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# Baseline Characterization of Anthropogenic Contaminants in Biota Associated with the Alaska OCS Liberty and Northstar Oil and Gas Production Unit in the Nearshore Beaufort Sea

Task 8 of the Arctic Nearshore Impact Monitoring in the Development Area Project  
(ANIMIDA)

**Project Final Report**

August 2003

*Prepared for...*  
Minerals Management Service  
Alaska OCS Office  
Anchorage, Alaska

Prepared By:  
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Task 8 of the Arctic Nearshore Impact Monitoring in the Development Area Project (ANIMIDA)

**Final Report**

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## Executive Summary

The bioaccumulation of trace substances, including anthropogenic contaminants, was investigated in five species of fish in and near the North Slope oil field developments, including the Northstar project area and the Liberty prospect. The fish species studied were: Arctic Cod, Arctic Cisco, Four Horn Sculpin, Broad Whitefish and Humpback Whitefish. We collected fish from a total of five sites (from west to east): Stump Island, Northstar, Point Brower, Liberty and Bullen Point. Whole body concentrations of polynuclear aromatic hydrocarbons (PAH), organochlorine compounds (PCBs and 12 pesticides) and 12 trace metals were determined. Two biomarkers of contaminant exposure were also evaluated: P4501A in liver hepatocytes and gut epithelial cells and bile hydrocarbon metabolites.

The PAH, and many of the metals are potential contaminants arising from oil field operations, such as drilling, production, transportation of personnel and materials, dock construction, and onshore support operations. These contaminants also have local natural sources and distant anthropogenic sources. The organochlorines are normally not expected to result from oil field operations and most of the organochlorines undoubtedly have their ultimate sources far from the North Slope of Alaska, from where they are carried in winds and haze as volatile gases or absorbed to aerosols. However, some organochlorine data were needed for interpretation of biomarker data and their analysis did not incur much extra cost to the project. In addition, the Arctic Marine Assessment Program (AMAP), a multi-national program to assess contaminants in the Arctic, has recommended that organochlorines be measured in and around oil field operations and sites of historic military operations, e.g., Bullen Point near the development area. Further, Presidential Executive Order 12898 mandates measurement of contaminants in subsistence resources as a matter of environmental justice. In addition, distant anthropogenic sources of metals are likely making some contributions to the metals measured in biota in the development area.

The two biomarkers, P4501A induction and bile metabolites of PAH, both respond to exposure to PAH, and because of PAH metabolism, are in fact, more relevant to PAH exposure than measures of these compounds in tissues.

Site-by-site comparisons were also carried out by analysis of variance for each species to see which sites had statistically higher concentrations of contaminants. Other analyses of variance were carried out to determine if weight of fish explained a significant amount of variability in the contaminant concentration data. We report a number of different patterns of variability in which there were differences in trace substance concentrations in fish due to site and discuss site-to-site differences and whether they may be related to anthropogenic inputs. The site-to-site comparisons of trace substance concentrations in various species of fish are based on relatively small numbers of samples, so the relationships found should be interpreted cautiously, i.e. they may change with larger sample numbers. About 10% of the significant site differences in individual trace substances could be due to chance. These data and their analysis should be the basis for further investigation and monitoring. However, the data

provide a good overall picture of trace substance concentrations in fish in the development area.

Perhaps the strongest evidence for anthropogenic influences from petroleum development are the concentrations of PAH and the two biomarkers that respond to PAH, particularly in the Four Horn Sculpin. While there were no effects of site on total PAH or low-molecular weight PAH in any species of fish, there were differences seen in high-molecular-weight PAH between sites for Arctic Cisco and Four Horn Sculpin. The sites where there were elevated concentrations in these two species were Stump Island and Point Brower. In Four Horn Sculpin P4501A induction in liver varied significantly with site, with Point Brower and Stump Island having the highest responses. In Arctic Cod, Northstar fish had significantly greater P4501A content than Liberty fish. Hydrocarbon metabolites in the bile also had a pattern of differences that is somewhat consistent with P4501A induction. Phenanthrene equivalents in the bile varied significantly with site in Four Horn Sculpin, with Bullen Point, Stump Island, and Liberty having the higher responses than Point Brower. Benz(a)pyrene equivalents in the bile of this species also varied significantly with site with Stump Island clearly having the highest concentrations. Arctic Cisco also had benz(a)pyrene equivalents that varied significantly with site, with Bullen Point having the highest measured concentrations.

Both of these bile hydrocarbon components occur in extracted petroleum, and probably in drill cuttings from the developed formations, but they also have potential natural sources, particularly benzo(a)pyrene. If anthropogenic activities are responsible or contributing to these responses in Four Horn Sculpin, and given the sites at which they occur, then it is more likely that they are not directly related to drilling at the platform sites. Rather, it may be the activity to the east of Stump Island at West Dock, e.g., motorized vessels, that may be the source. There also may be some influence of the nearby Endicott Causeway on fish caught at Point Brower. At Bullen Point, historical activities at the military site may be responsible for the observed responses.

Among the chlorinated hydrocarbons and pesticides, a variety of patterns were observed. Data on site differences in these anthropogenic compounds were interpreted as to whether they may indicate distant sources, e.g., transport from lower latitudes, or some local source. In the case of PCBs, Arctic Cisco varied significantly with site; fish from Stump Island had the highest concentrations. A similar trend was seen for total pesticides, except that Stump Island and Point Brower were the two sites with the higher concentrations. However, for other individual classes of pesticides making up the total pesticide category, there were significant differences due to site with one or more species. For Chlordanes, DDTs, Endosulfans and Endrins, Stump Island had consistently high concentrations relative to the other sites. It was also mainly the Arctic Cisco that had significant site differences for these groups of compounds (save for DDTs). The Four Horn Sculpin had site differences for Chlordanes. Humpback Whitefish had site differences for Endrins. Arctic Cod had site differences for HCHs. Taken together these data suggest that there are elevated concentrations of several pesticides in the area of Stump Island and Point Brower over the general background for the area and there might be a low-level source there for pesticides. We do not know what the potential local source for this low-level elevation over background might be, but Arctic Rivers can carry significant amounts of contaminants from distant sources that are

deposited on the land and washed into the rivers during the summer. Point Brower is in the delta of the Sagavanirktok River.

Also consistent with the known long-range transport in the atmosphere from lower latitudes to the Arctic, PCBs were generally uniformly distributed among sites for four of the five species of fish analyzed, the exception being Arctic Cisco at Stump Island. We have, however, recognized two patterns of relative congener abundance in the fish from this study: a mixture dominated by high-molecular-weight congeners, and a second pattern including a similar congener composition of high-molecular-weight compounds, but also has significant, and sometimes dominant, low-molecular-weight components (e.g. IUPAC congener 8). The low-molecular-weight congeners in such mixes have been reported previously from Beaufort Sea samples.

Interpreting anthropogenic contributions of metals poses a particular problem, as the metals being analyzed all occur in the sediments and fish tissues naturally and it is possible to have residual concentrations in the gut of the fish being analyzed. We can probably discount anthropogenic loadings of nickel that did not differ with change of site. However, most of the metals did show significant differences due to site in one or two species: arsenic, barium, cadmium, chromium, iron, lead, mercury, selenium, vanadium and zinc.

The high concentrations of arsenic in Four Horn Sculpin occurred at Stump Island, Liberty and Point Brower. The reason for this pattern is not known, as it did not appear to be significantly elevated in sediments anywhere in the area on an iron-normalized basis. It is not known if there is an anthropogenic source of arsenic in the area.

Analysis of the ratios of barium to iron in the fish data suggests that sediment may have played a role in trace metals detected in Four Horn Sculpin. We therefore ascribe no other particular interpretation to the site effect seen with this element in Four Horn Sculpin. In addition, the barium sulfate used in drilling mud is not very biologically available to marine organisms.

Site effects were found for cadmium in Arctic Cisco and Humpback Whitefish. In the former species, Point Brower, Liberty and Stump Island fish had higher concentrations than Bullen Point. Stump Island Humpback Whitefish had greater concentrations of cadmium than Point Brower fish. Cadmium bioavailability can change with salinity, but it is not known if salinity was a factor in determining site differences in these two species.

There was only one species where the variation in iron content differed significantly between sites: Arctic Cod. Again, it is not known whether this is attributable to development activity at the Northstar location, but further consideration may be in order for this element as well. Since Cod are bottom feeders, at least part of the time, sediments in the gut may have influenced this outcome. Iron is an essential element and is therefore physiologically regulated in fish. It seems unlikely that without a very large biologically available source that iron would appreciably accumulate in fish beyond the range that is physiologically required.

Humpback Whitefish was the only species where site differences were seen for lead concentrations, with Stump Island fish having higher concentrations than Point Brower.

One species showed significant variation in mercury: Arctic Cisco. Point Brower Cod had greater concentrations than the other sites, but the differences in means were very little. At this stage, we cannot rule out a slight difference in natural or anthropogenic influence on mercury in this species. Nor can we rule out random variability in a small sample set (n=5-11 per site) as an explanation of this finding.

For selenium there was one species for which site had a significant effect on whole-body concentrations: Arctic Cod from Liberty had greater concentrations than those from Northstar. Again, this is based on a very small sample size (n=7-8) and we have no reason to attribute this to anthropogenic activities.

Vanadium is another element for which Arctic Cod showed significant differences due to site. In this case the Liberty fish had higher concentrations than the Northstar fish. Again the potential influence of sediments in the gut may as well as small sample size may be a factor, as there are no known sources of Vanadium at Liberty.

For zinc, the Arctic Cisco was the only species in which site had an influence on whole-body concentrations. In this case, Point Brower, Liberty and Stump Island had higher concentrations than Bullen Point. We attach no particular significance to this finding.

Based on high site-trace contaminant and site-biomarker differences, we recommend the Four Horn Sculpin as a candidate species for further monitoring of possible anthropogenic releases of trace substances that may be bioaccumulated by fish. The Four Horn Sculpin, along with the Arctic Cod, appear to be the two species that are most appropriate for monitoring at the offshore platform areas, while the two species of Whitefish and the Arctic Cisco are anadromous and more closely tied to the inshore portions of the development area. In this regard, we present and discuss the relative power of different sized collections of Four Horn Sculpin to detect changes in various trace contaminants and the number of years required to detect different percentage change with a fixed number of fish per site. For example, if Four Horn Sculpin were to be analyzed for PAH by collecting 20 fish per site per year, it is estimated that it would take 4 to 7 years of data to detect a 50% change in concentrations. The analysis of variation also indicated that 50% differences in concentrations of most analytes can be detected with fewer than 15 fish.

## 1.0 Introduction

*Background.* A new federal offshore oil production facility (Northstar) and a proposed facility (Liberty Prospect) in Alaska's North Slope prompted the Minerals Management Service (MMS) to solicit proposals to investigate the potential environmental impacts of these slated developments (since Task 8 was initiated, Northstar has been completed but Liberty is on hold). Applied Marine Sciences, Inc. (AMS), through a competitive bidding process, won the contract (Task 8) to investigate tissue contaminant residues and effects in select local biota. Task 8 addresses the critical issue of potential bioaccumulation of trace substances (both trace metals and organic compounds) in marine biota in the Liberty and Northstar development areas. This task seeks to determine whether trace substances of concern are being accumulated by higher trophic level organisms (i.e., fish and whales). Any potential effects from trace substances, whether natural or anthropogenic in origin, are not being addressed by this study. After input from the Scientific Review Board (SRB), MMS, the public and various resource agencies the study objectives now address these concerns in several species of fish. Funding and support were not provided for any further work on whales started in FY02, so this report is confined to evaluating the potential bioaccumulation of anthropogenic contaminants in several species of fish in the development area. This report describes results of analysis of fish collected in the summer of 2001.

Trace substances in the tissues of marine fish caught in the development area can come from many sources. All of the metals measured in this study have natural sources, they occur naturally in fish, and some of them are essential to fish physiology, e.g., iron, zinc and selenium. Most of the metals found in fish tissues in this study would be expected to occur in about the concentrations at which they were found. Many of these metals can also have additional sources from human activities, and this study attempts to determine if anthropogenic metal contributions were occurring by comparing tissues of fish from various areas with and without known industrial activities. In addition, it is well established that metals mobilized by industrial activities far from the North Slope are transported in the atmosphere on particles. Examples of metal sources that atmospherically transported to the Arctic include mercury from burning of coal, cadmium from smelting of zinc ores, and lead from gasoline and mining activities. These metals may enter the Arctic Ocean and be incorporated into the tissues of marine organisms.

The organochlorines are all man made. In most cases, the predominant source of organochlorines in the Arctic is long-range atmospheric transport of gases or particles from lower latitudes. Many of these compounds are volatilized at higher temperatures where they are used in large quantities (e.g. in Asia) and are deposited with snow in the Arctic. Examples of compounds found in this study that originate from distant sources include: DDT, PCBs, HCHs, toxaphene, chlordane and dieldrin. A good general reference for further information on trace substances in Arctic ecosystems is "Arctic Pollution Issues: A state of the Arctic Environment Report" (AMAP, 1997).

The polynuclear aromatic hydrocarbons in the Arctic Ocean originate from a variety of sources, including petrogenic natural sources in the area (coal and peat deposits), distant anthropogenic sources (mainly combustion products from lower latitudes), and local sources including oil and gas development activities and historic military operations.

*Rationale.* Due to the distribution and environmental risk of anthropogenic chemicals, these compounds (i.e., metals and organics including PAHs, PCBs and pesticides) are to be estimated in biota while oil and gas exploration and development activities on Alaska's North Slope continue. Some of these chemicals occur naturally (metals), some are imported by long-range atmospheric transport (organochlorines and some metals), others may come from historic industrial and military activity in the area (PCBs), and some may come from current industrial activity at the Northstar platform, vessel activity and other associated human activities on the North Slope of Alaska.

*Objectives.* The three objectives of Task 8 were to:

1. Determine the baseline concentrations of anthropogenic compounds and responses of contaminant biomarkers in representative upper trophic level biota.
2. Evaluate whether the concentrations of contaminants and/or biomarker responses indicate significant contaminant exposure to subsistence consumers.
3. Provide the essential background data and a framework for long-term monitoring of local biota if warranted by initial results of this study.

*Hypotheses.* In designing a study to meet these goals, AMS formulated two hypotheses:

HO<sub>1</sub>: Baseline concentrations of PAHs, POP's, metals, and exposure/response biomarkers in biota from the Northstar and Liberty areas of the Beaufort Sea are not a result of oil and gas industry activities.

HO<sub>2</sub>: Oil and Gas industry activities in the Northstar and Liberty areas will not result in an increase in tissue concentrations of POP's, PAHs, metals and exposure/response biomarkers in biota from the Northstar and Liberty areas.

The field collection and sampling program conducted was designed to test these hypotheses using multiple fish species at multiple sites. The six species analyzed have considerable differences in life history, site fidelity, and utilization by people.

Our choices of fish species to investigate in this study were based on several needs and goals. We set out to test our hypotheses by sampling 15-20 fish of one or two species at the Northstar Platform area and comparing them with a similar number of fish collected at the Liberty prospect area. However, as with many preliminary studies, there were significant constraints imposed on the study based on available budget, research vessels, seasonality of sampling, and the desire of MMS to provide information on fish species of importance to human subsistence fisheries. Logistical

constraints compromised this plan. Collecting time at the platform sites was limited and we did not attain our goals for numbers of fish. This was compensated for by directing more effort to other sites in the area. As a result, we have a broad sampling of species over a large area that included other reference areas, e.g., Liberty, and areas of human activity, i.e., near Stump Island and at Bullen Point. Ultimately, these collections resulted in analysis of fish that fell into two broad categories; anadromous/amphidromous and marine.

It should be emphasized that because of the potential and variable presence of distant sourced anthropogenic and naturally present compounds, in addition to those coming from petroleum exploration and production, it was not expected that all of the reference sites would have lower concentrations than the project sites for trace substances and the contaminants assayed in fish. It should also be emphasized that we are unaware at the onset of this study of PCBs and pesticides coming from petroleum production. These compounds were included in the study mainly because of their potential to affect contaminant biomarkers that would also respond to petroleum and because they are a concern for subsistence users in the area. Organochlorines have been found on oil field roads in the Kenai Peninsula where waste oil has been used for dust control. Waste fluids (not necessarily oils) were used in the Prudoe Bay field for dust control on roads (D. Prentki, MMS, personal communication). There are also confirmed reports of an organochlorine spill on the nearby Colville River (State of AK, 2000). Also, there are reports of historic spiking of the oil reservoir in the Colville river watershed with PCBs to be used as tracers. (S. Florio, personal communication).

Fish investigated in this study fall into two broad categories based on the areas of the nearshore Beaufort Sea that they inhabit. Broad and Humpback Whitefish and Arctic Cisco represent the anadromous/amphidromous fish, and the non-anadromous (marine) fish are represented by Arctic Cod and Four Horn Sculpin. The Cisco and Whitefish are the most important of these species with regard to subsistence diet and commercial fisheries, though Arctic Cod are apparently utilized for human and dog food as well. The Four Horn Sculpin has minimal importance for subsistence use (Craig, 1984, 1989). The literature on the anadromous fish is well represented by investigations of aspects of their life history, particularly with respect to effects of oil and gas industry causeways and other structures (West Dock and Endicott) on summer (open water) movements of fish (Fechhelm, 1999, Fechhelm and Bryan, 1994, Fechhelm et al, 1990, 1992, 1995, 1995, 1996, 1999, 2001, Schmidt et al, 1989, and Griffiths et al, 1992, and 1998). The two marine fish species sampled in this study (Arctic Cod and Four Horn Sculpin) are not as well represented in the literature with regard to life history or local effects, however there have been a few useful studies conducted (Barber et al., 1997; Craig, 1984; Goldberg et al., 1987; Graham and Hop, 1995).

There are several aspects of fish life history that are important when considering the measurement and interpretation of contaminants in their tissues and in attempting to determine the sources of the contaminants. These aspects are of particular importance to this study due to our investigation of both marine and anadromous fish with widely divergent life history patterns. The Cisco and Whitefish overwinter in the Sagavanirktok and, to a much larger extent, the Colville River. This means that they are only present in the project area for an average of 12 weeks per year and

are generally restricted to the narrow band of warm brackish water within a few hundred meters of the shore. The significance of this may be directly related to tissue residues of contaminants found in these fish. While it is generally understood that most tissue contaminants in fish are a result of dietary uptake, tissue residues may also be a result of contaminants passing through the gills and skin as well. Schmidt et al., (1989) described very limited feeding of overwintering Cisco and Whitefish from the Sagavanirktok River, and a slightly higher level of feeding of overwintering fish from the Colville River. Also, Kline et al. (1999) found stable isotope evidence to support some contribution of freshwater carbon to the diet of these fish species in the Prudhoe Bay area. This means that although it is likely that tissue contaminant residues in these fish are largely a result of massive summer feeding in the nearshore Beaufort Sea, some may also be reflective of winter freshwater uptake.

The regional geography and North Slope oil and gas industry developments probably also play a significant role in tissue contaminant residues with different effects on the anadromous versus marine species. Griffiths et al., (1992) claims that smaller Cisco and Whitefish collected east of West Dock are mostly fish that overwinter in the Sagavanirktok River, while those species collected west of West Dock (Stump Island) are mostly from the Coleville River. All of these issues most likely play a significant role in contaminant uptake for the fish from this study.

The Four Horn Sculpin and Arctic Cod are found further offshore and are apparently less influenced by nearshore conditions. Kline et al., (1999) characterized the carbon in Four Horn Sculpin as marine in origin and did not indicate an influence of freshwater carbon sources on this species. Though both the Arctic Cod and Four Horn Sculpin are marine fish, they appear to have widely divergent life history patterns. The Cod are more pelagic and appear to be more heavily influenced in their movements by prevailing winds than the Sculpin. They are found in large aggregations, both offshore and onshore, and during the summer may be found in large concentrations in the narrow band of brackish water along the shore. The Sculpin are found throughout the project area both onshore and offshore. In general, Sculpin species are not known for large seasonal migrations. Arctic Cod and Four Horn Sculpin have been recommended by the Arctic Monitoring and Assessment Program (AMAP) as candidate monitoring species because of their limited movement and association with the marine environment.

## **2.0 Methods**

### **2.1 Fish Collections**

The field program collected multiple species of fish from “impact” sites, and “reference” sites. The “impact” site for platform effects was around the Northstar production island (already under construction at the outset of Task 8). The reference for this site was the Liberty area proposed for future development. The other sites were chosen in the course of the study to characterize the regional conditions when vessel time at the platforms restricted our collection time. These sites included Stump Island, a few miles south of Northstar and west of West Dock; Point Brower,

a few miles southeast of the Endicott Causeway in the Sagavanirktok River delta, and Bullen Point, (DEW line site) approximately 5 miles southeast of the Liberty site (Fig. 1).

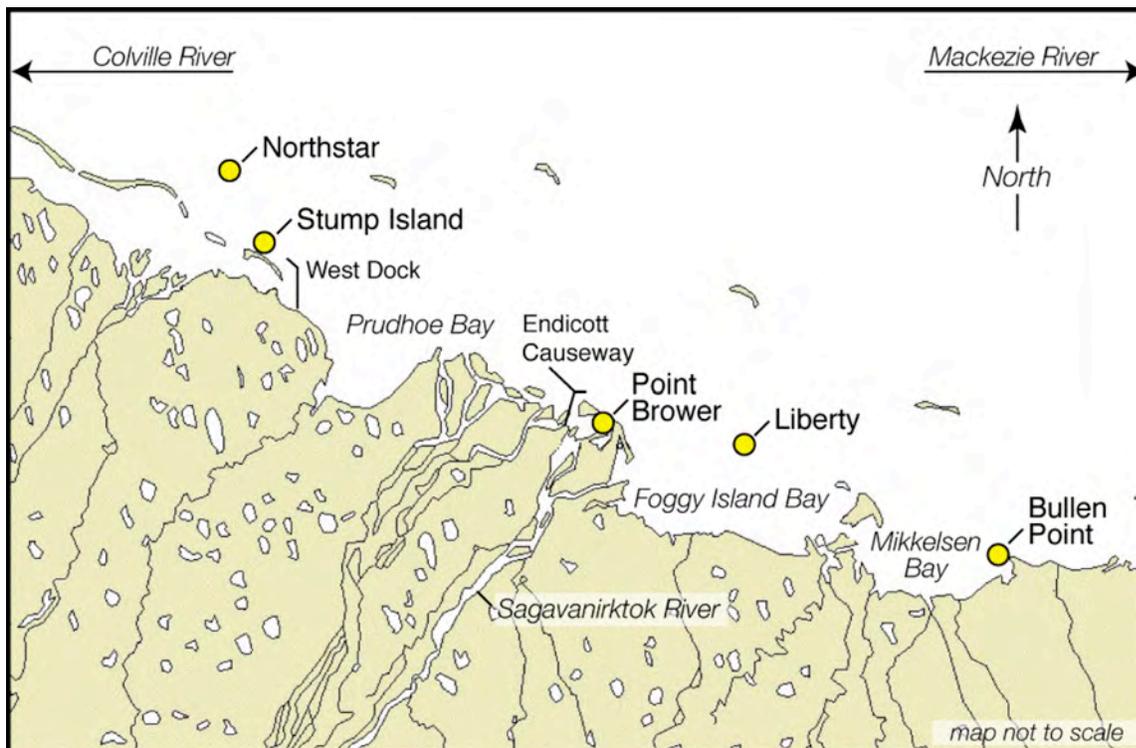


Figure 1. Locations of 2001 fish collection locations (yellow circles).

A combination of fyke net sets, gill net sets and trawl net hauls were used to capture fish in the summer of 2001 during the middle of the open water season. The field collections of fish occurred from July 25 to August 13, 2001. Methods were utilized according to site topography i.e., gill nets and trawls were used at the project sites (offshore), and fyke nets and gill nets were used at the reference sites (onshore). Fyke nets can be set in deep water by divers, however, budgetary and logistical constraints resulted in use of gill nets and trawls at Liberty and Northstar. Consideration should be given to the use of fyke nets at Northstar (and Liberty if it is completed) on the armored subsurface of the production islands for possible future collection efforts. This would require use of heavy weights to anchor the gear as rebar stakes (the traditional anchoring system for nearshore sites) could not be hammered into the concrete surface. This could be done, but would require a higher level of effort than the traditionally utilized anchoring system. Table 1 lists the latitude/longitude of each collection site and the collection method(s) employed.

Table 1. Fish collection locations and method(s)

Site Name	Location (Lat./Long.)	Method of Capture
Stump Island (SIS)	N70°25.958' W148°41.922'	fyke net
Northstar (N)	N70°29.611' W148°41.813'	trawl and gill net
Point Brower (PBS)	N70°17.650' W147°49.211'	fyke net
Liberty (L)	N70°16.672' W147°30.331'	trawl and gill net
Bullen Point (BPS)	N70°10.524' W146°50.494'	fyke net and gill net

Fyke nets were deployed through use of a small outboard-engine-powered inflatable boat owned and operated by Kinnetic Laboratories Incorporated (KLI). For the Stump Island site we mobilized from West Dock. For the Point Brower site we mobilized from Endicott, and for the Bullen Point site we mobilized from the MMS launch 1273 which anchored near the site. The fyke nets were set in a similar fashion at each of the fyke net sites, though differences in site topography resulted in slight differences in the way that the nets were deployed at each site. In general, the lead was positioned perpendicular to the shoreline and started onshore, so that fish could not swim between the shore and the lead. The lead was then anchored on the bottom with re-bar stakes all the way out to the end, approximately 30 meters. The length of the lead varied at each site, dependent on water depth. The maximum water depth being approximately 120 cm, the depth that a person (of average height), wearing chest waders can safely work. Next, one side of the trap was attached to the lead, and the wing was attached to the other side of the trap. The wing was then stretched parallel to the shoreline and anchored with re-bar. The end of the wing was always positioned up current from the trap. Both the lead and the wing are rectangular nets that have corks on the top and weights on the bottom. The mesh is approximately 3 cm stretched. This method of utilizing fyke nets has been and continues to be heavily practiced on the North Slope (though often the nets are set up with two wings, so that the net will capture fish going in either direction along the shore). It is particularly effective as many of the anadromous/amphidromous fish of the region utilize the narrow band of brackish, relatively warm water next to the shore. Fish were retrieved from the fyke nets every 24 hours, unless inclement weather precluded access to the nets. To retrieve fish from the trap, we positioned the boat next to the trap and released fish from the trap into a holding net. The fish were then immediately sorted, and any unnecessary fish were released unharmed. The fish that were kept for the study were placed in a clean seawater filled plastic tub with a lid, and transported as quickly as possible to the dissection lab.

Trawls were conducted around both the Northstar production island and the area slated for the Liberty project. The net was a small (approx. 3 m width) scientific sampling otter trawl set up for bottom trawling (as opposed to mid-water trawling). The net was deployed from the MMS launch 1273, an 11m-long aluminum vessel with a draft of 1.3 m. The net was deployed and retrieved with a single winch wire that was tied to the trawl doors. Tows were typically 1 mile in length and speed over bottom averaged approximately 2.5 knots. Water depth varied from approximately 5-15 m. Contact with the bottom was determined by inspecting the polishing of the metal runners on the bottom of the trawl doors. Additional information about the location, duration, speed and depth of the individual tows may be found in Table 1

and in Appendix A. Note that Table 1 only lists one trawl location for each trawl site. There were actually multiple trawl locations for each trawl site but they were all very close together.

Gill nets were deployed at Northstar, Liberty and Bullen Point. The nets were cut from old commercial herring nets formerly used in the San Francisco Bay (CA) fishery. They are knotted monofilament nets of approximately 5.5cm (stretched) mesh, an appropriate size for collection of most of the Beaufort Sea fishes, with the exception of young of the year Coregonids and Char, and small Cod and Snailfish. The nets were approximately 70m long and 8m deep and were rigged with anchors and floats, enabling them to sit on the sea floor. They often fished the entire water column as they were typically set in less than 8m of water, and the fairly light currents did not lay them over.

Catch per unit effort (CPUE) was determined for each of the methods. These determinations do not include mobilization and demobilization times (which differ widely for each method), and include the entire catch for each method, rather than just the fish that were selected for the study. Additionally, the CPUE's were determined for each gear type, and included all use of each gear type at all sites. The CPUE for fyke nets was 1.5 fish per hour, for gill nets was 10.6 fish per hour, and for trawls was 17.7 fish per hour.

Due to the uncertainty in knowing which species and how many fish would be captured at each site, a flexible approach was taken for species selection. In addition to the objectives previously identified, goals for fish collections included:

1. To sample fish species that are important components of local human subsistence diets, and
2. To sample species with maximum local site fidelity, so that their tissues might reflect uptake of local sources of contaminants.

These additional goals were met despite the relatively depauperate nature and low diversity of local fish populations. We kept most of the fish captured at each site, then chose the most appropriate species for analysis after the collections were completed. Multiple fish species were captured using fyke nets, otter trawls, and gillnets. Of these, eight species were collected and dissected: Four Horn Sculpin (*Myoxocephalus quadricornus*), Arctic Cod (*Boreogadus saida*), Broad Whitefish (*Coreogonus nasus*), Humpback Whitefish (*Coreogonus pidschian*), Arctic Cisco (*Coreogonus autumnalis*), Dolly Varden Char (*Salvelinus malma*), Arctic Flounder (*Pleuronectes glacialis*), and Snailfish (*Liparidae*). The Dolly Varden, Arctic Flounder, and Snailfish were not analyzed. Their tissues have been archived for potential future analysis. The original design of the field program was based on obtaining two years of data in 2000 and 2001, so that comparisons between years could be made. It was thought that potential differences in tissue contaminant residues and biomarker data from species collected at the same locations during ensuing field seasons might allow some determination of annual variability in contaminants. The original design was changed due to poor fish catches during the first field season in 2000. The poor catch was a result of several factors, including an enforced late start to the field season and limited access to the vessel in order to accommodate the needs of the other tasks. These issues were overcome to some extent during the second field season, during

which more successful fish collections were made at multiple locations. The reported data are therefore from 2001 samples only.

### *2.1.1 Fish Dissections and Sample Storage*

Dissections began as soon as possible after the daily fish collection was completed and the fish were brought to the dissection area. Fish collected at Stump Island and Northstar were dissected at British Petroleum's (formerly ARCO) seawater treatment plant at the end of West Dock. Fish collected at Point Brower and Liberty were dissected at Endicott, and fish collected at Bullen Point were dissected on the MMS launch 1273.

Jordan Gold, one of the Task 8 investigators, directed the dissections and was assisted by either two or three other ANIMIDA scientists depending on availability of personnel. One individual did all of the record keeping, filled out the dissection forms and made the labels for all of the tissue containers. Another individual removed fish from the holding tank, sacrificed them with a sharp blow to the head, and then weighed and measured the fish before providing them to the dissector. When only three people were involved, the same individual then positioned the containers for the deposit of the tissues provided by the dissector, and sealed each container after it was filled with the appropriate tissue and fixative (if used). The same individual also removed bile from the gall bladder with the help of the dissector, and deposited the bile into the bile container (a factory cleaned small glass vial with a Teflon lined cap) and then placed the container on dry ice. When a third scientist was available, that person took over the duties of processing the bile samples.

Dissections were accomplished in a very similar fashion regardless of the species being dissected. This description is for the basic process, without regard to minor differences required by the different species. Prior to the beginning of the dissections, a brief meeting was conducted to assign duties and discuss any issues for the upcoming dissections, including the order in which each species would be dissected. This was of issue as free flowing seawater was not available, so as the dissection process wore on, the water quality in the fish holding tank degraded. To minimize the chances of the fish dying prior to the end of the dissections, assessments were made as to the relative "toughness" of the individual fish species. The order in which fish were removed from the tank was generally as follows: Dolly Varden (Char), Arctic Cisco, Arctic Cod, Humpback Whitefish, Broad Whitefish, Snailfish, Arctic Flounder, and Four Horn Sculpin. This order varied on a daily basis, as all species were not caught during each collection event. Once the order of dissections was determined and everyone was ready, the fish dissections began. In general, each dissection took approximately 3 minutes, with approximately 3 minutes in between each dissection to store the dissected tissues, rinse the dissection gear and get the containers labeled for the next dissection. Once the dissections began, they continued non-stop until all fish were processed and tissues were stored.

The required containers were labeled, all dissection gear was detergent washed, rinsed with deionized (DI) water, washed with dilute HCL, rinsed with DI water,

washed with methanol and rinsed with DI water. All of the personnel handling tissues wore nitrile gloves and washed and rinsed their gloves in the same fashion as the dissection instruments. This process for cleaning gear/gloves was repeated prior to handling each fish. After being removed from the holding tank, sacrificed, measured on a millimeter scale plastic measuring board, weighed on a pesola balance (100g or 20kg scale depending on fish size), the fish was placed on the nylon dissection board. The dissector then snipped off a small piece of gill arch for P4501A, and opened up the fish by slicing from the anus through the pectoral girdle and up to the gills with a scalpel, thus exposing the organs within the peritoneal cavity. Depending on species and fish size, a second cut was sometimes made through the musculature dorsal of the pectoral girdle to facilitate exposure of the peritoneal cavity. The gall bladder was then located and bile was removed through the use of a small gauge pre-cleaned syringe. A snip of liver, gut, heart (whole heart in small fish), kidney, spleen, muscle (from the belly) and gonad was then removed for P4501A, and all P4501A samples were placed in an HDPE container. The sex was visually determined if possible, notes were made about irregularities (such as fin deformities, lesions, abnormal characteristics, or swollen or discolored organs), peritoneal fat and parasites, and the remaining carcass was then either placed in a factory-cleaned glass container, or if too large, was wrapped in combusted foil and then placed in a Ziploc bag for future organics and metals analyses. The carcasses were placed on dry ice if on the boat, or in a freezer if ashore. The bile was frozen on dry ice prior to being placed in a freezer. The P4501A samples were fixed in 10% formalin in seawater. Additionally, rinse blanks (equipment blanks) of the dissection gear were periodically taken by collecting DI water poured over cleaned dissection gear to ensure that the cleaning procedures were adequate, and that they were not contributing (assayed) contaminants to the tissue samples. These blanks were collected into factory cleaned glass containers, and were frozen for shipment to the analytical labs.

At the end of the field season, P4501A samples and frozen bile samples (packed with dry ice) were shipped to AMS's facilities in California and the frozen carcasses were shipped to ICF's facilities in Massachusetts. On arrival at the laboratories, the samples were logged in and either placed in freezers (carcasses and bile) or stored at room temperature (P4501A).

The determination was then made as to which samples should be analyzed. ICF was notified and they homogenized the carcasses and archived portions in their freezers for possible metals analyses. These archived portions were later shipped to Dr. John Trefry's lab in Melbourne, Florida (Florida Institute of Technology) where the metals analyses were conducted. AMS shipped the bile samples to Dr. Peggy Krahn's lab in Seattle, Washington (National Marine Fisheries Service), and the P4501A samples to Dr. John Stegeman's lab in Woods Hole, Massachusetts (Woods Hole Oceanographic Institute).

Though notes were taken of parasites, deformities/irregularities, and peritoneal fat, no analysis was undertaken that utilized this information. These notes are in the individual dissection sheets in the appendices.

## 2.2 Analyses of Contaminants and Biomarkers

The analyses included organic (i.e., petroleum and non-petroleum related) and metal parameters in tissues, bile FAC's (a marker of short-term on time scales of hours to days, exposure to aromatic hydrocarbons), and the biomarker CYP1A (a marker of exposure to aromatic and some chlorinated hydrocarbons, e.g., coplanar PCBs, for periods of days to weeks). Analytes are listed in Table 2.

Table 2. List of all assayed analytes.

<b>Whole Body Organic Compounds</b>	
8 - 2,4'-Dichlorobiphenyl (Cl2)	lindane
18 - 2,2',5'-Trichlorobiphenyl (Cl3)	Mirex
28 - 2,4,4'-Trichlorobiphenyl (Cl3)	Toxaphene
44 - 2,2',3,5'-Tetrachlorobiphenyl (Cl4)	Naphthalene
52 - 2,2',5,5'-Tetrachlorobiphenyl (Cl4)	Benzo[g,h,i]perylene
66 - 2,3',4,4'-Tetrachlorobiphenyl (Cl4)	Biphenyl
101 - 2,2',4,5,5'-Pentachlorobiphenyl (Cl5)	C1-Naphthalenes
105 - 2,3,3',4,4'-Pentachlorobiphenyl (Cl5)	C2-Naphthalenes
118 - 2,3',4,4',5'-Pentachlorobiphenyl (Cl5)	C3-Naphthalenes
128 - 2,2',3,3',4,4'-Hexachlorobiphenyl (Cl6)	C4-Naphthalenes
138 - 2,2',3,4,4',5'-Hexachlorobiphenyl (Cl6)	Acenaphthylene
153 - 2,2',4,4',5,5'-Hexachlorobiphenyl (Cl6)	Acenaphthene
170 - 2,2',3,3',4,4',5'-Heptachlorobiphenyl (Cl7)	Anthracene
180 - 2,2',3,4,4',5,5'-Heptachlorobiphenyl (Cl7)	Dibenzothiophene
187 - 2,2',3,4',5,5',6'-Heptachlorobiphenyl (Cl7)	C1-Dibenzothiophenes
195 - 2,2',3,3',4,4',5,6'-Octachlorobiphenyl (Cl8)	C2-Dibenzothiophenes
206 - 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl (Cl9)	C3-Dibenzothiophenes
209 - 2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (Cl10)	Fluorene
2,4'-DDD	C1-Fluorenes
2,4'-DDE	C2-Fluorenes
2,4'-DDT	C3-Fluorenes
4,4'-DDD	Phenanthrene
4,4'-DDE	C1-Phenanthrenes / anthracenes
4,4'-DDT	C2-Phenanthrenes / anthracenes
Aldrin	C3-Phenanthrenes / anthracenes
alpha-Chlordane	C4-Phenanthrenes / anthracenes
cis-Nonachlor	Benzo[a]anthracene
gamma-Chlordane	Chrysene
Heptachlor	C1-Chrysenes
Heptachlor Epoxide	C2-Chrysenes
Oxychlordane	C3-Chrysenes
Methoxychlor	C4-Chrysenes
trans-Nonachlor	Fluoranthene

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alpha-hexachlorocyclohexane	Pyrene
beta-hexachlorocyclohexane	C1-Fluoranthenes/ pyrenes
delta-hexachlorocyclohexane	C2-Fluoranthenes/ pyrenes
Endosulfan I	C3-Fluoranthenes/ pyrenes
Endosulfan II	Benzo[a]pyrene
Endosulfan Sulfate	Benzo[e]pyrene
Dieldrin	Benzo[b]fluoranthene
Endrin	Benzo[k]fluoranthene
Endrin Aldehyde	Dibenzo[a,h]anthracene
Endrin Ketone	Perylene
hexachlorobenzene	Indeno[1,2,3,-c,d]pyrene

**Bile Fluorescent Compounds**

PHN Equivalents (ng/g)	BaP Equivalents (ng/g)
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**P4501A Response**

liver hepatocytes	skin/ muscle vascular endothelium
liver vascular endothelium	gonad vascular endothelium
liver bile ducts	gut mucus epithelium
gill pillar cells	gut vascular endothelium
gill epithelium	spleen vascular endothelium
gill vascular endothelium	heart atrial endothelium
kidney tubules	heart ventricle endothelium
kidney vascular endothelium	

**Whole Body Metal**

arsenic	mercury
barium	nickel
cadmium	lead
chromium	selenium
copper	vanadium
iron	zinc

### *2.2.1 Tissue Organic Residue Analyses*

Tissue organic residue analysis was conducted through analysis of PAHs with GC/MS (gas chromatograph mass spectrometry) and the PCBs and pesticides through GC/ECD (gas chromatograph electron capture detection). The PCB and pesticide data reflect individual lifetime exposure to non-metabolized organic compounds, while PAH residues reflect some fraction of accumulated PAH, i.e., the non-metabolized fraction.

This section describes the sample preparation and analytical methods that were used in performing the organic chemical analyses.

#### *2.2.1.1 Tissue Sample Preparation*

The entire fish body was homogenized for all samples. A 5-gram aliquot was removed from each homogenized fish sample, frozen, and sent to John Trefry at Florida Institute of Technology (FIT) for metals analysis. Since metals determinations were to be performed on the homogenized tissue samples, the use of stainless steel utensils were avoided when handling the tissue samples. Whenever possible, Teflon<sup>®</sup> coated or titanium utensils were used to handle the tissue samples.

Samples were grouped together into four batches of 20 or fewer samples plus associated quality control samples. The level of contamination in the samples was expected to be low. A procedural blank (PB), blank spike (BS), laboratory duplicate, and tissue standard reference material (SRM) sample were extracted with each batch of tissue samples.

A 5-gram aliquot of each homogenized sample was removed for dry weight determination. Approximately 15 grams wet weight of tissue homogenate was transferred to a clean Teflon<sup>®</sup> centrifuge tube for digestion. The remainder of the homogenate was re-labeled and stored frozen as archived samples.

Thirty (30) mL of pre-extracted 6N potassium hydroxide and the surrogates were added to each homogenized tissue sample. The surrogates used were naphthalene-d<sub>8</sub>, acenaphthene-d<sub>10</sub>, phenanthrene-d<sub>10</sub>, and benzo[a]pyrene-d<sub>12</sub> for PAH analysis and dibromo-octafluorobiphenyl, PCB 103, and PCB 198 for PCB and pesticide analysis. Surrogate compounds were spiked into all tissue samples at the low-level because target compound concentrations in the samples were expected to be at trace levels. The container was then flushed with purified nitrogen, sealed, and allowed to digest overnight in a hot water bath at approximately 35°C. After digestion, 30 mL of ethyl ether was added to each sample and the mixture was agitated on an orbital shaker for 5 minutes. The samples were then centrifuged at 2,000 revolutions per minute (rpm) for 5 minutes to facilitate phase separation. The ether layer was removed using a Pasteur pipette and filtered through sodium sulfate into a 250-mL K-D apparatus. The ether extraction of the digest was repeated twice, and the ether extracts combined in the K-D apparatus. The combined ether extract from each sample was reduced in volume to approximately 1 mL by K-D and nitrogen concentration techniques. The extracts were then exchanged to methylene chloride

and an aliquot was removed and weighed on an electrobalance for total non-saponifiable, lipid-weight determinations.

#### *2.2.1.2 Extract Fractionation*

The fish tissue extracts were fractionated in order to remove potential interference and to improve the quality of the analysis at trace levels. Prior to fractionation, the sample extracts were exchanged from hexane to methylene chloride under nitrogen.

The fractionation was performed using a 30-cm by 1-cm column that was wet-packed in methylene chloride with 100 percent activated silica gel/5 percent deactivated alumina/activated copper (approximately 11:1:2 g) and preconditioned with 30 mL methylene chloride followed by 30 mL of hexane. The sample extract (which had been verified to be less than 50 mg extractable material per 1 mL) was loaded onto the column. The sample was eluted with 18 mL of hexane and the isolated saturate (f1) fraction was collected. This was followed by 21 mL of hexane:methylene chloride (1:1) to isolate the aromatic (f2) fractions.

#### *2.2.1.3 Internal Standard Addition*

The extracts (or extract fractions) were reduced to a measured final volume under a stream of nitrogen. The final sample extracts were spiked with PAH and pesticide/PCB internal standards, as appropriate for each extract or fraction. In general, the extracts were concentrated to approximately 250 microliter ( $\mu\text{L}$ ) before adding the internal standards in order to lower detection limits. The internal standard compounds used were chrysene-d12 and fluorene-d10 for PAH analysis and tetrachlorometaxylene for pesticide/PCB analysis.

#### *2.2.1.4 Organic Instrumental Analysis*

Instrumental analysis of the tissue samples was performed by GC/MS for PAHs and by GC/ECD for pesticides and PCBs. The laboratory SOPs include the acceptability criteria for the calibration, procedural blank, surrogate compound recoveries, and spike recoveries, as well as the corrective action if the criteria are not met, reporting requirements, and method detection limit (MDL) protocols. The data quality objectives (DQO) for these analyses are summarized in Tables 3 and 4.

#### *2.2.1.5 Polynuclear Aromatic Hydrocarbons by Gas Chromatography/Mass Spectrometry*

Analysis for PAHs was performed according to ICFs SOP ICF-2827, "Determination of Polynuclear Aromatic Hydrocarbons and Selected Heterocyclic Compounds by Gas Chromatography/Mass Spectrometry in the Selected Ion Monitoring Mode." (see US EPA 1993; method 8270). ICF's PAH analysis method is a modified version of EPA's SW-846 Method 8270. The target PAHs compounds are listed in Table 2. The GC/MS was operated in selected ion monitoring (SIM) mode to obtain the desired sensitivity. The GC/MS was first tuned with perfluorotributylamine (PFTBA) to verify accurate mass assignment and to maximize the sensitivity of the instrument in the mass range of interest (100 to 300 atomic mass units). After tuning, an initial calibration was performed which consisted of five calibration standards, at different

concentration levels, spanning the concentration range of interest. Average response factors for each target compound and surrogate are calculated from the initial calibration standards relative to the internal standard compounds added to the sample extracts just prior to instrumental analysis (internal standardization). Continuing calibration standards, at a mid-range concentration level, were analyzed every 18 hours or after every 12 sample analyses to monitor sensitivity and linearity of the GC/MS. The average response factors generated from the initial calibration were used to calculate the concentrations of target compounds and surrogates in the environmental and quality control samples. The recoveries of the surrogate compounds spiked into the samples prior to extraction were used to assess sample-specific extraction efficiency. The target compound concentrations were adjusted based on sample-specific surrogate recoveries to correct for differences in extraction efficiency (surrogate corrected).

#### *2.2.1.6 Chlorinated Pesticides and PCB Congeners by Gas Chromatography/Electron Capture Detector*

Analysis for pesticides and PCBs was performed according to ICFs SOP ADL-2818, "Determination of Chlorinated Pesticides and PCB Congeners by Gas Chromatography/Electron Capture Detection." (see US EPA 1993; method 8081/8082). ICF's pesticide and PCB congener analysis method is a modified version of EPA's SW-846 Method 8081 using dual, dissimilar columns and dual detectors. A Restek RTX-5 column (or equivalent) was used as the primary column and a DB-17 column (or equivalent) was used as the confirmation column. The target pesticide and PCB congeners compound lists are listed in Table 2. Prior to sample analysis, an initial calibration was performed which consisted of five calibration standards at different concentration levels ranging from 1 to 200 ng/mL. Average calibration factors for each target compound and surrogate were calculated from the initial calibration standards (external standardization). Continuing calibration standards, at a mid-range concentration level, were analyzed every 18 hours or after every 10 sample analyses to monitor sensitivity, retention time stability, and linearity of the GC/ECD. Sample analyses were performed after acceptable calibration analyses were obtained. The average calibration factors generated from the initial calibration were used to calculate the concentrations of target compounds and surrogates in the environmental and quality control samples. When coelution occurred between one or more target compounds or when interference occurred on the primary column, the results were reported from the confirmation column for the affected compounds. Compound identification was based on 1) detecting a peak within the established retention time window for a specific compound on both the primary and confirmation columns and 2) the analyst's judgment. The recoveries of the surrogate compounds spiked into the sample prior to extraction were used to assess sample-specific extraction efficiency. The target compound concentrations were adjusted based on sample-specific surrogate recoveries to correct for differences in extraction efficiency.

#### *2.2.1.7 Organic Chemistry Laboratory Quality Control*

##### *Data Quality Objectives and Quality Control Samples*

A set of DQOs was established for the program to ensure that the analytical data would be of the quality necessary to achieve the project objectives. The DQOs were adapted from the specific laboratory analytical SOPs and were included in the laboratory workplan specific for the program. They are included here as Tables 3 and 4. Tables 5 and 6 summarize the quality control results for PAH's, PCB's and pesticides.

For processing, samples were grouped together in batches of 20 field samples, plus associated QC samples. In general, the QC samples processed with each batch of tissue samples included one procedural blank, one blank spike, one SRM (Tissue SRM 1974a), and one duplicate analysis. The blank spike sample was fortified with PAH, pesticide, and PCB matrix spike solutions.

There were a number of additional measures added to the processing of the samples to monitor QC and to aid in the assessment of the data's usability with respect to the program objectives. An important part of this is the evaluation of specific QC samples for accuracy, precision, and potential contamination. The following is a general description of some elements.

##### *2.2.1.8 Solvent and Standard Checks*

Prior to sample analysis, every lot of solvent used in the analytical process was analyzed in duplicate to verify that it was free of contamination and acceptable for use. Likewise, prior to spiking the samples with surrogates and internal standards, all standard preparation records were checked. No standards were used for an analysis unless they had been approved for use.

##### *2.2.1.9 Instrument Calibration*

Before instrumental analysis of sample extracts, a multi-level calibration was analyzed and the linearity of the analyte response factors were evaluated. A continuing calibration standard was analyzed regularly to check the stability of the instrument response. If the relative standard deviations (RSDs) for the initial calibration or the percent difference of the daily calibration did not meet the criteria set in the SOP, a new calibration was run and the affected samples re-analyzed.

##### *2.2.1.10 Reference Samples (for PAHs)*

To assess the accuracy of the mixture used to calibrate the method, an independently verified instrument standard reference material (IRM) was analyzed against the calibration standard for PAH samples. The values of the analytes had to be within 15 percent of the target value for the calibration solution to be valid.

In addition, a solution of an assayed crude oil was analyzed with each initial calibration sequence and the results were compared to a laboratory-established mean

to assess method accuracy. The solution was also used to provide petroleum pattern information and to aid in qualitative identification of target compounds.

#### *2.2.1.11 Procedural Blank*

A procedural blank was processed and analyzed with each analytical batch in order to monitor potential contamination resulting from laboratory solvents, reagents, glassware, and processing procedures.

#### *2.2.1.12 Blank Spike*

A blank matrix was spiked with representative target compounds prior to extraction to assess the effect of the sample processing procedure independent of sample matrix effects.

#### *2.2.1.13 Laboratory Duplicate*

A field sample was analyzed in duplicate to assess the precision of the method in the target matrix.

#### *2.2.1.14 Standard Reference Materials*

A Standard Reference Material of a well-characterized sample of known concentration was processed through sample preparation and instrumental analysis with each batch of samples. The results were compared to externally certified values to assess method accuracy. This program used tissue SRM 1974a provided by National Institute of Standards and Technology (NIST).

#### *2.2.1.15 Laboratory Records*

The laboratory maintained detailed records throughout the processing of the samples. All raw instrumental data were archived electronically. Completed records or copies of forms were collated into a binder for final archive storage. The final laboratory data package contains sufficient detail so that an external audit could be performed. The documentation in the final data package includes:

- Lot numbers, vendor, and preparation records for reagents and standards
- Sample preparation records
- Analytical procedures used that are not documented in laboratory SOPs
- Instrument analysis records
- Instrument raw data hardcopy
- Documentation of observations or deviations encountered

#### *2.2.1.16 Laboratory Data Review*

The following describes the process of data reporting and review by the laboratory. The chemistry data for each analysis were reduced and reviewed by the laboratory staff and then assembled into the final data package. The assembled package was peer reviewed and checked to ensure that the DQOs were met, that the analyses met the program objectives, and that the data was traceable and defensible. The data was

also reviewed for compliance with the documented procedures and quality objectives in the work plan. Also, data was reviewed for internal consistency and against expected or known values.

After the final laboratory data package review, it was subjected to a formal audit. The audit process is coordinated by the QA Manager and follows the procedure outlined in the ICF Data Review SOP. The formal audit process included a 100-percent review of all hand-calculated values and a 20-percent review of computer-generated results. The process also checked the traceability of a final result through the instrument calibration and to the sample preparation steps. A formal report was issued to the facility supervisors at the completion of the audit for response. Upon completion of the responses, the auditor released the results to the Program Manager for review and reporting. The final laboratory data package and the audit report are maintained in the laboratory files.

#### *2.2.1.17 Organics Quality Control Results*

Laboratory QC samples were analyzed to assess precision and accuracy of the sample preparation and analytical procedures. The number and type of laboratory QC samples was based on the total number of field samples and as specified in ICF SOPs and the Field Sampling and Logistics Plan (Arthur D. Little, 2001). For this program, the following laboratory QC samples and measures were used to evaluate accuracy and precision of the analytical data: surrogate recoveries, procedural blanks, blank spike samples, laboratory duplicates, standard reference materials, and oil reference standards. The results for the organic QC samples and measures are presented in Appendix C, along with the results for the associated environmental samples. Discussion and interpretation of the results are provided in the following sections.

#### *2.2.1.18 Surrogate Results*

Surrogate compounds were added to all environmental and QC samples prior to sample preparation. These compounds were added to determine the efficiency of the sample extraction and analysis procedures. Surrogate recoveries were evaluated to assess analytical method accuracy relative to sample matrix and laboratory performance.

For the PAH analyses, all of the environmental and QC sample surrogate recoveries were within the recovery acceptance limits, with several exceptions. Surrogates acenaphthene-d10 and phenanthrene-d10 recovered low in sample N25-126-ACD; naphthalene-d8 recovered low in samples N25-128-ACD, PBS-75-BW, L14-90-AD, L14-96-FS, and BPS-109-FS; naphthalene-d8 and acenaphthene-d10 recovered low in sample L14-92-AD; and benzo(a)pyrene-d12 recovered low in samples SIS-12-HW and SIS-21-HW. Also, one blank spike had low recoveries for all four surrogates and the associated method blank had low recoveries for two surrogates. The surrogate recovery outliers ranged from 31 to 44 percent. The target compound results in the affected samples are considered to be estimated values.

For the pesticide/PCB analyses, all of the environmental and QC sample surrogate recoveries were within the recovery acceptance limits, with one exception. One blank

spike had a low recovery for dibromo-octafluoro-biphenyl. The method blank and associated field samples had acceptable surrogate recoveries indicating that the poor extraction efficiency in the blank spike was an isolated occurrence, thus, the low surrogate recovery in the blank spike do not adversely affect the quality or usability of the associated environmental sample data.

#### *2.2.1.19 Procedural Blanks*

A laboratory procedural blank was prepared with each sample preparation batch by extracting a blank sample matrix (sodium sulfate) as if it were one of the environmental samples. Procedural blanks are used to assess the potential of contamination introduced during sample preparation and analysis. PAH, pesticide, and PCB analyses were performed on each PB.

For the PAH analyses, between five and eighteen PAH target compounds were detected at trace concentration less than the MRL in each of the tissue PBs. For the pesticide and PCB analyses, between one and three pesticides and between one and ten PCBs were detected at trace concentrations less than the MRL in each of the tissue PBs. One pesticide/PCB PB associated with samples BPS-121-FS and N25-126-ACD was contaminated with the matrix spike solution at concentration above the MRL. Inadequate sample mass was available to re-prepare and re-analyze these two samples, and thus they have been reported, as is, along with the contaminated blank. There is no indication that the associated samples were contaminated with the matrix spike solution.

Environmental sample results that were within 5 times the associated PB concentration were qualified with a “B” to indicate that the compound was also present in the blank. Of the results that were qualified with a “B”, none of these results were at concentrations greater than 5 times the sample-specific MRL. Results that were qualified with a “B” may be biased high or may be false positives.

#### *2.2.1.20 Blank Spike Sample Recoveries*

A blank spike sample was prepared with each sample preparation batch by spiking a blank sample matrix with known concentrations of a subset of the target compounds. BSs are used to assess the accuracy of the sample preparation and analysis procedures independent of sample matrix effects.

For the PAHs analyses, the recoveries of between three and sixteen compounds in each tissue BS exceeded the acceptance criteria with recoveries ranging from 126 to 160 percent. The QC sample results were adjusted based on surrogate recoveries and these exceedances may have resulted from lower surrogate recoveries in the BS analysis. The affected target compound results in the associated samples are considered to be estimated values and may be bias high.

For the pesticide/PCB analyses, all recovery criteria were met with several exceptions: 4,4'-DDD recovered high in four of eight BSs; 2,4'-DDT recovered high in three of eight BSs; 2,4'-DDE and dieldrin recovered high in two of eight BSs; and PCB 180 recovered high in one of eight BSs. The outlying BS recoveries ranged from 130-

140 percent. The affected target compound results in the associated samples are considered to be estimated values and may be bias high.

#### *2.2.1.21 Laboratory Duplicates*

Laboratory duplicates were prepared with each sample preparation batch by extracting a second separate aliquot of an environmental sample. Laboratory duplicates were evaluated to assess analytical precision related to laboratory performance and sample matrix. PAH, pesticide, and PCB analyses were performed on each laboratory duplicate.

For the PAH, pesticide, and PCB analyses, good laboratory duplicate precision was noted with one exception. Several compounds in the pesticide and PCB duplicate analysis of sample BPS-113-FS exceeded relative percent difference (RPD) criterion of less than 30 percent for all compounds detected at concentrations greater than 2 times the MRL. The results for this sample should be considered estimated due to potential sample heterogeneity. For the remaining field duplicate pairs, the RPDs were less than 30 percent for all of the compounds detected at concentrations above two times the MRL and for the majority of the compounds detected at concentrations below two times the MRL. The laboratory duplicate precision criterion does not apply to compounds detected below two times the MRL due to increased variability at low concentrations. (RPD was calculated as the absolute difference between the two measurements divided by the mean of the two measurements).

#### *2.2.1.22 Standard Reference Materials*

Instrument Standard Reference Materials (IRM) were analyzed with each instrumental analytical sequence to assess accuracy of the instrument calibration. A matrix-specific SRM was prepared and analyzed with each sample preparation batch to assess accuracy of the analytical method relative to sample preparation and analysis procedures. PAH, pesticide, and PCB analyses were performed on each SRM.

##### *Instrument SRM (IRM)*

IRM 1491 was analyzed prior to each PAH, pesticide, and PCB analytical sequence. The percent differences (%Ds) of the measured values versus the certified values were within 15 percent for all instrument SRMs with several exceptions. PCB 101 and PCB 128 recovered high in one IRM (15.4 and 17%, respectively) and 4,4'-DDD recovered low in two IRMs (-23.4 and -27.4%). The PCB 101 and PCB 128 results may be bias high in the associated samples and the 4,4'-DDD results may be bias low in the associated samples.

##### *Tissue SRM*

SRM 1974a was prepared and analyzed for PAHs, pesticides, and PCBs along with the tissue samples.

For the pesticide/PCB analyses, all of the compound concentrations were within 35 percent of the certified values with the following three exceptions: cis-Nonachlor recovered high in two of eight SRMs (66.7 and 57.9 percent) and dieldrin recovered

high in one SRM (54.2 percent). The affected target compound results in the associated samples are considered to be estimated values and may be bias high. For the PAH analyses, all of the compound concentrations were within 35 percent of the certified values with the following exceptions: anthracene recovered high in all SRMs (215, 37.5, 197, 118, 130, 149, and 138 percent); acenaphthylene recovered high in one SRM (155 percent); phenanthrene recovered high in one SRM (43.2 percent); benzo(b)fluoranthene recovered high in two SRMs (51.1 and 60.8 percent); benzo(k)fluoranthene recovered high in 3 SRMs (70.5, 53.1, and 58.1 percent); benzo(e)pyrene recovered high in two SRMs (38.1 and 35.7 percent); benzo(g,h,i)perylene recovered high in two SRMs (52.7 and 40.4 percent); and naphthalene recovered high in two SRMs and low in one (56.6, 82.1, and -47.2 percent).

The high recoveries of anthracene are consistent with the results obtained for this compound in multiple (more than 40 samples) analyses of SRM 1974a over the last four years by ICF. This QC issue does not impact the quality or usability of the associated sample data since acceptable recoveries for anthracene were noted in the IRM analyses, and since it appears that the certified value for anthracene in NIST SRM 1974a is incorrect. The results in the tissue samples for the remaining compounds may be biased high as indicated by the high recoveries in the tissue SRM. These SRM exceedances have a minor impact on the quality and usability of the associated sample data since the exceedances were not extreme and did not result in any data being considered unusable.

#### *2.2.1.23 Control Oil Analyses*

A North Slope crude oil sample was analyzed prior to each analytical sequence for PAHs. The results of the North Slope Crude oil analyses were used to evaluate accuracy of the analytical methods, provide a chromatographic pattern for comparisons with samples, and provide an independent check of the quantitation for alkyl PAHs. Results of the control oil analyses were compared to laboratory mean values generated from multiple analyses of the oils. All of the PAH results were within the acceptance limits.

Table 3. Data Quality Objectives – PAHs by GC/MS/SIM

Element or Sample Type	Minimum Frequency	Acceptance Criteria
MS Tuning Check	Prior to each analytical sequence	Using PFTBA: m/z 69: base peak abundance set to high sensitivity m/z 219: 30-60% of base peak abundance m/e 502: 2-8% of base peak
Initial Calibration	Prior to every batch sequence.	5 point curve; %RSD £25% for 90% of compounds and £35% for all compounds
Continuing Calibration	Every 12 field samples or 16 hours (whichever is more frequent) and at end of analytical sequence	%RSD £25% for 90% of compounds and %RSD £35% for all compounds.
Oil Reference Sample (North Slope Crude)	After each initial calibration sequence	%D £35% from laboratory established target value (use surrogate corrected results)
Instrumental SRM (SRM 1491)	After each initial calibration sequence	%D £15% from target value for all certified compounds (use surrogate corrected results)
Procedural Blank	Every preparation batch of 20 or fewer samples	No more than 2 compounds to exceed 5x target MDL unless compound not detected in associated sample(s) or associated sample compound concentration is >5x blank value
Standard Reference Material	Every preparation batch of 20 or fewer samples	%D £35% from target value for all certified compounds (use surrogate corrected results)
Blanks Spike	Every preparation batch of 20 or fewer samples	%R 35-125%; RPD £35%
Laboratory Duplicate	Every preparation batch of 20 or fewer samples	RPD £30% for all compounds at concentrations >2x MRL
Surrogate Compounds	Every sample	%R 35-125% for d <sub>8</sub> -naphthalene and d <sub>12</sub> -benzo[a]pyrene; 45-125% for d <sub>10</sub> -acenaphthene and d <sub>10</sub> -phenanthrene
Internal Standard Compounds	Every sample	Area response 50-200% of previous continuing calibration check standard

Table 4. Data Quality Objectives – Pesticides and PCB Congeners by GC/ECD

Element or Sample Type	Minimum Frequency	DQO/ Acceptance Criteria
Initial Calibration	Prior to every instrument batch sequence or as needed indicated by continuing calibration check	5 point curve; %RSD £25% for 90% of compounds and £35% for all compounds
Continuing Calibration	After every 10 field samples or 18 hours, whichever is more frequent, and at end of instrument batch sequence	%RSD £25% for 90% of compounds and %RSD £35% for all compounds.
Instrumental SRM (SRM 1491)	After each initial calibration sequence	%D £15% from target value for all certified compounds (use surrogate corrected results)
Procedural Blank	One per preparation batch or one per 20 samples or one per extraction type	No compound to exceed the MRL
Blank Spike	One per 20 samples	Recovery between 45 and 125%
Laboratory Duplicate	Every preparation batch of 20 or fewer samples	RPD £30% for all compounds at concentrations >2x MRL
Standard Reference Materials	As requested (approximately 1 set per twenty field samples)	Percent difference within ± 35% for certified compounds
Surrogate Standards	Every sample and blank	Recovery between 45 and 125%
Internal Standard Compounds	Every sample	Area response 50-200% of previous continuing calibration check standard

Table 5. Organic Quality Control Result Summary – Polynuclear Aromatic Hydrocarbon Analyses

QC Sample or Measurement Type	Acceptance Criteria	Quality Control Result Summary	Impact to Data Quality and Usability
Initial Calibration	%RSD <25% for all compounds (up to 10% of compounds can be >25%, but <35%)	All criteria were met.	None.
Continuing Calibration	%D <25% for all compounds (up to 10% of compounds can be >25%, but <35%)	All criteria were met.	None.
Surrogate Recoveries	45 to 125% recovery (35 – 125% for d8-naphthalene)  d8-naphthalene (d8n) d10-acenaphthene (d10a) d10-phenanthrene (d10p) d12-benzo(a)pyrene (d12b)	All criteria were met with the following exceptions: d10a and d10p recovered low in N25-126-ACD; d8n recovered low in N25-128-ACD, PBS-75-BW, L14-90-AD, L14-96-FS, and BPS-109-FS; d8n and d10a recovered low in L14-92-AD; and d12b recovered low in SIS-12-HW and SIS-21-HW. Low surrogate recoveries were also noted in one PB and BS.	Minor. The results for affected tissue samples should be considered estimated values due to low surrogate recoveries.
Procedural Blank (PB)	No compound to exceed 5 times the MDL unless sample amount is >10 times blank amount	All criteria were met. Several PAHs were detected in the tissue blanks at trace concentrations, but were less than 5 times the MDL.	Minor. Results within 5 times the blank result were qualified “B” and may be biased high or false positives.

Table 5. Organic Quality Control Result Summary – Polynuclear Aromatic Hydrocarbon Analyses Continued...

QC Sample or Measurement Type	Acceptance Criteria	Quality Control Result Summary	Impact to Data Quality and Usability
Blank Spike (BS) Sample Recoveries	35 to 125% recovery for spiked compounds	Each BS had 3 to 16 compounds with high spike recoveries ranging from 126 to 160%.	Minor. Results for these compounds in the associated samples may be bias high.
Laboratory Duplicate	RPD <30% for all compounds >2 times the MRL	All criteria were met.	None.
Instrument SRM (1491)	Measured values must be within 15% of true value for all certified compounds	All criteria were met.	None.
Tissue SRM (1974a)	Measured values must be within 30% of the true value on average for all compounds, not to exceed 35% of true value for more than 30% of the compounds	All criteria were met for the tissue SRM, with the exception of high responses for anthracene in 7 of 7 SRMs, acenaphthylene in 1 of 7, phenanthrene in 1 of 7, benzo(b) fluoranthene 2 of 7; benzo(k)fluoranthene in 3 of 7, benzo(e)pyrene in 2 of 7, and benzo(g,h,i)perylene in 2 of 7; and low responses for naphthalene in 3 of 7 SRMs.	Minor. The certified value for naphthalene and anthracene in SRM 1974a appears to be incorrect based on consistently high anthracene results in repeated analyses over the past four years. The results for the remaining compounds in the associated samples may be bias high.
Oil Reference Standard (North Slope Crude)	%D <35% for compounds above the RL	All criteria were met.	None.

Table 6. Organic Quality Control Result Summary – Pesticide and PCB Congener Analyses

QC Sample or Measurement Type	Acceptance Criteria	Quality Control Result Summary	Impact to Data Quality and Usability
Initial Calibration	5 point curve; %RSD £25% for 90% of compounds and £35% for all compounds	All criteria were met.	None.
Continuing Calibration	%RSD £25% for 90% of compounds and %RSD £35% for all compounds.	All criteria were met.	None.
Surrogate Recoveries	45 to 125% recovery	All criteria were met with the exception of one low surrogate recovery in blank spike sample.	None. Surrogate recoveries in all field samples were acceptable.
Procedural Blank	No compound to exceed the MRL	All criteria were met. Several pesticides and PCBs were detected at trace concentrations less than the MRL.	Minor. Results within 5 times the associated blank result were qualified with a "B" and may be biased high or may be false positives.
Blank Spike (BS) Sample Recoveries	45 to 125% recovery for spiked compounds	All criteria were met with several exceptions: 4,4'-DDD recovered high in 4 of 8 BSs; 2,4'-DDT recovered high in 3 of 8 BSs; 2,4'-DDE and dieldrin recovered high in 2 of 8 BSs; and PCB 180 recovered high in 1 of 8 BSs.	Minor. The 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, dieldrin, PCB 180 results in the associated samples may be biased high by 30-40%.
Laboratory Duplicate	RPD <30% for all compounds >2 times the MRL	All criteria were met with the exception of several compounds in lab duplicate pair of sample 01-BPS-113-PHC-T-FS-DUP.	Minor. The results in sample 01-BPS-113-PHC-T-FS-DUP should be considered estimated due to potential sample heterogeneity.

Table 6. Organic Quality Control Result Summary – Pesticide and PCB Congener Analyses Continued...

QC Sample or Measurement Type	Acceptance Criteria	Quality Control Result Summary	Impact to Data Quality and Usability
Tissue SRM (1974a)	Measured values must be within 30% of the true value on average for all compounds, not to exceed 35% of true value for more than 30% of the compounds	All criteria were met with three exceptions: cis-Nonachlor recovered high in 2 of 8 SRMs and dieldrin recovered high in 1 of 8 SRMs.	Minor. The cis-Nonachlor and dieldrin results may be bias high in the associated samples.
Instrument Reference Material (IRM)	%D £15% from target value for all certified compounds	All criteria were met with several exceptions: PCB 101 and PCB 128 recovered high in one IRM; and 4,4'-DDD recovered low in two IRMs.	Minor. The PCB 101 and PCB 128 results may be bias high in the associated samples and the 4,4'-DDD results may be bias low in the associated samples.

### 2.2.2 Trace Metals Analysis in Fish Tissue

Prior to acid digestion, the homogenized tissue samples received from ICF were thawed and re-mixed with a Teflon stirring rod. The samples were then split into two portions, one subsample to be digested wet for Hg and the other to be freeze-dried and digested for determination of the remaining trace metals. The freeze-dried subsamples also provided the percent water content data to convert the Hg results from a wet-weight to dry-weight basis.

The concentrations of all metals (except Hg) were determined using 2 to 7 grams of wet-weight tissue weighed into 100-mL glass digestion flasks. These subsamples were freeze-dried, reweighed for percent water content, and then digested by the sequential addition of concentrated, high-purity nitric acid (HNO<sub>3</sub>), hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), and hydrochloric acid (HCl) with gentle refluxing. Aliquots of tissue Certified Reference Materials (CRMs) were digested along with the experimental samples. Once the tissue samples and CRMs were completely dissolved, the clear solutions were transferred to graduated cylinders, diluted to 20 mL with high-purity reagent water (18 megohm resistivity) rinses of the digestion flasks, and then stored in labeled 30-mL polyethylene screw-cap bottles for trace metal analysis.

Mercury determinations were carried out using 0.3 to 2 grams of wet tissue and dry CRMs weighed into 50-mL glass digestion tubes. These subsamples were digested by the addition of concentrated, high-purity HNO<sub>3</sub> and sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) and

refluxing at 90°C for 1 hour in the Sealed tubes. The dissolved samples were transferred to graduated cylinders, diluted to 20 mL with high-purity reagent water rinses of the digestion tubes, and then stored in labeled 30-mL polyethylene screw-cap bottles.

