Increasing the Number of Alaska Natives and Rural Alaskans Working in Fisheries and Marine Sciences:

Review and Recommendations

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This report was written by Dr. Dolly Garza, Professor of Fisheries, and Paula Cullenberg, Professor of Fisheries, Alaska Sea Grant Marine Advisory Program, University of Alaska Fairbanks.

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Alaska Sea Grant and the School of Fisheries and Ocean Sciences at UAF.
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Vision: Alaska Natives and rural Alaskans will pursue education toward professional careers in fisheries, marine and ocean sciences, and will be employed in these fields in Alaska at levels equal to their demographic representation in the state.

Executive Summary
Subsistence and commercial fisheries are of paramount importance to the lifestyle, livelihood and cultural heritage of Alaska Natives and all rural Alaskans. Alaska Natives have substantial local knowledge about flora and fauna including biology, ecology and sustainability. Yet Alaska Natives are severely underrepresented in the fields of fisheries science, marine science, and fisheries management, policy and enforcement in our state. This is despite the availability of professional and technical resource jobs in communities throughout Alaska and the existence of high unemployment in most of these rural communities.

In this report we have summarized information and comments from educators, students, agency personnel, Tribes and Alaska Native organizations, and a review of reports as to why there are few Natives and rural students in these sciences, and what might be done to turn this around. We make several recommendations and include an appendix referencing both ongoing Alaskan programs as well as relevant programs outside of Alaska.

The main roadblocks identified to Alaska Native and rural Alaskan pursuit of fisheries and marine science careers include:
- Little or no exposure to the fisheries and other marine sciences fields while in middle and high school;
- Limited or lack of rigorous science and math classes in high school leaving students unprepared once they get to college;
- Lack of a dedicated fishery/marine science educational pathway to and at the University of Alaska;

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• Lack of retention programs to help those entering college in fisheries/marine science and biology succeed;
• Poor linkages between education, funding, internships and employers.
• Different cultural learning styles by Native students than found in schools and universities, and
• Relevance of current teaching materials to Native and rural Alaskan students.

Ultimately, reaching the goal of increasing the number of Alaska Natives and rural Alaskans entering careers in fisheries and marine science will require clear pathways for students. These pathways should begin in the pre-college years and create a solid bridge to post-secondary education and employment.

Establishing a clear pathway requires employers, educators and stakeholders to commit to and work together to increase the number of Alaska Natives and rural Alaskans working in the fields of fisheries and marine science and management.

To reach this goal, we offer five action recommendations.

1. Stakeholders, universities and colleges, and employers should support and engage in K-12 programs and opportunities which encourage students to consider fisheries or marine science careers.

2. University fisheries, marine science and natural resource departments or schools should develop, or partner with, programs to actively recruit and retain Alaska Native and rural Alaskan students.

3. Technician training which supports entry level work should be available statewide and clearly “stair step” into degree programs and/or advanced job placement.

4. Potential employers such as natural resource agencies, research entities, fishing organizations, Tribal groups and Alaska Native organizations, and others should target Alaska Native and rural Alaska students by developing paid summer internships and research assistantships which link to education programs, funding scholarships and mentoring secondary and university students.

5. Outreach and information about fishery/marine science education pathways and employment opportunities should be developed and shared by all those interested.

Although this report primarily addresses fisheries science, many of the issues/methods discussed here can relate to other NOAA sciences – marine science, oceanography, weather etc. However, in Alaska, the greatest number of opportunities is in the fisheries field.
Introduction:

Purpose of this report

The purpose of this report is to generate discussion about ways to increase the number of Alaska Natives and rural Alaskans in fisheries and marine science careers. There are numerous statewide groups who currently are engaged either directly or indirectly in efforts to support capacity building in rural Alaska related to fisheries science employment either at the technician, biologist, or manager level. In a number of sites, high school projects, summer camps, summer internships, university and college classes are offered by educators and employers who are committed to supporting the next generation of fisheries scientists.

Yet we feel that progress toward our identified vision statement could be improved if the many independent efforts were collaborative, rather than independent of each other, as most currently are. In addition, we found that some of the pieces of an effective effort still are missing. We hope that by identifying these gaps and recommending actions we will move towards a successful statewide education-to-career effort in fisheries science directed at Alaska Natives and rural Alaskans. We focus this report on ways to:

- introduce rural Alaskans to fisheries and marine science,
- increase recruitment and retention of Alaska Native and rural students in a bachelor’s degree program in fisheries or related field and,
- Encourage future employers to support and encourage students.

Supporting Alaska Native and rural Alaska graduate students is not addressed in this report, although many concerns are relevant. Graduate education should be reviewed at some point.

Finally, we believe that stakeholders, educators and employers must commit to the vision and goal of this paper and be precise in the design of programs and steps specific to meeting this goal.

Why Care about Capacity Building in Rural Alaska?

The long term sustainability of Alaska’s rural coastal communities depends on both the health of local resources and a diversified economic base. Capacity building\(^2\) is one way to enable rural Alaskans to work in the jobs available in their community as well as participate in policy decisions that impact their lives. There is high turnover in jobs in rural Alaska as many employees often are recruited from outside the region or state. Residents who enhance their

\(^2\)Capacity building is “the process by which individuals, organizations, institutions and societies develop abilities (individually and collectively) to perform functions, solve problems and achieve objectives.” United Nations Development Programme, 1997 Technical Paper 2. New York:UNDP
local knowledge and skills with an advanced education and are employed in their region will more likely stay longer, resulting in a stable workforce.

Alaska Natives and rural Alaskans also have traditional and cultural links to the natural resources of Alaska. As professionals in fisheries, marine science or any other natural resource field they, more effectively, can incorporate local knowledge into research design and policy decisions. They already have links with local resource users which can improve understanding and communication between agencies and communities, resulting in increased compliance and better management.

As McKie Campbell, Commissioner of the Alaska Department of Fish and Game has noted, “rural Alaskans working in fisheries can provide long term stability for ADF&G and better understanding and cooperation with rural residents.” We believe that this statement can and should be extended to other local, regional, State and Federal employers.

There is a growing trend in Alaska to develop partnerships between local stakeholders and fisheries management agencies and researchers. While cooperative or co-management is not mandated in Alaska for fisheries management, there are movements toward collaborative management and research. Alaska Native Tribes have already moved into the arenas of environmental and fishery monitoring, fishery management and policy, and limited research through several federal opportunities such as the USFWS Office of Subsistence Management, the Marine Mammal Protection Act and the Wild Migratory Bird Act. Organizations such as Cook Inlet Keepers demonstrate rural community commitments to resource conservation efforts.

Alaska Natives have experience in subsistence fisheries which span several thousand years, and both Alaska Native and rural Alaskans have a history in the commercial fishing industry that dates back over a hundred years. This wealth of practical experience and knowledge should be brought into collaborative efforts in fisheries and marine science arenas by stakeholders and management agencies. Increasing the number of Alaska Natives and rural Alaskans in fisheries, marine science and management positions will make accessing this knowledge easier and more effective.

II. Where Are We Now?

“I was studying seafood marketing, but I realized that the degree was taking me away from Alaska. I switched to fisheries science.”

Valli Peterson, student, UAF Fisheries, South Naknek.

The number of Alaska Natives or other rural Alaskans who are currently fisheries or marine science professionals, or who are actively working as fisheries managers is negligible and not easy to track. The Alaska Department of Fish and Game hires over 300 fisheries technicians as

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3 “Managing Fisheries: Empowering Communities” Conference remarks, April 2005
seasonal employees each year. They also employ over 80 entry level permanent fish biologists. Overall, out of 1,400 employees in 2002, 62 were self identified as Alaska Natives, less than 5% of the workforce.\textsuperscript{4} NOAA Fisheries Alaska Region currently has four Alaska Natives on staff, about 2% of their workforce and none are in a professional job series.\textsuperscript{5}

Statistics from the University of Alaska School of Fisheries and Ocean Sciences show a low number of Alaska Natives graduating from the fisheries degree programs. In the last fifteen years four Alaska Native students have graduated with a fisheries degree, two with a BS and one with an MS. Of 52 faculty members at the School of Fisheries and Ocean Sciences, two are Alaska Native and both grew up in rural Alaska. However, one is retiring in fall of 2006.

Yet, approximately 50% of the population of rural Alaska is Alaskan Native, and statewide 16% of the state’s residents are Alaska Native. A significant percentage of the rural population of Alaska is engaged in either commercial or subsistence harvest of fisheries resources.

\textbf{Roadblocks – Issues and Constraints}

\textit{“My math skills are just not good”}

As Bernice Joseph, Executive Dean of the University of Alaska College of Rural and Community Development notes, “…There are very few Alaska Natives and rural Alaskans currently pursuing fisheries as a career choice. There needs to be a concerted effort by educators, industry and communities to heighten awareness of opportunities available in the fishing industry.”\textsuperscript{6}

This could be because of one or several factors:

a) Rural residents are unaware of the opportunities in fisheries science.
   - there is no or limited fishery/marine science career outreach efforts to schools
   - recruitment by colleges and universities has focused on education, health, or on general college education.

b) Rural residents do not want to pursue fisheries or marine science as a career.
   - they do not find the field interesting
   - fisheries scientists and managers may be negatively associated with enforcement actions in rural Alaska
   - scientists generally do not acknowledge or incorporate local knowledge.

c) Rural residents would like to pursue this career but do not see an easy and accessible pathway to get there.

