

# Expectation of Mortality as a Function of Body Condition in SRKWs

The penultimate slide in presentations at a briefing by NOAA Fisheries Service in Seattle, 11 February, 2011 entitled “Effects of Fisheries on Killer Whales: Preliminary Analysis Technical Meeting.”

Little context for these data was given in February. Today’s presentation will provide some of that missing context, and hopefully, spur participants in this workshop to consider all pertinent supporting information when judging the scientific merits of explanations based on the body condition of SRKWs.

NOAA FISHERIES SERVICE



**Other Information Suggesting the Whales may be Malnourished**

- Observation of very poor body condition in 13 members of the population from the mid-1990’s to present (The Center for Whale Research).
- All but two of those whales subsequently died.
- None of the whales that died were recovered, so a definitive cause of death is unknown.

| Year | Whale ID | Whale Sex/Age | Fate     |
|------|----------|---------------|----------|
| 1994 | L42      | M / 21        | Died     |
|      | K17      | M / 28        | Died     |
| 1995 | J3       | M / 43        | Died     |
|      | L63      | M / 11        | Died     |
|      | L68      | M / 10        | Died     |
| 1996 | J12      | F / 24        | Died     |
|      | L9       | F / 65        | Died     |
| 1997 | J5       | F / 59        | Died     |
| 2002 | L102     | Unk / Calf    | Died     |
| 2005 | K25      | M / 14        | Survived |
| 2006 | K28      | F / 12        | Died     |
| 2008 | L106     | M / 3         | Survived |
|      | L67      | F / 23        | Died     |



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## “Peanut-Head” Condition

**From Durban et al. 2009:**

**... this condition is typified by a pronounced depression behind the blowhole /cranium, and the surfacing behavior of the whale can be described as a flat “ploughing” motion rather than a pronounced arched surfacing.**

Source material obtained without contact from:



