



SMOLTS

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Plan to move Tutka Bay net pens snowballs into controversy over salmon aquaculture in Alaska

A planning process that began four years ago has created a stir among Homer area residents and business owners—that is Cook Inlet Aquaculture Association’s (CIAA) plan to move a portion of its net pens out of Tutka Bay Lagoon to Tutka Bay. Although CIAA has put forth considerable effort to be transparent and open about hatchery operations, much misinformation has been circulated in the Kachemak Bay area about Tutka Bay Lagoon Hatchery operations, moving the net pens to Tutka Bay, and about Alaska salmon hatcheries in general.

Tutka Bay Lagoon Hatchery pink salmon operations

Annually, CIAA’s goal is to collect sufficient broodstock and eggs to produce and temporarily rear 100 million pink salmon fry in net pens for approximately two months each year. The fry imprint to the area where the net pens are located and then are released to grow and develop in the open ocean. About three million adult pink salmon are expected to return from this release. Forty percent of the return is expected to be harvested by CIAA to recover hatchery operation costs, 5% is needed for broodstock for the next rearing cycle, and the remainder is expected to be harvested in the common property fishery.

Currently CIAA is in the process of rebuilding the broodstock and common property harvests have been curtailed. The number of fry produced each year varies depending on broodstock availability, egg size, and egg-to-fry survival. In the hatchery, 125 million eggs of average size can be incubated. If the eggs are larger, as they were in 2016, the number of eggs that can be incubated is less.

Why move the net pens

The common property fishery and CIAA are not always able to efficiently harvest the fish prior to reaching the lagoon. Once in the lagoon, harvest becomes difficult due to tidal limitations for lagoon access. The result is stress to the fish and loss of quality, which is detrimental to hatchery broodstock that are held in the lagoon and the common property use of the fish. By temporarily rearing the fish in Tutka Bay and near a freshwater source, CIAA expects the returning adults to be readily available for harvest by the cost recovery or common property fishery. CIAA is not proposing to increase the number of fry released, but only the location where they are temporarily reared.

Permit process timeline

In 2013, CIAA began seeking an alternative rearing location with ADF&G and identified a site at the head of the bay to temporarily place up to 10 net pens for short-term rearing. This resulted in CIAA submitting a permit application



Net pens in Tutka Bay Lagoon.

to the Alaska Department of Natural Resources (ADNR) to create a new short-term rearing (two–three months) and release site at the head of Tutka Bay for approximately 80% of the fry to be released. The remaining 20% would continue to be released in Tutka Bay Lagoon to provide limited harvest opportunities and broodstock for future adult returns.

In the fall of 2014, ADNR denied the permit request, which CIAA appealed. In April 2015, ADNR provided CIAA with a temporary permit for three years to deploy net pens and release fry at the head of Tutka Bay. The purpose of the temporary permit was to allow ADNR and CIAA to identify and assess conflicts with other uses of the Kachemak Bay State Park. However, a month later this permit was put into abeyance while ADNR conducted a further review due to public pressure from park users who felt the net pens were a violation of appropriate use for a scenic park. With staffing changes at the ADNR commissioner level, there was no movement on the permit application until January 2017, when CIAA was provided again with a temporary permit but this time for two years to deploy net pens and release fry.

See page 4, NET PENS

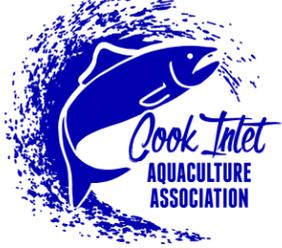
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Inside

<p>Board member profile: Bob Merchant Page 2</p> <p>Staff highlights Page 2</p> <p>Executive Director’s message Page 3</p> <p>Fish releases Page 3</p> <p>Community perspective Page 5</p> <p>2017 returns Page 6</p>	<p>Education Page 6</p> <p>BOD update Page 6</p> <p>Alaska hatchery research Page 7</p> <p>2017 field season Page 7</p>
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Bob Merchant, Director

Bob Merchant has built his livelihood on both renewable and nonrenewable resources, having been a commercial fisherman and a member of the laborers' union working on oil field jobs around Alaska. When it comes down to it, Bob says "I want to be on the side of renewal." And that is why Bob has served on the CIAA Board as a director or alternate for nearly ten years, working in support of sustainable salmon runs for all.

Bob's road to Alaska was a winding one. He was born in Montana, and raised in Washington while his father worked as a telegrapher for Northern Pacific Railroad. His father's career in communications eventually led to a move to Alaska, via the Alaska Highway, in 1957. Bob was 11 years old when the family settled in Anchorage. Although he only spent three years in Alaska, the experience guided Bob's future.

"I was the perfect age—in Alaska from 11 to 14 years old. These were the perfect formative years that I spent riding motorcycles and sport fishing in Campbell Creek. It infected me, and I had this drive to come back."

Bob and his family continued to travel around the country following his father's employment, with Bob attending schools in Montana, Texas, New Mexico, and California. As soon as Bob graduated from high school, he moved to Kenai in 1965. This was the Vietnam War era and he served briefly in the National Guard in Kenai. Soon after that he joined the Army serving in Europe as an artillery surveyor.

After his military service ended in 1969, Bob started junior college in California. In 1970 Bob was again infected, but this time by commercial fishing—"the salt water gets in your blood," he says. Bob began working as a deckhand for Danny Mahan, in the Cook Inlet drift gillnet fishery and continued to work summers in Alaska while finishing college.

By 1972, Bob received his BA in history and geology from Fresno State and thought about going to law school, but his heart was really in Alaska. He returned

Board member profile: Bob Merchant

to Alaska in 1973 and by 1975 he had bought a commercial drift permit and started fishing on his own. Bob has primarily drift gillnetted in Cook Inlet, but he also bought a seine permit in 1980 and seined in lower Cook Inlet for about six years. He was hoping to get away from the fish politics in upper Cook Inlet, but he found out that he enjoyed gillnetting more than seining. So, he got out of seining and has focused primarily on drift gillnetting since 1988. The same year that Bob bought his own drift gillnet permit (1975), he also joined the laborers' union and began working on the Trans Alaska Pipeline (TAPS) in Tonsina. When Bob was not fishing, he worked various oil field jobs, including work for Tesoro north of Kenai.

