south Delta and slightly increase Delta outflow. Increased outflow could increase movement of delta smelt, juvenile winter-run chinook salmon, and other Bay-Delta species to habitats less affected by diversions and more conducive to increased survival.

DW could also compensate monetarily for unmitigated entrainment losses of delta smelt, Sacramento splittail, and other species (Attachment 1). The compensation could be used to increase protection for delta smelt and winter-run chinook salmon through improved or new fish screens on other Delta diversions and increased monitoring to identify key periods to avoid diversion or provide additional outflow.

Water Quality Effects

The effects of DW project operations on water quality were evaluated by estimating the changes in monthly export chloride (Cl) concentration that would result from DW project operations. DW diversions will reduce Delta outflow, and this will subsequently increase export Cl concentrations for several months. DW discharges for export may increase or decrease the monthly export Cl concentrations depending on the Cl concentrations of water stored on the DW islands relative to the channel Cl concentrations.

The export Cl was estimated as a function of the effective Delta outflow. The monthly effective Delta outflow was estimated from the monthly Delta outflow sequence using the Contra Costa Water District (CCWD) "G-model" approach as:

New Effective Outflow = Old Effective Outflow + (Outflow-Old Effective Outflow) * [1-exp(-Old Effective Outflow/10,000)]

where "New" refers to the current month and "Old" refers to the previous month. The monthly export Cl concentration was then estimated from the monthly effective outflow as:

Export Cl (mg/l) = 25 + 1667 * exp[-0.0005 * New Effective Outflow (cfs)]

The assumed minimum Cl concentration of 25 milligrams per liter (mg/l) was used to reflect the average influence of river inflows and agricultural drainage sources. The 70-year average export Cl for the No-Project Alternative simulation was 74.7 mg/l.

The Cl concentration of water stored by DW was calculated by assuming that the Cl concentration of DW diversions was the same as the export Cl concentration. Estimated Cl concentration of DW storage increased slightly with evaporation, and stored water was then discharged and mixed with the SWP and CVP exports.

Figure 12 shows the effects on simulated monthly export Cl for the DW BA Alternative (draft EIR/EIS Alternative 2) and for the DW ESA Alternative measures. The 70-year average export Cl concentration was 75.9 mg/l (+1.2 mg/l compared with the No-Project Alternative) for the DW BA Alternative. The average Cl concentration of water diverted to the DW reservoir islands was 55.0 mg/l for the DW BA Alternative.

The monthly plots indicate that simulated export Cl generally increased more with higher DW diversion flow because the higher DW diversions have the greatest potential to reduce the outflow and increase the export Cl. However, water is not available for DW diversion at the lowest Delta outflows, which correspond to the highest export Cl concentrations. Figure 12 shows that the impacts of DW diversions ranged from 0 mg/l to about 50 mg/l.

The average simulated Cl concentration for DW discharge was 57.7 mg/l for the DW BA Alternative. Some increases in export Cl concentrations were simulated when the DW storage Cl was greater than the export Cl without DW discharges. However, most of the simulated DW discharges caused a reduced export Cl concentration. Figure 12 indicates that the range of effects was +30 mg/l (i.e., increase) to -30 mg/l (i.e., decrease) compared with conditions under the simulated No-Project Alternative.

Figure 12 also shows the effects of DW operations on export Cl concentration for the DW ESA measures with the FMWT index greater than 239. The average estimated export Cl for this alternative was 74.3 mg/l (-0.4 mg/l compared with the No-Project Alternative). The average Cl concentration diverted to DW storage was 43.2 mg/l. The DW diversion Cl concentrations are lower compared with those simulated for the DW BA Alternative because of the restrictions on outflow reduction and the higher outflow requirements during the diversion period.

Figure 12 indicates that simulated DW discharges almost always reduced the export Cl concentration. The average DW discharge Cl concentration was 50.3 mg/l. Figure 12 indicates that the range of effects was +25 mg/l (increase) to -25 mg/l (decrease) compared with the No-Project Alternative.

The effects for the DW ESA with FMWT less than 239 were not substantially different from those for the basic ESA measures.

These water quality evaluation results suggest that the ESA protective measures to minimize fish impacts have the additional benefit of reducing water quality effects by eliminating DW diversions of relatively high Cl concentrations (i.e., salinity) during periods of relatively low Delta outflow.