Dietary Record Generator

Tribal LifeLine™ Project

A Project by The LifeLine™ Group
Funded by US EPA/OPPTS

LifeLine™

Review

- The Dietary Record Generator (DRG) arose from a need to capture dietary information about populations which was not in a format that could be used by current LifeLine™ or other software.
- The DRG is an **auxiliary** tool
  - Is necessary to do state-of-the-art dietary risk assessments.
  - Can be used for ANY subpopulation.
    - Focus is currently on Alaska Native populations
  - Creates dietary intake records in format appropriate for LifeLine™ software or other software that reflects current available information.

Review
Purpose of DRG

- To reliably capture available dietary information and get it into a useable format without skewing or misrepresenting the information.

Outline

- **Using non-customary data sources**
- Dietary survey concepts
- Process of file creation
  - Define the population of interest
  - Define relevant food list
  - Define age brackets
  - Define consumption parameters
  - Generate dietary files
- Understanding results of DRG

What is Non-Customary Data?

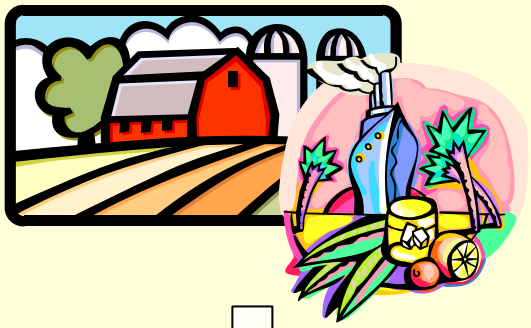
- Customary data = Instances where risk assessment models can use the data directly from reports.
  - Continuing Survey of Food Intakes by Individuals (CSFII)
  - National Health and Nutrition Examination Survey (NHANES)
- Non-customary data includes anything that contains valuable dietary information, but which cannot be used by the model directly.

Non-Customary Data

- Why use Non-Customary Data
  - Non-Customary ≠ Non-Important
  - In some sub-populations such as Alaska Native populations, data isn't always straightforward or available
    - Remote location
    - Cultural differences and boundaries
    - Fewer customary studies (funding, distrust of "science," etc.)

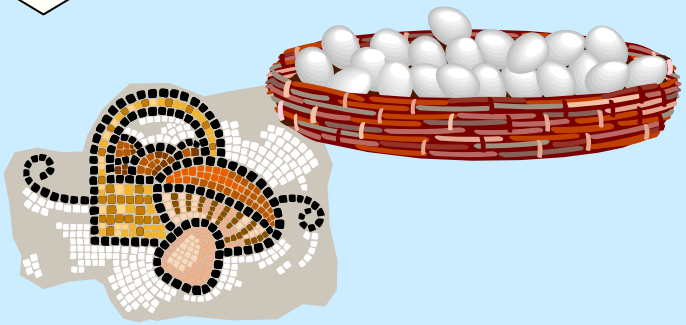
- Goal of Non-Customary Data
  - To capture how the population under analysis is different from another population, and to describe how population subgroups are different from one another.

Farm gate or Port



Processing Industries

Retail



Seasonality, Age-related mix with commercial foods, storage, preparation

What is Important in Non-customary Data Sources?

- Relevant
- Representative
- Quantifiable
- Transparent

Relevant

- The non-customary data must provide information about parameters which are important to the DRG
  - What foods are eaten and in what form
  - Probability of eating associated with different age groups, seasons, or locations
  - Amount eaten (portion size)
  - Patterns (long term variability) associated with consumption of the food

Representative

- Who is described by the information?
- Who can this information be applied to? Extrapolate…

Quantifiable

- The information needs to carry with it some quantitative component.
  - Actual measure of amount eaten, harvested, etc.
    - Total weight, per capita weight
  - Percentages
    - Percent of people eating or using a resource
    - Percent of resource used in a specific preparation method
- In some cases this quantitative component is inferred.

Transparent

- All information should be referenced to a source.
- This is especially important because some of the information may not have been exposed to routes of validation familiar to “western standards.” It may be more subject to debate than data provided from more customary sources.
  - Narratives or descriptions
  - Personal experience or communication
  - Assumptions based on other similar foods
  - Manipulation of existing data from scientific studies

Data Sources Available in Alaska

- **Data from dietary surveys**
- Subsistence harvest data
- Traditional ecological knowledge (TEK)
- Published documents related to subsistence
- Personal communication/experience

Dietary Survey Concepts

- Variation in diet
  - "A central feature of the dietary intake of free-living individuals is variation from day to day superimposed on an underlying consistent pattern. A number of factors, such as day of the week or season, may contribute to daily variation in dietary intake in a systematic manner. The magnitude of these influences is largely determined by cultural and ecological factors."
    - Willett, W. Nutritional Epidemiology, Second Edition. Oxford University Press, New York, NY. 1998.
  - Between person variation vs within person variation.
  - Examples
- Open ended vs closed ended survey methods

Dietary Survey Designs

Open Ended – 24 hr Recall Food Record	Closed Ended – Food Frequency Questionnaire
Accommodate any level of detail regarding diet	Food list limits detail and may skew results if poorly designed Validation important
Interviewer effects and respondent burden	Respondent burden
Describes short term variation in diet and may be unrepresentative of usual intake.	Describes average intake over an extended period of time but does not reflect short term variation.