**Center  
for  
WHALE RESEARCH**

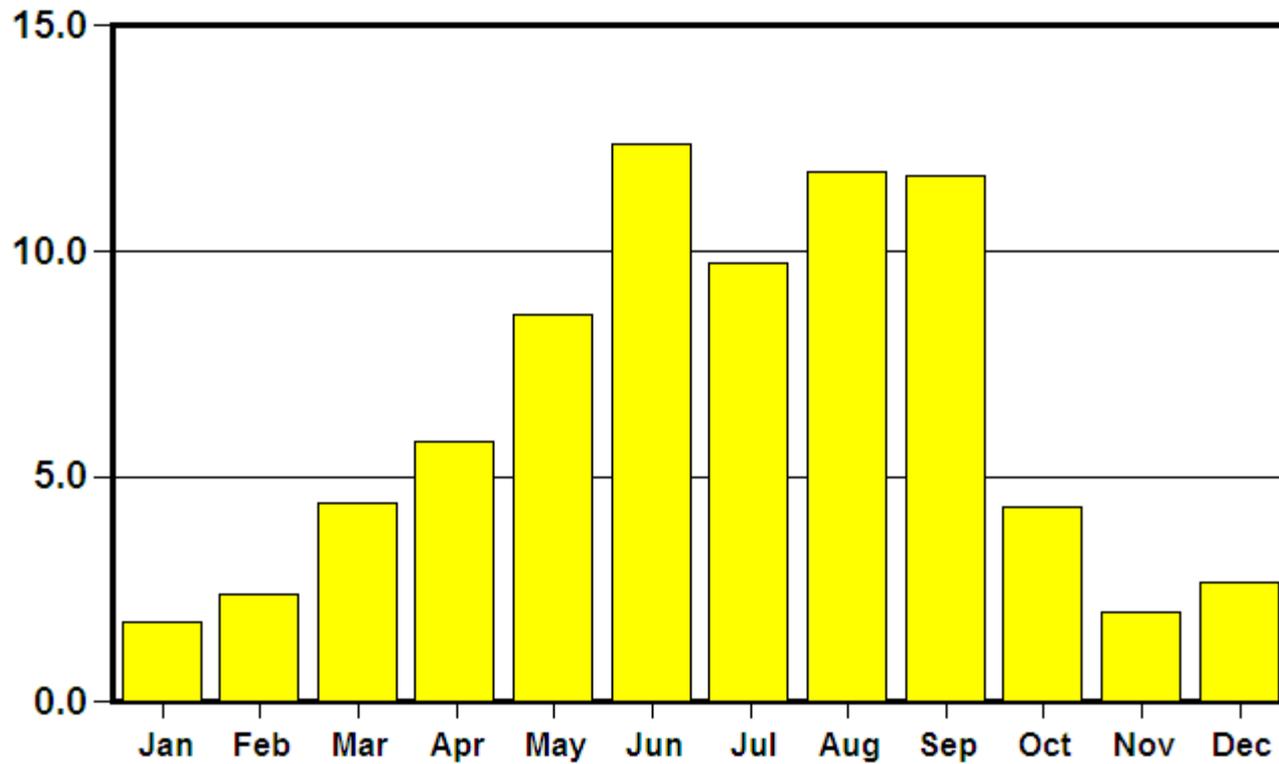
<http://www.whaleresearch.com/>

**Durban, J., H. Fearnbach, D. Ellifrit, and K. Balcomb. 2009. Size and body condition of southern resident killer whales. Contract report to the Northwest Regional Office, National Marine Fisheries Service. Order number AB133F08SE4742, Requisition Number NFFP5000-8-43300.**

*I wish to thank the Center for Whale Research for being a source of demographic information on killer whales. Any errors in the material in this presentation are mine and not the result of any action by the Center or its staff.*

