IDWR Water Supply Meeting

January 11, 2007

Ron Abramovich
Water Supply Specialist
USDA NRCS Snow Survey
Boise, Idaho

GRAND TARGHEE
SNOTEL Site
Elevation: 9260 feet
Mountain Snowpack as of January 1, 2007

Legend

percent

- >150
- 130-150
- 110-129
- 90-109
- 70-89
- 50-69
- <50
- No Survey

Prepared by
USDA, Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov
Spring and Summer Streamflow Forecasts as of January 1, 2007

Legend

Percent
- > 150
- 130 - 150
- 110 - 129
- 90 - 109
- 70 - 89
- 50 - 69
- < 50
- No Forecast

Prepared by
USDA, Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov

This Year 2007
January 1, 2007
Idaho Snowpack

State Boundary

Major Basins

Percent of Average

- >150
- 130 - 149
- 110 - 129
- 90 - 109
- 70 - 89
- 50 - 69
- <50
- Not Surveyed
January 1, 2007
50% Exceedance
Summer Streamflow Forecast
Idaho

State Boundary
Major Basins
Percent of Average
- >150
- 130 - 149
- 110 - 129
- 90 - 109
- 70 - 89
- 50 - 69
- <50
Not Forecast
<table>
<thead>
<tr>
<th>Region or Basin</th>
<th>January 11, 2007 SWE as % of Average</th>
<th>January 11, 2007 SWE as % of Seasonal Peak</th>
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<tr>
<td>IDAHO PANHANDLE REGION</td>
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<td>BRUNEAU BASIN</td>
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<td>OwyHEE BASIN</td>
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<td>Reservoir or Basin</td>
<td>Percent of Capacity December 31, 2006</td>
<td>Percent of Average December 31, 2006</td>
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<td>--------------------------</td>
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<td>--------------------------------------</td>
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<tr>
<td>Bear Lake</td>
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<td>Salmon Falls</td>
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<td>Blackfoot</td>
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<td>Coeur d' Alene</td>
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<td>Magic</td>
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<td>Boise (3)</td>
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<td>American Falls</td>
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<td>Palisades &amp; Jackson (2)</td>
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<td>Little Wood</td>
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<tr>
<td>Dworshak</td>
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# Idaho Surface Water Supply Index (SWSI)

As of January 1, 2007

<table>
<thead>
<tr>
<th>BASIN or REGION</th>
<th>SWSI Value</th>
<th>Recent Years With Similar SWSI Value</th>
<th>Agricultural Water Supply Shortage May Occur When SWSI is Less Than</th>
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<tbody>
<tr>
<td>PANHANDLE</td>
<td>-1.1</td>
<td>1981</td>
<td>NA</td>
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<tr>
<td>CLEARWATER</td>
<td>-1.3</td>
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<td>NA</td>
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<tr>
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<td>1998</td>
<td>NA</td>
</tr>
<tr>
<td>WEISER</td>
<td>0.2</td>
<td>2002</td>
<td>NA</td>
</tr>
<tr>
<td>PAYETTE</td>
<td>0.0</td>
<td>1980/1981</td>
<td>NA</td>
</tr>
<tr>
<td>BOISE</td>
<td>0.2</td>
<td>1993</td>
<td>-2.1</td>
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<tr>
<td>BIG WOOD</td>
<td>-0.2</td>
<td>2000</td>
<td>-0.5</td>
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<tr>
<td>LITTLE WOOD</td>
<td>0.5</td>
<td>1996</td>
<td>-2.0</td>
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<tr>
<td>BIG LOST</td>
<td>0.0</td>
<td>1993</td>
<td>-0.5</td>
</tr>
<tr>
<td>LITTLE LOST</td>
<td>0.5</td>
<td>1980/1981</td>
<td>0.0</td>
</tr>
<tr>
<td>HENRY'S FORK</td>
<td>-0.1</td>
<td>1989</td>
<td>-3.3</td>
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<tr>
<td>SNAKE –Heise</td>
<td>0.0</td>
<td>1995</td>
<td>-1.8</td>
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<td>OAKLEY</td>
<td>1.1</td>
<td>1997</td>
<td>-1.0</td>
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<td>SALMON FALLS</td>
<td>0.9</td>
<td>1999</td>
<td>-1.0</td>
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<tr>
<td>BRUNEAU</td>
<td>-1.1</td>
<td>2004</td>
<td>NA</td>
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<tr>
<td>BEAR RIVER</td>
<td>-1.7</td>
<td>2002</td>
<td>-2.9</td>
</tr>
</tbody>
</table>
Lewis Lake Divide SNOTEL El. 7850

