2019 Annual Summary of Fish, Shellfish, and Marine Invertebrate Take for Science, Education, and Rescue/Salvage

Oregon Department of Fish and Wildlife

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07/28/22

Introduction

The Oregon Department of Fish and Wildlife (ODFW) has been issuing permits and authorizations for the take of fish, shellfish, and marine invertebrates through a permitting program since at least 1993. The ODFW mission is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. The Fish Division permitting program carries out the agency's mission to conserve indigenous species and to provide guidance to researchers and resource managers to help study, manage, and protect fish and habitat resources.

Permitting is important for several reasons in addition to being mandated by ORSs and OARs. Permits are a way for ODFW to track take activities happening statewide, which provides ODFW the opportunity to manage resources including protections of listed or sensitive species or areas where sampling (or multiple sampling events) could have negative impacts. Permitting also allows ODFW to coordinate efforts so that researchers are not interfering or overlapping sampling areas and ensures that researchers, educators, and restoration practitioners maintain compliance with laws and have protection from litigation. Approved permits and authorizations can include terms and conditions such as sampling protocols, anesthetic guidelines, and temperature restrictions which also promotes responsible and ethical treatment of animals.

The permitting program authorizes the scientific, educational, and rescue/salvage take of all fish, shellfish, and marine invertebrates in Oregon. This responsibility arises from the authority of ODFW and the Oregon Fish and Wildlife Commission provided in law (Oregon Revised Statutes (ORS) 492.012, 497.075, 497.298, 498.002, 506.036, and 506.109; Oregon Administrative Rules (OAR) 635-007-0900 to 635-007-0930, 635-100-0005, 635-100-0040, and 635-100-0125). A primary consideration in reviewing and authorizing permits is to assure the ethical and conservative use of these species, consistent with needs identified by the state list of Threatened and Endangered Species (ORS 496.176 and 496.182), the Sensitive Species List, conservation and recovery plans, and the Oregon Conservation Strategy. The federal Endangered Species Act (Code of Federal Regulations 16 sections 1531 – 1544) provides additional focus, and the program closely coordinates with the National Oceanic and

Atmospheric Administration's National Marine Fisheries Service (NOAA) and the US Fish and Wildlife Service (USFWS).

Take of fish from the waters of the state is prohibited unless there is a permit or other authorization from ODFW in place to allow it (ORS 498.002, ORS 497.075). A Scientific Take Permit (STP) can be issued to any agency, corporation, association, entity, or student desiring to engage in the taking of fish for scientific or educational purposes (OAR 635-007-0900). A Rescue/Salvage Authorization (RSA) is issued if the purpose of the take is to remove fish from an area to avoid or minimize impacts to the fish due to in-water work activities. STPs and RSAs are not needed for ODFW employees or enrolled tribal members working within the boundaries of reservation lands. The definition of "take" means to "fish for, hunt, pursue, catch, capture or kill, or attempt to fish for, hunt, pursue, catch, capture or kill" (ORS 506.006 (12), OAR 635-006-0001 (43)). The permitting program issues permits and authorizations to take fish if the purpose of the take is for science, education, or rescue/salvage.

This purpose of this report is to summarize and document the information collected by the ODFW Scientific Take Permits and Rescue/Salvage Authorizations. While the program has been in place since at least 1993, this is the first year the program has generated an annual report. The intention of this report is to provide information on the types of activities the permitting program authorizes including a summary of the species handled across the state with examples showing the different types of data collected through this permitting program.

Types of permits and authorizations

There are two types of take permits/authorizations that the permitting program issues: Scientific Take Permits and Rescue/Salvage Authorizations. A STP issued by the Fish Division of ODFW is required for any person desiring to take marine fish, shellfish or invertebrates, freshwater fish, mussels, clams, or crayfish from waters of this state for scientific or educational purposes (OAR 635-007-0900). A RSA is required if the take is for rescue/salvage purposes related to in-water work activities.

Prior to 2019, any rescue/salvage project was permitted with a STP. In 2019, some changes were made to the permitting program and RSAs began to be issued to authorize the take of fish and shellfish for construction and in-water work projects where the purpose of the take was to aid in the survival of the animal that would likely be harmed or die otherwise. This change better aligned the ODFW Fish Division with how the ODFW Wildlife Division authorized similar activities, alleviated the need to charge a fee because this change meant not issuing a permit defined in rule, and allowed for a more streamlined and simpler application, review, and reporting process.

When the purpose of a project is for scientific take or education and includes transport of live eggs, fish or marine invertebrates related to those activities, the transport of these organisms can be authorized under the STP to alleviate the need for an ODFW Fish Transport Permit and the need to get two separate permits from ODFW.

One benefit of the way ODFW implements the permitting program is the close partnership with NOAA Protected Resources Division. ODFW administers the 4(d) research permit program in close collaboration with NMFS to obtain annual, easy to modify research permits for ESA fish that are jointly issued with NMFS. As part of this process, ODFW permitting staff coordinate with researchers in Oregon to submit applications that are reviewed by ODFW and NOAA via joint process. NOAA makes a Section 7 determination (NMFS ECO Consultation Number: WCRO-2018-00251, 4/18/19) for the annual 4(d) permit program which analyzes effects to all NOAA species. Much of the joint permit review process with NOAA for the 4(d) program as well as other jointly issued permits like Willamette Biological Opinion and CRS Biological Opinion also ensures that the agencies coordinate with proposed research projects to make sure there is not duplicate sampling or take occurring in Oregon.

Payments Overview

The 2009 Legislature voted to charge a fee to receive a Fish or Wildlife Scientific Take Permit affective January 1, 2010 (OAR 635-006-1025). The intention of the permit fees (TABLE 1) is to offset the costs of administrative and permitting tasks.

TABLE 1. List of fees for Scientific Take Permits by year. ODFW stopped charging for K-12 educational institutes in 2016. There is no fee for Rescue/Salvage Authorizations.

Time Period (Years)	K-12	Other Entity
2010-2015	$ 17.00	$ 102.00
2016-2017	-	$ 108.00
2018-2019	-	$ 114.50
2020-2023	-	$ 121.50

Process

The ODFW permitting program uses a web-based program to administer STPs and RSAs. The Authorizations and Permits for Protected Species (APPS: https://apps.nmfs.noaa.gov) website is written and maintained by a private consultant (Helen Kupeli at HMKConsulting) via contract from NOAA. ODFW permits were incorporated into the APPS system in 2002, prior to which ODFW permits were managed using paper applications. The database is housed on a server at the NOAA's Northwest Fisheries Science Center in Seattle, WA and there are several programs at NMFS that use APPS including the Protected Resources Programs on both the east and west

coasts. Oregon is currently the only state to include state level take permitting within the APPS program.

Because Oregon uses the APPS program, ODFW works jointly with permitting partners at NOAA to allow some combined ODFW/NOAA permits and authorizations. Applicants can apply for NMFS Section 10 permits, NMFS 4(d) research permits, Determination of Take authorizations under both the Willamette and Columbia River System Biological Opinions, Oregon Scientific Take permits, and Oregon Rescue/Salvage authorizations all with the same application process using APPS.

Once an application is submitted, it is reviewed for completeness making sure all the fields are filled in and comprehensible, that the take requested matches what is described in the methods, and that all the information needed to understand the project purpose and impacts of take are included. If ESA-listed fish are included, the corresponding federal authorization is reviewed to make sure the state permit is not authorizing anything that would affect ESA-listed species that is not already included in the federal authorization. The timeline from receiving an application to issuance is generally 4-6 weeks or less. Applicants can apply for ODFW permits at any time during the year; permits are issued for the calendar year, expiring December 31.

Part of the purpose of the ODFW permitting program is to help inform relevant entities of all the work happening across the landscape so that managers can understand total impacts to the resource due to research, education, and construction-related activities. For each permit or authorization issued, several interested individuals are cc'd on the issued permit email, depending on the scope of the project. The ODFW District and Assistant District Fish Biologists, and the Marine Program Shellfish and Finfish Biologists receive notifications for each of the locations included in the permit and will submit comments prior to permits being issued. Review comments are also sought out from programs or specialists in the agency if applicable, such as Willamette BiOp staff, the Statewide Lamprey Coordinator, the Invasive Species Coordinator, Columbia River Program staff, or the Statewide Geneticist. ODFW notifies Oregon Parks and Recreation Department when projects include work on marine shorelines/parks, and Oregon State Police and NOAA for projects occurring in the Pacific Ocean.

At any time during the year, requests can be submitted to modify ODFW permits and authorizations. Modifications can be made to any part of the permit, and there is no fee to process and issue them. Administrative or editorial changes are made directly, but changes to methods or take are sent to the ODFW Fish Districts for review.

An annual report is required of any issued permit or authorization (OAR 635-007-0920). An annual report that accounts for the take of all the species that were interacted with and responses to a couple of brief questions summarizing the implementation of the project is due

at the end of each year and no later than Jan 31. This report is submitted using the APPS program. All the information contained in the following sections of this summary report was compiled by querying the APPS permitting database of the submitted annual reports associated with scientific take permits and rescue/salvage authorizations.