Metal concentrations in the digested tissue samples, CRMs, and blanks were determined by flame atomic absorption spectrometry (FAAS), graphite furnace atomic absorption atomic spectrometry (GFAAS) with Zeeman or continuum background correction, cold-vapor atomic absorption spectrometry (CVAAS), or inductively coupled plasma-mass spectrometry (ICP-MS). The method used for each element and the corresponding MDLs are given in Table 10. All analytical techniques followed manufacturers' specifications and SOPs on file at FIT. These methods are based on EPA methods described for Series 7000 (FAAS and GFAAS), Series 7470 (CVAAS), and Series 6010A (ICP/MS) (EPA 1991).

#### 2.2.2.1 Quality Control Measurements for Metal Analysis

For this project, QC measures included balance calibration, instrument calibration (FAAS, GFAAS, Zeeman Graphite Furnace Atomic Absorption Spectrometry [ZGFAAS], CVAAS and ICP/MS), matrix spike analysis for each metal, duplicate sample analysis, CRM analysis, procedural blank analysis and standard checks. With each batch of up to 40 samples, 2 procedural blanks, 2 CRMs, 2 duplicate samples and 2 matrix-spiked samples were analyzed.

Table 7. Summary of Instrumental Methods and Method Detection Limits for Metal Analysis of Fish Tissue

Metal	Organisms	
	Method	MDLs ( $\mu\text{g metal/g tissue dry weight}$ )
As – arsenic	ZGFAAS	0.03
Ba – barium	ICP-MS	0.01
Cd – cadmium	ICP-MS	0.001
Cr – chromium	GFAAS	0.01
Cu – copper	FAAS	0.7
Fe – iron	FAAS	2.5
Hg – mercury	CVAAS	0.001
Ni – nickel	GFAAS	0.01
Pb – lead	ICP-MS	0.003
Se – selenium	ZGFAAS	0.03
V – vanadium	GFAAS	0.01
Zn – zinc	FAAS	0.4

Notes:

CVAAS = Cold Vapor Atomic Absorption Spectrometry

FAAS = Flame Atomic Absorption Spectrometry

GFAAS = Graphite Furnace Atomic Absorption Spectrometry

ICP/MS = Inductively Coupled Plasma/Mass Spectrometry

MDL = Method Detection Limit

ZGFAAS = Zeeman Graphite Furnace Atomic Absorption Spectrometry

#### *2.2.2.2 Instrument Calibration*

Electronic balances used for weighing samples and reagents were calibrated prior to each use with certified (National Institute of Standards and Technology [NIST] traceable) standard weights. All pipets (electronic or manual) were calibrated prior to use. Each of the spectrometers used for metals analysis was initially standardized with a three- to five-point calibration with a linear correlation coefficient of  $r=0.999$  required before experimental samples could be analyzed. Analysis of complete three- to five-point calibrations and/or single standard checks alternated every 5 to 10 samples until all of the analyses were complete. The RSD between complete calibration and standard check was required to be <15 percent or recalibration and reanalysis of the affected samples was performed.

#### *2.2.2.3 Matrix Spike Analysis*

Matrix spikes were prepared for a minimum of 5 percent of the total number of samples analyzed and included each metal to be determined. Results from matrix spike analysis using the method of standard additions provide information on the extent of any signal suppression or enhancement due to the sample matrix. If necessary (i.e., spike results outside 80 to 120 percent limit), spiking frequency was increased to 20 percent and a correction applied to the metal concentrations of the experimental samples.

#### *2.2.2.4 Duplicate Sample Analysis*

Duplicate samples from homogenized field samples (as distinct from field replicates) were prepared in the laboratory for a minimum of 5 percent of the total samples. These laboratory duplicates were included as part of each set of sample digestions and analyses and provided a measure of analytical precision.

#### *2.2.2.5 Procedural Blank Analysis*

Two procedural blanks were prepared with each set of 40 samples to monitor potential contamination resulting from laboratory reagents, glassware, and processing procedures. These blanks were processed using the same analytical scheme, reagents, and handling techniques as used for the experimental samples.

#### *2.2.2.6 CRM Analysis*

A common method used to evaluate the accuracy of environmental data is to analyze CRMs, samples for which consensus or "accepted" analyte concentrations exist. The following CRMs were used: Dogfish Muscle DORM-2; Lobster Hepatopancreas TORT-2; and Riverine Water SLRS-3, all certified by the National Research Council of Canada (NRC). Metal concentrations obtained for the CRMs were required to be within 20 percent of accepted values for >85 percent of the analyses. When no certified value for a metal was available in a tissue CRM (Ba), the Riverine CRM and tissue matrix spikes were used to evaluate analytical accuracy.

### 2.2.3 Bile FAC's (*Fluorescing Aromatic Compounds*)

This assay can demonstrate very recent exposure to metabolized organic compounds, e.g., PAHs. Bile samples were analyzed for metabolites of aromatic compounds using a high-performance liquid chromatographic procedure (Krahn et al., 1982, 1984) with fluorescence detection. Briefly, the (thawed) bile is injected directly into a high performance liquid chromatograph (HPLC) equipped with a Perkin-Elmer HC-ODS (reverse-phase) analytical column and two fluorescence detectors connected in series, and a gradient (100% water containing 5 $\mu$ L acetic acid/L, to 100% methanol). The excitation/emission wavelengths of one detector are set to 255/380 nm, where metabolites of phenanthrene (PHN) fluoresce. The excitation/emission wavelengths of the other detector are set to 380/430 nm, where the metabolites of benzo[*a*]pyrene (BaP) fluoresce. The total integrated area for each detector is then converted (normalized) to equivalents of known concentrations of either PHN or BaP standards. Quality assurance procedures include PHN and BaP calibration standards, a "bile pool" reference material, blank analyses, and replicate analyses to evaluate HPLC/UV fluorescence performance.

### 2.2.4 Cytochrome P4501A (*CYP1A*)

*Cytochrome P4501A (CYP1A)* is detected by a highly sensitive immunohistochemical (IHC) analysis that determines levels of CYP1A proteins in organs and tissues of interest. This data represents induction of the P4501A enzyme pathway by exposure to xenobiotic compounds (organics) and is used as an indicator of exposure to and pathways of contaminants to organisms.

An abbreviated method for the immunohistochemical analyses is as follows. Preserved tissues were placed in cassettes in 10% neutral buffered formalin, embedded in paraffin, and analyzed immunohistochemically for the presence of CYP1A. Tissue sections (5 mm) mounted on Superfrost Plus slides (Fisher) were deparaffinated and hydrated as before (Smolowitz et al., 1991). Matching serial sections were incubated with 150 ml of 1-12-3p6 monoclonal antibody against scup CYP1A, using modifications of Smolowitz (Smolowitz et al., 1991). Formalin-fixed tissues were embedded in paraffin, and 5-mm sections were mounted on Superfrost Plus slides (Fisher) and analyzed immunohistochemically for the presence of CYP1A as before (Smolowitz et al., 1991). Matching serial sections were incubated using the Shandon™ coverslip system for 2 h with two 150-ml aliquots of MAb 1-12-3p6 or with nonspecific purified mouse myeloma protein (UPC-10, IgG2A, Organon Teknika, West Chester, PA), each at 1.5 mg/ml in 1% BSA/TBS added at 0 and 60 minutes. Blocking solutions, secondary antibodies, linker and color developer were components of the Signet (Medford, MA) murine immunoperoxidase kit. Color development was achieved as described before using 2% 3-amino-9-ethylcarbazole and 1% hydrogen peroxide. Sections were counterstained with Mayer's hematoxylin. Slides were examined with a Zeiss Axioskop microscope and relative staining intensities were determined subjectively by comparing the staining of samples to that of control and highly induced 3,3',4,4' tetrachlorobiphenyl-treated scup liver sections included in each run. Nonspecific staining, if present, was determined by comparison with UPC-10 stained sections. Staining occurrence was scored as 0-no staining (or

equal to UPC staining), 1-rare- few cells staining, 2-many cells staining, 3-multifocal and diffuse-all cells staining. The intensity of staining was scored as 0-none (or equal to UPC staining), 1-mild, 2-moderate, 3- medium, 4-strong, 5-very strong. A scaled product of staining occurrence times the staining intensity was determined for each cell type. Therefore, IHC scores (being the product of 2 numbers, the first from 0-3, and the second from 0-5) could range from 0 to 15.

Quality assurance included the following steps:

1. Internal standards were included in each staining run to assure the consistency and quality of a run, and to determine maximum (occurrence 3 X intensity 5=15) and minimum (0) staining.
2. All tissues were stained with UPC 10 to determine if nonspecific staining was present.
3. As part of the standard Signet protocol, slides were presoaked in 3% H<sub>2</sub>O<sub>2</sub> to eliminate endogenous peroxidase activity.
4. Any slides with questionable staining were re-run.

### 2.2.5 Tissue Analysis Strategy

*Whole body analyses for organic and metal tissue contaminant residues* (note that these fish had small pieces of tissues and organs removed for the Bile FAC analyses and the CYP1A analyses). This was done so that the results of the assays could be compared from individual fish, rather than using separate fish for individual assays. However, some small (less than 20 g) Cod were collected from the project sites. These fish were too small to conduct all of the analyses on individual fish. For these small Cod, a subset was retained for whole body tissue contaminant residue analyses, and a second subset was retained for whole body CYP1A analyses. These fish were too small to collect bile for the bile FAC analyses.

*Bile FAC analyses* were conducted on larger fish, when bile could be sampled from the gall bladder.

*Cytochrome P4501A (CYP1A)* induction was assayed on multiple organs from each fish. These organs included: gill, heart, liver, kidney, gonad, gut, muscle and skin.

*Morphometric* data was acquired for each dissected fish. This data included: length, weight, sex, and observations about parasite load and other pathologies (See dissection methods and fish dissection sheets in appendices).

## 2.2.6 Statistical Analyses

### *Data conditioning*

The analytical results with qualifiers were treated as follows:

#### 1. Included data:

- All values without qualifiers from the analytical laboratories.
- All values with the “b” qualifier, i.e., result detected in the associated procedural blank and sample result is less than 5 times the result found in the procedural blank.
- All values with the “j” qualifier--estimated result detected below the adjusted minimum reporting limit.

#### 2. Excluded data:

- Naphthalene parent compound, due to high concentrations in system blank.
- Benzo[g,h,i]perylene, due to high concentrations in system blank.

### *Data entry, normalizations and transformations*

(All statistical analyses were performed on data that was entered into Excel spreadsheets and checked for errors after entry and before any manipulations).

Several steps were taken to improve the power of statistical analyses. First, to control for variation in measured trace organic compound concentrations caused by lipid content (Hebert and Keenleyside, 1995), wet-weight, concentrations reported from the analytical laboratory were normalized to the lipid content, as follows:

Lipid-weight concentration = measured wet-weight concentration ÷ lipid decimal %

This provided lipid-normalized concentrations for statistical analyses. Dry-weight trace metal concentrations, bile fluorescence values and P4501A values were not normalized to lipid. Second, because the variance was proportional to the mean for most variables, the data were transformed to ensure conformance to the assumptions of parametric statistical procedures using the log transformation, as follows:

Transformed value =  $\log_{10}(\text{value})$

For variables that included zeros (i.e., endosulfans, endrins, P4501A values in liver hepatocytes and gut mucous epithelia cells), one was added to each value.

### *Statistical Procedures*

Several statistical procedures were performed to explore patterns in the data. First, a one-way analysis of variance (ANOVA) was performed for each fish species to examine the effects of site, with weight as a covariate, on the concentrations of organic analytes and trace metals, as well as bile fluorescence and P4501A induction in two tissues. A separate two-way ANOVA with interactions was performed to determine whether there were significant interactions between the effects of site and weight for any contaminant. Organic analytes were analyzed as totals for all PAHs,

for low-molecular-weight PAHs (two and three ring compounds), high-molecular-weight PAHs (four, five and six ring compounds), all PCBs, and all pesticides, as well as the following pesticide groups:

- all DDTs = 2,4'-DDD, 2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT
- all Chlordanes = alpha-Chlordane, gamma-Chlordane, cis-Nonachlor, trans-Nonachlor, Heptachlor, Heptachlor Epoxide, Oxychlordane, Methoxychlor
- all HCHs = alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, delta-hexachlorocyclohexane
- all endrins = Endrin, Endrin Aldehyde, Endrin Ketone
- all endosulphans = Endosulfan I, Endosulfan II, Endosulfan Sulfate.

Second, backward stepwise multiple regressions were used to assess the effects of total low-molecular-weight PAHs, total high-molecular-weight PAHs, total PCBs, and total pesticides on P4501A activity. Transformed data were used for the regression analyses. Third, clustering was performed using Ward's minimum variance method on standardized species-site means for all organic analytes, all PAHs, all PCBs, and all pesticides. All statistical analyses were performed with the JMP software package (SAS Institute, 2000).

Statistical power of our analyses was tested in two ways. In both cases, data for the Four Horn Sculpin were used. The first test examined the power of this monitoring program to detect differences between sites within a sampling period. This procedure revealed how the percentage difference that could be detected between two sites varies according to the number of fish collected from each of four sites (Sokal & Rohlf, 1995). Because this test is based on the Coefficient of Variation (CV), an average CV was calculated from sites where more than two Four Horn Sculpin were collected (i.e., Bullen Point, Point Brower and Stump Island). The second test examined the percentage change at a site that could be detected through time (i.e., trend analysis) if 20 fish were collected in each year (Gerrodette, 1987). This analysis assumes that the rate of change is consistent through time.

## **3.0 Results**

### **3.1 Collections**

The number of fish of each species captured at the five sampling sites in 2001 is provided in Table 8.

Table 8. Summary of fish collected in the summer of 2001. Species in bold type were selected for chemical and biomarker analyses.

Species	Stump Island	Point Brower	Liberty	Bullen Point	Northstar	Species Total
Dolly Varden	4	1		3		8
<b>Arctic Cisco</b>	11	5	8	9		33
<b>Humpback Whitefish</b>	13	3				16
Arctic flounder	8	7				15
<b>Four Horn Sculpin</b>	12	5	2	10		29
<b>Broad Whitefish</b>		6				6
<b>Arctic Cod</b>			8		6 + composite	15
Snailfish				2		2
Total per site	48	27	18	25	7	
					Grand Total	124

It can be seen from Table 8 that a total of 124 fish representing 8 species were collected and processed for analysis. Eighty-nine of these were eventually analyzed. A map of the collection sites is provided in Figure 1.

### 3.2 Trace Organic Substances in Fish Tissues

In Table 9, all of the results of statistical analyses to determine if there are site or weight differences in any of the independent variables are provided.

Table 9. Results of one-way ANOVA for the effects of site, with weight as a covariate, on the concentrations of trace organic chemicals in five species of fish. Statistically significant results ( $p \leq 0.05$ ) are indicated by bold type.

Analyte Group & Species	$r^2$	Weight		Site		Interaction
		$p$	$p$	$p$	Student's <sup>a,b</sup>	$p$
<b>Total PAHs</b>						
Arctic Cisco	0.1712	0.1826	0.3553	PB=L=SI=BP		0.1957
Arctic Cod	0.1537	0.4515	0.1977	L=NS		0.8888
Broad Whitefish	0.3312	0.3100	-	PB		-
Four Horn Sculpin	0.1827	0.1582	0.7534	PB=BP=L=SI		0.7527
Humpback Whitefish	0.3129	0.7709	0.0549	SI=PB		0.0776
<b>Low-molecular-weight PAHs</b>						
Arctic Cisco	0.1475	0.2412	0.4059	PB=L=SI=BP		0.1728
Arctic Cod	0.1980	0.4190	0.1342	L=NS		0.6095
Broad Whitefish	0.2221	0.3454	-	PB		-
Four Horn Sculpin	0.2850	0.1433	0.3525	PB=BP=L=SI		0.7229
Humpback Whitefish	0.3218	0.9466	0.0639	SI=PB		0.3607

Analyte Group & Species	$r^2$	Weight		Site	Interaction
		$p$	$p$	Student's <sup>a,b</sup>	$p$
<b>High-molecular-weight PAHs</b>					
Arctic Cisco	0.5401	<b>0.0004</b>	<b>0.0168</b>	PB>SI=L=BP	0.7825
Arctic Cod	0.0238	0.7317	0.6442	L=NS	<b>0.0457</b>
Broad Whitefish	0.2331	0.3321	-	PB	-
Four Horn Sculpin	0.4885	0.3661	<b>0.0009</b>	PB=SI>BP, PB=SI=L, L=BP	0.8324
Humpback Whitefish	0.0453	0.5359	0.9890	PB=SI	<b>0.0197</b>
<b>Total PCBs</b>					
Arctic Cisco	0.3479	0.1017	<b>0.0310</b>	SI>BP=L, SI=PB, PB=BP=L	<b>0.0092</b>
Arctic Cod	0.1787	0.4678	0.3273	NS=L	0.6423
Broad Whitefish	0.0007	0.9604	-	PB	-
Four Horn Sculpin	0.2014	0.2726	0.1861	BP=SI=PB=L	0.7426
Humpback Whitefish	0.4134	0.5316	0.0695	SI=PB	0.7626
<b>Total Pesticides</b>					
Arctic Cisco	0.4722	<b>0.0067</b>	<b>0.0157</b>	PB=SI>L=BP	0.7180
Arctic Cod	0.3465	<b>0.0444</b>	0.9788	NS=L	0.3431
Broad Whitefish	0.2949	0.2655	-	PB	-
Four Horn Sculpin	0.2479	0.1600	0.0929	PB=SI=L=BP	0.6448
Humpback Whitefish	0.5550	0.1490	0.0607	SI=PB	0.8332
<b>Total Chlordanes</b>					
Arctic Cisco	0.5988	<b>0.0052</b>	<b>0.0003</b>	SI=PB>L=BP	0.6746
Arctic Cod	0.3465	<b>0.0406</b>	0.8919	NS=L	0.2481
Broad Whitefish	0.2695	0.2912	-	PB	-
Four Horn Sculpin	0.2957	0.1527	<b>0.0441</b>	SI>BP, SI=PB=L, PB=L=BP	0.7418
Humpback Whitefish	0.7256	<b>0.0361</b>	<b>0.0126</b>	SI>PB	0.7122
<b>Total DDTs</b>					
Arctic Cisco	0.3078	0.1767	<b>0.0492</b>	SI>BP=L, SI=PB, PB=BP=L	<b>0.0083</b>
Arctic Cod	0.0912	0.6624	0.4709	NS=L	0.6047
Broad Whitefish	0.1497	0.5200	-	PB	-
Four Horn Sculpin	0.1867	0.0668	0.4864	L=SI=PB=BP	<b>0.0292</b>
Humpback Whitefish	0.3268	0.2815	0.2826	SI=PB	0.8874
<b>Total HCHs</b>					
Arctic Cisco	0.3473	0.4365	<b>0.0071</b>	BP=PB=L>SI	0.5865
Arctic Cod	0.3335	0.8613	<b>0.0447</b>	NS>L	0.7163
Broad Whitefish	0.2264	0.3402	-	PB	-
Four Horn Sculpin	0.2189	0.5454	0.1659	L=SI=PB=BP	<b>0.0253</b>
Humpback Whitefish	0.0687	0.6398	0.3494	PB=SI	0.4192

Analyte Group & Species	$r^2$	Weight		Site	Interaction
		$p$	$p$	Student's <sup>a,b</sup>	
<b>Total Endosulfans</b>					
Arctic Cisco	0.3823	0.7870	<b>0.0042</b>	SI>BP=L, SI=PB, PB=BP=L	0.8872
Arctic Cod	0.1318	0.7570	0.2246	L=NS	0.3786
Broad Whitefish	0.2167	0.3521	-	PB	-
Four Horn Sculpin	0.1990	0.5843	0.1532	PB=SI=BP=L	0.5393
Humpback Whitefish	0.0923	0.4394	0.2744	SI=PB	0.5773
<b>Total Endrins</b>					
Arctic Cisco	0.2200	0.7269	0.0716	SI=BP=L=PB	0.3140
Arctic Cod	-	-	-	Not Detected	-
Broad Whitefish	0.2137	0.3560	-	PB	-
Four Horn Sculpin	0.2021	<b>0.0443</b>	0.2948	SI=PB=BP=L	0.8548
Humpback Whitefish	0.5058	0.2069	<b>0.0038</b>	SI>PB	0.3474
<b>Liver Hepatocyte P4501A</b>					
Arctic Cisco	0.2187	0.8518	0.0889	L=PB=SI=BP	0.7255
Arctic Cod	0.4543	0.8514	<b>0.0141</b>	NS>L	0.9982
Broad Whitefish	0.2370	0.3275	-	PB	-
Four Horn Sculpin	0.3844	0.1875	<b>0.0090</b>	PB=SI>BP, PB=SI=L, BP=L	0.4735
Humpback Whitefish	0.0974	0.3482	0.2811	SI=PB	0.4951
<b>Gut Mucus Epithelium P4501A</b>					
Arctic Cod	0.4140	0.1230	0.2124	NS=L	0.6654
Four Horn Sculpin	0.2880	0.1856	0.1823	PB=BP=L	0.1567
<b>PHN Equivalents</b>					
Arctic Cisco	0.7871	<b>0.0018</b>	0.2360	BP=SI=PB	0.7073
Broad Whitefish	0.5860	0.1314	-	PB	-
Four Horn Sculpin	0.7296	0.5110	<b>&lt;0.0001</b>	BP=SI=L>PB	0.4155
Humpback Whitefish	0.1453	0.2257	0.1910	PB=SI	0.8152
<b>BaP Equivalents</b>					
Arctic Cisco	0.9786	<b>0.0092</b>	<b>&lt;0.0001</b>	BP>SI=PB	0.5985
Broad Whitefish	0.6219	0.1129	-	PB	-
Four Horn Sculpin	0.5440	0.6074	<b>0.0031</b>	SI>PB, SI=BP=L, L=PB	0.3586
Humpback Whitefish	0.2785	0.3663	0.3065	SI=PB	0.7133

<sup>a</sup> Student's *a posteriori* results are for Student's t test for least significant means. Values are arranged with the highest means on the left and the lowest on the right.  
<sup>b</sup>BP = Bullen Point, L = Liberty, NS = Northstar, PB = Point Brower, SI = Stump Island.

### 3.2.1 PAH in Fish Tissues

The mean whole-body concentrations for total PAH ranged from less than 100 ng/g to over 1000 ng/g (lipid-normalized wet-weight). There was no significant effect of site on the concentrations of total PAHs in any of the fish species (Table 12, Figure 2), nor was there an effect of weight. There also were no significant interactions between weight and site for PAH concentrations. Where there were more than one species analyzed at a site, the Four Horn Sculpin had the highest concentrations of total PAH (Figure 2).

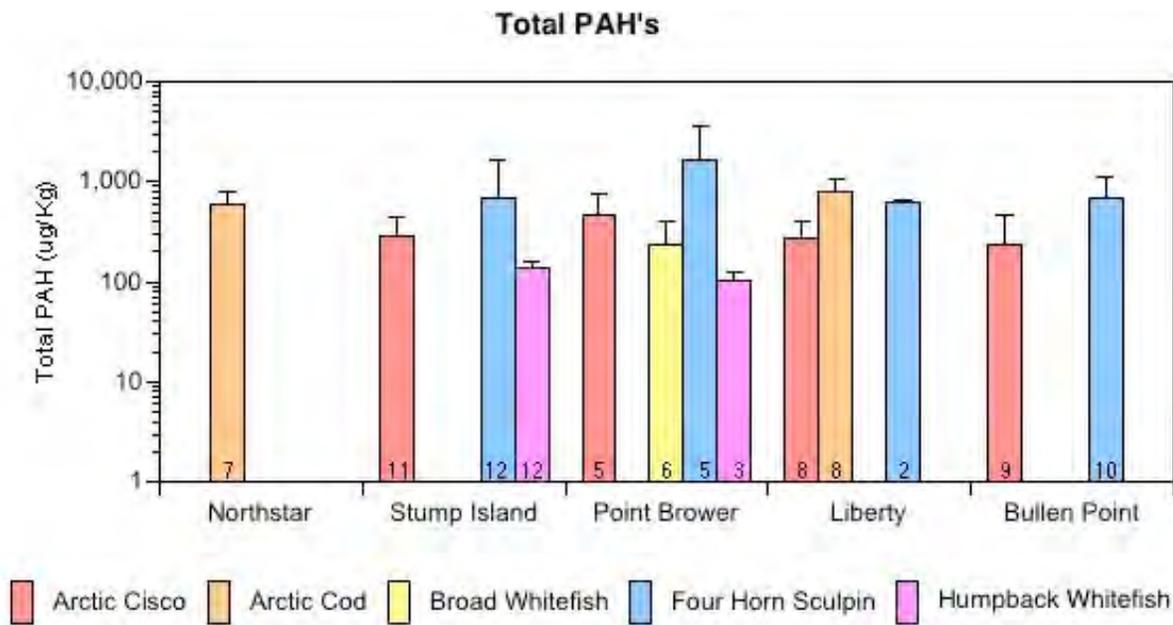


Figure 2. Total PAHs (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

In addition to the analyses of total PAHs, we divided the PAHs into two groups: low and high-molecular-weight PAHs. The low-molecular-weight PAHs included the two and three-ringed compounds: the alkyl naphthalenes, phenanthrene and anthracene. The high-molecular-weight PAHs included all the 4 and 5-ringed compounds. For low-molecular-weight PAHs, there were no significant site differences for any of the species of fish (Table 9, Figure 3). For the high-molecular-weight PAHs, two species showed an effect of site: Arctic Cisco ( $p= 0.0168$ ) and Four Horn Sculpin ( $p= 0.0009$ ) (Table 9, Figure 4). For the Cisco, Point Brower had higher values than the other sites. For the Four Horn Sculpin, both Point Brower and Stump Island had higher concentrations than Bullen Point. For Arctic Cod and Humpback Whitefish there were significant interactions between site and weight that appear to be due to catching different sized fish at different stations, although neither were highly significant (e.g.,  $p > 0.01$ ). For this group of PAHs the highest values were for Four Horn Sculpin.

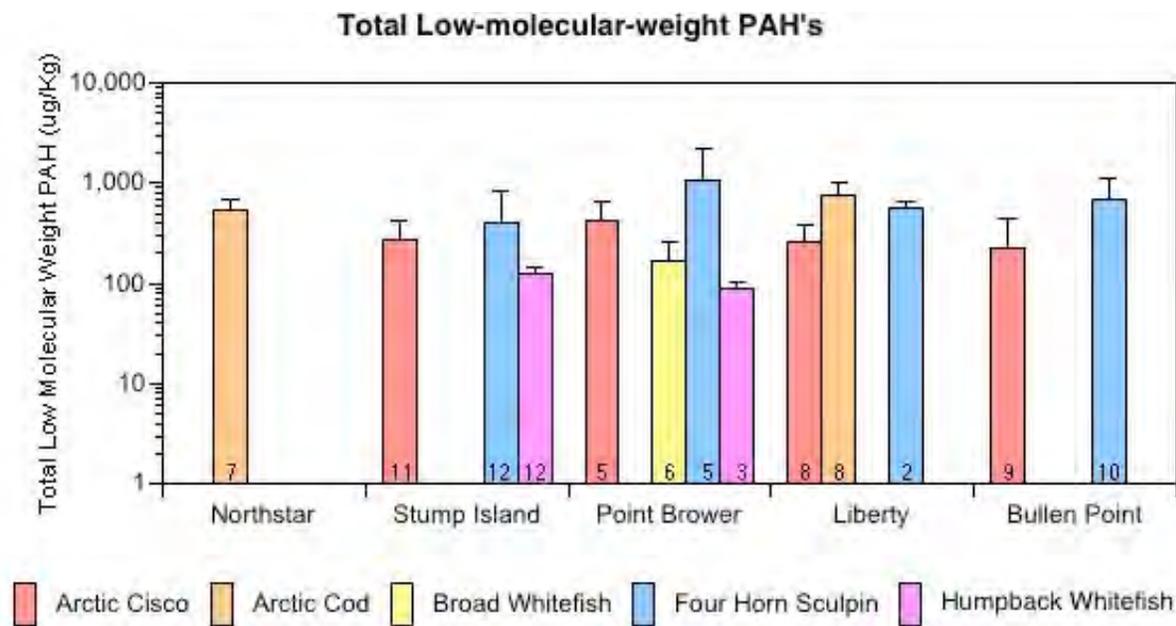


Figure 3. Total low-molecular-weight PAHs (lipid-normalized wet weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

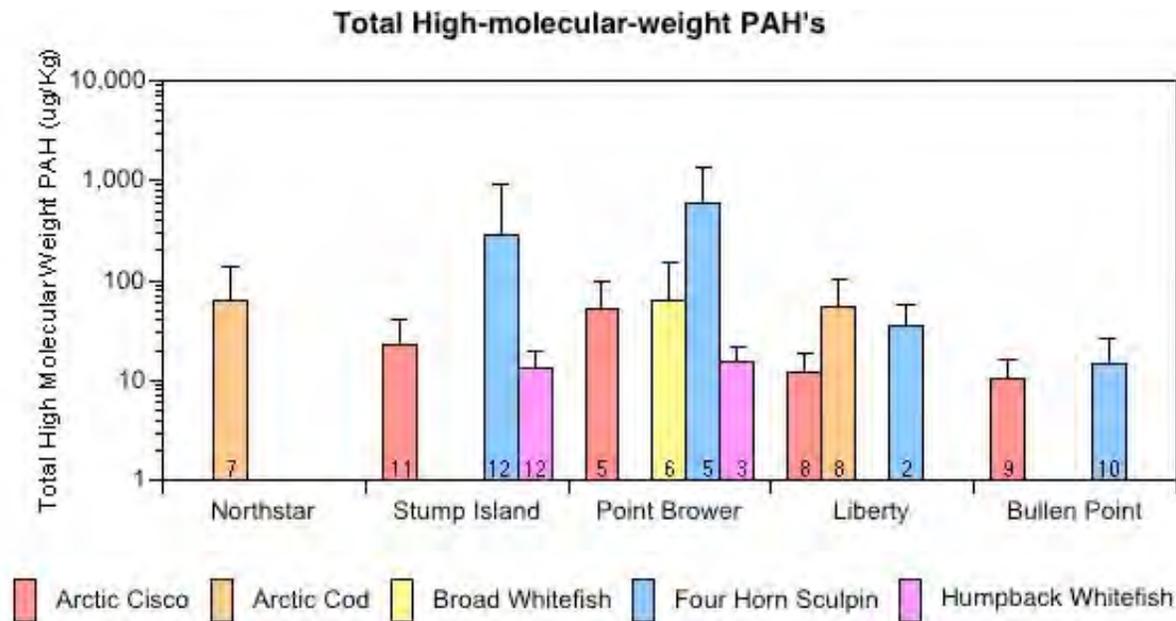


Figure 4. Total-high-molecular-weight PAHs (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

### 3.2.2 PCBs in Fish Tissues

The results of the analyses of PCBs were generally similar to those for PAHs. The only significant effect of site on the concentrations of PCBs was in Arctic Cisco (Table 12, Figure 5), in which Stump Island was higher than Bullen Point and Liberty. There were no effects of weight on PCB concentrations for any species. There was one significant interaction between weight and site for PCB concentrations, again with Arctic Cisco. An analysis of weight distributions indicated two very large males, one from Stump Island and one from Point Brower, were outliers, and re-analysis without these two individuals eliminated the significant interaction. A few individual Four Horn Sculpin from Bullen Point had the highest PCBs of any of the fish analyzed in this study. This is also the location of an old Military installation, a Distant Early Warning (DEW) line site. There were 63 DEW line sites in the Arctic, in Greenland, Canada and Alaska and there were about 30 tons of PCBs estimated to be at these sites (AMAP, 1997).

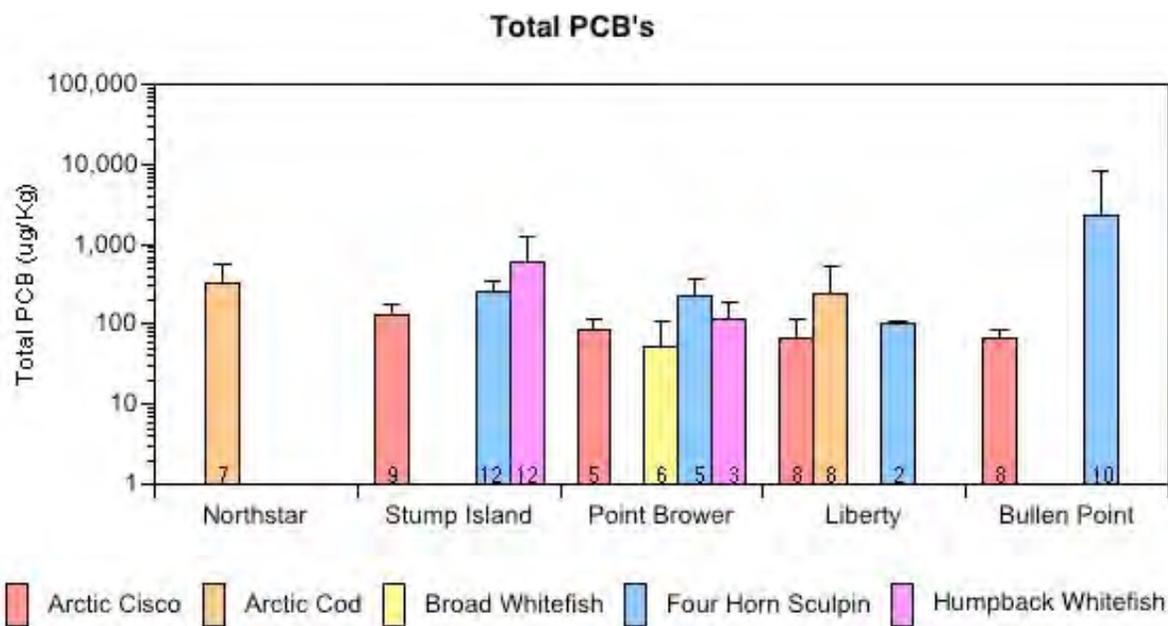


Figure 5. Total PCBs (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

There are two patterns of relative congener abundance in the fish from this study. The first is a mixture dominated by high-molecular-weight congeners (e.g., IUPAC congener 153) that is the most commonly encountered in our samples (Figure 6). A second pattern includes a similar congener composition of high-molecular-weight compounds, but also has significant, and sometimes dominant, low-molecular-weight components (e.g. IUPAC congener 8) (Figure 7).

**PCB Congeners in Arctic Cod at Stump Island**

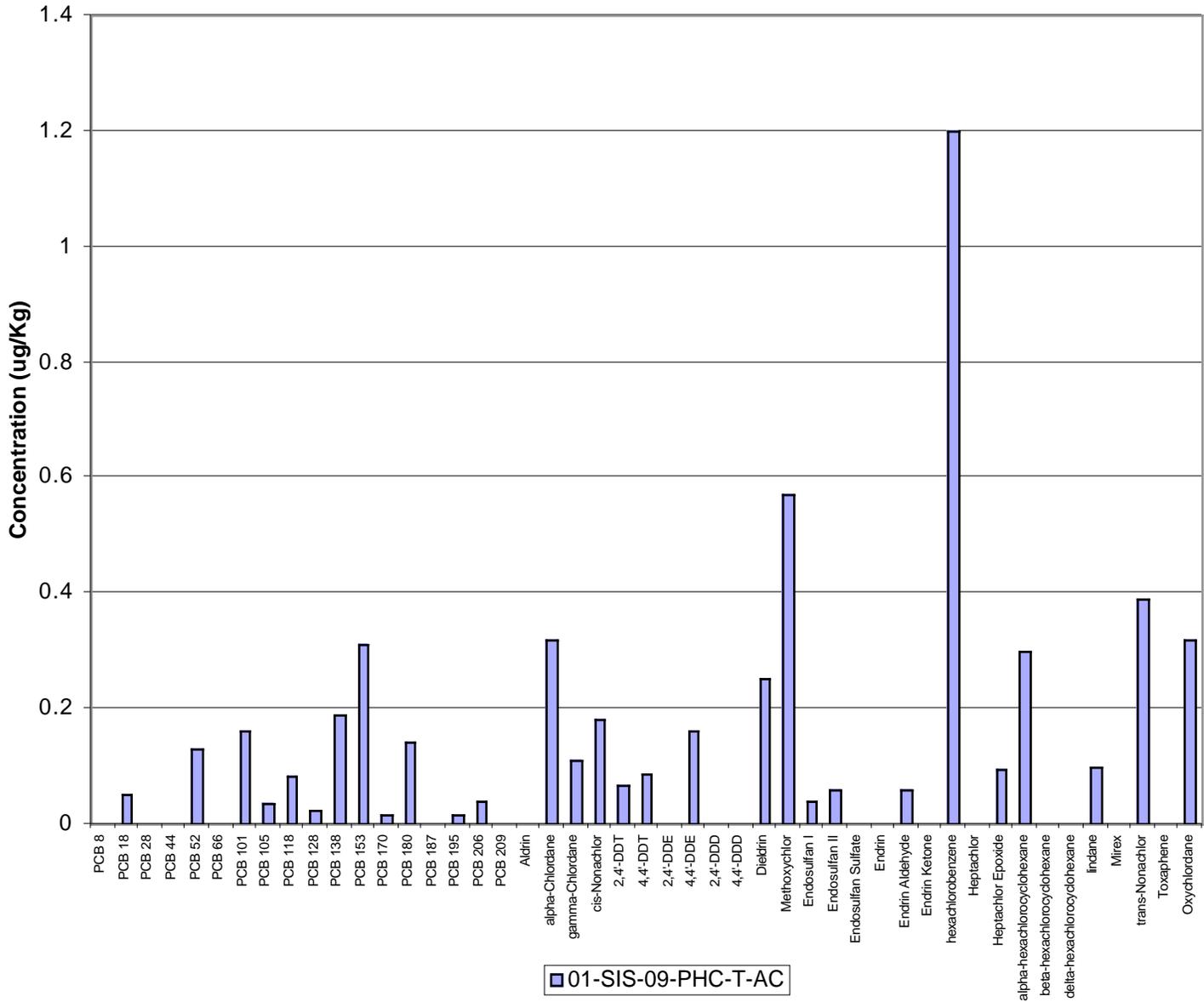


Figure 6. The pattern of PCB congeners in an Arctic Cod captured at Stump Island.

**PCB Congeners in Arctic Cod at Bullen Point**

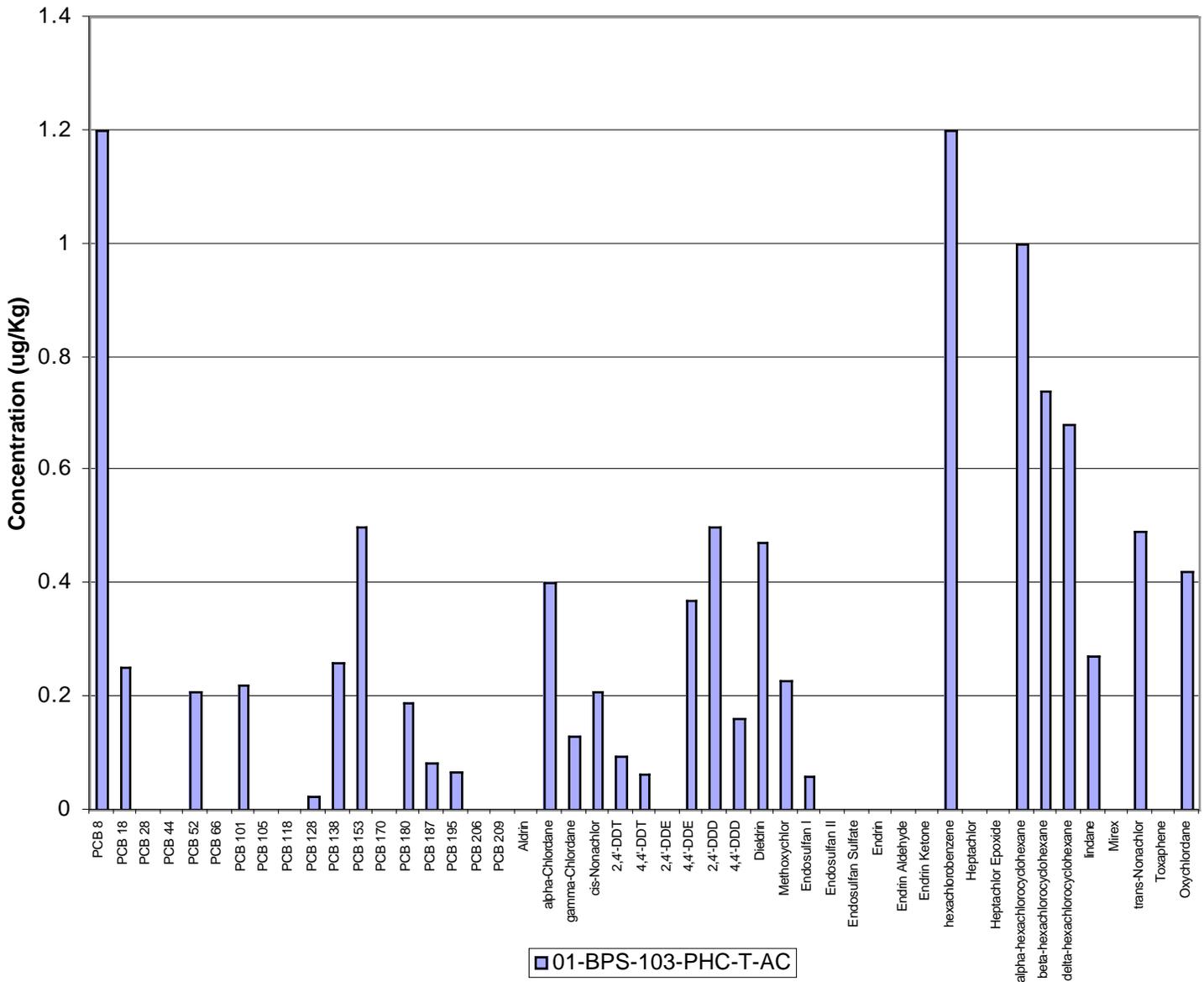


Figure 7. The pattern of PCB congeners in an Arctic Cod captured at Bullen Point.

### 3.2.3 Pesticides in Fish

Arctic Cisco was the only fish species that showed significant variation in total pesticide concentrations among sites (Table 12, Figure 8). Arctic Cisco at Point Brower and Stump Island had significantly higher total pesticide concentrations than those Liberty or Bullen Point. There was a significant effect of weight on pesticide concentrations in Arctic Cisco and Arctic Cod, but there were no significant interactions between weight and site (Table 9). In addition to total pesticides, we statistically analyzed a variety of separate pesticide groups that made up the total pesticide category: Chlordanes, DDTs, hexachlorohexanes, Endosulfans, and Endrins.

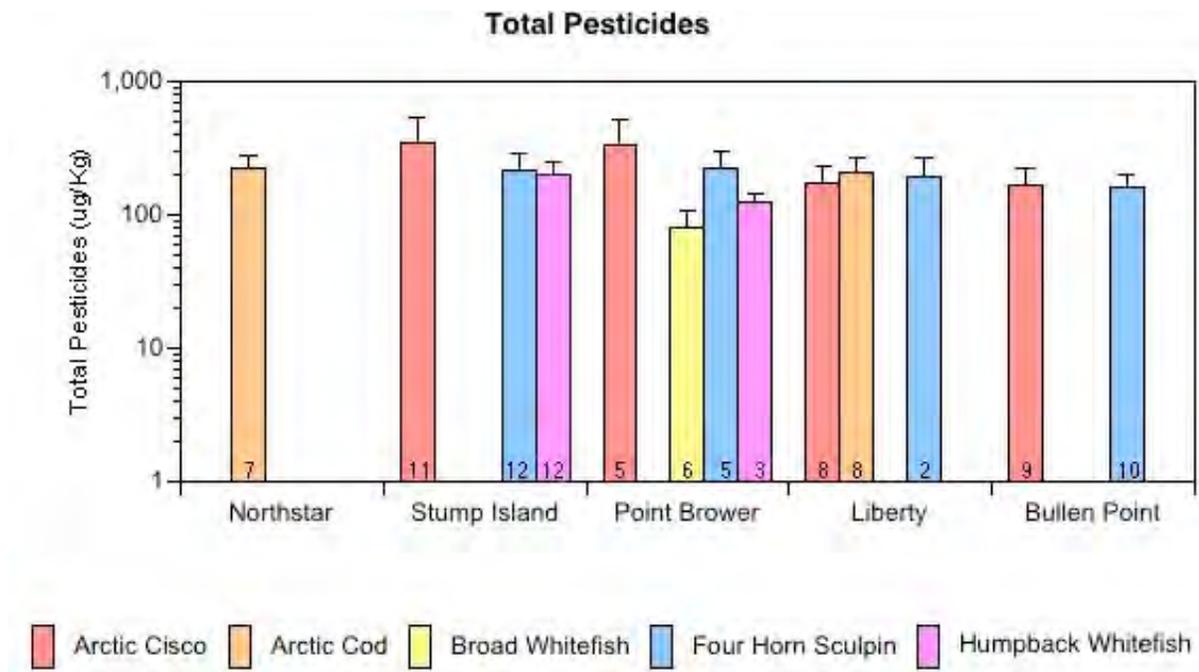


Figure 8. Total Pesticides (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

For chlordanes, three species showed significant variation with site: Arctic Cisco, Four Horn Sculpin and Humpback Whitefish (Table 12, Figure 9). For the Arctic Cisco, Stump Island and Point Brower had equivalent concentrations and these were higher than the other sites at which this species was caught. For the Four Horn Sculpin, Stump Island had higher concentrations than did Bullen Point. For the Humpback Whitefish, Stump Island had higher concentrations than Point Brower.

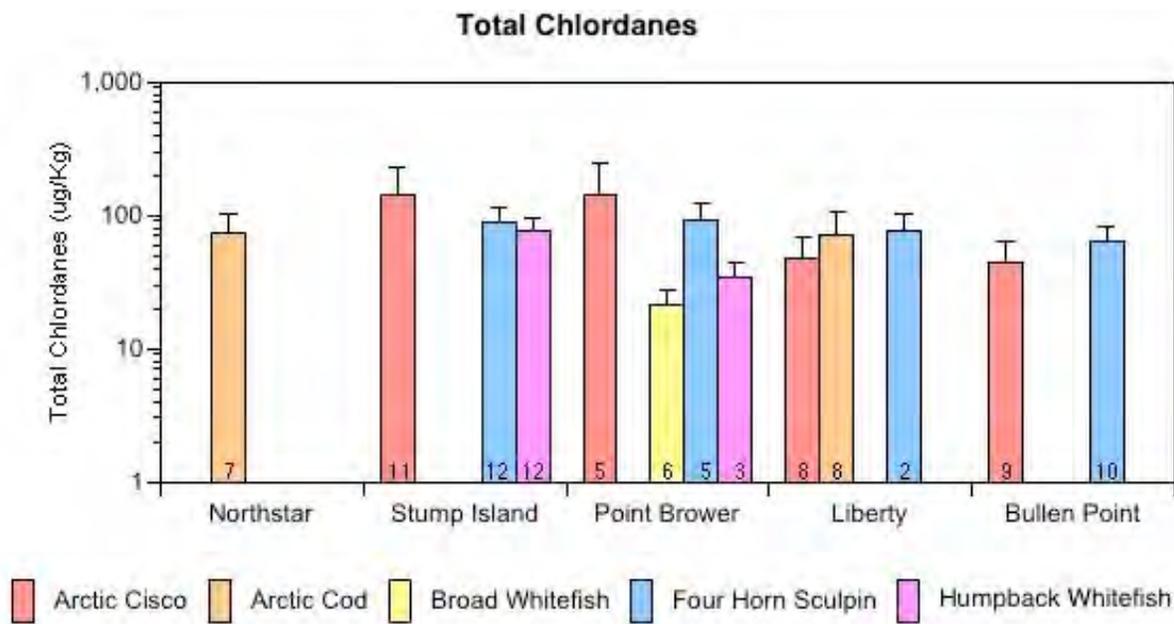


Figure 9. Total chlordanes (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

For DDTs, Arctic Cisco showed significant variation between collection sites, with Stump Island having higher concentrations than Bullen Point and Liberty (Table 12, Figure 10). There were significant interactions between weight and site for Arctic Cisco and Four Horn Sculpin. The high significance ( $p=0.0185$ ) of the interaction for Arctic Cisco was substantially reduced when the two large fish at Stump Island and Point Brower were removed from the analysis, as was discussed for PCBs.

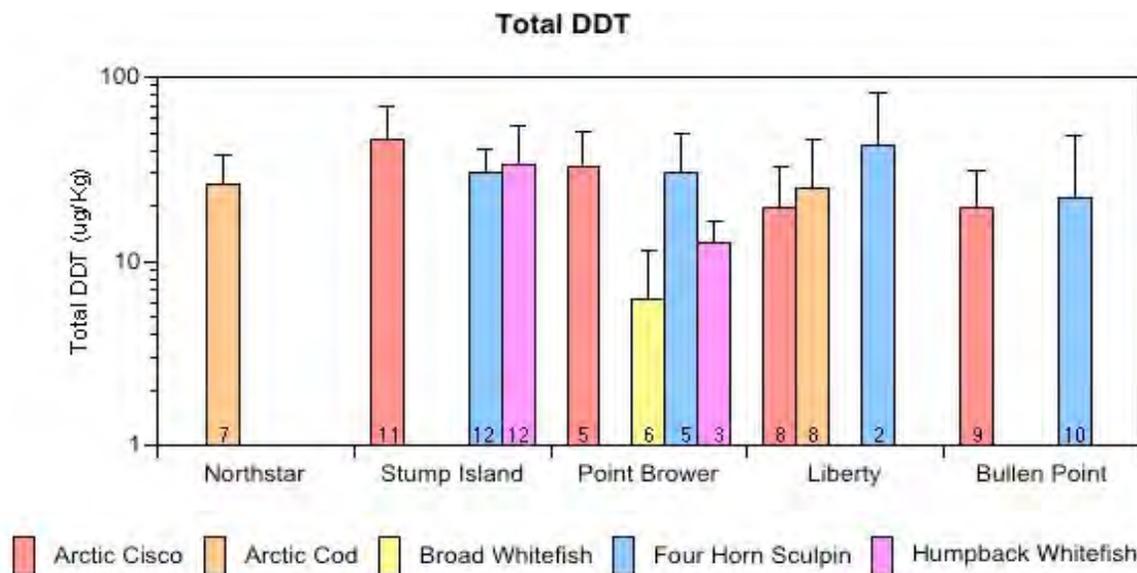


Figure 10. Total DDTs (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

For the hexachlorahexanes, Arctic Cisco ( $p=0.0071$ ) and Arctic Cod ( $p=0.0447$ ) showed significant variation with site. Arctic Cisco had similar whole-body concentrations at three stations that were all higher than at Stump Island. Arctic Cod were significantly higher at Northstar than at Liberty. There was a significant interaction of site and weight for Four Horn Sculpin (Table 12, Figure 11).

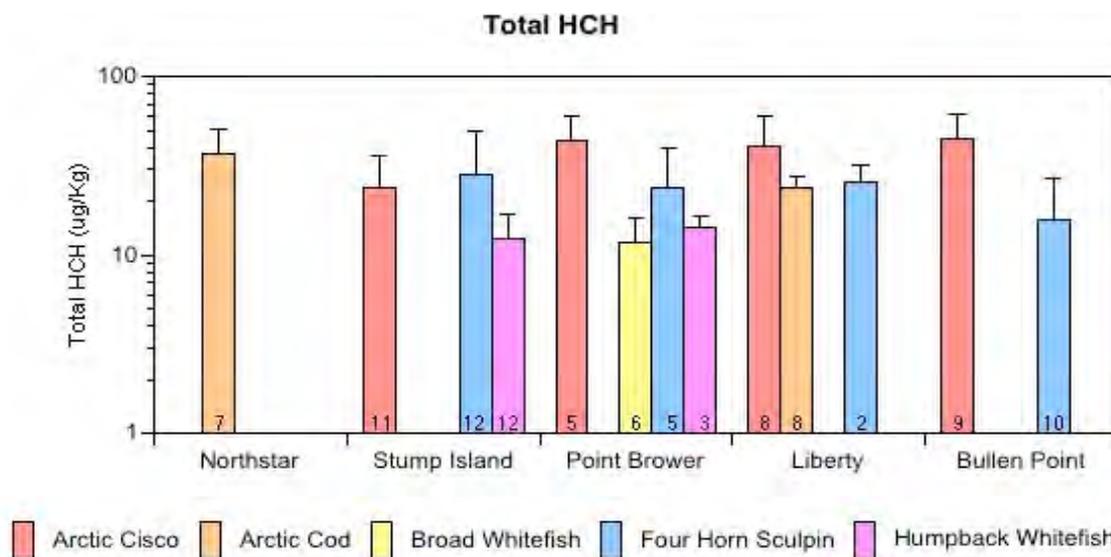


Figure 11. Total HCH (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

For endosulfans, only Arctic Cisco showed a significant variation with site. Stump Island had higher concentrations than Bullen Point or Liberty (Table 12, Figure 12).

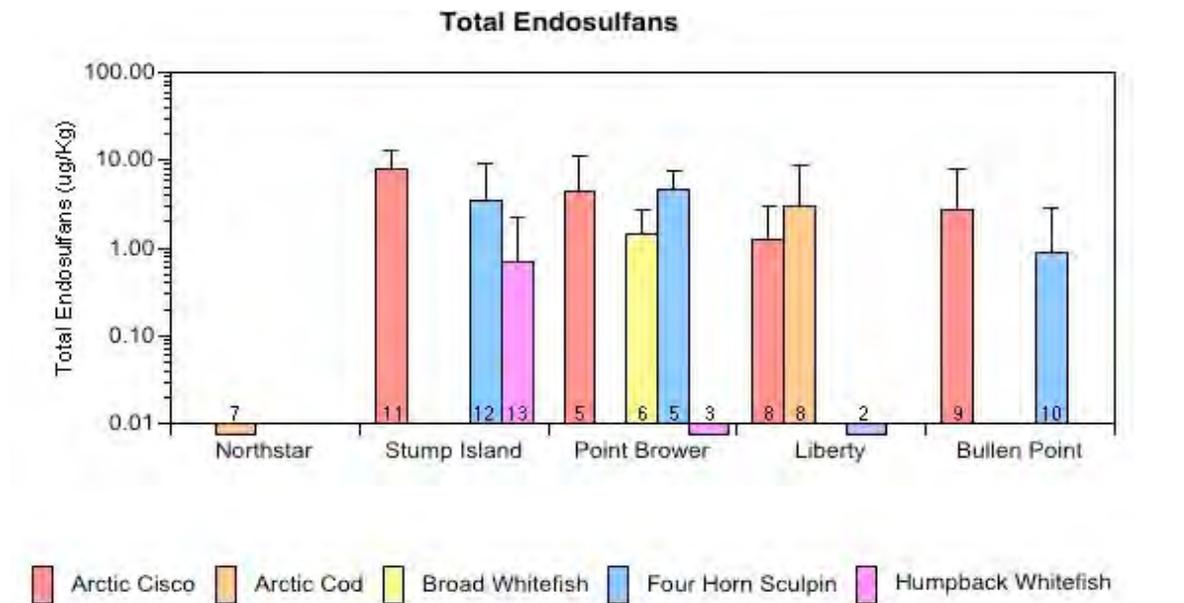


Figure 12. Total endosulphans (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar. Values below the x-axis are between 0 and the lowest value on the y-axis.

For endrins, Humpback Whitefish had significant variation due to site, with Stump Island having higher concentrations than Bullen Point (Table 12, Figure 13).

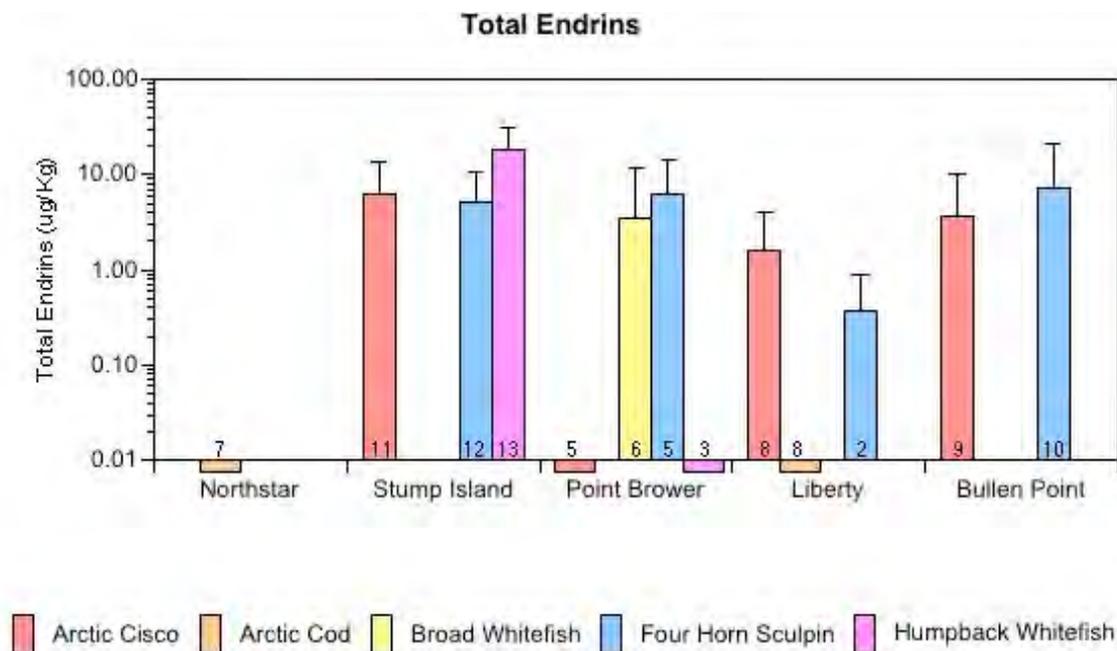


Figure 13. Total endrins (lipid normalized wet-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar. Values below the x-axis are between 0 and the lowest value on the y-axis.

### 3.3 P4501A In Fish Tissues

Only hepatocytes and gut mucous epithelia cells showed much induction in the species we captured, and even here the induction was low to moderate. We present the data for these two cell types in Table 10, Figures 14 and 15. Arctic Cod and Four Horn Sculpin both showed significant variation due to site ( $p=0.0141$  and  $P=0.0090$ , respectively) for P4501A abundance in liver hepatocytes. For Arctic Cod, Northstar fish had significantly greater P4501A abundance than did specimens collected from the Liberty site—these were the only two sites where they were collected. For Four Horn Sculpin, Point Brower and Stump Island had comparable values, which were significantly higher than fish from Bullen Point. The remainder of the fish species showed no difference in liver hepatocyte P4501A abundance. There was not a significant effect of site on P4501A abundance in gut epithelial cells.

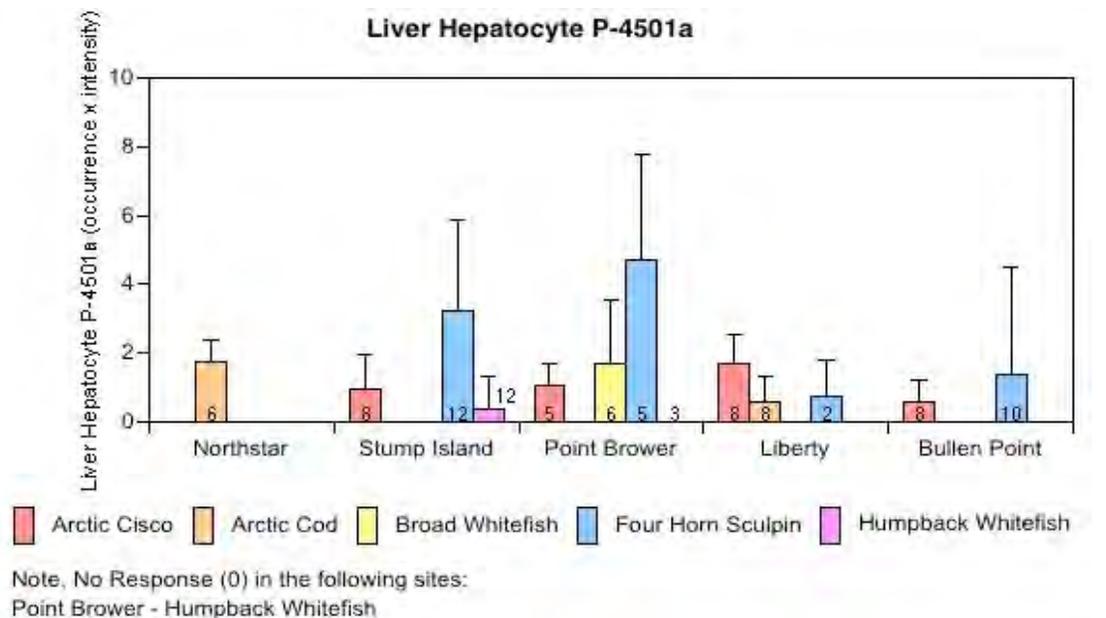


Figure 14. Liver hepatocyte P4501A staining scores by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar. The value for Humpback Whitefish at Point Brower was zero and is represented only by the number of fish (3).

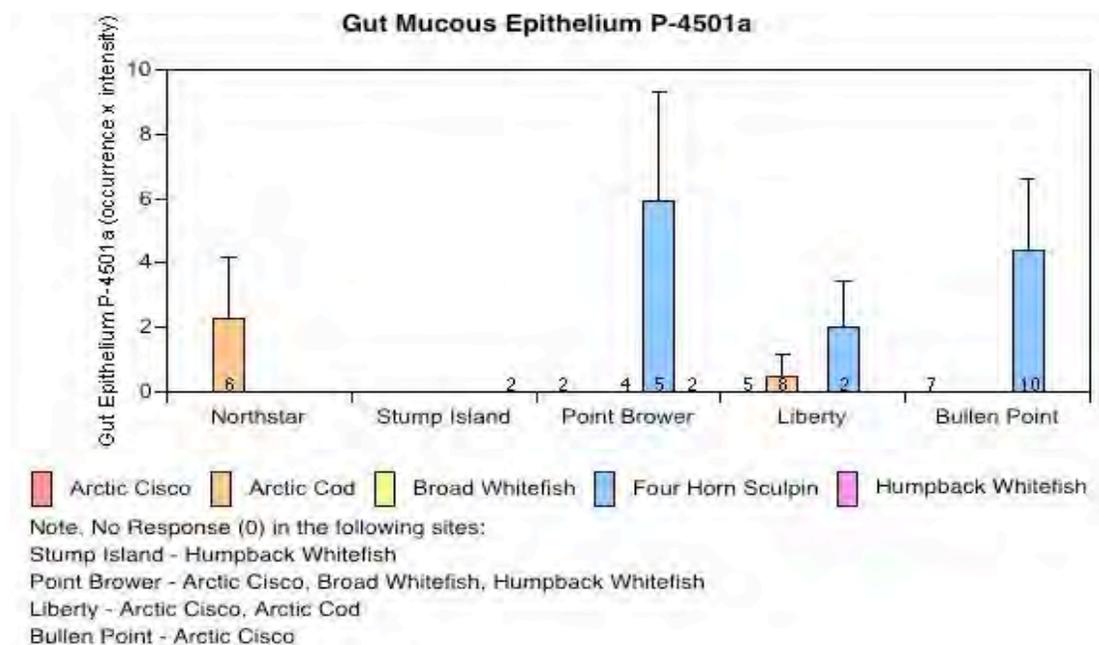


Figure 15. Gut mucous epithelium P4501A staining scores by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar. Values that averaged zero are represented on the x-axis by a number indicating the number of fish.

### 3.3.1 Relationship of Whole-Body Concentrations of Organic Chemicals to P4501A

Stepwise multiple regression for each fish species using the P4501A scores for liver hepatocytes and gut mucus epithelium and low-molecular-weight PAHs, high-molecular-weight PAHs and PCB whole-body concentrations indicated significant relationships in two species, Arctic Cod and Four Horn Sculpin. In the Arctic Cod, PCB concentrations were related to the abundance of P4501A in hepatocytes. In the Four Horn Sculpin, low-molecular-weight PAHs were positively related to P4501A abundance in gut epithelia (Table 10).

Table 10. Significant results of backward stepwise multiple regressions to determine the effects of lipid normalized contaminant concentrations (i.e., sum of PCBs, sum of low-molecular-weight PAHs, sum of high-molecular-weight PAHs, sum of pesticides) on P4501A activity for two tissues in five species of fish. All values were log transformed ( $\log_{10}$  for contaminants,  $\log_{10}+1$  for P4501A).

Tissue/Cell and Species	$r^2$	$p$	Regression Equation
Liver Hepatocyte P4501A			
Arctic Cod	0.6042	<b>0.0011</b>	$Y = 0.3876 \text{ PCBs} - 0.6028$
Gut Mucus Epithelium P4501A			
Four Horn Sculpin	0.2193	<b>0.0580</b>	$Y = 0.3833 \text{ low-molecular-weight PAHs} - 0.3770$

### 3.4 Bile Hydrocarbons

Bile hydrocarbons and hydrocarbon metabolites were determined for two PAHs, phenanthrene and benzo(a)pyrene, which represent compounds with three and four aromatic rings, respectively. These also respectively represent our low-molecular-weight and high-molecular-weight PAH compound classes. In general phenanthrene is more representative of fresh petroleum and benzo(a)pyrene weathered petroleum and, especially, pyrogenic sources (e.g., forest fires, internal combustion engines). All species with bile samples were tested for site differences and three cases of significant variation were found. There was a highly significant variation due to site for phenanthrene equivalents in the bile of Four Horn Sculpin, in which comparable concentrations were found at Bullen Point, Stump Island and Liberty, which were all higher than Point Brower (Table 9, Figures 16 and 17). One individual Arctic Cisco at Bullen Point had a value of 10,000 ng/g phenanthrene equivalents. Benzo(a)pyrene equivalents exhibited highly significant variation due to site in Arctic Cisco, for which Bullen Point was higher than Stump Island and Point Brower. In Four Horn Sculpin, benzo(a)pyrene equivalents were significantly higher at Stump Island than at Point Brower. Many of the fish assayed had values in excess of 5,000ng/g B(a)P equivalents.

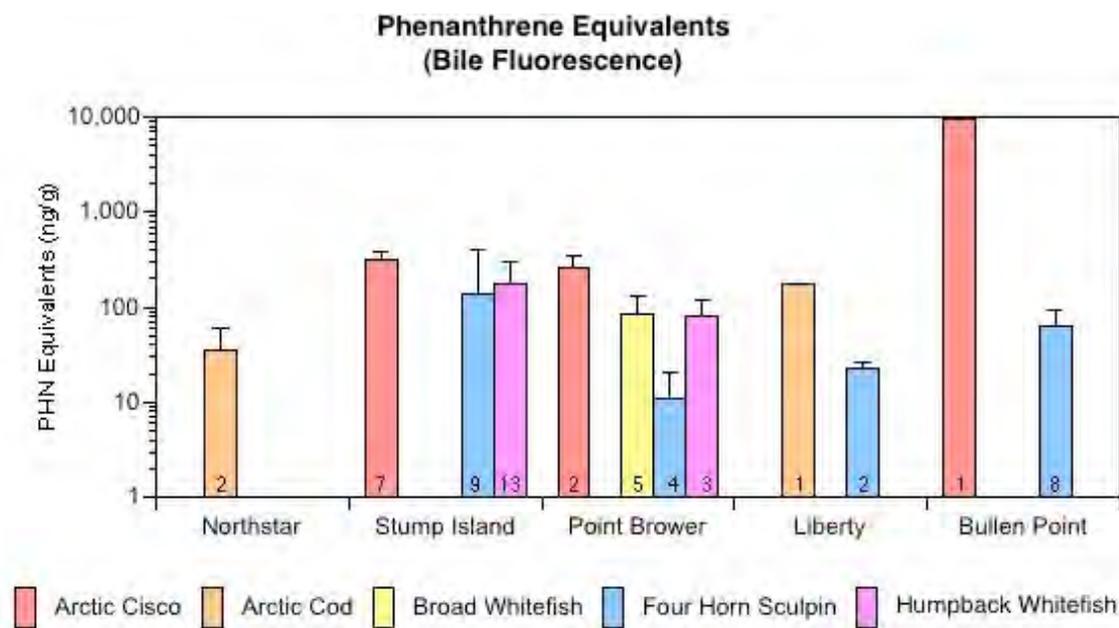


Figure 16. Phenanthrene equivalents by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

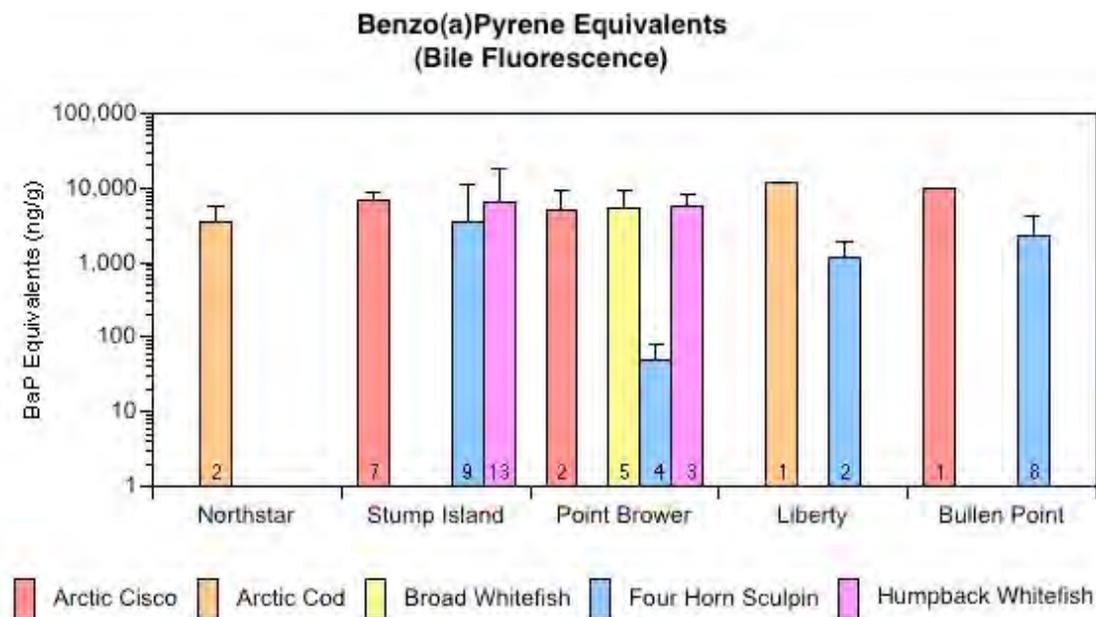


Figure 17. Benzo(a)pyrene equivalents by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

### 3.5 Metals in Fish

Tissue aliquots were analyzed from all species for 12 metals. The data were generally analyzed in the same way that those for organic compounds were. Using two-way analysis of variance with site and size of fish as the dependent variables and whole-body-metal concentration as the independent variable. The results of these statistical analyses are presented in Table 11.

