

Report of the US-Canada  
Pacific Whiting/Hake  
Scientific Review Group

March 14-15, 2012

Vancouver, BC

Canada

# SRG - 2012

- Meeting
  - Feb 21-23, Seattle, WA
- Members
  - Richard Methot, co-chair, NOAA
  - Greg Workman, co-chair, PBS, DFO
  - Michael Prager, retired from NOAA
  - Kendra Holt, PBS, DFO
  - Two vacancies
- SRG Technical Advisors in 2012
  - John Simmonds, CIE, acoustic survey expert
  - Henrik Sparholt, CIE
  - Tom Carruthers, UBC

# SRG Summary Conclusions

1. Survey methodology
2. Assessment model methodology
3. Survey result
4. Assessment result
5. Uncertainty and risk
6. Major research recommendations

# SRG #1: Survey Methodology

- One SRG technical expert is highly experienced with acoustic surveys
- Hake acoustic survey methodology uses standard approaches
- Acoustic system calibration and methods for biological classification of acoustic data are suitable
- “Kriging” statistical analysis provides means to estimate survey precision based on hake patchiness and transect spacings

# SRG #2: Assessment Model

## Methodology

- Extensive work by the JTC over past few years comprehensively investigated alternative model configurations and comparability between modeling software – excellent work
- Current approach uses the Stock Synthesis model to produce the base results in a simpler configuration than explored in recent years
- Canadian Catch-Age-Model used for additional sensitivity analyses
- In future, no need to routinely produce base result from both models

# SRG #3: Survey Result

- Biomass of 521,000 mt in summer 2011 was dominated by 3-yr olds from the 2008 yearclass
- Only 7% in Canada at time of the survey; not unexpected from a cool year with young fish
- Drop in biomass relative to the 2009 survey was unexpected; overestimation in 2009 was considered more plausible possibly due to occurrence of Humboldt squid

# SRG #4: Assessment Result

- Spawning biomass in 2012 estimated to be near 33% of the unfished level, hence near the target level from the harvest policy
  - Abundance in 2012 has 25% chance of being below 22% of unfished level and 25% chance of being higher than 51% of the unfished level
- Recent harvest rates have been above the target rate because TACs had been set on basis of overestimated biomass levels
- The JTC report adequately documents these results and their implication for harvest advice

# SRG #4a: Survey Observation Error

- Observation error simply means that we cannot exactly measure stock biomass. Various issues create uncertainty: patchiness in stock distribution, acoustic calibration, biological classification, movement of the stock
- Assessments have internal biological continuity, so the hindsight they provide identifies when larger survey observation discrepancies occurred
- Survey in 2009 dominated by 2005 and 2006 yearclasses and indicated rapidly increasing biomass
- Lower biomass in 2011 survey is dominated by 2008 yearclass
- The assessment models cannot fit both the 2009 survey point and the 2011 survey point. If the 2005 and 2006 yearclasses were as strong as indicated in the 2011 assessment using the 2009 survey, then the 2011 survey biomass would have been much higher and would have contained more of these yearclasses
- Relative yearclass strengths in fishery catch data are compatible with both scenarios (high biomass from 2009 and low biomass from 2011), so cannot resolve the uncertainty
- The 2012 assessment's spawning stock biomass is in the lower 2.5% of projected SSB from the 2011 assessment, thus indicating the magnitude of the assessment change caused by the 2011 survey relative to the 2009 survey

# SRG #5: Uncertainty and Risk

- Forecast of spawning biomass through 2014 is relatively stable, but highly uncertain and dependent on the current estimate of the 2008 yearclass and expected, but unmeasured, subsequent yearclasses
- Assessment uncertainty is due to inherent high recruitment fluctuations and observation error in acoustic surveys, compounded by the biennial frequency of the surveys
- Although the stock is estimated to be near its target level, this situation is tenuous because of the dominance by a single yearclass. Setting harvest advice on basis of the default harvest policy would ignore these uncertainties.
- Harvesting at less than the default level in 2012 would reduce the risk of stock and fishery declines in the future

# SRG #6: Major Research Recommendations

- Increase survey frequency to annual and include information on age 1 hake to the extent feasible
  - Better preview of incoming yearclasses
  - Averages out the year-to-year observation error in the survey
  - Survey in 2012 would be immediately advantageous, but would delay work designed to achieve long-term survey improvements and annual survey capability
- Conduct a management strategy evaluation
  - Will account for high recruitment fluctuations, survey frequency, and survey observation error in evaluating the expected performance of the current harvest policy and alternative policies to be created with input from JMC and AP.

# Additional Recommendations

- Increase emphasis on inter-vessel acoustic calibrations
- Continue research on extracting an age-1 index from the acoustic survey or other information
- Complete the current maturity study and provide for ongoing collection and analysis of maturity data
- Evaluate seaward extent of hake distribution, especially in the north based on fishing locations, and adjust survey extent if warranted
- Investigate statistical methods to more completely characterize uncertainty in survey results
- Add more trawls to verify acoustic targets, possibly through incorporation of commercial vessels in the survey design
- Explore assessment model sensitivity to relaxation of the constant-selectivity-over-time configuration used in the current base model