SMELT WORKING GROUP
Friday, February 15, 2013

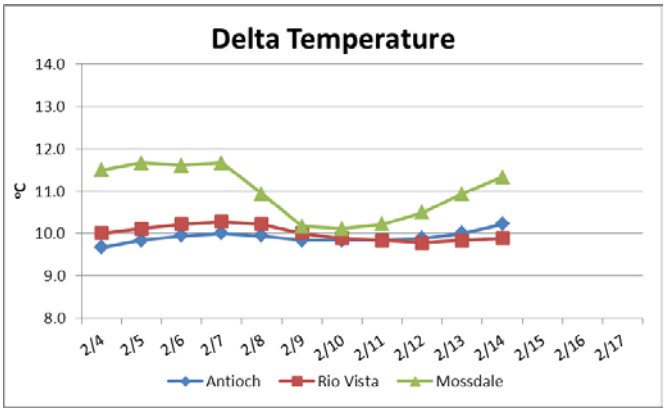
Meeting Summary:

The water projects concern level of salvage (228 adult delta smelt or 75% of the total Incidental Take Limit [ITL]) was reached on February 6, 2013. However, since that time, no salvage has occurred at either facility. The Working Group was requested by the Service to hold an impromptu meeting to review current adult delta smelt distribution and salvage data, Delta conditions, and projected operations. Based on this review the Working Group recommended to the Service that OMR could be increased to -2,500 cfs from the previous OMR flow level of -2,000 cfs. The Working Group will continue to monitor salvage, turbidity, and other conditions, and will reconvene Monday, February 19.

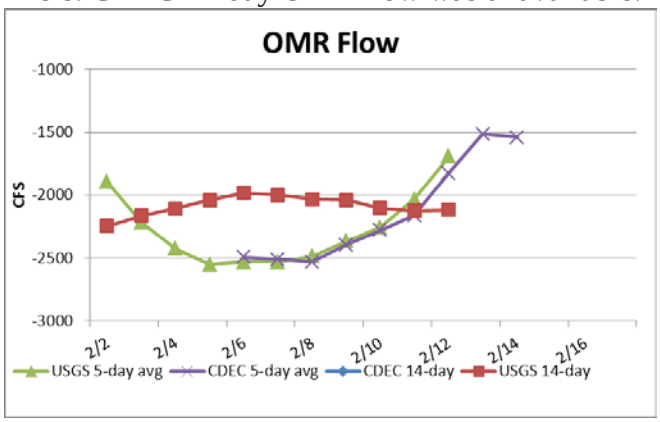
Reported Data:

1) Current environmental data:

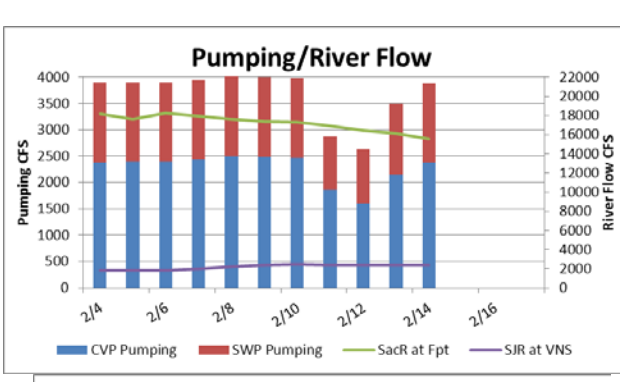
- **Water temperatures**:

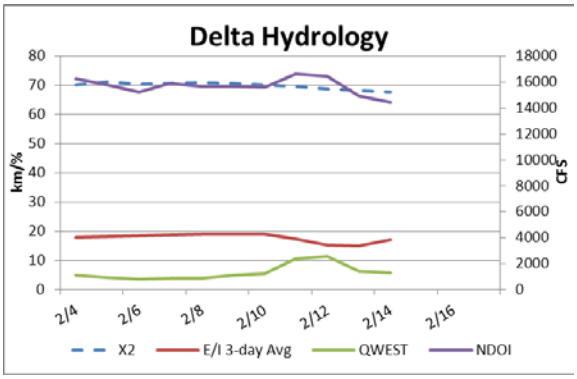


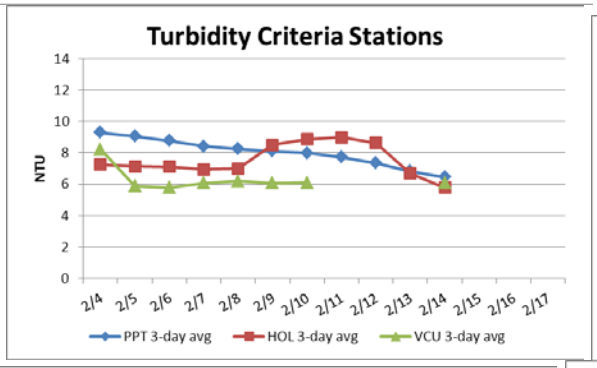
- **OMR:** USGS tidally-averaged 5-day average OMR flow and 14-day average OMR flow on February 12 was -1,691 cfs and -2,118 cfs, respectively. CDEC 5-day OMR flow as of February 14 is -1,542 cfs. CDEC 14-day OMR flow was unavailable.

