Exxon Valdez Oil Spill
Restoration Project Annual Report

Kodiak Archipelago Youth Area Watch

Restoration Project 01610
Annual Report

This annual report has been prepared for peer review as part of the *Exxon Valdez* Oil Spill Trustee Council restoration program for the purpose of assessing project progress. Peer review comments have not been addressed in this annual report.

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June 2001

Kodiak Archipelago Youth Area Watch

Restoration Project 01610
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Study History: This project was initiated in 1998 by the Chugach Regional Resources Commission as they established outreach to communities on the Kodiak Archipelago. The local school district played an important role in facilitating communication to outlying villages and Tribal Councils through student intern involvement and student intern reporting to the communities involved. Restoration Project 00610 created the Kodiak Archipelago's Youth Area Watch. Restoration Project 01610 was the second phase of this effort to engage the youth and communities of the Kodiak Archipelago in the oil spill restoration efforts through monitoring, observation, documentation and testing of a variety of environmental factors.

Abstract: The Kodiak Island Borough School District expanded the Kodiak Archipelago's Youth Area Watch in two additional communities, Port Lions and Chiniak. Students, site coordinators, scientists, and the project coordinator in Kodiak continue to work together to gather and report information to communities with regards to oceanographic monitoring, beach monitoring, sea mammal observations, PSP and algal blooms, harbor seal bio-sampling, and the value of traditional ecological knowledge to western science. Training opportunities continued throughout the school year so that all involved could improve their technical skills while collaborating through the established island-wide network.

Key Words: Community involvement, harbor seal, Kodiak Archipelago, monitoring, observations, students, traditional ecological knowledge.

Project Data: (will be addressed in the final report)

Citation:

Schneider, T., and S.L. Ward. 2001. Kodiak Archipelago youth area watch, *Exxon Valdez* Oil Spill Restoration Project Annual Report (Restoration Project 01610), Alaska Department of Fish and Game, Habitat and Restoration Division, Anchorage, Alaska.

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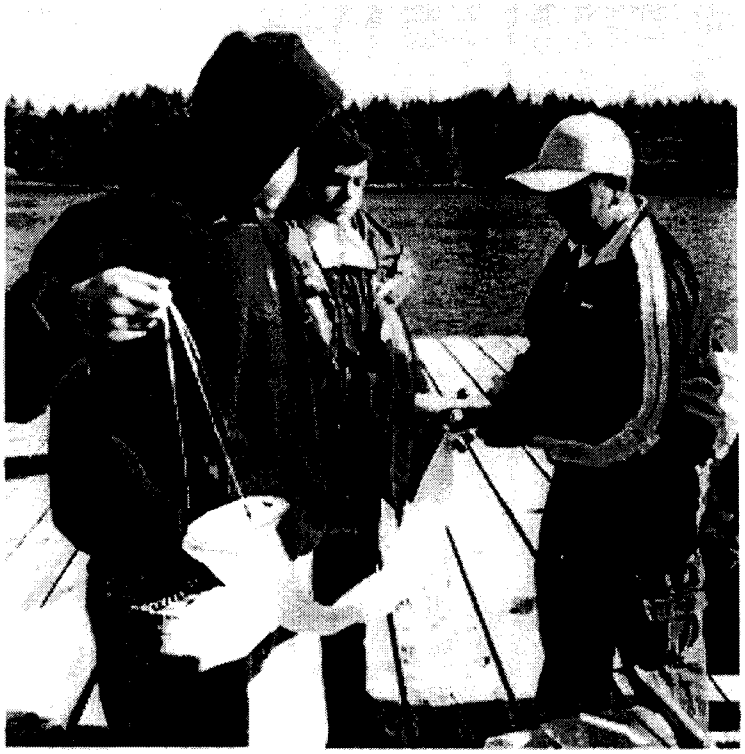
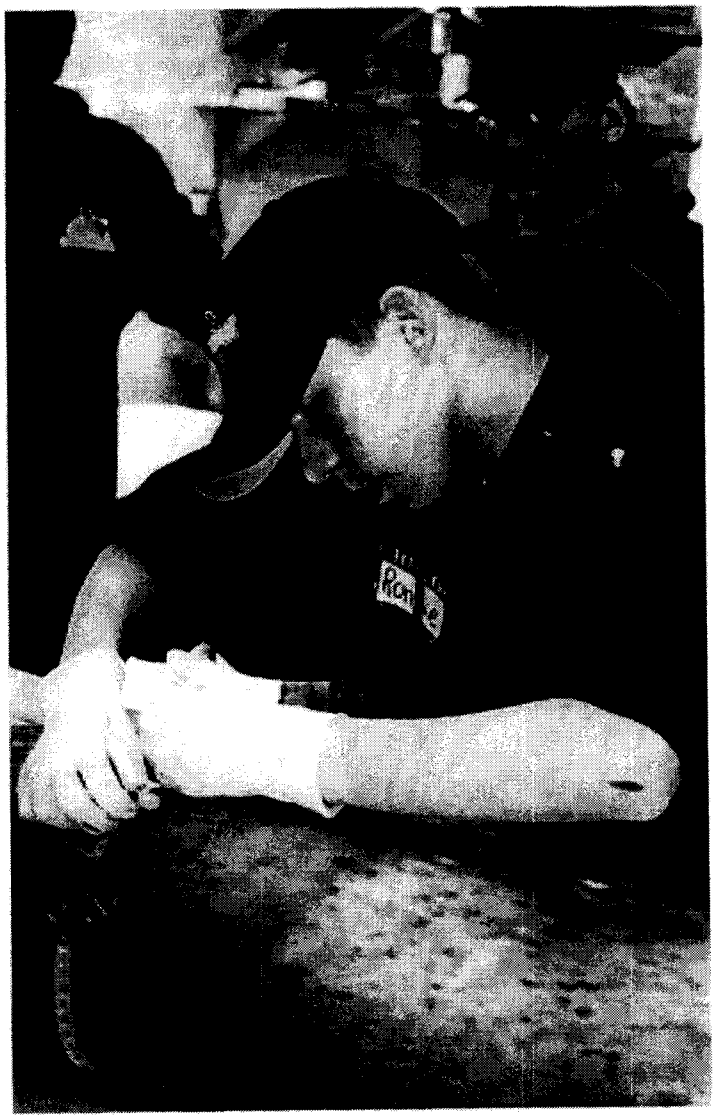
Figures:

Port Lions students prepare to take algae sample, while Ouzinkie student looks on during Kodiak training.



UAF's Dr. Brian Himelbloom of the Fisheries Industrial Technology Center assists students in identifying algae present in Kodiak's Trident Basin.