\textsuperscript{4} Letter from Geron Bruce, Deputy Director, Division of Commercial Fisheries, Alaska Department of Fish and Game.
\textsuperscript{5} White paper NOAA Fisheries Alaska Region 2003.
\textsuperscript{6} Meeting with University and Fisheries Agencies, December 9, 2005, Anchorage, Alaska.
They don’t know much about the opportunities or requirements or worry that they would have to move away from home permanently

• K-12 students may not be encouraged to go further in the science. Class offerings in science and math may be limited so that pursuing a science major in college does not seem possible.

• Without quality high school science and math, students are required to take remedial classes at college which may discourage them from going further. Students may also lack good study skills and find little support on campus.

• There are no fisheries/science programs to bridge students from high school to college.

• There is no fisheries two-year degree to serve as a bridge to a BS/MS/PhD.

• Scholarships are often linked to higher GPAs which make them inaccessible or scholarships are not fishery/marine science focused.

• Many rural students shy away from committing to a program that means leaving home to complete a 4 year degree.

d) Other careers seem more desirable for several reasons.

• Fisheries and marine science jobs may not pay as much as other positions.

• Entry level fisheries jobs are usually seasonal and have little or no benefits.

• Parents have poor view of fishery management and do not encourage children to enter these fields.

• There may be few fishery/marine science jobs in rural communities, and some residents cannot or chose not to leave rural communities.

III. Moving Forward

The critical steps in reaching the goal of increasing the number of Alaska Natives and rural Alaskans working in fisheries and marine sciences includes outreach to K-12 students about fisheries and marine science and career opportunities, recruiting students to pursue a university degree, retaining students once they are enrolled and helping them to achieve employment once their education is complete.

Employers, educators, Alaska Native organizations, rural groups, fishing associations and other stakeholders, all have important roles in encouraging Alaska Native and rural Alaska students to pursue an interest in fisheries and/or marine sciences. While many groups around the state are engaged in a number of fishery/marine science efforts, communication and coordination between these efforts are limited. We encourage all participants in this effort to be aware of each others’ efforts and to share resources when possible.
### Potential Tools to Increase the Number of Rural Alaskans and Alaska Natives in Fisheries and Marine Science

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<tr>
<th>Group</th>
<th>Outreach to K-12 students</th>
<th>Recruitment of students</th>
<th>Retention of students</th>
<th>Employment of students</th>
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<tr>
<td>Rural/AK Native groups (tribal, fishing, non-profit, others)</td>
<td>Community mentorship of students, support of curriculum</td>
<td>Scholarships</td>
<td>Scholarships, summer internship positions</td>
<td>Links to employment opportunities, Summer jobs</td>
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<td>Summer camps</td>
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<td>High school mentors</td>
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<td>Summer jobs</td>
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<td>Educators (high school, university)</td>
<td>Curriculum and coursework related to fisheries, marine science and relevant to rural Alaska. Invite biologists to class.</td>
<td>Scholarships</td>
<td>Credit for internships, peer group activities, practical experiences for hands-on learners</td>
<td>Links to employers</td>
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<td>High school prep classes, high school bridging opportunities</td>
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<td>K-12 activities</td>
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<td>Summer camps, Mentoring programs</td>
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<tr>
<td>Employers (agencies, tribal govts, fishing groups, non-profits)</td>
<td>Guest speaking, project sponsorship, providing teaching materials</td>
<td>Scholarships, high school opportunities</td>
<td>Internships, professional mentorships, summer positions Seasonal tech jobs</td>
<td>Links to employment opportunities</td>
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<td>Help with summer camps</td>
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### Recruiting Alaska Native and rural Alaskan students to fisheries

Recruiting students means instilling that spark of interest in a young person’s mind and showing him or her how to make that interest turn into a solid future opportunity. A number of activities are happening around the state of Alaska that serve to spark an interest in fisheries and marine science and management.

**Summer Camps**

Summer camp or student internship experiences are a valuable way for middle and high school students to meet fisheries scientists and participate in the excitement of hands-on field work.
The Bristol Bay Economic Development Corporation in partnership with the US Fish and Wildlife Office of Subsistence Management holds a Salmon Camp for middle and high school students. The Kuskokwim Native Association has a high school component to their summer fisheries internship program related to the Fisheries Partners Program (supported by USFWS Office of Subsistence Management). In a number of communities in Alaska, Culture Camps offer a chance to incorporate western fisheries science with traditional practices, and some camp teachers are looking for more structured educational activities.

Educators and employers could use summer camps as an opportunity to recruit students into the fisheries/marine science career path by providing information about possible university programs and scholarships or future seasonal or fulltime job and intern opportunities. Employers can also dedicate staff to help develop science-friendly, locally relevant education activities which can be used in camps. These can be created by joint efforts between camp leaders, teachers and local scientists.

For more summer camp information, see the Appendix.

**High School Activities/Classes/Opportunities**

Activities, curriculum, mentorships, field opportunities in fisheries and marine science during high school can introduce students to these fields and excite their interest. In Alaska, opportunities of this kind are sporadic and inconsistent. Some urban high schools may offer dedicated marine science classes. However, many rural schools, even in areas where marine and freshwater resources are critical to residents’ livelihoods have little or no fisheries or marine science curriculum and little local knowledge due to high teacher turnover. While several groups around the state offer, or are developing marine science curricula, there is currently no mandate or plan to incorporate them into schools.

Higher level math and science classes are often not offered in rural schools. Students from these communities are at a distinct disadvantage when applying to college and while in college. In addition, some science classes may not be locally relevant, and may turn students away from science as a career.

The University of Alaska’s Alaska Native Science and Engineering Program (ANSEP) pre-college or TALPA program has targeted high achieving students in 28 rural and urban high schools across the state with a compelling program. Dr. Hal Spackman, UAA Engineering Associate Professor, travels to targeted high schools to promote careers in science, and in particular engineering. As an incentive for students to take higher level math and science courses, the ANSEP program offers them an opportunity to build and keep a computer. When the student completes Trigonometry, Physics, Advanced Chemistry, and the computer class (including a week long intensive in AutoCad) the computer is theirs. This has been a successful program which has grown significantly over the last 10 years.

The University of Alaska Fairbanks Bristol Bay Campus was recently funded by NOAA to support offering higher level science and math to high school students. The “High School Pipeline Program” funds student tuition to participate in UAF classes in trigonometry, physics
and other science classes not offered at the local high school. Students are able to take these
courses, thus qualifying for the ANSEP-computer program, as well as receiving college credit.
The grant currently provides 15 scholarships for high school students to take classes on campus
as well as funds for work-study and mentoring. In fall of 2006, the Bristol Bay Campus will
offer Introduction to Marine Biology under this program.

High School to University Bridging Programs

Many universities around the country now recognize that high school students may not be ready,
either academically or emotionally, when they enter college. High School to College Bridging
Programs are offered in many universities as a way to ease the transition.

For rural students in Alaska, this transition can be particularly difficult. The University of Alaska
offers a number of high school to college bridging programs. Two, in particular, do not currently
but could include a fisheries/marine science component.

The ANSEP High School Bridge program is currently is offered on the University of Alaska
Anchorage campus. Students spend nine weeks on campus. Their mornings are spent studying
calculus for about 2 hours a day. The rest of the day, the students work as interns in private
firms around Anchorage, primarily engineering firms. Evenings are spent in study groups. They
are paid for their summer work and if successful, they are offered a scholarship to the University
of Alaska ($6,500/year).

The University of Alaska Fairbanks Rural Alaska Honors Institute (RAHI) is a summer bridging
program that targets college-bound students from rural Alaska in making the academic and social
transition between high school and college. RAHI provides summer courses which help students
hone their skills to prepare them for college.

Sheldon Jackson College also offers a summer high school to college science bridge program.
See the Appendix for more detail.

Fisheries Technician Opportunities for High School Students

Over 300 fisheries technicians are hired each summer by the Alaska Department of Fish and
Game. ADF&G is developing a program designed to employ high school students as technicians
as a stepping stone to further work with the Department.

Fisheries Bio-Technician Training Programs have been operated by the National Park Service in
Nondalton and by the Yukon River Drainage Fishermen’s Association (YR DFA) on the Yukon
over the last few years. Both programs accept high school students and have shown success in
seeing their students find employment as technicians. In the last 2 years, the Kuskokwim Native
Association has run a successful program for high school summer interns similar to their college
intern program.

There are undoubtedly other programs offered through agencies or tribes of which we are
unaware.
Retention of Alaska Native and rural Alaska students in college/university

Paying attention: Community building, mentoring and tutoring

“...the western idea of sending your kids away to college is not the traditional Native way”  Jack Lorrigan, Sitka

Leaving Home
Separation from family and community is a major issue for Alaska Native and rural Alaskan young students moving onto a large urban college campus. Feeling culturally isolated has been recognized as a struggle for Alaska Native students coming on campus. UA has a long history of trying to build “community among AK Native students” through Rural Student Services at the University of Alaska Fairbanks, the Native Student Services at the University of Alaska Anchorage and the Native and Rural Student Center at University of Alaska Southeast.

“offer as much available as close to home as possible”

Starting at a Rural Campus or at the Technician Level
Offering core college courses close to home, via a rural campus, provides a social and financial means to transition to a college or university without moving away from home for the full four or five years. Rural students also may be more comfortable starting at a technician level at a rural campus before moving into a bachelor’s degree program at a university.