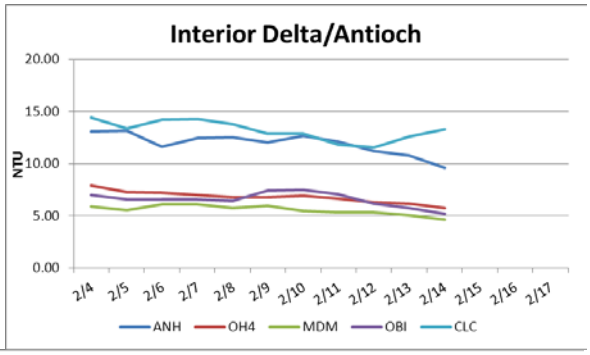


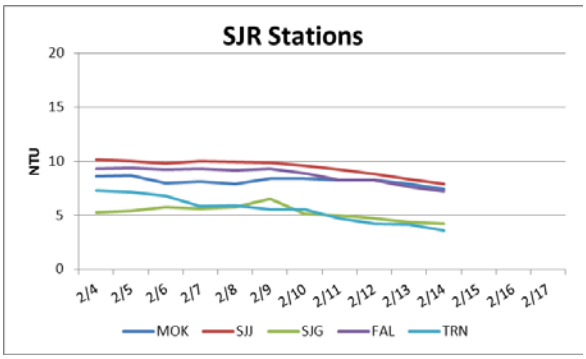
- **Flow:** Sacramento River flows at Freeport are approximately 15,551 cfs and San Joaquin River is 2,360 cfs. X_2 calculation from CDEC is at 67.9km.

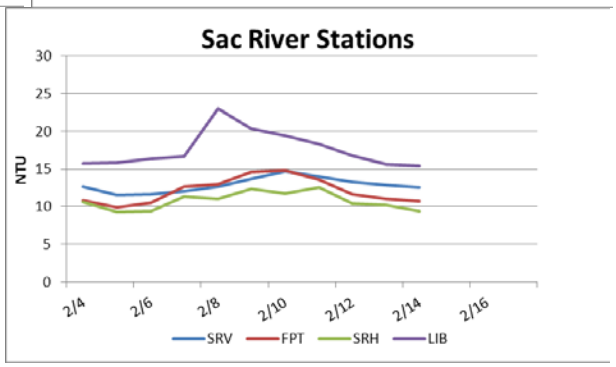












Delta Fish Monitoring:

Spring Kodiak Trawl #2 was in the field last week. One hundred twenty-five adult delta smelt were collected, four males expressed milt, and all other individuals were pre-spawn. Spring Kodiak Trawl #3 will commence on March 4th, 2013.

Smelt Larval Survey #4 is in the field this week. All southern and central Delta stations have been processed. No delta smelt larvae or adults have yet been detected. The survey did result in surpassing a distributional criterion for the State Water Project's longfin smelt ITP. A total of 2530 longfin smelt larvae were collected so far, 467 of which were collected at criteria stations in the central and southern Delta. SLS #5 is in the field the week of February 25.

The 2012 annual Fall Midwater Trawl Index (September through December) is 42. The combined SWP and CVP total allowable take for adult delta smelt for the WY 2013 as calculated from the FMWT Index using the formula prescribed in the BO is 305.

The 2012 Delta Smelt Recovery Index (based on September and October) is 13. More information on the Recovery Index can be found on the Bay-Delta Office's web site at http://www.fws.gov/sfbaydelta/species/delta_smelt.cfm. Results from CDFG surveys are available online at: http://www.dfg.ca.gov/delta/.

2) Salvage:

For the last eight days, salvage of adult delta smelt at the facilities has been zero. The total combined delta smelt salvage for the season is now 228 (100 at the SWP and 128 at the CVP) as of February 6, or 75% of the total allowable take of 305. No longfin smelt were salvaged over this reporting period. The total combined longfin smelt salvage for the season is now 4.

Current longfin smelt and delta smelt salvage information can be downloaded from DFG's salvage FTP site at ftp://ftp.dfg.ca.gov/salvage/Daily%20Smelt%20Summary/ or queried from DFG's salvage web page at http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx

3) Expected Project Operations:

Combined CVP/SWP exports are expected to be approximately 3,900 cfs for the week of February 11, 2013, targeting an OMR of -2,000cfs.

4) Particle Tracking Modeling:

No PTM runs were requested for this week.

5) Turbidity Modeling:

No turbidity modeling was discussed today.

