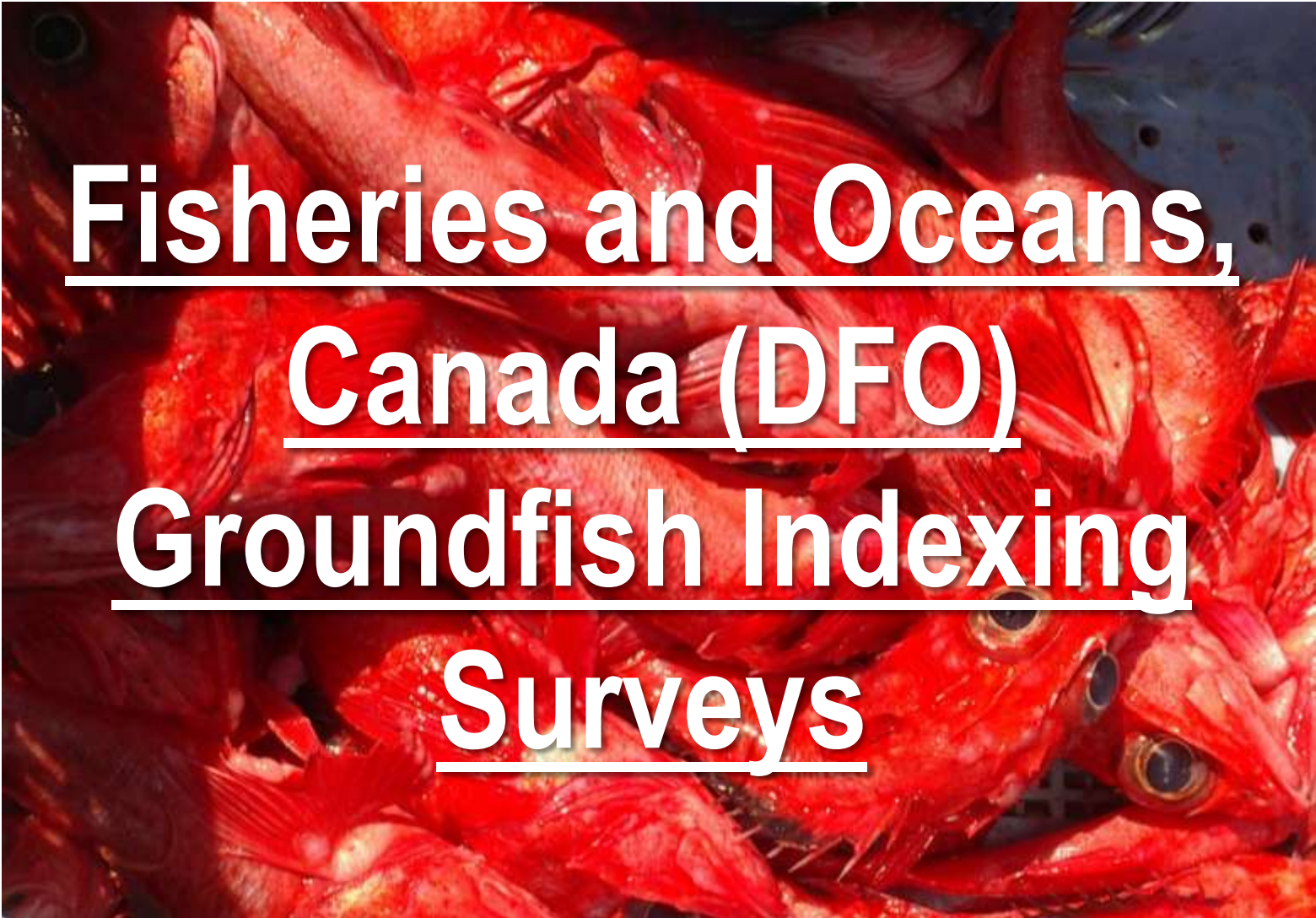




Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

A close-up photograph of a large pile of bright red fish, likely Atlantic salmon, filling the central portion of the slide. The fish are piled together, showing their scales, fins, and eyes. The background above the fish is a blue gradient representing water, and the background below is a dark blue gradient.