What is not included in this report is the take of any non-ESA listed fish by ODFW employees, or ESA-listed fish from ODFW employees that was authorized outside of the 4(d) program. Examples of activities implemented by ODFW employees that are not included here would be fish handled as part of an HGMP, take of USFWS listed species under USFWS/ODFW Section 6 agreement, emergency rescue/salvage take reported under Limit 3 to NMFS, ODFW project take covered by a NMFS Section 7 or 10, volunteer/STEP program, or other management activity that are authorized by ODFW outside of the STP program.

There are limitations of the reported take in the dataset. The records are not QA/QC'd for accuracy, the data is based on what is reported by different individuals (that are not always the project biologists), and the formatting and types of data collected are based on the way the APPS system was programmed. The information reported through APPS is available for anyone to search and can be a useful tool to find species reported by locations, take methods, and a variety of search fields. An example of a limitation for *Oncorhynchus mykiss* specifically is that in areas where both rainbow trout and steelhead occur, and there is no way in the field to differentiate between the two, they are often all reported as steelhead. Therefore, the tallies for steelhead may be inflated because they include rainbow trout.

Take is reported in APPS by 4th field HUC which doesn't align exactly with ODFW Fish District boundaries. Throughout this report, where HUCs overlap multiple districts, the HUCs were included in summaries by the district that encompassed the majority of HUC area as follows: Lower Willamette HUC assigned to NWWD coast district (not included in NWWD Cascade district), Middle Willamette HUC assigned to Mid-Willamette district (not included in NWWD Cascade district), Hells Canyon HUC assigned to Wallowa district (not included in LaGrande district), and Upper Willamette HUC assigned to mid-Willamette district (not included in Upper Willamette district).

Take as reflected in this report is an underestimate of the total research, monitoring, education, and rescue/salvage take that occurred in Oregon for various reasons. First, ODFW staff do not need a STP for non-ESA fish take, therefore any activities conducted by ODFW staff or by other entities with ODFW staff present are not reported through the permitting program. Second, for any border waters with Washington or Idaho, if researchers are not working on a specific state's shoreline and only working in open waters, a permit from either state is valid. If a project was permitted by Washington or Idaho, that take is not reported to Oregon under this program. In addition to being an underestimate of total numbers, take is sometimes reported

by the permit holders or primary contacts which are not always the biologists that collect the data. There are no confirmations on identification of species or locations. When unusual numbers, locations, or species are reported, it is sometimes questioned during the report review process, however, reports are not always confirmed.

Take Summaries

Prior to 2002, permits were managed with paper applications which have been archived at ODFW but have not been converted electronically. The permitting program started using the APPS system in 2002, so permit information can only be electronically summarized back to 2002. Since 2002, the ODFW permitting program has issued over 5,000 permits and authorizations using APPS (TABLE 2). Approximately 300 permits are issued annually, with most of the applications submitted for 'Management/Applied Research' or 'Monitoring' project types.

TABLE 2. Number of permits issued by year (2002-2019), authorization type, and project type. ORSA = Oregon Rescue/Salvage Authorization, ORSTP = Oregon Scientific Take Permit.

Year	# Permits Issued	Authorization Type			Project Type					
		NOAA 4(d)	ORSA **	ORSTP	Academic Research	Mmt - Applied Research	Education - School/ College	Monitoring	Public Display or Interpretive Program	Rescue/ Salvage
2002	294	196		191	54	196	31	135	9	2
2003	328	215		238	62	192	42	145	11	24
2004	304	184		242	54	167	41	131	10	33
2005	295	158		254	58	147	45	114	9	33
2006	295	158		254	51	141	42	120	11	46
2007	315	145		269	55	143	35	133	8	51
2008	328	80		290	53	156	49	130	11	53
2009	324	117		265	62	158	42	123	16	45
2010	312	101		261	64	143	43	117	12	58
2011	275	93		227	50	134	39	112	10	44
2012	284	82		239	53	136	39	104	10	53
2013	272	85		223	50	130	36	105	9	49
2014	275	78		229	46	130	30	103	7	52
2015	277	76		234	44	123	34	102	8	68
2016	279	79		236	53	125	32	105	14	59
2017	281	76		239	54	120	35	99	10	68
2018	265	73		226	49	119	32	84	10	68
2019	286	74	65	187	44	117	37	101	13	86
*Total**	*5,289*	*2,070*	*65*	*4,304*	*956*	*2,577*	*684*	*2,063*	*188*	*892*

*Totals do not match because permits can include multiple authorizations and project types

**ORSA authorizations were created in 2019, although the rescue/salvage project type was always available.

Take data is authorized and reported spatially by the 4th field Hydrologic Unit Code (HUC) subbasin level. Of the 91 4th-field HUC's available to work in Oregon, permits have been issued in all but three of them (TABLE 3, Appendix FIGURE A1). Two of the three HUC's that have never appeared in the ODFW STP database are in the Southeast district (East Little Owyhee, Thousand Virgin) and the third is in the Klamath district (Butte). The HUC with the most permitted activity is Siletz-Yaquina, which is likely because it has both marine and freshwater projects. The freshwater only HUC with the most permitted activity is the Upper Willamette.

TABLE 3. Total number of permits by 4th field HUC for 2002-2019 combined, annual average for 2002-2019 combined, and total number for 2019 only.

4th Field HUC	2019	Total Permits (2002-2019)	Average # (2002-2019)
Alsea	23	403	22
Alvord Lake	2	25	2
Applegate	5	118	7
Brownlee Reservoir	2	12	1
Bully	0	5	1
Burnt River	0	9	1
Chetco	4	122	7
Clackamas	12	323	18
Coast Fork Willamette	11	151	8
Coos	35	551	31
Coquille	12	259	14
Crooked-Rattlesnake	0	4	1
Donner und Blitzen	2	30	2
Goose Lake	1	42	2
Guano	0	11	1
Harney-Malheur Lakes	2	28	2
Hells Canyon	6	78	4
Illinois	7	120	7
Imnaha River	4	68	4
Jordan	0	2	1
Lake Abert	1	29	2
Little Deschutes	2	34	2
Lost River	2	41	2
Lower Columbia	14	273	15
Lower Columbia-Clatskanie	16	191	11
Lower Columbia-Sandy	13	253	14

Lower Crooked	7	72	4
Lower Deschutes	4	133	7
Lower Grande Ronde	5	58	3
Lower John Day	9	131	7
Lower Klamath River	1	3	1
Lower Malheur	2	34	2
Lower Owyhee	1	13	1
Lower Rogue	10	178	10
Lower Snake-Asotin	4	13	3
Lower Willamette	26	417	23
McKenzie	19	310	17
Middle Columbia-Hood	14	249	14
Middle Columbia-Lake Wallula	8	118	7
Middle Fork John Day	8	137	8
Middle Fork Willamette	14	229	13
Middle Owyhee	0	13	2
Middle Rogue	10	147	8
Middle Snake-Payette	0	3	2
Middle Snake-Succor	0	4	1
Middle Willamette	24	364	20
Molalla-Pudding	9	143	8
Marine	50	933	52
Necanicum	5	128	7
Nehalem	10	208	12
North Fork John Day	9	140	8
North Santiam	15	201	11
North Umpqua	14	202	11
Powder River	3	23	2
Siletz-Yaquina	38	634	35
Siltcoos	5	129	7
Silver	1	23	2
Silvies	1	27	2
Siuslaw	16	289	16
Sixes	5	155	9
Smith River	2	17	2
South Fork Crooked	1	14	1
South Fork Owyhee	0	3	1
South Santiam	13	203	11

South Umpqua	18	226	13
Sprague	3	82	5
Summer Lake	1	22	2
Trout	1	33	2
Tualatin	25	284	16
Umatilla	4	81	5
Umpqua	18	356	20
Upper Crooked	4	41	2
Upper Deschutes	9	120	7
Upper Grande Ronde River	3	112	6
Upper John Day	10	157	9
Upper Klamath Lake	8	142	8
Upper Klamath River	8	95	5
Upper Malheur	2	49	3
Upper Quinn	1	10	1
Upper Rogue	11	153	9
Upper Willamette	37	514	29
Walla Walla	2	58	3
Wallowa River	5	75	4
Warner Lakes	1	35	2
Williamson	5	66	4
Willow E	0	5	1
Willow N	1	11	1
Wilson-Trask-Nestucca	18	331	18
Yamhill	11	183	10

Information reported annually includes the actual take numbers of any species handled as part of the project. The actual take reported from the 286 issued permits in 2019 included 14,162,502 individual animals, with work occurring in every ODFW Fish District (TABLE 4, Appendix FIGURE A2, or accompanying excel spreadsheet).

Over 11 million of those animals were marine invertebrates (n=11,626,503) and over two million were freshwater fish. Of the 246 identifiable species taken in 2019, there were 84 marine fish species, 75 marine invertebrate species, 77 freshwater fish species, and ten freshwater shellfish species reported. The complete list of species handled in 2019 is shown in Appendix TABLE A1. Since many anadromous species can be captured in either marine or freshwater projects and many projects sample in both locations, one clarification is that

salmon, Eulachon, sturgeon and Starry Flounder in TABLE 4 are summarized under the freshwater fish category in this report.

The freshwater fish take reported in 2019 (Appendix TABLE A1) comprises 1,137 native game fish including 260 White Sturgeon and 749 Eulachon. Freshwater fish take included 832,382 non-native game fish composed of 70% American Shad, 19% crappie, 7% Yellow Perch, 1% Channel Catfish or bullhead and 1% Smallmouth Bass.

