	1395	1390	1440	1430	1440	1475	1490	1527	1526	1472	1535	1530	1575	1635	1575	1562	1345
End	1405	1380	1400	1430	1442	1450	1490	1495	1538	1532	1482	1542	1522	1568	1641	1565	1565	1350
Loran 2H5																		
Start	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
End	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Depth (fms)																		
Start	56	66	103	51	60	75	87	65	74	110	60	62	54	56	53	66	72	65
End	58	65	102	50	61	80	96	71	74	114	60	62	57	58	55	66	77	66
Bottom type	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Time net on bottom (min)	15	15	18	15	15	15	17	15	20	16	17	18	10	10	12	12	15	10
Time gear set	1145	1255	1417	0850	1020	1130	1315	1450	1600	1720	0835	1025	1140	1320	1440	1605	1655	0825
Remarks	--	Coral	--	--	--	--	--	--	--	--	Gn Md	--	--	--	--	--	--	--
Pink shrimp catch (lbs)	129	6	26	35	85	255	5	85	126	T	120	112	833	32	135	22	72	T.U. Coral reef 4
Catch/hour	516	24	87	140	340	1020	18	340	378	--	423	373	4998	216	675	110	288	24
Shrimp/lb	293	287	116	257	282	267	--	188	193	--	257	241	222	211	265	--	204	--
Snags (athoms cable out)	150	175	225	150	200	200	250	175	225	250	150	175	150	150	150	175	200	175

Drag number	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Date - 67	2-26	2-26	2-26	3-7	3-7	3-7	3-7	3-8	3-9	3-21	3-21	3-21	3-21	3-26	3-26	3-26
Loran 2H4																
Start	1335	1305	1255	1225	1230	1182	1172	1185	1130	1135	1145	1115	1103	1088	1070	1090
End	1330	1300	1249	1229	1240	1178	1178	1190	1138	1132	1149	1118	1106	1083	1067	1090
Depth																
Start	102	97	84	86	132	82	56	102	50	68	83	80	73	59	79	110
End	105	98	92	89	132	82	54	103	51	69	82	80	74	59	—	106
Bottom type	Gn M&S	—	reef	Gn M&S	—	—	—	—	—	—	—	—	—	—	—	—
Time net on bottom (min)	11	10	15	6	15	15	10	10	10	15	15	10	10	15	10	10
Time gear set	1000	1108	1233	0850	0956	1225	1448	1453	0640	0950	1055	1245	1349	1115	1250	1413
Remarks	Sea urchins	—	T.U. rock in net	Cliff	—	—	—	—	—	—	—	—	—	—	—	—
Shrimp catch	2	16	T	126	0	2100	20	1	73	48	4	0	54	90	0	0
Catch/hour	11	96	—	1260	—	8400	120	6	438	192	16	—	324	360	—	—
Shrimp/lb	—	152	—	238	—	219	—	—	233	122	—	—	90	137	—	—
Scope	250	250	250	225	300	225	150	250	150	200	225	225	200	175	200	300

Drag number	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Date - 67	3-26	3-27	3-27	3-27	3-27	3-27	3-27	3-27	3-27	3-27	4-2	4-3	4-3	4-3	4-3	4-3	4-3	4-3	4-3
Moran 2H3																			
Start	1090	1095	1100	1132	1140	1130	1185	1180	1182	1205	1125	1345	1349	1400	1390	1440	1438	1480	1478
End	1088	1091	1105	1136	1130	1135	1178	1175	1187	1200	1125	1351	1355	1405	1395	1445	1433	1485	1470
Depth (fms)																			
Start	51	67	79	89	60	51	52	60	73	52	120	93	62	79	50	59	90	130	70
End	55	69	79	86	62	51	52	62	73	53	135	97	63	85	46	60	98	138	70
Bottom type	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Time net on bottom (min)																			
	15	16	13	10	15	15	15	13	15	15	6	15	10	11	15	10	15	10	16
Time gear set																			
	1705	0622	0727	0821	0917	1015	1115	1205	1255	1355	1235	0723	0843	0950	1105	1212	1316	1452	1656
Remarks																			
	Towed E to W	--	--	--	--	--	--	--	--	--	rough bottom	--	T.U.	small tear	--	--	--	--	--
Shrimp catch	0	T	T	0	0	0	2	165	T	87	0	T	T	T	T	25	0	0	0
Catch/hr	--	--	--	--	--	--	8	761	--	348	0	--	--	--	--	150	0	0	0
Shrimp/lb	--	--	--	--	--	--	--	121	--	--	--	--	--	--	--	197	--	--	--
Scope	150	175	200	250	175	150	150	175	200	150	275	250	175	225	150	175	250	300	175