Dietary Surveys

- Available
  - **Alaska Traditional Diet Project**
    - Alaska Native Health Board and Alaska Native Epidemiology Center
  - **Variance in Food Use in Dene/Metis Communities.**
  - **Assessment of Dietary Benefit/Risk in Inuit Communities.**
  - **Yukon First Nations' Assessment of Dietary Benefit/Risk.**
    - Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University (CINE).
- In Progress
  - **Genetics of Coronary Artery Disease in Alaskan Natives (GOCADAN)**
    - Medlantic Research Institute in partnership with Norton Sound Health Corporation
    - National Institutes of Health
  - **Influence of Maternal Nutrition on Pregnancy and Infant Outcomes in Alaska Native populations**
    - Alaska Native Tribal Health Consortium
  - **Dietary Benefits and Risks in Alaskan Villages**
    - Aleutian/Pribilof Islands Association, Inc.
    - National Institute of Environmental Health Sciences (NIEHS)

Data Sources Available in Alaska

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Harvest Data

- Alaska Department of Fish and Game, Division of Subsistence
  - The Community Subsistence Information System (CSIS) is the sole automated repository for information on subsistence fish and wildlife harvests in Alaska. Information is derived from more than a decade of research by the Division of Subsistence, and from other sources.
- Harvest data is roughly the subsistence equivalent of grocery store shelf disappearance data or purchase tape information.
  - Who eats the food
  - Waste
  - Preparation method/cooking losses
- Alaska Department of Fish and Game has calculated “user numbers” upon special request.

Traditional Ecological Knowledge

- "Traditional knowledge (TK) is the information that people in a given community, based on experience and adaptation to a local culture and environment, have developed over time, and continue to develop. This knowledge is used to sustain the community and its culture and to maintain the genetic resources necessary for the continued survival of the community. Traditional knowledge includes mental inventories…practices and technologies… [and] also encompasses belief systems that play a fundamental role in a people's livelihood, maintaining their health, and protecting and replenishing the environment…
- **The term "traditional" used in describing this knowledge does not imply that this knowledge is old or untechnical in nature, but "tradition based." It is "traditional" because it is created in a manner that reflects the traditions of the communities, therefore not relating to the nature of the knowledge itself, but to the way in which that knowledge is created, preserved and disseminated.**
- Traditional knowledge is collective in nature and is often considered the property of the entire community…It is transmitted through specific cultural and traditional information exchange mechanisms…and often to only a select few people within a community."
  - From: A Handbook on Issues and Options for Traditional Knowledge Holders in Protecting their Intellectual Property and Maintaining Biological Diversity By: Stephen A. Hansen and Justin W. VanFleet American Association for the Advancement of Science (AAAS), Science and Human Rights Program. Washington, DC, 2003. Retrieved from: http://shr.aaas.org/tek/handbook/

Publications

- **Alaska Department of Fish and Game**
  - Subsistence Technical Paper Series
  - Wildlife Notebook
  - Fisheries Reports
- **Alaska Department of Environmental Conservation**
- **Alaska Department of Health and Social Services**
  - Public Health
  - Epidemiology
- **US Fish and Wildlife Service – Subsistence Management Program**
- **University of Alaska**
  - Alaska Native Knowledge Network
  - Institute for Circumpolar Health Studies
  - Cooperative Extension
- **Alaska Native Health Board (ANHB)**
  - 23 member board consisting of one elected or selected representative of the Board of Directors or health committees of Alaska's Native regional health organizations and independent tribal public compactors/contractors.
- **Alaska Native Science Commission**
  - Alaska Traditional Knowledge and Native Foods Database
- **Alaska Native Tribal Health Consortium**
  - ANTCH is a non-profit health organization owned and managed by Alaska Native tribal governments and their regional health organizations.
  - Alaska Native Epidemiology Center
- **Other Organizations**
  - Regional Health Organizations - Aleutian Pribiloff Islands Association, Norton Sound Health Corporation, etc
  - Special Interest Groups, Ex. Alaska Eskimo Whaling Commission

