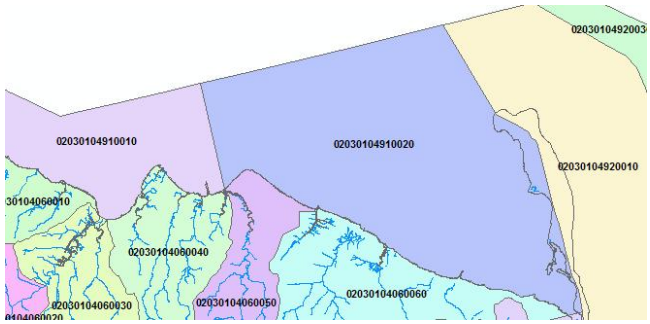
NEW JERSEY GEOLOGICAL SURVEY

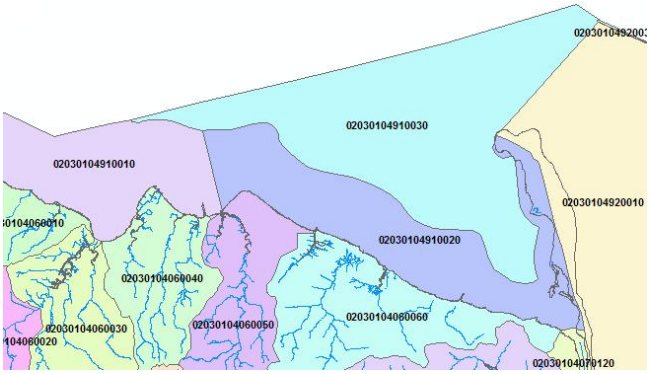
Technical Memorandum 09-2

Revisions to New Jersey's HUC14s, 2009, with a correlation to HUC12s

Old



New



New Jersey Department of Environmental Protection

STATE OF NEW JERSEY
Jon S. Corzine, *Governor*

Department of Environmental Protection
Mark N. Mauriello, *Acting Commissioner*

Land Use Management
Scott Brubaker, *Assistant Commissioner*

Geological Survey
Karl Muessig, *State Geologist*

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

As national leaders in the stewardship of natural resources, we preserve the ecological integrity of the Garden State and maintain and transform places into healthy, sustainable communities. Our dynamic workforce provides excellence in public service through innovation, education, community involvement and sound science.

NEW JERSEY GEOLOGICAL SURVEY

The mission of the New Jersey Geological Survey is to map, research, interpret and provide scientific information regarding the state's geology and groundwater resources. This information supports the regulatory and planning functions of DEP and other governmental agencies and provides the business community and public with information necessary to address environmental concerns and make economic decisions.

For more information contact:
New Jersey Department of Environmental Protection
New Jersey Geological Survey
P.O. Box 427
Trenton, NJ 08625-0427
(609) 984-6587
http://www.njgeology.org

On the cover:
HUC14 watersheds in the Raritan Bay area, shaded in pastels. The 1990's version is on the left, the 2009 version is on the right.

Epigram:
"Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer."

From Guiding Principle #1 of the Dublin Statements and Principles, signed at the United Nations Conference on Environment and Development in Rio de Janeiro in June 1992.

NEW JERSEY GEOLOGICAL SURVEY
Technical Memorandum 09-2

Revisions to New Jersey's HUC14s, 2009, with a correlation to HUC12s

by

Jeffrey L. Hoffman and Ted Pallis

New Jersey Geological Survey

New Jersey Department of Environmental Protection
Land Use Management
New Jersey Geological Survey
PO Box 427
Trenton, NJ 08625
www.njgeology.org

2009

Contents

Illustrations

Tables

Appendices

Revisions to New Jersey's HUC14s, 2009, with a Correlation to HUC12s

Summary

Watersheds are defined at a variety of scales for different purposes. A true watershed is all the area that drains to a defined point. For management and analysis purposes, hydrologic units are defined as all the area that drains to a stream segment between an upstream-downstream pair of points. For 20 years New Jersey has used a locally-created 1:24,000-scale system of hydrologic units for management and analysis. Each unit has a unique 14-digit hydrologic unit code (HUC). These units are informally termed HUC14 watersheds even though they are not true watersheds. Digital copies of New Jersey's HUC14 boundaries are available as geographical information system (GIS) coverages.