Snow Water Equivalent

- Average SWE
- 2005 SWE
- 2006 SWE
- 2007 SWE

NRCS - Natural Resources Conservation Service
Big Wood Basin --- Baseflows are above average, system seems primed. If snowpack is 60-100% of average look for similar 1:1 relationship between snow and flow. Unlike in Drought years like 2003 when we saw snow at 95%, stream at 46% (probably wont happen this year!)
Big Lost Basin --- Groundwater levels up 50 feet in at least one well and should mean the system is primed again and offer another level of insurance if snow and runoff are low. Look for a similar 1:1 relationship between snow and flow. Unlike 2004, when snow was 75% and flow were 39%.
January 1  Big Lost Surface Water Supply Index (SWSI)
Big Lost River below Reservoir & Mackay Reservoir

Adequate Irrigation Water Supply Above 180 KAF

Jan 1 Forecast
97%
166 KAF

Years


1000 Acre-Feet

NRCS
Natural Resources Conservation Service
Signs of Long Term Drought in Little Lost Basin

-- Only 1 month of above average flow since April 2000
-- Annual Flow below average since 1999
-- 8 Year Total Flow lowest since 1959 when records start
January 1 Surface Water Supply Index (SWSI)
Snake River near Heise & Jackson and Palisades Reservoirs

Adequate Irrigation Water Supply Above 4,300 KAF

Jan 1
Forecast
87%
3600 KAF
January 1 Bear River Surface Water Supply Index (SWSI)
Bear River at Stewart Dam & Bear Lake

Jan 1 Forecast
71% 188 KAF
Snow 78%

Adequate Surface Irrigation Water Supply Above 500 KAF
Oakley Reservoir
End of Month Storage Projection

January 1, 2007

Full Reservoir
75.6 KAF

162% of average

10% Forecast
30% Forecast
50% Forecast
70% Forecast
90% Forecast

NRCS
Natural Resources Conservation Service
<table>
<thead>
<tr>
<th>Station #</th>
<th>Data Type</th>
<th>Period</th>
<th>Years</th>
<th># of Years</th>
<th>Units KAF</th>
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<tr>
<td>13105000</td>
<td>Strm</td>
<td>Mar-Sep</td>
<td>1971-2006</td>
<td>36</td>
<td>KAF</td>
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<td>13106500</td>
<td>Resv</td>
<td>31-Dec resv</td>
<td>1971-2006</td>
<td>36</td>
<td>KAF</td>
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</table>

**ENSO Classification**

- SE Strong El Nino
- EN Mild El Nino
- N Neutral
- LN Mild La Nina
- SL Strong La Nina

**2006 Provisional Data**

<table>
<thead>
<tr>
<th>Year</th>
<th>Allotment (per share)</th>
<th>ENSO</th>
<th>Streamflow Mar-Sep</th>
<th>Reservoir 31-Dec</th>
<th>Streamflow Reservoir</th>
<th>ENSO Classification</th>
<th>Exceedance Probability</th>
<th>SWSI</th>
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<td>1984</td>
<td>1.167</td>
<td>N</td>
<td>268.5</td>
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<td>1986</td>
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<td>157.9</td>
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<td>1987</td>
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<td>90.3</td>
<td>205.9</td>
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</table>

**2007 10% Chance Exceedance Forecast**

<table>
<thead>
<tr>
<th>Allotment</th>
<th>ENSO</th>
<th>Streamflow</th>
<th>Reservoir 31-Dec</th>
<th>Streamflow Reservoir</th>
<th>Exceedance Probability</th>
<th>SWSI</th>
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<td>1.167</td>
<td>EN</td>
<td>122.0</td>
<td>72.8</td>
<td>194.8</td>
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**2007 30% Chance Exceedance Forecast**

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<th>ENSO</th>
<th>Streamflow</th>
<th>Reservoir 31-Dec</th>
<th>Streamflow Reservoir</th>
<th>Exceedance Probability</th>
<th>SWSI</th>
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<tr>
<td>1.167</td>
<td>EN</td>
<td>101.0</td>
<td>72.8</td>
<td>173.8</td>
<td>0.64</td>
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**2007 50% Chance Exceedance Forecast**

