

Department of Oceanography
University of Washington

Cruises of the *R.V. Brown Bear*
1952—1965

During this period, the *Brown Bear*
made 381 Scientific Cruises.



RV Brown Bear in Hood Canal, Cruise 63, July 1954

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SUMMARY OF MV/BLOCK BEAN CRUISES FOR 1952

CRUISE	DATES	AREA	OBSERVATIONS, STATION NUMBERS, (AMOUNT), ANALYSES	REMARKS
off	1 11 ~ 15 March 1952	Strait of Juan de Fuca & canyon	Oceanographic stations (# 1 - 10) BT's (9) Piston core (1) Chlorinity, oxygen Samples for J. Chow and R. Jentoft 400	Initial voyage as an oceanographic vessel.
PSS Biol	2 31 March - 2 April	San Juan Islands & Bonneville Cable Area	Biological dredges for Dr. E. Swan (9) Oceanographic stations (# 11 - 14) Piston cores (8) Chlorinity, oxygen 200	Bonneville personnel on board, 2 April
off PSS	3 16 ~ 19 April	Puget Sound except Hood Canal & inside passage	Oceanographic stations (# 16 - 41) STD lowerings (# 3402 - 3470) Chlorinity, oxygen 295	Time study of long. cross section from Bush Pt. to Pt. No. Pt. (6 runs)
off	4 29 April - 5 May	Off coast of Vancouver Island	Oceanographic stations (# 48 - 58) BT's (75) Surface samples (60) GEK fixes (81) Chlorinity, oxygen Samples for R. Jentoft 644	Weather very stormy
Biol	5 15 May	Bonneville Cable Area	Piston cores (5) Penetrometer lowerings (3) Biological dredges (3) 40	Bonneville personnel on board
PSS	6 28-29 May 3 ~ 6 June	Puget Sound Survey (1)	Oceanographic stations (# 59 - 120) STD lowerings (# 3471 - 3559) Chlorinity, oxygen 435	
	6-S 25 June	Lake Washington	Oceanographic station (#121) Chlorinity, oxygen 10	
off	7 2-16 July	Pacific Ocean - two lines 500 mi. long out on 48° 30'N in on 50° 30'N	Oceanographic stations (# 124 - 146) BT's (155) Surface samples (91) GEK fixes (185) Chlorinity, oxygen, inorganic phosphate total phosphate, Samples for D. Chow and J. Chow 1511	GEK time study, 25 hours starting 8 July at 2200, stats. 131 - 139

SUMMARY OF MV/BROOK BEAR CRUISES FOR 1952

CRUISE	DATES	AREA	OBSERVATIONS, STATION NUMBERS, (AMOUNT), ANALYSES	REMARKS
8-a	31 July - 2 August	Strait of Juan de Fuca and Hood Canal	Oceanographic stations (# 147 - 157) BT's (12) Ekman and Price current meter readings (21) Chlorinity 370	Ocean. 501-502 class from Friday Harbor
8-b	4 - 5 August	East Sound	Oceanographic stations (#158 - 168) BT's (14) Ekman and Price current meter readings Chlorinity, oxygen, phosphata	
9	15 August - 5 September	NE Pacific Ocean, off Washington and Oregon coasts	Oceanographic stations (# 169 - 203) BT's (215) Surface samples (59) GEK fixes (84) STD used for surface salinities Chlorinity and oxygen Samples for J. Chow 1868	Cobb Seamount surveyed. Search for Columbia River outflow.
10	13 - 16 October	Puget Sound Survey (2)	Oceanographic stations (# 204 - 248) STD lowerings (# 3597 - 3664) Phleger cores (21) Snapper samples (9) Chlorinity, oxygen 380	Plankton sample for Dr. C. L. Utterbach
11	22 October	Lake Washington	Oceanographic stations (# 249 - 254) CTD lowerings (16) Chlorinity, oxygen 25	
12	29 October	Lake Washington	Oceanographic stations (# 255 - 258) CTD lowerings (27) Chlorinity 25	
13	31 October	Port Orchard	Phleger cores (6) Clarke-Bumpus plankton sample (7) Orange-peel bottom samples (6) Zobell water sampler used (4) BT's (10) 40	Samples for bacteriologi- cal studies by Dr. R. Bader

SUMMARY OF MV/BROOKLYN CRUISES FOR 1952

CRUISE	DATES	AREA	OBSERVATIONS, STATION NUMBERS, (AMOUNT), ANALYSES	REMARKS
14	5 - 7 November	Admiralty Inlet	STD lowerings (# 3667 - 3752) 10 meter samples (43) Chlorinity, temperature 310	Time study from Marrowstone Pt. to Bush Pt. (8 times) and Bush Pt. to Pt. No. Pt. (9 times)
15-a 15-b	12 - 14 17 - 18 November	Puget Sound Survey (3)	Oceanographic stations (# 259 - 300) STD lowerings (# 3753 - 3826) Phleger cores (15) Snapper bottom samples (13) Chlorinity and oxygen 520	Picked up water for Mr. K. Nelson
15-c	22 November	Pt. Jefferson area Bonneville cable area	Phleger cores (2) Snapper bottom samples (1) Biological dredges (2) Bottom profile - Pt. Jefferson to Shilshole Bay 25	Ocean. 450 class on board Laid cable with Bonneville samples attached.
16	24 - 26 November	Hood Canal near Union	Clarke-Bumpus plankton (9) Water samples for chlorophyll detn. (6) Piston cores (2) Phleger cores (5) 150	Piston corer worked poorly. Drs. Bader and Barlow aboard.
17	8 - 10 December	Southern end of East Passage	Oceanographic stations (# 301 - 364) STD lowerings (# 3827 - 3869) Chlorinity 230	Time study - two parts, 26 hours each
18	15 - 19 December	Puget Sound Survey (4)	Oceanographic stations (# 365 - 435) Phleger core (1) Snapper bottom sample (1) Clarke-Bumpus plankton (2) Chlorinity, oxygen 430	
19	29, 30 December	Bonneville Cable Area	Tri-Phleger corer (18) Penetrometer lowerings (3) Biological dredges (3) Box dredge (5) 30	Bonneville I and M days

SUMMARY OF MV/BRO. JEAR CRUISES FOR 1954

CRUISE	DATES	AREA	OBSERVATIONS, STATION NUMBERS, (AMOUNT), ANALYSES	REMARKS
20	21 - 27 January	Puget Sound Survey (5)	Oceanographic stations (#437 - 481) Water for chlorophyll analysis (7 stat.) Clarke-Bumpus plankton (5) Photometer lowerings (42) Chlorinity and oxygen 470	STD winch dropped while loading - hydro line parted
21	16-20 February	Puget Sound Survey (6)	Oceanographic stations (#482 - 554) Water for chlorophyll analysis (6 stat.) Photometer lowerings (19) Chlorinity and oxygen 500	
22	3 March	Bonneville Cable Area	Piston cores (3) Phleger cores (10) 30	Bonneville data - N day
23	16 - 20 March	Puget Sound Survey (7)	Oceanographic stations (#555 - 605) Clarke-Bumpus plankton (2) Water for chlorophyll analysis (6 stat.) Photometer lowerings (50) Chlorinity and oxygen 450	
24-a -b	14 - 16 April 17, 18 April	Puget Sound Survey (8)	Oceanographic stations (#606 - 654) Clarke-Bumpus Plankton (2) Water for chlorophyll analysis (7) Photometer lowerings (14) Chlorinity, Phosphate, and oxygen 500	
25	22 April	Port Orchard	Piston cores (3) 35	For bacteriological studies by Dr. Bader
26	30 April - 1 <u>E</u> May	NE Pacific Ocean off Washington and Van- couver Island coasts.	Oceanographic stations (# 655 - 689) BT's (141) Surface samples (92) GEK fixes (111) Thermistor used for surface temperatures Clarke-Bumpus plankton (13) Chlorinity, oxygen and phosphate Samples for J. Chow 847	25 hour GEK time study started 0706 10 May - Stat. 684 - 686

SUMMARY OF MV/BROWN BEAR CRUISES FOR 1953

CRUISES	DATES	AREA	OBSERVATIONS, STATION NUMBERS, (AMOUNT), ANALYSES	REMARKS
27	18 - 22 May	Puget Sound Survey (9)	Oceanographic stations (#690 - 738) BT's (51) Clarke-Bumpus plankton (2) Water for chlorophyll analysis (7) Chlorinity, oxygen and phosphates 450	Phosphates ran only on Hood Canal stations.
28	22 - 24 May	East Sound	Oceanographic stations (#739 - 743) Fhleger cores (10) Chlorinity, oxygen, phosphate, copper, silicate, nitrite, and pH 155	Ocean. 422 class on board with Dr. T. G. Thompson
29	3 - 15 June	NE Pacific Ocean, off Wash. and Van- couver Island coasts	Oceanographic stations (#744 - 776) BT's (150) Surface samples (76) GEK fixes (161) Thermitow used for surface temperatures Clarke-Bumpus plankton (21) Chlorinity and oxygen 951	GEK time study, 10 1/2 hours starting 1560 6 June - stats. 755 - 764 Explored Cobb Seamount Searched for Patoka Shoal
30	18- 22 July	Puget Sound Survey (11)	Oceanographic stations (#777 - 830) BT's (55) Chlorinity, oxygen and phosphate 700	Ocean. 351 class of Dr. C. A. Barnes aboard
31	31 July - 14 August	NE Pacific Ocean - Cobb Seamount area	Oceanographic stations (#831 - 847) BT's (218) Surface samples (58) GEK fixes (590) Ekman current meter readings (186) Chlorinity and oxygen 758	Cobb Seamount survey Current measurements on Cobb for 87 hours GEK time study for 72 hours starting 1840, 8 August
32	19 - 22 August	Puget Sound Survey (12)	Oceanographic stations (#848 - 906) BT's (57) Chlorinity, oxygen and phosphate 470	
33	2 - 13 September	NE Pacific Ocean - Columbia River and adjacent area	Oceanographic stations (#907 - 967) BT's (214) Surface samples (130) Clarke-Bumpus plankton (15) Biological dredges (8) Pipe dredge (1) STD used for surface salinities Chlorinity and oxygen EEC 1477	Explored the outflow of the Columbia River Many unusual biological specimens collected for Fisheries Unprotected thermometers calibrated

SUMMARY OF UP/DOWN BEAL CRUISES FOR 1953

CRUISE	DATES	AREA	OBSERVATIONS, STATION NUMBERS, (AMOUNT), ANALYSES	REMARKS
34	21 - 25 September	Puget Sound Survey (13)	Oceanographic stations (# 969 - 1026) BT's (58) Chlorinity, oxygen and phosphate 480	Included Holmes Harbor
35	16 - 18 October	Puget Sound, partial Survey (14-a)	Oceanographic stations (# 1027 - 1055) BT's (29) Chlorinity, oxygen and phosphate 230	Includes Holmes Harbor Omits Hood Canal and South Sound
36	23 - 25 October	Puget Sound, partial Survey (14-b)	Oceanographic stations (# 1056 - 1085) BT's (30) Photometer lowerings (8) Underwater camera (20 pictures) Chlorinity, oxygen and phosphate 300	Includes Hood Canal and South Sound

SUMMARY OF SURVEY OPERATIONS FOR 1955

STATION	DATE	LOCATION	OBSERVATIONS, SURVEY RUNNERS, (ANALYST), ANALYSES	REMARKS
31	7 November	President Point	Echo soundings along 10 traverses 55	Ocean. h50 class on board.
32	13 - 14 November	Polina Harbor and Port Gardner	Phleger cores (7) Snapper samples (11) Box dredged (1) Clarke-Dumpus plankton samples (3) Biological dredges (1) 1/2 m. Plankton net (2-vert., 3 horiz.) 85	Ocean. h30 and Ocean. h50 class on board.
33	16 - 20 November	Luget Sound Survey (35)	Oceanographic stations (# 1086-1137) STD lowerings (#3002 - 3061) BT's (32) Photometer lowerings (11) Chlorinity, oxygen and phosphate 470	
h0	23 November	Point Wells	Underwater camera (2h exposures) Phleger cores (2) 25	Ascertaining proper exposure for camera.
h1	20 Nov. - 3 December	Busk Point	Oceanographic stations (# 1138-1140) STD lowerings (# 3002 - 1050) Current cross, large (130) Ekman and Geomark current meters (h50) 320	Time study - three stations occupied between Bush and Middle Points. h0 crossings.
h2	7 - 10 December	Luget Sound Survey (16)	Oceanographic stations (# 1141 - 1190) STD lowerings (# 1051 - 1067) BT's (3h) Chlorinity, oxygen and phosphate 460	Did not get Otter Point or Pillar Point stations because of weather.
h3	17 - 18 December	Point Wells and President Point	Underwater camera (h0 exposures) 30	Photographing Bonneville cable area.
h4	21 - 23 December	Busk Point area	Oceanographic stations (# 1191 - 1232) STD lowerings (#1068 - 1068) 185	Time study - longitudinal section in Admiralty Inlet three stations - 1h crossings.
h5	27 - 31 December	Adalga & Padilla Keys, Anacortes	Bottom soundings (6 lines) Phleger cores (12) Snapper samples (26) Underwater camera (26 exposures) 155	Preliminary survey of reef-like sites to determine effect of any future pollution on vegetation.

SUMMARY OF MV/BROWN BEAR CRUISES FOR 1954

CRUISE	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES	REMARKS
46	11 - 15 January	Puget Sound Survey (17)	Oceanographic stations (57) STD lowerings (7) BT's (50) Phleger cores (8) Plankton hauls (2) Chlorinity, oxygen, phosphate and sulfite waste liquor (S.W.L.) 480	S.W.L. samples ran by State Fisheries
47	26 - 27 January	Pully point to Race Rocks	Oceanographic stations (14) BT's (14) Chlorinity and oxygen 200	
48	29 - 31 January	Anacortes Area	Oceanographic stations (15) Chlorinity, oxygen and pigment analyses Ekman current meter (120) Price current meter 150	Data covers complete tidal cycle
49	5 - 6 February	Anacortes Area	Dredge, box (total of 8) Bredge, rock 130	Correlated with BB Cruise 46 48
50	15 - 19 February	Puget Sound Survey (18) and Carr Inlet Survey (1)	Oceanographic stations (66) STD lowerings (13) BT's (53) Plankton Hauls (3) Chlorinity, oxygen, phosphate and sulfite waste liquor 480	
51	24 February	Port Orchard	Underwater Photographs (10) 40	

SUMMARY OF MV, JAWN BEAR CRUISES FOR 1954

CRUISE	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES	REMARKS
52	5 March	Lake Union & Lake Washington	Cores (10) Underwater photographs (18) 10	
53	22 - 26 March	Puget Sound Survey (19) and Carr Inlet Survey (2)	Oceanographic stations (67) STD lowerings (6) BT's (61) Plankton hauls (3) Chlorinity, oxygen, phosphate and sulfite waste liquor 480	Samples for Dr. J. Chow
54	8 - 10 April	Padilla Bay & Georgia Strait	Dredges (10) Snapper bottom samples (9) Bottom profile (1) 220	Pressure tested underwater camera case.
55	19 - 24 April	Puget Sound Survey (20) and Carr Inlet Survey (3)	Oceanographic stations (106) BT's (106) Plankton hauls (2) Chlorinity, oxygen, phosphate and sulfite waste liquor 600	Time study in Carr Inlet for 25 hours at 3 stations.
56	28 April - 4 May	Columbia River & Adjacent Area	Oceanographic stations (28) BT's (60) Transparency samples (6 sets) Chlorinity and oxygen STD (surface only) Suspended material (34 millipore filters) 744	Bathymetry of area studied with the EDO
57	7 - 9 May	San Juan Islands	Fossil and rock samples obtained from several islands 170	20 members of the Geology Department on board.