The federal government recently released a less-detailed but nation-wide system of 12-digit hydrologic units. In New Jersey these new units (informally called HUC12 watersheds) used 1:24,000 base maps for elevation control but also relied upon a new 1:2,400 hydrography coverage. The HUC12 creation process showed that some HUC14 boundaries were inconsistent with the more detailed hydrography. Additionally, the HUC14s were created with no consideration of drainage in neighboring states whereas the HUC12s do.

New Jersey Department of Environmental Protection staff revised the HUC14 boundaries to be more consistent with the new hydrography and the HUC12 boundaries. In some cases the revisions more clearly define areas that drain to a common point. This process created 34 new HUC14s, deleted two HUC14s, and changed over 100 boundaries. The resulting coverage is not entirely consistent with the new HUC12 coverage but discrepancies are small.

This report graphically shows all HUC14 additions, deletions and major boundary changes. It lists all changes and provides a correlation between HUC14s and HUC12s.

The revised HUC14 coverage is an interim product. A new HUC14 coverage, using the 1:2,400 hydrography but also elevational control at 1:2,400 (or better) is planned once the new elevation coverage is available. The HUC12 coverage will also be revised at that time.

Process Description

A watershed is all the area that drains to a defined point. A hydrologic unit is that area that drains to a stream segment between a pair of upstream-downstream points. Accurate definition of watersheds and hydrologic units is vital for programs that analyze and manage surface-water quality and quantity as a function of land use (Cohen, 1997).

A hierarchical approach defines New Jersey's hydrologic units. Larger hydrologic units are subdivided, and then subdivided again. Each successive level of subdivision is identified by a code that starts with the number of its parent hydrologic unit and adds additional digits as suffixes. In the 1990's the land area of New Jersey was covered by twelve regional hydrologic units, each with a unique 8-digit number (fig. 1). In New Jersey these are informally called HUC8 watersheds (HUC8s) even though they are not true watersheds. Seaber and others (1987) produced HUC8s for the entire nation.

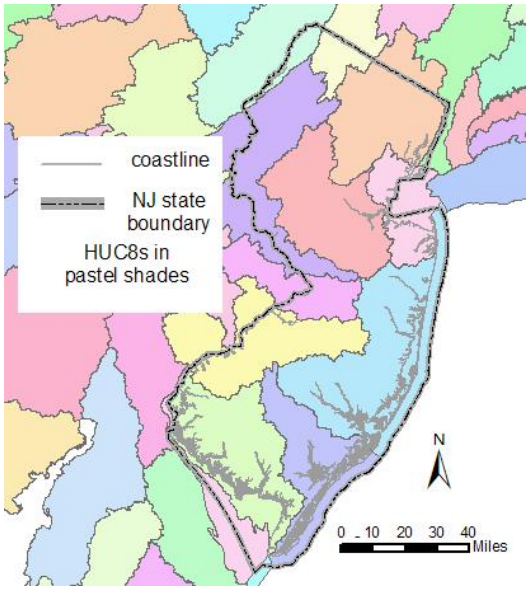


Figure 1. HUC8s in and near New Jersey.

Ellis and Price (1995) subdivided the HUC8s in New Jersey based on observed and inferred drainage. They devised a set of 150 of the 11-digit hydrologic units (informally called HUC11s) (fig. 2) which fit conformably inside the HUC8s. The HUC11s are then further subdivided into 921 of the 14-digit hydrologic units (informally called HUC14s) (fig. 3). The boundaries of these hydrologic units are available in digital form as geographical information systems (GIS) coverage shape files (table 1).