Drag number	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Date - 67	4-3	4-4	4-4	4-4	4-4	4-4	4-4	4-4	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-7	4-7
Loran 2H3																			
Start	1520	1608	1602	1600	1580	1562	1570	1538	--	--	--	--	--	--	--	--	--	--	--
End	1524	1601	1592	1600	1576	1557	1562	1545	--	--	--	--	--	--	--	--	--	--	--
Loran 2H4																			
Start	--	--	--	--	--	--	--	--	1575	1658	1665	1658	1657	1712	1700	1710	1705	1738	1745
End	--	--	--	--	--	--	--	--	1582	1660	1672	1655	1660	1705	1707	1714	1710	1745	1750
Loran 2H5																			
Start	--	--	--	--	--	--	--	--	--	--	--	3382	--	--	--	--	--	--	--
End	--	--	--	--	--	--	--	--	--	--	--	--	3385	--	--	--	--	--	--
Depth (fms)																			
Start	48	50	62	75	84	64	51	62	110	120	68	58	55	55	62	67	108	105	71
End	47	52	60	75	81	64	49	64	108	126	71	60	57	54	59	67	112	106	72
Bottom type	--	--	gn M	--	gy S	--	--	--	--	rough	--	--	--	--	--	--	--	--	--
Time net on bottom (min)	12	12	10	1	10	10	10	10	14	10	15	15	15	15	17	15	15	15	15
Time gear set																			
set	1710	0718	0830	0935	1021	1110	1202	1325	0808	0930	1044	1153	1325	1515	1625	1714	1820	0542	0700
Remarks	--	--	--	H.U.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shrimp catch	0	380	920	0	0	T	0	T	0	0	18	T	T	T	0	T	T	65	0
Catch/hour	0	1900	5520	--	0	--	0	--	0	0	72	--	--	--	0	--	--	260	0
Shrimp/lb	--	227	197	--	--	--	--	--	--	--	250	--	--	--	--	--	--	173	--
Scope	150	150	175	225	225	175	150	175	300	300	200	175	150	175	175	200	275	275	175

Drag number	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Date - 67	4-7	4-7	4-7	4-7	4-7	4-7	4-8	4-8	4-18	4-18	4-18	4-18	4-18	4-18	4-18	4-18	4-19	4-19
Loran 2H4																		
Start	1759	1786	1780	1779	1815	1825	1820	1868	2342	2301	2260	2205	2160	2222	2129	2130	2222	2390
End	1765	1790	1778	1781	1810	1830	1825	1875	2332	2297	2251	2208	2158	2116	2130	—	2230	2395
Loran 2H5																		
Start	3390	3384	3375	—	3365	3368	3377	3370	—	—	—	3362	3360	3352	3359	3365	3378	3400
End	3390	—	—	—	3365	3368	—	3370	—	—	—	3360	3361	3352	3358	—	3378	3400
Depth (fms)																		
Start	57	57	65	101	98	88	73	70	84	80	75	95	82	110	67	55	74	61
End	57	—	68	106	98	87	74	71	85	75	75	100	84	102	69	56	76	65
Bottom type	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Shale	—	—
Time net on bottom (min)	10	10	10	11	13	10	10	10	12	10	16	10	12	10	10	8	14	15
Time gear set	0830	0933	1028	1141	1355	1520	1432	1551	0857	0955	1055	1307	1430	1542	1647	1750	0837	1222
Remarks	—	—	—	—	—	—	—	—	—	—	—	Steep	Rough	—	—	4000 lbs of rocks	H. U.	—
Shrimp catch	T	0	0	295	40	50	0	83	68	T	0	T	T	0	0	0	0	T
Catch/hour	—	—	—	1609	185	300	—	498	340	—	—	—	—	—	—	—	—	—
Shrimp/lb	—	—	—	310	242	—	—	191	117	—	—	—	—	—	—	—	—	—
Scope	150	175	200	250	250	225	200	175	250	225	225	200	200	275	175	150	175	175

