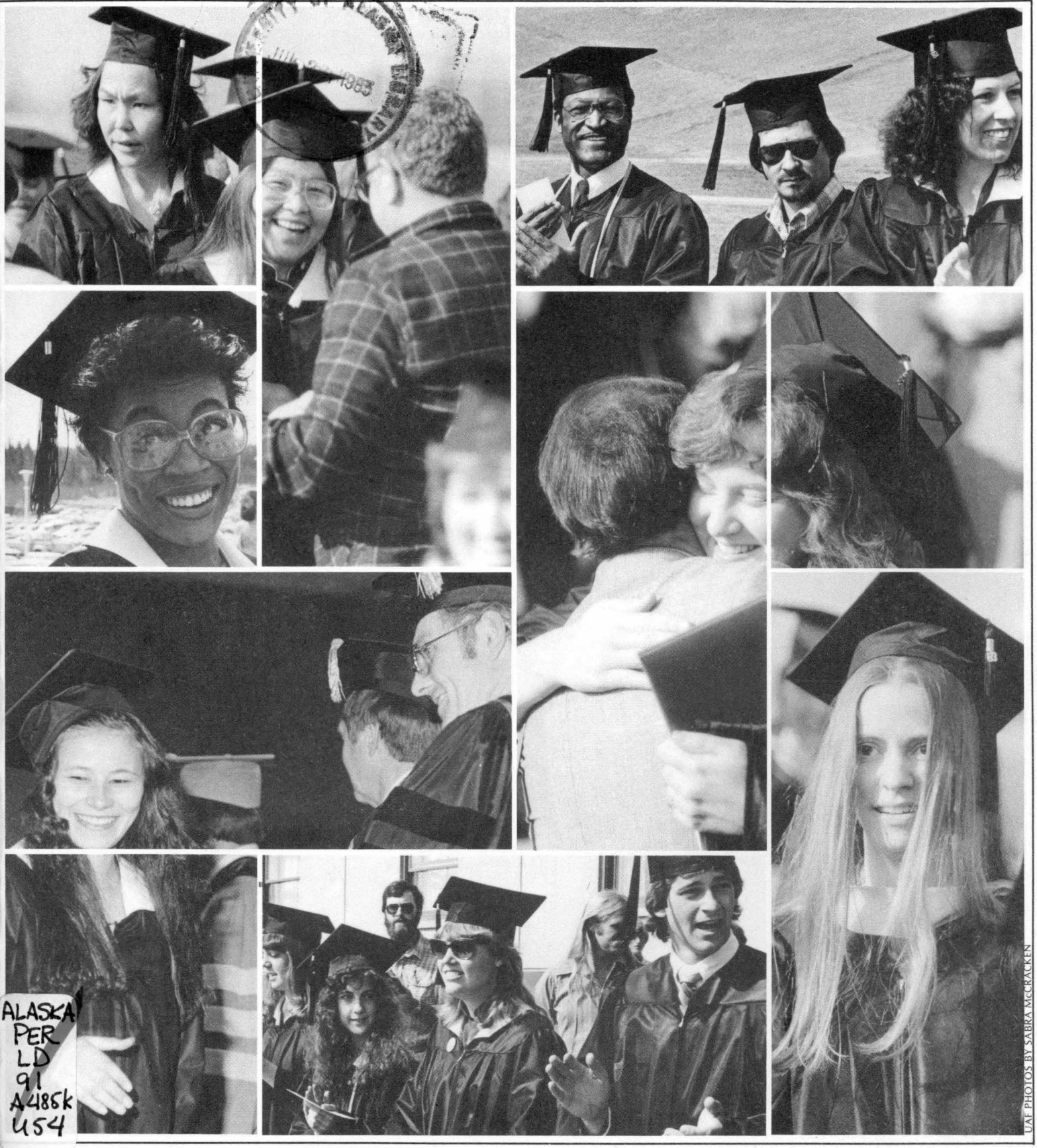
UNIVERSITY OF ALASKA MAGAZINE

VOLUME 1, NUMBER 3 JUNE 1983



UAF PHOTOS BY SABRA McCRACKEN

University of Alaska Magazine is published three times a year for alumni and friends of the university by the statewide administration, Information Services office. The University of Alaska, a Land Grant and Sea Grant institution, is a statewide system of higher education and an affirmative action/equal opportunity employer and educational institution.

EDITOR
DOREEN FITZGERALD

DESIGN
CATHRYN CUNNINGHAM

DISTRIBUTION
DONA McLEAN
BARBARA GLEASON

THE COVER

The cover photographs of 1983 graduates were taken by Sabra McCracken, photographer for Public Affairs at the University of Alaska, Fairbanks.

Contributors include the public affairs and information offices at University of Alaska units throughout the state. Submissions and letters to the editor are welcome. Address correspondence to:

University of Alaska Magazine
Room 2 Bunnell Building
University of Alaska
Fairbanks AK 99701
(Computer/SYUAMAGAZINE)

UNIVERSITY OF ALASKA
MAGAZINE

VOLUME 1, NUMBER 3 JUNE 1983

SABRA McCRACKEN

Talking with 1983 graduates—see Comment, page 18.

Features

Departments

PUBLICATIONS

Dena'ina Elnena—Tanaina Country

A study of the geography of the Dena'ina, also called Tanaina, one of the Athabaskan peoples of Alaska. By James Kari and Priscilla Russell Kari of the Alaska Native Language Center. The work includes discussions of the Dena'ina language, place names, geographical regions, the directional system and trails; the second section covers the Dena'ina people use of the land they occupy, which is the most environmentally varied of any Alaskan Native people's. Available from ANLC, 302 Chapman, University of Alaska, Fairbanks 99701 ($9.00 includes postage and handling).

Alaska Sea Grant Program

Sea Grant produces many bulletins and other publications on Alaskan fisheries and related topics. A publication list is available on request. Reports now available include "Proceedings of the Third Alaska Aquaculture Conference," ($10 includes postage and handling); and "Sea Urchin, Alaska Underutilized Species Volume III," which looks at the biology, Alaskan distribution, harvesting, processing and marketing of sea urchins ($7 includes postage and handling). Write University of Alaska Sea Grant Program, 590 University Ave., Suite 102, Fairbanks 99701.

Alaska Science Nuggets

This book by retired University of Alaska professor Neil Davis is a compendium of about 400 articles, most by Davis, written for a newspaper science column. The 250-page paperback book covers topics like the aurora, earthquakes, zeolites and earthworms, all discussed in a clear and informal style. The book was published by the Geophysical Institute, University of Alaska, Fairbanks and is available from the UAF Bookstore ($9.00 includes postage and handling). Other recent Geophysical Institute publications include: "Ice Cover Development on Interior Alaska Streams," by Tom Osterkamp and Joan Gosink (available free from the Geophysical Institute Library, Elvey Bldg., UAF, Fairbanks 99701); "Thermal Models for Estimating the Potential Impact of A Warmer Climate on Permafrost in Alaska," by Osterkamp has been placed in research libraries around the state (UAG R-295).

Arsenic in the Water, Soil, Bedrock and Plants in the Ester Dome Area of Alaska

Published by the University of Alaska, Fairbanks Institute of Water Resources. The book discusses the geological causes for the poison and evaluates the use of such water for gardens and greenhouses. Available from IWR, Duckering Bldg., University of Alaska, Fairbanks 99701 ($9.75 includes postage and handling). The IWR annual report, which covers seventeen research topics is also available.

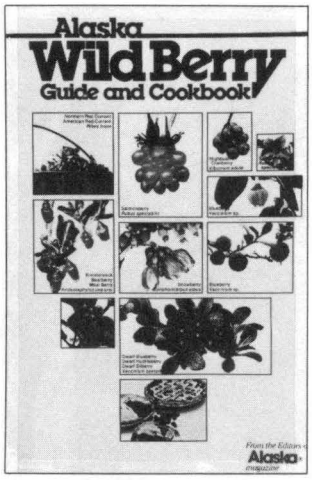
learn Alaska

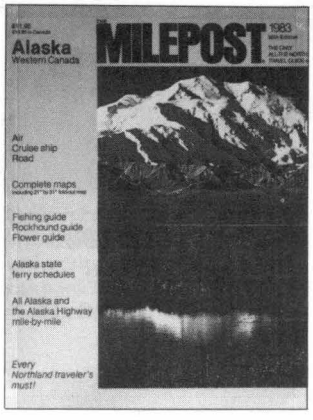
LearnAlaska

Published by the statewide educational telecommunications system, this magazine reports current programming and recent LearnAlaska Network developments. Subcriptions are available at no cost. Write LearnAlaska Magazine, 3 Bunnell Bldg., University of Alaska, Fairbanks 99701.

Wild Berry Guide

A new book from Alaska Northwest Publishing, *Alaska Wild Berry Guide and Cookbook*, includes information on 48 species of berries found in the state ($14.95 includes postage and handling). Also from Northwest is the 1983 edition of *MILEPOST*, a north country travelers' guide ($11.95 plus $1 for fourth-class or $3 for first-class postage); Vol. No. 1 of the *Alaska Geographic* is "Adventure Roads North, The Story of the Alaska Highway and Other Roads in The MILEPOST ($15.95 includes postage and handling). Available at newsstands or write Alaska Northwest Publishing Co., Box 4-EEE. Anchorage 99509.





Alaska Native News

This new Alaskan magazine covers developments in education, economics, politics,

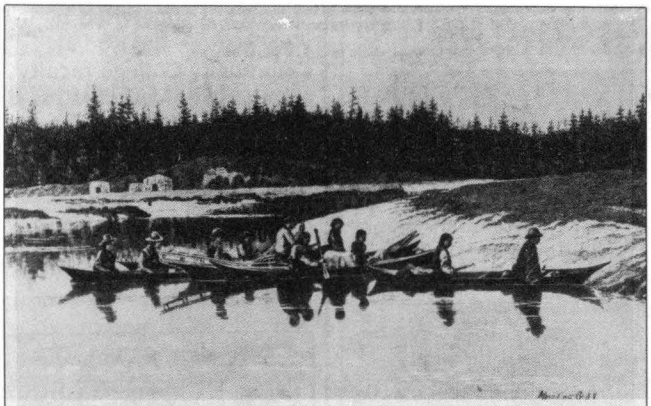
culture, and other news of the Alaskan Native community. Published and edited by Rosita Worl, it is available at newsstands or by subscription for $26 yearly. Write to the magazine at 3150 Mountain View Drive, Anchorage 99501.

In Honor of Eyak, The Art of Anna Nelson Harry

The heritage of the Eyak people, as told by Anna Nelson Harry; compiled and edited by Michael Krauss of the University of Alaska's Alaska Native Language Center. "Anna Nelson Harry was one of the very last of a whole nation, the Eyaks. . . . The Eyak nation, so far as we know, may never have numbered over five hundred souls; but, if we pause to listen, Anna's art can teach us that the spirit of the Eyak nation was as great as any, and that we all have much to learn from the wisdom of even the smallest and most powerless of nations." Available from ANLC ($7.50). Two cassette tapes of Anna Nelson Henry are also available for $9.00. *Stories Told by John Fredson to Edward Sapir* is a collection of nineteen accounts and tales that were recorded in 1923. The book's two sections are "Autobiography and Native Ways," and "Traditional Stories." ($7.50 includes postage and handling). A publication list of stories, dictionaries, research papers and other texts is also available on request. ANLC, 302 Chapman Bldg., University of Alaska, Fairbanks 99701.

Northern Engineer

Published by the Geophysical Institute at the University of Alaska, this magazine focuses on engineering practice and technical developments in cold regions. Volume 14, No. 4



START FROM ALAGÁNIK.
Engraving in *An Expedition to the Copper, Tanana, and Koyukuk Rivers, &c., 1885*, by Henry T. Allen, Washington, 1887, perhaps from photograph taken by W. R. Abercrombie, June 1884.

features reports on projects which were funded by the state Northern Technology Grants Program. Administered by the Alaska Council on Science and Technology, "NORTECH" began in 1979 to foster innovation, test ideas and stimulate interest in "transportation, recycling, food production, waste disposal, building design, energy generation and any residential or industrial enterprise which may be more efficient, less costly or less energy-intensive than methods now in use." *Northern Engineer* subscriptions are $10/one year, $15/two years, and $35/five years. Back issues are $2.50 each. Write Carla Helfferich, Editor, Northern Engineer, Geophysical Institute, University of Alaska, Fairbanks 99701. Geophysical Institute research projects are reported in the newsletter, "Geophysical Institute Quarterly," which is available free from the Institute.

UAITC Video Productions

The University of Alaska Instructional Telecommunications Consortium will have several new videotapes available by fall, 1983: "3 Wheelin," on safe operation of three-wheeled vehicles; the Fisheries Safety and Survival Series—"Sea Survival," "Hypothermia," "Cold Water Near-Drowning," and "Shore Survival" (workbooks, teacher's manuals and videotapes; "Gatekeeping: The Job Interview," examines ways in which cultural differences can affect the job interview process. Videotapes can be checked out through university unit libraries or duplicates can be purchased. Contact Tom Cloonan, UAITC Audio-Visual Services, K-102, Anchorage Community College, 2533 Providence Dr., Anchorage 99504. For information on Fisheries Project workbooks contact Barry Willis, Director UAITC-ID, 2221 E. Northern Lights Blvd., Suite 210, Anchorage 99504.

Agroborealis

This annual magazine reports the agricultural research of the Universiy of Alaska Agriculture Experiment Station. The 1983 issue covers research on conservation tillage, computers and farming, tissue culture, moose habitat, reindeer, crab meal feed additives, and more. For a free subscription write the Agricultural Experiment Station, University of Alaska, Fairbanks 99701.

Alaska Quarterly Review

The second issue, (Vol. 1 No. 3 & 4) of this new journal of literature, criticism and philosophy is now out. Published by the College of Arts and Sciences, University of Alaska, Anchorage, the journal is devoted to contemporary literary art. On the editorial board are Thomas Sexton, poetry; Ronald Spatz, fiction; James Wilson, criticism; and James Liszka, philosophy. Barbara Snyder Berry and Ronald Turner are associate editors. Subscriptions: $8 yearly for individuals; $10 for institutions. Write the journal at the Dept. of English, University of Alaska, Anchorage, 3221 Providence Dr., Anchorage 99508.

The Arctic Herd

University of Alaska poet, John Morgan, has a new poetry collection accepted for publication by the University of Alabama Press. *The Arctic Herd*, to be published in hardcover and paperback editions, was chosen in competition from among 500 submissions. It will be one of two poetry collections published this year in The Alabama Poetry Series.

COURIER

Grant funds Kodiak project for student's history research

Using local resources, students at Kodiak Community College are documenting the history of Kodiak institutions and establishments, thanks to a $7,000 grant from the Historical Commission of the Alaska Department of Education.

The grant has enabled the college to offer a three-credit course for which the following historical research topics were selected: Kodiak street names, the Aleutian Homes housing project, air service to Kodiak Island, Kodiak newspapers, and the developmental history of Kodiak Island Borough.

During the course, students are allowed to select the topics of greatest interest to them. Their research is supervised by Irving Warner, the Kodiak Community College faculty member who coordinates the course. Warner, who developed the project and grant application, said the Kodiak communtiy has begun to express interest in this type of local historical research.

During the class, students learn the proper methods for collecting historical information and compiling the data into concise, readable historical reports. Research methods will be adapted to suit each of the five topics and each resulting report will be issued in the form of a chapbook authored by the student. The chapbooks will then be filed with the Historical Commission, which will make them available to the public as a permanent historical resource.

Barbara Cristaldi
Kodiak CC

CCREE People Meet

Several hundred people from the university's Community Colleges, Rural Education program, and Cooperative Extension Service met in Fairbanks last month for their fourth statewide conference, "The Links That Makes Us Strong."

Partnership enlivens Kenai theater arts

Theatre arts are going strong at Kenai Peninsula Community College, where students can enroll in credit and non-credit theatre practicums, and where cooperation between the college and community theatre groups made possible the presentation of three original plays at the Alaska State Community Theatre one-act play competition in Haines this spring.

The Kenai Performers, Peninsula Dancers and Pier One Theatre presented the three "Arctic Free State" pieces at the competition. First place went to the Fairbanks Light Opera Troupe for their shortened version of "River Song," a musical by Marydith Beamon. From Kenai, Barbara Peterson won best supporting actress and Lance Petersen was elected to the state Community Theatre Association board.

Along with KPCC's formal agreement with the performing groups, the college had a more personal stake in the competition. Petersen, who wrote the plays, directed one and acted in another, is a full-time KPCC instructor. Dave Forbes, another full-time instructor, performed in all three pieces. Several part-time instructors participated: Clay Brockel acted in the shows; Jean Brockel acted in one and was the vocal director for

all three; Robert Richardson wrote the music and performed in the plays. KPCC students Brent Florendo and Cathi Thompson participated as performer and technical crew member, respectively.

At Kenai, the cooperation between college and local groups provided both academic credits and a community service for audiences and performers who enjoy the cultural experience of live theatrical performances. The agreement this year resulted in a seven-production season.

The theatre project began in 1981, when the college helped fund "The Ballad of Kenai," written by Peterson, with music by Bob Richardson and vocal direction by Jean Brockel. The play won state and northwest regional contests to qualify for the national competition in Kalamazoo, Michigan.

The Michigan trip was made possible by support from KPCC, a $2,000 grant from the University of Alaska Foundation, gifts from businesses and individuals, and the governor's office.

Although KPCC does not have a performing arts degree program, it continues to be instrumental in the growth of and education about the performing arts in its service area, the Kenai Peninsula.

David Forbes
Kenai Peninsula CC

Survival skills important in wilderness

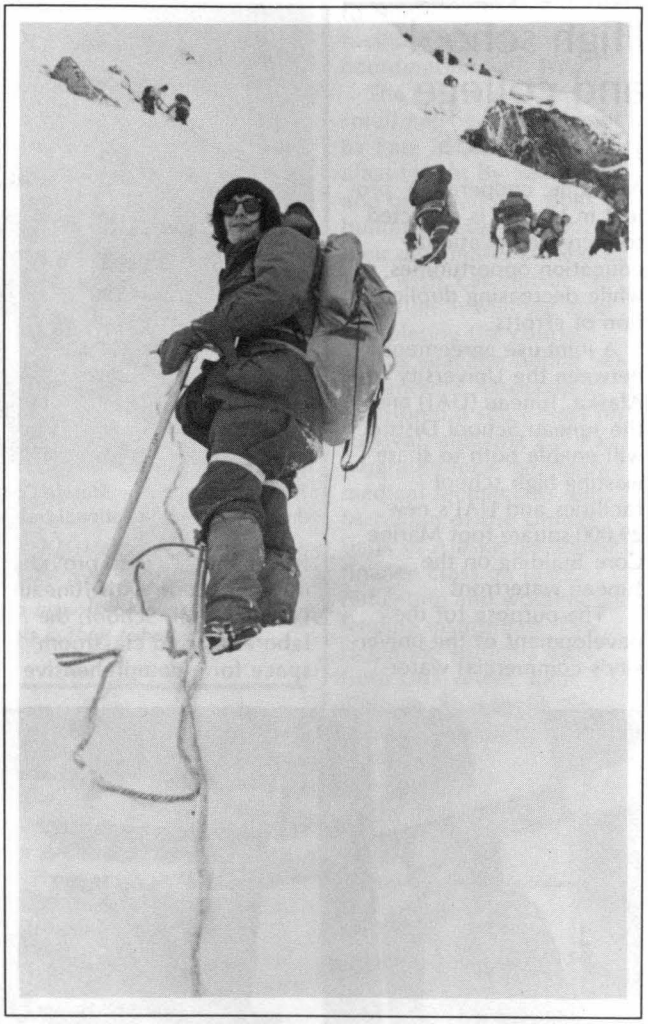
On a crystal clear spring morning, nothing beats the view from atop Mt. McKinley. This, in part, is what a proposed Alaska wilderness skills program at Anchorage Community College is all about: providing students with the skills needed to enjoy a mountaintop vista.

Wilderness skills have been taught at ACC and other University of Alaska campuses for more than ten years, according to ACC instructor Tod Miner. Bill Babcock, another ACC teacher, has been showing students a safe and skillful approach to Alaska's wilderness for the past twelve years.

Miner said that he, Babcock, and other instructors around the state would like to develop a standardized program of courses so that students could earn certification in wilderness skills.

On April 22 Miner began his latest wilderness classroom adventure when he and students left for a month-long ascent of Mt. McKinley. This climb allows students to test their mountaineering skills with the safety net of a watchful instructor.

Before students are allowed to tackle a climb like this, they complete hours of lecture and lab work in climbing techniques, first aid and other subjects.



Instructor Tod Miner climbs a peak in the Talkeetna Mountains. (photo courtesy of Tod Miner)

About a dozen related courses are offered at ACC through the Community Campus program, including beginning and intermediate mountaineering; expedition planning and outfitting; expedition climbing—Mt. McKinley; arctic winter survival; backpacking and camping; basic wilderness skills (fall); woodland and advanced survival; and a popular log home construction course.

Miner said that he and others working to coordinate wilderness training throughout the state hope to present a formal proposal to the university next fall.

Mark Andrews
ACC Public Information

High school and college join forces

A unique, cooperative project in Juneau is expected to increase vocational education opportunities, while decreasing duplication of efforts.

A joint-use agreement between the University of Alaska, Juneau (UAJ) and the Juneau School District will enable both to share existing high school facilities and UAJ's new 29,000-square-foot Marine Core Building on the Juneau waterfront.

"The purpose for the development of the university's commercial waterfront property is to provide, in cooperation with Juneau-Douglas High School, the laboratory and classroom space for a comprehensive technical training center for trades—particularly those needed in the Southeastern Alaskan region," said Richard Lee, dean of Juneau-Douglas Community College, one of UAJ's five schools. Lee is also chairman of the joint-user committee for design of the new facility.

UAJ PHOTO

The university's new Marine Core Center in Juneau will be used by the cooperative vocational training project.

The two schools will share space, and ultimately, administration of the project. Plans call for a pedestrian overpass to span Egan Drive and link the Marine Core complex with the high school.