# Fisheries and Oceans, Canada (DFO) Groundfish Indexing Surveys

Canada 



## DFO Groundfish Indexing Surveys

- 1) Groundfish Multi-species Bottom Trawl
- 2) Multi-species Small Mesh Bottom Trawl (shrimp)
- 3) Sablefish Longline Trap
- 4) Inshore Rockfish Longline Hook
- 5) Hake Hydro-acoustic
- 6) Strait of Georgia Dogfish Longline Hook



A topographic map of the Pacific Northwest coastline, showing the rugged terrain of the land and the deep blue waters of the ocean. The map is oriented with the coastline on the right and the open ocean on the left. The land is depicted in shades of green, with darker green indicating higher elevations and lighter green indicating lower elevations. The ocean is shown in shades of blue, with lighter blue indicating shallower depths and darker blue indicating deeper waters. The coastline is characterized by numerous fjords, inlets, and peninsulas, particularly in the central and southern regions. The text "Groundfish Multi-species Bottom Trawl Surveys" is overlaid on the map in a white, sans-serif font.

## Groundfish Multi-species Bottom Trawl Surveys

- Depth stratified random design
- Catches sorted to species
- Selected specimens sampled for length, sex, visual maturity, weight, ageing structures, genetics
- Net-mounted CTD and TDR





## Groundfish Multi-species Bottom Trawl Surveys

### 1) Hecate Strait

- 2005, 2007, 2009, biennial
- 10 m to 500 m
- ~220 stations
- Late May to late June



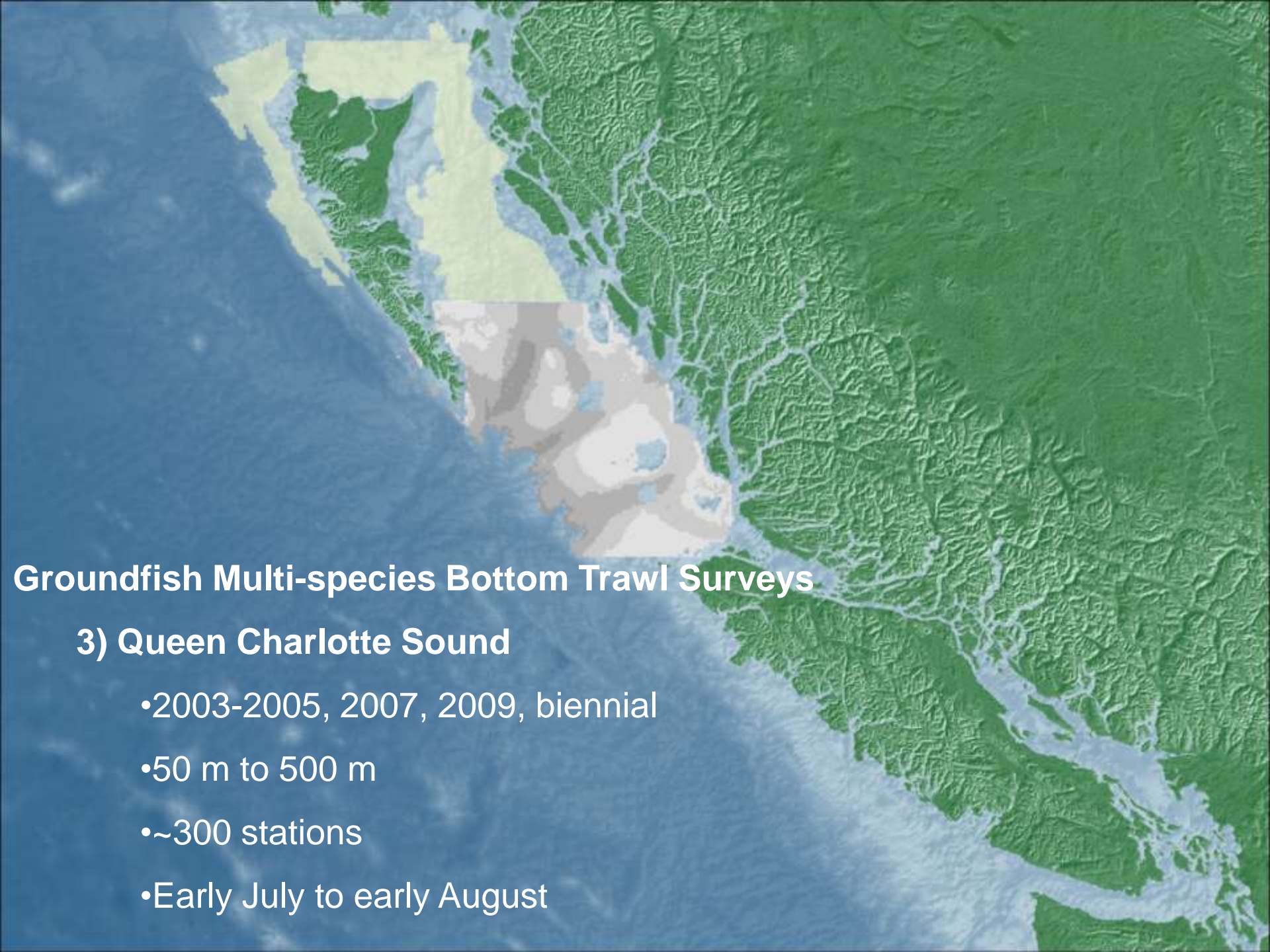
A map of the Pacific Northwest region, including British Columbia, Canada, and the surrounding waters. Two specific areas are highlighted: a yellow-shaded region in the central part of the coast and a brown-shaded region further north. The land is depicted in green with topographical details, and the water is in shades of blue.