Drag number	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
Date - 67	4-21	4-21	4-21	4-21	4-21	4-21	4-21	4-21	4-22	4-22	4-22	4-22	4-22	4-22	4-22	4-22	4-22	4-22
Loran 2H4																		
Start	2388	2440	2450	2438	2440	2479	2474	2480	2478	2480	2527	2530	2527	2515	2562	2570	2586	2618
End	2390	2448	2455	2450	2448	2476	2468	2472	2470	2470	2534	2538	2519	2521	2555	2562	2592	2610
Loran 2H5																		
Start	--	3405	3402	3392	3385	3390	3396	3405	3412	3420	--	3412	3405	3395	3407	3413	3422	--
End	3409	--	--	3392	3385	3391	3396	3405	--	3420	3420	3412	3405	3395	--	3413	3422	3432
Depth (fms)																		
Start	51	65	70	86	123	115	96	79	69	55	62	76	86	110	96	86	69	51
End	52	65	70	88	125	110	94	79	69	55	66	76	85	117	91	86	70	50
Bottom type	--	--	--	--	--	--	--	--	--	--	--	--	Flat	Flat	--	--	--	--
Time net on bottom (min)	15	15	15	18	16	15	20	15	16	19	15	15	16	17	15	15	15	16
Time gear set	0725	0852	0939	1050	1237	1415	1545	1735	0557	0755	0917	1020	1205	1320	1448	1548	1705	1816
Remarks	--	--	peak at end	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pink shrimp catch (lbs)	0	0	380	T	28	20	25	232	600	0	84	11	0	25	25	42	0	0
Catch/hour	0	0	1520	--	105	80	75	928	2250	--	336	44	0	88	100	168	0	0
Shrimp/lb (ct.)	--	--	136	--	--	122	139	191	154	--	193	n.s.	--	88	92	88	--	--
Scope	150	175	200	225	300	300	250	225	225	150	175	200	225	275	250	225	200	150

Drag number	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
Date - 67	4-23	4-23	4-23	4-23	4-23	4-23	4-23	4-23	4-23	4-23	4-24	4-24	4-24	4-24	4-24	4-24	4-24	4-24
Loran 2H4																		
Start	2610	2637	2655	2662	2700	2690	2700	2742	2750	2740	2842	2806	2802	2838	2850	2890	2933	2940
End	2620	2642	2650	2668	2709	2701	2712	2750	2755	2750	2847	2798	2806	2842	2854	2895	2938	2933
Loran 2H5																		
Start	3422	3415	3426	3434	3435	3425	3420	3420	3429	3435	3442	3440	3430	3433	3424	3426	3426	3435
End	--	--	3426	3434	3435	3425	3420	--	3430	3435	--	--	3430	3433	3423	--	--	3435
Depth (fms)																		
Start	74	102	81	58	61	86	107	103	88	60	58	58	89	90	120	98	94	85
End	75	107	81	58	61	90	104	104	88	60	60	58	89	91	115	97	94	85
Bottom type	Flat	--	Flat	--	Flat	gn MS	--	Flat	Sand	--	Flat	--	--	--	--	--	gn M	Flat
Time net on bottom (min)	16	17	18	16	20	20	18	17	15	16	17	15	17	15	18	16	15	16
Time gear set	0545	0700	0830	0940	1040	1227	1344	1505	1615	1755	0540	0650	0812	0920	1042	1252	1359	1518
Remarks	--	--	--	--	--	Flat	--	--	--	--	--	--	N cur- rent	--	--	--	S. proriger	--
Shrimp catch	189	45	405	0	0	455	2	T	112	0	0	0	55	45	0	0	0	445
Catch/hour	709	159	1350	0	0	1365	7	--	448	0	0	0	194	180	0	0	0	1669
Shrimp/lb	149	85	136	--	--	90	--	--	85	--	--	--	90	95	--	--	--	109
Scope	200	275	225	175	175	225	275	275	250	175	175	175	250	250	275	250	250	225