Old Harbor student measures the girth of a harbor seal while a hunter watches the technique.

A Port Lions student takes a bit of the blubber from this harbor seal to add to the samples that will be dispersed to various scientists for further study. Hunter, John Boone, assists while the student's partners take notes.

Appendices: KAYAW Data Sheet (3-15-00) designed by Dr. Brian Himelbloom; KAYAW Data Sheet (revised 5-18-01 by Dr. Brian Himelbloom and Carla Lam); KAYAW defined goals, objectives, Alaska Content Standards, Alaska Standards for Culturally Responsive Schools; Marine Station Inventory List; Description of the KAYAW Capelin and Pacific Sandlance Beach Utilization study by Susan Payne.

Introduction: The Youth Area Watch program instituted in the Prince William Sound and lower Cook Inlet has been one of the most popular and supported projects that the Trustee Council has implemented. During the spring of 1998 Kodiak Island Borough School District personnel and Chugach Regional Resources Commission personnel began to discuss the development of a "Kodiak Youth Area Watch" so that this successful program might impact more of the *Exxon Valdez* oil spill affected region.

The KAYAW participants are committed to assisting in the restoration of the spill area through the collection of samples and data for research projects. Participants also understand the need to establish baseline data from each of the outlying communities of the Kodiak Archipelago for use in future studies of the region and for a better long term understanding of their environment. This project involves youth, mostly Alaska Native youth, in science through hands on, experiential education that makes sense both culturally and academically.

Objectives: Students participating in the Kodiak Archipelago Youth Area Watch worked during the 2000-2001 school year to accomplish the following objectives:

1. Interact with community members, researchers and project staff.
2. Conduct research in the four identified projects.
3. Identify and conduct research on at least one local science project.
4. Complete training regarding the scientific research and documentation.
5. Report to local entities with regards to research procedures and findings.
6. Participate in the Kodiak Rural Science Fair and/or the Academy of Elders/Science Camp.
7. Pursue careers and other training in the fields related to marine science.

The KIBSD Project Coordinator and the Community Development Director for the Chugach Regional Resources Commission met the following objectives during the 2000-2001 school year:

1. Updated the MOA between CRRC and KIBSD.
2. Oriented researchers on working with students and community members.
3. Purchased additional monitoring equipment for project expansion.
4. Completed on site and distance training and coordination with site coordinators.
5. Conducted school orientations for students in KAYAW.
6. Invited site coordinators, researchers and students to the science camp.
7. Coordinated student research, documentation and efforts to share information with communities.
8. Submitted proposal for 02610 for continued funding.

9. Educated Tribal Councils of the efforts of the KAYAW and coordinated opportunities for collaboration between school projects and community projects.
10. Acted as liaison between community Elders and students in the effort to document traditional ecological knowledge.

Methods, Results and Discussion: Teri Schneider of the Kodiak Island Borough School District is the primary project coordinator for the KAYAW. The Chugach Regional Resources Commission's Office Assistant assisted to coordinate some of the travel and expenditures. The KIBSD coordinator utilized email, telephone and personal site visits to coordinate activities and research with site coordinators, tribal councils, community members, scientists and school staff.

Dr. Brian Himelbloom has been vital in providing training, acting as liaison between the Jellet Biotek team and KAYAW participants, and helping to define more clearly the objectives and reporting procedures for our students and site coordinators. Dr. Himelbloom also served as a science judge for the Rural Science Fair and has coached participants to improve projects for future competitions. He is now working to support an island-wide student team to compete in the National Ocean Science Bowl. It is an additional goal of KAYAW to have some of our students participate in this event.

The participating school sites were selected based on their interest and commitment to the project (Ouzinkie, Old Harbor, Akhiok, Port Lions, Chiniak, and Kodiak Alternative High School). Larsen Bay and Karluk were not involved this year because of their limited number of high school students (2), and the need for greater teacher/community involvement than what was able to be given based on their unique circumstances. Research in the communities of Ouzinkie, Old Harbor and Kodiak continued from the previous season at the beginning of the school year. Port Lions and Chiniak began their work during the late winter months after training was provided.

Each of the site coordinators are school teachers who have made the KAYAW activities a part of what students do for credit in science (research procedures and data collection), social studies (documentation of oral histories) and, language arts (reporting, writing, technical reading/writing and, interviewing). KAYAW projects prompted the District science curriculum review team to take a serious look at "place based" science as a basis for how it will define what we do in our District. The entire rural school's curriculum was redesigned to integrate such "real" research into future work of all students of science in the outlying sites. The alternative high school in Kodiak adopted this same science curriculum.

All of the coordinated projects (field testing the PSP kit, bio-sampling, and oceanographic monitoring) took place geographically close to each of the communities. Each site coordinator determined field schedules with involved community members and other school staff members. Two harbor seal bio-sampling training took place: one in Kodiak and one in Old Harbor. A maximum number of participants (students and hunters) were present both times. No contracted vessels were needed throughout the

school year as each site was able to adequately access the ocean from docks. Summertime work during science camp will require a contract vessel.

Weekly oceanographic monitoring, sea mammal sightings, land animal sightings and behaviors are noted, and weather is observed. Students share and discuss the gathered information with community members and Elders. The information is sometimes graphed and displayed at the local post office or tribal office building. Seal bio-sampling continues to take place throughout the year when locals harvest animals. Clams are collected for testing the PSP test kit during extreme tides and when families harvest them for personal use.

Because of the delayed funding of the KAYAW from CRRC to KIBSD, an early training opportunity did not take place in Kodiak at the Community College. Instead, a redesigned training took place in March during the Rural Schools In-service in Port Lions. This also served as an orientation for teachers who are new to the District and are interested in having KAYAW active in their community. Additional training for site coordinators, community members and students took place throughout the school year.

Unfortunately, coordination between Dr. Gerry Plumley's Algae PSP Testing project and KAYAW was not successful beyond the initial contact and training that took place during the 1999-2000 school year. Research directly related to this project did not take place.

Many of the sites identified at least one other research topic as a long term project that will be further developed and carried out throughout the next school year. These site coordinators received additional funds through grants they wrote themselves to purchase support materials to implement their plans. The following are the projects identified by students and site coordinators in each participating community:

1. Old Harbor-Development of an inter-tidal invertebrate saltwater aquarium for closer observation opportunities and the development of a coho salmon hatchery.
2. Ouzinkie-Development of a salmon hatchery. (The site coordinator also wrote and received a grant for a microscope/video-PC viewer so that students will be able to study more effectively the algae and plankton that show up in their samples.)
3. Kodiak-Natural history study of northern Kodiak Island area during a three-day kayaking field trip.
4. Port Lions-The study of organic gardening using ocean kelp as a fertilizer.

