Regional Information Report No. 1J20-04

Summary of Dockside Port Sampling in Southeast Alaska during the 2016/2017–2017/2018 Commercial Shrimp Pot and Beam Trawl Fishing Seasons

by

Jeffrey R. Rice

March 2020

Alaska Department of Fish and Game **Division of Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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SUMMARY OF DOCKSIDE PORT SAMPLING IN SOUTHEAST ALASKA DURING THE 2016/2017–2017/2018 COMMERCIAL SHRIMP POT AND BEAM TRAWL FISHING SEASONS

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G) in Southeast Alaska utilized a dockside port sampling program to sample shrimp caught in the pot and beam trawl fisheries. Shrimp samples were also collected in preseason surveys conducted by ADF&G Commercial Fisheries Division, Shellfish Section and on-the-grounds surveys conducted by ADF&G area management biologists. Species sampled were northern, sidestripe, humpy, coonstripe, and spot shrimp. The primary ports where dockside sampling occurred were Petersburg and Wrangell. All shrimp sampled for size-at-sex were sent to the Petersburg ADF&G office for processing. This report looks at how effective the dockside port sampling program was in both measuring and size-at-sex sampling shrimp during the 2016/2017 and the 2017/2018 seasons.

Key words: Southeast Alaska, dockside port sampling program, port sampling, size-at-sex, northern shrimp, *Pandalus borealis*, sidestripe shrimp, *Pandalus dispar*, humpy shrimp, *Pandalus goniurus*, coonstripe shrimp, *Pandalus danae*, spot shrimp, *Pandalus platyceros*.

INTRODUCTION

The Alaska Department of Fish and Game, Commercial Fisheries Division, Shellfish Section in Southeast Alaska requested dockside sampling be conducted for the commercial pot shrimp fishery and beam trawl fishery. These dockside shrimp samples, along with the shrimp collected during department sponsored preseason and on-the-grounds surveys, were sent to Petersburg where they were sampled for size-at-sex by port sampling staff. This report examines the effectiveness of dockside port sampling in the pot and beam trawl shrimp fisheries during the 2016/2017 and the 2017/2018 seasons.

POT SHRIMP

METHODS AND PROCEDURES

The shrimp pot fishery in registration Area A is open only from October 1 through February 28 (winter season), unless closed earlier by emergency order (5 AAC 31.110). The commissioner may, by emergency order, open a shrimp fishing season from May 15 through July 31(summer season) in a district where the guideline harvest range was not reached during the winter season (5AAC 31.145). Port sampling staff assist shellfish management with stock assessment by sampling shrimp collected dockside and on the grounds as well as shrimp taken in pots during ADF&G sponsored preseason surveys. The objectives of dockside sampling are to gather data and information on size frequency, sex, fishing location, effort levels, and estimates of average catch per unit of effort (Smith et al. 2011). ADF&G initiated the survey program in 1996 with objectives of obtaining an index of abundance, size composition, sex ratios, and size at first spawning of spot and coonstripe shrimp in each district surveyed (Davidson et al. 2005). The objectives of on-the grounds sampling is to get detailed fishing location and effort information, as well as data on size frequency and sex. The major target of on-the-grounds sampling is catcher processors, which cannot be sampled dockside (Smith et al. 2014).

The dockside sampling goals for the 2016/2017 and the 2017/2018 seasons for pot shrimp set by shellfish management, which have not changed since the 2011/2012 season, were included in a memorandum released prior to the opening of each season from Quinn Smith (Table 1). Samples of shrimp were collected either from a survey, dockside, or on the grounds and delivered frozen to Petersburg. Each size-at-sex sample quantity differed based on their source. Surveys collected a subsample of 50 shrimp from three different shrimp pots each day, dockside samplers collected 50 shrimp per landing, and the on-the-grounds goal was three samples of 100 shrimp per analysis area.