SUMMARY OF MV/BROWN BEAR CRUISES FOR 1954

CRUISES	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES	REMARKS
58	13 - 14 17 - 20 May	Puget Sound Survey (21) and Carr Inlet Survey (4)	Oceanographic stations (69) BT's (69) Plankton hauls (2) Chlorinity, oxygen, phosphate and sulfite waste liquor 480	Transparency samples for Dr. Wayne Burt
59	21 - 22 May	Hood Canal	Oceanographic stations (4) Chlorinity, oxygen, phosphate, silicate, nitrite, pH 140	Dr. Thompson's ocean. chem. class on board
60	1 - 5 June	Bush Point	Oceanographic stations (108) Ekman current meter (440) Genware current meter (115) Gyro current meter 400	Time study - occupied 3 lateral section & 1 longitudinal section Drifting ship method
61	10 June	Lake Washington	To test new piston coring tube. 3 cores collected. Testing depressor 10	
62	15 - 25 June	Off Washington Coast	Oceanographic stations (14) GEK fixes (903) BT's (160) 492	GEK time study Samples for Dr. Jim Chow
63	8 - 12 July	Puget Sound Survey (23) and Carr Inlet Survey (6)	Oceanographic stations (78) BT's (78) Plankton hauls (22) Chlorinity, oxygen, phosphate, silicate and sulfite waste liquor 700	Dr. Barnes' physical oceanography class from Friday Harbor on board.

SUMMARY OF MV/BROWN BEAR CRUISES FOR 1954

CRUISES	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES	REMARKS
64	2 August- 8 September	Gulf of Alaska	Oceanographic stations (60) Clarke-Bumpus plankton haul (60) Deep net hauls (4) Surface plankton hauls (5) Cores (19) Snapper samples (2) GEK fixes (216) BT's (290) Chlorinity, oxygen, phosphate and plankton pigment 3385	Exploratory cruise of this area.
65	15 September	Shilshole Bay	Oceanographic stations (3) CTI lowerings (6) Chlorinity 25	Testing CTI
66	27 September- 2 October	Puget Sound Survey (25) and Carr Inlet Survey (8)	Oceanographic stations (108) BT's (108) Plankton hauls (2) Chlorinity, oxygen, phosphate and sulfite waste liquor 630	Time study in Carr Inlet - 3 stations for 30 hours.
67	15 - 17 October	Off Washington Coast	Oceanographic stations (6) BT's (16) Cores, phleger (20) Chlorinity, oxygen & phosphate 173	Dr. Bader, Party chief
68	19 - 20 October	Carr Inlet Survey (9)	Oceanographic Survey (26) BT's (26) Chlorinity, oxygen & phosphate 140	
69	25 - 27 October	Off Golden Gardens	Dredges (10) Phleger cores (2) Underwater photographs (10) 60	

SUMMARY OF MV/BROWN BEAR CRUISES FOR 1954

CRUISES	DATES	AREA	OBSERVATIONS (AMOUNTS), ANALYSES	REMARKS
0	5 - 8 November	East Sound	Oceanographic stations (9) Vertical plankton hauls (9) Light intensity measurements (79) BT's (9) Chlorinity, oxygen, phosphate, silicate, plankton pigments 155	Visitors for UBC on board
1	9 - 10 November	Richmond Beach	Dredges (7) 70	Mapping an outcrop
2	12 - 14 November	Puget Sound Survey (26 - a)	Oceanographic stations (18) BT's (18) Chlorinity, oxygen, phosphate and sulfite waste liquor 140	Dr. Barnes' physical oceanography class to inside of Whidby Is. area.
3	15 - 18 November	Puget Sound Survey (26-b) and Carr Inlet Survey (10)	Oceanographic stations (54) BT's (45) STD lowerings (9) Plankton hauls (2) Chlorinity, oxygen, phosphate 440	Does not include area inside of Whidby Is.
4	22 November	Lake Washington & Ship Canal to Salmon Bay	Oceanographic stations (6) CTD lowerings (16) Chlorinity, oxygen, H ₂ S 25	
5	29 November - 2 December	Point Wells to Point Jefferson	Dredges (7) Underwater photographs (10) 70	

SUMMARY OF MV/BROWN BEAR CRUISES FOR 1954

CRUISES	DATES	AREA	OBSERVATIONS (AMOUNTS), ANALYSES	REMARKS
76	6 - 10 December	Northern Hood Canal	STD lowerings (115) Chlorinity samples (244) Ekman current meter (100) Gemware current meter (260) Biplane (137) Price current meter (100 hrs.) 75	Time study - occupied two anchor stations for 50 hours at each.
77	12 - 14 December	Carr Inlet Survey (11)	Oceanographic stations (25) BT's (25) Chlorinity, oxygen, phosphate 140	
78-A	17 December	Lake Washington	Testing high-speed dredge 10	
78-B	27 - 29 December	Strait of Juan de Fuca and Skagit Flats	Dredges (12) 150	Used and "anchor" dredge for some geological samples
79	30 December	Lake Washington	Testing new piston corer obtained one core 10	

SUMMARY OF IN/BROWN BEAR CRUISES FOR 1955

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS), ANALYSES (PARTY CHIEF)	REMARKS
80	3-7 January	Puget Sound to 75 miles off Neah Bay	Oceanographic Stations (13) BT's (18) Chlorinity, oxygen, phosphate, silicate suspension, boron, nickel, phytoplankton Miles traveled - 236 (Mr. C. M. Love)	Samples obtained for Mr. Gast and Mr. Laevastu
81	17-21 January	Puget Sound Survey (27) and Carr Inlet Survey (12)	Oceanographic Stations (66) BT's (66) High speed plankton sampler (23) Clarke-Bumpus plankton (2) Chlorinity, oxygen, phosphate, sulphite waste liquor Miles traveled - 500 (Mr. E. E. Collias)	First time the high speed plankton sam- pler was used.
82	26 January	Puget Sound	High-speed dredge (2) Anchor dredge (2) Miles traveled - 50 (Mr. M. P. Wennkens)	
83	31 Jan. - 4 February	Carr Inlet Time Study (4)	Oceanographic stations (41) Ekman meter at 25 & 100 feet (340 lowerings) Price meter at 15 feet (continuous) Miles traveled - 80 (Dr. R. G. Paquette)	
84	8 February	Lake Washington & Lake Union	Piston cores (2) Gravity cores (3) Miles traveled - 10 (Dr. R. Bader)	
85	9-10 February	Carr Inlet Survey (13) and Southern Puget Sound	Oceanographic stations (27) BT's (27) Chlorinity, oxygen, phosphate Miles traveled - 150 (Mr. E. E. Collias)	End of Carr Inlet surveys

SUMMARY OF MW/BROWN BEAR CRUISES FOR 1955

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS), ANALYSES (PARTY CHIEF)	REMARKS
86	12 February	Puget Sound	Dredging for biological specimens Miles traveled - 30 (Dr. H. Frolander)	Dr. H. Frolander's Ocean 432 class
87	18-19 February	Colvos Passage & Commencement Bay	Oceanographic stations (12) S-T-D lowerings (20) Ekman current meter (51 lowerings) Price current meter (read every 10 mins.) Chlorinity, oxygen, phosphate, transparency Miles traveled - 70 (Dr. C. A. Barnes)	Ocean 402 and 412 class aboard
88	25 February	Lake Washington	Bathymetry Gravity cores (2) Miles traveled - 20 (Dr. R. Bader)	
89	26 February	Puget Sound	Gravity cores (4) Snapper samples (4) Plankton hauls (3) Miles traveled - 30 (Drs. Bader and Frolander)	Ocean 403 class on board
90	28 February	Puget Sound	Anchor dredge (5) Miles traveled - 20 (Mr. M. P. Wennekens)	
91	1-2-3 March	Lake Washington	Piston cores (6) Bathymetry Miles traveled - 50 (Dr. Bader)	
92	5 March	Port Madison	Oceanographic stations Chlorinity, oxygen Miles traveled - 30 (Dr. T. G. Thompson)	Ocean chem class on board

SUMMARY OF MT/BROWN BEAR CRUISES FOR 1955

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS), ANALYSES (PARTY CHIEF)	REMARKS
93	7-8, 10-11, 14-18 March	Puget Sound	Biological dredges Anchor dredges Underwater photographs Miles traveled - 222 (Mr. M. P. Wennkens)	
94	21-25 March	Puget Sound Survey (28)	Oceanographic stations (60) BT's (60) High Speed plankton samples (19) Clarke-Bumpus plankton samples (34) Chlorinity, oxygen, phosphate, sulfite waste liquor Miles traveled - 1:30 (Mr. E. E. Collias)	
95	8 April	Puget Sound	Clarke-Bumpus plankton samples (6) Miles traveled - 30 (Mr. F. Hebard)	
96	9 April	Lake Washington	Bathymetric measurements Miles traveled - 20 (Dr. H. R. Gould)	
97	12-13 April	Possession Sound	Anchor dredges (6) Miles traveled - 150 (Mr. M. P. Wennkens)	
98	15-17 April	East Sound	Plankton hauls <i>Oceanographic Stations ()</i> Pigment samples Miles traveled - 150 (Mr. C. Yentch)	Group of Dr. Skegel's students from University of British Columbia on board
99	28 April	Puget Sound	Clarke-Bumpus plankton samples (9) Miles traveled - 30 (Mr. F. Hebard)	

SUMMARY OF RESEARCH AND OBSERVATIONS 1954-1955

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (ANALOGIES), ANALYSES (PARTY CHIEF)	REMARKS
100	29-30 April	Colvos Passage, north end	Oceanographic stations (10) Eman current meter lowerings at 2.5, 10, 20, 30, 60, and 90 meters Miles traveled - 32 (Dr. R. G. Pequette)	Ocean 350 class on board
101	3-6 May	Strait of Juan de Fuca	Anchor dredges Underwater photographs Miles traveled - 250 (Mr. H. P. Hennichs)	Party of zoology students out on 3 May
102	9-12 May	Puget Sound Survey (29)	Oceanographic stations (52) BT's (52) Chlorinity, oxygen, phosphate, sulfite waste liquor Miles traveled - 480 (Mr. E. E. Collias)	
103	13-15 May	Southern Puget Sound	Oceanographic stations (6) Chlorinity, oxygen, phosphate Miles traveled - 90 (Dr. T. G. Thompson)	Dr. Thompson's ocean chem class on board, Mr. J. Gast, teaching assistant
104	20-22 May	San Juan Islands	Geological party on board Miles traveled - 180 (Dr. H. R. Gould)	Similar to Brown Bear Cruise 57
105	24-25 May	Strait of Juan de Fuca, eastern end	Salt water barge in tow Miles traveled - 11.0 (Mr. J. Stevens)	
106	26 May	Lake Washington	Oceanographic stations (5) Chlorinity, oxygen Miles traveled - 10 (Mr. E. E. Collias)	
107	9 June	Puget Sound	Testing ball breaker and other gear Miles traveled - 20 (Dr. R. G. Pequette)	

SUMMARY OF HYDROGRAPHIC SURVEY CRUISES FOR 1955

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (ANALYSES), ANALYSES (PAINTER CHIEF)	REMARKS
108	13 June- 3 July	Offshore - Washington and Oregon coasts	Oceanographic stations (43) BT's (189) Plankton hauls (20) Gravity cores (54) Snapper samples (15) Fished 13 1/2 hours, 109 1/2 miles Chlorinity, oxygen, phosphate Night light stations (6) Miles traveled - offshore 2705, transit 240 (Mr. C. M. Love)	Two observers from Oregon Fish Commission on board
109	13-16 July	Georgia Strait, Juan de Fuca Strait, Northern Puget Sound	Oceanographic stations (48) BT's (48) Chlorinity, oxygen, phosphate, transparency Miles traveled - 372 (Dr. C. A. Barnes)	Dr. Barnes' ocean 351 class on board
110	1 August- 19 Sept	Gulf of Alaska	Oceanographic stations (72) BT's (268) Plankton samples (92) Gravity cores (44) Chlorinity, oxygen, phosphate, chlorophyll, light-dark bottles Miles traveled - 4700 (Dr. R. G. Paquette)	Part of NORFAC 1955 Many samples taken for special investigators See Special Report No. 22
111	7-11 November	Puget Sound Survey (30)	Oceanographic stations (55) BT's (55) Chlorinity, oxygen, phosphate Miles traveled - 494 (Mr. E. E. Collias)	

SUMMARY OF IV/BROWN BEAR CRUISES FOR 1955

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS), ANALYSES (PARTY CHIEF)	REMARKS
112	28 Nov- 2 Dec	Hood Canal	Anchor dredges (29) Gravity cores (19) Miles traveled - 150 (Mr. M. P. Wennekens)	
113	28 December	Puget Sound	Testing BT's Miles traveled - 10 (Mr. Don Hanson)	
114	29-30 December	Lake Washington	Piston Cores Miles traveled - 20 (Dr. H. R. Gould)	Using new improved piston corer

SUMMARY OF RV/DROWN BEAR CRUISES FOR 1956

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
115A B	5 6 January	Lake Washington	Piston cores (3) Miles traveled - 30 (Dr. Howard Gould)	
116	9-10 January	Hein Bank	Salt water barre core Miles traveled - 150 (Mr. John Stevens)	
117A B	19 20 January	Lake Washington	Piston cores (2) Miles traveled - 20 (Dr. Howard Gould)	
118	21 January	Puget Sound	Biological dredges (6) Miles traveled - 30 (Dr. Herbert Frolander)	
119	23-24 January	Port Susan	Oceanographic stations (6) Chlorinity, oxygen, phosphate, boron Miles traveled - 70 (Mr. James Gast)	
120A B C	26 27 28 January	Lake Washington	Piston cores (7) Miles traveled - 40 (Dr. Howard Gould)	
121	30 January	Puget Sound	Plankton hauls (6) Miles traveled - 20 (Mr. Frank Hebard)	
122A B C	2 3 4 February	Lake Washington	Piston cores (9) Miles traveled - 50 (Dr. Howard Gould)	
123	6 February	Puget Sound	Plankton hauls (6) Miles traveled - 20 (Mr. Frank Hebard)	

SUMMARY OF RV/BROWN BEAR CRUISES FOR 1956

COURSE NO.	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
1008 B C	9 10 11 February	Lake Washington	BT's and bottom temperatures Piston cores (7) Miles traveled - 50 (Mr. Thomas Budinger & Dr. Howard Gould)	
1009	13 February	Puget Sound	Plankton hauls (6) Miles traveled - 30 (Mr. Frank Hebard)	
1010	16-17 February	Lake Washington	BT's and bottom temperatures Miles traveled - 55 (Mr. Eugene Collias)	
1011	18 February	Puget Sound	Biological dredges (3) Plankton hauls (3) Miles traveled - 30 (Dr. Herbert Frolander)	Oceanography 1003 class on board
1012	20-21 February	Puget Sound	Plankton hauls (9) Miles traveled - 20 (Mr. Frank Hebard)	Time study near Point Jefferson
1013	25-26 February	Port Susan	Oceanographic stations (6) Chlorinity, oxygen, phosphate, boron Miles traveled - 70 (Mr. James Gast)	Oceanographic chemistry class aboard
1014	27 February- 2 March	Puget Sound Survey (31)	Oceanographic stations (52) BT's (54) Chlorinity, oxygen, phosphate Miles traveled - 480 (Mr. Eugene Collias)	
1015	2 March	Lake Washington	Piston core (1) Miles traveled - 6 (Mr. Thomas Budinger)	Obtained a 74- foot core

Summary of Biological and Chemical Data (1953)

DATE	AREA	OBSERVATIONS (AMOUNT), ANALYSES (DATE WHEN)	REMARKS
11 March	Large Seamount	Piston cores (4) Miles traveled - 50 (Mr. Thomas Dullinger)	
12 March	Large Seamount	Piston cores (2) Gravit. cores (10) Miles traveled - 30 (Mr. Thomas Dullinger)	
14 March	Large Seamount	Test Lincoln three-disc current meter Miles traveled - 25 (Mr. Allen Hurlbert)	
16-18 March	Puget Sound	Plankton hauls (20) Miles traveled - 60 (Mr. Frank Hurlbert)	
19 March	Puget Sound	Oceanographic stations (6) Chlorinity, oxygen, phosphate, boron Miles traveled - 70 (Mr. James Gask)	
20-22 March	Port Susan, Port Gardner, Possession Sound, San Juan Islands and San Pedro Sound	Anchor dredges (23) (Mr. Pat Wenzel)	Termination of bottom sampling for benthic communities in Puget Sound system.
23 March	Puget Sound	Test plankton haul (Dr. Robert Rappaport)	
2-14 April	Cobb Seamount	Oceanographic stations (10) BT's (145) Plankton hauls (2) Bottom sampling (20) Soundings - 570 miles Chlorinity, oxygen, phosphate Miles traveled - 1200 (Mr. Thomas Dullinger)	

SUMMARY OF RV/BROWN BEAR CRUISES FOR 1956

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
140A	19-21 April	Georgia Strait, Polier Pass to Sandy Head	Anchor dredges (11) (Mr. Pat Wennekens)	Canadian scientists from University of British Columbia aboard
B	22 April	Puget Sound	Plankton Hauls (Dr. Herbert Frolander)	
141	26 April	Lake Washington	Piston core (1) Miles traveled - 10 (Dr. Howard Gould)	Oceanography 452 class aboard
142	1 May- 9 June	Gulf of Alaska and adjacent waters	Oceanographic stations (74) BT's (320) Plankton hauls (187) Bottom samples (23) Night-light collections (16) Gill net sets (11) Chlorinity, oxygen, phosphate Miles traveled - 3984 (Mr. Guthbert Love)	
143	4-11 July	Silver Bay, Alaska	Oceanographic stations (42) BT's (25) S-T-D lowerings (54) Plankton hauls (37) Bottom samples (61) 20 miles surface trace Drift pole and dye studies Current measurements Temperature measurements by thermistor Chlorinity, oxygen, phosphate Miles traveled - 1800 (Dr. Clifford Barnes)	Pollution study sponsored by Government and private agencies. Funds largely from Alaska Lumber and Pulp Co.