Personal Communication/Experience

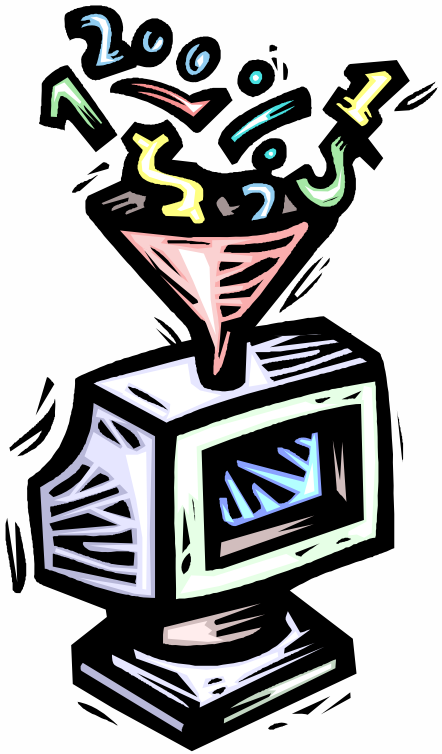
- Expert advice and insight
  - Professionals
    - Scientists, nutritionists, risk assessors working in Alaska, etc.
  - Alaska Natives
    - Those willing to share traditional knowledge
- Time spent observing and experiencing traditional lifestyles

Outline

- Using non-customary data sources
- Dietary survey concepts
- **Process of file creation**
  - Define the population of interest
  - Define relevant food list
  - Define age brackets
  - Define consumption parameters
  - Generate dietary files
- Understanding results of DRG

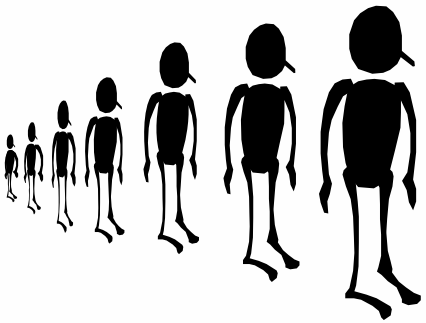
Process of File Creation

- Define the population of interest
- Define relevant food list
- Define age brackets
- Define consumption parameters
- Generate dietary files



Defining the Population

- Who is the target population?
- Outside of
  - Age
  - Season
  - Can one dietary file capture the variation?
    Or does the population need to be more narrowly defined and separate files created?



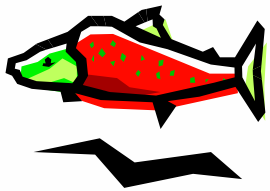
- Example:
  - In Alaska, there are many different geographic, cultural, political, etc boundaries.
  - Without sub-dividing the population into smaller regions, “too much” variation would be present to be able to capture in the DRG.
  - Solution: Eco-cultural “zones” were used to divide the state. A file is created for each zone.
- Considerations:
  - Feasibility
  - Data quality
  - Defensibility

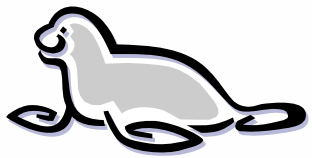
Defining the Population

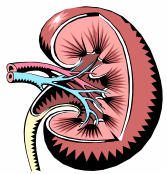
- Considerations regarding gender
  - At this time the LifeLine™ software is gender neutral.
  - Therefore the DRG will be gender neutral in its first version.
  - HOWEVER: the importance of gender in this tool is not being overlooked. In future versions, this feature will be built in.

Define the Relevant Food List

- Focus on
  - Foods eaten in large amounts.
    - Alaska example: Salmon
  - Foods eaten by a large number of people.
    - Alaska example: Seal Oil
  - Foods known to carry high concentrations of toxins.
    - Alaska example: Organ meat (liver/kidney)







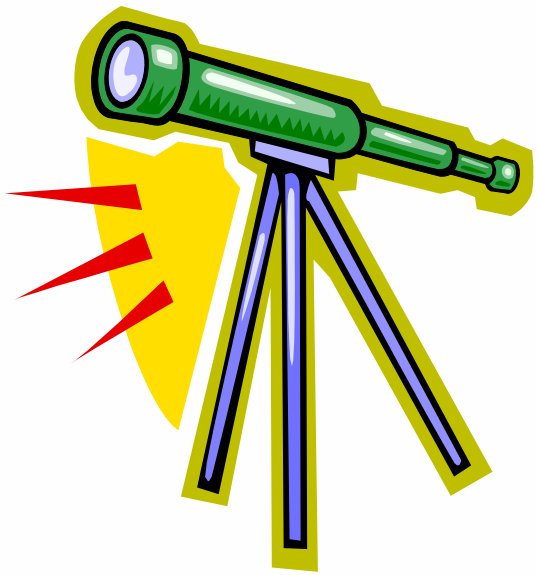
- Example: In Alaska salmon, ocean fish, large land mammals, marine mammals, and marine invertebrates account for 89% of each region's per person harvest. (DEC)

