Appendix 4. Stepwise Main Logic for Classifying Years Prior to 2012 to Land Uses

The following steps serve as an informal, but structured, English language-like syntax for the main logic flow for classifying the 2002, 1992, 1982, and 1974 rasters (grids). It is designed to be supplemental information to the main text, and intended for users/readers who want significantly more detail. See main text for dataset descriptions and citations.

These steps form the general logic flow. Where processing is tailored to a target "goal" number of pixels (for example, in Developed and Agriculture), specific values and parameters will differ by region and year, in order to map each region as accurately as possible.

/**********

/* NOTES:

/* Explanatory comments are preceded by /*

/* Class names of USGS National Water-Quality Assessment Program (NAWQA) Wall-to-Wall Anthropogenic Land Use Trends (NWALT) classes are bolded (for example, **Water**, **Developed**, and so forth).

/* Control words are in all caps (for example, IF, THEN, ELSE, and so forth).

/* *later_year_grid* is the grid for the year following the one being processed (for example, for the initial loop, it is 2012).

/* *cur_year_grid* is the grid for the year being processed (for example, for the initial loop, it is 2002).

/* END NOTES

/**********

/**********

/* Several steps make an intermediate classification to a Level 1 class that is indicated by a "Generic" label (for example, Generic Agriculture, which is later broken out to a specific class).

/* Likewise, several steps make an intermediate classification to an "Unassigned" class. That means it is not known yet what it is and some checks are still pending.

1

2 Do for each year 2002, 1992, 1982, and 1974 /* For example, first loop: *later_year_grid* eq 2012;
3 *cur_year_grid* eq 2002.

4 {

5 *cur_year_grid* = **Low Use** **/*** Default; everything in grid assigned as Low Use.

6 /**********

```
/* Check water against digitized polygons where water bodies were created.
/**********************
IF later_year_grid == Water, THEN
        IF within a manually digitized reservoir poly and reservoir date >(2002, 1992, 1982, and 1974),
THEN
        /* Year threshold is era specific; for example, if building 2002 and reservoir date is 2003, then
        /*   the water pixels within the digitized polygon were not Water in 2002.
                cur_year_grid = Unassigned      /* Then nonwater; Unassigned for now; still more to check
        later.
        ELSE
                cur_year_grid = Water           /* Then same as later_year_grid.
        ENDIF       /* End IF within manually digitized reservoir polygon.
ENDIF       /* End IF later_year_grid == Water

/**********************
/* Check digitized polygons where a dam was removed.
/**********************
IF within a manually digitized dam-removal poly and dam-removal date >(2002, 1992, 1982, and 1974),
THEN
        /* Year threshold is era specific; for example, if building 2002 and dam-removal date is 2003, then
        /*   the water pixels within the digitized polygon were water in 2002.
                cur_year_grid = Water           /* NWALT class 11
ENDIF       /* End IF manually digitized dam-removal poly.
/**********************
/*Wetlands
/**********************
IF later_year_grid == Wetlands, THEN
        cur_year_grid = Wetlands                    /* Core wetlands, same each year
ENDIF       /* End IF later_year_grid == Wetlands
/**********************
/* Conservation
```

/**********

IF *later_year_grid* == **Conservation,** THEN

IF within a Projected Areas Database (PAD) Category 1 area and PAD establishment date >(2002, 1992, 1982, and 1974), THEN

/* Year threshold is era specific; for example, if building 2002 and establishment date is 2003, then

/* the pixels within the digitized polygon were not Conservation in 2002.

cur_year_grid = **Unassigned** **/*** Then non-Conservation; Unassigned for now

ELSE

cur_year_grid = **Conservation** **/*** Then same as later_year_grid

ENDIF /* End IF within a PAD Category 1 area

ENDIF /* End IF *later_year_grid* == Conservation

/**********

/* Developed, Level 1

/**********

Calculate goal Developed percent for that era and region based on relationship of National Land Cover Database (NLCD) 2001–2011 change and hden 2000–2010 change, applied to the hden change for the target year.

From that, calculate the number of pixels that need to change for each era and region ("Goal # of pixels").

IF *later_year_grid* == **Developed** and not in low-probability change mask, THEN /* Current year Developed always a subset of later years.