Currently the University of Alaska Southeast offers a 1 year certificate program and a 2 year associates of applied science (AAS) program in fisheries technology. The program was originally crafted to train potential hatchery workers and field or lab technicians at fishery agencies. The program has designed a number of courses which could be valuable statewide. In the fall 2006, all classes in the program will be available via distance delivery. Supplementing the distance offerings with some field based work could offer a regional relevance to the program.

However transitioning between a technical degree, associates, or certificate program to a bachelor’s degree is not always easy. Not all classes transfer between campuses or programs and students may need to re-take some basic science courses once they enter a bachelor’s program. This can be frustrating and adds extra time to the degree, discouraging some students from continuing. Articulation agreements between the 1 or 2 year and 4 year programs and between University MAUs will need to be developed to ensure a clear pathway for students who are starting at rural centers.

The College of Rural and Community Development via the Interior-Aleutian Campus currently offers an associates degree in tribal management which focuses on tribal administration. They
are developing a natural resource management strand which will offer rural residents access to
training via distance delivery and some field-based work.

Currently the School of Fisheries and Ocean Sciences is developing the BS program into a 2+2
model where the first 2 years of the program could be taken at any University of Alaska site and
the second two years could be taken in either Juneau or Fairbanks. For example, several students
at the UAS Fisheries Technology Program wanted to go on toward a BS in fisheries but
considered Fairbanks was too far away. Juneau is often the preferred option for fishery students
from Southeast Alaska.

Both the Bristol Bay Campus in partnership with the Interior-Aleutian Campus and Sheldon
Jackson College have grants through the TCUP or Tribal College and University Program,
funded by NSF and geared toward careers in Science, Technology or Engineering fields.

Building Community On Campus

“The best things about ANSEP have been the support,
tutoring and sense of community.”
Valli Peterson

Mentoring, tutoring and creating a sense of community are all effective in supporting Alaska
Native and rural Alaskan students once they leave home and attend a larger campus. ANSEP
and Rural Student Services both work with students on these aspects on the UAF campus.

Within the fisheries program at the School of Fisheries and Ocean Sciences, student advising,
mentoring and tutoring could be expanded to be specific to rural Alaskans as Rural Student
Services or another friendly environment.

Funding

Funding of a college or university education is a substantial roadblock identified by many current
students and graduates. Many scholarships don’t include funds for housing, overlooking a major
need of students particularly if they have families. Partial funding of scholarships may deter
many potential students, especially those with families, or financial commitments.

Native corporations, Tribes and Native non-profits, CDQ groups often offer partial scholarships.
While these funding sources are important, like many they are not full scholarships.

The Future Fishery Management Leadership Project is a new comprehensive program developed
by Sheldon Jackson College which includes both a full scholarship and internship opportunities
with NOAA Fisheries. Students selected for the scholarship receive full payment of housing, a
monthly stipend, tuition, fees, and books. They also participate as paid interns with NOAA
Fisheries. Interns may also participate in a two or three week research project on board one of
NOAA Fisheries research vessels.
The Alaska Native Science and Engineering Program (ANSEP) also links scholarship funds at the UAF/UAA campuses to success at paid internships, maintaining a certain GPA and participation in weekly mentoring and tutoring sessions. Their annual scholarship, which is primarily funded through private donations, is full tuition at UAF.

In other cases, researchers applying for grants, have built in funding for student assistants as well as scholarship funds. While this is common with graduate students, it has been used to fund undergraduates as well.

Other potential scholarships are listed in the Appendix. Both the Sheldon Jackson scholarship and the ANSEP scholarship provide funding linked to internships and performance as the most effective models for addressing recruitment and retention.

**Internships and Summer Field Classes**

> "The internship experience is a valuable ingredient in a young professional’s development, and is virtually always a good experience even if it helps them know what area they do NOT want to go into."  Sue McHenry, UAF RSS.

Paid internships offer students professional field experiences and can help students decide if they are committed to the field. Internships can also be part of an undergraduate or graduate education, and may offer credit. This credit may or may not be useful in the student’s degree program, depending on the department or degree. Currently internships exist with USFWS Office of Subsistence Management Fisheries Information Service Partners program and other federal agencies such as NOAA and the US Forest Service. Credit is available in some cases.

The Alaska Department of Fish and Game hires, by far, the largest number of seasonal employees as Fish Technicians. ADF&G does not have a comprehensive college internship program, although they do have job classifications for student interns, college interns and graduate interns. They have an internship program in the Sport Fish Division, but not in the Commercial Fisheries Division. Numerous people commented that a summer college internship with ADF&G would encourage students. By identifying these internships as different from fisheries technicians, there would be a clear statement by ADF&G that they were creating “understudies” as a means to nurture future ADF&G biologists.

> "Make sure you always have an understudy”
> (Tony Christianson, Hydaburg)

Fisheries technician work is generally an entry level opportunity for high school graduates, but, without a minimum of a bachelor’s degree do not stair step into a biologist or higher level professional position.
Employment

“*I had a good, interesting boss who encouraged me*”

Whether hiring fisheries technicians right out of high school or graduates with a bachelor’s or advanced degree, employers wanting to increase the number of Alaska Natives or rural Alaskans in their agency must first clearly identify this as a goal. A specific policy and enacting program designated by the employer to recruit and retain Alaska Native and rural Alaskans should be developed and understood by supervisors.

The combination I have seen work best has been careful selection, high support and encouragement.... And luck.

*Sue McHenry, UAF Rural Student Services*

Partnering with educators at the junior high and high school, and university levels and providing field experiences, internships and professional mentors that link education to work are important. This partnership allows employers to reach potential employees while they are making choices about their future and provide clear pathways from education to work.

“*Education won’t guarantee me a job, but it will give me an opportunity.*”

Fisheries technician work can serve to recruit individuals to decide to go further in their education and in the profession, thus completing the circle, if there is a clear pathway. As an example, technicians can be hired with no formal training but those completing the AAS degree at UAS’ Fisheries Technician program have been able to start at a GS-4 rather than a GS-2 level in the federal system.7

**IV. Moving Forward: Recommendations**

*Employers, educators and stakeholders should commit to and work together to increase the number of Alaska Natives and rural Alaskans working in the fields of fisheries science and management.*

These recommendations move from the K-12 student to professional employee. Combined, these actions can create a pathway for interested students to enter into fishery and marine science careers.

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7 Kate Sullivan, Program Director, UAS Fisheries Technology Program, April 2006.
Recommendation 1. Stakeholders, universities and colleges, and employers should support and engage in K-12 programs and opportunities which encourage students to consider fisheries or marine science careers.

- Add a fisheries, marine science, and biology component to ANSEP precollege career information.
- Develop a Fisheries/Marine Sciences component to the Rural Alaska Honor’s Institute (RAHI),
- Allow professional staff or faculty time for participation in summer camps and school year activities,
- Assist in development of culturally relevant science education materials.
- Recruit students via, brochures, posters, participation at career days throughout the State.
- Funds will be needed for staff time, travel and material preparation.

Discussion
Despite the strong resource dependence by Alaskans on marine and fisheries resources, there are currently no state educational standards mandating anything other than an overview of these subjects. As a result, in order to encourage young people to pursue these fields, agencies and stakeholders must work to supplement school district materials through active participation in K-12 relevant educational opportunities. While recognizing high schools have a lot of curriculum demands, opportunities do exist for talks, class participation, and project development. Staff time for these activities should be made available by agencies and university.

The ANSEP high school program employs a computer as an incentive for students to pursue higher level sciences. In Bristol Bay, the local campus supplements high school science and math classes.

Recommendation 2. University fisheries, marine science and natural resource departments or schools should develop or partner with programs to actively recruit and retain Alaska Native and rural Alaskan students.

- The UAF School of Fisheries and Ocean Sciences and other UA natural resource departments should collaborate with the Alaska Native Science and Engineering Program, and/or other models which recruit minority and rural students and provide a clear pathway from high school to college to work opportunities.
- University of Alaska MAUs should coordinate their efforts so as to facilitate student access to fisheries and science classes. Whenever possible, courses should be transferable across campuses and between programs. Core coursework should be consistent across programs and available at all sites.
• A fisheries component should be added to the Rural Alaska Honors Institute and other university summer bridge programs.
• Fisheries and marine science programs should be widely available across the state via rural campuses or distance delivery. Field opportunities for internships and undergraduate research should be available in rural sites across that states and be credit bearing.
• Costs of this recommendation include supporting a staff and faculty time to work with ANSEP and RAHI programs and to work on pre-college recruitment, student support on campus, developing and supporting internships, and summer bridge programs, developing and supporting scholarships and providing links to employment opportunities.

Discussion

The Alaska Native Science and Engineering Program (ANSEP) provides a clear pathway from high school to college to summer professional work experiences to employment possibilities. To date, the majority of the ANSEP students at both UAA and UAF have been engineering majors. Partnering with ANSEP to support students in fisheries and/or biology and other natural resource focused students is just beginning and has the potential to increase the number of successful Alaska Native and rural students in fisheries.

The Rural Alaska Honors Institute’s summer bridge program can introduce students to the fishery and marine science fields. Once on campus students can avail themselves to ANSEP sponsored tutoring sessions or get further support from Rural Student Services.

Recommendation 3. Technician training which supports entry level work should be available statewide and clearly “stair step” into degree and/or advanced job placement.