A heart attack in 1995 and another in 2004 forced Bob to retire early from the laborers' union and also sidelined him from fishing for a short stretch. Although he sold his boat, the F/V Northwind, in 2004, he now regrets that because healthy life style changes have led him to good health. He now takes his permit and fishes with it as the fourth net on Area H drift gillnet boats or uses his permit to fish with boat owners that do not have permits.

A pivotal event for Bob and his way of thinking about the environment came when the Exxon Valdez ran aground at Blich Reef in Prince William Sound, spilling more than 11 million gallons of crude oil, on March 24, 1989.

"That spill killed so much wildlife. I was one of the people that thought that [a tanker spill from the TAPS trade] would never happen. It opened my eyes about the oil industry, the environment. I don't have any qualms at all about shutting down industry to protect wildlife, fish runs, and habitat."

It is that conviction that pushed Bob to volunteer for CIAA. "I am always on the side of fish. Industry development, such as Pebble Mine, never stops and I need to stay vigilant and be a voice for the salmon resource. I am at an age now where I am not going to hesitate to volunteer and be a voice for the salmon resource." Bob first served as an alternate (1997–1999) for one of the Inlet Wide Commercial Fishermen Representative seats held by Dyer VanDevere, and then he served in one of those seats as a Director (2000–2002). In 2015, Bob returned to CIAA as a Director in one of the Upper Cook Inlet Drift Association (UCIDA) seats. At UCIDA, Bob has been a board member and also served as the president for two years. He was also a founding member of Kenai Wild, a group set up to strengthen branding of Cook Inlet salmon, which is not operating anymore.

"I am a firm believer that if it is a public resource, if it is a common property resource, it should be funded from the common property users," Bob explained when discussing challenges faced by CIAA. The State of Alaska used to operate many of the state-

wide salmon enhancement programs and these were funded more broadly than they are today. When the State divested itself of many of its hatcheries and enhancement programs in the early 1990s, aquaculture associations such as CIAA took over the operations and continue to produce fish for all the fisheries, not just the commercial fishery.

A portion of the funding used to support CIAA every year comes from commercial fishermen through the Salmon Enhancement Tax, which is a 2% tax levied on the commercially-caught salmon in Area H. Through the Salmon Enhancement Tax and cost recovery harvesting, CIAA provides other common property fisheries such as the China Poot personal use dipnet fishery (sockeye salmon) in Kachemak Bay and the increasingly-popular sockeye salmon sport fishery in Resurrection Bay. Bob wants to see more public support for CIAA operations, and he points to current controversy with some Homer residents and business owners over the Tutka Bay net pens (see page 1).

When Bob owned his own boats, he enjoyed working on them, such as doing the fiberglass work. "I am kind of a typical Alaskan. If I can do it, I do it myself," Bob says. So it is no wonder he is a talented woodworker. When he tells his wife JoAnn that he feels like making something beautiful, he is not kidding! Bob has made several pieces of furniture. One of his favorite pieces he made is a colonial-style secretary desk out of cherry wood. Crafting such furniture takes patience—one Queen Anne chair Bob made took three years of off-and-on effort.

It is probably the same patience and perseverance Bob applies to woodworking that helps to keep him involved in one of the most political fisheries in Alaska—and to keep him vigilant about salmon conservation.



Bob Merchant's favorite furniture creation, a colonial-style secretary desk.

Staff highlights

At Tutka Bay Lagoon Hatchery, Jeff Sidley joined as the Assistant Hatchery Manager in January. He came to CIAA from the Cannery Creek Hatchery in Prince William Sound, where he was the Assistant Maintenance Supervisor. Chuck Wilasniewski resigned his position as a fish culturist. Aaron Breidert filled this position in May. Aaron has fish culture experience from the Shepherd of the Hills Fish Hatchery in Missouri as well as experience as a Biological Science

Technician for the U.S. Fish and Wildlife Service in Wisconsin.

Tim Wagner became a Temporary Fish Culturist at Trail Lakes Hatchery in April. He is assisting hatchery staff in day-to-day fish husbandry tasks, fish transports, and egg collections.

In April, Jared Grangroth, joined CIAA as a Temporary Project Technician out of the Headquarters office. Jared worked as a Seasonal

Assistant last year enumerating salmon at Hidden Creek.

At Port Graham Hatchery, Basil Meganack joined CIAA as a Temporary Fish Culturist in April. He worked for CIAA as a Seasonal Assistant in 2016. Craig Parry, the Port Graham Assistant Hatchery Manager, is leaving CIAA in late June to become the Hatchery Manager at Neets Bay Hatchery in Southeast Alaska.

Executive Director's message: lessons learned

Last year I made some bold predictions that we would fill the Tutka Bay Lagoon Hatchery to its pink salmon egg capacity and could possibly reach the same goal at the Port Graham Hatchery. Neither prediction was realized. I will admit the Port Graham Hatchery prediction was a stretch because a stronger than predicted return was required to fill the hatchery, but we should have been able to achieve the goal at the Tutka Bay Lagoon Hatchery. The pink salmon return at Tutka Bay Lagoon Hatchery was lower than predicted, but we had the broodstock. We failed to fill the hatchery due to inexperience with a new egg collection location and challenging weather events.

Prior to last year all eggs were collected from broodstock held in saltwater net pens in Tutka Bay Lagoon. Eggs collected from fish held in saltwater net pens tend to be lower in quality resulting in poor survival rates. To improve egg survivals we decided to move the egg collection from the saltwater of Tutka Bay Lagoon to the freshwater of Tutka Creek. Amazingly, the site we choose for the freshwater egg collection was the same site identified as a potential collection site in 1975 during hatchery plan development. I can only speculate on why the freshwater site wasn't developed prior to 2016; perhaps it was just easier to collect eggs from the lagoon.