/* Identifying Developed pixels that were non-Developed in previous era is an iterative process, and varies by region and year.

WHILE number of pixels set to Unassigned does not approximate Goal # of pixels:

/* Each iteration of loop does not make permanent change till Goal achieved; final iteration makes actual change to *cur_year_grid* grid.

/* Break landscape into zones based on housing unit density (hden) change, current hden, and if it was previously Developed or not in a historical land cover/use dataset (Geographic Information Retrieval and Analysis System (GIRAS)/NLCDe 1992, NLCD 2001). More pixels will change where hden change is greatest, where current hden is low, and where previous historical land cover/use dataset indicates it was non-Developed.

SWITCH based on value of hden change for that era, current year hden, and if Developed in cur_year_grid historical land cover/use dataset.

/* First three cases: areas of biggest change:

CASE high hden change, low current year hden, and not Developed previously.
/* change >30 and current year hden >124.

Select *n* of these pixels using rand() function. /* *n* is a heuristic; a starting point, that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Unassigned** /* Set to Unassigned; are now not Developed.

CASE high hden change, low current year hden, and Developed previously /* change >30 and current year hden >124.

Select *(n* * 0.2) of these pixels using rand() function. /* Fewer pixels because disagrees with historical land cover/use dataset.

cur_year_grid = **Unassigned** /* Set to Unassigned; are now not Developed.

CASE high hden change, high current year hden, and not Developed previously.
/* change >30 and current year hden >124.

Select *(n* * 0.6) of these pixels using rand() function. /* *n* is a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Unassigned** /* Set to Unassigned; are now not Developed.

CASE low hden change, low current year hden, and not Developed previously.
/* change >5 and <30 and current year hden <124.

Select *(n* * 0.5) of these pixels using rand() function. /* *n* is a heuristic; a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Unassigned** /* Set to Unassigned; are now not Developed.

CASE low hden change, high current year hden, and not Developed previously.
/* change >5 and <30 and current year hden <124.

Select *(n* * 0.4) of these pixels using rand() function. /* *n* is a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Unassigned** /* Set to Unassigned; are now not Developed.

default:

No change.

END SWITCH

/* Identify urban change not related to hden.

/* Catches some nonresidential changes outside urban areas, although most urban change is associated with hden zone changes at the partial block group scale.

Identify pixels with known commercial/industrial/recreation/airport uses in the *later_year_grid* and are not Developed in the current year historical land cover/use dataset. For 2002, based simply on NLCD 2001–2011 changes. For 1992, based on NLDEe 1992 assisted by the NLCD 1992–2001 Retrofit Change Product. For 1982, assume one-half GIRAS-indicated changes; for 1974, the other one-half.

cur_year_grid = **Unassigned** /* Set to Unassigned; are now not Developed.

/* Identify some major road changes not already mapped.

/* This process similarly varies slightly depending on the year, but likewise identifies a small number of pixels not already captured.

Identify number of major road pixels in *later_year_grid*; multiply by 0.007. /*estimate of major road change per decade over large region.

Identify the number already changed from the above processing. For 2002, this can be assisted by using 2000 Census roads.

Select the number still needed using rand() function.

cur_year_grid = **Unassigned** /* Set to Unassigned; are now not Developed.

END WHILE /* End while loop to identify correct number of Goal pixels to be changed.

ELSE IF *later_year_grid* == Developed /* Else Developed that did not change.

cur_year_grid = **Developed** /* Generic Level 1 Developed for now.

ENDIF /* End IF later_year_grid == Developed

/**********

/* Mining/Extraction

/**********

/* 2002 Mining is slightly different than the 1992–1974 years, to keep the product as consistent as possible with the NLCD 2001–2011 series.