In addition to the KAYAW identified projects and the additional site projects, each of the rural schools began to gather information that will lead to the development of "village histories." Included in this work is information on the geographic location and uniqueness of each site, its economy, government, recreation and population information. Students began the work of designing a website that would also support the KAYAW data collection, but ran into technical difficulties when the hardware in the rural schools would not support the software currently available to the District. Once again, the

development of the KAYAW website has been delayed for technical reasons out of control of the project coordinators.

Students from each site also participated in the training by Henry Huntington on the topic of Traditional Ecological Knowledge. This two and a half-day event led to the re-publication of *Illuani*, an oral history magazine published by the Kodiak Island Borough School District. Included in the magazine are interviews with local community Elders and others who shared information about the life and culture of the Kodiak Island area. Students from all of KIBSD's sites will continue to gather oral histories, focusing on the documentation of traditional ecological knowledge.

Conclusions: Though we had a difficult beginning, the 2000-01 KAYAW ended the school year successfully and will continue its work during the Academy of Elders/Science Camp at Afognak during the summer. Funding from this year' s budget will be utilized to implement a planning and training session for site coordinators, researchers, and the project coordinator early in the fall of 2001. The integration of KAYAW and other place based projects will continue to impact our rural school's curriculum and the choices that some of our students make in post-secondary training and career choice.

Acknowledgements: The authors would like to acknowledge each of the site coordinators: Charlie Powers, Old Harbor; Chad Pooler, Port Lions; Ned and Elaine Griffin, Chiniak; Mitch Simeonoff and Roy Rastopsoff, Akhiok; Marc Leinberger and Herman Squartsoff, Ouzinkie; and, Dave Allen, Kodiak Alternative High School. Without the coordination done at each site, KAYAW would not exist. Dr. Brian Himelbloom from UAF at the Fisheries Industrial Technology Center has been vital in acting as a liaison between the "world of science" and the "world of school." Carla Lam, Environmental Education Coordinator of the Kodiak Island Borough School District, worked diligently as a member of the science curriculum review team to re-design the rural science program to integrate KAYAW and other place based elements. Bill Hauser from the Alaska Department of Fish and Game has been an effective liaison between CRRC and EVOS. The authors are particularly thankful to the EVOS Trustee Council for funding KAYAW. Together, we are inspiring future Alaskan scientists.

KAYAW Data Sheet (for marine plankton monitoring)

Page _____

Marine Station _____ Latitude ____ ' " Longitude ____ ' " Date __/__/__ (m/d/y)

Weather _____

Previous tide ____ ft ____ m (meters) at ____ : ____ Next tide ____ ft ____ m (meters) at ____ : ____

Time sampling began ____ : ____ Time sampling ended ____ : ____

Plankton sample collected ____ ml (milliliters) from a tow of ____ cubic meters (cu. m) of sea water

Equations needed for the following:

Volume of the tow (V_T) in cu. m = pi x r x r x L *Equation 1*

where r is the radius of the net opening and L is the length towed in the water (vertically or horizontally)

Number of plankton per cu. m = $10 \times n \times V_s / V_T$ *Equation 2*

where n is the number of plankton counted per 0.1 ml using the microslide and field microscope, V_s is the volume collected in the plankton bottle (i.e., 50 ml) and V_T was calculated from the first equation

Solve the second equation by plugging in the values for: n, r and L

Phytoplankton present? _____ (yes or no) If yes, phytoplankton quantity? _____ (number per cu. m)

Alexandrium present? _____ (yes or no) If yes, *Alexandrium* quantity? _____ (number per cu. m)

Zooplankton present? _____ (yes or no) If yes, zooplankton quantity? _____ (number per cu. m)

Other marine observations _____

Data collected and entered by _____

bhh v.2 (05/18/2001)

KAYAW Data Sheet

Page _____

Marine Station _____ Latitude ____ ' " Longitude ____ ' " Date ____ / / ____ (m/d/y)

Weather _____

Animals observed _____

Previous tide ____ ft ____ m (meters) at ____ : ____ Next tide ____ ft ____ m (meters) at ____ : ____

Time sampling began ____ : ____ Time sampling ended ____ : ____

Water temperature at surface ____ °F (____ °C)
Salinity at surface ____ %
pH at surface ____
Dissolved oxygen at surface ____ ppm (parts per million)
Alkalinity at surface ____ ppm

Secchi disk depth ____ ft (____ m)

Water temperature at depth of ____ ft (____ m) was ____ °F (____ °C)
Salinity at depth ____ %
pH at depth ____
Dissolved oxygen at depth ____ ppm
Alkalinity at depth ____ ppm

Plankton sample collected ____ ml (milliliters) from a tow of ____ cubic meters of sea water

Alexandrium present? ____ (yes or no) *Alexandrium* abundance? ____ (few or many) *Alexandrium* quantity? ____ (number per cu. m)

Other marine observations _____

Data collected and entered by _____

bhh v.1 (03/15/00)

Kodiak Bay Watch

Kodiak Archipelago Youth Area Watch

GOAL: To form a cooperative exchange of information between scientists, schools and local communities in order to establish long-term data collection that will help explain localized events. Four projects will be implemented with each site selecting the projects they wish to be involved in. Projects include 1) oceanographic monitoring, 2) field testing of PSP test kit for subsistence use, 3) Harbor Seal biosampling, and 4) and algal PSP testing.

Objectives:

Students will:

1. develop a better understanding of the local land and water resources
2. become ethical and consistant collectors of scientific data
3. share their findings with the school, ASB, tribal council and EVOS

Alaska Content Standards:

Science-

A4. understand observable natural events such as tides, weather, seasons, and moon phases in terms of the structure and motion of the earth

A5. understand the strength and effects of forces of nature, including gravity and electromagnetic radiation

A9. understand the transfers and transformations of matter and energy that link living things and their physical environment, from molecules to ecosystems

A14. understand the interdependence between living things and their environments; that the living environment consists of individuals, populations, and communities; and that a small change in a portion of an environment may affect the entire environment

A15. use science to understand and describe the local environment

B1. use the processes of science; these processes include observing, controlling variables, developing models and theories, hypothesizing, predicting, and experimenting

B2. design and conduct scientific investigations using appropriate

instruments

B5. employ ethical standards, including unbiased data collection and factual reporting of results

C2. understand that scientific knowledge is validated by repeated specific experiments that conclude in similar results