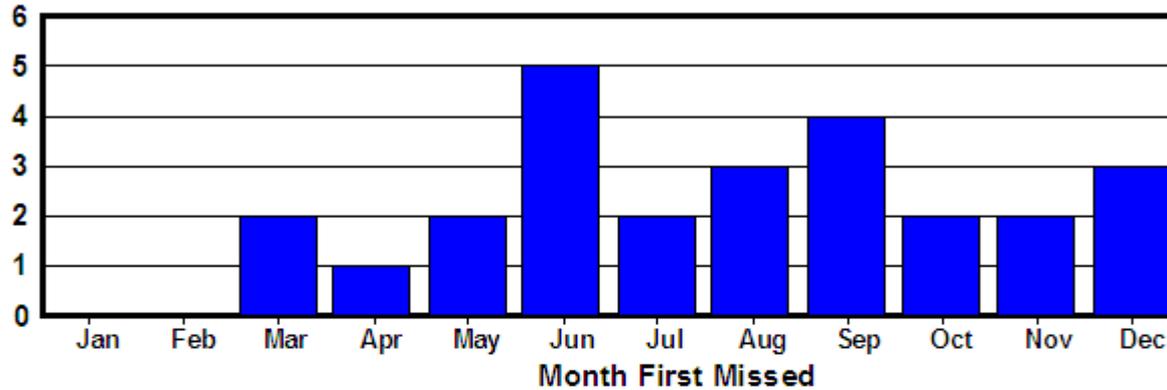
# Frequency of Surveys

Mean Number of Surveys to Count SRKWs: 2007 - 2011

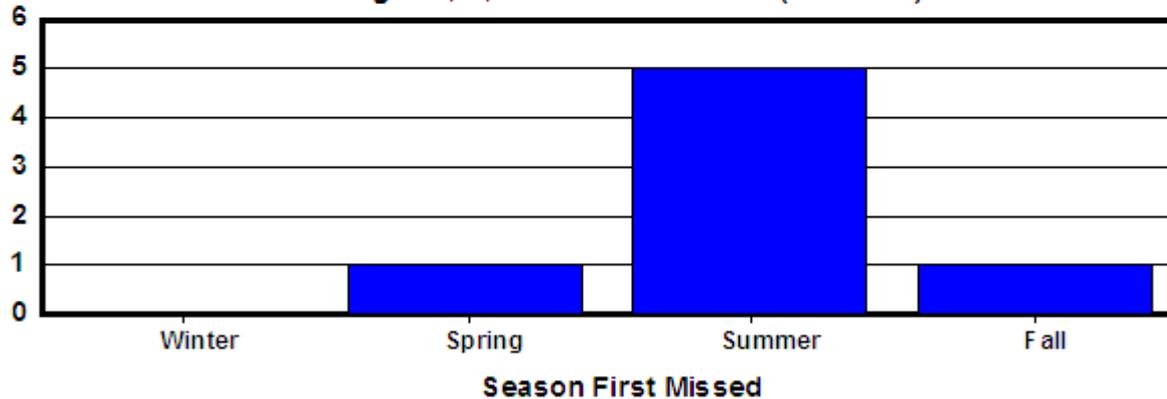


# Timing of Disappearances (Mortalities)