IF year == 2002, THEN

Intersect NLCD 2001 Barren (class 31) and any of (in-house mining polygons or State mining-permitted areas or NLCDe 1992 class 32 120-m buffer or U.S. Environmental Protection Agency (EPA) mining, metal or nonmetal points 2000-m buffer or (U.S. Geological Survey (USGS) 2000 oil/gas polys and EPA oil/gas points 2000-m buffer)).

cur_year_grid = **Production, Mining/Extraction** /* NWALT class 41

ENDIF

IF year == 1992, 1982, or 1974, THEN

```
144         Calculate regional trend based on change in LC Trends data allocated to region.
145         Identify target number of mining pixels for this era and region.
146         WHILE target number of pixels not satisfied:
147             Select that number of pixels from later_year_grid Mining – (rand() of  x * NLCDe 1992 Class
148         32 pixels) + (rand() of y * GIRAS class 75 pixels).      /* x and y are fractions that increase going
149         back in time.
150             Intersect those against (in-house mining polygons or State mining-permitted areas or
151         NLCDe 1992 class 32 120-m buffer or EPA mining, metal or nonmetal points 2000-m buffer or
152         (USGS cur_year_grid oil/gas polys and EPA oil/gas points 2000-m buffer)).
153             If significantly less or more than target number, then iterate loop and select more or less.
154         END WHILE
155         cur_year_grid = Production, Mining/Extraction              /* NWALT class 41
156     ENDIF
157     /************************
158     /* Assign interim classes here to the pixels above, which were coded as Unassigned.
159     /* These might still change class further on as a result of the Mining and Agriculture processing.
160     /************************
161
162     IF cur_year_grid == Unassigned, THEN          /* Changed from previous year.
163         SWITCH based on check of historical land cover/use dataset.      /* (GIRAS/NLCDe 92/NLCD 01)
164             CASE mining:                /* Fairly uncommon
165                 cur_year_grid = Production, Mining/Extraction      /* NWALT class 41
166             CASE agriculture:
167                 cur_year_grid = Production, Agriculture      /* (generic ag for now)
168             default:
169                 cur_year_grid = Low Use          /* NWALT class 50, but still could change below.
170         END SWITCH
171     ENDIF         /* End IF cur_year_grid == Unassigned
172
173     /************************
174     /* Agriculture, Level 1
175     /************************
```

/* Ensure agreement as much as possible with NLCD 2001 agriculture.

/* Note, however, that this is within the constraints of the other conditions of getting to this point; that is, it was not masked already by Water, Conservation, Developed, or Mining changes.

IF year == 2002, THEN

IF (not already assigned from above (Water, Wetlands, Conservation, Developed, or Mining) and Agriculture in NLCD 2001, THEN

cur_year_grid = **Agriculture** /* Generic Level 1 Agriculture for now

/* Check small number of pixels that were not Agriculture (Ag) in 2001 but had been "rural road-filled" in 2012 and Ag.

ELSE IF (not already assigned from above (Water, Wetlands, Conservation, Developed, or Mining) and != Agriculture in NLCD 2001 but was rural-roads filler in 2012 and Agriculture in 2012, THEN

cur_year_grid = **Agriculture** /* Generic Level 1 Agriculture for now

ENDIF

/* Check for largest county-level Census of Agriculture (CoA) changes as well. There should at least be some increase/decrease in Ag based on that, so the product agrees with both NLCD and CoA.

SWITCH based on value of county TC change for 2012–2002 and if was Ag in prior year land cover.

CASE decrease in TC from 2012 to 2002 >1 percent and not Ag in NLCDe 1992.

Select *n* of these pixels using rand() function. /* *n* is a heuristic adjustable by region.

cur_year_grid = **Low Use** /* NWALT class 50; should be less Ag in this county than what NLCD01 shows.

CASE increase in Total Cropland (TC) from 2012 to 2002 >1 percent and Ag in NLCDe 1992.

Select *n* of these pixels using rand() function. /* *n* is a heuristic adjustable by region.

cur_year_grid = **Agriculture** /* Generic Level 1 Agriculture for now; should be more Ag in this county than what NLCD01 shows.

default:

No change.

END SWITCH /* End Switch based on value of county TC change.

ENDIF

IF year == 1992, 1982, or 1974, THEN

Calculate goal Ag percent for that era and region based on change of CoA TC.

From that, calculate the number of pixels that need to change for each era and region ("Goal # of pixels").

IF not already assigned from above (Water, Wetlands, Conservation, Developed, or Mining) and not in low-probability change mask, THEN

/* identifying Ag pixels is an iterative process, and varies by region and year.