The size-at-sex sampling methods used are described in the shrimp section of the ADF&G Southeast Shellfish Sampling manual. The shrimp samples were first thawed prior to sampling. A species code of (961) northern, (962) sidestripe, (964) coonstripe or (965) spot was recorded for each shrimp in the sample. Each shrimp's carapace was then measured with dial calipers and rounded to the nearest half millimeter. The length taken was from the eye socket to the center of the rear margin of the carapace. The presence or absence of eggs and parasites was recorded for each and whether or not the shrimp was considered to be soft-shelled. For spots, coonstripes, and sidestripes sex was determined by examining the endopodites of the first and second pleopod under a magnifier lamp and comparing them to an illustrated key. Because of their small size, only the endopodite of the first pleopod was examined on northern shrimp. Each species required a different key: spot (Hoffman 1972), northern (Allen 1959), sidestripe (Butler 1980) and coonstripe (compiled by ADFG shrimp sexing technicians in the sampling manual). All shrimp were determined to be either (1) immature male, (1) mature male, (3) transitional, or (2)female. The sternal spines of spots and coonstripes were examined and recorded as (1) prominent, (2) reduced, (3) remnant, or (4) missing in order to help determine whether a female had previously spawned. For coonstripes only, individual whole and head-off weights were obtained to the nearest tenth of a gram. In the case of dockside deliveries, the permit holder was asked the dates fished, area(s) fished, number of pot lifts, pot size and type, pounds of shrimp caught by species, and how the shrimp were sorted. All sampling information was recorded on the Pot Shrimp Interview and Shrimp Specimen Data forms and then entered into Alexander, the integrated fisheries database for Southeast Alaska or into the newer Zander database for OceanAK.

RESULTS AND DISCUSSION

Dockside samples taken during the pot shrimp fishery were delivered by permit holders to a port sampler in Wrangell. As these shrimps are sorted and headed on the grounds for market, it was necessary that the port sampler arrange with the permit holder to collect a random, unsorted, head-on sample to be sent to Petersburg for size-at-sex sampling. Due to this at-sea processing, separate carapace lengths, collected in port, were not available in either season. Seven size-at-sex samples were taken during both the 2016/2017 and the 2017/2018 seasons. The size-at-sex goal was met both seasons in the Bradfield analysis area (Table 2).

On-the ground samples collected by area managers during the 2016/2017 and 2017/2018 seasons (Table 3) were sent to the Petersburg office where they were size-at-sex sampled in the lab by port sampling staff. In the two-year period this report covers, many of the catcher-processors covered by on-the-grounds sampling were fishing in areas where goals existed for dockside sampling. Dockside deliveries have become less common and tend to be from catcher-sellers. While the two sampling programs overlap in some areas (Table 4) they generally don't sample the same vessels. The goals for on-the-ground sampling are provided to area managers through a memorandum from Quinn Smith (Table 5).

Survey samples collected onboard the R/V Kestrel and R/V Medeia during the 2016/2017 and 2017/2018 seasons (Table 6) were sent to the Petersburg office where they were size-at-sex sampled in the lab by port sampling staff. The goals for survey size-at-sex sampling come from the Pot Shrimp Operational Plan distributed through a memorandum from Quinn Smith. The plan states that approximately 50 shrimp will be randomly selected from 3 pots daily for a total of 150 per day and 600 shrimp per trip. There were five trips scheduled during the 2016/2017 season as district 113 was not surveyed, and six trips scheduled for the 2017/2018 season.

BEAM TRAWL

METHODS AND PROCEDURES

The beam trawl shrimp fishery season in registration Area A starts May 1st and ends February 28th, which means landings occur over two calendar years. The dockside port sampling program assists shellfish management by sampling shrimp from beam trawl dockside deliveries. The objectives of dockside sampling are to gather data and information on size frequency, sex, fishing location, effort levels, and estimates of average catch per unit of effort (CPUE). These data provide the only biological information for shrimp beam trawl fisheries, which lack stock assessment surveys (Smith et al 2014). The dockside sampling goals for beam trawl shrimp set by shellfish management were identical for the 2016/2017 and the 2017/2018 seasons and were included in a memorandum from Quinn Smith (Table 7). Port sampling is asked to get as many samples as possible without exceeding the maximum number of trips requested annually.