Table 11. Results of one-way ANOVA for the effects of site, with weight as a covariate, on the concentrations of trace metals in five species of fish. Statistically significant results ( $p \leq 0.05$ ) are indicated by bold type.

Analyte Group & Species	$r^2$	Weight		Site	Interaction
		$p$	$p$	Student's <sup>a,b</sup>	$p$
<b>Arsenic</b>					
Arctic Cisco	0.3756	<b>0.0041</b>	0.0949	SI=L=BP=PB	0.9550
Arctic Cod	<b>0.0041</b>	0.8974	0.8433	L=NS	0.3472
Broad Whitefish	0.5788	0.0790	-	PB	-
Four Horn Sculpin	0.6531	<b>0.0062</b>	<b>0.0008</b>	SI=L=PB>BP	0.2503
Humpback Whitefish	<b>0.0337</b>	0.7424	0.5156	SI=PB	<b>0.0177</b>
<b>Barium</b>					
Arctic Cisco	0.2359	<b>0.0492</b>	0.3593	SI=PB=BP=L	0.9664
Arctic Cod	0.3013	0.2949	0.1870	NS=L	0.5971
Broad Whitefish	0.5125	0.1096	-	PB	-
Four Horn Sculpin	0.4055	0.6967	<b>0.0053</b>	PB=L>BP, PB>SI, L=SI, SI=BP	0.6778
Humpback Whitefish	0.1263	0.3246	0.2019	SI=PB	0.6144
<b>Cadmium</b>					
Arctic Cisco	0.2954	0.1671	<b>0.0485</b>	PB=L=SI, PB>BP, L=SI=BP	<b>0.0252</b>
Arctic Cod	0.3135	0.9374	0.0611	NS=L	0.5804
Broad Whitefish	0.1443	0.4133	-	PB	-
Four Horn Sculpin	0.4885	<b>0.0487</b>	0.0601	SI=L=BP=PB	0.9280
Humpback Whitefish	0.3982	0.3055	<b>0.0143</b>	SI>PB	0.9451
<b>Chromium</b>					
Arctic Cisco	0.3813	0.7748	<b>0.0040</b>	SI=L>BP, SI>PB=BP, L=PB	0.4336
Arctic Cod	0.0771	0.7150	0.4940	NS=L	0.2898
Broad Whitefish	0.3758	0.1957	-	PB	-
Four Horn Sculpin	0.3469	0.8765	<b>0.0289</b>	L=PB>SI, PB=BP, BP=SI	0.8805
Humpback Whitefish	<b>0.0293</b>	0.6453	0.9957	PB=SI	0.8825
<b>Copper</b>					
Arctic Cisco	0.1660	0.1926	0.4451	SI=L=BP=PB	0.7059
Arctic Cod	0.5481	<b>0.0039</b>	0.4051	NS=L	0.6182
Broad Whitefish	0.5719	0.0819	-	PB	-
Four Horn Sculpin	0.2265	<b>0.0243</b>	0.5825	L=SI=PB=BP	0.2107
Humpback Whitefish	0.3477	0.6678	<b>0.0468</b>	SI>PB	0.8456

Analyte Group & Species	$r^2$	Weight		Site	Interaction
		$p$	$p$	Student's <sup>a,b</sup>	$p$
<b>Iron</b>					
Arctic Cisco	0.2936	<b>0.0319</b>	0.1328	BP=SI=L=PB	0.7236
Arctic Cod	0.5376	0.8356	<b>0.0071</b>	NS>L	0.9307
Broad Whitefish	0.5797	0.0786	-	PB	-
Four Horn Sculpin	0.2550	0.4266	0.0654	L=PB=SI=BP	0.6798
Humpback Whitefish	0.1175	0.2304	0.4486	SI=PB	0.8735
<b>Lead</b>					
Arctic Cisco	0.1298	0.5195	0.3540	L=SI=BP=PB	0.8177
Arctic Cod	0.3116	0.9453	0.0617	NS=L	0.1033
Broad Whitefish	0.2836	0.2767	-	PB	-
Four Horn Sculpin	0.1627	0.3521	0.2294	BP=PB=L=SI	0.0530
Humpback Whitefish	0.4875	0.0766	<b>0.0056</b>	SI>PB	0.3129
<b>Mercury</b>					
Arctic Cisco	0.5111	0.8321	<b>0.0002</b>	PB>SI>L=BP	0.4379
Arctic Cod	0.4009	0.4107	0.0552	NS=L	0.2757
Broad Whitefish	0.2639	0.2973	-	PB	-
Four Horn Sculpin	0.4188	<b>0.0092</b>	0.4984	SI=BP=PB=L	<b>0.0153</b>
Humpback Whitefish	0.5096	0.1726	0.0896	SI=PB	0.4997
<b>Nickel</b>					
Arctic Cisco	0.2001	0.6212	0.1039	SI=L=BP=PB	0.1535
Arctic Cod	0.0847	0.5739	0.5696	NS=L	0.4935
Broad Whitefish	0.1807	0.4008	-	PB	-
Four Horn Sculpin	0.0719	0.8853	0.6533	L=SI=PB=BP	0.5701
Humpback Whitefish	0.1415	0.1850	0.2578	SI=PB	0.7548
<b>Selenium</b>					
Arctic Cisco	0.1898	0.2688	0.2055	PB=L=SI=BP	0.7670
Arctic Cod	0.6337	0.9151	<b>0.0016</b>	L>NS	0.3972
Broad Whitefish	<b>0.0185</b>	0.7974	-	PB	-
Four Horn Sculpin	0.0982	0.3870	0.4797	PB=BP=L=SI	0.9731
Humpback Whitefish	0.2642	0.0573	0.1120	SI=PB	0.1486
<b>Vanadium</b>					
Arctic Cisco	0.2762	<b>0.0396</b>	0.1869	PB=L=SI=BP	0.9545
Arctic Cod	0.3229	0.3441	<b>0.0438</b>	L>NS	0.3846
Broad Whitefish	<b>0.0015</b>	0.9424	-	PB	-
Four Horn Sculpin	0.0877	0.5840	0.5327	L=PB=SI=BP	0.4450
Humpback Whitefish	0.1256	0.6248	0.2105	SI=PB	0.9890
<b>Zinc</b>					
Arctic Cisco	0.4020	0.4332	<b>0.0068</b>	PB=SI=L>BP	0.9730
Arctic Cod	0.3326	<b>0.0391</b>	0.4367	L=NS	0.8970
Broad Whitefish	0.0578	0.6463	-	PB	-
Four Horn Sculpin	0.1161	0.9008	0.3906	L=PB=SI=BP	0.6046
Humpback Whitefish	0.5310	0.1118	<b>0.0035</b>	SI>PB	0.7391

<sup>a</sup> Student's *a posteriori* results are for Student's t test for least significant means.

Values are arranged with the highest means on the left and the lowest on the right.

<sup>b</sup> BP = Bullen Point, L = Liberty, NS = Northstar, PB = Point Brower, SI = Stump Island.

*Arsenic* - Four Horn Sculpin was the only species that had significant variability in As concentration due to site. Stump Island, Liberty and Point Brower had comparable concentrations, which were higher than Bullen Point. There was only one significant interaction term; that between site and weight for Humpback Whitefish. Mean As concentrations ranged between about 2 and 14  $\mu\text{g/g}$  (dry-weight) for the five species analyzed from the sites, with Arctic Cod averaging above 10  $\mu\text{g/g}$  (dry-weight) and Humpback Whitefish below 5  $\mu\text{g/g}$  (dry-weight) (Table 12, Figure 18).

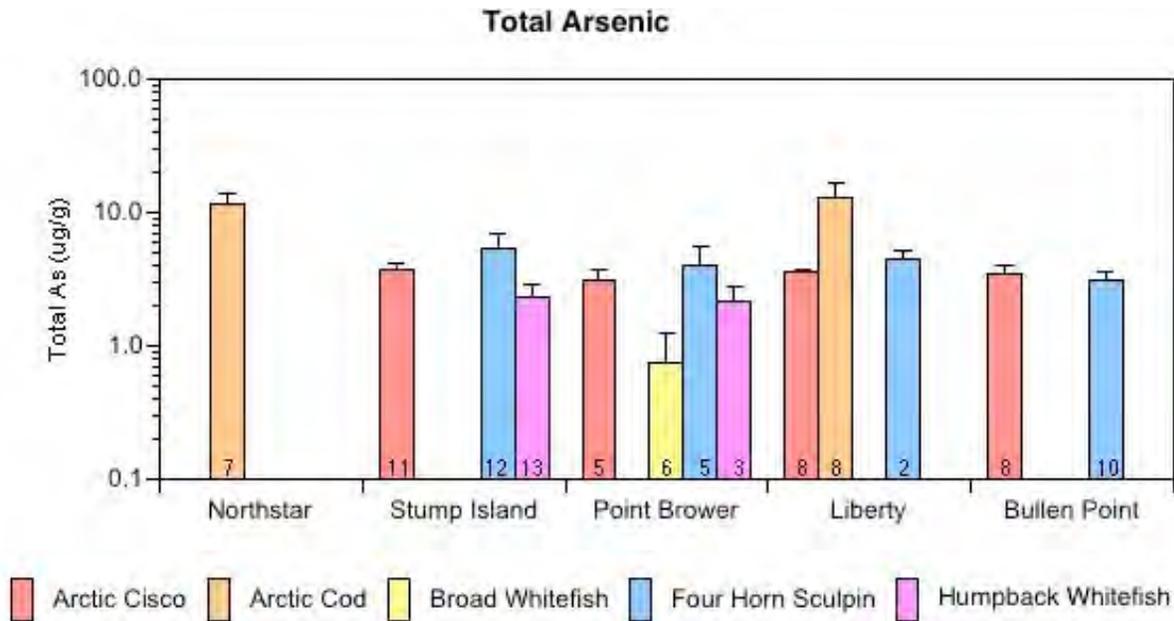


Figure 18. Total arsenic (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Barium* - Only Four Horn Sculpin displayed significant variability in Ba concentrations with site ( $p=0.0053$ ). Point Brower and Liberty had equivalent concentrations and they were higher than Bullen Point. No other species showed significant variation in Ba concentrations with site (Table 12, Figure 19).

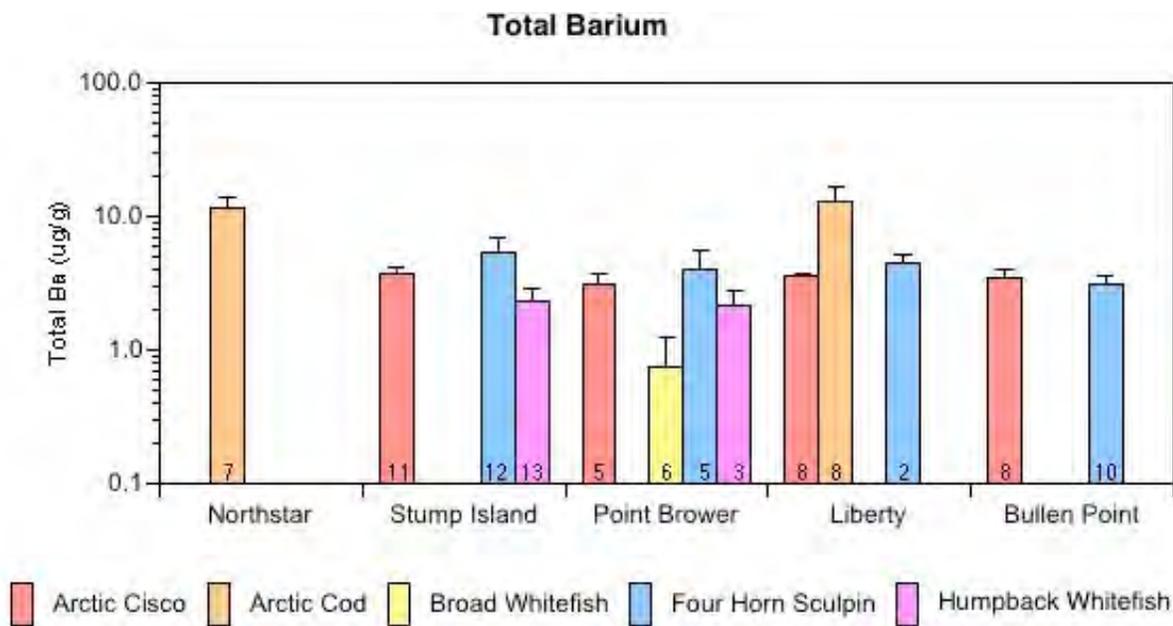


Figure 19. Total barium (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Cadmium* - This is an interesting element because of its dramatic change in bioavailability between fresh and salt water and the subsequent effect on toxicity (Hall and Anderson, 1995). Cadmium is complexed by chloride in seawater and not as nearly as available as in freshwater. Two species showed significant differences due to site, Arctic Cisco and Humpback Whitefish. Arctic Cisco also showed a site-weight interaction. Arctic Cisco at Point Brower had higher concentrations than those at Bullen Point, consistent with and possibly due to higher availability of cadmium in the freshwater outflow of the Saganvirtok River (Table 12, Figure 20). Humpback Whitefish also had significantly higher concentrations at Stump Island than at Point Brower ( $p=0.01$ ).

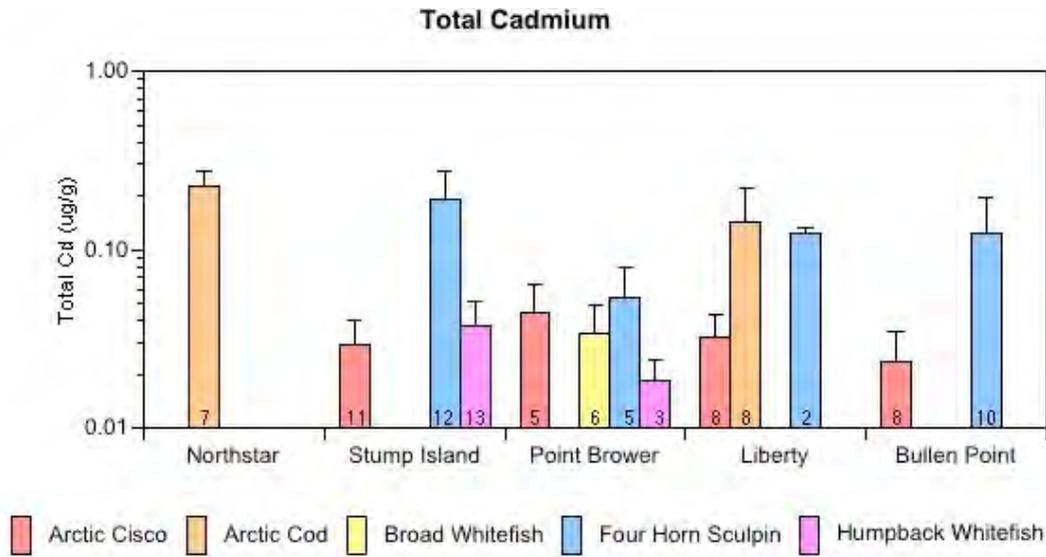


Figure 20. Total cadmium (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Chromium* - Chromium concentrations varied with site for the Arctic Cisco and Four Horn Sculpin (Table 12, Figure 21). For Arctic Cisco, Stump Island and Liberty had higher concentrations than did Bullen Point. For Four Horn Sculpin, Liberty and Point Brower had higher concentrations than did Stump Island.

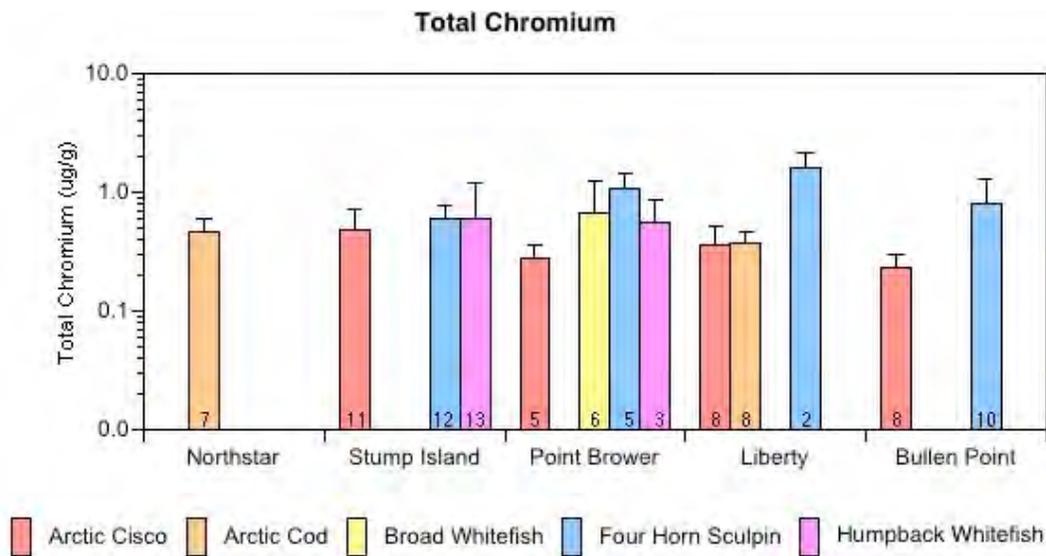


Figure 21. Total chromium (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Copper* - Whole-body concentrations of copper ranged from about 3 to 20 ppm. There was one significant site difference, for Humpback Whitefish, in which Stump Island was higher than Point Brower (Table 12, Figure 22).

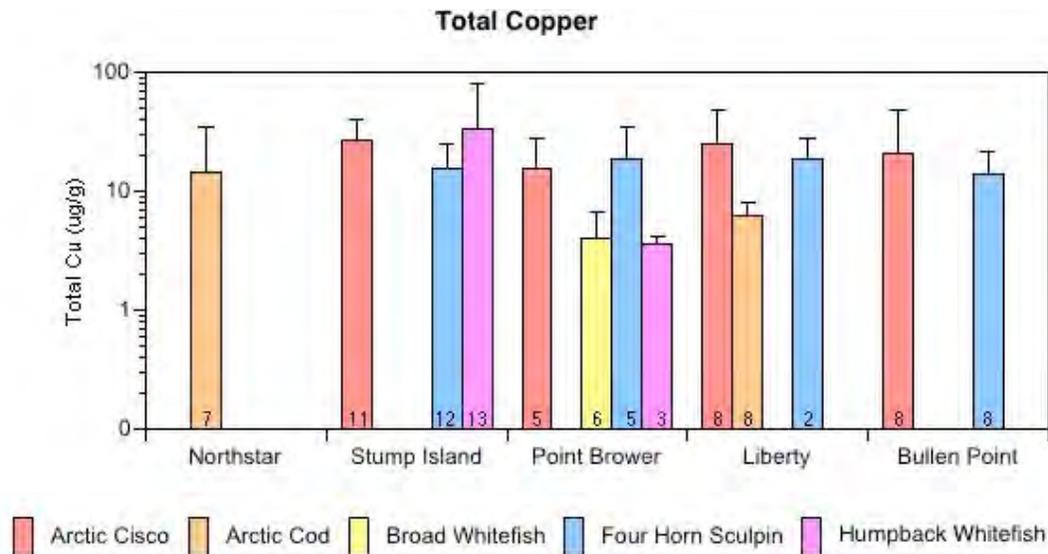


Figure 22. Total copper (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Iron* - Only the Arctic Cod had significant differences due to site, with Northstar having higher concentrations than Liberty. Four Horn Sculpin also had higher concentrations of Fe compared to the other species with the highest mean concentrations at Liberty. However, the high variability in Fe concentrations in this species precluded finding any significant site differences (Table 12, Figure 23).

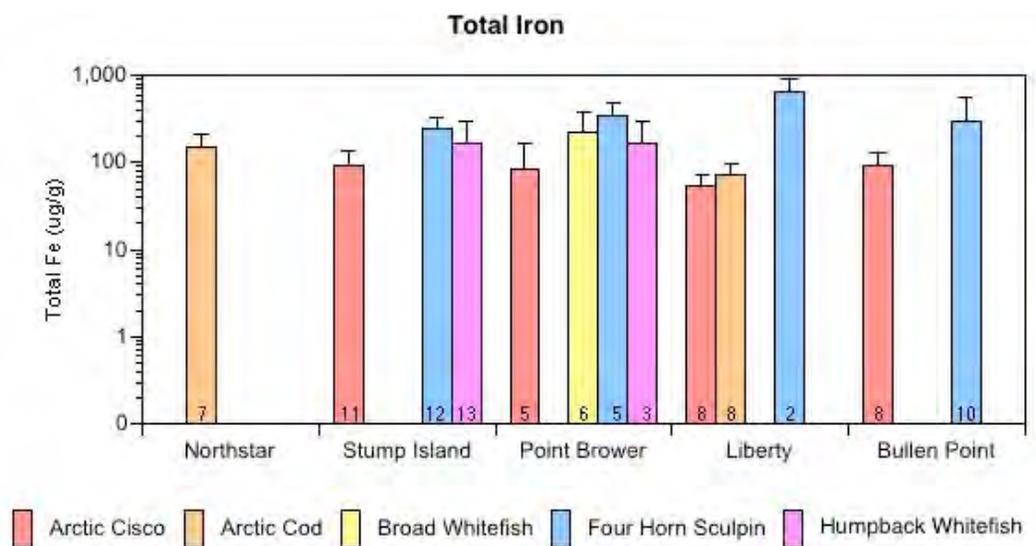


Figure 23. Total iron (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Lead* - There was one significant variation in Pb concentrations due to site, for Humpback Whitefish. (Table 12, Figure 24). For this species, Stump Island was higher than Point Brower.

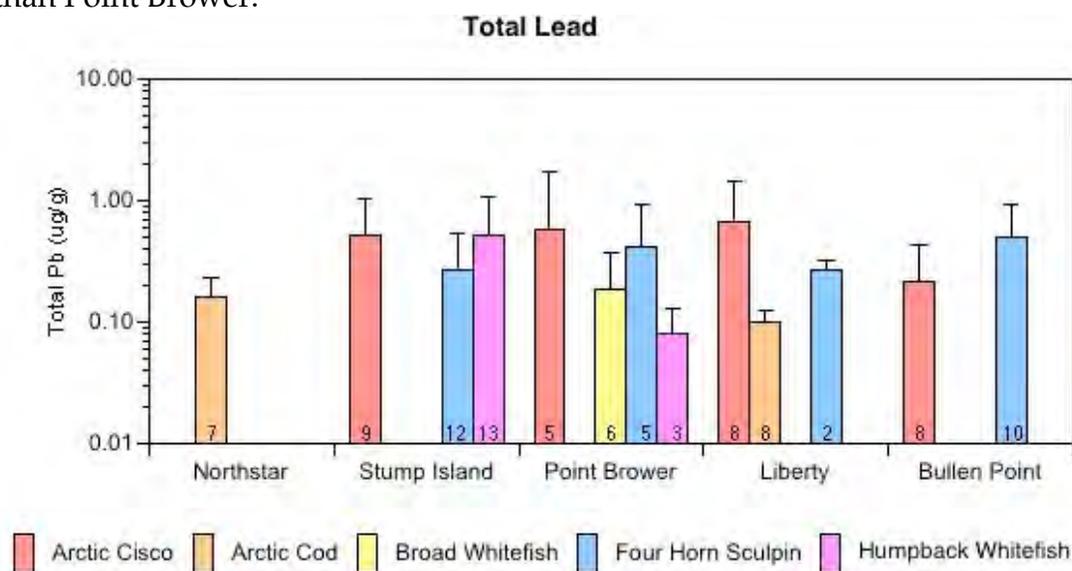


Figure 24. Total lead (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Mercury* - In Arctic Cisco, mercury concentrations varied significantly with site. In this species, Point Brower fish had significantly greater mercury concentrations than did any other sites, and Stump Island had higher concentrations than either Liberty or Bullen Point. When Four Horn Sculpins occurred with other species in the analyzed collections, they had the highest concentrations of mercury. In Four Horn Sculpin there was also a significant interaction between site and weight (Table 12, Figure 25).

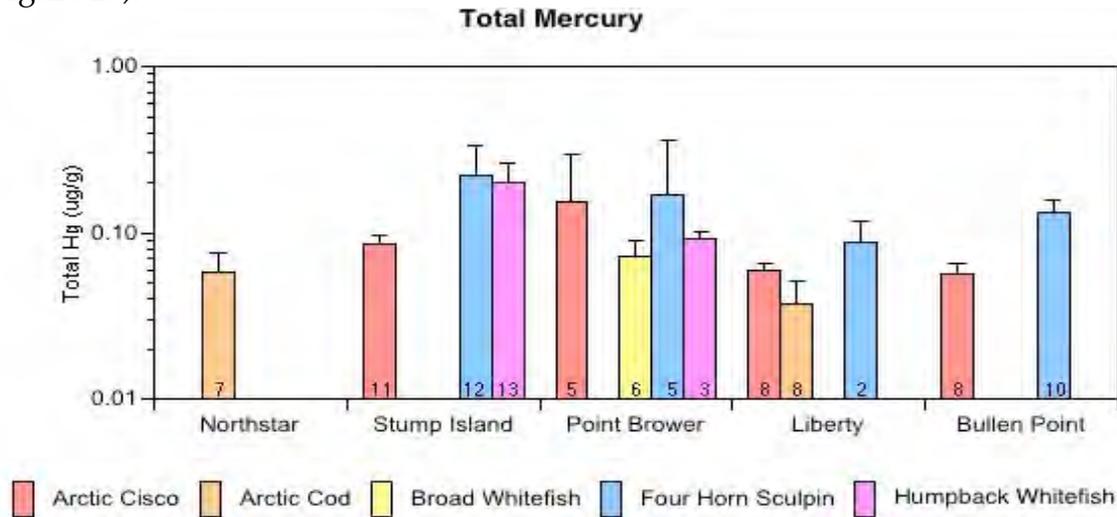


Figure 25. Total mercury (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Nickel* - There were no significant effects of site on Ni whole-body concentrations in any of the fish species. There were also no significant interactions of site with fish weight (Table 12, Figure 26).

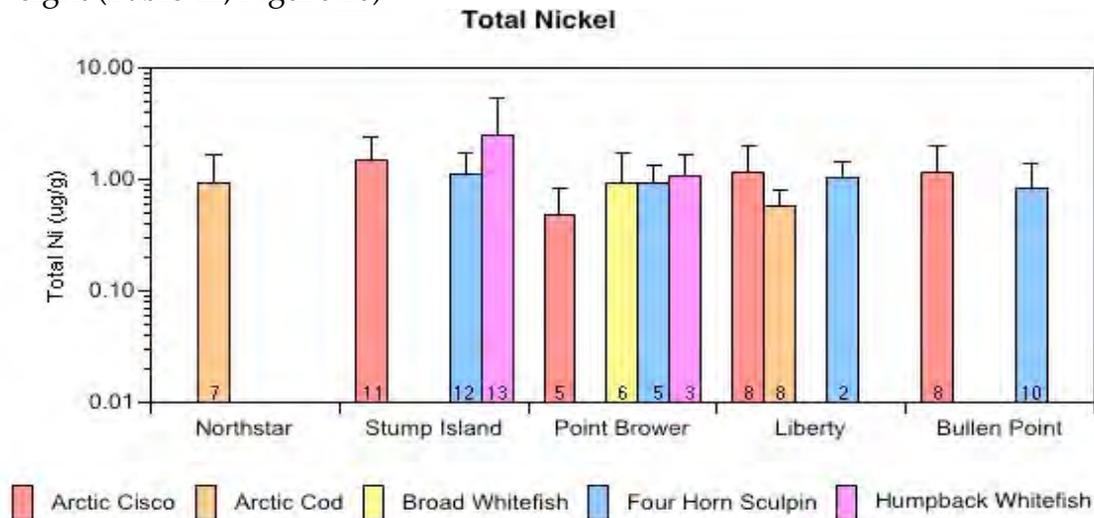


Figure 26. Total nickel (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Selenium* - There was one species that had differences in Se concentration due to site, Arctic Cod. Arctic Cod from Liberty had significantly higher concentrations than did those from Northstar (Table 12, Figure 27). In three out of four sites where Four Horn Sculpin occurred with other species, they had the highest mean concentrations.



Figure 27. Total selenium (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Vanadium* - There was only one species in which the concentration of V varied significantly with site, the Arctic Cod. As for selenium, the Liberty fish had significantly higher concentrations than did the Northstar fish (Table 12, Figure 28). In three out of four sites where Four Horn Sculpin occurred with other species, they had the highest mean concentrations.

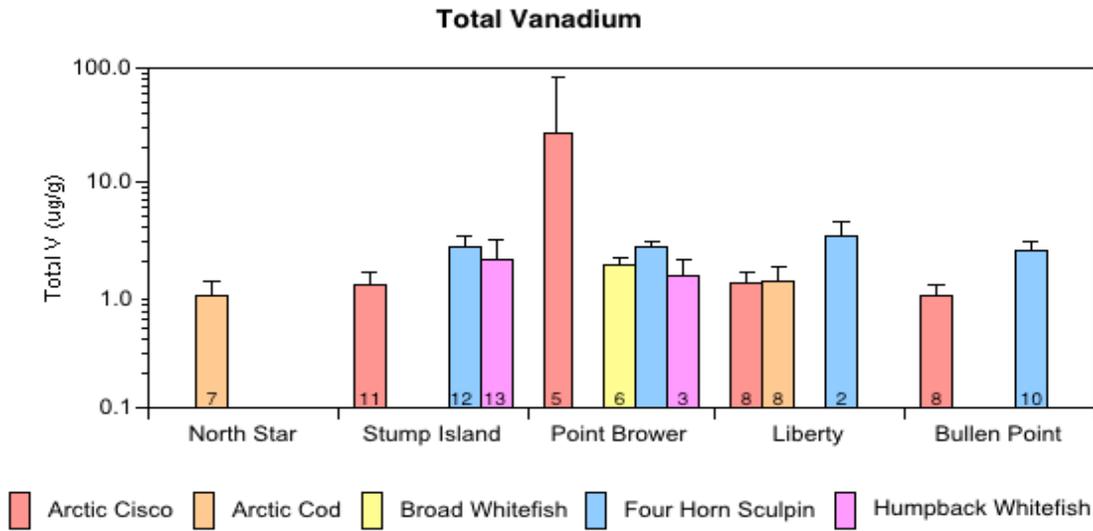


Figure 28. Total vanadium (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

*Zinc* - The Arctic Cisco and Humpback Whitefish were the only species in which there was significant variability in whole-body Zn concentrations due to site. For Arctic Cisco, Point Brower, Stump Island and Liberty were equivalent, but they were all higher than Bullen Point. For Humpback Whitefish, Stump Island fish had higher concentrations than Point Brower fish (Table 12, Figure 29). In three out of four sites where Four Horn Sculpin occurred with other species they had the highest mean concentrations.



Figure 29. Total Zinc (dry-weight) concentrations by species and site. Error bars depict one standard deviation and the numbers of individual fish making up the samples are indicated at the bottom of each bar.

### 3.6 Cluster Analyses

In an attempt to further understand the patterns of variability of contaminants in the various species of fish, we carried out several kinds of cluster analyses (Figures 30, 31, 32 and 33). The first cluster analysis was based on standardized mean concentrations of all organic analytes. In the results of that analysis there were three separate groups found to be significant at the highest level of separation: 1) Four Horn Sculpin from Point Brower and Stump Island (green), 2) Four Horn Sculpin from Bullen Point (blue), and 3) All remaining site-species combinations (red). While there was one site-species interaction for Four Horn Sculpin in the third cluster, this result generally suggests that Four Horn Sculpin show innate patterns of variability that are more similar within species than with other species in this study.

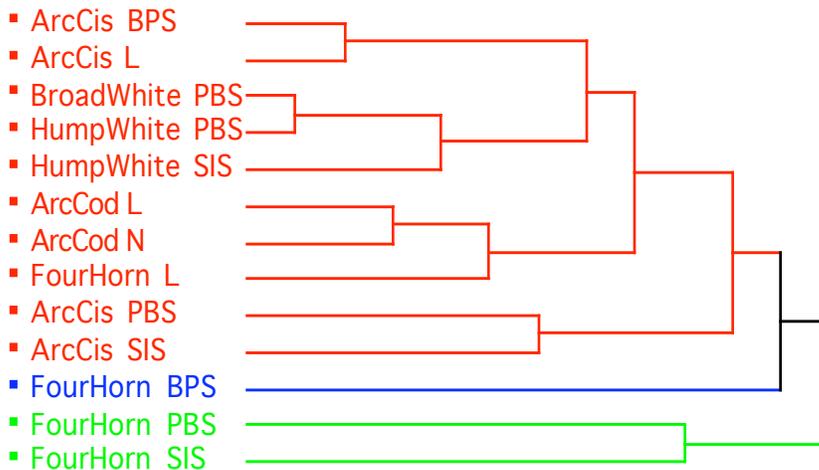


Figure 30. Clusters of species/site combinations based on standardized mean concentrations of all organic analytes. Colors indicate separate clusters.

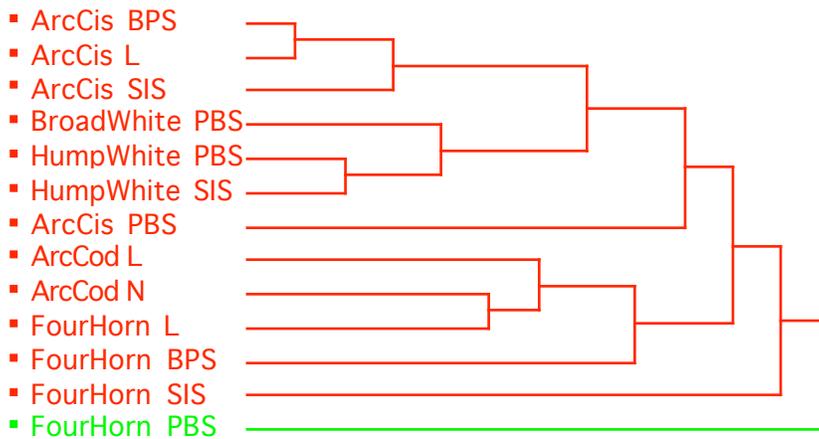


Figure 31. Clusters of species/site combinations based on standardized mean concentrations of PAH analytes. Colors indicate separate clusters.

In the second cluster analysis we did a similar procedure, but using only all of the PAHs. The results of this analysis were similar to those for all organic analytes in that the Four Horn Sculpin from Bullen Point clustered separately from all the other site-species combinations (Figure 31). A similar pattern emerged for the PCB congeners, the Bullen Point Four Horn Sculpin stood out as different from the other site-species combinations (Figure 32). The analysis of pesticides only produced two clusters of about equal size in which no particular species or sites stood out as dominating either cluster (Figure 33).

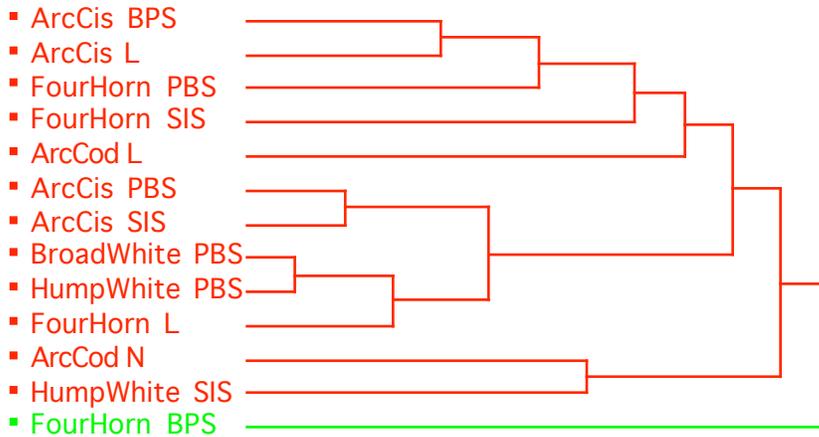


Figure 32. Clusters of species/site combinations based on standardized mean concentrations of PCB congeners. Colors denote separate clusters.

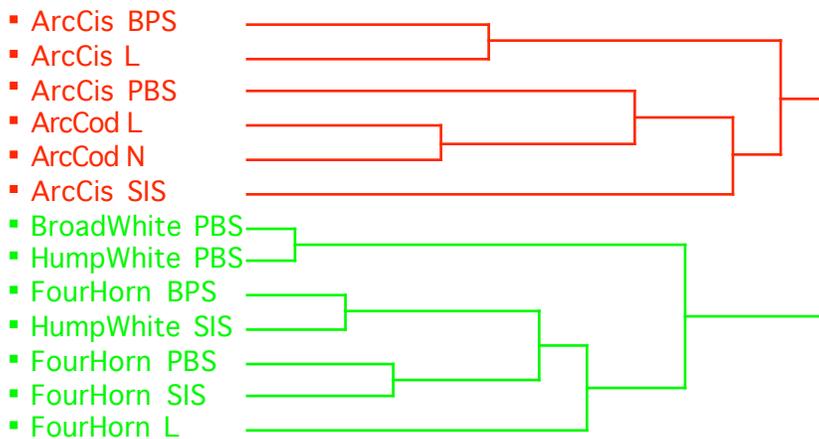


Figure 33. Clusters of species/site combinations based on standardized mean concentrations of pesticide analytes. Colors denote separate clusters.

## 4.0 Discussion

The objective of Task 8 of the ANIMIDA project was to determine if trace substances in the North Slope oil field development areas might be resulting in uptake of trace substances in fish to concentrations in excess of surrounding natural conditions. There are some general considerations in correctly interpreting the data presented in the results section with regard to this objective.

First, for substances that occur naturally, i.e., trace metals and PAHs, some means of partitioning what might be natural and what might be anthropogenic, and within the anthropogenic category what is due to oil field operations, is necessary to reach project goals. This can be done in a two ways:

1. Comparison of tissue concentrations in areas of human activity with sites representing background conditions. Elevated concentrations in tissues can result from local anthropogenic sources. There have been both military and oil field development activities in the study area and these influences should be considered. For example, in our fieldwork at the Bullen Point site we saw a petroleum-like material seeping into the ocean at the Distant Early Warning (DEW) military installation. There are also potential natural sources and natural conditions that might contribute more biologically available components in certain areas. For example, freshwater from the Sagavanirktok River might change speciation for naturally available cadmium and make it more likely to accumulate in fish near the River delta (There was some suggestion of this in the data for Arctic Cisco but several sites were equally high). Differential loading of organic mater into sediments might also change rates of Hg methylation, and, hence, increase Hg availability to fish locally. There also local sources for PAH that might include seepage and natural peats (Valette-Silver, 1999).
2. Use of diagnostic ratios between elements or compounds that might indicate a source of the trace substances in the tissues. This works well for sediments, but the approach has to be used cautiously with organisms which might differentially take up, metabolize or excrete compounds, distorting the ratios over the source ratios. Copper and zinc, for instance, are regulated physiologically in fish. It appears that for organic compounds many invertebrates are much more useful than are vertebrates because fish, birds and mammals metabolize many organic compounds at appreciably greater rates than invertebrates.

One other important process to consider is metabolism of trace organic compounds. The P4501A biomarker is an enzyme that is both induced by some organic contaminants, e.g., some PCBs and PAHs, and that can metabolize a variety these and other compounds as well. So, interpreting the data on PAH in tissues should take this into account. It is possible to have little detectable PAH in an animal with an active P4501A enzyme system when it is being exposed to relatively high and potentially harmful concentrations in the environment. In fact, it has been experimentally demonstrated that long-term exposure of fish to petroleum-contaminated sediments can result in no detectable PAH in tissue after 60 days, while the fish is still being exposed (McCain et al., 1978). So tissue concentrations of PAH in

fish may not be a reliable indicator of what is being absorbed, quickly metabolized and excreted. It is for this reason that the enzyme biomarker P4501A was measured in this study in addition to the PAH concentrations in the tissues. This enzyme is induced within several hours of significant exposure to oil and PAH and may persist on the order of weeks after exposure (Elskus and Stegeman, 1989; Stegeman and Kloepper-Sams, 1989; Spies et al., 1982). This enzyme can also be induced by PCBs, but since the PCBs appeared to be generally uniformly distributed in fish at different stations in this study, its contribution to enzyme induction is likely to be uniform between stations. The second biomarker used in this study is the concentration of PAH metabolites in the bile. If a fish is being exposed to PAH and they are being taken up from food, sediment or water, and being metabolized, they will be excreted in the bile (Krahn et al, 1984). This biomarker is thought to reflect mainly the bioavailable aromatic hydrocarbons in the last few meals eaten by the fish.

An important consideration in data interpretation is the number of fish analyzed at each site. Our data is such that the power of any conclusions that are drawn is low. For example, most contrasts between Liberty and Northstar are based on 7 or 8 individual fish at each site, whereas similar work done elsewhere would be based on 15-20 or more individuals at a site. In general, trace constituent concentrations follow log normal distributions in exposed populations and this sort of distribution requires larger numbers of samples to capture variability than if the distribution was a normal one.

Also, we have reported tissue residue concentrations of several trace substances where site is a significant source of variation, but for which we have no immediate explanation, neither natural or anthropogenic enrichment. It should be kept in mind that with marginal numbers of samples for many analyte-species combinations that some of these differences between sites may be due to chance. In addition, with a large number of analyses one might expect chance occurrences of significant relationships. There were 62 ANOVAs (not counting the total PAHs) that were carried out for combinations of species and trace organic substances and biomarkers and 60 ANOVAs for the metals for a total of 122 ANOVAs. At an alpha level of 0.05, as was used in this study, it would be expected that about 6 of the ANOVAs would return alpha values of 0.05 or less just on the basis of chance. There were 16 ANOVA results for organic compounds/ biomarkers with alpha values of 0.05 or less and 14 for metals with alpha values of 0.05 or less. So out of the 30 trace-substances/species combinations that returned alpha values of 0.05 or less, about 10% could have been due to chance. We could have been more conservative in our approach by reducing the conventional alpha level in the ANOVAs by dividing by the number of ANOVAs that were carried out. However, we felt that this approach is too restrictive in an exploratory study and would rather have some unexplained results than miss real effects.

In Table 12, we present the range of mean concentrations for the fish analyzed from the collection stations. So although there are low numbers of fish from individual stations these mean ranges provide a very good picture of the trace substance concentrations in the development area of the Beaufort Sea.

Table 12. Ranges of Mean Concentration Values at Collection Sites.

Species	Means (Range)														
	Total PAH	Total PCBs	Total Pests	As	Ba	Cd	Cr	Fe	Cu	Hg	Ni	Pb	Se	V	Zn
Arctic Cisco	232.9-464.5	68.2-83.4	166.2-346.3	3.1-3.7	3.07-73.64	0.02-0.04	0.23-0.49	53.5-90.7	15.4-21.2	0.057-0.154	0.476-1.144	0.213-0.675	1.55-2.00	0.97-26.9	79.0-105.4
Arctic Cod	599.7-797.1	234.3-331.9	208.7-224.5	11.6-13.1	11.6-13.1	0.14-0.23	0.37-0.46	72.2-151.9	6.17-14.36	0.038-0.058	0.58-0.93	0.10-0.16	1.98-3.4	0.97-1.28	91.4-93.5
Broad Whitefish	*230.3	52.3	81.4	0.8	0.762	0.034	0.68	226.0	4.0	0.073	0.942	0.187	2.053	1.855	78.517
Four Horn Sculpin	610.2-1654.3	100.8-2310	162.9-222.0	3.06-5.5	3.05-5.45	0.054-0.189	0.80-1.61	238.8-663.0	14.1-18.9	0.09-0.22	0.83-1.11	0.26-0.50	2.38-2.63	2.49-3.29	96.7-106.3
Humpback Whitefish	105.1-137.0	118.8-610.6	125.9-204.1	2.2-2.4	2.157-2.353	0.018-0.038	0.56-0.61	166.9-168.6	3.7-33.0	0.092-0.198	1.097-2.462	0.08-2	1.92-2.00	1.47-2.10	50.40-78.37

\*Broad Whitefish were collected only at one site, Point Brower.

Finally, we present two ways of looking at the current sampling efforts and how these inform our ability to detect change over time, or differences between collections in the contaminant measures in fish undertaken in this study. First, in Figure 34, we use the variability in some of the organic contaminant classes and markers among the Four Horn Sculpin to determine how long, using annual sampling, it would take to detect different percent changes in this species. The plot shows, for example, that it would take only another year of sampling to detect a 50% change in the concentrations of total pesticides for the Four Horn Sculpin. On the other hand, it would take four additional years to detect a 50% change in low-molecular-weight PAHs, 6 years to detect a similar change in total PCBs and liver hepatocyte P4501A and 7 years to detect this change in high-molecular-weight PAHs.

### Detectable Site Trends in Four Horn Sculpin

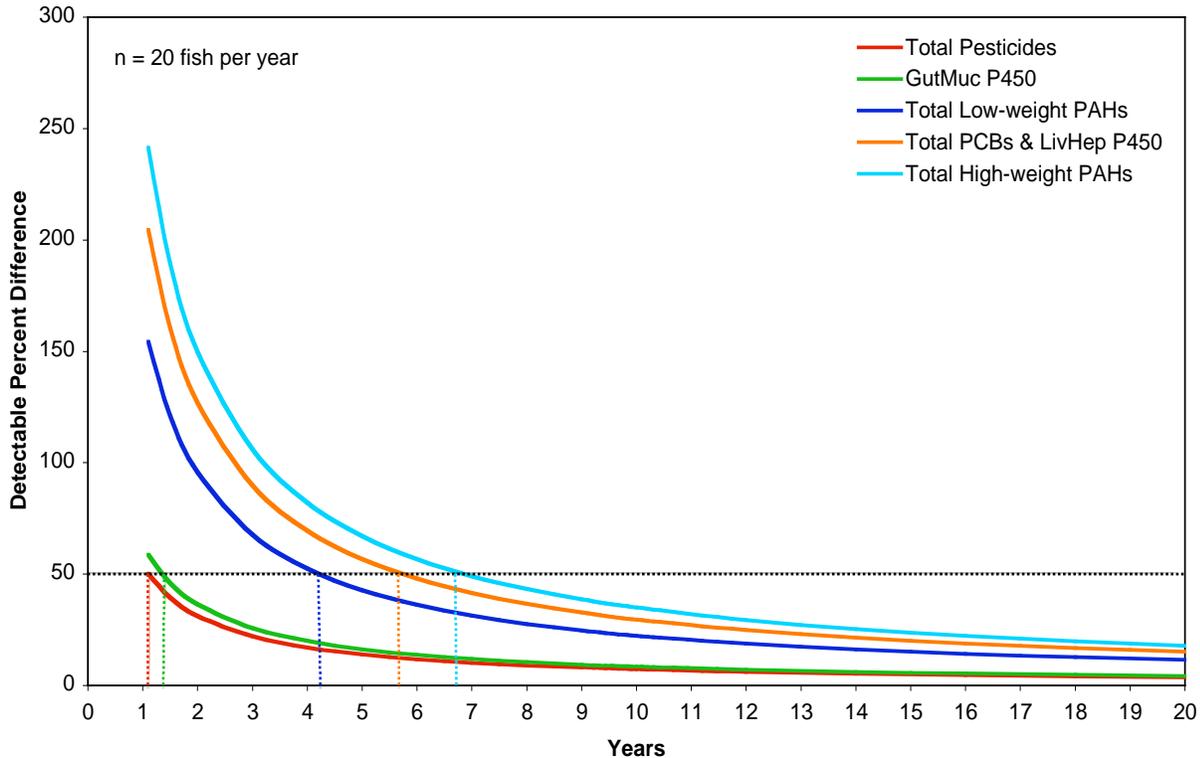


Figure 34. The number of years required to detect significant within-site trends for six variables measured in Four Horn Sculpin, if 20 fish are collected each year. The number of years required to detect significant changes of 50% are indicated for each variable. Analysis is based upon non-transformed data.

The second way of evaluating detection of differences in fish contaminant accumulation is to calculate the percent difference that can be detected in any measure between two collection areas (e.g., affected and control) as a function of the number of fish analyzed. Again, using the Four Horn Sculpin, a series of curves for a number of scenarios were generated. In Figure 35, it can be seen that for the Four Horn Sculpin the low sample numbers in this study were sufficient for detecting changes of less than 50% for most variables. However, for total high-molecular-weight PAH about 14 fish are needed to detect a true difference of 50% in means (with  $\beta=0.80$ ) and more than 40 fish are needed to detect a difference of 50% in liver hepatocyte P4501A.

### Mean Differences Between Four Horn Sculpin

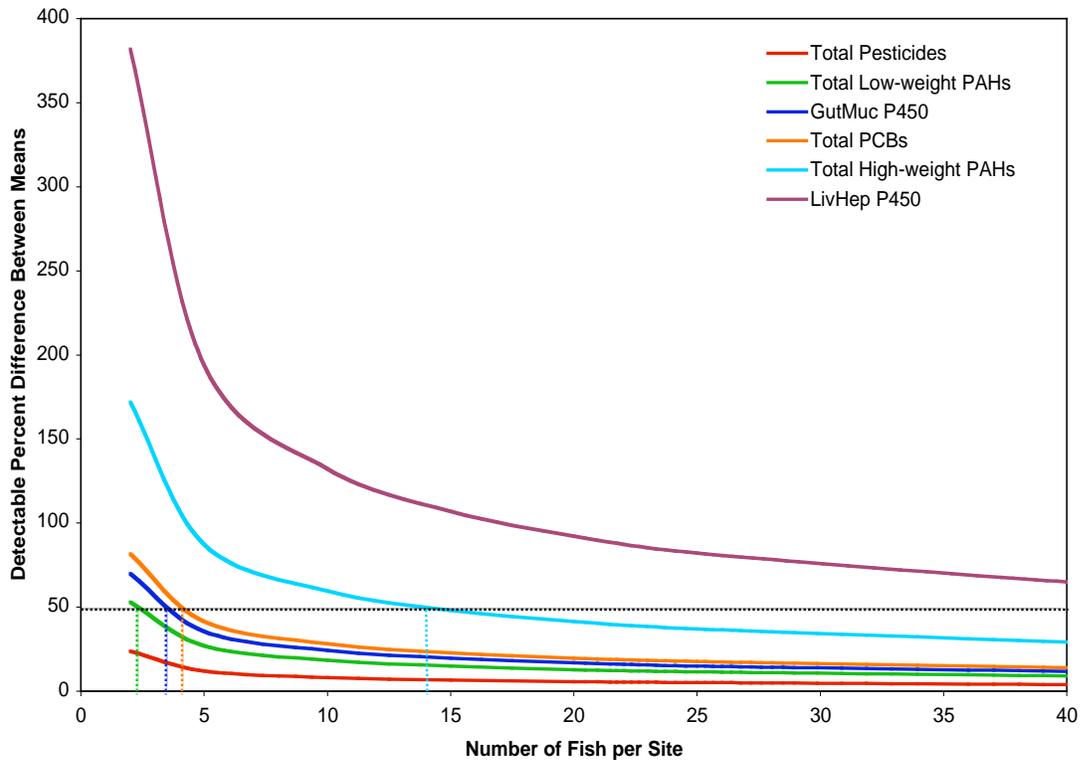


Figure 35. Relationship between numbers of Four Horn Sculpin collected from each of four sites and the percentage of difference between means that can be detected. The number of fish required to detect significant differences of 50% are indicated for each variable. These calculations are based upon log transformed data and assume that a difference with  $p = 0.05$  would have an 80% probability of being detected.

The above discussion of power not only sets the stage for designing a future monitoring program, but also for considering the strength of any emerging trends in these 2001 data with an average about 6-7 fish per species per station.

We propose the Four Horn Sculpin as a candidate species for monitoring for a number of reasons:

1. They show a higher number of site differences than any other species except Arctic Cisco in this exploratory study (Table 13).
2. While their movements have not been explicitly studied around the project area, sculpins generally have a limited range of movement in other areas and they are likely a species that will reflect local conditions within the development area.
3. They probably represent the marine environment better than other species included in the study, especially the three anadromous species.

4. From the above analyses it is apparent that this species has relatively good power to detect change.
5. They have a rather catholic diet of epibenthic and benthic organisms and therefore probably are good integrators of contaminants derived from lower in the food web.
6. They have been recommended by the Arctic Marine Assessment Program and their use on Alaska's North Slope should contribute to a better understanding of the circumpolar distribution and fate of trace substances in the Arctic.

Table 13. Summary of significant differences for species and contaminants with respect to the effect of site.

	Four Horn Sculpin	Arctic Cod	Arctic Cisco	Humpback Whitefish	Broad Whitefish
High-molecular-weight PAH	x		x		
PCBs			x		
∑DDT			x		
Chlordanes	x		x	x	
HCH		x	x		
Endosulfans			x		
Endrins				x	
Arsenic	x				
Barium	x				
Cadmium			x	x	
Chromium	x		x		
Copper				x	
Iron		x			
Lead				x	
Mercury			x		
Selenium		x		x	
Vanadium		x			
Zinc			x	x	
Phenanthrene metabolites	x				
Benz(a)pyrene metabolites	x		x		
Liver P4501A	x	x			
<b>Total</b>	<b>8</b>	<b>5</b>	<b>11</b>	<b>7</b>	<b>0</b>

In addition to the above considerations that favor Four Horn Sculpin as a species for monitoring, a study in Cambridge Bay, Northwest Territories, Canada found high variability in PCBs between sites for this species separated by less than 10 km (Bright et al., 1995).

Our experience in this study is that gill nets and trawls are the best means of catching Four Horn Sculpin and other offshore fishes in the area of the platforms. Fyke nets are more appropriate for the nearshore anadromous species caught in this study.

There are some indications emerging from these data of possible anthropogenic influence in fish from the study area. Perhaps the strongest evidence is for the PAH and the markers that respond to PAH, particularly in the Four Horn Sculpin. While there were no effects of site on whole body tissue residue concentrations of total PAH or low-molecular-weight PAH in any species of fish, there were differences seen in high-molecular-weight compounds between sites for Arctic Cisco and Four Horn Sculpin. The sites where there were elevated concentrations in these two species were Stump Island and Point Brower. In Four Horn Sculpin P4501A induction in the liver cells (hepatocytes) varied significantly with site, with Point Brower and Stump Island having the highest responses. Also, phenanthrene and benz(a)pyrene equivalents in the bile varied significantly with site in Four Horn Sculpin. These are very sensitive biomarkers and the P4501A marker showed minimal levels of response over the entire area. It should also be noted that both biomarker responses can give false positive responses with regard to anthropogenic PAH:

1. P4501A can respond to other chemicals. There are potential natural inducers, i.e., peat (Kopponen et al., 1993). It is also possible that some of the pesticides that were detected in the fish tissues could have induced P4501A as not much work has been done with these compounds relative to induction of this enzyme in fish.
2. There is a background of naturally fluorescing compounds in the bile of fish that are not petroleum.

Despite these caveats, the findings with respect to PAHs are that the data are broadly consistent with accumulation of low levels of PAHs in Four Horn Sculpin, induction of the enzyme (P4501A) for metabolism of PAHs, and appearance of PAH metabolites in the bile at sites where there is known anthropogenic activity—Stump Island. We do not have an explanation for responses in Point Brower fish, but there could be influences either from the Endicott Causeway or PAHs in the Sagavanirtoq River (perhaps of a natural origin). The Point Brower fish also clustered separately from other species-site combinations when only the PAHs were analyzed (Fig. 31). It should also be noted that the backward multiple regression relating tissue burdens of PAHs and PCBs to P4501A response lent a little support to the above interpretation, as the P4501A in gut mucosa of Four Horn Sculpin was significantly related to low-molecular-weight PAHs. Both these measures, LMW PAH and P4501A in gut mucosa, did not vary as function of site. One interpretation of this result of the stepwise multiple regression is that a low level of LMW PAHs occurs at some stations but not enough fish are available at the sampling sites to detect site differences. In studies of biomarkers it is not uncommon to find relationships emerging based on analysis of all individuals regardless of site that differ if the data are contrasted as site means. It should be kept in mind again here that the power of our study to resolve relationships is relatively weak for liver hepatocyte P4501A and high-molecular-weight PAH due to the small number of fish of each species at our collection stations and the high variability of these measures. A clearer picture of PAH bioaccumulation and metabolism would emerge for fish by a more concentrated effort on Four Horn Sculpin.

A potentially fuller interpretation of PAHs in fish will be possible once data in the annual report for Task 2 can be compared with the fish data. There are measurements of PAHs in the sediments, amphipods and bivalves taken in Task 2 and it will be instructive to compare the variability in trace substances in invertebrates and in fish. Also, we have not attempted to apply any diagnostic ratios to determine PAH sources. Such ratios in clams, in particular, are useful, as they are likely not much altered by metabolism. It is certain however that there are both multiple natural and anthropogenic sources of PAH, in the nearshore Beaufort Sea (and that accurately distinguishing the ultimate contributions of these sources of PAH that are biologically available by tissue measurements may be impossible (Steinhauer and Boehm, 1992; Yunker and MacDonald, 1995).

Organochlorines and pesticides do not occur naturally, so what is found in the tissues is clearly anthropogenic. The only question is whether the source is distant or local, and therefore more likely to be related to industrial or military activity in oil field development area. Although distant sources are thoroughly mixed atmospherically by the time they arrive in the Arctic, there is some evidence that large rivers draining into the Beaufort Sea might result in higher local concentrations and variability within the study area that may not be attributable to local sources (Bright et al., 1995). PCBs in fish tissues in this study only varied significantly with site in Arctic Cisco. These are some of the few data on PCBs in fish from the North Slope of Alaska. In another study in the Canadian Arctic, Four Horn Sculpin were analyzed around Cambridge Bay and nearby areas, Northwest Territories that included a dump near a small town and, like Bullen Point, a DEW line site. Whole-body concentrations of PCBs (without the livers and on a wet-weight basis) ranged from about 4 to 220 ppb total PCBs. The higher values were attributed to contaminated soil near the town and the military site (Bright et al., 1995).

We have recognized two patterns of relative congener abundance in the fish from this study. The first is a mixture dominated by high-molecular-weight congeners (e.g., IUPAC congener 153). A second pattern includes a similar congener composition of high-molecular-weight compounds, but also has significant, and sometimes dominant, low-molecular-weight components (e.g. IUPAC congener 8). The low-molecular-weight congeners in such mixes have been reported previously from Beaufort Sea samples (Vallette-Silver et al., 1999). The clustering of the site-species combinations found that for PCBs, Bullen Point clustered separately, suggesting a potential local source at this site but not enough of a robust source to provide a statistically significant site difference with low numbers of fish at that site. This is also the location of an old Military installation, a Distant Early Warning (DEW) line site. There were 63 DEW line sites in the Arctic, in Greenland, Canada and Alaska and there were about 30 tons of PCBs estimated to be at these sites (AMAP, 1997).

Further, if all analytes are used, a separate cluster for Point Brower Four Horn Sculpin emerges. We have no explanation of this except that this is within the influence of the Sagavanirktok River and there are likely different ratios in the trace substances coming from this source relative to the Beaufort Sea.

For other individual classes of pesticides making up the total pesticide category there were significant differences due to site with one or more species. For Chlordanes, DDTs, Endosulfans and Endrins species which had significant variability with site had consistently high concentrations in Stump Island fish relative to those at the other sites. Point Brower fish were also high in many cases. It was also mainly the Arctic Cisco that had significant site differences for these groups of compounds, although Arctic Cod, Humpback Whitefish and Four Horn Sculpin also had a difference each for one compound or compound group. The Four Horn Sculpin had site differences for Chlordanes. Humpback Whitefish had site differences for Chlordanes and Endrins. Taken together these data suggest that there are elevated concentrations of several pesticides in the area of Stump Island and Point Brower over the general background for the area and there might be a low-level source there for pesticides. We do not know at this time what a local source might be. Pest control is one possibility that should be investigated.

Due to the natural occurrence of metals in crustal rocks and nearshore marine sediments, we face challenges in interpreting what metals may have an anthropogenic source. There were no differences due to site in the whole-body concentrations of only nickel, which will not be discussed further as there is no basis in our findings for an anthropogenic source for this metal in tissues. The remainder of the metals analyzed showed significant differences due to site in one or more species: arsenic, barium, cadmium, iron, mercury, selenium, vanadium and zinc.

The highest concentrations of arsenic occurred in Four Horn Sculpin at Stump Island and Point Brower. The source of this arsenic is uncertain, as it did not appear to be significantly elevated in sediments anywhere in the area on an iron-normalized basis (see Trefry et al, Interim Report, Task 2). There was very little variability in the concentrations of this metal in fish, so just slight changes from site to site in mean values were likely to result in finding significant differences. It is not known if there is an anthropogenic source of arsenic in the area. It should be noted that arsenic concentrations are several times greater in sediments of the sampling area than average crustal abundance and that the maximum concentration of arsenic in sediments exceeds the Effects Range Low (ERL) of Long and MacDonald (1995) (See Task 2 report—Trefry et al). It should also be noted that arsenic is generally elevated in North Slope sediments compared to other locations in Alaska (Vallette-Silver et al., 1999). A study in the eastern Beaufort Sea found concentrations of arsenic of 0.5 to 0.8  $\mu\text{g/g}$  (wet-weight basis), which compares to about 1-15  $\mu\text{g/g}$  dry-weight found in this study. Using a conversion of dry to wet of about 4-5 times the values found in this present study appear to be significantly higher than those found in the previous study (West, unpublished 1985).

Also, river borne arsenic entering the Beaufort Sea on suspended particles may partition to biological compartments. Arsenic appears to be accumulated in marine organisms by trophic transfer. Most studies have found that concentrations of arsenic do not increase with increasing trophic level (e.g., Bernhard and Andrae, 1984). However, studies done in an Australian estuary suggest that biomagnification may occur (Barwick and Maher, 2003).

Analysis of the ratios of barium to iron in the fish data suggests that sediment may have played a role in trace metals detected in Four Horn Sculpin. We therefore ascribe no other particular interpretation to the site effect seen with this element in Four Horn Sculpin. Sediments do occur in the guts of bottom feeding fish. In addition, the barium sulfate used in drilling mud is not appreciably biologically available to marine organisms.

There was an effect of site on cadmium concentrations in Arctic Cisco. Point Brower fish had the highest concentrations of the four collection sites, however in the other species there was not a pronounced difference in Cd concentrations at Point Brower and other stations. Several stations had equivalent concentrations in this species. It is not known if the influence of freshwater made cadmium more biologically available at these sites.

Chromium varied significantly with site in Arctic Cisco and Four Horn Sculpin. Arctic Cisco had the highest concentrations at Stump Island. For Four Horn Sculpin, Liberty and Point Brower had the highest concentrations. We can ascribe no particular interpretation to these data.

Copper had the higher concentrations in Humpback Whitefish at Stump Island than at Point Brower. We cannot discount the possibility of an anthropogenic source of this metal at Stump Island.

Arctic Cod was the only species where the variation in iron content differed significantly between sites. Again, four of the sites had equivalent values. Iron is an essential element and is therefore physiologically regulated in fish. It seems unlikely that without a very large biologically available source that iron would appreciably accumulate in fish beyond the range that is physiologically required. However, with four of the five sites having equivalent values we ascribe no particular reason for the significant variation besides the vagaries of chance sampling and small sample sizes.

Stump Island Humpback Whitefish had higher concentrations of lead than those from Point Brower. We cannot discount the possibility of an anthropogenic source of this metal at Stump Island.

Arctic Cisco showed significant variation in mercury. Point Brower fish had greater concentrations than Stump Island fish, which in turn were higher than Liberty fish. However, the differences in means were very small. At this stage, we cannot rule out a slight local anthropogenic influence on mercury in this species. Nor can we rule out random variability in a small sample set (n=6-7 per site) as an explanation of this finding.

It should be noted that cadmium, lead and mercury are believed to be transported in the atmosphere to the Arctic, so there is a possible anthropogenic component to the concentrations in fish tissue measured here (Mac Donald et al., 2000).

For selenium, Arctic Cod from Liberty had greater concentrations than those from Northstar. Again, this is based on a very small sample size and we have no reason to attribute this to anthropogenic activities at the site.

Vanadium is another element for which Arctic Cod showed significant differences due to site. In this case, the Liberty fish had higher concentrations than the Northstar fish. Again, the potential influence of sediments in the gut, as well as a small sample size, may be a factor as there are no known sources of vanadium at Liberty.

For zinc, the Arctic Cisco and the Humpback Whitefish had variation due to site. In this case Stump Island fish had consistently higher concentrations.

Among all of the analytes assessed by Task 8, PCBs appear to be of greatest concern to human health based on measured whole-body concentrations. When whole body tissue residues are compared to EPA's screening values for subsistence consumption of (fish) flesh, it appears that flesh concentrations, had we measured them, might approach EPA's screening values, which at 3 ppb total PCBs, are conservative in comparison with FDA screening values of 2 ppm. The data produced by Task 8 investigations cannot be compared to EPA and FDA screening values, as Task 8 data are from whole-body concentrations and EPA and FDA values are based on concentrations in muscle tissue. PCBs are stored in lipid-rich tissues, and are typically in much lower concentrations in flesh than in whole body. Additionally, EPA subsistence screening values are based on a detailed risk assessment scenario that applies risk based on specified levels of consumption. The data produced in Task 8 is based only on whole body fish tissue concentrations. No investigation of consumption levels was included. National Status and Trends Benthic Surveillance Project fish data was investigated to determine if useful comparisons could be made between the fish from the North Slope and multiple locations from around the United States. However, after careful consideration of the NS&T data we decided not to use it, as all of the PCB data produced by NS&T is from fish livers rather than whole-body concentrations. Fish liver concentrations are expected to be much higher (perhaps an order of magnitude or more) than whole-body concentrations.

Ecological effects of PCBs in fish are a prominent concern in addition to the obvious concerns to subsistence consumers. The vast majority of studies have human health as their main priority and therefore investigate PCBs only in the edible portions (flesh) of the investigated organisms. This is unfortunate (from our perspective) from several standpoints. Chief among them is that PCBs accumulate most heavily in the lipid rich portions (organs), making the data non-comparable with studies such as this one, the objective of which was determination of whole body levels, thus allowing an investigation of the environment with human health issues taking a lesser role. From a purely ecological perspective, one recent study (Meador et. al., 2002) emerges that looked at whole body tissue residues of PCBs in salmonids. The authors investigated all of the effects studies conducted to date and determined (using the admitted conservative 10<sup>th</sup> percentile approach recommended by the EPA) that whole body lipid normalized wet-weight concentrations of total PCBs exceeding 2.4 ppm cause harm (as defined in the Endangered Species Act) to juvenile salmonids. While the Meador et. al., study did not include Whitefish or Cisco, they are closely related to the Salmon, Trout and Char that were investigated. We clearly understand that significant physiological differences between groups of fishes make a comparison of potential harm somewhat tenuous, however given the lack of available data, we think a comparison is worthwhile in this case. The mean tissue

concentrations of PCBs for all five of the (Task 8) investigated species were below 2.4 ppm. The Four Horn Sculpin at Bullen Point had a mean value of 2.3 ppm, and a single individual had a concentration of 462 ppm. Sculpins at Bullen Point clearly had the highest PCB concentrations of any of the site-species combinations. The concentrations found there are of some concern for ecological effects on fish. (Hoekstra et. al., (2003) also found concentrations well below 2.4 ppm in fish collected by subsistence fishers from nearby Elson lagoon (Barrow, AK). Additionally, a study by Atuma et. al., (1998) documented whole body lipid normalized wet-weight. concentrations of 1.3-3.1 ppm PCBs in Atlantic Salmon from the Baltic Sea. Further investigation of contaminants and their potential effects on fish (e.g., in Four Horn Sculpin) is warranted based on findings presented here.

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## 6.0 Appendices

**APPENDIX A: FISH COLLECTION FORMS**  
(Located on enclosed CD)

These field forms, located on the enclosed CD, document the timing, location, method, personnel, and species collected at each site.

**Arthur D Little****Station Log**

Station ID

SIS

Date 07-25-01

Client MMS

Time setup 15:00-18:00 Fyke net

Project 2001 ANIMIDA

Case No. 72105

**Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)****Sampling Location**

Station Number

SIS

**Station Type**

BSMP/Northstar/Liberty/Other

Latitude 70° 25.958' N

Longitude 148° 41.922' W

**Field Observations and Measurements**

Wind Speed 0-5 Wind Direction ~ 115°

Seas/Ice calm seas offshore ice breaking up

Water Depth 3.25 m @ end

Conductivity, Temperature, Depth (CTD) NA

Doppler Current NA

Turbidity NA Instrument Tow NA

Comments: offshore side

**Samples Collected**

NA

**Sediments:**

Core Sample

Van Veen Grab

No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

&gt;50% silt/clay

Fine

Coarse Sand

Gravel

Shell Hatch

Mixed

Indications of Anoxia:

Yes

No

H<sub>2</sub>S Odor: Yes

No

Comments:

**Water/Suspended Sediments:**

Surface

Mid-Water

Bottom

Other

Comments:

NA

**Biota**

(check species collected for analysis)

**Amphipods:** Annonyx**Fish:** Sculpin Safron Cod Arctic Cod Char Cisco Flounder Whitefish Other**Clams:** Astarte NA Cyrtodaria Macoma Portlandia

Comments:

**Quality Control Samples**

Field Blank

NA

Equipment Blank

NA

Other

NA

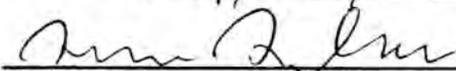
Overall Comments:

Set up Fyke net ~ 20m lead with 1' being set to SE stump island shoreline (SIS)

Field Personnel:

G. Lawley, J. Gold, F. Quevedo

Signature:



Date:

07-26-01

Arthur D Little

# Station Log

Station ID

SIS

Date 07-26-01

Client MMS

Time 14:00 collection Fyke net

Project 2001 ANIMIDA

Case No. 72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number SIS

### Station Type

BSMP/Northstar/Liberty/Other

Latitude 70° 25.958' N

Longitude 148° 41.922' W

### Field Observations and Measurements

Wind Speed 0-5 Wind Direction N 115°

Seas/Ice calm seas, offshore ice broken

Water Depth shore to 4'e trap Conductivity, Temperature, Depth (CTD) NA

Doppler Current NA Turbidity NA Instrument Tow NA

Comments: zodiac trip

### Samples Collected

Sediments: Core Sample NA Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_

Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments: \_\_\_\_\_

### Water/Suspended Sediments: NA

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments: offshore ice present

### Biota (check species collected for analysis)

Amphipods: Annonyx \_\_\_\_\_

Fish: Sculpin (4 hrs) Safron Cod \_\_\_\_\_ Arctic Cod (1) Char (1) (~125) Cisco (1) Flounder (1) Whitefish (~20) Other \_\_\_\_\_

Clams: Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: Fyke net with SE wing set up

### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank 01-SIS-11-FA-EB-DC 01-SIS-11-PHC-EB-DC Other \_\_\_\_\_

### Overall Comments:

01-SIS-01-<sup>LAWLEY</sup>PHC-T-DV  
through 01-SIS-28-PHC-T-FS processed

kept: 2

file and organic samples chilled on ice until storage in freezer @ PBC  
[net deployment 07-25-01 (15:00) through 07-26-01 14:00 ~20hrs] realkended buoy

Field Personnel: LAWLEY, J Gold, F. Quozoli, J Brown, M. Mertz

Signature: \_\_\_\_\_

James Dwyer

Date: 07-27-01

Arthur D Little

# Station Log

Station ID

SIS

Date 07-27-01

Time 11:00 @ collection

Fyke net maint.