## **Groundfish Multi-species Bottom Trawl Surveys**

### **2) West Coast Haida Gwaii**

- 2006, 2007, 2008, 2010, biennial
- 180 m to 1300 m
- ~150 stations
- Late August to late September





## **Groundfish Multi-species Bottom Trawl Surveys**

### **3) Queen Charlotte Sound**

- 2003-2005, 2007, 2009, biennial
- 50 m to 500 m
- ~300 stations
- Early July to early August



A topographic map of the West Coast of Vancouver Island, British Columbia, Canada. The land is shown in green with white contour lines indicating elevation. The surrounding ocean is blue. Several areas along the coast are highlighted in yellow, representing the survey regions for the Groundfish Multi-species Bottom Trawl Surveys. These areas are located along the northern, central, and southern coasts of the island.

## Groundfish Multi-species Bottom Trawl Surveys

### 4) West Coast Vancouver Island

- 2004, 2006, 2008, 2010, biennial
- 50 m to 500 m
- ~220 stations
- Late May to late June



A map of the Pacific Northwest coast of Canada, showing the coastline from British Columbia down to the Gulf of Alaska. The land is depicted in green with topographic shading, and the water is in blue. Four specific areas are highlighted in yellow and labeled: WCHG (West Coast Haida Gwaii) in the northwest, HS (Hecate Strait) in the central north, QCS (Queen Charlotte Sound) in the central south, and WCVI (West Coast Vancouver Island) in the southeast.