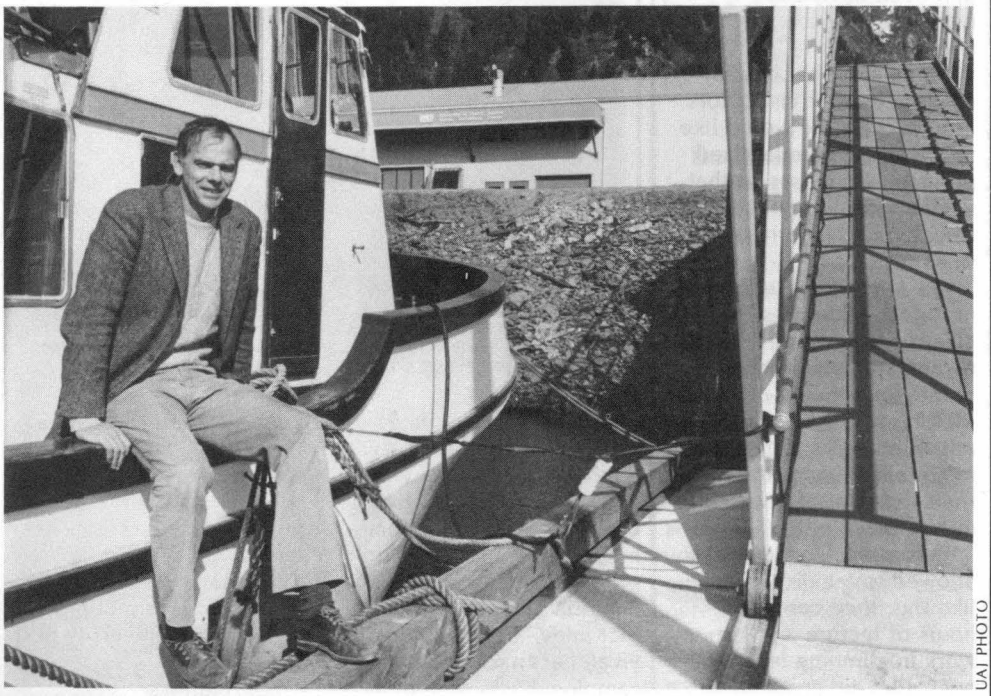
High school and college students will be taking classes on both sides of the highway, enabling the schools to reduce course duplication, while increasing the number of classes available to students at both schools.

Combining capital budgets provides "more space, more facilities and equipment for the dollars spent," said Lee.

Programs will include welding, boat repair and construction, woodworking, house construction, power mechanics, fishing technology and, in another two or three years, electronics. The facility will also provide the principal base of support for the university's fisheries training and research vessels.

"This project is setting a precedent," Lee said. "It's the first time anything like it has been done in the state. I know the concept has been looked at in other towns and the potential is there in a number of areas."

If the project is successful, it may provide a model for similar cooperation in other communities.



UAJ PHOTO

Richard Lee, UAJ dean, surveys the site of the new Marine Core Center, a facility for vocational training.

"It's terribly important to train our young people to be competent, to train them so they can do well in a very competitive market. As the Marine and Technology Center develops, it will be something to help keep the young people and the money they earn within the state.

"Vocational education is all highly individualized, hands-on training. We're limited by the specilized training stations in a particular course. Classes are limited (in size) so each of the students in the class will be able to get the necessary training and experience on the equipment. Where we can add more, we will," said Lee.

Two years ago educational leaders in Juneau began to examine how to get the most out of both the high school remodeling project and the UAJ development program. The joint-use agreement resulted from this inquiry.

Lee credited Michael Adams, school district superintendent, for his efforts in clearing away many potential stumbling blocks. "He stepped into the middle of this and did a great job bringing us through this far."

Classes in the new building are scheduled to begin next fall.

NWCC PHOTO

Vernon Auliye (foreground) and David Ivanoff, both of Unalakleet, enjoy the catch after welding crab pots in their fisheries technology course.

Fisheries technology course aids Norton Sound fishermen

When the need for improved commercial fishing in Norton Sound was identified, Northwest Community College responded with a fisheries technology course.

Looking at an overall development plan for the region, Kawerak, the nonprofit branch of the Bering Straits Native Association, identified the region's twenty-year-old commercial fisheries as underdeveloped.

It was seen that people of the region were mainly using small boats, which can't compete well with larger craft.

"We have an ongoing resource which can give cash income to people," said Caleb Dotomain, director of the fisheries course.

The community college hosts the course, in which students can earn up to twelve hours credit, depending on the amount of work involved in the projects they select. Kawerak pays student tuition, while the college provides part of the welding instruction, student support services and course evaluation. Kawerak has obtained a renewable grant which each year provides for the training of up to twenty-five subsistence fishermen in commercial fishing techniques.

Last year the six-month course was held in Unalakleet, but it was moved to Nome for better use of facilities and improved coordination with NWCC.

The course includes small engine repair taught by Paul Simao, a welding class taught by Sam Rogers, and boat building. Boat building students supply their own materials and if they wish, can pursue certification in welding after completing the course.

This year the Bering Sea Fishermen's Association sponsored a short class on survival, and first aid was taught by local emergency medical technicians. Jim McMillan of the United Bank of Alaska presented a finance class on taxes, budgeting and working with lending institutions. Participating students were from Unalakleet, Elim, Golovin, Shaktoolik, St. Michael, Stebbins, Koyuk and Nome.

Shelly Trainor
Northwest CC

Rural Ed course cycle introduced

Spring audio conferences kicked off the first cycle of core courses for rural Alaskan college students under the new associate of arts degree cycle of the University of Alaska's Rural Education program.

"The core course cycle assures students that every semester there will be at least five courses offered for first year students, and five courses offered for se-

COURIER

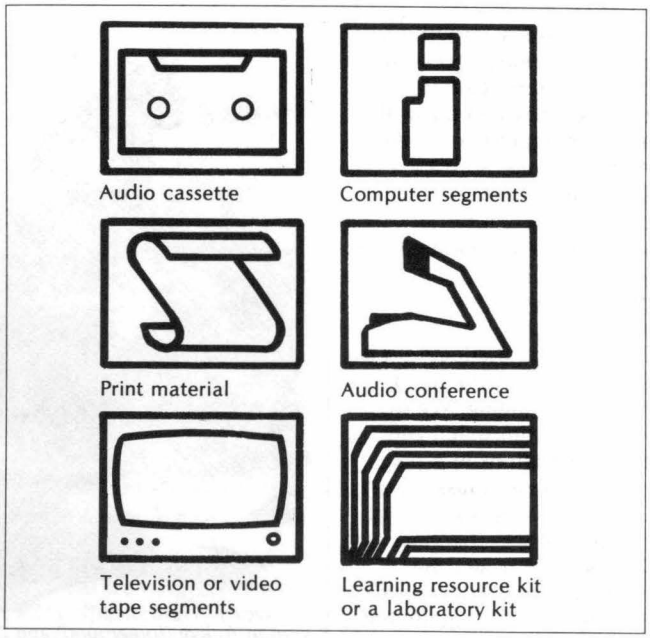
cond year students that may be applied to degree requirements," said Margery Walker, Dean of Rural Education.

"The rural student may take one course at a time, or more if his schedule allows."

The assurance of having core course offerings is new for Rural Education service areas. In the past, a student needing a particular course was able to enroll only if an instructor could be found. Now, using telecommunications and other distance delivery methods when appropriate, instructors are selected to deliver needed courses on a statewide basis.

"We have three options for core course instruction and delivery," said Margaret Wood, director of learning resources. "Rural education center coordinators may use a qualified, local instructor, if one is available. Or they may elect to use a distance education instructor, such as John Turner of Fairbanks, who employed regularly scheduled audio conferences and other distance delivery materials to teach his statewide course in child development. In this case, local facilitators are hired by center coordinators to assist professor Turner at each of the involved sites."

The third option is the use of a correspondence study course, which may be supplemented with a friendly student syllabus, resource materials, video or audio tapes, and hot-line teletutoring.



"This is a very different and exciting delivery sytem," said Turner, who this spring taught Psychology 245, The Growing Years, to students in Unalaska, Northway and Sand Point.

The "Library Hot-Line" is another new resource for rural education students. Lee Harris, coordinator of library resources, has established this service for students enrolled in courses. It allows them to call her collect to request library services not available in smaller communities. "This is one of the most enjoyable aspects of my job," she said. "Being in contact with students and assisting them with their work is very rewarding."

The average age for rural education students is about thirty and many are in the thirty to fourty-year-old age bracket.

"When you are thirty years old, and are thinking about starting a degree program, you have other responsibilities that cannot be put aside to enable you to pursue your educational goal," said Dean Walker. "If you are a family person, your family depends on your presence at home. If you have a job, and most 30-year-old people do need employment, you cannot crop your job to attend school. For these reasons, Rural Education has sought ways to provide degree-oriented students with a reliable delivery system for courses."

"Connections"
Rural Education newsletter

Russians attend UAA Center's annual meeting on addictions

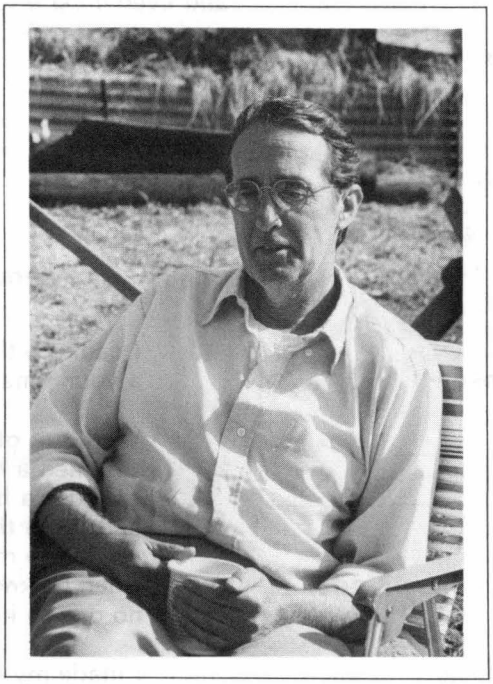
The University of Alaska, Anchorage hosted members of a Russian medical delegation for five days in May. The visitors attended the Annual School on Addiction Studies, sponsored by the UAA Center for Alcohol and Addiction Studies. The Russians also visited the university's academic departments and Anchorage health facilities.

Attending the conference as part of a scientific exchange with the Soviet Union initiated earlier this year were Oleg Balunov, a neurologist and chief physician at the Psychoneurological Institute in Moscow, Fyodor Ramashov, a surgeon and dean of the medical faculty of Lamumba University in Moscow, and Vladimir Panchekhin of the International Relation Section of the Soviet Medical Workers Union.

The addictions studies program has become an important educational event in Alaska, affording professionals and the public an opportunity to hear and meet with experts on substance abuse topics. State and local officials and guest lecturers from outside Alaska spoke or conducted workshops and panel discussions on such topics as models for family intervention, treatment of women clients, and adapting western counseling methods to non-western clients.

UAA Public Affairs

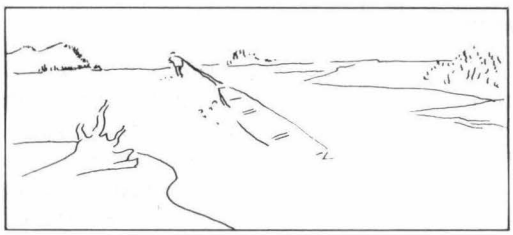
John Haines



on people and the land

by Doreen Fitzgerald

illustrations by Jo Haines



*As he was awarded an honorary doctorate by the University of Alaska, Fairbanks this May, attention was once again drawn to the work of John Haines, poet and essayist. Haines has lived and worked in Alaska for most of the last 36 years, distilling his experience into his poems and reflecting on it in numerous essays on poet and place; on people and the land. The introduction he wrote for his book Living Off The Country** follows:

I suppose that ideally—and it is the ideal that concerns us—writing in Alaska, and of Alaska would be a continuous attempt to identify this place, to give it range and substance beyond mere geography and the descriptions in travel brochures.

To me, this seems important, because I often feel that we are in danger of losing Alaska to the name itself—in the narrow political and commercial sense of it—and of becoming mired in those endlessly repeated phrases by which we have known the place at one time or another: "The Last Frontier," "The Great Land," and so forth. What may have been, what might be *Alaska*, has been copied and cheapened in a thousand ways, turned into an attraction or souvenir. The substance of native Alaskan life and legend has been too often pirated and turned into an item for sale—a book, a collection, an exhibit. So that we will in the end find ourselves living with and by a cliché of the tourist—a scenic view, a panorama of mountain and plain, and like Africa, with its wild game and tribal peoples vanished. Something will have escaped us, something we need, as we need air, water and food.

I speak of Alaska because it is the place I know best, but what I say of it will be as true, I think, for the rest of this continent. From time to time, when the air has cleared around me, and I have cleared a space in my own head, I have been able to look on my own writing as one individual's effort to recover something of that native ground, the original and hardly comprehended thing under our feet: the actual historical ground, compounded of rock and slime, of animal stench and human use.

And rightly comprehended the theme of the writing would be a constant: a sustained effort to demolish the cliché; to understand, and then to say, as well as we can, what we feel to be true.

Rolling Back

For a long time now
we have heard these voices
singing along eroded wires,
murmers from the veiled partitions
of clouds, little whispers
tracing the dust . . .

They tell us what we partly know,
hidden by the noise we make:
the land will not forgive us.

Crushed and broken things,
shapes of clay and burning lignite,
come from the soil of the plains
and speak to us their words in smoke—
the hawk of the nightmare
is flying again.

The past returns in the lightning
of horses manes, iron shoes
striking sparks from the pavement;
in the idleness of men who circle
the night with their sliding ropes.

Everything we have known for so long,
a house at ease, a calm street
to walk on, and a sunset
in which the fire means us no harm . . .

Rolling back from the blocked summit
like an uncoupled train
with no hand on the brake,
gathering speed in the dark
on the mountain grade.

In 1947 Haines first came to the place in Alaska where he was to settle. He was twenty-three that year.

"I left art school to come to Alaska, selling my car and everything else I owned to raise the money," he said during a recent interview.

After another stint at art school and a job as a draftsman for the Navy Department, Haines returned in 1954 to his homestead along the Richarson Highway.

Later he was to write this poem:

Poem of the Forgotten

I came to this place,
a young man green and lonely.

Well quit of the world,
I framed a house of moss and timber,
called it a home,
and sat in the warm evenings
singing to myself as a man sings
when he knows there is
no one to hear.

I made my bed under the shadow
of leaves, and awoke
in the first snow of autumn,
filled with silence.

Born in 1924 in Norfolk Virginia, Haines was schooled at St. John's, the National Art School, American University in Washington D.C., and the Hans Hoffman School of Fine Art in New York City.

The sculptural quality of his poems has been frequently mentioned, and his art training is reflected in the strong, observant visual images in his work. His art background seems to have inspired several poems about painting and painters, including this one:

Paul Klee

The hot mice feeding in red,
the angry child
clutching a blue watermelon—
these are the sun and moon.

The Tunisian patch,
where beneath some crooked
black sticks
a woman's face is burning.

There are also disasters at sea,
compasses gone wrong—

only because of a gentle
submarine laughter,
no one is drowning.

Haines said he always had the intention to write, and it was that endeavor that eventually became his life's work, along with the energies expended making a subsistence livelihood from his homestead. His chosen life style gave to him the strong sense of place so vivid in his writing, but it also carried the price of economic uncertainty and few material luxuries—a life that can be difficult to sustain.

On the Road

It is not good to be poor.
It is good to listen to the wind,

but not when you stand
alone on a road at night
with all your winter parcels,
like a mailbox waiting for
a postman who will never arrive.

The wind comes in carloads,
and goes by with a rushing
of lights and emptiness.

I think only of my home.
I have a pair of slippers for a wife
whose bare feet are waiting.

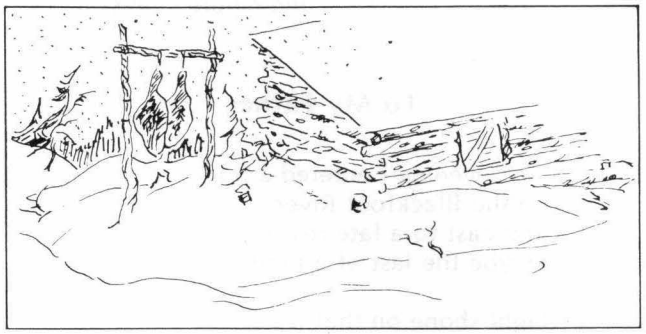
There is a light through the trees—
it is only a simple place,
with two souls strung together
by nerves and poverty.

It is not good to be poor—
and there are no coins in the wind.

Haines is presently a free-lance writer, lecturer and teacher and spends at least part of the year at Richardson. He said he enjoys teaching, "depending on the students," and has taught at the Universities of Washington, Alaska and Montana and has been a visiting writer and lecturer at many other colleges and universities. For his work he has been awarded a Guggenheim Fellowship, a grant from the National Endowment for the Arts, an Amy Lowell Traveling Fellowship, and the Alaska Governor's Award for Excellence in the Arts.

A poem is a unique combination of image, story and sound. It may originate in a single experience, but the poet usually goes beyond the specific incident, drawing upon the totality of experience which in a large measure determines his vision and his voice.

Haines said of the following poem that it came out of an experience during his first reading tour. "While in New York, I was visiting with a friend and had only a thin coat. Because I had to walk a long distance in a chilly spring evening, the woman lent me her husband's sweater."



The Sweater of Vladimir Ussachevsky

Facing the wind of the avenues
one spring evening in New York,
I wore under my thin jacket
a sweater given me by the wife
of a genial Manchurian.

The warmth in that sweater changed
the indifferent city block by block.
The buildings were mountains
that fled as I approached them.
The traffic became sheep and cattle
milling in muddy pastures.
I could feel around me the large
movements of men and horses.

It was spring in Siberia or Mongolia,
wherever I happened to be.
Rough but honest voices called to me
out of that solitude:
they told me we are all tired
of this coiling weight,
the oppression of a long winter;
that it was time to renew our life,
burn the expired contracts,
elect new governments.

The old Imperial sun has set,
and I must write a poem to the Emperor.
I shall speak it like the man
I should be, an inhabitant of the frontier,
clad in sweat-darkened wool,
my face stained by wind and smoke.

Surely the Emperor and his court
will want to know what a fine
and generous revolution begins tomorrow
in one of his remote provinces . . .

The strong sense of place evoked by Haines' writing, both poetry and prose, has developed from years of attentive interaction with his surroundings at the homestead.

"When I was a child my family moved around a lot. When I came to Alaska, I was looking for a place in which I could put down roots and feel I belonged. Of necessity, I grew up in the suburbs, but my dad took me into the countryside often to fish, and from that I got a feeling for landscape and nature," he said.

To My Father

Last evening I entered a pool
on the Blackfoot River
and cast to a late rise,
maybe the last of a perishing fall.

Light shone on that water,
the rain-dimple of feeding trout,
and memory,
and the deep stillness of boyhood.

And I remembered, not the name
of the river, nor the hill
in Maryland looming beyond it,
nor the sky, a late rose
burning that eastern summer;

but the long, rock pool that whispered
before us, and your voice
steady and calm beside me:
"Try it here, one more time . . ."

And the fly with its hook floated down,
a small, dim star riding a ripple,
and the bright fish rose
from under its rock, and struck.

Last evening I watched a rise
break again on the still current;
quiet as a downed leaf,
its widening circle in the dusk.

"One thing I've learned over the years, because I got to know this area from the ground up, is that you've got to get your hands in the soil—dig in the soil, swear at it, live by it—to know a place intimately. Coming for even a few weeks, as a reporter for example, isn't the same thing."

Although Haines is known as a "nature" writer and his work is filled with the details of ecology, the interior of his poems is filled with the presence of people.

Winter News

They say the wells
are freezing
at Northway where
the cold begins.

Oil tins bang
as evening comes on,
and clouds of
steaming breath drift
in the street.

Men go out to feed
the stiffening dogs,

the voice of the snowman
calls the white-
haired children home.

The Pitcher of Milk

Today is the peace of this mist
and its animals, as if all
the cows and goats in the land
gave milk to the dawn.

The same mist that rises
from battlefields, out of the mouths
and eye-sockets of horse
and man, it mingles with smoke
from moss fires
in the homesteader's clearing.

I and the others come to the doors
of cold houses, called
by the thin ringing of a spoon;

we stand with our brimming bowls,
called to where Peace awakens
in a cloud of white blood.

A Winter Light

We still go about our lives
in shadow, pouring the white cup full
with a hand half in darkness.

Paring potatoes, our heads
bent over a dream—
glazed windows through which
the long, yellow sundown looks.

By candle or firelight
your face still holds
a mystery that once
filled caves with the color
of unforgettable beasts.

from
With an Axe and an Auger

The land lives in its people. It is more alive because they worked it, because they left this hillside and that creek bottom marked by their shovels and axes. The meaning of this place lies in the rough weight of their hands, in the imprint of their gum-booted travel.

Here among the willows you will find old pipe-fittings, valves, and chunks of steam-hose; they are scattered with rusty tins, bent hoops and splintered boxes. In this place, Ike Isaacson sank his prospect hole and fired his boiler. His cabin has fallen to rot and rain, but for those of us who remember, this tangled blueberry flat is still Ike's bench.

Up there where the woods are thinned, someone whose name has escaped all memory built his cache and hung up his winter's meat. Lying there, half-sunken in the moss, are the hewn and punky timbers, and here in the living spruce a rusty spike has gathered a knot of pitch.

And on this sandy knoll, someone else we knew had a cabin. Here were the fence-posts of his garden. And look, a few woody stalks of rhubarb still break through the sod by the cornerpost each spring.

At this bend in the road, not far from the fallen bridge, Melvin killed his grizzly with a pistol.

They are useful ghosts, these old inhabitants with their hand-worn implements, their settled lives. They tell us something of what we have been, and if we live long enough and well enough, what each of us may become: one more sign of our residence on earth, alive by reason of remembered love.

I was lucky to have known them when I did, for they are no longer standing in their patched wool and mended cotton. In some way I have always accepted, they were my people, if the phrase now means anything, and the best of them I have loved with a deep appreciation that has never left me. They were friends and teachers, and I do not expect to see their kind again.