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<th>Reservoir 31-Dec</th>
<th>Streamflow Reservoir</th>
<th>Exceedance Probability</th>
<th>SWSI</th>
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<td>1.167</td>
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<td>86.0</td>
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**2007 70% Chance Exceedance Forecast**

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<th>Reservoir 31-Dec</th>
<th>Streamflow Reservoir</th>
<th>Exceedance Probability</th>
<th>SWSI</th>
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<tr>
<td>1.167</td>
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<td>71.0</td>
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**2007 90% Chance Exceedance Forecast**

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<th>Streamflow Reservoir</th>
<th>Exceedance Probability</th>
<th>SWSI</th>
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<td>~0.85</td>
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<td>0.39</td>
<td>-0.9</td>
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**Adequate Water Supply Greater than -1.5 SWSI or 110 KAF**

<table>
<thead>
<tr>
<th>Year</th>
<th>Allotment</th>
<th>ENSO</th>
<th>Streamflow</th>
<th>Reservoir 31-Dec</th>
<th>Streamflow Reservoir</th>
<th>Exceedance Probability</th>
<th>SWSI</th>
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<tr>
<td>1989</td>
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**Adequate Water Supply Greater than 1.5 SWSI or 110 KAF**

<table>
<thead>
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<th>Year</th>
<th>Allotment</th>
<th>ENSO</th>
<th>Streamflow</th>
<th>Reservoir 31-Dec</th>
<th>Streamflow Reservoir</th>
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2006 Boise River near Boise Daily Streamflow Forecasts Using SNOTEL Data
Official Forecasts (triangles) and Observed Flow (at end of season)

Apr - Jul Observed Flow
2062 KAF
146% of Average
2006 Boise River near Boise Daily Streamflow Forecasts Using SNOTEL Data

Official Forecasts (triangles) and Observed Flow (at end of season)

Apr - Jul Observed Flow
2062 KAF
146% of Average
<table>
<thead>
<tr>
<th>Region or Basin</th>
<th>January 1-11 Precipitation as % of Monthly Total</th>
<th>Oct 1 - Jan 11 Precipitation as % of Annual Total</th>
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<tbody>
<tr>
<td>PANHANDLE REGION</td>
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<td>53</td>
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<tr>
<td>CLEARWATER BASIN</td>
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<td>SNAKE BASIN ABOVE PALISADES</td>
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<td>34</td>
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<tr>
<td>BRUNEAU BASIN</td>
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<td>35</td>
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<tr>
<td>Owyhee Basin</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>BEAR RIVER BASIN</td>
<td>26</td>
<td>31</td>
</tr>
</tbody>
</table>
Only based on daily SNOTEL data

No baseflow in equation which is a big component in this basin
Only based on daily SNOTEL data
No baseflow in equation which is a big component in this basin
We use last summer’s flows to predict this year’s runoff
Wind Damage

Site was still reporting intermittently, and is now fixed
Dec 14-15, 2006 Wind Storm

- Most sites - performance decreased
- Some sites - performance increased
- Charts show Transmit to Acknowledgement ratio (T/A)
  - T/A is the average number of transmits the site has to make to get 1 acknowledgement from Master Stationi
Some sites work better half broken…..

Elk Butte SNOTEL Site Clearwater Basin Idaho

Damaged Antenna & Precipitation Gage

Tree across pillow, and increased snow depth 30 inches!

Some sites work better half broken…..
Idaho State Water Supply Committee Meeting

January 12th, 2006

Jay Breidenbach / NOAA National Weather Service

2006 Precipitation Summary
El-Nino Status
Climate Outlook
Early Look at Water Supply Numbers
Spring Flood Potential
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm
U.S. Snow Accumulation
Modeled Snow Depth Departure from Normal (Daily) for 2007 January 11, 6:00 Z

Inches of depth

- > 59
- 39 to 59
- 31 to 39
- 24 to 31
- 16 to 24
- 8 to 16
- 4 to 8
- 2 to 4
- 0.4 to 2
- -0.4 to 0.4
- -2 to -0.4
- -4 to -2
- -8 to -4
- -16 to -8
- -24 to -16
- -31 to -24
- -39 to -31
- -59 to -39
- < -59

Elevation in feet (Not estimated)