**WCHG**

**HS**

**QCS**

**WCVI**

## **Groundfish Multi-species Bottom Trawl Surveys**

- 1) Hecate Strait (HS)
- 2) West Coast Haida Gwaii (WCHG)
- 3) Queen Charlotte Sound (QCS)
- 4) West Coast Vancouver Island (WCVI)

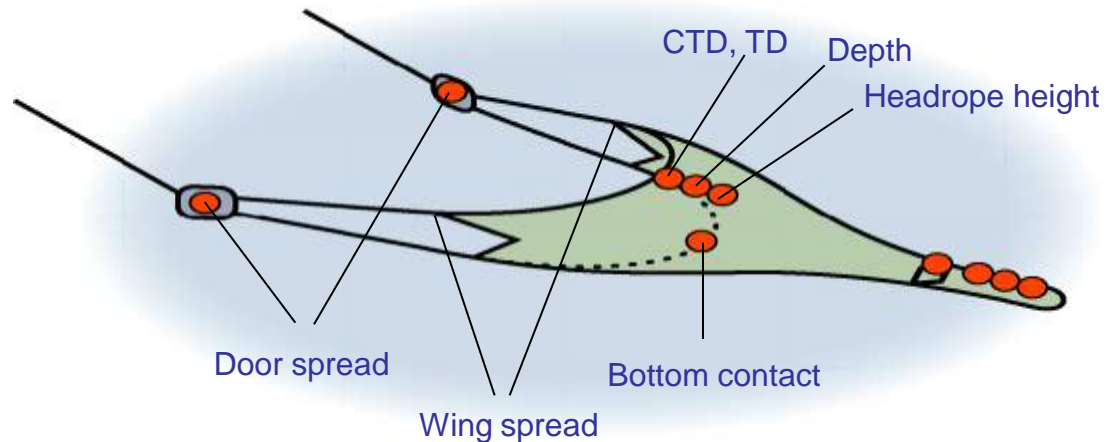




# Groundfish Multi-species Bottom Trawl Surveys

## Vessel, net, and environmental monitoring

- GPS, speed, course, vessel weather station
- Net mensuration
  - Net depth
  - Trawl geometry
    - Door spread, wing spread
    - Headrope height
  - Bottom contact sensor
- Net mounted CTD
  - DO, pH
  - Continue with pH?
  - Mounting location?



A map of the Pacific Northwest coast of the United States, showing the coastline from Alaska down to the Gulf of the Farallones. The land is colored green, and the water is blue. Several areas are highlighted in dark red, indicating the survey locations. These include the coastal waters off the coast of Alaska, the coastal waters off the coast of British Columbia, and the coastal waters off the coast of Washington and Oregon. The survey area is labeled as the Multi-species Small Mesh Bottom Trawl Survey.

## Multi-species Small Mesh Bottom Trawl Survey

- Annual
- 50 m to 200 m
- ~190 stations
- Late April to late May
- Groundfish details since 2003





## Sablefish Longline Trap Survey

- Trap by trap catches
- Electronic Monitoring system for QA
- Representative sample (50 pcs) of sablefish sampled for length, sex, visual maturity, weight, ageing structures, genetics
- Other species length and sex only
- Trap-mounted TDR