6) Assessment of Risk:

Background:

RPA Component 1, Action 2: "An action implemented using an adaptive process to tailor protection to changing environmental conditions after Action 1. As in Action 1, the intent is to protect pre-spawning adults from entrainment and, to the extent possible, from adverse hydrodynamic conditions."

"The range of net daily OMR flows will be no more negative than -1,250 to -5,000 cfs. Depending on extant conditions (and the general guidelines below) specific OMR flows within this range are recommended by the Working Group from the onset of Action 2 through its termination…" (page 35).

Discussion: The Working Group was requested by the Service to review the current entrainment risk for adult delta smelt given the lack of salvage over the previous eight days. The Working Group reviewed and discussed all relevant data from Delta monitoring, salvage, field surveys, and planned Project operations.

Ken Newman, USFWS Stockton, presented an analysis he completed at the request of the Service regarding the potential benefit of increasing the sampling rate at the fish salvage facilities. Ken presented two scenarios to the group, with different rates of entrainment for each. See the attached document (Newman 2013).

Additionally, staff from DWR presented an informal conceptual framework they produced regarding potential causes for the eight days of zero salvage. See the attached document (DWR 2013).

The Working Group discussed Ken Newman's and DWR's analyses. Based on Ken's analysis, members agreed that increasing the rate of sampling at the fish facilities would not likely result in a greater salvage rate at the current trend of zero salvage. Ken's analysis did not describe the potential control of the 0-salvage trend. Following the discussion on DWR's conceptual framework illustrating potential causes for zero salvage, the Working Group suggested the flow chart was very useful toward increasing the SWG members' knowledge on this subject and toward evaluating possible causes of salvage trends.

The Working Group decided that due to zero salvage over the previous eight consecutive days, during a time when the projects had been targeting an OMR of no more negative than -2500cfs,, the OMR flow target could be increased to -2,500 cfs from the February 12, 2013, determination of an OMR target of -2000cfs. Members remain concerned with the total salvage to date for the season, and potential movement for additional delta smelt to move into the southern Delta in future weeks, particularly given that there have been no ripe females observed in either salvage or survey data, indicating that it is still early in the delta smelt migration period. Members indicated the desire for a cautious approach to increasing OMR flow combined with vigilant monitoring of daily salvage. Members noted that returning OMR flow to the previous level during the last week of salvage and closely monitoring daily salvage results could provide further understanding for the recent zero salvage.

The Working Group will meet again on February 19.

WEEKLY ADVICE FOR THE DEPARTMENT OF FISH AND GAME FOR LONGFIN SMELT

Advice for week of February 4, 2013:
The Smelt Working Group believes that an OMR of -5000 is protective of longfin smelt at this time. The current OMR advice for delta smelt (-2500 cfs, dropping to -1250) will be very protective for longfin smelt**.**

Summary of Risk:
Risk of additional entrainment into the south Delta remains very low. Salvage and survey data for adult longfin smelt suggests limited spawning in the central and south Delta. SLS #3 distribution numbers surpassed the criterion 3 threshold, yet densities were low at all but 2 criteria stations and current densities do not by themselves warrant protections beyond -5000 OMR. Qwest conditions since survey 3 have been positive and OMR only weakly negative (generally less negative than the target -2500), leading to little south Delta entrainment. Currently X2 is located at about Chipps Island, which suggests that a few adult longfin smelt will move into the central and south Delta to spawn. Barker Slough criteria are only in effect during "Dry" and "Critical" water years; this year is currently forecast as Wet for the Sacramento River.

Basis for advice:
The 2009 State Water Project 2081 for longfin smelt states that advice to the DFG Director shall be based on:

1. Adult Salvage – total adult (>=80mm) longfin smelt salvage (SWP+CVP) for December through February > 5 times the Fall Midwater Trawl longfin smelt annual abundance index.

2. Adult abundance, distribution or other information indicates that OMR flow advice is warranted.

3. Larva distribution in the Smelt Larva Survey or the 20mm Survey finds longfin smelt larvae present at 8 of 12 central and south Delta sampling stations in 1 survey (809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, 919; see Figure 1).

4. Larva catch per tow exceeds 15 longfin smelt larvae or juveniles in 4 or more of the 12 survey stations listed.

5. For Barker Slough Exports only: Between January 15 and March 15 of Critically Dry or Dry water years only (Sacramento River), based on abundance and distribution and detection of longfin smelt larvae at Station 716.

Discussion of Criteria
1. On January 20 and 21, 2013, longfin smelt salvage occurred at the SWP for a total salvage of 4. These are the first and only instances of adult longfin smelt salvage this water year. The Fall Midwater Trawl longfin smelt annual abundance index has completed and is 61. The total salvage level threshold for advice is >305 (see criterion in #1). No advice is warranted based on this criterion.

2. January Bay Study sampling collected a single longfin smelt in the San Joaquin River at their station 863 (Santa Clara Shoals, between Twitchell and Bradford Islands). Distribution information does not indicate advice is warranted based on this criterion.