C3. understand that society, culture, history, and environment affect the development of scientific knowledge

C5. understand that sharing scientific discoveries is important to influencing individuals and society and in advancing scientific knowledge

C7. understand that major scientific breakthroughs may link large amounts of knowledge, build upon the contributions of many scientists, and cross different lines of study

D2. understand that scientific innovations may affect our economy, safety, environment, health, and society and that these effects may be long or short term, positive or negative, and expected or unexpected

Language Arts-

D2. evaluate the validity, objectivity, reliability, and quality of information read, heard, and seen

Mathematics-

A4. represent, analyze, and use mathematical patterns, relations, and functions using methods such as tables, equations, and graphs

A6. collect, organize, analyze, interpret, represent, and formulate questions about data

Geography-

C1. analyze the operation of the earth's physical systems (ecosystems, climate systems, erosion systems, the water cycle, and tectonics)

C3. recognize the concepts used in studying environments and recognize the diversity and productivity of different regional environments

Technology-

A1. use a computer to enter and retrieve information

A2. use technological tools for learning, communications, and productivity

A3. use local and world-wide networks

C1. use technology to observe, analyze interpret, and draw conclusions

C3. create new knowledge by evaluating, combining, or extending information using multiple technologies

D2. use communications technology to exchange ideas and information

D3. use technology to explore new and innovative methods for interaction with others

E7. integrate the use of technology into daily living

Alaska Science Performance Standards:

Cultural Standards:

For Students

A4. practice their traditional responsibilities to the surrounding environment

A7. determine the place of their cultural community in the regional, state, national and international political and economic systems

B3. make appropriate choices regarding the long-term consequences of their actions

B4. identify appropriate forms of technology and anticipate the consequences of their use for improving the quality of life in the community

E2. understand the ecology and geography of the bioregion they inhabit

For Curriculum

A3. incorporates contemporary adaptations along with the historical and traditional aspects of the culture

A4. respects and validates knowledge that has been derived from a variety of cultures

C5. treats local knowledge as a means to acquire the conventional curriculum content as outlined in state standards

D2. engages students in the construction of new knowledge and understandings that contribute to an ever-expanding view of the world

E1. encourages students to consider the inter-relationship between their local circumstances and the global community

For Educators

B1. regularly engage students in appropriate projects and experiential learning activities in the surrounding environment

B3. provide integrated learning activities organized around themes of local significance and across subject areas

For Schools

A1. maintains multiple avenues for Elders to interact formally and informally with students at all times

B2. provides opportunities for students to regularly engage in the documenting of Elders' cultural knowledge and produce appropriate print and multimedia materials that share this knowledge with others

For Communities

D2. creates a supportive environment for youth to participate in local affairs and acquire the skills to be contributing members of the community

E2. encourages teachers to make use of facilities and expertise in

the community to demonstrate that education is a community-wide process involving everyone as teachers

Materials in the Kit:

hydrometer	plankton net	secchi disk
field microscope	dissolved oxygen kit	water sampler
thermometer	pH test papers	alkalinity test papers

Oceanographic Monitoring:

Atmospheric measurements to be taken and reported:
(students are encouraged to report their data on the GLOBE internet site)

1. current temperature and time observations are being made
2. cloud cover (clear, scattered, broken, overcast)
3. record precipication for the day (rain, snow, sleet, none)
   a. measured amount of precipitation for the last 24 hr
   b. pH of precipitation
4. wind speed using Beaufort scale

Hydrologic measurements to be taken and reported:
(students are encouraged to report their data on the GLOBE internet site)

1. record time and height of previous and next tide
2. data for the water at the surface to include salinity, pH, temperature, dissolved oxygen, and alkalinity
3. data for the water at a depth of 4 meters to include pH, temperature, salinity, dissolved oxygen, and alkalinity
4. plankton sample and record the amount of sample collected, area of the sea in cubic meters where sample is collected, and determine the presence and number of *Alexandrium* in the sample.

PSP Testing:

Biosampling:

Kodiak Bay Watch

Kodiak Archipelago's Youth Area Watch

Marine Station's Inventory List

Monitoring Equipment/Supplies

Quantity	Item	Replacement Cost
1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS 1 Chiniak	Water Sampler w/ 15 meter cord # 15010	$55.00 The Science Source PO Box 727 Waldoboro, Maine 04572 phone 800-299-5469
1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS 1 Chiniak	All plastic hydrometer- plain form, PC, salt	$70.00 VWR Scientific Products 3745 Bayshore Blvd. Brisbane CA 94005
2	Rite in the Rain notebooks	approx. $6.00 each Mailboxes, Etc
Multiple copies	Data sheets copied on Rite in the Rain paper	approx. $ 31.95/ream Mailboxes, Etc.
1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS 1 Chiniak	Playmate Elite cooler	approx. $15.00 Department Store
1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS 1 Chiniak	Secchi Disk w/ 48ft., 1/8 in cord	$43.00 Hach Company PO box 608 Loveland, CO 80539-0608 phone 800-227-4224
50 Old Harbor 50 Ouzinkie 50 Port Lions 50 KAHS 50 Chiniak	Total Alkalinity test strips	$7.00 Hach Company PO box 608 Loveland, CO 80539-0608 phone 800-227-4224
50 Old Harbor 50 Ouzinkie 50 Port Lions 50 KAHS 1 Chiniak	pH test strips	$9.00 Hach Company PO box 608 Loveland, CO 80539-0608 phone 800-227-4224

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Updated 6/29/01

1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS 1 Chiniak	Dissolved Oxygen Test Kit	$48.00 Hach Company PO Box 608 Loveland, CO 80539-0608 phone 800-227-4224
1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS 1 Chiniak	Field Microscope w/ illuminator	$564.00
1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS 1 Chiniak	Ocean Plankton Net 5"mouth X 40" codend 10 micron mesh with mini-dolphin adapter w/ 125 ml sampling bottle	$210.00 Wildlife Supply Company 301 Cass Street Saginaw, MI 48602-2097 phone 800-799-8301
16592, 16590 Old Harbor 16594, 16605 Ouzinkie 16595 KAHS	Marine Chart for village area	$16.50 each Marine store
1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS	Onset Temperature Collector Optic Shuttle, Software, Device, Base	$463.00 set
1 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS	Plastic Thermometer (non-mercury filled)	$11.00 VWR Scientific Products 3745 Bayshore Blvd. Brisbane CA 94005
1 set of 31 Old Harbor 1 Ouzinkie 1 Port Lions 1 KAHS 1 Chiniak	Standard borosiliate microslides 100 mm long	$21.20 Vitrocom 8 Morris Avenue Mountain Lakes, NJ 07046 phone 973-402-1443
2 Old Harbor 2 Ouzinkie 2 KAHS 2 Port Lions	Clipboards	approx. $5.00 Department Store
2 Old Harbor 1 KAHS 1 Akhiok 1 Port Lions	Seal Bio-Sampling Kits	$125.00 each Alaska Native Harbor Seal Commission PO Box 2229 Cordova, Alaska 99574 phone 424-5882 fax 424-5883