Food List Data Sources

- Harvested Species
- 24hr Recall data will provide an unsolicited food list by the subject.
  - Centre for Indigenous Peoples' Nutrition and Environment (CINE) data comes from 24hr recall surveys.
- Food Frequency Questionnaires (FFQ) will only gather information related to the pre-determined food list.
  - Alaska Traditional Diet Project used a FFQ which was developed by two prominent Alaska nutritionists.
- DRG's Alaska file has a food list which is a compilation of these three information sources along with the addition of other foods/parts of animals which are particularly relevant to risk assessment.
- Great care should be taken in constructing a food list because if a relevant food is omitted, the model will not be able to take into account the contribution of that source to exposure.
- Food list should err on the side of inclusiveness.

Telescoping Food List

- This feature allows the data that the user brings to the DRG to be as detailed or as general as necessary.
- Hierarchy
  - Consumption Group
    - Species
      - Sub-species
        - » Parts eaten



Telescoping Food List
Adding a Consumption Group

Dietary Record Generator - File 1

File Help

Overview

Food Setup

Age Range Setup

Consumption Setup

Generate Consumption

Reports

Foods Setup

Foods

- Salmon
- Moose
- New ConsumptionGroup

Add Consumption Group | Add Species | Remove Item

Properties

Item Heirarchy Selected: Consumption Group

Name: New ConsumptionGrou

Synonyms:

Is Food:

Calories per 100g: 0

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Telescoping Food List
Adding a Species

Dietary Record Generator - File 1

File Help

Overview

Food Setup

Age Range Setup

Consumption Setup

Generate Consumption

Reports

Foods Setup

Foods

- Salmon
  - Chinook Salmon
  - New Species(2)
- Moose

Add Species | Add Sub-Species | Remove Item

Properties

Item Heirarchy Selected: Species

Name: New Species(2)

Synonyms:

Is Food:

Calories per 100g: 0

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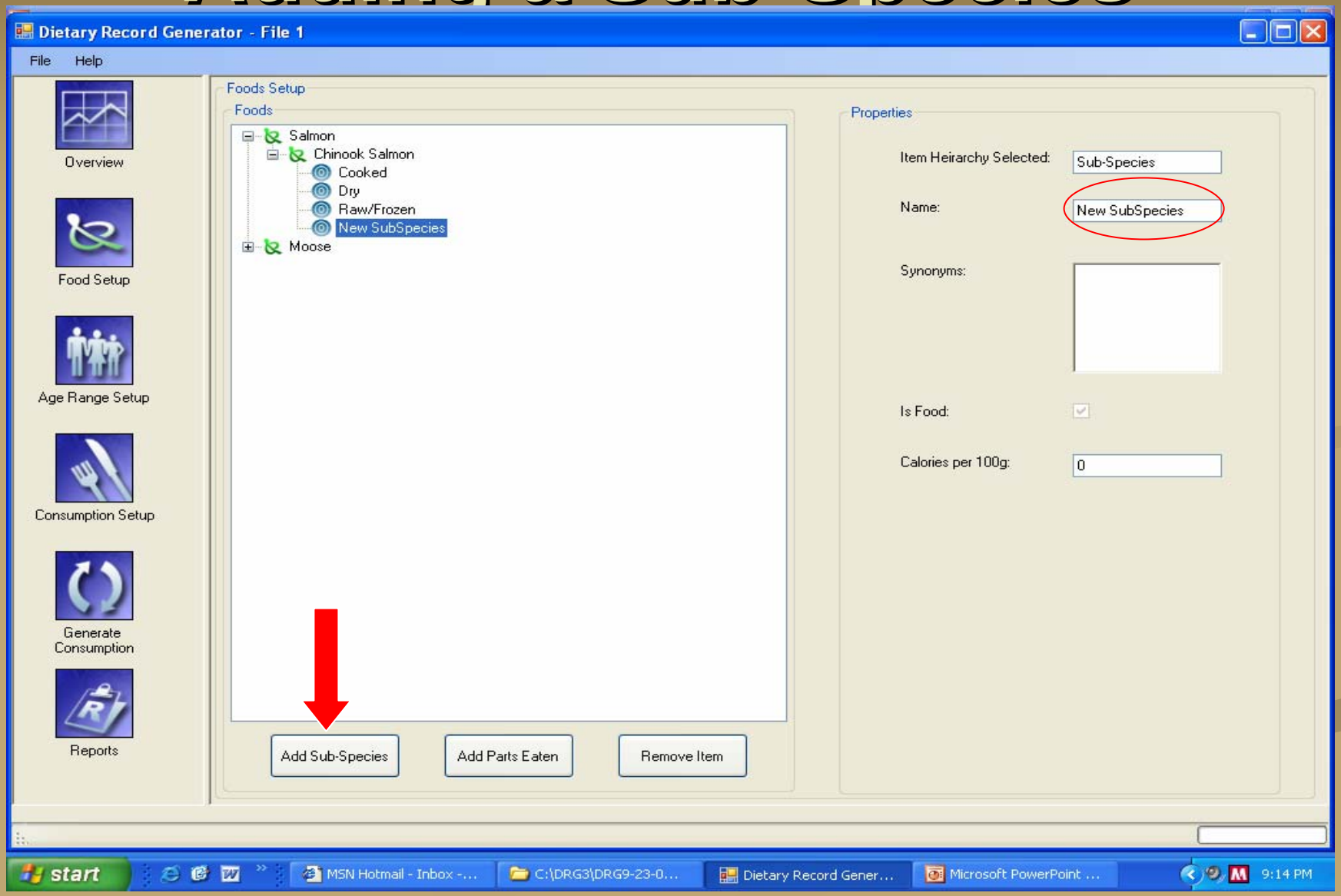
Telescoping Food List
Adding a Sub-Species