There are three main components to a successful egg collection—the holding and collection of sexually-mature broodstock, the removal of eggs and sperm from the fish, and the sale or disposal of carcasses. After our 2016 attempt to collect broodstock from Tutka Creek each component was carefully reviewed by CIAA.

To hold and collect broodstock at the freshwater egg take site staff installed a standard picket weir that directed fish to a small capture pen. The weir appeared to be working until a large upstream log was dislodged by high water. The log damaged a portion of the weir, which was quickly repaired by the hatchery staff. Three more high water events followed with each inflicting more damage to the weir, followed by quick repairs by the staff. Finally, near the end of the egg collection, a major flood event occurred destroying the weir beyond repair.

It was clear a stronger weir was needed if we were going to successfully collect broodstock from the Tutka Creek. Over the winter, we looked at several options and built a stronger weir capable of deflecting logs and debris and with improved access for cleaning. This weir will be installed this summer.

Once the fish reach the weir they are captured, euthanized, and their gametes—eggs and sperm—removed. To collect over 100 million eggs this process needs to be conducted efficiently. In 2016, we were able to collect gametes

with the system we had installed, but it was hard on the crew. We were challenged with the development of a more efficient process for the collection of gametes and the biggest challenge was developing a way to quickly lift fish from the creek without damaging the gametes. With Board member Jacob Wise's assistance, a lift box for transferring fish from Tutka Creek to a trailer set up to collect gametes from the fish was designed, built, and installed. Hatchery staff recommended several changes to the gamete removal process that were also incorporated into the new gamete collection trailer. The trailer has been completed and will be shipped to the hatchery soon.

The last major component in the process is the disposal of the broodstock carcasses after the gametes have been removed. Carcasses are collected in totes and hauled about one-half mile to a point where they can be loaded on a vessel (barge or boat) for removal from the lagoon. Boat access to the lagoon is tidally dependent and difficult.

Last year we were short totes for collecting and hauling carcasses to the vessel and had numerous problems transferring fish from the totes to the vessel due to tidal fluctuations and unstable slopes. With the help of several board members we designed a system for transferring the carcasses to the barge or boat, but a better method to dump the totes was needed. Board member Paul Roth designed and sold to CIAA a tote dumper that we could operate with the equipment available at the hatchery. The tote dumper with a chute for transferring carcasses to a vessel at any tide will be installed this summer.

The problems faced during the Tutka Bay Lagoon Hatchery freshwater egg collection led to a lot of discussion among staff and at board meetings, and not all of it was harmonious. Nobody wants a failure. It brings out second guessing and finger pointing, and we sometimes forget to look for the lessons learned by our mistakes.

The CIAA board of directors is a passionate group of people and although things can get contentious, the goal is always to provide and protect the salmon resource. The lessons learned at Tutka Bay Lagoon last year will help us to improve and continue to meet this goal.



Gary Fandrei, Executive Director

The routine of fish transfers and releases

There is one thing that is consistent with hatchery operations and that is the fish life cycle. Gametes are collected, fertilized, and incubated. Eggs reach the eyed stage and are shocked, picked, and inventoried. Eyed eggs hatch and the alevin absorb their yolk sacs and are ready for transfers to rearing containers where they start to feed. Fish are fed for a certain time period and then released to the ocean. Depending on the species, fish return in one year (pink and coho) or two–three years (sockeye). And the cycle starts all over again. Most of the time the fish life cycle that occurs in the hatchery is routine and predictable... BUT there is that time when it is anything but...and the winter/spring of 2017 was just that.

Let's start with Tutka Bay Lagoon Hatchery. Last year was the first year of being able to complete a freshwater egg collection at Tutka Creek versus a saltwater egg collection at Tutka Bay Lagoon. Staff collected nearly 65 million green pink salmon eggs. At the end of the spawning season, a flood event took down the weir and the 6" transfer line used to transfer unfed fry from the hatchery to the net pens in the lagoon (nearly 3,500 ft away). This was temporarily fixed in December using easily-removable clamps to join the pipes together.

This winter, weather stayed dry and cold for a long

time. Normally the fish are ready for transfer in March but this year fish were not interested in coming out of their incubators and waited until early April. When the fish were ready to start transfer, staff were unpleasantly surprised to find that the 6" transfer line was frozen. Attempts to thaw out the line were unsuccessful. Staff began brainstorming other ways to get the fish transferred to the net pens, which included using the unfortunate but now fortunate temporary fix to the 6" transfer line to connect a flex hose to send fish to waiting tanks on a barge. The barge would then be towed to the net pens and the fish off loaded. Mother Nature decided to give us a break and the line thawed and it wasn't necessary to use this transfer method—the extra handling event was not something that the fish or staff would enjoy. Fish eventually did make it out to the net pens and things once again became routine and predictable.

The dry and cold spell of weather not only affected Tutka Bay Lagoon Hatchery but it also made life interesting for the crew at Trail Lakes Hatchery in Moose Pass. This hatchery uses ground water for its water supply and is highly dependent on the aquifer water level. With the weather conditions this winter, the availability of water supply from the groundwater was critical. Staff evaluated a number of options and began systematically proceeding down those options

to conserve water. All excess water was cutback. Coho smolt from BY15 were moved down to the raceways at Bear Creek Weir. Sounds easy, but of course everything was frozen solid and covered in snow at the weir. Staff persevered and got the snow and ice out before the fish were transferred. Extra staff were hired to feed these fish.

Next 288,000 Bear Lake sockeye smolt were released at Bear Creek. Again, the creek was frozen over but staff were able to get through the ice and release the fish.