KAYAW is funded in part by the Exxon Valdez Oil Spill Trustee Council, the Kodiak Island Borough School District, and the Chugach Regional Resources Commission.
Updated 6/29/01

Kodiak Area Youth Watch for Capelin and Pacific Sandlance Beach Utilization

The Kodiak Area Youth Watch is an excellent opportunity to gain greater knowledge of the Kodiak Island habitat utilization and distribution of forage fish such as capelin (*Mallotus villosus*) and Pacific sandlance (*Ammodytes hexapterus*). The goal this year would be to locate preferred beaches of Pacific Sandlance and spawning beaches of both capelin and sandlance and, if time or interest allows, to take length frequencies. To locate preferred beaches, especially spawning beaches, will take many eyes. You can use local knowledge to find out about historical utilization in your area as well as location and timing of spawning events. In your notes please keep track of this historical data including dates and years of sightings.

Declines in capelin (handout #1) may have played a role in the declines of Stellar sea lions and harbor seals. A wide variety of predators feed on both capelin and P. sandlance. These fish were possibly impacted by the Exxon Valdez oil spill being near shore species during some, as in the case of capelin, and most of their life cycle, as in P. sandlance. Other environmental factors may have contributed to declines in capelin (see handout #1) in the Gulf of Alaska.

Capelin (handout #2) utilize beaches only for spawning and are known to spawn during the highest full moon tides of May and June (Warner and Shafford, 1978), and later. Near Kodiak, Roslyn Beach at Chiniak, has been a favorite place for smelting throughout the years. In my experience, the use of a preferred spawning beach is intermittent. In 1998, I had a report of capelin spawning on Woody Island at the end of July which corresponded with the full moon tide of that month/year. If the beach is the site of heavy capelin spawning, the beach will be spongy with all the egg deposit. Capelin smell of cucumbers and there will be a smell of cucumber in the air, and likely there will be birds and animals feeding in the area. We have an excellent opportunity to correlate temperature and possibly phytoplankton blooms with these spawning events which may be crucial factors in timing of spawning. Off-shore winds are also associated with capelin spawning, so be sure to note the wind direction in relation to the beach.

Pacific Sandlance (handout #2) are ubiquitous around Kodiak. Spawning has been reported in September and October in Kachemak Bay(Robards et al.1999) and October in Kodiak (Dick and Warner, 1982). However, I have had reports of possible spawning in July which is a likely possibility according to Blackburn and Anderson (1997). Unlike capelin, most P. sandlance spend their entire lives near shore, often burying themselves in the sand intertidally and subtidally for protection and energy conservation. They seem to prefer beaches with fresh water seepage. At low tide a shovel or foot easily dislodges buried sandlance in their preferred beach habitat of sand or fine gravel. On hot days, P. sandlance can be seen laying all over beaches, having been literally baked out of the sand. Spawning P. sandlance utilize the intertidal zone and leave slight pits or indentations in the sand. The eggs are very small and can be seen, barely, attached to gravel and sand.

There are other smelt or forage fish that resemble these two species. Surf smelt *(Hypomesus pretiosus pretiosus*) and longfin smelt (*Spirinchus thaleichthys*) may be in the area and are beach spawners. Eulachon (*Thaleichtys pacificus*) and rainbow smelt (*Osmerus mordax*) are anadromous and are river spawners. **Local names** for the fish are as follows: capelin, surf smelt,

and longfin smelt are smelt or grunion; sandlance are needle fish, and the eulachon are known as hooligan or candlefish.

The data sheet provided by Brian Himmelbloom has all the needed fields for reporting your forage fish sightings. Included is a length frequency sheet, please measure the fork length which is measured from the tip of the snout to the fork in the caudal peduncle or tail (see handout # 3 for description of fork length).

We need:

1. **Latitude/longitude** of the beach, local name of beach.
2. **Tide stage** of observations
3. **Time of sampling**
4. **Temperature** and other water column information
5. **Weather**: note the wind direction. Please be detailed about the direction of the wind in relation to the beach.
6. **Other marine observations**: include marine mammals, birds, land mammals present.
7. Take as many **fork length frequency measurements** as you can...100 lengths would be great!
   If you find an excellent beach for P. sandlance or capelin, take length frequencies over the summer. For capelin attempt to note male or female in your length frequencies; it is easy to differentiate males from females when they are spawning (see # 2). If so inclined, you can enter your length frequencies onto an Excel spreadsheet, numbered to correspond with the data sheet that goes with the sighting.
   To build a **length frequency board**, glue or screw a block of wood onto the end of a flat piece of plywood or plexiglass long enough to fit your ruler. Glue or screw your metric ruler onto the wood with the 0 end butted up against the block. Measure your fish by placing the snout of the fish against the block, stretching the fish out to measure the fork length(handout #3).
8. It would be interesting to identify and measure these species from cod or other fish stomachs.
   If we cannot locate spawning beaches of capelin, we would know they are in the area. If on a vessel, identify the predator species, note the latitude/longitude of the catch, time of day, and any other pertinent data. Use data sheets.
9. **Collect a sample** of spawning fish (at least 20 fish) and any fish you cannot identify. Preserve them in a freezer, if possible, or if not in a bag or jar with salt (table or rock salt used to salt salmon or herring).

References used for Handout #2:

Hart, J.L. Pacific Fishes of Canada. Ottawa, Canada: Fisheries Research Board of Canada; 1973. 740 p.

Eschmeyer, W.N, Herald E.S., Hammann, H. A Field Guide to Pacific Coast Fishes of North America from the Gulf of Alaska to Baja California. Boston, MA: Houghton Mifflin Company; 1983. 336p.

I have not given full citations for the articles cited, if you are interested please contact me for copies. Email: susan.a.payne@noaa.gov or phone: 481-1719. Thank you for all your help!