WHILE number of pixels set to Unassigned does not approximate Goal # of pixels:

/* Break landscape into zones based on county-level TC change, and if it was previously Ag or not in a historical land cover/use dataset (GIRAS/NLCDe 1992, NLCD 2001). More pixels will change where TC change is greatest and where previous historical land use/land cover dataset indicates it was Ag. Add additional check for areas where the History Database of the Global Environment (HYDE) data indicate large Ag change and TC change in combination.

SWITCH based on value of county TC change for that era, and if A in *cur_year_grid* historical land cover/use dataset.

/* First 5 cases: decrease in county-level Ag (for example, less in 1992 than 2002).

/**********

CASE high TC decrease from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and not Ag previously. /* change: >2 percent loss of county Ag.

Select *n* of these pixels using rand() function /* *n* is a heuristic; a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Low Use** /* NWALT class 50

CASE high TC decrease from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and Ag previously. /* change: >2 percent loss of county Ag.

Select *(n* * 0.2) of these pixels using rand() function /* Fewer pixels because it disagrees with historical land cover/use dataset.

cur_year_grid = **Low Use** /* NWALT class 50

CASE medium TC decrease from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and not Ag previously. /* change: 1–2 percent loss of county Ag.

Select *(n* * 0.7) of these pixels using rand() function. /* *n* is a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Low Use** /* NWALT class 50

CASE low TC decrease from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and not Ag previously. /* change: 0–1 percent loss of county Ag.

Select *(n* * 0.3) of these pixels using rand() function /* *n* is a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Low Use** /* NWALT class 50

CASE TC decrease >0 from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and not Ag previously and HYDE Ag loss >3. /* change >0 percent loss in Ag and HYDE loss >3 percent.

Select *(n* * 0.2) of these pixels using rand() function. /* *n* is a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Low Use** /* NWALT class 50

/* Second 5 cases: increase in county-level Ag (for example, more in 1992 than 2002).

/**********

CASE high TC increase from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and Ag previously. /* change: >2 percent gain of county Ag.

Select *n* of these pixels using rand() function. /* *n* is a heuristic; a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Agriculture** /* Generic Level 1 Agriculture for now.

CASE high TC increase from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and not Ag previously. /* change: >2 percent gain of county Ag.

Select *(n* * 0.2) of these pixels using rand() function. /* Fewer pixels because disagrees with historical land cover/use dataset.

cur_year_grid = **Agriculture** /* Generic Level 1 Agriculture for now.

CASE medium TC increase from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and A previously. /* change: 1–2 percent gain of county Ag.

Select *(n* * 0.7) of these pixels using rand() function /* *n* is a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Agriculture** /* Generic Level 1 Agriculture for now.

CASE low TC increase from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and Ag previously. /* change: 0–1 percent gain of county Ag.

Select *(n* * 0.3) of these pixels using rand() function. /* *n* is a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid = **Agriculture** /* Generic Level 1 Agriculture for now.

CASE TC increase >0 from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and Ag previously and HYDE Ag gain >3. /* change >0 percent gain in Ag and HYDE gain >3 percent.

283 Select *(n* * 0.2) of these pixels using rand() function. /* *n* is a
284 starting point that is adjusted as more or fewer pixels are needed.

285 *cur_year_grid* = **Agriculture** /* Generic Level 1 Agriculture
286 for now

287 *default:*

288 No change.

289 END SWITCH /* End Switch based on value of county TC change for that era.

290 END WHILE /* End while loop to identify correct number of Goal pixels to be changed.

291 ELSE IF *later_year_grid* == **Agriculture** /* Else Agriculture that did not change.

292 *cur_year_grid* = **Agriculture** /* Generic Level 1 Agriculture for now.

293 ENDIF /* End ELSE IF *later_year_grid* == Agriculture.

294 ENDIF /* End IF year ==1992,1982, or 1974.

295

296

297 /**********************

298 /* Agriculture, Level 2: breakout "Agriculture" to Crops (43) and Pasture/Hay (44).

299 /**********************

300 Calculate goal percent Pasture/Hay as percent of TC: (CP + HayAlf)/TC for that era and region, based on
301 change of that ratio.

302 /* If CoA data indicates there was relatively more crop than pasture/hay than in the previous era, then
303 our product should also.