• Universities should interface with communities and tribes to develop and teach short technical courses to meet local needs. Credit could be offered for courses which can be used in certificate, associates or bachelor’s degree programs when possible.
• Expansion of certificate and associates programs which can stair step into bachelor’s programs should be made available when possible. Existing programs that are related to the fisheries field should be examined to see if course requirements can be transferable.
• An “occupational endorsement” (6-9 credits) for fisheries technicians available at UAF could also be an option.
• Develop a table comparing course requirements across campuses from technical programs to advanced degrees to guide students.
• Provide these programs and course work through a mix of distance education classes, hands-on lab and field work similar to the approach used by the Alaska Native and Rural Development program.

• Costs of this recommendation include: faculty time to develop technical coursework and to pursue articulation with a bachelor’s degree. Funds will also be needed for translating coursework into a distance education format; materials and teaching time for face-to-face lab classes; staff time to organize, support and provide outreach about the program.

Discussion:
Some Alaska Native and rural Alaskan students may enter the fisheries science field at a technician level. Technician level training, either coursework or some form of certificate or associates degree program may serve these rural based residents. Although fish technicians working for the Alaska Department of Fish and Game are not required to have any training beyond a high school degree, some residents might wish to go farther in their professional development, or may have time during the off season and want to take courses. Some students working for a non-profit or tribal group might be encouraged by their employer to take relevant training.

Technician training can lead to improved employment opportunities. For example, with an associates degree, you can start in a federal job at the GS 4 level, and after one year in employment move up to a GS 5 level. Normally the GS 5 would require 4 years of education. The UAS Fishery Technician program graduates have seen success in finding jobs, particularly through their professional internship connections.

Technician training at any level can be a stepping stone and a recruitment tool for future education in fisheries. The University’s role in technician training could be to provide support in course development, partnering to provide credit when possible, and using the training as a platform to recruit undergraduates. Training such as with the EPA Indian Grants Assistance Program (IGAP) which meets the needs of tribes and rural communities can provide stepping stones into a degree program.

Ideally, students should be able to start a one year certificate and be inspired to move onto a bachelor’s degree without losing core credit. By linking this program with the BS in Fisheries (or perhaps other science degrees), students can feel that their coursework is a good investment and gives them future options. This currently isn’t always the case.

Technician training is occurring in some sites around the state and formally through the UAS program. Potentially, some part of these programs could be made available statewide through distance delivery with hands-on sessions in several locations around the state. While recognizing that all course work cannot be completed through distance delivery, progress can still be made in sharing resources, providing credit that stair steps to higher education and working together to make technician training more available across the state.
Recommendation 4. Employers, such as natural resource agencies, research entities, fishing organizations, Tribal groups and Alaska Native organizations, and others should target Alaska Native and rural Alaska students by developing paid summer internships and research assistantships that link to education programs, funding scholarships and mentoring secondary and university students.

- Develop internships for students pursuing their bachelor’s or advanced degrees and recognize them as professional development opportunities unique from seasonal technician work.
- Encourage linking scholarships with internship programs to attract and encourage students as potential employees.
- Mentor students during internships, continuing post-internship to encourage graduation and agency employment.
- Funding needs include support for paid internships, scholarship funds when possible, time for staff coordination and follow up so as to link internships and scholarships to employment.

Discussion
Employers, by directing their attention to students via internships, scholarships and mentoring have the opportunity to identify and nurture future employees. By offering a paid, professional internship, employers will both have a summer employee and chance to evaluate an individual for potential long term employment. However, it is important for employers to distinguish professional internships from seasonal fishery technician work. While an intern might do work similar to technicians, the title intern implies the expectation that the student will continue and is being mentored at the professional level. That will attract students motivated in going farther. On the other hand, internships require some level of mentoring which takes time and commitment by the potential employer. Employers should also work with the university to provide optional credit to summer internships.

Recommendation 5. Outreach and information about fishery and marine science education pathways and employment opportunities should be developed and shared by all those interested.

- Review and share various marine science curriculum.
- Brochures, posters, career camps are good ways to reach students.
- Local groups may be in the best position to get this information out to communities and students.
- Develop a website to act as a clearinghouse for information.
Discussion
Alaska is a vast state with many regions that are geographically isolated by each other. On the other hand, with electronic communication tools and distance education facilities, many of the curriculum, course materials, internship and employment opportunities could be shared more systematically.

A website or listserv could act as a networking tool in encouraging Alaska Native and rural Alaskan students to pursue fisheries and marine science and would be a valuable tool for educators. Who should maintain the site is a question for discussion.

V. Follow Through

In the period of time that this report was written, encouraging progress has been made. The Alaska Department of Fish and Game has urged his department to develop ideas related to increasing the recruitment of rural Alaskans into fisheries positions. The USFWS through their Office of Subsistence Management has led the way in the development of rural based professional internships. NOAA Fisheries Alaska Region has developed a scholarship/internship/mentoring program through Sheldon Jackson College.

At the university level, the Alaska Native Science and Engineering Program has begun to develop an initiative to support students interested in fisheries and wildlife. The School of Fisheries and Ocean Sciences at UAF has signed an MOA with the University of Alaska Southeast to work together to support the fisheries and marine science programs of the University. Sheldon Jackson College has developed internship programs and programs that lead to graduate education in fisheries.

At the high school level, partnerships with the university has made it more possible for students to take higher level math and science, often receiving university credit at the same time.

Communication between stakeholders, educators and employers has led to an increased understanding of the pathways that are available to rural young people interested in a fisheries or marine science career.

Continuing this momentum will take coordination, communication and funding. We suggest that a network be established on October 23 and 24th in Anchorage at a meeting designed to move forward with these recommendations.
Appendix

Programs to Encourage Alaska Natives and Rural Alaskans to Pursue Fisheries and Marine Science Careers

(this list is a work in progress and will be kept on the web at www.marineadvisory.org/Marinescience and updated regularly. Please send additions and corrections to Paula Cullenberg, pcullenberg@uaa.alaska.edu)

Summer Camps and High School Summer Internships

Southeast Alaska Science and Math Camp, Sheldon Jackson College
http://www.sheldonjackson.edu/
This academic camp is for those who want an opportunity to earn math and science credits while immersing themselves in the following integrated studies: marine biology & fisheries, math applied to the sciences, terrestrial & aquatic ecology, physical geography of Alaska, geographic information systems (GIS). This camp is funded by a grant from the National Science Foundation, Tribal Colleges and University Program (TCUP).

USFWS Summer Science camps www.alaska.fws.gov
About a dozen summer science camps on Alaska's national wildlife refuges teach science and environmental stewardship, closely tied to Native tribal cultures. Working with tribal elders in many cases, the camps are co-sponsored by a range of partners, including Native villages and school departments, and are offered at no cost to the children who attend. At remote Alaska Maritime National Wildlife Refuge, students camp overnight as they explore the mysteries of the Eastern Aleutian Islands and the Bering Sea. At Tetlin National Wildlife Refuge, high school students get school credit in boreal botany at a camp that includes field work, homework, and writing assignments. At Selawik National Wildlife Refuge, students learn about traditional whitefish subsistence fishing methods, whitefish ecology, and fishing culture.

Bristol Bay Salmon Camp, Bristol Bay Economic Development Corporation
Bristol Bay Salmon Camp is held in July in Dillingham and Aleknagik. Middle school and high school students from throughout Bristol Bay are encouraged to apply. Students selected to attend the camp will spend time with fisheries biologists and other experts, working outdoors in field settings to observe salmon in their natural environment.

Kuskokwim Native Association High School Fisheries Internship Program
KNA, through its Fisheries Partners Program (funded by USFWS Office of Subsistence Management) offers high school internships in fisheries.

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Kawerak
Kawerak has mentored a high school student through the Hutton Fisheries Scholarship, through the American Fisheries Society for the past two summers. The student works with the Kawerak fisheries program on field research projects. Contact information for the Hutton scholarship is found later in this appendix.

Ellikarrmiut Summer Science Field Camp
http://fc.bethel.uaf.edu/~summer_science
Kuskokwim Campus, College of Rural Alaska, University of Alaska Fairbanks. The Ellikarrmiut Summer Science Field Camp is one of the programs offered by KuC’s Science and Technology Academy to encourage Y-K Delta high school juniors and seniors to consider education and careers in Science and Technology. The camp is located on Nunivak Island and provides a learning environment that is a hands-on and adventure-based.

Science Preparation Programs for High School Students

ANSEP PreCollege Program
http://soe.uaa.alaska.edu/ansep/
The ANSEP pre-college program targets high school juniors. All participating students are required to enroll and successfully complete chemistry, physics, and trigonometry. In the lab, juniors assemble parts to a computer and learn to use AutoCAD, MS Office, and other appropriate software. The next year, when those juniors are seniors, they help a new batch of juniors build computers. To motivate the students, they earn scholarship money for use at Pacific Alliance universities and students who meet each of the program requirements, get to keep the computer when they come to the university. In the summer after graduation, Pre-College Program students transition to the Pacific Alliance Summer Bridging Program. Pre-College Program brings computer technology to remote communities, provides high school students with a vision of a career in science and engineering, catalyzes an interest in high school trigonometry, chemistry, and physics, connects students with professionals in industry and academia and provides program partners with a technologically trained workforce. The Pre-College Program was initially funded by NSF through the Partnerships for Innovation (PFI) Program. ANSEP has transitioned the original grant to outside funding. ANSEP is expanding to support students interested in biology, fisheries and wildlife (see below).