SUMMARY OF RV/BROWN BEAR CRUISES FOR 1956

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
144	18 July- 31 August	Offshore- Washington, Oregon, California coast	Oceanographic stations (40) BT's (425) Biological samples (433) Mid water trawls (6) Night-light collections (7) Gravity cores (11) Other bottom samples (5) Bathymetry - 4000 miles (approx.) Albacore tuna caught - 108 Chlorinity, oxygen, phosphate Miles traveled - 4325 (Dr. Herbert Frolander)	Dr. R. H. Fleming aboard 20-31 August Two representatives of Oregon Fish Commission aboard
145	24-25 September	Port Susan	Oceanographic stations (6) Chlorinity, phosphate, boron Miles traveled - 70 (Mr. James Gast)	
146	22-24 October	Port Susan, Holmes Harbor	Oceanographic stations (11) Chlorinity, oxygen, phosphate, boron (6) Miles traveled - 100 (Mr. James Gast)	Boron samples on 6 stations
147	26 October	Lake Washington	Piston cores (3) Miles traveled - 10 (Mr. Thomas Budinger)	
148	20-21 November	Port Susan, Holmes Harbor	Oceanographic stations (8) Chlorinity, oxygen, phosphate, boron (6) Miles traveled - 90 (Mr. James Gast)	
149	23 November	Point Wells	Piston cores (25) Dredge (1) Miles traveled - 35 (Mr. Thomas Budinger)	Samples for Dr. Bader, dredge for U. S. Navy

SUMMARY OF RV/DROWN BEAR CRUISES FOR 1956

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
150	28 November	Lake Washington	Oceanographic stations (8) Chlorinity, oxygen, phosphate Miles traveled - 20 (Mr. John Lincoln)	
151	5-10 December	Puget Sound and offshore - Washington coast	Oceanographic stations (17) BT's (30) Plankton hauls (16) Miles traveled - 600 (Mr. Cuthbert Love)	
152	20 December	Port Susan, Holmes Harbor	Oceanographic stations (8) Chlorinity, oxygen, phosphate, boron (6) Miles traveled - 90 (Mr. James Gast)	

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1957

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
153	17-20 January	Northern Puget Sound	Oceanographic stations (3) Chlorinity, oxygen, phosphate BT's (2) (Dr. Clifford A. Barnes)	Special phosphate cast to determine freezing effect on samples
154	22-24 January	Southern Puget Sound 505-1	Oceanographic stations (31) Chlorinity, oxygen, phosphate Sulfide waste liquor (147) Biological oxygen demand (31) BT's (31) Plankton hauls (3) Snapper bottom-samples (20) (Mr. John Lincoln)	
155	26 January	Port Susan	Oceanographic stations (6) Chlorinity, oxygen, phosphate, borate, alkalinity, plant pigments (Mr. James Gast)	
156	28 January	Lake Washington, Lake Union	Oceanographic stations (8) Chlorinity, oxygen, phosphate BT's (8) (Mr. John Lincoln)	
157	29 January	Lake Washington	Stations (6) (Dr. Robert Paquette)	Test thermistors for micro-temperature structure
158	4-11 February	Puget Sound and Offshore - Washington and Vancouver Island coasts	Oceanographic stations (30) Chlorinity, oxygen, phosphate BT's (88) Plankton hauls (33) (Mr. Cuthbert M. Love)	8 stations inshore
159	18 February	Puget Sound	Plankton hauls Biological dredges Snapper bottom-samples (Dr. Herbert F. Frolander)	Demonstrations of equipment. Oceanography 403 class aboard

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1957

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
160	22 February	Port Susan	Oceanographic stations (6) Chlorinity, oxygen, phosphate, borate, alkalinity, plant pigments (Mr. James Gast)	
161	8-10 March	East Sound	Oceanographic stations (5) Chlorinity, oxygen, borate, alkalinity, iodine, carbon dioxide (Dr. Thomas G. Thompson, Mr. James Gast)	Oceanography 421 class aboard
162	17 March	Port Susan	Oceanographic stations (6) Chlorinity, oxygen, phosphate, borate, alkalinity, plant pigments (Mr. James Gast)	
163	19 March - 6 April	Silver Bay, Alaska and Offshore Washington and Vancouver Island coasts	Oceanographic stations (57) Chlorinity, oxygen, phosphate BT's (64 offshore, 36 inshore) Plankton hauls (11, 12) Plankton pump hauls (136) Midwater trawls (5,3) Snapper bottom samples (13) Micro-temperature measurements (14) Current measurements (72 hrs.) Drift pole and stick studies River runoff estimate Photographic record of beach conditions (Dr. Clifford A. Barnes; Mr. Cuthbert M. Love, offshore)	Pollution study sponsored by Government and private agencies Funds largely from Alaska Lumber and Pulp Co. 13 offshore stations taken enroute and return. USF&W Teal conducted S-T-D lowerings and with U.S. Forest Service Ranger VII aided with 50-hr. time study.
164	15-19 April	Puget Sound General Survey (81)	Oceanographic stations (56) Chlorinity, oxygen, phosphate, borate (6), plant pigments (6) BT's (51) (Mr. John Lincoln)	12 duplicate BT's to test new type of slides

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1957

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
165	23-26 April	Puget Sound to Tacoma Narrows	Midwater trawl (72) (Mr. William Aron)	
166	27 April	Agate Pass	Sampling techniques (Dr. Richard H. Fleming)	Demonstrations of equipment. Oceanography 203 class aboard
167	6-9 May	Southern Puget Sound 58° 2'	Oceanographic stations (29) Chlorinity, oxygen, phosphate BT's (29) Midwater trawls (56) (Mr. Cuthbert M. Love)	
168	13-17 May	Offshore - Washington coast	Oceanographic stations (6) Chlorinity, oxygen, phosphate BT's (22) Plankton hauls (6) Midwater trawls (46) Productivity (3) (Mr. Cuthbert M. Love)	Special phosphate samples
169	17-18 May	Port Susan, Hood Canal	Oceanographic stations (6) Chlorinity, oxygen, phosphate, borate, alkalinity, plant pigments Midwater trawls (13) (Mr. James Gast)	
170	23-26 May	Anacortes, East Sound	Oceanographic stations (5) Chlorinity, oxygen, phosphate, nitrite, silicate, plant pigments (Dr. Thomas G. Thompson, Mr. James Gast)	Oceanography 422 class aboard. Oceanography class from Skagit Valley Junior College (Mr. Robert Dursch) aboard for demonstration cruise
171	5 June	Lake Washington, Lake Union	Oceanographic stations (8) Chlorinity, oxygen, phosphate BT's (3) (Mr. John Lincoln)	

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1957

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
172	10-14 June	Puget Sound General Survey (33)	Oceanographic stations (70) Salinity, oxygen, phosphate BT's (70) Midwater trawls (2) (Mr. John Lincoln)	Salinity Bridge aboard for first time
173	17 June	Puget Sound	Midwater trawls (7) (Mr. William Aron)	Midwater trawl and depth- distance recorder tested and calibrated
174	18 June	Port Susan	Oceanographic stations (6) Chlorinity, oxygen, phosphate, borate, alkalinity, plant pigments (Mr. James Gast)	
175	8-15 July	Georgia, Haro, Juan de Fuca Straits. Offshore- Washington coast	Oceanographic stations (38) Salinity, oxygen, phosphate BT's (37) Plankton hauls (16) Productivity (5) (Dr. Clifford A. Barnes, Mr. John Dermody)	Oceanography 361 class from Friday Harbor aboard

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1957

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
176	22 July - 22 September	Gulf of Alaska, Bering Sea, Aleutian Trench	Oceanographic stations (36) Salinity, oxygen, phosphate, silicate, pH, alkalinity, particulate iron, manganese, calcium, borate, iodine, total phosphorus Age-dating samples (11) BT's (437) Plankton hauls (65) Midwater trawls (149) Secchi disc (16) Productivity (110) Time series (2 x 30-hrs.) Individual current measurements (228) Bottom cores - gravity corer (6) Miles traveled - 6600 (Dr. Robert Paquette)	IGY cruise Deepest sample - 7280 m. in Aleutian Trench, Sta. 176-10 Data punched on IBM cards Ports of call - Adak (twice) Kodiak
177A 177B	29 30 October	Lake Washington Lake Union	Oceanographic stations (8) Chlorinity, oxygen, phosphate BT's (2) (Mr. Cuthbert M. Love)	
178	1-2 November	Admiralty Inlet, Saratoga Passage	Midwater trawls (20) (Mr. William Aron)	
179	4-12 November	Puget Sound and Offshore - Washington and Vancouver Island coasts	Oceanographic stations (33) Chlorinity, oxygen, phosphate BT's (73) Plankton hauls (29) Midwater trawls (2) Productivity (6) (Mr. Cuthbert M. Love)	8 stations inshore

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1957

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS), ANALYSES (PARTY CHIEF)	REMARKS
180	2-6 December	Puget Sound General Survey (34)	Oceanographic stations (58) Chlorinity, oxygen, phosphate BT's (57) (Dr. Robert Paquette)	Oceanography class from Skagit Valley Junior College (Mr. Robert Dursch) aboard 4 December for demonstration cruise
181	6-7 December	Admiralty Inlet, Saratoga Passage	Midwater trawls (20) (Mr. William Aron)	

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CRUISE NUMBER	DATES	AREA	OBSERVATIONS (EQUIPMENT, ANALYSES (DEPT. CHIEF))	REMARKS
182	2-3 January	Strait of Juan de Fuca, Admiralty Inlet, Puget Sound	Oceanographic station (h) Fe and Productivity samples (Dr. Sayed A. El Wardani)	
183	7 January	Lake Washington, Lake Union	Hydrographic station (8) Cl, T ^{OC} , O ₂ , PO ₄ , BT (Betty Ann Morse)	
184	10-11 January	Admiralty Inlet, Holmes Harbor, Saratoga Pass.	MWT (20) BT (5) (Mr. William Aron)	
185	31 January	Puget Sound, Port Madison, Agate Pass.	Demonstration Plankton and bottom sampling. (Dr. Herbert F. Frolander)	Oceanography 603 Class aboard.
186	7-8 February	Admiralty Inlet, Holmes Harbor, Saratoga Pass.	MWT (19) BT (3) (Mr. William Aron)	
187	10-14 February	Southern Puget Sound 585° 3	Oceanographic station (h3), Plankton, Core (1), Productivity samples (on 3 stations), current measurements at 5 depths at Windy Point in Totten Inlet from 1400, 11 Feb. to 0500, 14 Feb. (63 hrs.) from BB; at Cannery Pt. in Hammersley Inlet from MIDA for total of 25-1/4 hrs. (Mr. John H. Lincoln)	Vessel MIDA (US charter boat) working in conjunction with BROWN BEAR.
188	19-26 February	Offshore, Washington, Vancouver Island Coasts	Oceanographic station (29), BT (62) MWT (6), Corals (h), Plankton (13) (Mr. Guthbert Love)	
189	7-8 March	Admiralty Inlet, Holmes Harbor, Saratoga Pass.	MWT (20) BT (4) (Mr. William Aron)	

SUMMARY OF R/V DEEPH DEAR CRUISES FOR 1958

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
190	24 March	Pt. Jefferson	Calibration of BT's, D-D recorders, practice hydro casts. (Mr. John Dermody)	5 USCGS officers aboard for training.
191	4-5 April	Admiralty Inlet, Saratoga Pass, Holmes Harbor	MWT (20) BT's (5) (Mr. William Aron)	
192	11-13 April	East Sound	Oceanographic stations (4) T, Cl, O ₂ , pH, Alk. (Dr. Thomas Thompson, Mr. Richard A. Barkley)	Oceanography class aboard. Samples for dissolved organic matter. (Dr. Koyama)
193	14-17 April	Offshore, Washington & Vancouver Island Coasts	Oceanographic stations (2), thermistor measurements. (Dr. Gerald Garrison)	Cruise under direction of Dr. Gerald Garrison, Applied Physics Laboratory to make thermistor measurements.
194	2-3 May	Admiralty Inlet, Holmes Harbor, Saratoga Pass.	MWT (20) BT's (5) (Mr. William Aron)	
195	17 May	Puget Sound, Agate Pass,	Demonstration of equipment. (Dr. Richard H. Fleming)	Oceanographic 203 class aboard. Department personnel aboard.
196		East Sound	Oceanographic stations (4), T, Cl, O ₂ , pH, Alk, PO ₄ , Nitrite, Silicate, (Dr. Thomas Thompson, Mr. Richard A. Barkley)	Oceanography class aboard. Samples for dissolved organic matter. (Dr. Koyama)
197	5 June	Lake Washington	To photograph routines on board. (Mrs. Edith L. Haselwood)	Photographic cruise.
198	6-8 June	Admiralty Inlet, Holmes Harbor, Saratoga Pass., Straits of Juan de Fuca	Oceanographic stations (4) BT's (8) MWT's (12) MMWT's (13) (Mr. William Aron, Mr. John Dermody)	(MWT = 3' trawl - "midget" midwater trawl)

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
199	30 June 20 August	N.E. Pacific - Strait of Juan de Fuca to San Diego	Oceanographic stations (42), BT's (467) Flankton (39), MWT (336), T, S, O ₂ , PO ₄ , Si, Fe, Mn, pH, Alk, productivity, CO ₂ , albacore trolling, cores (13) (Dr. Maurice Rattray, Jr.)	RGV cruise. Ports: San Francisco 24-26 July, San Diego 29-31 July. Steamed 5,500 miles. Deepest station 4896 meters.
200	14 September	Lake Washington	Oceanographic station (2), bottom samples (2), BT (1), MWT (1), S, O ₂ (Dr. Richard H. Fleming)	Demonstration cruise, chancellors British & German wealth Universities aboard.
201	15-19 September	Puget Sound General Survey (35)	Oceanographic stations (54) T, S, O ₂ , PO ₄ , BT, productivity samples on 8 stations. (Mr. John H. Lincoln)	2 protected thermometers broken.
202	20 Sept. 3 October	Offshore, Washington & Vancouver Island Coasts	MWT (89), oceanographic stations (14) T, S, O ₂ , PO ₄ , BT, Plankton (30), Cores (5) (Mr. William Aron)	1 protected thermometer broken.
203	23-25 October	Carr Inlet, Puget Sound, Holmes Harbor	3 stations: productivity (5 series), C-B plankton (3), Light penetration (1 series), S, O ₂ , PO ₄ , NO ₃ , BT, chlorophyll, total organic matter. (Dr. George Anderson)	Anchored at Pt. Jefferson 0600 - 1730, 24 October
204 (LWS-2)	5 November	Lake Washington, Lake Union	Oceanographic stations (5), BT's (5) (Mr. John Dermody)	Mr. William Finnegan of U.S. Army Engineers aboard to assist in work.
204-A	8 November	Lake Washington	Oceanography 105 class demonstration (Dr. Joe S. Grenger)	
205	17-21 November	Puget Sound, General Survey (36)	Oceanographic stations (67), T, S, O ₂ , PO ₄ , BT's, Productivity (Mr. John H. Lincoln)	Area covered included Budd, Rudd, and Eld Inlets. Used 3 BT, 3 messengers.