The sampling methods used are described in the shrimp section of the ADF&G Southeast Shellfish Sampling manual. Samples of shrimp were collected dockside in Petersburg. Dockside samplers collected 50 shrimp per landing for carapace measurements and an additional 25 shrimp to be sampled for size-at-sex. A species code of (961) northern, (962) sidestripe, (964) coonstripe or (965) spot was recorded for each shrimp in the sample. Each shrimp's carapace was then measured with dial calipers and rounded to the nearest half millimeter. The length taken was from the eye socket to the center of the rear margin of the carapace. The presence or absence of eggs and parasites was recorded for each and whether or not the shrimp was considered to be soft-shelled. For spots, coonstripes, and sidestripes sex was determined by examining the endopodites of the first and second pleopod under a magnifier lamp and comparing them to an illustrated key. Because of their small size, only the endopodite of the first pleopod was examined on northern shrimp. Each species required a different key: spot (Hoffman 1972), northern (Allen 1959), sidestripe (Butler 1980) and coonstripe (compiled by ADFG shrimp sexing technicians in the sampling manual). All shrimp were determined to be either (1) immature male, (1) mature male, (3) transitional, or (2) female. The sternal spines of spots and coonstripes were examined and recorded as (1) prominent, (2) reduced, (3) remnant, or (4) missing in order to help determine whether a female had previously spawned. Each species in the sample, including (960) incidental species, was counted and weighed in bulk. Permit holders were asked the dates fished, area(s) fished, mesh size, net width, net height, and targeted shrimp species. They were also asked to describe temporal, spatial, and depth distribution of effort during the trip and how the shrimp were sorted. All the information was recorded on the Trawl Shrimp Interview and Shrimp Specimen Data forms and then entered into Alexander, the integrated fisheries database for Southeast Alaska.

RESULTS AND DISCUSSION

The Southeast beam trawl fishery has been unable to sustain consistent and significant harvests due to poor market conditions (Smith et al. 2014). Region-wide harvest dropped off precipitously in the 2006/2007 season after the main buyer of northern shrimp in Petersburg stopped buying after an eighty-year history in the fishery (Smith et al. 2011). Beam trawl sampling was inactive from 2007 through 2010. It was reactivated during the 2011/2012 season when a processor in Wrangell began buying. During the 2016/2017 and the 2017/2018 seasons, the only processing and sampling that has occurred has been in Petersburg. During the 2016/2017 season, twenty-one length and size-at-sex samples were taken in Petersburg. In the 2017/2018 season, twenty-four

length and size-at-sex samples were taken in Petersburg (Table 8). The goal was met for the Duncan Canal fishery in 2016/2017 and for the Stikine Flats fishery in the 2016/2017 and the 2017/2018 season (Table 9). While participants in the beam trawl fishery remain few, sampling opportunities have increased. During the 2014/2015 and 2015/2016 seasons four individual vessels were sampled.

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TABLES

Table 1.–Dockside sampling goals and analysis areas to sample for spot shrimp in the shrimp pot fishery in Southeast Alaska.

Management Unit	Analysis Area	Sub-districts	Lengths		Size-at-Sex	
			Shrimp (Total)	Landings (minimum)	Shrimp (Total)	Landings (minimum)
District 6	SW Etolin	106-20,22,25	500	5	150	3
	Upper Clarence	106-10,30	500	5	150	3
District 7	Bradfield	107-40,45	500	5	150	3
	Zimovia Strait	107-30,35	500	5	150	3
District 8	Eastern Sumner	108-30,40	500	5	150	3
	Stikine Strait	108-10,20	500	5	150	3
District 10	Port Houghton	110-34	500	5	150	3
	Hobart / Windham	110-31, 32, 33	500	5	150	3
District 11	Auke Bay	111-50,55	500	5	150	3
	Seymour Canal	111-11,12,13,14	500	5	150	3

Table 2.–Dockside sampling goals compared to actual samples taken in the shrimp pot fishery in Southeast Alaska.

Management Unit	Analysis Area	Sub-districts	Goals				Actual samples taken			
			Length only		Size-at-Sex		Size-at Sex		Size-at-Sex	
			Shrimp (Total)	Landings (minimum)	Shrimp (Total)	Landings (minimum)	2016/2017 Shrimp	2016/2017 Landings	2017/2018 Shrimp	2017/2018 Landings
District 6	SW Etolin	106-20,22,25	500	5	150	3	0	0	0	0
	Upper Clarence	106-10,30	500	5	150	3	0	0	0	0
District 7	Upper Ernest Sound	107-20	0	0	0	0	0	0	0	0
	Bradfield	107-40,45	500	5	150	3	352	7	353	7
	Zimovia Strait	107-30,35	500	5	150	3	0	0	0	0
District 8	Eastern Sumner	108-30,40	500	5	150	3	0	0	0	0
	StikineStrait/ Chichagof Pass	108-10,20	500	5	150	3	0	0	0	0
District 10	Port Houghton	110-34	500	5	150	3	0	0	0	0
	Hobart / Windham	110-31, 32, 33	500	5	150	3	0	0	0	0
District 11	Auke Bay	111-50,55	500	5	150	3	0	0	0	0
	Seymour Canal	111-11,12,13,14	500	5	150	3	0	0	0	0
						Total	352	7	353	7

Note: No length-only samples were taken during the 2016/2017 and 2017/2018 seasons

Table 3.–Shrimp collected on-the-grounds during the 2016/2017 and 2017/2018 commercial pot shrimp seasons for size-at-sex sampling.