Telescoping Food List
Adding a Part Eaten

Dietary Record Generator - File 1

File Help

Overview

Food Setup

Age Range Setup

Consumption Setup

Generate Consumption

Reports

Foods Setup

Foods

- Salmon
  - Chinook Salmon
    - Cooked
      - New PartsEaten
    - Dry
    - Raw/Frozen
- Moose

Add Parts Eaten

Remove Item

Properties

Item Heirarchy Selected: Part Eaten

Name: New PartsEaten

Synonyms:

Is Food:

Calories per 100g: 0

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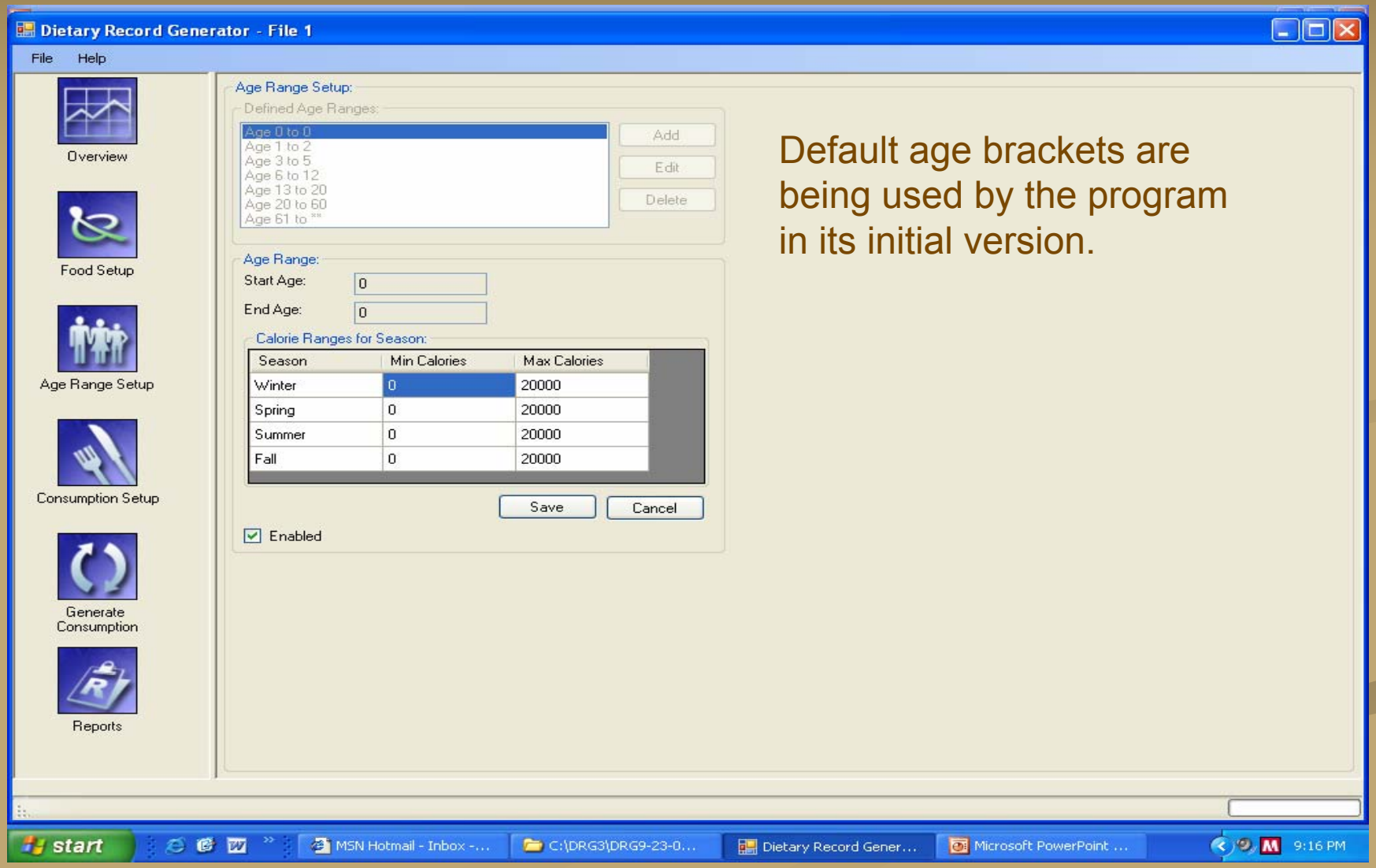
Defining Age Brackets