304 /* First, copy over or fill values as starting point from *later_year_grid*.

305 IF *cur_year_grid* == Agriculture from above, THEN /* Generic Level 1 agriculture.

306 IF year == 2002, THEN

307 IF Agriculture in NLCD 2001, THEN /* Use NLCD 2001 coding for '02 as starting point

308 *cur_year_grid* = **Crops or Pasture/Hay** /* code from NLCD 2001 class.

309 ELSE /* small number will not have been non-Ag in 2002 (rural roads): fill with
310 NWALT 2012 class.

311 *cur_year_grid* = **Crops or Pasture/Hay** /* NWALT 43 or 44, fill with what it was
312 in 2012.

313 ENDIF /* end if Ag in NLCD 2001.

```
314         ELSE IF year == 1992, 1982, or 1974, THEN          /* Get previous year's coding as starting point.

315             IF later_year_grid = Crops or Pasture/Hay

316                 cur_year_grid = Crops or Pasture/Hay       /* Fill with later_year_grid coding to
317 start.

318             ELSE                                           /* Else was not Ag in later_year_grid; need a
319 reasonable start point to fill it.

320                 Fill with a graduated number of Crops or Pasture/Hay, depending on gradation of
321 county percent Pasture/Hay.          /* That is, counties with high Crop percent should mostly be filled
322 with Crop.

323             ENDIF       /* End not Ag in later_year_grid.

324         ENDIF /* end if-else-if on year.

325         /* Break landscape into zones based on CoA ratio change above, soil capability class (soilcapclass),
326 slope, and if it was previously Pasture/Hay or not in a historical land cover/use dataset (NLCDe 1992).

327         SWITCH based on CoA ratio change above, soilcapclass, slope, and NLCDe 1992.

328             /* First 7 cases: decrease in county-level Pasture/Hay ratio of TC (for example, should be
329 relatively less Pasture/Hay in 1992 than 2002).

330             /* For year 2002, the number of pixels selected in all the cases below are multiplied by 0.5
331 (that is, change based on CoA is downweighted), because of the less confident ratio for that era (see
332 paper).

333             /* The biggest change will be in the first case of both increase and decrease.

334             /**********************************************

335             CASE high ratio decrease from later_year_grid to cur_year_grid (for example, 2002 to 1992)
336             and soilcapclass favorable to Crops (<3) and low slope and NLCDe–1992 ne 81/* change:
337             >20 percent change in ratio, soilcapclass <3, and slope <12 percent, not pasture in 1992.

338                 Select n of these pixels using rand() function.      /* n is a heuristic; a starting point
339         that is adjusted as more or fewer pixels are needed.

340                 cur_year_grid = Crops          /* NWALT class 43

341             CASE high ratio decrease from later_year_grid to cur_year_grid /* change:  >20 percent
342             change in ratio.

343                 Select (n * 0.2) of these pixels using rand() function.          /* Fewer pixels
344         because less likely soil/slope/NLCDe conditions.

345                 cur_year_grid = Crops          /* NWALT class 43

346             CASE medium-high ratio decrease from later_year_grid to cur_year_grid (for example,
347             2002 to 1992) and soilcapclass favorable to Crops (<3) and low slope and NLCDe-1992 ne
348             81/* change:  10–20 percent change in ratio, soilcapclass <3, and slope <10 percent, not
349             pasture in 1992.
```

Select *(n* * 0.7) of these pixels using rand() function. /* Fewer than the original *n*, because less change.

cur_year_grid = **Crops** /* NWALT class 43

CASE medium-high ratio decrease from *later_year_grid* to *cur_year_grid* /* change: 10–20 percent change in ratio.

Select *(n* * 0.1) of these pixels using rand() function. /* Fewer pixels because less likely soil/slope/NLCDe conditions.

cur_year_grid = **Crops** /* NWALT class 43

CASE medium ratio decrease from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and soilcapclass favorable to Crops (<3) and low slope and NLCDe–1992 ne 81/* change: 5–10 percent change in ratio, soilcapclass <3, and slope <9 percent, not pasture in 1992.