CRUISE NUMBER	DATE	AREA	OBSERVATIONS (SPECIES, TIME, (PARTY CHIEF)	REMARKS
206 (LWS-3)	25 November	Lake Washington, Lake Union, Salmon Bay	Oceanographic stations (6), T, S, O ₂ , PO ₄ , BT (Mr. John Darnody)	
207	2 December	Lake Washington	MWT (11) (Mr. William Aron)	Testing of port pump arrangements in addition to the 11 hauls made 11/24/52
208	4-6 December	Puget Sound, Hood Canal	Oceanographic stations (4), T, S, O ₂ , PO ₄ , NO ₃ , pH, chlorophyll, productivity zooplankton (Dr. George Anderson)	
209	19-23 December	Complete Puget Sound Survey (31)	Oceanographic stations (62), T, S, O ₂ , PO ₄ , BT's. Productivity (Mr. John Darnody)	Student training cruise 6 samples for organic C, N, P.

SHIP LOG OF R/V HAWK BEAR CRUISES FOR 1972

CRUISE NUMBER	DATE	AREA	OBSERVATIONS (ACQUISITION), ANALYSES (PARTY CHIEF)	REMARKS
210 LWS-4	12 January	Lake Washington	Cores for Zoology (J. Shapiro) - 16 Cl, O ₂ , PO ₄ , T ⁶⁰ C. (3 stations) (Dunnody)	
211	14 January	Pt. Jefferson	Prod. (1) chlorophyll (Anderson) BE, Cl, PO ₄ , NO ₃ , pH, plankton	
210 (b)	16 January	Lake Union	Cl, O ₂ , PO ₄ , T ⁶⁰ C (2) (Henson)	Continuation of Cruise 210
212	23 January	Puget Sound	Demonstrations of Biol. Gear. Hatched Pairs of G. D. and 1/2 m. hulls (3) (Frelander)	Class - Ocean. 403
213	26-28 January	Jervis Inlet	Joint AFL Cruise - testing AFL and Cl gear in deep water Cl, T ⁶⁰ C, O ₂ , (3) Prod (4) OB (2) (Dunnody, Dunnody)	
214	30 January	Port Madison	Student training in bathymetry, bottom samples, horiz. control (Greager)	Ocean. 503
215	3-4 February	Lake Washington, Holmes Harbor, Saratoga Passage	NAT (10) BE's (2) (Aron)	staff photographer aboard
216 A	5 February	Pt. Jefferson	GBK calibration and tests (Piquette)	
217	6-8 February	Gair Inlet, Hood Canal, Holmes Harbor, Adair Bay Inlet	Prod. (3) chlorophyll BE, Cl, PO ₄ , NO ₃ , pH, plankton (Anderson)	
218	21 February	Puget Sound Basin	Hydro. Sta. (5) S ⁶⁰ /cc, T ⁶⁰ C, O ₂ , PO ₄ , N ₂ (Barnes)	Ocean. 410

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1959

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (ASSETS), ANALYSES, (PARTY CHIEF)	REMARKS
216B	26 February	Pt. Jefferson	WSP calibration and tests (Pequette)	
219	2 March	Port Susan	Hydro stas. (5) S ₂ , T ₂ , O ₂ , PO ₄ (Pequette)	C & GS students
220A	27-28 February	East Sound	Hydro. Sta. (3) T ₂ , S ₂ , pH, Alk, O ₂ , T ₂ , I ₂ (Thompson)	Ocean. 421 (1st part)
220B	5-7 March	East Sound	Hydro Sta. (3) T ₂ , T ₂ , T ₂ , S ₂ , pH, Alk, O ₂ , N ₂ (Thompson)	Ocean. 421 (2nd part)
221	3-4 March	Dabob Bay	Hydro Sta. (29), S ₂ , T ₂ , O ₂ , PO ₄ , micro-structure (Pequette)	Joint cruise w/ API- micro-currents
222	12-22 March	Haro Strait	Hydro Sta. (3), S ₂ , O ₂ , PO ₄ , T ₂ , WSP (4) N ₂ (Rattray)	currents Haro, H.C.
223	24-28 March (38)	Puget Sound	Hydro Sta. (60), S ₂ , T ₂ , O ₂ , PO ₄ , Prod. (James)	Puget Sound Survey
224	30 March- 2 April	Indian Arm	Hydro Sta. (8), S ₂ , T ₂ , O ₂ , PO ₄ , Prod. (Anderson)	Joint cruise w/ RCUBS
225	10-12 April	Spokane River	Hydro Sta. (2), S ₂ , T ₂ , PO ₄ , NO ₃ , Chlorophyll, CD, ST, Electrometer, Redd. (Anderson)	
226	15 April	Pt. Jefferson area	Dredging trials (4) (Cwen)	Biol. Sample Gathering
227	24 April	Pt. Jefferson area	Interception (Evenden)	Ocean. 431
228 LWS-5	29 April	Johns Washington and Union	Hydro Sta. (5) WSP (4) Bottom Sample (1) WSP (8) (James)	w/ U. S. Army Engineers

CRUISE LOG OF THE U.S. COAST AND GEOD. SURV. VESSEL "ALBATROSS" TO 1957

CRUISE NUMBER	DATE	AREA	STATION (S), (A), (B), (C), (D), (E), (F), (G), (H), (I), (J), (K), (L), (M), (N), (O), (P), (Q), (R), (S), (T), (U), (V), (W), (X), (Y), (Z), (AA), (AB), (AC), (AD), (AE), (AF), (AG), (AH), (AI), (AJ), (AK), (AL), (AM), (AN), (AO), (AP), (AQ), (AR), (AS), (AT), (AU), (AV), (AW), (AX), (AY), (AZ), (BA), (BB), (BC), (BD), (BE), (BF), (BG), (BH), (BI), (BJ), (BK), (BL), (BM), (BN), (BO), (BP), (BQ), (BR), (BS), (BT), (BU), (BV), (BW), (BX), (BY), (BZ), (CA), (CB), (CC), (CD), (CE), (CF), (CG), (CH), (CI), (CJ), (CK), (CL), (CM), (CN), (CO), (CP), (CQ), (CR), (CS), (CT), (CU), (CV), (CW), (CX), (CY), (CZ), (DA), (DB), (DC), (DD), (DE), (DF), (DG), (DH), (DI), (DJ), (DK), (DL), (DM), (DN), (DO), (DP), (DQ), (DR), (DS), (DT), (DU), (DV), (DW), (DX), (DY), (DZ), (EA), (EB), (EC), (ED), (EE), (EF), (EG), (EH), (EI), (EJ), (EK), (EL), (EM), (EN), (EO), (EP), (EQ), (ER), (ES), (ET), (EU), (EV), (EW), (EX), (EY), (EZ), (FA), (FB), (FC), (FD), (FE), (FF), (FG), (FH), (FI), (FJ), (FK), (FL), (FM), (FN), (FO), (FP), (FQ), (FR), (FS), (FT), (FU), (FV), (FW), (FX), (FY), (FZ), (GA), (GB), (GC), (GD), (GE), (GF), (GG), (GH), (GI), (GJ), (GK), (GL), (GM), (GN), (GO), (GP), (GQ), (GR), (GS), (GT), (GU), (GV), (GW), (GX), (GY), (GZ), (HA), (HB), (HC), (HD), (HE), (HF), (HG), (HH), (HI), (HJ), (HK), (HL), (HM), (HN), (HO), (HP), (HQ), (HR), (HS), (HT), (HU), (HV), (HW), (HX), (HY), (HZ), (IA), (IB), (IC), (ID), (IE), (IF), (IG), (IH), (II), (IJ), (IK), (IL), (IM), (IN), (IO), (IP), (IQ), (IR), (IS), (IT), (IU), (IV), (IW), (IX), (IY), (IZ), (JA), (JB), (JC), (JD), (JE), (JF), (JG), (JH), (JI), (JJ), (JK), (JL), (JM), (JN), (JO), (JP), (JQ), (JR), (JS), (JT), (JU), (JV), (JW), (JX), (JY), (JZ), (KA), (KB), (KC), (KD), (KE), (KF), (KG), (KH), (KI), (KJ), (KK), (KL), (KM), (KN), (KO), (KP), (KQ), (KR), (KS), (KT), (KU), (KV), (KW), (KX), (KY), (KZ), (LA), (LB), (LC), (LD), (LE), (LF), (LG), (LH), (LI), (LJ), (LK), (LL), (LM), (LN), (LO), (LP), (LQ), (LR), (LS), (LT), (LU), (LV), (LW), (LX), (LY), (LZ), (MA), (MB), (MC), (MD), (ME), (MF), (MG), (MH), (MI), (MJ), (MK), (ML), (MM), (MN), (MO), (MP), (MQ), (MR), (MS), (MT), (MU), (MV), (MW), (MX), (MY), (MZ), (NA), (NB), (NC), (ND), (NE), (NF), (NG), (NH), (NI), (NJ), (NK), (NL), (NM), (NN), (NO), (NP), (NQ), (NR), (NS), (NT), (NU), (NV), (NW), (NX), (NY), (NZ), (OA), (OB), (OC), (OD), (OE), (OF), (OG), (OH), (OI), (OJ), (OK), (OL), (OM), (ON), (OO), (OP), (OQ), (OR), (OS), (OT), (OU), (OV), (OW), (OX), (OY), (OZ), (PA), (PB), (PC), (PD), (PE), (PF), (PG), (PH), (PI), (PJ), (PK), (PL), (PM), (PN), (PO), (PP), (PQ), (PR), (PS), (PT), (PU), (PV), (PW), (PX), (PY), (PZ), (QA), (QB), (QC), (QD), (QE), (QF), (QG), (QH), (QI), (QJ), (QK), (QL), (QM), (QN), (QO), (QP), (QQ), (QR), (QS), (QT), (QU), (QV), (QW), (QX), (QY), (QZ), (RA), (RB), (RC), (RD), (RE), (RF), (RG), (RH), (RI), (RJ), (RK), (RL), (RM), (RN), (RO), (RP), (RQ), (RR), (RS), (RT), (RU), (RV), (RW), (RX), (RY), (RZ), (SA), (SB), (SC), (SD), (SE), (SF), (SG), (SH), (SI), (SJ), (SK), (SL), (SM), (SN), (SO), (SP), (SQ), (SR), (SS), (ST), (SU), (SV), (SW), (SX), (SY), (SZ), (TA), (TB), (TC), (TD), (TE), (TF), (TG), (TH), (TI), (TJ), (TK), (TL), (TM), (TN), (TO), (TP), (TQ), (TR), (TS), (TT), (TU), (TV), (TW), (TX), (TY), (TZ), (UA), (UB), (UC), (UD), (UE), (UF), (UG), (UH), (UI), (UJ), (UK), (UL), (UM), (UN), (UO), (UP), (UQ), (UR), (US), (UT), (UU), (UV), (UW), (UX), (UY), (UZ), (VA), (VB), (VC), (VD), (VE), (VF), (VG), (VH), (VI), (VJ), (VK), (VL), (VM), (VN), (VO), (VP), (VQ), (VR), (VS), (VT), (VU), (VV), (VW), (VX), (VY), (VZ), (WA), (WB), (WC), (WD), (WE), (WF), (WG), (WH), (WI), (WJ), (WK), (WL), (WM), (WN), (WO), (WP), (WQ), (WR), (WS), (WT), (WU), (WV), (WW), (WX), (WY), (WZ), (XA), (XB), (XC), (XD), (XE), (XF), (XG), (XH), (XI), (XJ), (XK), (XL), (XM), (XN), (XO), (XP), (XQ), (XR), (XS), (XT), (XU), (XV), (XW), (XX), (XY), (XZ), (YA), (YB), (YC), (YD), (YE), (YF), (YG), (YH), (YI), (YJ), (YK), (YL), (YM), (YN), (YO), (YP), (YQ), (YR), (YS), (YT), (YU), (YV), (YW), (YX), (YY), (YZ), (ZA), (ZB), (ZC), (ZD), (ZE), (ZF), (ZG), (ZH), (ZI), (ZJ), (ZK), (ZL), (ZM), (ZN), (ZO), (ZP), (ZQ), (ZR), (ZS), (ZT), (ZU), (ZV), (ZW), (ZX), (ZY), (ZZ)	REMARKS
222	1-8 May	Amesbury & Hood Canal	Hydro (1) plankton hauls (3) BT (1) (Anderson)	W. 100 ft College Science Dept
230	15-17 May	East Sound	MTT (10) Chem. Instruction (Thompson)	Ocean. 442 (1st part)
231	18-20 May	East Sound	Chem. Instruction (Thompson)	Ocean. 442 (2nd part)
232	26 May	Lake Washington	MTT (10) BT (1) (Linger)	
233	3-5 June	Puget Sound (39)	Hydro (41) BT (39) (Dennis)	
234	17 June-3 July	Puget Sound & Offshore	Instruction (Paquette)	Ocean. 361
235	31 July-3 August	N. Pacific & Bering Sea	Hydro Sta. (17) BT (165) MTT (81) Prod. (Aron)	
236	5 August-2 September	Haring Strait & Chukchi Sea	Hydro (178) BT (136) Plank. (260) Bottom S. (158) Prod. (61) Currents () (Planning)	Project CHALICE
237	7 October	Lake Washington	Instruction MTT (8) BT (1) (Anderson)	Biol. 473
238	8 October	Lake Washington	Calibrate UGM Edo fathometer (Greager)	
239	12-14 October	Lynch Cove	Hydro Sta. (6) CB (1) BT (6) Prod. (Barkley)	
240	19-21 October	Port Blaney	Bottom samples (49) (Burns)	
241	22 October	Lake Washington	Hydro Sta. (6) BT (6) (Dennis)	
241	1-6-6			

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1959

CRUISE NUMBER	DATE	AREA	OBSERVATIONS (A. DUFF), ANALYSES (PARTY INTERV)	REMARKS
242	26-29 October	Puget Sound 40a	Hydro Sta. (35) BT (45) Prod. STD (22) (Dormery)	
243	2-4 November	Hollingsham Bay 40b	Hydro Sta. (47) STD (22) Bottom (24) (Collins)	
244	24 November	Lake Washington	MBT (1) BT'S (1) (Linger)	
245	30 November-2 December	Lynch Cove	Hydro Sta. (13) BT (13) Radio phosphorus Prod (7) NO ₂ CB (Barkley)	
246	3 December	Fairweather Bay	Instruction (Greager)	Ocean. 405
247	5 December	Puget Sound	Instruction (Barnes)	Ocean. 390
248	10-11 December	Southern Puget Sound	Hydro (25) (Collins)	Dilution study