Tutka sockeye smolt from BY15 were the next to be transferred to net pens at Tutka Bay Lagoon and Port Graham Hatchery approximately two weeks earlier than scheduled. Fish were smaller and not fully ready for saltwater so there were higher than normal mortalities upon transfer.

In between the Resurrection Bay release at Bear Creek and the Tutka smolt transfers, staff at Trail Lakes noticed water bubbling up from the ground near the well pads. It would later be determined (once ground thawed to allow excavation) that the pipeline from the wells had a hole. The remainder of the BY15 Bear Lake sockeye smolt were transferred on schedule to the net pens in mid-April at Resurrection Bay.

See page 4, TRANSFERS

Net pens—continued from page 1

News of this approval was not well received by some members of the public and ADNR received several letters both for and against the deployment of the net pens in Tutka Bay. The controversy eventually reached Governor Walker’s office who provided instructions for Commissioner Cotten (ADF&G) and Commissioner Mack (ADNR) to have a public listening meeting in Homer to hear the arguments by both sides. The meeting, held in May, was well attended by an audience with varying view points. Supporters stressed the importance hatchery programs have to the State of Alaska fisheries, and the fact that fish production requires a high-quality environment to be successful. Those opposed to the temporary placement of net pens in Tutka Bay had the opposite concern that the rearing of fish in Tutka Bay would have a negative impact on the surrounding environment and park use. At times during this meeting, it was difficult to ascertain issues with locating net pens in Tutka Bay versus a larger issue on the use of hatcheries to enhance fisheries. Other concerns expressed by those opposed to the net pen/hatchery production were the potential impact to the carrying capacity of the ocean, lack of recent baseline data, and the perceived lack of sufficient public process.

Facts about the net pen move

- CIAA has been open and transparent since the beginning of this process in 2013 with over 30 public discussions that included the proposed net pen move. Many of these public forums were in the Homer-area including two Homer City Council meetings and six Kachemak Bay State Park Citizen Advisory Committee meetings.
- CIAA is not increasing salmon production by moving net pens, nor are there any plans to increase production. CIAA has been permitted since 1994 to incubate 125 million pink salmon eggs annually.
- The fish will continue to enter and pass through Tutka Bay just as they have since 1978 when this hatchery was first operational. Regardless of where the fish are reared and released—in the lagoon or at the head of the bay—they emigrate along the same path.
- The net pens will not be at the head of the bay year round. At most they will be in place for eight to ten weeks during the April to June timeframe. CIAA’s goal is to remove the net pens from the Tutka Bay as soon as possible recognizing that weather patterns dictate when this can be done.
- There is no expansion of the Tutka Bay Lagoon Hatchery special harvest area.
- CIAA is working with the Kachemak Bay Research Reserve to institute a benthic monitoring program as well as monitoring phytoplankton and zooplankton.

Facts about aquaculture in Alaska

- Salmon hatcheries in Alaska are not industrial fish farms. In Alaska, salmon

fisheries are supplemented through a process commonly called “ocean ranching,” where salmon eggs are incubated and short-term reared to a juvenile stage before release to the wild. Salmon produced by the Alaska hatchery enhancement program remain wild. You simply cannot compare Alaska’s salmon hatchery program to those programs where fish are raised from first feed to harvest entirely in tanks or pens, which can span 12–18 months.

- The Alaska hatchery program was carefully designed and is regulated to increase salmon abundance and enhance fisheries, while protecting wild stocks. The State of Alaska has established genetics, pathology, and other policies that must be followed by all salmon hatcheries. The State monitors the hatcheries closely and does not permit enhancement projects that are anticipated to have a negative effect on habitat, natural salmon production, or other species.
- Only local stocks are permitted for use as broodstock so that hatchery-incubated salmon are genetically like the wild stocks in the same area.
- Alaska’s hatchery program has been a good investment for Alaska and its coastal communities producing 30% of the annual salmon harvest.

The interactions of hatchery fish with wild populations has been debated heavily in the scientific community with no clear answer being provided. Nearly all studies on these interactions have been conducted outside of Alaska where hatchery programs are not subject to the rigorous guidelines to protect natural productivity that Alaska has in place. ADF&G is in its fifth year of a multi-million dollar (see page 7) study to assess the impact hatchery produced fish have on wild salmon production. Preliminary information from this study indicates that concerns and issues regarding the negative impact hatchery production has on wild stock may not be as significant as once believed.

It is detrimental to hatchery operations to have a negative impact on the environment. In Alaska, the hatchery programs are only rearing salmon to the fry or smolt stage—the rest of their life journey relies upon healthy ecosystems and intact habitats. Without healthy salmon habitat, there will not be salmon, whether they begin their lives in a hatchery or not.

Current status of the move

Despite having a permit from ADNR for placing net pens in Tutka Bay, CIAA elected not to move the net pens this year due to logistical and production issues at the hatchery. However, CIAA is committed to operating the Tutka Bay Lagoon Hatchery efficiently and without negative environmental impacts. If you are interested in learning more about the Tutka Bay Lagoon Hatchery or other CIAA operations please visit CIAA’s website at www.ciaa.net or call (907-283-5761).

Transfers—continued from page 3

With the smolt transfers complete and improving weather, gains were made in the aquifer level and once again hatchery operations are back on track for being routine and predictable.

Port Graham Hatchery also had its share of frozen pipelines but the process water lines were not affected just the domestic water lines to the hatchery and residencies. Because Port Graham Hatchery is still in the building phase of its fish production, the number of fish rearing in the hatchery was low, which is fortunate considering the weather conditions.

While it is easy to become complacent when hatchery operations tend to be routine and predictable, this year showed that it can easily change—without team work, dedication, and the ability to adapt, results could have much worse. We are all glad to put the winter behind us and move hopefully to the routine and predictable gamete collection this summer. The table below summarizes 2017 salmon releases from CIAA’s hatchery operations.