Marine invertebrate take (TABLE 4) made up 82% of the total take reported in Oregon during 2019. Most of the invertebrate take was from one permit in the Coos district, and primarily consisted of larvae collected via zooplankton net. Approximately half of the marine fish take reported in TABLE 4 was from one purse seine project that took place with researchers and Washington Department of Fish and Wildlife (WDFW) agency staff in collaboration with the commercial fishing industry and NOAA in Washington and Oregon.

TABLE 4. Number of freshwater fish and shellfish and marine fish and invertebrates taken within ODFW Fish Districts in 2019. Additional detailed data by district/HUC/species/take type is available via accompanying excel spreadsheet distributed with this report.

ODFW District	**Freshwater**		**Marine**		**Total**
	Fish	**Shellfish**	**Fish**	**Invertebrate**	
Coos-Coquille	36,639	546	741	9,919,753	9,957,679
Deschutes	306,641	658	-	-	307,299
John Day	11,296	1,494	-	-	12,790
Klamath	452,047	333	-	-	452,380
La Grande*	1,250	32	-	-	1,282
Mid-Willamette*	169,337	261	-	-	169,598
Mid-Coast	92,371	289	2,927	89,793	185,380
Mid-Columbia	101,898	1,864	-	-	103,762
North Coast	26,858	431	1,511	4,594	33,394
NWWD - Cascade Unit*	106,483	133	-	-	106,616
NWWD - Coast Range*	103,138	1,741	-	-	104,879
South Coast	1,028	0	0	0	1,028
Southeast	6,796	3	-	-	6,799
Umatilla	533,328	11	-	-	533,339
Umpqua	35,523	840	0	0	36,363
Upper Rogue	2,547	30	-	-	2,577
Upper Willamette*	13,114	12,250	-	-	25,364
Wallowa*	46,699	0	-	-	46,699
Marine Shoreline or Offshore	3,798	0	459,113	1,612,363	2,075,274
Total	*2,050,791*	*20,916*	*464,292*	*11,626,503*	*14,162,502*

*Note: where a HUC overlaps two districts, it was assigned to the district that had the higher amount of area included.

TABLE 5. Number of non-native, non-game fish reported in 2019 within ODFW Fish Districts.

	District												
Species/Disposition	**Coos-Coquille**	**John Day**	**Klamath**	**Mid-Willamette***	**Mid-Columbia**	**North Coast**	**NWWD - Cascade Unit***	**NWWD - Coast Range***	**Southeast**	**Umatilla**	**Upper Rogue**	**Wallowa***	**Total**
Carp, Common													
Released Alive		1		10	15	3		25	27	21		67	169
Intentional Mortality								2	240				242
Goby, Amur													
Released Alive						2		2					4
Intentional Mortality								2					2
Goldfish													
Released Alive	83		2,583					11					2,677
Intentional Mortality								100					100
Kilifish, Banded													
Released Alive					35	452	45	39		7		8	586
Intentional Mortality							1	4					5
Minnow, Fathead													
Released Alive			84,341					19					84,360
Intentional Mortality			4										4
Mosquitofish													
Released Alive	24			7			20	246			1		298
Intentional Mortality				13									13
Shiner, Golden													
Released Alive						2		10					12
Weatherfish, Oriental													
Intentional Mortality							1	26					27
Total	*107*	*1*	*86,928*	*30*	*50*	*459*	*67*	*486*	*267*	*28*	*1*	*75*	*88,499*

*Note: where a HUC overlaps two districts, it was assigned to the district that had the higher amount of area included.

Non-native, non-game fish have been introduced throughout Oregon and are common in many basins. In 2019, a total of eight non-native, non-game species were reported as taken in 12 of 18 ODFW Fish Districts (TABLE 5); they were not reported in the Deschutes, Upper Willamette, LaGrande, Mid-Coast, Umpqua, and South Coast districts, as well as marine shoreline/offshore areas). The highest quantity of a single non-native, non-game fish was the Fathead Minnow (n=84,341) which were caught in projects from the Klamath district. The coast unit of the North Willamette Watershed District reports showed take of all eight of the non-native, non-game

species reported. As of 7/28/22, in the USGS Nonindigenous Aquatic Species Database (https://nas.er.usgs.gov/queries/default.aspx), Amur Gobies captured at Welch Island are more downstream than any of the reported sightings, and both Mosquitofish in the Coquille and Banded Killifish in Molalla River and Beaver Cr (Sandy) have never been reported. The ODFW permitting program advises permittees to report invasive species to the ODFW Invasive Species Coordinator so the program is aware of sightings, and we do not directly report observations to the NAS database since we cannot QA/QC the identification.

APPS records the type of take (or handling; i.e., observe/harass, capture/handle/release, transport) that occurs by permittee when encountering the animal. A permit and subsequent reporting are not required if the only take action is 'observe/harass'. There are many projects throughout the state that conduct snorkel surveys or spawning grounds surveys where the only take action is observe/harass. Permittees are encouraged to include observations when they are part of a larger project with multiple collection methods and types of take, but they are not required to do so. Because some permittees report this action and others do not, observe/harass is not directly comparable with other take actions reported. Overall, for 2019, reported observe/harass take made up 0.5% of the total take reported (TABLE 6). Most of the take reported for freshwater fish species is capture/handle/release which is generally the take action used for the incidental capture of non-target species.

TABLE 6. Number of organisms taken by type of handling (called 'take action' in APPS).

Take Action	Freshwater Fish	Freshwater Shellfish	Marine Fish	Marine Invertebrate	Total
Capture/Handle/Release Fish	1,664,622	6,099	311,641	350,518	2,332,880
Capture/Mark, Tag, Sample Tissue/Release Live Animal	97,621	13,824		202	111,647
Collect, Sample, and Transport Live Animal	189,586	2	437	11,003,988	11,194,013
Intentional (Directed) Mortality	12,161	130	151,914	271,792	435,997
Observe/Harass	77,784		300	3	78,087
Rescue/Salvage	9,017	861			9,878
Total	*2,050,791*	*20,916*	*464,292*	*11,626,503*	*14,162,502*

Rescue/salvage projects contributed to 0.07% of total fish take reported in APPS during 2019. The majority of take reported was from monitoring, management, or educational projects, totaling more than 99% of fish take in 2019 (TABLE 2, TABLE 6). There were 702,612 individual salmonids handled or observed in 2019 (TABLE 7), which was 34% of the total freshwater fish handled. Take included both juveniles and adults of all the salmonid species that occur in Oregon, except no take of Pink Salmon and some introduced trout species in lakes occurred. In

TABLE 7, 'juvenile' includes fry, jack, smolt, larvae, sub adult, sub-yearling and yearling life stages, 'adult' includes adult, carcass and kelt life stages and 'all/both' includes unknown life stages. There was no 'egg' life stage take reported for salmonids in 2019. Take for salmon by ESA stock are shown in Appendix TABLE A5 and discussed later in comparison to NMFS estimated returns for 2019 (TABLE 12).

TABLE 7. Number of salmonid species taken by species and life stage in 2019.

Species	**Life Stage**			**Total**
	Adult	**Juvenile**	**All/Both**	
Kokanee	124,375	3	-	124,378
Salmon, Chinook	3,310	164,802	-	168,112
Salmon, Chum	1	2,074	-	2,075
Salmon, Coho	6,393	190,485	-	196,878
Salmon, Sockeye	66	104,452	-	104,518
steelhead*	2,077	77,191	-	79,268
Trout, Brook	67	205	2,537	2,809
Trout, Brown	147	1,359	409	1,915
Trout, Bull	1,133	655	390	2,178
Trout, Cutthroat	5,967	4,620	352	10,939
Trout, Rainbow/Redband*	2,107	5,982	551	8,640
Whitefish	255	99	521	875
Total	*145,899*	*551,927*	*4,786*	*702,612*

*Note: *Oncorhynchus mykiss* are split into trout and steelhead in this table.

In addition to total numbers of organisms taken, take is also tracked by method of collection, type of handling, and procedures that will occur on each animal. As an example of the types of data collected, TABLE 8 summarizes a couple of the different combinations.

In 2019, there were 22,965 individual lamprey reported as captured using 11 different methods (TABLE 8). One of the limitations of APPS is that methods are standardized using drop down boxes. Experimental or novel collection methods are characterized simply as 'other'. When summarizing the data, the 'other' collection method can be a variety of techniques. In this example, the 120 juvenile Western Brook Lamprey were collected using a sieve. While ongoing efforts by ODFW and USFWS are made to hold trainings to educate researchers on lamprey identification, the majority of lamprey taken under ODFW permit program are still reported as either unknown species, Pacific Lamprey, or Western Brook Lamprey. No take was reported during 2019 for any of the other lamprey species present in Oregon: Goose Lake, Miller Lake, Klamath River, Klamath Lake, Pacific Brook, Western Brook, Pit-Klamath or Western River Lamprey. Most of the rarer species are likely not reported here because there are very few projects working in those HUCS and the projects are not using methods to target capture of

lamprey. For species with wider distribution such as Pacific Brook and Western River Lamprey, take is likely not reported to species because researchers are not always able to identify the larval/juveniles sampled and therefore they are reported as unknowns.

