

APPENDIX C – PORTION MODELS

Table A: Portion Model Weights and Methods Used to Determine Portion Model Weights

Scans of the Scaled Portion Model Images and Tables of Contents Used During the Lummi Seafood Consumption Study Interviews

Table A: Portion Model Weights and Methods

Food Model Description	Amount	Uncooked Seafood Weights of Edible Meat¹	Method	Eaten by Number of Respondents n=82
Salmon Filet w/ skin	1 Filet	233.90 g	Measured	82
Salmon Filet w/o skin	1 Filet	208.87 g	Measured	82
Salmon Head	1 Head, divided	15.94 g	Measured	82
Salmon Eggs	1 Skein	159.05 g	Measured	82
Halibut Filet w/ skin	1 Filet	261.95 g	Measured	63
Halibut Filet w/o skin	1 Filet	233.92 g	Measured	67
Mid-sized Fish Filet	1 Filet	135.00g	Measured	79
Mid-sized Fish Filet w/o skin	1 Filet	120.6 g	Measured	79
Fish Sticks	4 Fish Sticks	60.76 g	Measured	11
One Fish Stick	1 Fish Stick (Count)	15.19 g	Measured	12
Small Eggs: Herring, Grunters, Bullhead	1 Heap of Eggs	50.10 g	Measured	77
Fish Hash	1 Serving of Hash	103.47 g	Measured	82
Fish Sandwich	1 Open-Faced Sandwich	82.63 g	Measured	82
Bowl of Fish Soup	1 Bowl of Soup	111.74 g	Measured	82
Bowl of Clam Soup	1 Bowl of Soup	78.51 g	Measured	82
Hooligans (River Smelt)	15 Fish	156 g	Measured	77
One Hooligan (River Smelt)	1 Fish	10.40 g	Measured	77
Herring (also used for Surf Smelt)	6 Fish	113.25 g	Measured	26
One Herring	1 Fish	18.875 g	Measured	26
Grunder	1 Fish	107.94 g	Measured	26
Bullhead	1 Fish	107.94g	Fish unavailable - Grunder Weight used	4
Clam Fritters	2 Fritters	125.25 g	Measured	81
Fried Clam Strips	1 Serving of Clam Strips	163.98 g	Measured	78

Food Model Description	Amount	Uncooked Seafood Weights of Edible Meat¹	Method	Eaten by Number of Respondents n=82
Geoduck Neck Strips	1 Serving of Neck Strips (1 Geoduck Siphon)	269.90 g	Measured	13
Horse Clam Neck Strips	1 Serving of Neck Strips (1 Horse Clam Siphon)	106.60 g	Measured	69
Horse Clam Cleaned	1 Clam	155.7 g	From Literature ²	4
Butter Clam Whole	1 Clam	24.3 g	From Literature ³	1
Cockles	9 Clams	133.70 g	Measured	33
One Cockle	1 Clam	14.85 g	Measured	33
Oysters	10 Oysters	153.00 g	Measured	72
One Oyster	1 Oyster	15.30 g	Measured	72
Manila Clams	13 Clams	126.20 g	Measured	66
One Manila Clam	1 Clam	9.7 g	Measured	66
Mussels	10 Mussels	49.00 g	Measured	21
One Mussel	1 Mussel	4.9 g	Measured	21
Scallops	3 Scallop Muscles	52.35 g	Measured	22
One Scallop Muscle	1 Scallop Muscle	17.45 g	Measured	6
Limpets	6 Snails	14.30 g	Measured	2
One Limpet	1 Snail	2.38 g	Measured	2
Fried Shrimp	11 Shrimp	43.94 g	Measured	42
One Shrimp	1 Shrimp	3.99 g	Measured	48
Fried Octopus/Squid	1 Serving of Cleaned Filets	275.60 g	Measured	44
Sea Urchin	1 Sea Urchin	68.04 g	From Literature ⁴	24
Sea Cucumber	1 Sea Cucumber	32.78 g	Measured	8
Moon Snail	1 Snail	50g	Tulalip Survey	0
Abalone	2 Snails	95g	From Literature ⁵	9