Table 1. Hydrologic-unit geospatial data available from NJDEP.*

Name of Coverage	Link
DEPHUC14	http://www.nj.gov/dep/gis/digidownload/zips/statewide/dephuc14.zip
DEPHUC11	http://www.nj.gov/dep/gis/digidownload/zips/statewide/dephuc11.zip
DEPHUC12	http://www.nj.gov/dep/gis/digidownload/zips/statewide/dephuc12_boundary.zip

*Available as compressed shape files.

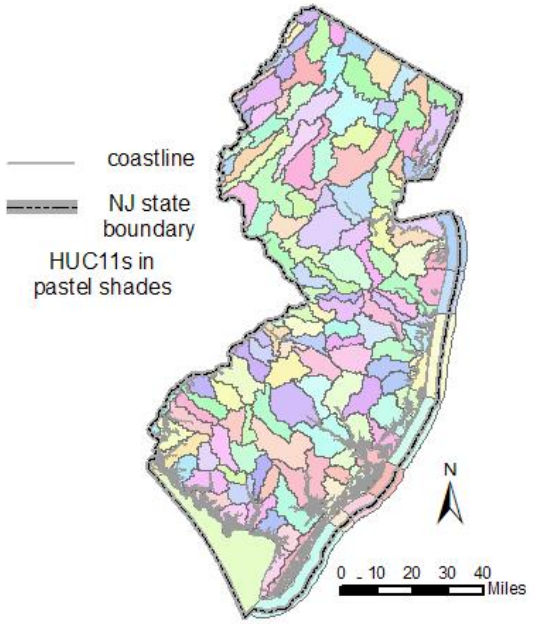


Figure 2. HUC11s in New Jersey, 1990's version.

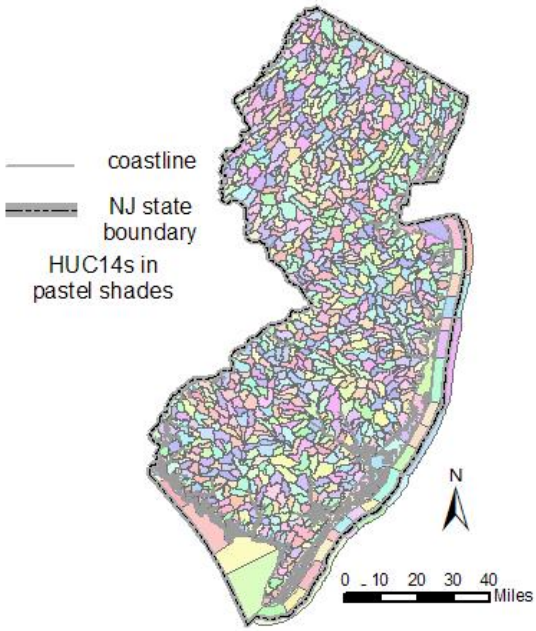


Figure 3. HUC14s in New Jersey, 1990's version.

Ellis and Price (1995) developed HUC11s and HUC14s for New Jersey based on elevations and stream courses from the United States Geological Survey's 1:24,000 quadrangle maps. They did not develop HUC11s and HUC14s for Pennsylvania or New York. Thus while the HUC8 boundaries continue across state boundaries, New Jersey's HUC11s and HUC14s do not.

Nationwide only the HUC8 hydrologic units were available up through the mid-2000's. In order to allow more detailed watershed reporting U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service (2009) detailed a process for creating consistent hydrologic-unit boundaries. This resulted in a nationwide, consistent set of 12-digit hydrologic units (USEPA, 2009). In New Jersey, the HUC12s are smaller than the HUC11s but larger than the HUC14s (fig. 4).