There were 14,874 freshwater mussels taken in 2019 (TABLE 9), even though only nine of the 286 issued permits in 2019 reported any take of freshwater mussels. There are six total types of take actions available in APPS (TABLE 6), and freshwater mussels were taken by all take actions except 'observe/harass' (TABLE 9). Note that when a project has multiple take actions, often the most intrusive method is reported instead of using multiple lines to report every possible take action. For instance, if a project is tagging only a portion of the fish they capture, then usually all take is reported on one line as capture/mark, tag, sample tissue/release instead of having a separate line for the ones that didn't get tagged. Therefore, numbers handled by take action cannot be tallied precisely in these summaries.

TABLE 8. Number of lamprey species taken by species, life stage, and capture method, 2019.

	Method											
Species by Life Stage	**Electrofishing**	**Fish Passage Facility**	**Hand and/or Dip Net**	**Net, Plankton**	**Other/ Unknown**	**Screw Trap**	**Seine**	**Substrate (pump/core/dredge)**	**Trap (Fyke/Hoop/Pot/Minnow)**	**Trawl**	**Visual Observation**	**Total**
Lamprey, Pacific												
Adult	2	11	48	0	0	37	1	0	492	4	11	606
Adult and Juvenile combined	29	0	0	0	0	0	0	0	0	0	0	29
Juvenile	975	12,029	3	0	0	610	16	0	299	0	0	13,932
Lamprey, Western Brook												
Adult	38	0	0	0	0	0	0	0	0	0	0	38
Adult and Juvenile combined	53	0	0	0	0	0	0	0	0	0	0	53
Juvenile	274	0	1	0	120	2	4	0	7	0	0	408
Lamprey, unknown spp.												
Adult	2	0	16	0	0	8	0	0	0	0	5	31
Adult and Juvenile combined	361	0	232	1	0	0	0	0	447	0	0	1,041
Juvenile	3,061	2,585	49	0	0	1,026	55	1	0	0	50	6,827
Total	*4,795*	*14,625*	*349*	*1*	*120*	*1,683*	*76*	*1*	*1,245*	*4*	*66*	*22,965*

TABLE 9. Number of freshwater mussels reported by species and take action in 2019.

Take Action	Floater spp.	Western Pearlshell	Western Ridged	Total
Capture/Handle/Release Fish	20	400	5	425
Capture/Mark, Tag, Sample Tissue/Release Live Animal	36	13,757	1	13,794
Collect, Sample, and Transport Live Animal	0	2	0	2
Intentional (Directed) Mortality	0	0	2	2
Rescue/Salvage	0	651	0	651
Total	*56*	*14,810*	*8*	*14,874*

There were many different combinations (n=19) of procedures used on salmon and steelhead in 2019 (TABLE 10). The totals in the cells with multiple procedures in TABLE 10 do not necessarily indicate that all those methods were used on all fish. Some projects have multiple objectives and will not do every procedure on every fish. Applicants are required to include all the procedures they would like to use for each species, but they are not required to report how many of each species received each procedure. Therefore, TABLE 10 indicates the potential maximum number of fish to which the procedure(s) could have been applied.

The most common procedure is the use of anesthetic, reported on up to 93% of salmon/steelhead taken in 2019 (TABLE 10). There is not a way to summarize different anesthetics available for use within APPS, but permitees are asked to provide that information in the text portion of the application. Note also that a term and condition is placed on issued permits that requires projects to follow FDA-approved protocols and use only FDA-approved substances for anesthetizing fish.

Other common procedures used on salmon and steelhead included tagging and marking. Keeping in mind that not all fish received all procedures; 14% could have received a PIT tag, 25% may have been given a fin/maxillary clip/punch, and <1% might have received a floy or radio tag.

See Appendix TABLE A2 and supplemental excel sheet for a complete list of the methods, take actions, and procedures used in 2019 for all species.

TABLE 10. Count of the different procedures used on salmon and steelhead in 2019.

Procedures	Salmon, Chinook	Salmon, Chum	Salmon, Coho	Salmon, Sockeye	steelhead
Anesthetize	37,237	32	56,867	92,644	12,641
Anesthetize; Dye Injection (tattoo, photonic)	29	0	2,245	0	510
Anesthetize; Dye Injection (tattoo, photonic); Finclip - mark	273	0	1,440	0	47
Anesthetize; Dye Injection (tattoo, photonic); Tissue Sample Scale	0	0	0	0	377
Anesthetize; Finclip – mark	1,712	0	22,418	0	746
Anesthetize; Finclip - mark; Tag, Acoustic or Sonic (Internal); Tag, PIT; Tag, Radio (Internal)	801	0	0	0	0
Anesthetize; Finclip - mark; Tag, PIT	3	0	283	0	106
Anesthetize; Finclip - mark; Tag, PIT; Tissue Sample Fin or Opercle	0	0	0	0	718
Anesthetize; Finclip - mark; Tissue Sample Fin or Opercle	0	0	895	0	8
Anesthetize; Maxillary Clip	36,039	0	0	0	9,821
Anesthetize; Maxillary Clip; Tag, Acoustic or Sonic (Internal); Tag, PIT; Tag, Radio (Internal)	0	0	0	0	875
Anesthetize; Maxillary Clip; Tag, PIT	600	0	0	601	600
Anesthetize; Stomach pump (non-lethal); Tissue Sample Fin or Opercle	4	0	0	0	0
Anesthetize; Tag, Elastomer	0	0	875	0	0
Anesthetize; Tag, Floy; Tag, Radio (Internal)	52	0	0	52	68
Anesthetize; Tag, Floy; Tissue Sample Scale	0	0	0	0	304
Anesthetize; Tag, PIT	5,053	0	2,745	0	1,425
Anesthetize; Tag, PIT; Tissue Sample Fin or Opercle	4,186	0	103	0	76
Anesthetize; Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	693	0	156	0	13,761
Anesthetize; Tag, PIT; Tissue Sample Scale	0	0	0	0	270
Anesthetize; Tag, Radio (Internal)	0	0	87	0	0
Anesthetize; Tissue sample (other internal tissues)	869	0	0	0	6
Anesthetize; Tissue sample (other internal tissues); Tissue Sample Otolith	425	0	0	0	0
Anesthetize; Tissue Sample Fin or Opercle	3	0	0	0	0
Anesthetize; Tissue Sample Scale	0	0	0	0	4
Dye Injection (tattoo, photonic)	0	0	0	0	60
Finclip – mark	0	0	2,882	0	223
Finclip - mark; Paint, Stain or Dye Immersion	115	0	146	0	383
Finclip - mark; Tag, PIT	0	0	0	0	471
Paint, Stain or Dye Immersion	0	0	0	0	37
Punch (opercle, caudal, etc.)	0	0	0	0	430
Punch (opercle, caudal, etc.); Tag, Floy	0	0	717	0	0
Punch (opercle, caudal, etc.); Tissue Sample Scale	0	0	739	0	0
Stomach pump (non-lethal)	193	0	0	0	0
Stomach pump (non-lethal); Tissue Sample Fin or Opercle	0	0	0	0	121
Tag, Floy; Tissue Sample Fin or Opercle	1	0	0	14	2

Procedures	Salmon, Chinook	Salmon, Chum	Salmon, Coho	Salmon, Sockeye	steelhead
Tag, Floy; Tissue Sample Scale	0	0	484	0	0
Tag, PIT	8,250	0	1,246	0	4,363
Tag, PIT; Tissue Sample Fin or Opercle	0	0	0	0	417
Tag, PIT; Tissue Sample Scale	27	0	0	0	1,200
Tissue Sample Fin or Opercle	1,185	0	4	0	755
Tissue Sample Fin or Opercle; Tissue Sample Scale	0	0	0	0	50
Tissue Sample Scale	0	0	5	0	98

Total mortality by collection method, which includes intentional/directed mortality (lethal sampling) as well as indirect mortality (accidental mortality that occurred as a result of sampling) is summarized in TABLE 11. The overall mortality for 2019 was 5.7% for freshwater projects combined and 65% for all marine projects combined. While TABLE 11 includes all take statewide, including take types that had planned, directed mortality, note the directed take only makes up 2.7% (n= 215,201) of the total mortality and comes mostly (85%) from two marine invertebrate projects using pumps. Marine plankton sampling was the method statewide that had the largest amount of take (n= 10.9M) and had a high mortality (n= 7.56M) with over 99% or mortalities coming from eggs or juvenile life stages of non-specified marine invertebrates. This mortality, while high, is anticipated due to the nature of the sampling methods and is an estimated value from large trawls rather than precise take count. Directed mortality for freshwater projects was only 1.8% statewide.

The ODFW Fish Division permit program uses a standard allowable mortality rate of 3% for electrofishing and 1% for all other collection methods unless an exception is authorized during district biologist review during permitting for special circumstances. Exceptions are typically authorized for activities like trawling or special dam passage studies and for any project that will have intentional directed mortality. During 2019, overall statewide take showed that the reported electrofishing mortality was well under the 3% standard allowable rate at 0.6% (TABLE 11) which implies the projects authorized for take are doing a good job of using handling techniques to minimize mortality even with a high-risk activity like electrofishing. In contrast, mortality rates for screw trapping were well over the 1% standard at 27% (TABLE 11) and were mostly white crappie taken at Lookout Point Reservoir (96%). Projects with high screw trapping mortality were mostly from hydropower projects monitoring passage associated with dams in the Willamette, Deschutes and Columbia River which tend to have higher injury rates and mortality associated then do normal screw trap monitoring operations. For freshwater sampling, most mortality rates were below the rate that was expected at <1% for most types

except related to fish passage facilities and trawling which typically always have a higher morality.