Client MMS

Project 2001 ANIMIDA

Case No. 72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number SIS

Latitude 70° 25.958' N

### Station Type

BSMP/Northstar/Liberty/Other

Longitude 148° 41.922' W

### Field Observations and Measurements

Wind Speed 12.5 Wind Direction 70° Seas/Ice calm

Water Depth 3.25 m Conductivity, Temperature, Depth (CTD) NA

Doppler Current NA Turbidity NA Instrument Tow NA

Comments: F-net maintenance

### Samples Collected

Sediments: Core Sample \_\_\_\_\_ Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_

Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments:

NA

### Water/Suspended Sediments:

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments:

NA

### Biota (check species collected for analysis)

Amphipods: ~~Anonyx~~ any cednydian 3 Arctic cisco

Fish: Sculpin 10 Safron Cod \_\_\_\_\_ Arctic Cod 6 Char 1 Cisco 4 Flounder 1 Whitefish 6 Other 9 spine stickle

Clams: Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: Fyke net set 07/26 - 07/27, all species released

### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank \_\_\_\_\_ Other \_\_\_\_\_

NA

### Overall Comments:

F-net checked and fish released due to replicates and processing issues

### Field Personnel:

G. Lawley F. Quertoli

### Signature:

[Signature]

Date: 07-27-01

Arthur D Little

# Station Log

Station ID SIS

Date 07-28-01

Client MMS

Time 09:00 collection Fyke net

Project 2001 ANIMIDA

Case No. 72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number SIS  
Latitude 70° 25.958' N

### Station Type

Longitude 150° 14.922' W  
BSMP/Northstar/Liberty/Other

### Field Observations and Measurements

Wind Speed 5-10 Wind Direction 180° Seas/Ice slight S. winds/cloudy  
Water Depth 325 Conductivity, Temperature, Depth (CTD) NA  
Doppler Current NA Turbidity NA Instrument Tow NA

Comments: feeding trip

### Samples Collected

**Sediments:** Core Sample NA Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_

Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments:

### Water/Suspended Sediments:

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments:

### Biota (check species collected for analysis)

**Amphipods:** Annonyx \_\_\_\_\_  
**Fish:** Sculpin 6 Safron Cod \_\_\_\_\_ Arctic Cod \_\_\_\_\_ Char \_\_\_\_\_ Cisco 25 Flounder \_\_\_\_\_ Whitefish 6 Other (2) Rainbow smelt (released)  
**Clams:** Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments:

### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank 01-SIS-FAC-34-FAC-EB-QC  
01-SIS-34-CYP-EB-QC  
Other PHC

Overall Comments: 01-SIS-31-29-PHC-T-DV through 01-SIS-34-PHC-EB-QC

extra fish released due to sample replicates  
see dissection log sheets for selection of fish

Field Personnel: G. Lawley, J. Gold, F. Querzoli

Signature: [Signature] Date: 07-28-01

Arthur D Little

# Station Log

Station ID SIS

Date 07-30-01

Client MMS

Time 0900 collection/demob

Project 2001 ANIMIDA

Case No. 72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number SIS

### Station Type

BSMP/Northstar/Liberty/Other

Latitude 70°25.958' N

Longitude 148°41.922' W

### Field Observations and Measurements

Wind Speed 8-12 Wind Direction W-NW

Seas/Ice 1' seas / rain / cloudy

Water Depth 3.4 m

Conductivity, Temperature, Depth (CTD) NA

Doppler Current NA

Turbidity NA

Instrument Tow NA

Comments: zodiac trip collection and breakdown net

### Samples Collected

Sediments: Core Sample      Van Veen Grab      No. of Replicates     

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay      Fine      Coarse Sand      Gravel      Shell Hatch      Mixed     

Indications of Anoxia: Yes      No      H<sub>2</sub>S Odor: Yes      No     

Comments: NA

### Water/Suspended Sediments:

Surface      Mid-Water      Bottom      Other     

Comments: NA

Biota (check species collected for analysis)

Amphipods: Annonyx     

1 - Rankin's neck

Fish: Sculpin 25 Safron Cod 2 Arctic Cod 11 Char 2 Cisco 65 Flounder 10 Humpback      Whitefish 12 Other     

Clams: Astarte      Cyrtodaria      Macoma      Portlandia     

Comments: Selected samples taken, remaining released @ 0730.01

### Quality Control Samples

Field Blank      Equipment Blank 01-SIS-     Other EB-QC  
01-SIS-     EB-QC

Overall Comments:

tuck down net after collection.  
(will be moved to Pt. Brewer next. @)

Field Personnel:

G. Lawley, J. Gold, F. Querali

Signature:

[Signature]

Date: 07-30-01

Arthur D Little

Station Log

Station ID PBS

Date 07-31-01

Client MMS

Time 07:31 at CW >

14:00 - 15:30

Project 2001 ANIMIDA

Case No. 72105

Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

Sampling Location

Station Number PBS

Station Type

BSMP/Northstar (Liberty) / Other

Latitude 70.17.650 N

Longitude 147.49.211 W

Field Observations and Measurements

Wind Speed 15 kn Wind Direction E Seas/Ice 0.5 / no ice

Water Depth 1m Conductivity, Temperature, Depth (CTD) NA

Doppler Current NA Turbidity NA Instrument Tow NA

Comments: Sharp drop off near shore, muddy bottom

Samples Collected

Sediments: Core Sample Van Veen Grab No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay Fine Coarse Sand Gravel Shell Hatch Mixed

Indications of Anoxia: Yes No H2S Odor: Yes No

Comments: (a)

Water/Suspended Sediments:

Surface Mid-Water Bottom Other

Comments: (a)

Biota (check species collected for analysis)

Amphipods: Anonyx

Fish: Sculpin Safron Cod Arctic Cod Char Cisco Flounder Whitefish Other

Clams: Astarte Cyrtodaria Macoma Portlandia

Comments: (a)

Quality Control Samples

Field Blank Equipment Blank Other

Overall Comments: Fyke net deployment

Field Personnel: G. Lawley, J. Gold

Signature: [Signature] Date: 07-31-01

Arthur D Little

01e

# Station Log

Station ID

PBS

Date

08-01-01

Client

MMS

Time

15:00

Project

2001 ANIMIDA

Case No.

72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number

PBS

### Station Type

BSMP/Northstar/Liberty/Other

Latitude

70° 17.650' N

Longitude

147° 49.211' W

### Field Observations and Measurements

Wind Speed

15-18 km/h

Wind Direction

SSW

Seas/Ice

—

Water Depth

1.1 m

Conductivity, Temperature, Depth (CTD)

—

Doppler Current

—

Turbidity

—

Instrument Tow

—

Comments:

Fyke net collection/maintenance

### Samples Collected

#### Sediments:

Core Sample

Van Veen Grab

No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay

Fine

Coarse Sand

Gravel

Shell Hatch

Mixed

Indications of Anoxia:

Yes

No

H<sub>2</sub>S Odor: Yes

No

Comments:

### Water/Suspended Sediments:

Surface

Mid-Water

Bottom

Other

Comments:

### Biota

(check species collected for analysis)

Amphipods: Annonyx

Fish: Sculpin

2

Safron Cod

1

Arctic Cod

—

Char

—

Cisco

2

Flounder

—

Whitefish

3

Clams:

Astarte

—

Cyrtodaria

—

Macoma

—

Portlandia

—

Comments:

### Quality Control Samples

Field Blank

NA

Equipment Blank

NA

Other

NA

Overall Comments:

Fyke net collection and maintenance

only 1 (BW) taken of accept. size and target sp.

Field Personnel:

J. Gold, G. Lawley, F. Querczoli

Signature:

John J. Gold

Date:

08-01-01

Arthur D Little

Station Log

Station ID PBS  
Client MMS  
Project 2001 ANIMIDA  
Case No. 72105

Date 08-03-01  
Time 13:00 4

Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

Sampling Location

Station Number PBS  
Latitude 70° 17.650' N Longitude 147° 49.211' W

Station Type

BSMP/Northstar/Liberty/Other

Field Observations and Measurements

Wind Speed 18-20 k/h Wind Direction SSW Seas/Ice 0.5-1/noice  
Water Depth 1 m Conductivity, Temperature, Depth (CTD) NA  
Doppler Current NA Turbidity NA Instrument Tow NA

Comments: Paint Brower, peat moss collecting in net, very muddy

Samples Collected

Sediments:		Core Sample	Van Veen Grab	No. of Replicates		
Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay  Fine  Coarse Sand  Gravel  Shell Hatch  Mixed

Indications of Anoxia: Yes  No  H<sub>2</sub>S Odor: Yes  No

Comments:

\* Fyke net collection and maintenance @

Water/Suspended Sediments:

Surface  Mid-Water  Bottom  Other

Comments:

NA

Biota (check species collected for analysis)

Amphipods: Annonyx   
Fish: Sculpin 2 Safron Cod  Arctic Cod  Char 1 Cisco  Flounder 7 Whitefish 3 Other   
Clams: Astarte  Cyrtodaria  Macoma  Portlandia   
*2 rainbow smelt, 3 Arctic cisco*

Comments:

Quality Control Samples

Field Blank  Equipment Blank  Other   
01-PBS-62-PIK-EB-QC  
01-PBS-62-FAC-EB-QC

Overall Comments:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Field Personnel:

G. Cantey, J. Gold, F. Querzoli

Signature:

[Signature]

Date: 08-03-01

Arthur D Little

# Station Log

Station ID PBS  
 Client MMS  
 Project 2001 ANIMIDA  
 Case No. 72105

Date 08-04-01

Time 14:00

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number PBS

Latitude 70° 17.650' N

Longitude 147° 49.211' W

### Station Type

BSMP/Northstar/Liberty/Other

### Field Observations and Measurements

Wind Speed 18-24 Wind Direction SSW

Seas/Ice ~ 1.0

rain/overcast

Water Depth 1.0 m

Conductivity, Temperature, Depth (CTD) \_\_\_\_\_

Doppler Current \_\_\_\_\_

Turbidity \_\_\_\_\_ Instrument Tow \_\_\_\_\_

Comments: \_\_\_\_\_

### Samples Collected

**Sediments:** Core Sample \_\_\_\_\_ Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_

Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments: \_\_\_\_\_

### Water/Suspended Sediments:

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments: \_\_\_\_\_

### Biota (check species collected for analysis)

**Amphipods:** Annonyx \_\_\_\_\_

**Fish:** Sculpin 3 Safron Cod \_\_\_\_\_ Arctic Cod \_\_\_\_\_ Char \_\_\_\_\_ Cisco 3 Arctic 4 Flounder 2 Whitefish 3 Other \_\_\_\_\_

**Clams:** Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: \_\_\_\_\_

### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank \_\_\_\_\_ Other \_\_\_\_\_

### Overall Comments:

Lyke net collection  
IR photos taken

### Field Personnel:

G Lawley J Gold J Brown F Quersoli

### Signature:

[Signature]

Date: 08-04-01

**Arthur D Little****Station Log**

Station ID

PBS

Date 08-06-01

Client MMS

Time 09:00 Fyke net

Project 2001 ANIMIDA

Case No. 72105

**Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)****Sampling Location**

Station Number PBS

**Station Type**

BSMP/Northstar/Liberty/Other

Latitude 70° 17.650' N Longitude 147.49.211' W

**Field Observations and Measurements**

Wind Speed 0.5 km Wind Direction W

Seas/Ice Flat / slight fog

Water Depth 1.0 m

Conductivity, Temperature, Depth (CTD) —

Doppler Current —

Turbidity — Instrument Tow —

Comments: Fyke net collected only

**Samples Collected**Sediments: Core Sample 1 Van Veen Grab No. of Replicates ignore Fyke catch 08/06-1  
Crosscut

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other
1	1					

Sediment Texture (check all that apply):

&gt;50% silt/clay — Fine — Coarse Sand — Gravel — Shell Hatch — Mixed —

Indications of Anoxia: Yes — No — H<sub>2</sub>S Odor: Yes — No —

Comments:

\* Core sample taken @ 1330 by GL/JG before demobe

**Water/Suspended Sediments:**

Surface — Mid-Water — Bottom — Other —

Comments:

**Biota** (check species collected for analysis)

Amphipods: Annonyx —

Fish: Sculpin 6 Safron Cod — Arctic Cod — Char — Cisco 20 Flounder ~4 Whitefish 1 Other — (Arctic smelt)

Clams: Astarte — Cyrtodaria — Macoma — Portlandia —

Comments:

**Quality Control Samples**

Field Blank — Equipment Blank — Other —

Overall Comments:

08/04 - 08/06 Fyke net deployment

Hung net to clean after fish collection  
returned @ 13:30 to demobe net

Field Personnel:

J Gold Gary Lawley F. Quersli

Signature:

[Signature]

Date: 08-06-01

Arthur D Little

Station Log

Station ID

L14 13-2-07

Date 2/10/01

Client MMS

Time 1019-1047

Project 2001 ANIMIDA

Case No. 72105

Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

Sampling Location

Station Number L14

Otter Trawl #1 of 6 (32 min, 2.5 knots) Towing S-N 1/2 mile

Station Type

BSMP/Northstar/Liberty/Other

Latitude 70° 16.672' N

Longitude 70° 17.655' W

147° 50.531' W

147° 28.975' W

Field Observations and Measurements

Wind Speed 10-15 Wind Direction WSW Seas/Ice

Water Depth Conductivity, Temperature, Depth (CTD)

Doppler Current Turbidity Instrument Tow

Comments:

Samples Collected

Sediments: Core Sample Van Veen Grab No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay Fine Coarse Sand Gravel Shell Hatch Mixed

Indications of Anoxia: Yes No H<sub>2</sub>S Odor: Yes No

Comments:

Water/Suspended Sediments:

Surface Mid-Water Bottom Other

Comments:

Biota (check species collected for analysis)

Amphipods: Annonyx (used & returned)

Fish: Sculpin 3 Safron Cod Arctic Cod Char Cisco Flounder Whitefish Other

Clams: Astarte Cyrtodaria Macoma Portlandia

Comments:

Quality Control Samples

Field Blank Equipment Blank Other

Overall Comments:

Field Personnel:

M. Martz, J. Gold, C. Lawley

Signature:

A. Taylor

Date: 08/02/01

Arthur D Little

# Station Log

pg 147

Station ID

L14

Date 8/7/01

Client MMS

Time 0955 - 1452

Project 2001 ANIMIDA

Case No. 72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

Sampling Location

Gill net set

Station Number L14

Station Type

BSMP/Northstar/Liberty/Other

Latitude 70° 16. 672' N  
147° 50. 331' W

Longitude 70° 16. 670' N  
147° 30. 423' W

### Field Observations and Measurements

Wind Speed 10-15 Wind Direction WSW Seas/Ice

Water Depth 20-30' Conductivity, Temperature, Depth (CTD)

Doppler Current Turbidity Instrument Tow

Comments:

### Samples Collected

Sediments: Core Sample ~~Van Veen Grab~~ No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay Fine Coarse Sand Gravel Shell Hatch Mixed

Indications of Anoxia: Yes No H<sub>2</sub>S Odor: Yes No

Comments:

### Water/Suspended Sediments:

Surface ~~Mid-Water~~ Bottom Other

Comments:

Biota (check species collected for analysis)

Amphipods: Annonyx

Fish: Sculpin Safron Cod Arctic Cod Char Cisco <sup>Arctic - kept</sup> 6 Flounder Whitefish Other

Clams: Astarte Cyrtodaria Macoma Portlandia

Comments:

### Quality Control Samples

Field Blank ~~Equipment Blank~~ Other

Overall Comments:

Field Personnel:

M. Mertz, J Gold, G Lawley

Signature:

*[Signature]*

Date:

08/07/08

**Arthur D Little**

# Station Log

Page 3 of 7

Station ID L14  
 Client MMS  
 Project 2001 ANIMIDA  
 Case No. 72105

Date 8/7/01  
 Time 1128 - 1139

### Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

*Other Trawl #2 of 4 @ 21 min, 1 N. mile*

#### Sampling Location

Station Number L14  
 Latitude 70° 17' 65.5" N  
147° 28' 97.5" W

Longitude 70° 18' 07.8" N  
147° 26' 27.6" W

Station Type  
 BSMP/Northstar/Liberty/Other

#### Field Observations and Measurements

Wind Speed 10-15 Wind Direction WSW Seas/Ice \_\_\_\_\_  
 Water Depth \_\_\_\_\_ Conductivity, Temperature, Depth (CTD) \_\_\_\_\_  
 Doppler Current \_\_\_\_\_ Turbidity \_\_\_\_\_ Instrument Tow \_\_\_\_\_

Comments: \_\_\_\_\_

#### Samples Collected

**Sediments:** Core Sample \_\_\_\_\_ Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_  
 Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments: \_\_\_\_\_

#### Water/Suspended Sediments:

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments: \_\_\_\_\_

#### Biota (check species collected for analysis)

**Amphipods:** Annonyx \_\_\_\_\_ *all fish too small, returned*  
**Fish:** Sculpin 3 Safron Cod \_\_\_\_\_ Arctic Cod 2 Char \_\_\_\_\_ Cisco \_\_\_\_\_ Flounder \_\_\_\_\_ Whitefish \_\_\_\_\_ Other \_\_\_\_\_  
**Clams:** Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: \_\_\_\_\_

#### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank \_\_\_\_\_ Other \_\_\_\_\_

Overall Comments: \_\_\_\_\_

Field Personnel: \_\_\_\_\_

M. Murt & J. Gold & G. Lawley

Signature: \_\_\_\_\_

P. Dwyer

Date: 08/07/01

Arthur D Little

# Station Log

Py 4067

Station ID

L14

Client

MMS

Project

2001 ANIMIDA

Case No.

72105

Date 8/7/01

Time 1139 - 1204

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

Sampling Location

OTTAWA TRENCH #3 25 MIN IN.M.  
4960

Station Number L14

Station Type

BSMP/Northstar/Liberty/Other

Latitude 70° 19.078' N

Longitude 70° 17.326' W

147° 26.276' W

142° 24.266' W

### Field Observations and Measurements

Wind Speed 10-15

Wind Direction WSW

Seas/Ice

Water Depth

Conductivity, Temperature, Depth (CTD)

Doppler Current

Turbidity

Instrument Tow

Comments:

### Samples Collected

Sediments:

Core Sample

Van Veen Grab

No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay

Fine

Coarse Sand

Gravel

Shell Hatch

Mixed

Indications of Anoxia:

Yes

No

H<sub>2</sub>S Odor: Yes

No

Comments:

### Water/Suspended Sediments:

Surface

Mid-Water

Bottom

Other

Comments:

### Biota

(check species collected for analysis)

Amphipods: Anonyx

Too Small

KEPT

Fish: Sculpin

Safron Cod

Arctic Cod

Char

Cisco

Flounder

Whitefish

Other

Clams:

Astarte

Cyrtodaria

Macoma

Portlandia

Comments:

### Quality Control Samples

Field Blank

Equipment Blank

Other

Overall Comments:

Field Personnel:

M. Mertz, J. Gold, G. Lawley

Signature:

[Signature]

Date:

08/07/01

<b>Arthur D Little</b>	<b>Station Log</b>	Station ID <u>L14</u> <span style="float: right;">Pg 5 of 7</span>
		Client <u>MMS</u>
		Project <u>2001 ANIMIDA</u>
Date <u>8/7/01</u>		Case No. <u>72105</u>
Time <u>1217-1251</u>		

**Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)**

Other Trawl # 4446  
 33 min, 1 NM

**Sampling Location**  
 Station Number L14  
 Latitude 70° 17.326' N  
14° 24.266' W  
 Longitude 70° 16.305' N  
147° 26.837' W

**Station Type**  
 BSMP/Northstar/Liberty/Other Liberty

**Field Observations and Measurements**

Wind Speed 10-15 Wind Direction WSW Seas/Ice \_\_\_\_\_  
 Water Depth \_\_\_\_\_ Conductivity, Temperature, Depth (CTD) \_\_\_\_\_  
 Doppler Current \_\_\_\_\_ Turbidity \_\_\_\_\_ Instrument Tow \_\_\_\_\_

Comments: \_\_\_\_\_

**Samples Collected**

**Sediments:** Core Sample \_\_\_\_\_ Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):  
 >50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_  
 Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments: \_\_\_\_\_

**Water/Suspended Sediments:**

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments: \_\_\_\_\_

**Biota** (check species collected for analysis)

**Amphipods:** Anonyx FOUND kept

**Fish:** Sculpin 3 Safron Cod \_\_\_\_\_ Arctic Cod 1 Char \_\_\_\_\_ Cisco \_\_\_\_\_ Flounder \_\_\_\_\_ Whitefish \_\_\_\_\_ Other Swallowtail

**Clams:** Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: \_\_\_\_\_

**Quality Control Samples**

Field Blank \_\_\_\_\_ Equipment Blank \_\_\_\_\_ Other \_\_\_\_\_

Overall Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Field Personnel: M. Mertz J Gidd G Lawley

Signature: [Signature] Date: 08/07/01

**Arthur D Little**

# Station Log

Station ID

L14<sup>pg cut</sup>

Date 8/7/01

Time 1306-1339

Client MMS

Project 2001 ANIMIDA

Case No. 72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number L14

Latitude 70° 16.624' N  
147° 33.657' W

TRAWL # 50633 min. 2.2 miles  
3.4 knots

Longitude 70° 16.263' N  
147° 33.657' W

### Station Type

BSMP/Northstar/Liberty/Other

### Field Observations and Measurements

Wind Speed \_\_\_\_\_ Wind Direction \_\_\_\_\_ Seas/Ice \_\_\_\_\_

Water Depth \_\_\_\_\_ Conductivity, Temperature, Depth (CTD) \_\_\_\_\_

Doppler Current \_\_\_\_\_ Turbidity \_\_\_\_\_ Instrument Tow \_\_\_\_\_

Comments:

### Samples Collected

**Sediments:** Core Sample \_\_\_\_\_ Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_

Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments:

### Water/Suspended Sediments:

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments:

### Biota (check species collected for analysis)

**Amphipods:** Anonyx \_\_\_\_\_ Too small 4 Too small, 1 kept

**Fish:** Sculpin 2 Safron Cod \_\_\_\_\_ Arctic Cod 5 Char \_\_\_\_\_ Cisco \_\_\_\_\_ Flounder \_\_\_\_\_ Whitefish \_\_\_\_\_ Other Swirlfish

**Clams:** Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments:

### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank \_\_\_\_\_ Other \_\_\_\_\_

Overall Comments:

Field Personnel:

M. MEATZ J Gidd G Lowley

Signature:

F. Zuyuki

Date: 08/07/01

Arthur D Little

Station Log

Station ID

L14 <sup>pg 7 of 8</sup>

Date 9/7/01

Time 1355-1426

Client MMS

Project 2001 ANIMIDA

Case No. 72105

Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

OTTER TRAIL # 6 of 6

Sampling Location

Station Number L14

Station Type

BSMP/Northstar/Liberty/Other

Latitude 70° 16.300' N  
147° 33.026' W

Longitude 70° 16.201' N  
147° 27.944' W

31 min  
~ 2.5 miles @ 3.6 knots

Field Observations and Measurements

Wind Speed 10-15 mph Wind Direction W-SW

Seas/Ice

Water Depth

Conductivity, Temperature, Depth (CTD)

Doppler Current

Turbidity Instrument Tow

Comments:

Samples Collected

Sediments: Core Sample Van Veen Grab No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay Fine Coarse Sand Gravel Shell Hatch Mixed

Indications of Anoxia: Yes No H<sub>2</sub>S Odor: Yes No

Comments:

Water/Suspended Sediments:

Surface Mid-Water Bottom Other

Comments:

Biota (check species collected for analysis)

Amphipods: Annonyx kept (ARCTIC)  
Fish: Sculpin Safron Cod Arctic Cod Char Cisco Flounder Whitefish Other

Clams: Astarte Cyrtodaria Macoma Portlandia

Comments:

Quality Control Samples

Field Blank Equipment Blank Other

Overall Comments:

Field Personnel:

Signature:

[Handwritten Signature]

Date: 08/07/01

Arthur D Little

# Station Log

Station ID BPS

Date 08/10/01  
Time 15:00

Client MMS  
Project 2001 ANIMIDA  
Case No. 72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number BPS  
Latitude 70°10'52.4"N

Longitude 146°50'49.4"W

### Station Type

BSMP/Northstar/Liberty/Other Reference

### Field Observations and Measurements

Wind Speed 8-10 km Wind Direction SW Seas/Ice 2-4 ft / no ice  
Water Depth 1m Conductivity, Temperature, Depth (CTD) \_\_\_\_\_  
Doppler Current \_\_\_\_\_ Turbidity \_\_\_\_\_ Instrument Tow \_\_\_\_\_

Comments: \_\_\_\_\_

### Samples Collected

Sediments:		Core Sample	Van Veen Grab	No. of Replicates		
Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_  
Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments: \_\_\_\_\_

### Water/Suspended Sediments:

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments: \_\_\_\_\_

### Biota (check species collected for analysis)

Amphipods: Anonyx \_\_\_\_\_  
Fish: Sculpin \_\_\_\_\_ Safron Cod \_\_\_\_\_ Arctic Cod \_\_\_\_\_ Char \_\_\_\_\_ Cisco \_\_\_\_\_ Flounder \_\_\_\_\_ Whitefish \_\_\_\_\_ Other \_\_\_\_\_  
Clams: Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: \_\_\_\_\_

### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank \_\_\_\_\_ Other \_\_\_\_\_

Overall Comments: <sup>15:00</sup> Single fyke net set up @ <sup>east entrance of</sup> Bullen pt shoreline near closed radar facility  
17:00 2nd fyke net set up in 2 traps single lead (west of Bullen pt)  
GPS coordinates of 2nd trap = 70°10'14.2"N Lat  
146°53'38.0"W Long

Field Personnel:

J Gold G Lanley M. Mertz F. Quershi

Signature:

[Signature]

Date: 08/10/01

Arthur D Little

# Station Log

Station ID BPS

Date 08/11/01  
Time 16:00

Client MMS  
Project 2001 ANIMIDA  
Case No. 72105

16:00 / Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)  
16:00 Gill net Bullen pt lagoon 70° 10' 56.4" N 147° 51.870' W 56/m

Sampling Location BPS  
Station Number BPS  
Latitude (A) 70° 10' 52.4" N Longitude 146° 50' 49.4" W Station Type BSMP/Northstar/Liberty/Other  
(B) 70° 10' 14.2" N 146° 53' 38.0" W Reference

Field Observations and Measurements  
Wind Speed 5-12 Wind Direction NE Seas/Ice 2/ no ice  
Water Depth ~4' Conductivity, Temperature, Depth (CTD) \_\_\_\_\_  
Doppler Current \_\_\_\_\_ Turbidity \_\_\_\_\_ Instrument Tow \_\_\_\_\_

Comments: \_\_\_\_\_

Samples Collected  
Sediments: Core Sample \_\_\_\_\_ Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):  
>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_  
Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments: \_\_\_\_\_

Water/Suspended Sediments:  
Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments: \_\_\_\_\_

Biota (check species collected for analysis) (B) catch

Amphipods: Annonyx \_\_\_\_\_

Fish: Sculpin 8 Safron Cod \_\_\_\_\_ Arctic Cod \_\_\_\_\_ Char \_\_\_\_\_ Cisco 10 Flounder 1 Whitefish \_\_\_\_\_ Other \_\_\_\_\_

Clams: Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: gillnet (30) arctic (30) L. Cisco (1) sculpin

Quality Control Samples  
Field Blank \_\_\_\_\_ Equipment Blank \_\_\_\_\_ Other \_\_\_\_\_

Overall Comments: 16:00  
Fyke net (A) East pt Bullen GPS not taken net wings blown out  
attached (2) dolly voburn (1) safron cod (1) sculpin (10) L. Cisco (2) sm. arctic

16:00 Fyke net (B) west pt Bullen lead detached hurriedly net cut vs 1'  
mended and redeployed A+B Catches combined

Field Personnel: M. Mertz, J. Gold, G. Lawley, F. Queredol

Signature: [Signature] Date: 08/11/01

Arthur D Little

# Station Log

Station ID L15

Date 08/11/01

Client MMS

Time 11:30 - 15:50

Project 2001 ANIMIDA

Case No. 72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number L15

### Station Type

BSMP/Northstar/Liberty/Other

Latitude Below

Longitude Below

### Field Observations and Measurements

Wind Speed 0-20 kts Wind Direction N Seas/Ice \_\_\_\_\_

Water Depth N 20' Conductivity, Temperature, Depth (CTD) \_\_\_\_\_

Doppler Current \_\_\_\_\_ Turbidity \_\_\_\_\_ Instrument Tow \_\_\_\_\_

Comments: \_\_\_\_\_

### Samples Collected

Sediments: Core Sample \_\_\_\_\_ Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_

Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments: \_\_\_\_\_

### Water/Suspended Sediments:

Surface \_\_\_\_\_ Mid-Water \_\_\_\_\_ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments: \_\_\_\_\_

### Biota (check species collected for analysis)

Amphipods: Annonyx \_\_\_\_\_ sp. save/collected

Fish: Sculpin \_\_\_\_\_ Safron Cod \_\_\_\_\_ Arctic Cod 4 Char \_\_\_\_\_ Cisco \_\_\_\_\_ Flounder \_\_\_\_\_ Whitefish \_\_\_\_\_ Other \_\_\_\_\_

Clams: Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: lots of isopods, brown kelp, juv. cod (too small), sm. sculpin, etc.

### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank \_\_\_\_\_ Other \_\_\_\_\_

Overall Comments: 147° 30.231' W to 147° 30.484' W / 200-250m

Trawl #1 70° 16.672' N 250m 70° 17.290' N 200-250m / 200m kept, no target sp.

Trawl #2 70° 17.331' N 147° 30.290' W to 80m 70° 16.781' N 147° 30.753' W / (net ripped, cord end - repair)

Trawl #3 70° 16.632' N 147° 30.331' W to 70° 15.944' N 147° 25.376' W / 100m kept, no target sp.

Trawl #4 70° 15.389' N 147° 25.518' W to 250m 70° 16.183' N 147° 30.875' W / (photos taken)

Field Personnel: M. Mertz J. Gold G. Lawley F. Quervold

Signature: [Signature] Date: 08/11/01





Arthur D Little

# Station Log

Station ID

N25

Date

8/13/01

Time

12:30 - 1:00

Client

MMS

Project

2001 ANIMDA

Case No.

72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMDA)

Sampling Location

Northstar Gill Netset

Station Number

N25

70° 29.013'

142° 41.065'

Station Type

BSMP/Northstar/Liberty/Other

Latitude

Longitude

Field Observations and Measurements

NO Fish caught.

Wind Speed

Wind Direction

Seas/Ice

Water Depth

30 FT

Conductivity, Temperature, Depth (CTD)

Doppler Current

LAN East

Turbidity

Instrument Tow

Comments:

Samples Collected

Sediments:

Core Sample

Van Veen Grab

No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay

Fine

Coarse Sand

Gravel

Shell Hatch

Mixed

Indications of Anoxia:

Yes

No

H<sub>2</sub>S Odor: Yes

No

Comments:

Water/Suspended Sediments:

Surface

Mid-Water

Bottom

Other

Comments:

Biota

(check species collected for analysis)

Amphipods: Annonyx

Fish: Sculpin

Safron Cod

Arctic Cod

Char

Cisco

Flounder

Whitefish

Other

Clams:

Astarte

Cyrtodaria

Macoma

Portlandia

Comments:

Quality Control Samples

Field Blank

Equipment Blank

Other

Overall Comments:

Field Personnel:

M Mertz J Gold G Lowley

Signature:

for J Gold / M Mertz

Date:

08/13/01

Arthur D Little

# Station Log

Station ID N25  
 Client MMS  
 Project 2001 ANIMIDA  
 Case No. 72105

Date 8/13/01  
 Time 1242-1310

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number N25  
 Latitude 70° 29' 06" N  
148° 41' 37" W

TRAIL #1

Longitude 70° 29' 62" W  
148° 39' 29" W

### Station Type

BSMP/Northstar/Liberty/Other

### Field Observations and Measurements

Wind Speed 0-5 Wind Direction N Seas/Ice calm (fog)  
 Water Depth 37 FT Conductivity, Temperature, Depth (CTD) \_\_\_\_\_  
 Doppler Current \_\_\_\_\_ Turbidity \_\_\_\_\_ Instrument Tow \_\_\_\_\_  
 speed 2.5 km.

Comments: \_\_\_\_\_

### Samples Collected

**Sediments:** Core Sample \_\_\_\_\_ Van Veen Grab \_\_\_\_\_ No. of Replicates \_\_\_\_\_

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay \_\_\_\_\_ Fine \_\_\_\_\_ Coarse Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Shell Hatch \_\_\_\_\_ Mixed \_\_\_\_\_  
 Indications of Anoxia: Yes \_\_\_\_\_ No \_\_\_\_\_ H<sub>2</sub>S Odor: Yes \_\_\_\_\_ No \_\_\_\_\_

Comments: \_\_\_\_\_

### Water/Suspended Sediments:

Surface \_\_\_\_\_ Mid-Water ~~\_\_\_\_\_~~ Bottom \_\_\_\_\_ Other \_\_\_\_\_

Comments: \_\_\_\_\_

### Biota (check species collected for analysis)

**Amphipods:** Annonyx \_\_\_\_\_  
**Fish:** Sculpin \_\_\_\_\_ Safron Cod \_\_\_\_\_ Arctic Cod 15 Char \_\_\_\_\_ Cisco \_\_\_\_\_ Flounder \_\_\_\_\_ Whitefish \_\_\_\_\_ Other \_\_\_\_\_  
**Clams:** Astarte \_\_\_\_\_ Cyrtodaria \_\_\_\_\_ Macoma \_\_\_\_\_ Portlandia \_\_\_\_\_

Comments: \_\_\_\_\_

### Quality Control Samples

Field Blank \_\_\_\_\_ Equipment Blank ~~\_\_\_\_\_~~ Other \_\_\_\_\_

Overall Comments: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Field Personnel: M Metz J Gold G Lawley

Signature: ADL for J Gold Date: 08/13/01

Arthur D Little

# Station Log

Station ID N25  
 Client MMS  
 Project 2001 ANIMIDA  
 Case No. 72105

Date 8/13/01  
 Time 1320 - 1340

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number N25  
 Latitude 70° 29.508'  
143° 59.733'

Trawl #2  
 Longitude 70° 29 611'  
142° 41.813'

### Station Type

BSMP/Northstar/Liberty/Other

### Field Observations and Measurements

Wind Speed 0-5 Wind Direction N Seas/Ice calm fog  
 Water Depth 39' Conductivity, Temperature, Depth (CTD) —  
 Doppler Current — Turbidity — Instrument Tow —

speed 2.5 kts

Comments:

### Samples Collected

**Sediments:** Core Sample — Van Veen Grab — No. of Replicates —

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay — Fine — Coarse Sand — Gravel — Shell Hatch — Mixed —  
 Indications of Anoxia: Yes — No — H<sub>2</sub>S Odor: Yes — No —

Comments:

### Water/Suspended Sediments:

Surface — Mid-Water — Bottom — Other —

Comments:

### Biota (check species collected for analysis)

**Amphipods:** Annonyx —  
**Fish:** Sculpin — Safron Cod — Arctic Cod 11 Char — Cisco — Flounder — Whitefish — Other —  
**Clams:** Astarte — Cyrtodaria — Macoma — Portlandia —

Comments:

### Quality Control Samples

Field Blank — Equipment Blank — Other —

Overall Comments:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Field Personnel:

M Metz J Gold G Landrey

Signature:

F Zylber for J Gold

Date:

08/13/01

Arthur D Little

# Station Log

Station ID N25  
 Client MMS  
 Project 2001 ANIMIDA  
 Case No. 72105

Date 8/13/01  
 Time 13:52 - 14:20

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

Trawl #3

### Sampling Location

Station Number N25  
 Latitude 70° 29.581'  
148° 39.733'

### Station Type

BSMP/Northstar/Liberty/Other

Longitude 70° 29.611'  
148° 41.813'

speed 2.5 kn

### Field Observations and Measurements

Wind Speed 0-5 Wind Direction NE Seas/Ice 0-1  
 Water Depth 39' Conductivity, Temperature, Depth (CTD) —  
 Doppler Current — Turbidity — Instrument Tow —

Comments: \_\_\_\_\_

### Samples Collected

**Sediments:** Core Sample — Van Veen Grab — No. of Replicates —

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay — Fine — Coarse Sand — Gravel — Shell Hatch — Mixed —  
 Indications of Anoxia: Yes — No — H<sub>2</sub>S Odor: Yes — No —

Comments: \_\_\_\_\_

### Water/Suspended Sediments:

Surface — Mid-Water — Bottom — Other —

Comments: \_\_\_\_\_

### Biota (check species collected for analysis)

**Amphipods:** Anonyx —  
**Fish:** Sculpin 3 Saffron Cod — Arctic Cod — Char — Cisco — Flounder — Whitefish — Other —  
**Clams:** Astarte — Cyrtodaria — Macoma — Portlandia —

Comments: \_\_\_\_\_

### Quality Control Samples

Field Blank — Equipment Blank — Other —

Overall Comments: \_\_\_\_\_

Field Personnel: M. Metz J. Gold G. Lawley

Signature: J. Metz for J. Gold

Date: 08/13/01

Arthur D Little

# Station Log

Station ID

N25

Date

8/13/01

Time

14:27-15:02

Client

MMS

Project

2001 ANIMIDA

Case No.

72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

Sampling Location

N25 TCRDI #4

Station Number

70° 28.547' N  
148° 41.911' W

70° 30.085' N  
148° 42.160' W

Station Type

BSMP/Northstar/Liberty/Other

Latitude

~~70° 28.547'~~  
~~70° 28.547'~~

Longitude

~~148° 41.911'~~  
~~148° 39.750'~~

### Field Observations and Measurements

Wind Speed

4-8

Wind Direction

E

Seas/Ice

spec'd 3.0 K<sub>N</sub>  
calm / no ice

Water Depth

31'

Conductivity, Temperature, Depth (CTD)

Doppler Current

Turbidity

Instrument Tow

Comments:

### Samples Collected

Sediments:

Core Sample

Van Veen Grab

No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay

Fine

Coarse Sand

Gravel

Shell Hatch

Mixed

Indications of Anoxia:

Yes

No

H<sub>2</sub>S Odor: Yes

No

Comments:

### Water/Suspended Sediments:

Surface

Mid-Water

Bottom

Other

Comments:

### Biota

(check species collected for analysis)

Amphipods:

Anonyx

Fish:

Sculpin

Safron Cod

Arctic Cod

Char

Cisco

Flounder

Whitefish

Other

Clams:

Astarte

Cyrtodaria

Macoma

Portlandia

Comments:

### Quality Control Samples

Field Blank

Equipment Blank

Other

Overall Comments:

Field Personnel:

M Metz J Gold G Goulet

Signature:

*[Signature]*

Date:

08/13/01

Arthur D Little

# Station Log

Station ID

N25

Date

8/13/01

Time

1510-1540

Client

MMS

Project

2001 ANIMIDA

Case No.

72105

## Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA)

### Sampling Location

Station Number

N25

Latitude

70° 30.022'

Longitude

70° 28.650'

### Station Type

B SMP/Northstar/Liberty/Other

### Field Observations and Measurements

Wind Speed

4-8

Wind Direction

E

Seas/Ice

Water Depth

42'

Conductivity, Temperature, Depth (CTD)

Doppler Current

Turbidity

Instrument Tow

Comments:

### Samples Collected

#### Sediments:

Core Sample

Van Veen Grab

No. of Replicates

Organics	Metals	Grain Size	TOC	<sup>13</sup> C	Methyl Hg	Other

Sediment Texture (check all that apply):

>50% silt/clay

Fine

Coarse Sand

Gravel

Shell Hatch

Mixed

Indications of Anoxia:

Yes

No

H<sub>2</sub>S Odor:

Yes

No

Comments:

### Water/Suspended Sediments:

Surface

Mid-Water

Bottom

Other

Comments:

### Biota

(check species collected for analysis)

Amphipods: Annonyx

Fish: Sculpin

Safron Cod

Arctic Cod

Char

Cisco

Flounder

Whitefish

Other

Clams:

Astarte

Cyrtodaria

Macoma

Portlandia

Comments:

### Quality Control Samples

Field Blank

Equipment Blank

Other

Overall Comments:

Field Personnel:

M. Metz, J Gold, G Lawley

Signature:

A [Signature] for Stalder

Date:

08/13/01

**APPENDIX B: FISH DISSECTION FORMS**  
(Located on enclosed CD)

These forms, on the enclosed CD, were filled out during the fish dissections, and document species, timing, tissues, ancillary data and blanks.

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 m Pt  
 method of take: Fyke net species: (DV) dolly varden  
 period of deployment: 07-25<sup>4pm</sup> - 07-26<sup>2pm</sup> recorder: FCL  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG/SB  
 start time: 17:03 recorder: FCL  
 finish time: 17:08 specimen code: DV  
 standard length(mm): 460 weight(kg): 0.8  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

~~liver sample for RGS?:~~ Bile sample code: 01-SIS-01-FAC-T-DV  
~~liver sample for T.M.?:~~ sample code: \_\_\_\_\_  
~~muscle sample for T.M.?:~~ sample code: 01-SIS-01-FAC-T-PV  
~~liver sample for Organics?:~~  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-01-CYP-T-DV  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: stump island  
GONAD FOR P-450

almost ripe, added spleen and belly meat for P-450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07.26.01 latitude: 70° 25.958' <sup>sec</sup> N  
 time collected: 14:50 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 m Pt  
 method of take: Fyke species: (AC) Arctic Cisco  
 period of deployment: 0725/0726 recorder: Few  
 alive when caught?: yes

DISSECTION

date: 07.26.01 dissector: JG, JB  
 start time: 17:10 recorder: Few  
 finish time: 17:16 specimen code: AC  
 standard length(mm): 285 weight(kg): 200(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: ?

SAMPLES

Bile (FAC)  
~~liver sample for RGS?:~~  sample code: 01-SIS-02-FAC-T-AC  
~~liver sample for T.M.?:~~  sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-02-PHC-T-AC  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-02-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 gonad other samples taken?: NA comments: \_\_\_\_\_  
 muscle P450  \_\_\_\_\_

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 0726-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 325 Pt  
 method of take: Fyke net. species: Arctic Cisco (AC)  
 period of deployment: 725/726 recorder: FE  
 alive when caught?: yes

DISSECTION

date: 0726-01 dissector: JL, JB  
 start time: 17:17 recorder: FE  
 finish time: \_\_\_\_\_ specimen code: AC  
 standard length(mm): 270 weight(kg): 100(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: ?

SAMPLES

~~liver sample for RGS?:~~  Bile FAC sample code: 01-SIS-03-FAC-T-AC  
~~liver sample for T.M.?:~~ \_\_\_\_\_ sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-03-PHC-T-AC  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-03-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 gonad ~~other samples taken?:~~ NA comments: ✓

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.9221 W  
 station code: S15 depth(m): 325 ft  
 method of take: Fyke net species: Arctic C. 500 (AC)  
 period of deployment: 0725-0726 recorder: FCL  
 alive when caught?: Yes

DISSECTION

date: 07-26-01 dissector: JG, JB  
 start time: \_\_\_\_\_ recorder: FCL  
 finish time: \_\_\_\_\_ specimen code: AC  
 standard length(mm): 280 weight(kg): 0.100g  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: (?)

SAMPLES

<sup>Bile FAC</sup>  
 liver sample for RGS?:  sample code: 01-S15-04-FAC-T-AC  
~~liver sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_~~  
 liver sample for Organics <sup>Fin</sup>:  sample code: 01-S15-04-PHC-T-AC  
 liver sample for P-450?:  sample code: 01-S15-04-PHC-T-AC  
 gill sample for P-450?:  sample code: CYP  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>P450</sup> ~~other samples taken?: NA~~ comments: ↓

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic cisco (Ac)  
 period of deployment: 07-25/07-26 recorder: Fer  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG, JB  
 start time: \_\_\_\_\_ recorder: Fer  
 finish time: \_\_\_\_\_ specimen code: Ac  
 standard length(mm): 280 weight(kg): 100g  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: ?

SAMPLES

<sup>Bile</sup>  
 @ liver sample for RGS?:  sample code: 01-SIS-05-FAC-T-AC  
 @ liver sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-05-PHC-T-AC  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-05-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 gonads <sup>P450</sup> - other samples taken?: NA comments: \_\_\_\_\_

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N<sup>±0</sup>  
 time collected: 14:00 longitude: 148° 41.922' W.  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic cisco (AC)  
 period of deployment: 0725/0726 recorder: FEL  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG, JB  
 start time: \_\_\_\_\_ recorder: FE  
 finish time: \_\_\_\_\_ specimen code: AC  
 standard length(mm): 280 weight(kg): 100g  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F (?)

SAMPLES

<sup>Ble</sup>  
~~liver sample for RGS?~~  sample code: 01-SIS-06-FAC-T-AC  
~~liver sample for T.M.?~~ \_\_\_\_\_ sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-00-PHC-T-AC  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-06-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gonad</sup> ~~other samples taken?~~  comments: ↓  
<sup>p450</sup>

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 072601 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: S15 depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic cisco (AC)  
 period of deployment: 0725/0726 recorder: FL  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: TL  
 start time: \_\_\_\_\_ recorder: FL  
 finish time: \_\_\_\_\_ specimen code: AC  
 standard length(mm): 290 weight(kg): 100(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

<sup>Bile</sup>  
 liver sample for RGS?:  sample code: 01-S15-07-FLAC-T-AC  
~~liver sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_~~  
 muscle sample for T.M.?:  sample code: 01-S15-07-<sup>FLAC</sup>T-AC  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-S15-07-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>general</sup> other samples taken?:  comments: \_\_\_\_\_  
<sub>P-450</sub>

no ~~liver~~ muscle tissue included (possibly exclude) to

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 0726-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic cisco (AC)  
 period of deployment: 0725/0726 recorder: FO  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: FO  
 finish time: \_\_\_\_\_ specimen code: AC  
 standard length(mm): 290 weight(kg): 150g  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

<sup>bile</sup>  
 liver sample for RGS?:  sample code: 01-SIS-08-FAC-T-AC  
~~liver sample for T.M.?: \_\_\_\_\_~~ sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-08-PHC-T-AC  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-08-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>general (450)</sup> other samples taken?:  comments: ↓

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: S15 depth(m): 3.25 f  
 method of take: Fyke net species: Arctic cisco (AC)  
 period of deployment: 0725/0726 recorder: Fdr  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: Fdr  
 finish time: \_\_\_\_\_ specimen code: AC  
 standard length(mm): 270 weight(kg): 100(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: ? (present)

SAMPLES

<sup>bile</sup>  
~~liver sample for RGS?:~~  sample code: 01-S15-09-FAC-T-AC  
~~liver sample for T.M.?:~~  sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-S15-09-PHC-T-AC  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-S15-09-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gonad</sup> ~~other~~ <sup>P450</sup> samples taken?:  comments: \_\_\_\_\_

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-26-01 latitude: 70° 25.5<sup>258</sup> N  
 time collected: 14:00 longitude: 148° 41.922 W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: (AC) Arctic cisco  
 period of deployment: 0725/0726 recorder: FCH  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: FCH  
 finish time: 17:45 specimen code: AC  
 standard length(mm): 290 weight(kg): 100 (g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: ? (too small) ♂

SAMPLES

~~liver~~ <sup>bile</sup> sample for RGS?:  sample code: 01-SIS-10-FAC-T-AC  
 liver sample for T.M.?:  sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-10-PHC-T-AC  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-10-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 gonad <sup>P-450</sup> other samples taken?:  none comments: \_\_\_\_\_

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: NA  
 time collected: 14:00 longitude: NA  
 station code: SIS depth(m): 3.25 ft  
 Ⓢ method of take: Fyke net/EF species: Equipment Blank (EB)  
 period of deployment: 0725/0726 recorder: Fell  
 alive when caught?: yes

\*dissection equipment blank

DISSECTION

date: 07.26.01 dissector: JG/JB  
 start time: 17:50 recorder: Fell  
 finish time: 17:55 specimen code: EB  
 standard length(mm): NA weight(kg): NA  
 external abnormalities/parasites: \_\_\_\_\_  
 internal abnormalities/parasites: \_\_\_\_\_  
 sex: ↓ ♂ NA

SAMPLES

Ⓢ ~~liver~~ bile  
 liver sample for RGS?:  sample code: 01-SIS-11-FAC-EB-Q1  
 Ⓢ liver sample for T.M.?:  sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: \_\_\_\_\_  
 liver sample for Organics?:  sample code: 01-SIS-11-PHC-EB-Q1  
 liver sample for P-450?: NA sample code: NA  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: ↓

collected DI Rinstate Ⓢ

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 1400 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback Whitefish (HW)  
 period of deployment: 0725/0726 recorder: Fdl  
 alive when caught?: yes

DISSECTION

date: 0726-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: Fdl  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): 470 weight(kg): 600(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

<sup>Bile</sup>  
 liver sample for RGS?:  sample code: 01-SIS-12 - FAC - T - HW  
~~liver sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_~~  
 muscle sample for T.M.?:  sample code: 01-SIS-12 - PHC - T - HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-12 - P450 - T - HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gonad P450</sup> other samples taken?:  comments: \_\_\_\_\_  
 muscle P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback whitefish (HW)  
 period of deployment: 0725/0724 recorder: Fer  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: Fer  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): ~ 465 weight(kg): 750 (g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

<sup>liver</sup>  
~~liver~~ sample for RGS?:  sample code: 01-SIS-13-FAC-T-HW  
~~liver~~ sample for T.M.?:  sample code: ⊖  
 muscle sample for T.M.?:  sample code: 01-SIS-13-PHC-T-HW  
 liver sample for Organics?:  sample code: ⊖  
 liver sample for P-450?:  sample code: 01-SIS-13-CYP-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gonad P450</sup> other samples taken?:  comments: ↓  
 muscle P450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback whitefish (Hi)  
 period of deployment: 0725/0726 recorder: FD  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: FD  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): 438 weight(kg): 700(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

<sup>bile</sup> liver sample for RGS?:  sample code: 01-SIS-14-FAC-T-HW  
~~liver sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_~~  
 muscle sample for T.M.?:  sample code: 01-SIS-14-PHC-T-HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-14-CYP-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gonads P450</sup> other samples taken?:  comments: ✓  
 muscle P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 0726-01 latitude: 70° 25.758' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: S15 depth(m): 325 ft  
 method of take: Fyke net species: Humpback whitefish (HW)  
 period of deployment: 0725/0726 recorder: Fa  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: Fa  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): @ 45 415 weight(kg): 600(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

Bile  
 liver sample for RGS?: \_\_\_\_\_ sample code: 01-S15-15-FAC-T-HW  
 @ liver sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_  
 muscle sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_  
 liver sample for Organics?: \_\_\_\_\_ sample code: > 01-S15-15-FAC-T-HW  
 liver sample for P-450?: ✓ sample code: 01-S15-15-CYP-T-HW  
 gill sample for P-450?: ✓ sample code: \_\_\_\_\_  
 spleen/kidney sample for P-450?: ✓ sample code: \_\_\_\_\_  
 heart sample for p-450? ✓ sample code: \_\_\_\_\_  
 @ gland P450 other samples taken?: ✓ comments: \_\_\_\_\_  
muscle P450 ✓

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 072601 latitude: 70° 25.958' W  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback White fish  
 period of deployment: 0725/0726 recorder: F.R.  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: F.R.  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): 411 weight(kg): 500(g)  
 external abnormalities/parasites: \_\_\_\_\_  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

Bile  
 liver sample for RGS?:  sample code: 01-SIS-16-FAC-T-HW  
 liver sample for T.M.?:  sample code: (circled symbol)  
 muscle sample for T.M.?:  sample code: 01-SIS-16-PHC-T-HW  
 liver sample for Organics?:  sample code: 01-SIS-16-CYP-T-HW  
 liver sample for P-450?:  sample code: \_\_\_\_\_  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
spleen kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
gonad p450 other samples taken?:  comments: \_\_\_\_\_  
muscle p450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 072601 latitude: 70° 25.858' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 PX  
 method of take: Fyke net species: Humpback white (HW)  
 period of deployment: 07-25/0726 recorder: FQ  
 alive when caught?: YES

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: FQ  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): 418 weight(kg): 600(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: ↓  
 sex: M

SAMPLES

<sup>Bile</sup>  
 liver sample for RGS?:  sample code: 01-SIS-17-FAC-T-HW  
~~liver sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_~~  
 muscle sample for T.M.?:  sample code: 01-SIS-17-PHC-T-HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-17-CYP-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: ↓  
muscle P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 072601 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback white fish (HW)  
 period of deployment: 0725/0726 recorder: Fca  
 alive when caught?: yes

DISSECTION

date: 0726-01 dissector: Jb  
 start time: \_\_\_\_\_ recorder: Fca  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): 440 weight(kg): 600(5)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: Tapeworms  
 sex: F

SAMPLES

Bile  
~~liver sample for RGS?~~  sample code: 01-SIS-18-FAC-T-HW  
~~liver sample for T.M.?~~  sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-18-PHC-T-HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-18-CYP-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
~~kidney sample for P-450?~~  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
~~gonad p450 other samples taken?:~~  comments: \_\_\_\_\_  
muscle - p450 -

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0726-11 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback white fish (HW)  
 period of deployment: 0725/0726 recorder: FR  
 alive when caught?: yes

DISSECTION

date: 0726-11 dissector: JG  
 start time: \_\_\_\_\_ recorder: HW FR  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): @ 400 402 weight(kg): 500(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: Tapeworms  
 sex: F (well developed, but not translucent)

SAMPLES

<sup>Bale</sup>  
 liver sample for RGS?:  sample code: 01-SIS-19-FAC-T-HW  
~~liver sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_~~  
 muscle sample for T.M.?:  sample code: 01-SIS-19-PHC-T-HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-19-PHC<sup>CYP</sup>-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gumad p-450</sup> other samples taken?:  comments: \_\_\_\_\_  
 muscle p-450  \_\_\_\_\_

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: S15 depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback whitefish (HW)  
 period of deployment: 0725/0726 recorder: FDR  
 alive when caught?: yes

DISSECTION

date: 0726-01 dissector: SB  
 start time: \_\_\_\_\_ recorder: FDR  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): 429 weight(kg): 600 (g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: Tapeworms  
 sex: M

SAMPLES

<sup>Bile</sup>  
~~liver sample for RGS?:~~  sample code: 01-S15-20-FAC-T-HW  
~~liver sample for T.M.?:~~  sample code: (FW)  
 muscle sample for T.M.?:  sample code: 01-S15-20-PHC-T-HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-S15-20-PHC-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gonad P450</sup> other samples taken?:  comments: \_\_\_\_\_  
muscle P450 taken

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0726-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fykenet species: Humpback whitefish (HW)  
 period of deployment: 0725/0726 recorder: FCR  
 alive when caught?: yes

DISSECTION

date: 0726-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: Fer  
 finish time: \_\_\_\_\_ specimen code: HC  
 standard length(mm): 395 weight(kg): 500(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: ↓  
 sex: M

SAMPLES

<sup>Bile</sup>  
~~liver sample~~ for RGS?:  sample code: 01-SIS-21-FAC-T-HW  
~~liver sample~~ for T.M.?:  sample code: Ⓢ  
 muscle sample for T.M.?:  sample code: 01-SIS-21-PHC-T-HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-21-PCYP-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>Spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gonad P450</sup> other samples taken?:  comments: ↓  
muscle P450 taken

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0726-01 latitude: 70° 25.958' N  
 time collected: 19:00 longitude: 148° 41.922' W  
 station code: 515 depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback Whitefish (HW)  
 period of deployment: 0725/0726 recorder: FEL  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JB  
 start time: \_\_\_\_\_ recorder: FEL  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): 423 weight(kg): 600 (g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

<sup>Bile</sup>  
 liver sample for RGS?:  sample code: 01-515-22-FAC-T-HW  
<sup>(w)</sup> liver sample for T.M.?:  sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-515-22-PHC-T-HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-515-22-CYP-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>genus P450</sup> other samples taken?:  comments: \_\_\_\_\_  
muscle P450 taken ✓

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0726-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 178° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Humpback white fish (HW)  
 period of deployment: 0725/0726 recorder: Felz  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: \_\_\_\_\_ recorder: Felz  
 finish time: \_\_\_\_\_ specimen code: HW  
 standard length(mm): 428 weight(kg): 800(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: Tapeworms  
 sex: M

SAMPLES

<sup>bile</sup>  
~~liver sample for RGS?~~  sample code: 01-SIS-23-FAC-T-HW  
 @ ~~liver sample for T.M.?~~ \_\_\_\_\_ sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-23-PHC-T-HW  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-23-CYP-T-HW  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450? \_\_\_\_\_ sample code: \_\_\_\_\_  
 general P450 ~~other samples taken?~~  comments: \_\_\_\_\_  
muscle P450 taken

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: S15 depth(m): 3.25 ft  
 method of take: Fyke net. species: Humpback white fish (HW)  
 period of deployment: 0725/0726 recorder: Fch  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: 18:41 recorder: Fch  
 finish time: 18:50 specimen code: HW  
 standard length(mm): 419 weight(kg): 500(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

~~liver sample for RGS?:~~  Bile sample code: 01-S15-24-FAC-T-HW  
~~liver sample for T.M.?:~~  sample code: (scribble)  
 muscle sample for T.M.?:  sample code: 01-S15-24-PHC-T-HW  
 liver sample for Organics?:  sample code: 01-S15-24-CYP-T-HW  
 liver sample for P-450?:  sample code: \_\_\_\_\_  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
~~other samples taken?:~~  comments: \_\_\_\_\_  
ground P450  
Muscle P450 taken

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic Clounder (AF)  
 period of deployment: 0725/0726 recorder: Fell  
 alive when caught?: yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: 18:50 recorder: Fell  
 finish time: 19:00 specimen code: AF  
 standard length(mm): 215 weight(kg): 150(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

Bile

SAMPLES

liver sample for RGS?:  sample code: 01-SIS-25-FAC-T-AF  
~~liver sample for T.M.?:  sample code: Ⓢ~~  
 muscle sample for T.M.?:  sample code: 01-SIS-25-PHC-T-AF  
 liver sample for Organics?:  sample code: 01-SIS-25-CYP-T-AF  
 liver sample for P-450?:  sample code: 01-SIS-25-CYP-T-AF  
 gill sample for P-450?:  sample code: ↓  
 kidney sample for P-450?: NA sample code: ↓  
 heart sample for p-450?  sample code: ↓  
 gonad P450? other samples taken?:  comments: ↓  
muscle P450 taken ✓

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: S15 depth(m): 3.25 dy  
 method of take: Fyke net species: 4-horn Sculpin (FS)  
 period of deployment: 0725/0726 recorder: FQ  
 alive when caught?: yes

DISSECTION

date: 0726-01 dissector: JG  
 start time: 19:00 recorder: FQ  
 finish time: \_\_\_\_\_ specimen code: FS  
 standard length(mm): 205 weight(kg): 150(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

<sup>Bile</sup>  
~~liver~~ sample for RGS?:  sample code: 01-S15-26-FAC-T-FS  
~~liver~~ sample for T.M.?: \_\_\_\_\_ sample code: (2)  
 muscle sample for T.M.?:  sample code: 01-S15-26-PHC-T-FS  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-S15-26-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
<sup>gonad P450</sup> other samples taken?:  comments: \_\_\_\_\_  
Muscle P450 taken ✓

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fykeret species: four horn Sculpin (FS)  
 period of deployment: 0725-0726 recorder: Fde  
 alive when caught?: yes

DISSECTION

date: 0726-01 dissector: JL  
 start time: \_\_\_\_\_ recorder: Fde  
 finish time: \_\_\_\_\_ specimen code: FS  
 standard length(mm): 208 weight(kg): 100(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

~~liver~~ <sup>Bile</sup> sample for RGS?:  sample code: 01-SIS-27-FAC-T-FS  
~~liver~~ sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: 01-SIS-27-PHC-T-FS  
 liver sample for Organics?:  sample code: \_\_\_\_\_  
 liver sample for P-450?:  sample code: 01-SIS-27-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 gonads <sup>P450</sup> other samples taken?:  comments: \_\_\_\_\_  
~~\_\_\_\_\_~~  
~~\_\_\_\_\_~~ <sup>p450 muscle tissue</sup> ✓

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-26-01 latitude: 70° 25.958' N  
 time collected: 14:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: four horn sculpin (FS)  
 period of deployment: 0725/0726 recorder: FR  
 alive when caught?: Yes

DISSECTION

date: 07-26-01 dissector: JG  
 start time: 19:00 recorder: FR  
 finish time: 19:10 specimen code: FS  
 standard length(mm): 208 weight(kg): 100(g)  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

<sup>Bile</sup>  
 liver sample for RGS?: NA sample code: NA  
 liver sample for T.M.?: NA sample code: NA  
 muscle sample for T.M.?: ✓ sample code: 01-SIS-28-PHC-T-FS  
 liver sample for Organics?: ✓ sample code: 01-SIS-28-CYP-T-FS  
 liver sample for P-450?: ✓ sample code: \_\_\_\_\_  
 gill sample for P-450?: ✓ sample code: \_\_\_\_\_  
 kidney sample for P-450?: ✓ sample code: \_\_\_\_\_  
 heart sample for p-450? ✓ sample code: \_\_\_\_\_  
 other samples taken?: ✓ comments: \_\_\_\_\_  
 muscle p-450 taken ✓

end of dissecting day @ 07-26-01

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-28-01 latitude: 70° 29.58' N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke species: Polly Varden (DV)  
 period of deployment: 07/27/01-07/28 recorder: FA  
 alive when caught?: yes

DISSECTION

date: 07-28-01 dissector: JG  
 start time: 10:45 recorder: FA  
 finish time: 10:50 specimen code: DV  
 standard length(mm): 345 weight(kg): 345 @ 300  
 external abnormalities/parasites: N  
 internal abnormalities/parasites: N  
 sex: ?

SAMPLES

<sup>Bile</sup>  
~~liver~~ sample for RGS?:  sample code: 01-SIS-29-FAc-T-DV  
~~liver~~ sample for T.M.?:  sample code: —  
~~muscle~~ sample for T.M.?:  sample code: —  
~~liver~~ sample for Organics? <sup>Tm</sup>  sample code: 01-SIS-29-PHC-T-DV  
 liver sample for P-450?:  sample code: 01-SIS-29-CYP-T-DV  
 gill sample for P-450?:  sample code: —  
<sup>folley</sup> kidney sample for P-450?:  sample code: —  
 heart sample for p-450?  sample code: —  
 other samples taken?:  comments: —  
 General P450   
 muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07.28.01 latitude: 70° 25.958' N  
 time collected: 09.00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke species: Polly Varden (DV)  
 period of deployment: 07.27 | 07.28 recorder: fdh  
 alive when caught?: yes

DISSECTION

date: 07.28.01 dissector: JG  
 start time: 10.51 recorder: fdh  
 finish time: 10.59 specimen code: DV  
 standard length(mm): 440 weight(kg): ~600 600  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

<sup>Bile</sup>  
~~liver~~ sample for RGS?:  sample code: 01-SIS-30-FAC-T-DV  
~~liver~~ sample for T.M.?:  sample code: \_\_\_\_\_  
~~muscle~~ sample for T.M.?:  sample code: \_\_\_\_\_  
~~liver~~ sample for Organics?  sample code: 01-SIS-30-PHC-T-DV  
 liver sample for P-450?:  sample code: 01-SIS-36-CYP-T-DV  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>placenta</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
~~other samples taken?~~ \_\_\_\_\_ comments: Liver discolored, bruised  
 gonad P450   
 muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07.28.01 latitude: 70° 25.958 'N  
 time collected: 09:00 longitude: 148° 41.922 'W  
 station code: SIS depth(m): 325 ft  
 method of take: Fyke net species: Fourhorn Sculpin (FS)  
 period of deployment: 0727/0728 recorder: FCA  
 alive when caught?: yes

DISSECTION

date: 07.28.01 dissector: JG  
 start time: \_\_\_\_\_ recorder: FCA  
 finish time: \_\_\_\_\_ specimen code: FS  
 standard length(mm): 200 weight(kg): 87  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

~~liver sample for RGS?:~~  Bike sample code: 01-SIS-31-FAC-T-FS  
~~liver sample for T.M.?:~~ \_\_\_\_\_ sample code: \_\_\_\_\_  
~~muscle sample for T.M.?:~~ \_\_\_\_\_ sample code: \_\_\_\_\_  
~~liver sample for Organics?:~~  sample code: 01-SIS-31-PHC-T-FS  
 liver sample for P-450?:  sample code: 01-SIS-31-CTP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?: \_\_\_\_\_ comments: \_\_\_\_\_  
gonads P450   
muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-28-01 latitude: 70° 25.958' N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Fourhorn sculpin (FS)  
 period of deployment: 0727/0728 recorder: FR  
 alive when caught?: yes

DISSECTION

date: 07-28-01 dissector: JG/JB  
 start time: \_\_\_\_\_ recorder: FR  
 finish time: \_\_\_\_\_ specimen code: FS  
 standard length(mm): 184 weight(kg): 51  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

~~liver~~ Bile sample for RGS?:  sample code: 01-SIS-32-FAC-T-FS  
~~liver~~ sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_  
~~muscle~~ sample for T.M.?: \_\_\_\_\_ sample code: \_\_\_\_\_  
~~liver~~ sample for Organics?: Am  sample code: 01-SIS-32 PHC-T-FS  
 liver sample for P-450?:  sample code: 01-SIS-32-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?: \_\_\_\_\_ sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?: \_\_\_\_\_ comments: \_\_\_\_\_  
ovad p450   
Muscle Tissue p450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-28-01 latitude: 70° 25.958' N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Fourhorn Sculpin (FS)  
 period of deployment: 0727-0728 recorder: FQ  
 alive when caught?: yes

DISSECTION

date: 07-28-01 dissector: JG/JB  
 start time: 11:10 recorder: FQ  
 finish time: 11:15 specimen code: FS  
 standard length(mm): 141 weight(kg): 25  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

Bile (~3ml)  
 liver sample for RGS?:  sample code: 01-SIS-33-FAC-T-FS  
 liver sample for T.M.?:  sample code: \_\_\_\_\_  
 muscle sample for T.M.?:  sample code: \_\_\_\_\_  
 liver sample for Organics?  sample code: 01-SIS-33-PHC-T-FS  
 liver sample for P-450?:  sample code: 01-SIS-33-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?: \_\_\_\_\_ comments: \_\_\_\_\_  
 gonads P450   
 muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-28-01 latitude: NA  
 time collected: 09:00 longitude: NA  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fake net species: Equipment Blank (EB)  
 period of deployment: NA recorder: FQ  
 alive when caught?: NA

DISSECTION

date: 07-28-01 dissector: JG/JB  
 start time: 11:15 recorder: FQ  
 finish time: 11:20 specimen code: EB  
 standard length(mm): NA weight(kg): NA  
 external abnormalities/parasites: ↓  
 internal abnormalities/parasites: ↓  
 sex: NA

SAMPLES

<sup>Bile</sup>  
 liver sample for RGS?:  sample code: 01-SIS-34-FAC-EB-QL  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~liver sample for Organics?~~ <sup>T.M.</sup>  sample code: 01-SIS-34-PHC-EB-QC  
 liver sample for P-450?: NA sample code: NA  
 gill sample for P-450?: ↓ sample code: \_\_\_\_\_  
 kidney sample for P-450?: ↓ sample code: \_\_\_\_\_  
 heart sample for p-450? ↓ sample code: \_\_\_\_\_  
 other samples taken?: ↓ comments: ↓  
Collected DL Rinsoite @ 07-28-01

End of  
 dissection  
 @ 07-28-01

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-30-01 latitude: 70° 25.958' N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: S15 depth(m): 325 ft  
 method of take: Fyke net species: Polly Varden (DV)  
 period of deployment: 0728/0730 recorder: FD  
 alive when caught?: yes

DISSECTION

date: 07-30-01 dissector: JG, GL  
 start time: 12:10 recorder: FD  
 finish time: 12:25 specimen code: DV  
 standard length(mm): 335 weight(kg): 250  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: ?