When I think of them now, it is of something hugely tender and forgiving, akin to a healing thingness in the world that assures the soil of its grasses, the earth of its sun.

They are voices, gestures, faces peering out of old photographs, but not that only. They live as names spoken from the shadows: Campbell, Melvin, Hershberger, Doherty, Fry. There were some, like Kievic and Sam Loma, who died before I came; I knew them only as figures looming half-legendary in the local stories.

The cemetery site at Richardson long ago caved into the Tanana; it is silt and driftwood and the rest of the riverbed. On a slope outside Fairbanks, intergrown with the birches, with mosses and strawberry vines, the glass-covered nameplates are cracked and muddied, their letters erased by the weather. No doubt they are all recorded in some basement file in the courthouse, written down with the deeds and taxes in a musty ledger.

But the people live in these hills, in the shape of their ditches, their mounds and cellars. They are accounted for in the names they gave to the country, to its furrows and pockets of upraised bones: a hidden lake, a creek like so many others, one windy dome among a hundred ridges. I know of more than one high tributary named in passing by a man reminded of the place he came from; amused or forgetful, inventing as he walked, or moved perhaps by something in the far-off news of that day: *Icicle, Republican, Buckeye, Carrie Nation.*

A wandering spirit came home to the land. In the shape of a man, it cleared a space in the forest and built a shelter from the trees at hand. It came to learn the ways of this country; to sleep and awaken, to flourish and grow old; to watch the river, the clouds moving east, the frost in the grass.

It will never die completely. Look for it in the trails you follow, in the amber blazes on black bark. You will find it in the settled forge, in the rotting windlass, in the cabin sill you come upon by a creek that has no name; in the green scar on that far hill.

There have been many changes at the homestead and in Alaska since Haines first arrived. A ravine has been filled in, raising the Richardson Highway, and you can no longer look directly down on the river from the cabin. There's traffic now, more than an occasional car.

"One thing I miss is the sense of an enormous, open and unknown country," he said. "You have a little of everything here now—ducks and geese, jet aircraft, the river, cars."

At Richardson the roadhouse has burned down and the oldtimers who lived there when Haines first came are gone.

"They were all here then; they had come for the gold and stayed, and it was a community of a sort."

Deserted Cabin

Here in the yellowing
aspen grove
on Campbell's Hill
the wind is searching
a fallow garden.

I remember the old man
who lived here.
Five years have gone by,
and his house has grown
to resemble his life—
a shallow cave hung
with old hides, rusty
traps and chains,
smelling of eighty years
of unwashed bedding
and rotting harness.

I see him sitting there
now as he used to,
his starved animals gathered
about his bony knees.
He talks to himself
of poverty, cursing softly,
jabbing a stick at the shadows.

The bitterness of a soul
that wanted only to walk
in the sun and pick
the ripening berries.

It is like coming home
late in the evening
with a candle in your hand,
and meeting someone
you had forgotten—
the voice is strange.

It is the cold autumn wind
stirring the frozen grass,
as if some life
had just passed there,
bound home
in the early darkness.

"I would like to recreate the lives of the older people I met when I first came here, most of whom are no longer living," Haines said. "From my point of view, there's nobody else who's going to do it. I knew these people, talked with them, and listened to their stories. If we'd had tape recorders then, I might have taped them, but as it is, it's all up here," he said, tapping his temple. "I think this material has in it the archtypal experience of the frontier.

"Richardson was the population center of this area. In 1906 it was a town of several hundred people, and small steamers came up the Tanana River from Fairbanks. Tenderfoot, just over the hill from Richardson, also was a part of the district.

Homestead

I
It is nearly thirty years
since I came over Richardson Hill
to pitch a bundle of boards
in the dark, light my fire
and stir with a spoon
old beans in a blackened pot.

II
What did I come for? To see
the shadows waver and leap,
listen to water,
birds in their sleep,
the tremor in old men's voices.

The land gave up its meaning slowly,
as the sun finds day by day
a deeper place in the mountain.

III
Green smoke and white ash,
the split wood smelling of honey.

And the skinned carcass of a fox
flung red in the snow, frost
flowering in the blue, flawed glass—
these are the images.

The canvas tent wall warmed
by a candle, my halfway house
of flies on summer evenings.

IV
One morning in my first winter
I met a tall man set apart
by the crazy cunning in his stare.

From him by tallow light
I heard his tales of Richardson
and Tenderfoot, names and antics
of pathfinders and squawmen,
Jesus-workers, quick whores.

I followed where his hand
made a hill or a hollow,
saw their mark on the land,
the grass-grown scars,
fallen bailiwicks, and heaps
of iron scaling in the birches.

These shadows came and went.
One still September day
I knew their passing

left no more sound in the land
than a handful of berries
tumbled in a miner's pail.

V

From the spent dream behind me,
Dakotas, reeling Montanas. . .
came grass fires, and
a black hand mowing the plains.

The floor of the sky littered
with shackled farms,
dust through the window cracks,
a locust cloud eating the harvest.

California, pillar of sandstone,
Oregon still vaguely green—
these are the images.

And now on the high tundra,
willows and water without end,
come shade and a noise like death.

VII

Old ladders shorten, pulled down
in the sod, half-rotted houselogs
heaved by the frost; my hand
spans the distance I have come.

Out of a passion turned searing
and blind, like a theme
of bitter smoke, a deep blow
strikes at the granite roots.

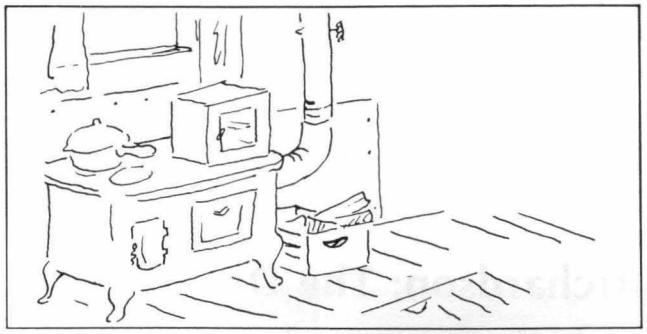
By oil-light and the glint of coal,
forcing its way,
a rougher spirit invades the land,
this ruin carved by a plow.

VII

Here is the place I came to,
the lost bridge, my camp
made of shouldered boards
nailed to this hill, by a road
surveyed out of nowhere.

A door blows aside in the wind,
and a path worn deep to the spring
showers familiar leaves.

A battered dipper shines here
in the dusk; the trees stand close,
their branches are moving,
in flight with the rustling of wings.

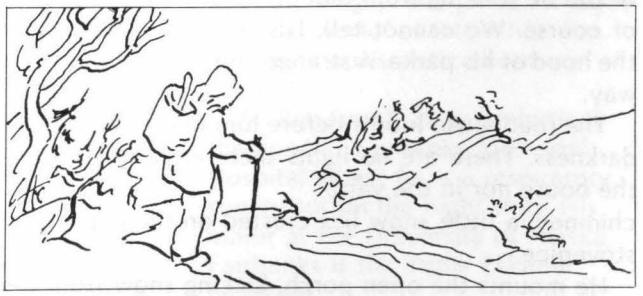


Haines is the author of several books of poetry. The poems which appear here are from News from the Glacier: Selected Poems 1960-1980 *(1982), Wesleyan University Press, Middletown Connecticut. Other books are* Winter News *(1962);* The Stone Harp (1964); Twenty Poems *(1971);* In a Dusty Light *(1977); and* Cicada *(1977).*

Living Off the Country *(1981), (its introduction is reprinted here), is a book of essays, reviews, interviews and autobiography. It is part of the Poets on Poetry Series published by The University of Michigan Press, Ann Arbor Michigan.*

The illustrations by Jo Haines used for this article are reprinted from Other Days: Selections from a Work in Progress *(1982), published by Greywolf Press, Port Townsend Washington. "from With an Axe and an Auger" and "Richardson: The Dream," which appear here, are from this collection of essays.*

The poet is now collaborating with Fairbanks composer John Adams on a project which is funded by the Alaska State Council on the Arts. It will include a sequence of eighteen poems, "Forest Without Leaves," which Haines has been working on for some time.



"Some of my poetry, especially poems in Winter News, *have been set to music in the past, but this is the first time I've had the experience of working out the poems as the music is being composed," said Haines. "And it's not going to be just entertainment—it will have a message."*

Haines, who sold his homestead several years ago, has continued to live in the cabin and hopes to remain there at least for several more years, although the land is again for sale and the future uncertain.

Richardson: The Dream

It is a night in midwinter on the Richardson road. Snow is falling, and there is snow on the roadway. The road is narrow and winding, brushed in on either side by birches and willows whose branches cross each other, heavy with snow. The right-of-way has not been cleared for many years.

A light wind blowing out of Delta sweeps the flakes along; they fall on the unmarked roadway. No cars have passed for hours and days, not for many weeks. It has been snowing for a long time. The snow is light and dry, the kind of snow a man may walk through, the snow blowing aside in his passage.

The figure of a man approaches, walking west on the road, toward Richardson. He is bundled in a loose and baggy parka, in the style men used to wear, an outer garment like a shell, worn to break the wind.

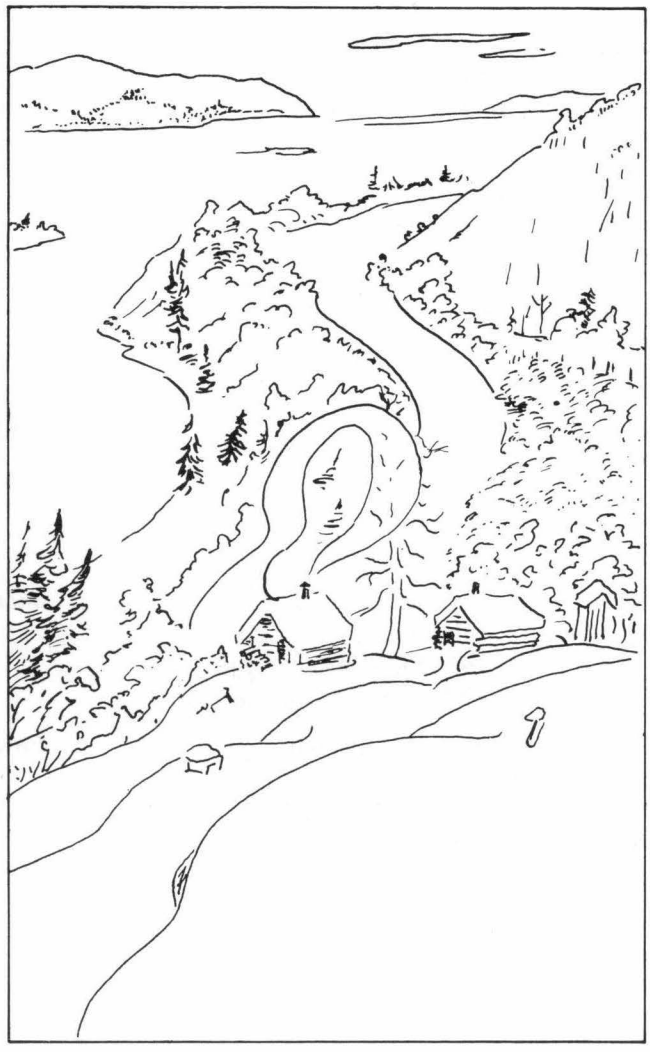
He comes on past the old Doherty cabin, pushing aside the loose and drifting snow as he walks. He peers before him into the darkness. It may be Hans. No, it is Melvin. Perhaps, then, it is Hershberger—he would be walking from that direction; it would be he, of course. We cannot tell. His face is hidden within the hood of his parka. A stranger, and yet he knows his way.

The roadhouse looms before him in the snow-filled darkness. There are no lights there anywhere, not in the house nor in the yard.
chimney; a little snow lies crusted on the cap of the stovepipe.

He mounts the open porch, kicking snow from the steps. He stands before a door, he knocks and listens. There is no sound in answer; no dog barks, no light comes on within.

He goes to one of the tall windows, leans there and looks inside, his forearm resting on the framing. He knocks again on the glass.

The old logs of the building are dusted with snow; there is snow in all the cracks and snow on the sills. Snow lies deep on the roof, and there is no sheet of ice to hang heavy and gleaming from the eaves; there has been no fire in that house for a long time. No one is home.



The man stands on the porch and listens. The rough and peeling signboard creaks on its wires overhead. There is no other sound but the wind, quiet with snow in the forest. No stars can be seen, there are no lights anywhere in the distance. The entire landscape seems dark and empty, the vast interior a place of snow and silence.

The man turns away, pulling his parka hood around him. He walks again on the road in the direction he came from, into the wind, toward Tenderfoot Hill. He disappears in the darkness. Snow closes around him, filling his tracks as he goes.

Talking with UA graduates

As commencements took place around the state this spring, it seemed appropriate to look up some graduating students and talk with them about the future, and about their student careers at the University of Alaska. Our thanks to the following contributors for the interviews: Sabra McCracken, University of Alaska, Fairbanks; Judith Cummings, University of Alaska, Anchorage; Mark Andrews, Anchorage Community College; Gwen Freeman, Kenai Peninsula Community College; and Jean Culbertson, Adak Rural Extension Center. Karlene John was interviewed by the editor.

The graduates interviewed this year look forward to the future with guarded optimism. Most of them feel they have a personal stake in the state's future, and they look back on their college careers as an an important step toward achieving their own goals. Many University of Alaska students are older than the traditional 21- or 22-year-old graduate, and are experienced in the worlds of work and family life. Most of these graduates are similar.

Looking forward to a career as a dental hygienist, Kathy Mossestad, 34, is like many Anchorage Community College students who begin their studies with definite career goals.

"I had been working for the National Park Service, but I wanted to get into a professional field. I was frustrated at the idea of being a secretary or clerk," she said.

A desire for a change from government work, the possibility of flexible hours, and the fact she had already completed a number of required biology courses also contributed to Mossestad's career choice.

She said she finds work in her field satisfying, and would make the same choice again. But she counsels prospective dental hygiene students—"It is sort of a high pressure field"—one requiring emotional maturity for success.

Originally from San Bernardino, California, Mossestad came to Alaska in 1980. An Anchorage resident, she plans to stay because she considers the career opportunities better.

Mossestad believes that in the future, questions about the environment and budgetary problems arising from falling world oil prices will probably be of greatest concern. She predicts that Alaskans will likely have to learn to live without some things in the future, such as the nonrenewable resources that fuel the state's current prosperity.

Her priority for the college in the years to come would be to maintain its academic excellence. "I'm (also) impressed with the cleanliness of ACC and the quality of facilities. But funding is always important. . .we always must contend with that. To have things 'better' you need more money. Often, lower funding means making some difficult choices."

If she could improve on her college experience, Mossestad said she would have liked more time to be more than just a student. "You're never ready for the work load. Homework!—that's what I'd like to change," she joked. "I enjoy the 'real world' of 9-to-5 life. I'm definitely optismistic about my future."

ACC PHOTO

Kathy Mossestad

Av Ben-Israel, 31, is a physical therapist at Fairbanks Memorial Hospital where he is a respiratory supervisor on the night shift. His major at the University of Alaska, Fairbanks is the Yupik Eskimo language.

"We have so many Natives at the hospital who don't speak English. That's why I chose to major in Yupik. Besides, you can't understand a culture until you understand the language."

To further this understanding of Native culture, Ben-Israel minored in Alaska Native Studies with an emphasis on political science. He now plans to leave Alaska to attend law school, then return to practice law.

COMMENT

His advice to incoming students: "Major in something you enjoy. That's why I'm still in college. I started at Vanderbilt and majored in something I thought I could make money in. But I didn't stick with it because I didn't enjoy it."

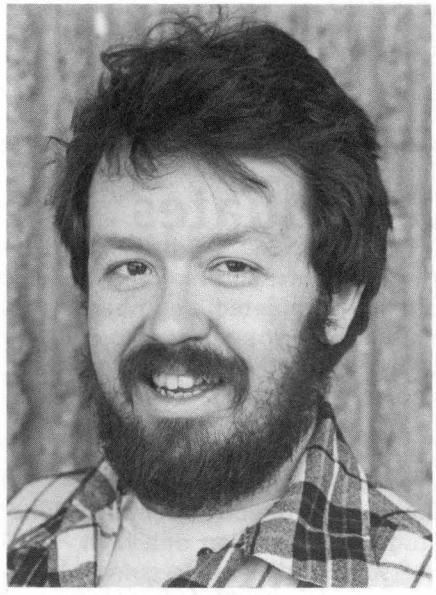
Ben-Israel said of the future, "I hope that the state of Alaska and the town of Fairbanks can maintain a sense of community while urbanizing. One of the things I like about Fairbanks, and that a lot of university students like, is that sense of neighborliness. For example, if you're broken down on the road, you know that someone is going to stop and help you."

Living in a cabin off-campus, he appreciates the different life styles among people at UAF and finds people there much more accepting of different life styles than at outside colleges.

"Money and oil are not important," he said, "when compared with this sense of community we share in Fairbanks and Alaska."

Commenting on the best of his college experience: "The enthusiasm of the instructors in my major and minor fields is contagious. They've been real dedicated. For example, David Case taught federal Indian law this semester. It was a brain pain class. You had so much to learn that it hurt your brain trying to get it all in. And he taught it just like a law class, so you had to be prepared."

Ben-Israel's one criticism of the university is the low library book acquisition rate and the minimal library hours. "I've never been at a university where the library is closed at night. And I think there are some very important books missing from our library. For example, in law. I would like to see the book acquisition percentage rate increased. Right now it is set at ten percent of current holdings," he said.



UAF PHOTO

Av Ben-Israel

Karlene John of Juneau wants a law degree and the skills which will enable her to contribute to the resolution of issues important to Alaskan Natives.

The 27-year-old Tlingit graduated with a bachelor's degree in Native Studies at the University of Alaska, Fairbanks; a three-hour course in sociology will give her a second major in that subject. This summer she's attending the University of Washington for graduate study in public affairs.

"If I could do it over again, I would take more time selecting a major, and would probably have studied more business, economics and political science," she said. "Originally I was interested in business, but got discouraged when I had trouble with a math course."

First counseled to attend college when she was completing high school in Fairbanks, John has been taking classes and working since she entered UAF in 1975.

Although she accomplished her own educational goal at the university, John thinks more resources should be dedicated to assisting Native students; and she's also concerned about Native education at the elementary and secondary level.

"I think it's obvious that the university isn't fully meeting Native student needs, and that the causes of high dropout rates aren't understood," she said.

"To begin with, most of the Native students are very family oriented and leaving their village or home town to come to the university is a traumatic change for them. And (because of conditions in rural schools) many haven't been fully prepared in basic subjects like English and math.

"At the university, I feel there should be a greater effort made to recognize and understand the problems of Native students. Rural Student Services is a good program, but this type of effort should be expanded, particularly for students who have completed their first year and selected a major.

"It should be recognized that Native students may be easily discouraged. He or she may need to be encouraged to be more independent and to develop more self confidence. Non-Natives, as well as Natives, need to overcome the stereotype that Natives are inferior students.

"For me, getting a higher education helped me realize I can achieve more in the future. And it's important for Native students to know, to be told, that they can achieve.

John said that many Native students major in education, but she would like to see other schools within the university show an interest in attracting them. "Engineering, for example, is the first one I've heard of doing this."

Looking ahead, John said her desire to obtain a law degree stems from the kind of issues now facing Alaskan Natives. "I am most concerned with what happens in 1991, regarding the Native Land Claims;

what happens when shares and lands can be freely sold to non-Native corporations. And there's also the problem of maintaining subsistence rights."

On the future of the university, she added, "I wouldn't mind serving on the Board of Regents."

Brian Miskill graduated from the University of Alaska, Anchorage this spring with a bachelor's degree in civil engineering. Now 32, he was much younger when he majored in aerospace engineering at the University of Colorado, in Boulder—at a time when he thought there would be a future in the field.

He soon made two important discoveries: (1) there was no such immediate future, and (2) Alaska. In 1973, Miskell came to Alaska for a brief visit and like many others before him, fell in love with the state and stayed. He spent the last two years at UAA taking courses specific to his major and may later do graduate studies in his field.

Miskill sees some challenges in the state's future. "The legislature is going to have to encourage private sector investment in Alaska . . .because when the oil money shuts off, the high upkeep in maintaining state-funded building projects will be astronomical and unaffordable."

Like Miskill, 31-year-old Jesse Owens came from Outside. Leaving behind a scholarship at the University of Missouri, he came in 1971, working on the pipeline before settling back into college life.

Owens, who says he was always more fascinated by "mud holes with little critters than with trucks and playing cowboys," graduated with a bachelor's degree in biological science and is considering graduate work in biology.

"Alaska is a natural laboratory where people come from all over the world to study wildlife, biology, anthropology," he said. "The geology is everywhere, and people from everywhere (but Alaska) have to tell us what it all means. We should be doing that ourselves," he said.

ACC PHOTO

Gloria Weinberger

For Gloria Weinberger, it was a back injury in 1978 that changed her life. After the accident, she enolled in Anchorage Community College as part of her vocational rehabilitation program, and she now looks forward to a new career with enthusiasm.

Weinberger, 37, lives with her husband and three children in Big Lake. She graduated from ACC's Office Occupations program. As part of her rehabilitation, she took a position with the college's Public Safety Office and said her first choice of jobs would be with Public Safety.

"I just really enjoy this. I feel this is where the Lord put me for a reason. I used to never like anything to do with an office, but my interests have completely changed," she said.

The time spent at ACC opened up a new world for her and she suggests that students considering a similar occupation should take as many courses in the field as possible. "With everything going computer, students should also get some computer time. A good counselor makes a difference, so students can rely on them too."

Weinberger said she thinks that funding for the University system should be of paramount concern in the future. "If they want students to say (in Alaska), the schooling has to be here for them."

She said her priority for ACC would be to make facilities completely accessible to handicapped students, along with maintaining current programs and adding to the curriculum when possible.

"I've had a good experience at the college, and I don't know what else I could say. ACC, especially the Counseling Services Department, has been a good experience."

At Kenai Peninsula Community College, Thomas Cross, Jr. graduated with an associate degree in petroleum technology. He has been in Alaska for six years and also reports being hooked on the state.