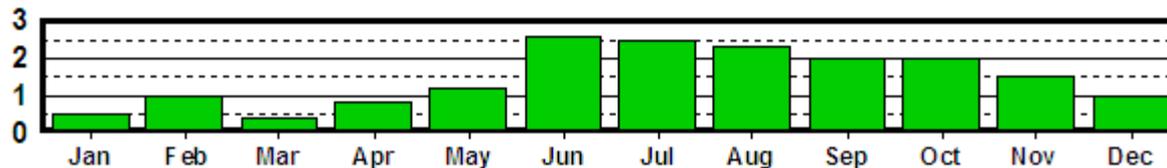
Number of SRKWs Missing in J,K,L Pods: 1998 - 2011 (Subset A)



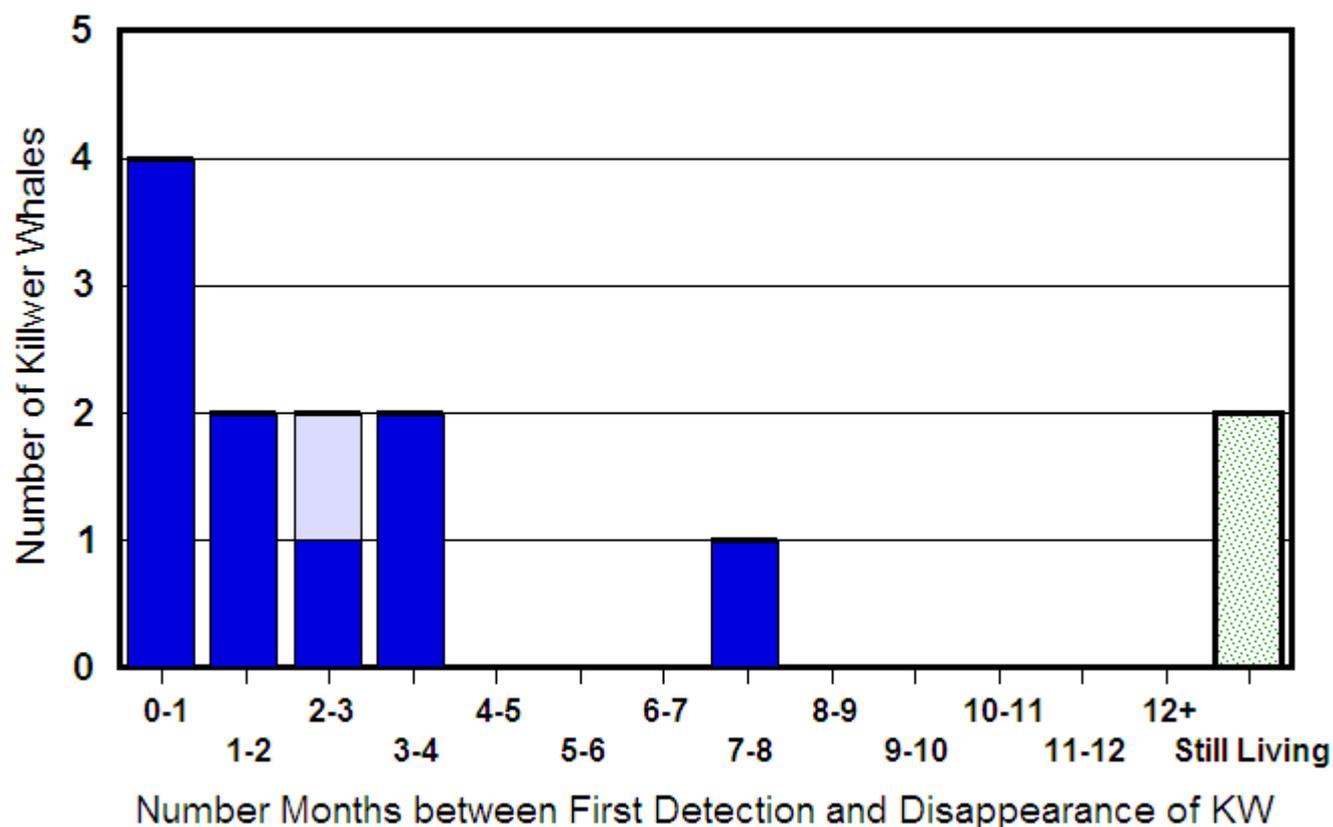
Number of SRKWs Missing in J, K, L Pods: 1998 - 2011 (Subset B)