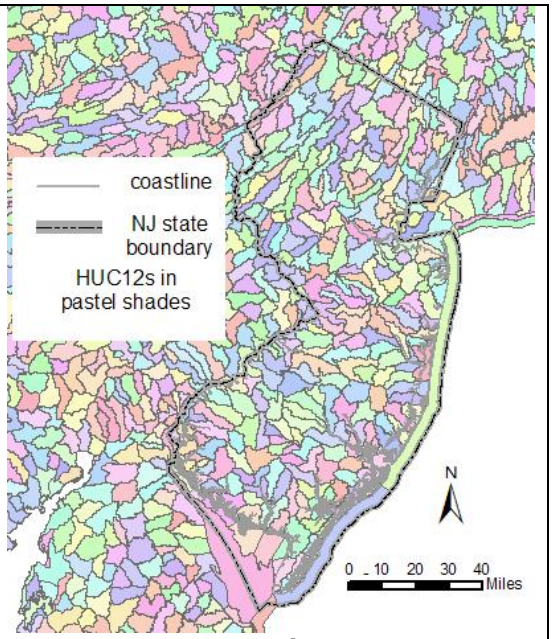


Figure 4. HUC12s in and near New Jersey

The United States Environmental Protection Office (USEPA), Philadelphia office, did the actual delineation of HUC12s for New Jersey (USEPA, 2009). This process relied on a digital coverage of the 1:24,000 quadrangle maps for elevation control. For hydrography control the USEPA used a newly-released digital coverage of New Jersey's streams (NJDEP, 2008). The updated hydrography coverage is based on areal photographs taken in 2002 and is considered accurate at a 1:2,400 scale

The NJDEP reviewed and approved all HUC12 boundaries. During this review process it was apparent that some of the older HUC14s (based on 1:24,000 coverages) were inconsistent with the new 1:2,400 hydrography. Additionally, some of the HUC14s did not fit conformably within a single HUC12. And some of the HUCs at NJ's boundaries did not make hydrologic sense when drainage in neighboring states was taken into account.

This review process thus generated a HUC14-revision project. A number of changes were made to the HUC14 coverage in order to correct the identified problems. This report details those changes. Overall, 34 new HUC14s were added while 2 were deleted. Over 100 boundaries were changed in order to match the new hydrography and HUC12s.

The HUC14 revision process consisted of heads-up editing of the HUC14 shape file in ARCMAP 9.2. HUC14 lines were moved to be more consistent with the HUC12s, 1:2,400 hydrography, and 1:24,000 elevation contours.

This revision process did not include a detailed examination of all HUC14 boundaries. It focused on fitting each HUC14s as comfortably as possible within a single HUC12, and that the defined hydrologic units are reasonable. Additionally, due to their differing creation processes, the HUC14 and HUC12 lines rarely match exactly. There are numerous minor discrepancies that were not resolved in this editing process. The available elevation and hydrography data do not conclusively show which line is more accurate. This will be corrected when all hydrologic unit boundaries are redone in the near future with more accurate elevational control.

The HUC12 numbering scheme is, in places, inconsistent with the numbering scheme established by Ellis and Price (1995). For some HUC14s the first twelve digits of its HUC number are not the same as the twelve digits of the HUC12 it falls in. In contrast, for all HUC14s the first 11 digits are the same as the HUC11 the HUC14 falls in. This inconsistency will be corrected when all hydrologic unit boundaries are redone in the near future.

In general, the HUCs are spatially sequentially numbered within a given HUC8. Lower numbers are generally in the headwaters higher in the watershed, increasing in a downstream direction. During this revision process new HUC14s were given a number not previously used. Thus in those cases where a new HUC14 was created in upstream areas it was assigned a greater number than some downstream HUC14s. This spatially nonsequential numbering will be corrected when all hydrologic unit boundaries are redone in the near future.

Appendix E provides a correlation all HUC14s with corresponding HUC12.

The current HUC12 and HUC14 boundaries are drawn using elevation data from maps of 1:24,000 base scale. New Jersey plans to create a LIDAR-based elevation data set at 1:2,400 or better in the next few years (Larry Thornton, NJDEP, oral communication, 2009). Once this elevation data set is available all hydrologic unit boundaries will be re-evaluated and redrawn as necessary.

The HUC12 boundaries were created in the form of a geodatabase. The previous version of the HUC14 boundaries was created as a shape file. This current HUC version is also a shape file. The next version of the HUC14s will probably be generated and maintained in the form of a geodatabase.