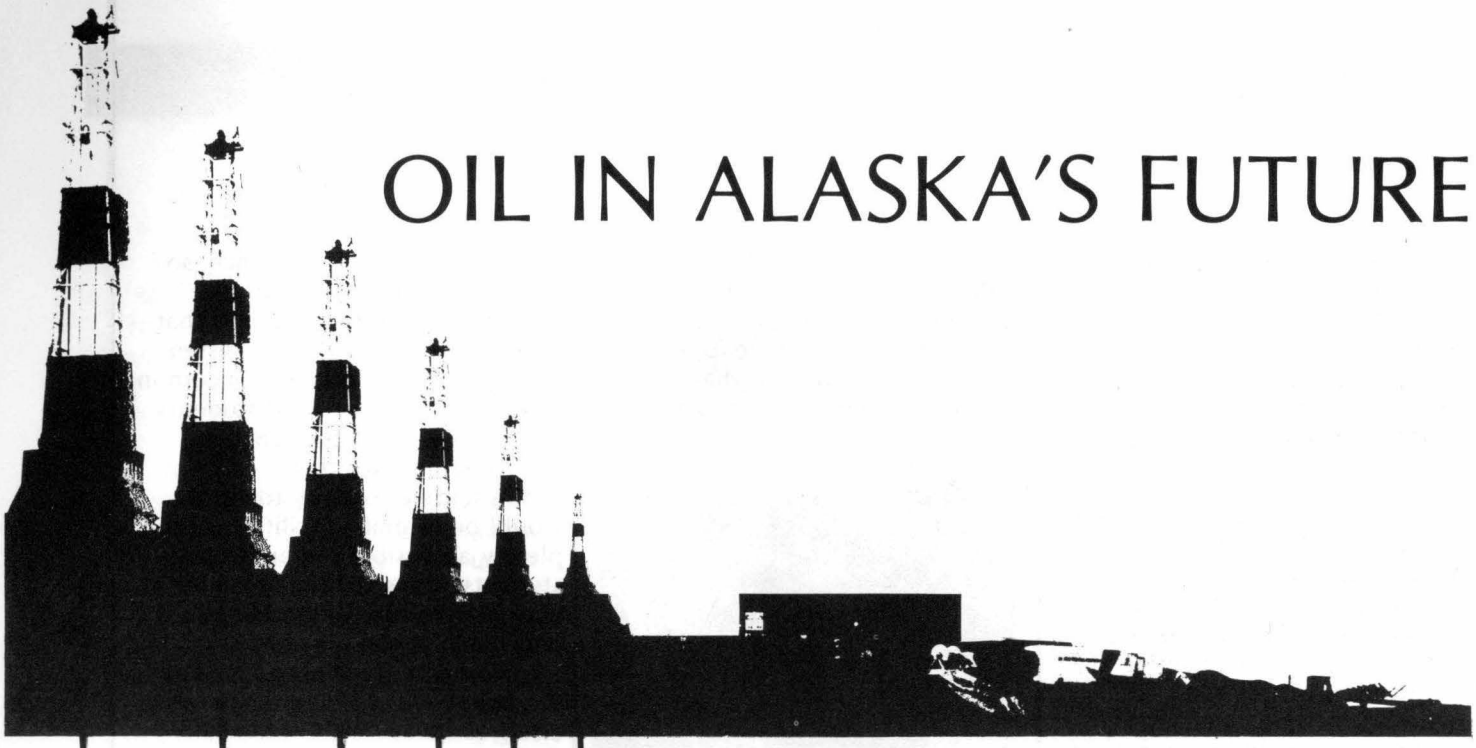
As he finished his petroleum technology degree, he advised other students: "Get the most information possible (about your career choice) from peer advisors, counselors and instructors." He said he chose the general petroleum degree because it was the most popular, and gave him a broad introduction to the oil industry. Now he thinks he might have opted for an engineering aide degree and might have taken some different classes.

Optimistic "is the way to be," Cross said, although he sees some important issues in Alaska: "The pollution problem that won't be faced until it's uncontrolable; the Boom and Bust syndrome of Alaska's economy; and where to house the Lower-48'ers who are moving here by the car loads."

If Cross had the opportunity to help direct the University of

continued on 44

OIL IN ALASKA'S FUTURE



The End of the OPEC Era

by Arlon R. Tussing

Arlon Tussing is an adjunct professor of economics with the University of Alaska's Institute of Social and Economic Research (ISER) in Anchorage, and president of Arlon Tussing and Associates, a Seattle consulting firm. This article was condensed by ISER editor Ronald Crowe from the ISER publication, Alaska Review of Social and Economic Research *19:4 (December 1982). See the original article for a fuller and more detailed account of the subject.*

Oil Prices and Alaska's Economy

Alaska's labor force, population, and personal income have been increasing faster than those of any other state for almost a decade. Most of this growth has resulted from the two great surges in world oil prices usually identified with the rise of OPEC—the Organization of Petroleum Exporting Countries.

The fivefold price increase for Middle Eastern crude oil in 1973-74 and the resulting threefold increase in the market value of U.S. domestic crude oil made it economically feasible to develop the Prudhoe Bay field and complete the Trans-Alaska oil pipeline (TAPS). Even if real oil prices had remained at their 1975-78 levels, Prudhoe Bay oil royalties and taxes would have made Alaska the richest state government *per capita* throughout the 1980s, and Alaska one of the faster-growing states in income and employment.

World oil prices took off again in 1979-80, with real prices at the Persian Gulf rising threefold. However, the stability of transportation charges between the North Slope and Lower-48 refineries caused the price of Prudhoe Bay oil—and consequently Alaska's royalty and severance-tax collections—to grow almost *fivefold*. At their peak in 1981, oil revenues were flowing into the state treasury at an annual rate of more than $10,000 per capita.

By the second quarter of 1981, when crude-oil prices began their present downward trend, most private and government planners in the state seemed to assume that oil prices, and the prices of other fossil fuels, would keep rising without limit. Any disagreement over the long-term oil price outlook was largely confined to whether price increases would average 2, 3, or 5 percent in excess of general inflation.

The prospect of ever-rising oil prices implied that Prudhoe Bay would generate more and more revenue for the state, providing more and more public- and private-sector jobs. It also promised to sustain a high level of exploration activity on state lands and the federal outer continental shelf (OCS) and, most likely, a series of major new discoveries. Rising oil prices convinced sponsors of the proposed Alaska gas pipeline that they could just about ignore the difficulty of marketing North Slope gas as a constraint on the project's economic feasibility.

An ever-increasing real price of oil on world markets also seemed to assure Alaska a petrochemicals boom based on the growing cost advantage North Slope natural-gas liquids

(NGLs) would have over oil-based petrochemical feedstocks used elsewhere; it also seemed to guarantee development of Alaska's coal for export.

Higher and higher prices for oil meant, moreover, that natural gas and coal would be too valuable to use for generating electric power in Alaska; this outlook has been the main rationale for planning a multi-billion dollar hydroelectric generating plant on the Susitna River and has led many legislators to believe that the state would be able to finance the Susitna project with a direct appropriation from the General Fund.

The price of oil is thus the biggest single outside influence on Alaska's economy, and by 1982, uncertainty about the oil-price outlook had become the biggest single source of uncertainty about the state's economic future.

Since the upward movement of oil prices ended in 1981, economic distress has already overtaken many of the top oil-exporting countries. By the end of 1982, all but two OPEC nations were in a deficit fiscal and foreign-exchange position. In less than a year, a record boom gave way to a grave depression in the deep-gas areas of Oklahoma, among oilfield-service contractors, and for the financial institutions that specialized in backing them. All but a handful of synthetic-fuels projects have now been abandoned and the future of those remaining is doubtful.

Several forces have joined to perpetuate a petroleum-driven boom in Alaska that has lasted longer than in other petroleum-exporting regions. Most crucial has been: (1) actual spending of state money appropriated in 1980 and 1981 has continued to increase month by month well into 1982. (2) The momentum of North Slope oil exploration and development programs, some of which would be economical at any world oil-price level higher than (say) $10 a barrel. (3) The host of Anchorage commercial building projects for which the key decisions and commitments were made before 1981. (4) The continuing increase in state money flowing into the economy has combined with oil-industry investments to perpetuate a mood of high optimism among private investors in Alaska's non-energy industries, particularly residential and commercial real-estate development.

The 1981 Turning Point

At the end of 1981, oil prices were suffering their greatest decline in half a century, but industry executives and forecasters—even outside Alaska—cautioned that the attendant "glut" was a temporary phenomenon. Despite many signals to the contrary, that opinion persisted well into 1982.

The truth is that neither an end to the recession, nor OPEC's attempts at production quotas, nor continued wars in the Middle East will long be able to shore up a sagging crude-oil market. It is, indeed, because oil prices climbed so rapidly and so high in the 1970s that they are now almost certain to fall and keep falling—perhaps as steeply and as far as they rose. The forces that led to the enormous price hikes of the past decade work just as effectively in reverse.

History shows us no long-term oil price trends, but only a series of cycles of uneven duration and amplitude.

As Figure 1 shows us, crude oil markets are inherently *cyclical* and, except during a unique period of almost four decades when the State of Texas dominated both U.S. and world crude oil markets, oil price fluctuations have been large and frequent. *History shows us no long-term oil price trends*, but only a series of cycles of uneven duration and amplitude. The era of OPEC's opportunistic price-gouging is over, and no other entity is in sight with the power to move oil prices in any consistent direction or to stabilize them at any given level.

Market Control Before OPEC

OPEC's helplessness in today's crude oil market is best understood against the backdrop of the Texas Railroad Commission (TRC), whose rule emerged in the 1930s following nearly 70 years of unregulated oil prices.

Before the TRC, the oil market was characterized by frenzied competition and violent, short-term price fluctuations as one black-gold rush after the other unleashed supplies and sent prices plummeting.

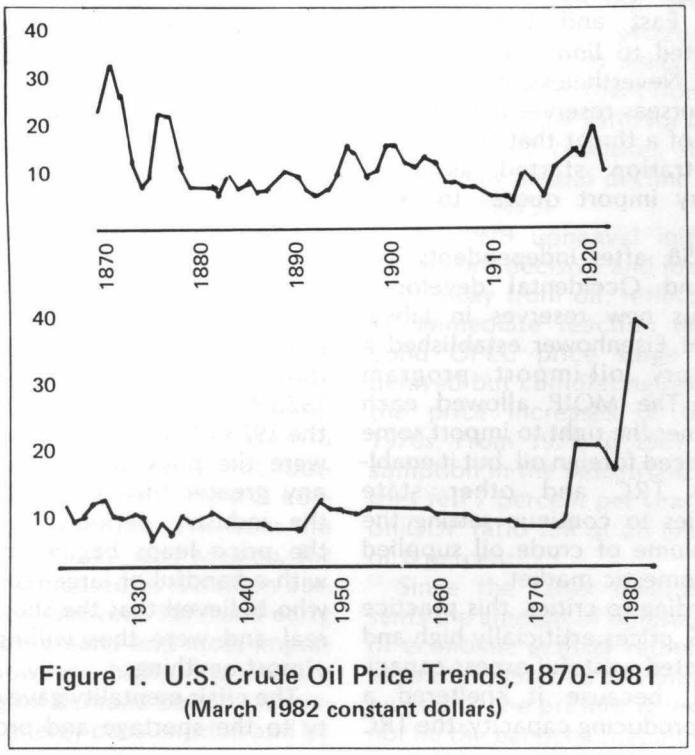


Figure 1. U.S. Crude Oil Price Trends, 1870-1981
(March 1982 constant dollars)

Growing oil demand rapidly restored prices after most of these crises, as petroleum captured markets previously held by whale oil, gas, or coal, and as the automobile population swelled.

Following a 1931 drilling rush in the newly-disclosed East Texas oil field, prices fell locally to 10 cents a barrel. The governor called out the National Guard to shut down the field, and the Texas legislature gave the TRC authority to limit output from individual wells. Refiners thereafter had to funnel requests for crude oil through the TRC, and the commission parceled out the allowable share of demand to each well.

This "conservation" arrangement assured each producer a buyer for at least some of his oil. TRC's ability to stabilize the market was further bolstered by similar market demand prorationing in several other states. A series of federal actions also reinforced TRC authority, beginning with the Connally "hot oil" Act of 1936, which made it a federal crime to ship oil produced in violation of state conservation orders.

After WWII, the executive branch acted to prevent uncontrolled imports of low-cost foreign crude oil from undermining the states' control of U.S. oil supplies. For a while, U.S.-based companies controlling Middle East and Caribbean oil cooperated to limit oil imports to the U.S. Nevertheless, by 1948, the huge overseas reserves had become enough of a threat that the Truman administration started assigning voluntary import quotas to companies.

In 1958, after independents like Hunt and Occidental developed enormous new reserves in Libya, President Eisenhower established a mandatory oil-import program (MOIP). The MOIP allowed each U.S. refiner the right to import some lower-priced foreign oil, but it enabled the TRC and other state authorities to continue setting the total volume of crude oil supplied to the domestic market.

According to critics, this practice kept U.S. prices artificially high and perpetuated wasteful excess capacity. Still, because it sheltered a surplus-producing capacity, the TRC prorationing functioned as the balance wheel of the world oil market for four decades. U.S. and world crude oil prices remained relatively stable through WWII, the U.S. recessions of the 1950s, and several supply disruptions in the 1950s and 1960s.

However, once domestic oil production reached full capacity in 1972, the TRC could no longer regulate production; the U.S. had no choice, politically at least, other than to do away with import controls, leaving consumers exposed to whatever upheavals might occur in the oil-exporting countries.

Meanwhile, nationalization of major oil company concessions overseas plus the growing influence of the independents (plus national oil companies like those of France, Italy, and Brazil), had stripped the majors of their ability to balance supply and demand outside of North America. Thereafter, a supply curtailment by the Arab oil producers, which would have hardly caused a ripple in oil prices ten years or even two years earlier, transformed world energy markets and, for a few years at least, handed control of those markets to OPEC.

OPEC's hold over world energy markets in the '70s was no less real because it was mainly psychological.

Panic Pricing in 1973-74 and 1979

Despite public perceptions to the contrary, OPEC did not engineer either of the great oil price leaps of the 1970s. They came instead from consumer panics that spread through the spot market after the 1973-74 Arab embargo. In neither the 1973-74 nor the 1979 price spiral were the physical shortfalls of oil any greater than those that faced the industry periodically. Rather, the price leaps began both times with a handful of large-scale buyers who believed that the shortage was real and were thus willing to pay almost anything.

The crisis mentality gave credibility to the shortage and propagated the panic to every class of consumer—motorists, households, and businesses started hoarding supplies, building up inventories, buying all they could store, while producers, refiners, and others expected to profit from holding products for sale at higher prices in the future. All of these anticipations, of course, validated themselves; supplies did get tighter, and prices continued to rise.

The Role of Spot Prices

"Spot" transactions—the sale of tankerload or less—usually account for only a few percent of the world supply of oil, because the bulk of it moves in "captive" channels from producing companies to affiliate refiners or customers via long-term contract. However, the spot market is indispensible because it allows any company or government to fill a temporary shortfall or dispose of a temporary over-supply.

Thus, a crude oil shortage or surplus equal to only three percent of the total world demand may show up as a surplus or shortage amounting to 50 or 100 percent of normal spot market demand. As a result, spot markets tend to fluctuate daily and seasonally, and to range widely above and below posted or contract price levels, which typically change slowly and infrequently.

While changes in crude oil spot prices occasionally herald deep-seated market changes, they are more often exaggerated reflections of unexpected weather or business conditions, the buildup or drawdown of inventories, or political events. After such an occurrence, the spot market has generally returned to near previous contract price levels. However, they twice failed to do so in the OPEC-dominated market of the 1970s. After the panics of 1973-74 and 1979, spot prices did not return to pre-crisis levels; instead, *contract* prices rose—by OPEC decree—to the peak levels which the panic had carried the spot prices. This feat was OPEC's great triumph which, ironically, is now begetting its downfall.

The Power of Saudi Arabia and OPEC

Unlike the TRC, which could actually manipulate the supply of oil,

OPEC never had any authority over its diverse and sometimes warring members. Still, once the surplus capacities of Texas and Louisiana disappeared in the early seventies, Saudi Arabia, with the world's largest reserves and population of only 5 million, could have taken over the TRC's balance-wheel role by increasing or curtailing crude oil output over a wide range. Throughout the 70s, Saudi Arabia, with or without the other Arab cooperation, had much of the wherewithal to stabilize the market, as the TRC once did. However, they did not, and their opportunity now may have passed forever.

The OPEC Mystique

It was a worldwide obsession with scarcity rather than manipulation of total oil supplies that underpinned the OPEC mystique and locked in the high prices decreed by OPEC in 1974 and 1979 after the direct causes of the panic had vanished. The doctrine of imminent resource exhaustion was embraced in the 1970s by a broad spectrum of parties who hand entirely different world views and different ends: environmentalists, oil companies, alternative energy entrepreneurs, politicians, civil servants, academics, consultants, and journalists. Each wanted to believe, or at least persuade others, that "the wolf is really here,"—that OPEC's prices may have risen too abruptly for comfort, but that in the last analysis, they only expressed the dictates of geological necessity.

"Oil in the Ground is Better than Money in the Bank"

Each price increase, regardless of its cause, helped convince the oil exporting countries that "oil in the ground is a better investment than money in the bank." This doctrine was a self-validating one, because as long as most producers believed in it, it encouraged them to hold oil off the market in the belief that its value would be much higher in the future. It was therefore the most effective and durable weapon in OPEC's ideological arsenal.

Although the organization had no enforcement machinery, and did not even attempt a prorationing scheme until 1982, its members did reduce production when preservation of the price gains of 1974 and 1979 required it. However, they did so individually, without coordination or urging by OPEC, because they had more money than they needed at the moment (only Algeria, Equador, and Indonesia were in deficit), and believed that their oil would be worth more later. In neither price rise did OPEC have any role in initiating or orchestrating the curtailments.

The self-fulfilling doctrine that oil in the ground was the world's best investment not only encouraged OPEC to officially adopt spot market prices generated by consumer panic, but it enabled those prices to stick.

The End of the OPEC Era

OPEC's hold over world energy markets in the 1970s was no less real because it was mainly psychological. However, the cartel's mystique was far more fragile than the earlier market power of Texas, which was based on direct control of production. Today, few of the material requisites for further OPEC success remain. Its share of the world oil market has fallen from 55 percent in 1974 to 27 percent in October 1982, and even the share of Saudi Arabia is already less than the share Texas held as late as the mid-1960s.

Crude oil demand does respond—slowly but massively—to price changes.

Contrary to a near-consensus of industry, government, and the academic/consulting community during the 1970s, crude oil demand does respond—slowly but massively—to price changes. The non-OPEC output has grown rapidly and will continue to grow: production from the North Sea, Alaska, and Mexico, for example, increased by 4 million barrels per day between 1977 and early 1982. Most clearly and most importantly, however, high oil prices are shrinking oil demand both by reducing total energy consumption and by making coal, natural gas, nuclear power, and other energy sources more attractive.

The Flight from Oil

The seemingly unending rise in oil prices during the 1970s reinforced the impression among economists and industrial executives that oil demand was insensitive to price changes. An absolute decline in U.S. oil consumption was first visible in 1979; the rest of the industrialized world followed a year later.

The drop in total oil use over the last three years and the experts' tardiness in recognizing the trend of consumption stem from profound changes in the structure of world energy demand that have actually been under way since 1974.

As a result, absolute oil consumption in the industrialized countries grew at an annual rate of 7.6 percent. After 1974, however, the quadrupled crude oil price led to a gradual leveling off of demand for oil through 1975; growth resumed between 1975 and 1979 at an annual rate of about 1 percent, but this partial recovery only concealed the fundamental shift that had taken place in the world's energy-use patterns.

More telling than gross consumption figures is the change in oil use per unit of economic activity, or "gross domestic product"—the oil/GDP ratio. After rising at an annual rate of 1.3 percent from 1960 to 1973, the oil/GDP ratio for the major industrialized countries showed a 1.5-percent annual *decline* between 1973 and 1979.

The 1979 upheaval initiated an even more decisive and long-lasting shift away from oil, reflecting both an immediate reaction to the second OPEC price surge and the delayed but cumulating response to the price increases of the early 1970s. From 1979 to 1981, oil consumption in the industrialized countries fell 7 percent per year, and the oil/GDP ratio fell at an annual rate of 8 percent.

Since the latter measure represents the amount of oil used *per unit of economic activity* rather than an absolute figure, its fall implies that an end to the present recession will not be the panacea that much of the

energy industry and many analysts seem to anticipate. Those who attribute the oil glut and the current "softness" of oil markets primarily to the world recession forget that economic recovery will mean a *more rapid replacement* of existing vehicles, industrial machinery, and buildings with models designed since 1974 in response to high energy prices.

Over the past decade, industry has been relentlessly converting existing oil-burning equipment to coal, natural gas, and other energy sources. Because changes in the world's fuel-use patterns are generally embodied in long-lived, capital-intensive investments such as buildings, transportation equipment, and industrial machinery, the extended period it has taken for the 1974 price rises to produce an absolute decline in oil consumption only reflects the time required to replace these assets. This long lag in adjusting the world's capital stock to changed energy-supply conditions also suggests that the all-time high oil prices of 1974-1982 will influence consumption patterns for many more years, *even if world oil prices now fall as rapidly and as far as they rose in the 1970s.*

Only when demand falls is the power of a price-maker tested.

Oil prices need not continue to rise just because the world's petroleum resource is finite. The world has no demand for crude oil as such, but only for the heat, motive power, and chemical building blocks it provides, and only for so long as it is the cheapest source of these goods. No matter how scarce natural petroleum liquids become, their prices cannot rise and remain above the cost at which each of these wants can be dispensed with or served in some other way.

At only $15 a barrel, oil was already more expensive than coal everywhere in the world, and had consequently priced itself out of electrical-generation and other large-scale stationary-heat and boiler-fuel markets. At well under $50 a barrel, given a few years for market and infrastructure development, liquid petroleum products would have become marginal even as transportation fuels, increasingly replaced by some combination of compressed and liquefied hydrocarbon gases and alcohols.

This situation does not bode well for OPEC, nor for the ability of Saudi Arabia or anyone else to manipulate or stabilize the market. Only when demand falls is the power of a price-maker tested. Can the OPEC nations, many of whom are deeply in debt, now afford to cut back production as they must?

