SELECTION OF SAMPLES FOR HUMAN HEALTH SCREEN (INEEL)

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The overall objective of the Screening Analysis is to provide a broad base of data on a wide range of radionuclides to serve as a base for understanding the occurrence of radionuclides in a wide range of organisms at different trophic levels in the marine ecosystem, for foods that are consumed by the Aleuts, and for organisms that are harvested commercially. This initial screen will serve as a basis for a additional analyses, depending upon the screening results, the relative importance of the organisms to as Aleut and commercial foods and to the marine ecosystem, and the availability and distribution of specimens across sampling areas.

The rationale for our choice of organisms for screening was based on our initial three-pronged approach (Aleut foods, commercial fisheries, marine food web) and the availability of organisms within the marine ecosystem around Amchitka and the Kiska reference site. Within these constraints, organisms were selected based on their mobility (Table 1) and life history traits (Table 2).

Our rationale for the number of organisms to be screened was a function of mobibility (Table 3). When organisms were sedentary, we chose to screen 1 composite each from the three Amchitka test shots, and from Kiska. When organisms were mobile, we chose to screen 1 composite from the west side and 1 from the east side of Amchitak (in the region of the test shots). When organisms were highly mobile we chose to screen 1 composite from Amchitka region and 1 from Kiska (Table 2).

Organisms that are very important to the human food chain (i.e. Halibut, King Crab, Octopus) but were collected in much smaller numbers will be examined during the next phase of radionuclide analysis, as will organism that are key to marine food web (i.e. Eagle, other kelp or invertebrates).

TABLE 1. MOBILITY TRAITS INFLUENCING SELECTION OF SCREENING SPECIES

MOBILITY	IMPORTANCE	SPECIES
Sedentary	Provides an indication of point exposure	Fucus Alaria nana Alaria fistuloa
Locally mobile	Integrates exposure over a small area	Sea Urchin Rock Jingle Black Rockfish Rock Greenling Glaucous-winged Gull
Mobile	Provides an indication local movement within a few km of designated site	Yellow-Irish Lord Ocean Perch Walleye Pollock Tufted Puffin Pigeon Guillemot Common Eider Brown King Crab
Migratory	Provides an indication of regional exposure	Atka Mackerel Pacific Cod

TABLE 2: RATIONALE FOR SPECIES SELECTION FOR SCREENING ANALYSIS

PRIMARY PRODUCERS: The following species are all primary producers in the marine ecosystem, are sedentary (and thus represent local exposure), and are the base of food chains. There is good representation of the sedentary species from the four study sites (Milrow, Long Shot, Cannikin, Kiska), and for the mobile species from Amchitka and Kiska.

Alaria fistulosus - This kelp occurs at several depths, representing the subtidal environment.

Alaria nana - This kelp occurs mainly in the intertidal.

Fucus - This brown algae occurs in the intertidal, and there is reference data from other places.

INVERTEBRATES: Invertebrates are often the primary consumers in marine ecosystems, are eaten by organisms higher on the food chain, and are fairly sedentary representing local exposure. They are also eaten by the Aleut people.

Green Urchin - Urchins were abundant in most of the diving transects at 15, 30 and 60 feet and thus represent good coverage of the marine floor environment. They are a primary food of Sea Otters, a species of concern. They are also eaten by Eiders and Gulls (based on the literature and on stomach contents we examined). And they are considered a delicacy by Aleuts.

Rock Jingle - They are less abundant, but are sedentary.

VERTEBRATES: Vertebrates are often secondary or tertiary consumers, and have different degrees of mobility. The species selected, at some stage in their life cycle, are all eaten by Aleuts and some are part of commercial fisheries.

FISH:

Rock Greenling - This is a sedentary species, each male maintaining a small territory, hence representing local exposure, that lives in the kelp zone. It is eaten by Aleuts (as are its eggs), and is eaten by fish higher on the trophic chain, such as Cod and Gulls.

Black Rockfish - This is a relatively sedentary species (representing local exposure) that lives in the kelp zone and just outside the kelp zone. It is eaten by Aleuts and is a little higher on the food chain than the Rock Greenling.

Sculpin (Yellow Irish Lord) - This is a less sedentary (but not migratory) species that is larger than Black Rockfish, eats invertebrates, and is an Aleut food.