TABLE 11. Mortality reported as total number and percent of total take by method for freshwater and marine projects.

Take Method	Total Take (# Animals)	Total Mortality (# Animals)	Mortality Rate (%)
Freshwater	**2,071,707**	**118,055**	**5.7%**
Electrofishing	101,164	615	0.6%
Fish Passage Facility	956,143	28,295	3.0%
Hand and/or Dip Net	26,932	19	0.1%
Hook and Line	1,199	0	0.0%
Net, Gill/Trammel/Tangle	8,955	45	0.5%
Net, Plankton	5,563	0	0.0%
Other/Unknown	131	0	0.0%
Screw Trap	312,427	85,040	27.2%
Seine	255,658	290	0.1%
Substrate (pump/core/dredge)	633	0	0.0%
Trap (Fyke/Hoop/Pot/Minnow)	264,514	2,708	1.0%
Trawl	48,647	1,038	2.1%
Visual Surveys	89,741	5	0.0%
Marine	**12,090,795**	**7,924,763**	**65.5%**
Electrofishing	0	0	0.0%
Hand and/or Dip Net	150,878	7,977	5.3%
Hook and Line	3,296	0	0.0%
Net, Plankton	10,907,942	7,561,313	69.3%
Other/Unknown	5,201	2,226	42.8%
Seine	467,527	22,970	4.9%
Substrate (pump/core/dredge)	211,147	195,346	92.5%
Trap (Fyke/Hoop/Pot/Minnow)	7,549	1,406	18.6%
Trawl	337,077	133,525	39.6%
Visual Surveys	178	0	0.0%
Total	*14,162,502*	*8,042,818*	*56.8%*

TABLE 12. Partial summary (# of fish) of NOAA estimated annual abundance of listed Oregon species (NMFS 2019, p.24) compared to results from 2019 ODFW permit program reported take and reported mortality.

Species/Stock	Life Stage	Estimated Wild Fish Returns (from 2019 NMFS Biop)	Reported Actual Take of Wild Fish (from ODFW STP RSA 2019)[b]	Handling Rate of reported STP/RSA take compared to NMFS Estimated Returns (%)	Reported Actual Mortality (from ODFW STP RSA 2019)	Incidental Mortality Rate of reported STP/RSA take compared to NMFS Estimated Returns (%)
UCR steelhead	Adult	3,618	0	0.0%	0	0.00%
UCR steelhead	Smolt	181,722	954	0.5%	2	0.00%
SR steelhead	Adult	29,289	10	0.0%	0	0.00%
SR steelhead	Smolt	834,970	10	0.0%	0	0.00%
SR spr/sum Chinook	Adult	18,270	0	0.0%	0	0.00%
SR spr/sum Chinook	Smolt	1,201,631	261	0.0%	0	0.00%
SR fall Chinook	Adult	12,029	61	0.5%	0	0.00%
SR fall Chinook	Smolt	788,775	1,159	0.1%	0	0.00%
MCR steelhead	Adult	9,242	308	3.3%	0	0.00%
MCR steelhead	Smolt	415,760	1,035	0.2%	0	0.00%
CR Chum	Adult	10,644	0	0.0%	0	0.00%
CR Chum	Smolt	6,081,120	1,833	0.0%	9	0.00%
LCR steelhead	Adult	12,920	1,028	8.0%	0	0.00%
LCR steelhead	Smolt	335,102	7,521	2.2%	0	0.00%
LCR Chinook	Adult	29,469	28	0.10%	0	0.00%
LCR Chinook	Smolt	11,906,946	14,769	0.10%	14	0.00%
LCR Coho	Adult	32,986	3,737	11.30%	1	0.00%
LCR Coho	Smolt	652,672	27,703	4.20%	56	0.01%
UW steelhead	Adult	3,657	14	0.40%	0	0.00%
UW steelhead	Smolt	143,898	8	0.00%	0	0.00%
UW Chinook	Adult	11,443	2,440	21.30%	3	0.03%
UW Chinook	Smolt	1,275,681	15,528	1.20%	68	0.01%
OC Coho	Adult	135,705	2,551	1.90%	3	0.00%
OC Coho	Parr	16,394,210	64,295[a]	0.40%	35	0.00%
SONCC Coho	Adult	8,161	56	0.70%	0	0.00%
SONCC Coho	Parr	1,656,908	2,036[a]	0.10%	1	0.00%

**Note: totals in this table may differ from accompanying excel spreadsheet since this table only includes ESA stocks.*

[a]Coho salmon parr only includes juvenile fish not smolts so it's comparable to NMFS BiOp estimate.

[b]For all species with smolt life stage - this data only includes smolts not juveniles so it's comparable to NMFS BiOp estimate.

The 2019 NMFS 4(d) Biological Opinion estimates annual abundance for NOAA listed species based on a five-year average for data available and/or publications with similar data (NMFS 2019). TABLE 12 shows some relevant estimates for 2019 from NMFS based on wild/natural Oregon stocks as compared to the 2019 reported take from permittees. Most (23 out of 26) ESA stocks in Oregon had less than 5% of the run handled by STPs and RSAs during 2019. The three stocks with higher handling rates were all adult fish from the following ESU's: LCR steelhead (8.0%), LCR Coho (11.3%) and UW Chinook (21.3%), but all had very low morality rates of 0.03% or less (TABLE 12) with the majority of adult take from one permit in the Clackamas.

No ESA listed sDPS Green Sturgeon or any non-listed nDPS Green Sturgeon were captured statewide in 2019, so there were no impacts to Green Sturgeon from ODFW permitted take (see accompanying excel spreadsheet for all data).

There are four species in Oregon that were recently delisted: Oregon Chub, Foskett Speckled Dace, Borax Lake Chub and Modoc Sucker. There was no take reported on STPs for any of those species during 2019. Take of ESA listed fish under USFWS authority included Lost River Suckers (n= 12,065) and Shortnose Suckers (n=11,210) with take of those species mostly occurring for the purpose of targeting monitoring and conservation rearing including 9,832 larval take of each species (TABLE 13). One of these projects was focused on trying to research and minimize mortality related to BOR dams. While there was take of both listed sucker species, most activities worked towards conservation and no mortalities were reported for either species by the four projects that handled them.

TABLE 13. Actual take, incidental mortality and mortality rate of USFWS listed fish from 2019 ODFW permit program.

Species/Stock	**Life Stage**	**Reported Actual Take (# Animals)**	**Reported Incidental Mortalities (# Animals)**	**Incidental Mortality Rate (%)**
Lost River Sucker	Juvenile	9,832	0	-
	Adult	2,233	0	-
	Total	*12,065*	*0*	-
Shortnose Sucker	Juvenile	9,832	0	-
	Adult	1,378	0	-
	Total	*11,210*	*0*	-
Lahontan Cutthroat	Juvenile	245	0	-
	Adult	179	1	0.56%
	Total	*424*	*1*	*0.41%*
Bull Trout	Juvenile	655	0	-
	Adult	1,133	12	1.06%
	All/Both	390	0	-
	Total	*2,178*	*12*	*0.55%*

Bull Trout are also under USFWS jurisdiction and permittees handled a total of 2,178 Bull Trout during 2019, with over half of handled fish comprised of adults.

Other Highlights

During review of both the 2018 and 2019 ODFW 4(d) programs, NMFS was especially interested in ODFW coordination of responses from researchers on why they needed to sample ESA-listed fish rather than use the new technologies in eDNA sampling to avoid direct handling. NMFS proposed that in the future they may require projects that do not need to handle fish to migrate to use eDNA rather than approve take for ESA fish. ODFW coordinated with permittees and internally with staff to respond on eDNA as a conservation measure to reduce take. As of fall 2019, ODFW had collected about 90% of native fish and 70% of non-native fish tissues to catalog Oregon species eDNA. Since all species were not documented, eDNA was not yet able to be widely used. Additionally, the cost of eDNA lab processing continues to be prohibitive.

A notable improvement to the program in 2019 was that the new Rescue/Salvage Authorization was a simpler approach to authorize these types of projects and is a more streamlined process. ODFW supports the rescue/salvage of fish from in water work areas where the alternative would be harmful to the fish in the area. Because the focus of these projects is to save fish that would otherwise be harmed or perish rather than a project that is intentionally handling the fish, this is an important distinction in the reported take. In future years, the permit program will be able to query the rescue/salvage project take more efficiently since they are now separated out from the research/monitoring/education/management take permits.

The permitting program collects a variety of information related to the take of animals in Oregon waters. These data can be useful for a range of purposes, especially because it is a large database of take observations statewide that includes 18 years of information. This is the first summary report from the permit program and includes examples of what we can include in tables based on APPS reporting database. Additional or different information for specific districts, species, methods, or other parameters can be provided in future reports based on staff interest or request.

Literature Cited:

National Marine Fisheries Service. 2019. Consultation on the Evaluation and Determination of Research Programs Submitted for Consideration Under the Endangered Species Act Section 4(d) Rule's Scientific Research Limit [50 CFR 223.203(b)(7)] and Scientific Research and Monitoring Exemptions [50 CFR 223.210(c)(1)]. NMFS ECO Consultation Number: WCRO-2018-00251. 145 p.