Food Model Description	Amount	Uncooked Seafood Weights of Edible Meat¹	Method	Eaten by Number of Respondents n=82
Chiton	1 Chiton	0 g	Weight unavailable	6
Barnacles	4 Barnacles	0 g	Weight unavailable	2
Dungeness Crab Meat with crab butter	1 Crab	275.51 g	Measured	76
Dungeness Crab Meat without Crab Butter	1 Crab	248.49 g	Measured	77
Red Rock Crab Claws (no picture)	1 Pair of Claws	18.4g	From Literature ⁶	10
Species added by Respondents:				
King Crab	1 Crab	0 g	Weight unavailable	1
Tanner Crab	1 Crab	0 g	Weight unavailable	1

1 - Unless otherwise noted, the weights of all portion models were determined empirically as part of the Lummi Seafood Consumption Study according to the recommendations of the EPA's National Health and Environmental Effects Research Laboratory, which has developed guidelines and computer-assisted personal interviewing (CAPI) software for tribal fish consumption surveys (www.epa.gov/nheerl/tribalfish/, accessed Feb. 2, 2011) (Kissinger et al. 2010).

2 - Horse Clam, cleaned, whole: The average weight of horse clams harvested on the Lummi Indian Reservation was taken from the Lummi Intertidal Baseline Inventory (LNR 2010). The weight ratio of clam shell and intestines to edible meat for horse clams was derived from the portion model data published in Appendix F of the seafood consumption survey of the Tulalip Tribes and Squaxin Island Tribes (Toy et al. 1996) and used to calculate the final edible meat weight for one horse clam.

3 - Butter Clam, cleaned, whole: The average weight of butter clams harvested on the Lummi Indian Reservation was taken from the Lummi Intertidal Baseline Inventory (LNR 2010). The weight ratio of clam shell and intestines to edible meat for butter clams was derived from the portion model data published in Appendix F of the seafood consumption survey of the Tulalip Tribes and Squaxin Island Tribes (Toy et al. 1996) and used to calculate the final edible meat weight for one butter clam.

4 - Sea Urchin (Gonads): The average weight of the gonads (the edible part) for red sea urchins was obtained from a fish buyer (Grand Hale Marine Products) who has previously bought sea urchins from Friday Harbor on San Juan Island which is located in the U&A area of the Lummi Nation. The fish buyer supplied the average weight of the harvested sea urchins and the weight ratio of whole animal to edible gonads from which the average weight of edible gonads was calculated.

5 - Abalone, edible meat: The edible meat weight for pinto abalone was calculated from the recoverable meat weight ratio listed by the Alaska Department of Fish and Game (ADFG 1994) and the meat weight listed in the British Columbia Shellfish's Growers Association's publication about pinto abalone (BCSGA 2012).

6 - Red Rock Crab Claws: The red rock crab claw weight was taken from an internet report describing the personal use of red rock crabs (Clovegarden 2012).

References:

Alaska Department of Fish and Game (ADFG). 1994. *Abalone*. Ken Imamura, Wildlife Notebook Series
<http://www.adfg.alaska.gov/static/education/wns/abalone.pdf> (accessed February 6, 2012).

British Columbia Shellfish Growers Association (BCSGA). 2012. *Abalone*. <http://bcsga.ca/about/industry-encyclopedia/abalone/>
(accessed February 6, 2012).

Clovegarden. 2012. *Rock Crab*. http://www.clovegarden.com/ingred/sf_cbrockz.html (accessed February 6, 2012)

Lummi Natural Resources Department (LNR). 2010. *Lummi Intertidal Baseline Inventory*. Prepared for the Lummi Indian Business Council (LIBC), March.

Kissinger L, Lorenzana RM, Mittl B, Lasrado M, Iwenofu S, Olivo, Helba C, Capoeman P, and Williams A. 2010 *Development of a Computer-Assisted Personal Interview Software System for Collection of Tribal Fish Consumption Data*, Risk Analysis, 30 (12): 1833-1841.

Toy, K A, N L Polissar, S Liao, and G D Mittelstaedt. 1996. *A Fish Consumption Survey of the Tulalip and Squaxin Island Tribes of the Puget Sound Region*. 7615 Totem Beach Road, Marysville, WA 98271: Tulalip Tribes, Department of Environment.