- For which age ranges is information available?
- In the future, the age range will be modifiable. At present, it is fixed.
- Each age bracket requires a range of accepted calorie levels.

Defining Age Brackets

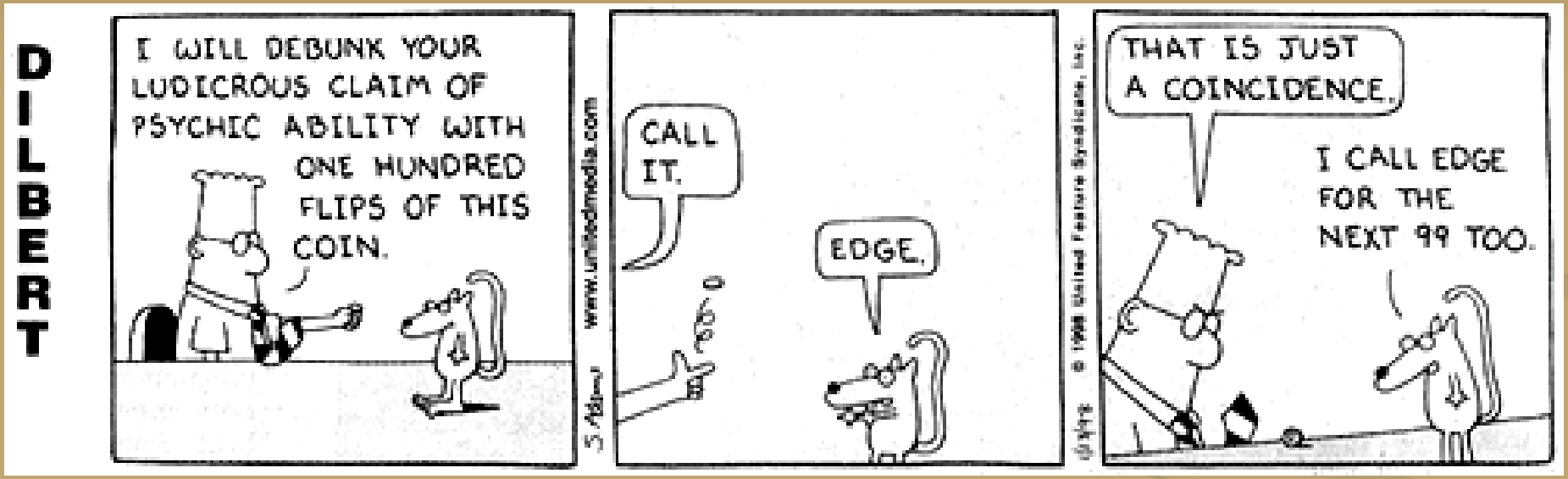


Default age brackets are being used by the program in its initial version.

Defining Consumption Parameters

- Information needed
  - For each consumption group (top level), a probability of eating in each season, in decimal form
    - OR a distribution of probabilities
  - For each species (2nd level), sub-species (3rd level), or part eaten (4th level) a probability of eating in decimal form.
    - These probabilities must add up to 1.
  - For each actual food (the lowest level of detail) a portion size estimate
    - OR the user can choose to have the food take on the portion size estimate for the food above it in the hierarchy.
- Telescoping food list allows for any level of detail to be brought to the DRG.

