June 17, 2011

Fir Island Farms Restoration Alternatives Descriptions

Alternative 0: No Action

Alternative 1: A 225 acre restoration project that includes flood dike set back, restored tidal channel habitat, replacement drainage storage, restored tidal marsh habitat, farmland conversion, and replacement tidegates.

Alternative 2: A 168 acre restoration project that includes flood dike set back, restored tidal channel habitat, replacement drainage storage, restored tidal marsh habitat, farmland conversion, and replacement tidegates.

Alternative 2A: A 144 acre restoration project that includes flood dike set back, restored tidal channel habitat, replacement drainage storage, restored tidal marsh habitat, farmland conversion, and replacement tidegates.

Alternative 3: A 97 acre restoration project that includes flood dike set back, restored tidal channel habitat, replacement drainage storage, restored tidal marsh habitat, farmland conversion, and replacement tidegates.

Alternative 4: A 27 acre restoration project that includes a self regulating tidegate(s) in Dry Slough, new flood dikes, restored tidal channel habitat, replacement drainage storage, restored tidal marsh habitat, farmland conversion, and replacement tidegates.

Alternative 5: A 11.9 acre restoration project that includes a self regulating tidegate(s) in Claude Davis Slough, new flood dikes, restored tidal channel habitat, replacement drainage storage, restored tidal marsh habitat, farmland conversion, and replacement tidegates.

Alternative 6: A 13.2 acre restoration project that includes a self regulating tidegate(s) in Brown Slough, enhanced flood dike.

Alternative Analysis Factor Defined

1. Total Project Site Footprint: The area of the project site equal to the sum of the area of the levee footprint, habitat channels, tidal marsh and area of the drainage storage.

2. Total Converted Farmland Acres: The farmable area of each restoration alternative that is converted to a use other than farming, i.e. new dike footprint, new drainage storage, new tidal marsh habitat, existing channels, existing wetlands and existing dikes.

3. Total Converted WDFW Farmland Acres: The farmable area of WDFW's Fir Island Farm for each restoration alternative that is converted to a use other than farming, new dike footprint, new drainage storage, new tidal marsh habitat, existing channels, existing wetlands and existing dikes.

4. Total Converted Private Farmland Acres: The farmable area of the Hayton Farm for each restoration alternative that is converted to a use other than farming, new dike footprint, new drainage storage, new tidal marsh habitat, existing channels, existing wetlands and existing dikes.

5. Market Value of Converted Farmland: A present time estimate of $8200 per acre for farmland on Fir Island as determined by WDFW's Region 4 Lands Agent multiplied by the Total Converted Farmland Acres.

6. Annual Gross Value of Lost Crop Production: The average market value of a mixed agriculture crop typical of Fir Island multiplied by the Total Converted Farmland Acres based on an estimated annual per acre crop production of $2593.

7. Tidegate Fish Agreement Credits: The Implementation Agreement for the Skagit Tidegate Fish Initiative establishes one credit for each acre to which tidal inundation is restored. The credits are available to the participating Skagit drainage and diking districts to offset NOAA fish passage requirements associated with district tidegate and floodgate repair and replacement.

8. Total Length of New Flood Dike: Total length of new flood dike or flood berm that would be constructed for each alternative.

9. Restored Tidal Marsh Habitat - Acres: The area of each restoration alternative that is tidally inundated.

10. Restoration Cost Per Acre Tidal Marsh Restored: For each restoration alternative, The Total Restoration Cost (33) is divided by the Restored Tidal March Habitat (9).

11. Low Tidal Marsh Habitat Restored (Acres): The area of the restored tidal marsh with a bed elevation that will support low marsh vegetation species.

12. Net Restored Channel Area Combined – South Fork Regression: The predicted restored channel area calculated for the area landward and seaward of the existing dikes combined as calculated with the south fork regression model as described in Hood (2007) minus the modified baseline channel area seaward of the existing dikes.

13. Chinook Smolts Produced Annually – Chinook Model: The number of Chinook smolts produced per year as predicted by the Skagit Chinook Model (Beamer et al. 2005) for the net channel area that restored under each alternative. The smolt production estimates for the restoration alternatives that provide fish access via a self regulating tidegate were reduced by 50% to account for restricted access.

14. Chinook Smolts Produced Annually – Reference Site Model: The number of Chinook smolts produced per year as predicted by the Reference Site Model for the net channel area that restored under each alternative. The smolt production estimates for the restoration alternatives that provide fish access via a self regulating tidegate were reduced by 50% to account for restricted fish access.

15. Chinook Smolts Produced Annually Per Acre Converted Farmland: The Chinook Smolts Produced as determined by the Reference Site Model (14) divided by the Total Converted Farmland Acres (2). The smolt production estimates for the restoration alternatives that provide fish access via a self regulating tidegate were reduced by 50% to account for restricted fish access.

16. Restoration Cost Per Chinook Smolts Produced - Reference Site Model - 50 Years: For each restoration alternative, the total cost of restoration (33) is divided by the Chinook smolts produced annually as predicted by the Reference Site Model (14). The result of this calculation is then divided by 50.

17. Adult Chinook Produced Annually– Chinook Model: For each restoration alternative, the Chinook smolts produced annually as predicted by the Chinook Model (13) is multiplied by the average smolt to adult survival estimate used to predict annual Chinook adult returns.