CRUISE NUMBER	DATE	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
249	18-19 January	Elliot Bay	Hydro (11), $\frac{1}{2}$ m (20), STD (12), BT (12) (English)	Ocean 403
250	20 January	Puget Sound	Dredges (4), MWT (2) (Henry)	
251	25-29 January	Puget Sound Survey (v1)	Hydro (69), BT (29), Productivity (3), C-B (1), Secchi (1) (Dermody)	
252	5 February	Port Susan	Hydro (6), BT (6), Grab (3) Secchi (3) (Collins)	Ocean X380
253	20 Feb. - 9 March	Santa Barbara Channel	Hydro (18), BT (15), Core (30), Phytoplankton (36), Currents (2), Thermistor (20) (Barkley)	In conjunction with N.O.T.S.
254	12-24 March	Western Pacific	Hydro (8), BT (80), PO_4 (15), Grab (8), Barnacle (40), MWT (47) (Barkley)	
255	8 April	Port Madison	Bathymetry (50 miles), Cores (2) (Creager)	
256	15 April	Lake Washington	Kullenberg Cores (2) (Creager)	
257	19-22 April	Bellingham Bay	Hydro Sta. (44), Cores (2), Grabs (15), S.S. (27), STD, S $^{\circ}/_{\infty}$, T $^{\circ}C$, O $_2$, PO_4 (346) (Collins)	

(continued)

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1960

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
258	26 April	Lake Washington	MWT (10), BT (1) (Linger)	
259	2-6 May	Puget Sound Survey (1/2)	Hydros (71), BT (25), Core (1), Grab (10), Secchi (3) (Henson)	
260	10 & 13 May	Puget Sound Basin	Hydro Sta. (8), Cl, O ₂ , PO ₄ , NO ₃ , NO ₂ , SiO ₄ , pH, Alk. (85) (Richards)	Ocean 422
261	16-19 May	Port San Juan & San Juan Islands	Grabs (24), Hydros (24), S ‰, T°C (24), Prod (6), plus 12-hour time study (Burns & Anderson)	
262	21-22 May	Bellingham Bay	Hydro Sta. (42), Grabs (12), Secchi (8), S.S. (10), STD, T°C, S ‰, O ₂ , PO ₄ (323) (Collias)	Ocean 412
263	27 May	Alki Point	Cores (37), Grabs (38) (Creager)	
264	7-8 June	Dabob Bay	Hydro (16), G-B (27), MWT (3), BT (14), Secchi Disk (7), Prod. (Dermody)	
265	10-20 June	Offshore	Hydro (68), Secchi (39), G-B (2), $\frac{1}{2}$ m (7) (Collias)	Ocean 460
266	23 June	Lake Washington	MWT (13), DD Recorder (3), BT (1), Secchi (1) (Linger)	

(continued)

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1960

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT), ANALYSES (PARTY CHIEF)	REMARKS
267	7 July	Puget Sound Basin	Instrument test and calibration (Creager, Paquette)	
268	12 July 28 Aug.	Bering and Chukchi Seas	Hydros (148), Secchi (122) $\frac{1}{2}$ m (74), C-B (72), Prod (67), Grab (63), Core (65) Current (34) (Gast)	
269	29 Aug.- 16 Sept.	Bering Sea and S.E. Alaska Inlets	Hydro (38), Grab (53) (Gast)	
270	6 October	Fairweather Bay	Grab (4), Core (3) (Creager)	Ocean 405
271	8 December	Puget Sound Basin	Hydro (2), Prod (18) (Anderson)	
272	14-20 December	Puget Sound Survey & ⁽⁴³⁾ Bellingham Bay	Hydro (109), MWT (13) (Collias)	
273	27-30 December	Dabob Bay	Hydro (23), Grab (15), MWT (5) C-B (25), Hydrophoto (2), $\frac{1}{2}$ m (10) (Burns, Damkaer)	Time Series

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1961

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS) ANALYSES (PARTY CHIEF)	REMARKS
274	6 January	Elliott Bay	Testing Gear (Mr. E. C. Collias)	Temperature-Salinity Recorder Test
275	10-21 January	Columbia River Cobb Seamount	Hydro (67) .5 MHV (20) Productivity (57) BT (121) SCD (24) CB (71) SPC (263) PRDS (17) (Mr. Cuthbert Love)	Dropped anchor and buoy for Dr. Paquette at Cobb Seamount
276	6-10 February	Admiralty Inlet Rosario Strait Bellingham Bay	Hydro (38) (Mr. E. C. Collias)	Rhodamine-B Dye Trace Studies in Bellingham Bay
277	20 February	Lake Washington	MWT (26) ET (1) SCD (1) (Mrs. Fay Linger)	No Hydro Stations
278	24 February	Shilshole Bay	1 Dredge Grabs: VV (2) .5MHV (1) CB (1) (Dr. Karl Banse)	Oceanography 403 Class No Hydro Stations
279	28 February	Port Susan	Hydro (6) PLKV (1) MWT (1) SCD (2) BT (6) (Mr. E. C. Collias)	Oceanography X380 Class
280	7-28 March	Columbia River	Hydro (74) CB (42) BT (144) Productivity (50) PRDS (12) SCD (21) .5MHV (18) SPC (264) (Mr. John Dermody)	
281	31 March	Lake Washington	Gear Testing (Mr. John Lincoln)	No Hydro Stations
282	4-9 April	Cobb Seamount	Hydro (6) BT (10) SPC (80) SCD (4) (Miss Bettyann Morse)	
283	14 April	Point Madison	Geology (Dr. Joe S. Creager)	

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1961

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS) ANALYSES (PARTY CHIEF)	REMARKS
284	17-21 April	Fuget Sound Survey 44	Hydro (59) (Mr. E. C. Collins)	
285	27-29 April	Saanich Inlet	Hydro (5) Van Dorn and Madsen Chem. Sampling of an Anoxic Fjord (Dr. Francis A. Richards)	
286	2-3 May	Lake Washington	Gear Testing - M-T (Mrs. Fay Linger)	
287	8-26 May	Columbia River	Hydro (82) CB (70) SCD (69) SPC (297) BT (134) (Mr. John Lincoln)	
288	9-18 June	Columbia River	Hydro (47) BT (62) CB (82) SCD (40) SPC (230) RWT (8) PEDD (30) (Mr. E. C. Collins)	
289	30 June	Lake Washington	Summer Institute Class Gear Demonstration, CB, BT, Hydro (2 parts) (Mr. H. Robert Dursch)	419
290	6-25 July	Columbia River	Hydro (77) BT (172) CB (50) SCD (54) SPC (120) (Mr. Cuthbert Love)	
291	20 July - 13 August	Columbia River	Hydro (28) GRC (14) BSGC (5) VV (25) DREG (1) (Dr. Joe S. Creager)	
292	14-20 August	Columbia River	Hydro (9) BT (23) SCD (6) SPC (66) (Dr. Clifford A. Barnes)	

MINUTES OF A/V BROWN BEAD CHURCH FOR 1961

CHURCH NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS) ANALYSES (PAINTY CHURCH)	REMARKS
293	14 Sept. - 20 Oct.	Columbia River	Hydro (129) BT (135) BTCL (87) CB (136) PROD (42) SCD (55) SPC (520) (Mr. E. C. Collias)	
294	2-4 November	Saanich Inlet	Hydro (1) Bottom Sediment Study (Mr. E. C. Collias)	
295	9 November	Lake Washington	VV (1) GRC (1) Sediment Study (Dr. Joe S. Greager)	+ 32
296	13-17 November	Puget Sound H	Hydro (72) (Mr. John Stevens)	
297	28 Nov. - 18 Dec.	Columbia River	Hydro (73) BT (37) BTCL (86) CB (117) SCD (26) SPC (237) (Mr. Guthbert Love)	

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WAVE TO AIRPORTS: 1970 IN COMING SUMMERS

BT	Bathythermograph
ETEL	Electric Bathythermograph
CTD	Conductivity Temperature Depth
COW	Continuous Observation
CTD	Conductivity Temperature Depth
Hydro	Hydrographic
KULC	Kullback Core
.5 MV	1/2-Meter Haul Vertical
HWT	Hidwater Trawl
PROD	Productivity at Multi-depths
PROD	Productivity Incubated
PRDS	Productivity Simulated
PSTC	Piston Core
SCD or SECCH	Secchi Disc
SHPK	Shipek Core
SPC	Special Chemistry
VV	Van Veen
OBSOLETE	
PLKV	Plankton Vertical

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1962

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT) ANALYSES (PARTY CHIEF)	REMARKS
298	11 January	PSS and Puget Sound Basin	Hydro (5) (Mr. E. C. Collias)	Mileage: 70
299	23 January - 7 February	Columbia River Survey	Hydro (97) BT (133) CB (32) SCD (33) SPC (406) PROD (194) (Mr. John Dermody)	97 Stations
300	23 February	Shilshole Bay	Class Demonstration MWT Trolling (Dr. Karl Banse)	Mileage: 18
301	1 March	Shilshole Bay	Class Demonstration MWT Trolling (Dr. Karl Banse)	Mileage: 18
302	5-10 March	Puget Sound Survey 41	Hydro (79) (Mr. John W. Stevens)	Mileage: 625 79 Stations
303	16 March	Port Madison	Sediment Study (Dr. Joe S. Creager)	
304	27 March - 11 April	Columbia River Survey	Hydro (73) BT (180) CB (47) SCD (40) SPC (380) PROD (188) (Mr. Cuthbert M. Love)	73 Stations
305	3-5 May	Saanich Inlet	Hydro (5) (Dr. Francis A. Richards)	Mileage: 230
306	19 May	Port Susan	Hydro (10) (Dr. Clifford S. Barnes)	10 Stations Mileage: 87
307	24-25 May	Puget Sound	Testing Plankton Samplers (Dr. Karl Banse)	

*Inshore
stations*

5

2

79

2

5

10

SUMMARY OF R/V BROWN BEAR CRUISES FOR 1962

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNT) ANALYSES (PARTY CHIEF)	REMARKS
308A 308B	7-13 June 13-19 June	Columbia River Survey	Hydro (79) GRC (2) VV (25) BT (115) CB (149) SPC (283) (Mr. E. C. Collias)	79 Stations
309	20 June - 9 July	Columbia River Survey	Hydro (89) BT (83) CB (59) (Dr. George C. Anderson)	89 Stations
310	10-23 July	Columbia River Survey	Hydro (31) BT (67) CB (41) SCD (33) SPC (71) (Mr. John W. Stevens)	31 Stations
311	24 July - 14 August	Columbia River Survey	Hydro (15) GRC (52) SHPK (10) (Dr. Dean A. McManus)	15 Stations
312 A 312 B	13-28 September 1-18 October	Columbia River Survey	GRC (16) CB (159) SCD (78) SHPK (17) CB (32) SPC (817) (Mr. E. C. Collias) (Mr. Cuthbert Love)	
313	24 October	Lake Washington	Core Grab (Dr. Joe S. Creager)	Mileage: 5
314	25 October	Lake Washington	Core Grab (Dr. Joe S. Creager)	Mileage: 5
315	25-27 October	Saanich Inlet	GRC, KULC, VV, Hydro Plankton, Bottom Sampler (Dr. Joe S. Creager)	Mileage: 230 1/2 station

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KEY TO ABBREVIATIONS USED IN CHINESE SUMMARIES

BT	Bathymograph
BTEL	Electric Bathymograph
CBH	Clarke Bump Horizontal
CBV	Clarke Bump Oblique
GC	Grasping Core
Hydro	Hydrographic
KULC	Kullenberg Core
.5 MUV	1/2-Meter Haul Vertical
MWT	Midwater Trawl
PRDP	Productivity at Multi depths
PRDI	Productivity Incubated
PRDS	Productivity Simulated
PSTC	Piston Core
SCU or SCOD	Secchi Disc
SHPK	Shipek Core
SPC	Special Chemistry
VV	Van Veen
ONSCU/STC	
PLEV	Plankton Vertical

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January 1965

UNIVERSITY OF WASHINGTON

SUMMARY OF BROWN BEAR CRUISES FOR THE YEAR 1963

DEPARTMENT OF OCEANOGRAPHY

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS) ANALYSES (CRUISE LEADER)	REMARKS	NAUT. MILES TRAV.	HYDRO STA.
316	21 February	Lake Washington Survey	In dry dock for repair November 1 to February 18 Instruction--bottom sampling technique & equipment (Dr. Dean A. McManus)	15 crew members for future cruises	14	0
317 (A&B)	22 February	Shilshole Bay	.5 MH; PRDD; PRDI; 6' MWT; CB; HYDRO; Nansen bottle; reversing thermometer (Dr. Karl M. Banse)	Class demonstration 2 sections	12	0
318	29 February - 20 March	Columbia River Survey	SPC (769); BT (121); FROD (418); FHPL (170); ZOPL (91); SECDI (35); IRDM (17); SOLR (20); LITS (14); (Mr. Cuthbert M. Love)		1965	106
319	27 March	Lake Washington Survey	Testing anchors, buoys, bottom currents (Mr. Walter C. Sands)		9	0
320	28 March - 10 April	Columbia River Survey	BT (38); FROD (205); FHPL (170); ZOPL (55); SECDI (16); IRDM (7); SOLR (25); LITS (10) (Mr. John W. Stevens)		1430	39
321	13 April	Port Orchard	(Dr. Joe S. Creager)	Ocean 553 class demonstration	28	0
322	16 April - 1 May	Columbia River Survey	SPC (398); BT (95); GEOL (6); FROD (387); FHPL (140); ZOPL (44); SECDI (37); (Mr. William A. Dawson)		1762	97

SUMMARY OF BROWN BEAR CRUISES FOR THE YEAR 1963

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS) ANALYSES (CRUISE LEADER)	REMARKS	NAUT. MILES TRAV.	HYDRO STA.
323	13-19 May	Columbia River Survey	SPC (336); BT (50); GEOL (5); PROD (147); PHPL (50); ZOPL (21); SECDI (14); IRDM (5); SOLR (7); LITS (5) (Mr. Cuthbert M. Love)		760	27
324	21 May - 4 June	Columbia River Survey	SPC (335); BT (143); ZOPL (47); SECDI (88) (Mr. John W. Stevens)		1486	140
325	12 June	Lake Washington Survey	(Dr. Joe S. Creager)		18	0
326	13-23 June	Columbia River Survey	SPC (273); BT (58); GEOL (18); PROD (31); SECDI (8) (Mr. Eugene E. Collias)	Ocean 460 class demonstration	791	76
327	24 June - 1 July	Cobbs Seamount Columbia River Survey	SPC (74); BT (28) (Mr. Walter C. Sands)		634	9
328	1-3 July	Saanich Inlet	(Dr. M. Grant Gross) Dr. Richards - Senior Scientist		156	0
329	8-19 July	Columbia River Survey	SPC (102); BT (51); PROD (289); PHPL (70); ZOPL (53); SECDI (26); IRDM (8); LITS (8) (Dr. George C. Anderson)		1240	38
330	5-6 August	Shilshole Bay	Underwater TV platform testing (Dr. Joe S. Creager)		18	0

SUMMARY OF BROWN BEAR CRUISES FOR THE YEAR 1963

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS) ANALYSES (CRUISE LEADER)	REMARKS	NAUT. MILES TRAV.	HYDRO STA.
331	12-24 August	Columbia River Survey	SPC (352); BT (69); GEOL (2); PROD (251); PHPL (70); ZOPL (7); SECDI (30); IRDM (6); SOLR (13) (Dr. M. Grant Gross) Dr. Barnes - Senior Scientist		956	63
332	24-28 August	Columbia River Survey	SPC (41); BT (11); PROD (67); PHPL (30); ZOPL (45); SECDI (3); IRDM (2); SOLR (5); LITS (3) (Mr. Gerald A. Sanger)		625	11
333	28 August - 14 September	Columbia River Survey	BT (28); (Dr. Dean A. McManus)		1366	41
334	15-18 September	Longbranch (off McNeil Island)	Testing underwater TV (Dr. Joe S. Creager)		93	0
335A	20-29 September	Columbia River Survey	SPC (827); BT (155); PROD (884); PHPL (215); ZOPL (72); SECDI (150); IRDM (17); SOLR (29); LITS (26) (Mr. Harlow G. Farmer)	}	3385	225
335B	30 September - 26 October	Columbia River Survey	Included above (Mr. Eugene E. Collias)			
336	30 October	Lake Washington Survey	Bottom sampling; GRC; VV; PDR; SHPK; SECDI; sexton (Dr. Joe S. Creager)	Ocean 405 Geology class demonstration	6	0
337	31 October	Lake Washington Survey	Bottom sampling; GRC; VV; sexton; SHPK; SECDI; PDR (Dr. Joe S. Creager)	Ocean 405 Geology class demonstration	6	0

