# **ABDU DEMAND MODEL STEPS**

*Raster Calculations all have cell size 30.*

1. **CONVERT NWI POLYGON with kcal field to raster**
   1. Inputs: NWI Polygon with kcal field
   2. Output: Raster\_NE\_NWI\_ABDU\_kcals
2. **MULTIPLY Habitat Suitability Index Value with wetland kcal value:**
   1. Inputs: Raster\_NE\_NWI\_ABDU\_kcals and Habitat Suitability Index Raster
   2. Raster Calculation with Habitat Suitability Index:
      1. "%Raster\_NE\_NWI\_ABDU\_kcals%" \* "%NE\_HSI\_HC\_2010\_alb%"
      2. Output: NWIxHSI
3. **CALCULATE the total ABDU wetland energy per county (*why per county?)***
   1. Inputs: NWIxHSI and NE\_counties\_extended\_bnd\_ABDU\_stepdowns (Polygon Layer)
   2. Zonal statistics:
      1. sum of NWIxHSI pixels within each county
      2. Output: Sum\_zone\_county\_nwi\_kcals
4. **CALCULATE the proportional energy per pixel**
   1. Inputs: Sum\_zone\_county\_nwi\_kcals and NWIxHSI
   2. Raster Calculator:
      1. "%NWIxhsi2010%"/"%Sum\_zone\_county\_nwi\_kcals%"
      2. Output: abdu\_prop\_energy
5. **CALCULATE pixel level demand for ABDU from NAWMP objectives**
   1. Inputs: DED in kcal per county (convert to raster first), and abdu\_prop\_energy
   2. Raster Calculator:
      1. "%NE\_counties\_stepdown\_ABDU\_ded\_kcal%" \* "%abdu\_prop\_energy%"
      2. Output: abdu\_demand
6. **SUM ABDU Demand at the HUC12 Level:**
   1. Inputs: abdu\_demand and HUC12 polygons
   2. Zonal Statistics:
      1. Sum of pixel level demand for ABDU for each HUC12
      2. Output: abdu\_demand\_zonesum\_huc
7. **CALCULATE TOTAL dabbler demand and ABDU demand per huc12**
   1. Inputs: abdu\_demand\_zonesum\_huc and SM\_FW\_dabbler\_zonesum\_huc (from dabbler model output, steps not listed here)
   2. Raster Calculation:
      1. "%SM\_FW\_dabbler\_zonesum\_hucs%"+ "%abdu\_demand\_zonesum\_huc%"
      2. Output: ABDU\_Dabbler\_demand\_total
8. **CALCULATE DIFFERENCE between total demand and supply per huc12**
   1. Inputs: Raster\_NE\_NWI\_ABDU\_kcals, HUC12 polygon, ABDU\_Dabbler\_demand\_total
   2. Zonal Statistics:
      1. Input: Raster\_NE\_NWI\_ABDU\_kcals, HUC12 polygon
      2. Sum NWI kcals pixels for each HUC12 polygon
      3. Output: abdu\_supply\_zonesum\_huc
   3. Raster Calculation:
      1. Inputs: abdu\_supply\_zonesum\_huc and ABDU Dabbler\_demand\_total
      2. "%abdu\_supply\_zonesum\_huc%" - "%ABDU\_Dabbler\_demand\_total%"
      3. Output: abdu\_dab\_supp\_demand\_diff
9. **SUM ABDU and Dabbler Demand at the state level (requires output from another model)**
   1. Zonal Statistics to sum TOTAL ABDU demand at state level:
      1. Inputs: abdu\_demand and state polygons
      2. Sum of pixel level demand for ABDU for each state
      3. Output: abdu\_demand\_zonesum\_state
   2. Raster Calculator to sum ABDU and Dabbler Demand at State Level:
      1. Input: SM\_FW\_dabbler\_zonesum\_states\*\*\* and abdu\_demand\_zonesum\_state
      2. "%abdu\_demand\_zonesum\_state%" + "%SM\_FW\_dabbler\_zonesum\_states%"
      3. Output: ABDU\_Dabbler\_demand\_total\_state
10. **CALCULATE DIFFERENCE between total demand and supply per state**
    1. Inputs: Raster\_NE\_NWI\_ABDU\_kcals, state polygon, ABDU\_Dabbler\_demand\_total
    2. Zonal Statistics:
       1. Input: Raster\_NE\_NWI\_ABDU\_kcals, state polygon
       2. Sum NWI kcals pixels for each state polygon
       3. Output: abdu\_supply\_zonesum\_state
    3. Raster Calculation:
       1. Inputs: abdu\_supply\_zonesum\_state and ABDU Dabbler\_demand\_total\_state **\*\*\* (SEE PART 7) \*\***
       2. "%abdu\_supply\_zonesum\_state%" - "%ABDU\_Dabbler\_demand\_total\_state%"
       3. Output: abdu\_dab\_supp\_demand\_diff\_state
11. **CALCULATE State Supply / Demand as a mean for each state, output a table.**
    1. Inputs: abdu\_dab\_supp\_demand\_diff\_state, NE states polygons
    2. Zonal Statistics As A Table:
       1. Mean for each state
       2. Output: zonal\_state\_2010