Select *(n* * 0.4) of these pixels using rand() function. /* Fewer than the original *n*, because less change.

cur_year_grid = **Crops** /* NWALT class 43

CASE medium ratio decrease from *later_year_grid* to *cur_year_grid* /* change: 5–10 percent change in ratio.

Select *(n* * 0.05) of these pixels using rand() function. /* Fewer pixels because less likely soil/slope/NLCDe conditions.

cur_year_grid = **Crops** /* NWALT class 43

CASE low ratio decrease from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and soilcapclass favorable to Crops (<3) and low slope and NLCDe–1992 ne 81/* change: 2–5 percent change in ratio, soilcapclass <3, and slope <8 percent, not pasture in 1992.

Select *(n* * 0.1) of these pixels using rand() function. /* Fewer than the original n, because less change.

cur_year_grid = **Crops** /* NWALT class 43

/* Second 7 cases: increase in county-level Pasture/Hay ratio of TC (for example, should be relatively more Pasture/Hay in 1992 than 2002).

/**********

CASE high ratio increase from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and soilcapclass less favorable to Crops (>= 3) and higher slope and NLCDe–1992 != a crop class/* change: < -20 percent change in ratio, soilcapclass >= 3, and slope >8 percent, not pasture in 1992.

Select *n* of these pixels using rand() function. /* *n* is a heuristic; a starting point that is adjusted as more or fewer pixels are needed.

cur_year_grid =**Pasture/Hay** /* NWALT class 44

CASE high ratio increase from *later_year_grid* to *cur_year_grid* /* change: <-20 percent change in ratio.

Select *(n* * 0.2) of these pixels using rand() function. /* Fewer pixels because less likely soil/slope/NLCDe conditions.

cur_year_grid = **Pasture/Hay** /* NWALT class 44

CASE medium-high ratio increase from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and soilcapclass less favorable to Crops (>= 3) and higher slope and NLCDe-1992 !=a crop class /* change: -10 to -20 percent change in ratio, soilcapclass >= 3, and slope >9 percent, not pasture in 1992.

Select *(n* * 0.8) of these pixels using rand() function. /* Fewer than the original n, because less change.

cur_year_grid = **Pasture/Hay** /* NWALT class 44

CASE medium-high ratio increase from *later_year_grid* to *cur_year_grid* /* change: -10 to-20 percent change in ratio.

Select *(n* * 0.1) of these pixels using rand() function. /* Fewer pixels because less likely soil/slope/NLCDe conditions.

cur_year_grid = **Pasture/Hay** /* NWALT class 44

CASE medium ratio increase from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and soilcapclass less favorable to Crops (>= 3) and higher slope and NLCDe–1992 !=a crop class /* change: -5 to -10 percent change in ratio, soilcapclass >= 3, and slope >10 percent, not pasture in 1992.

Select *(n* * 0.6) of these pixels using rand() function. /* Fewer than the original n, because less change.

cur_year_grid = **Pasture/Hay** /* NWALT class 44

CASE medium ratio increase from *later_year_grid* to *cur_year_grid* /* change: -5 to-10 percent change in ratio.

Select *(n* * 0.05) of these pixels using rand() function. /* Fewer pixels because less likely soil/slope/NLCDe conditions.

cur_year_grid = **Pasture/Hay** /* NWALT class 44

CASE low ratio increase from *later_year_grid* to *cur_year_grid* (for example, 2002 to 1992) and soilcapclass less favorable to Crops (>= 3) and higher slope and NLCDe–1992 != a crop class /* change: -2 to -5 percent change in ratio, soilcapclass >= 3, and slope >11 percent, not pasture in 1992.

Select *(n* * 0.4) of these pixels using rand() function. /* Fewer than the original n, because less change.

cur_year_grid = **Pasture/Hay** /* NWALT class 44

default:

No change.

END SWITCH /* End Switch based on value of county TC change for that era.

ELSE IF *later_year_grid* == Agriculture /* Crop or Pasture/Hay that did not change.

cur_year_grid = *later_year_grid* **(Crop or Pasture/Hay)** /* Assign whatever it was in the later_year_grid.

ENDIF /* End ELSE IF *cur_year_grid* == Agriculture.

/**********

/* Grazing Potential

/**********

Buffer Water pixels in *cur_year_grid* by 1 km. /* Other buffers already exist in setup.