UAF Bristol Bay Campus High School Pipeline Program www.uaf.edu/bbc
This project is designed to attract, recruit, and train a 'pipeline' of high school students to pursue careers, advanced degrees, or environmental entrepreneurship opportunities in the sciences directly related to NOAA's mission. The UAF Bristol Bay Campus was recently funded by NOAA to support offering higher level science and math to high school students. The “High School Pipeline Program” funds student tuition to
participate in UAF classes in trigonometry, physics and other science classes not offered at the local high school. Students are able to take these courses, thus qualifying for the ANSEP-computer program, as well as receiving college credit. Receiving credit is an important component and incentive of this program and the concept needs to be incorporated into all programs including internship programs. The grant currently provides 15 scholarships for high school students to take classes on campus as well as funds for work-study and mentoring. In fall of 2006, the Bristol Bay Campus will offer Introduction to Marine Biology under this program.

Each winter, Alaska holds a regional ocean sciences competition as part of the National Ocean Science Bowl. In the past, the Alaska regional NOSB has consisted of a jeopardy-style quiz and a research project, each of which counted 50 percent toward the winning score. New in 2007 is the "quiz-only" competition, in which teams of four students each compete against each other in a timed quiz. The winning team competes against other regional teams from across the United States.

High School to College Summer Bridging Programs

The Alaska Native Science and Engineering Program Summer Bridge Program, University of Alaska Anchorage [www.ansep.uaa.alaska.edu](http://www.ansep.uaa.alaska.edu)
ANSEP’s summer bridge program has, to date, been based in Anchorage focusing primarily on preparing high school students to major in engineering. ANSEP is currently developing a summer bridge program that may include a rigorous math classroom component followed by a field component focusing on fisheries and/or wildlife.

Rural Alaska Honors Institute (RAHI), University of Alaska Fairbanks [www.uaf.edu/rahi/](http://www.uaf.edu/rahi/)
The Rural Alaska Honors Institute (RAHI) is a bridging program that assists students in Rural Alaska in making the academic and social transition between high school and college. RAHI is for college-bound students who are willing to work hard and who are dedicated to excellence. RAHI was organized by the University of Alaska Fairbanks to serve rural and Alaska Native high school honors students. Those who apply should have at least a 3.0 cumulative GPA and plan to have finished their junior or senior year. They should read at or above grade level and committed to earning a college degree.

Rural Alaska Preparatory Program (RAPP), Sheldon Jackson College [http://www.sheldonjackson.edu/](http://www.sheldonjackson.edu/)
This college prep camp is for those who want to ace the high school qualifying exam. Special skills and understandings are needed for college success. RAPP helps students
understand the requirements in mathematics, reading, writing, science. RAPP also helps students look for and apply for financial aid. The camp is funded by a grant from the U.S Department of Education, Title III Grant, Alaska Native & Hawaii Serving Institutions.

High School Science Programs and Opportunities outside of Alaska (these may be available to Alaskan students or may serve as model programs)

- The Hutton Junior Fisheries Biology Program ([http://www.fisheries.org/html/Hutton.shtml](http://www.fisheries.org/html/Hutton.shtml)) is a summer mentoring program for high school students sponsored by AAAS to stimulate interest in careers in fisheries science and management among groups underrepresented in the fisheries professions. Students selected will be matched with a professional mentor for a summer-long, hands-on experience in a marine or freshwater setting and will be provided with a $3,000 scholarship.
- The Research Science Institute provides 70 high school students with 6 weeks of science, math and engineering academics. ([http://www.cee.org/rsi](http://www.cee.org/rsi)). The only cost of this program is for transportation to and from the Massachusetts Institute of Technology where the program is run.
- Science & Tribes Educational Partnership (STEP) is an association between Northwest tribes and the University of Washington to prepare Native American Students for academic and professional success in the natural resource sciences. This program combines K-12 and teacher training focused on tribal resource issues, school-based academic programs, and intensive summer research.
- Ku’ula Curricula ([http://edithkanakaolefoundation.org](http://edithkanakaolefoundation.org)). This program is a part of the Kanaka’ole Foundation and has programs for Kindergarten through Grade 6 for science fair and resource guide; Grade 7-8 for coastal monitoring and Science Fair; and Grade 10-12 designed to teach traditional conservation of marine resources and provide basic knowledge of scientific measurement and research along coastlines. The program is based at Hilo, Hawaii. Details for each program area are provided on the website.
- Native American Fish and Wildlife Society ([http://www.nafws.org/](http://www.nafws.org/)) is a national tribal organization designed to develop a national communications network for the exchange of information and management techniques related to self-determined tribal fish and wildlife management. This society sponsors a Native American Environmental Awareness Summer Youth Practicum to promote natural resources management careers for Native American Youth. Each year 35 high school students are enrolled in a summer course at Mt. Evans Outdoor Education Lab in Evergreen, Colorado.
- MANRRS-Minorities in Agriculture, Natural Resources and Related Sciences ([http://www.manrrs.org/](http://www.manrrs.org/)). This is a national society that provides a network to support professional development of minorities in agriculture, natural resources and related sciences with a membership that includes high school, undergraduate, and graduate students as well as professional members.
Technician Training Programs

- **University of Alaska Southeast Fisheries Technology Program**
  [www.ketch.alaska.edu/departments/fisheries/](http://www.ketch.alaska.edu/departments/fisheries/) UAS Fisheries Technology Program offers a Certificate or Associate of Applied Science (AAS) degree in fisheries technology out of their Ketchikan campus. Some classes are available distance delivery. They offer both a hatchery technician strand and a fisheries management strand.

- **Yukon River Drainage Fishermen’s Association Fisheries Technician Training Program** [http://www.yukonsalmon.com](http://www.yukonsalmon.com)
  YR DFA operates a three-week training camp at a remote location near St. Mary's, Alaska to train 10-12 students seeking employment as fishery technicians and wishing to further develop their knowledge of Yukon River fisheries. Both fisheries and safety-oriented topics are covered during hands-on and classroom instruction sessions. Guest instructors are invited from various organizations including U.S. Fish & Wildlife Service, Alaska Dept. of Fish & Game, UAF-CES, U.S. Coast Guard Auxiliary, and Alaska Dept. of Natural Resources.

- **Sheldon Jackson College Hatchery Training Program**
  [http://www.sheldonjackson.edu/](http://www.sheldonjackson.edu/)
  SJC provides hatchery training at the technician level up to assistant hatchery manager training for students. SJC offers a "Certificate of Hatchery Technician Training" and an "Assistant Hatchery Manager in Training" internship. The former is designed to attract students who may not be interested in a 4 year degree or would like to be competitive within the job market; this certificate is a 2 semester program that involves taking fish culture, hatchery applications and a hatchery internship. The latter is designed to attract students who have worked in the hatchery field, but would like to finish a bachelor’s degree and then return to work in a hatchery. The internship is taken as upper division junior and senior level classes, may be taken each semester, and provides the student the opportunity to manage people (students) in day to day hatchery operations.

- **Lake Clark Fishery Biotechnician Training Program, National Park Service**
  [http://www.nps.gov/akso/2005AnnualReport/fishcamp.htm](http://www.nps.gov/akso/2005AnnualReport/fishcamp.htm) The Fishery Biotechnician Training Program was developed to address a need for qualified applicants to fill existing field positions on fisheries research and monitoring projects, particularly in the Bristol Bay region. Funding from the Public Lands Corps program, US Fish and Wildlife Fisheries Information Service and University of Alaska Cooperative Extension Service was used to develop and support a comprehensive, field-based training program to provide graduates with the skills and certifications necessary to be work-ready for government and private agency fisheries technician jobs. The training program combined classroom-style instruction with hands-on field experience and targeted young adults aged 18 years and older. Participants lived in a model field camp located
on Six-Mile Lake near Nondalton and attended classroom and lab sections taught by federal and state fishery biologists and other agency professionals. Students successfully completing the three-week program received three university credits from the University of Alaska Fairbanks, a stipend and a certificate of completion from the National Park Service. The program has trained more than 20 rural residents and many graduates have gone on to work on fisheries research projects conducted by NPS, FWS and the Alaska Department of Fish and Game.

- (Other employers offer on the job technician training to their incoming employees including Native Village of Eyak and Kawerak)

Technician Training Programs Outside of Alaska

- The Carrier Sekani Tribal Council Fisheries (www.cstc.bc.ca/fisheries.htm), is a program in British Columbia designed to supply fisheries trainees to assist in the management of various aspects of fisheries. The Council is working to substantially increase their participation in the sustainability of fishery stocks, and thus re-establish their longstanding role in fish conservation and management. The Council is involved in the training of Aboriginal Fisheries Officers and in fisheries technical training.

- Malaspina University-College Fisheries and Aquaculture Extension Program (www.mala.ca/nrep/index.asp), has an educational training program that includes fisheries and development of professional/technical fisheries workers. The coordinator of the program has a great deal of experience delivering community-based, applied training to remote communities throughout Canada. The website provides a curriculum for At Sea Fisheries Observer Training, Biological Sampling Procedures, Electrofishing, Fish Habitat Restoration, Fisheries Field Technician Certificate Program, etc.