There is little prospect that OPEC can function effectively in a chronic buyer's market, especially in the face of the organizations current internal dissensions and the precarious financial situation of its members. At its March 1982 meeting, the group made its first serious attempts at TRC-style prorationing. The experiment was an instant failure, with at least three members (Iran, Nigeria, and Libya) brazenly exceeding their quotas from the beginning.

Even holding the line at today's production level is not enough to bolster OPEC's flagging power, as world oil consumption continues to shrink and the production of nonmembers—especially Mexico—continues to grow.

The greatest source of downward pressure on prices is the shaky financial condition of the exporting countries, a drastic turn-around from the situation of 1975. Since 1973, spending of OPEC member countries for imports has risen at an average annual rate of 30 percent, because of ambitious industrialization plans in every one of them and extravagant purchases of military hardware in many.

Already, the combination of declining oil demand and rapidly rising expenditures has resulted in trade deficits for all but three OPEC members. These deficits, exacerbated by the continuing Iran-Iraqi war, are already beginning to take their toll as the most hard-pressed countries, in search of revenues to pay for today's imports, produce as much oil as they can sell.

To put OPEC's weakness into further perspective, consider the following:

- In August 1982, world crude oil production was about 54 million barrels a day. Out of this total the Saudi share was about 5.5 million, or 10 percent; all of OPEC was producing about 17 million barrels a day, or 31 percent of world supply. If new production in non-OPEC countries plus further declines in consumption were to equal only 10 percent of present world demand, OPEC's members would have to reduce their own production by 32 percent in order to defend any chosen price level.

- Conservation, fuel-switching, and recession caused the noncommunist world's oil consumption to fall by 7.5 million barrels per day between 1979 and mid-1982. If consumption declined by only half as much over the next two years, OPEC's output would have to fall by an amount equal to the combined production of Kuwait, Libya, Algeria, and Indonesia in August 1982, or by 68 percent of current Saudi output.

- Production from Iran, the world's former number-two oil exporter, has fallen 4 million barrels a day from its 1974 peak. The former number-three exporter, Iraq, is producing 2.6 million barrels a day less than its 1978 peak. If the war between these countries should end and they returned to the market with their 1978 sales volumes, other OPEC countries would have to curtail production by an amount equal to 90 percent of the August 1982 Saudi output.

- Finally, if by chance the last three developments all took place, and if OPEC hoped to sustain world prices at current levels, it would have to find places to cut production by at least 12.7 million barrels a day—75 percent of the organization's current output, or 231 percent of August 1982 Saudi production.

The range of conditions within which OPEC, Saudi Arabia, or anyone can continue to dictate or

even defend the level of world oil prices is thus extremely narrow. The reckless opportunism that held sway in the 1970s is now taking its toll. Long-term changes in supply and demand adverse to OPEC's interests have been under way ever since the cartel's first big coup in 1974. As these changes become visible to everybody, the mystique that has been OPEC's chief source of power will vanish along with forecasts of hundred-dollar oil. The world market will soon be, if it is not already, out of anyone's control.

What Have We Learned

A big new disturbance in world oil markets could push prices either up or down. It is still conceivable, if only barely so, that a sharp economic upturn and an exceptionally cold winter could combine with the right kind of Middle Eastern political crisis and send prices soaring for a third time to levels significantly above those reached in 1980-81.

The probabilities, however, weigh heavily on the other side. There is a hugh overhang of excess producing capacity in the oil-exporting countries. Several of them are in extreme fiscal distress; Mexico in particular has both the ability and a desperate need to increase oil exports. Meanwhile, the price-induced flight from oil is still gathering a momentum that will not be spent for years, *no matter what happens to oil prices today.*

World oil prices will fluctuate both randomly and cyclically. In (the future) the most likely price will be far below 1979-82 levels.

All of these forces together, not to mention a worldwide economic slump that is far from over, mean that prices must continue to go down, and they must go down substantially. The serious questions are whether they will descend smoothly or chaotically, and how far they will drop.

Looking back across the years of OPEC and energy crises to the relative tranquility of the TRC era and beyond, there are several lessons for the future.

1. Worldwide scarcity and rising real resource costs (capital, material, and labor costs) had little or no direct responsibility for the worldwide energy-price upheavals of the 1970s. The earth's known resources still include plenty of crude oil that could be developed and produced at resource costs well below 1973 real prices. Considering these resources alone, there is enough low-cost oil left to satisfy the world's current rate of consumption for several decades.

2. The most stable and easily sustainable price range is probably about $10 to $18 a barrel (in 1982 constant dollars), delivered to the world's major consuming regions. Unlike pre-1973 prices, the $10 to $18 price range is high enough to cover the cost of mining and transporting coal—and of burning it in an environmentally acceptable fashion—almost, but not quite, everywhere in the world. Prices in this range would leave oil a significant fraction of the markets for electric-utility and industrial boiler fuels and for petrochemical feedstocks.

History offers some empirical support for the viability of a long-term world oil price in the $10 to $18 range. Over the past 110 years, the average price in 1982 dollars has been almost exactly $13 a barrel and, despite an average constant-dollar prime fluctuation of more than 20 percent a year, no long-term trend can be detected. (The average 1982-dollar price between 1871 and 1925 was almost the same as the avage price between 1926 and 1980.)

3. World oil prices will fluctuate both randomly and cyclically. In any given future year, however, the most likely price will be far below 198)79-82 levels.

In summary, there is no basis in geology, resource-economics, or history for predicting a never-ending increase in the real price of oil. Private investments and governmental institutions founded on that proposition are sure losers.

Spending Levels and the Tax Base

by Scott Goldsmith

Scott Goldsmith is an associate professor of economics with the University of Alaska's Institute of Social and Economic Research (ISER) in Anchorage. ISER editor Ron Crowe adapted this article from "Sustainable Spending Levels from Alaska State Revenues," which appeared in the ISER publication, Alaska Review of Social and Economic Conditions, *20:1 (February, 1983).*

In November 1982 the citizens of Alaska passed a referendum limiting state spending. This spending limit, which will become law in fiscal year 1984 (FY84), puts a ceiling on the state budget and limits its growth to changes in population and prices.

However, falling world oil prices during the past eighteen months and an anticipation of no better than stable prices over the next several years have eliminated whatever effectiveness the spending limit might have had in holding spending below total revenues.

Under present conditions, revenues will not be high enough in FY84 to reach the spending limit. Therefore the state, knowing that current revenues are derived largely from a dwindling tax base, must again address the question of how to limit spending.

If the current spending limit will not work, then what will? The author suggests an alternative spending rule which would base spending upon the sum of renewable revenues plus the annual real earnings of state assets. Under this rule, after an initial downward adjustment, state expenditures would stabilize at about $1.5 billion (in 1982 dollars) and would be insulated from the decline in petroleum revenues. The rule would require a substantial increase in savings and investment of petroleum revenues over and above those currently flowing into the Permanent Fund.

The present spending limit, which can have *no* effect on spending, and the author's proposed alternative present Alaskans with clear alternatives. The first allows a business-as-usual approach wherein the present generation will continue to spend this one-time bonanza of oil revenues almost as fast as they are generated and bequeath to future generations a tax base insufficient to fund perhaps even the basic necessities of government. The sustainable spending alternative, on the other hand, incorporates a spending and savings/investment strategy which will allow revenues from the Prudhoe oil bonanza to not only take care of present necessities, but also provide for the needs of future generations.

Alaska State Revenues and Prudhoe Bay Oil

From the start of Prudhoe Bay production in 1977 to 1982, Alaska's petroleum revenues rose from 54 to 87 percent of state general fund revenues. Because during this time the state has increasingly helped fund local governments, petroleum revenues have supported an even larger portion of local as well as state government activity. Unfortunately, the largest part of these revenues come from a single oil field.

The 10-billion-barrel Prudhoe Bay field on Alaska's North Slope, the largest oil field ever discovered in North America, has accounted for about 95 percent of Alaska's oil production in recent years, with the now-declining Cook Inlet basin accounting for the remainder.

Despite Prudhoe's size, its production, like that of Cook Inlet, will inevitably follow the cycle eventually followed by all oil fields: growth, peak, and decline. And because, unlike other oil-producing states, Alaska oil production is dominated by this one super-giant field, its eventual decline will likely be more abrupt than that of other states.

Even including all other proved reserves, Alaska oil production will peak in the mid-1980s, and the subsequent decline will be rapid (see Figure 1). Prudhoe Bay production will fall to approximately one-third of present levels in about ten years,

To fully replace revenues lost from the declining Prudhoe Bay field would require development of a new field on state lands every year.

and the introduction of new fields such as Kuparuk will have little effect on either total years of continued peak production or subsequent decline.

For example, the 600-million barrel Endicott field (Point Thomson) will only postpone the total production decline by about one year. In fact, to sustain Alaska's revenue base, oil companies would have to find a new 500-billion-barrel reservoir *on state lands* each year as Prudhoe Bay production declines, a most unlikely prospect. And even if a new Prudhoe Bay were to be discovered today, it could not begin to produce revenues for about twelve years.

The most recent estimate of reserves on Alaska's unexplored regions is 21.5 billion barrels of oil, or twice the proved capacity of the Prudhoe Bay reservoir. However, most of this oil is expected to be found on federally owned North Slope lands or offshore in the Beaufort Sea. The state, through taxation and a small share of royalties, will receive but a small part of revenues from any oil produced on federal lands. The state has no taxing authority for any oil produced offshore.

Alaska's Tax Base

Prudhoe Bay oil, which is the main element of the nonrecurring tax base, is an asset currently worth upwards of $30 billion to the state. At current rates of expenditure, Alaska is rapidly depleting this asset, and it has no alternatives to meet future needs.

State oil revenues come from the sale of a part of the state's tax base—the state government's tax and royalty "share" of the oil. Of the five major categories of petroleum revenues, lease bonuses and royalty income most clearly represent the sale of a state asset.

The other three revenue sources—the severance tax, the corporate income tax, and the property tax on oil and gas production and transportation related property represent taxation of a nonrenewable resource.

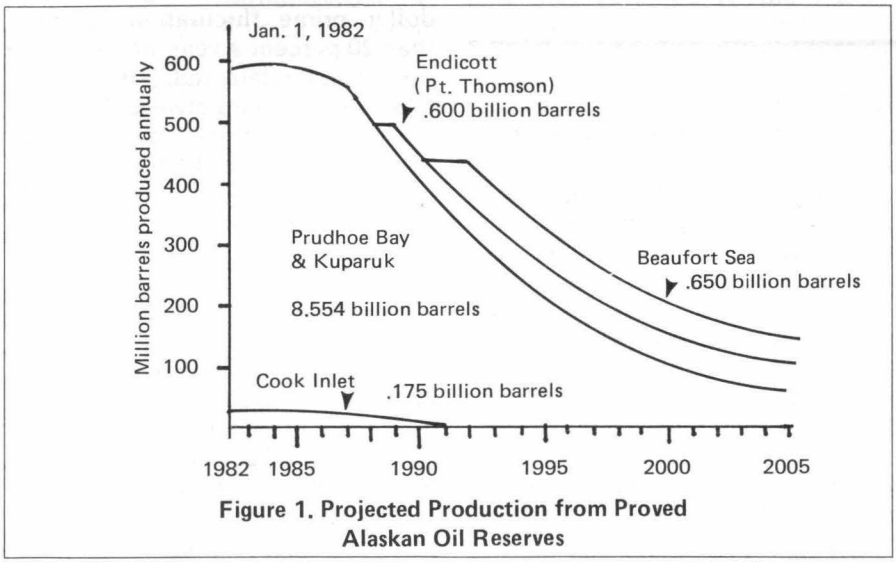


Figure 1. Projected Production from Proved Alaskan Oil Reserves

The state will receive these revenues only as long as oil is being produced and sold. If reserves are produced today, they will not be available as a tax base tomorrow.

Recurring state revenues are miniscule compared to current levels of state spending and cannot be realistically viewed as an answer to the state's impending fiscal crisis.

Such revenues have historically come from four sources, the largest part from personal and corporate income taxes and the remainder from federal transfer and user fees. In FY83 only seven percent of revenues will come from recurring sources not directly related to petroleum, another seven percent will come from investment earnings and the remaining 86 percent will come from nonrecurring petroleum activity.

Future Revenues: Actual and Potential

Figure 2 shows a projection of future revenues based upon likely petroleum production (including natural gas) from leased areas as well as current trends in recurring (individual, non-oil business, and miscellaneous) general fund revenues. A revenue gap appears in 1989 at about the time production from Prudhoe Bay begins to decline. Revenues then fall during each suceeding year. Neither investment earnings nor business, individual, or miscellaneous revenues will be large enough by 1990 to offset the fall in petroleum revenues.

Several strategies have been suggested for dealing with this projected revenue gap, which could reach $1 billion by 1991.

1. **Increase the flow of petroleum revenues.** Raising the per-barrel tax rate or increasing production on state lands would only temporarily compensate for declining production and could accelerate it. To fully replace the revenues the state will lose from the declining Prudhoe Bay field would require development of a new field on state lands every year. This is virtually impossible.

2. **Rely on the development of nonpetroleum natural resources.** No natural resource alternatives exist that could expand enough in a few years to generate revenues comparable to petroleum. In 1981, petroleum (crude oil plus natural gas) accounted for 92.5 percent of natural resource sales; seafood contributed 5.9 percent. All others combined totaled only 1.6 percent.

3. **Rely on downstream processing of, or value added to, Alaskan resources.** Currently, revenues from such downstream processing are primarily obtained from the corporate income tax. At current tax rates, the corporate tax base would need to grow to over 100 times its current size to replace the revenues from petroleum in 1982.

4. **Reimpose the personal income tax and increase corporate tax rates.** This would increase individual and business taxes only modestly, as shown in Figure 2. This strategy would fill the revenue gap for only one year and would subsequently reduce it by a small percentage.

Clearly, no one of these strategies is capable of filling the revenue gap. Adopting all of them would likely yield no higher revenues than would result from increased taxation of income, because tax increases tend to restrict the growth of the tax base.

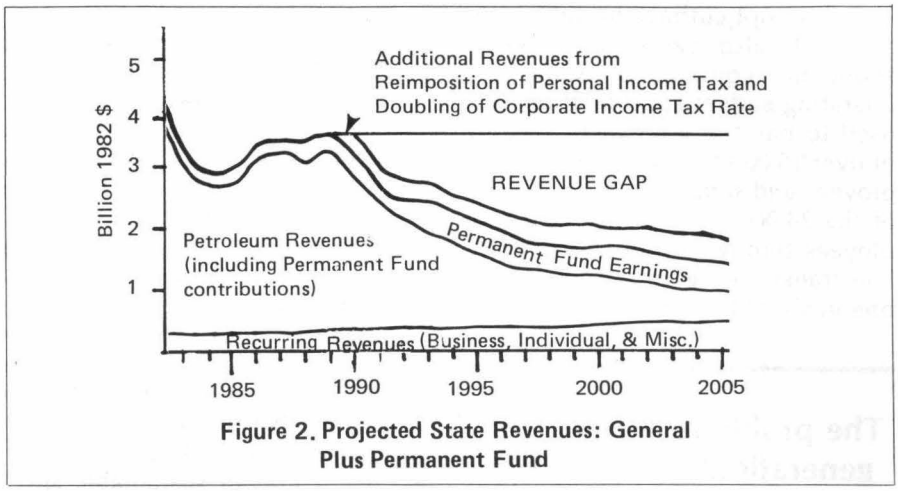


Figure 2. Projected State Revenues: General Plus Permanent Fund

The Present Spending Limit

When Alaska's oil revenues begin to decline, the state will have only the Permanent Fund to draw upon in order to sustain spending. However, to the extent that the Permanent Fund earnings are used to supplement general revenues and fund the Permanent Fund dividend program, the fund principal will be eroding at the rate of annual inflation, and annual contributions will just barely offset this erosion. It will total only about $4.5 billion (1982 $) in 1988.

If the state starts using the Permanent Fund at this time to fund the budget up to the limit, it will be exhausted in only four years (Figure 3). Once this cushion is gone, the state will have to cut expenditures abruptly, eliminating many programs now considered necessities.

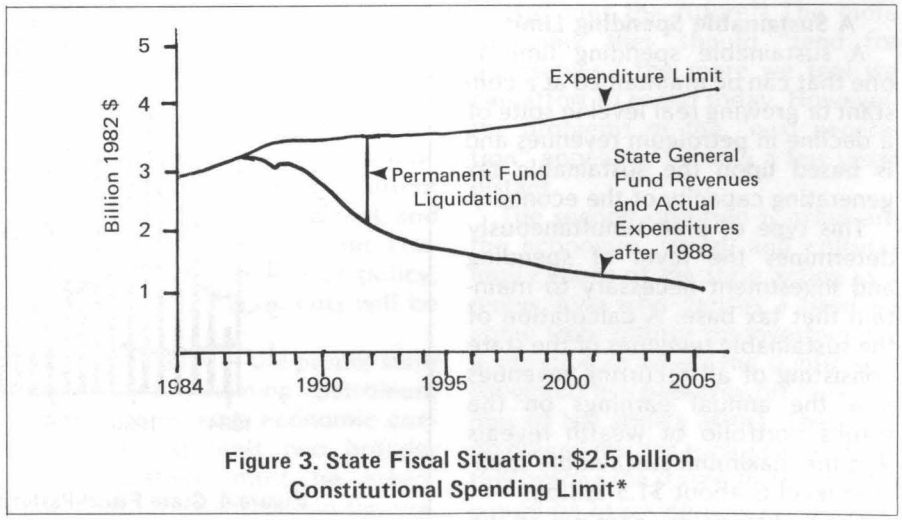


Figure 3. State Fiscal Situation: $2.5 billion Constitutional Spending Limit*

This abrupt cutback in state spending will also cause a statewide economic contraction. Currently, operating budget appropriations are used to pay the wages and salaries of over 15,000 state government employees and support a large number of the 24,000 local government employees through various local revenue transfer programs. Thus, about one in six of the 200,000 jobs in the state economy directly result from state operating appropriations. The capital budget also directly provides employment to a significant portion of the construction industry.

The problems of the "next generation" appear to be only a few years distant.

Also, the Permanent Fund dividend program and state loan programs each pump income into the economy on a scale similar to the payroll of a major industry such as construction or manufacturing. Overall, about one-third of current personal income can be traced, directly or indirectly, to state government spending. Like other industries, state spending has a "multiplier" effect in the trade, service, finance, and other support sector industries of the state. A forced reduction in spending would cause a contraction of private support sector activity because the "multiplier" works in a downward as well as upward direction.

A Sustainable Spending Limit

A sustainable spending limit is one that can be maintained at a constant or growing real level in spite of a decline in petroleum revenues and is based upon the sustainable tax generating capacity of the economy.

This type of plan simultaneously determines the level of spending and investment necessary to maintain that tax base. A calculation of the sustainable revenues of the state consisting of all recurring revenues plus the annual earnings on the state's portfolio of wealth reveals that the maximum sustainable spending level is about $1.5 billion.

The real monetary earnings on the assets held by the state in 1982, both in the form of oil in the ground at Prudhoe Bay and in financial assets, totaled approximately $750 million. This was the earnings, at a 2.5 percent real rate of return, on assets with a present value of $30 billion (Table 5 in original ISER Report).

Recurrent revenues totaled about $450 million, including petroleum revenues from fields other than Prudhoe Bay. Thus, total sustainable revenues equaled *about* $1.2 billion in 1982 dollars, or about $1.475 billion in 1984 dollars (Table 9 in original ISER report).

The amount of sustainable spending in any year is primarily a function of three variables: (1) the real return on state assets, (2) the level of petroleum revenues, and (3) the level and growth of revenues from recurring sources.

The most important of these is the real return on state assets. For example, we have assumed a real return of two percent on the general fund and three percent on the Permanent Fund, for a combined rate of approximately 2.5 percent. At this rate, a $30 billion portfolio would produce $750 million in sustainable spending annually. A change in the interest rate of .5 percent would change sustainable spending by $150 million.

About 90 percent of state assets are currently held as petroleum. If the present value of petroleum reserves are double current estimates, then they could sustain an annual spending level of $1.5 billion rather than $750 million; the spending ceiling could be raised to $1.95 billion (1982 dollars). Smaller portfolios would produce smaller annual earnings.

The difference between all revenues collected and sustainable revenues spent under the limit formula would go into savings/investment for maintenance of the state tax base and ultimately the sustainable spending level in future years. This would guarantee a conversion of the nonrenewable Prudhoe Bay tax base into a renewable tax base.

The result of implementing the sustainable spending strategy is illustrated in Figure 4 (see footnote 15 in original ISER report). We assume that expenditures gradually fall over a three-year period from their current level to the sustainable limit, after which they would grow indefinitely with the growth of recurring revenues.

State general fund spending would be less than general fund revenues from the initiation of this strategy until about 2005. Each year, revenues in excess of the limit (sustainable revenues) would be saved and invested. This savings would

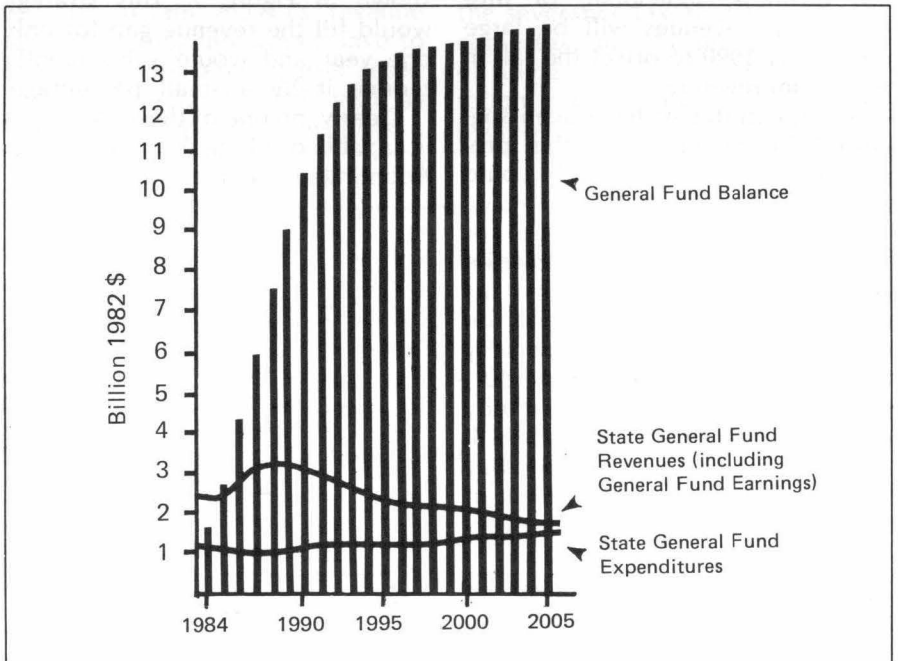


Figure 4. State Fiscal Pattern: Sustainable Spending Strategy

presumably go into the general fund, although it could go into the Permanent Fund or some other account.