Appendix

FIGURE A1 – Oregon 4th Field HUCS

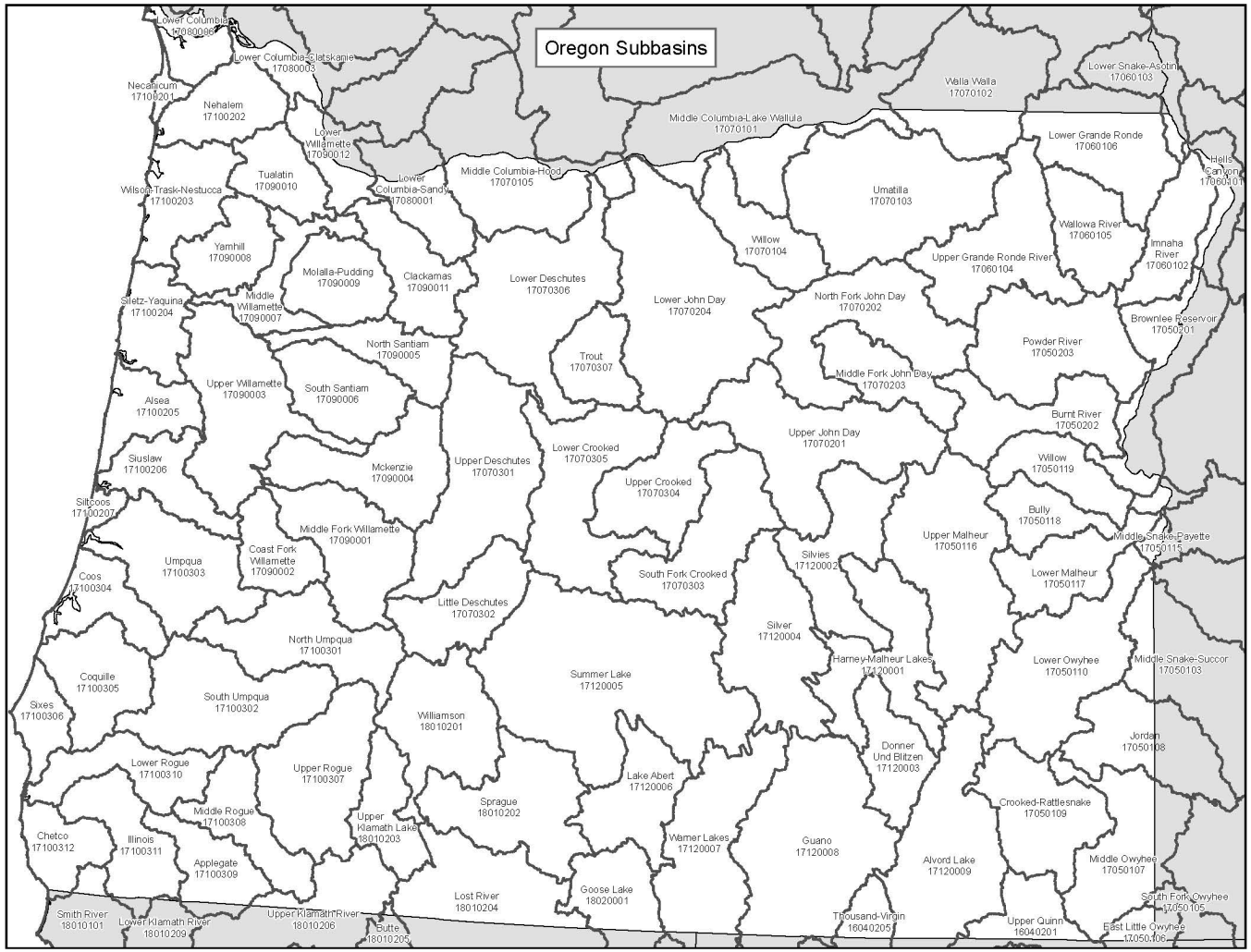

FIGURE A2 – ODFW Fish Districts

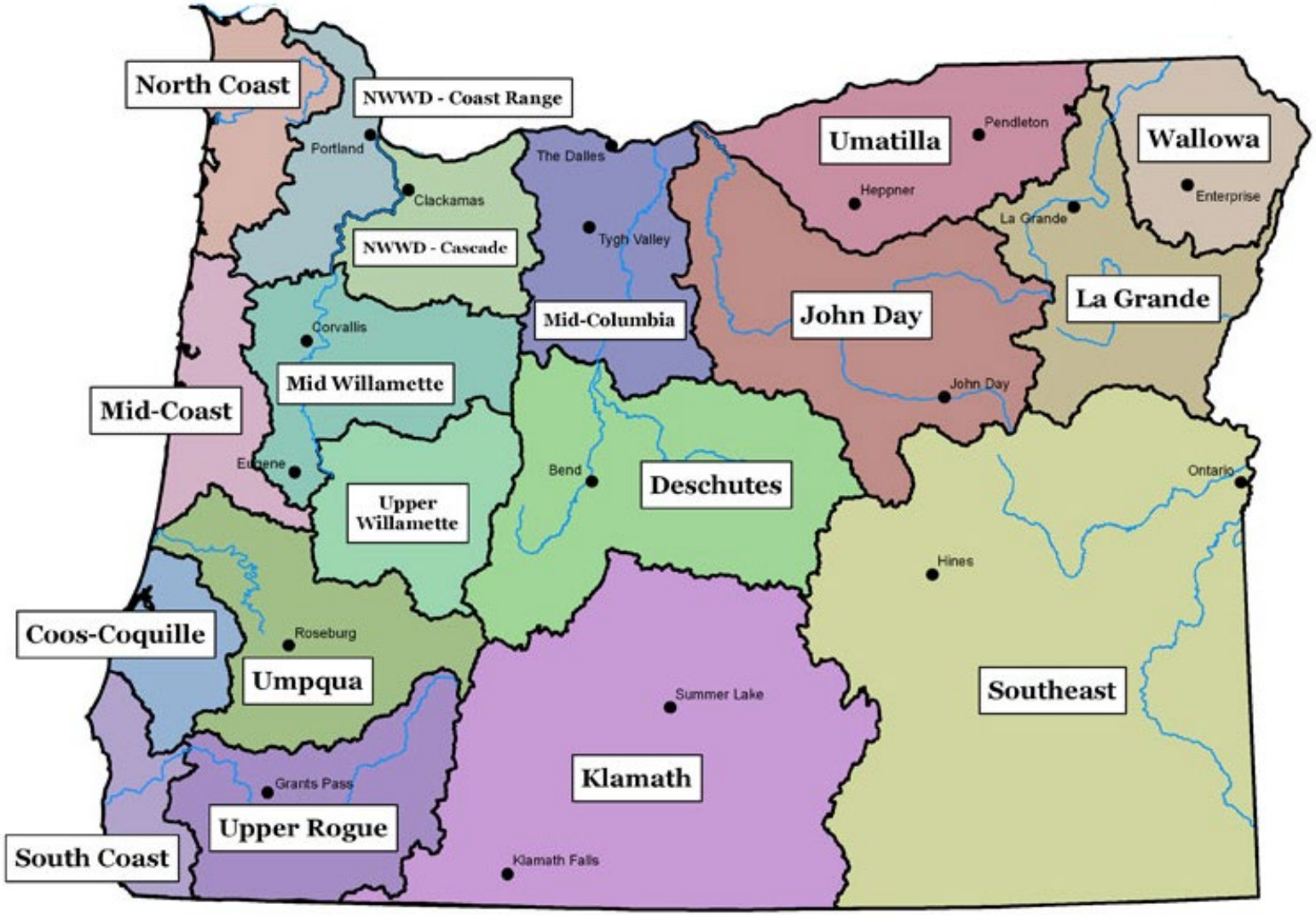

TABLE A1 – Total actual take and incidental mortality by species (# of animals) and life stage collected in 2019.

Species Common Name	Juvenile	Adult	All/Both	Total Actual Take	Total Incidental Mortality
Freshwater Species					
Bass, Largemouth	10	547	45	602	29
Bass, Smallmouth	111	3,867	5,680	9,658	7
bass, unknown	10	17	0	27	0
Bluegill	396	2,062	302	2,760	391
bullhead (unknown)	0	15	0	15	1
Bullhead, Black	4	0	1	5	0
Bullhead, Brown	21	6,740	784	7,545	2,821
Bullhead, Yellow	2,134	6	7	2,147	1,754
Carp, Common	3	136	272	411	1
Catfish, Channel	0	124	2	126	2
Catfish, Flathead	0	6	0	6	0
Chub, Blue	106,713	1,055	1,700	109,468	15
Chub, Chiselmouth	0	100	1,454	1,554	25
Chub, Oregon	0	1	0	1	0
Chub, Tui	57,829	1,614	18,501	77,944	11
Chub, Umpqua	0	3142	0	3142	4
Clam, Asian	0	124	0	124	0
cottids	225	5504	227	5956	46
Crappie, Black	271	2062	2	2335	39
Crappie, White	153,951	732	120	154,803	81,902
Crayfish, Columbia River Signal	4	10	0	14	0
crayfish, other	286	816	0	1102	2
Crayfish, Red Swamp	0	4	17	21	0
Crayfish, Ringed	28	395	0	423	0
Crayfish, Signal	427	1,865	41	2,333	1
dace (unknown)	0	4,271	604	4,875	9
Dace, Leopard	0	8	14	22	0
Dace, Longnose	165	668	59	892	5
Dace, Millicoma	0	210	0	210	0
Dace, Speckled	821	2,051	494	3,366	91
Dace, Umpqua	61	143	37	241	2
Eulachon	0	749	0	749	748
Flounder, Starry	34	65	29	128	7
Goby, Amur	2	2	2	6	0
Goldfish	2,422	336	19	2,777	0