University and College Programs

**Alaska Native Science and Engineering Program (ANSEP), University of Alaska Anchorage** www.ansep.ualaska.edu ANSEP is a high school to college to employment pathway program that has been highly successful recruiting and retaining Alaska Native engineers. Originally funded by the National Science Foundation, ANSEP now depends on industry donations to support an active pre-college math and science incentive program, a summer bridge program for high school graduates entering the University of Alaska. During the school year, ANSEP provides study group support and community building. Students who maintain ANSEP standards receive a scholarship to UA and summer professional internships. In an effort to broaden the program, ANSEP is developing a program for biology, fisheries and wildlife students.
Alaska Pacific University Bachelor of Arts degree in Marine Biology is offered for students who want an education founded in the Liberal Arts, but who have a strong interest in Marine Biology. Students earning this degree will be well prepared for careers in public policy, business, law, or other professional areas, particularly where these areas intersect with the marine world, such as the seafood industries. This degree is also excellent preparation for students who want to enter graduate school or entry-level professional work in marine biology, fisheries science, or aquarium science. www.alaskapacific.edu/undergraduate/marine_biology

The American Indian Science and Engineering Society, University of Alaska Fairbanks http://www.uaf.edu/aises/ offers professional support and contacts through weekly meetings during the school year. The National AISES organization was formed in 1977 by a group of American Indian scientists and engineers. Current AISES membership includes over 3400 members composed of scientists, researchers, engineers, college and pre-college students. There are over 150 college chapters throughout the U.S. and Canada. AISES programs include the national American Indian science fair, pre-college summer academic programs, teacher training, a K-12 education newsletter, an environmental camp, curriculum development such as the Science of Alcohol modules, a book catalog, and the Winds of Change magazine. The majority of AISES resources are used to support college students.

University of Alaska Anchorage http://biology.uaa.alaska.edu/ offers a Bachelor of Science and Bachelor of Arts degree in Biology as well as a Bachelor of Science in Natural Sciences

University of Alaska Fairbanks, School of Fisheries and Ocean Sciences (SFOS), offers a Bachelor of Science and Master of Science degree and a PhD program in fisheries. http://www.sfos.uaf.edu/academics/prospective/ The B.S. program is offered on the Fairbanks campus (soon to be available in Juneau as well); the graduate programs are available at either Fairbanks or Juneau. A Bachelor of Arts (BA) degree in fisheries is under development. SFOS is creating a partnership with ANSEP to support Alaska Native and rural Alaskan fisheries students through this program.

University of Alaska Fairbanks, College of Rural and Community Development (CRCD) www.uaf.edu/rural CRCD offers a Certificate and Associate of Applied Science (AAS) in Land and Renewable Resources through the Bristol Bay Campus. The Interior Aleutian Campus is developing a natural resources technician strand in their Tribal Management Program. CRCD also offers Bachelor of Art and Master of Science degrees in Rural Development, which may be adaptable to natural resource concentrations.
The Hutlee Umyuarchdelee Math Focus Project is a partnership between the University of Alaska Fairbanks Interior-Aleutians and Bristol Bay Campuses, funded by the National Science Foundation. The project goal is to help Natives and rural Alaskans succeed in college and pursue careers in science, technology, engineering and math. Students must be interested in working on a college degree from home in the areas of science, math and technology and be able to make a two-year commitment to the project. If accepted to the project, rural students will take University classes by distance delivery via audio conference from their rural communities. The Hutlee project provides extra academic support to the student to ensure success in math and science courses. Several times per year, Hutlee students attend week-long learning institutes in Fairbanks where they meet teachers and other students, strengthen academic skills, and learn how to use UAF distance delivery technology. In addition, students have the opportunity to participate in internships and science career opportunities. At project end, participating students will have completed 4 credits of Calculus and have a plan to complete an associate or bachelors degree at UAF.

University of Alaska Fairbanks offers a Bachelors of Science degree in Biology http://mercury.bio.uaf.edu/ offers undergraduate degrees in biology and wildlife.

University of Alaska Southeast, Juneau Campus, offers a Bachelor of Science degree in Biology with an emphasis in either Marine Biology or General Biology www.uas.alaska.edu/biology/. Students learn biological principles and skills in lecture, laboratory, and field courses with an emphasis on involvement in research projects.

Sheldon Jackson College Bachelor of Science degree with a Fisheries Science or Marine Biology emphasis www.sheldonjackson.edu/506.cfm or www.sheldonjackson.edu/507.cfm

Examples of Programs outside of Alaska Directed at Science and, in some instances, Fisheries Education and Training. Few programs exist specific to fisheries per se, but industrious students can work to ensure that their program will assist in their own fisheries education. The programs listed or discussed below also contain information on internships and/or scholarships.

- Northwest Indian College National Indian Center for Marine Environmental Research and Education, NICMERE http://www.nwic.edi/nicmere
  This program is designed to provide education and research opportunities for Tribal College and University Students in marine sciences including fisheries science. A goal is to increase the number of Native Americans competing in professional and research programs through education which encourages internships and mentoring opportunities. NICMERE is charged with providing
Native scientists who are fully qualified from a Native perspective and build jobs that will enhance their communities using their natural resources. Research fellowships and internships are available

- National Cooperative Fisheries Scholarship Program at the University of Arkansas at Pine Bluff (USPB) ([www.uaex.edu/aqui/](http://www.uaex.edu/aqui/)) is housed in the Department of Aquaculture and Fisheries at UAPB and offers two competitive 4-year scholarships to high school seniors. The program is cooperative with the US Geological Survey. The website provides information on applying for the scholarships as well as descriptions of the program, including research, and the undergraduate curriculum.

- Minorities in Marine Science Undergraduate Program (MIMSUP) described in ([http://www.ac.wwu.edu/~mimsup](http://www.ac.wwu.edu/~mimsup)) and Bringham, Sulkin, Strom and Muller-Parker. 2003. Increasing Diversity in Marine Sciences Through the Minorities in Marine Science Undergraduate Program. 2003. Journal of Geoscience Education 51(5):474-480, is a program at Western Washington University’s Shannon Point Marine Center ([http://www.ac.wwu.edu/~spmc/index.html](http://www.ac.wwu.edu/~spmc/index.html)) which seeks to increase the representation of minority individuals in marine sciences including fisheries sciences. This is a program that has been in existence for over 15 years, includes two 10-week quarters of intensive marine science study, presented to 8 students who are recruited annually from across the nation. The NSF funding covers tuition and fees for two quarters, housing costs, travel to the Shannon Point Marine Center and the outreach work-study programs.

- The University of Hawaii at Hilo and Manoa’s School of Ocean and Earth Sciences and Technology ([www.kahalacenter.org/hisp/marine_sci.shtml](http://www.kahalacenter.org/hisp/marine_sci.shtml)) has a program of study, presumably with scholarships, on marine sciences and probably fisheries, although fisheries science, per se was not among the programs mentioned.

- National Coalition of Underrepresented Racial and Ethnic Groups in Engineering and Science (nCourages) ([http://www.ncourages.org/](http://www.ncourages.org/)). This is a coalition of 11 science and engineering societies working together to increase racial and ethnic diversity in these fields.

- The University of Idaho has established the Native American Recruitment Program which is designed to target, recruit and retain Native American students at the University of Idaho. [http://www.uihome.uidaho.edu/uihome](http://www.uihome.uidaho.edu/uihome) The American Indian Studies Program, American Indian Education in Science Program and a number of other programs at the University are described. Also described are several pre-college programs: Upward Bound, Northwest Nations Educational Opportunity Center, Northwest Nations Upward Bound, Upward Bound Math Science, Educational Talent Search, and HOIST—Helping Orient Indian Students and Teachers Into Math and Science. (This is an example of a program available at a university/college directed at recruitment and retention of Native Americans. Similar examples can be found at many universities.)

- The University of Washington STEP program (Sciences and Tribes Educational Partnership) ([http://www.cofs.washington.edu/](http://www.cofs.washington.edu/)) is based in the College of Ocean and Fisheries Sciences. The purpose of this program is to establish a pipeline to provide to Native American students the
capability of sustaining environment-based post-secondary studies. This program includes internships and working with students and researchers in Fisheries and the Program on the Environment.

- **Native Americans in Marine Science**
  [http://spacegrant.oregonstate.edu/programs/education/namss.html](http://spacegrant.oregonstate.edu/programs/education/namss.html)
  The National Science Foundation funds this research participation program for American Indians and Alaska Native undergraduates at Oregon State University who are interested in exploring science as a career. The purpose of the program is to increase the number of Native Americans and Alaska Natives in scientific professions by giving students direct scientific research experience. Students selected for the program are paid hourly wages for part-time work as research assistants with faculty scientific research projects.

**Scholarships & Loans for Alaska Native and Rural Students in Fisheries or Marine Sciences**

**Future Fishery Management Leadership Project, Sheldon Jackson College**
[www.sheldonjackson.edu](http://www.sheldonjackson.edu/)
In order to apply for the scholarship, students must meet program criteria including United States citizenship, academic standing and status, enrollment in an environmental/marine sciences program, and financial need. Students selected for the scholarship receive full payment of housing, a monthly stipend, tuition, fees, and books. They also participate as paid interns in fisheries-related organizations such as the NOAA Fisheries Regional Office, the Auke Bay Laboratory, or NOAA Fisheries' Ted Stevens Marine Research Institute (under construction) in Juneau. Interns may also participate in a two or three week research project on board one of NOAA Fisheries research vessels. For more information about the Future Fishery Management Leadership Project, contact John Gorman at NOAA Fisheries' Regional Office in Juneau at 907-586-7641 or john.gorman@noaa.gov.