3 & 4. The third Smelt Larva Survey (SLS) of 2013 was conducted January 28 and 29. During survey 3, longfin smelt larvae were collected at 9 of 12 central or south Delta stations, so the **distribution criterion was met** (cf., Table 1 and Basis for Advice #s 3 & 4 above). Given the potential to entrain some larvae from Franks Tract into the south Delta and the likelihood of peak hatching occurring in early February, an OMR less negative than -5000 would be more protective, but a more positive OMR is not yet warranted based on current central and south Delta longfin smelt larval densities.

5. Barker Slough Exports: current water type for the Sacramento River is Wet (http://www.water.ca.gov/swp/operationscontrol/docs/delta/DeltaWQ.pdf), therefore even though longfin smelt larvae are present at station 716, no advice is provided. Current exports are low (14-20 cfs) and don't pose a risk to larvae in Barker Slough (http://www.water.ca.gov/swp/operationscontrol/docs/delta/DeltaHydrology.pdf).

Current conditions: Net Delta outflow declined steadily through January. As of January 31 net Delta outflow was 17,690. X2 remained below 60 km from December 26 through January 3, but has been increasing slightly and as of February 3 was about 71. Combined State and federal exports are currently about 3900 cfs. Qwest has been slightly positive since January 24 and as of January 31 was about +1170 and declining.

To delay or reduce the likelihood of exceeding the delta smelt adult salvage limit, the Smelt Working Group today recommended maintaining the OMR target at -2500 until the total delta smelt salvage reached 75% of the annual limit, or 228 out of 305, at which time the OMR target is recommended to become -1250. These targets should provide substantial additional protection for longfin smelt larvae.

Table 1. Longfin smelt catch per station from 2013 Smelt Larva Survey, Survey 3.

Study Year	Survey #	SLS Station	Sample Status	Species	Smelt Catch
2013	3	405	Processed	Longfin Smelt	114
2013	3	411	Processed	Longfin Smelt	180
2013	3	418	Processed	Longfin Smelt	92
2013	3	501	Processed	Longfin Smelt	270
2013	3	504	Processed	Longfin Smelt	335
2013	3	508	Processed	Longfin Smelt	174
2013	3	513	Processed	Longfin Smelt	67
2013	3	519	Processed	Longfin Smelt	86
2013	3	520	Processed	Longfin Smelt	62
2013	3	602	Processed	Longfin Smelt	56
2013	3	606	Processed	Longfin Smelt	21
2013	3	609	Processed	Longfin Smelt	4
2013	3	610	Processed	Longfin Smelt	4
2013	3	703	Processed	Longfin Smelt	76
2013	3	704	Processed	Longfin Smelt	109
2013	3	705	Processed	Longfin Smelt	25
2013	3	706	Processed	Longfin Smelt	33
2013	3	707	Processed	Longfin Smelt	170
2013	3	711	Processed	Longfin Smelt	22
2013	3	716	Processed	Longfin Smelt	38
2013	3	723	Processed	Longfin Smelt	98
2013	3	801	Processed	Longfin Smelt	34
2013	3	804	Processed	Longfin Smelt	27
2013	3	809	Processed	Longfin Smelt	69
2013	3	812	Processed	Longfin Smelt	9
2013	3	815	Processed	Longfin Smelt	7
2013	3	901	Processed	Longfin Smelt	51
2013	3	902	Processed	Longfin Smelt	1
2013	3	906	Processed	Longfin Smelt	2
2013	3	910	Processed		No Smelt Catch
2013	3	912	Processed		No Smelt Catch
2013	3	914	Processed	Longfin Smelt	1
2013	3	915	Processed	Longfin Smelt	2
2013	3	918	Processed		No Smelt Catch
2013	3	919	Processed	Longfin Smelt	9