2017 Releases

Hatchery	Brood year/stock/species	Date	Number	Size (gm)	Release location
Tutka Bay Lagoon					
	BY16 Tutka Pink	May 15, 2017	4,111,900	0.32	Tutka Bay Lagoon
	BY16 Tutka Pink	May 22, 2017	13,482,600	0.63	Tutka Bay Lagoon
	BY16 Tutka Pink	June 7, 2017	36,290,900	0.53	Tutka Bay Lagoon
Trail Lakes					
	BY15 Bear Lake Sockeye	March 7, 2017	288,000	7.12	Bear Creek
	BY15 Bear Lake Sockeye	May 22, 2017	1,528,000	15.75	Resurrection Bay
	BY15 Tutka EBL Sockeye	May 25, 2017	356,000	13.68	Tutka Bay Lagoon
	BY15 Tutka EBL Sockeye	May 25, 2017	85,800	14.66	Port Graham Bay
	BY15 Bear Lake Coho	June 6, 2017	54,000	13.34	Bear Creek
	BY16 Bear Lake Sockeye	May 31, 2017	2,433,000	0.58	Bear Lake
	BY16 Tutka EBL Sockeye ^a	June 22, 2017	900,000	0.30	Hazel Lake
	BY16 Tutka EBL Sockeye ^a	June 21, 2017	1,467,000	0.30	Leisure Lake
	BY16 Tutka EBL Sockeye ^a	June 20, 2017	257,000	0.30	Kirschner Lake
	BY16 Bear Lake Coho	June 7, 2017	125,000	1.10	Bear Lake
Port Graham					
	BY16 Port Graham Pink	June 7, 2017	6,059,800	1.03	Port Graham Bay

a. These numbers are estimates.

Community perspective: Not out of the water yet By Matt Steffy

As an economic engine, Alaska's seafood industry is second only to oil and gas. In the 2014 season, commercial fishing accounted for 41,200 full-time equivalent jobs, \$2.1 billion in generated income, and \$5.9 billion in economic output. This industry has a long history in our state, one that even predates the petroleum industry. The science of maintaining a long-term sustainable harvest takes on a variety of different forms, from quotas and season limits, to escapement goals and closure periods. For a long time, the greatest threat to any fishery has been overfishing. This was a hard-learned lesson born from the scars of the North Sea salmon, Atlantic cod, and global whaling—all fisheries with a long commercial history. In Alaska, with such a relatively young population, we have the perpetual benefit of learning from others' mistakes; particularly in the field of resource management. While debates continue over sport fishing vs. commercial fishing, subsistence vs. personal use, and international vs. local fisheries, there is another specter that is looming on the horizon and already banging on the door: invasive species.

There are many non-native or exotic species in our day-to-day life. The plants in your garden and the pets in your home are notable examples. An invasive species is something much more. As defined by Executive Order 13112, an invasive species "does or is likely to do economic or environmental harm, or harm to human health." On a global perspective, we can think of kudzu in the American southeast, zebra mussels in the Great Lakes, or pythons in the Everglades.

So, what invasives are causing concern in Alaska? While there are several nuisance species such as orange hawkweed and white sweetclover that out compete native plants and drastically change their local environment, particular attention has been drawn in recent years to those that have the grave potential to impact our fisheries. The first aquatic invasive to break the radar in Alaska was probably Atlantic salmon that escaped fish farms in the northwest. These fish are lower in nutrient value, but compete with our native species for the same resources. So far, they have not established themselves in considerable numbers, most likely due to the malfunctioning wiring in their anadromous heads that search out the streams and rivers of their birth to reproduce successfully.

At present, the most injurious plant invasives for the commercial fishing industry include such outlaws as Elodea, reed canarygrass, and the knotweed complex. Each of these species has the potential to compromise

the spawning habitat of salmonids. Reed canarygrass and the knotweeds grow along streambanks and out into the streambed itself. Their roots and stems crowd out valuable spawning grounds while also disrupting the nutrient balance of the waterbodies they occupy. Their presence causes shifts in the invertebrate populations, water temperature, dissolved oxygen, and substrate composition.

Elodea is the first freshwater aquatic invasive species detected in Alaska, and has been the subject of aggressive eradication efforts over the last four years. Elodea is your typical aquarium plant, and is believed to have been introduced by people dumping their aquariums into lakes. This may sound like a bizarre and isolated practice, but I personally observed this as a Park Ranger and then Manager of the Chena Lake Recreation Area in the North Pole area of the Interior. And, yes, the goldfish survived the transplant too, though only until winter. Elodea, on the other hand, continues to photosynthesize and reproduce in the darkest of winter months through five feet of ice. If you've never seen it before, you can picture it as underwater kudzu. It reproduces vegetatively and completely dominates the water column in the littoral zone in depths up to twenty feet.

The Kenai Peninsula Cooperative Weed Management Area embarked on an ambitious effort of Early Detection and Rapid Response (EDRR) beginning in 2013 to address infestations in three lakes on the northern Kenai Peninsula. Federal, state, municipal, private, and non-profit agencies combined forces to treat the infested lakes quickly with a selection of herbicides that targeted the plant with surgical precision. As of today, all three lakes have been laboriously tested and show no signs of Elodea. This kind of success is rare and takes a phenomenal amount of cooperation, outreach, and funding.

We are certainly not out of the water yet. Invasive species that could compromise our commercial fishing industry are perpetually on the fringes; waiting for an adequate vector to slip into valuable habitats and establish themselves. As a state, as a community, and as an industry, we must work on EDRR and our ability to prevent and/or eradicate invasive species as they present themselves. Tobias Schwoerer with UAA's Institute for Social and Economic Research has recently completed a study on Elodea's impact on Alaskan fisheries, and concluded after four years of research that Elodea could eventually have colossal impacts on our economic productivity. "I found that if elodea spreads throughout Alaska, between 200 and 300 floatplane lakes could potentially be infested with elodea by 2030. The economic loss to commercial



Matt Steffy in Port Graham. Photo courtesy of Janice Chumley, Cooperative Extension Service.

sockeye fisheries and recreational floatplane pilots would most likely approach \$97 million a year. That equals one quarter of the value fishermen received for their 2016 statewide salmon catch." -Tobias Schwoerer. Further on in his work he formulates that Alaska could put forward \$10 million to eradicate all Elodea in the state, but that does not include future monitoring efforts.