Community reorganization in the Gulf of Alaska following ocean climate regime shift

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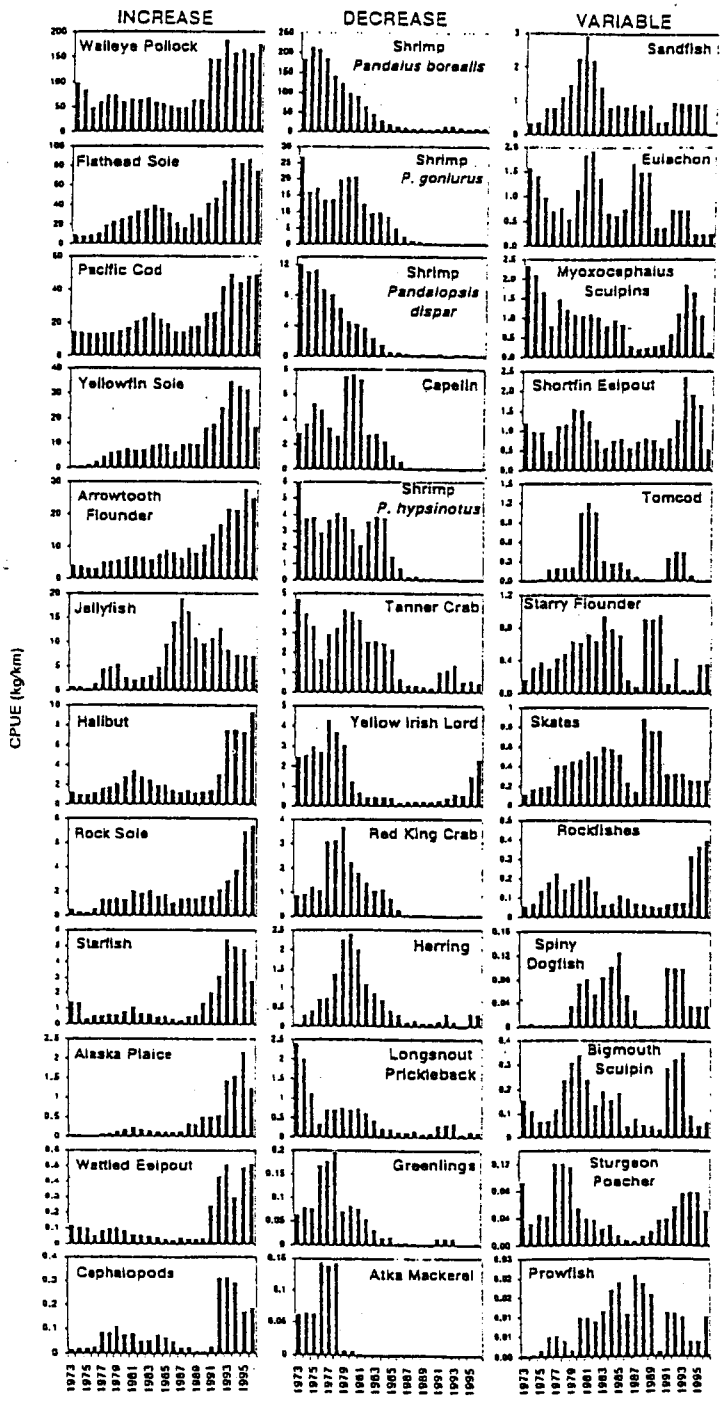


Fig. 3. Trends in catch biomass (CPUE) for 35 taxa caught in standardized small-mesh trawls conducted between 1972 and 1997. Taxa are ranked from highest (top) to lowest (bottom) in abundance for each category (increasing, decreasing, variable). These taxa account for more than 98% of the total biomass caught in all years. Trends were smoothed by taking

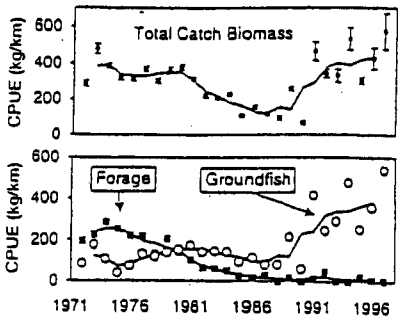


Fig. 4. Trends in catch biomass (CPUE) of combined taxa in standardized small-mesh trawls conducted between 1972 and 1997. Upper panel shows catch biomass (±SE) of all taxa, and bottom panel shows separate trends for groundfish (cod, pollock, all flatfish) and forage species (all shrimps, capelin, smelts, sandfish, herring, juvenile pollock <20 cm). Lines show 3 yr running averages

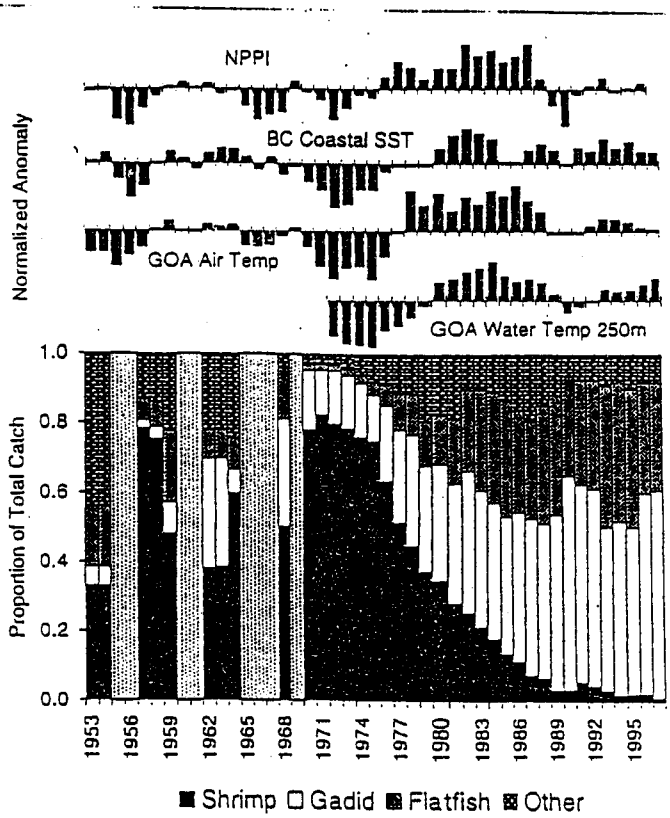


Fig. 2. Composition of small-mesh trawl catches in the Gulf of Alaska (GOA) between 1953 and 1997 in relation to climate indices. Climate data expressed as normalized anomalies. NPPI: North Pacific Pressure Index; BC: British Columbia; SST: sea surface temperature.