SWP ITP Criteria Stations

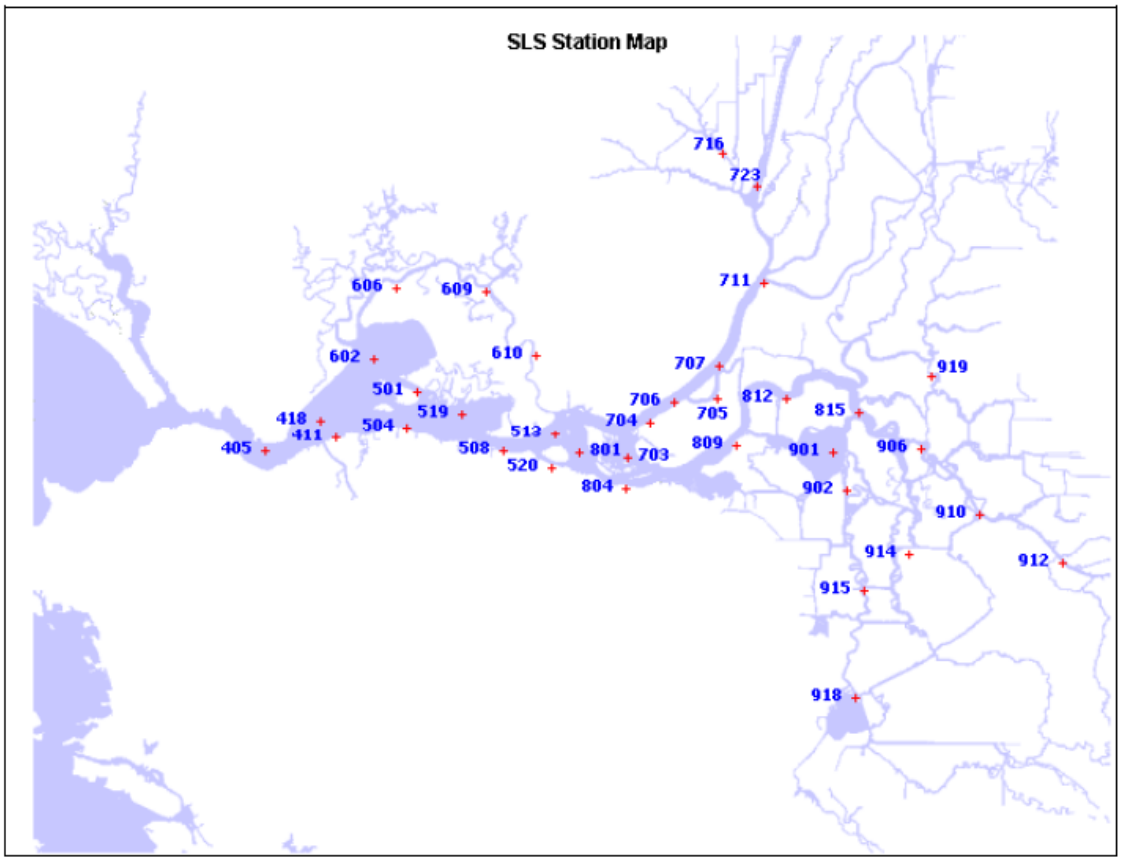
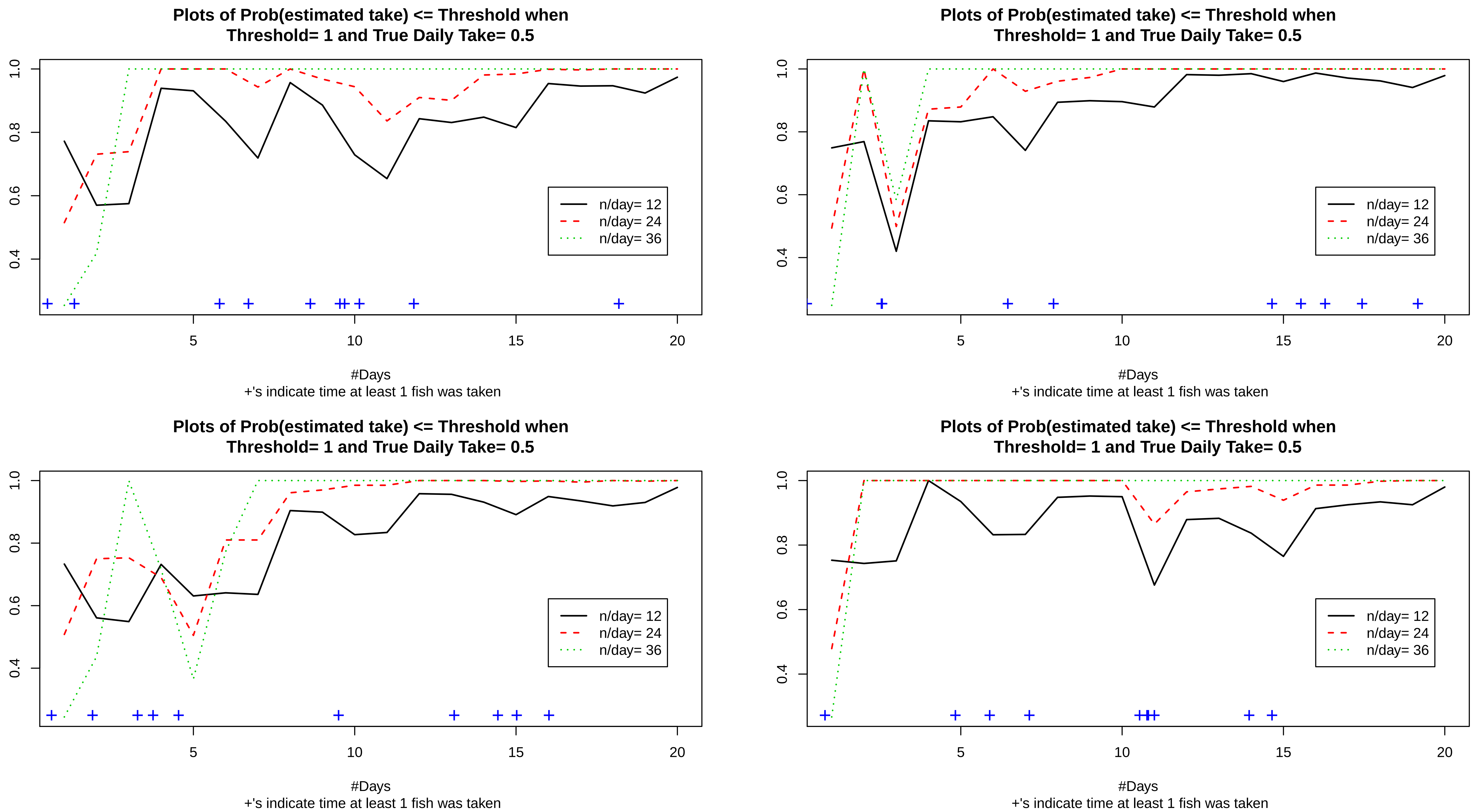
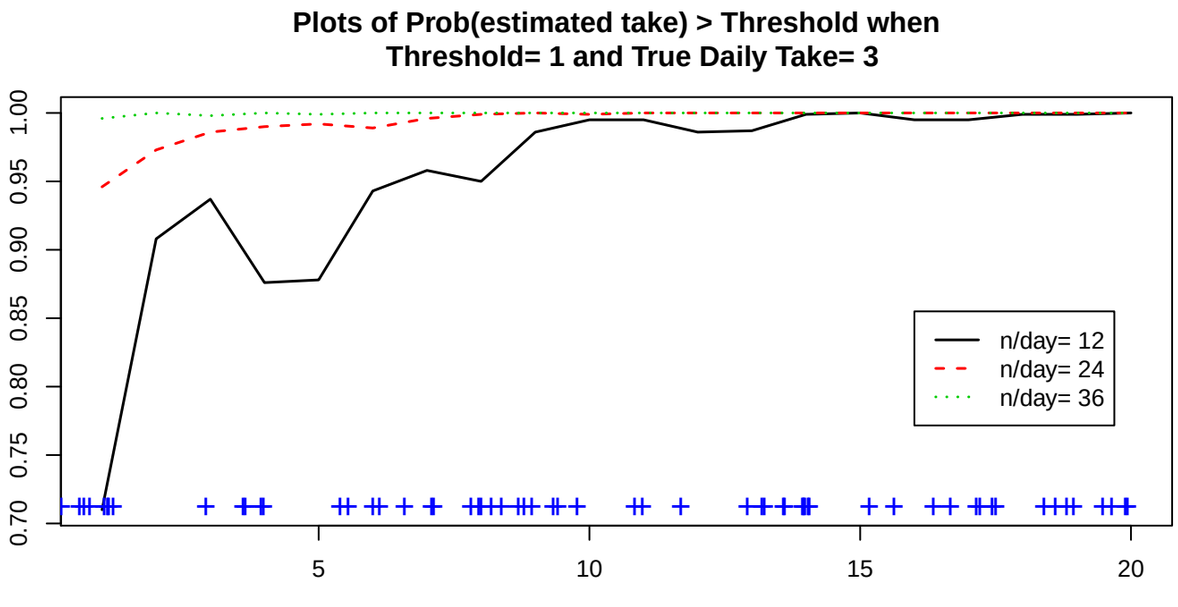