SUMMARY OF BROWN BEAR CRUISES FOR THE YEAR 1963

CRUISE NUMBER	DATES	AREA	OBSERVATIONS (AMOUNTS) ANALYSES (CRUISE LEADER)	REMARKS	NAUT. MILES TRAV.	HYDRO STA.
338	20 November	Golden Gardens to Port Madison	Underwater camera; 6" corer; 12' piston corer (Dr. Dean A. McManus)		24	0
339	3-12 December	Columbia River Survey S. to 45°40'; W. to " 126°00'	SFC (48); BT (67); ZOPL (8) (Miss Betty-Ann Morse)		1033	67

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CRUISE NUMBER	DATES	AREA	CRUISE LEADER	PURPOSE	DATA COLLECTED (AMOUNTS)	NAUT. MILES TRAV.
340 (PSP 10)	27 January	Puget Sound Basin - Port Orchard	Eugene E. Collias	Survey water prop- erties; class cruise X380	Demonstrations: HYDRO (5); PHPL (2); CB (2); .5MN (4)	42
341 With OSH-5	11-27 February	*Columbia River outlet area	Guthbert M. Love	Scale and periods cruise	HYDRO (54); SPC (138); BT (154); SECDI (22); CHL (180); CB (8); RBL (4); PDCS (2); AIR (2); SOLR (6.3); ZOPL (8); SWO (4)	1467
342 (SWB 01)	6-11 April	Circumnavigate San Juan Islands to Pillar Pt.	Eugene E. Collias	Salt Water Balance study	HYDRO (94); RCM (62); HPCM (72) BTCL (1); BT (4)	294
343	1 May	Lake Washington; Webster Pt.	Douglas R. Fenton	Testing equipment	KLBC (2)	4
344	18 May - 6 June	Washington and Oregon coastal waters	Eugene E. Collias	Water properties studies; distri- bution of plankton	HYDRO (37); SPC (714); CB (176); PRDD (64); BTCL (22); BT (72); PHPL (653); IRDM (4); SECDI (18); SOLR (15); AIR (2)	2147
345	7-11 June	Astoria Canyon	Douglas R. Fenton	Survey Astoria Canyon bottom	HYDRO (7); BTPH (2); BT (7); 6" core (1); MWT (1); CB (61); HPPC (1)	201
346	12-21 June	Columbia River outlet area	Alyn C. Duxbury	Class cruise; Columbia River survey	HYDRO (77); ECKM (1); BT (43); KHCM (24); HPCM (39); PDR (1) SECDI (62); RGC (4)	521
347	22 June - 3 July	Columbia River outlet area	John W. Stevens	Columbia River water properties survey	HYDRO (98); SPC (225); BT (96) MWT (13); SECDI (46)	1248

* This area covers Washington - Oregon
coastal waters to 150 miles west

SUMMARY OF BROWN BEAR CRUISES FOR THE YEAR 1964

CRUISE NUMBER	DATES	AREA	CRUISE LEADER	PURPOSE	DATA COLLECTED (AMOUNTS)	NAUT. MILES TRAV.
348	22 July - 4 August	Cobb Seamount to Astoria vicinity	Walter C. Sands	Survey Cobb Seamount bathymetry; photog- raphy	BT; BTEL; PHCL; UCL; PHBW	
349	6-27 August	Columbia River outlet area	Gerald A. Sanger	Columbia River water properties survey via use of computer	HYDRO (31); PHPL (612); FRDD (105); SPWS (88); SPC (693); BTEL (9); IRDM (11); SECDI (16); SOLR (15); CB (101); PDP-5 computer test	31.70
350 (SWB 02)	8-12 September	Haro Strait; Strait of Juan de Fuca; Rosario Strait; Admiralty Inlet	Eugene E. Collias	Salt Water Balance study	HYDRO (94); RCM (66); HPCM (62); BT (5)	284
351	12-29 September	Columbia River outlet area	Alyn C. Duxbury	Columbia River box survey	HYDRO (142); FRDD (6); BT (142); HPPC (6); SPC (697); CB (4); ISL (144); HBW (229); FRDD (6)	1062

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CRUISE NUMBER	DATES	AREA	CRUISE LEADER	PURPOSE	DATA COLLECTED (AMOUNTS)	NAUT. MILES TRAV.
352	11-28 January	Columbia River outlet area	Eugene E. Collias	Columbia River water properties studies; biological samplings	HYDRO (27); SPC (710); PRDD (49); PHPL (327); IRDM (10); SECDI (13); SOLR (14); CB (91); AIR (1); PDGS (218)	2027
353	9-20 February	Columbia River outlet area	Betty-Ann Morse	Columbia River water properties studies	HYDRO (81); SPC (325); NH ₃ (169); BTEL (35); ISL (24); BT (11); SECDI (15); PDGS (25); RBL (6)	1088
354	19-28 March	Columbia River outlet area	Alyn C. Duxbury	Class cruise; water properties studies	HYDRO (49); SPC (225); NH ₃ (90); BT (21); BTEL (29); SECDI (22)	545
355	29 March - 8 April	Columbia River outlet area	John W. Stevens	Columbia River water properties studies	HYDRO (63); SPC (325); BT (3); BTEL (61); SECDI (31); AIR (2); thermometer calibration	498
356	9-13 April	Columbia River outlet area	Gerald A. Sanger	Columbia River water properties studies	HYDRO (12); MWT (4); CB (70); RBL (1); IRDM (4)	173
357	14 April - 2 May	Columbia River outlet area	Russell Sweetland	Columbia River water properties studies; biological studies	HYDRO (32); SPC (589); BT (59); BTEL (7); PRDD (118); SECDI (14); PHPL (477); IRDM (9); LITS (14)	1722
358	4 May	Lake Washington	Joe S. Creager	Ocean 460 class cruise	Sampling demonstrations	6
359	6 May	Lake Washington	Joe S. Creager	Ocean 460 class cruise	Sampling demonstrations	6

SUMMARY OF BROWN BEAR CRUISES FOR THE YEAR 1965

CRUISE NUMBER	DATES	AREA	CRUISE LEADER	PURPOSE	DATA COLLECTED (AMOUNTS)	NAUT. MILES TRAV.
360	7 May	Lake Washington	Joe S. Creager	Ocean 460 class cruise	Sampling demonstrations	8
361	8 May	Port Orchard	T. Saunders English	Water properties studies; biological sampling	HYDRO (2); VV (1); BT (3); PHPL (2); CB (1); MWT (2)	42
362	12-16 May	Port Angeles	Richard W. Sternberg	Testing underwater TV; testing current meters	UCL (2); HPCM (2); KHCM (1); PHPL (1)	134
363	18 May	Lake Washington	Dean A. McManus	Equipment testing		8
364	21 May - 3 June	Cobb Seamount	Walter C. Sands	Survey site for tower		
365	11-20 June	Columbia River outlet area	Alyn C. Duxbury	Columbia River water properties studies	HYDRO (60); SPC (300); BT (45); SPWS (300); SECDI (23); NH ₃ (50); VV (11); BTEL (15); PDR (60)	839
366	24 June - 2 July	Eickelberg Ridge	Y. R. Nayudu	Study bottom; take bottom photographs; dredging	HYDRO (1); PHBW (200); PHCL (200); VV (2); BT (2); FLBC (2); HPFC (2); GRC (2)	1285
367	2-12 July	Northern Washing- ton coast	Hsin-Yi Ling	To collect geo- logical samples on continental shelf	HYDRO (97); SHPK (61); BT (13); GRC (25); PSTC (11)	592
368	4-24 August	Strait of Juan de Fuca geological samples; Columbia River survey	Gerald A. Sanger	Emphasizing water properties studies and particulate matter in deep casts	HYDRO (42); SPC (804); BT (69); BTEL (24); PHPL (602); IRDM (16); SECDI (20); SOLR (16); ALPH (24); CB (99); MWT (10); AIR (1); Deep net (16); RBL (5)	1985

SUMMARY OF BROWN BEAR CRUISES FOR THE YEAR 1965

CRUISE NUMBER	DATES	AREA	CRUISE LEADER	PURPOSE	DATA COLLECTED (AMOUNTS)	NAUT. MILES TRAV.
369 (DAB 53)	27-30 August	Dabob Bay; Hood Canal; Strait of Juan de Fuca	Betty-Ann Morse	Continuing study of water properties	HYDRO (47); SECDI (24)	252
370	7-12 September	48°N and 125°-55°W	Richard W. Sternberg	Bottom sampling; current study; testing underwater TV	HPCM; UCL; VV; SHPK; GRC; ISL	
371	14-26 September	Columbia River outlet area	Alyn C. Duxbury	Currents and sus- pended sediment studies	HYDRO (53); SPC (320); BT (53); .5MN (6); SECDI (21); SFWS (320) HBW (entire cruise); ISCT (536); PHBW (150); HPCM (28); PVC (1)	1051
372	3 October	Port Madison	Clifford A. Barnes	Testing bottom currents; sparker high speed plank- ton catcher; BTEL		26
373 (DAB 58)	5-7 October	Dabob Bay; Hood Canal	William Peerenboom	Water properties and currents studies	HYDRO (14); SECDI (2); PDCS (28)	124
374	8-10 October	Puget Sound Basin; Strait of Juan de Fuca	Eugene E. Collias	Water properties studies	HYDRO (16); SECDI (7)	269
375 (DAB 59)	11-13 October	Dabob Bay; Hood Canal	William Peerenboom	Water properties and currents studies	HYDRO (18); SECDI (4); PDCS (31)	142
376	15 October	Port Madison; Puget Sound Basin	Dean A. McManus	Ocean 554 class cruise	KLBC; HPFC; PSTC; VV; SHPK	26

SUMMARY OF BROWN BEAR CRUISES FOR THE YEAR 1965

CRUISE NUMBER	DATES	AREA	CRUISE LEADER	PURPOSE	DATA COLLECTED (AMOUNTS)	NAUT. MILES TRAV.
377 (DAB 60)	18-20 October	Dabob Bay; Hood Canal	William Peerenboom	Water properties and currents studies	HYDRO (20); SECDI (5); PDCS (14)	182
378 (DAB 61)	24-26 October	Dabob Bay; Hood Canal	William Peerenboom	Water properties and currents studies	HYDRO (17); SECDI (3); PDCS (20)	134
379	29-31 October	Puget Sound Basin; Strait of Juan de Fuca	Eugene E. Collias	Water properties studies	HYDRO (15); SECDI (6)	270
380	3-21 November	Columbia River survey	Russell Sweetland	Water properties studies; biological samplings	HYDRO (14); SPC (403); BT (28); PRDD (128); SECDI (8); SOLR (8); CB (45); AIR (2); PHPL (168)	1758
*381 (DAB 63)	28-30 December	Dabob Bay; Hood Canal; Strait of Juan de Fuca	Eugene E. Collias	Water properties and currents studies	HYDRO (24); SECDI (3)	224

* The last official cruise of the Brown Bear for the
University of Washington, Department of Oceanography

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KEY TO ABBREVIATIONS USED IN CRUISE SUMMARIES OF THE
Brown Bear, Commando, Hoh, Kandu, Oceaneer, Onar,
Oshawa, Tenas, Thomas G. Thompson

AIR	Air samples	ISCT	In situ conductivity & temperature
AGZ	Agassiz dredge	ISL	Induction salinometer lowerings
ALPH	Alpha meter lowerings	KHCM	Kelvin-Hughes current meter (in hours)
BKG	Bathykymogram	KLBC	Kullenberg core
BT	Bathythermograph - mechanical	LITS	Light saturation experiments
BTEL	Bathythermograph - electrical	MWT	Midwater trawl samples
BTPH	Bottom photography	NIT	Lake Nitinat
CB	Clarke-Bumpus samples	PDCS	Parachute drogue current study (in hours)
CHL	Chlorophyll	PDP	Precision depth recorder
DAB	Dabob Bay	PESR	Precision echo sounding recorder
ESE	Esturine Ecology	FGC	Phleger gravity corer
GDR-T	Graphic depth recorder - transceiver	PHBW	Photometry - Black & white
GRC	Gravity core	PHCL	Photometry - color
HBW	Hourly bridge weather	PHPL	Phytoplankton samples
HPCM	Hydro products current meter	PRDD	Productivity at multi-depths
HPPC	Hydro products piston core	PSP	Puget Sound Productivity
HYDRO	Oceanographic stations	PSTC	Piston core
IRDM	Irradiance meter lowerings	PVC	Polyvinolchloride

RBL	Radiation Biology Laboratory samples
RCM	Roberts current meter
SECDI	Secchi disc readings
SHFK	Shipek grab samples
SIMRAD	Simonson Radio Corp.
SOLR	Solarimeter recordings (in days)
SPC	Special chemistry samples
SPW	Suspended particulate water
SRBL	Surface radiation biology
STD	Salinity temperature depth recorder
SWB	Salt Water Balance
SWO	Special wind observations
TDR	Temperature depth recorder
TSK	Tsurumi-Seiki-Kosakusho Co. Ltd.
UCL	Underwater camera lowerings
VD	Van Dorn bottles
VV	Van Veen grab samples
ZOPL	Zooplankton
.5MN	$\frac{1}{2}$ meter net plankton samples
1MN	1 meter net plankton samples

Oceanographic Cruises in which I have participated

Year	Dates	Ship (Cruise)	location	Cruise Name (or purpose)	Position	Days
1947	Summer	Hydah	San Juan Islands	Ocean Chem class	Student	9
1948	Summer	Hydah	San Juan Islands	Ocean Chem Class	Student	10
	July 2-31	Oncorhynchus	San Juan Islands	Ocean Chem Class	Student	9
	August 5-17	Oncorhynchus	San Juan Islands	Ocean Chem & Physical Ocean	Student	4
	Student	Oncorhynchus	San Juan Islands	Ocean Chem	Student	1
	September 1-4	Oncorhynchus	San Juan Islands	Day Trips	Cruise leader	2
	September 5 – 8	Oncorhynchus	Pillar Point to Seattle	STD and water samples	Deck	4
	September 21 – 22	Oncorhynchus	Southern Puget Sound	Water sampling	Cruise Leader	2
	September 27 – 28	Oncorhynchus	Seattle to Deception Pass	STD and water sampling	Cruise Leader	2
	October 12 – 13	Oncorhynchus	Seattle to Port Townsend	STD and water sampling	Cruise Leader	2
	October 18 – 21	Oncorhynchus	Admiralty Inlet – Hood Canal	STD and water sampling	Cruise Leader	4
	October 27 – 29	Oncorhynchus	To Port Townsend	STD and water sampling	Cruise Leader	2
	November 1 – 4	Oncorhynchus	Tacoma Narrows	STD and water sampling	Cruise Leader	4
	November 15 – 18	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	4
	November 22 – 24	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	3
	Nov 30 – Dec 2	Oncorhynchus	Commencement Bay	STD and water sampling	Cruise Leader	3
	December 7 – 10	Oncorhynchus	Strait of Georgia	STD and water sampling	Cruise Leader	3
	December 15-17	Oncorhynchus	Hood Canal	STD and water sampling	Cruise Leader	3
	December 10 – 13	Oncorhynchus	Southern Hood Canal	STD and water sampling	Cruise Leader	4
1949	January 10 – 14	Oncorhynchus	Admiralty Inlet – Poss. Sound	STD and water sampling	Cruise Leader	5
	January 17 – 20	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	4
	February 8, 9, 11,	Oncorhynchus	Elliott Bay Day trips	STD and water sampling	Cruise Leader	3
	February 15, 17, 21	Oncorhynchus	Elliott Bay Day trips	STD and water sampling	Cruise Leader	3
	February 23 – 25	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	3
	February 28	Oncorhynchus	East Passage	STD and water sampling	Cruise Leader	1
	Feb 38 – March 4	Oncorhynchus	Commencement Bay	STD and water sampling	Cruise Leader	5
	March 10 – 11	Oncorhynchus	Port Orchard	STD and water sampling	Cruise Leader	2
	March 14 – 18	Oncorhynchus	Whidbey Basin – Adm. Inlet	STD and water sampling	Cruise Leader	5
	March 28 – 31	Oncorhynchus	Hood Canal	STD and water sampling	Cruise Leader	4