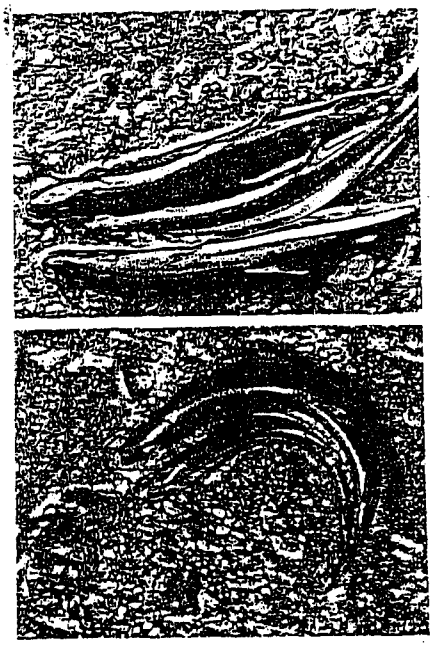
CAPELIN *Mallotus villosus* Pl. 10

Identification: A northern smelt with very *small scales* — more scale rows (170–220) cross lateral line than in other smelts. *Adipose fin rectangular*, with a very long base (longer than in our other marine smelts). 17–20 pectoral fin rays. Adult males have a prominent "hairy" band along side and long-based anal and pelvic fins. Olive-green above; silvery below. Usually has black dots on gill cover. In Pacific to about 8½ in. (22 cm).

Range: Circumpolar, in Arctic, N. Atlantic, and N. Pacific; Korea to Str. of Juan de Fuca. Habitat: Marine, oceanic; to 263 ft. (80 m). In schools.

Remarks: Comes inshore in large schools from April–Oct. to spawn on fine gravel or sand beaches; incubation 2–3 weeks. A common and important forage fish for other fishes; of limited commercial importance in our area.

Similar species: (1) Eulachon (p. 82) has *striated* gill cover (Fig. 30 opp. Pl. 10); 10–12 pectoral fin rays. (2) Rainbow Smelt (p. 82) has 11–14 pectoral fin rays, a larger mouth, and prominent *teeth* on tongue. (3) Night Smelt (p. 82) has a larger mouth, prominent *teeth* on tongue, larger scales in fewer rows (62–65) on side. (4) Longfin Smelt (p. 82) has 10–12 pectoral fin rays, *shorter*-based adipose fin, *canine teeth* on tongue.



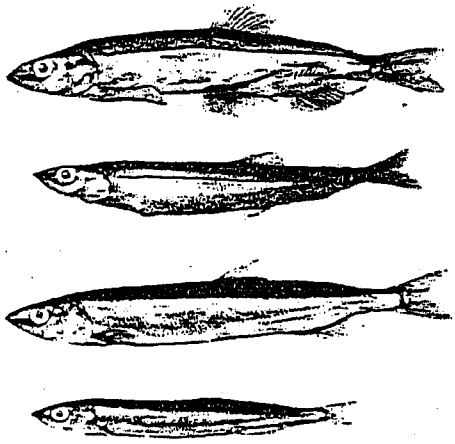


FIG. 2. *Top*, male capelin (upper) and female capelin (lower) as they look during the spawning season. Note the spawning ridges and enlarged fins of the male and the plump belly of the female (Winters 1969); *Bottom*, male capelin (upper) and female capelin (lower) as they look after the spawning season has ended. Note the absence of spawning ridges and regression of the fins of the male, and the slender appearance of the female (Winters 1969).

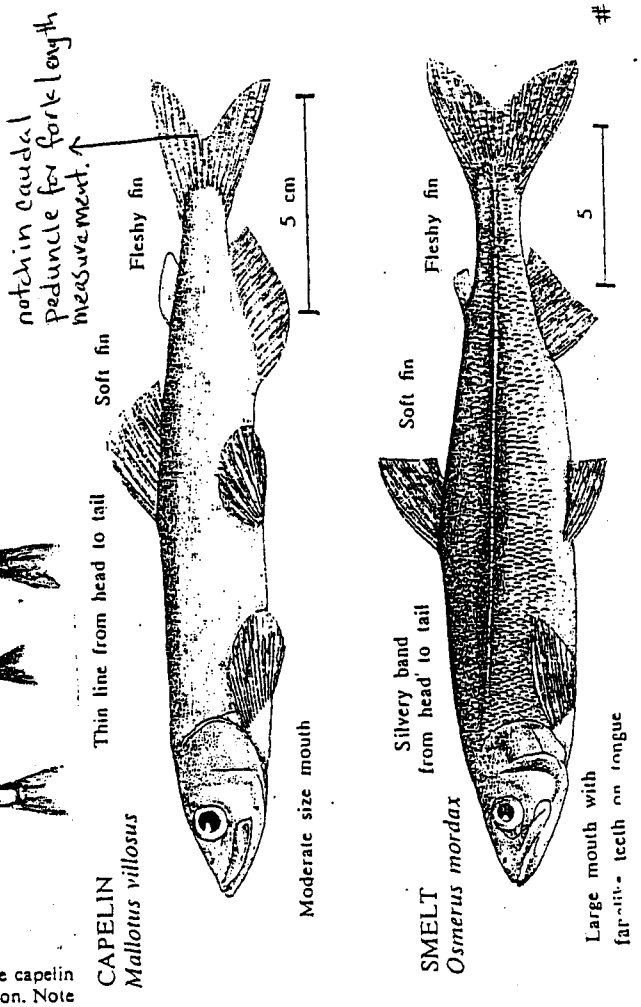


FIG. 6. Beach-spawning capelin photographed during the spawning act: *upper*, female in the middle; *lower*, female on the inside.

PACIFIC SAND LANCE

Sand Lances: Family Ammodytidae

A small family of *elongate* fishes with a *pointed* snout, a long dorsal fin *without* spines, *no* pelvic fins, and a *forked* caudal fin. Scales small, cycloid. Lateral line *high* on back. Fleshy ridge on each side, near midbelly.