As a state, and as an industry, we need to formulate a strategically funded resource plan that allows us to deal with these invaders as they arise; that's Early Detection and Rapid Response. There is a \$1 million request on Senator Murkowski's desk for Elodea work. We can all do our best to support it, but it is going to take a lot more. Would there be taxes added on to registration fees? At the commercial and the recreational level? Would taxes be added to boat registrations? These all sound terrible, but look at the alternative. We must find a way to cooperatively protect our assets now, so that our grandkids can be out there harvesting salmon for their families and their industries. It's a matter of investment. How much can we spend now to ensure revenue in the future? Are we willing to invest, as a state and as a workforce, in our future at some cost in order to protect the future returns on an invaluable industry for our economy?

Matt Steffy is a Natural Resource Specialist at the Homer Soil & Water Conservation District and can be reached at 235-8177 x117, or matt@homerswcd.org. Some referenced informational materials were gathered from the 2015 AMSI report and Dr. Schwoerer's publications in newspapers across the state.

2017 estimated returns

Each year CIAA attempts to predict how many adult salmon will return to the different release locations. We use historical information and adjust accordingly based on environmental information during the ocean-rearing stage and the condition of the fish that were released to determine an ocean survival. The number of fish released or counted during the smolt migration are multiplied by this ocean-survival percentage and in the case of sockeye, the estimated year class split as well, to predict what the total return will be for the upcoming season. Based on this prediction, we determine how many of the returning adult salmon will be harvested by CIAA's contracted processor to provide funding for CIAA's operations. Then we wait to see how the actual return will meet these predictions. Generally, the more data points available as historical information, the better the prediction will be—but over the last few seasons, ocean conditions have provided returns that have not followed the predictions provided by the historical information. The table above provides the estimated total returns, broodstock requirements and the various harvests for 2017. Now the waiting begins....

2017 Total Return Predictions

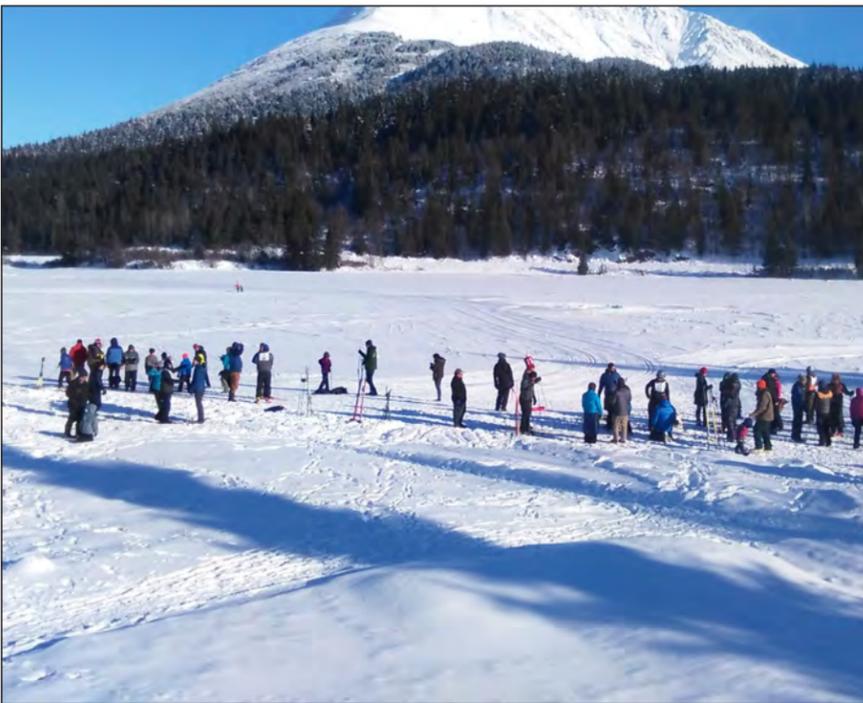
Species	Return site	Stock	Estimated total return	Broodstock escapement	Estimated cost recovery	Percentage harvested in cost recovery	Common property
Sockeye	Resurrection	Bear Lake	120,583 ^a	13,000	97,583	81%	10,000
Sockeye	Tutka Bay	English Bay Lakes	62,236 ^a	7,000	35,236	57%	20,000
Sockeye	Neptune Bay	English Bay Lakes	31,430 ^a	0	31,430	100%	0
Sockeye	China Poot	English Bay Lakes	31,381 ^a	0	30,881	98%	500
Sockeye	Kirschner Lake	English Bay Lakes	13,020 ^a	0	13,020	100%	0
Sockeye	Nanwalek	English Bay Lakes	3,715 ^b	3,715	0	0%	0
Sockeye	Hidden Lake	Hidden Lake	27,755 ^b	13,000	400	0%	14,355
Sockeye	Shell Lake	Shell Lake	134 ^c	134	0	0%	0
Coho	Resurrection	Bear Lake	17,120 ^a	800	0	0%	16,320
Pink	Tutka Bay	Tutka Creek	354,005 ^b	171,714	182,291	52%	0
Pink	Port Graham	Port Graham River	39,233 ^d	39,323	0	0%	0

a. Returns are 100% hatchery produced.
 b. Returns are mixed hatchery and wild produced.
 c. Returns are 100% hatchery produced. Shell Lake is a restoration project to recover the sockeye population there was nearly extirpated by invasive northern pike.
 d. Port Graham Hatchery is in the building stages of broodstock development. Returns reported are only the hatchery-produced contribution. The wild production is not included in this estimate.