SAMPLES

~~liver~~ <sup>Bile</sup> sample for RGS?:  sample code: 01-SIS-35-FAC-T-DV  
~~liver~~ sample for T.M.?:  sample code: \_\_\_\_\_  
~~muscle~~ sample for T.M.?:  sample code: \_\_\_\_\_  
~~liver~~ sample for Organics?:  sample code: 01-SIS-35-PHC-T-DV  
 liver sample for P-450?:  sample code: 01-SIS-35-CYP-T-DV  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen/</sup>kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
~~gill~~ <sup>gill</sup> sample for P-450?  \_\_\_\_\_  
~~muscle~~ <sup>muscle</sup> tissue P-450  \_\_\_\_\_

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0730 latitude: 70° 25.958' <sup>C</sup>N  
 time collected: 0900 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic cisco (AC)  
 period of deployment: 07/28-07/30 recorder: FR  
 alive when caught?: yes

DISSECTION

date: 07-30-01 dissector: SB, GL  
 start time: 12:25 recorder: FR  
 finish time: 12:30 specimen code: AC  
 standard length(mm): 398 weight(kg): 450  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

<sup>Bile</sup>  
 liver sample for RGS?:  sample code: 01-SIS-36-FAC-T-AC  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics?  <sup>TM</sup> sample code: 01-SIS-36-FAC-T-AC  
 liver sample for P-450?:  sample code: 01-SIS-36-FAC-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?: \_\_\_\_\_ comments: \_\_\_\_\_  
 gonads P450   
 muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-30-01 latitude: 70° 25.958 'N  
 time collected: 09:00 longitude: 148° 41.922 'W  
 station code: SK depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic C.Sco (AC)  
 period of deployment: 07/28 - 07/30 recorder: FeQ  
 alive when caught?: yes

DISSECTION

date: 07-30-01 dissector: JG, GL  
 start time: 12:30 recorder: FeQ  
 finish time: 12:35 specimen code: AC  
 standard length(mm): 416 weight(kg): 300  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

Bile  
 liver sample for RGS?:  sample code: 01-SIS-37-FAC-T-AC  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics?/TM  sample code: 01-SIS-37-PAC-T-AC  
 liver sample for P-450?:  sample code: 01-SIS-37-CYP-T-AC  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 spleen/kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: count \* ulcers on skin  
gizzard P450   
muscle tissue P450   
gall tissue P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 0730-01 latitude: 70° 25.958' N  
 time collected: 0900 longitude: 148° 41.922' W  
 station code: S15 depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic Flounder (AF)  
 period of deployment: 0728-0730 recorder: EQ  
 alive when caught?: yes

DISSECTION

date: 0730-01 dissector: JH, GL  
 start time: 1235 recorder: Fol  
 finish time: 12:45:40 specimen code: AF  
 standard length(mm): 215 weight(kg): 150  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

Bile  
 liver sample for RGS?:  sample code: 01-SIS-38-FAC-T-AF  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics?:  sample code: 01-SIS-38-ATC-T-AF  
 liver sample for P-450?:  sample code: 01-SIS-38-CYP-T-AF  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
 gonad P450   
 muscle tissue P450   
 gill

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07.30-01 latitude: 70° 25.958' N  
 time collected: 0900 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25 ft  
 method of take: Fyke net species: Arctic Flounder (AF)  
 period of deployment: 0728/0730 recorder: FR  
 alive when caught?: yes

DISSECTION

date: 07-30-01 dissector: JG, GL  
 start time: 12:40 recorder: FR  
 finish time: 12:45 specimen code: AF  
 standard length(mm): 215 Est. weight(kg): 150  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

*Bile*  
 liver sample for RGS?:  sample code: 01-SIS-39-FAC-T-AF  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~liver sample for Organics?:  sample code: \_\_\_\_\_~~  
 liver sample for P-450?:  sample code: 01-SIS-39-CYP-T-AF  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
 gonad P450   
 muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 0730-01 latitude: 70° 25.958' N  
 time collected: 0900 longitude: 148° 41.922' W  
 station code: S15 depth(m): 325 m PK  
 method of take: Fyke net species: Arctic Flounder (AF)  
 period of deployment: 0728-0730 recorder: FEL  
 alive when caught?: yes

DISSECTION

date: 07-30-01 dissector: JG, GL  
 start time: 12:47 recorder: FEL  
 finish time: 12:53 specimen code: AF  
 standard length(mm): 209 est. weight(kg): 125  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

Bile (leaked into cavity) <sup>too little</sup>  
 liver sample for RGS?: NA sample code: none  
~~liver sample for T.M.?: NA sample code: 01-S15-40-FAC-T-AF~~  
~~muscle sample for T.M.?: NA sample code: 01-S15-40-PAC-T-AF~~  
 liver sample for Organics?  sample code: 01-S15-40-CYP-T-AF  
 liver sample for P-450?:  sample code: 01-S15-40-CYP-T-AF  
 gill sample for P-450?:  sample code: 01-S15-40-CYP-T-AF  
 kidney sample for P-450?:  sample code: 01-S15-40-CYP-T-AF  
 heart sample for p-450?  sample code: 01-S15-40-CYP-T-AF  
 other samples taken?: goad P450 ✓  
muscle tissue P450 ✓

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0730-01 latitude: 70° 25.958' N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 325 m A  
 method of take: Fyke net species: Arctic Flounder (AF)  
 period of deployment: 0728-0730 recorder: PELL  
 alive when caught?: yes

DISSECTION

date: 0730-01 dissector: JG, GL  
 start time: 12:55 recorder: FR  
 finish time: 13:03 specimen code: AF  
 standard length(mm): 218 est-weight(kg): 150  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

<sup>Bile</sup>  
 liver sample for RGS?:  sample code: 01-SIS-41-FAC-T-AF  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics? <sup>AM</sup>  sample code: 01-SIS-41-PAC-T-AF  
 liver sample for P-450?:  sample code: 01-SIS-41-CYP-T-AF  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>Spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?: \_\_\_\_\_ comments: \_\_\_\_\_  
gonad P450 ✓  
muscle tissue P450 ✓  
gill ✓

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 0730-01 latitude: 70° 25.958' N  
 time collected: 0900 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25  
 method of take: Fyke net species: Arctic Flounder (AF)  
 period of deployment: 0728/0730 recorder: Fed  
 alive when caught?: yes

DISSECTION

date: 0730-01 dissector: JG, GL  
 start time: 1305 recorder: Fd  
 finish time: 1314 specimen code: AF  
 standard length(mm): 162 ~~est~~ weight(kg): 52  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

Bile  
~~liver~~ sample for RGS?:  sample code: 01-SIS-42-FAC-T-AF  
~~liver~~ sample for T.M.?:  sample code: \_\_\_\_\_  
~~muscle~~ sample for T.M.?:  sample code: \_\_\_\_\_  
~~liver~~ sample for Organics?  sample code: 01-SIS-42-FAC-T-AF  
 liver sample for P-450?:  sample code: 01-SIS-42-CYP-T-AF  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>pleom</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
gonad P450   
muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 0730 01 latitude: 70° 25.258' N  
 time collected: 09:00 longitude: 148° 41.722' W  
 station code: SIS depth(m): 3.25  
 method of take: Fyke net species: Arctic Flounder (AF)  
 period of deployment: 0728/0730 recorder: FEL  
 alive when caught?: yes

DISSECTION

date: 0730-01 dissector: JG GL  
 start time: 13:15 recorder: FEL  
 finish time: 13:22 specimen code: AF  
 standard length(mm): 180 weight(kg): 53  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

Bile  
 liver sample for RGS?:  sample code: 01-SIS-43-FAC-T-AF  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics?: TM  sample code: 01-SIS-43-PHC-T-AF  
 liver sample for P-450?:  sample code: 01-SIS-43-CYP-T-AF  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?: \_\_\_\_\_ comments: \_\_\_\_\_  
gonad P450   
muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0730-01 latitude: 70° 25.958' N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25  
 method of take: Fyke net species: Arctic Plounder (AF)  
 period of deployment: 0728/0730 recorder: Full  
 alive when caught?: Yes

DISSECTION

date: 07-30-01 dissector: JG \* GL  
 start time: 13:24 recorder: Full  
 finish time: 13:29 specimen code: AF  
 standard length(mm): 141 weight(kg): 31  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: M

SAMPLES

Bile  
 liver sample for RGS?:  sample code: 01-315-44-FAC-T-AF *not enough sample @*  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics?  sample code: 01-315-44-FAC-T-AF  
 liver sample for P-450?:  sample code: 01-315-44-OP-T-AF  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
*Spleen* kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
 gonads P450   
 muscle tissue P450  (not all)

\* dropped, rinsed w DI upon initial dissection, cont. diss  
 whole fish sample @ 07-30-01

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0730-01 latitude: 70° 25.958 'N  
 time collected: 09:00 longitude: 148° 41.922 'W  
 station code: SIS depth(m): 3.25  
 method of take: Fyke net species: Fourhorn Sculpin (FS)  
 period of deployment: 0728 | 0730 recorder: FOL  
 alive when caught?: yes

DISSECTION

date: 07/30/01 dissector: SG GL  
 start time: 13:32 recorder: FOL  
 finish time: 13:40 specimen code: FS  
 standard length(mm): 299 weight(kg): 400  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

-T-FS

Bile  
 liver sample for RGS?:  sample code: 01-SIS-45-FAC-FS  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics?:  sample code: 01-SIS-45-PHC-T-FS  
 liver sample for P-450?:  sample code: 01-SIS-45-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
 gonad P450   
 muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0730-01 latitude: 70° 25.958 'N  
 time collected: 09:00 longitude: 148° 41.922 'W  
 station code: S15 depth(m): 3.25  
 method of take: Fyke net species: four horn Sculpin (FS)  
 period of deployment: 07-28/0730 recorder: FQ  
 alive when caught?: yes

DISSECTION

date: 0730-01 dissector: JG, GL  
 start time: 13:42 recorder: FQ  
 finish time: 13:48 specimen code: FS  
 standard length(mm): 250 weight(kg): 175  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

Bile  
 liver sample for RGS?:  sample code: 01-S15-46-FAC-T-FS  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics?/TM  sample code: 01-S15-46-PHC-T-FS  
 liver sample for P-450?:  sample code: 01-S15-46-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>Spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
gonad P450   
muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07.30.01 latitude: 30° 25.958' <sup>Q</sup>W N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: SLS depth(m): 3.25  
 method of take: Fyke net species: Fourhorn Sculpin (FS)  
 period of deployment: 0728/0730 recorder: FA  
 alive when caught?: yes

DISSECTION

date: 0730-01 dissector: JG, GL  
 start time: 1350 recorder: FA  
 finish time: 1357 specimen code: FS  
 standard length(mm): 215 est. weight(kg): 125  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

<sup>Bile</sup>  
~~liver~~ sample for RGS?:  sample code: 01-515-47-FAC-T-FS  
~~liver~~ sample for T.M.?:  sample code: \_\_\_\_\_  
~~muscle~~ sample for T.M.?:  sample code: \_\_\_\_\_  
~~liver~~ sample for Organics?:  <sup>PHC</sup> sample code: 01-515-47-FAC<sup>PHC</sup>-T-FS  
 liver sample for P-450?:  sample code: 01-515-47-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
Gonad P450   
Muscle Tissue P450

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07-30-01 latitude: 70° 25.958' N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: S15 depth(m): 3.25  
 method of take: Fyke net species: Fourhorn Scaulpin (FS)  
 period of deployment: 0728/0130 recorder: FR  
 alive when caught?: yes

DISSECTION

date: 07 30 - 01 dissector: JG, GL  
 start time: 1358 recorder: FR  
 finish time: 14:03 specimen code: FS  
 standard length(mm): 218 est. weight(kg): 125  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

bile

liver sample for RGS?:  sample code: 01-515-48-FAC-T-FS  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics? fm  sample code: 01-515-48-PHC-T-FS  
 liver sample for P-450?:  sample code: 01-515-48-P<sup>@</sup>YP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
Spleen kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
 gonad P450   
 muscle tissue P450

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 0730-01 latitude: 70° 25.958' N  
 time collected: 09:00 longitude: 148° 41.222' W  
 station code: SIS depth(m): 3.25  
 method of take: Fyke net. species: Fourhorn Sculpin (FS)  
 period of deployment: 07/28-07/30 recorder: Far  
 alive when caught?: yes

DISSECTION

date: 0730-01 dissector: JG, GL  
 start time: 14:05 recorder: Far  
 finish time: 14:11 specimen code: FS  
 standard length(mm): 218 Est. weight(kg): 82  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

Bile  
 liver sample for RGS?:  sample code: 01-SIS-49-FAC-T-FS  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics? FM  sample code: 01-SIS-49-PHC-T-FS  
 liver sample for P-450?:  sample code: 01-SIS-49-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
<sup>Spleen</sup> kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?: \_\_\_\_\_ comments: \_\_\_\_\_  
gonad P450   
muscle tissue P450

comment 5: bile very dark green

FISH COLLECTION/DISSECTION DATA SHEETCOLLECTION

date collected: 07.30-01 latitude: 70° 25.958' N  
 time collected: 09:00 longitude: 148° 41.922' W  
 station code: SIS depth(m): 3.25  
 method of take: Fyke net species: fourhorn Scalpin (FS)  
 period of deployment: 07/28 - 07/30 recorder: FAC  
 alive when caught?: yes

DISSECTION

date: 0730-01 dissector: JG, GL  
 start time: 14:13 recorder: FAC  
 finish time: 14:20 specimen code: FS  
 standard length(mm): 219 119 weight(kg): 97  
 external abnormalities/parasites: NA  
 internal abnormalities/parasites: NA  
 sex: F

SAMPLES

liver sample for RGS?:  sample code: 01-SIS-50-FAC-T-FS  
~~liver sample for T.M.?:  sample code: \_\_\_\_\_~~  
~~muscle sample for T.M.?:  sample code: \_\_\_\_\_~~  
 liver sample for Organics?:  sample code: 01-SIS-50-PHC-T-FS  
 liver sample for P-450?:  sample code: 01-SIS-50-CYP-T-FS  
 gill sample for P-450?:  sample code: \_\_\_\_\_  
 kidney sample for P-450?:  sample code: \_\_\_\_\_  
 heart sample for p-450?  sample code: \_\_\_\_\_  
 other samples taken?:  comments: \_\_\_\_\_  
 gonad p450   
 muscle tissue p450

Comments: ulcer on tail

FISH COLLECTION/DISSECTION DATA SHEET

COLLECTION

date collected: 07-30-01      latitude: NA  
 time collected: NA      longitude: ↓  
 station code: ↓      depth(m): NA  
 method of take: ↓      species: Equipment Blank (EB)  
 period of deployment: ↓      recorder: FQ  
 alive when caught?: NA

DISSECTION

date: 0730      dissector: JG, GL  
 start time: 14:22      recorder: FQ  
 finish time: 14:28      specimen code: EB  
 standard length(mm): NA      weight(kg): NA  
 external abnormalities/parasites: ↓  
 internal abnormalities/parasites: ↓  
 sex: ↓

SAMPLES

<sup>Bile</sup>  
~~liver sample for RGS?:~~  sample code: 01-SIS-51-FAC-EB-QC  
~~liver sample for T.M.?:~~  sample code: \_\_\_\_\_  
~~muscle sample for T.M.?:~~  sample code: \_\_\_\_\_  
 liver sample for Organics?: TM  sample code: 01-SIS-51-PHC-EB-QC  
 liver sample for P-450?: 7 sample code: \_\_\_\_\_  
 gill sample for P-450?: 7 sample code: \_\_\_\_\_  
 kidney sample for P-450?: 7 sample code: \_\_\_\_\_  
 heart sample for p-450? 7 sample code: \_\_\_\_\_  
 other samples taken?: 7  comments: 7

DI of finsete collected @ 0730-01

②

End of Processing/  
dissection session  
@ 073001

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/01/01 Latitude: 70° 17.650' N  
 Time Collected: 15:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 1.1 m  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Broad Whitefish (BW)  
 Period of Deployment: 0731 - 0801 Recorder: Fel  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/01/01 Dissector: JGJGL  
 Start Time: 17:00 Recorder: Fel  
 Finish Time: 17:20 Specimen Code: BW  
 Standard Length (mm): 260 Weight (g): 150  
 External Abnormalities/Parasites: — Comments: —  
 Internal Abnormalities/Parasites: — Comments: —  
 Sex: M / F /  $\emptyset$  Mature: Y /  $\emptyset$

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: <u><math>\emptyset</math>IN</u>	Sample Code: <u>01-PBS-52 FAC-T-BW</u>
Sample for Organics/Trace metals: <u><math>\emptyset</math>IN</u>	Sample Code: 01-   -   - PHC -   -
Liver sample for P450: <u><math>\emptyset</math>IN</u>	Sample Code: 01-   -   - CYP -   -
Gill sample for P450: <u><math>\emptyset</math>IN</u>	Sample Code: 01-   -   - CYP -   -
Spleen sample for P450: <u><math>\emptyset</math>IN</u>	Sample Code: 01-   -   - CYP -   -
Kidney sample for P450: <u><math>\emptyset</math>IN</u>	Sample Code: 01-   -   - CYP -   -
Heart sample for P450: <u><math>\emptyset</math>IN</u>	Sample Code: 01-   -   - CYP -   -
Gonad sample for P450: <u><math>\emptyset</math>IN</u>	Sample Code: 01-   -   - CYP -   -
Muscle tissue sample for P450: <u><math>\emptyset</math>IN</u>	Sample Code: 01-   -   - CYP -   -

Comments: only single fish taken from Fyke net.  $\emptyset$   
gall/bile leaked into fissure after coliquet taken.  $\emptyset$

Recorder: Kana Taylor Date: 08/01/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 03, 01 Latitude: 70° 17.650' N  
 Time Collected: 13:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 10m  
 Method of Take: Flyke Net / Trawl / Hook & Line Species: Arctic Cisco (Ac)  
 Period of Deployment: 0802 / 0803 Recorder: FR  
 Alive when Caught:  N  
 Comments: deployment 08-2-01, 080301

**Dissection**

Date: 08, 03, 01 Dissector: JG / GL  
 Start Time: 15:30 Recorder: FR  
 Finish Time: 15:40 Specimen Code: AC  
 Standard Length (mm): 406 Weight (g): 600  
 External Abnormalities/Parasites: NA Comments: —  
 Internal Abnormalities/Parasites: NA Comments: —  
 Sex:  M /  F ? Mature:  Y /  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01-PBS-53-FAC-T-AC</u>
Sample for Organics/Trace metals: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01-PBS-53-PHC-T-AC</u>
Liver sample for P450: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01-PBS-53-CYP-T-AC</u>
Gill sample for P450: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01- - - CYP - -</u>
Spleen sample for P450: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01- - - CYP - -</u>
Kidney sample for P450: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01- - - CYP - -</u>
Heart sample for P450: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01- - - CYP - -</u>
Gonad sample for P450: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01- - - CYP - -</u>
Muscle tissue sample for P450: <input checked="" type="radio"/> Y / <input type="radio"/> N	Sample Code: <u>01- - - CYP - -</u>

Comments: Small amount of bile remaining in gall  
gut tissue added for P450

Recorder: [Signature] Date: 08, 03, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 03, 01 Latitude: 70° 17.650' N  
 Time Collected: 13:00 Longitude: 197° 49.211 W  
 Station Code: PBS Depth (m): 110  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic Oiscod (AC)  
 Period of Deployment: 08-02/0803 Recorder: Edm  
 Alive when Caught:  Y /  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08, 03, 01 Dissector: SG / GL  
 Start Time: 15:41 Recorder: Fdr  
 Finish Time: 15:48 Specimen Code: AC  
 Standard Length (mm): 224 Weight (g): 74  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M /  F Mature:  Y /  N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01-PBS-54-FAC-T-AC</u>
Sample for Organics/Trace metals:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01-PBS-54-PHC-T-</u>
Liver sample for P450:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01-PBS-54-CYP-T-</u>
Gill sample for P450:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01- - - CYP - -</u>
Spleen sample for P450:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01- - - CYP - -</u>
Kidney sample for P450:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01- - - CYP - -</u>
Heart sample for P450:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01- - - CYP - -</u>
Gonad sample for P450:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01- - - CYP - -</u>
Muscle tissue sample for P450:	<input checked="" type="checkbox"/> <u>Y</u> / <input type="checkbox"/> <u>N</u>	Sample Code:	<u>01- - - CYP - -</u>

Comments: gut tissue P450  Y

Recorder: A Douglas Date: 08, 03, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 03, 01  
 Time Collected: 13:00  
 Station Code: PBS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08-02 / 08-03  
 Alive when Caught: (Y) N  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650 'N  
 Longitude: 147° 49.211 'W  
 Depth (m): 1.0  
 Species: Broad whitefish (BW)  
 Recorder: FQ

**Dissection**

Date: 08, 03, 01  
 Start Time: 15:49  
 Finish Time: 15:52  
 Standard Length (mm): 712

Dissector: SG / GL  
 Recorder: FQ  
 Specimen Code: BW  
 Weight (g): 79

External Abnormalities/Parasites: Y

Comments: anus / pelvic fins<sup>w</sup> skin ulcerated

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M / F (?)

Mature: Y / (N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y) N  
 Sample for Organics/Trace metals: (Y) N  
 Liver sample for P450: (Y) N  
 Gill sample for P450: (Y) N  
 Spleen sample for P450: (Y) N  
 Kidney sample for P450: (Y) N  
 Heart sample for P450: (Y) N  
 Gonad sample for P450: (Y) N  
 Muscle tissue sample for P450: (Y) N

Sample Code: 01-PBS-55-FAC-T-BW  
 Sample Code: 01-PBS-55-PHC-T-BW  
 Sample Code: 01-PBS-55-CYP-T-BW  
 Sample Code: 01- - -CYP- -  
 Sample Code: 01- - -CYP- -

Comments: gut tissue for P450 taken

Recorder: A. Ruyter

Date: 08, 03, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 03, 01 Latitude: 70° 17.650' N  
 Time Collected: 13:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 1.0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Broad Whitefish (BW)  
 Period of Deployment: 08/02 - 08/03 Recorder: fan  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08, 03, 01 Dissector: JG, GL  
 Start Time: 15:53 Recorder: fan  
 Finish Time: 16:00 Specimen Code: BW  
 Standard Length (mm): 406 Weight (g): 600  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA In swim bladder Comments: \_\_\_\_\_  
 Sex: M/F/? Mature: Y/N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: Y/N Sample Code: 01-PBS-Sk-FAC-T-BW  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - -PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - -CYP - -

Comments: Gut tissue taken p450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: A. Dwyer Date: 08, 03, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 03, 01 Latitude: 70° 17.650 'N  
 Time Collected: 13:00 Longitude: 147° 49.211 'W  
 Station Code: PBS Depth (m): 1.0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic Hounder (AF)  
 Period of Deployment: 08/02 - 08/03 Recorder: FEL  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08, 03, 01 Dissector: SG/GL  
 Start Time: 16:05 Recorder: FEL  
 Finish Time: 16:10 Specimen Code: AC  
 Standard Length (mm): 254 Weight (g): 200  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M (F) Mature: Y (N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-PBS-57-FAC-T-AF  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - -PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - -CYP - -

Comments: gut fissure P450 taken  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature] Date: 08, 03, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/03/01 Latitude: 70° 17.650' N  
 Time Collected: 13:00 Longitude: 149° 49.211' W  
 Station Code: PBS Depth (m): 1.0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic Flounder (AF)  
 Period of Deployment: 08/02 - 08/03 Recorder: FR  
 Alive when Caught: (Y) N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/03/01 Dissector: JG, GL  
 Start Time: 6:12 Recorder: FR  
 Finish Time: 6:19 Specimen Code: AF  
 Standard Length (mm): 246 Weight (g): 200  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M (F)? Mature: (Y) N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: (Y) N Sample Code: 01-PBS-58-FAC-T-AF  
 Sample for Organics/Trace metals: (Y) N Sample Code: 01- - -PHC - -  
 Liver sample for P450: (Y) N Sample Code: 01- - -CYP - -  
 Gill sample for P450: (Y) N Sample Code: 01- - -CYP - -  
 Spleen sample for P450: (Y) N Sample Code: 01- - -CYP - -  
 Kidney sample for P450: (Y) N Sample Code: 01- - -CYP - -  
 Heart sample for P450: (Y) N Sample Code: 01- - -CYP - -  
 Gonad sample for P450: (Y) N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: (Y) N Sample Code: 01- - -CYP - -

Comments: gut tissue for P450 taken  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Frank Quigley Date: 08/03/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/03/01 Latitude: 70° 17.650' N  
 Time Collected: 13:00 Longitude: 147° 49.211' W  
 Station Code: P25 Depth (m): 1.0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic Flounder (AF)  
 Period of Deployment: 08-02 / 08-03 Recorder: FG  
 Alive when Caught:  Y  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/03/01 Dissector: JG, GL  
 Start Time: 16:21 Recorder: FG  
 Finish Time: 16:26 Specimen Code: AF  
 Standard Length (mm): 236 Weight (g): 175  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: MALE? Mature:  Y

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y Sample Code: 01-PBS-59-FAC-T-AF  
 Sample for Organics/Trace metals:  Y Sample Code: 01- - -PHC- -  
 Liver sample for P450:  Y Sample Code: 01- - -CYP- -  
 Gill sample for P450:  Y Sample Code: 01- - -CYP- -  
 Spleen sample for P450:  Y Sample Code: 01- - -CYP- -  
 Kidney sample for P450:  Y Sample Code: 01- - -CYP- -  
 Heart sample for P450:  Y Sample Code: 01- - -CYP- -  
 Gonad sample for P450:  Y Sample Code: 01- - -CYP- -  
 Muscle tissue sample for P450:  Y Sample Code: 01- - -CYP- -

Comments: gut tissue for P450 taken  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Travis Longin Date: 08/03/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/03/01 Latitude: 70° 17.650' N  
 Time Collected: 13:00 Longitude: 147° 48.211' W  
 Station Code: PB5 Depth (m): 1.0  
 Method of Take: Fake net / Trawl / Hook & Line Species: arctic flounder (AF)  
 Period of Deployment: 08/02 - 08/03 Recorder: FA  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/03/01 Dissector: JL GL  
 Start Time: 16:28 Recorder: FA  
 Finish Time: 16:35 Specimen Code: AF  
 Standard Length (mm): 231 Weight (g): 175  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M (E)? Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-PB5-60-FAC-T-AF  
 Sample for Organics/Trace metals: Y/N  
 Liver sample for P450: Y/N  
 Gill sample for P450: Y/N  
 Spleen sample for P450: Y/N  
 Kidney sample for P450: Y/N  
 Heart sample for P450: Y/N  
 Gonad sample for P450: Y/N  
 Muscle tissue sample for P450: Y/N

Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-

Comments: gut tissue taken for P450

Recorder: [Signature] Date: 08/03/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08,03,01 Latitude: 30° 17.650' N  
 Time Collected: 13:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 1.0  
 Method of Take: Fake net / Trawl / Hook & Line Species: Fourhorn Sculpin (FS)  
 Period of Deployment: 08/02 - 08/03 Recorder: FEL  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08,03,01 Dissector: JG, GL  
 Start Time: 16:37 Recorder: FEL  
 Finish Time: 16:47 Specimen Code: FS  
 Standard Length (mm): 135 Weight (g): 25  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M (F)? Mature: Y (N)

**Samples (Year - Site - Rep.# - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: Y/N Sample Code: 01-PBS-61-FAC-T-FS  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - - PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - - CYP - -

Comments: Tissue gut taken for P450 analysis

Recorder: [Signature] Date: 08,03,01

Fish Collection/Dissection Data Sheet

Collection

Date Collected: 08/03/01 Latitude: NA  
 Time Collected: 13:00 Longitude: ↓  
 Station Code: PBS Depth (m): —  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Equipment Blank (EB)  
 Period of Deployment: NA Recorder: FDR  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Dissection

Date: 08/03/01 Dissector: JG/GL  
 Start Time: 16:48 Recorder: FDR  
 Finish Time: 16:53 Specimen Code: EB  
 Standard Length (mm): NA Weight (g): NA  
 External Abnormalities/Parasites: ↓ Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: ↓ Comments: \_\_\_\_\_  
 Sex: M/F/? Mature: Y/N

Samples

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:	<u>Y/N</u>	Sample Code:	<u>01-PBS-62-FAC-EB-QC</u>
Sample for Organics/Trace metals:	<u>Y/N</u>	Sample Code:	<u>01-PBS-62-PHC-EB-QC</u>
Liver sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP- -</u>
Gill sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP- -</u>
Spleen sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP- -</u>
Kidney sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP- -</u>
Heart sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP- -</u>
Gonad sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP- -</u>
Muscle tissue sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP- -</u>

Comments: DI rinsate collected @ 08.03.01

\_\_\_\_\_

\_\_\_\_\_

Recorder: James Dyer Date: 08/03/01

end of dissection day @ 08/03/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/04/01  
 Time Collected: 14:00  
 Station Code: PBS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/03 - 08/04  
 Alive when Caught:  YIN  
 Comments: \_\_\_\_\_

Latitude: 70° 17' 17.0" N  
 Longitude: 147° 49.211" W  
 Depth (m): 1.0 m  
 Species: Dolly Varden (DV)  
 Recorder: \_\_\_\_\_

**Dissection**

Date: 08/04/01  
 Start Time: 16:15  
 Finish Time: 16:21  
 Standard Length (mm): 520

Dissector: JG, GL, JB  
 Recorder: Fish  
 Specimen Code: PV  
 Weight (g): 1250

External Abnormalities/Parasites: NA  
 Internal Abnormalities/Parasites: NA  
 Sex: MIF?

Comments: \_\_\_\_\_  
 Comments: \_\_\_\_\_  
 Mature:  YIN

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  YIN  
 Sample for Organics/Trace metals:  YIN  
 Liver sample for P450:  YIN  
 Gill sample for P450:  YIN  
 Spleen sample for P450:  YIN  
 Kidney sample for P450:  YIN  
 Heart sample for P450:  YIN  
 Gonad sample for P450:  YIN  
 Muscle tissue sample for P450:  YIN

Sample Code: 01-PBS-63-FAC-T-PV  

Sample Code: 01-	-	- PHC	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	↓	↓	↓	↓

Comments: Out tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature]

Date: 08/04/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/04/01  
 Time Collected: 14:00  
 Station Code: PBS  
 Method of Take: Rope Net / Trawl / Hook & Line  
 Period of Deployment: 08/03 - 08/04  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 147° 49.211' W  
 Depth (m): 10  
 Species: Humpback whale (HW)  
 Recorder: PQ

**Dissection**

Date: 08/04/01  
 Start Time: 16:24  
 Finish Time: 16:30  
 Standard Length (mm): 388

Dissector: JB  
 Recorder: FJL  
 Specimen Code: HW  
 Weight (g): 450

External Abnormalities/Parasites: NT

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M(?)

Mature: Y(N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y  N  
 Sample for Organics/Trace metals:  Y  N  
 Liver sample for P450:  Y  N  
 Gill sample for P450:  Y  N  
 Spleen sample for P450:  Y  N  
 Kidney sample for P450:  Y  N  
 Heart sample for P450:  Y  N  
 Gonad sample for P450:  Y  N  
 Muscle tissue sample for P450:  Y  N

Sample Code: 01-PBS-64-FAC-T-HW  

Sample Code: 01-	-	- PHC	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	-	- CYP	-	-
Sample Code: 01-	↓	↓	↓	↓

Comments: gut tissue taken for P450

Recorder: Tom Ingh

Date: 08/04/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/04/01  
 Time Collected: 14:00  
 Station Code: P85  
 Method of Take: Pyke net / Trawl / Hook & Line  
 Period of Deployment: 08/03 - 08/04  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 147° 49.211' W  
 Depth (m): 1.0  
 Species: Kumpback (HW)  
 Recorder: \_\_\_\_\_

**Dissection**

Date: 08/04/01  
 Start Time: 16:31  
 Finish Time: 6:40  
 Standard Length (mm): 395

Dissector: JG  
 Recorder: Far  
 Specimen Code: HW  
 Weight (g): ~~395~~ 550

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M(?)?

Mature: Y(N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y  N  
 Sample for Organics/Trace metals:  Y  N  
 Liver sample for P450:  Y  N  
 Gill sample for P450:  Y  N  
 Spleen sample for P450:  Y  N  
 Kidney sample for P450:  Y  N  
 Heart sample for P450:  Y  N  
 Gonad sample for P450:  Y  N  
 Muscle tissue sample for P450:  Y  N

Sample Code: 01-P85-65-FAC-T-HW  

Sample Code: 01-	-	- PHC -	-	
Sample Code: 01-	-	- CYP -	-	
Sample Code: 01-	-	- CYP -	-	
Sample Code: 01-	-	- CYP -	-	
Sample Code: 01-	-	- CYP -	-	
Sample Code: 01-	-	- CYP -	-	
Sample Code: 01-	-	- CYP -	-	
Sample Code: 01-	↓	↓ - CYP -	↓	↓

Comments: gut tissue taken for P450

Recorder: Ann Loh

Date: 08/04/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/04/01 Latitude: 70° 17.650' N  
 Time Collected: 14:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 1.0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Humpback Whitefish (HW)  
 Period of Deployment: 08/03 - 08/04 Recorder: FA  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/04/01 Dissector: JG, GL, JB  
 Start Time: 16:40 Recorder: FA  
 Finish Time: 16:45 Specimen Code: HW  
 Standard Length (mm): 350 Weight (g): 210  
 External Abnormalities/Parasites: — NA Comments: —  
 Internal Abnormalities/Parasites: — NA Comments: —  
 Sex: M? Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-PBS-1db-FAC-T-HW  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - - PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - - CYP - -

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature] Date: 08/04/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/04/01 Latitude: 70° 17.650' N  
 Time Collected: 14:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 60  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic Cusco (AC)  
 Period of Deployment: 08/03 - 08/04 Recorder: FR  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/04/01 Dissector: JG  
 Start Time: 16:47 Recorder: FR  
 Finish Time: 16:53 Specimen Code: AC  
 Standard Length (mm): 205 Weight (g): 65  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex:  M  F  ? Mature:  Y  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y  N Sample Code: 01-PBS-67-FAC-T-AC  
 Sample for Organics/Trace metals:  Y  N Sample Code: 01- - -PHC - -  
 Liver sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Gill sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Spleen sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Kidney sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Heart sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Gonad sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450:  Y  N Sample Code: 01- - -CYP - -

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Ann Dyer Date: 08/04/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 04, 01  
 Time Collected: 14:00  
 Station Code: PBS  
 Method of Take: Fyke Net / Trawl / Hook & Line  
 Period of Deployment: 08/03 - 08/04  
 Alive when Caught: (Y) N  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 147° 49.211' W  
 Depth (m): 1.0  
 Species: Arctic Cisco (AC)  
 Recorder: EQ

**Dissection**

Date: 08, 04, 01  
 Start Time: 16:53  
 Finish Time: 16:57  
 Standard Length (mm): 106 @ 161

Dissector: JG, GL, JB  
 Recorder: EQ  
 Specimen Code: AC  
 Weight (g): 32

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M / F (?)

Mature: Y (N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y) N  
 Sample for Organics/Trace metals: (Y) N  
 Liver sample for P450: (Y) N  
 Gill sample for P450: (Y) N  
 Spleen sample for P450: (Y) N  
 Kidney sample for P450: (Y) N  
 Heart sample for P450: (Y) N  
 Gonad sample for P450: (Y) N  
 Muscle tissue sample for P450: (Y) N

Sample Code:	01-	PBS-68-	FAC	-	T	-	AC
Sample Code:	01-	-	-	PHC	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	√	√	-	CYP	√	√

Comments: gut tissue taken for P450

Recorder: [Signature]

Date: 08, 04, 01

Fish Collection/Dissection Data Sheet

Collection

Date Collected: 08, 04, 01 Latitude: 70° 17.650' N  
 Time Collected: 14:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 10  
 Method of Take: CVR net / Trawl / Hook & Line Species: ARCTIC CISCO (AC)  
 Period of Deployment: 08/03 - 08/04 Recorder: FD  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Dissection

Date: 08 04 01 Dissector: JG, EL, JB  
 Start Time: 16:57 Recorder: FD  
 Finish Time: 17:03 Specimen Code: AC  
 Standard Length (mm): 140 Weight (g): 19  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M / F (?) Mature: Y/N

Samples

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-PBS-09-FAC-T-AC  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - -PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - -CYP - -

Comments: gut tissue for P450 taken

Recorder: [Signature] Date: 08, 04, 01

Fish Collection/Dissection Data Sheet

Collection

Date Collected: 08/04/01  
 Time Collected: 14:00  
 Station Code: PBS  
 Method of Take: Bye net / Trawl / Hook & Line  
 Period of Deployment: 08/03 - 08/04  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 147° 49.211' W  
 Depth (m): 10  
 Species: Fourhorn Sculpin (FS)  
 Recorder: FA

Dissection

Date: 08/04/01  
 Start Time: 17:05  
 Finish Time: 17:12  
 Standard Length (mm): 245

Dissector: JW, GL, JB  
 Recorder: FA  
 Specimen Code: FS  
 Weight (g): 150

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M(F)?

Mature: Y/N

Samples

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N  
 Sample for Organics/Trace metals: Y/N  
 Liver sample for P450: Y/N  
 Gill sample for P450: Y/N  
 Spleen sample for P450: Y/N  
 Kidney sample for P450: Y/N  
 Heart sample for P450: Y/N  
 Gonad sample for P450: Y/N  
 Muscle tissue sample for P450: Y/N

Sample Code: 01-PBS-70-FAC-T-FS  
 Sample Code: 01- - - PHC - -  
 Sample Code: 01- - - CYP - -

Comments: gut tissue taken for P450

Recorder: [Signature]

Date: 08/04/01

Fish Collection/Dissection Data Sheet

Collection

Date Collected: 08/04/01  
 Time Collected: 14:00  
 Station Code: PBS  
 Method of Take: Free Net / Trawl / Hook & Line  
 Period of Deployment: 08/03 - 08/04  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 147° 49.211' W  
 Depth (m): 1-0  
 Species: Fourhorn Sculpin (FS)  
 Recorder: FR

Dissection

Date: 08/04/01  
 Start Time: 17:13  
 Finish Time: 17:20  
 Standard Length (mm): 150

Dissector: JG GL JB  
 Recorder: FR  
 Specimen Code: FS  
 Weight (g): 30

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M/F/?

Mature: YIN

Samples

(Year Site Rep # Analysis Matrix Sp. Code)

Bile/Gall for FAC: YIN  
 Sample for Organics/Trace metals: YIN  
 Liver sample for P450: YIN  
 Gill sample for P450: YIN  
 Spleen sample for P450: YIN  
 Kidney sample for P450: YIN  
 Heart sample for P450: YIN  
 Gonad sample for P450: YIN  
 Muscle tissue sample for P450: YIN

Sample Code: 01-PBS-71-FAC-T-FS  
 Sample Code: 01- - - PHC - -  
 Sample Code: 01- - - CYP - -

Comments: gut taken for P450

Recorder: [Signature]

Date: 08/04/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/04/01 Latitude: 70° 17.650' N  
 Time Collected: 14:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 1.0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic Plounder (AF)  
 Period of Deployment: 08/03 - 08/04 Recorder: FD  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/04/01 Dissector: JG  
 Start Time: 17:20 Recorder: FD  
 Finish Time: 17:27 Specimen Code: AF  
 Standard Length (mm): 197 Weight (g): 75  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M)/F/? Mature: (Y)/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:	<u>(Y)/N</u>	Sample Code:	<u>01-PBS-72-FAC-T-AF</u>
Sample for Organics/Trace metals:	<u>(Y)/N</u>	Sample Code:	<u>01- - -PHC - -</u>
Liver sample for P450:	<u>(Y)/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Gill sample for P450:	<u>(Y)/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Spleen sample for P450:	<u>(Y)/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Kidney sample for P450:	<u>(Y)/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Heart sample for P450:	<u>(Y)/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Gonad sample for P450:	<u>(Y)/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Muscle tissue sample for P450:	<u>(Y)/N</u>	Sample Code:	<u>01- - -CYP - -</u>

Comments: gut tissue taken for P450

Recorder: [Signature] Date: 08/04/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/04/01  
 Time Collected: 14:00  
 Station Code: PBS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/03 - 08/04  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 147° 49.211' W  
 Depth (m): 1.0  
 Species: Arctic flounder (AF)  
 Recorder: FG

**Dissection**

Date: 08/04/01  
 Start Time: 17:28  
 Finish Time: 17:35  
 Standard Length (mm): 248

Dissector: JG - GL - JB  
 Recorder: FG  
 Specimen Code: AF  
 Weight (g): 225

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: MIA?

Mature: YIN

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: YIN  
 Sample for Organics/Trace metals: YIN  
 Liver sample for P450: YIN  
 Gill sample for P450: YIN  
 Spleen sample for P450: YIN  
 Kidney sample for P450: YIN  
 Heart sample for P450: YIN  
 Gonad sample for P450: YIN  
 Muscle tissue sample for P450: YIN

Sample Code: 01-PBS-B3-FAC-T-AF  

Sample Code: 01-	-	-	PHC	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	↓	↓	CYP	↓	↓

Comments: gut tissue taken for P450

Recorder: [Signature]

Date: 08/04/01

Fish Collection/Dissection Data Sheet

Collection

Date Collected: 08/04/01 Latitude: NA  
 Time Collected: 14:00 Longitude: ↓  
 Station Code: PBS Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: equipment blank (EB)  
 Period of Deployment: 08/03 - 08/04 Recorder: FQ  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Dissection

Date: 08/04/01 Dissector: JG, GL, SB  
 Start Time: 17:35 Recorder: FQ  
 Finish Time: 17:40 Specimen Code: EB  
 Standard Length (mm): NA Weight (g): NA  
 External Abnormalities/Parasites: NA Comments: —  
 Internal Abnormalities/Parasites: NA Comments: —  
 Sex: M/F/? Mature: Y/N

Samples

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y)N Sample Code: 01-PBS-74-FAC-EB QC  
 Sample for Organics/Trace metals: (Y)N Sample Code: 01-↓-↓-PHC-↓-↓  
 Liver sample for P450: Y(N) Sample Code: 01- - - CYP - -  
 Gill sample for P450: Y(N) Sample Code: 01- - - CYP - -  
 Spleen sample for P450: Y(N) Sample Code: 01- - - CYP - -  
 Kidney sample for P450: Y(N) Sample Code: 01- - - CYP - -  
 Heart sample for P450: Y(N) Sample Code: 01- - - CYP - -  
 Gonad sample for P450: Y(N) Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: Y(N) Sample Code: 01- - - CYP - -

Comments: \_\_\_\_\_

Recorder: Ann Dwyer Date: 08/04/01

end of dissection day (w) 08/04/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/06/01 Latitude: 70° 17.650' N  
 Time Collected: 09:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 1.0  
 Method of Take: Eyebot / Trawl / Hook & Line Species: Broad whitefish (BW)  
 Period of Deployment: 08-06-04 Hwt 09/10 Recorder: Fdh  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/06/01 Dissector: JG  
 Start Time: ~~09:00~~ 10:50 Recorder: Fdh  
 Finish Time: 11:00 Specimen Code: BW  
 Standard Length (mm): 430 Weight (g): 400  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: worms in swim bladder  
 Sex: M/F/? Mature: YIN

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: <u>YIN</u>	Sample Code: <u>01-PBS-75-FAC-T-BW</u>
Sample for Organics/Trace metals: <u>YIN</u>	Sample Code: <u>01- - -PHC - -</u>
Liver sample for P450: <u>YIN</u>	Sample Code: <u>01- - -CYP - -</u>
Gill sample for P450: <u>YIN</u>	Sample Code: <u>01- - -CYP - -</u>
Spleen sample for P450: <u>YIN</u>	Sample Code: <u>01- - -CYP - -</u>
Kidney sample for P450: <u>YIN</u>	Sample Code: <u>01- - -CYP - -</u>
Heart sample for P450: <u>YIN</u>	Sample Code: <u>01- - -CYP - -</u>
Gonad sample for P450: <u>YIN</u>	Sample Code: <u>01- - -CYP - -</u>
Muscle tissue sample for P450: <u>YIN</u>	Sample Code: <u>01- ↓ - ↓ -CYP - ↓ - ↓</u>

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: J. L. Long Date: 08, 06, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/06/01  
 Time Collected: 09:00  
 Station Code: PBS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08-04 - 08/06  
 Alive when Caught: (Y/N)  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 147° 49.211' W  
 Depth (m): 1.0  
 Species: Broad whitefish (BW)  
 Recorder: feh

**Dissection**

Date: 08/06/01  
 Start Time: 11:00  
 Finish Time: 11:10  
 Standard Length (mm): 175

Dissector: Fehr, SG, & L  
 Recorder: feh  
 Specimen Code: BW  
 Weight (g): 41

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M / F / ?

Mature: Y / N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y/N)  
 Sample for Organics/Trace metals: (Y/N)  
 Liver sample for P450: (Y/N)  
 Gill sample for P450: (Y/N)  
 Spleen sample for P450: (Y/N)  
 Kidney sample for P450: (Y/N)  
 Heart sample for P450: (Y/N)  
 Gonad sample for P450: (Y/N)  
 Muscle tissue sample for P450: (Y/N)

Sample Code:	01-PBS-76-FAC-T-BW
Sample Code:	01- - -PHC - -
Sample Code:	01- - -CYP - -
Sample Code:	01- - -CYP - -
Sample Code:	01- - -CYP - -
Sample Code:	01- - -CYP - -
Sample Code:	01- - -CYP - -
Sample Code:	01- - -CYP - -
Sample Code:	01- - -CYP - -

Comments: gut tissue taken for P450  
Bile leaked small amount into body cavity

Recorder: Karen Quyn

Date: 08/06/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/06/01  
 Time Collected: 09:00  
 Station Code: PBS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/04 - 08/06  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 149° 49.211' W  
 Depth (m): 1.0  
 Species: Broad Whitefish (BW)  
 Recorder: 1 FOL

**Dissection**

Date: 08/06/01  
 Start Time: 11:10  
 Finish Time: 11:17  
 Standard Length (mm): 215

Dissector: JG, GL  
 Recorder: FOL  
 Specimen Code: BW  
 Weight (g): 300

External Abnormalities/Parasites: yes

Comments: piece of tail regrown

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex:  M  F  ?

Mature:  Y  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y  N  
 Sample for Organics/Trace metals:  Y  N  
 Liver sample for P450:  Y  N  
 Gill sample for P450:  Y  N  
 Spleen sample for P450:  Y  N  
 Kidney sample for P450:  Y  N  
 Heart sample for P450:  Y  N  
 Gonad sample for P450:  Y  N  
 Muscle tissue sample for P450:  Y  N

Sample Code: 01-PBS-77-FAC-T-BW  

Sample Code: 01-	-	-	PHC	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	✓	✓	CYP	✓	✓

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Tommy Angler

Date: 08/06/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/06/01  
 Time Collected: 09:00  
 Station Code: PBS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/04 - 08/06  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

Latitude: 70° 17.650' N  
 Longitude: 147° 49.211' W  
 Depth (m): 10  
 Species: Arctic Herring (AF)  
 Recorder: FQ

**Dissection**

Date: 08/06/01  
 Start Time: 11:20  
 Finish Time: 11:25  
 Standard Length (mm): 205

Dissector: JG GL  
 Recorder: FQ  
 Specimen Code: AF  
 Weight (g): 125

External Abnormalities/Parasites: NA

Comments: ✓

Internal Abnormalities/Parasites: NA

Comments: ✓

Sex: M (F) ?

Mature: YIN

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: YIN  
 Sample for Organics/Trace metals: YIN  
 Liver sample for P450: YIN  
 Gill sample for P450: YIN  
 Spleen sample for P450: YIN  
 Kidney sample for P450: YIN  
 Heart sample for P450: YIN  
 Gonad sample for P450: YIN  
 Muscle tissue sample for P450: YIN

Sample Code: 01-PBS-78-FAC-T-AF  

Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-

Comments: gut tissue taken for P450

Recorder: James Sample

Date: 08/06/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/06/01 Latitude: 70° 17.650' N  
 Time Collected: 09:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 1-D  
 Method of Take: Fyke net/ Trawl / Hook & Line Species: Pom. Minn. Sculpin (P3)  
 Period of Deployment: 08/04 - 08/04 Recorder: FQ  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/06/01 Dissector: JG, GL  
 Start Time: 11:27 Recorder: FQ  
 Finish Time: 11:32 Specimen Code: FS  
 Standard Length (mm): 140 Weight (g): 32  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M (F)? Mature: (Y) N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: <u>(Y) N</u>	Sample Code: <u>01-PBS-79-FAC-J-FS</u>
Sample for Organics/Trace metals: <u>(Y) N</u>	Sample Code: 01- - -PHC - -
Liver sample for P450: <u>(Y) N</u>	Sample Code: 01- - -CYP - -
Gill sample for P450: <u>(Y) N</u>	Sample Code: 01- - -CYP - -
Spleen sample for P450: <u>(Y) N</u>	Sample Code: 01- - -CYP - -
Kidney sample for P450: <u>(Y) N</u>	Sample Code: 01- - -CYP - -
Heart sample for P450: <u>(Y) N</u>	Sample Code: 01- - -CYP - -
Gonad sample for P450: <u>(Y) N</u>	Sample Code: 01- - -CYP - -
Muscle tissue sample for P450: <u>(Y) N</u>	Sample Code: 01- - -CYP - -

Comments: gut tissue taken for P450

Recorder: [Signature] Date: 08/06/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/06/01 Latitude: 70° 17.650' N  
 Time Collected: 09:00 Longitude: 147° 49.211' W  
 Station Code: PBS Depth (m): 1.0  
 Method of Take: Fyke Net / Trawl / Hook & Line Species: Pomohina Sculpin (FS)  
 Period of Deployment: 08/05 - 08/06 Recorder: FCL  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/06/01 Dissector: JG GL  
 Start Time: 11:33 Recorder: FCL  
 Finish Time: 11:42 Specimen Code: FS  
 Standard Length (mm): 142 Weight (g): 35  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M (F)? Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-PBS-80-FAC-T-FS  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - -PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - -CYP - -

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Aimee Dunbar Date: 08/06/01

End of dissection day @ 08:00

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: NA  
 Station Code: L14 Depth (m): NA  
 Method of Take: Fyke net / ~~Trawl~~ / Hook & Line Species: Arctic Cisco (Ac)  
 Period of Deployment: 08/07 Recorder: FR  
 Alive when Caught:  Y /  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG GL  
 Start Time: 18:32 Recorder: FR  
 Finish Time: 18:44 Specimen Code: AC  
 Standard Length (mm): 280 Weight (g): 200  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex:  M /  F / ? Mature:  Y /  N

**Samples** (Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01-L14-81-FAC-T-AC</u>
Sample for Organics/Trace metals:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01- - -PHC- -</u>
Liver sample for P450:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01- - -CYP- -</u>
Gill sample for P450:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01- - -CYP- -</u>
Spleen sample for P450:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01- - -CYP- -</u>
Kidney sample for P450:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01- - -CYP- -</u>
Heart sample for P450:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01- - -CYP- -</u>
Gonad sample for P450:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01- - -CYP- -</u>
Muscle tissue sample for P450:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code:	<u>01- - -CYP- -</u>

Comments: gut tissue taken for P450

\_\_\_\_\_

\_\_\_\_\_

Recorder: [Signature] Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 07, 01  
 Time Collected: 12:00  
 Station Code: L14  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/07  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Latitude: NA  
 Longitude: \_\_\_\_\_  
 Depth (m): ↓  
 Species: Arctic Cisco (AC)  
 Recorder: FR

**Dissection**

Date: 08, 07, 01  
 Start Time: 18:44  
 Finish Time: 18:49  
 Standard Length (mm): 300

Dissector: JL, GL  
 Recorder: FR  
 Specimen Code: AC  
 Weight (g): 225

External Abnormalities/Parasites: —

Comments: —

Internal Abnormalities/Parasites: yes

Comments: tape worms

Sex: (M)/F/?

Mature: Y(N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y)/N  
 Sample for Organics/Trace metals: (Y)/N  
 Liver sample for P450: (Y)/N  
 Gill sample for P450: (Y)/N  
 Spleen sample for P450: (Y)/N  
 Kidney sample for P450: (Y)/N  
 Heart sample for P450: (Y)/N  
 Gonad sample for P450: (Y)/N  
 Muscle tissue sample for P450: (Y)/N

Sample Code: 01-L14-82-FAC-T-AC

Sample Code:	01-	-	- PHC -	-	-
Sample Code:	01-	-	- CYP -	-	-
Sample Code:	01-	-	- CYP -	-	-
Sample Code:	01-	-	- CYP -	-	-
Sample Code:	01-	-	- CYP -	-	-
Sample Code:	01-	-	- CYP -	-	-
Sample Code:	01-	-	- CYP -	-	-

Comments: gut tissue taken for P450  
fatty tissue

Recorder: [Signature]

Date: 08, 07, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: arctic cisco (AC)  
 Period of Deployment: 08/07 Recorder: FEL  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG, GL  
 Start Time: 18:49 Recorder: FEL  
 Finish Time: 18:56 Specimen Code: AC  
 Standard Length (mm): 275 Weight (g): 200  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: yes Comments: tugeworms  
 Sex: M/F/? Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-L1483-FAC-T-AC  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - -PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - -CYP - -

Comments: gut tissue  
stomach packed to shrimp mysids

Recorder: Ann Dwyer Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01  
 Time Collected: 10:00  
 Station Code: L14  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08-07-01  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Latitude: NA  
 Longitude: \_\_\_\_\_  
 Depth (m): \_\_\_\_\_  
 Species: Arctic OSCU (AC)  
 Recorder: Fdu

**Dissection**

Date: 08/07/01  
 Start Time: 18:56  
 Finish Time: 19:02  
 Standard Length (mm): 287

Dissector: JG, GL  
 Recorder: FA  
 Specimen Code: AC  
 Weight (g): 200

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: yes

Comments: tapeworms

Sex: (M) F/?

Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y) N  
 Sample for Organics/Trace metals: (Y) N  
 Liver sample for P450: (Y) N  
 Gill sample for P450: (Y) N  
 Spleen sample for P450: (Y) N  
 Kidney sample for P450: (Y) N  
 Heart sample for P450: (Y) N  
 Gonad sample for P450: (Y) N  
 Muscle tissue sample for P450: (Y) N

Sample Code: 01-L14-84-FAC-T-AC  

Sample Code: 01-	-	-	PHC	-	-	-
Sample Code: 01-	-	-	CYP	-	-	-
Sample Code: 01-	-	-	CYP	-	-	-
Sample Code: 01-	-	-	CYP	-	-	-
Sample Code: 01-	-	-	CYP	-	-	-
Sample Code: 01-	-	-	CYP	-	-	-
Sample Code: 01-	-	-	CYP	-	-	-
Sample Code: 01-	✓	✓	CYP	✓	✓	✓

Comments: gut tissue taken for P450

full stomach crustacea amphipods mollusks

Recorder: Ann Dwyer

Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:20 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / ~~Trawl~~ / Hook & Line Species: Arctic Husco (AC)  
 Period of Deployment: 09/07 Recorder: F&L  
 Alive when Caught: (Y)N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG GL  
 Start Time: 19:02 Recorder: F&L  
 Finish Time: 19:11 Specimen Code: AC  
 Standard Length (mm): 245 Weight (g): 175  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: yes Comments: tapeworm  
 Sex: (M)F/? Mature: (Y)N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: (Y)N Sample Code: 01-L14-85-FAC-T-AC  
 Sample for Organics/Trace metals: (Y)N Sample Code: 01- - - PHC - -  
 Liver sample for P450: (Y)N Sample Code: 01- - - CYP - -  
 Gill sample for P450: (Y)N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: (Y)N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: (Y)N Sample Code: 01- - - CYP - -  
 Heart sample for P450: (Y)N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: (Y)N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: (Y)N Sample Code: 01- - - CYP - -

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Ann Dwyer Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:20 Longitude: \_\_\_\_\_  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic cisco (AC)  
 Period of Deployment: 08/07 Recorder: FEL  
 Alive when Caught:  Y /  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JB & L  
 Start Time: 19:11 Recorder: FEL  
 Finish Time: 19:18 Specimen Code: AC  
 Standard Length (mm): 257 Weight (g): 175  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex:  M /  F / ? Mature:  Y /  N

**Samples**

(Year - Site - Rep.# - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y /  N Sample Code: 01-L14-S6-FAC-T-AC  
 Sample for Organics/Trace metals:  Y /  N Sample Code: 01- | - - PHC | - |  
 Liver sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Gill sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Spleen sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Kidney sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Heart sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Gonad sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450:  Y /  N Sample Code: 01- ↓ - ↓ - CYP ↓ - ↓

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature] Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: ↓  
 Station Code: L14 Depth (m): ↓ cisco  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic TUSK (AC)  
 Period of Deployment: 08/07 Recorder: Feb  
 Alive when Caught: (Y/N)  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG GL  
 Start Time: 19:18 Recorder: Feb  
 Finish Time: 19:24 Specimen Code: AC  
 Standard Length (mm): 288 Weight (g): 175  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M/F)? Mature: (Y/N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y/N) Sample Code: 01-L14-87-FAC-T-AC  
 Sample for Organics/Trace metals: (Y/N) Sample Code: 01- - -PHC - -  
 Liver sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Gill sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Spleen sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Kidney sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Heart sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Gonad sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: (Y/N) Sample Code: 01- ↓ - ↓ -CYP - ↓ ↓

Comments: gut tissue taken for P450

Recorder: Anna Quynh Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / ~~Trawl~~ / Hook & Line Species: Arctic Cisco (AC)  
 Period of Deployment: 08/07 Recorder: Jan  
 Alive when Caught:  Y /  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JB, GL  
 Start Time: 19:24 Recorder: FB  
 Finish Time: 19:50:30 Specimen Code: Ac  
 Standard Length (mm): 303 Weight (g): 200  
 External Abnormalities/Parasites: NA Comments: ✓  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex:  M /  F / ? Mature:  Y /  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y /  N Sample Code: 01-L14-88-FAC-T-Ac  
 Sample for Organics/Trace metals:  Y /  N Sample Code: 01- | - | - PHC | - |  
 Liver sample for P450:  Y /  N Sample Code: 01- | - | - CYP | - |  
 Gill sample for P450:  Y /  N Sample Code: 01- | - | - CYP | - |  
 Spleen sample for P450:  Y /  N Sample Code: 01- | - | - CYP | - |  
 Kidney sample for P450:  Y /  N Sample Code: 01- | - | - CYP | - |  
 Heart sample for P450:  Y /  N Sample Code: 01- | - | - CYP | - |  
 Gonad sample for P450:  Y /  N Sample Code: 01- | - | - CYP | - |  
 Muscle tissue sample for P450:  Y /  N Sample Code: 01- | - | - CYP | - |

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Jan Dargatzis Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic cod (AR) ACP  
 Period of Deployment: 08/07 Recorder: FEL  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG, GL  
 Start Time: 19:50 Recorder: FEL  
 Finish Time: 20:00 Specimen Code: ACD  
 Standard Length (mm): 144 Weight (g): 22  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M) F/? Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y) N Sample Code: 01- L14-89 - FAC - T - ACP  
 Sample for Organics/Trace metals: (Y) N Sample Code: 01- - - PHC - - -  
 Liver sample for P450: (Y) N Sample Code: 01- - - CYP - - -  
 Gill sample for P450: (Y) N Sample Code: 01- - - CYP - - -  
 Spleen sample for P450: (Y) N Sample Code: 01- - - CYP - - -  
 Kidney sample for P450: (Y) N Sample Code: 01- - - CYP - - -  
 Heart sample for P450: (Y) N Sample Code: 01- - - CYP - - -  
 Gonad sample for P450: (Y) N Sample Code: 01- - - CYP - - -  
 Muscle tissue sample for P450: (Y) N Sample Code: 01- ↓ - ↓ - CYP ↓ - ↓

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Ann Dwyer Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: J  
 Station Code: L14 Depth (m): J  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic cod (ACD)  
 Period of Deployment: 08/07 Recorder: Fa  
 Alive when Caught: (Y/N)  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: SG, GL  
 Start Time: 20:00 Recorder: Fa  
 Finish Time: 20:10 Specimen Code: ACD  
 Standard Length (mm): 135 Weight (g): 21  
 External Abnormalities/Parasites: NA Comments: —  
 Internal Abnormalities/Parasites: NA Comments: —  
 Sex: (M) F? Mature: (Y/N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y/N) Sample Code: 01-L14-90-FAC-T-ACD  
 Sample for Organics/Trace metals: (Y/N) Sample Code: 01- - -PHC - -  
 Liver sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Gill sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Spleen sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Kidney sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Heart sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Gonad sample for P450: (Y/N) Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: (Y/N) Sample Code: 01- - -CYP - -

Comments: gut tissue taken P450  
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 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature] Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / Crawl / Hook & Line Species: Arctic COD (AeD)  
 Period of Deployment: 08/07 Recorder: FR  
 Alive when Caught: (Y) / N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG, GL  
 Start Time: 20:10 Recorder: FR  
 Finish Time: 20:17 Specimen Code: ACD  
 Standard Length (mm): 143 Weight (g): 22  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M) / F / ? Mature: (Y) / N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: (Y) / N Sample Code: 01- U4-91 - FAC - T - ACD  
 Sample for Organics/Trace metals: (Y) / N Sample Code: 01- - - PHC - -  
 Liver sample for P450: (Y) / N Sample Code: 01- - - CYP - -  
 Gill sample for P450: (Y) / N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: (Y) / N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: (Y) / N Sample Code: 01- - - CYP - -  
 Heart sample for P450: (Y) / N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: (Y) / N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: (Y) / N Sample Code: 01- √ - √ - CYP - √ - √

Comments: gut taken for P450  
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 \_\_\_\_\_

Recorder: [Signature] Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / (Trawl) / Hook & Line Species: Arctic cod (ACD)  
 Period of Deployment: 08/07/01 Recorder: FR  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG. LIL  
 Start Time: 20:17 Recorder: FR  
 Finish Time: 20:21 Specimen Code: ACD  
 Standard Length (mm): 146 Weight (g): 25  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M/F/? Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

<sup>small amt?</sup>  
 Bile/Gall for FAC: (Y)N Sample Code: 01-L14-92-FAC-T-ACD  
 Sample for Organics/Trace metals: (Y)N Sample Code: 01- - -PHC - -  
 Liver sample for P450: (Y)N Sample Code: 01- - -CYP - -  
 Gill sample for P450: (Y)N Sample Code: 01- - -CYP - -  
 Spleen sample for P450: (Y)N Sample Code: 01- - -CYP - -  
 Kidney sample for P450: (Y)N Sample Code: 01- - -CYP - -  
 Heart sample for P450: (Y)N Sample Code: 01- - -CYP - -  
 Gonad sample for P450: (Y)N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: (Y)N Sample Code: 01- ↓ - ↓ - CYP - ↓ - ↓

Comments: gut tissue taken for P450  
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 \_\_\_\_\_  
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Recorder: [Signature] Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: kelp snailfish (KS)  
 Period of Deployment: 08/07 Recorder: Fal  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG GL  
 Start Time: 20:21 Recorder: Fal  
 Finish Time: 20:32 Specimen Code: KS  
 Standard Length (mm): L14 Weight (g): 22  
 External Abnormalities/Parasites: NA Comments: —  
 Internal Abnormalities/Parasites: NA Comments: —  
 Sex: M/F/? Mature: Y/N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: Y/N Sample Code: 01-L14-93-FAC-T-KS  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - -PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- ↓ - ↓ -CYP - ↓ ↓

Comments: gut tissue taken for P450  
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 \_\_\_\_\_

Recorder: [Signature] Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:30 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Kelp Snailfish (KS)  
 Period of Deployment: 08/07 Recorder: FD  
 Alive when Caught:  Y /  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG  
 Start Time: 20:33 Recorder: FD  
 Finish Time: 20:42 Specimen Code: KS  
 Standard Length (mm): 100 Weight (g): 20  
 External Abnormalities/Parasites: NA Comments: —  
 Internal Abnormalities/Parasites: NA Comments: —  
 Sex: M (F)? Mature:  Y /  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y /  N Sample Code: 01-L14-94-FAC-T-KS  
 Sample for Organics/Trace metals:  Y /  N Sample Code: 01- - - PHC - -  
 Liver sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Gill sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Spleen sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Kidney sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Heart sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Gonad sample for P450:  Y /  N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450:  Y /  N Sample Code: 01- - - CYP - -

Comments: gut tissue taken for P450

Recorder: [Signature] Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/07/01 Latitude: NA  
 Time Collected: 10:00 Longitude: J  
 Station Code: L14 Depth (m): J  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Fourhorn Sculpin (A) FS  
 Period of Deployment: 08/07 Recorder: Fe  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/07/01 Dissector: JG  
 Start Time: 20:42 Recorder: Fe  
 Finish Time: 20:48 Specimen Code: FS  
 Standard Length (mm): 150 Weight (g): 33  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M(F)? Mature: Y(N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-44-95-FAC-T-FS  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- | - | - PHC | - |  
 Liver sample for P450: Y/N Sample Code: 01- | - | - CYP - - |  
 Gill sample for P450: Y/N Sample Code: 01- | - | - CYP - - |  
 Spleen sample for P450: Y/N Sample Code: 01- | - | - CYP - - |  
 Kidney sample for P450: Y/N Sample Code: 01- | - | - CYP - - |  
 Heart sample for P450: Y/N Sample Code: 01- | - | - CYP - - |  
 Gonad sample for P450: Y/N Sample Code: 01- | - | - CYP - - |  
 Muscle tissue sample for P450: Y/N Sample Code: 01- | - | - CYP - - |

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Ann Douglas Date: 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08,07,01 Latitude: NA  
 Time Collected: 10:00 Longitude: ↓  
 Station Code: L14 Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Fourhorn Sculpin (FS)  
 Period of Deployment: 08/07/01 Recorder: Fee  
 Alive when Caught: (Y)N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08,07,01 Dissector: JG  
 Start Time: 20:48 Recorder: Fee  
 Finish Time: 20:59 Specimen Code: FS  
 Standard Length (mm): 180 Weight (g): 50  
 External Abnormalities/Parasites: NA Comments: —  
 Internal Abnormalities/Parasites: NA Comments: —  
 Sex: M(F)? Mature: (Y)N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp Code)**

Bile/Gall for FAC: <u>(Y)N</u>	Sample Code: <u>01-L14-96-FAC-T-FS</u>
Sample for Organics/Trace metals: <u>(Y)N</u>	Sample Code: <u>01- - - PHC - -</u>
Liver sample for P450: <u>(Y)N</u>	Sample Code: <u>01- - - CYP - -</u>
Gill sample for P450: <u>(Y)N</u>	Sample Code: <u>01- - - CYP - -</u>
Spleen sample for P450: <u>(Y)N</u>	Sample Code: <u>01- - - CYP - -</u>
Kidney sample for P450: <u>(Y)N</u>	Sample Code: <u>01- - - CYP - -</u>
Heart sample for P450: <u>(Y)N</u>	Sample Code: <u>01- - - CYP - -</u>
Gonad sample for P450: <u>(Y)N</u>	Sample Code: <u>01- - - CYP - -</u>
Muscle tissue sample for P450: <u>(Y)N</u>	Sample Code: <u>01- - - CYP - -</u>

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Tim Ogden Date: 08,07,01

end of dissection day  
 @ 08/07/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/00  
 Time Collected: 16:00  
 Station Code: BPS  
 Method of Take: Fyke net / (Trawl) Hook & Line  
 Period of Deployment: 08/10 - 8/11  
 Alive when Caught:  Y  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.6" W  
 Depth (m): 1 m  
 Species: ArctZ Q500 (AC)  
 Recorder: \_\_\_\_\_

**Dissection**

Date: 08/11/01  
 Start Time: 20:00  
 Finish Time: 20:13  
 Standard Length (mm): 165

Dissector: JG, GL, MM  
 Recorder: EC  
 Specimen Code: AC  
 Weight (g): 2.00

External Abnormalities/Parasites: NA

Comments: ✓

Internal Abnormalities/Parasites: NA

Comments: ✓

Sex:  M /  F / ?

Mature: Y /  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y /  N  
 Sample for Organics/Trace metals:  Y /  N  
 Liver sample for P450:  Y /  N  
 Gill sample for P450:  Y /  N  
 Spleen sample for P450:  Y /  N  
 Kidney sample for P450:  Y /  N  
 Heart sample for P450:  Y /  N  
 Gonad sample for P450:  Y /  N  
 Muscle tissue sample for P450:  Y /  N

Sample Code:	01-	<sup>BPS</sup> 45-97	- FAC	- T	- AC
Sample Code:	01-	-	- PHC	-	-
Sample Code:	01-	-	- CYP	-	-
Sample Code:	01-	-	- CYP	-	-
Sample Code:	01-	-	- CYP	-	-
Sample Code:	01-	-	- CYP	-	-
Sample Code:	01-	-	- CYP	-	-
Sample Code:	01-	-	- CYP	-	-

Comments: gut tissue taken for P450

Recorder: Tom Taylor

Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 16:00 Longitude: 146° 53' 35.0" W  
 Station Code: BPS Depth (m): 1-0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic Cisco (AC)  
 Period of Deployment: 08/10 - 08/11 Recorder: Kou  
 Alive when Caught:  Y /  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/18/01 Dissector: JG GL  
 Start Time: 20:13 Recorder: Kou  
 Finish Time: 20:20 Specimen Code: AC  
 Standard Length (mm): 300 Weight (g): 225  
 External Abnormalities/Parasites: NA YES Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA YES Comments: Tapeworms  
 Sex:  M /  F / ? Mature: Y / N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01-BPS-98-FAC-T-AC</u>
Sample for Organics/Trace metals: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01- - - PHC - -</u>
Liver sample for P450: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01- - - CYP - -</u>
Gill sample for P450: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01- - - CYP - -</u>
Spleen sample for P450: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01- - - CYP - -</u>
Kidney sample for P450: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01- - - CYP - -</u>
Heart sample for P450: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01- - - CYP - -</u>
Gonad sample for P450: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01- - - CYP - -</u>
Muscle tissue sample for P450: <input checked="" type="checkbox"/> Y / <input type="checkbox"/> N	Sample Code: <u>01- - - CYP - -</u>

Comments: Agut tissue tumor for P450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: John D. [Signature] Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 16:00 Longitude: 146° 53' 38.0" W  
 Station Code: BPS Depth (m): 1.0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic Ocean (H)  
 Period of Deployment: 08/10 - 08/11 Recorder: Far  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: SG, GL  
 Start Time: 20:20 Recorder: Far  
 Finish Time: 20:28 Specimen Code: AC  
 Standard Length (mm): 267 Weight (g): 175  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M) F? Mature: YIN

**Samples (Year - Site - Rep.# - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: YIN Sample Code: 01- BPS-99 - FAC - T - AC  
 Sample for \_\_\_\_\_  
 Organics/Trace metals: YIN Sample Code: 01- - - PHC - - -  
 Liver sample for P450: YIN Sample Code: 01- - - CYP - - -  
 Gill sample for P450: YIN Sample Code: 01- - - CYP - - -  
 Spleen sample for P450: YIN Sample Code: 01- - - CYP - - -  
 Kidney sample for P450: YIN Sample Code: 01- - - CYP - - -  
 Heart sample for P450: YIN Sample Code: 01- - - CYP - - -  
 Gonad sample for P450: YIN Sample Code: 01- - - CYP - - -  
 Muscle tissue sample for P450: YIN Sample Code: 01- - - CYP - - -

Comments: gall tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature] Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 16:00 Longitude: 176° 53' 38.0" W  
 Station Code: BPS Depth (m): 10  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic cisco (AC)  
 Period of Deployment: 8/10 - 8/11 Recorder: FD  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: JG, GL  
 Start Time: 20:29 Recorder: FD  
 Finish Time: 20:36 Specimen Code: AC  
 Standard Length (mm): 318 Weight (g): 200  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M/F/? Mature: Y(N)

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: <u>Y/N</u>	Sample Code: <u>01-BPS-100-FAC-T-AC</u>
Sample for Organics/Trace metals: <u>Y/N</u>	Sample Code: <u>01- - -PHC - -</u>
Liver sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Gill sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Spleen sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Kidney sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Heart sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Gonad sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Muscle tissue sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>

Comments: gut tissue taken for P450

Recorder: [Signature] Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01  
 Time Collected: 16:00  
 Station Code: BPS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/10 - 08/11  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 1.0  
 Species: artsa G.S.O (AC)  
 Recorder: FCR

**Dissection**

Date: 08/11/01  
 Start Time: 20:30  
 Finish Time: 20:41  
 Standard Length (mm): 315

Dissector: JG, GL  
 Recorder: FCR  
 Specimen Code: AC  
 Weight (g): 2.00

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex:  M  F  ?