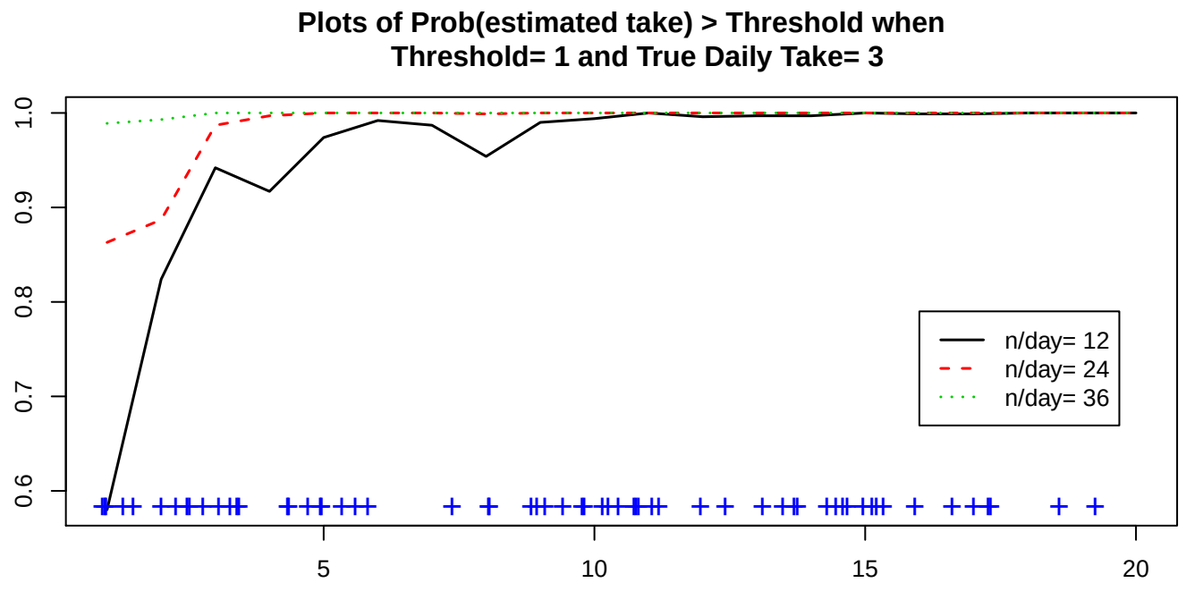
Figure 1. DFG's Smelt Larva Survey station locations.