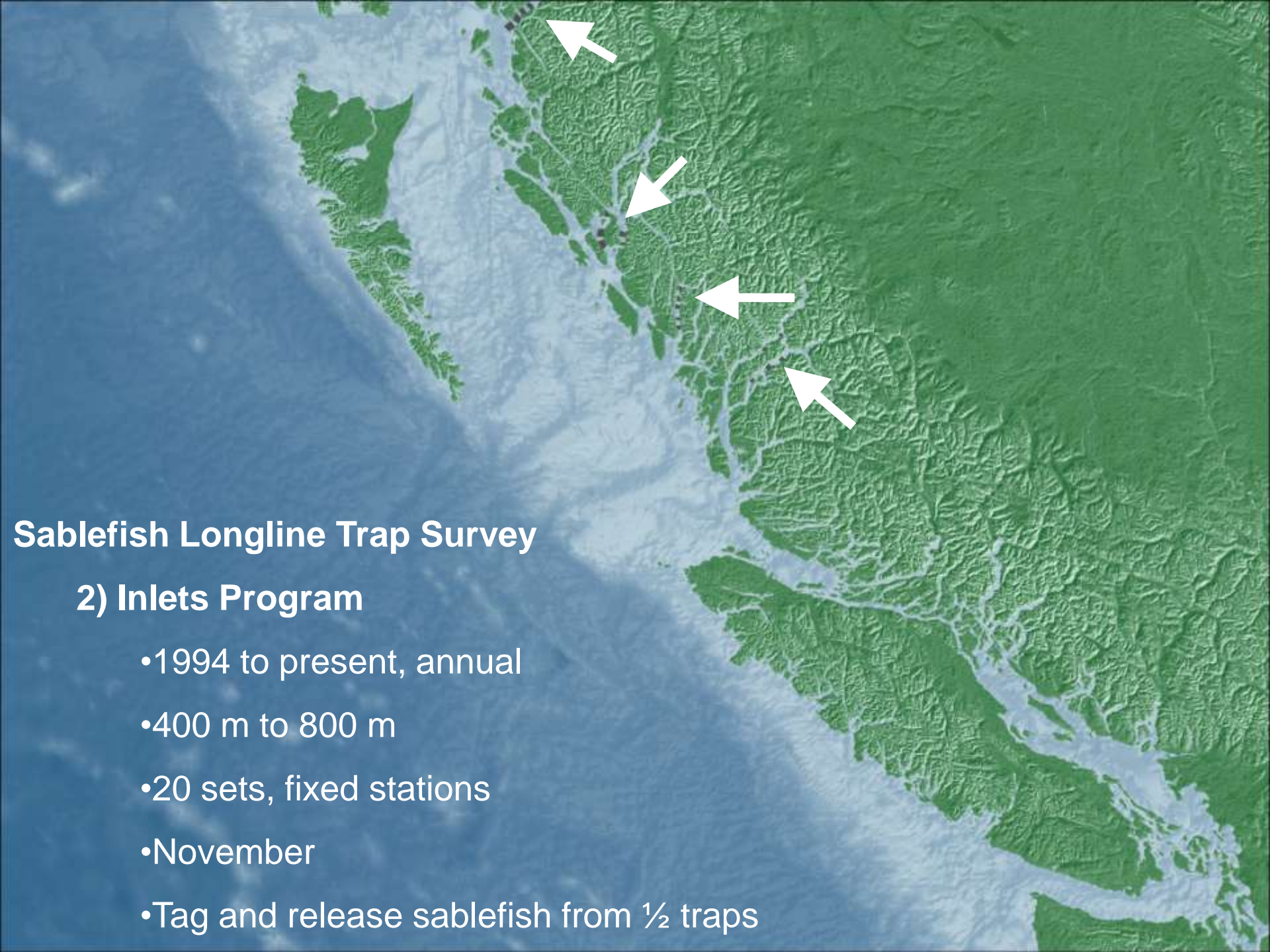
A topographic map of the Pacific Northwest coastline, showing the rugged terrain of the land and the deep blue waters of the ocean. The coastline is characterized by numerous fjords and inlets, particularly in the northern and central regions. The land is depicted in shades of green, indicating varying elevations, while the ocean is a deep blue. The map is oriented with the coastline running diagonally from the top left towards the bottom right.

## **Sablefish Longline Trap Survey**

### **1) Randomized Program**

- 2003 to present, annual
- 180 m to 1375 m
- 90 sets, depth and spatial stratified
- October to early November
- Tag and release sablefish from 1/3 traps





# Sablefish Longline Trap Survey

## 2) Inlets Program

- 1994 to present, annual
- 400 m to 800 m
- 20 sets, fixed stations
- November
- Tag and release sablefish from ½ traps



A map of the Pacific Northwest coast of North America, showing the coastline from British Columbia down to Washington state. The land is depicted in green with topographic detail, and the ocean is in blue. Several black rectangular markers are placed along the coast, indicating the locations of Sablefish Longline Trap Survey stations. These markers are located in the Strait of Georgia, the Juan de Fuca Strait, and further south along the coast.