Mean Number of Full Pods Encountered in Salish Sea: 2007 - 2011



## Apparent Time to Disappearance for 13 SRKW once detected w/ "Peanut-head" Condition since 1994



Lighter shade blue bar represents a KW w/ an advanced condition first seen late in the year.

# A Question for the Science Panel to Consider

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Since 1998 only three (**3**) SRKWs have been observed as having the “peanut-head” condition and died ostensibly of inadequate nutrition. What killed the other **44** whales?

# Disappearances of SRKWs from J, K, L Pods by Year

|              | Disappeared All | Disappeared w/ Peanut Head |
|--------------|-----------------|----------------------------|
| 1998         | 6               |                            |
| 1999         | 4               |                            |
| 2000         | 7               |                            |
| 2001         | 0               |                            |
| 2002         | 2               | 1                          |
| 2003         | 3               |                            |
| 2004         | 0               |                            |
| 2005         | 3               |                            |
| 2006         | 6               | 1                          |
| 2007         | 1               |                            |
| 2008         | 8               | 1                          |
| 2009         | 1               |                            |
| 2010         | 6               |                            |
| 2011         | 0               |                            |
| <b>Total</b> | <b>47</b>       | <b>3</b>                   |

## SKRWs w/ "peanut-head" condition

| Year | Whale ID | Whale Sex/Age | Fate     |
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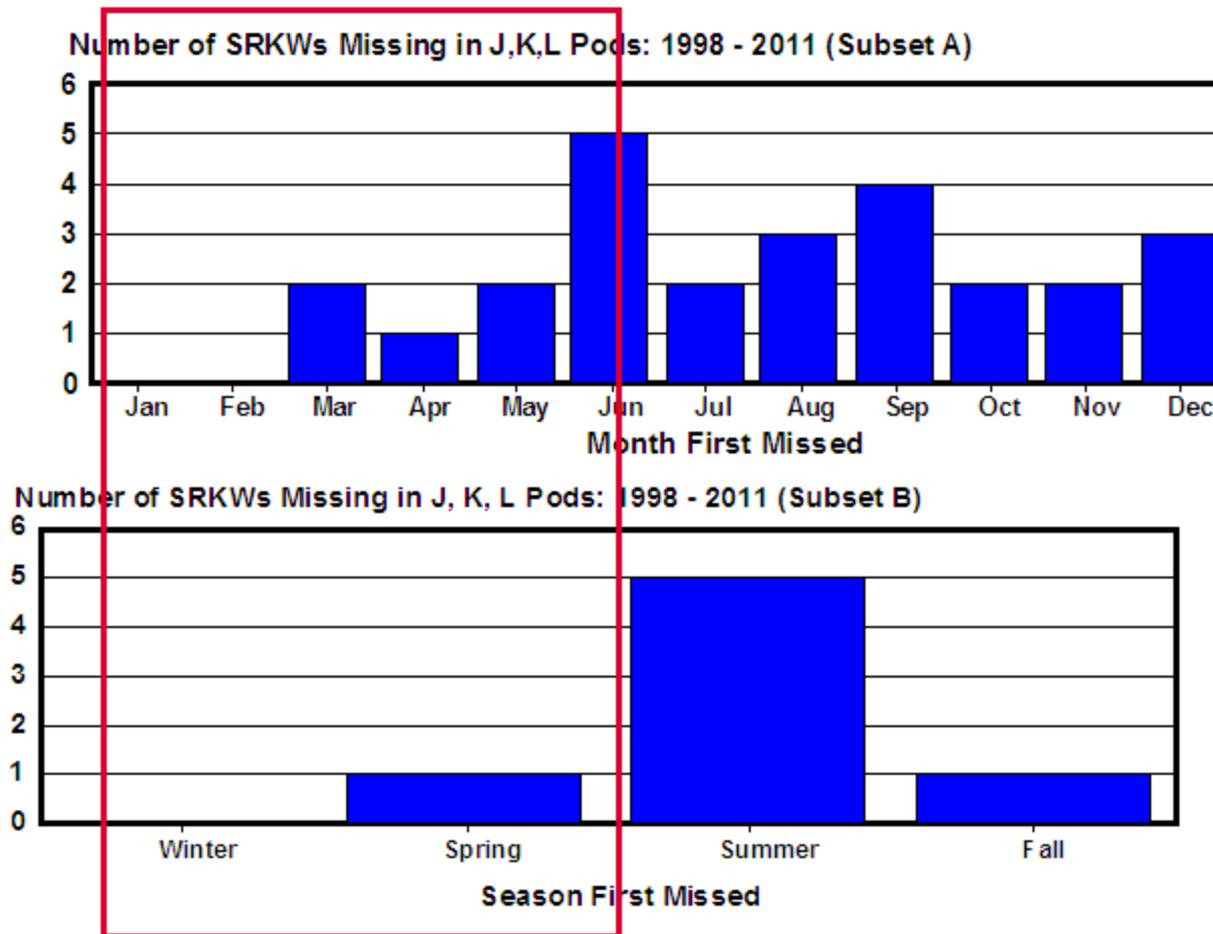
Note two KWs, one detected w/ "peanut-head" in 2005 and another in 2008, are still alive and no longer have the condition.

# Possibility of a Partial Answer to the 1<sup>st</sup> Question

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An estimated 33% of SRKWs that died w/o the condition being observed could have developed the condition and died while the whales were outside of the Salish Sea. Is this possibility sufficient evidence that they did?

# Timing of Disappearances (Mortalities)



**Estimated 33%  
of Missing SRKWs**

# Possibility of a Partial Answer to the 1<sup>st</sup> Question

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If the possibility is fully realized (a big if), **30** SKRWs still died without having the “peanut-head” condition.