Drag number	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	
Date - 67	4-24	4-24	4-25	4-25	4-25	4-25	4-30	4-30	4-30	4-30	4-30	4-30	4-30	4-30	4-30	5-1	5-1	5-1	5-1	
Loran 2H4																				
Start	2890	2890	2945	2970	2978	2973	3440	3390	3338	3288	3235	3188	3187	3141	3082	3086	3082	3075	3075	
End	2882	2886	2950	2965	2972	2968	3435	3385	3332	3282	3230	3182	3192	3136	3079	3090	3076	3070	3068	
Loran 2H5																				
Start	3435	3445	3446	--	3435	3425	3462	3460	3456	3455	3452	3458	3449	3447	3455	--	3433	3422	3415	
End	--	--	--	--	--	--	3462	--	--	3455	3452	3458	3449	3447	--	--	--	--	--	
Depth (fms)																				
Start	85	62	60	60	85	95	49	52	57	62	65	51	69	69	51	74	86	100	114	
End	85	62	60	60	85	96	50	52	59	62	66	52	69	69	50	73	88	106	115	
Bottom type	--	--	Flat	--	--	--	--	--	--	gn M	gn M	--	--	--	Flat	--	--	Steep	gn M	
Time net on bottom (min)	16	12	10	12	17	16	16	16	17	16	15	15	17	16	10	11	15	11	17	
Time gear set	1644	1800	0610	0706	0833	1009	0743	0849	1012	1120	1325	1452	1606	1719	1842	0600	0719	0840	0943	
Remarks	snag	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Yell Tl RF	--	--	Flat B	
Shrimp catch	75	0	0	0	580	0	45	0	25	58	0	0	675	0	0	0	125	75	2	
Catch/hour	281	0	0	0	2047	0	169	0	88	218	0	0	2382	0	0	0	500	409	7	
Shrimp/lb	120	--	--	--	125	--	175	--	200	177	--	--	185	--	--	--	108	104	--	
Scope	225	175	175	175	225	250	175	150	175	175	200	150	200	200	150	200	225	250	275	

Drag number	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163
Date - 67	5-1	5-1	5-1	5-1	5-1	5-1	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-3	5-3	5-3
Loran 2H4																		
Start	3138	3142	3140	3143	3188	3175	3190	3230	3233	3238	3238	3282	3336	3390	3435	3525	3480	3478
End	3130	3135	3136	3143	3180	3170	3186	3225	3238	3229	3233	3277	3340	3398	3438	3522	3475	3472
Loran 2H5																		
Start	3402	3417	3425	3434	3440	3427	3415	3404	3420	3430	3440	3445	3445	3448	3452	3460	3455	3441
End	--	--	--	3434	--	3427	--	--	--	--	--	--	--	--	3452	3460	3455	--
Depth (fms)																		
Start	120	106	92	65	81	86	97	101	91	86	83	78	74	64	64	55	60	71
End	123	110	95	75	82	87	99	103	91	86	83	80	74	66	63	55	60	72
Bottom type	bumpy	--	-- rough	--	level	level	flat	flat	flat	flat	--	flat	gn SM	gn M	--	--	--	
Time net on bottom (min)	17	15	16	0	16	12	12	15	16	17	14	15	13	16	10	16	15	15
Time gear set	1137	1330	1447	1604	1719	1835	0528	0710	0844	1000	1120	1305	1429	1539	1645	1006	1113	1259
Remarks	--	--	--	H.U. rocks	--	smelt	--	red stripe RF	--	--	--	--	--	--	--	--	--	--
Shrimp catch	0	215	390	0	10	0	500	0	1000	102	145	220	132	80	305	56	120	70
Catch/hour	0	860	1463	0	38	0	2500	0	3750	360	621	880	609	300	1830	210	480	280
Shrimp/lb	--	96	140	--	--	--	111	--	187	338	133	139	166	170	186	121	128	199
Scope	300	275	250	200	225	250	250	275	250	225	225	200	200	175	175	175	175	200

Drag number	164	165	166	167	168	169	170	171	172	173
Date - 67	5-3	5-3	5-3	5-3	5-3	5-4	5-4	5-4	5-4	5-4
Loran 2H4										
Start	3430	3373	3330	3280	3282	3338	3386	3375	3432	3485
End	3425	3368	3336	3277	3286	3344	3381	3370	3438	3480
Loran 2H5										
Start	3438	3438	3438	3432	3422	3422	3424	3410	3428	3428
End	--	--	--	--	3422	--	--	--	--	--
Depth (fms)										
Start	68	72	78	80	86	89	83	95	80	78
End	68	73	79	81	88	90	85	96	80	78
Bottom type	--	--	--	--	--	--	--	--	--	--
Time net on bottom (min)	15	16	15	16	14	20	15	16	15	15
Time gear set	1402	1513	1623	1732	1850	0517	0701	0813	0951	1107
Remarks	--	--	--	--	--	--	--	--	--	--
Shrimp catch	540	320	105	140	110	660	14	30	35	195
Catch/hour	2160	1200	420	525	471	1980	56	113	140	780
Shrimp/lb	170	177	167	136	117	181	n.s.	170	193	213
Scope	200	200	225	225	225	250	225	250	225	225