**The A.W. "Winn" Brindle Memorial Education Loan Program**
[alaskaadvantage.state.ak.us](http://alaskaadvantage.state.ak.us/) was established in memory of A.W. "Winn" Brindle who was president of the Wards Cove Packing Company and Columbia Ward Fisheries. It is funded by private donations and contributions from fisheries in exchange for state tax credits. The funds provide renewable educational loans to Alaska residents for full-time study in fisheries, seafood processing, food technology or related programs for Alaska residents. The loan provides up to 50% forgiveness benefits if recipient returns to Alaska for employment in fisheries-related field. Applicant must be a full-time student. Deadline: 5/15.

See Also ANSEP/UA (described earlier) [www.ansep.ualaska.edu](http://www.ansep.ualaska.edu)
Examples of the many Scholarships and Scholarship Programs Potentially Available to Native Americans, including Alaska Natives.

While many are available few are directed specifically at fisheries sciences. However, the ones noted below may be flexible enough to cover fisheries. Information from Canada is included but the majority of the available scholarships are specific to First Nation and Canadian Aboriginal peoples going to school in Canada. They may serve as an example.

- See American Indian Science and Engineering Society Scholarships (http://www.aises.org/highered/scholarships/) for descriptions
  - Henry Rodrigues Reclamation Scholarship and Internship ($5,000 annually). Bachelor’s degree seeker in engineering or science relating to water resources.
  - A. T. Anderson Memorial Scholarship ($1,000 annually). Major must be within several scientific disciplines including science or natural resources. Must be considered American Indian or Alaskan Native
  - EPA Tribal Lands Environmental Science Scholarship ($4,000 annually). Must be a full time junior or senior or full time graduate student and be studying environmental studies, science or engineering fields.

- See College Scholarships for Native American Students, pp 1-3. (http://www.abetterchance.org/ReferralOrgs&Resources/res-coll_native_schol1.htm)
  - ACS/Bayer Scholars Program—for full-time college students at accredited colleges or universities in chemistry or the sciences
  - Alaska Native Brotherhood Association
  - American Indian Heritage Foundation/Miss Indian USA. 2-year for up to $15,000/yr
  - American Indian Heritage Foundation/Outstanding Indian. Average $1000
  - American Indian Heritage Foundation/Scholarships. $1,000 annually
  - American Indian Science and Engineering Society (AISES)—see previously
  - AT&T Labs Undergraduate Research Program. Must be a woman or member of a minority group underrepresented in the sciences and must be at least a college junior.
  - Atlantic Salmon Federation—Oriented toward the Atlantic Salmon fishery
  - Della M. Bailey Indian Scholarship Trust
  - Battelle—Internships for minorities in science and engineering
  - Coca-Cola Scholarships provide 54 $20,000 scholarships and 100 four-year $4,000 scholarships
  - Cooperative Education Agreement scholarships for women and minority candidates in fish and wildlife biology. $11,000 annually plus tuition
Council of Energy Resource Tribes (CERT)—for American Indian or Canadian Indian CERTs Tribes Program graduates and CERT summer interns

Intel Science Talent Search—award is from $5,000 to $100,000. 40 presented annually and it requires a scientific research project presentation.

International Order of the King's Daughters and Sons. For Native American undergraduates who are beginning or continuing in a technical, vocational or college program

Charles A. Lindbergh Fund, Inc--$10,580 grant to students in technology and environment.

Lucent Technologies Foundation Cooperative Research Fellowship Program for Minorities--$17,000 plus tuition, fees, books, and travel expenses and includes sciences and related fields as majors

Private Colleges and Universities Scholarships

Al Qoyawayma Award to undergraduate American Indian students studying science, engineering and Arts. $2,000 annually

The Jackie Robinson Foundation provides a scholarship for up to $6,000

Take Me Away to College Calgon Bath and Body Scholarship Contest

US Department of Interior Bureau of Indian Affairs annual awards

- See American Institute of Biological Sciences Diversity Outreach Directory (http://www.aibs.org/diversity/diversity_outreach_directory.html)
  - Association for Women in Science (www.awis.org/)
  - Building Engineering and Science Talent (BEST) (www.bestworkforce.org/)
  - Ecological Society of America’s Strategies for Ecology Education, Development and Sustainability (SEEDS) (www.esa.org/seeds/)
  - MESA USA- Mathematics, Engineering, Science, Achievement (http://mesa.ucop.edu/about/mesausa.html)
  - National Council for Science and Environment (NCSE) (www.ncseonline.org) -- working with EnvironMentors to help minority high school students connect with college and university environmental programs
  - The Quality Education for Minorities (QEM) NetworkMathematics, Science and Engineering Program (http://qemnetwork.qem.org) --internships

- Ernest F. Hollings Undergraduate Scholarship with up to $29,000 available per student for studies and internships in the area of ocean and atmospheric sciences and education www.orau.gov/noaa/HollingsScholarship Designed to increase undergraduate training in ocean and atmospheric science, research, technology and education.
• Morris K. Udall Undergraduate Scholarships [www.udall.gov/scholarship](http://www.udall.gov/scholarship) offer up to $5,000 to sophomore and junior college students who have demonstrated commitment to careers related to tribal public policy or health care, and are Native American or Alaska Native and also who are studying science or resource management.

• National Oceanic and Atmospheric Administration (NOAA) Educational Partnership Program (EPP) [http://epp.noaa.gov/](http://epp.noaa.gov/). This program is designed to provide financial assistance to support research and training of students who are conducting a course of study in a NOAA related science field. The goal of the program is to increase the number of students trained and graduating in sciences directly related to NOAA’s mission. The program seeks to increase collaboration between research efforts between NOAA scientists and researchers at colleges and universities. The EPP actually is comprised of four competitive programs: (1) Cooperative Science Centers which have been established at Minority Serving Institutions to advance research and provide training related to NOAA’s mission; (2) Environmental Entrepreneurship Program (EEP), a program which offers grants to attract historically underrepresented groups to environmental sciences for program development and environmental demonstration projects; (3) the Graduate Sciences Program which is designed to recruit and provide graduate level training in NOAA-related sciences; and (4) the Undergraduate Scholarship Program which offers internships and scholarships to 10 students annually. This program targets sophomores and juniors who have or are about to declare a major in atmospheric, oceanic or environmentally-related sciences. Scholarships ($650/wk) are provided for 10-week internships plus travel costs to and from NOAA sites. A maximum of $4,000 is provided per academic year plus a housing allowance if the student is not living at home.

• The Marine Technology Society (MTS) lists available student scholarships, available funds and general requirements ([www.mtsociety.org/education/student_education.cfm](http://www.mtsociety.org/education/student_education.cfm)). These are not specific to minority students. The scholarships are primarily to expand the opportunities for marine technology and marine engineers. For example
  
  o Charles H. Bussmann Undergraduate Scholarship of $2500 for MTS student members; undergraduates enrolled full time in a marine related field
  o The MTS Student Scholarship or $2000 for MTS student members and non-MTS students who are undergraduates or graduates enrolled full time in a marine related field or high school students who have been accepted into a full time undergraduate program.

• The Higher Education Division of the Bureau of Indian Affairs, US Department of Interior, provides loans of $200-$7,000 annually to students

• [http://thomas.loc.gov](http://thomas.loc.gov) provides information on the Federal Family Educational Program
Internships

USFWS Subsistence Fisheries Monitoring Program
http://alaska.fws.gov/asm/fisdetails.cfm?choose=3
The Partners for Fisheries Monitoring Program was established to help Alaska Native and rural organizations participate in subsistence fisheries management and research. Alaska Native and rural organizations represent those who depend on subsistence fisheries resources and have perspectives and knowledge that can be valuable in identifying issues, conducting research, and managing these fisheries.

Internships are associated with:
Association of Village Council Presidents
Bristol Bay Native Association
Council of Athabascan Tribal Governments
Kuskokwim Native Association
Native Village of Eyak

NOAA Fisheries: Alaska Fisheries Science Center and the Alaska Region office.
http://www.afsc.noaa.gov/internships/overview.htm The AFSC accepts applications for a variety of internships (mostly summer) in the biological sciences, marine sciences and other disciplines. NOAA can hire students under either the STEP program http://www.nmfs.noaa.gov/ole/about/step.html or the SCEP program http://www.nmfs.noaa.gov/ole/about/scep.html

Alaska Department of Fish and Game, Sportfish Division

USGS
http://www.absc.usgs.gov/research/Fisheries/Lake_Clark/intern.htm
Native Alaskan Intern Program, Dr. Carol Ann Woody, USGS

CDQ Programs
The CDQ programs offer paid internships in areas including office management, fisheries education, fisheries quota management.

Aleutian Pribilof Island Community Development Association
Yukon Delta Fisheries Development Fund
Central Bering Sea Fishermen’s Association
Coastal Villages Region Fund
Norton Sound Economic Development Corporation
Bristol Bay Economic Development Corporation
Alaska Conservation Foundation  
http://www.akcf.org/_pages/programs_&_initiatives/conservation_internship_program.php

Alaska SeaLife Center  
http://www.alaskasealife.org/New/about-ASLC/internship-program.php

Other Internship Programs and Opportunities

By-and-large the student receiving the internship would be conducting work or study at locations outside their place of residence or primary education.