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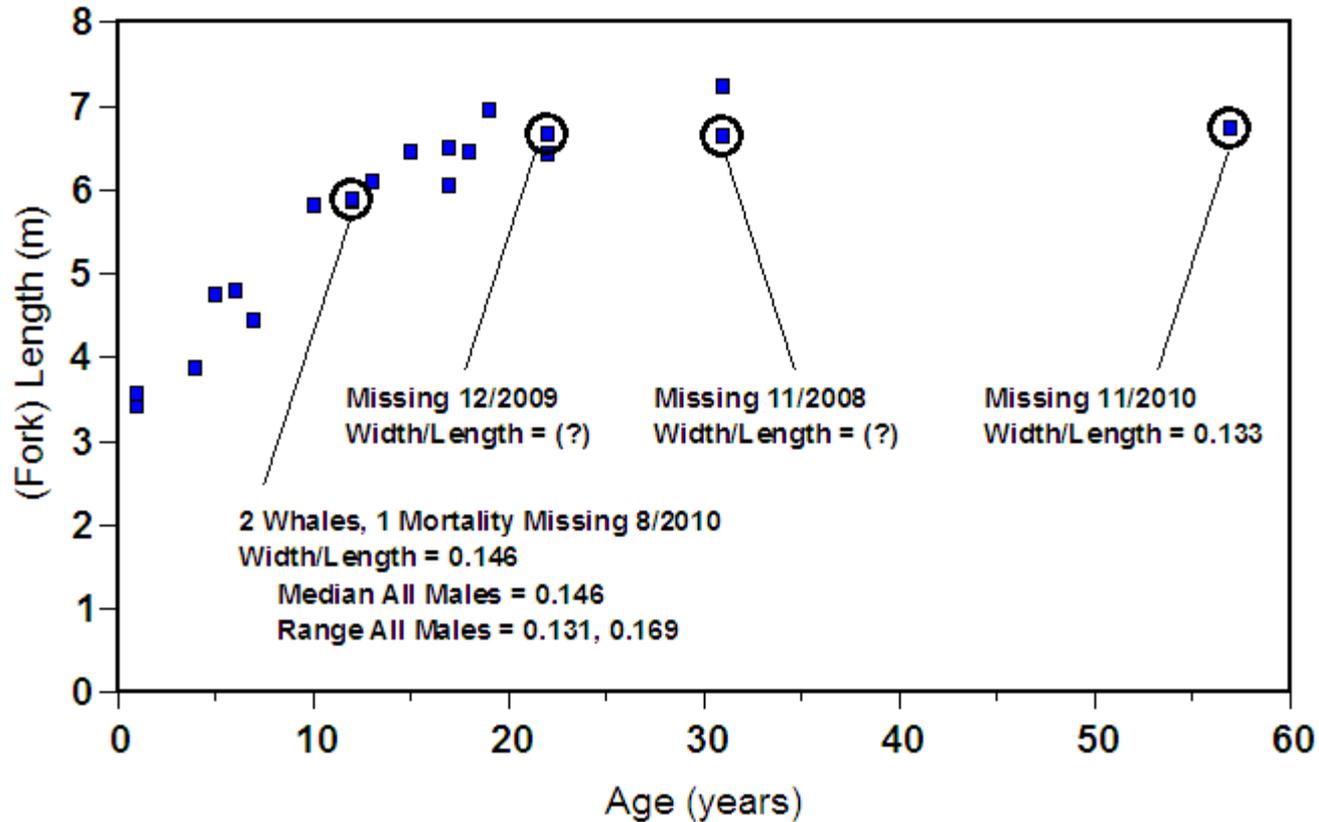
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If the possibility is fully realized (a big if), **30** SKRWs still died without having the “peanut-head” condition since 1998.