Education and outreach



CIAA staff member Kristin Beck feeds the salmon smolt at the net pens in Resurrection Bay during the Silver Salmon Derby Committee tour. Photo courtesy of GeNeil Flaherty.



Participants enjoying the Moose Pass Rendezvous, 2017.

The area CIAA operates in, the Cook Inlet Region is huge—38,000 square miles or roughly the size of Virginia. In this area are many cities and villages, encompassing the majority of Alaska's population. Because CIAA's operations are spread across this vast area, and also encompass a variety of projects from fisheries enhancement to habitat restoration, we rely on building good relationships with a number of communities. In the last few months, Seward and Homer have been a major focus of CIAA outreach.

Seward is a community that provides a lot of support to and receives considerable benefit from CIAA's operations. The increasingly popular sport fishing opportunity provided by the enhancement of the sockeye salmon fishery in Resurrection Bay and the coho salmon production provided to the Silver Salmon Derby are just a couple of projects that benefit both the community and CIAA. In addition, CIAA relies on goods, services, and the ability to hire employees from Seward and the neighboring community of Moose Pass for Trail Lakes Hatchery operations.

Over the past few months, CIAA has taken opportunities to strengthen its relationship with these communities. For the first time ever, CIAA supported the Moose Pass Winter Rendezvous, a community event benefitting the community and the Moose Pass School. Trail Lakes Hatchery staff participated in this event in mid-February.

Executive Director Gary Fandrei addressed the Seward Rotary Club in March. And he was the main speaker at the Salmon Forum organized by the Resurrection Bay Conservation Alliance to discuss biology, history, economics, and the general status of the Resurrection Bay and Bear Lake salmon stocks. Gary focused on the salmon life cycle through the operations of the Trail Lakes Hatchery and discussed habitat ideas brought forth from community members.

This spring Trail Lakes Hatchery staff gave a tour of the Resurrection Bay net pens to the Silver Salmon Derby Committee. And although the fish in the net pens were not the silvers that the committee cherishes (the coho salmon are released to Bear Creek), they still enjoyed the tour and plan to visit the Bear Creek Weir in June to see the adult sockeye salmon return.

Homer is also a community CIAA considers a partner because of CIAA's hatcheries, and the various stocking and habitat projects lower Cook Inlet. Because of the Tutka Bay net pen issue (see page 1), CIAA has participated in several meetings in Homer to discuss the history behind the move and the facts about Tutka Bay Lagoon Hatchery pink salmon production. Although CIAA had been working on this net pen move for years, and had reached out in Homer through various city council and other citizen group meetings, this issue really took on a life of its own in the past few months culminating in a listening session in May. In conjunction with that session, CIAA provided a tour of the proposed net pen site and the Tutka Bay Lagoon Hatchery to several people including members of the Kachemak Bay State Park Citizen Advisory Board.

CIAA strives to strengthen its relationship with a number of the Cook Inlet watershed communities because we often share the goal of providing and protecting the salmon resource for all users.

Board of Directors update

New board members and alternates

Over the winter/spring, there have been a few changes to CIAA board membership. Marlon Ash stepped down as the Port Graham/Nanwalek Representative and this seat remains vacant. We wish to extend our appreciation to Marlon for his short but dedicated tenure.

At the March meeting, the board added an additional seat and filled that with Nate Berga, who is a Plant Manager at Pacific Star Seafoods. "The work CIAA does is important and contributes to the future of the seafood industry in Cook Inlet," says Nate explaining why it is important for him to be involved and contribute.

In April, Kenai Peninsula Fisherman's Association (KPFA) appointed a new member, Joseph Person, to replace Will Faulkner who became the alternate to this seat. Joseph is a third-generation East Side setnetter, who has dedicated much time and energy to the KPFA board.

Kenny Rodgers who held one of the Northern District Setnetters of Cook Inlet left the board in May. Kenny served on the board for a number of years and was involved in the Susitna projects, with a passion for

protecting the northern district salmon. He will be missed. Kenny's replacement is Gary Swan, who served as Kenny's alternate. Gary has fished upper Cook Inlet and currently is a setnet fisherman at Fire Island, and is retired from federal service. His alternate is his son, Darell Swan, who also setnets and serves as a technician for the Alaska National Guard.

Upcoming board election

This fall, CIAA will begin an election process to fill three of the five at-large Board of Director Seats. These seats are reserved for Cook Inlet Area H salmon permit holders and are commonly referred to as the Inlet Wide Commercial Fishermen Representatives. These seats act as the voice for all 1,281 permit holders (data current of May 2017). The terms of these seats—held by Christine Brandt, John McCombs, and Carl Hatten—are set to expire at the February 2018 annual meeting. Nominating petitions will be sent out to permit holders in October, 2017.

Next board meeting

The next board meeting will be held September 16, 2017 at 10:00 a.m. at the Kenai CIAA Headquarters Building.

Alaska hatchery research update

As reported in previous issues of *Smolts*, the State of Alaska is currently engaged in a multi-million dollar study to evaluate the interactions of Alaska's hatchery and wild salmon stocks. The study, now in its fifth year and expected to end in 2023, will improve the understanding of hatchery and wild stock interactions. And the results will provide Alaska-specific information for assessing Alaska's hatchery program. This is important considering that Alaska's hatchery program often faces criticisms based on science from hatchery programs outside of Alaska that vastly differ in terms of operations and regulations. This is the largest systematic study in Alaska, and the world, focused on hatchery-wild interactions.

The fishery enhancement program was initiated by the State of Alaska in 1971, a time of severely depressed commercial salmon fisheries. The program is designed to make the protection of wild stocks the main priority by adopting a series of mitigation requirements including:

- Only local stocks may be used for the brood source, so that the hatchery-produced fish are locally adapted and have local genetic profiles.
- Hatcheries and stocking projects are required to be away from important wild stocks.
- Marking of hatchery salmon to accurately detect hatchery-raised salmon. Nearly 100% of all hatchery salmon are marked using otolith thermal marking.