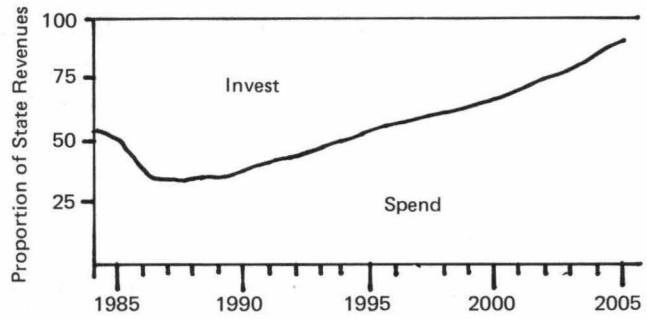
The growth of the general fund would represent the conversion of petroleum into financial wealth. Over time, earnings from the general fund would become an increasingly important component of total revenues. At some point after 2000, as Prudhoe Bay petroleum revenues ran out, actual revenues would be no greater than sustainable revenues, and from that time expenditures would equal actual revenues.

This strategy simultaneously provides a savings and a spending formula. The savings and investment necessary to maintain the level of sustainable revenues in future years is the difference between total revenues and sustainable revenues. The year-by-year allocation between spending and savings/investment is shown in Figure 5. In the early years, savings and investments, not including investments in the Permanent Fund, would have to be greater than spending if a sufficient asset base were to be built up to maintain maximum sustainable spending.

The portfolio of public wealth would evolve over time, as shown in Figure 6. As the value of oil in the ground declined with extraction, it would be replaced by a growing value of financial capital in the form of the general and Permanent funds. Earnings from financial assets would replace petroleum revenues as the primary funding source for state government. This conversion plan

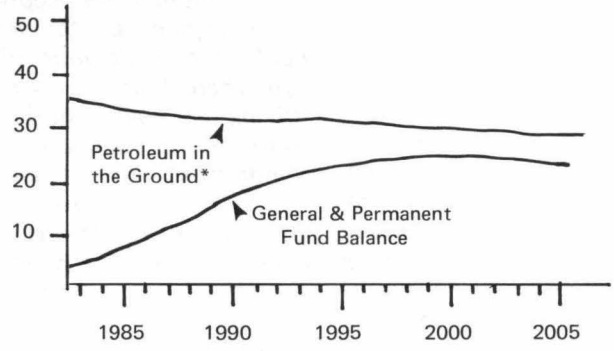
About one-third of current personal income can be traced, directly or indirectly, to state government spending.

and its maintenance would require discipline and restraint. The state portfolio of assets would be composed of discretionary assets rather than the current nondiscretionary oil reserves; maintenance of the asset value would require considerable prudence and orientation to long-term needs.



Note: Constitutionally mandated Permanent Fund contributions not included.

Figure 5. Proportions of General Fund Revenues Invested and Spent in Sustainable Spending Strategy



*An estimate of the present value of petroleum revenues using a discount rate of 2 percent.

Figure 6. Portfolio of Public Wealth: Sustainable Spending Strategy

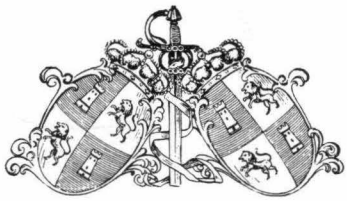
Conclusions

Future state revenues from petroleum may be more or less than have been projected in this analysis, and sustainable revenues, consequently, more or less. Whatever their level, there is a sustainable level of expenditures which, if exceeded, means program cuts will be necessary in future years. If current revenue projections are correct, and if the present spending limit continues to guide state fiscal policy, then essential program cuts will be very large.

Any discussion of the proper state response to declining petroleum revenues transcends economic considerations. At least two broader social questions must be asked. First, to what extent should the present generation of Alaskans worry about the fiscal problems which the next generation may inherit from us? (Or, what is the proper rate at which to discount the future?) The more we think they should "fend for themselves," the more we feel we can afford to spend today. However, the problems of the "next generation" appear to be only a few years distant.

The second question is, what are the economic, social, and cultural implications of the state acting as a *rentier* (one who derives a fixed income from returns on investments); a situation in which the public sector would live primarily off the earnings of the state's assets. There are no precedents for such a fiscal structure among the states. In, this Alaska would be breaking new ground.

New Cantabria



Alaska in the last chronicles of the Spanish Empire

by Arsenio Rey-Tejerina

Several coincidences contributed to make my sea voyage to Alaska a memorable one. There I was, another Spaniard, navigating the Inside Passage, marveling at the landscape in the wake of my fellow countrymen who had come the same way over two hundred years earlier.

On old Spanish maps I have seen, the area was called New Cantabria, which I thought an appropriate name, because of it's striking similarities in climate and geography with the Cantabric region where I grew up.

The ship I was riding had a name honoring Columbus and the pilot was another Hispanic, Captain Alberto Raúl Ornelas. As soon as I saw his name on the bridge bulletin, I asked one of the officers to take me to the control room. I was deeply moved to shake his hand and touch the helm. I held it for awhile under his watchful eye. There I was, a novice mariner, driving that huge boat through rocky waters with a sea coast dappled with hundreds of little islands backdropped by the snow covered mountains and thundering glaciers, just as my ancestors had done when they came exploring all the nooks and crannies of this coast.

My trek to Alaska had started in New York twelve days earlier in a small Toyota, crossing the whole continent and carrying me and my family to Anchorage. I was coming to initiate a Department of Foreign Languages at the University of Alaska, Anchorage.

We embarked in Seattle at the end of August. Hanging from my neck I had a pair of binoculars and in my hands a map on which I had jotted all the Spanish names gathered from my research on the discoveries of those intrepid sailors who had come up from San Blas port, just north of present day Acapulco.

Captain Ornelas was taken aback by the profusion of Spanish names indicated on my map. He knew just a few of them, those on contemporary seafaring maps, but the majority had long since been changed.

FIRST EXPEDITION, 1767-1774

Several years before the American Revolution for independence, the Spanish Ambassador at St. Petersburg, Russia sent to Madrid a 207-page report on Russian movements in the northwest Pacific, including a 1750 map of southwestern Alaska.

In 1764, the Spanish king Carlos III urged his viceroy in Mexico to send an expedition to the north. But Mexico did not have the proper ships to undertake the task of checking the Russian advances, and had to build them.

The port of San Blas, located in a well-forested area, was chosen in 1767 as the base of operations for the exploration and settlement of the Pacific Northwest. By late 1773 they were ready to sail.

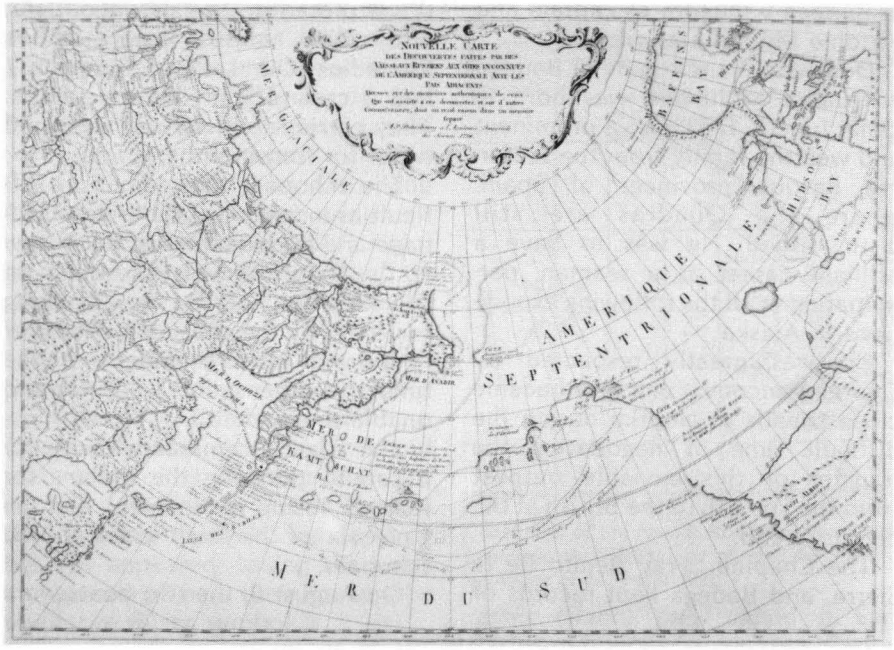
Viceroy Fray Antonio Maria Bucareli y Ursúa, appointed the best navigator of Mexico, Juan José Pérez Hernández, to lead the expedition. However, complications ultimately delayed the departure until mid-June of the following year.

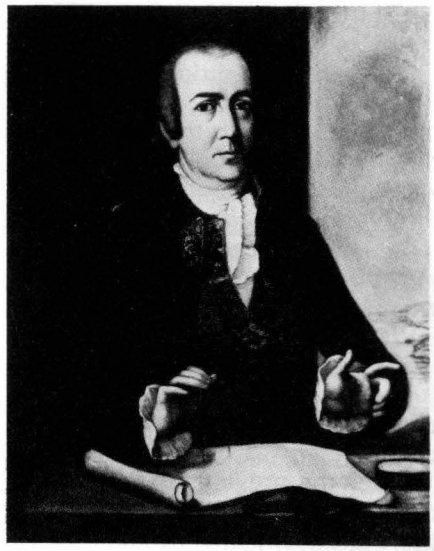
This was too late, even with good weather, for the slow-moving *Santiago* frigate to reach the sixtieth parallel of the Aleutian chain as they were commanded. But with its eighty-seven crew, two priests and one surgeon, the frigate sailed anyway, and they did get to Alaska!

When the expedition entered the waters below Ketchikan, the area was named Entrada de Pérez (Pérez's Entry) for the captain.

His pilot, Estevan José Martínez Fernández Martínez de la Sierra, was a man of vision and enormous energy who later would establish the northern-most Spanish colony of Nootka and who led the fourth expedition to Unalaska.

These two, and the two boat chaplains, Fathers Juan Crespí Cos and Tomás de la Peña Saravia, kept diaries of the exploration.





UAF ALASKA & POLAR REGIONS DEPT.

Don Esteban José Martínez piloted the first expedition to Alaska and took part in all the rest. At left, a copy of the Russian map of the "unknown coasts of Northern America and adjacent countries" which was at first used by the Spanish.

During this expedition, today's Forrester Island was named Santa Cristina. Cape Muzon, a probable English transposition of Muñoz, was called Cabo Santa María Magdalena.

It was the end of July when Captain Pérez, feeling it would be too late to push north against rising headwinds, decided to turn back.

Although the first expedition did not achieve its full purpose, its aims are worth considering, since they are similar to those of future explorations.

Viceroy Bucareli had given detailed instructions to the ninety explorers. Besides sailing to sixty degrees north latitude to establish the limits of the Russian penetration, they were to follow traditional Spanish approaches with the Indian cultures.

The two main principles were to attract the Indians to vassalage and then Christianize them. They were to make every possible effort to learn about Indian customs, religion and government, and to estimate their numbers.

The Indians' friendship was to be cultivated at all costs to create a good welcome for later settlers. Officers were directed to maintain strict discipline among the seamen to ensure good treatment of the Indians and especially, to prevent "undesirable contacts" with native women.

There were to be no hostilities or any taking of lands or belongings from the Indians. If the captain should encounter opposition to landing in any one place, he was to find one where they would be accepted.

The main object was to ascertain the presence of foreigners and to keep an eye open for metallic deposits and agricultural opportunities—the presence of cereals or vegetables, and perhaps some exotic products such as pepper, cloves or nutmeg.

To create good relations, four large cases of glass beads and trinkets were taken to give to the chiefs and leaders.

The experience gained from this voyage helped to prepare for later, successful expeditions: they needed smaller consort ships to approach uncharted coastlines; the Spaniards were unprepared for the cold, foggy climate and they needed more fresh food and water; scurvy was a threat; the Russian maps were of no help.

A pleasant discovery was the high culture found among the Haidas, which was thought by the Spaniards to be far superior to the California tribes.

The Haidas were curious about European clothing, utensils and weapons, especially metals. The Indians were described by the explorers as light-skinned, good looking, and strong; but the Spaniards did not like to see the women wearing labrets in their lower lips.

The expedition exchanged clothing, nails and other small iron objects for some woven capes, conical hats, fur garments and weapons which were sent to Mexico and Madrid, where they created a sensation.

The explorations were considered worth continuing for their scientific value, but were no longer thought necessary to check Russian advances, since no trace of the Russians was found in any of the places discovered.*

In fact, the Spaniards were the first western culture to have touched the area of the Alaska's southeastern panhandle.

**After the discovery of Alaska by Captain Bering and Chiricov in mid-1741, other Russians made sporadic visits to the Aleutian islands to obtain furs. As the hunters spread eastward they concocted rough maps from their observations. The Empress Catherine, in trying to regulate the fur trade, named a few officials, who in the summer of 1768 made it to Unalaska. But the Russian foothold in Alaska was not established until 1783-85, when Shelikov, the "Russian Columbus," arrived at Kodiak, and in the 1790s after Baranov's arrival.*

SECOND EXPEDITION, 1775

The second expedition sailed from San Blas on March 16, 1775, four months earlier than the departure of the first expedition. The *Santiago* was again used, but was renamed the *Nueva Galicia*, undoubtedly in reference to the new lands they were to visit, which were similar in geography and climate to Spain's Galicia.

There were fewer men this time (sixty-four) and Juan José Pérez came along, but only as pilot. The commander was Bruno de Heceta.

After the previous experience of not being able to more closely explore the many channels and rocky coastal waters, they took along the schooner *Sonora*, with Francisco de la Bodega y Quadra as captain and Antonio Mourelle as pilot.

Don Juan Francisco de la Bodega y Quadra Mollinedo was born in Lima, June 3, 1743, into a prominent and wealthy family from the seafaring Basque provinces of Spain, where the Quadras are still distinguished. He was to have a brilliant career as a seaman, participating in all the following expeditions to Alaska.

He was greatly respected by George Vancouver and they became close friends at Nootka during the difficult time of negotiating the transfer of this enviable outpost from the Spanish to the British at the century's end.

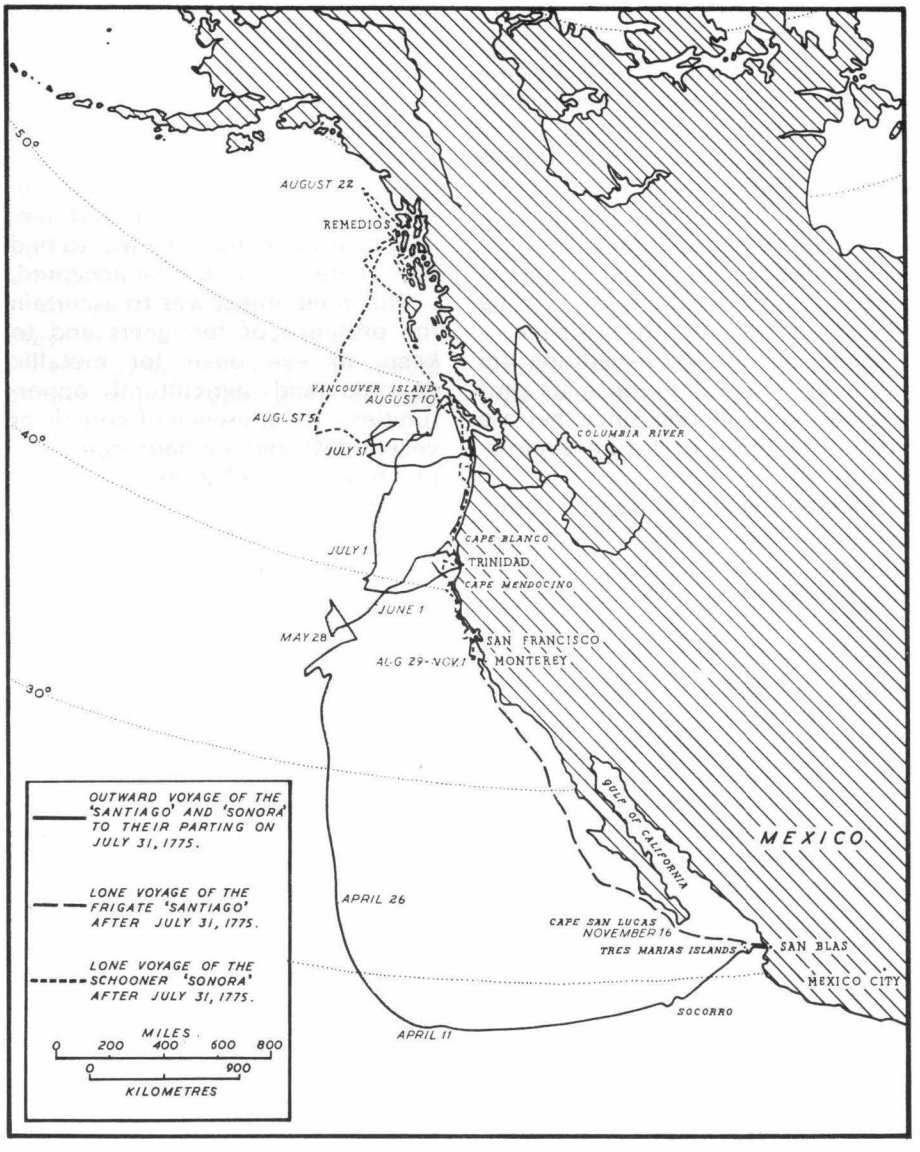
The Chaplain, Fray Benito de la Sierra, and Bodega kept records of this exploration. The 36-foot *Sonora*, also called Nuestra Señora de los Remedios (Our Lady of Remedies), had a crew of only fifteen sailors. They carried food for one year and water for four months.

The schooner had numerous difficulties in following the frigate *Santiago* and at one time had to be towed by it. But the worst blow was on July 14 when half the crew, looking for water on the coast of Vancouver Island, was killed by Indians. At the time, five other sailors were sick and unable to stand.

The frigate commander was opposed to pursuing the Indians for fear of losing more men, and he gave six of his own crew to the schooner.

On August 8, the two boats were

A Spanish stamp of 1967 honoring Juan Fransisco de la Bodega Y Quadra.



Coastal map of the Pacific Northwest from San Francisco to Unalaska as charted by the expeditions of 1775 and 1779.

separated again by a heavy storm and they lost track of each other. Bodega's schooner proceeded north, arriving at the latitude of Mt. Edgecumbe. The place was named San Jacinto and its cape was called Cabo del Engaño (The Deceiving Cape). Puerto Guadalupe and Puerto de los Remedios (Port of Help) were two other places visited on what is today called Shelikof Bay of Kruzof Island.

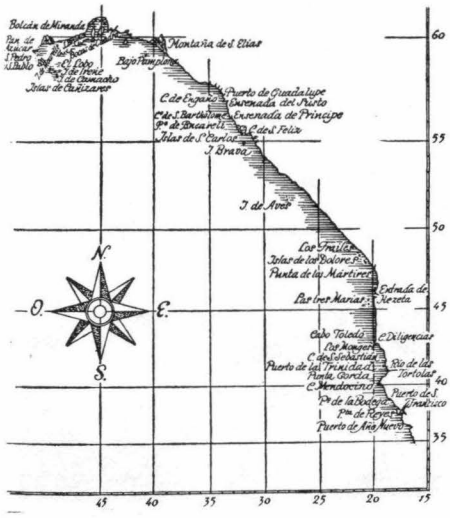
After reaching the fifty-eighth parallel, they went ashore somewhere on Chichagof Island to take possession of the land and plant a big cross as a sign. They did not see any Indians, but as soon as they got into the boat, hundreds of Natives appeared, taking the cross and planting it near their houses like one more totem symbol.

These Indians first encountered by the explorers must have been Tlingit, judging by the location of their dwelling, a big log house with a stockade of more logs around it for protection. When they saw the boat approaching the stockade, they came out unarmed and started haranguing the Spaniards in their native language, using all kinds of gestures, which seemed unending and were, of course, totally incomprehensible to the Spaniards.

While the explorers were preparing to return to Mexico at the end of August, Captain Bodega and some of his sailors were on land exchanging gifts for some smoked salmon. As they proceeded to fill their water tanks to take back to the ship, they saw that the Indians demanded to be paid, and Bodega gave them some more gifts. Not enough, judging by the large group of men who appeared armed with long spears topped with flint points. The sailors were allowed to leave only after getting into defense formation with their guns ready to shoot if the Indians came another step closer.

On the way back to Mexico, the Spaniards carefully mapped the coast. Since the captain was sick with scurvy, the pilot Mourelle came ashore to take possession of land which he named Puerto Bucareli (Bucareli Bay on today's maps) in homage to the viceroy who had sent the expedition.

When they touched today's Forrester Island, they called it San Carlos in honor of their king, Carlos III, not knowing it had been named Santa Cristina by the previous expedition.



Coast map of the Pacific Northwest from San Francisco to Unalaska as charted by the expeditions of 1775 and 1779.

On August 31, Bodega, recovered from his sickness and noticing a northward wind change, decided to turn around and again attempt reaching the sixtieth parallel. This would have taken them to the latitude of Anchorage, but half the crew then fell sick with scurvy. They reached the fifty-sixth parallel in mid-September, then again turned around and headed for Mexico.

The commander of this expedition, Don Bruno de Heceta, never made it to Alaska. But during this and the following expedition, several places were named for him, including one of the islands northwest of Prince of Wales.