Probabilities…



Defining Top Level Probability of Consumption

Dietary Record Generator - File 1

File Help

Overview
Food Setup
Age Range Setup
Consumption Setup
Generate Consumption
Reports

Consumption Parameters:

Viewing Hierarchy:

Foods
Season
Age Range

Move Up
Move Down

- Salmon
  - Chinook Salmon
    - Cooked
      - Winter
        - Age 0 to 0
        - Age 1 to 2
        - Age 3 to 5
        - Age 6 to 12
        - Age 13 to 20
        - Age 20 to 60
        - Age 61 to **
      - Spring
      - Summer
      - Fall
    - Dry
    - Raw/Frozen
- Moose

Season: Winter - Age Range: 0 to 0

Consumption Group:

Name	Is Food	Probability of Consumption	Consumption Amount
Salmon	☐	0.31	Single Value: 110 ...

Species:

Name	Is Food	Probability of Consumption	Consumption Amount
Chinook Salmon	☐	1	Single Value: 110 ...

Sub Species:

Name	Is Food	Probability of Consumption	Consumption Amount
Cooked	☑	0.07	Distribution: Log Normal ...
Dry	☑	0.9	Single Value: 74 ...
Raw/Frozen	☑	0.03	Distribution: Log Normal ...

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Defining 2nd, 3rd, and 4th Level Probabilities

Dietary Record Generator - File 1

File Help

Overview
Food Setup
Age Range Setup
Consumption Setup
Generate Consumption
Reports

Consumption Parameters:

Viewing Hierarchy:

Foods
Season
Age Range

Move Up
Move Down

- Salmon
  - Chinook Salmon
    - Cooked
      - Winter
        - Age 0 to 0
        - Age 1 to 2
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        - Age 20 to 60
        - Age 61 to **
      - Spring
        - Age 0 to 0
        - Age 1 to 2
        - Age 3 to 5
        - Age 6 to 12
        - Age 13 to 20
        - Age 20 to 60
        - Age 61 to **
      - Summer
      - Fall
    - Dry
      - Winter
      - Spring
      - Summer
      - Fall
    - Raw/Frozen
      - Winter
      - Spring
      - Summer
      - Fall
- Moose

Season: Winter - Age Range: 0 to 0

Consumption Group:

Name	Is Food	Probability of Consumption	Consumption Amount
Salmon	☐	0.31	Single Value: 110 ...

Species:

Name	Is Food	Probability of Consumption	Consumption Amount
Chinook Salmon	☐	1	Single Value: 110 ...

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Adding a Portion Size Estimate

Dietary Record Generator - File 1

File Help

Overview

Food Setup

Age Range Setup

Consumption Setup

Generate Consumption

Reports

Consumption Parameters:

Viewing Hierarchy:

Foods
Season
Age Range

Move Up
Move Down

- Salmon
  - Chinook Salmon
    - Cooked
      - Winter
      - Dry
        - Winter
        - Spring
        - Summer
        - Fall
      - Raw/Frozen
        - Winter
        - Spring
        - Summer
        - Fall
  - Moose

Season: Winter - Age Range: 0 to 0

Consumption Group:

Name	Is Food	Probability of Consumption	Consumption Amount
Salmon	☐	0.31	Single Value: 110 ...

Species:

Name	Is Food	Probability of Consumption	Consumption Amount
Chinook Salmon	☐	1	Single Value: 110 ...

ption	Consumption Amount
	Distribution: Log Normal ...
	Single Value: 74 ...
	Distribution: Log Normal ...

Edit SubSpecies Consumption Amount

Variable Data:

- ○ Single Value
- ◉ Distribution

Distribution Type:

- ◉ Log Normal
- ○ Normal
- ○ Triangular
- ○ Pareto
- ○ Uniform
- ○ User Supplied

Distribution Parameters:

Mean: 128

Standard Deviation: 91

☐ Enable

Upper Bound (opt): 0.0

OK

Cancel

☐ Inherited From Parent

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Generating Dietary Records

Dietary Record Generator - File 1

File Help

Overview

Food Setup

Age Range Setup

Consumption Setup

Generate Consumption

Reports

Generate Consumption:

Record Generation Parameters:

Number of Record to Generate Per Age Range: 100

Generate

Generation Output:

Age Range	Season	Attempted	Passed	Avg Calories (Passed)	Avg Calories (Attempted)	Min Calories (Attempted)	Max Calories (Attempted)
0 to 0	Winter	100	100	357.561	357.561	0	1838.171
0 to 0	Spring	100	100	123.281	123.281	0	512.22
0 to 0	Summer	100	100	147.972	147.972	0	807.786
0 to 0	Fall	100	100	364.469	364.469	0	1314.795
1 to 2	Winter	100	100	338.958	338.958	0	1382.461
1 to 2	Spring	100	100	114.159	114.159	0	490.492
1 to 2	Summer	100	100	150.828	150.828	0	1105.282
1 to 2	Fall	100	100	367.580	367.580	28.14	1054.425
3 to 5	Winter	100	100	560.805	560.805	40.20	4435.392
3 to 5	Spring	100	100	131.158	131.158	0	453.68
3 to 5	Summer	100	100	208.510	208.510	0	901.105
3 to 5	Fall	100	100	491.890	491.890	0	2024.234
6 to 12	Winter	100	100	585.832	585.832	0	2376.800
6 to 12	Spring	100	100	300.653	300.653	0	1378.517
6 to 12	Summer	100	100	203.240	203.240	0	1290.052
6 to 12	Fall	100	100	662.116	662.116	0	3322.689