Year	Dates	Ship (Cruise)	location	Cruise Name (or purpose)	Position	Days
1949	April 4 - 7	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	4
	April 12 - 14	Oncorhynchus	Possession Sound	STD and water sampling	Cruise Leader	6
	April 18, 21, 22	Oncorhynchus	Elliott Bay	STD and water sampling	Cruise Leader	3
	April 25 - 28	Oncorhynchus	Port Orchard, Poss. Sound	STD and water sampling	Cruise Leader	4
	May 3-5	Oncorhynchus	Hood Canal	STD and water sampling	Cruise Leader	3
	May 10-12	Oncorhynchus	Possession Sound	STD and water sampling	Cruise Leader	3
	May 20	Oncorhynchus	Elliott Bay	STD and water sampling	Cruise Leader	1
	May 24-25	Oncorhynchus	Southern Puget Sound	STD and water sampling	Cruise Leader	4
	June 14-17	Oncorhynchus	To Vancouver BC	STD and water sampling	Cruise Leader	4
	June 29	Oncorhynchus	Poss. Sound to Friday Harbor	STD and water sampling	Cruise Leader	1
	July 6-8	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise leader	3
	July 11-14	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	4
	July 27-29	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	3
	August 1 - 4	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	3
	August 8 - 12	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	5
	August 18	Oncorhynchus	Return to Seattle	Dead Head	Cruise Leader	1
	September 8-15	Oncorhynchus	Strait of Juan de Fuca	STD and water sampling	Deck	8
	September 22-23	Oncorhynchus	Port Orchard	STD and water sampling	Cruise leader	2
	October 6-7	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	2
	October 11-12	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	5
	November 19-23	Oncorhynchus	Southern Puget Sound	STD and water sampling	Cruise Leader	4
	Nov. 29 - Dec 3	Oncorhynchus	Hood Canal	STD and water sampling	Cruise Leader	5
1950	January 9	Oncorhynchus	Elliott Bay	STD and water sampling	Cruise Leader	1
	January 18-20	Oncorhynchus	Hood Canal	STD and water sampling	Cruise Leader	3
	Jan 31 - Feb 3	Oncorhynchus	Hood Canal	STD and water sampling	Cruise Leader	4
	February 20-24	Oncorhynchus	Southern Puget Sound	STD and water sampling	Cruise Leader	5
	March 1-2	Oncorhynchus	Hood Canal	STD and water sampling	Cruise leader	2
	March 7-9	Oncorhynchus	Port Orchard	STD and water sampling	Cruise Leader	3
	March 14-17	Oncorhynchus	Admiralty Inlet, etc	STD and water sampling	Cruise Leader	4
	March 28-31	Oncorhynchus	Hood Canal	STD and water sampling	Cruise Leader	4
	April 5-7	Oncorhynchus	Colvos Passage	STD and water sampling	Cruise Leader	3
	May 16-18	Oncorhynchus	Strait of Juan de Fuca	STD and water sampling	Cruise Leader	3

Year	Dates	Ship (Cruise)	location	Cruise Name (or purpose)	Position	Days
1950	June 8-10	Oncorhynchus	Southern Puget Sound	STD and water sampling	Cruise Leader	3
	June 28-29	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	2
	July 3-7	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	5
	July 9 - 14	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	6
	August 14-18	Oncorhynchus	Southern Puget Sound	STD and water sampling	Cruise Leader	5
	September 21-22	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	2
	September 28-29	Oncorhynchus	Elliott Bay	STD and water sampling	Cruise Leader	2
	October 19-20	Oncorhynchus	Colvos Passage	STD and water sampling	Cruise Leader	2
	November 1-3	Oncorhynchus	Tacoma Narrows	STD and water sampling	Cruise Leader	3
	November 7-9	Oncorhynchus	Tacoma Narrows	STD and water sampling	Cruise Leader	3
1951	March 19-22	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	4
	March 27-28	Oncorhynchus	Tacoma Narrows, Carr Inlet	STD and water sampling	Cruise Leader	2
	May 1-4	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	4
	May 21-24	Oncorhynchus	Admiralty Inlet	STD and water sampling	Cruise Leader	4
	July 5-6	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	2
	July 10-11	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	2
	July 13-14	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	2
	July 30-31	Oncorhynchus	San Juan Islands	STD, water sampling, students	Cruise Leader	2
	August 2	Oncorhynchus	Haro Strait	STD, water sampling, students	Cruise Leader	1
	18 Aug - 28 Sept	Burton Island	Beaufort Sea	Water sampling, bathymetry	Chemist and deck	20
1952	31 March-2 April	Brown Bear (2)	Bonneville Cable Area	Bathymetry and currents	Deck	1
	16-19 April	Brown Bear (3)	Admiralty Inlet	Time Study	Deck	3
	29 April - 5 May	Brown Bear (4)	Off Vancouver Island	Water sampling	Deck	6
	15 May	Brown Bear (5)	Puget Sound	Bonneville crossing	Deck	1
	28-29 May 3-6 June	Brown Bear (6)	Puget Sound	Sound Survey - 1	Deck	5
	July 2-16	Brown Bear (7)	Pacific Ocean	Two lines offshore and GEK	Deck	14
	20 Aug - 17 Sept	Burton Island	Beaufort Sea	Water sampling, bathymetry	Chemist and deck	8
	13-16 October	Brown Bear (10)	Puget Sound	Sound Survey - 2	Deck	5
	22 October	Brown Bear (11)	Lake Washington	Water sampling	Cruise Leader	1
	5-7 November	Brown Bear (14)	Admiralty Inlet	Time study	Deck	2
	12-14 17-18 Nov	Brown Bear (15)	Puget Sound	Sound Survey - 3	Deck	3
	15-19 December	Brown Bear (18)	Puget Sound	Sound Survey - 4	Deck	4

Year	Dates	Ship (Cruise)	location	Cruise Name (or purpose)	Position	Day:
1952	29-30 December	Brown Bear (19)	Bonneville Crossing	Bathymetry and currents	Deck	2
1953	21-27 January	Brown Bear (20)	Puget Sound	Sound Survey - 5	Deck	6
	16-20 February	Brown Bear (21)	Puget Sound	Sound Survey - 6	Cruise Leader	4
	3 March	Brown Bear (22)	Bonneville Cable	Bathymetry and currents	Deck	1
	16-20 March	Brown Bear (23)	Puget Sound	Sound Survey - 7	Cruise Leader	4
	14-18 April	Brown Bear (24)	Puget Sound	Sound Survey - 8	Cruise Leader	4
	30 April - 12 May	Brown Bear (26)	NE Pacific Ocean	Water sampling	Chemist	13
	18-22 May	Brown Bear (27)	Puget Sound	Sound Survey - 9	Cruise Leader	4
	June	Oncorhynchus	Puget Sound	Sound Survey - 10	Cruise Leader	5
	18-22 July	Brown Bear (30)	Puget Sound	Sound Survey - 11	Cruise Leader	4
	19-22 August	Brown Bear (32)	Puget Sound	Sound Survey - 12	Cruise Leader	4
	2 - 13 September	Brown Bear (33)	NE Pacific Ocean	Water sampling	Cruise Leader	11
	21-25 September	Brown Bear (34)	Puget Sound	Sound Survey - 13	Cruise Leader	4
	16-19 October	Brown Bear (35)	Puget Sound (north part)	Sound Survey - 14-a	Cruise Leader	3
	23-25 October	Brown Bear (36)	Puget Sound (south part)	Sound Survey - 14-b	Cruise Leader	2
	16-20 November	Brown Bear (39)	Puget Sound	Sound Survey - 15	Deck	4
	7-10 December	Brown Bear (42)	Puget Sound	Sound Survey - 16	Cruise Leader	3
	21-23 December	Brown Bear (44)	Bush Point	Time Study	Cruise Leader	3
1954	11-15 January	Brown Bear (46)	Puget Sound	Sound Survey - 17	Cruise Leader	4
	15-19 February	Brown Bear (50)	Puget Sound	Sound Survey - 18 Carr Inlet - 1	Deck	4
	22-26 March	Brown Bear (53)	Puget Sound	Sound Survey - 19 Carr Inlet - 2	Cruise Leader	4
	19-24 April	Brown Bear (55)	Puget Sound	Sound Survey - 20 Carr Inlet - 3	Cruise Leader	4
	13-14 17-20 May	Brown Bear (58)	Puget Sound	Sound Survey - 21 Carr Inlet - 4	Cruise Leader	5
	1-5 June	Brown Bear (60)	Bush Point	Time Study	Deck	4
	14-17 21-24 June	Oncorhynchus	Puget Sound	Sound Survey - 22 Carr Inlet - 5	Cruise Leader	8
	8-12 July	Brown Bear (63)	Puget Sound	Sound Survey - 23 Carr Inlet - 6	Cruise Leader	5
	10-13, 16-20 Aug	Oncorhynchus	Puget Sound	Sound Survey - 24 Carr Inlet - 7	Cruise Leader	7
	27 Sept - 2 October	Brown Bear (66)	Puget Sound	Sound Survey - 25 Carr Inlet - 8	Deck	5
	19-20 October	Brown Bear (68)	Carr Inlet	Carr Inlet - 9	Cruise Leader	2
	12-14 November	Brown Bear (72)	North Puget Sound	Sound Survey - 26a, 410 Class	Instructor	2
	15-18 November	Brown Bear (73)	South Puget Sound	Sound Survey - 26 Carr Inlet - 10	Cruise Leader	3
	22 November	Brown Bear (74)	Lake Washington	Water sampling	Cruise Leader	1

Year	Dates	Ship (Cruise)	location	Cruise Name (or purpose)	Position	Days
1954	12-14 December	Brown Bear (77)	Carr Inlet	Carr Inlet - 11	Cruise Leader	2
1955	17-21 January	Brown Bear (81)	Puget Sound	Sound Survey-27 Carr Inlet-12	Cruise Leader	4
	31 Jan - 4 February	Brown Bear (83)	Carr Inlet	Carr Inlet Time Study 4	Deck	5
	9-10 February	Brown Bear (85)	Carr Inlet	Carr Inlet - 13	Cruise Leader	2
	21-25 March	Brown Bear (94)	Puget Sound	Sound Survey - 28	Cruise Leader	4
	29-31 April	Brown Bear (100)	Colvos Passage	Dr Paquette and ocean 350 class	Instructor	2
	9-12 May	Brown Bear (102)	Puget Sound	Sound Survey - 29	Cruise Leader	4
	26 May	Brown Bear (106)	Lake Washington	Water sampling	Cruise Leader	1
	1 August-19 Sept	Brown Bear (110)	North Pacific Ocean	NORPAC	Chemist	49
	20 October 1955	Oncorhynchus	Lake Washington	Water sampling	Cruise Leader	1
	7-11 November	Brown Bear (111)	Puget Sound	Sound Survey - 30	Cruise Leader	2
1956	23-24 January	Brown Bear (119)	Port Susan	Samples for James Gast	Cruise Leader	2
	9 February	Brown Bear (124)	Lake Washington	Water sampling	Cruise Leader	1
	16-17 February	Brown Bear (126)	Lake Washington	Water sampling	Cruise Leader	1
	27 February- 2 Mar	Brown Bear (130)	Puget Sound	Sound Survey - 31	Cruise Leader	5
	4-11 July	Brown Bear (143)	Silver Bay, Alaska	Water sampling, currents	Asst Cruise Leader	8
1957	10 July - 20 August	Horizon (SI0)	San Diego to Aleutian Is	MUKLUK	Deck	41
1959	21 February	Brown Bear (218)	Puget Sound Main Basin	Water sampling	Deck	1
	3-5 March	Brown Bear (221)	Hood Canal	Water sampling	Deck	3
	19-23 March 1959	Brown Bear (222)	Haro Strait	Water sampling	Deck	4
	3-5 June	Brown Bear (233)	Puget Sound Survey	Water sampling	Cruise Leader	3
	26-29 October	Brown Bear (242)	Puget Sound Survey	Water sampling	Deck	3
	2-4 November	Brown Bear (243)	Northern Puget sound	Water sampling	Cruise Leader	3
	5 December	Brown Bear (247)	East Passage	Class project	Instructor	1
	10-11 December	Brown Bear (248)	Southern Puget Sound	Dilution study	Cruise Leader	2
1960	5 February	Brown Bear (252)	Port Susan	Ocean X380 class	Instructor	1
	19-22 April	Brown Bear (257)	Bellingham Bay	Water sampling	Cruise Leader	3
	21-22 May	Brown Bear (262)	Bellingham Bay	Water sampling	Cruise Leader	2
	10-20 June	Brown Bear (265)	Pacific Ocean	Ocean 460 class	Instructor	10
	2-4 November	Hydah	Bellingham Bay	BLL-08	Cruise Leader	3
	14-20 December	Brown Bear (272)	Puget Sound	Sound Survey-43 & BLL-9	Cruise Leader	5
1961	6-10 February	Brown Bear (276)	Puget Sound	Bellingham Bay - 10	Cruise Leader	4

Year	Dates	Ship (Cruise)	location	Cruise Name (or purpose)	Position	Days
1961	28 February	Brown Bear (279)	Port Susan	Ocean X380 Class	Instructor	1
	20-24 March	Astor	Bellingham Bay	Dye study	Cruise Leader	5
	17-21 April	Brown Bear (284)	Puget Sound	Sound Survey - 44	Cruise Leader	5
	9-18 June	Brown Bear (288)	Columbia River mouth	Water sampling	Cruise Leader	10
	14 Sept - 20 Oct	Brown Bear (293)	Columbia River Plum	Water sampling	Cruise Leader	36
1962	11 January	Brown Bear (298)	Port Susan	Water sampling	Cruise Leader	1
	5 - 10 March	Brown Bear (302)	Puget Sound survey	Water sampling	Cruise Leader	5
	7-19 June	Brown Bear (308)	Columbia River mouth	Water sampling	Cruise Leader	12
	12-28 September	Brown Bear (312A)	Columbia River mouth	Water sampling	Cruise Leader	16
1963	17 January	HOH (27)	Puget Sound	For Class X-380	Cruise Leader	1
	11 April	HOH (48)	Portage Bay	Testing current meter anchors	Cruise Leader	1
	16 -21 April	HOH (50)	Bellingham Bay (16)	Water sampling	Cruise Leader	5
	6 - 10 May	HOH (55)	Bellingham Bay (17)	Multi ship operation	Cruise Leader	2
	27 - 29 May	HOH (62)	Bellingham Bay	Retrieve current meters	Cruise Leader	3
	13-23 June	Brown Bear (326)	Columbia River mouth	Ocean 460 class on board	Instructor	10
	15 July	HOH (67)	West Point	Test current meters	Cruise Leader	1
	7 August	Tenas (19)	Lake Washington	Dye Study - 460 class	Instructor	1
	8 August	Tenas (20)	Lake Washington	Dye Study - 460 class	Instructor	1
	9 August	Tenas (21)	Lake Washington	Dye Study - 460 class	Instructor	1
	13 August	Tenas (22)	Lake Washington	Dye Study - 460 class	Instructor	1
	6 September	HOH (75)	Lake Washington	Dye Study	Cruise Leader	1
	10 September	HOH (76A)	Lake Washington	Dye Study	Cruise Leader	1
	11 September	HOH (76B)	Lake Washington	Dye Study	Cruise Leader	1
	12 September	HOH (76C)	Lake Washington	Dye Study	Cruise Leader	1
	16 September	ONAR (1)	Lake Washington	Dye Study - final	Cruise Leader	1
	30 Sept - 26 Oct	Brown Bear (335)	Columbia River area	Traced the plume	Cruise Leader	27
	29 - 31 October	HOH	West Point	Time study	Cruise Leader	2
	19 November	HOH	Elliott Bay	Testing Salinometers	Cruise leader	1
1964	27 January	Brown Bear (340)	Port Orchard	X380 Class	Instructor	1
	6-11 April	Brown Bear (342)	San Juan Islands	Salt Balance - 1	Cruise Leader	5
	18 May - 6 June	Brown Bear (344)	Columbia River Mouth	Water sampling	Cruise Leader	19
	8-12 September	Brown Bear (350)	San Juan Islands	Salt Balance - 2	Cruise Leader	4