Scenario A


Plots of Prob(estimated take) <= Threshold when
Threshold= 1 and True Daily Take= 0.5
n/day= 12
n/day= 24
n/day= 36
#Days
+'s indicate time at least 1 fish was taken
Plots of Prob(estimated take) <= Threshold when
Threshold= 1 and True Daily Take= 0.5
n/day= 12
n/day= 24
n/day= 36
#Days
+'s indicate time at least 1 fish was taken
Plots of Prob(estimated take) <= Threshold when
Threshold= 1 and True Daily Take= 0.5
n/day= 12
n/day= 24
n/day= 36
#Days
+'s indicate time at least 1 fish was taken
Plots of Prob(estimated take) <= Threshold when
Threshold= 1 and True Daily Take= 0.5
n/day= 12
n/day= 24
n/day= 36
#Days
+'s indicate time at least 1 fish was taken

Scenario B


Plots of Prob(estimated take) > Threshold when
Threshold= 1 and True Daily Take= 3
1.00
0.95
0.90
0.85
0.80
0.75
0.70
5
10
15
20
n/day= 12
n/day= 24
n/day= 36
#Days
+'s indicate time at least 1 fish was taken


Plots of Prob(estimated take) > Threshold when
Threshold= 1 and True Daily Take= 3
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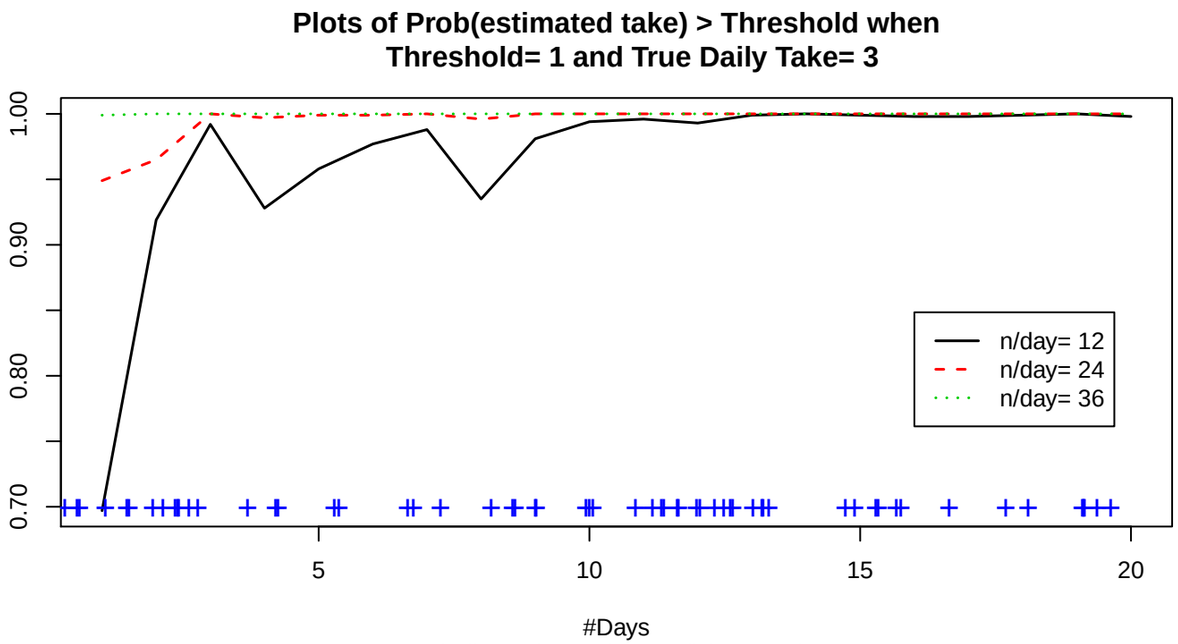
0.9
0.8
0.7
0.6
5
10
15
20
n/day= 12
n/day= 24
n/day= 36
#Days
+'s indicate time at least 1 fish was taken