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  - Define consumption parameters
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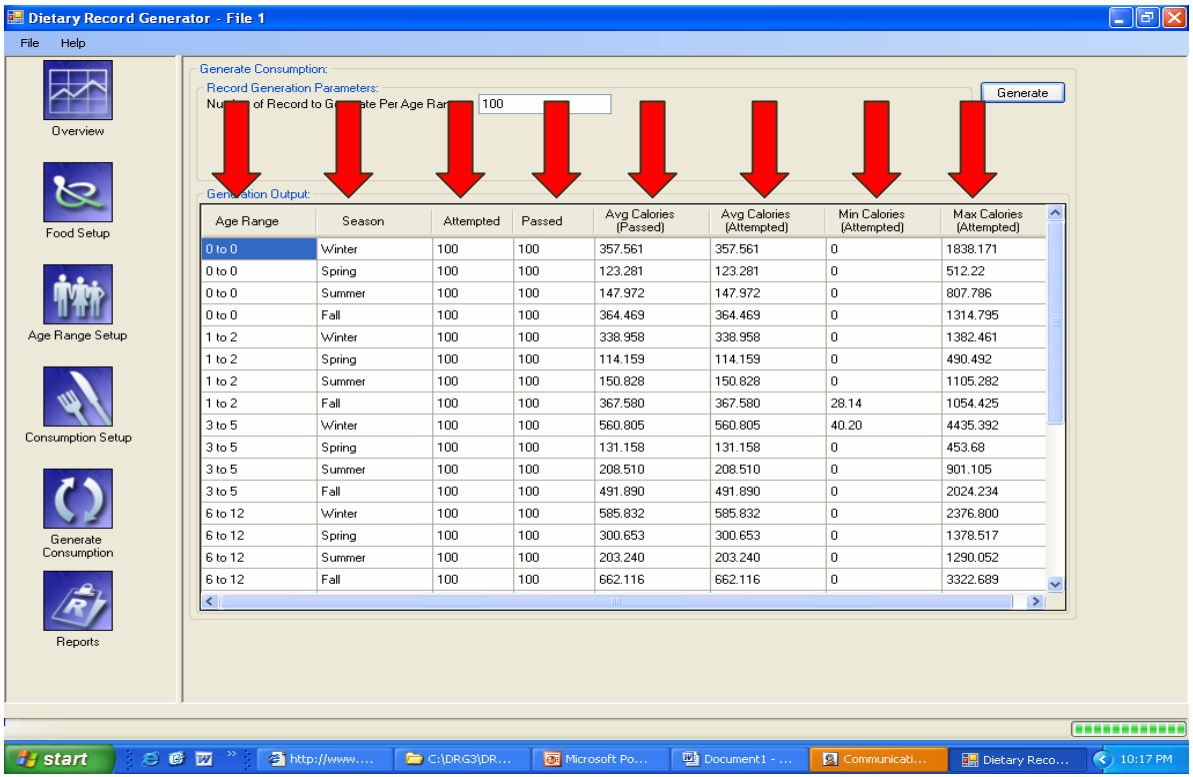
- **Understanding results of DRG**

Understanding Results of the DRG

- Details
- Big Picture

Understanding Details of DRG Results

- Age Range
- Season
- Attempted
- Passed
- Average Calories Passed
- Average Calories Attempted
- Minimum Calories Attempted
- Maximum Calories Attempted



Age Range	Season	Attempted	Passed	Avg Calories (Passed)	Avg Calories (Attempted)	Min Calories (Attempted)	Max Calories (Attempted)
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6 to 12	Fall	100	100	662.116	662.116	0	3322.689

Understanding Big Picture Results of DRG

- This tool provides the very important link between available dietary information and current modeling technology used to advise decisions.
- Previous to this tool, this valuable information may have been overlooked because it didn’t “fit” into the modeling paradigm.

We are Not Done Yet…

- Still much work to be done
  - Alpha and Beta Testing
  - Quality Assurance
  - Data Quality Guidelines/Guidelines for Use
  - Training
  - Other applications

References

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Thank You

- Your attention and comments are much appreciated.
- We look forward to your feedback.