References

Cohen, Sandra, 1997, Draft statewide watershed management framework document for the State of New Jersey: N.J. Department of Environmental Protection, Office of Environmental Planning, Trenton, N.J., 78p.

Ellis, W.H. and Price, C.V., 1995, Development of a 14-digit hydrologic coding scheme and boundary data set for New Jersey: U.S. Geological Survey Water-Resource Investigations Report 95-4134, 1 plate, scale 1:250,000.

New Jersey Department of Environmental Protection, 1993, NJDEP state rivers for New Jersey (third order or higher): online metadata in support of 1:24,000 geospatial digital coverage of streams, available at http://www.nj.gov/dep/gis/stateshp.html.

New Jersey Department of Environmental Protection, 2008, NJDEP stream network: online metadata in support of 1:2,400 geospatial digital coverage of streams, available at http://www.nj.gov/dep/gis/strmnet.html.

Seaber, P.R., Kapinos, F.P., and Knapp, G.L., 1987, Hydrologic unit maps: U.S. Geological Survey Water-Supply Paper 2294, 63 p.

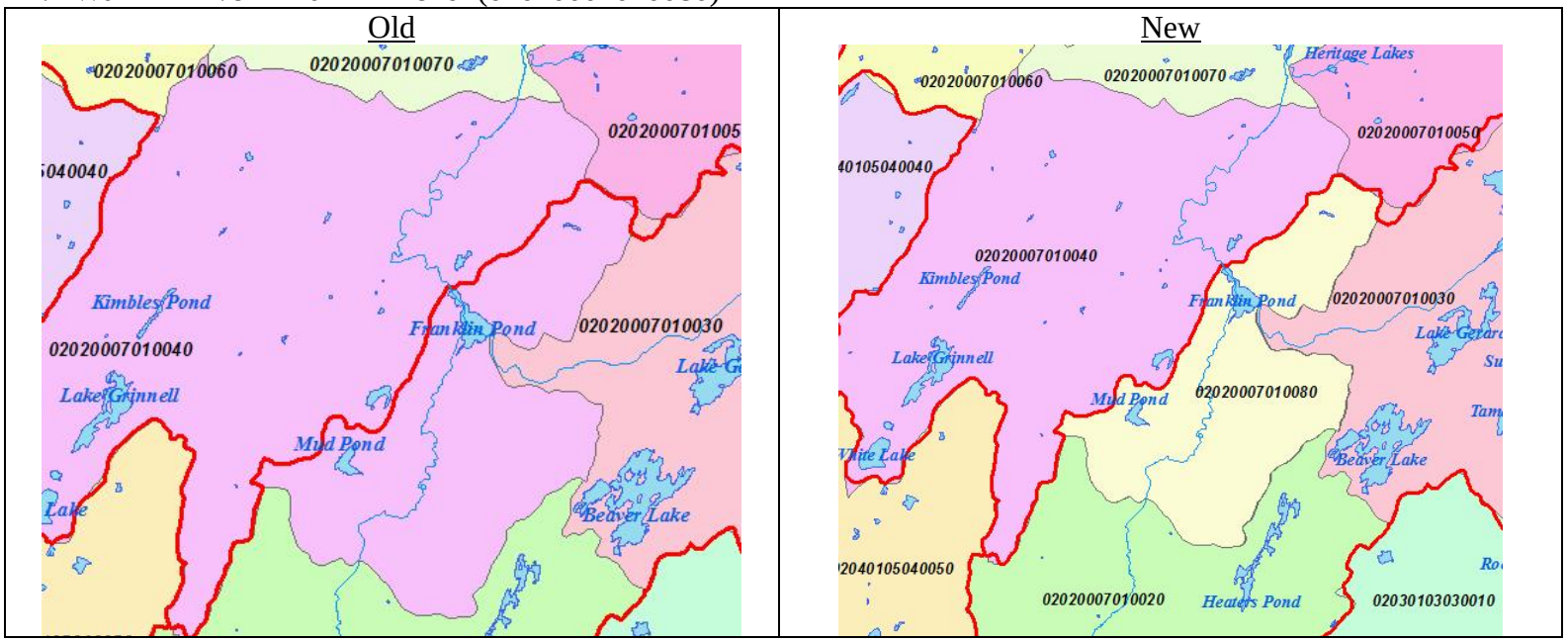
U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service, 2009, Federal guidelines, requirements, and procedures for the national Watershed Boundary Dataset: U.S. Geological Survey Techniques and Methods 11–A3, 55 p.