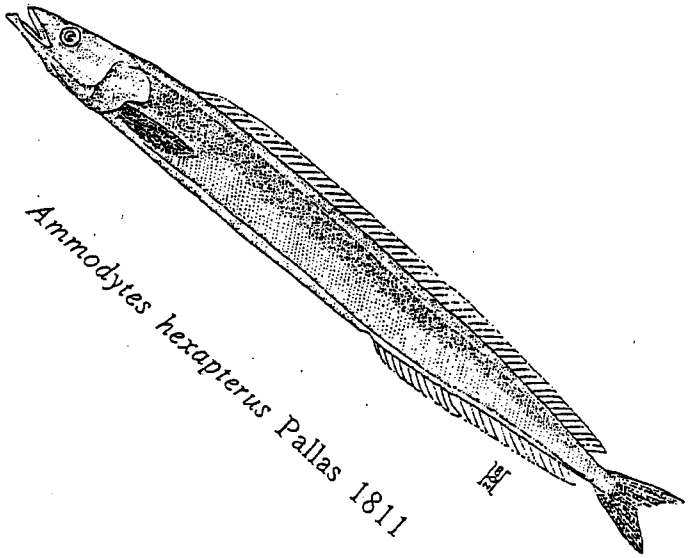
Sand lances occur in the N. Pacific, N. Atlantic, and Indian Oceans; inshore and offshore. They often bury themselves in sand. Some species form large schools and are important as food for other fishes. About 12 species, 1 in our area.

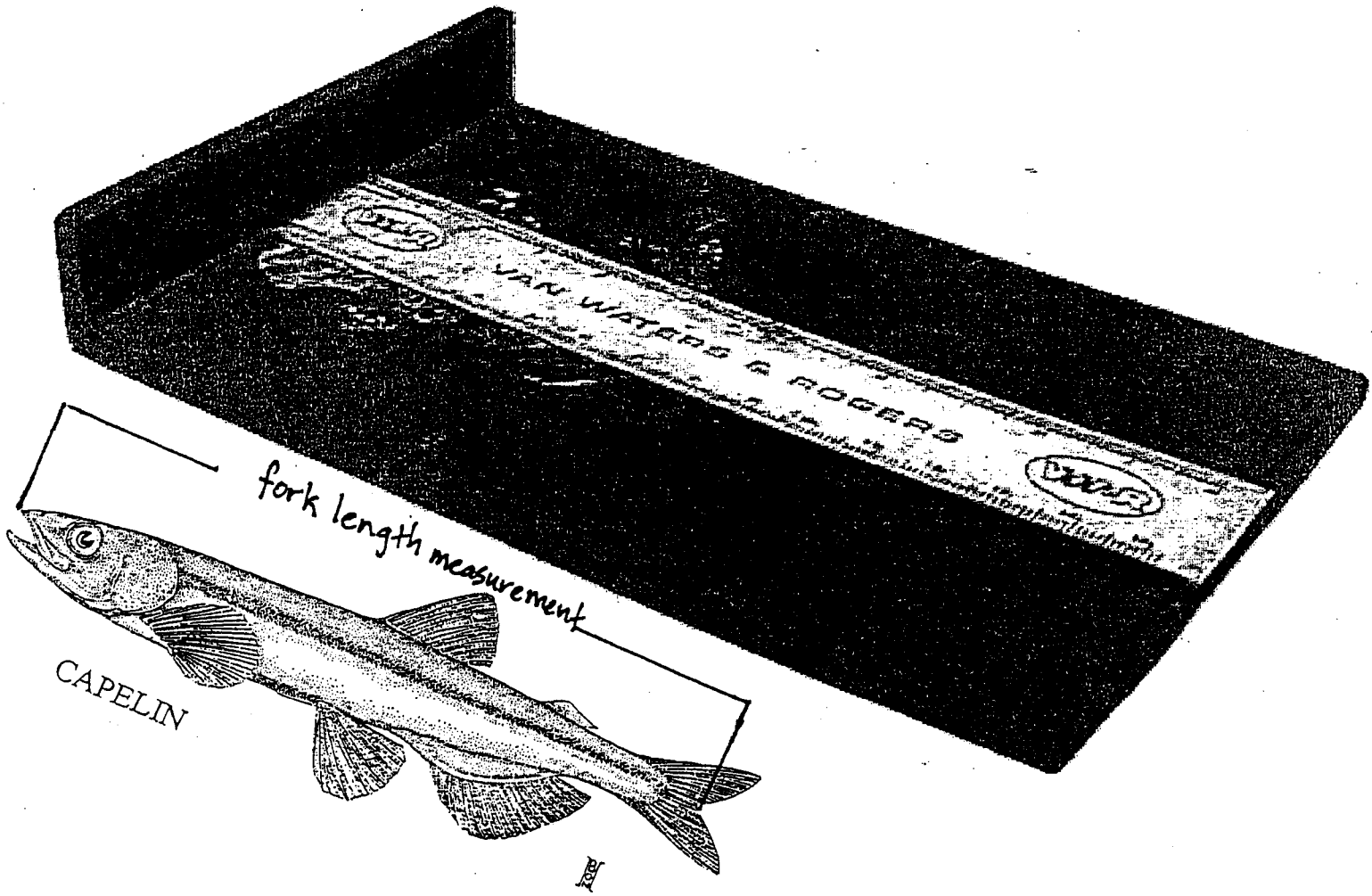
PACIFIC SAND LANCE Pl. 42
Ammodytes hexapterus

Identification: Elongate. Lateral line *high on back*. Fold of skin *along* each side of *belly*. Lower jaw *projects*. Caudal fin *forked*. Metallic blue or green above; silvery below. To 8 in. (20 cm) in our area, but reaches 10½ in. (27 cm) in the Bering Sea.

Range: Sea of Japan to Arctic Alaska, the Bering Sea, and to Balboa I. (s. Calif.). Habitat: Varies — can occur in large schools near surface in inshore or offshore waters; also buries itself in sand. Intertidal and to 156 ft. (47 m) when inshore; stays near surface over deep water offshore.

Remarks: Important as food for predatory fishes, sea birds, and marine mammals. Most likely to be seen as stomach content, or on sand beaches (wiggling in sand at low tide).




VAN WIJNEN & ROGERS
fork length measurement
CAPELIN

DP-004 87-12-07

SPECIMEN FORM

VESSEL (1 2 3) [ ][ ][ ] ____________________ CRUISE (5 6 7) [ ][ ][ ] HAUL (9 10 11) [ ][ ][ ]

STRATUM (13 14 15) [ ][ ][ ] SPECIES CODE (17 18 19 20 21) [ ][ ][ ][ ][ ] SPECIES NAME ____________________

FREQ-UENCY (36) [1] SUBSAMPLE TYPE (48) [ ] WEIGHT DETERMIN. (49) [ ] AGE STRUCTURE (50) [ ] AGE DETERMIN. (51) [ ]

MATURITY TABLE (59 60) [ ][ ] YOUR NAME ____________________ DATE ______________

23 SEX	25 MAT UR	28 29 30 31 LENGTH IN MM.	38 39 40 41 42 WEIGHT (GRAMS)	45 46 AGE	53 54 55 56 57 SPECIMEN NUMBER	62 63 64 65 66	68 69 70 71 72