Investigating the trophic ecology of juvenile fish species is an important component of the Alaska Fisheries Science Center Recruitment Processes Program in order to understand the influence of prey selectivity and availability on survival during early life. In order to standardize protocols for sampling juvenile Walleye Pollock for diet analyses, a procedure was developed to optimize subsample size per station using prey curves, i.e., number of prey taxa vs. number of fish stomachs. The majority of published diet studies use prey curves post analysis which often shows inadequate sampling. Using historic diet data from 5 years and 3 habitats of juvenile Walleye Pollock from the central Bering Sea, projected prey curves and their confidence intervals are created using the Chao2 estimator (defined in table below) from EstimateS* software. The minimum number of fish to process in order to adequately describe the diet for each year and habitat is then determined from these prey curves and sampling effort is distributed accordingly. The following flowchart illustrates the step-by-step protocol needed to conduct this type of analysis.

### A Quantitative Approach for Targeted Subsampling of Juvenile Fish for Diet Analysis

**by Kathryn Mier and Nissa Ferm, Alaska Fisheries Science Center, NMFS/NOAA**

Prior to sampling
- Determine hypothesis (temporal or spatial) and tabulate no. of stations where fish were caught (per year or habitat).

**Prior to processing**
- Choose no. of fish to process based on desired % taxa
- Determine hypothesis (temporal or spatial) and tabulate no. of stations where fish were caught (per year or habitat).

How many fish do I collect?
- How many fish do I process?

**Historical diet data (presence/absence)**

Create prey curves by year...

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Fish</th>
<th>Total Stations</th>
<th>Fish to Process Per Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>19.73</td>
<td>3 * 267</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>24.59</td>
<td>3 * 127</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>26.13</td>
<td>3 * 127</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>13.95</td>
<td>3 * 63</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>22</td>
<td>3 * 34</td>
<td></td>
</tr>
</tbody>
</table>

From prey curve, tabulate # of fish stomachs on x axis associated with % of Chao2* estimator

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Chao2 estimator*</th>
<th>No. of fish stomachs based on % of Chao2 estimator</th>
<th>No. of stations in survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>85%</td>
<td>90%</td>
</tr>
<tr>
<td>Year</td>
<td></td>
<td>1994</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>24.59</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>26.13</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>1997</td>
<td>13.95</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>1999</td>
<td>22</td>
<td>34</td>
</tr>
</tbody>
</table>

Offshore: 39 fish
- Divide no. of fish to process by all stations where fish were collected to get subsample size (fish per station).

Inshore (86 fish)
- For example, to capture 85% of prey taxa (from table), process: Inshore: 86/10 = 8.6 (9)

Front (102 fish)
- Choose no. of fish to process based on desired % taxa
- Available processing time:
  - 85%, 90%, or 100% of taxa

**St. Paul Island, Alaska**

Offshore: 39 fish

### Prior to sampling

**How many fish do I collect?**

**How many fish do I process?**

### Flowchart

1. **Prior to sampling**
   - Determine hypothesis (temporal or spatial) and tabulate no. of stations where fish were caught (per year or habitat).

2. **Prior to processing**
   - Choose no. of fish to process based on desired % taxa
   - Determine hypothesis (temporal or spatial) and tabulate no. of stations where fish were caught (per year or habitat).

3. **Historical diet data (presence/absence)**

4. **Create prey curves by year…**

5. **or by habitat**

6. **From prey curve, tabulate # of fish stomachs on x axis associated with % of Chao2* estimator**

7. **No. of fish stomachs based on % of Chao2 estimator**

8. **No. of stations in survey**

9. **Total fish = 3 * 267 Total stations = 19 + 15 + 8 = 31 Fish to sample per station = 3 * 267 / 31 + 25% = 32**