Francisco Antonio Mourelle

Worth noting is that of the sixteen men on the schooner *Sonora*, only four had seafaring experience; the rest were all farmers. Because their boat was small, most of their provisions were carried by the frigate, but after contact with it was lost, they had to fend for themselves.

In Mourelle's words: *The deck and tiny cabin were all it had to offer for security or living quarters, with no chests or other baggage than a bed and what could be contained underneath in a box; the height and width of the sleeping space necessitated remaining in a sitting position; the small deck did not offer the possibility of a walk and in this inactivity one lived for the space of ten months.*

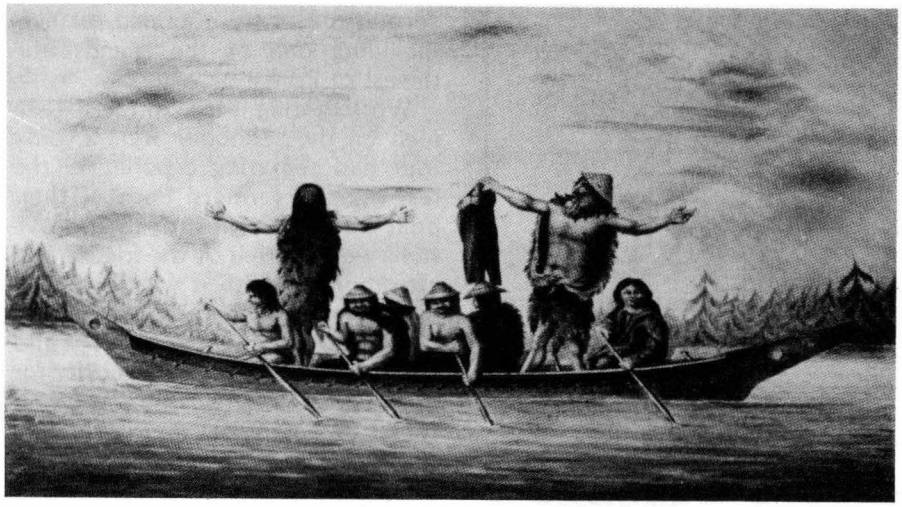
Bodega y Quadra's diaries from this expedition helped pave the way for James Cook three years later. Cook carried them in his well-equipped vessel, the *HMS Resolution* (462 tons and 117 crew).

Many names given to geographical features by the Spaniards during this expedition remain on contemporary maps of Alaska. The most significant is Suemez Island, named for the viceroy. Hendida (Split in the Middle), Santa Lucía, Coronados (The Crowned Ones), Los Hermanos (The Brothers) are some other islands mapped and named at the time and still found on maps of the Tongass National Forest.

THIRD EXPEDITION, 1779

The third Spanish expedition to Alaska began in mid-1777 at the Port of Callao in Perú, when Captain Bodega sailed from there in the newly built frigate, *La Favorita* (The Favorite), alias *Nuestra Señora de los Remedios* (Our Lady of the Remedies). Most of the sailors were Peruvians, although some Ecuadorians may have joined along the way when Bodega stopped at Paita and Guayaquil.

The ship did not reach the Mexican port base of San Blas until the beginning of 1778. The chief commander aboard the *Princesa* (Princess), Ignacio Arteaga, was waiting there with orders to sail to



The chief of Mulgrave (Yakutat) returns a sailors stolen pants, a gesture of peace depicted by Jose Cardero. A similar incident took place during the Malaspina expedition of 1791.

At right, a portrait by Thomas de Suria of a Yakutat woman (Museo de America, Bauza Collection, 103).

the seventieth parallel, almost the latitude of today's Point Barrow.

With the experience gained from their previous expedition, Bodega and his two pilots, José Cañizares and Francisco Mourelle, advised reaching Bucareli Bay (west of today's Ketchikan) and waiting there for the beginning of summer to begin the trip to the northwest.

The two leaders, Arteaga on the *Princesa* and Bodega on the *Favorita*, left port at 11 p.m. on February 11, 1779, carrying 108 men and provisions for fifteen months.

Eighty-two days later, after numerous mishaps, the *Favorita* reached the proposed winter station alone. It had been separated from the *Princesa* for more than two weeks, but a few hours later, the *Princesa* appeared on the horizon. The two commanders decided to rest there ten days, wait for sounder weather and make some repairs on their boats while taking on provisions of water.

On May 13th, with great solemnity and in the presence of a group of Indians, a High Mass was celebrated and a huge cross erected. The port was named Santisíma Trinidad (Holy Trinity), which feast day it was on the Roman calendar. Mourelle calls it Santa Cruz (Holy Cross) instead, honoring the day of their arrival.

To explore the bay, two launches commanded by Morelle and the pilot José Camacho, along with the second pilots (Juan Bautista Aguirre and Juan Pantoja) and the surgeon, Juan García, took off from Cape Bartholomé on the southern tip of today's Baker's Island.

While they were away, the *Favorita* pilot, Cañizares, made a cartographic study of the port where they were anchored.

Arteaga and several members of the crew were sick and on advice of the surgeon, Mariano Núñez de Esquibel, they were put ashore in some barracks. A few of them had already died, but the epidemic was stopped with the help of the Natives, who gave them fresh fish, bear and wolf skins, foot rugs and other practical things. In response, the explorers offered the Indians some trinkets and a few kitchen utensils, which were greatly appreciated by the Indians.

These daily contacts and visits on board so familiarized the Natives with the Hispanics, that soon a few robberies took place. One day while a sailor was on shore washing, he was undressed and robbed of his pants.

A few Indians, in their reported interest for trinkets, were even willing to exchange their children (possibly not their own), indicating that these strange new objects were of irresistible value. On the advice of the priests a seven-year-old girl was accepted. Bodega took a nine-year-old boy under his protection and later, four- and five-year-old boys were offered to them.

Then, on June 3, over 300 armed Tlingits came in thirty canoes. Although the Spaniards were alarmed, they allowed some of the Indians on board because they showed no animosity.

The little robberies were keeping pace with these daily exchanges, until some irreplaceable carpentry tools were taken. Bodega sent two paque-boats in pursuit of the Indians, who abandoned their canoes and hid inland. The Spaniards captured the canoes and exchanged them for the tools.

On June 11, more armed canoes came between the anchored frigates and the cross planted on shore. The Indians pulled down the cross, but the Spaniards fired a cannonade from a boat. Frightened, the Indians ran away, leaving the cross behind.

The following day the two launches returned from the mapping trip and also had to shoot a few times to stop the Indian's robberies. In the afternoon, the expedition's two leaders went ashore to make peace with the Natives and replant the cross, but their troubles were not over. The Indians captured a group of sailors and took several hostages. It took a few days to settle the matter, since two sailors were hiding voluntarily with the intention of staying among the Indians.

Bodega y Quadra has given us some interesting observations on

the Bucareli Indians: they were slightly brown, some almost white, with fair complexions; they were of medium height, strong, arrogant and warlike.

The Indian's clothing was made from wolf, deer, bear or other animal skins and covered their bodies down to the knees. Some were dressed with "wool blankets well made and about four feet long by three feet in width and five inches of flounce all around."

They had boots of leather, open in the front with cords to tie. On their heads they wore funnel-shaped tree bark hats and on their wrists, bracelets of iron, copper or whale barbs. At their necks they wore several threads with bones and very fine copper necklaces. Their ears were decorated with retorted copper wires, jet beads and tiny gourd shells made out of some rubber-like topaze. Their hair was long and brown, loose to the shoulders and tied up in an X form with a wool lace. They sometimes came with painted faces and arms in "almagre" (red ochre) and lead colors, with their heads covered with small feathers.

The women dressed modestly, clothed from neck to feet in open-sleeved dresses made of skins and tied around the waist. They had pleasant, fair faces with rosy cheeks and their hair was long and tousled. If the cold was severe, they would cover up with one or two sea otter skins. But for the Spaniards, the women's attractiveness was destroyed by the custom of perforating the lower lip with a copper wire on which a round, flat piece of wood at least one inch in diameter was hung. It appeared that married women, in particular, followed this practice, while younger women often hung shells in their noses.

To make war the men would armor the upper body with small pieces of wood tied together to allow free movement. A thick bark piece worn around the neck and reaching to the eyes was used, along with a head mask in the shape of some ferocious beast. The legs were protected by boards and a thick leather piece behind and down to the ankles.

Their weapons were arrows,

A young woman of the Queen Charlotte Islands.

lances ten to fifteen feet long topped by iron barbs, knives the length of bayonets, and axes of sharp silex or some green flint hard enough to cut any wood without leaving a mark.

When they meant peace and friendship they would raise their arms in cross-form and yell, *COHACAN* in a complicated guttural screech.

Bodega felt curious about their language, lamenting his lack of comprehension: *"The difficult pronunciation of their words has been an enormous inconvenience in that we have not been able to take in writing many utterances they express in answer to our questions. They form the words in their throats with a movement of the tongue against the palate and to reproduce them we would need a great number of diphthongs. One can see how little use of their lips the women make, not even touching. However, we learned that they count up to 10 and from there repeat the same number until a new one for 20."*

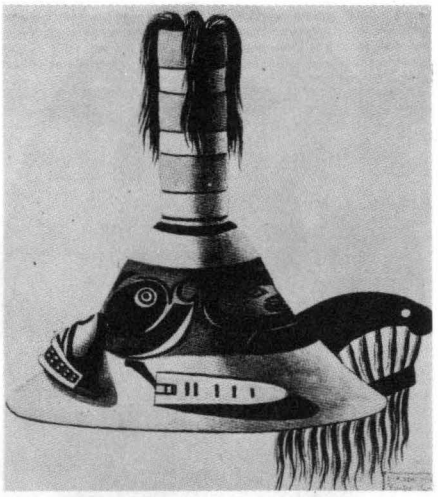
Bodega considered these Indians good artisans, judging from the things he saw, such as mats in variegated colors; wolf, bear and deerskins; well-woven wool blankets embellished with white, brown and yellow designs; little wooden boxes in the shape of a frog or other figures, and other objects.

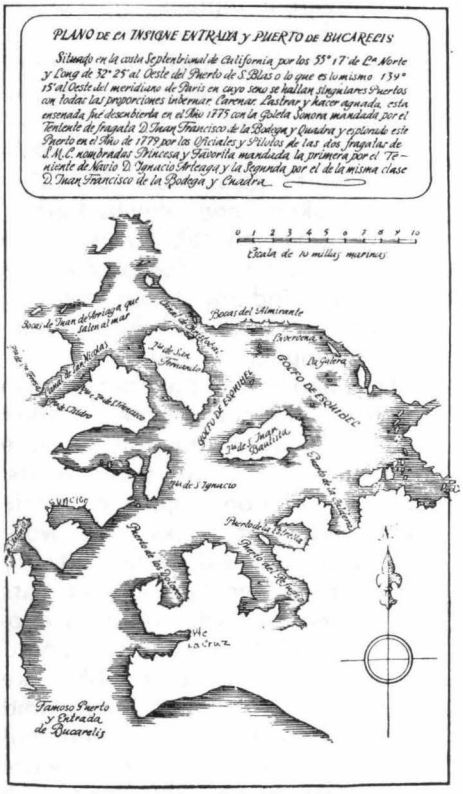
Their canoes were made out of pine wood and were usually family-size, although some were bigger. The canoes were constructed using three sections—one corresponding to the keel, and two others which were joined together, as if glued. The canoes were light and thin, with both ends raised to long points, and they had interesting ornamentations requiring great skill.

On the contrary, their lodgings on the beaches appeared to have little importance and were lightly built to be portable at any time. They consisted of three easily-moved poles covered with bark and grass. As the men mapping the area discovered, further inland there was a village (rancheria) situated on top of a steep hill, which could only be reached by a long ladder. Here the houses were more solidly built, with logs on all four sides and a flat interior floor.

The Indian food was boiled or roasted fish, especially salmon and flounder, called by them *azetla* and *chatla*; also hake, sardines, some other abundant little fish similar to

Thomas de Suria drew this Tlingit Indian holding a fighting knife (Museo de America, Bauza Collection, 113).





Bucareli Bay and islands discovered by Bodega in 1775 and mapped in 1779; left, a Nootka chief and his wife; above, a carved and painted Tlingit headpiece, with woven basketry rings rising from an opening in the top.

prawn and various shellfish such as cockles, clams, and mussels.

They also ate a kind of marine vegetable which in Peru is known as *cochayuyo*; other vegetables and wild tubers; and meats from deer, whale, bear and duck. To hunt they used dogs, which were numerous.

About their religion and government structure, Bodega could not gather much information since he could not understand the language to ask them. Some seemed to worship the sun, others nothing. The government seemed rather oligarchic, since some of the elders were shown homage.

The two runaway sailors reported seeing a majestic man, about forty-years-old and especially dressed, who was obeyed by the inland people. Perhaps he was a king, they thought.

The topography of Bucareli Bay is described as steep hills, even down by the ports. The hills were named San Antonio, Asunción, and Mayoral. The 1980 map of the Tongass National Forest carries many of the names given to features 200 years ago by the cartographers of the expedition: the ports—Real Marina (Royal Navy), Estrella (Star), Refugio (Refuge), St. Nicholas (San Nicolás), and La Caldera (Caldron); the islands—St. Joseph (San Josep), San Lorenzo, Anguilla (Eel), San Fernando, San Juan Bautista, St. Ignace (San Ignacio); the bays—San Alberto and Trocadero (Exchanging Post) and the Gulf of Esquibel in honor of the expedition's doctor, Mariano Núñez de Esquibel; the channels—Portillo (narrow gate), St. Nicholas (San Nicolás), and Bocas de Finas (Mouths of Fine?).

Having repaired their boats and replaced their water provisions, and assured of good weather conditions, the expeditionaries were ready to push northward. On July 1, they left Bucareli Bay and after sixteen days of continuous navigation through the open ocean, they saw the very high mountain of San Eliás (Mt. St. Elias, 18,008 ft.).

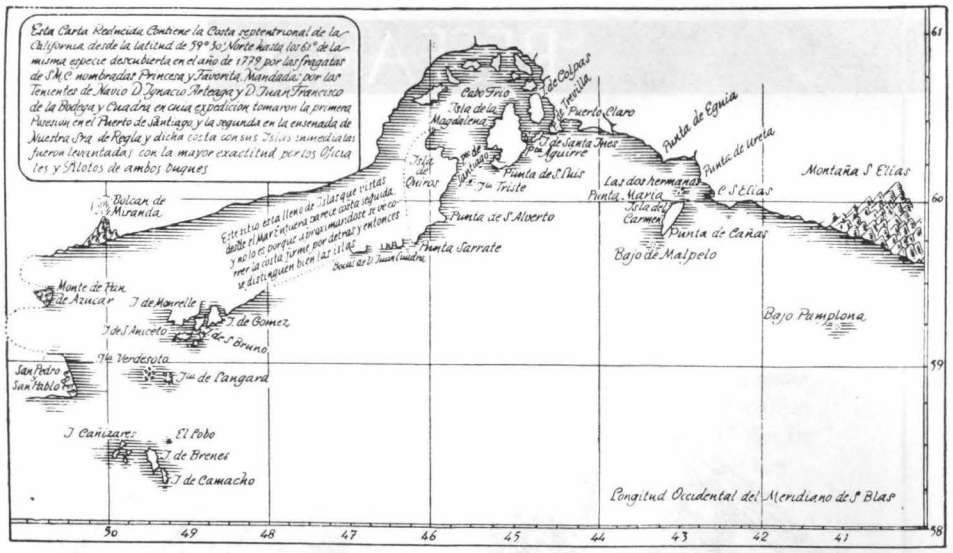
The ships arrived at an island which was named Nuestra Señora del Carmen (Our Lady of Carmel) and just north of there, they found many welcoming ports surrounded by beautiful meadows and wooded hills—a big contrast with the snow covered mountains in the background. This same island had probably been sighted by Vitus Bering, thirty-eight years earlier, and named St. Elias. Russians later renamed it Kayak because of its shape.

The two frigates were near the coast, close by today's city of Cordova, when two canoes of what may be the first Eskimos met by the Spaniards came by. Pulling out the copper barbs of their arrows, the Natives gave them to the explorers as a sign of peace. The Natives were invited aboard and given the customary bagatelles. In return, the Spaniards were encouraged to come inland.

Bodega went to explore the bay for several days, but finding many currents, mudflats and rocks, he returned to the frigates. The many fiords, bays and islands of this *terra incognita* were posing such difficulties to the expedition that the best pilot engineers had to combine their efforts.

While José Cañizares and Juan Pantoja y Arriaga led an exploration, Arteaga and his crew took the *Favorita's* launch one morning at eight and came ashore in a little port to take official possession of the land. The place was named Puerto Santiago, honoring the patron saint of Spain, St. James, whose feast day was celebrated on that day, July 25.

Today the whole area bears the name of Prince William, given it by



A detailed map of Prince William Sound from the Bodega y Quadra expedition of 1779. At left, Suria's portrait of a young Nootka woman.

Captain Cook. The Spaniards named Hinchinbrook Island Santa Magadalena and its northern cape, Cabo Frío (Cold).

The day after the pilots returned, the staff majors had an important meeting to decide whether to continue or stop the exploration. Many were sick with scurvy and all their search for the great passage of Ferrer Maldonado through the northwest had proven fruitless. The Russian charts had indicated one, but there was none to be found anywhere.

It was decided to push west, remaining close enough to the coast to see any passage that might appear. They saw more and more islands (probably the Chugach Islands group) on the right hand side, which they believed to be the mainland until barges were sent out to explore.

The first day of August they rounded the southern tip of the Kenai Peninsula, and thinking it was just another island, they named it Isla Nuestra Señora de la Regla (Our Lady of the Rule).

Sixteen miles south of Seldovia, most of the Spaniards came ashore: commander Bodega; the second captain of the *Princesa*, Fernando de Quirós y Miranda; the chaplains of the two frigates; all the officers and their troops; and part of the sailors. Since the expedition's general commander was bedridden, Bodega took official possession of the land for Spain, naming it Ensenada de la Regla (Sound of the Rule).

The following morning was a very clear day and they could see an erupting volcano on the west. What today we know as Iliamna, they called Bolcán Miranda, honoring the second captain of the *Princesa*.

The Russian captain, M.D. Tebenkov, confirms that the volano was in eruption around 1779. Bodega surmised that the land of the volcano was part of the continent and not just another island, as claimed by two sailors who had climbed one of the island mountains.

The Spaniards report seeing a few Indians during the following days, but none came to the boats. The expedition had reached the 152nd meridian going west and still had not found any trace of Russians. After their detailed study of the land, they had confirmed the inexactitudes of the Russian charts which indicated a passage through the north of the continent.

Arteaga, the chief commander, gave the order to return to Mexico. His ship, the *Princesa* had lost eight men to scurvy. Bodega's crew was not sick and he writes: "I wanted to continue westward for a few more days." On August 7 at 7:00 p.m., the ships took leave of Kenai and three weeks later they were in San Francisco.

Author's note: The sources for this material are too many to be detailed here, but I will indicate a few: "Diario de Fray Thomas de la Peña y Saravia, 28 de agosto 1774,"; "Diario de Fray Juan Crespi Cos del viaje a las costas del Norte hasta los 60 grados, 5 de octubre, 1774," (both in the Museo Naval de Madrid); Coleccion de diarios y Relaciones para la historia de los viajes y descubrimientos, *II, VI, Madrid:CSIC, 1944; Javier Ybarra y Berge,* De California a Alaska, *Madrid, 1945; R. Barreiro-Meiro, (ed.)* Esteban Jose Martinez (1742-1798), *Madrid:Instituto de la Marina, 1964;* Exploration in Alaska, Captain Cook Commemorative Lectures, June-November 1978, *"Russians, Indians, and Passages: Spanish Voyages to Alaska in the Eighteenth Century," by Christon I. Archer, Cook Inlet Historical Society, Anchorage, Alaska, 1980.*

Editor's Note: Arsenio Rey-Tejerina is a professor of foreign languages at the University of Alaska, Anchorage, where he started the Department of Foreign Languages. He was born and raised in Spain and has spent the last twenty years in the United States. He earned a doctorate in Hispanic Literature at New York University in 1974 and also lived in the Southwest before coming to Alaska in 1981.

L. NAKASHIMA

Naval Arctic Research Laboratory personnel erect a tent frame for an experiment in 1974. The government closed the facility in 1980.

Legislation and UA Foundation project focus on arctic research policies

The importance of arctic research to Alaska's economic future and the quality of life for its residents is reflected in two current efforts with similar goals.

In the U.S. Congress, Senator Frank Murkowski has spearheaded a drive to pass legislation which will establish a federal arctic research policy and a mechanism for funding research.

In Alaska, the University of Alaska Foundation is asking people throughout the state to help create a framework for a coordinated research program on the special challenges of the high latitudes.

The rapid acceleration of developmental activity in Alaska, and throughout the high latitudes, has brought into focus a wide spectrum of scientific challenges. But, compared with other fields, arctic science is in its infancy.

Policies on arctic research have been established by all polar nations, except the United States. In February, Murkowski reintroduced the Arctic Research and Policy Act, a bill which was unanimously reported out of the Governmental Affairs Committee last year and which unanimously passed the Senate late in the 97th Congress. The current Arctic Research Bill, S.373, would create an Arctic Science Policy Council and an Arctic Research Commission to create and implement a comprehensive policy on Arctic research. Representative Don Young has introduced the measure in the House of Representatives.

"It is a sad but true fact that the U.S. is the only polar nation without a coordinated effort to conduct necessary scientific research in the Arctic," Murkowski said. "It is important to note that we do conduct such an effort in the Antarctic, where a comprehensive policy guides research efforts in order that inefficiencies and duplication will not occur. Why do we bother to plan and coordinate our federal scientific effort in the Antarctic, while we fail to do so in the Arctic, where vast American energy resources exist and U.S. citizens live?"

In June 1982, the Foundation trustees took up the cause of arctic research in Alaska. The initial target was to build a constituency among future-oriented Alaskans, and the hope was that Alaskans from communities throughout the state would participate.