U.S. Environmental Protection Agency, 2009, 12-digit hydrologic unit boundaries of the United States: online metadata in support of the the nation-wide HUC8 geospatial digital coverage, available at http://www.epa.gov/waters/doc/auxiliary/wbd.html, accessed 6/23/09.

Appendix A. New HUC14s

A total of 34 new 14-digit hydrologic units (HUC14s) were added. This was done by making other HUC14s smaller. The following pages describe these additions and show the changes to existing HUC14s. Each page has a pair of figures with a text description of the change. The HUC14s (old on left, new on right) are shaded in pastels and the HUC12s boundaries are shown in red. The HUC14s are numbered in black. Some of the graphs show selected locational information.

A.1 Wallkill River - Franklin Pond (02020007010080)



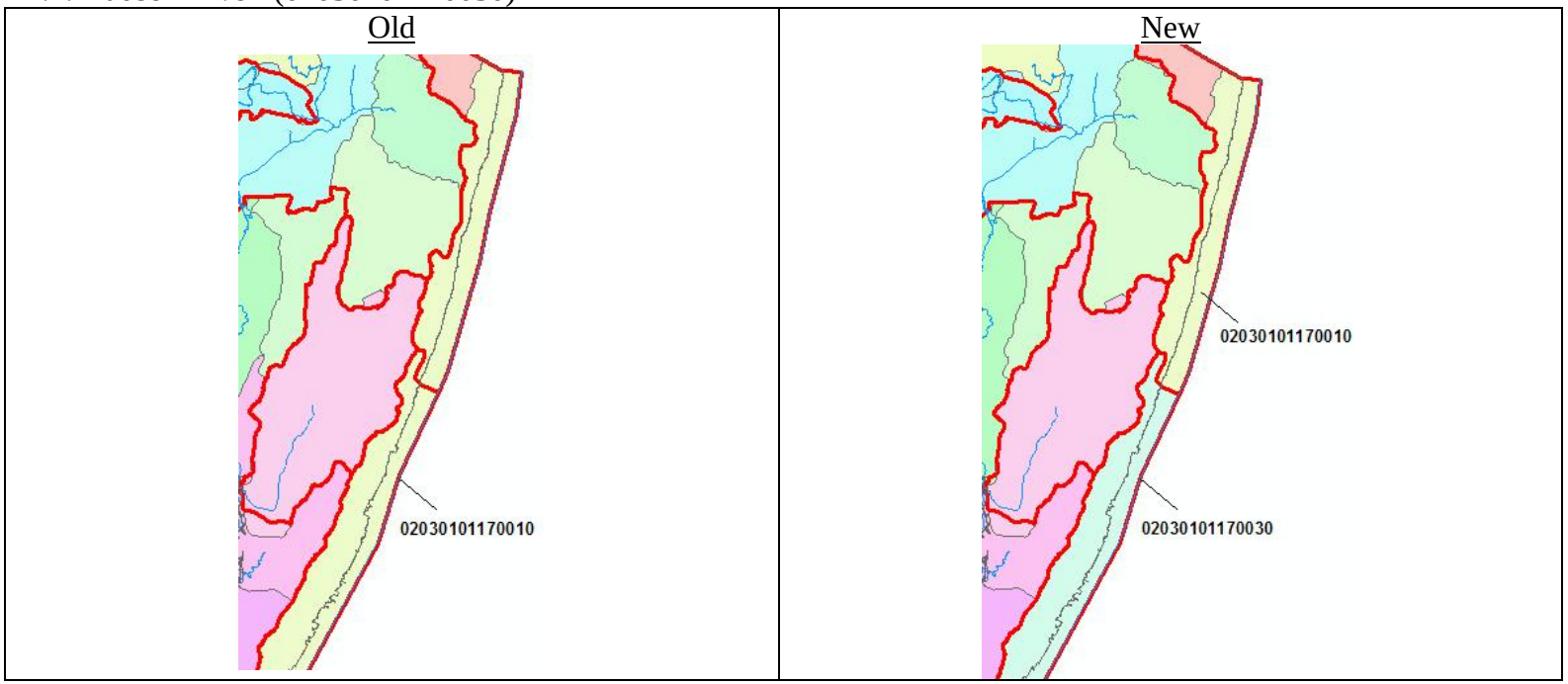
(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: 02020007010040 (SW_NAME Wallkill R(Hamburg SW Bdy to Ogdensburg) included the Wallkill River above Franklin Pond, some land that drained into Franklin Pond from the north, and an area downstream of Franklin Pond.