18. Adult Chinook Produced Annually - Reference Model: For each restoration alternative, the Chinook smolts produced annually as predicted by the Reference Site Model (14) is multiplied by the average smolt to adult survival estimate used to predict annual Chinook adult returns.

19. Restoration Cost Per Chinook Adult Produced – Reference Site Model - 50 Years: For each restoration alternative, the total cost of restoration (33) is divided by the Chinook adults produced annually (18) using the Reference Site Model and then divided by 50.

20. Snow Geese – WDFW Total Winter Forage Area Lost: Total cover crop acreage removed per each restoration alternative at WDFW's Fir Island Farm. Same as Total Converted WDFW Farmland acres.

21. Snow Geese – Hayton Total Winter Forage Area Lost: Total WDFW cover crop acreage removed per the restoration alternative multiplied by 1.86.

22. Snow Geese – WDFW Total Winter Forage Caloric Lost: The total caloric loss (Kcal) associated with the winter forage production lost per each restoration alternative at WDFW's Fir Island Farm. Calculation: # acres lost per alternative 1-5 x 1600(# lbs forage per acre) = A (Total lbs forage per acre (alternatives 1-5), A(Total lbs forage per acre – alt 1-5) x 453.6 (grams per lb) = B (Total grams per acre – alt 1-5), B(Total grams per acre – alt 1-5) x 2.4 (Kcal per gram) = C (Total Kcal forage per acre – alt 1-5).

23. Snow Geese – Hayton Total Winter Forage Caloric Lost: The total caloric loss (Kcal) associated with the winter forage production lost per each restoration alternative at the Hayton Crop Farm. See metric 17 for an example of how caloric loss is calculated.

24. Snow Geese – WDFW Total Number Snow Geese Supported: The number of snow geese supported by the caloric (Kcal) lost per each restoration alternative at WDFW's Fir Island Farm (26). Calculation: (# acres – alt 1-5) x 1600 (# lbs forage per acre) = A (Total lbs forage per acre per alternatives 1-5), A(Total lbs forage per alt 1-5) x 453.6 (grams per lb) = B (Total grams per # acres – alt 1-5), B(Total grams per # acres Alt 1-5) x 2.4 (Kcal/gram) = C, (614 Kcal per day/per bird, 197 days per winter season), 614 Kcal x 197 days = D (Total Kcal per bird/per season), C = (Total Kcal per # acres – alt 1-5) divided by D (Total Kcal per bird/per season) = Total # birds supported (alt 1-5).

25. Snow Geese – Hayton Total Number Snow Geese Supported: The number of snow geese supported by the caloric (Kcal) lost per each restoration alternative at the Hayton Crop Farm. See metric 19 for an example of how the number of snow geese supported was calculated.

26. Snow Geese – WDFW Lost Lease Revenue – WDFW Only: The total lease revenue lost per total farmed acreage taken out of production at WDFW's Fir Island Farm for each alternative. Lost revenue projections include Lease Holder excise tax (L&E) assessments and deduct a $10,000 credit (based upon a $50 per acre x 200 acre rebate designed to compensate the lessee for the cost of seed and planting). The current lease rate for WDFW owned agricultural land is $225 per acre.

27. Snow Geese – WDFW Lost Lease Revenue – WDFW + Hayton: The total lease revenue lost per total farmed acres taken out of production at WDFW's Fir Island Farm plus the lands taken out of production on property owned by Hayton Crop Farms (HCF). As part of the initial bid for the lease option at WDFW's Fir Island Farm, HCF offered to include 290 acres of adjacent HCF farm acreage into the Snow Goose Reserve, plant this 290 acres and an additional 110 acres leased by HCF to winter wheat for a total of 400 acres. For every leased acre of farmland on WDFW owned lands, HCF contributes 1.86 acres of winter forage. For every acre taken out of production at WDFW's Fir Island Farm per each of the restoration alternative, 1.86 acres of winter forage on HCF are also lost.

28. Snow Geese - NAWCA Reimbursement Cost: The total dollars required to reimburse the NAWCA (North American Waterfowl Conservation Act) funding that was used to originally purchase WDFW's Fir Island Farm for winter forage habitat is the present time estimate of $8200 per acre for farmland on Fir Island as

determined by WDFW's Region 4 Lands Agent multiplied by the Total Converted WDFW Farmland Acres.

29. Public Access: The extent to which the existing public access, parking and wildlife viewing opportunities at WDFW's Fir Island Farm will be maintained or altered as a result of each restoration alternative.

30. Capital Cost of New Drainage/Flood Infrastructure: Capital costs associated with construction of the new flood dikes, augmented flood dikes and drainage infrastructure (culverts, tidegates, SRTs, interior drainage storage, dredging, grading, w/ 25% contingency).

31. Real Estate Acquisition, Easements, NAWCA Costs: Capital costs associated with NAWCA Reimbursement Cost, Real Estate Acquisition for Adjacent Properties, Construction Easements.

32. Engineering, Permits, Administration, Construction Oversight: Capital costs associated with engineering design, permits, project administration, and oversight during construction.

33. Total Restoration Cost: The sum of Construction Capital Costs, Real Estate Capital Costs, Project Design, Permits, Admin and Oversight Capital Costs.