## Sablefish Longline Trap Survey

### 3) Standardized Program

- 1990 to 2010, plan to discontinue
- 275 m to 1200 m
- 45 sets, fixed station
- October to early November



A topographic map of the Pacific Northwest coastline, showing the rugged terrain of the land and the deep blue waters of the ocean. The map is oriented with the coastline on the right and the open ocean on the left. The land is depicted in shades of green, with darker green indicating higher elevations and lighter green indicating lower elevations. The ocean is shown in various shades of blue, with lighter blue indicating shallower waters and darker blue indicating deeper waters. The coastline is highly irregular, with many fjords, bays, and peninsulas. The text "Inshore Rockfish Longline Hook Surveys" is overlaid on the map in white, bold, sans-serif font. Below the title is a bulleted list of survey methods and procedures, also in white, sans-serif font.

## **Inshore Rockfish Longline Hook Surveys**

- Depth stratified random design
- Hook by hook catches
- Catches sorted to species and weighed
- Selected specimens sampled for length, sex, visual maturity, weight, ageing structures, genetics



A map of the Pacific Northwest coast of the United States, showing the coastline from Alaska down to California. The land is colored green, and the water is blue. A red line follows the coast, indicating the survey area. The text 'Inshore Rockfish Longline Hook Surveys' is overlaid on the map.

## Inshore Rockfish Longline Hook Surveys

### 1) PHMA Outside (commercial halibut association)

- 2006 to present
- North in even-numbered years
- South in odd-numbered years
- ~200 sets
- 20 m to 250 m
- August to mid September



A topographic map of a coastal region, likely in British Columbia, Canada. The land is shown in green with contour lines indicating elevation. The water is light blue. A thick black line traces a path along the coast, representing the survey track for the Inshore Rockfish Longline Hook Surveys. The track starts in the upper left, follows the coast through several bays and inlets, and ends in the lower right.

## Inshore Rockfish Longline Hook Surveys

### 2) DFO Inside

- 2003 to present (except 2006), annual
- Covers  $\frac{1}{2}$  to  $\frac{1}{3}$  of survey area
- 40 m to 100 m
- ~70 sets
- August



A map of the Pacific Northwest coast of North America, showing the coastline from Alaska down to the Gulf of Mexico. The land is colored green, and the water is blue. Black lines are drawn across the map, representing the systematic transects used for the hydro-acoustic survey. These lines are mostly parallel to the coast, with some branching out into the Gulf of Mexico. The text "Hake Hydro-acoustic Survey" is overlaid on the left side of the map.

## Hake Hydro-acoustic Survey

- Joint survey with NOAA
- Acoustic data collected from systematic transects
- Mid-water trawl to ground-truth acoustic data
- 1995, 1998, 2001, 2003, 2005, 2007, 2009, biennial
- 50 m to 1500 m
- ~ 60 sets
- Catches sorted to species
- Selected specimens (hake) sampled for length, sex, visual maturity, weight, ageing structures, genetics
- August to mid September



A topographic map of the Strait of Georgia, showing the rugged terrain of the surrounding landmasses in shades of green and brown. The water areas are depicted in light blue. Several black dots are scattered across the strait, indicating the locations of the survey sites.

## Strait of Georgia Dogfish Longline Hook Survey

- Fixed location index sites stratified by depth
- Catches sorted to species
- Selected specimens sampled for length, sex, visual maturity, weight, ageing structures, genetics
- 1986, 1989, 2005, 2008, triennial
- Surface to 250 m
- ~50 sets
- October





The End



A topographic map of a coastal region, likely the Pacific Northwest of North America, showing a large body of water on the left and a green, mountainous landmass on the right. The text "Stratified Random Survey Design" is overlaid in white.

# Stratified Random Survey Design



