Mature:  Y  N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC:  Y  N  
 Sample for \_\_\_\_\_  
 Organics/Trace metals:  Y  N  
 Liver sample for P450:  Y  N  
 Gill sample for P450:  Y  N  
 Spleen sample for P450:  Y  N  
 Kidney sample for P450:  Y  N  
 Heart sample for P450:  Y  N  
 Gonad sample for P450:  Y  N  
 Muscle tissue sample for P450:  Y  N

Sample Code: 01-BPS-101-FAC-T-AC  

Sample Code: 01-	-	-	PHC	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	-	-	CYP	-	-
Sample Code: 01-	↓	↓	CYP	↓	↓

Comments: gut tissue taken for P450

Recorder: [Signature]

Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01  
 Time Collected: 10:00  
 Station Code: 008 BPS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 8/10 - 8/11  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 1-0  
 Species: Arctic Cisco (AC)  
 Recorder: FA

**Dissection**

Date: 08/11/01  
 Start Time: 20:28 41  
 Finish Time: 20:48  
 Standard Length (mm): 314

Dissector: JL GL  
 Recorder: FEL  
 Specimen Code: AC  
 Weight (g): 200

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: (M) F 1 ?

Mature: YIN

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: YIN  
 Sample for Organics/Trace metals: YIN  
 Liver sample for P450: YIN  
 Gill sample for P450: YIN  
 Spleen sample for P450: YIN  
 Kidney sample for P450: YIN  
 Heart sample for P450: YIN  
 Gonad sample for P450: YIN  
 Muscle tissue sample for P450: YIN

Sample Code: 01- BPS-102- FAC - T - AC  
 Sample Code: 01- - - PHC - - -  
 Sample Code: 01- - - CYP - - -  
 Sample Code: 01- - - CYP - - -  
 Sample Code: 01- - - CYP - - -  
 Sample Code: 01- - - CYP - - -  
 Sample Code: 01- - - CYP - - -  
 Sample Code: 01- - - CYP - - -  
 Sample Code: 01- - - CYP - - -

Comments: gut tissue taken for P450

Recorder: [Signature]

Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 16:00 Longitude: 146° 53' 38.0" W  
 Station Code: BPS Depth (m): 1.0  
 Method of Take: Ryke net / Trawl / Hook & Line Species: Arctic cisco (AC)  
 Period of Deployment: 08/10 - 08/11 Recorder: for  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: JG GL  
 Start Time: 20:48 Recorder: for  
 Finish Time: 20:51 Specimen Code: AC  
 Standard Length (mm): 273 Weight (g): 175  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M/F/? Mature: Y(N)

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: Y/N Sample Code: 01-<sup>BPS</sup> PB-103-FAC-T-AC  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - - PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - - CYP - -

Comments: gut tissue taken for p450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature] Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 16:00 Longitude: 146° 53' 38.0" W  
 Station Code: BPS Depth (m): 1.0  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic C:510 (AC)  
 Period of Deployment: 08/10 - 08/11 Recorder: ER  
 Alive when Caught: (Y)N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: JG GL  
 Start Time: 20:51 Recorder: ER  
 Finish Time: 20:55 Specimen Code: AC  
 Standard Length (mm): (2) 287 297 Weight (g): 200  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M)F? Mature: (Y)N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: <u>(Y)N</u>	Sample Code: 01- <u>BPS</u> - <u>104</u> - FAC - T - AC
Sample for Organics/Trace metals: <u>(Y)N</u>	Sample Code: 01- - - PHC - -
Liver sample for P450: <u>(Y)N</u>	Sample Code: 01- - - CYP - -
Gill sample for P450: <u>(Y)N</u>	Sample Code: 01- - - CYP - -
Spleen sample for P450: <u>(Y)N</u>	Sample Code: 01- - - CYP - -
Kidney sample for P450: <u>(Y)N</u>	Sample Code: 01- - - CYP - -
Heart sample for P450: <u>(Y)N</u>	Sample Code: 01- - - CYP - -
Gonad sample for P450: <u>(Y)N</u>	Sample Code: 01- - - CYP - -
Muscle tissue sample for P450: <u>(Y)N</u>	Sample Code: 01- <u>✓</u> - <u>✓</u> CYP - <u>✓</u> <u>✓</u>

Comments: gut tissue taken for P450

Recorder: Mark Dyer Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 10:00 Longitude: 146° 53' 38.0" W  
 Station Code: BPS Depth (m): 1.0  
 Method of Take: Ryke net / Trawl / Hook & Line Species: WTALE CO CO (AC)  
 Period of Deployment: 08/10 - 08/11 Recorder: FEL  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: SL, GL  
 Start Time: 20:34 55 Recorder: FEL  
 Finish Time: 20:43 59 Specimen Code: AC  
 Standard Length (mm): 304 Weight (g): 200  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex:  M  F  ? Mature:  Y  N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	BPS	-	IPS	-	FAC	-	T	-	AC
Sample for Organics/Trace metals:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	-	-	-	-	PHC	-	-	-	-
Liver sample for P450:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	-	-	-	-	CYP	-	-	-	-
Gill sample for P450:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	-	-	-	-	CYP	-	-	-	-
Spleen sample for P450:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	-	-	-	-	CYP	-	-	-	-
Kidney sample for P450:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	-	-	-	-	CYP	-	-	-	-
Heart sample for P450:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	-	-	-	-	CYP	-	-	-	-
Gonad sample for P450:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	-	-	-	-	CYP	-	-	-	-
Muscle tissue sample for P450:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sample Code:	01-	-	-	-	-	CYP	-	-	-	-

Comments: gut tissue taken for P450

Recorder: [Signature] Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 16:00 Longitude: 146° 53' 38.0" W  
 Station Code: BPS Depth (m): \_\_\_\_\_  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Polly Varden (DV)  
 Period of Deployment: 08/10 - 08/11 Recorder: FEL  
 Alive when Caught: (X) N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: JG, GL  
 Start Time: 21:00 Recorder: FEL  
 Finish Time: 21:04 Specimen Code: \_\_\_\_\_ DV  
 Standard Length (mm): 437 Weight (g): 600  
 External Abnormalities/Parasites: N.A Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: Y Comments: Tapeworms  
 Sex: M(?)? Mature: Y(N)

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: (X) N Sample Code: 01- BPS - 106 - FAC - T - DV  
 Sample for Organics/Trace metals: (X) N Sample Code: 01- - - PHC - -  
 Liver sample for P450: (X) N Sample Code: 01- - - CYP - -  
 Gill sample for P450: (X) N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: (X) N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: (X) N Sample Code: 01- - - CYP - -  
 Heart sample for P450: (X) N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: (X) N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: (X) N Sample Code: 01- - - CYP - -

Comments: gut taken for P450

Recorder: [Signature] Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 16:00 Longitude: 146° 53.38.0" W  
 Station Code: BPS Depth (m): 1.0  
 Method of Take: Fyke Net / Trawl / Hook & Line Species: Polly Varden (PV)  
 Period of Deployment: 08/10 - 08/11 Recorder: \_\_\_\_\_  
 Alive when Caught:  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: JG, GL  
 Start Time: 21:04 Recorder: JA  
 Finish Time: 21:08 Specimen Code: PV  
 Standard Length (mm): 293 Weight (g): 225  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA (T) Comments: tapeworms  
 Sex: M/F/? Mature: Y (N)

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC:  N Sample Code: 01-BPS-107-FAC-T-PV  
 Sample for Organics/Trace metals:  N Sample Code: 01- - - PHC - - -  
 Liver sample for P450:  N Sample Code: 01- - - CYP - - -  
 Gill sample for P450:  N Sample Code: 01- - - CYP - - -  
 Spleen sample for P450:  N Sample Code: 01- - - CYP - - -  
 Kidney sample for P450:  N Sample Code: 01- - - CYP - - -  
 Heart sample for P450:  N Sample Code: 01- - - CYP - - -  
 Gonad sample for P450:  N Sample Code: 01- - - CYP - - -  
 Muscle tissue sample for P450:  N Sample Code: 01- - - CYP - - -

Comments: gut tissue taken for P450

Recorder: Tom Dyke Date: 08/11/01



**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01  
 Time Collected: 16:00  
 Station Code: BPS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/10 - 08/11  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 1.0  
 Species: Edwardsia Sculpin (B)  
 Recorder: Fdr

**Dissection**

Date: 08/11/01  
 Start Time: 21:17  
 Finish Time: 21:20  
 Standard Length (mm): 172

Dissector: JG, OL  
 Recorder: Fdr  
 Specimen Code: FS  
 Weight (g): 53

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M/F/?

Mature: Y/N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: Y/N  
 Sample for Organics/Trace metals: Y/N  
 Liver sample for P450: Y/N  
 Gill sample for P450: Y/N  
 Spleen sample for P450: Y/N  
 Kidney sample for P450: Y/N  
 Heart sample for P450: Y/N  
 Gonad sample for P450: Y/N  
 Muscle tissue sample for P450: Y/N

Sample Code: 01-<sup>BPS</sup>-109-FAC-T-FS  

Sample Code:	01-	-	-	PHC	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	
Sample Code:	01-	-	-	CYP	-	-	

Comments: gut tissue taken for P450  
red gonads

Recorder: Frank Doyle

Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 11, 01  
 Time Collected: 10:00  
 Station Code: BPS  
 Method of Take: gill net / Trawl / Hook & Line  
 Period of Deployment: 08/10 - 08/11  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 1.0  
 Species: four horn sculpin (FS)  
 Recorder: FLW

**Dissection**

Date: 08, 11, 01  
 Start Time: 21:20  
 Finish Time: 21:25  
 Standard Length (mm): 210

Dissector: JO, CL  
 Recorder: FLW  
 Specimen Code: FS  
 Weight (g): 125

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M/F/?

Mature: (Y)N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: (Y)N  
 Sample for Organics/Trace metals: (Y)N  
 Liver sample for P450: (Y)N  
 Gill sample for P450: (Y)N  
 Spleen sample for P450: (Y)N  
 Kidney sample for P450: (Y)N  
 Heart sample for P450: (Y)N  
 Gonad sample for P450: (Y)N  
 Muscle tissue sample for P450: (Y)N

Sample Code:	01-	BPS-110	-	FAC	-	T	-	FS
Sample Code:	01-	-	-	PHC	-	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-	-
Sample Code:	01-	↓	↓	CYP	↓	↓	↓	↓

Comments: gut tissue taken for P450  
red ovaries

Recorder: Jim Ingle

Date: 08, 11, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01  
 Time Collected: 16:00  
 Station Code: BPS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/10 - 08/11  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 1-0  
 Species: Fourhorn Sculpin (FS)  
 Recorder: FEA

**Dissection**

Date: 08/11/01  
 Start Time: 21:25  
 Finish Time: 21:32  
 Standard Length (mm): 182

Dissector: JG GL  
 Recorder: FEA  
 Specimen Code: FS  
 Weight (g): 65

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M (F)?

Mature: YIN ?

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: YIN  
 Sample for Organics/Trace metals: YIN  
 Liver sample for P450: YIN  
 Gill sample for P450: YIN  
 Spleen sample for P450: YIN  
 Kidney sample for P450: YIN  
 Heart sample for P450: YIN  
 Gonad sample for P450: YIN  
 Muscle tissue sample for P450: YIN

Sample Code: 01-<sup>BPS</sup>-111-FAC-T-FS  

Sample Code: 01-	-	- PHC -	-	-
Sample Code: 01-	-	- CYP -	-	-
Sample Code: 01-	-	- CYP -	-	-
Sample Code: 01-	-	- CYP -	-	-
Sample Code: 01-	-	- CYP -	-	-
Sample Code: 01-	-	- CYP -	-	-
Sample Code: 01-	-	- CYP -	-	-

Comments: gut tissue taken for P450

orange liver bleed in vial  
half tint to red in ovaries

Recorder: Tommy J. [Signature]

Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 11, 01  
 Time Collected: 16:00  
 Station Code: BPS  
 Method of Take: Fake net / Trawl / Hook & Line  
 Period of Deployment: 08/10 - 08/11  
 Alive when Caught:  Y N  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 1.0  
 Species: Fourhorn Sculpin (ES)  
 Recorder: FCH

**Dissection**

Date: 08, 11, 01  
 Start Time: 21:32  
 Finish Time: 21:38  
 Standard Length (mm): 175

Dissector: JG GL  
 Recorder: FCH  
 Specimen Code: FS  
 Weight (g): 165

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M  F ?

Mature:  Y N ?

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y N  
 Sample for Organics/Trace metals:  Y N  
 Liver sample for P450:  Y N  
 Gill sample for P450:  Y N  
 Spleen sample for P450:  Y N  
 Kidney sample for P450:  Y N  
 Heart sample for P450:  Y N  
 Gonad sample for P450:  Y N  
 Muscle tissue sample for P450:  Y N

Sample Code: 01-BPS-112-FAC-T-FS  

Sample Code:	01-	-	-	PHC	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-

Comments: gut tissue taken for P450  
half red tint to gonad.

Recorder: [Signature]

Date: 08, 11, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01  
 Time Collected: 16:00  
 Station Code: BPS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/10 - 08/11  
 Alive when Caught:  Y N  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38" W  
 Depth (m): 1.0  
 Species: Fewhorn Sulpy (FS)  
 Recorder: FEL

**Dissection**

Date: 08/11/01  
 Start Time: 21:38  
 Finish Time: :  
 Standard Length (mm): 182

Dissector: JG, GL  
 Recorder: FEL  
 Specimen Code: FS  
 Weight (g): 59

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M  F ?

Mature:  Y N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y N  
 Sample for Organics/Trace metals:  Y N  
 Liver sample for P450:  Y N  
 Gill sample for P450:  Y N  
 Spleen sample for P450:  Y N  
 Kidney sample for P450:  Y N  
 Heart sample for P450:  Y N  
 Gonad sample for P450:  Y N  
 Muscle tissue sample for P450:  Y N

Sample Code:	01-	BPS	13	FAC	T	FS
Sample Code:	01-	-	-	PHC	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-

Comments: gut tissue taken for P450  
gonads "reddish"

Recorder: Jim Zylstra

Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 11, 01  
 Time Collected: 16:00  
 Station Code: BPS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/10 - 08/11  
 Alive when Caught: (Y)N  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 1.0  
 Species: fourhorn Sculpin (FS)  
 Recorder: FW

**Dissection**

Date: 08, 11, 01  
 Start Time: 21:42  
 Finish Time: 21:50  
 Standard Length (mm): 164  
 External Abnormalities/Parasites: NA  
 Internal Abnormalities/Parasites: NA  
 Sex: M(?)?

Dissector: JG, GL  
 Recorder: FW  
 Specimen Code: FS  
 Weight (g): 60  
 Comments: \_\_\_\_\_  
 Comments: \_\_\_\_\_  
 Mature: (Y)N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: (Y)N  
 Sample for Organics/Trace metals: (Y)N  
 Liver sample for P450: (Y)N  
 Gill sample for P450: (Y)N  
 Spleen sample for P450: (Y)N  
 Kidney sample for P450: (Y)N  
 Heart sample for P450: (Y)N  
 Gonad sample for P450: (Y)N  
 Muscle tissue sample for P450: (Y)N

Sample Code:	01-	<sup>BPS</sup> - 114 - FAC - T - FS
Sample Code:	01-	- - - PHC - - -
Sample Code:	01-	- - - CYP - - -
Sample Code:	01-	- - - CYP - - -
Sample Code:	01-	- - - CYP - - -
Sample Code:	01-	- - - CYP - - -
Sample Code:	01-	- - - CYP - - -
Sample Code:	01-	- - - CYP - - -
Sample Code:	01-	- - - CYP - - -

Comments: gut tissue taken for P450  
red gonads

Recorder: Jim Deagle Date: 08, 11, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 11, 01  
 Time Collected: 11:30  
 Station Code: L15  
 Method of Take: Fyke net (Trawl) / Hook & Line  
 Period of Deployment: 08/11 1/2 hr  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

Latitude: see station log.  
 Longitude: ↓  
 Depth (m): ~200-6  
 Species: Arctic Cod (ACD)  
 Recorder: For

**Dissection**

Date: 08, 11, 01  
 Start Time: 21:48 50  
 Finish Time: 21:55 2  
 Standard Length (mm): 164

Dissector: JS, GL  
 Recorder: For  
 Specimen Code: ACD  
 Weight (g): 28

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex:  M  F  ?

Mature:  Y  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y  N  
 Sample for \_\_\_\_\_  
 Organics/Trace metals:  Y  N  
 Liver sample for P450:  Y  N  
 Gill sample for P450:  Y  N  
 Spleen sample for P450:  Y  N  
 Kidney sample for P450:  Y  N  
 Heart sample for P450:  Y  N  
 Gonad sample for P450:  Y  N  
 Muscle tissue sample for P450:  Y  N

Sample Code: L15 01 - 15 - FAC - T - ACD  

Sample Code: 01-	-	-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-	-	-
Sample Code: 01-	-	-	-	-	-	-	-

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: For Douglas

Date: 08, 11, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08, 11, 01 Latitude: see station log  
 Time Collected: 11:30 Longitude:                       
 Station Code: L15 Depth (m):                       
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctid cod (KA)  
 Period of Deployment: 08/11 1/2 hr Recorder:                       
 Alive when Caught: (Y)N Comments:                     

**Dissection**

Date: 08, 11, 01 Dissector: JG GL  
 Start Time: 21:55 Recorder:                       
 Finish Time: 21:57 Specimen Code:                       
 Standard Length (mm): 130 Weight (g): 18  
 External Abnormalities/Parasites: NA Comments:                       
 Internal Abnormalities/Parasites: NA Comments:                       
 Sex: (M)F/? Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y)N Sample Code: 01- L15-116-FAC-T-ACD  
 Sample for Organics/Trace metals: (Y)N Sample Code: 01- - - - -  
 Liver sample for P450: (Y)N Sample Code: 01- - - - -  
 Gill sample for P450: (Y)N Sample Code: 01- - - - -  
 Spleen sample for P450: (Y)N ? Sample Code: 01- - - - -  
 Kidney sample for P450: (Y)N Sample Code: 01- - - - -  
 Heart sample for P450: (Y)N Sample Code: 01- - - - -  
 Gonad sample for P450: (Y)N Sample Code: 01- - - - -  
 Muscle tissue sample for P450: (Y)N Sample Code: 01- - - - -

Comments: gut tissue taken for P450

Recorder:                      Date: 08, 11, 01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: see station log  
 Time Collected: 16:30 Longitude: \_\_\_\_\_  
 Station Code: \_\_\_\_\_ Depth (m): ↓  
 Method of Take: Fyke net / (Trawl) / Hook & Line Species: arctic cod (ACD)  
 Period of Deployment: 08/11 1/2 hr Recorder: \_\_\_\_\_  
 Alive when Caught: (Y) / N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: JG GL  
 Start Time: 21:57 Recorder: Felt  
 Finish Time: 22:01 Specimen Code: ACD  
 Standard Length (mm): 139 Weight (g): 19  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M) / F / ? Mature: (Y) / N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC:	<u>(Y) / N</u>	Sample Code:	01-	<sup>L15</sup> <u>BTS-117</u>	- FAC - T -	<u>ACD</u>
Sample for Organics/Trace metals:	<u>(Y) / N</u>	Sample Code:	01-	-	- PHC -	-
Liver sample for P450:	<u>(Y) / N</u>	Sample Code:	01-	-	- CYP -	-
Gill sample for P450:	<u>(Y) / N</u>	Sample Code:	01-	-	- CYP -	-
Spleen sample for P450:	<u>(Y) / N</u>	Sample Code:	01-	-	- CYP -	-
Kidney sample for P450:	<u>(Y) / N</u>	Sample Code:	01-	-	- CYP -	-
Heart sample for P450:	<u>(Y) / N</u>	Sample Code:	01-	-	- CYP -	-
Gonad sample for P450:	<u>(Y) / N</u>	Sample Code:	01-	-	- CYP -	-
Muscle tissue sample for P450:	<u>(Y) / N</u>	Sample Code:	01-	↓	↓ - CYP -	↓

Comments: gut tissue taken for P450

Recorder: Ann Zylke Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01  
 Time Collected: 11:30  
 Station Code: L15  
 Method of Take: Fyke net / (Trawl) / Hook & Line  
 Period of Deployment: 08/11  
 Alive when Caught: (Y)IN  
 Comments: \_\_\_\_\_

Latitude: see station log  
 Longitude: \_\_\_\_\_  
 Depth (m): \_\_\_\_\_  
 Species: Atlantic cod (NW)  
 Recorder: FR

**Dissection**

Date: 08/11/01  
 Start Time: 22:03  
 Finish Time: 22:11  
 Standard Length (mm): 136  
 External Abnormalities/Parasites: NA  
 Internal Abnormalities/Parasites: NA  
 Sex: M / F / ?

Dissector: JG & L  
 Recorder: FR  
 Specimen Code: ACD  
 Weight (g): 19  
 Comments: \_\_\_\_\_  
 Comments: \_\_\_\_\_  
 Mature: Y / N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y)IN  
 Sample for Organics/Trace metals: (Y)IN  
 Liver sample for P450: (Y)IN  
 Gill sample for P450: (Y)IN  
 Spleen sample for P450: (Y)IN  
 Kidney sample for P450: (Y)IN  
 Heart sample for P450: (Y)IN  
 Gonad sample for P450: (Y)IN  
 Muscle tissue sample for P450: (Y)IN

Sample Code: 01-<sup>L15</sup>-118-FAC-T-ACD  
 Sample Code: 01- - -PHC - -  
 Sample Code: 01- - -CYP - -

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: Jim Zylstra

Date: 08/11/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/11/01 Latitude: \_\_\_\_\_  
 Time Collected: \_\_\_\_\_ Longitude: \_\_\_\_\_  
 Station Code: \_\_\_\_\_ Depth (m): \_\_\_\_\_  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Equipment Blank (EB)  
 Period of Deployment: \_\_\_\_\_ Recorder: FJR  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/11/01 Dissector: JG, GL  
 Start Time: 22:13 Recorder: FJR  
 Finish Time: 22:15 Specimen Code: E13  
 Standard Length (mm): \_\_\_\_\_ Weight (g): \_\_\_\_\_  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M/F/? Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:	<u>Y/N</u>	Sample Code:	<u>01-BPS-119-FAC-EB-QC</u>
Sample for Organics/Trace metals:	<u>Y/N</u>	Sample Code:	<u>01-BPS-119-PHC-EB-QC</u>
Liver sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Gill sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Spleen sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Kidney sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Heart sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Gonad sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP - -</u>
Muscle tissue sample for P450:	<u>Y/N</u>	Sample Code:	<u>01- - -CYP - -</u>

Comments: equipment blank rinsate

Recorder: Tracy J. J. J. Date: 08/11/01

*Sediment*  
Fish Collection/Dissection Data Sheet

Collection

Date Collected: 08/12/01  
Time Collected: 10:00  
Station Code: @ BPS BPS  
Method of Take: Fyke net / Trawl / Hook & Line  
Period of Deployment: \_\_\_\_\_  
Alive when Caught: Y/N  
Comments: \_\_\_\_\_

Latitude: \_\_\_\_\_  
Longitude: \_\_\_\_\_  
Depth (m): shore intertidal  
Species: \_\_\_\_\_  
Recorder: EQ

Dissection

Date: 1/1  
Start Time: \_\_\_\_\_  
Finish Time: \_\_\_\_\_  
Standard Length (mm): \_\_\_\_\_

Dissector: NA  
Recorder: \_\_\_\_\_  
Specimen Code: \_\_\_\_\_  
Weight (g): \_\_\_\_\_

External Abnormalities/Parasites: \_\_\_\_\_

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: \_\_\_\_\_

Comments: \_\_\_\_\_

Sex: M/F/?

Mature: Y/N

Samples

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y(N)  
Sample for Organics/Trace metals: (Y)N  
Liver sample for P450: Y(N)  
Gill sample for P450: Y(N)  
Spleen sample for P450: Y(N)  
Kidney sample for P450: Y(N)  
Heart sample for P450: Y(N)  
Gonad sample for P450: Y(N)  
Muscle tissue sample for P450: Y(N)

Sample Code: 01-120-FAC--  
Sample Code: 01-BPS-120-PHC-5-SEEP  
Sample Code: 01--CYP--  
Sample Code: 01--CYP--

Comments: GPS Coord.  
Shore along banks of W side of BPS collected for reference

Recorder: [Signature]

Date: 08/12/01

Fish Collection/Dissection Data Sheet

Collection

Date Collected: 08/12/01 Latitude: 70°10'14.2" N  
 Time Collected: 09:00 Longitude: 146°53'38.0" W  
 Station Code: BPS Depth (m): 60  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Fowhwa Saitpur (FS)  
 Period of Deployment: (B) 08/11 - 08/12 9:00am Recorder: FQ  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Dissection

Date: 08/12/01 Dissector: JG GL  
 Start Time: 17:42 Recorder: FQ  
 Finish Time: 17:50 Specimen Code: \_\_\_\_\_ FS  
 Standard Length (mm): 145 Weight (g): 25  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M) F / ? Mature: Y/N

Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-BPS-121-FAC-T-FS  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - - PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - - CYP - -

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature] Date: 08/12/01  
12

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/12/01  
 Time Collected: 09:00  
 Station Code: BPE  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 08/11 08/12  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 1.0  
 Species: fourhorn Sculpin (FS)  
 Recorder: FR

**Dissection**

Date: 08/12/01  
 Start Time: 12:50  
 Finish Time: 17:53  
 Standard Length (mm): 185

Dissector: JG GL  
 Recorder: FR  
 Specimen Code: FS  
 Weight (g): 65

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M/F/?

Mature: Y/N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N  
 Sample for Organics/Trace metals: Y/N  
 Liver sample for P450: Y/N  
 Gill sample for P450: Y/N  
 Spleen sample for P450: Y/N  
 Kidney sample for P450: Y/N  
 Heart sample for P450: Y/N  
 Gonad sample for P450: Y/N  
 Muscle tissue sample for P450: Y/N

Sample Code:	01-	BPE	122	-	FAC	-	T	-	FS
Sample Code:	01-			-	PHC	-		-	
Sample Code:	01-			-	CYP	-		-	
Sample Code:	01-			-	CYP	-		-	
Sample Code:	01-			-	CYP	-		-	
Sample Code:	01-			-	CYP	-		-	
Sample Code:	01-			-	CYP	-		-	
Sample Code:	01-			-	CYP	-		-	

Comments: gut tissue taken for P450  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Recorder: [Signature]

Date: 08/12/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/12/01  
 Time Collected: 09:00  
 Station Code: BPS  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: @ 08/11 - 08/12  
 Alive when Caught: YIN  
 Comments: \_\_\_\_\_

Latitude: 70° 10' 14.2" N  
 Longitude: 146° 53' 38.0" W  
 Depth (m): 10  
 Species: Forstery's Sculpin (AF FS)  
 Recorder: PCR

**Dissection**

Date: 08/12/01  
 Start Time: 17:53  
 Finish Time: 17:58  
 Standard Length (mm): 171

Dissector: JB, GL  
 Recorder: PCR  
 Specimen Code: AF FS  
 Weight (g): 55

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex: M/F?

Mature: (Y)N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: YIN  
 Sample for Organics/Trace metals: YIN  
 Liver sample for P450: YIN  
 Gill sample for P450: YIN  
 Spleen sample for P450: YIN  
 Kidney sample for P450: YIN  
 Heart sample for P450: YIN  
 Gonad sample for P450: YIN  
 Muscle tissue sample for P450: YIN

Sample Code: 01-BPS-123-FAC-T-FS  
 Sample Code: 01- - -PHC- -  
 Sample Code: 01- - -CYP- -  
 Sample Code: 01-V - -CYP- -

Comments: gut tissue taken for P450

Recorder: [Signature]

Date: 08/12/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/12/01 Latitude: 70° 10' 14.2" N  
 Time Collected: 04:00 Longitude: 146° 53' 38.0" W  
 Station Code: BPS Depth (m): 10  
 Method of Take: Fake net / Trawl / Hook & Line Species: Dolly Varden (W)  
 Period of Deployment: 08/11 - 08/12 Recorder: FJA  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/12/01 Dissector: JG GL  
 Start Time: 7:58 Recorder: FJA  
 Finish Time: 10:10 Specimen Code: DV  
 Standard Length (mm): 495 Weight (g): 650  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: Y Comments: tapeworms - full and rematode 3(?)  
 Sex: M/F/? Mature: Y/N

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: <u>Y/N</u>	Sample Code: <u>01-BPS-124-FAC-T-DV</u>
Sample for Organics/Trace metals: <u>Y/N</u>	Sample Code: <u>01- - -PHC - -</u>
Liver sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Gill sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Spleen sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Kidney sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Heart sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Gonad sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>
Muscle tissue sample for P450: <u>Y/N</u>	Sample Code: <u>01- - -CYP - -</u>

Comments: gut tissue taken for p450  
\* blood may be present in bile

Recorder: Ann Taylor Date: 08/12/01

\* kind of dissection day 08/12/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/13/01 Latitude: /  
 Time Collected: 13:45 Longitude: /  
 Station Code: N01 Depth (m): /  
 Method of Take: Fyke net / Trawl / Hook & Line Species: ( )  
 Period of Deployment: \_\_\_\_\_ Recorder: \_\_\_\_\_  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 1/1 Dissector: \_\_\_\_\_  
 Start Time: \_\_\_\_\_ Recorder: \_\_\_\_\_  
 Finish Time: \_\_\_\_\_ Specimen Code: \_\_\_\_\_  
 Standard Length (mm): \_\_\_\_\_ Weight (g): \_\_\_\_\_  
 External Abnormalities/Parasites: \_\_\_\_\_ Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: \_\_\_\_\_ Comments: \_\_\_\_\_  
 Sex: M/F/? Mature: Y/N  
NA

**Samples** (Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: Y/N Sample Code: 01-N01-125-FAC - -  
 Sample for Organics/Trace metals: Y/N Sample Code: 01-N01-125-PHC - W - FB  
 Liver sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - - CYP - -

Comments: Cone liner rinsate Blank @ lab Endicott

Recorder: [Signature]

Date: 08/13/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/13/01 Latitude: see log sheet  
 Time Collected: 13:40 Longitude: ↓  
 Station Code: N25 Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: arctic cod (ACD)  
 Period of Deployment: 08/13 42 hr Recorder: FEA  
 Alive when Caught: Y/N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/13/01 Dissector: JG GL  
 Start Time: 19:40 Recorder: FEA  
 Finish Time: 19:47 Specimen Code: ACD  
 Standard Length (mm): 146 Weight (g): 20  
 External Abnormalities/Parasites: NA Comments: —  
 Internal Abnormalities/Parasites: NA Comments: —  
 Sex: (M) F1? Mature: Y/N

**Samples** (Year - Site - Rep.# - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: <u>Y/N</u>	Sample Code: <u>01-N25-126-FAC-T-ACD</u>
Sample for Organics/Trace metals: <u>Y/N</u>	Sample Code: 01- - -PHC - -
Liver sample for P450: <u>Y/N</u>	Sample Code: 01- - -CYP - -
Gill sample for P450: <u>Y/N</u>	Sample Code: 01- - -CYP - -
Spleen sample for P450: <u>Y/N</u>	Sample Code: 01- - -CYP - -
Kidney sample for P450: <u>Y/N</u>	Sample Code: 01- - -CYP - -
Heart sample for P450: <u>Y/N</u>	Sample Code: 01- - -CYP - -
Gonad sample for P450: <u>Y/N</u>	Sample Code: 01- - -CYP - -
Muscle tissue sample for P450: <u>Y/N</u>	Sample Code: 01- ↓ - ↓ -CYP - ↓ - ↓

Comments: got tissue taken for P450

\_\_\_\_\_

\_\_\_\_\_

Recorder: [Signature] Date: 08/13/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/13/01 Latitude: see station log  
 Time Collected: 13:40 Longitude: \_\_\_\_\_  
 Station Code: N25 Depth (m): ↓  
 Method of Take: Fyke net / Trawl / Hook & Line Species: Arctic cowl (AcD)  
 Period of Deployment: 1/2 hr Recorder: Ja  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/13/01 Dissector: JG, GL  
 Start Time: 19:45 Recorder: Ja  
 Finish Time: 19:55 Specimen Code: \_\_\_\_\_  
 Standard Length (mm): 195 Weight (g): 50 AcD  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex:  M  F  I  ? Mature:  Y  N  ?

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC:  Y  N Sample Code: 01-N25-127-FAC-T-AcD  
 Sample for Organics/Trace metals:  Y  N Sample Code: 01- - -PHC - -  
 Liver sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Gill sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Spleen sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Kidney sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Heart sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Gonad sample for P450:  Y  N Sample Code: 01- - -CYP - -  
 Muscle tissue sample for P450:  Y  N Sample Code: 01- - -CYP - -

Comments: gut tissue taken for P450  
Liver is green  
gonad yellow ~~green~~ yellow

Recorder: A. Quigley Date: 08/13/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/13/01 Latitude: See station log  
 Time Collected: 13:40 Longitude: \_\_\_\_\_  
 Station Code: N25 Depth (m): \_\_\_\_\_  
 Method of Take: Fyke net / Trawl / Hook & Line Species: arctic cod (ACD)  
 Period of Deployment: 1/2 hr Recorder: Fur  
 Alive when Caught: (Y) N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/13/01 Dissector: JG GL  
 Start Time: 14:55 Recorder: Fur  
 Finish Time: 20:00 Specimen Code: \_\_\_\_\_ ACD  
 Standard Length (mm): 147 Weight (g): 23  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: (M) (F) (?) Mature: (Y) (N)

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC: (Y) (N)  
 Sample for Organics/Trace metals: (Y) (N)  
 Liver sample for P450: (Y) (N)  
 Gill sample for P450: (Y) (N)  
 Spleen sample for P450: (Y) (N)  
 Kidney sample for P450: (Y) (N)  
 Heart sample for P450: (Y) (N)  
 Gonad sample for P450: (Y) (N)  
 Muscle tissue sample for P450: (Y) (N)

Sample Code: 01-N25-128-FAC-T-ACD  
 Sample Code: 01- | - | - PHC - | -  
 Sample Code: 01- | - | - CYP - | -  
 Sample Code: 01- | - | - CYP - | -  
 Sample Code: 01- | - | - CYP - | -  
 Sample Code: 01- | - | - CYP - | -  
 Sample Code: 01- | - | - CYP - | -  
 Sample Code: 01- | - | - CYP - | -  
 Sample Code: 01- | - | - CYP - | -

Comments: P450 sample taken of gut tissue

Recorder: J. Douglas Date: 08/13/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/13/01  
 Time Collected: 13:40  
 Station Code: N25  
 Method of Take: Fyke net / (Trawl) / Hook & Line  
 Period of Deployment: 1/2 hr  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

Latitude: See station log  
 Longitude: \_\_\_\_\_  
 Depth (m): \_\_\_\_\_  
 Species: Arctic cod (ACD)  
 Recorder: FAR

**Dissection**

Date: 08/13/01  
 Start Time: 20:00  
 Finish Time: 20:07  
 Standard Length (mm): 161

Dissector: JG GL  
 Recorder: FAR  
 Specimen Code: ACD  
 Weight (g): 28

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex:  M  F  ♀

Mature:  Y  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y  N  
 Sample for Organics/Trace metals:  Y  N  
 Liver sample for P450:  Y  N  
 Gill sample for P450:  Y  N  
 Spleen sample for P450:  Y  N  
 Kidney sample for P450:  Y  N  
 Heart sample for P450:  Y  N  
 Gonad sample for P450:  Y  N  
 Muscle tissue sample for P450:  Y  N

Sample Code: 01-N25-129-FAC-T-ACD  

Sample Code:	01-	-	-	PHC	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-
Sample Code:	01-	-	-	CYP	-	-

Comments: gut tissue taken for P450  
gonad " pyloric caeca

Recorder: J. Douglas

Date: 08/13/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/13/01 Latitude: see station log  
 Time Collected: 13:40 Longitude: \_\_\_\_\_  
 Station Code: N25 Depth (m): \_\_\_\_\_  
 Method of Take: Fyke net / Trawl / Hook & Line Species: arctic cod (Aco)  
 Period of Deployment: 08/13 1/2 hr Recorder: Fer  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/13/01 Dissector: JG/BL  
 Start Time: 20:07 Recorder: Fer  
 Finish Time: 20:12 Specimen Code: Aco  
 Standard Length (mm): 135 Weight (g): 20  
 External Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Internal Abnormalities/Parasites: NA Comments: \_\_\_\_\_  
 Sex: M/F Mature:  Y  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y  N Sample Code: 01-N25-130-FAC-T-Aco  
 Sample for Organics/Trace metals:  Y  N Sample Code: 01- - - PHC - -  
 Liver sample for P450:  Y  N Sample Code: 01- - - CYP - -  
 Gill sample for P450:  Y  N Sample Code: 01- - - CYP - -  
 Spleen sample for P450:  Y  N Sample Code: 01- - - CYP - -  
 Kidney sample for P450:  Y  N Sample Code: 01- - - CYP - -  
 Heart sample for P450:  Y  N Sample Code: 01- - - CYP - -  
 Gonad sample for P450:  Y  N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450:  Y  N Sample Code: 01- - - CYP - -

Comments: gut for see taken for P450

Recorder: Kenn Doyle Date: 08/13/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/13/01  
 Time Collected: 13:40  
 Station Code: N25  
 Method of Take: Fyke net / Trawl / Hook & Line  
 Period of Deployment: 1/2 hr  
 Alive when Caught:  Y  N  
 Comments: \_\_\_\_\_

Latitude: See station log  
 Longitude: \_\_\_\_\_  
 Depth (m): \_\_\_\_\_  
 Species: arctic cod - (MCD)  
 Recorder: FW

**Dissection**

Date: 08/13/01  
 Start Time: 20:12  
 Finish Time: 20:20  
 Standard Length (mm): 146

Dissector: JG GL  
 Recorder: FW  
 Specimen Code: \_\_\_\_\_  
 Weight (g): 71 ACD

External Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Internal Abnormalities/Parasites: NA

Comments: \_\_\_\_\_

Sex:  M  F  I  O

Mature:  Y  N

**Samples**

(Year - Site - Rep # - Analysis - Matrix - Sp. Code)

Bile/Gall for FAC:  Y  N  
 Sample for Organics/Trace metals:  Y  N  
 Liver sample for P450:  Y  N  
 Gill sample for P450:  Y  N  
 Spleen sample for P450:  Y  N  
 Kidney sample for P450:  Y  N  
 Heart sample for P450:  Y  N  
 Gonad sample for P450:  Y  N  
 Muscle tissue sample for P450:  Y  N

Sample Code: 01-N25-131-FAC-T-ACD

Sample Code:	01-	-	-	PHC	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-
Sample Code:	01-	-	-	CYP	-	-	-
Sample Code:	01-	↓	-	↓	-	↓	↓

Comments: gut tissue taken for P450

Recorder: [Signature]

Date: 08/13/01

**Fish Collection/Dissection Data Sheet**

**Collection**

Date Collected: 08/13/01 Latitude: See station log  
 Time Collected: 13:40 Longitude: \_\_\_\_\_  
 Station Code: N25 Depth (m): \_\_\_\_\_  
 Method of Take: Fyke net / Trawl / Hook & Line Species: arctic cod (AO)  
 Period of Deployment: \_\_\_\_\_ Recorder: FAC  
 Alive when Caught: Y/N Comments: \_\_\_\_\_  
 Comments: \_\_\_\_\_

**Dissection**

Date: 08/13/01 Dissector: JG  
 Start Time: 20:20 Recorder: FAC  
 Finish Time: 20:31 Specimen Code: AO  
 Standard Length (mm): NA Weight (g): NA  
 External Abnormalities/Parasites: — Comments: —  
 Internal Abnormalities/Parasites: — Comments: —  
 Sex: M/F/? (NA) Mature: Y/N (NA)

**Samples (Year - Site - Rep # - Analysis - Matrix - Sp. Code)**

Bile/Gall for FAC: Y/N Sample Code: 01-N25-132-FAC-T-AO  
 Sample for Organics/Trace metals: Y/N Sample Code: 01- - - PHC - -  
 Liver sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gill sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Spleen sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Kidney sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Heart sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Gonad sample for P450: Y/N Sample Code: 01- - - CYP - -  
 Muscle tissue sample for P450: Y/N Sample Code: 01- - - CYP - -

Comments: \* Composites See attached sheet  
whole fish samples composited

Recorder: [Signature] Date: 08/13/01

FDC1

(whole fish)  
arctic cod

01-N25-132-PHC-T-ACD  
composite  
organics

Fish Tissue Composite Sample Data Sheet

Tissue composite #: 1  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 81 mm  
3.0g

Tissue composite #: 2  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 74 mm  
1.5 g

Tissue composite #: 3  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 80 mm  
2.0 g

Tissue composite #: 4  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: ~~whole~~ whole  
Sample code #'s of fish  
used in this composite: /

Comments: 106 mm  
7.0g

Tissue composite #: 5  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 82 mm  
3.0 g

Tissue composite #: 6  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 80 mm  
3.0 g

FDX 2

(whole fish)  
Arctic cod.

01-N25-132-PHC-T-ACD

Fish Tissue Composite Sample Data Sheet

composite  
organics

Tissue composite #: 7  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 72 mm  
1.5 g

Tissue composite #: 8  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 77 mm  
1.5 g

Tissue composite #: 9  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 86 mm  
30 g

Tissue composite #: 10  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 84 mm  
3.5 g

Tissue composite #: 11  
Date: 08/13/01  
Zone: N25  
Species: ACD  
Tissue: whole  
Sample code #'s of fish  
used in this composite: /

Comments: 80 mm  
3.0 g

~~Tissue composite #: \_\_\_\_\_  
Date: \_\_\_\_\_  
Zone: \_\_\_\_\_  
Species: \_\_\_\_\_  
Tissue: \_\_\_\_\_  
Sample code #'s of fish  
used in this composite: \_\_\_\_\_~~

~~Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_~~

**APPENDIX C: RAW DATA**

(Located on the enclosed CD)

This appendix, located on the enclosed CD, contains all of the raw laboratory analysis data and the fish species, length (SL), weight, and sex. All of the organic data is expressed in wet-weight, and all of the metal data is expressed in dry-weight. All data is expressed as parts per billion ( $\mu\text{g}/\text{kg}$ ).

Fish #	Site Code	SPECIES	SEX	WEIGHT	LENGTH	8 - 2,4'- Dichlorobiphenyl (C12)	18 - 2,2',5'- Trichlorobiphenyl (C13)	28 - 2,4,4'- Trichlorobiphenyl (C13)	44 - 2,2',3,5'- Tetrachlorobiphenyl (C14)	52 - 2,2',5,5'- Tetrachlorobiphenyl (C14)	66 - 2,3',4,4'- Tetrachlorobiphenyl (C14)	101 - 2,2',4,5,5'- Pentachlorobiphenyl (C15)
2	SIS	AC	U	200	285		0.041			0.17		0.27
3	SIS	AC	U	100	270		0.049			0.11		0.18
4	SIS	AC	U	100	280		0.08			0.13		0.29
5	SIS	AC	U	100	280			0.24		0.09		0.19
6	SIS	AC	F	100	280			0.43		0.078		0.17
7	SIS	AC	F	100	290		0.06			0.12		0.25
8	SIS	AC	F	100	290	0.33	0.11			0.14		0.29
9	SIS	AC	F	100	270		0.052			0.13		0.16
10	SIS	AC	F	100	290		0.13			0.1		0.21
12	SIS	HW	M	600	470	0.51			0.8	2.4	0.71	5.5
13	SIS	HW	M	750	465	0.29	0.055		0.21	0.45	0.16	3
14	SIS	HW	M	700	438	0.25			0.085	0.086	0.064	0.99
15	SIS	HW	F	600	415	0.39		0.5		1	0.26	2.7
16	SIS	HW	M	500	411	0.77			0.18	0.71	0.29	3.3
17	SIS	HW	M	600	418	0.19	0.2	0.48		3.2	8.4	9.6
18	SIS	HW	F	600	440	0.57		0.086			0.066	1.3
19	SIS	HW	F	500	402	0.99	0.66			0.25		0.79
20	SIS	HW	M	600	429	0.8	0.46		0.94	2.8	0.68	9.5
21	SIS	HW	M	500	395	0.4			0.19	0.41	0.098	1.2
22	SIS	HW	M	600	423	0.36	0.05		0.14	0.26	0.11	1.5
23	SIS	HW	M	800	428	0.97	0.79			0.23		1.4
24	SIS	HW	F	500	419	0.46	0.26		0.37	0.64	0.21	2.4
26	SIS	FHS	F	150	205	0.44						
27	SIS	FHS	M	100	208	0.6	0.31					0.93
28	SIS	FHS	F	100	208	0.54	0.17					
31	SIS	FHS	F	87	200	0.5	0.93	0.52	0.46	0.84	0.44	0.62
32	SIS	FHS	F	51	184	0.59	0.91	0.51	0.69	1.2	0.63	0.77
33	SIS	FHS	M	25	141	0.43	1.3	0.81	1	1.3	0.76	0.93
36	SIS	AC	M	450	398							1.1
37	SIS	AC	F	300	416					2.6	0.66	0.77
45	SIS	FHS	F	400	299	0.86	0.58	0.44		0.37	0.66	
46	SIS	FHS	F	175	250	0.69	1.1	0.76	0.78	1.4	0.82	0.78
47	SIS	FHS	F	125	215	0.94	1.2	0.61	0.73	1.1	0.62	0.87
48	SIS	FHS	F	125	218	0.75	0.9	0.44	0.44	0.78	0.42	0.45
49	SIS	FHS	F	82	218	0.67	0.76		0.76	0.97	0.56	1
50	SIS	FHS	F	97	119	0.48	1.2	0.75	0.98	1.4	1	0.8
52	PBS	BW	M	150	260	0.18	0.59	0.63	0.87	1.1	0.85	0.51
53	PBS	AC	M	600	406		0.17			0.15		0.36
54	PBS	AC	F	74	224					0.09		0.19
55	PBS	BW	F	79	212	0.69	0.1					0.25
56	PBS	BW	M	600	406	0.26	0.39		0.21	0.4	0.64	0.42
61	PBS	FHS	F	25	135	0.36	0.32		0.33	0.61	0.42	0.7
64	PBS	HW	F	450	388	0.66	0.39		0.24	0.34	0.73	0.75
65	PBS	HW	F	550	395	0.56	0.48		0.71	1.2	0.63	2.2
66	PBS	HW	F	210	350	1.3	0.47	0.37	0.17	0.31	0.24	0.58
67	PBS	AC	F	65	205							
68	PBS	AC	U	32	161					0.079		0.12
69	PBS	AC	U	19	140					0.15		0.2
70	PBS	FHS	F	150	245	0.37	0.12				0.12	0.45
71	PBS	FHS	M	30	150	0.47	0.96		0.12	0.65	0.29	0.85
75	PBS	BW	M	400	430							0.23
76	PBS	BW	U	41	175							0.12
77	PBS	BW	F	300	215							0.27
79	PBS	FHS	F	32	140	0.2	0.27				0.19	0.8
80	PBS	FHS	F	35	142	0.26						
81	L	AC	M	200	280		0.12			0.099		0.14
82	L	AC	M	225	300		0.2			0.1		0.14
83	L	AC	F	200	275		0.097			0.11	0.14	0.18
84	L	AC	M	200	287		0.11			0.12	0.21	0.16
85	L	AC	M	175	245	1.4	0.74			0.13		0.17
86	L	AC	M	175	257	0.9	0.44			0.14	0.29	0.18
87	L	AC	M	175	288	0.69	0.37			0.12		0.12
88	L	AC	F	200	303	0.69	0.14			0.12		0.2
89	L	ACD	F	22	144	2.3						
90	L	ACD	F	21	135	0.81				0.33		
91	L	ACD	F	22	143	1.9						
92	L	ACD	F	25	146	1.4	0.32			0.26		
95	L	FHS	F	33	150	0.36						
96	L	FHS	F	50	180	0.29						
97	BPS	AC	M	200	165	0.59	0.44			0.11	0.21	0.18
98	BPS	AC	F	225	306	0.71	0.28			0.2	0.028	0.2
99	BPS	AC	M	175	267	0.28	0.13			0.17	0.25	0.3
100	BPS	AC	M	200	318	0.39	0.13			0.18		0.23
101	BPS	AC	M	200	315	0.61	0.29			0.25		0.21
102	BPS	AC	M	200	314	0.29	0.12			0.16	0.36	0.19
103	BPS	AC	M	175	273	1.2	0.25			0.21		0.22
104	BPS	AC	M	200	297	0.69	0.28			0.23	0.54	0.24
105	BPS	AC	F	200	304	0.99	0.3				0.37	0.2
108	BPS	FHS	F	66	184	0.26	0.29	1.2		0.8	1.2	
109	BPS	FHS	F	53	172	0.3				0.22	0.17	0.83
110	BPS	FHS	F	125	210	0.24						
111	BPS	FHS	F	65	182	0.67	1.9	1.8	12	54	55	71
112	BPS	FHS	F	165	175	0.18				0.72	0.16	1.7
113	BPS	FHS	F	59	182	0.21	0.18	0.11		0.32	0.18	1
114	BPS	FHS	F	60	164	0.4				0.2	0.14	1
115	L	ACD	M	28	164	1.1	0.54			0.3	0.41	2.1
116	L	ACD	F	18	130	1.1	0.64			0.35		0.76
117	L	ACD	M	19	139	0.48			0.9	1.6		4
118	L	ACD	F	19	136	1.4						0.48
121	BPS	FHS	M	25	145	0.99					0.17	1.4
122	BPS	FHS	M	65	185	0.15					0.26	1.2
123	BPS	FHS	M	55	171	0.36	5	3.4	1.1	2.9	2.4	1.2
126	N	ACD	F	20	146	1.7		0.22		0.61	0.57	1.6
127	N	ACD	M	50	195	1.2				0.4	0.21	1.4
128	N	ACD	F	23	147	0.61				1.4	0.68	5
129	N	ACD	M	28	161	3.7				0.34	0.74	0.66
130	N	ACD	M	20	135	0.86				0.59	0.37	1.2
131	N	ACD	F	21	146	2.1		0.51		0.38	0.95	0.82
132	N	ACD	NA	NA	NA	0.2				0.54	0.43	1.7

Fish #	Site Code	SPECIES	105 - 2,3,3',4,4'-	118 - 2,3',4,4',5'-	128 - 2,2',3,3',4,4'-	138 - 2,2',3,4,4',5'-	153 - 2,2',4,4',5,5'-	170 - 2,2',3,3',4,4',5'-	180 - 2,2',3,4,4',5,5'-
			Pentachlorobiphenyl (C15)	Pentachlorobiphenyl (C15)	Hexachlorobiphenyl (C16)	Hexachlorobiphenyl (C16)	Hexachlorobiphenyl (C16)	Heptachlorobiphenyl (C17)	Heptachlorobiphenyl (C17)
2	SIS	AC	0.051	0.16	0.04	0.24	0.44		0.12
3	SIS	AC	0.04	0.087	0.047	0.17	0.39		0.1
4	SIS	AC	0.042	0.12		0.27	0.4		0.15
5	SIS	AC	0.25	0.086	0.039	0.14	0.286	0.014	0.11
6	SIS	AC		0.06	0.033	0.16	0.28		0.079
7	SIS	AC	0.03	0.11	0.034	0.21	0.34		0.13
8	SIS	AC	0.045	0.081	0.038	0.24	0.48	0.28	0.17
9	SIS	AC	0.035	0.084	0.025	0.19	0.31	0.016	0.14
10	SIS	AC		0.052		0.15	0.35		0.14
12	SIS	HW	2.4	5.1	1.1	5.2	5.2	0.64	0.74
13	SIS	HW	0.84	2.3	0.56	2.7	2.5	0.39	0.52
14	SIS	HW	0.21	0.79	0.16	1.1	1.3	0.2	0.27
15	SIS	HW	1.1	2.4	0.48	2.5	2.3	0.36	0.37
16	SIS	HW	1.1	2.8	0.7	3.1	3.1	0.5	0.5
17	SIS	HW	8.5	17	4.5	17	14	2.3	2.9
18	SIS	HW	0.44	1.2	0.26	1.4	1.6	0.32	0.32
19	SIS	HW	0.27	0.54	0.12	0.56	0.73	0.14	0.1
20	SIS	HW	3.5	8.1	2.4	8.4	7.5	1.1	1.4
21	SIS	HW	0.4	1.2	0.19	1.3	1.2	0.14	0.17
22	SIS	HW	0.44	1.4	0.34	1.6	1.6	0.22	0.29
23	SIS	HW	0.42	1.3	0.34	1.6	1.5	0.28	0.26
24	SIS	HW	0.75	2.1	0.47	2.3	2.2	0.31	0.43
26	SIS	FHS	0.25	0.51		0.78	0.88	0.11	0.11
27	SIS	FHS		0.35		0.79	0.85	0.1	0.078
28	SIS	FHS		1.1	0.35	1.4	1.5	0.18	0.26
31	SIS	FHS	0.23	0.54		0.75	0.64	0.12	0.11
32	SIS	FHS	0.28	0.64	0.08	0.85	0.76	0.11	0.14
33	SIS	FHS	0.37	0.89	0.12	1.5	0.98	0.15	0.19
36	SIS	AC		0.64	0.076	0.55	0.96		0.31
37	SIS	AC	0.032	0.33	0.048	0.45	0.66		0.33
45	SIS	FHS	0.22	0.74	0.12	0.88	0.91	0.16	0.19
46	SIS	FHS	0.31	0.94	0.069	0.66	0.63	0.12	0.17
47	SIS	FHS	0.26	0.53	0.28	0.92	0.77	0.085	0.17
48	SIS	FHS		0.34	0.084	0.69	0.47	0.09	0.17
49	SIS	FHS	0.41	1.1	0.33	1.4	1.3	0.14	0.22
50	SIS	FHS	0.64	1.5	0.43	1.5	1.4	0.23	0.36
52	PBS	BW	0.27	0.32	0.04	0.35	0.29	0.058	0.057
53	PBS	AC	0.084	0.054		0.3	0.6	0.013	0.25
54	PBS	AC		0.12	0.035	0.17	0.32		0.091
55	PBS	BW		0.048		0.56	0.21		0.027
56	PBS	BW		0.13		0.5	0.3		0.038
61	PBS	FHS		0.37		1.2	0.86	0.18	0.12
64	PBS	HW		0.63		0.71	0.5	0.13	0.084
65	PBS	HW	0.82	2	0.32	2.8	1.9	0.44	0.55
66	PBS	HW	0.16	0.33		0.54	0.39	0.16	0.085
67	PBS	AC		0.066		0.19	0.19		
68	PBS	AC		0.034		0.12	0.21		0.073
69	PBS	AC		0.12		0.11	0.26		
70	PBS	FHS		0.18	0.1	0.84	0.75	0.12	0.22
71	PBS	FHS	0.14	0.42	0.11	1.5	1.1	0.19	0.42
75	PBS	BW	0.066	0.05		0.1	0.16		0.016
76	PBS	BW	0.028	0.07		0.053	0.062		
77	PBS	BW	0.029			0.061	0.031		
79	PBS	FHS	0.28	0.6		0.4	1.2	0.18	0.094
80	PBS	FHS		0.12		0.21	0.31	0.045	0.042
81	L	AC		0.051		0.13	0.3		
82	L	AC				0.08	0.26		
83	L	AC		0.068		0.14	0.33		0.084
84	L	AC		0.039		0.13	0.36		0.091
85	L	AC				0.15	0.36		
86	L	AC				0.12	0.31		
87	L	AC				0.14	0.3		0.11
88	L	AC				0.14	0.32		
89	L	ACD				0.32		0.073	0.07
90	L	ACD		0.11					0.055
91	L	ACD		0.3		0.19			
92	L	ACD							
95	L	FHS		0.32		0.34	1.6	0.067	0.1
96	L	FHS	0.999	0.12		0.06	0.5	0.058	0.042
97	BPS	AC				0.16	0.42		
98	BPS	AC				0.13	0.52		
99	BPS	AC	0.05	0.11	0.04	0.3	0.38		0.13
100	BPS	AC	0.058	0.098	0.046	0.24	0.48		0.18
101	BPS	AC	0.073	0.077	0.027	0.22	0.44		
102	BPS	AC				0.13	0.31		
103	BPS	AC			0.023	0.26	0.5		0.19
104	BPS	AC				0.1	0.38		
105	BPS	AC	0.045			0.13	0.39		
108	BPS	FHS	0.99	1.7	0.34	1.7	2.4	0.25	0.36
109	BPS	FHS	0.34	0.71		0.91	1.3	0.1	0.17
110	BPS	FHS	0.077	0.18		0.21	0.49	0.042	0.044
111	BPS	FHS	23	59	14	89	62	6.9	8.8
112	BPS	FHS	0.5	1.1	0.17	1	1.4	0.22	0.17
113	BPS	FHS	0.42	0.98	0.59	1.5	1.3	0.25	1.4
114	BPS	FHS	0.53	1.1	0.28	1.4	1.2	0.17	0.27
115	L	ACD	1.3	2.7	0.7	4.2	3.8	0.53	1
116	L	ACD	0.23	0.32		1.6	0.92		0.12
117	L	ACD	1.6	3.4	1	4.4	2.9	0.49	0.55
118	L	ACD	0.22	0.55	0.12	1.8	0.66		0.29
121	BPS	FHS	0.8	0.73		1.1	2.2	0.097	0.16
122	BPS	FHS	0.75	1.5	0.58	2.3	2.7	0.34	0.56
123	BPS	FHS	0.87	1.2		1.7	1.7	0.27	0.39
126	N	ACD		0.3			1.8	0.25	0.12
127	N	ACD	1	1.3	0.59	3.1	2	0.77	0.97
128	N	ACD	4.1	7.7	2.6	10	7.6	1.3	2.2
129	N	ACD	0.14	0.23	0.14	0.9	0.55		0.096
130	N	ACD	1	1.7		2.9	2.2	0.81	1.1
131	N	ACD	0.12	0.27	0.086	1	0.54		0.1
132	N	ACD	0.98	2.3	0.64	2.9	2.1	0.42	0.46

Fish #	Site Code	SPECIES	187 - 2,2',3,4',5,5',6- Heptachlorobiphenyl (C17)	195 - 2,2',3,3',4,4',5,6- Octachlorobiphenyl (C18)	206 - 2,2',3,3',4,4',5,5',6- Nonachlorobiphenyl (C19)	209 - 2,2',3,3',4,4',5,5',6,6'- Decachlorobiphenyl (C110)	2,4-DDD	2,4-DDE	2,4-DDT	4,4-DDD	4,4-DDE	4,4-DDT	Aldrin	alpha-Chlordane	cis-Nonachlor
2	SIS	AC	0.046		0.04	0.019				0.059	0.12	0.19	0.068	0.29	0.2
3	SIS	AC	0.04							0.069	0.12	0.15	0.057	0.32	0.19
4	SIS	AC	0.047							0.096	0.15	0.22	0.1	0.41	0.25
5	SIS	AC	0.057		0.31	0.098				0.056	0.99	0.15	0.092	0.27	0.17
6	SIS	AC	0.036				0.096			0.063	0.13	0.17	0.083	0.33	0.17
7	SIS	AC	0.047				0.1			0.076	0.16	0.19	0.077	0.37	0.19
8	SIS	AC	0.061	0.022	0.051		0.19			0.074	0.13	0.21	0.067	0.36	0.23
9	SIS	AC		0.016	0.038					0.065		0.16	0.086	0.032	0.18
10	SIS	AC	0.087		0.22	0.05	0.074			0.14	0.15	0.063		0.037	0.21
12	SIS	HW	0.5	0.021	0.017					1		0.25		0.49	0.57
13	SIS	HW	0.37	0.034	0.016					0.34	0.84	0.3		0.16	0.54
14	SIS	HW	0.19	0.0082	0.0089	0.11				0.17	0.71	0.12		0.037	0.23
15	SIS	HW	0.23	0.017	0.012					0.41				0.24	0.54
16	SIS	HW	0.37	0.0086	0.012					0.46	0.78	0.21		0.22	0.68
17	SIS	HW	1.4	0.15	0.068	0.012				1				0.53	0.97
18	SIS	HW	0.18		0.01					0.19	0.33			0.16	0.4
19	SIS	HW	0.088	0.0094	0.016			0.03		0.38	0.22			0.12	0.39
20	SIS	HW	0.91	0.046	0.031					0.72	2.3	0.18		0.42	0.93
21	SIS	HW	0.11		0.0058					0.12	0.4			0.1	0.24
22	SIS	HW	0.19	0.014	0.013					0.17	0.46			0.13	0.28
23	SIS	HW	0.21		0.01					0.26	0.44			0.11	0.39
24	SIS	HW	0.23	0.014	0.012					0.23	0.8	0.065		0.22	0.37
26	SIS	FHS		0.0043	0.0072			0.18		0.28	0.68			0.38	0.39
27	SIS	FHS	0.17							0.21	1.2			0.3	0.43
28	SIS	FHS		0.012						0.13	0.55	0.034		0.47	0.41
31	SIS	FHS	0.048							0.17	0.4	0.092		0.23	0.3
32	SIS	FHS	0.042		0.023	0.0088				0.18	0.54	0.17		0.26	0.3
33	SIS	FHS	0.029		0.031	0.01				0.23	0.76	0.12		0.48	0.28
36	SIS	AC	0.29				0.51			0.19				0.36	0.4
37	SIS	AC	0.16			0.2				0.45	0.73			1.5	0.69
45	SIS	FHS	0.041							0.23	0.45			0.14	0.45
46	SIS	FHS	0.038		0.027					0.12	0.5	0.036		0.096	0.29
47	SIS	FHS	0.044							0.11	0.96			0.31	0.28
48	SIS	FHS	0.098		0.021					0.51	0.042			0.19	0.19
49	SIS	FHS		0.017	0.022					0.18	1.1	0.13		0.54	0.43
50	SIS	FHS	0.029		0.029					0.18	0.39	0.059		0.27	0.28
52	PBS	BW	0.043		0.01					0.16	0.2	0.045		0.091	0.11
53	PBS	AC	0.064	0.039	0.037	0.02	0.19		0.13	0.21	0.35	0.11		0.32	0.31
54	PBS	AC	0.036				0.19			0.1	0.14	0.032		0.15	0.17
55	PBS	BW			0.014					0.25	0.021	0.032		0.068	0.045
56	PBS	BW	0.076		0.017					0.33	0.25	0.086		0.24	0.19
61	PBS	FHS	0.049		0.036					0.51	0.56	0.1		0.13	0.44
64	PBS	HW	0.078		0.013					0.59	0.24	0.073		0.39	0.25
65	PBS	HW	0.22		0.024					0.63	0.37	0.23		0.36	0.44
66	PBS	HW	0.034		0.01					0.28	0.24			0.15	0.21
67	PBS	AC	0.17								0.1			0.22	
68	PBS	AC					0.19				0.085			0.13	0.17
69	PBS	AC					0.26				0.11			0.13	0.15
70	PBS	FHS	0.19	0.05	0.017					0.24	0.16	0.055		0.14	0.33
71	PBS	FHS	0.29	0.016	0.029					0.072	0.55	0.091		0.35	0.19
75	PBS	BW								0.091	0.13			0.14	0.12
76	PBS	BW			0.013					0.02				0.029	0.053
77	PBS	BW			0.008									0.064	0.043
79	PBS	FHS	0.13		0.027	0.0064					0.29	0.17		0.076	0.17
80	PBS	FHS									0.16	0.034		0.082	0.1
81	L	AC	0.036		0.032		0.2			0.14	0.14	0.049		0.2	0.13
82	L	AC			0.018						0.16	0.05		0.2	0.15
83	L	AC	0.044		0.026		0.17			0.11	0.15	0.052		0.15	0.16
84	L	AC					0.24		0.1		0.16	0.06		0.27	0.17
85	L	AC	0.077				0.48		0.067	0.14		0.04		0.24	0.18
86	L	AC					0.33	0.13	0.07		0.14	0.055		0.16	0.14
87	L	AC	0.062				0.34		0.058	0.13	0.14	0.044	0.033	0.21	0.16
88	L	AC										0.059		0.15	
89	L	ACD	0.16		0.016						0.42	0.26		0.25	
90	L	ACD	0.087		0.012						0.3	0.08		0.39	0.2
91	L	ACD	0.05									0.2		0.75	
92	L	ACD			0.026						0.15			0.15	0.17
95	L	FHS	0.072								1.7	0.21		0.35	
96	L	FHS			0.0087						0.29	0.03		0.066	0.2
97	BPS	AC			0.04		0.29	0.16		0.13				0.16	0.16
98	BPS	AC			0.026		0.12							0.33	0.21
99	BPS	AC	0.04		0.035		0.24	0.19	0.047	0.13	0.14			0.15	0.18
100	BPS	AC	0.072		0.16	0.072	0.42		0.05	0.16	0.16	0.026		0.33	0.22
101	BPS	AC	0.053				0.59			0.12	0.16	0.049		0.32	0.26
102	BPS	AC		0.05	0.027		0.24	0.13	0.065	0.12	0.16			0.26	0.18
103	BPS	AC	0.083	0.066			0.5		0.094	0.16	0.37	0.063		0.4	0.21
104	BPS	AC		0.07	0.04				0.21	0.13				0.39	0.19
105	BPS	AC	0.083		0.048				0.15	0.094	0.16			0.46	0.22
108	BPS	FHS	0.069		0.015									0.5	
109	BPS	FHS	0.048	0.0033	0.012							0.57	0.042	0.06	0.46
110	BPS	FHS	0.019											0.14	0.25
111	BPS	FHS	3.5	0.26	0.12	0.018	0.22								
112	BPS	FHS	0.19	0.0077	0.0094					0.18				0.34	0.36
113	BPS	FHS	1.9		14	4.7				0.26	0.49	0.087		0.18	0.3
114	BPS	FHS	0.16	0.013	0.06	0.018				0.2	0.45	0.062		0.24	0.34
115	L	ACD	1.2		4	1				0.74	0.63	0.17		0.57	0.69
116	L	ACD			0.034				0.74	0.46	0.61	0.34		0.74	0.39
117	L	ACD	0.34		0.27	0.051				0.51	0.98	0.24		0.5	0.37
118	L	ACD	0.25		0.075	0.023				0.41		0.073		0.26	0.22
121	BPS	FHS	0.069	0.01	0.021					1.4	0.42			0.08	0.33
122	BPS	FHS	0.15	0.017	0.074	0.017				0.92	1	0.13		0.16	0.43
123	BPS	FHS	0.22		0.13	0.038								0.08	0.33
126	N	ACD	0.16		0.023					0.98	0.59	0.18		0.24	0.43
127	N	ACD	0.57	0.088	0.14	0.034				0.44	0.72	0.23		1.1	0.58
128	N	ACD	1.3		1.1	0.48				0.9	0.33			0.9	0.84
129	N	ACD	0.15		0.095	0.028				0.35	0.3	0.11		0.57	0.27
130	N	ACD	0.72	0.086	0.29	0.091				0.56	0.59	0.21		0.22	0.29
131	N	ACD			0.12	0.047				0.36	0.32	0.15		0.63	0.24
132	N	ACD	0.38	0.02	0.14	0.032				0.37	0.32	0.1		0.48	0.4