District	Number of shrimp sent to Petersburg for sex-at-size sampling		
	Sub-district	Season	
		2016/2017	2017/2018
101	80	50	54
	90	49	0
	95	49	46
102	40	0	171
103	11	63	0
	23	68	0
	40	61	0
106	30	284	237
107	10	126	0
	20	337	135
	30	61	0
	40	91	0
110	14	68	59
	31	87	46
	32	152	130
	34	141	131
Total		1687	1009

Table 4.–Comparison of dockside and on-the-grounds commercial pot shrimp samples taken during the 2016/2017 and 2017/2018 seasons.

Management unit	Analysis areas	Subdistricts	Actual Sex-at-Size samples taken			
			2016/2017		2016/2017	
			Shrimp	Samples	Shrimp	Samples
District 1	West Behm Canal	101-85,90,95	148	3	100	2
District 2	Middle Clarence	102-40,50,60	0	0	171	3
District 3-A	Hetta Inlet	103-23,25	68	1	0	0
	Lower Cordova Bay	103-11,15	63	1	0	0
	Upper Cordova Bay	103-30,40	61	1	0	0
District 6	Upper Clarence	106-10,30	284	4	237	4
District 7	**Bradfield**	**107-40,45**	**352**	**7**	**353**	**7**
	Bradfield	107-40,45	91	2	0	0
	Lower Ernest Sound	107-10	126	2	0	0
	Upper Ernest Sound	107-20	337	4	135	3
	Zimovia Strait	107-30,35	61	1	0	0
District 10	Farragut Bay	110-14	68	1	59	1
	Hobart/Windham	110-31,32,33	239	3	176	3
	Port Houghton	110-34	141	2	131	2
District 15	Taiya Inlet	115-35	151	1	300	2
	Total dockside (in bold)		**352**	**7**	**353**	**7**
	Total on-the-grounds		1838	26	1309	20
	combined total		2190	33	1662	27

Table 5.–Sampling goals and analysis areas to sample for on-the-grounds sampling of the shrimp pot fishery in Southeast Alaska.

Management unit	Analysis areas	# Lengths (optimal)		# Lengths (minimum)		Sex samples (minimum)	
		Shrimp (per vessel)	No. vessels	Shrimp (per vessel)	No. vessels	Shrimp (per vessel)	No. vessels
District 1	Back Behm Canal	100	4	100	3	100	3
	West Behm Canal	100	4	100	3	100	3
	Inner Ketchikan Inlets	100	4	100	3	100	3
District 2	Cholmondeley Sound	100	4	100	3	100	3
	Kasaan Bay	100	4	100	3	100	3
Sections 3-B/C	Craig	100	4	100	3	100	3
	Sea Otter Sound	100	4	100	3	100	3
District 6	Upper Clarence	100	4	100	3	100	3
District 7	Bradifeld	100	4	100	3	100	3
	Zimovia	100	4	100	3	100	3
	Upper Ernest Sound	100	4	100	3	100	3
	Lower Ernest Sound	100	4	100	3	100	3
District 10	Hobart/Windham	100	4	100	3	100	3
	Port Houghton	100	4	100	3	100	3
Section 13-C	Hoonah Sound	100	4	100	3	100	3
District 15	Chilkat Inlet	100	4	100	3	100	3
	Chilkoot Inlet	100	4	100	3	100	3
	Lutak Inlet	100	4	100	3	100	3
	Taiya Inlet	100	4	100	3	100	3

Table 6.–Shrimp sampled from pots during the 2016 and 2017 surveys.