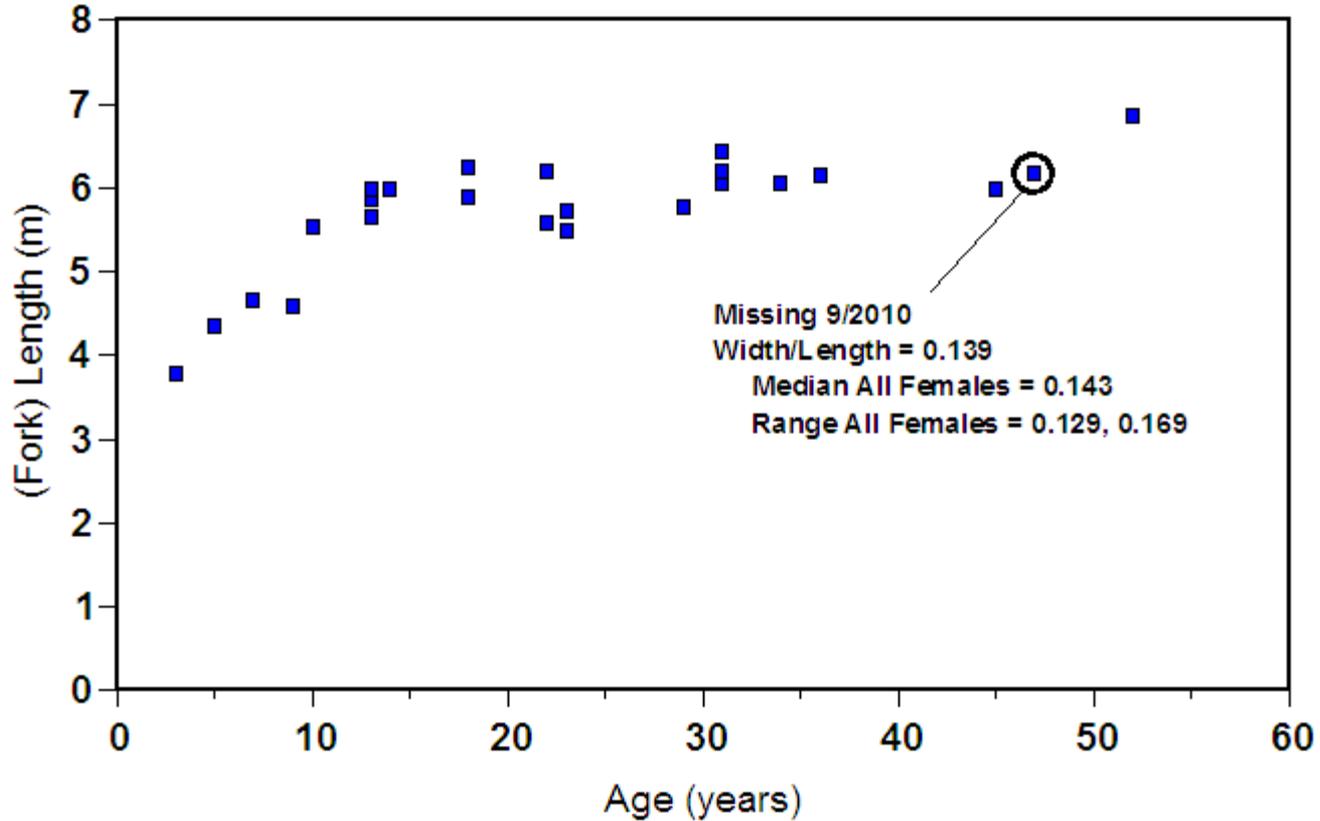
What’s the body condition of those SKRWs without the “peanut-head” condition that subsequently lived against those that subsequently died?

## Went Missing by August, 2011



From Durban et al. 2009 - Males measured in September, 2008 as part of a "condition" study.

## Went Missing by August, 2011



From Durban et al. 2009 - Females measured in September, 2008 as part of a "condition" study

## Demographic Statistics for Mortalities of SRKWs

| "Peanut"<br>Condition | Years       | Age at Death |        | Sex   |         |         |
|-----------------------|-------------|--------------|--------|-------|---------|---------|
|                       |             | Median       | Mean   | Males | Females | Unknown |
| No                    | 1998 – 2011 | 24 yrs       | 26 yrs | 15    | 17      | 12      |
| Yes                   | 1994 - 2011 | 23 yrs       | 27 yrs | 5     | 5       | 1       |

**Note that periods cover different years (periods need to be the same).**

**Note statistics should be compared against those from extant SKRWs (i.e., median/mean age of survivors and sex of survivors)**

# Other Questions for the Science Panel to Consider

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Did SRKWs w/ the “peanut-head” condition “die from malnutrition” or were they “malnourished because they were dying (or sick, or injured)”?

How can malnutrition, a chronic process, kill SRKWs acutely within a month or sometimes days?

If SRKWs share prey as do NRKWs, why would “evidence” of malnutrition (the “peanut-head” condition) be concentrated in only a few SRKWs (1 or 2 in a year out of a population of 80 or so)?

**Answers to some of these questions and to others will require meticulous inspection of the all the data from surveys**