IF *cur_year_grid* == **Low Use**) and (within 1 km of NHD 1:24k water body or water pixel in this year or within 500 m of NHDPlus streamline) and slope <30 percent and NLCDe 1992 == Pasture/Hay and CDL 2009 == (Alfalfa, Other Hay/Alfalfa or Grassland/Pasture) and Homeland Security Infrastructure Program (HSIP) != Military, Natl Park or Developed Industrial and current year hden <124, THEN

cur_year_grid = **Production, Grazing Potential** /* NWALT class 45

ENDIF

/**********

/* Semi-Developed classes

/**********

/* Semi-Developed, urban interface high

IF *cur_year_grid* == **Low Use** and (current year hden >500 or (10-pixel expanded zone of agreement of urban from GIRAS/NLCDe 1992-NLCD 2011 and intersects 1990 Census Urban Area)), THEN

cur_year_grid = **Semi-Developed, Urban Interface High** /* NWALT class 31

ENDIF

/* Semi-Developed, urban interface low medium

IF *cur_year_grid* == **Low Use** and (current year hden >16 and current year hden <= 500) and PAD grid != USGS Gap Analysis Program status 1, 2, or 3, THEN

cur_year_grid = **Semi-Developed, Urban Interface Low Medium** /* NWALT class 32

ENDIF

/* Semi-Developed; anthropogenic, other

IF *cur_year_grid* == **Low Use** and (known current (Commercial/Industrial/Recreation land use from HSIP/Esri/In-house polys/EPA point buffers or Theobald) and (GIRAS == Industrial/Transp/Confined Feeding Lots/Beaches or Mining)), THEN

    cur_year_grid = **Semi-Developed; Anthropogenic, Other** /* NWALT class 33

ENDIF

/**********

/*Developed, Level 2

/**********

/* Assume same class as previous year unless residential hden change.

/* Developed pixels in this grid will always be a subset of the later_year_grid.

IF *cur_year_grid* == **Developed**

    IF *later_year_grid* == 21, 22, 23, or 24 (nonresidential), THEN

        *cur_year_grid = later_year_grid (***Developed 21–24**)/* Default is start with the last year's class.

    ELSE IF current year hden >500 /* else residential, high

        cur_year_grid = **Developed, Residential High Density** /* Class 25

    ELSE IF current year hden >16 and current year hden <=500 /* else residential, low medium

        cur_year_grid = **Developed, Low-Medium Density** /* Class 26

    ELSE

        cur_year_grid = **Developed, Other** /* Class 27

    ENDIF

ENDIF

/* Now account for urban interclass changes (for example, residential to commercial), to the degree that is possible.

/* At present, this is done with very small number of manual corrections.

/* Simply not reliable enough to do this in automated way back to the 1970s; investigating how it could be done for future versions of this product.

IF manual correction polys indicate interurban change, apply correct class to appropriate year.

ENDIF

}

END /* end big do loop for each year.

490

491

492 /**********************

493 /*Timber

494 /**********************

495 /*Timber is a post-processing loop: done after all other processing is complete and maintained as a
496 series of separate annual grids.

497 /* Result of this is a series of 14 Timber grids (*cur_year_timber_grid*).

498

499 Do for each year 1999 through 2012. /* Have 14 Landfire disturbance grids, one for each year.

500 {

501 IF (year == 1999 through 2006) /* Then source of Low Use pixels is NWALT 2002 grid

502 *cur_year_grid* == NWALT 2002 grid.

503 ELSE /* Else, source of Low Use pixels is NWALT 2012 grid

504 *cur_year_grid* == NWALT 2012 grid.

505 ENDIF

506 IF *cur_year_grid* == **Low Use** and (current year Landfire disturbance code == “clearcut,”
507 “thinning,” “harvest,” “mastication,” “other mechanical,” or “unknown”) and (in a forest class in
508 GIRAS, NLCDe 1992, NLCD 2001, or NLCD 2011) and hden is less than 10 and does not intersect
509 NLCD road and outside core urban area, THEN

510 *cur_year_timber_grid* = **Timber** /* NWALT class 42

511 ENDIF

512 }

513 END /* end loop for each year 1999–2012.

514