The Alaska Department of Fish and Game (ADF&G) manages both wild and hatchery stocks. The salmon fisheries are managed with a wild stock priority. Since the early 1970s, when the hatchery program was implemented, wild stocks have rebounded, alongside hatchery-raised salmon.

Although there is no evidence to suggest that wild stocks are being negatively impacted by hatchery-raised fish in Alaska, there have been growing concerns over interactions between hatchery and

wild salmon, including straying by hatchery salmon and the genetic fitness of hatchery salmon. This led to the undertaking of this study by ADF&G to look at the interactions between hatchery and wild pink and chum salmon in Southeast and Prince William Sound streams.

The priority research questions that are being addressed by this study are:

1. What is the genetic stock structure of pink salmon in Prince William Sound and chum salmon in Southeast Alaska?
2. What is the extent and annual variability in straying of hatchery pink salmon in Prince William Sound and chum salmon in Prince William Sound and Southeast Alaska?
3. What is the impact on fitness (productivity) of wild pink and chum salmon stocks due to straying of hatchery pink and chum salmon?

The field work for questions 1 and 2 has been completed and analyses are near completion. One highlight of the results to date is that the natural systems in Prince William Sound continue to be productive in the presence of hatchery straying. It was noted that the natural production of Prince William Sound pink salmon was particularly strong in the three years (2013–2015) of work that provided total return estimates. Another result from these three years of study was that a comparison of harvest rates for hatchery-produced and naturally-produced pink salmon in Prince William Sound indicates that the ADF&G policy of preferential harvest of hatchery-produced fish is effective with nearly 100% harvest rates for hatchery fish.

With questions 1 and 2 well on their way to being addressed, the study will focus on question 3, the fitness question. These studies are considered to be the most important to the long-term understanding of hatchery-wild fish interactions.

Funding for the study has been an issue, with the total project cost estimated to be over \$14 million dollars.

Fish processors and seven of Alaska's aquaculture associations, including CIAA, have stepped up to provide funding. The aquaculture associations are providing up to \$350,000 per year. In addition to the in-kind support provided by ADF&G, this study has also received grant funding from the Staltonstall-Kennedy Grant Program (\$250,000), the North Pacific Research Board (\$289,000) and the Pacific Salmon Commission Northern Fund (\$100,000).

When the study is complete, the results will not only inform management of Alaska's hatchery programs, but it will also help to guide the marketability of Alaska salmon. Initial results have already made a difference in Alaska salmon marketing. In 2012, salmon fisheries in Prince William Sound lost recertification under the Marine Stewardship Council (MSC) standard. Seafood with the MSC label has been found to be caught responsibly, handled with care, and be traced back to a sustainable resource. Prince William Sound salmon lost its recertification as a result over concerns regarding the aquaculture operations there.

This year, MSC gave the recertification back to Prince William Sound based on the results coming out of this hatchery-wild interaction study. In a press release, MSC stated, "Based upon the findings quantified by the Alaska Hatchery Research Program, the certification assessment team has determined that the impacts of wild and hatchery salmon interactions are low and meet the sustainability requirements of the MSC Fisheries Standard." With this move, all Alaska salmon fisheries are again carrying the MSC label.

"We recognize the importance of all salmon stocks to Alaska and the need to assure our hatchery programs are well managed," says CIAA's Executive Director, Gary Fandrei. "We believe the information generated by this study will benefit Cook Inlet's hatchery programs for many years."

2017 field season underway



CIAA staff member Jared Grangroth measures invasive pike that were harvested from Whiskey and Hewitt lakes in early June.

Each year, CIAA operates smolt traps and adult weirs to collect data on the numbers of smolt leaving a system and the number of adults returning. These data are used by CIAA for hatchery operations, as well as ADF&G for fisheries management.

In support of the hatchery programs, smolt and/or adult enumeration projects are or will be conducted at Bear, Hidden, and Shell lakes and Paint River in 2017. This year CIAA is also counting salmon smolt leaving Tustumena Lake. Because CIAA has not performed any enhancement projects in Tustumena Lake in over a decade, this project is providing valuable information on the health of the lake for salmon rearing that can be used by ADF&G for management purposes. You can follow daily counts at <http://www.ciaa.net.org/data/salmon-enumeration.html>.

CIAA is continuing to fight invasive northern pike in the Susitna watershed by harvesting pike in Shell, Whiskey, and Hewitt lakes this season. Pike are also being targeted in the Tyonek watershed through a partnership including CIAA, Tyonek Tribal Conservation District, U.S Geological Survey, and University of Alaska Fairbanks. These are just a few highlights of the various field and habitat projects CIAA has undertaken this year.

We wish to thank PacRim Coal, LP, for the donation it made to CIAA of two rotary screw traps they had built for sampling fry in the Chuitna River as part of the studies for the now-shelved Chuitna Coal Project on the west side of Cook Inlet. This type of trap consists of a large cone suspended between two floating pontoons. The cone is rotated by river flow and a portion of the migrating fish are funneled into an underwater holding tank at the back of the trap. The estimated value of this donation is \$15,000 and we anticipate future use of these traps either by CIAA or on loan to other organizations looking to count fry or smolt for their projects.

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Municipality of Anchorage

Sean Palmer

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Cook Inlet Seiners Association

Matt Alward

Jacob Wise



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Providing and protecting your salmon resource

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Cathy Cline, Project Technician

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To receive *Smolts*, send a request with your name, your organization's name, and your address to: *Smolts*, 40610 Kalifornsky Beach Road, Kenai, AK 99611 or to lisak@ciaaet.org.

For change of address for permit holders, notify Commercial Fisheries Entry Commission (CFEC), P.O. Box 110302, Juneau, AK 99801-0302, or call them at 907-789-6150. We use mailing labels from the CFEC. If your address is wrong, please contact CFEC; we cannot correct your address.