Trip	Species	2016			2017		
		Lengths only	Sex-at-size	Total	Lengths only	Sex-at-size	Total
1	Northern	19	0	19	39	0	39
	Sidestripe	0	0	0	0	0	0
	Coonstripe	41	0	41	51	0	51
	Spot	5028	619	5647	4987	861	5848
2	Northern	28	0	28	58	0	58
	Coonstripe	72	0	72	81	3	84
	Spot	4207	766	4973	4758	870	5628
3	Northern	53	0	53	45	0	45
	Sidestripe	1	0	1	0	0	0
	Coonstripe	41	0	41	58	2	60
	Spot	2966	640	3606	4021	614	4635
4	Northern	38	0	38	61	0	61
	Coonstripe	55	0	55	62	0	62
	Spot	3928	623	4551	4309	645	4954
5	Northern	46	0	46	60	0	60
	Coonstripe	50	0	50	50	0	50
	Spot	2407	284	2691	3442	455	3897
6	Northern	0	0	0	18	0	18
	Coonstripe	0	0	0	44	0	44
	Spot	0	0	0	2493	302	2795
Total		18980	2932	21912	24637	3752	28389

Table 7.–Annual sample goals by fishery and fishing period for pink and sidestripe beam trawl shrimp fisheries.

	Duncan Canal	Stikine Flats	Blake Channel	Thomas & Farragut Bays
May 1–Jun 30	3	3	3	3
Jul 1–Aug 31	3	3	3	3
Sep 1–Oct 31	0	3	0	0
Sep 1–Feb 28	6	0	3	3
Nov 1–Feb 28	0	3	0	0
Total Trips	12	12	9	9
Total CL measurements*	600	600	450	450
Total sexed shrimp	300	300	225	225

* Does NOT include shrimp to be sexed

Table 8.–Beam trawl shrimp sampled dockside during the 2016/2017 season.

Season	Date Sampled	Trip number	Fishery	Length only	Sex-at-Size	Total
2016/2017	5/5/2016	5005	Duncan Canal	50	25	75
	5/5/2016	5006	Stikine Flats	50	25	75
	5/10/2016	5007	Duncan Canal	50	25	75
	5/18/2016	5008	Stikine Flats	50	25	75
	5/24/2016	5009	Duncan Canal	50	25	75
	6/14/2016	5010	Duncan Canal	50	25	75
	8/24/2016	5011	Stikine Flats	50	25	75
	8/25/2016	5012	Stikine Flats	50	25	75
	8/30/2016	5013	Duncan Canal	50	25	75
	9/12/2016	5014	Duncan Canal	50	25	75
	11/30/2016	5015	Stikine Flats	100	50	150
	12/20/2016	5016	Stikine Flats	75	25	100
	1/5/2017	5001	Stikine Flats	50	50	100
	1/18/2017	5002	Stikine Flats	50	50	100
	1/18/2017	5003	Duncan Canal	50	25	75
	1/30/2017	5004	Duncan Canal	50	25	75
	1/31/2017	5005	Stikine Flats	50	25	75
	2/1/2017	5006	Duncan Canal	50	25	75
	2/7/2017	5007	Stikine Flats	50	50	100
	2/7/2017	5008	Duncan Canal	50	25	75
	2/15/2017	5009	Stikine Flats	50	50	100
			Total for 2016/2017	1125	650	1775

Table 9.–Beam trawl shrimp sampled dockside during the 2017/2018 seasons.

2017/2018	5/1/2017	5010	Duncan Canal	50	25	75
	5/10/2017	5011	Stikine Flats	50	25	75
	5/15/2017	5012	Duncan Canal	50	25	75
	5/17/2017	5013	Stikine Flats	50	25	75
	5/17/2017	5014	Duncan Canal	50	25	75
	5/22/2017	5015	Duncan Canal	50	25	75
	5/31/2017	5016	Stikine Flats	50	50	100
	6/14/2017	5017	Duncan Canal	50	25	75
	8/28/2017	5018	Stikine Flats	50	50	100
	8/29/2017	5019	Duncan Canal	50	50	100
	9/7/2017	5020	Stikine Flats	50	25	75
	10/2/2017	5021	Stikine Flats	50	50	100
	10/11/2017	5022	Stikine Flats	50	50	100
	10/25/2017	5023	Stikine Flats	50	50	100
	10/30/2017	5024	Stikine Flats	50	25	75
	11/20/2017	5025	Duncan Canal	50	25	75
	12/11/2017	5026	Duncan Canal	50	25	75
	1/8/2018	5001	Duncan Canal	50	25	75
	1/8/2018	5002	Duncan Canal	50	25	75
	1/16/2018	5003	Stikine Flats	50	50	100
	1/16/2018	5004	Duncan Canal	50	25	75
	1/23/2018	5005	Duncan Canal	50	25	75
	1/24/2018	5006	Stikine Flats	50	50	100
	2/7/2018	5007	Stikine Flats	50	50	100
			Total for 2017/2018	1200	825	2025