Species Common Name	Juvenile	Adult	All/Both	Total Actual Take	Total Incidental Mortality
Kilifish, Banded	452	101	38	591	4
Kokanee	3	124,375	0	124,378	4,299
lamprey (unknown)	6,827	31	1,041	7,899	5
Lamprey, Pacific	13,932	606	29	14,567	52
Lamprey, Western Brook	408	38	53	499	11
Madtom, Tadpole	0	4	0	4	0
Minnow, Fathead	59,222	19	25,123	84,364	0
mixed invertebrate	150	1,875	0	2,025	2
Mosquitofish	61	86	164	311	1
Mussel, Oregon Floater	1	19	0	20	0
Mussel, Western Floater	0	8	0	8	0
Mussel, Western Pearlshell	183	14,627	0	14,810	8
Mussel, Western Ridged	2	6	0	8	0
Mussel, Winged Floater	0	28	0	28	0
Northern (Pit) Roach	0	0	27	27	0
Peamouth	27	86	520	633	5
Perch, Yellow	47,970	1,704	11,044	60,718	22
Pikeminnow, Northern	341	952	252	1,545	5
Pikeminnow, Umpqua	207	1	190	398	4
Pumpkinseed	169	81	1205	1455	0
Redside Shiner, Lahontan	0	0	45	45	0
Salmon, Chinook	164,802	3,310	0	168,112	2286
Salmon, Chum	2,074	1	0	2,075	18
Salmon, Coho	190,485	6,393	0	196,878	569
Salmon, Sockeye	104,452	66	0	104,518	2124
Sandroller	0	147	0	147	0
sculpin (unknown)	5,665	7,292	41,245	54,202	71
Sculpin, Coast Range	0	1	864	865	3
Sculpin, Fluffy	3	0	8	11	0
Sculpin, Klamath Lake	0	0	1,000	1,000	0
Sculpin, Marbled	0	0	1,300	1,300	0
Sculpin, Mottled	0	21	1	22	0
sculpin, not listed here	1	0	22	23	0
Sculpin, Paiute	0	453	0	453	17
Sculpin, Prickly	9	34	21	64	0
Sculpin, Reticulate	124	1,191	0	1,315	11
Sculpin, Riffle	0	5	0	5	0
Sculpin, Shorthead	0	7	0	7	0
Sculpin, Slender	0	0	86	86	0

Species Common Name	Juvenile	Adult	All/Both	Total Actual Take	Total Incidental Mortality
Sculpin, Torrent		236	0	236	3
Shad, American	589,454	62	490	590,006	18,930
shiner (unknown)	0	3	0	3	0
Shiner, Golden	2	10	0	12	0
Shiner, Redside	947	8,708	528	10,183	103
steelhead	77,191	2,077	0	79,268	230
Stickleback, Threespine	7,071	7,070	12,984	27,125	228
Sturgeon, White	172	88	0	260	0
sucker (unknown)	6,036	309	196	6,541	14
Sucker, Bridgelip	60	260	16	336	3
Sucker, Klamath Largescale	5,001	940	0	5,941	0
Sucker, Klamath Smallscale	0	89	0	89	0
Sucker, Largescale	164	12,848	83	13,095	9
Sucker, Lost River	9,832	2,233	0	12,065	0
Sucker, Mountain	0	0	14	14	0
Sucker, Shortnose	9,832	1,378	0	11,210	0
Sucker, Tahoe	0	0	79	79	0
Sunfish	36	46	12	94	1
Trout, Brook	205	67	2537	2,809	10
Trout, Brown	1,359	147	409	1,915	815
Trout, Bull	655	1,133	390	2,178	12
Trout, Cutthroat	4,620	5,967	352	10,939	123
Trout, Inland Columbia Redband	712	3	289	1,004	3
Trout, Rainbow	5,265	1,968	75	7,308	117
Trout, Rainbow X Cutthroat Hybrids	0	1	26	27	0
Trout, Redband (Native Rainbow)	5	136	187	328	2
unknown fish	46,361	0	99	46,460	8
Walleye	0	41	3	44	2
Warmouth	0	32	0	32	0
Weatherfish, Oriental	0	27	0	27	1
whitefish (unknown)	0	26	10	36	0
Whitefish, Mountain	99	229	511	839	11
Marine Species					
Abalone, Flat	0	1	0	1	0
Anchovy, Northern*	0	1,244	0	7,244	6,530
Anemone, Aggregating	5	722	0	727	0
Anemone, Giant Green	4	139	0	143	0
anemone, not listed here	0	3,065	0	3,065	2,226
barnacle	1,000	20,991	0	21,991	4,710

Species Common Name	Juvenile	Adult	All/Both	Total Actual Take	Total Incidental Mortality
Barnacle, Gooseneck	0	237	0	237	1
bay clams, foodfish spp., < 1 inch	274	1,534	0	1,808	30
bay clams, foodfish spp., > 1 inch	0	1,374	0	1,374	20
Blackbelly Eelpout	0	184	0	184	184
bryozoan	0	421	0	421	40
Cabezon	806	0	10	816	0
chiton	0	210	11	221	0
Clam, Butter	0	62	0	62	0
Clam, Cockle	0	73	0	73	0
Clam, Gaper	0	16	0	16	0
Clam, Macoma	0	37	0	37	1
Clam, Native Littleneck	0	32	0	32	0
clam, other	0	1,099	0	1,099	0
Clam, Purple Varnish	0	28	0	28	0
Clam, Softshell	0	34	0	34	0
coral, soft	0	16	0	16	0
Crab, Brown Box	0	1	0	1	0
Crab, Dungeness	5,319	2,688	0	8,007	1,705
Crab, European Green	1,423	59	0	1,482	1,440
Crab, Graspus	16	18	0	34	0
Crab, Harris Mud	0	6	0	6	0
Crab, Hermit	10	813	0	823	2
Crab, Kelp	2	91	0	93	0
Crab, Lithode	0	5	0	5	0
crab, other anomuran	0	51	0	51	0
crab, other brachyuran	0	107	0	107	0
Crab, Pea	0	6	0	6	0
Crab, Porcelain	0	71	0	71	0
Crab, Puget Sound King	0	1	0	1	0
Crab, Red Rock	1	262	0	263	0
Crab, Tanner		778		778	778
crabs, other "Lithodes"		54		54	0
crabs, small, intertidal	193	1,088		1,281	6
crabs, subtidal - not listed here	66	530		596	522
Cucumber, Sea		5,961		5,961	5,864
Dogfish, Spiny	2	148	1	151	33
Eel, Wolf		1	12	13	1
estuarine fish - not listed here	10		17	27	0
flatfish - not listed here	295	200	42	537	198

Species Common Name	Juvenile	Adult	All/Both	Total Actual Take	Total Incidental Mortality
Flounder, Arrowtooth	8	4,908		4,916	953
Greenling, Kelp	46	9	1	56	6
Gunnel	96	67	6	169	0
Hagfish, Pacific		8		8	8
Hake, Pacific	28	11,653		11,681	11,553
Halibut, Pacific		600		600	83
Herring, Pacific		219,004	15	219,019	11,020
invertebrates - not listed here	27,704	209,166	0	236,870	185,534
isopods and amphipods	0	82,089	65	82,154	82
Jacksmelt	0	12	0	12	0
jelly (unknown)	684	192,777	0	193,461	10,468
Jelly, Comb	1	9	1	11	6
Jelly, Cross	0	11	0	11	0
Jelly, Egg Yolk	0	15	0	15	13
Jelly, Moon	0	153	0	153	153
Jelly, Sea Nettle	0	58	0	58	54
Jelly, Water	0	48	0	48	0
Jingles	0	42	0	42	0
Lampfish, Northern	0	821	0	821	46
Lanternfish	0	8,055	0	8,055	3,052
limpets	0	2,192	0	2,192	2,000
Lingcod	4	4,673	5	4,682	0
Mackerel, Jack*	1	7,380	19	7,900	2,183
Mackerel, Pacific	0	1,541	0	1,541	382
marine fish - not listed here*	853	3,435	12	10,300	9,367
marine invertebrates - up to 10 per species	10,890,500	18,075	180	10,908,755	7,561,867
marine invertebrates -up to 5 per species	0	44	0	44	0
Medusafish	0	1	0	1	1
Mussel, Bay	0	518	0	518	0
Mussel, California	2,850	15,818	5	18,673	1
nudibranchs	0	830	31	861	319
Octopus, Giant	0	2	0	2	1
octopus, other	0	21	0	21	19
oyster (native)	293	2	0	295	0
Oyster, Pacific	347	1	0	348	0
Perch, Pacific Ocean	5	2,045	0	2,050	0
Pipefish, Bay	17	83	19	119	0
Poacher, Picklebreast	0	0	114	114	0
Pollock, Walleye	0	0	1	1	0