Paul Gavora, Tom Miklautsch and former University of Alaska President William Wood, all of Fairbanks, committed themselves to the task and began soliciting community involvement and financial contributions in the interior. In six months, they had enlisted 185 Alaskans who agreed to each donate or pledge $1,000 as seed money for the Foundation's Arctic Research Program. Their $200,000 goal will soon be reached.

In early 1983, Attorney John Hughes, Foundation Board Chairman, and Bill Scott, partner of Peat, Marwick, Mitchell & Co., began a similar campaign in the southcentral area. To date, about half of the Foundation's $500,000 goal has been met in donations and pledges.

"We're asking our friends and all citizens who share a vision for Alaska's future to invest in this project," said Scott. "There may be nothing in it for us as individuals,

but Alaska will benefit. So will our children. And so will America as a whole."

During 1983-1984, these initial contributions will be used to determine the scope of past research in various areas and to identify current research needs. An experienced scientific administrator with national credentials will be hired as project director.

There are many obvious and less well-known areas where further research is needed. For example: the impact of oil development on subsistence and commercial fishing; questions related to permafrost the mitigation of ice fog; affects of polar upper atmosphere disturbances on northern communications and weaponry; sea-ice forecasting; and pollutant dispersion in ice-bearing soils and seas.

A task force of scientists (who understand the procedures, standards and ethics necessary to ensure reliable research results) and Alaskans from the private sector who are involved in research applications, will assist in this task of assessing research needs.

"We want to provide access to current and comprehensive information on what research has been conducted in the past, by private and public agencies, and where the gaps are," said Dixie Brown, executive director of the Foundation.

"The objective of the project is to promote a consistent program of arctic, polar and high latitude scientific research which will complement existing research efforts."

"What you are doing dovetails perfectly with the legislation we are working on in Washington, D.C.," said Murkowski in a letter to Scott last February. "The fact that individual Alaskans are pledging their support and their dollars to Arctic research tells a powerful story. It illustrates that people are personally dedicated to solving the challenges of increased human activity and research development in the high latitudes, not just for the good of Alaska, but for the nation as a whole."

In Alaska, various research institutes have been created since statehood. An integral part of the University of Alaska program, several have earned national and international recognition for the quality of their faculty and their work.

But research in the northern latitudes has been conducted by hundreds of private businesses, governmental agencies and educational institutions home-based outside of Alaska. Over the years, research study teams have been formed and then disbanded, and valuable data has been lost. The recent closing of the Navy's Arctic Research Laboratory at Barrow was also a major set-back.

"The current situation in and of itself troubles me greatly; but it is even more troubling in light of the fact that the Soviet Union is engaged in a massive effort to study the Arctic and its potential from a strategic and economic point of view. We are lagging behind," Murkowski said. "Across the Bering Strait thousands of Soviet scientists are moving toward the consolidation of Soviet defense systems. They are rapidly developing new technologies to produce oil, gas and strategic minerals in the Arctic regions. They are also developing and integrating their Arctic transportation systems.

"Testimony received. . . by the Senate Governmental Affairs Committee indicated that the Soviets have 20,000 to 25,000 scientists engaged in Arctic research;. . .(their) naval fleet includes 37 Arctic research vessels and 19 ice breakers. In contrast, the U.S. has no Arctic research vessel and the five ice breakers in the fleet are rarely used for research."

Murkowski said that the Arctic Research Bill would create an Arctic Science Policy Council and an Arctic Research Commission to create and implement a comprehensive Arctic science policy.

The council, composed of five Presidential appointees representing state and federal government interests, would develop an integrated Arctic science policy and facilitate cooperation between the U.S. government, state and local entities.

The nine-member Arctic Research Commission, selected by the Council from scientists, Arctic residents and industry representatives, would survey existing research programs and identify research needs. It would then grant money for relevant research. They would also create an Arctic Information and Data Retrieval Center to become a central clearinghouse for federal research data.

Doreen Fitzgerald

Anthropologist to visit Japan

Wallace Olson, University of Alaska, Juneau professor of anthropology, will be working in Japan later this year on a project that could bring far-reaching changes in the Southeast Alaskan mariculture industry.

Olson will spend a six-month sabbatical leave on a working-

RESEARCH

learning tour of Minamikayabe, one of Japan's largest seaweed farming communities. What he learns could help determine the viability of such an industry in Southeast Alaska.

"There is an increasing need for economic expansion and diversification in our area," he said. "Salmon fishing only provides a seasonal income for a part of our population, and even this, through limited entry, is decreasing as a source of income for many people.

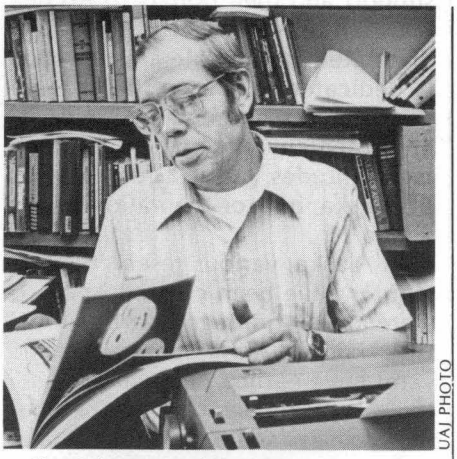
"The people of Minamikayabe farm the kombu seaweed, a staple of the Japanese economy and diet, "like we in America grow corn," said Olson. Kombu is one of the 2,000 species of seaweed that grows abundantly in the waters of Southeast.

the two communities, Juneau and Minamikayabe, are remarkably similar, according to Olson. They share a common climate and geography and respect for the sea as a source for local industry.

Minamikayabe, on the northernmost island of Japan, is a fishing village spread along the coast for about eleven miles. It has a population of about 11,000 and is one of the few villages in Japan that has a community college. The mayor of Minamikaybe has been a visitor to Juneau and he extended the invitation to Olson to visit Japan.

During his tour, which has taken two years of planning, Olson will study the social, cultural and economic factors of growing seaweed as a commercial industry.

"If it proves, at some point, to be something that could be done in Alaska and it's something that will be looked into seriously, I would have some knowledge of what's involved," said Olson. "Right now I don't know if it if viable. We have to gather a lot more information about what's involved—pay rates, harvesting schedules, labor and so forth."



UAI PHOTO

Wallace Olson to study Japanese community.

Olsen said that the development of such industries as mariculture and seaweed farming apparently require certain social and cultural patterns to be successful. Over 2,700 articles have been published on the modernization of fishing communities and these reports conclude that about 90 percent of the failures of modernization projects can be traced to a lack of understanding of the social and cultural factors involved, according to Olson.

"My research would consist of the traditional anthropological understanding through participant observation. Through living in a community which is famous for its seaweed industry, I will attempt to determine factors necessary for such an industry to be successful."

He said the Japanese have diversified their use of the seas and coastal waters and have developed entire new industries and markets for sea products.

"But because of human and industrial pollution, they have had to import many products, including seaweed. We have the potential for growing these products in this area The market for such products is available in Japan and, perhaps in the future, Americans and others may increase their use of seaweed in the daily diet."

To grow kombu, seeds are implanted on long ropes anchored in the water. Once every two years, the ropes are pulled up and the kombu is dried on the beaches. It can then be shredded, used like instant potatoes, or served in salads.

"Seaweed is a very nourishing food. One reason why we aren't as advanced in developing this industry is because we don't use seaweed in our diets. We don't do that because we haven't been pushed, not like the Japanese people."

Olson, who teaches several courses in anthropology, linguistics and philosophy, will be studying more than the seaweed industry while in Japan.

"The key to successful anthropological understanding is experience in a variety of different cultures. For nearly twenty years all of my experience has been with the Native people of Alaska. This has provided me with a wealth of information and knowledge of this area. But for more successful teaching, it would be valuable for me to have at least six months of living and studying in a totally different cultural context."

As his hosts have requested, Olsen plans to become certified as a teacher in Japan so he can teach English in the village school system, a role which will make him

a participant in the community, as well as observer.

"The interesting thing about Japanese is that the language itself reflects a highly sensitive awareness of social relationships far beyond what is found in English. Social linguistics is a major aspect of modern linguistic studies. To really put the language together with the social context, one must actually participate in the society and the culture to a certain extent. I hope that in six months I will be able to have a better understanding of the Japanese language and of the social-cultural context in which it is used."

Olson, who also teaches comparative religion, will have the opportunity to study two of Japan's major religions, Buddhism and Shinto. Yoji Endo, a UAJ student from Japan, has arranged for Olson to contact leaders of one Buddhist sect to increase his understanding of that religion. Endo was also instrumental in the translation of much of the correspondence between Olson and Japanese officials.

Olson, who holds degrees in history and anthropology, will also take time to study Japanese history. "Hopefully, as one outgrowth of this trip, we will be able to offer a basic introductory course in Japanse culture so Americans, and especially Alaskans, can better understand the cultural base from which the Japanese operate."

Olson admits he is packing a lot into the trip.

"One of the problems with a project like this is that sometimes it can take two months or more to gain entrance and be accepted within the social structure, (but) I don't think it will happen in this case."

The mayor of Minamikayabe has planned a reception when Olson arrives, and has invited the whole town, all 11,000 people. "Judging from the influence the mayor has on his community, I think most of the people will be there," said Olson.

Don Frey
UAJ Information Services

Institute creates new tool for marine research

Scientists who study the oceans will find it easier to collect information using a new, portable tool developed at the University of Alaska's Institute of Marine Science.

The STD (salinity, temperature, depth) data collection system can operate in areas that were previously inaccessable to large oceanographic vessels. The instrument is self-contained and battery operated so it can be deployed from a small boat, or even a helicopter, using a small winch.

It was designed and built to allow scientists to gather a depth profile of salinity and temperature. Many sets of these depth profiles taken at different locations provide a comprehensive picture of chemical and physical conditions in the area of the ocean being studied.

One area may be compared with another, or the data may be integrated with other types of information. The goal of such research is to improve our understanding of the physical and biological processes taking place in the ocean environments which provide so much of the world's food and other resources.

The STD data are read out using a Hewlett-Packard HP-85 mini computer. Computer programs have been developed for this purpose which are human-interactive, or friendly, meaning that no special computer expertise is needed by the operator.

To use the system, the operator starts it from the computer keyboard, storing pertinent station data and selecting the desired mode of operation. Required operations are prompted by the computer. Incorrect operations are flagged and correct inputs requested from the user.

Once started, the STD is disconnected from the computer and deployed overboard by winch

UAF PHOTO

Computers used to gather information on ocean waters.

cable. It can operate without electrical connection to the surface vessel because it has an internal microprocessor and is capable of using its decision-making capability to perform the function of internal controller during a cast. Communication with the device is

reestablished when it is retrieved from the water.

The STD is able to determine the start and end points of a cast—it *knows* when to begin and stop recording information. Only useful data are recorded, eliminating long computer readout cycles. For a 200-meter cast, the data turnaround time is about seven minutes after the unit is back on deck.

The need to carry along a computer is eliminated because the STD can be deployed in a succession of casts without additional communication. For example, sixteen 500-meter casts could be accomplished in this way. The instrument automatically generates a new station number for each cast, allowing data readout at a later time.

The computer system's main function, besides initializing the STD for a cast, is to provide a means for retrieving, logging and checking the measurements taken. Data are presently archived on an HP-85 tape cartridge. After the data is retrieved, an abbreviated listing of the information is provided to satisfy the user that the unit is functioning correctly and to provide preliminary information on the profile. A detalied, one-meter listing may also be requested.

The STD is currently being used to support various IMS research projects. Its electronic and mechanical system was designed and built by Gil Mimken, support engineer at IMS. Former IMS data processing supervisor Cydney Hansen developed the software for the computer. David Nebert, IMS oceanographer provided oceanographic consultation for the project.

This report was adapted from an article in Institute of Marine Science Notes, *a quarterly newsletter on IMS research activities. To request the newsletter, write IMS Notes, Institute of Marine Science, University of Alaska, Fairbanks AK 99701.*

Scientists use sound to study ocean environments and marine life

Acoustics is a branch of marine science that deals with the generation, propagation and reception of energy in the form of sound waves in the sea.

Practical use of the study of underwater sound began after the turn of the century. Today, acoustics is applied in many areas of marine science as researchers use electronic listening devices to probe the depths of the sea.

Bathymetry (measuring the depth of the sea) is accomplished using echo sounders. They emit pulses of sound which are reflected off distant objects. Sonar equipment can be aimed and tuned and is used, for example, to detect submarines.

Acoustic devices are also used to locate schools of fish and to study the distribution and amount of plankton—small plants and animals on which the ocean food chain is based. This information is important to understanding and maintaining fisheries resources.

Acoustics is used to probe the sediments on the sea bottom to increase basic understanding of the oceans and for mineral exloration. Acoustic techniques are also used to position drilling platforms at sea.

The behavior of marine life is studied by listening to the sounds made by marine organisms and by studying the effect of natural and man made sounds.

Research in this area is being conducted by scientists at the University of Alaska's Institute of Marine Science. Marine mammals such as whales and seals produce sounds to communicate and some species use sound to produce echos which are used to locate food.

This report was adapted from a script by John Kelley, associate professor at the Institute of Marine Science. It was prepared for "I Didn't Know That," a series of short radio programs on science topics which is is distributed on request to stations throughout the state. For more information contact UAF Public Affairs Director Karen Cedzo, 7th Floor Gruening Building, University of Alaska, Fairbanks 99701 or call (907) 474-7581.

The world's toughest environment for oil exploration

While the search for oil in northern Alaska continues on land and has led to the development of the Kuparuk Field west of Prudhoe Bay and to exploratory drilling in the National Petroleum Reserve-Alaska, much of the action is now moving offshore into the ice-covered ocean.

This is where the prospects for finding oil are high and where a recent federal lease sale netted almost two billion dollars in bonus bids from oil companies, allowing

them to drill for oil on the tracts they acquired.

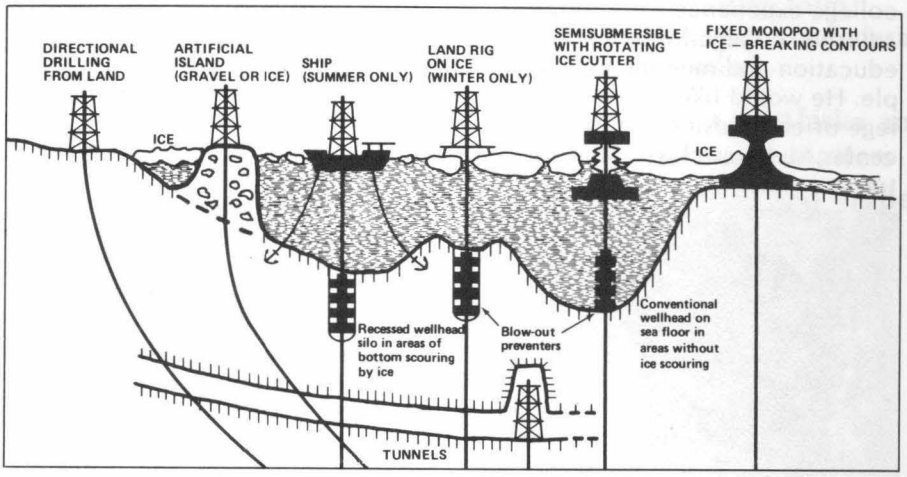
This is also one of the toughest environments on earth in which to look for, or extract, oil—an area where moving sea ice and permafrost under the ocean floor pose serious problems to man-made drilling platforms and pipelines, requiring the development and use of entirely new technologies.

The sea ice in the Artic Ocean is not stationary, but is moved about by winds, currents and tides. It can be thrown up into giant pressure ridges that may reach 20—30 feet high, and at the same time, extend 50 feet or more below the ocean surface.

When the ice buckles and is deformed into ridges and large fields of ice rubble, gaps (so-called leads) open in the ice and make it impossible for vehicles to move over the ice.

The ice ridges and icebergs (so-called ice islands) which in some years come floating to the Alaskan coast from the high Canadian Arctic can exert tremendous forces on drilling structures. They can also plough along the ocean floor, making gouges over six feet deep, which could damage buried pipelines between offshore drilling platforms and the shore. The ground at some depth below the ocean is permanently frozen, and pipelines cannot be buried too deeply because the hot oil would melt this permafrost.

A cooperative program among scientists at the Univeristy of Alaska's Geophysical Institute, the petroleum industry and the federal government has studied for over a decade the problems posed to offshore oil development by sea ice and subsea permafrost.



Offshore drilling methods for the Arctic.

Professor William Stringer has supervised remote sensing by satellites to show where and when ice ridging and open water occur from year to year. Aircraft flights have determined where the ice is likely to override the shore. Professors Lew Shapiro, William Sackinger and Dr. Jerry Johnson have been measuring the forces of the ice around drilling islands and at other locations, and the strength of the ice itself.

Ice movement and deformation have been studied by radar, which "sees" the minute-by-minute movement of individual pieces of ice. Professors Tom Osterkamp, Will Harrison and John Morack have studied the permafrost under the ocean—its depth, thickness and properties—by drilling, probing and using methods adapted from earthquake studies.

All of these studies are important in helping to design better and safer structures to get the oil out from under the ocean. Some of the presently used and proposed drilling methods are illustrated in the drawing above.

The three on the left have already been used in Alaska and the land rig on ice has been used in the high Canadian Arctic. Semisubmersibles with rotating ice cutters and tunnels are not likely to be economical soon, but there are several designs on the drawing boards of the type illustrated on the right, and we are likely to see some of these in action before the end of the decade.

Oil is presently the major economic resource in Alaska. Research is helping to determine the most safe and environmentally acceptable means of extracting oil from the ground. Studies of the kind described here, which are carried out cooperatively by the oil industry, universities and the federal government, can contribute to a better future for the state.

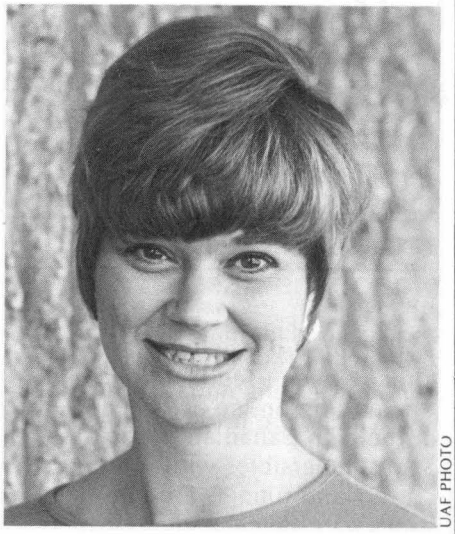
This article was adapted from The Geophysical Institute Quarterly, *a newsletter which discusses research activities of the institute. To receive the publication, write Geophysical Institute, University of Alaska, C.T. Elvey Building, Fairbanks, AK 99701.*

COMMENT

continued from 19

Alaska, he has no doubt about his first objective—"Settle their Political Disputes!. They work for the people of the community, and this should be their first priority."

He said the best things about his college experience were the peer advisors, college life in general, the education and meeting new people. He would like to see the college offer "housing, a sports center, summer classes and an intercom system."



UAF PHOTO

Fran Hove

At the University of Alaska, Fairbanks, Fran Hove was named Outstanding Graduating Senior Woman this spring. She graduated with a double major in secondary education and journalism.

Her early work experience is one of the reasons she chose to major in secondary education with an emphasis on business administration. Having worked for many years as a secretary, she said she's learned the importance of a well organized office.

"Women are often found in secretarial or back-up positions. Very rarely is their work appreciated. People in secretarial positions are often looked down upon, but they are the ones who get the work done."

Her journalism major came about because she really loves to write. "If I were starting out in college and was fresh out of high school, I'd major in journalism and get experience as a reporter. Beginning college after you're married and have one child, however, changes your priorities. You can't afford to work for the low beginning salaries that newspapers or television stations offer," she said.

As far as any changes or improvements in the university system, she said, "It is important for Native students to study areas besides their Native culture. They are the ones who will be running their state in the future and they must be prepared to deal in the wider world."

Hove said the best thing about her academic experience is the teachers. "Two professors have been a major influence, Dean Gottehrer in journalism, and Tony Strong in Native studies. They know their fields. Gottehrer was an editor, and Strong is a lawyer."

The exposure to students of many ages was also a plus for Hove. "In one class we had people from 18 to 65. It was wonderful to share the different viewpoints that age gives."

She sees education, and a well educated populace as most important in dealing with the issues and questions facing the state, and she expressed concern about the shrinking dollars in state education.

"It isn't just because I come from a family of teachers and myself plan to teach that I believe education is very important. There is no other way to solve the problems in the state, nation or world without education."

After a summer vacation Hove plans to teach in Fairbanks and to later pursue a master's degree in counseling. She credits her husband, Hank Hove, for making it possible for her to complete her undergraduate degree in three years.

A career Navy man, Bill Bridges began life in Linden, Indiana but after 18 years in the service, he finds it difficult to name a home town. The 37-year-old Navy First Class construction electrician thinks his final duty station will be in Florida, but he said he likes Alaskan life and would like to return, if his wife, Lynn, is willing.

He graduated after taking eighteen credits at the University of Alaska's Adak Extension Center. Part of his college credits came from evaluation of his military schools, but while he was stationed in Ohio five years ago, he made up his mind to go back to school, and since then has been making use of all opportunities—taking classes on shipboard and at Diego Garcia. He said he only regrets not having started sooner. "Don't wait to get on a big campus," he said, urging others to make use of extension centers.

A student who enjoys studying, Bridges particularly likes the new video tape courses he has taken at Adak. He and Lynn enrolled in Introduction to Humanities, a video taped course, and enjoyed it so much they signed up of Psychology 245, The Growing Years. They and their two daughters, aged 7 and 11, watched the tapes, talked them over and are now shopping for more they can share.

He said that even more important than the specific facts in a given course is the stimulation of new ideas and the broadening of views which make you better able to cope.

Bridges believes the future can only get better with more education. After retiring, he plans to get a degree in vocational education so he can help others learn. He credits his instructors' enthusiasm for their fields for his desire to expand his knowledge within those areas.

He said he hopes that education will continue to be available to all, whenever and wherever they decide they want to learn, and he favors the open door policy and credit for prior learning.

University of Alaska Magazine
Room 2 Bunnell Building
University of Alaska
Fairbanks AK 99701

Non-profit
Organization
U.S. Postage
PAID
Permit No. 2
Fairbanks AK
99701