Fish #	Site Code	SPECIES	gamma-Chlordane	Heptachlor	Heptachlor Epoxide	Oxychlorane	Methoxychlor	trans-Nonachlor	alpha-hexachlorocyclohexane	beta-hexachlorocyclohexane	delta-hexachlorocyclohexane	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Dieldrin
2	SIS	AC	0.12		0.15	0.27		0.41	0.29						0.29
3	SIS	AC	0.11		0.12	0.27	0.34	0.41	0.22			0.028	0.16		0.24
4	SIS	AC	0.1			0.34	0.31	0.52	0.2			0.039	0.059		0.22
5	SIS	AC	0.068	0.024		0.14	0.95	0.34	0.16				0.06		0.099
6	SIS	AC	0.087	0.045	0.092	0.19	0.12	0.4	0.18			0.022	0.051		0.15
7	SIS	AC	0.095		0.12	0.24	0.36	0.4	0.24			0.042	0.054		0.23
8	SIS	AC	0.098			0.3	0.28	0.44	0.41			0.071	0.048		0.33
9	SIS	AC	0.11		0.096	0.32	0.57	0.39	0.3			0.041	0.059		0.25
10	SIS	AC	0.23		0.17	0.33		0.38	0.31				0.042		0.36
12	SIS	HW	0.52	0.22		0.7		0.89	0.66	0.13					0.38
13	SIS	HW	0.076	0.02		0.38		1.4	0.095	0.068					
14	SIS	HW	0.082	0.015	0.22	0.23		0.62	0.17	0.085					0.13
15	SIS	HW	0.26			0.61		0.66	0.49					0.16	0.44
16	SIS	HW	0.21			0.72		1.2	0.48	0.068					0.32
17	SIS	HW	0.18	0.035	0.32	0.38		0.68	0.35	0.043					
18	SIS	HW	0.068		0.34	0.41	0.092	0.73	0.29	0.037		0.031			0.34
19	SIS	HW			0.73	0.84	0.55	0.66	0.44					0.18	0.29
20	SIS	HW	0.36			0.88		1.5	0.5						0.59
21	SIS	HW				0.4		0.56	0.28						0.2
22	SIS	HW	0.085			0.23	0.067	0.62	0.16	0.034					0.16
23	SIS	HW			0.53	0.65	0.44	0.83	0.86						0.35
24	SIS	HW	0.1	0.042		0.3	0.078	0.71	0.2	0.1					0.26
26	SIS	FHS	0.24	0.051		0.61		0.83	0.41	0.096					0.48
27	SIS	FHS	0.18		0.37	1.2	0.29	1.2	2.3	0.38					0.76
28	SIS	FHS	0.17	0.065	0.14	0.59	0.032	0.88	0.58				0.19	0.19	0.39
31	SIS	FHS	0.06	0.072		0.38	0.09	0.57	0.37						0.21
32	SIS	FHS	0.046	0.063	0.24	0.58	0.073	0.72	1.3	0.2					0.54
33	SIS	FHS	0.086	0.19	0.27	0.63	0.38	0.88	0.67				0.31	0.26	0.59
36	SIS	AC	0.21		0.5	0.54		1	1.4	0.3		0.033	0.12		0.55
37	SIS	AC	0.22			0.74		1.3	0.8				0.38		0.58
45	SIS	FHS	0.025	0.11	0.24	0.66		0.91	0.67						0.39
46	SIS	FHS	0.055	0.21	0.24	0.67	0.22	0.78	0.88	0.18				0.21	0.34
47	SIS	FHS	0.062	0.15	0.53	0.69	0.1	0.77	0.73	0.087					0.38
48	SIS	FHS	0.048			0.29		0.53	0.34						0.17
49	SIS	FHS	0.078	0.14	0.25	1	0.071	1.3	0.55					0.22	0.65
50	SIS	FHS	0.05	0.056	0.24	0.55	0.13	0.73	0.65						0.34
52	PBS	BW				0.2		0.17					0.053		0.1
53	PBS	AC	0.21			0.4		0.64	0.83	0.19			0.094		0.33
54	PBS	AC	0.13			0.23	0.38	0.33	0.26		0.026		0.038		0.18
55	PBS	BW		0.21		0.22	0.078		0.25				0.046		0.063
56	PBS	BW	0.092	0.042	0.54	0.4		0.49	0.9					0.15	0.39
61	PBS	FHS	0.043	0.083		0.7	0.55	0.58	0.31				0.061		0.41
64	PBS	HW	0.26	0.5	0.47	0.51		0.56	0.82						0.56
65	PBS	HW	0.13	0.16		0.7	0.22	0.73	1.1						0.67
66	PBS	HW		0.05		0.4		0.55	0.99						0.37
67	PBS	AC				0.32		0.56							0.17
68	PBS	AC	0.15			0.13	0.86	0.22	0.39			0.042	0.059		0.14
69	PBS	AC	0.19			0.24	1.2	0.28	0.6						0.23
70	PBS	FHS	0.065	0.059	0.12	0.32	0.091	0.65	1.1				0.11		0.26
71	PBS	FHS	0.073	0.23	0.092	0.38	0.37	0.48	0.41						0.31
75	PBS	BW	0.17			0.22		0.3	0.79				0.15		0.23
76	PBS	BW				0.22	0.23	0.23	0.5						0.13
77	PBS	BW				0.35	0.35		0.48						0.15
79	PBS	FHS		0.13		0.36	0.34	0.28	0.44				0.15		0.26
80	PBS	FHS	0.03	0.035	0.084	0.23	0.56	0.21	0.2				0.046	0.12	0.23
81	L	AC	0.14			0.18		0.34	0.62						0.27
82	L	AC	0.11			0.11		0.34	0.9	0.37		0.053			0.29
83	L	AC	0.17			0.17		0.34	0.66	0.28					0.17
84	L	AC	0.12			0.2		0.37	0.72	0.23		0.053			0.22
85	L	AC	0.11			0.35	0.27	0.39	0.92						0.32
86	L	AC	0.12			0.34		0.35	0.95	0.54					0.2
87	L	AC	0.13			0.28	0.26	0.37	0.74			0.042			0.28
88	L	AC	0.053			0.29		0.35	0.93	0.35		0.093	0.28		0.37
89	L	ACD				0.47	0.14	1.2	1.2	0.3					1.3
90	L	ACD				0.2	0.41	0.6	1.1						0.55
91	L	ACD				0.32	0.69	0.97	0.68	0.18			0.48		0.78
92	L	ACD	0.077			0.12	0.78	0.45	0.56				0.24		0.47
95	L	FHS				0.76	0.31	1.1	0.48	0.086					0.45
96	L	FHS			0.062	0.24	0.2	0.49	0.58	0.071					0.32
97	BPS	AC	0.098			0.21		0.3	0.9			0.53			0.25
98	BPS	AC	0.25			0.36		0.41	1.4	0.54					0.43
99	BPS	AC	0.1			0.18		0.33	0.7	0.17					0.19
100	BPS	AC	0.17		0.13	0.31	0.28	0.41	0.92	0.37		0.32	0.09	0.042	0.42
101	BPS	AC	0.16			0.36	0.31	0.37	1.1	0.58					0.43
102	BPS	AC	0.16			0.22		0.34	0.8	0.19					0.21
103	BPS	AC	0.13			0.42	0.23	0.49	1	0.74		0.68			0.47
104	BPS	AC	0.22			0.34		0.47	1.1	0.43		0.094			0.4
105	BPS	AC	0.22			0.3		0.43	1	0.48					0.27
108	BPS	FHS			0.16	0.22	0.12	0.94	0.34	0.063					0.51
109	BPS	FHS	0.038	0.056		0.57	0.17	0.82	0.29					0.12	0.4
110	BPS	FHS	0.025			0.3	0.057	0.53	0.28	0.022					0.3
111	BPS	FHS	0.05			0.42	0.055	0.38	0.43	0.038					
112	BPS	FHS			0.25	0.55	0.14	0.79	1.5	0.27				0.19	0.86
113	BPS	FHS	0.11			0.42		0.73	0.3						0.32
114	BPS	FHS	0.14			0.47	0.41	0.73	0.67						0.45
115	L	ACD	0.6	0.13		0.43		1	0.58						0.68
116	L	ACD	0.8			0.48	0.63	1.1	0.98			0.14			0.96
117	L	ACD	0.38	0.095		0.27	0.5	0.51	0.83						0.64
118	L	ACD	0.22	0.13		0.16	0.78		0.89						0.49
121	BPS	FHS	0.81	0.1		0.41	0.3		0.16						0.45
122	BPS	FHS	0.31			0.54	0.63	0.82	0.25						0.28
123	BPS	FHS		0.082		0.5	0.4	0.43	0.45						0.42
126	N	ACD	0.7	0.32		0.51	0.44	1.1	1.6						0.97
127	N	ACD	0.52			0.49		1.4	0.73	0.22					0.96
128	N	ACD	0.59			0.41	0.32	1	1.2						1.2
129	N	ACD	0.39			0.68	0.27	0.71	1.7	0.58					0.77
130	N	ACD	0.47	0.15		0.35	0.9	0.47	1.1						0.65
131	N	ACD	0.44	0.11		0.49	0.44	0.73	1.9	0.7		0.33			0.86
132	N	ACD	0.48			0.36		0.68	1.5	0.47		0.09			0.9

Fish #	Site Code	SPECIES	Endrin		Endrin Ketone	hexachlorobenzene	lindane	Mirex	Toxaphene	Naphthalene	Benzo[g,h,i] perylene		C1-Naphthalenes	C2-Naphthalenes	C3-Naphthalenes	C4-Naphthalenes	Acenaphthylene
			Endrin	Aldehyde							Biphenyl	Benzo[g,h,i] perylene					
2	SIS	AC				1.7	0.07			0.93	0.33	0.15	0.4	0.8	0.53		
3	SIS	AC				1.4	0.071			1.2	0.27	0.19	0.72	1			0.053
4	SIS	AC		0.07		0.97	0.089			0.87	0.98	0.18	0.75	1.1			
5	SIS	AC				0.57				0.86	0.33	0.13	0.51				
6	SIS	AC				0.73				1	0.21	0.13	0.59	0.76			
7	SIS	AC		0.061		1.1	0.054			0.98	0.44	0.22	0.67	1.2			
8	SIS	AC		0.082		1.2	0.11			0.94	0.29	0.21	0.74	1.2			
9	SIS	AC		0.058		1.2	0.1			0.88	0.19	0.2	0.57	1.2			
10	SIS	AC		0.11		1.4	0.092			1.1	0.17	0.32	0.82	1			
12	SIS	HW		1.2		2.2	0.36	0.26		1.7	0.15	0.28	0.72	1.1	1.1		0.43
13	SIS	HW		0.058		1.1	0.022	0.17		0.78		0.19	0.37	0.56			0.21
14	SIS	HW		0.18		1.2		0.12		1.3	0.063	0.27	0.52	0.74			0.32
15	SIS	HW		0.88		2.7		0.2		1.9	0.08	0.4	0.89	2.3	2.2		0.3
16	SIS	HW		1.7		2.5	0.19	0.17		1.8	0.11	0.46	0.86	1	1.2		
17	SIS	HW		1.6		1.2	0.033	0.13		2.9	1.3	0.36	0.92	1.5			0.31
18	SIS	HW		0.63		1.5	0.035	0.2		0.95	1.3	0.21	0.55	0.83			0.096
19	SIS	HW				1.9		0.13		2	0.71	0.34	0.74	1.5	1.6		0.054
20	SIS	HW		1.3		2.2		0.25		1.7	0.42	0.31	0.72	1.4	1.4		0.079
21	SIS	HW		0.35		0.93		0.067		0.89	0.23	0.2	0.44	0.72			0.33
22	SIS	HW		0.32		1	0.026	0.14		1.3	0.15	0.27	0.45	0.62	0.56		0.049
23	SIS	HW				1.8		0.19		1.7	0.1	0.3	0.7	1.2	1.3		0.065
24	SIS	HW		0.6		1.2		0.14		1.9	0.1	0.31	0.61	0.77	0.68		0.089
26	SIS	FHS				1.4		0.14		1.6	0.22	0.26	0.66	1	0.71		0.036
27	SIS	FHS	0.1			1.7	0.7	0.19		5.5	0.49	0.36	0.52	1.5			0.05
28	SIS	FHS		0.39		0.92	0.28	0.087		0.97	0.2	0.23	0.52	0.76			0.029
31	SIS	FHS		0.057		0.69	0.089	0.12		2.7	0.21	2.9	0.93	1.2			0.084
32	SIS	FHS		0.15		0.99	0.21	0.062		2.5	0.66	3.7	1	1.3	0.9		0.25
33	SIS	FHS		0.26		1.4	0.12	0.09		3.4	0.22	4.1	1.6	1.9	1.3		0.092
36	SIS	AC	0.11			2		0.084		3.1	0.58	0.39	1.7	3.9	6.5		2.5
37	SIS	AC	0.99			1.7	0.6			2.4	0.4	0.33	1.1	2.6	3.8		2
45	SIS	FHS				1.3	0.19	0.36		2	0.1	1.3	0.72	1.1			0.074
46	SIS	FHS				1.3	0.087	0.23		2.8	0.35	4.2	0.89	1.3			0.14
47	SIS	FHS		0.28		0.97	0.16	0.17		2.6	0.064	3.6	1.7	4.5	4.3	2.6	
48	SIS	FHS		0.26		0.69	0.081			4.4	1.6	2.9	1.6	1.9	1.3		0.64
49	SIS	FHS		0.18		1.6		0.088		1.6		3.4	0.53	0.75			
50	SIS	FHS				0.94	0.19	0.12		1.8	0.3	4.7	0.78	0.99			
52	PBS	BW				0.42	0.032	0.051		2.2	0.25	4.4	0.68	0.91			0.12
53	PBS	AC				1.2	0.14			1.8	0.14	0.27	0.62	1.5	1		
54	PBS	AC				0.71	0.061			0.95	0.39	0.21	0.44	0.73			
55	PBS	BW		0.52		0.72	0.033	0.044									
56	PBS	BW				3.4	0.11	0.12		1.9	0.54	1.5	0.92	1.6	1.5		0.41
61	PBS	FHS		0.3		0.88	0.051	0.082		2.6	0.22	2	1	1.4	1.2		0.093
64	PBS	HW				3.5	0.14	0.19		2.2	0.043	1	0.73	1.2	1		0.24
65	PBS	HW				4.7	0.087	0.23		1.9	0.062	1.6	0.72	1.6	1.6		
66	PBS	HW				2.9	0.13	0.16		1.4	0.051	0.95	0.54	1.1	0.92		
67	PBS	AC				0.65		0.28		2.2	0.54	0.31	0.94	1.4			0.13
68	PBS	AC				1	0.1			2	0.49	0.45	0.94	1.2			0.69
69	PBS	AC				1.2				2.7	1.7	0.48	1.6	1.8			0.16
70	PBS	FHS				0.56	0.098	0.16		2.3	0.05	0.69	0.83	0.69			0.42
71	PBS	FHS		0.27		1.2	0.15	0.16		3.5	0.3	1.7	1.3	2.1	2.3		
75	PBS	BW				1.8		0.1		1.8	0.16	0.26	0.65	2.6	1.9		0.16
76	PBS	BW	0.012			1.3				2.1	0.12	0.39	0.71	1.6	0.98		0.084
77	PBS	BW				1.1		0.096		1.4	0.064	0.29	0.62	1.2	0.86		0.055
79	PBS	FHS				0.83		0.1		3.2	0.93	0.7	1.3	1.8	1.4		0.25
80	PBS	FHS				0.69		0.047		2.2	0.082	0.34	0.69	1.2	0.81		0.057
81	L	AC				1.2	0.15			3.4	0.8	0.16	1	1			
82	L	AC				1.3	0.19			3.7	1.9	0.4	1.9	1.8	0.95		
83	L	AC				0.84	0.13			2.7	0.71	0.34	1.5	1.8	0.87		
84	L	AC		0.083		1.4	0.17			2.9	0.62	0.44	2.2	2.2	1.1		
85	L	AC				1.1	0.3			3.2	0.16	0.53	2.2	2.1	1.1		
86	L	AC		0.14		0.86	0.21			3.4	3.2	0.51	2.6	2.4	1.2		
87	L	AC				0.96	0.2			3	0.15	0.5	2.1	2	0.96		
88	L	AC		0.12		1.1	0.23			4.1	0.18	0.55	2.7	2.4	1.2		
89	L	ACD				3		0.14		9.1	0.2	1.2	5.2	5.1	2.2		0.21
90	L	ACD				2.1		0.07		11	5.5	1.4	7	5.8	2.4		0.13
91	L	ACD				2.6	0.16			7.5	1.3	1.2	5	3.8	2.3		0.14
92	L	ACD				1.8	0.081			7.3	0.89	1.1	3.5	4	2		0.17
95	L	FHS				1	0.15	0.091		3.7	0.22	0.89	3.3	3.6	1.8		0.084
96	L	FHS	0.016			0.43	0.092	0.077		4.4	0.11	0.99	4.5	3.6	1.5		0.074
97	BPS	AC		0.091		0.84	0.25			1.6	1.2	0.34	0.76	1.4	0.96		
98	BPS	AC		0.96		1.6	0.26			2.4	1	0.39	1	1.7	0.88		
99	BPS	AC		0.053		0.76	0.14			3.6	0.29	0.42	2.2	2	1		
100	BPS	AC				1.3	0.19			1.1	0.29	0.32	0.64	1.5	0.92		
101	BPS	AC				1.1	0.26			6.2	1.3	1	12	11	3.2		1.8
102	BPS	AC		0.069		0.73	0.16			1.2	0.38	0.29	0.72	1.1	0.78		
103	BPS	AC				1.2	0.27			1.1	0.31	0.37	0.67	1.7	1.1		
104	BPS	AC		0.09		1.6	0.23			1.3	0.45	0.34	0.99	2.2	1.4		
105	BPS	AC		0.091		1.3	0.22			1.9	0.64	0.32	0.86	1.4	0.78		
108	BPS	FHS				0.83	0.067			5.2	0.1	1	8.2	8.5	2.8		
109	BPS	FHS				1.1	0.086	0.069		4.6	0.098	1	6.5	7.2	2.6		0.054
110	BPS	FHS				0.68	0.049	0.054		3.8	0.064	0.77	5.2	5	1.7		0.028
111	BPS	FHS		0.88		0.64	0.085	0.11		3.6	0.11	1.2	2.4	2.9	2.6		0.071
112	BPS	FHS				2.7	0.24			7.5	0.077	1.2	10	3.2			0.049
113	BPS	FHS		0.9		0.58	0.18	0.072		4.4	0.93	7.5	6.6	1.8			
114	BPS	FHS				1.1		0.1		3.9	0.66	3.6	4.5	3.2			
115	L	ACD				2.6	0.13	0.12		13			12	11	4.7		
116	L	ACD				2.5	0.77	0.16		17		3.1	16	12	3.2		
117	L	ACD				2.3		0.12		20		2.9	16	11	3.3		
118	L	ACD				1.6				17		2.4	13	9.2	2.7		
121	BPS	FHS		0.26		1.2	0.38			4.3	0.99	4.7	5.4	2.6			
122	BPS	FHS				0.47	0.15	0.26		4.5		1	5.4	4.9	1.9		
123	BPS	FHS				0.62	0.3	0.14					3.3	1.2			
126	N	ACD				3		0.39		7.4		1.2	4.8	4.7	2.3		
127	N	ACD				2.2	0.44	0.19		11			10	6.8	2.1		
128	N	ACD				2.8	0.16	0.22		17			5.4	7.8			
129	N	ACD				2	1.1	0.11		15		1.8	9.6	6.7	2.7		
130	N	ACD				1.7	0.63	0.13		13			8.5	6.9	2.4		
131	N	ACD				1.8	0.98	0.2		12			8.6	5.7	2.3		
132	N	ACD															

Fish #	Site Code	SPECIES	Acenaphthene	Anthracene	Dibenzothiophene	C1-Dibenzothiophenes	C2-Dibenzothiophenes	C3-Dibenzothiophenes	Fluorene	C1-Fluorenes	C2-Fluorenes	C3-Fluorenes	Phenanthrene	C1-Phenanthrenes/ anthracenes
2	SIS	AC			0.09				0.1				0.45	
3	SIS	AC		0.042	0.08				0.15				0.59	
4	SIS	AC			0.081				0.15				0.43	
5	SIS	AC			0.075				0.1				0.32	
6	SIS	AC		0.15					0.13				0.34	
7	SIS	AC		0.055	0.1				0.14				0.47	
8	SIS	AC		0.057	0.095				0.22				0.56	
9	SIS	AC			0.11				0.18				0.44	
10	SIS	AC			0.064								0.49	
12	SIS	HW	0.56	0.11	0.089				0.19				0.51	
13	SIS	HW		0.034	0.041				0.095				0.34	
14	SIS	HW		0.025	0.052				0.11				0.33	
15	SIS	HW	0.82	0.058	0.14				0.33				0.78	
16	SIS	HW	1.4	0.14	0.14				0.26				0.96	
17	SIS	HW	0.62	0.076	0.088				0.18				0.54	
18	SIS	HW	0.59	0.051	0.088				0.15				0.59	
19	SIS	HW	0.41	0.063	0.15				0.2				0.58	
20	SIS	HW	0.55	0.072	0.12				0.23				0.64	
21	SIS	HW		0.035	0.059				0.094				0.3	
22	SIS	HW	0.29	0.035	0.052				0.11				0.28	
23	SIS	HW	0.41	0.059	0.079				0.19				0.52	
24	SIS	HW	0.4	0.041	0.079				0.12				0.36	
26	SIS	FHS	0.16	0.06	0.07	0.23	0.52		0.13				0.4	0.55
27	SIS	FHS	0.24	0.053	0.66				0.16				0.35	
28	SIS	FHS	0.15	0.023	0.03				0.095				0.26	
31	SIS	FHS	0.24	0.083	0.12				0.27				1	0.72
32	SIS	FHS	0.27	0.44	0.24	0.31	0.5		0.45	0.51			2.4	2.1
33	SIS	FHS	0.29	0.078	0.11				0.29	0.52			0.85	
36	SIS	AC			0.49				0.55				1.3	
37	SIS	AC		0.081		0.97	1.1	5.8	0.48				0.79	
45	SIS	FHS	0.2		0.069				0.32			0.057	0.49	
46	SIS	FHS	0.21	0.16	0.097				0.28				1	0.82
47	SIS	FHS	0.27	0.12	0.43	1.1	1.4	1.1	0.55	1	1.8	2	1.8	2.2
48	SIS	FHS	0.73	1.5	0.53	0.57	0.83	0.6	1.1	0.75			5.3	3.4
49	SIS	FHS	0.12	0.03	0.069				0.15				0.5	
50	SIS	FHS	0.19	0.045	0.062				0.17	0.44			0.65	
52	PBS	BW	0.25	0.13	0.12	0.24	0.34		0.22				0.99	0.84
53	PBS	AC			0.24				0.32				0.77	
54	PBS	AC		0.55	0.079				0.16				0.46	
55	PBS	BW												
56	PBS	BW	1.1	0.53	0.25	0.52	0.65	0.58	0.47	0.63			2.3	2.4
61	PBS	FHS	0.2	0.15	0.13	0.17	0.34	0.36	0.3	0.45			1.5	0.97
64	PBS	HW	0.47	0.14	0.085				0.2				0.84	
65	PBS	HW	0.82	0.061	0.12				0.28				1	
66	PBS	HW	0.56	0.05	0.093				0.21				0.58	
67	PBS	AC		0.14					0.29				0.92	
68	PBS	AC		0.11	0.15				0.28				0.76	
69	PBS	AC		0.22					0.42				1.3	
70	PBS	FHS	0.15	0.11	0.058				0.19				0.93	0.58
71	PBS	FHS	0.37	0.47	0.56	2.4	4.8	3.1	0.59	1.1	2.8	3	2.9	5.1
75	PBS	BW	1	0.045	0.13				0.27	0.79	1.2		0.88	
76	PBS	BW	0.52	0.074	0.098				0.21	0.69			0.66	
77	PBS	BW	0.54	0.092	0.11	0.16			0.15				0.62	
79	PBS	FHS	0.36	0.66	0.31	0.5	1.1	0.71	0.86	1	1.4	2.5	3.1	2
80	PBS	FHS	0.18	0.042	0.079				0.17				0.6	0.38
81	L	AC			0.12				0.17				0.59	
82	L	AC		0.2	0.18				0.31				0.58	
83	L	AC		0.64	0.15				0.23					
84	L	AC			0.19				0.27				0.8	
85	L	AC		0.064	0.16				0.38				0.85	
86	L	AC			0.21				0.34				0.81	
87	L	AC		0.049	0.13				0.31				0.74	
88	L	AC			0.19				0.43				0.89	
89	L	ACD	0.38	0.13	0.3				0.65				1.5	
90	L	ACD	0.38	0.11	0.32	0.33	0.48		0.72				1.8	1
91	L	ACD	0.22	0.33	0.27	0.29	0.69		0.7	1.3	1.5	4.6	1.5	
92	L	ACD	0.38	0.21	0.19				0.61				1.4	0.85
95	L	FHS	0.24	0.11	0.23	0.21			0.4				1.2	0.76
96	L	FHS	0.24	0.05	0.2	0.14			0.5				0.85	0.38
97	BPS	AC			0.16				0.16				0.59	
98	BPS	AC			0.14				0.26				0.66	
99	BPS	AC			0.16				0.23				0.62	
100	BPS	AC		0.056	0.12				0.25				0.7	
101	BPS	AC		0.049	0.13				0.61				0.75	
102	BPS	AC			0.13				0.22				0.57	
103	BPS	AC		0.046	0.12				0.34				0.6	
104	BPS	AC			0.19				0.28				0.82	
105	BPS	AC			0.17				0.17				0.51	
108	BPS	FHS	0.18	0.12	0.13				0.39				0.71	
109	BPS	FHS	0.14	0.059	0.084				0.44				0.71	
110	BPS	FHS	0.25	0.034	0.071				0.32				0.49	
111	BPS	FHS	0.47	0.082	0.067				0.22				0.63	
112	BPS	FHS	0.34	0.046	0.12				0.52				0.74	
113	BPS	FHS												0.18
114	BPS	FHS			0.096									0.39
115	L	ACD	0.7							1.3				1.6
116	L	ACD			0.31	0.25	0.68		1				1.6	0.94
117	L	ACD			0.31				1	0.82	7.2			0.72
118	L	ACD			0.23	0.31	0.83	0.46		0.87				1.1
121	BPS	FHS			0.18									
122	BPS	FHS			0.2	0.28				0.48				0.55
123	BPS	FHS			38				11	0.42				0.7
126	N	ACD			0.18	0.43	0.97						2.2	1.6
127	N	ACD								0.87				1.3
128	N	ACD		0.74					1.7				7.8	4.9
129	N	ACD			0.27	0.26								0.74
130	N	ACD			0.82	0.82	1.2			0.86				2.4
131	N	ACD	0.68		0.47	0.47	0.73							1.5
132	N	ACD				0.47								1.6

Fish #	Site Code	SPECIES	C2-Phenanthrenes/ anthracenes	C3-Phenanthrenes/ anthracenes	C4-Phenanthrenes/ anthracenes	Benzo[a] anthracene	Chrysene	C1- Chrysenes	C2- Chrysenes	C3- Chrysenes	C4- Chrysenes	Fluoranthene	Pyrene	C1-Fluoranthenes/ pyrenes	C2-Fluoranthenes/ pyrenes
2	SIS	AC										0.11	0.063		
3	SIS	AC										0.23	0.15		
4	SIS	AC										0.17	0.12		
5	SIS	AC										0.11	0.11		
6	SIS	AC										0.079	0.058		
7	SIS	AC										0.21	0.16		
8	SIS	AC										0.17	0.16		
9	SIS	AC										0.15	0.11		
10	SIS	AC										0.2			
12	SIS	HW										0.23	0.19		
13	SIS	HW										0.1	0.079		
14	SIS	HW										0.1	0.078		
15	SIS	HW										0.17	0.18		
16	SIS	HW										0.42	0.29		
17	SIS	HW										0.27	0.32		
18	SIS	HW										0.17	0.16		
19	SIS	HW										0.14	0.092		
20	SIS	HW										0.23	0.21		
21	SIS	HW										0.085	0.078		
22	SIS	HW										0.078	0.065		
23	SIS	HW										0.15	0.11		
24	SIS	HW										0.14	0.12		
26	SIS	FHS	0.76			0.12	0.23	0.22				0.16	0.22	0.38	
27	SIS	FHS				0.15	0.22					0.14	0.12		
28	SIS	FHS										0.1	0.11		
31	SIS	FHS	0.88			0.18	0.5	0.18				0.64	0.46	0.38	
32	SIS	FHS	1.2			1.2	1.4	0.63				1.9	1.4	1.3	0.75
33	SIS	FHS				0.14	0.5					0.41	0.28	0.35	
36	SIS	AC											0.16		
37	SIS	AC										0.28	0.2		
45	SIS	FHS				0.087	0.16					0.24	0.16		
46	SIS	FHS	0.84			0.67	1.1	0.39				1	0.84	0.78	0.72
47	SIS	FHS	2.3	1.1		0.32	0.39					0.42	0.36	0.44	0.39
48	SIS	FHS	2.4	1.2		4	4.1	2.1				6	5.4	4.2	2.3
49	SIS	FHS				0.33	0.35					0.19	0.14		
50	SIS	FHS				0.075	0.47					0.26	0.18		
52	PBS	BW	1.1			0.2	0.65	0.27				0.43	0.38	0.52	0.41
53	PBS	AC										0.18	0.16		
54	PBS	AC										0.18	0.12		
55	PBS	BW													
56	PBS	BW	1.7			1.4	1.6	0.73				2.3	2	1.7	0.84
61	PBS	FHS	0.95			0.23	0.45	0.22				0.77	0.57	0.68	0.37
64	PBS	HW										0.34	0.18		
65	PBS	HW										0.41	0.25		
66	PBS	HW										0.2	0.14		
67	PBS	AC											0.25		
68	PBS	AC										0.29	0.21		
69	PBS	AC										0.72	0.53		
70	PBS	FHS	0.62			0.081	0.15					0.34	0.32	0.35	
71	PBS	FHS	9.2	5.4	3.6	1.4	2.4	3.9	3.4	1.7		1.4	2.5	4.6	4.4
75	PBS	BW										0.19	0.14		
76	PBS	BW										0.2	0.16		
77	PBS	BW										0.12	0.089		
79	PBS	FHS	2			1.3	1.2	0.52				2.8	2.3	1.8	0.9
80	PBS	FHS	0.39									0.17	0.14		
81	L	AC										0.2	0.12		
82	L	AC										0.15	0.089		
83	L	AC										0.13	0.089		
84	L	AC										0.14	0.11		
85	L	AC										0.23	0.13		
86	L	AC										0.14	0.11		
87	L	AC										0.2	0.12		
88	L	AC										0.28	0.16		
89	L	ACD										0.61	0.32		
90	L	ACD	1.2									0.51	0.37	0.44	
91	L	ACD										0.51	0.36		
92	L	ACD				0.23	0.37					0.51	0.4	0.48	
95	L	FHS	1.4					0.22				0.38	0.28		
96	L	FHS	0.5									0.2	0.14		
97	BPS	AC										0.14	0.11		
98	BPS	AC										0.2	0.19		
99	BPS	AC										0.14	0.11		
100	BPS	AC										0.2	0.16		
101	BPS	AC										0.22	0.14		
102	BPS	AC										0.15	0.089		
103	BPS	AC										0.22	0.11		
104	BPS	AC										0.37	0.24		
105	BPS	AC										0.12	0.089		
108	BPS	FHS						0.2				0.26	0.26		
109	BPS	FHS										0.21	0.17		
110	BPS	FHS										0.13	0.093		
111	BPS	FHS										0.27	0.13		
112	BPS	FHS										0.22	0.16		
113	BPS	FHS													
114	BPS	FHS	0.4												
115	L	ACD				0.49	0.73								
116	L	ACD	1.3					0.18						0.61	
117	L	ACD	0.92					0.18						0.41	
118	L	ACD	1.9					0.51						0.79	0.85
121	BPS	FHS													
122	BPS	FHS													
123	BPS	FHS	0.64												
126	N	ACD	2.5					0.51							
127	N	ACD	1.4												
128	N	ACD	4.6	2.6		0.22	0.64							0.75	
129	N	ACD				1.2	2.5					4.8		3	
130	N	ACD	2.4			0.29	0.75							1.1	
131	N	ACD	1.2	0.99		0.47	1	0.37						0.91	
132	N	ACD	1.2			0.21	0.38	0.26						0.55	



Fish #	Site Code	SPECIES	Total Endosulphans	Total Endrin	Total Low PAHs	Total High PAHs	Total PAHs	PHN Equivalents (ng/g)	BaP Equivalents (ng/g)	Liver Hep	Gut muc ept	Kidney tubules	% water	As (µg/g)	Ba (µg/g)	Cd (µg/g)	Cr (µg/g)	Cu (µg/g)	Fe (µg/g)	Hg (µg/g)	Ni (µg/g)	Pb (µg/g)	Se (µg/g)
2	SIS	AC	0.16	0	2.52	0.173	2.693	10000	370			0	76	3.29	2.96	0.025	0.25	22	191	0.086	1.04	0.097	1.68
3	SIS	AC	0.097	0	2.825	0.38	3.205	6600	290			0	76	4.1	2.63	0.036	0.29	39.1	70.5	0.075	0.48	0.075	1.63
4	SIS	AC	0.098	0.07	2.691	0.29	2.981			0.75		77	3.61	3.13	0.025	0.38		106	0.096	1.72		2.1	
5	SIS	AC	0.06	0	1.135	0.22	1.355	5000	300	3	2	78	4.05	1.76	0.041	0.31	20.7	63.8	0.089	0.96	0.568	1.79	
6	SIS	AC	0.073	0	2.1	0.137	2.237	7400	430	1.5	3	77	3.52	2.15	0.021	0.74	36.9	97.4	0.083	2.3	0.76	1.98	
7	SIS	AC	0.096	0.061	2.855	0.37	3.225	7000	320	0	0	76	3.24	2.71	0.023	0.94	13.3	62.7	0.094	1.8	0.072	1.22	
8	SIS	AC	0.119	0.082	3.082	0.33	3.412	7900	290	1.5	0	76	2.99	1.75	0.021	0.5	23.9	74.1	0.083	1.53	0.734	1.56	
9	SIS	AC	0.1	0.058	2.7	0.26	2.96	9200	380	1.5	1	76	2.91	2.78	0.053	0.56		48.8	0.07	3.48		2.17	
10	SIS	AC	0.042	0.11	2.694	0.2	2.894			0	0.75	76	4.04	2.54	0.034	0.75	43.5	74.2	0.073	1.89	1.48	1.67	
12	SIS	HW	0	1.2	5.089	0.42	5.509	2700	140	3	2	72	2.09	4.26	0.048	0.73	12.3	96.7	0.17	0.51	0.31	2.01	
13	SIS	HW	0	0.058	1.84	0.179	2.019	1900	110	0	0	78	1.92	4.35	0.041	0.38	178	84.9	0.234	2.82	0.345	1.93	
14	SIS	HW	0	0.18	2.367	0.178	2.545	44000	560	0		75	1.34	5.04	0.039	0.53	4.7	94.9	0.294	0.63	0.185	1.59	
15	SIS	HW	0.16	0.88	8.218	0.35	8.568	5200	120	0	0	71	2.33	3.15	0.021	0.031	19.6	103	0.113	0.5	0.118	1.86	
16	SIS	HW	0	1.7	6.42	1.06	7.48	1100	67	0		73	2.22	3.96	0.044	0.4	26.9	130	0.175	1.77	0.874	1.67	
17	SIS	HW	0	1.6	4.594	0.59	5.184	5300	220	0		73	2.15	3.14	0.042	0.26	60.1	67.9	0.102	2.74	1.92	1.93	
18	SIS	HW	0.031	0.63	3.155	0.391	3.546	5700	130	0		76	2.32	10.6	0.065	2.37	10.3		0.294	3.9	0.279	2.37	
19	SIS	HW	0.18	0	5.637	0.232	5.869	2700	130	0		73	2.2	4.38	0.021			91.3	0.108	1.1		2.26	
20	SIS	HW	0	1.3	5.521	0.44	5.961	1300	75	1.5		75	2.43	8.4	0.048	0.57	5.8	253	0.223	0.08	0.219	2.07	
21	SIS	HW	0	0.35	2.178	0.642	2.82	2700	170	0		74	2.77	8.36	0.043	0.88	26.9	518	0.169	2.13	0.989	1.91	
22	SIS	HW	0	0.32	2.716	0.484	3.2	7100	220	0		75	2.75	4.66	0.026	0.053	13.9	137	0.267	0.88	0.092	2.48	
23	SIS	HW	0	0	4.823	0.26	5.083	3000	150	0	0	73	2.36	5.27	0.016	0.4	5.9	160	0.221	0.63	0.102	1.86	
24	SIS	HW	0	0.6	3.459	0.509	3.968	2300	140	0		75	3.71	8.5	0.037	0.67	31.2	266	0.207	4.42	0.86	2.06	
26	SIS	FHS	0	0	5.546	1.965	7.511	550	65	0		73	4.53	8.16	0.086	0.37	8.5	189	0.068	0.6	0.073	2.42	
27	SIS	FHS	0	0.1	5.573	1.51	7.083	1400	73	5		74	5.55	7	0.256	0.49	9.6	194	0.277	0.48	0.057	1.93	
28	SIS	FHS	0.38	0.39	2.097	1.068	3.165			1.5		73	4.3	8.74	0.206	0.69	12.9	394	0.31	0.84	0.175	2.06	
31	SIS	FHS	0	0.057	8.427	3.702	12.129	450	49	1.5		76	5.12	9.1	0.158	1.01	17.6	423	0.258	0.89	0.154	2.83	
32	SIS	FHS	0	0.15	15.57	13.36	28.93			1.5		77	5.41	12.3	0.168	0.55	8.6	190	0.181	0.93	0.074	2.1	
33	SIS	FHS	0.57	0.26	11.13	2.047	13.177			9		75	4.2	8.37	0.052	0.55	6.9	171	0.13	2.13	0.067	3.1	
36	SIS	AC	0.153	0.11	17.33	0.16	17.49	3200	180	1.5		65	4.12	2.12	0.024	0.33	36.8	158	0.1	0.41	0.928	1.36	
37	SIS	AC	0.38	0.99	19.051	0.649	19.7	5000	310	0	2	69	4.54	1.31	0.015	0.34	4.2	50.3	0.101	0.61	0.041	1.65	
45	SIS	FHS	0	0	4.33	0.74	5.07	850	47	2	6	78	7.99	8.54	0.312	0.56	33.3	232	0.497	1.44	0.267	3.67	
46	SIS	FHS	0.21	0	9.937	8.658	18.595	1000	33	3	6	75	6.37	8.72	0.263	0.63	20.2	229	0.225	1.57	0.366	1.14	
47	SIS	FHS	0	0.28	33.87	2.593	36.463	840	54	6		76	5.1	9.57	0.166	0.77	30	288	0.202	2.36	0.695	2.25	
48	SIS	FHS	0	0.26	27.25	46.2	73.45	640	33	1.5	4	75	8.46	7.65	0.192	0.56	12.6	221	0.254	0.53	0.225	1.69	
49	SIS	FHS	0.22	0.18	5.549	1.01	6.559	24000	830	1.5	3	74	4.34	5.1	0.085	0.59	4.8	93.7	0.096	0.33	0.144	2.13	
50	SIS	FHS	0	0	8.027	1.077	9.104	1200	41	6	4	79	4.01	10.3	0.323	0.52	23.5	241	0.163	1.2	0.932	3.31	
52	PBS	BW	0.053	0	10.34	3.68	14.02	2200	40	1.5		77	0.91	3.77	0.06	1.36	1.08	268	0.088	2.36	0.449	2.2	
53	PBS	AC	0.094	0	4.72	0.34	5.06	2200	190	0.75	0	72	4.16	1.48	0.029	0.36	5	218	0.104	0.52	0.046	1.75	
54	PBS	AC	0.038	0	2.629	0.3	2.929	7900	320	1.5		76	3.21	3.06	0.026	0.19	37	54.4	0.08	1.06	0.084	2.35	
55	PBS	BW	0.046	0.52	0	0	0	2300	38	0		65	0.54	2.51	0.023	0.24	3.2	118	0.057	0.49	0.059	1.55	
56	PBS	BW	0.15	0	17.06	15.87	32.93	8400	120	4	0	73	1.69	7.47	0.023	1.45	8.5	514	0.097	1.15	0.411	1.96	
61	PBS	FHS	0.061	0.3	11.213	4.825	16.038	18	6	2	4.5	0	79	4.56	15.1	0.085	0.95	6.4	351	0.054	0.77	0.205	2.2
64	PBS	HW	0	0	5.905	1.208	7.113	4700	42	0	0	71	2.01	8.05	0.024	0.85	4.1	305	0.1	1.48	0.131	1.76	
65	PBS	HW	0	0	7.801	1.521	9.322	8800	120	0	0	71	2.88	1.72	0.012	0.24	3.1	58.8	0.093	0.44	0.038	1.59	
66	PBS	HW	0	0	5.003	0.48	5.483	4100	79	0	0	72	1.58	4.66	0.019	0.6	3.8	142	0.084	1.37	0.076	2.43	
67	PBS	AC	0	0	4.13	0.25	4.38			1.5	0	76	2.39	2.05	0.043	0.25	6.2	103	0.098	0.29	0.067	2.17	
68	PBS	AC	0.101	0	4.58	0.5	5.08			1.5	0	75	2.82	2.4	0.05	0.36	14	0.044	0.41	0.159	2.64	1.15	
69	PBS	AC	0	0	5.98	1.25	7.23			0		77	2.77	2.37	0.074	0.23	14.7	33.4	0.076	0.36	0.016	2.62	
70	PBS	FHS	0.11	0	5.268	1.519	6.787	96	25	1.5	1.25	80	6.52	16.3	0.323	0.93	43.3	471	0.505	1.34	2.81	2.81	
71	PBS	FHS	0	0.27	52.79	31.64	84.43			9	10	79	3.36	11.8	0.027	1.35	8.2	482	0.121	1.44	0.229	2.65	
75	PBS	BW	0.15	0	9.885	0.33	10.215	4700	83	0	0	71	0.6	2.37	0.019	0.38	3.6	141	0.07	0.55	0.067	1.91	
76	PBS	BW	0	0.012	6.016	1.361	7.377			0.75	0	63	0.23	2.41	0.034	0.17	2	77.1	0.067	0.13	0.028	2.51	
77	PBS	BW	0	0	4.697	0.839	5.536	10000	140	4	0	53	0.6	3.62	0.043	0.48	5.6	238	0.056	0.97	0.11	2.19	
79	PBS	FHS	0.15	0	21.95	16.01	37.96	40	6	5	8	70	2.31	11.5	0.038	1.55	27.9	275	0.105	1.01	0.247	2.45	
80	PBS	FHS	0.166	0	4.938	0.391	5.329	39	6	6	0	77	3.21	8.76	0.064	0.66	6.1	165	0.065	0.54	0.091	3.06	
81	L	AC	0	0	3.04	0.32	3.36			0.75	0	75	3.88	1.79	0.035	0.26	8	28.7	0.055	0.3	0.165	1.61	
82	L	AC	0.053	0	6.32	0.239	6.559			0.75	0	72	3.48	2.17	0.057	0.23	9.8	37.4	0.049	1.35	0.099	1.46	
83	L	AC	0	0	5.53	0.219	5.749			1.5	0	75	3.88	1.41	0.031	0.56	12.3	44.9	0.06	0.32	0.363	2.1	
84	L	AC	0.053	0.083	7.2	0.25	7.45			3	0	74	3.57	2.25	0.033	0.36	9.9	87.3	0.059	0.9	0.13	1.83	
85	L	AC	0	0	7.384	0.36	7.744			3	0	73	3.42	2.81	0.017	0.25	42.1	58.4	0.058	0.53	0.073	1.66	
86	L	AC	0	0.14	8.07	0.25	8.32			1.5	0	75	3.64	1.58	0.027	0.4		51	0.067	0.94	1.59	2.07	
87	L	AC	0.042	0	6.789	0.32	7.109			1.5	0	75	3.46	1.77	0.025	0.26	26.4	61.1	0.07	0.84	0.94	1.99	
88	L	AC	0.093	0.12	8.36	0.44	8.8			1.5	0	73	3.16	1.09	0.031	0.6	67.8	59.1	0.059	1.55	2.04	1.74	
89	L	ACD	0</																				

Fish #	Site Code	SPECIES	V (µg/g)	Zn (µg/g)
2	SIS	AC	0.64	109
3	SIS	AC	1.36	98.3
4	SIS	AC	0.99	
5	SIS	AC	1.64	102
6	SIS	AC	1.29	103
7	SIS	AC	1.77	105
8	SIS	AC	1.21	95.3
9	SIS	AC	1.61	
10	SIS	AC	1.26	116
12	SIS	HW	1.35	66.3
13	SIS	HW	2.08	70.8
14	SIS	HW	1.55	93.2
15	SIS	HW	1.42	58.7
16	SIS	HW	1.84	76
17	SIS	HW	1.09	73
18	SIS	HW	5.07	97.9
19	SIS	HW	1.6	
20	SIS	HW	2.18	80.7
21	SIS	HW	2.28	78.8
22	SIS	HW	1.79	72.5
23	SIS	HW	1.89	54.5
24	SIS	HW	3.12	118
26	SIS	FHS	2.76	118
27	SIS	FHS	2.55	77.2
28	SIS	FHS	1.57	131
31	SIS	FHS	2.99	101
32	SIS	FHS	2.15	107
33	SIS	FHS	1.41	124
36	SIS	AC	0.93	110
37	SIS	AC	0.65	79
45	SIS	FHS	2.27	107
46	SIS	FHS	3.62	96.6
47	SIS	FHS	3.11	93.1
48	SIS	FHS	3.97	110
49	SIS	FHS	2.56	94
50	SIS	FHS	2.89	117
52	PBS	BW	1.98	83.5
53	PBS	AC	0.68	91.1
54	PBS	AC	1.43	120
55	PBS	BW	2.12	96.3
56	PBS	BW	2.29	111
61	PBS	FHS	2.93	105
64	PBS	HW	2.14	63.8
65	PBS	HW	0.94	36.2
66	PBS	HW	1.33	51.2
67	PBS	AC	1.38	138
68	PBS	AC	130	69
69	PBS	AC	0.92	109
70	PBS	FHS	2.75	120
71	PBS	FHS	3.01	100
75	PBS	BW	1.4	53.7
76	PBS	BW	1.75	60.1
77	PBS	BW	1.59	66.5
79	PBS	FHS	2.73	106
80	PBS	FHS	2.27	99
81	L	AC	1.16	87.4
82	L	AC	1.69	91.9
83	L	AC	1.03	81.9
84	L	AC	1.52	98.6
85	L	AC	1.76	86.2
86	L	AC	1.06	116
87	L	AC	1.21	85.4
88	L	AC	0.67	107
89	L	ACD	1.3	79.1
90	L	ACD	1.34	94.4
91	L	ACD	1.67	88.5
92	L	ACD	2.2	75.1
95	L	FHS	2.42	115
96	L	FHS	4.16	98.5
97	BPS	AC	0.78	
98	BPS	AC	0.86	71.8
99	BPS	AC	1.19	74.6
100	BPS	AC	0.58	76.7
101	BPS	AC	1.17	88.3
102	BPS	AC	0.85	84.5
103	BPS	AC	0.82	85.5
104	BPS	AC	1.29	72.9
105	BPS	AC	1.18	77.5
108	BPS	FHS	2.97	85.1
109	BPS	FHS	2.67	104
110	BPS	FHS	3.2	117
111	BPS	FHS	3.03	109
112	BPS	FHS	1.66	78.7
113	BPS	FHS	2.32	116
114	BPS	FHS	2.27	91.9
115	L	ACD	0.95	121
116	L	ACD	0.84	87.3
117	L	ACD	0.67	76.1
118	L	ACD	1.29	110
121	BPS	FHS	2.09	103
122	BPS	FHS	2.38	78.1
123	BPS	FHS	2.31	84.1
126	N	ACD	0.99	96.8
127	N	ACD	1.06	125
128	N	ACD	0.86	78.7
129	N	ACD	0.73	79.5
130	N	ACD	0.8	82.1
131	N	ACD	0.73	85.5
132	N	ACD	1.62	107

**APPENDIX D: MEANS, STANDARD DEVIATIONS AND TOTALS**  
(Located on the enclosed CD)

This appendix, located on the enclosed CD, contains the means totals and standard deviations of all organic, metals and biomarker analyses. The organics data is expressed as lipid normalized wet weight and the metals data is expressed as dry-weight. All data is expressed as parts per billion ( $\mu\text{g}/\text{kg}$ ).

	SITE_NAME	SPECIES	WEIGHT	LENGTH	8 - 2,4'- Dichlorobiphenyl (C12)	18 - 2,2',5-Trichlorobiphenyl (C13)
<b>Means</b>						
	Bullen Point	Arctic Cisco	197.2222222	284.3333333	18.11505708	6.979090031
	Liberty	Arctic Cisco	193.75	279.375	21.82758816	11.87339966
	Point Brower	Arctic Cisco	158	227.2	0	0.758928572
	Stump Island	Arctic Cisco	159.0909091	304.4545455	1.875	4.748998674
	Liberty	Arctic Cod	21.75	142.125	34.92624489	5.21938155
	North Star	Arctic Cod	27	155	31.94590649	0
	Point Brower	Broad Whitefish	261.6666667	283	5.983779997	4.089138008
	Bullen Point	Four Horn Sculpin	73.8	177	13.34135455	26.53938487
	Liberty	Four Horn Sculpin	41.5	165	13.3486943	0
	Point Brower	Four Horn Sculpin	54.4	162.4	16.63888612	18.3241001
	Stump Island	Four Horn Sculpin	126.4166667	205.4166667	21.1508053	25.73367027
	Point Brower	Humpback Whitefish	403.3333333	377.6666667	12.74819123	6.555620687
	Stump Island	Humpback Whitefish	603.8461538	427.1538462	15.91386822	5.318028598
<b>Standard Deviations</b>						
	Bullen Point	Arctic Cisco	15.02313031	48.27007354	7.935133975	2.683040031
	Liberty	Arctic Cisco	17.67766953	20.06373772	27.01864468	12.46548912
	Point Brower	Arctic Cisco	248.1259761	105.4262776	0	1.697015877
	Stump Island	Arctic Cisco	115.7976291	51.34854163	6.218671482	4.552563535
	Liberty	Arctic Cod	3.370036032	10.30169889	16.2424659	7.367511267
	North Star	Arctic Cod	11.66190379	21.26969675	23.01699522	0
	Point Brower	Broad Whitefish	214.2920126	108.2552539	10.78614075	5.820932465
	Bullen Point	Four Horn Sculpin	40.45793426	16.69996673	10.34848687	55.80819835
	Liberty	Four Horn Sculpin	12.02081528	21.21320344	0.021723735	0
	Point Brower	Four Horn Sculpin	53.56584733	46.48978382	6.935860624	22.26278356
	Stump Island	Four Horn Sculpin	95.12141364	45.99695313	7.183325205	15.20646979
	Point Brower	Humpback Whitefish	174.737899	24.21432083	7.546542073	1.086245263
	Stump Island	Humpback Whitefish	96.7417922	21.98046919	6.358684664	7.308820483
<b>Number of Samples</b>						
	Bullen Point	Arctic Cisco			9	9
	Liberty	Arctic Cisco			8	8
	Point Brower	Arctic Cisco			5	5
	Stump Island	Arctic Cisco			11	11
	Liberty	Arctic Cod			8	8
	North Star	Arctic Cod			7	7
	Point Brower	Broad Whitefish			6	6
	Bullen Point	Four Horn Sculpin			10	10
	Liberty	Four Horn Sculpin			2	2
	Point Brower	Four Horn Sculpin			5	5
	Stump Island	Four Horn Sculpin			12	12
	Point Brower	Humpback Whitefish			3	3
	Stump Island	Humpback Whitefish			13	13

	SITE_NAME	SPECIES	28 - 2,4,4'- Trichlorobiphenyl (Cl3)	44 - 2,2',3,5'- Tetrachlorobiphenyl (Cl4)	52 - 2,2',5,5'- Tetrachlorobiphenyl (Cl4)
<b>Means</b>	Bullen Point	Arctic Cisco	0	0	5.006142528
	Liberty	Arctic Cisco	0	0	4.602334589
	Point Brower	Arctic Cisco	0	0	8.118792378
	Stump Island	Arctic Cisco	2.379409064	0	14.66208147
	Liberty	Arctic Cod	0	2.960526313	9.625561125
	North Star	Arctic Cod	2.057880007	0	12.79985581
	Point Brower	Broad Whitefish	2.65151515	4.167396513	5.59302077
	Bullen Point	Four Horn Sculpin	23.84131856	54.985755	247.5207821
	Liberty	Four Horn Sculpin	0	0	0
	Point Brower	Four Horn Sculpin	0	4.615648206	13.56938892
	Stump Island	Four Horn Sculpin	12.97422509	15.6643391	25.14099478
	Point Brower	Humpback Whitefish	2.028508773	5.208660813	8.614253427
	Stump Island	Humpback Whitefish	1.871174455	13.32750401	34.68021318
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco	0	0
Liberty		Arctic Cisco	0	0	1.709441974
Point Brower		Arctic Cisco	0	0	6.113101405
Stump Island		Arctic Cisco	5.311432078	0	17.66358608
Liberty		Arctic Cod	0	8.373632926	13.84491031
North Star		Arctic Cod	4.01334068	0	5.739315213
Point Brower		Broad Whitefish	6.494859163	8.80538153	11.1114901
Bullen Point		Four Horn Sculpin	41.18618305	161.2872827	724.4667578
Liberty		Four Horn Sculpin	0	0	0
Point Brower		Four Horn Sculpin	0	7.069789333	18.82913953
Stump Island		Four Horn Sculpin	10.31984822	12.16357914	17.74877839
Point Brower		Humpback Whitefish	3.513480259	3.636684559	6.287302892
Stump Island		Humpback Whitefish	3.950585383	20.07974562	53.33699261
<b>Number of Samples</b>		Bullen Point	Arctic Cisco	9	9
	Liberty	Arctic Cisco	8	8	8
	Point Brower	Arctic Cisco	5	5	5
	Stump Island	Arctic Cisco	11	11	11
	Liberty	Arctic Cod	8	8	8
	North Star	Arctic Cod	7	7	7
	Point Brower	Broad Whitefish	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10
	Liberty	Four Horn Sculpin	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12
	Point Brower	Humpback Whitefish	3	3	3
	Stump Island	Humpback Whitefish	13	13	13

	SITE_NAME	SPECIES	66 - 2,3',4,4'- Tetrachlorobiohenvl (Cl4)	101 - 2,2',4,5,5'- Pentachlorobiohenvl (Cl5)	105 - 2,3,3',4,4'- Pentachlorobiohenvl (Cl5)
<b>Means</b>					
	Bullen Point	Arctic Cisco	5.450993159	6.530201046	0.814789507
	Liberty	Arctic Cisco	2.365324009	6.288686785	0
	Point Brower	Arctic Cisco	2.24299066	13.67213042	0.375
	Stump Island	Arctic Cisco	1.485148518	20.10313223	3.447862304
	Liberty	Arctic Cod	1.637380188	24.80423076	11.66168852
	North Star	Arctic Cod	11.68043502	36.82960296	22.26200699
	Point Brower	Broad Whitefish	5.118866902	7.437140835	1.624445408
	Bullen Point	Four Horn Sculpin	250.9664571	329.6667448	115.8551381
	Liberty	Four Horn Sculpin	0	0	23.0184332
	Point Brower	Four Horn Sculpin	9.4894346	29.2712232	4.594427244
	Stump Island	Four Horn Sculpin	15.4801617	19.45654052	7.780231734
	Point Brower	Humpback Whitefish	7.57971815	16.46166283	4.49271325
	Stump Island	Humpback Whitefish	23.21680545	108.5218569	41.3018211
<b>Standard Deviations</b>					
	Bullen Point	Arctic Cisco	5.530834161	2.066703195	1.060325661
	Liberty	Arctic Cisco	3.448176213	2.435442784	0
	Point Brower	Arctic Cisco	5.015479589	9.389798133	0.838525492
	Stump Island	Arctic Cisco	4.925680393	10.28659372	3.768212797
	Liberty	Arctic Cod	4.631210536	39.65150744	18.7342183
	North Star	Arctic Cod	4.209734654	24.06482427	24.68616346
	Point Brower	Broad Whitefish	8.820997984	3.650300655	2.602955758
	Bullen Point	Four Horn Sculpin	738.1158912	950.4272551	304.8258869
	Liberty	Four Horn Sculpin	0	0	32.55298042
	Point Brower	Four Horn Sculpin	9.439827983	19.71290501	6.697961925
	Stump Island	Four Horn Sculpin	10.40436776	12.34576787	6.196216154
	Point Brower	Humpback Whitefish	3.32031723	10.96216312	5.657723567
	Stump Island	Humpback Whitefish	61.30460861	110.0425279	52.61406371
<b>Number of Samples</b>					
	Bullen Point	Arctic Cisco	9	9	9
	Liberty	Arctic Cisco	8	8	8
	Point Brower	Arctic Cisco	5	5	5
	Stump Island	Arctic Cisco	11	11	11
	Liberty	Arctic Cod	8	8	8
	North Star	Arctic Cod	7	7	7
	Point Brower	Broad Whitefish	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10
	Liberty	Four Horn Sculpin	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12
	Point Brower	Humpback Whitefish	3	3	3
	Stump Island	Humpback Whitefish	13	13	13

	SITE_NAME	SPECIES	118 - 2,3',4,4',5- Pentachlorobiphenyl (Cl5)	128 - 2,2',3,3',4,4'- Hexachlorobiphenyl (Cl6)	138 - 2,2',3,4,4',5'- Hexachlorobiphenyl (Cl6)
<b>Means</b>					
	Bullen Point	Arctic Cisco	1.106284679	0.527619987	5.684675578
	Liberty	Arctic Cisco	0.653987631	0	5.17070279
	Point Brower	Arctic Cisco	7.568385822	0.83432658	14.54962003
	Stump Island	Arctic Cisco	8.797007176	2.155155415	16.81414478
	Liberty	Arctic Cod	25.88890696	6.438774435	41.94147106
	North Star	Arctic Cod	40.54980151	11.71345657	64.42215884
	Point Brower	Broad Whitefish	2.423470317	0.168350168	7.273128822
	Bullen Point	Four Horn Sculpin	282.2791436	66.05507595	419.2981323
	Liberty	Four Horn Sculpin	8.69090291	0	7.67878478
	Point Brower	Four Horn Sculpin	17.47500468	2.195018548	42.83296032
	Stump Island	Four Horn Sculpin	25.26621337	5.258003313	34.12903348
	Point Brower	Humpback Whitefish	13.63614868	1.410934743	18.69684525
	Stump Island	Humpback Whitefish	96.75418564	23.90645137	103.5853191
<b>Standard Deviations</b>					
	Bullen Point	Arctic Cisco	1.78470798	0.762558031	3.007928988
	Liberty	Arctic Cisco	0.973107845	0	2.228741362
	Point Brower	Arctic Cisco	5.178644835	1.865610948	5.83342675
	Stump Island	Arctic Cisco	4.925407622	1.897570583	10.38804798
	Liberty	Arctic Cod	38.51965823	11.14211079	53.69242437
	North Star	Arctic Cod	44.72244336	16.19092586	59.25593225
	Point Brower	Broad Whitefish	2.860936371	0.412372011	8.051611859
	Bullen Point	Four Horn Sculpin	786.8870995	187.1659659	1189.235727
	Liberty	Four Horn Sculpin	4.470256932	0	6.949173662
	Point Brower	Four Horn Sculpin	11.11627308	3.084985447	31.45480786
	Stump Island	Four Horn Sculpin	12.28581171	5.548729122	12.51549289
	Point Brower	Humpback Whitefish	11.24630623	2.443810662	15.89616998
	Stump Island	Humpback Whitefish	103.0260032	28.34991748	101.568966
<b>Number of Samples</b>					
	Bullen Point	Arctic Cisco	9	9	9
	Liberty	Arctic Cisco	8	8	8
	Point Brower	Arctic Cisco	5	5	5
	Stump Island	Arctic Cisco	11	11	11
	Liberty	Arctic Cod	8	8	8
	North Star	Arctic Cod	7	7	7
	Point Brower	Broad Whitefish	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10
	Liberty	Four Horn Sculpin	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12
	Point Brower	Humpback Whitefish	3	3	3
	Stump Island	Humpback Whitefish	13	13	13

	SITE_NAME	SPECIES	153 - 2,2',4,4',5,5'- Hexachlorobiohenvl (Cl6)	170 - 2,2',3,3',4,4',5- Heptachlorobiohenvl (Cl7)	180 - 2,2',3,4,4',5,5'- Heptachlorobiohenvl (Cl7)
<b>Means</b>					
	Bullen Point	Arctic Cisco	12.62865789	0	1.981737337
	Liberty	Arctic Cisco	12.42324315	0	1.390533185
	Point Brower	Arctic Cisco	25.11643066	0.058035714	5.595447108
	Stump Island	Arctic Cisco	29.78673729	1.865686865	10.93874903
	Liberty	Arctic Cod	28.89395699	3.903936281	7.298703365
	North Star	Arctic Cod	50.39793764	11.8241995	16.43221147
	Point Brower	Broad Whitefish	4.311778207	0.244107743	0.570029207
	Bullen Point	Four Horn Sculpin	314.3192598	35.15275392	48.86277261
	Liberty	Four Horn Sculpin	41.150367	2.57714627	2.819593785
	Point Brower	Four Horn Sculpin	43.273169	7.335253898	9.429145126
	Stump Island	Four Horn Sculpin	31.37188329	4.492802644	6.131750331
	Point Brower	Humpback Whitefish	12.90335752	3.43804965	3.292199
	Stump Island	Humpback Whitefish	96.51352882	14.80751857	17.97366408
<b>Standard Deviations</b>					
	Bullen Point	Arctic Cisco	4.131422512	0	3.216140101
	Liberty	Arctic Cisco	4.451814939	0	2.172034762
	Point Brower	Arctic Cisco	10.5759657	0.129771802	5.604761501
	Stump Island	Arctic Cisco	16.7258394	5.232807627	6.37798015
	Liberty	Arctic Cod	45.42811732	6.897645798	11.08524039
	North Star	Arctic Cod	40.87383441	11.10052219	15.96943335
	Point Brower	Broad Whitefish	3.051158915	0.597939413	0.585467112
	Bullen Point	Four Horn Sculpin	820.9239007	91.31165911	115.5291479
	Liberty	Four Horn Sculpin	25.60984109	0.135290443	1.250320232
	Point Brower	Four Horn Sculpin	21.59501295	3.699602045	9.021379313
	Stump Island	Four Horn Sculpin	13.56063063	1.712022264	2.995722876
	Point Brower	Humpback Whitefish	10.59717005	2.098458501	3.4506933
	Stump Island	Humpback Whitefish	82.32929537	13.22025782	17.17590422
<b>Number of Samples</b>					
	Bullen Point	Arctic Cisco	9	9	9
	Liberty	Arctic Cisco	8	8	8
	Point Brower	Arctic Cisco	5	5	5
	Stump Island	Arctic Cisco	11	11	11
	Liberty	Arctic Cod	8	8	8
	North Star	Arctic Cod	7	7	7
	Point Brower	Broad Whitefish	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10
	Liberty	Four Horn Sculpin	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12
	Point Brower	Humpback Whitefish	3	3	3
	Stump Island	Humpback Whitefish	13	13	13

	SITE_NAME	SPECIES	187 - 2,2',3,4',5,5',6- Heptachlorobiphenyl (C17)	195 - 2,2',3,3',4,4',5,6- Octachlorobiphenyl (C18)	206 - 2,2',3,3',4,4',5,5',6- Nonachlorobiphenyl (C19)
<b>Means</b>					
	Bullen Point	Arctic Cisco	1.16859116	0.5911396	1.504966279
	Liberty	Arctic Cisco	1.279404594	0	0.313887309
	Point Brower	Arctic Cisco	4.100400508	0.174107142	0.165178572
	Stump Island	Arctic Cisco	4.051045919	0.335498618	4.039734863
	Liberty	Arctic Cod	7.512834769	0	17.36691242
	North Star	Arctic Cod	10.59975537	0.809605357	5.548197196
	Point Brower	Broad Whitefish	0.364020748	0	0.26394378
	Bullen Point	Four Horn Sculpin	23.44871461	1.325294183	42.51008066
	Liberty	Four Horn Sculpin	1.333333335	0	0.20046083
	Point Brower	Four Horn Sculpin	6.96762562	0.638685744	1.128054714
	Stump Island	Four Horn Sculpin	1.592302019	0.098916418	0.422581288
	Point Brower	Humpback Whitefish	1.528913983	0	0.222726807
	Stump Island	Humpback Whitefish	10.95403411	0.693665728	0.522268359
<b>Standard Deviations</b>					
	Bullen Point	Arctic Cisco	1.277353706	0.890821311	2.352774682
	Liberty	Arctic Cisco	1.628424624	0	0.477799356
	Point Brower	Arctic Cisco	6.223163818	0.389315405	0.369350515
	Stump Island	Arctic Cisco	2.441920935	0.775496119	6.791536662
	Liberty	Arctic Cod	12.81887677	0	44.67985581
	North Star	Arctic Cod	9.276243745	1.261065644	6.245083585
	Point Brower	Broad Whitefish	0.563952167	0	0.178487634
	Bullen Point	Four Horn Sculpin	47.25929752	3.44527573	128.9091369
	Liberty	Four Horn Sculpin	1.885618086	0	0.283494425
	Point Brower	Four Horn Sculpin	6.595181693	0.989805025	0.742848564
	Stump Island	Four Horn Sculpin	1.846234825	0.198032393	0.418405227
	Point Brower	Humpback Whitefish	1.228240341	0	0.082760751
	Stump Island	Humpback Whitefish	8.47240152	0.958104658	0.365950792
<b>Number of Samples</b>					
	Bullen Point	Arctic Cisco	9	9	9
	Liberty	Arctic Cisco	8	8	8
	Point Brower	Arctic Cisco	5	5	5
	Stump Island	Arctic Cisco	11	11	11
	Liberty	Arctic Cod	8	8	8
	North Star	Arctic Cod	7	7	7
	Point Brower	Broad Whitefish	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10
	Liberty	Four Horn Sculpin	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12
	Point Brower	Humpback Whitefish	3	3	3
	Stump Island	Humpback Whitefish	13	13	13

SITE_NAME	SPECIES	209 - 2,2',3,3',4,4',5,5',6,6'- Decachlorobiohenvl (Cl10)	2,4'-DDD	2,4'-DDE	2,4'-DDT	4,4'-DDD
<b>Means</b>						
Bullen Point	Arctic Cisco	0.38277512	8.14553453	2.923803726	1.591938527	3.432497566
Liberty	Arctic Cisco	0	9.110824113	0.486526946	1.414963224	2.914804273
Point Brower	Arctic Cisco	0.089285714	16.24988703	0	0.580357142	3.32129022
Stump Island	Arctic Cisco	1.344217955	4.096626393	0.360036004	7.533552502	13.71276658
Liberty	Arctic Cod	4.229179986	0	0	3.3092744	7.322212078
North Star	Arctic Cod	1.988896177	0	0	0	12.04103634
Point Brower	Broad Whitefish	0	0	0	0	3.542603123
Bullen Point	Four Horn Sculpin	14.05683873	0.94017094	0	0	10.09031702
Liberty	Four Horn Sculpin	0	0	0	0	0
Point Brower	Four Horn Sculpin	0.067368422	0	0	0	7.960677304
Stump Island	Four Horn Sculpin	0.044565803	0	0.579150579	0	5.50942337
Point Brower	Humpback Whitefish	0	0	0	0	7.130439517
Stump Island	Humpback Whitefish	0.494482328	0	0.089445438	0	11.79787609
<b>Standard Deviations</b>						
Bullen Point	Arctic Cisco	1.14832536	7.427867296	2.362441335	1.311500458	2.333004594
Liberty	Arctic Cisco	0	8.752387752	1.376106012	1.567746706	3.301628518
Point Brower	Arctic Cisco	0.199648926	13.27384871	0	1.297718021	5.217260008
Stump Island	Arctic Cisco	2.185571999	5.409062649	1.194104335	8.614097518	13.93254864
Liberty	Arctic Cod	11.21057436	0	0	6.157379168	8.815245576
North Star	Arctic Cod	2.818014862	0	0	0	4.423602287
Point Brower	Broad Whitefish	0	0	0	0	3.686875726
Bullen Point	Four Horn Sculpin	43.35004842	2.97308156	0	0	17.38383466
Liberty	Four Horn Sculpin	0	0	0	0	0
Point Brower	Four Horn Sculpin	0.150640371	0	0	0	10.37873334
Stump Island	Four Horn Sculpin	0.104347239	0	2.006236457	0	2.665278008
Point Brower	Humpback Whitefish	0	0	0	0	2.187681453
Stump Island	Humpback Whitefish	1.699645757	0	0.322500115	0	6.734864389
<b>Number of Samples</b>						
Bullen Point	Arctic Cisco	9	9	9	9	9
Liberty	Arctic Cisco	8	8	8	8	8
Point Brower	Arctic Cisco	5	5	5	5	5
Stump Island	Arctic Cisco	11	11	11	11	11
Liberty	Arctic Cod	8	8	8	8	8
North Star	Arctic Cod	7	7	7	7	7
Point Brower	Broad Whitefish	6	6	6	6	6
Bullen Point	Four Horn Sculpin	10	10	10	10	10
Liberty	Four Horn Sculpin	2	2	2	2	2
Point Brower	Four Horn Sculpin	5	5	5	5	5
Stump Island	Four Horn Sculpin	12	12	12	12	12
Point Brower	Humpback Whitefish	3	3	3	3	3
Stump Island	Humpback Whitefish	13	13	13	13	13

	SITE_NAME	SPECIES	4,4'-DDE	4,4'-DDT	Aldrin	alpha-Chlordane	cis-Nonachlor	gamma-Chlordane
<b>Means</b>								
	Bullen Point	Arctic Cisco	3.041589738	0.485153448	0	9.152335353	6.040875801	4.878043703
	Liberty	Arctic Cisco	3.749480784	1.95084754	0.220588235	6.631163244	6.070061238	4.494430918
	Point Brower	Arctic Cisco	11.38488493	1.2538843	0	11.54808737	17.44594407	12.3346646
	Stump Island	Arctic Cisco	14.69316078	5.731311446	0	23.2710613	17.14805593	9.299457792
	Liberty	Arctic Cod	9.90257779	4.171688454	0	8.477547454	10.53283887	6.599706166
	North Star	Arctic Cod	9.926225376	4.206669011	0	13.79722572	9.670996911	11.31082649
	Point Brower	Broad Whitefish	2.060060778	0.609856368	0	2.348797557	2.068091125	0.844290585
	Bullen Point	Four Horn Sculpin	9.80908816	1.039961178	0	3.661231023	9.872986181	5.179836761
	Liberty	Four Horn Sculpin	38.16350915	4.58013313	0	1.520737325	11.08977643	0
	Point Brower	Four Horn Sculpin	17.7404666	4.61095003	0	8.127236712	12.10640553	2.11293087
	Stump Island	Four Horn Sculpin	22.51696899	1.910746892	0	10.53702912	11.31641882	3.272488143
	Point Brower	Humpback Whitefish	4.093314577	1.362724437	0	4.27213419	4.28523836	1.81483503
	Stump Island	Humpback Whitefish	18.71289016	2.837822151	0	6.454147495	14.76032012	4.117891092
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	4.027719358	0.74354219	0	3.619000283	1.832785595	1.659207962
	Liberty	Arctic Cisco	2.576311643	0.592455564	0.623917747	3.989272365	2.270561581	1.651913969
	Point Brower	Arctic Cisco	3.66003401	1.782886454	0	8.285338922	7.461119547	9.7462712
	Stump Island	Arctic Cisco	9.455251898	4.737087677	0	19.40921989	9.563560191	6.028609772
	Liberty	Arctic Cod	9.113595057	2.521624464	0	6.674178804	7.641940933	7.51839662
	North Star	Arctic Cod	7.854903563	2.119078668	0	10.84737336	5.268829672	3.175295976
	Point Brower	Broad Whitefish	2.0959526	0.669725647	0	1.003614668	0.746653199	1.513289374
	Bullen Point	Four Horn Sculpin	12.1863131	1.584202073	0	3.090055437	6.20858794	9.048517946
	Liberty	Four Horn Sculpin	35.07172397	4.522152432	0	2.15064735	2.649085852	0
	Point Brower	Four Horn Sculpin	11.63842975	2.921114791	0	7.088392429	6.458152744	1.629614702
	Stump Island	Four Horn Sculpin	9.287950693	1.891630306	0	4.986457634	3.40581006	2.719923808
	Point Brower	Humpback Whitefish	0.73878435	1.545719664	0	1.616772897	1.3307672	1.864290334
	Stump Island	Humpback Whitefish	17.16220076	3.995065491	0	3.602567582	4.930445646	3.742259953
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13	13