Species Common Name	Juvenile	Adult	All/Both	Total Actual Take	Total Incidental Mortality
Prawn, Spot	0	25	0	25	6
Prickleback, Black	0	0	6	6	0
Ratfish, Spotted	0	2,487	0	2,487	898
Rockfish, Black	12	1	10	23	0
Rockfish, Bocaccio	11	452	0	463	253
Rockfish, Canary	60	1,290	0	1,350	0
Rockfish, Chilipepper	0	135	0	135	1
Rockfish, Copper	0	1	8	9	0
Rockfish, Darkblotched	27	2,029	0	2,056	7
Rockfish, Greenspotted	0	7	0	7	0
Rockfish, Greenstriped	0	3,651	0	3,651	0
rockfish, other	1,067	3,781	2	4,850	3,499
Rockfish, Pacific Ocean Perch	0	78	0	78	78
Rockfish, Quillback	0	3	0	3	0
Rockfish, Redbanded	0	51	0	51	44
Rockfish, Rosethorn	0	439	0	439	437
Rockfish, Rougheye	0	7	0	7	1
Rockfish, Sharpchin	0	6,573	0	6,573	4,973
Rockfish, Shortbelly	7,560	0	0	7,560	0
Rockfish, Shortraker	0	1	0	1	0
Rockfish, Splitnose	1	0	0	1	1
Rockfish, Stripetail	0	5,386	0	5,386	1,740
Rockfish, Tiger	11	0	0	11	0
Rockfish, Widow	118	158	0	276	154
Rockfish, Yelloweye	0	220	0	220	0
Rockfish, Yellowmouth	0	381	0	381	0
Rockfish, Yellowtail	2	617	0	619	33
Sablefish	38	11,432	0	11,470	30
sanddab	113	11,149	126	11,388	11,154
Sanddab, Pacific	3	532	90	625	0
Sanddab, Speckled	20	0	172	192	0
Sandlance	2	414	1	417	2
Sardine*	0	15,658	0	16,658	3,032
Saury, Pacific	0	1	0	1	1
scallop, other	4	0	0	4	0
Scallop, Rock	0	14	0	14	0
Sculpin, Buffalo	2	3	3	8	0
Sculpin, Pacific Staghorn	918	444	132	1,494	4
Sculpins, Artedius	0	5	0	5	0

Species Common Name	Juvenile	Adult	All/Both	Total Actual Take	Total Incidental Mortality
Sculpins, Clinocottus	0	5	10	15	0
sculpins, large - not listed here	10	355	0	365	156
Sculpins, Oligocottus	0	103	20	123	0
Sea Pen	0	3	0	3	0
Sea Slugs	0	22	0	22	0
Sea Star, Bat	0	1	0	1	0
Sea Star, Blood	0	11	0	11	0
Sea Star, Colorful Six-armed	0	5	0	5	0
Sea Star, Drab six-armed	1	208	0	209	0
Sea Star, Dwarf Mottled	0	11	0	11	0
Sea Star, Giant Pink	0	1	0	1	0
Sea Star, Leather	0	3	0	3	0
Sea Star, Mottled	0	2	0	2	0
Sea Star, Ochre	76	1,866	0	1,942	0
Sea Star, Sand	0	1	0	1	0
Sea Star, Spiny Red	0	1	0	1	0
Sea Star, Sunflower	0	7	0	7	0
Sea Star, Velcro	0	1	0	1	0
Sea Star, Wrinked	0	1	0	1	0
sea stars - not listed here	10	12,485	0	12,495	12,181
shark - not listed here	0	346	0	346	340
Shark, Blue	3	193	0	196	0
shrimp - not listed here	1	5,831	0	5,832	989
Shrimp, Coonstripe	0	6	0	6	0
Shrimp, Crangon	0	2,817	23	2,840	0
Shrimp, Hippolytid	0	306	0	306	0
Shrimp, Mud and Ghost	674	5,134	0	5,808	300
Shrimp, Pink	0	1,019	0	1,019	1,019
Skate, Big	0	208	3	211	57
Skate, Longnose	0	1,233	0	1,233	753
skates and rays - not listed here	1	390	0	391	378
smelt, not listed here	0		203	203	0
Smelt, Surf	0	96	16	112	8
Smelt, Top	0	98	18	116	6
Smelt, Whitebait	0	14,122	0	14,122	867
Snail, Littorine	0	515	0	515	500
Snail, Moon	0	1	0	1	0
Snail, Nucella	0	8	0	8	0
Snail, Olive	0	27	0	27	0

Species Common Name	Juvenile	Adult	All/Both	Total Actual Take	Total Incidental Mortality
Snail, Triton	0	4	0	4	0
Snailfish, Showy	0	3	4	7	0
Snails and whelks	100	2,393	112	2,605	1,762
Sole, Butter	0	13	177	190	13
Sole, Curlfin	0	71	0	71	69
Sole, Dover	47	16,497	0	16,544	1
Sole, English	1,624	9,146	764	11,534	18
Sole, Petrale	0	11,848	6	11,854	0
Sole, Rex	741	18,874	1	19,616	8
Sole, Rock	0	32	0	32	32
Sole, Sand	37	17	89	143	17
Sole, Slender	0	5,682	0	5,682	4,706
Squid, Market*	0	53,528	0	53,529	14,856
squid, other*	1,736	983	0	2,721	983
Squid, Stubby	0	1	0	1	0
Sunfish, Ocean	0	1	1	2	0
surfperch (unknown)	0	0	4	4	0
Surfperch, Shiner	141	702	165	1,008	1
Surfperch, Striped	0	0	44	44	0
Thornyhead, Longspine	0	14,126	0	14,126	0
Thornyhead, Shortspine	0	4,896	0	4,896	0
tidepool and small estuary fish	15	373	12	400	3
Tomcod	4	60	700	764	30
Tube-snout	0	0	1	1	0
Tunicate, Club	0	6	0	6	0
tunicate, not listed here	0	540	0	540	140
Urchin, Purple	1	256	0	257	10
Urchin, Red Sea	3	94	0	97	0
urchins - not listed here	0	35,027	0	35,027	34,553
Worm, Flat	0	24	0	24	0
Worm, Nemertean	0	717	0	717	197
Worm, Tube	0	4,340	0	4,340	0

*Total actual take includes reported take of 'egg' life stage, but due to formatting constraints the 'egg' life stage was not included as a column in this appendix table.

TABLE A2 – Take (number of organisms) by all capture methods in 2019.

Capture Method	Freshwater Fish	Freshwater Invertebrate	Marine Fish	Marine Invertebrate	Total
Adult Fish Facility	875	0	0	0	875
Benthic Core 10-30" diameter	0	0	0	194,587	194,587
Crab traps or rings	0	0	1	512	513
Dam bypass, gatewell, orifice, etc.	946,252	1,875	0	0	948,127
Dredge, Large (3 ft or >)	0	0	0	448	448
Dredge, Small (< 3 ft)	1	124	0	853	978
Electrofishing, Backpack	91,365	1,324	0	0	92,689
Electrofishing, Boat	8,475	0	0	0	8,475
Fish Ladder (only if associated with fish handling)	3,687	0	0	0	3,687
Fish or a stream survey (where fish information is collected)	2,233	0	0	0	2,233
Hand and/or Dip Net	23,217	3,711	686	30,544	58,158
Hand held-spatula/knife	4	0	0	39,600	39,604
Hook and line/angler/rod and reel	1,065	0	3	0	1,068
Longline	134	0	3,247	46	3,427
Net, Cast	0	0	13	0	13
Net, D-frame	0	71	0	130	201
Net, Fyke	143,685	0	0	0	143,685
Net, Gill	1,071	0	0	0	1,071
Net, Hoop	13,472	0	0	0	13,472
Net, Kick	40	0	0	0	40
Net, seine	0	0	260	10	270
Net, Trammel	7,884	0	0	0	7,884
Net, Trap	63,731	492	0	0	64,223
Net, Zooplankton	5,452	0	2,081	10,905,732	10,913,265
Observations at weirs, fish ladders, dams	27	0	0	0	27
Other	19,784	11	301	4,900	24,996
Plankton Pump	508	0	11,500	0	12,008
Seine, Beach	255,125	335	3,135	1,719	260,314
Seine, Lampara	193	0	0	0	193
Seine, Purse	5	0	240,356	222,034	462,395
Shovel	0	0	0	80,047	80,047
Shrimp pump	0	0	0	3,246	3,246
Snorkel/Dive surveys	73,343	11,994	0	178	85,515
Spawning surveys	2,171	0	0	0	2,171
Trap, Buckley	2,635	0	0	0	2,635
Trap, Incline Plane	60,527	0	0	0	60,527

Capture Method	Freshwater Fish	Freshwater Invertebrate	Marine Fish	Marine Invertebrate	Total
Trap, Light	0	0	0	165	165
Trap, Minnow	7,235	703	10	4,182	12,130
Trap, Not listed here	15,256	276	1,687	1,505	18,724
Trap, Screw	251,900	0	0	0	251,900
Trawl, Beam	4	0	1,537	4	1545
Trawl, Bottom	429	0	149,315	72,742	222,486
Trawl, Midwater	341	0	28,621	32,067	61,029
Trawl, Nordic Surface	47,813	0	19,214	23,871	90,898
Trawl, Otter	60	0	2,325	7,381	9,766
Weir (only if associated with fish handling)	792	0	0	0	792
Total	*2,050,791*	*20,916*	*464,292*	*11,626,503*	*14,162,502*