- > 13124
- 8203 to 13124
- 3281 to 8203
- 3 to 3281
- < 3

Not Estimated
Figure 3. Anomalous equatorial upper-ocean heat content averaged over the longitude band 180°-100°W. Heat content anomalies are computed as departures from the 1982-2004 base period means.
Week centered on 18 OCT 2006
SST Anomalies (°C)
Snowfall (Inches; 1948-1993)

November thru March
7 El Nino Years *
8 La Nina Years *
19 Neutral Years

* Moderate & Strong events only
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID JFM 2007
MADE 21 DEC 2006

EC MEANS EQUAL
CHANNELS FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
0.5 MONTH LEAD
VALID JFM 2007
MADE 21 DEC 2006
EC MEANS EQUAL
CHANNELS FOR R, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
Snake River above Heise
Unregulated Runoff, April through July

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
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<td>3,000,000</td>
<td>3,000,000</td>
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</tbody>
</table>

30-Year Mean

2001 2002 2003 2004 2005 2006
Snake River at Neeley

Discharge (cfs)

- 2005
- 2006
- 2007
BEAR LAKE END OF MONTH STORAGE
WATER YEARS 1922-2005
UPDATED THRU JUNE 30, 2006

UPSTREAM STORAGE RESTRICTION

2006 Prediction - 5913
Bear Lake Inflow

APRIL THROUGH SEPTEMBER RAINBOW INLET CANAL VOLUME


1000 Acre Feet

Average

2007 PREDICTED
MACKAY RESERVOIR
HISTORIC AND CURRENT CONTENTS

CONTENTS (ACRE-FEET)

MAXIMUM CONTENTS 46,500 AF

IRRIG. SEASON
1993-2005 AVERAGE

2006 PRE-SEASON FILL

2007

2004 PRE-SEASON FILL

0
5000
10000
15000
20000
25000
30000
35000
40000
45000
50000

Sep
Oct
Nov
Dec
Jan
Feb
Mar
Jun
Jul
Aug
Sep
Oct
Nov
BIG LOST RIVER AT HOWELL COMPARISON WITH DEPTH TO WATER IN SELECTED WELLS

BIG LOST RIVER AT HOWELL

WELL 04N26E-26DCD1
TOTAL DEPTH = 143 FT

WELL 05N26E-23CDA1
TOTAL DEPTH = 203 FT.
Curren Tunnel Average Daily Flow Rate
September 8, 1993 to November 9, 2006

Note: A six-inch pipe diversion to Rangen Hatchery lab is located in the tunnel above the gage site.
Source: IDWR
57% of Boise System Capacity

67% of Payette System Capacity

Cascade 441520/646460 68% Full

SQWI 441520/646460 68% Full

68%

92 cfs

196 cfs

0 cfs

23 cfs

53 cfs

837 cfs

156 cfs

752 cfs

0 cfs

271 cfs

301 cfs

1160 cfs

411000

66%

77% Full

66% Full

63% Full

68% Full

81% Full

23% Full

57% of Boise System Capacity
Boise River Reservoir Combined System Storage
(Anderson Ranch, Arrowrock & Lucky Peak)
Boise Basin Runoff

January 1 – July 30

- 2003: 1,418,411 Acre-Feet
- 2004: 1,199,427 Acre-Feet
- 2006: 2,440,488 Acre-Feet
- 2007 Est.: 1,700,000 Acre-Feet

96% of 30-yr Avg.

30-yr Avg.: 1,727,837 Acre-Feet

2003: 1,418,411
2004: 1,199,427
2006: 2,440,488
2007 Est.: 1,700,000
Cascade Reservoir Storage
Capacity = 646,460 af
Deadwood Reservoir Storage
Capacity = 161,900 af
Payette Basin Runoff
January – July @ Horseshoe Bend


<table>
<thead>
<tr>
<th>Year</th>
<th>Acre-Feet</th>
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<tbody>
<tr>
<td>2003</td>
<td>1,933,520</td>
</tr>
<tr>
<td>2004</td>
<td>1,522,797</td>
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<tr>
<td>2006</td>
<td>2,412,321</td>
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<tr>
<td>2007 Est.</td>
<td>2,180,000</td>
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</table>

109% of Avg.
Owyhee Basin Runoff
April-June

Acre-Feet

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<tbody>
<tr>
<td></td>
<td>733,080</td>
<td>825,682</td>
<td>487,904</td>
<td>1,264,759</td>
<td>500,000</td>
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</tbody>
</table>

Est. 68% of Avg.