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01 – Salmon Filet

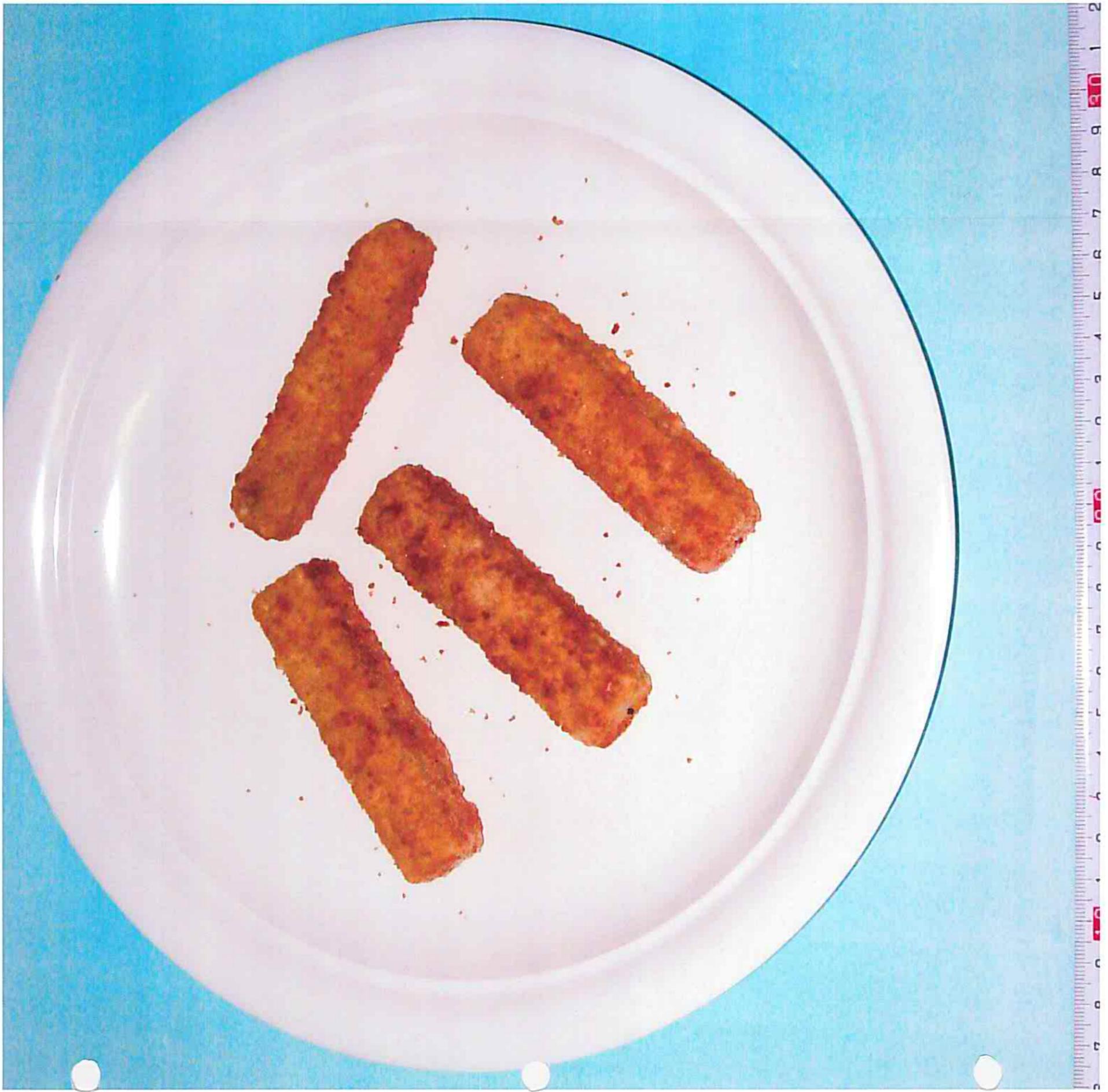
02 – Halibut Filet



03 – Mid-Size Fish Filet

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05 - Salmon Head



06 -- Salmon Eggs



07 - Small Fish Eggs



08 – Fish Hash



09 – Fish Sandwich



10 – Bowl of Fish Soup



11 – Bowl of Chowder



12 – Hooligans



6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6



13 – Herring/Surf Smelt

14 - Grunter



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

15 – Bullhead (Sculpin)