Year	Dates	Ship (Cruise)	location	Cruise Name (or purpose)	Position	Days
1965	11-28 January	Brown Bear (352)	Columbia River Mouth	Water sampling	Cruise Leader	18
	8-10 October	Brown Bear (374)	Puget Sound	Water sampling	Cruise Leader	33
	29 Oct-1 Nov	Brown Bear (379)	Puget Sound to Pillar Pt	Water sampling	Cruise Leader	32
	29 Nov – 1 Dec	OA (89)	Hood Canal	Dabob Bay (63)	Cruise Leader	3
	28-30 December	Brown Bear (381)	Puget Sound to Pillar Pt	<i>{Last cruise of the Brown Bear}</i>	Cruise Leader	3
	29 Nov – 1 Dec	OA (69)	Hood Canal	Dabob Bay (62)	Cruise Leader	3
1966	25-27 January	OA (74)	Hood Canal	Dabob Bay (64)	Cruise Leader	3
	23-25 February	OA (78)	Hood Canal	Dabob Bay (65)	Cruise Leader	3
	23-25 March	HOH (251)	Hood Canal	Dabob Bay (66)	Cruise Leader	3
	21 June – 8 Oct		Hood Canal Bridge	Time study with APL	Cruise Leader	10
	9-11 November	HOH (311)	Hood Canal – Dabob Bay	Dabob Bay (77)	Cruise Leader	3
	30 Nov – 2 Dec	OA (144)	Hood Canal	Dabob Bay (78)	Cruise Leader	3
1967						0
1968	15-31 July	TG Thompson -30	Columbia River	Columbia River effects	Asst Cruise Leader	16
	31 December	Tenas	Lake Washington	Water sampling	Cruise Leader	1
1969	27-29 May	HOH (507)	Sannish Inlet	Water sampling	Cruise Leader	3
	25 May – 2 June	TG Thompson -38	San Diego to Seattle	Water sampling	Cruise Leader	7
1970						0
1971	21-29 January	HOH (551 & 552)	Kiket Island	Two ship operation	Senior Scientist	8
	13-16 February	HOH (554)	Kiket Island	Water sampling	Cruise Leader	4
	18-30 March	OA (345)	Kiket Island	Multi-ship operation	Senior Scientist	12
	13-16 April	OH (560)	Kiket Island	Water sampling	Cruise Leader	4
	4-6 May	OH (565)	Kiket Island	Water sampling	Cruise Leader	3
	14-18 June	OH (579)	Kiket Island	Time and dye study	Senior Scientist	5
	6-9 July	OH (590)	Kiket Island	Water sampling	Cruise Leader	4
	10 – 16 July	TG Thompson-60	Columbia River	Water sampling r	Cruise Leader	7
	27-29 July	OH (594)	Kiket Island	Water sampling	Cruise Leader	3
	17-19 August	OH (600)	Kiket Island		Cruise Leader	3

Year	Dates	Ship (Cruise)	location	Cruise Name (or purpose)	Position	Days
1971	7-9 September	OH (603)	Kiket Island		Cruise Leader	3
1972						0
1973	14-17 May	K7 (16)	Case Inlet	Puget Sound Waste Disposal	Cruise Leader	3
	08-11 June	K7 (18)	Hood Canal – Union	Puget Sound Waste Disposal	Cruise Leader	3
	31 July – 3 Aug	K7	Hood Canal – Union	Puget Sound Waste Disposal	Cruise Leader	4
	11-14 Sept	K7	Hood Canal-Union	Puget Sound Waste Disposal	Cruise Leader	4
1974	25 – 27 November	K7 (34)	Puget Sound Basin	Metro (2)	Cruise Leader	3
	16-18 December	K7 (35)	Puget Sound Basin	Metro (3)	Cruise Leader	3
1975	7 – 9 January	K7 (36)	Puget Sound Basin	Metro (4)	Cruise Leader	3
	28 – 30 January	K7 (37)	Puget Sound Basin	Metro (5)	Cruise Leader	3
	19-21 February	OA (637)	Puget Sound Basin	Metro (6)	Cruise Leader	3
	27-28 February	K7 (39)	Puget Sound Basin	Metro (7) Heavy metal	Cruise Leader	2
	1-3 April	K7 (40)	Puget Sound Basin	Metro (9)	Cruise Leader	3
	7-9 May	K7 (45)	Puget Sound Basin	Metro (11)	Cruise Leader	3
	4-8 August	K7 (50)	Puget Sound Basin	Metro (17)	Cruise Leader	5

Total days at sea 1,068

Appendix—34 Curriculum Vita

CURRICULUM VITAE

DATE: 20 February 1985

NAME: EUGENE E. COLLIAS

BIRTHDATE: 3 February 1925

EDUCATION

MS in Oceanography	Scripps Institution of Oceanography	1959
MS in Chemistry	University of Washington	1951
BS in Chemistry	University of Washington	1946

EMPLOYMENT

1969 - to date	Northwest Consultant Oceanographers, Inc. (presently Technical Director)
1970 - 1980	Principal Oceanographer, Univ. of Wash.
1959 - 1970	Senior Oceanographer, Univ. of Washington
1956 - 1960	Graduate Student, Scripps Inst. of Oceanography.
1948 - 1956	Oceanographer, Univ. of Washington

RESEARCH

- - Compiled Northwest Regional Environmental Data Base Directory (EDBD) for National Oceanographic Data Center.
- - Compiled and reviewed all available water characteristics data from Grays Harbor, Washington
- - Compiled all available water characteristics data from Puget Sound for entry into EPA's STORET data files.
- - Numerous projects related to waste disposal into the waters of Puget Sound
- - Investigation of the effect of the sewers of METRO upon the nutrients in the main basin of Puget Sound The effect of dredged material disposal in Elliott Bay upon heavy metals
- - Tide height measurements, data reduction, and evaluation of long term tide information in basins in Puget Sound
- - Descriptive physical-chemical oceanography of Puget Sound
- - The effects of the Columbia River upon the NE Pacific
- - Computer assisted processing of oceanographic data
- - Party Chief or Senior Scientist on over 200 oceanographic cruises into Puget Sound and the Pacific ocean

TEACHING EXPERIENCE

Oceanography 101 (a survey course)	18 quarters
Field methods in oceanography	6 quarters

MEMBER OF

Sigma Xi
American Geophysical union
American Association for the Advancement of Sciences
Marine Technology Society
Photographic Society of America
University Christian Church, Seattle

PUBLICATIONS

Collias, E. E.

1951 The potentiometric titration of sulfate in sea water. Thesis for Master of Science, University of Washington.

Barnes, C. A. and E. E. Collias

1954 Physical and chemical data, Puget Sound and Approaches, March - August 1952. University of Washington, Department of Oceanography, Technical Report No. 24.

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1954 Physical and chemical data for Puget Sound and Approaches, February 1949 - February 1952. University of Washington, Department of Oceanography, Technical Report No. 28.

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1954 Physical and chemical data, Puget Sound and Approaches, October - December 1952, University of Washington, Department of Oceanography, Technical Report No. 35.

-----and -----

1956 Physical and chemical data, Puget Sound and Approaches, January - December 1953, University of Washington, Department of Oceanography, Technical Report No. 45.

-----and -----

1956 Physical and chemical data for Puget Sound and Approaches, January - December 1954, University of Washington, Department of oceanography, Technical Report No. 46.

-----and -----

1956 Physical and chemical data for Puget Sound and Approaches, January 1955 - March 1956, University of Washington, Department of Oceanography, Technical Report No. 51.

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1956 A manual for oceanographic observers aboard U.S. Fish and Wildlife Service exploratory fishing vessels. University of Washington, Department of oceanography, Special Report No. 23.

Barnes, C. A. and E. E. Collias

1958 Some considerations of oxygen utilization rates in Puget Sound. Journal of Marine Research, Vol. 17, pp. 68-80.

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1962 An oceanographic survey of the Bellingham-Samish Bay System. Volume I - Physical and chemical data. University of Washington, Department of Oceanography, Special Report No. 32, Volume I.

Collias, E. E., J. Dermody and C. A. Barnes

1962 Physical and chemical data for southern Puget Sound, August 1957 - October 1958. University of Washington, Department of Oceanography, Technical Report No. 67.

Creager, J. S., D. A. McManus and E. E. Collias

1962 Electronic data processing in sedimentary size analyses. Journal of Sedimentary Petrology, 32(4):833-839.

Barnes, C. A., E. E. Collias and others

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1963 Machine processing of geological data. University of Washington, Department of Oceanography, Technical Report No. 87.
- Collias, E. E.
1963 Current measurements off West Point, Washington, University of Washington, Department of Oceanography, Special Report No. 34.
- Collias, E. E. and C. A. Barnes
1964 Physical and chemical data, Puget Sound and Approaches, September 1956 - December 1959, University of Washington, Department of Oceanography, Technical Report No. 110.
- and -----
1965 Physical and chemical data, Puget Sound and Approaches, January 1958 - December 1959, University of Washington, Department of Oceanography, Technical Report No. 113.
- and -----
1965 Physical and chemical data, Puget Sound and Approaches, January 1960 - December 1961. University of Washington, Department of Oceanography, Technical Report No. 114.
- and -----
1966 Physical and chemical data, Puget Sound and Approaches, January 1962 - December 1963. University of Washington, Department of Oceanography, Technical Report No. 116.
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1966 An oceanographic Survey of the Bellingham-Samish Bay System. Volume II - Analyses of Data. University of Washington, Department of Oceanography, Special Report No. 32, Vol. II.
- Collias, E. E. and C. A. Barnes
1967 Physical and chemical data, Puget Sound and Approaches, January 1964 - December 1965. University of Washington, Department of Oceanography, Technical Report No. 161.
- and -----
1968 Physical and chemical data for Puget Sound and Approaches, January - December 1966. University of Washington, Department of Oceanography, Technical Report No. 213.
- Collias, E. E.
1968 Processing of oceanographic station data; a coordinated computer-compatible system. University of Washington, Department of Oceanography, Technical Report No. 181.
- Collias, E. E.
1970 Index to physical and chemical oceanographic data of Puget Sound and its Approaches, 1932-1966. University of Washington, Department of Oceanography, Special Report No. 43, Division of Marine Resources, Sea Grant Program, WSG 70-4.
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1973 Skagit Bay study dynamical oceanography, final report. University of Washington, Department of oceanography. Reference No. M73-73.
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1974 The influence of disposal of wastes on two areas in Mason County, Puget Sound. University of Washington, Department of Oceanography, Reference No. M74-51, Washington Sea Grant Publication WSG-TA 74-3.
- Collias, E. E., N. McGary and C. A. Barnes
1974 Atlas of Physical and Chemical Properties of Puget Sound and its Approaches. University of Washington Press, Seattle and London. 235 pp.
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1975 Evaluation of effects of channel maintenance dredging and dumping on the marine environment in southern Puget Sound. A collection of separate reports. Washington State Department of Fisheries, Technical Report No. 15.
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1975 An oceanographic study of the Port Orchard System. University of Washington, Department of Oceanography, Reference No. M75-102.
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1976 Trace contaminants from Duwamish River dredge spoils deposited off Fourmile Rock in Elliott Bay. Municipality of Metropolitan Seattle.
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1977 A study of the nutrients in the main basin of Puget Sound. Municipality of Metropolitan Seattle (METRO).
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- Loehr, L. C., E. E. Collias and R. H. Sullivan
 1979 Section 301(h) Waiver Application Form for Modification of the Requirements of Secondary Treatment for the City of Tacoma. (Submitted as separate forms for three different sewage outfalls.) Prepared the sections on "Estuarine Discharge" for Parametrix Engineering, Bellevue, Washington.
- Loehr, L. C., R. H. Sullivan and E. E. Collias
 1980 Oceanographic Investigations in Support of the Proposed Anacortes - Fidalgo Bay Marina. Incorporated into the Draft EIS for the Anacortes-Fidalgo Bay Marina.
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 1980 Physical and chemical oceanographic data from Grays Harbor 1938-1979. (unpublished data appendix to a technical report). Prepared for the U.S. Army Corps of Engineers, Seattle District. University of Washington Department of Oceanography ref. M80-23. 1,100+ pages.
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Parametrix, Inc.

1983 Section 301(h) waiver Applications for Modification of Secondary Treatment Requirements. Submitted by the City of Tacoma Washington for the Northend and Central Wastewater Treatment Plants. (Prepared the analysis and description of circulation based on 50 and 96 hour drogue studies and current meter data.)

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1984 "A Case Study of the Abuse of Science in Sewage Planning", Marine Pollution Bulletin. 15(12):439-443. (This is an updated and condensed version of the Loehr, Collias and Broenkow 1983 paper cited above.)

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1984 (unpublished). Nationwide Review of Oxygen Depletion and Eutrophication in Estuarine and Coastal Waters: West Region. Prepared for Brookhaven Labs, New York as part of a national project for the Ocean Assessments Division of NOAA. Review focussed on estuaries in California, Oregon and Washington.

Appendix 35 Metro Study Abstract

In 1973, the council of the Municipality of Metropolitan Seattle (METRO) implemented a program of environmental planning, pilot plant studies, Puget Sound water research projects, etc. One of the tasks proposed was to determine what effects on water properties within the main basin of Puget Sound are attributable to discharge from METRO's sewers. This study compared recent and historical data to determine the presence of any significant changes in nutrient and oxygen concentrations subsequent to METRO discharge, examined seasonal cycles in water properties, and examined the flux of nutrients within the study area. The study area included those waters south of Whidbey Island and north of The Narrows including Colvos Passage but excluding the Port Orchard system.

Observations of water properties were made during 22 cruises beginning 5 November 1974 and ending 19 November 1975. Water properties observed at three week intervals included salinity, dissolved inorganic orthophosphate, nitrate, nitrite, ammonia, silicate, and dissolved oxygen. Two time studies were made at the end of the West Point sewer. Samples for the uptake of ^{15}N -labeled compounds were made at selected locations and times.

A comparison of the new data (1974-75) with the historical data (1932-1963) indicated about a 10% increase in phosphate and no measureable change in the dissolved oxygen. This increase in phosphate was well within the normal variability observed in the historical data. Long-term changes in both dissolved oxygen and phosphate have been observed that are related to changes in upwelling off the Washington coast.

Ammonia originating at a sewer may be used as a tracer of the effluent very close to an outfall, but concentrations generally decrease rapidly to the usual low background level in a short distance

and time. Uptake of nitrate and ammonia by phytoplankton showed a definite seasonal trend and were high in comparison to open ocean values.

Observations made in the physical model of Puget Sound indicated that the effluent plume from the West Point outfall were filamentous, fractured, and generally of low concentrations outside of the "near field". This was confirmed by limited field observations.

Transport calculations for the main basin showed an average flux of $60,000 \text{ m}^3\text{sec}^{-1}$ into or out of the basin. In comparison, the average combined discharge of all sewers entering Puget Sound was $225 \text{ m}^3\text{sec}^{-1}$. Calculations of the flux of phosphate (as phosphate ion) showed an average transfer of 1,210 metric ton per day while the average phosphate contribution from sewers was only 12.6 tons per day. Also at any given time the amount of phosphate in the main basin is about 18,400 tons.

From these data, it was concluded that the sewage entering the main basin of Puget Sound from the sewers of METRO and other sewage systems has had no measurable effect upon either the nutrient concentrations or the dissolved oxygen content of the water.