

Appendices from Eugene E. Collias Biography, Volume 4, which pertain to the oceanography section of his biography.

Appendix 33: presents all the oceanographic cruises in which he participated from 1947 through 1975.

Appendix 34: presents his Curriculum Vitae showing about 50 publications from 1951 through 1984.

Appendix 35: Metro Study Abstract, describing comparison of new data (1974-75) in the main basin of Puget Sound with historical data (1932-1963).

Appendix—33 Oceanographic cruises

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
	1950	September 8-15	Oncorhynchus	Strait of Juan de Fuca	STD and water sampling	Deck
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
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
	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
1951	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
	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	Hydahl	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	{Last cruise of the Brown Bear}	Cruise Leader	3	
	1966	29 Nov - 1 Dec	OA (69)	Hood Canal	Dabob Bay (62)	Cruise Leader	3
		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	
1967	30 Nov - 2 Dec	OA (144)	Hood Canal	Dabob Bay (78)	Cruise Leader	3	
						0	
1968	15-31 July	TG Thompson -30	Columbia River	Columbia River effects	Asst Cruise Leader	16	
1969	31 December	Tenas	Lake Washington	Water sampling	Cruise Leader	1	
	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	Water sampling	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.

----- and -----

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

----- and -----

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.

Collias, E. E.

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.

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

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

1963 A standardized Pearle-Benson, or nitroso, method recommended for the estimation of spent sulfite liquor or sulfite waste liquor concentration in waters. TAPPI, 46(6):347-351, June, 1963.

- Collias, E. E., M. Rona, D. A. McManus and J. S. Creager
 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.
- Collias, E. E., C. A. Barnes, C. B. Murty and D. V. Hansen.
 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.
- Daniel, R. A. and E. E. Collias
 1971 Inductive conductivity probe calibration.
 Transactions of the 1971 IEEE conference on engineering in the
 ocean environment. pp. 16-18.
- Collias, E. E.
 1971 Current measurements in Puget Sound and adjacent waters, July 1948 -
 November 1955. University of Washington, Department of
 Oceanography, Technical Report No. 271.

- Collias, E. E. and A. C. Duxbury
1971 Bibliography of literature: Puget Sound Marine Environment. University of Washington, Department of Oceanography, Special Report No. 49, Division of Marine Resources, Sea Grant Publication WSG 71-6.
- Collias, E. E.
1973 A summary of water characteristics in Hood Canal (for the Trident Joint Venture Group) University of Washington, Department of Oceanography, Reference No. M73-56.
- Collias, E. E., C. A. Barnes and J. H. Lincoln
1973 Skagit Bay study dynamical oceanography, final report. University of Washington, Department of oceanography. Reference No. M73-73.
- Collias, E. E. and L. C. Loehr
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.
- Westley, R. E. E. Collias and others
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.
- Lincoln, J. H. and E. E. Collias
1975 An oceanographic study of the Port Orchard System. University of Washington, Department of Oceanography, Reference No. M75-102.
- Collias, E. E. and R. H. Sullivan
1975 Field observations and recommendations for Pierce County, Washington Chambers Creek Sewer Project.
- Schell, W. R., E. E. Collias, A. Nevissi and C. C. Ebbesmeyer
1976 Trace contaminants from Duwamish River dredge spoils deposited off Fourmile Rock in Elliott Bay. Municipality of Metropolitan Seattle.
- Collias, E. E.
1976 Nutrient balance in Puget Sound. 5th technical conference - estuaries of the Pacific Northwest. Oregon State University Engineering Experimental Station Circular No. 51, page 64.
- Collias, E. E. and J. H. Lincoln
1977 A study of the nutrients in the main basin of Puget Sound. Municipality of Metropolitan Seattle (METRO).
- Collias, E. E. and S. I. Andreeva
1977 Puget Sound Marine Environment - An Annotated Bibliography. University of Washington Press, Seattle and London. Prepared as part of the MESA Puget Sound Studies sponsored by NOAA and the EPA.
- Collias, E. E., R. H. Sullivan and L. C. Loehr
1978 Oceanographic Conditions Near Kayak Point Port Susan, Washington. Prepared for Wilsey and Ham, Inc., and printed in the Revised Draft EIS for the Kayak Point Sewage Treatment Facility, Seven Lakes Sewer District, Snohomish County, Washington in 1979.

- 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.
- Collias, E. E. and L. C. Loehr
 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.
- Loehr, L. C., and E. E. Collias
 1981 A Review of Water Characteristics of Grays Harbor 1938-1979 and an Evaluation of Possible Effects of the Widening and Deepening Project upon Present Water Characteristics. Prepared for the U.S. Army Corps of Engineers,
- Loehr, L. C., E. E. Collias, R. H. Sullivan and D. Haury
 1981 Commencement Bay Studies Technical Report Volume VI Physical Oceanography. Prepared for the U.S. Army Corps of Engineers Seattle District. 108 pp + appendix.
- Loehr, L. C., E. E. Collias and D. Foote
 1982 Small Applicant Questionnaire for Modification of Secondary Treatment Requirements Prepared for the Marina County Water District, California. Application filed with California State Water Resources Control Board and the U.S. Environmental Protection Agency under Section 301(h) of the Clean Water Act.
- Loehr, L. C., E. E. Collias and W. W. Broenkow
 1983 The Abuse of Science in Sewage Planning, A Case History eds, O.T. Magoon and H. Converse. Coastal Zone '83 Proceedings of the Third Symposium on Coastal and Ocean Management, Town and Country Hotel San Diego, California June 1-4, 1983, Volume II (New York: American Society of Civil Engineers, 1983), pp 1923-1934.
- Collias, E. E., W. R. Schell, A. Nevissi and J. H. Lincoln.
 (unpublished) The chemical and physical processes and properties of Puget Sound. Manuscript Series, Washington State Sea Grant program.
- Loehr, L. C. and E. E. Collias
 1983 "Old Cannery Wastes, A Potential Source of Trace Metals in the Marine Environment", Marine Pollution Bulletin, 14(10):392-394.

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 drogoue studies and current meter data.)

Loehr, L.C. and E.E. Collias.

- 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.)

Loehr, L.C. and E.E. Collias.

- 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 measurable 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.