	SITE_NAME	SPECIES	Heptachlor	Heptachlor Eoxide	Oxychlorthane	Methoxychlor	trans-Nonachlor	
<b>Means</b>	Bullen Point	Arctic Cisco	0	0.691121743	8.823694824	3.146746712	11.67693576	
	Liberty	Arctic Cisco	0	2.08430772	10.16675512	3.5236822	13.93952463	
	Point Brower	Arctic Cisco	0	0	15.86833717	58.70349926	28.48453818	
	Stump Island	Arctic Cisco	0.243882677	7.092773012	23.49424345	26.08137288	35.50864889	
	Liberty	Arctic Cod	1.214924046	0	7.83602308	17.50530671	19.87988545	
	North Star	Arctic Cod	1.697504784	0	10.39586449	7.371952211	19.87120623	
	Point Brower	Broad Whitefish	1.50115607	1.300578035	6.6118081	3.091341028	3.134710003	
	Bullen Point	Four Horn Sculpin	0.838705057	1.208941606	14.8683447	7.663837261	20.68359948	
	Liberty	Four Horn Sculpin	0	1.42857143	19.60402795	10.34903568	31.66069295	
	Point Brower	Four Horn Sculpin	5.704547216	2.866362894	19.86374749	18.77770664	21.83867324	
	Stump Island	Four Horn Sculpin	2.767195583	6.450438504	21.46169198	3.48292619	28.00011213	
	Point Brower	Humpback Whitefish	3.367364773	2.24450812	7.714932297	0.970017637	8.90835331	
	Stump Island	Humpback Whitefish	0.77319632	5.112420755	15.09032019	2.763124306	26.99381516	
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco	0	2.07336523	3.021772207	5.040348206	3.416269864
		Liberty	Arctic Cisco	0	2.396945344	5.44865778	6.5253902	4.958825063
Point Brower		Arctic Cisco	0	0	11.16258859	63.07742084	9.553764332	
Stump Island		Arctic Cisco	0.545674009	6.97350261	15.12285648	28.35218552	20.0765573	
Liberty		Arctic Cod	1.735866132	0	3.323058084	9.837407959	11.45114848	
North Star		Arctic Cod	2.32375745	0	3.35144178	8.149418111	12.08133916	
Point Brower		Broad Whitefish	3.388437827	3.185752556	2.346348804	4.116361102	3.493173029	
Bullen Point		Four Horn Sculpin	1.400183093	2.550509358	3.850781463	6.86960018	9.63314589	
Liberty		Four Horn Sculpin	0	2.020305091	12.08321059	1.601520237	12.84112668	
Point Brower		Four Horn Sculpin	4.811228167	2.728467914	9.231470365	8.797207758	9.446851205	
Stump Island		Four Horn Sculpin	1.70584517	5.214938581	7.588009629	3.328944185	7.453980164	
Point Brower		Humpback Whitefish	3.350464056	3.887602102	1.386028633	1.680119831	0.825242615	
Stump Island		Humpback Whitefish	1.614003906	7.156673316	4.066239901	4.841589438	12.11734242	
<b>Number of Samples</b>		Bullen Point	Arctic Cisco	9	9	9	9	9
		Liberty	Arctic Cisco	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	
	Stump Island	Arctic Cisco	11	11	11	11	11	
	Liberty	Arctic Cod	8	8	8	8	8	
	North Star	Arctic Cod	7	7	7	7	7	
	Point Brower	Broad Whitefish	6	6	6	6	6	
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	
	Liberty	Four Horn Sculpin	2	2	2	2	2	
	Point Brower	Four Horn Sculpin	5	5	5	5	5	
	Stump Island	Four Horn Sculpin	12	12	12	12	12	
	Point Brower	Humpback Whitefish	3	3	3	3	3	
	Stump Island	Humpback Whitefish	13	13	13	13	13	

	SITE_NAME	SPECIES	alpha-hexachlorocyclohexane	beta-hexachlorocyclohexane	delta-hexachlorocyclohexane	Endosulfan I
<b>Means</b>						
	Bullen Point	Arctic Cisco	28.83665148	12.54455258	3.866138389	2.476674288
	Liberty	Arctic Cisco	31.5051172	7.410419514	1.861702125	1.229485703
	Point Brower	Arctic Cisco	43.1990676	0.848214286	0.116071428	1.329113924
	Stump Island	Arctic Cisco	23.19648778	0.550964187	0	2.398689938
	Liberty	Arctic Cod	21.83469073	1.417748274	0.339805825	0
	North Star	Arctic Cod	29.53649313	6.17489623	1.249018024	0
	Point Brower	Broad Whitefish	11.65661807	0	0	0
	Bullen Point	Four Horn Sculpin	14.69964162	1.158606476	0	0
	Liberty	Four Horn Sculpin	22.2529442	3.228537295	0	0
	Point Brower	Four Horn Sculpin	24.04836717	0	0	0
	Stump Island	Four Horn Sculpin	25.72426598	2.479783826	0	0
	Point Brower	Humpback Whitefish	14.1936701	0	0	0
	Stump Island	Humpback Whitefish	10.88622815	1.561188345	0	0.092426953
<b>Standard Deviations</b>						
	Bullen Point	Arctic Cisco	6.507004719	5.169423332	7.742248295	5.119590972
	Liberty	Arctic Cisco	12.57543049	7.33409794	5.265688789	1.728715759
	Point Brower	Arctic Cisco	18.00284066	1.896664803	0.259543603	2.971989084
	Stump Island	Arctic Cisco	11.44932608	1.827341482	0	2.57453959
	Liberty	Arctic Cod	3.247711368	2.625684817	0.961116013	0
	North Star	Arctic Cod	6.177536699	6.14670621	2.56291629	0
	Point Brower	Broad Whitefish	4.419270882	0	0	0
	Bullen Point	Four Horn Sculpin	8.96868684	2.131664089	0	0
	Liberty	Four Horn Sculpin	6.328841017	0.061309135	0	0
	Point Brower	Four Horn Sculpin	15.63627577	0	0	0
	Stump Island	Four Horn Sculpin	17.73964727	3.901561937	0	0
	Point Brower	Humpback Whitefish	2.288454734	0	0	0
	Stump Island	Humpback Whitefish	4.801272338	1.690570352	0	0.333250119
<b>Number of Samples</b>						
	Bullen Point	Arctic Cisco	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8
	North Star	Arctic Cod	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13

	SITE_NAME	SPECIES	Endosulfan II	Endosulfan Sulfate	Dieldrin	Endrin	Endrin Aldehyd	Endrin Ketone
<b>Means</b>								
	Bullen Point	Arctic Cisco	0.223285487	0	10.16741795	0	3.584535842	0
	Liberty	Arctic Cisco	0	0	10.75707218	0	1.589221344	0
	Point Brower	Arctic Cisco	3.192571752	0	17.45000359	0	0	0
	Stump Island	Arctic Cisco	5.556202377	0	20.41090374	2.429742975	3.703352001	0
	Liberty	Arctic Cod	2.989660609	0	18.77013184	0	0	0
	North Star	Arctic Cod	0	0	19.83708909	0	0	0
	Point Brower	Broad Whitefish	1.07918119	0.361271677	3.841597692	0.044642857	3.466666667	0
	Bullen Point	Four Horn Sculpin	0	0.909782609	12.88432428	0	7.327514509	0
	Liberty	Four Horn Sculpin	0	0	15.70660525	0.368663595	0	0
	Point Brower	Four Horn Sculpin	3.547108606	1.0041841	14.63151197	0	6.08909194	0
	Stump Island	Four Horn Sculpin	1.325375537	2.148939861	14.2901918	0.278706801	4.866261221	0
	Point Brower	Humpback Whitefish	0	0	7.65696094	0	0	0
	Stump Island	Humpback Whitefish	0	0.604360178	7.793681726	0	18.21712667	0
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	0.66985646	0	4.545526637	0	6.695688592	0
	Liberty	Arctic Cisco	0	0	5.64356704	0	2.469330257	0
	Point Brower	Arctic Cisco	3.908455372	0	6.389562336	0	0	0
	Stump Island	Arctic Cisco	2.9400249	0	11.83160365	7.351807332	4.404543371	0
	Liberty	Arctic Cod	5.749004264	0	4.651319685	0	0	0
	North Star	Arctic Cod	0	0	5.656915243	0	0	0
	Point Brower	Broad Whitefish	1.345907256	0.884931266	1.369615469	0.109352219	8.491564442	0
	Bullen Point	Four Horn Sculpin	0	1.920331214	5.863259765	0	13.57014663	0
	Liberty	Four Horn Sculpin	0	0	1.357731923	0.521369056	0	0
	Point Brower	Four Horn Sculpin	3.018338384	2.24542391	4.338156271	0	8.350868369	0
	Stump Island	Four Horn Sculpin	3.096611514	3.264486689	5.403955284	0.965468679	5.660895375	0
	Point Brower	Humpback Whitefish	0	0	1.424166369	0	0	0
	Stump Island	Humpback Whitefish	0	1.513966071	4.175195125	0	12.73077689	0
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13	13

	SITE_NAME	SPECIES	hexachlorobenzene	lindane	Mirex	Toxaphene	Naphthalene	Benzo[g,h,i]pervlene
<b>Means</b>								
	Bullen Point	Arctic Cisco	34.05340846	6.40572227	0	0	63.96684067	18.15924018
	Liberty	Arctic Cisco	41.80635416	8.008405171	0	0	129.0106359	29.70442723
	Point Brower	Arctic Cisco	87.66187748	5.243668998	4.86956522	0	182.7010201	66.59511634
	Stump Island	Arctic Cisco	92.79170155	6.81880742	0.154269973	0	83.17445075	31.3435525
	Liberty	Arctic Cod	61.42426374	3.389371884	1.829728758	0	330.6998803	27.84968394
	North Star	Arctic Cod	51.02140433	12.24744353	4.41884978	0	281.980654	0
	Point Brower	Broad Whitefish	31.57837442	0.619612698	1.633885742	0	35.10401887	3.699001235
	Bullen Point	Four Horn Sculpin	32.05314306	4.565578729	3.428690125	0	140.4950001	1.648181604
	Liberty	Four Horn Sculpin	28.4263526	4.89759345	3.459378735	0	169.901007	6.608636285
	Point Brower	Four Horn Sculpin	42.2172821	3.142734396	5.565847906	0	139.2341622	16.5914507
	Stump Island	Four Horn Sculpin	37.92713404	5.97011179	4.277204933	0	91.72441613	14.2996381
	Point Brower	Humpback Whitefish	53.33664903	1.764894067	2.798656677	0	26.55907183	0.758322487
	Stump Island	Humpback Whitefish	48.95147131	1.317512655	5.198498598	0	48.7369237	11.03635207
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	12.44181492	1.527395982	0	0	44.16475426	10.39020424
	Liberty	Arctic Cisco	13.14821426	4.364740369	0	0	49.45625735	29.68980377
	Point Brower	Arctic Cisco	50.65580487	6.623950228	10.88867885	0	109.4900561	57.99659948
	Stump Island	Arctic Cisco	59.7379062	5.654435967	0.511655616	0	44.16252921	37.47680193
	Liberty	Arctic Cod	15.36387128	5.109853968	1.612431737	0	112.7549078	50.16718074
	North Star	Arctic Cod	12.8583514	8.442738724	1.636289764	0	78.03733296	0
	Point Brower	Broad Whitefish	12.85760423	0.72369727	0.953782551	0	19.51578919	2.889212213
	Bullen Point	Four Horn Sculpin	15.16555807	4.349457519	2.849567603	0	55.42332788	1.874339454
	Liberty	Four Horn Sculpin	12.17734666	0.930498939	0.125876837	0	46.47667209	2.177198559
	Point Brower	Four Horn Sculpin	17.84787206	3.677195206	2.87423614	0	47.32666605	19.1166199
	Stump Island	Four Horn Sculpin	9.587033546	6.383014741	2.316985714	0	56.20993553	21.29319628
	Point Brower	Humpback Whitefish	7.746454566	0.535932584	0.215820858	0	4.422288873	0.123569805
	Stump Island	Humpback Whitefish	9.639631915	2.653635426	1.782840457	0	15.40083992	14.54140695
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13	13

	SITE_NAME	SPECIES	Biphenyl	C1-Naphthalenes	C2-Naphthalenes	C3-Naphthalenes	C4-Naphthalenes	Acenaphthylene
<b>Means</b>								
	Bullen Point	Arctic Cisco	12.2021489	61.26466103	75.69078127	35.50721441	0	5.376344089
	Liberty	Arctic Cisco	17.23900418	80.15894796	77.07783798	36.31724616	0	0
	Point Brower	Arctic Cisco	34.8150899	89.25773762	120.0654666	4.46428572	0	27.08696676
	Stump Island	Arctic Cisco	16.36542813	54.97258558	88.16664162	22.04266465	0	9.715935088
	Liberty	Arctic Cod	41.47388898	249.1616754	201.325488	76.89104699	0	2.277250046
	North Star	Arctic Cod	8.048925543	188.0415643	143.970042	45.69503549	0	0
	Point Brower	Broad Whitefish	25.9560777	13.1392896	29.04207428	18.43394333	0	2.66071485
	Bullen Point	Four Horn Sculpin	30.23832684	178.197334	194.7407067	79.85108299	0	0.73775355
	Liberty	Four Horn Sculpin	39.2925414	164.797747	149.6159755	67.89554535	0	3.26062468
	Point Brower	Four Horn Sculpin	49.63108506	50.67734082	74.7648023	66.44061004	0	7.79526279
	Stump Island	Four Horn Sculpin	86.39449427	37.67110298	51.90382314	24.88883722	7.319819817	4.588059161
	Point Brower	Humpback Whitefish	17.03855627	9.62128039	18.81603453	16.87408257	0	1.146131807
	Stump Island	Humpback Whitefish	9.235504138	19.78234022	32.07374702	19.60440058	0	6.118614035
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	5.937153578	98.95310881	83.45510209	20.50428488	0	16.12903227
	Liberty	Arctic Cisco	9.309522238	39.2622652	33.86357193	20.92213504	0	0
	Point Brower	Arctic Cisco	24.55207669	59.72915544	62.81852774	9.982446341	0	46.37492325
	Stump Island	Arctic Cisco	10.56448652	33.41417849	59.01785423	45.86713441	0	20.02558126
	Liberty	Arctic Cod	23.57691755	121.6936265	87.90051948	32.23566694	0	2.578145255
	North Star	Arctic Cod	14.35964863	85.43098565	47.5002936	22.80574812	0	0
	Point Brower	Broad Whitefish	42.31883823	6.686514949	18.91300215	16.08141272	0	2.015355617
	Bullen Point	Four Horn Sculpin	13.60073131	88.64995707	65.67166976	22.15564508	0	1.077132786
	Liberty	Four Horn Sculpin	8.951375617	60.21088488	23.02713385	1.737896853	0	0.211444118
	Point Brower	Four Horn Sculpin	46.55495192	21.47233174	34.72465809	42.33816586	0	7.957610841
	Stump Island	Four Horn Sculpin	55.64574602	21.74632977	36.79649133	43.13595569	25.35659965	8.819170607
	Point Brower	Humpback Whitefish	3.631256728	0.792942705	2.082627843	3.736931724	0	1.985158521
	Stump Island	Humpback Whitefish	2.364897905	3.746241661	7.18279339	17.20370805	0	5.454083873
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13	13

	SITE_NAME	SPECIES	Acenaphthene	Anthracene	Dibenzothiophene	C1- Dibenzothiophenes	C2- Dibenzothiophenes
<b>Means</b>	Bullen Point	Arctic Cisco	0	0.590520191	4.281866797	0	0
	Liberty	Arctic Cisco	0	4.111850858	6.330750371	0	0
	Point Brower	Arctic Cisco	0	23.13879104	7.70145829	0	0
	Stump Island	Arctic Cisco	0	2.117488739	7.167620834	2.182718273	2.475247527
	Liberty	Arctic Cod	7.606132865	2.942952659	6.167910939	3.731392733	8.3508115
	North Star	Arctic Cod	2.011239271	1.7948096	1.20733883	7.75146981	9.165353586
	Point Brower	Broad Whitefish	11.94610049	2.714744478	2.487159462	3.046823213	2.996487028
	Bullen Point	Four Horn Sculpin	5.060072094	1.258230508	131.2294499	1.00719424	0
	Liberty	Four Horn Sculpin	9.974398345	3.18911077	8.86755419	7.11469534	0
	Point Brower	Four Horn Sculpin	12.94178993	15.27554629	12.29713951	35.14893754	71.35050644
	Stump Island	Four Horn Sculpin	9.359491409	9.108895544	7.56536313	7.024387948	10.38707134
	Point Brower	Humpback Whitefish	8.930203827	1.21165913	1.44489063	0	0
	Stump Island	Humpback Whitefish	12.03560588	1.746969387	2.653633008	0	0
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco	0	0.969096429	0.848766976	0
Liberty		Arctic Cisco	0	7.49608332	2.076820279	0	0
Point Brower		Arctic Cisco	0	24.97110183	9.799341371	0	0
Stump Island		Arctic Cisco	0	2.748076921	5.347219165	7.239257534	8.209467311
Liberty		Arctic Cod	7.95774021	4.010085455	2.770232089	4.17575246	9.383860988
North Star		Arctic Cod	5.321238939	4.748619852	2.153947292	7.49427014	12.6323765
Point Brower		Broad Whitefish	7.826741651	2.692431441	1.306463572	3.4538227	4.649150548
Bullen Point		Four Horn Sculpin	6.634315762	1.616290709	403.4527924	3.185027845	0
Liberty		Four Horn Sculpin	1.535142193	1.251527101	0.493610978	0.93774018	0
Point Brower		Four Horn Sculpin	6.926229268	14.87411567	12.77501709	60.23740583	120.3047383
Stump Island		Four Horn Sculpin	8.690470364	20.84758835	8.649316058	12.66590139	17.30890773
Point Brower		Humpback Whitefish	2.070797603	0.68772973	0.198800759	0	0
Stump Island		Humpback Whitefish	7.966650348	0.476440855	0.604580154	0	0
<b>Number of Samples</b>		Bullen Point	Arctic Cisco	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13

	SITE_NAME	SPECIES	C3-Dibenzothioophenes	Fluorene	C1-Fluorenes	C2-Fluorenes	C3-Fluorenes	Phenanthrene
<b>Means</b>								
	Bullen Point	Arctic Cisco	0	8.20753412	0	0	0	19.25652237
	Liberty	Arctic Cisco	0	12.29601012	0	0	0	26.56291725
	Point Brower	Arctic Cisco	0	26.99734083	0	0	0	78.75263344
	Stump Island	Arctic Cisco	13.05130509	12.19735602	0	0	0	38.80194645
	Liberty	Arctic Cod	1.356132075	15.24016515	15.48487995	29.48916406	17.80185763	25.83466699
	North Star	Arctic Cod	0	4.123211257	7.4416632	0	0	24.41276893
	Point Brower	Broad Whitefish	1.396917148	4.563465618	6.978078223	4.3956044	0	18.42418175
	Bullen Point	Four Horn Sculpin	0	43.62256933	3.14076012	0	0	11.73920736
	Liberty	Four Horn Sculpin	0	18.92814475	0	0	0	41.80747565
	Point Brower	Four Horn Sculpin	47.43941806	22.04073527	27.8364243	47.6780185	61.609907	94.71163168
	Stump Island	Four Horn Sculpin	5.572094375	12.14164879	9.619534658	5.067567567	5.743995788	48.07340293
	Point Brower	Humpback Whitefish	0	3.340993527	0	0	0	11.60045696
	Stump Island	Humpback Whitefish	0	5.048655534	0	0	0	15.20995091
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	0	3.901793342	0	0	0	5.944240233
	Liberty	Arctic Cisco	0	6.576680283	0	0	0	16.3338267
	Point Brower	Arctic Cisco	0	15.08231359	0	0	0	44.47887449
	Stump Island	Arctic Cisco	43.28628201	8.402669646	0	0	0	23.36385808
	Liberty	Arctic Cod	3.835720746	10.1990487	18.17900636	66.65479261	50.35125698	22.86972416
	North Star	Arctic Cod	0	10.90899159	12.83056512	0	0	49.74022652
	Point Brower	Broad Whitefish	3.421734226	2.395510679	8.116629646	10.76698789	0	11.10511623
	Bullen Point	Four Horn Sculpin	0	115.0050076	6.6621407	0	0	12.62981608
	Liberty	Four Horn Sculpin	0	5.817127002	0	0	0	3.72923697
	Point Brower	Four Horn Sculpin	76.97711207	17.03092067	29.83199166	72.78637098	85.84285719	68.11140215
	Stump Island	Four Horn Sculpin	13.11041888	14.07579465	13.7390699	17.55456899	19.47330335	70.85332458
	Point Brower	Humpback Whitefish	0	0.430449473	0	0	0	1.88192146
	Stump Island	Humpback Whitefish	0	0.764365549	0	0	0	2.892573048
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13	13

	SITE_NAME	SPECIES	C1-Phenanthrenes/ anthracenes	C2-Phenanthrenes/ anthracenes	C3-Phenanthrenes/ anthracenes	C4-Phenanthrenes/ anthracenes
<b>Means</b>	Bullen Point	Arctic Cisco	0	0	0	0
	Liberty	Arctic Cisco	0	0	0	0
	Point Brower	Arctic Cisco	0	0	0	0
	Stump Island	Arctic Cisco	0	0	0	0
	Liberty	Arctic Cod	21.59026234	15.74085433	0	0
	North Star	Arctic Cod	42.62539279	40.44586553	9.234215571	0
	Point Brower	Broad Whitefish	9.31570035	8.724041967	0	0
	Bullen Point	Four Horn Sculpin	5.904416169	3.22440087	0	0
	Liberty	Four Horn Sculpin	22.8298344	37.4466633	0	0
	Point Brower	Four Horn Sculpin	98.87524886	147.3604107	63.5294118	42.3529412
	Stump Island	Four Horn Sculpin	31.89744129	26.95006237	8.0473419	0
	Point Brower	Humpback Whitefish	0	0	0	0
	Stump Island	Humpback Whitefish	0	0	0	0
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco	0	0	0
Liberty		Arctic Cisco	0	0	0	0
Point Brower		Arctic Cisco	0	0	0	0
Stump Island		Arctic Cisco	0	0	0	0
Liberty		Arctic Cod	16.79364541	17.93520964	0	0
North Star		Arctic Cod	23.53349693	26.25265416	17.18428518	0
Point Brower		Broad Whitefish	15.04730662	13.55332531	0	0
Bullen Point		Four Horn Sculpin	9.035307657	7.263081131	0	0
Liberty		Four Horn Sculpin	7.521231363	20.37201309	0	0
Point Brower		Four Horn Sculpin	117.6343388	222.7946532	142.0560834	94.70405557
Stump Island		Four Horn Sculpin	50.56618999	37.86744256	19.38362837	0
Point Brower		Humpback Whitefish	0	0	0	0
Stump Island		Humpback Whitefish	0	0	0	0
<b>Number of Samples</b>		Bullen Point	Arctic Cisco	9	9	9
	Liberty	Arctic Cisco	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8
	North Star	Arctic Cod	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13

	SITE_NAME	SPECIES	Benzo[a] anthracene	Chrysene	C1-Chrysenes	C2-Chrysenes	C3-Chrysenes	C4-Chrysenes
<b>Means</b>	Bullen Point	Arctic Cisco	0	0	0	0	0	0
	Liberty	Arctic Cisco	0	0	0	0	0	0
	Point Brower	Arctic Cisco	0	0	0	0	0	0
	Stump Island	Arctic Cisco	0	0	0	0	0	0
	Liberty	Arctic Cod	3.041774673	4.660618488	2.532536205	0	0	0
	North Star	Arctic Cod	7.096404603	16.09640774	3.156672751	0	0	0
	Point Brower	Broad Whitefish	4.213619825	6.589254783	2.894552453	0	0	0
	Bullen Point	Four Horn Sculpin	0.505050505	1.24579125	1.84503492	0	0	0
	Liberty	Four Horn Sculpin	0	0	4.074074075	0	0	0
	Point Brower	Four Horn Sculpin	33.11753819	46.58715653	53.49195956	40	20	0
	Stump Island	Four Horn Sculpin	24.84656008	30.61842246	12.46792655	0	0	0
	Point Brower	Humpback Whitefish	0	0	0	0	0	0
	Stump Island	Humpback Whitefish	0	0	0	0	0	0
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco	0	0	0	0	0
Liberty		Arctic Cisco	0	0	0	0	0	0
Point Brower		Arctic Cisco	0	0	0	0	0	0
Stump Island		Arctic Cisco	0	0	0	0	0	0
Liberty		Arctic Cod	5.932810447	8.985078735	4.276578167	0	0	0
North Star		Arctic Cod	6.968963122	14.95520729	4.059953324	0	0	0
Point Brower		Broad Whitefish	8.102864493	10.42605311	4.636835232	0	0	0
Bullen Point		Four Horn Sculpin	1.597109929	3.939537839	3.018339423	0	0	0
Liberty		Four Horn Sculpin	0	0	5.761610811	0	0	0
Point Brower		Four Horn Sculpin	39.10742138	58.28967061	98.97713601	89.4427191	44.72135955	0
Stump Island		Four Horn Sculpin	55.4953209	55.55176826	29.49714337	0	0	0
Point Brower		Humpback Whitefish	0	0	0	0	0	0
Stump Island		Humpback Whitefish	0	0	0	0	0	0
<b>Number of Samples</b>		Bullen Point	Arctic Cisco	9	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13	13

	SITE_NAME	SPECIES	Fluoranthene	Pyrene	C1-Fluoranthenes/ dvrenes	C2-Fluoranthenes/ dvrenes	C3-Fluoranthenes/ dvrenes	
<b>Means</b>	Bullen Point	Arctic Cisco	5.770148157	4.066086163	0	0	0	
	Liberty	Arctic Cisco	7.629408855	4.697013789	0	0	0	
	Point Brower	Arctic Cisco	27.72955293	24.47477175	0	0	0	
	Stump Island	Arctic Cisco	13.58249606	9.181615131	0	0	0	
	Liberty	Arctic Cod	7.527748788	5.269528691	8.87361445	2.505896225	0	
	North Star	Arctic Cod	11.64200824	0	19.42100356	0	0	
	Point Brower	Broad Whitefish	9.377516958	7.960615402	6.282964517	3.748710617	0	
	Bullen Point	Four Horn Sculpin	3.953039911	2.90629481	0	0	0	
	Liberty	Four Horn Sculpin	11.64533198	8.41099165	0	0	0	
	Point Brower	Four Horn Sculpin	57.9056578	63.21070278	82.82011032	64.83062302	31.7647058	
	Stump Island	Four Horn Sculpin	39.12979635	33.54959258	26.89503578	13.9191192	2.970297033	
	Point Brower	Humpback Whitefish	4.52793809	2.729435483	0	0	0	
	Stump Island	Humpback Whitefish	5.027047199	4.336460934	0	0	0	
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco	2.421903071	1.780672856	0	0	0
		Liberty	Arctic Cisco	4.421538199	2.297057778	0	0	0
Point Brower		Arctic Cisco	28.57105132	17.69477551	0	0	0	
Stump Island		Arctic Cisco	10.83565822	7.815718294	0	0	0	
Liberty		Arctic Cod	8.324145286	6.130659607	7.899398116	7.087744855	0	
North Star		Arctic Cod	30.80185857	0	17.97956606	0	0	
Point Brower		Broad Whitefish	12.2049484	10.73535209	10.38353668	5.834851023	0	
Bullen Point		Four Horn Sculpin	4.523426475	3.420047494	0	0	0	
Liberty		Four Horn Sculpin	3.434760046	2.770980002	0	0	0	
Point Brower		Four Horn Sculpin	57.91469681	65.78332748	110.945267	110.1600444	71.02804145	
Stump Island		Four Horn Sculpin	82.84753069	74.57041828	58.33103148	32.54279479	10.28941075	
Point Brower		Humpback Whitefish	1.107511793	0.518793733	0	0	0	
Stump Island		Humpback Whitefish	1.388267678	1.476230584	0	0	0	
<b>Number of Samples</b>		Bullen Point	Arctic Cisco	9	9	9	9	9
		Liberty	Arctic Cisco	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	
	Stump Island	Arctic Cisco	11	11	11	11	11	
	Liberty	Arctic Cod	8	8	8	8	8	
	North Star	Arctic Cod	7	7	7	7	7	
	Point Brower	Broad Whitefish	6	6	6	6	6	
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	
	Liberty	Four Horn Sculpin	2	2	2	2	2	
	Point Brower	Four Horn Sculpin	5	5	5	5	5	
	Stump Island	Four Horn Sculpin	12	12	12	12	12	
	Point Brower	Humpback Whitefish	3	3	3	3	3	
	Stump Island	Humpback Whitefish	13	13	13	13	13	

	SITE_NAME	SPECIES	Benzo[a] pyrene	Benzo[e] pyrene	Benzo[b] fluoranthene	Benzo[k] fluoranthene	Dibenzo[a,h] anthracene	Perylene	
<b>Means</b>	Bullen Point	Arctic Cisco	0	0	0.531632111	0.202020202	0	0	
	Liberty	Arctic Cisco	0	0	0	0	0	0	
	Point Brower	Arctic Cisco	0	0	0	0	0	0	
	Stump Island	Arctic Cisco	0	0	0.247524753	0.132763276	0	0	
	Liberty	Arctic Cod	0.174148606	12.80588828	1.764559845	2.092265909	0.566037736	0	
	North Star	Arctic Cod	0	0	0	4.123211257	0	0.899100899	
	Point Brower	Broad Whitefish	9.402448355	2.714768097	3.56357409	2.955615897	0.361271677	2.16033164	
	Bullen Point	Four Horn Sculpin	0	0	0.612029915	0.376901709	0	2.095861776	
	Liberty	Four Horn Sculpin	0	0	1.85185185	1.111111111	0	8.1174262	
	Point Brower	Four Horn Sculpin	20.89308366	17.93802038	25.54157146	14.34202767	5.691875322	13.99102579	
	Stump Island	Four Horn Sculpin	21.79802293	16.55835043	23.43642598	18.29271834	3.666041506	8.537052249	
	Point Brower	Humpback Whitefish	2.71132437	2.946564383	0.672708117	0.459968767	0	1.05885236	
	Stump Island	Humpback Whitefish	0	0	1.27942168	1.1024773	0.175438596	0.411522634	
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco	0	0	1.594896333	0.606060607	0	0
		Liberty	Arctic Cisco	0	0	0	0	0	0
Point Brower		Arctic Cisco	0	0	0	0	0	0	
Stump Island		Arctic Cisco	0	0	0.820946731	0.440325974	0	0	
Liberty		Arctic Cod	0.492566642	34.8648351	3.299978955	4.210686808	1.600996487	0	
North Star		Arctic Cod	0	0	0	10.90899159	0	2.378797381	
Point Brower		Broad Whitefish	9.537205326	5.20975024	6.940348531	5.782569143	0.884931266	3.428690561	
Bullen Point		Four Horn Sculpin	0	0	1.3879771	0.800693005	0	4.473686603	
Liberty		Four Horn Sculpin	0	0	2.618914002	1.571348401	0	6.85262386	
Point Brower		Four Horn Sculpin	24.90190953	19.77115842	30.11487739	15.37408438	6.972242069	9.109165462	
Stump Island		Four Horn Sculpin	59.30274193	40.904621	51.07763007	43.23850528	6.568281964	13.84607939	
Point Brower		Humpback Whitefish	2.359411885	2.849467488	0.623125866	0.402128124	0	1.162401181	
Stump Island		Humpback Whitefish	0	0	2.109006602	1.840801398	0.632552854	1.483765957	
<b>Number of Samples</b>		Bullen Point	Arctic Cisco	9	9	9	9	9	9
		Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5	
	Stump Island	Arctic Cisco	11	11	11	11	11	11	
	Liberty	Arctic Cod	8	8	8	8	8	8	
	North Star	Arctic Cod	7	7	7	7	7	7	
	Point Brower	Broad Whitefish	6	6	6	6	6	6	
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10	
	Liberty	Four Horn Sculpin	2	2	2	2	2	2	
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5	
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12	
	Point Brower	Humpback Whitefish	3	3	3	3	3	3	
	Stump Island	Humpback Whitefish	13	13	13	13	13	13	

	SITE_NAME	SPECIES	Indeno[1,2,3,-c,d] ovrene	Percent Lipids	Percent Solids	Total PCB congeners	Total PCBs	Total Pesticides
<b>Means</b>								
	Bullen Point	Arctic Cisco	0	100	769.6163134	136.9454419	68.47272094	166.1886582
	Liberty	Arctic Cisco	0	100	937.929624	136.3781837	68.18909181	170.9257375
	Point Brower	Arctic Cisco	0	100	2190.243781	166.8381198	83.41905984	341.0855286
	Stump Island	Arctic Cisco	0	100	1726.804601	257.6592203	128.8296102	346.2780716
	Liberty	Arctic Cod	2.816926884	100	548.2644948	468.6193796	234.3096895	208.7473861
	North Star	Arctic Cod	1.301390121	100	451.2254147	663.7238136	331.8619067	224.7747016
	Point Brower	Broad Whitefish	1.87029491	100	643.3618433	104.5682652	52.2841326	81.39514372
	Bullen Point	Four Horn Sculpin	0.973517871	100	709.7500928	4620.050001	2310.025006	162.8843008
	Liberty	Four Horn Sculpin	0	100	870.0034135	201.635433	100.8177164	196.7365595
	Point Brower	Four Horn Sculpin	12.43686316	100	1035.615663	455.6907887	227.8453944	221.9558328
	Stump Island	Four Horn Sculpin	12.79871755	100	722.2322638	504.3780409	252.1890203	217.0925661
	Point Brower	Humpback Whitefish	0	100	403.1938017	237.6370097	118.8185047	125.914693
	Stump Island	Humpback Whitefish	1.123851721	100	795.9993532	1221.106631	610.5533153	204.125764
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	0	0	184.8171776	39.28039772	19.64019885	58.67934307
	Liberty	Arctic Cisco	0	0	282.4281667	94.31419008	47.15709496	62.14389345
	Point Brower	Arctic Cisco	0	0	1063.452326	65.25351814	32.62675902	181.2990547
	Stump Island	Arctic Cisco	0	0	992.8589671	108.7191005	54.35955033	186.1543071
	Liberty	Arctic Cod	6.118763256	0	140.193909	573.8629084	286.9314536	63.46523213
	North Star	Arctic Cod	3.44315462	0	104.7817811	470.1901061	235.0950532	53.52931943
	Point Brower	Broad Whitefish	3.145757754	0	208.2770391	114.5423781	57.27118905	26.92048823
	Bullen Point	Four Horn Sculpin	1.981145448	0	121.2056151	12291.02109	6145.510559	40.6338885
	Liberty	Four Horn Sculpin	0	0	125.1889175	14.34344185	7.171721068	72.02604876
	Point Brower	Four Horn Sculpin	17.14736679	0	140.611241	298.3088106	149.1544056	77.9334226
	Stump Island	Four Horn Sculpin	27.77526532	0	200.1725648	178.9666377	89.48331889	67.94282108
	Point Brower	Humpback Whitefish	0	0	29.57567495	134.8443251	67.42216227	18.55759373
	Stump Island	Humpback Whitefish	1.578619991	0	258.3306925	1286.411407	643.2057037	44.19607761
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13	13

	SITE_NAME	SPECIES	Total DDTs	Total HCHs	Total Chlordanes	Total Endosulphans	Total Endrin	Total Low PAHs
<b>Means</b>								
	Bullen Point	Arctic Cisco	19.62051751	45.24734243	44.40975388	2.699959773	3.584535842	222.3775932
	Liberty	Arctic Cisco	19.62744688	40.77723883	46.90992508	1.229485703	1.589221344	260.094565
	Point Brower	Arctic Cisco	32.79030363	44.16335332	144.3850707	4.521685684	0	412.2797704
	Stump Island	Arctic Cisco	46.12745369	23.74745197	142.139496	7.954892304	6.133094975	269.2569381
	Liberty	Arctic Cod	24.70575273	23.59224481	72.04623179	2.989660609	0	742.4665323
	North Star	Arctic Cod	26.17393073	36.96040741	74.11557693	0	0	535.9688956
	Point Brower	Broad Whitefish	6.212520265	11.65661807	20.90077252	1.440452867	3.511309523	166.2214038
	Bullen Point	Four Horn Sculpin	21.87953729	15.85824809	63.97748214	0.909782609	7.327514509	689.9515047
	Liberty	Four Horn Sculpin	42.74364225	25.4814815	75.65284175	0	0.368663595	575.0203105
	Point Brower	Four Horn Sculpin	30.31209392	24.04836717	91.39761054	4.551292706	6.08909194	1049.757169
	Stump Island	Four Horn Sculpin	30.51628981	28.2040498	87.28830044	3.474315399	5.144968022	409.3244359
	Point Brower	Humpback Whitefish	12.58647856	14.1936701	33.5773837	0	0	90.0242897
	Stump Island	Humpback Whitefish	33.43803383	12.4474165	76.06523546	0.696787132	18.21712667	123.5094208
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	11.69244124	17.03487241	18.74205607	5.251482572	6.695688592	227.5375569
	Liberty	Arctic Cisco	13.19976417	19.34212544	20.88881482	1.728715759	2.469330257	123.0217967
	Point Brower	Arctic Cisco	18.09163954	16.40956074	97.5431891	6.672344577	0	237.6451717
	Stump Island	Arctic Cisco	24.19025111	11.8571289	84.97716205	4.761530786	7.324824069	149.206745
	Liberty	Arctic Cod	21.73896669	3.985947776	34.95541835	5.749004264	0	261.2625325
	North Star	Arctic Cod	11.96963259	13.59461442	28.8083442	0	0	143.6579381
	Point Brower	Broad Whitefish	5.221817892	4.419270882	6.594307571	1.287968731	8.470371657	97.46345487
	Bullen Point	Four Horn Sculpin	26.87070752	10.89554909	17.72400776	1.920331214	13.57014663	431.1117144
	Liberty	Four Horn Sculpin	39.59387634	6.390150145	25.00399094	0	0.521369056	68.17286552
	Point Brower	Four Horn Sculpin	19.12360497	15.63627577	31.91714902	3.174786316	8.350868369	1210.662703
	Stump Island	Four Horn Sculpin	10.40519213	21.34417646	24.59285632	5.939780633	5.47893724	409.8909976
	Point Brower	Humpback Whitefish	3.870524624	2.288454734	10.14225269	0	0	11.45845648
	Stump Island	Humpback Whitefish	20.40449471	4.645057922	18.98816442	1.510668959	12.73077689	22.09930734
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	9	9	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	11	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	13	13

	SITE_NAME	SPECIES	Total High PAHs	Total PAHs	PHN Equivalents (na/a)	BaP Equivalents (na/a)	Liver Hep	Gut muc ept
<b>Means</b>								
	Bullen Point	Arctic Cisco	10.56988663	232.9474798	9700	9700	0.5625	0
	Liberty	Arctic Cisco	12.32642264	272.4209876			1.6875	0
	Point Brower	Arctic Cisco	52.20432472	464.4840952	5050	255	1.05	0
	Stump Island	Arctic Cisco	23.14439922	292.4013371	6811.111111	318.8888889	0.975	
	Liberty	Arctic Cod	54.63154471	797.098078	12000	180	0.5625	0.5
	North Star	Arctic Cod	63.73619921	599.7050949	3550	35.5	1.75	2.25
	Point Brower	Broad Whitefish	64.09553918	230.3169432	5520	84.2	1.708333333	0
	Bullen Point	Four Horn Sculpin	14.51352267	704.465027	2361.25	63.25	1.4	4.4
	Liberty	Four Horn Sculpin	35.21078685	610.2310975	1145	22.5	0.75	2
	Point Brower	Four Horn Sculpin	604.5629212	1654.32009	48.25	10.75	4.7	5.95
	Stump Island	Four Horn Sculpin	289.4840788	698.8085146	3436.666667	136.1111111	3.208333333	
	Point Brower	Humpback Whitefish	15.10679158	105.131081	5866.666667	80.33333333	0	0
	Stump Island	Humpback Whitefish	13.45622008	136.9656408	6538.461538	171.6923077	0.375	0
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	5.821219936	227.9886389			0.664803945	0
	Liberty	Arctic Cisco	6.708679373	128.9374596			0.873723559	0
	Point Brower	Arctic Cisco	44.96880906	275.5123978	4030.508653	91.92388155	0.670820393	0
	Stump Island	Arctic Cisco	17.79007732	160.5439841	2153.163048	70.78920194	1.003120132	
	Liberty	Arctic Cod	49.10279878	274.8810644			0.776323754	0.645497224
	North Star	Arctic Cod	74.65352001	185.8871912	2333.452378	23.33452378	0.612372436	1.942935923
	Point Brower	Broad Whitefish	87.36764676	165.8599005	3550.633746	46.05648706	1.860219521	0
	Bullen Point	Four Horn Sculpin	12.06189013	435.533591	1929.325845	29.59126319	3.098386677	2.221110833
	Liberty	Four Horn Sculpin	23.01023704	45.16262939	784.8885271	3.535533906	1.060660172	1.414213562
	Point Brower	Four Horn Sculpin	775.6181673	1982.602462	33.41032774	9.5	3.07408523	3.346640106
	Stump Island	Four Horn Sculpin	639.6109012	983.7964827	7717.242059	260.552991	2.67529381	
	Point Brower	Humpback Whitefish	6.402169882	16.7968987	2557.994006	39.01709027	0	0
	Stump Island	Humpback Whitefish	6.507755842	20.28830032	11405.15515	125.232041	0.932372341	0
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	1	1	8	7
	Liberty	Arctic Cisco	8	8	0	0	8	7
	Point Brower	Arctic Cisco	5	5	2	2	5	2
	Stump Island	Arctic Cisco	11	11	7	7	10	0
	Liberty	Arctic Cod	8	8	1	1	8	7
	North Star	Arctic Cod	7	7	2	2	6	6
	Point Brower	Broad Whitefish	6	6	5	5	6	4
	Bullen Point	Four Horn Sculpin	10	10	8	8	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	4	4	5	5
	Stump Island	Four Horn Sculpin	12	12	9	9	12	0
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	13	13	13	13	12	2

	SITE_NAME	SPECIES	% water	As (µg/g)	Ba (µg/g)	Cd (µg/g)	Cr (µg/g)	Cu (µg/g)	
<b>Means</b>	Bullen Point	Arctic Cisco	72.88888889	3.472222222	2.132222222	0.023666667	0.232222222	21.2	
	Liberty	Arctic Cisco	74	3.56125	1.85875	0.032	0.365	25.18571429	
	Point Brower	Arctic Cisco	75.2	3.07	2.272	0.0444	0.278	15.38	
	Stump Island	Arctic Cisco	74.72727273	3.673636364	2.349090909	0.028909091	0.49	26.71111111	
	Liberty	Arctic Cod	77.875	13.13375	2.65875	0.14275	0.37	6.175	
	North Star	Arctic Cod	76.28571429	11.60285714	3.752857143	0.227	0.462857143	14.35714286	
	Point Brower	Broad Whitefish	67	0.761666667	3.691666667	0.033666667	0.68	3.996666667	
	Bullen Point	Four Horn Sculpin	75.6	3.056	7.011	0.123	0.805	14.0625	
	Liberty	Four Horn Sculpin	65.5	4.465	11.635	0.1245	1.615	18.9	
	Point Brower	Four Horn Sculpin	77	3.992	12.692	0.0535	1.088	18.38	
	Stump Island	Four Horn Sculpin	75.41666667	5.448333333	8.629166667	0.188916667	0.6075	15.70833333	
	Point Brower	Humpback Whitefish	71.33333333	2.156666667	4.81	0.018333333	0.563333333	3.666666667	
	Stump Island	Humpback Whitefish	74.07692308	2.353076923	5.697692308	0.037769231	0.606166667	32.96666667	
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco	1.96497102	0.58938056	0.515164483	0.010805091	0.070316744	27.25447975
		Liberty	Arctic Cisco	1.195228609	0.24121345	0.539508705	0.011563489	0.145405836	22.49188213
Point Brower		Arctic Cisco	1.923538406	0.675018518	0.575213004	0.019269146	0.077910205	12.86281462	
Stump Island		Arctic Cisco	3.977207792	0.531117176	0.573767454	0.011004131	0.229738982	13.19937919	
Liberty		Arctic Cod	1.356202682	3.840792097	1.279926756	0.078852031	0.103647755	1.944038506	
North Star		Arctic Cod	2.627691364	2.430649531	1.027451772	0.045284287	0.147615975	20.73843912	
Point Brower		Broad Whitefish	8.579044236	0.503563965	1.953094126	0.015641824	0.572538208	2.688357615	
Bullen Point		Four Horn Sculpin	2.633122354	0.561786832	3.295098886	0.074387872	0.505552503	7.349429035	
Liberty		Four Horn Sculpin	3.535533906	0.671751442	3.344615075	0.007778175	0.51618795	9.050966799	
Point Brower		Four Horn Sculpin	4.062019202	1.624306006	3.020483405	0.026108747	0.356819282	16.65523942	
Stump Island		Four Horn Sculpin	1.880924982	1.465920954	1.751811833	0.088149107	0.160970071	9.303514325	
Point Brower		Humpback Whitefish	0.577350269	0.662293993	3.167664755	0.006027714	0.30664855	0.513160144	
Stump Island		Humpback Whitefish	1.846687957	0.543574353	2.409007935	0.013608538	0.610916872	48.24214177	
<b>Number of Samples</b>		Bullen Point	Arctic Cisco		9	9	9	9	9
		Liberty	Arctic Cisco		8	8	8	8	8
	Point Brower	Arctic Cisco		5	5	5	5	5	
	Stump Island	Arctic Cisco		11	11	11	11	11	
	Liberty	Arctic Cod		8	8	8	8	8	
	North Star	Arctic Cod		7	7	7	7	7	
	Point Brower	Broad Whitefish		6	6	6	6	6	
	Bullen Point	Four Horn Sculpin		10	10	10	10	8	
	Liberty	Four Horn Sculpin		2	2	2	2	2	
	Point Brower	Four Horn Sculpin		5	5	4	5	5	
	Stump Island	Four Horn Sculpin		12	12	12	12	12	
	Point Brower	Humpback Whitefish		3	3	3	3	3	
	Stump Island	Humpback Whitefish		13	13	13	12	12	

	SITE_NAME	SPECIES	Fe (µg/g)	Hg (µg/g)	Ni (µg/g)	Pb (µg/g)	Se (µg/g)	V (µg/g)
<b>Means</b>								
	Bullen Point	Arctic Cisco	93.64444444	0.056666667	1.144444444	0.213125	1.555555556	0.968888889
	Liberty	Arctic Cisco	53.4875	0.059625	1.17875	0.675	1.8075	1.2625
	Point Brower	Arctic Cisco	81.7688	0.1536	0.4762	0.5706	2.008	26.882
	Stump Island	Arctic Cisco	90.61818182	0.086363636	1.474545455	0.528333333	1.71	1.213636364
	Liberty	Arctic Cod	72.175	0.0375	0.58375	0.099625	3.435	1.2825
	North Star	Arctic Cod	151.9428571	0.057714286	0.931428571	0.161428571	1.982857143	0.97
	Point Brower	Broad Whitefish	226.0166667	0.0725	0.941666667	0.187333333	2.053333333	1.855
	Bullen Point	Four Horn Sculpin	293.3	0.1331	0.826	0.4994	2.565	2.49
	Liberty	Four Horn Sculpin	663	0.088	1.025	0.2645	2.465	3.29
	Point Brower	Four Horn Sculpin	348.8	0.17	0.94	0.4224	2.634	2.738
	Stump Island	Four Horn Sculpin	238.8083333	0.22175	1.108333333	0.269083333	2.385833333	2.654166667
	Point Brower	Humpback Whitefish	168.6	0.092333333	1.096666667	0.081666667	1.926666667	1.47
	Stump Island	Humpback Whitefish	166.8916667	0.198230769	2.462307692	0.524416667	2	2.096923077
<b>Standard Deviations</b>								
	Bullen Point	Arctic Cisco	33.91747747	0.009313968	0.851089171	0.225409746	0.317887996	0.242922027
	Liberty	Arctic Cisco	17.76846625	0.006545173	0.845144747	0.767121149	0.231254344	0.369546054
	Point Brower	Arctic Cisco	84.81927651	0.143815159	0.352373665	1.157107947	0.574560702	57.64557329
	Stump Island	Arctic Cisco	45.51869546	0.01075428	0.914793568	0.500029749	0.289931026	0.381451772
	Liberty	Arctic Cod	26.61104765	0.013700886	0.209484913	0.025922618	0.506105579	0.489482234
	North Star	Arctic Cod	56.09714363	0.017230925	0.757835263	0.068168559	0.552530973	0.312836486
	Point Brower	Broad Whitefish	158.6897655	0.016670333	0.783847349	0.190164841	0.325985685	0.335663522
	Bullen Point	Four Horn Sculpin	271.8774438	0.024709198	0.574421448	0.420757307	0.306929235	0.474833304
	Liberty	Four Horn Sculpin	229.1025971	0.028284271	0.431335137	0.055861436	0.16263456	1.230365799
	Point Brower	Four Horn Sculpin	134.0790811	0.189296064	0.384621026	0.516538285	0.329742324	0.287262946
	Stump Island	Four Horn Sculpin	92.22534121	0.113754221	0.652754072	0.275065102	0.721582331	0.750544752
	Point Brower	Humpback Whitefish	125.2368955	0.008020806	0.571343446	0.046758243	0.444109596	0.612127438
	Stump Island	Humpback Whitefish	127.6515389	0.066092301	2.917510794	0.545709456	0.254558441	1.028983192
<b>Number of Samples</b>								
	Bullen Point	Arctic Cisco	9	9	9	8	9	9
	Liberty	Arctic Cisco	8	8	8	8	8	8
	Point Brower	Arctic Cisco	5	5	5	5	5	5
	Stump Island	Arctic Cisco	11	11	11	9	11	11
	Liberty	Arctic Cod	8	8	8	8	8	8
	North Star	Arctic Cod	7	7	7	7	7	7
	Point Brower	Broad Whitefish	6	6	6	6	6	6
	Bullen Point	Four Horn Sculpin	10	10	10	10	10	10
	Liberty	Four Horn Sculpin	2	2	2	2	2	2
	Point Brower	Four Horn Sculpin	5	5	5	5	5	5
	Stump Island	Four Horn Sculpin	12	12	12	12	12	12
	Point Brower	Humpback Whitefish	3	3	3	3	3	3
	Stump Island	Humpback Whitefish	12	13	13	12	13	13

	SITE_NAME	SPECIES	Zn ( $\mu\text{g/g}$ )
<b>Means</b>	Bullen Point	Arctic Cisco	78.975
	Liberty	Arctic Cisco	94.3
	Point Brower	Arctic Cisco	105.42
	Stump Island	Arctic Cisco	101.9555556
	Liberty	Arctic Cod	91.4375
	North Star	Arctic Cod	93.51428571
	Point Brower	Broad Whitefish	78.51666667
	Bullen Point	Four Horn Sculpin	96.69
	Liberty	Four Horn Sculpin	106.75
	Point Brower	Four Horn Sculpin	106
	Stump Island	Four Horn Sculpin	106.325
	Point Brower	Humpback Whitefish	50.4
	Stump Island	Humpback Whitefish	78.36666667
	<b>Standard Deviations</b>	Bullen Point	Arctic Cisco
Liberty		Arctic Cisco	11.96793335
Point Brower		Arctic Cisco	26.54396353
Stump Island		Arctic Cisco	10.64519975
Liberty		Arctic Cod	16.5071359
North Star		Arctic Cod	17.293489
Point Brower		Broad Whitefish	22.34138909
Bullen Point		Four Horn Sculpin	14.96354459
Liberty		Four Horn Sculpin	11.66726189
Point Brower		Four Horn Sculpin	8.396427812
Stump Island		Four Horn Sculpin	15.02707405
Point Brower		Humpback Whitefish	13.81738036
Stump Island		Humpback Whitefish	17.59671113
<b>Number of Samples</b>		Bullen Point	Arctic Cisco
	Liberty	Arctic Cisco	8
	Point Brower	Arctic Cisco	5
	Stump Island	Arctic Cisco	9
	Liberty	Arctic Cod	8
	North Star	Arctic Cod	7
	Point Brower	Broad Whitefish	6
	Bullen Point	Four Horn Sculpin	10
	Liberty	Four Horn Sculpin	2
	Point Brower	Four Horn Sculpin	5
	Stump Island	Four Horn Sculpin	12
	Point Brower	Humpback Whitefish	3
	Stump Island	Humpback Whitefish	12

**APPENDIX E: P4501A**  
(Located on the enclosed CD)

This appendix contains the occurrence and intensity scores for all fish and all tissues.

tissue/cell type	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int
<b>sample #</b>			<b>108</b>			<b>109</b>			<b>110</b>			<b>111</b>			<b>112</b>
liver															
hepatocytes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			1			1			1			2			3
gill															
pillar cells	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
epithelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
kidney															
tubules	2	2	4	0	0	0	1.5	1	1.5	2.5	2	5	1	1	1
vascular endothelium	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gonad (t or o)			o			o			o			o			o
vascular endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut															
mucus epithelium	2.5	3	7.5	2	2	4	2.5	3	7.5	2	2	4	2	1.5	3
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spleen															
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
parenchyma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	1.5	3	4.5	0	0	0	0	0	0	0	0	0	0	0	0
<b>sample #</b>			<b>113</b>			<b>114</b>			<b>121</b>			<b>122</b>			<b>123</b>
liver							picture								
hepatocytes	0	0	0	0	0	0	3	3	9	2.5	2	5	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation	0	0	2			1			1			2			5
gill			not pres	picture		heavy Trichidona			not pres			not pres			
pillar cells				0	0	0							0	0	0
epithelium				0	0	0							0	0	0
vascular endothelium				0	0	0							0	0	0
kidney												not pres			
tubules	1.5	2	3	1.5	1	1.5	2	1.5	3				2	1	2
vascular endothelium	0	0	0	1.5	2	3	2	2	4				0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	1.5	2	3	0	0	0	0	0	0
gonad (t or o)			o			o			t			t			t
vascular endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut							picture						picture		
mucus epithelium	2	0.5	1	2.5	2	5	1.5	3	4.5	1.5	1	1.5	2	3	6
vascular endothelium	0	0	0	0	0	0	1	2	2	0	0	0	0	0	0
spleen						not pres			not pres						not pres
vascular endothelium	0	0	0							0	0	0			
parenchyma	0	0	0							0	0	0			
heart															
atrial endothelium	0	0	0	0	0	0	1.5	1	1.5	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	2	2	4	0	0	0	0	0	0
<b>sample #</b>			<b>95</b>			<b>96</b>			<b>70</b>			<b>71</b>			<b>79</b>
liver															
hepatocytes	0	0	0	3	0.5	1.5	3	0.5	1.5	3	3	9	2.5	2	5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			3			2			2			3			2
gill			heavy Trichidina									not pres			
pillar cells	0	0	0	0	0	0	0	0	0				0	0	0
epithelium	0	0	0	0	0	0	0	0	0				0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0				0	0	0
kidney						not pres						not pres			
tubules	1.5	2	3				1.5	1	1.5				1	0.5	0.5
vascular endothelium	0	0	0				0	0	0				0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gonad (t or o)			o			o			o			t			o
vascular endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut															
mucus epithelium	1.5	2	3	2	0.5	1	2.5	0.5	1.25	2.5	4	10	2	4	8
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spleen						mac aggs						not pres			
vascular endothelium	0	0	0	0	0	0	0	0	0				0	0	0
parenchyma	0	0	0	0	0	0	0	0	0				0	0	0
heart															
atrial endothelium	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0

tissue/cell type	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int
<b>sample #</b>			<b>80</b>			<b>26</b>			<b>27</b>			<b>28</b>			<b>31</b>
liver															
hepatocytes	3	2	6	0	0	0	3	1	3	3	0.5	1.5	3	0.5	1.5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			1			2			4			4			1
gill			not pres			not pres			not pres			Trichidina			Trichidina
pillar cells										0	0	0	0	0	0
epithelium										0	0	0	0	0	0
vascular endothelium										0	0	0	0	0	0
kidney									not pres						
tubules	0	0	0												
vascular endothelium	0	0	0												
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gonad (t or o)			o			o			not pres			o			o
vascular endo	0	0	0	0	0	0				0	0	0	0	0	0
gut						not pres			not pres			not pres			not pres
mucus epithelium	2	3	6												
vascular endothelium	0	0	0												
spleen						not pres									
vascular endothelium	0	0	0				0	0	0			not pres			not pres
parenchyma	0	0	0				0	0	0						
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>sample #</b>			<b>32</b>			<b>33</b>			<b>45</b>			<b>46</b>			<b>47</b>
liver															
hepatocytes	3	0.5	1.5	3	3	9	2	1	2	3	1	3	3	2	6
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			3			4			4			4			1
gill			not pres	pict		Trichidina			Trichidina			not pres			
pillar cells				0	0	0	0	0	0				0	0	0
epithelium				0	0	0	0	0	0				0	0	0
vascular endothelium				0	0	0	0	0	0				0	0	0
kidney			not pres			not pres									not pres
tubules							2	3	6	2	3	6			
vascular endothelium							0	0	0	0	0	0			
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gonad (t or o)			o			not pres			not pres			o			o
vascular endo	0	0	0							0	0	0	0	0	0
gut			not pres			not pres			not pres			not pres			not pres
mucus epithelium															
vascular endothelium															
spleen			not pres												
vascular endothelium				0	0	0	0	0	0	0	0	0	0	0	0
parenchyma				0	0	0	0	0	0	0	0	0	0	0	0
heart									not pres						
atrial endothelium	0	0	0	0	0	0				0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0				0	0	0	0	0	0
<b>sample #</b>			<b>48</b>			<b>49</b>			<b>50</b>			<b>115</b>			<b>116</b>
liver										pict		hi vac!	pict		hi vac!
hepatocytes	3	0.5	1.5	3	0.5	1.5	3	2	6	3	0.5	1.5	3	0.5	1.5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			2			2			2			5			5
gill			Trichidina			Trichidina						not pres			not pres
pillar cells	0	0	0	0	0	0	0	0	0						
epithelium	0	0	0	0	0	0	0	0	0						
vascular endothelium	0	0	0	0	0	0	0	0	0						
kidney												not pres			not pres
tubules	2	2	4	1.5	2	3	2	2	4						
vascular endothelium	0	0	0	0	0	0	0	0	0						
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gonad (t or o)			o			o			o			t			o
vascular endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut			not pres			not pres			not pres						
mucus epithelium										1	1	1	1	1	1
vascular endothelium										0	0	0	0	0	0
spleen															
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
parenchyma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart						not pres			not pres						
atrial endothelium	0	0	0							0	0	0	0	0	0
ventricle endothelium	0	0	0							0	0	0	0	0	0

tissue/cell type	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int
<b>sample #</b>			<b>117</b>			<b>118</b>			<b>126</b>			<b>127</b>			<b>128</b>
liver													pict		necrosis
hepatocytes	3	0.5	1.5	0	0	0	3	0.5	1.5	3	0.5	1.5	3	1	3
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			5			5			5			5			5
gill						not pres			not pres			not pres			mac aggs
pillar cells	0	0	0										0	0	0
epithelium	0	0	0										0	0	0
vascular endothelium	0	0	0										0	0	0
kidney			not pres			not pres						not pres			
tubules							1.5	1	1.5				1.5	2	3
vascular endothelium							0	0	0				0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gonad (t or o)			t			o			o			t			o
vascular endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut															
mucus epithelium	0	0	0	1.5	1	1.5	0	0	0	2.5	2	5	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spleen			not pres												mac aggs
vascular endothelium				0	0	0	0	0	0	0	0	0	0	0	0
parenchyma				0	0	0	0	0	0	0	0	0	0	0	0
heart									not pres						
atrial endothelium	0	0	0	0	0	0				0	0	0	1.5	3	4.5
ventricle endothelium	0	0	0	0	0	0				0	0	0	1.5	3	4.5
<b>sample #</b>			<b>129</b>			<b>130</b>			<b>131</b>			<b>52</b>			
liver															
hepatocytes	3	0.5	1.5	3	0.5	1.5	3	0.5	1.5	3	0.5	1.5			
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0			
bile duct	0	0	0	0	0	0	0	0	0	0	0	0			
vacuolation			5			5			5			1			
gill						not pres									
pillar cells	0	0	0				0	0	0	0	0	0			
epithelium	0	0	0				0	0	0	0	0	0			
vascular endothelium	0	0	0				0	0	0	0	0	0			
kidney			not pres			not pres			not pres						
tubules												not pres			
vascular endothelium										0	0	0			
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0			
gonad (t or o)			t			t			o			t			o
vascular endo	0	0	0	0	0	0	0	0	0	0	0	0			
gut															
mucus epithelium	3	1	3	2.5	1	2.5	2	1.5	3						
vascular endothelium	0	0	0	0	0	0	0	0	0						
spleen			not pres			mac aggs			not pres						
vascular endothelium				0	0	0									
parenchyma				0	0	0									
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0			
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0			
<b>sample #</b>			<b>2</b>			<b>3</b>			<b>4</b>			<b>5</b>			<b>6</b>
liver			np												
hepatocytes				0	0	0	3	0.25	0.75	3	1	3	3	0.5	1.5
vascular endothelium				0	0	0	0	0	0	0	0	0	0	0	0
bile duct				0	0	0	0	0	0	0	0	0	0	0	0
vacuolation						1			1			3			1
gill															
pillar cells	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
epithelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ovary endo															0
kidney															
tubules	0	0	0	0	0	0			np	2	1	2	2	1.5	3
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

tissue/cell type	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int
<b>sample #</b>			<b>7</b>			<b>8</b>			<b>9</b>			<b>10</b>			<b>36</b>
liver															
hepatocytes	0	0	0	3	0.5	1.5	3	0.5	1.5	0	0	0	3	0.5	1.5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			1			1			1			2			1
gill															
pillar cells	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
epithelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
kidney															
tubules	0	0	0	0	0	0	2	0.5	1	1.5	0.5	0.75	1	0.5	0.5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
skin/muscle vasc endo			np	0	0	0	0	0	0	0	0	0			
ovary	0	0	0	0	0	0									
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
testes													0	0	0
<b>sample #</b>			<b>37</b>			<b>53</b>			<b>54</b>			<b>67</b>			<b>68</b>
liver															
hepatocytes	0	0	0	3	0.25	0.75	3	0.5	1.5	3	0.5	1.5	3	0.5	1.5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			1			2			2			2			1
gill												np			
pillar cells	0	0	0	0	0	0	0	0	0				0	0	0
epithelium	0	0	0	0	0	0	0	0	0				0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0				0	0	0
kidney						np			np			np			np
tubules	2	1	2												
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ovary	0	0	0				0	0	0	0	0	0			
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
testes				0	0	0									
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut epith				0	0	0				0	0	0	0	0	0
gut vasc endo				0	0	0				0	0	0	0	0	0
<b>sample #</b>			<b>69</b>			<b>81</b>			<b>82</b>			<b>102</b>			<b>103</b>
liver															
hepatocytes	0	0	0	3	0.25	0.75	3	0.25	0.75	3	0.25	0.75	3	0.5	1.5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			1			1			2.5			3			3
gill									heavy parasites						
pillar cells	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
epithelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
kidney															
tubules			np							0	0	0			np
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
testes							0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut epith							0	0	0	0	0	0	0	0	0
gut vasc endo							0	0	0	0	0	0	0	0	0
<b>sample #</b>			<b>104</b>			<b>105</b>									
liver															
hepatocytes	3	0.25	0.75	0	0	0									
vascular endothelium	0	0	0	0	0	0									
bile duct	0	0	0	0	0	0									
vacuolation			4			2.5									
gill															
pillar cells	0	0	0	0	0	0									
epithelium	0	0	0	0	0	0									
vascular endothelium	0	0	0	0	0	0									
kidney															
tubules			np			np									
vascular endothelium	0	0	0	0	0	0									
ovary				0	0	0									
skin/muscle vasc endo	0	0	0	0	0	0									
testes	0	0	0												
heart															
atrial endothelium	0	0	0	0	0	0									
ventricle endothelium	0	0	0	0	0	0									
gut epith	0	0	0												
gut vasc endo	0	0	0												

tissue/cell type	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int
<b>sample #</b>			<b>83</b>			<b>84</b>			<b>85</b>			<b>86</b>			<b>87</b>
liver/sex			f			m			m			m			m
hepatocytes	3	0.5	1.5	3	1	3	3	1	3	3	0.5	1.5	3	0.5	1.5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			3			2			2			4			2
gill									np						
pillar cells	0	0	0	0	0	0				0	0	0	0	0	0
epithelium	0	0	0	0	0	0				0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0				0	0	0	0	0	0
kidney															
tubules			np			np			np			np			np
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut epith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut vasc endo	2	0.5	1	0	0	0	0	0	0	0	0	0	0	0	0
ovary/testes vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>sample #</b>			<b>88</b>			<b>97</b>			<b>98</b>			<b>99</b>			<b>100</b>
liver			f			m			f			m			m
hepatocytes	3	0.5	1.5	0	0	0	0	0	0	0	0	0	3	0.5	1.5
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	2	0.5	1
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			4			3			3			1			1
gill									hyperplasia						
pillar cells	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
epithelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
kidney															
tubules			np			np			np			np	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut epith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ovary/testes vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>sample #</b>			<b>12</b>			<b>13</b>			<b>14</b>			<b>15</b>			<b>16</b>
liver			m						m			f			m
hepatocytes	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			1			1			2			1			1
gill															
pillar cells	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
epithelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
kidney															
tubules	2	1	2	0	0	0									
vascular endothelium	0	0	0	0	0	0				0	0	0			
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut epith										0	0	0			
gut vasc endo										0	0	0			
ovary/testes vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spleen				0	0	0	0	0	0				0	0	0
<b>sample #</b>			<b>17</b>			<b>18</b>			<b>19</b>			<b>20</b>			<b>21</b>
liver			m			f			f			m			m
hepatocytes	0	0	0	0	0	0	0	0	0	3	0.5	1.5	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			2			1			1			1			3
gill															
pillar cells	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
epithelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
kidney															
tubules															
vascular endothelium															
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut epith															
gut vasc endo															
ovary/testes vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spleen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

tissue/cell type	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int
<b>sample #</b>			<b>22</b>			<b>23</b>			<b>24</b>			<b>27 (liver photos)</b>			<b>55 (liver photo)</b>
liver			m			m			f			m			f
hepatocytes	0	0	0	0	0	0				2	2.5	5	0	0	0
vascular endothelium	0	0	0	0	0	0				0	0	0	0	0	0
bile duct	0	0	0	0	0	0				0	0	0	2.5	2	5
vacuolation			1			4						3/4 areas of highly vacu			1 (bile can. stng)
gill									trich						
pillar cells	0	0	0	0	0	0	0	0	0						
epithelium	0	0	0	0	0	0	0	0	0						
vascular endothelium	0	0	0	0	0	0	0	0	0						
kidney															
tubules				0	0	0									
vascular endothelium				0	0	0							0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut epith				0	0	0									
gut vasc endo				0	0	0									
ovary/testes vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spleen	0	0	0				0	0	0						
<b>sample #</b>			<b>56</b>			<b>61 photo</b>			<b>64</b>			<b>65</b>			<b>66</b>
liver			m			f			f			f			f
hepatocytes	2	2	4	2	1	2	0	0	0	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacuolation			1			2/5 apop region?			3			1			1
gill															
pillar cells				0	0	0	0	0	0	0	0	0	0	0	0
epithelium				0	0	0	0	0	0	0	0	0	0	0	0
vascular endothelium				0	0	0	0	0	0	0	0	0	0	0	0
kidney															
tubules				0	0	0									
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
skin/muscle vasc endo	0	0	0				0	0	0				0	0	0
heart															
atrial endothelium	0	0	0	2	3	6	0	0	0	0	0	0	0	0	0
ventricle endothelium	0	0	0	2	3	6	0	0	0	0	0	0	0	0	0
gut epith	0	0	0	1.5	3	4.5	0	0	0	0	0	0	0	0	0
gut vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ovary/testes vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spleen	0	0	0				0	0	0						
<b>sample #</b>			<b>75</b>			<b>76</b>			<b>77</b>			<b>89 (photo)</b>			<b>90</b>
liver			m						f			f			f
hepatocytes	0	0	0	3	0.25	0.75	2	2	4	0	0	0	0	0	0
vascular endothelium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bile duct	0	0	0	2	1	2	2	1	2	0	0	0	0	0	0
vacuolation			1			1 (bile can. stng)			1 (bile can. stng)			5			5
gill															
pillar cells	0	0	0	0	0	0				0	0	0			
epithelium	0	0	0	0	0	0				0	0	0			
vascular endothelium	0	0	0	0	0	0				0	0	0			
kidney															
tubules													0	0	0
vascular endothelium	0	0	0				0	0	0	0	0	0	0	0	0
skin/muscle vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
heart															
atrial endothelium	0	0	0	0	0	0	0	0	0				0	0	0
ventricle endothelium	0	0	0	0	0	0	0	0	0				0	0	0
gut epith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gut vasc endo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ovary/testes vasc endo	0	0	0				0	0	0	0	0	0	0	0	0
spleen							0	0	0						

tissue/cell type	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int	Occ	Int	Occ X Int
<b>sample #</b>			<b>91</b>			<b>92</b>									
liver			f			f									
hepatocytes	0	0	0	0	0	0									
vascular endothelium	0	0	0	0	0	0									
bile duct	0	0	0	0	0	0									
vacuolation			5			5									
gill															
pillar cells	0	0	0												
epithelium	0	0	0												
vascular endothelium	0	0	0												
kidney															
tubules	0	0	0	0	0	0									
vascular endothelium	0	0	0	0	0	0									
skin/muscle vasc endo	0	0	0	0	0	0									
heart															
atrial endothelium	0	0	0	0	0	0									
ventricle endothelium	0	0	0	0	0	0									
gut epith	0	0	0												
gut vasc endo	0	0	0												
ovary/testes vasc endo	0	0	0	0	0	0									
spleen	0	0	0	0	0	0									
<b>sample #</b>			<b>101</b>												
liver			m												
hepatocytes	3	1	3												
vascular endothelium	0	0	0												
bile duct	0	0	0												
vacuolation			4												
gill															
pillar cells	0	0	0												
epithelium	0	0	0												
vascular endothelium	0	0	0												
kidney															
tubules			np												
vascular endothelium	0	0	0												
skin/muscle vasc endo	0	0	0												
heart															
atrial endothelium	0	0	0												
ventricle endothelium	0	0	0												
gut epith	0	0	0												
gut vasc endo	0	0	0												
ovary/testes vasc endo	0	0	0												