New: 02020007010040 was split. This number assigned to the area downstream of Franklin Pond. The new HUC14 includes the Wallkill upstream of Franklin Pond and the area to the north of Franklin Pond that drains into it. HUC14 02020007010030 that drains into Franklin Pond from the east is unchanged.

New HUC14#: 02020007010080
New HUC14 name: Wallkill R (Franklin Pond to Ogdensburg)

A.2. Hudson River (02030101170030)



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

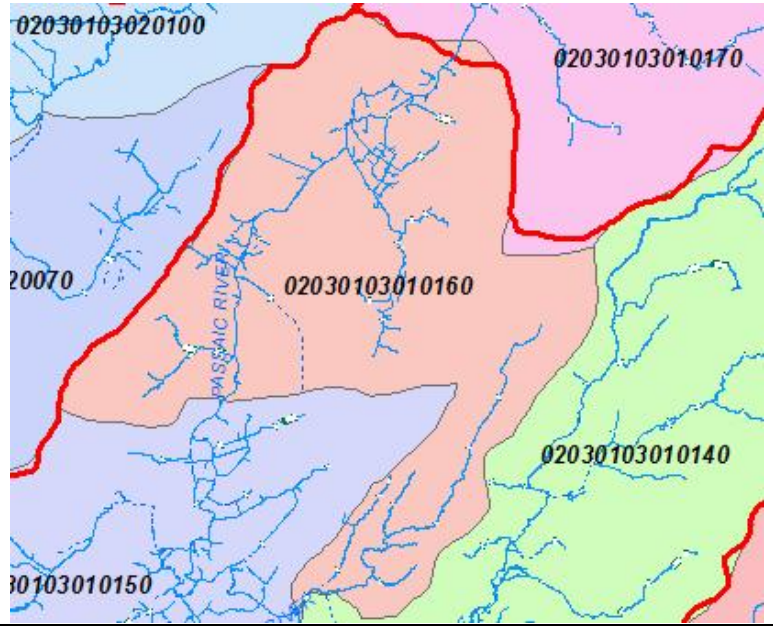
Old: The entire Hudson River off eastern New Jersey was one HUC14 - 02030101170010.

New: The Hudson River is split into two HUC14s. The old HUC14 number is assigned to the upper portion of the Hudson River. The new HUC14 (02030101117030) is assigned to the lower Hudson River.