- ENTRY POINT! (see http://ehrweb.aaas.org/entrypoint/) ENTRY POINT is a program of the AAAS offering internship opportunities for students with disabilities in science, engineering, math, computer science, and some fields of business.
- How to Get an Internship with the US Fish and Wildlife Service. (See http://www.eco.org/site/c.dnJLKPNnFkG/b.941989/k.ED5A/How_to_Get_an_Internship_) Backgrounds in demand include aquatics, biology, ecology, and natural resources. Pay is $4,800/12 weeks plus potentially free housing or a $1,000 housing allowance.
- Native Americans in Marine and Space Sciences—discussed previously under NAMSS at Oregon State University. See http://www.coas.oregonstate.edu
- Details of the NOAA Educational Partnership Program and the Environmental Entrepreneurship Program may be found at http://epp.noaa.gov
- Environment Canada’s Science Horizons Youth Internship Program (www.ec.gc.ca/sci_hor/) has provided practical work experience in environmental projects in such areas as climate and ecosystem research, wildlife research and management, ecological monitoring and assessment. The youth involved must be younger than 30 and eligible to work in Canada. The program matches youth with mentors or coaches who are experienced scientists or program managers in the private or public sector.
- The Smithsonian Institution has an office of Fellowships or Internships and has a website (www.si.edu/ofg/intern.htm) which describes opportunities generally available throughout their network. Among the internships described are:
  - Minority Internships to increase participation of minority students in Smithsonian scholarly programs.
  - Native American Internships to pursue projects related to Native American topics
- RIT has a website that lists Co-op/Internship Opportunities for Minority and underrepresented students and one that lists Co-op/Internship Opportunities in Ecology, Animal and Plant Biology and Marine Biology (www.rit.edu), which are 10 and 13 pages long, respectively. The opportunities listed are throughout the US. My reading of these many opportunities lead me to believe that few are
specific to fisheries sciences, but the marine science training would be invaluable
to students intending to major in fisheries science.

- The Native American Fish and Wildlife Society (NAFWS) has a website
  (www.nafws.org) that is 30 pages in length and lists both
  fellowships/internships and scholarships, most with websites and often mailing
  addresses.
- Environment Canada’s Science Horizons Youth Internship Program
  (http://www.ec.gc.ca/sci_hor/). Over the past 9 years this program has
  assisted close to 1000 students obtain practical work experience in
  environmental projects in areas such as climate and ecosystem research, wildlife
  research and management, ecological monitoring and assessment and
  development of scientific tools such as standards and guidelines of
  environmental quality.
  - ~100 youth placements/year for 6-12 months
  - approximately $12,000 (Canadian) per placement available for projects
  - matches youth with mentors
- The Society for Advancement of Chicanos and Native Americans in Science
  (SACNAS) provides listings of internships, undergrad research experiences, and
  summer programs (see www.sacnas.org).
- The Environmental Careers Organization (ECO) (http://www.eco.org/) places
  750 students and graduates in paid internships across the country.
- The Quality Education for Minorities (QEM) Network Mathematics, Science and
  Engineering Program (http://qemnetwork.qem.org/) is dedicated to improving
  the education of minority children, youth, and adults, and assists NSF, NASA,
  and NIH with its minority programs and in preparing grants to provide internships
  for minority students.
- SEEDS (Strategies for Ecology Education, Development, and Sustainability,
  http://www.esa.org/seeds/) provides a listing of internships available for
  undergraduates, provides some details, and a web link for each.
- JustGarciaHill (www.justgarciahill.org/jghdocs/) is an organization committed
  to increasing the number of minorities entering science careers. There are
  listings of internships provided.

Reports

These reports emphasize the need for improving the education base of Native
Americans and Canadian Aboriginals/First Nation peoples. This appendix section also
includes some material that can be used by students interested in finding out more
about science careers and job opportunities.

- Fisheries and Aquaculture Management of Fisheries and Oceans Canada has a
  website that describes the Aboriginal Fisheries Strategy and the Aboriginal
  Aquatic Resources and Oceans Management Program (AAROM) that provides
  a program overview and their desires to develop Aboriginal Fishery Officers,
Aboriginal capacity in aquatic resource management, commercial fishing and aquaculture (www.dfo-mpo.gc.ca/communic/fish_man/).

- The Fisheries Center at the University of British Columbia Research Reports Volume 10, Number 8 (2002) provides a substantive discourse on the need for “Education for Aboriginal Fisheries Science and Ecosystem Management.” This document also presents information on effective recruitment strategies, funding of needed programs and social support for Aboriginals leaving communities for training and education in fisheries. The full citation is Haggan, N., C. Brignall, B. Peacock, and R. Daniel. eds. 2002. Education for Aboriginal Fisheries Science and Ecosystem Management. Fisheries Centre, University of British Columbia. Volume 10. ISSN 1198-6727. This 49 page report discusses Traditional and Modern Ecosystem Science; findings of the workshop from which this report is based (including issues and constraints, building capacity, effective recruitment strategies, and funding support); laddering; a survey of post secondary programs (fisheries certificate, diploma, degree, and post-degrees); experience of First Nations with fisheries studies and education; existing programs; and employment opportunities.


- The AAAS Minority Scientists Network (MiSciNet) (http://sciencecareeers.sciencemag.org/career_development/miscinet). MiSciNet is a collaborative effort involving Science magazine’s Next Wave Web Site and the AAAS Directorate for Education and Human Resources. MiSciNet is a weekly online journal that addresses issues targeted toward underrepresented populations. Its initiatives include outreach activities and a presence at national scientific meetings. The site includes a meeting database page. Access to the site requires a Next Wave subscription or AAAS membership.

- Building Engineering and Science Talent (BESAT) (http://www.bestworkforce.org/). A public/private partnership to increase participation of underrepresented minorities in science. A report is available at the website.

- Cuker, B.E. 2005/2006. Programmatic Approaches to Building Diversity in the Ocean Sciences. Marine Technology Society Journal39 (4):8-11. This report provides a discourse on needs in building diversity in marine or ocean sciences, and Cuker states that “Too many of these students [minority students] also lack the kindergarten through grade 12 (K-12) preparation needed to be successful as an undergraduate science major.” I too recognize this and thus have provided the first section of this report which deals with pre-college level programs. Cuker describes a number of existing programs in his text and also provides information on a number of practices that have proven successful in building these programs: (1) recruiting for participants, (2) building a sense of community ownership, (3) structuring for diversity, (4) cultivating the individual, and (5) organizing for sustainability. Each has examples to help develop the practice. In addition, Cuker provides several references including: (a) Cuker 2001a. Steps to increasing minority participation in the aquatic sciences. Catching up with shifting

- Careers in Oceanography, Marine Science & Marine Biology provides a listing of guides to careers, schools, curricula, summer courses and internships in marine biology, careers in ichthyology. Go to the website in the title and also to http://scilib.uscd.edu.
- EnviroEducation.com October 14, 2004. Provides a report entitled Fisheries Science: Educational and Career Outlook which provides a brief discussion on what is fisheries Science, what are the educational requirements, and what are some of the careers and salary outlooks for this educational background.
- www.mbnms-simon.org provides a listing of Fisheries Education Links
- http://wdcrobcolp01.ed.gov (also see the Science-Oceanography website). This website provides a listing of various resources and websites such as Fisheries and Aquatic Resources; National Marine Sanctuary which can be useful sources to stimulate student’s interest.
- The American Institute of Biological Sciences (www.aibs.org/careers/) has a document available that could prove useful to pre-college students as well as undergraduates: Careers in the Biological Sciences. It provides information on studies that should be taken in high school and college to ensure a strong background, as well as questions to ask relative to college. This site also provides websites on general career development, internship listings, and research experiences for undergraduates.
- Youth and Education News, found in http://www.nativevillage.org/ provide information pertinent to early youth outreach, science projects, scholarships and grant programs.
- KUMU OLA Source of Knowledge Program http://www.kumuola.org/oregonmodel.html This 17 page article provides a good description of the Native Americans in Marine and Space Sciences (NAMSS) program, and discusses the NMFSS programs integration of research internships with educational programs in a free-choice learning process that encourages students’ individual critical thinking skills and supports their commitment and responsibility to society. The model is laid out early in the article. Structured academic and financial support to minority students is provided.
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Cover photos:
(upper right) Marjorie Tahbone, Kawerak AFS Hutton intern for 2006, tagging chum salmon on the Unalakleet River with ADFG.

(center) Peter McRoy, UAF Professor Peter McRoy teaching seaweed identification, Tribal environmental Employees from Craig, Alaska.

(upper left) Amanda Goods, high school intern at a salmon tagging project near Kalskag, part of the Kuskokwim Native Association Natural Resources High School Internship Program sponsored by the USFWS Office of Subsistence Management. She also worked as a high school intern at Takotna River weir through funding provided by the Bering Sea Fisherman's Association and Coastal Villages Region Fund.

(lower left) Olin Twitchell is a fisheries major at UAF was one of the Association of Village Council President’s (AVCP) college interns this year, funded in part by USFWS Office of Subsistence Management. He will be receiving a scholarship that was part of the AYK Sustainable Salmon Initiative grants. He worked at a research facility operated by University of Montana (Flathead Lake folks) on the Kwethluk River, at the tagging project at Kalskag, and at George River weir.