Plots of Prob(estimated take) > Threshold when
Threshold= 1 and True Daily Take= 3
1.00
0.90
0.80
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n/day= 12
n/day= 24
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#Days
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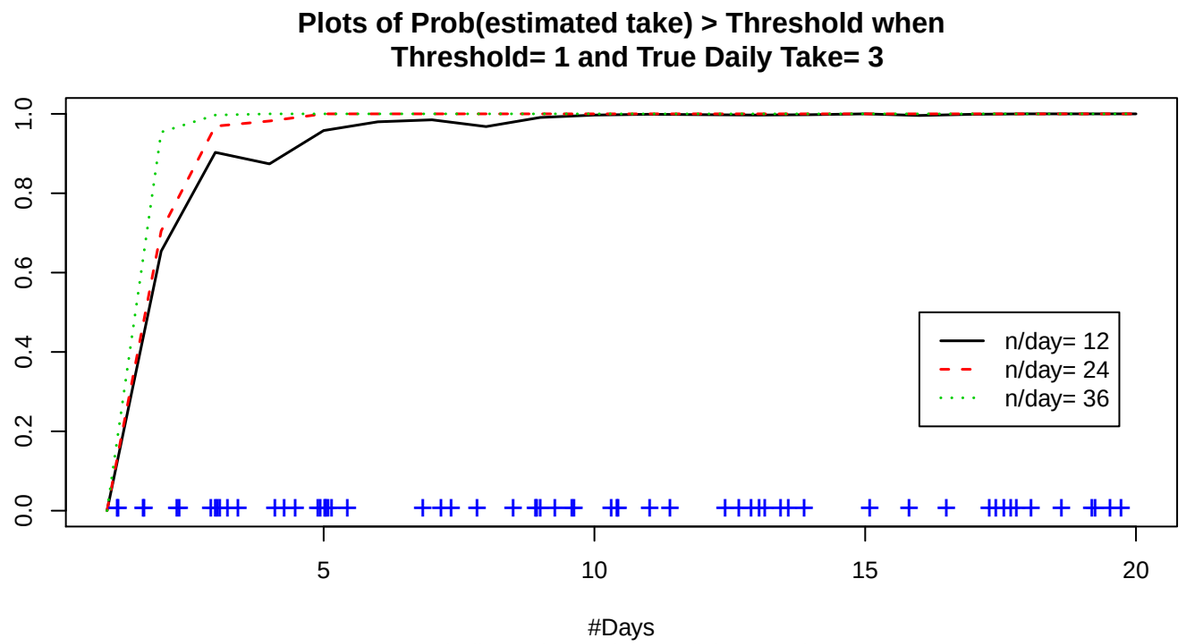
Plots of Prob(estimated take) > Threshold when
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1.0
0.8
0.6
0.4
0.2
0.0
5
10
15
20
n/day= 12
n/day= 24
n/day= 36
#Days
+'s indicate time at least 1 fish was taken

Rough conceptual framework for considering salvage implications of more negative OMR

***this framework is not exhaustive and elements within framework are not mutually exclusive**

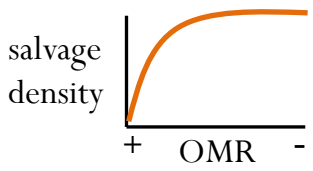
Observation

Low to no DSM entering salvage facilities

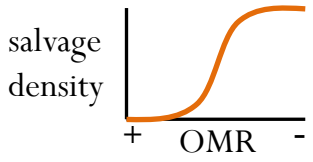
Possible reasons/mechanisms for lack of recent salvage

- Sampling efficiency increase with pumping velocity
- Low DSM local density near salvage facilities
  - Higher predation success:
    - lower flow/longer water residence time
    - low turbidity
  - Smelt holding:
    - lower flood tide velocities
    - low turbidity
  - Low DSM regional density in South Delta:
    - emigration
    - predation/salvage reduced finite local pop in South Delta
- Patchy/random DSM distribution

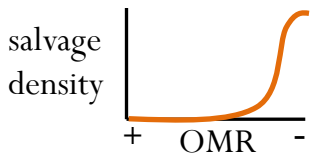
Hypothetical response to more negative OMR



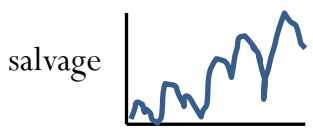
-increased sampling efficiency associated with higher water velocities at salvage facilities.



-at some velocity threshold related to OMR, predation success or holding behavior begin to decline resulting in higher salvage density



-at threshold OMR, zone of entrainment expands beyond South Delta drawing in lower SJR fish



Increasing negative OMR over time

-current lack of salvage reflects random lull between unevenly distributed clusters of smelt

-more negative OMR will increase salvage frequency of smelt clusters