16 – Clam Fritters

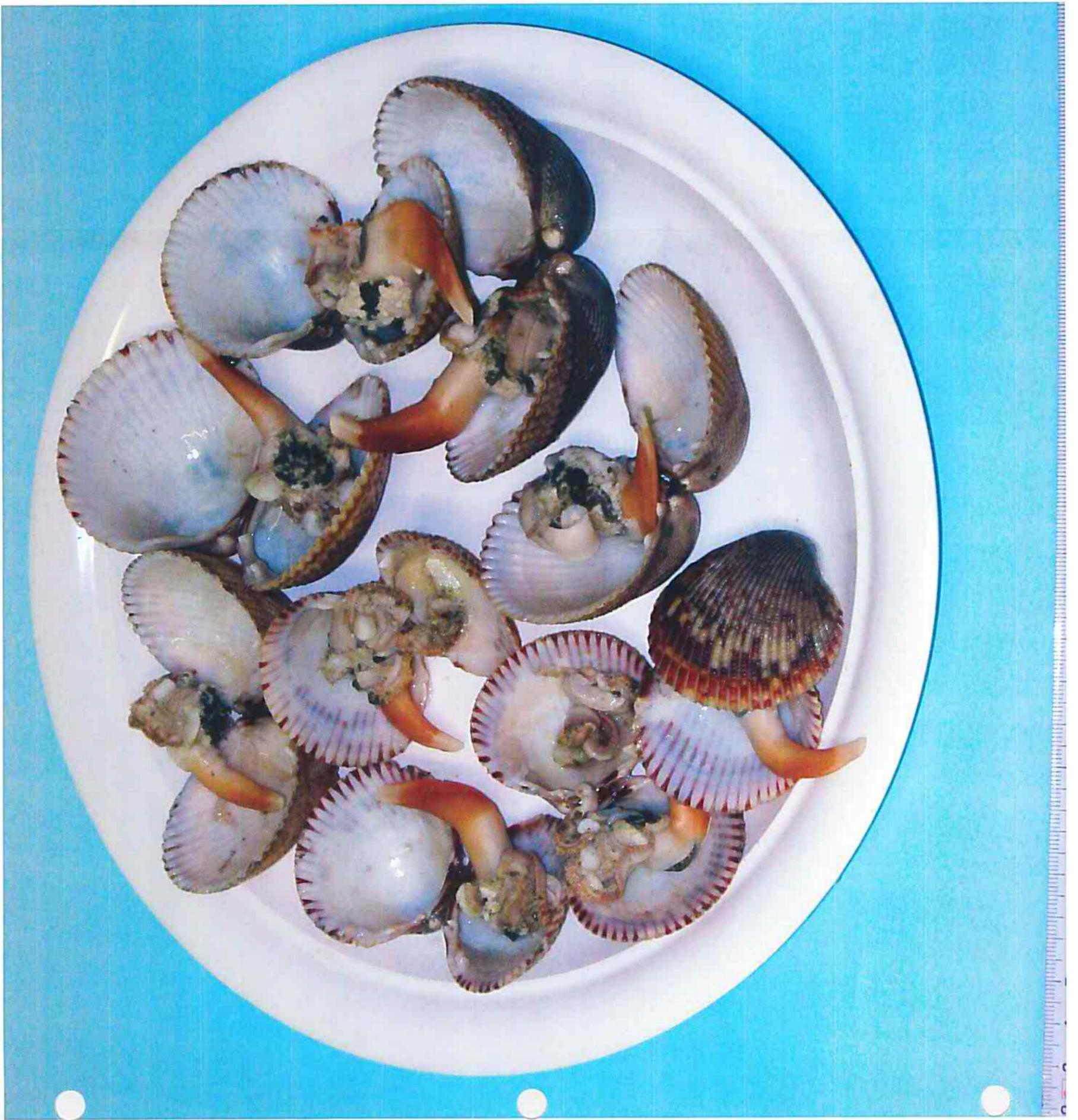


17 - Geoduck Strips



18 – Horse Clam Strips





20 – Clam Strips





21 – Pacific Oysters



23 – Fried Shrimp

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24 – Squid/Octopus