Atka Mackerel - This is a deep water, bottom fish that is relatively low on the food chain, but is of commercial value and is migratory.

Pacific Cod - This fish can reach 50-60 pounds, and eats smaller fish, such as Rock Greenling and Atka Mackerel, as well as Octopus, squid, fish eggs, and crabs (all found in our specimen's stomachs). It is both a preferred fish for the Aleut people and a major commercial species. It is mobile to migratory.

Ocean Perch - Top level predator of commercial interest that is mobile.

Walleye Pollock - This predatory fish is a major commercial species that is mobile.

Halibut - This fish is a top-level predator, can reach large sizes (up to 500 pounds) and advanced ages, and is highly prized both by Aleuts and commercial fisheries, and is migratory.

BIRDS (all are residents):

Eiders - Common Eiders are hunted extensively by Aleuts and their eggs are also eaten. It represents a low trophic level for birds, eating mussels, snails, and urchins.

Gulls - Glaucous-winged Gull eggs are considered a delicacy by Aleuts, and gulls represent an omnivorous species. We found urchins, starfish, and fish (including Dolly Varden and Greenlings) in their stomachs. Since there are nesting colonies at each of the test sites, and they normally feed within 5 miles of their colony, they represent local exposure. They do not migrate and so represent longer term exposure in the vicinity of Amchitka. They also can live to be 30 + years old.

Young Gull - There were nesting colonies adjacent to each of the 3 test shot areas, and on Kiska. Since parents feed their young entirely from local foods (usually within 5 miles of nesting colonies), they represent local exposure.

Tufted Puffin - They eat entirely fish of small to intermediate sizes. They are less localized to test shots, and represent local exposure within a local area. Birds were moving back and forth from the Long Shot to the Cannikin shoreline.

Pigeon Guillemot - They eat mainly small fish, and are localized to the sides of islands during the breeding season. Birds were moving back and forth from the Long Shot to the Cannikin shoreline.

TABLE 3. RATIONALE FOR SELECTION OF SCREENING NUMBERS.

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1. Where possible, one sample from each of the four study sites (Milrow, Long Shot, Cannikin, Kiska) for species that are sedentary or are locally mobile will be selected for screening (N = 4 for screening purposes).

Fucus	Sea Urchin
Alaria nana	Rock Jingle
Alaria fistulosa	Black Rockfish
Glaucous-winged Gull (adults, chicks)	Rock Greenling
	Yellow-irish Lord

2. Species that are mobile within a few km of a designated site will be examined from both sides of Amchitka (Bering Sea/Pacific Ocean), and from Kiska (N = 3).

Common Eider (eggs)
Pigeon Guillemot
Tufted Pigeon

3. Species that are highly mobile or migratory will be examined from Amchitka and from Kiska (N = 2)

Ocean Perch
Atka Mackerel
Walleye Pollock

4. Where specimens were available for both the inshore sampling and the NOAA trawl, species will be screened from both sampling methods. This was true only for Pacific Cod, and will include both sides of Amchitka from the nearshore sampling, and from Amchitka and Kiska for the NOAA trawl (N = 5).

TABLE 4: SPECIMENS FOR THE INEEL SCREEN OF SOFT TISSUE **.

Kelp: TOTAL = 12
1. Alaria fistulosa - 4
2. Alaria nana - 4
3. Fucus - 4

Fish: TOTAL = 23
1. Black Rockfish - 4
2. Ocean Perch - 2
3. Atka Mackerel - 2
4. Rock Greenling - 4
5. Walleye Pollock - 2
6. Pacific Cod - 5
7. Sculpin - 4

Invertebrates: TOTAL = 8
1. Sea Urchin - 4
2. Rock Jingle - 4

Birds TOTAL = 17
1. Common Eider eggs - 3
2. Tufted Puffin - 3
3. Glaucous Gull
   adult - 4
   young - 4
4. Pigeon Guillemot - 3

** When the sample size is 4, one composite will be selected from near Milrow, Long Shot, Cannikin, and Kiska. When the sample size is 3, one composite will be selected from the Bering side of Amchitka, the Pacific side of Amchitka (near the test shot region), and from Kiska. When the sample size is 2, one composite each will be selected from around Amchitka and from Kiska.