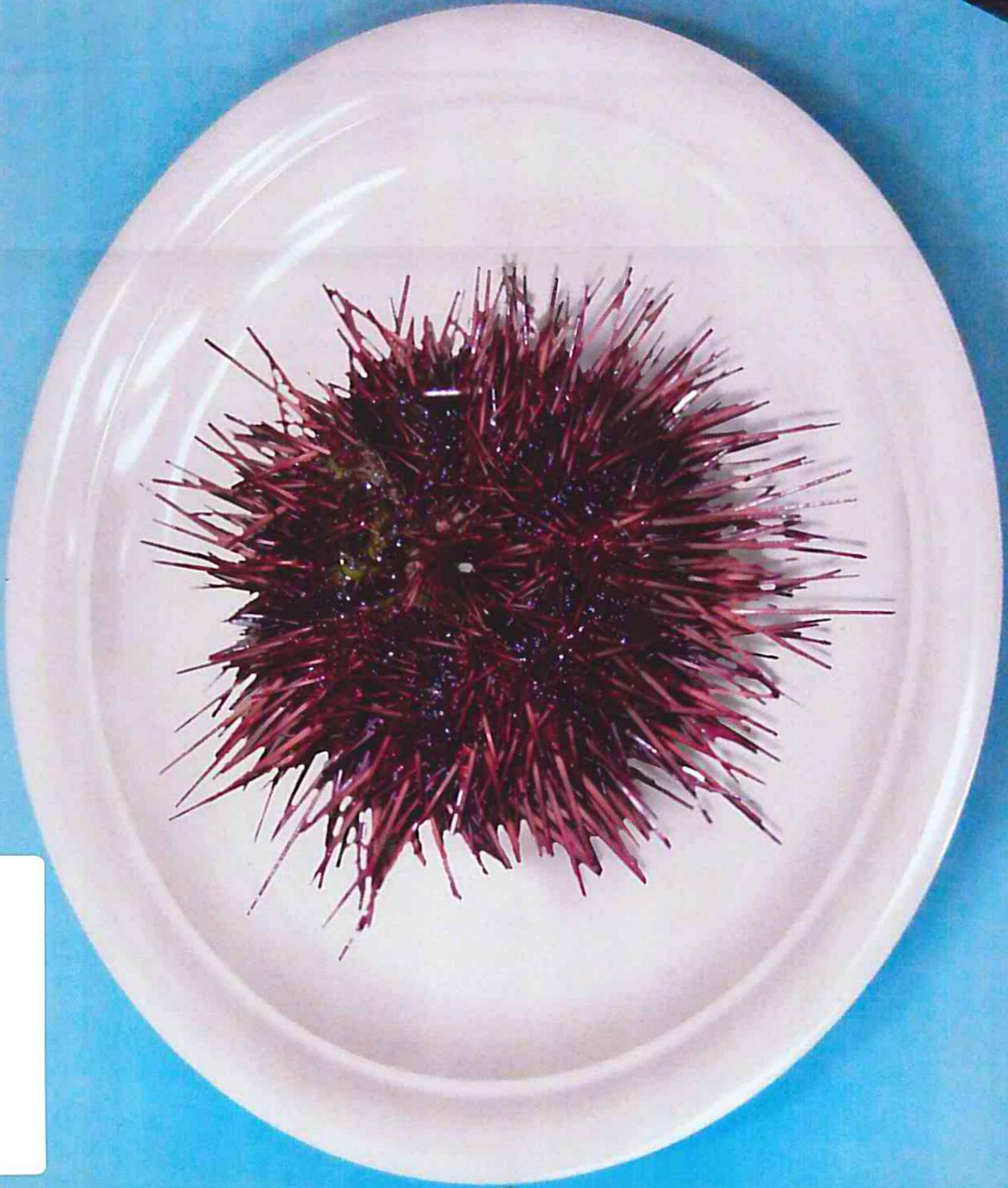
26 - Scallops





27 - Limpets

28 – Sea Urchin/Sqwi'tsi



29 – Sea Cucumber



30 – Moon Snail



31 - Abalone



32 - Chiton



33 - Barnacles



34 - Crab



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