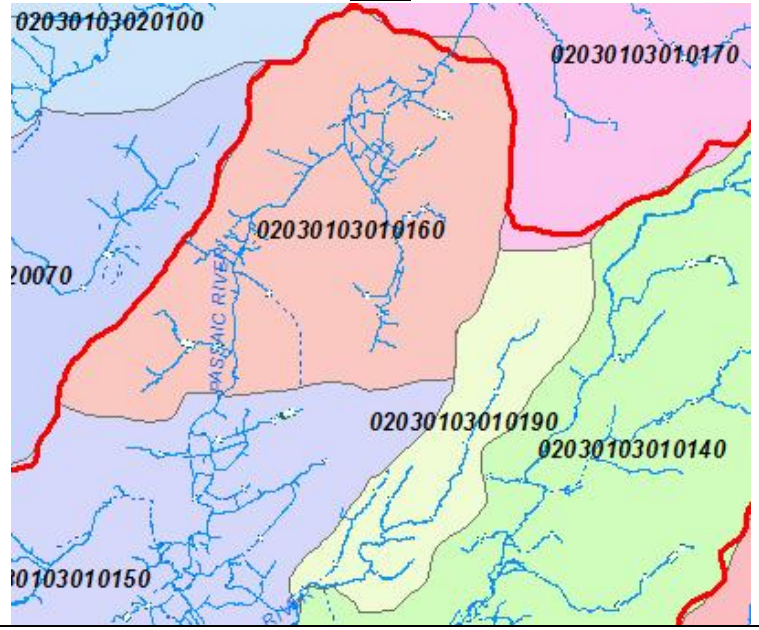
New HUC14#: 02030101117030
New HUC14 name: Hudson River (lower)
Note: HUC14 02030101170010 is renamed 'Hudson River (upper)'.

A.3. Slough Brook (02030103010190)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

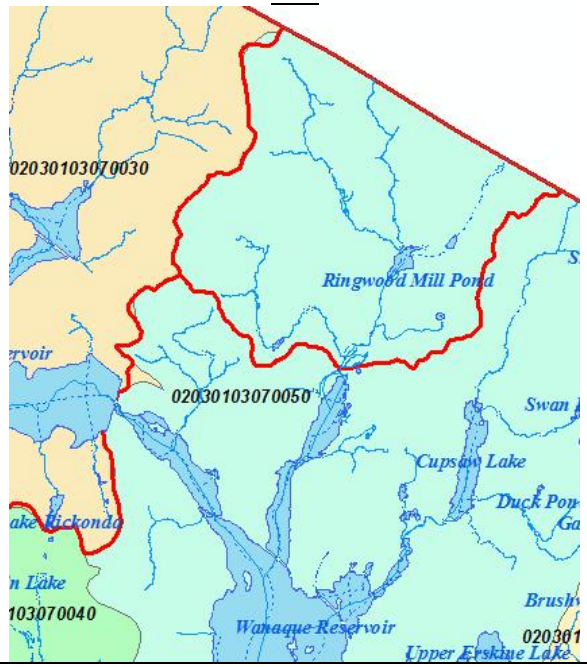
Old: Slough Brook flows south into the Canoe Brook Reservoir Number 1. This watershed was part of HUC14 02030103010060, which is primarily an area that drains directly to the Passaic River.

New: The Slough Brook watershed is broken out into its own HUC14.

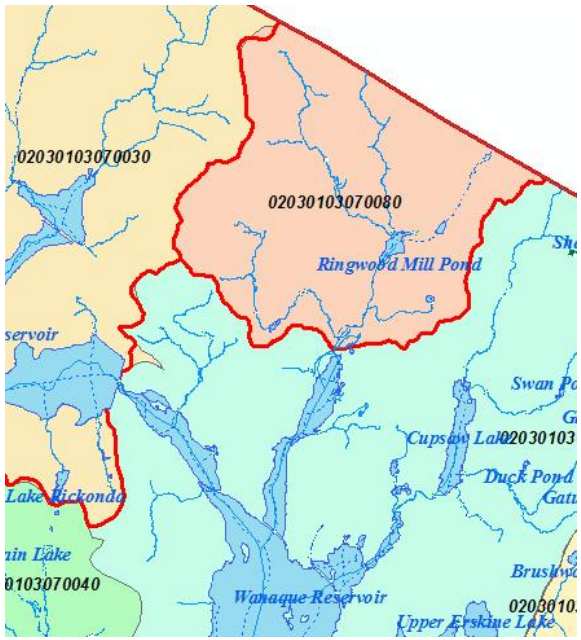
New HUC14#: 02030103010190
New HUC14 name: Slough Brook

A.4. Ringwood (02030103070080)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

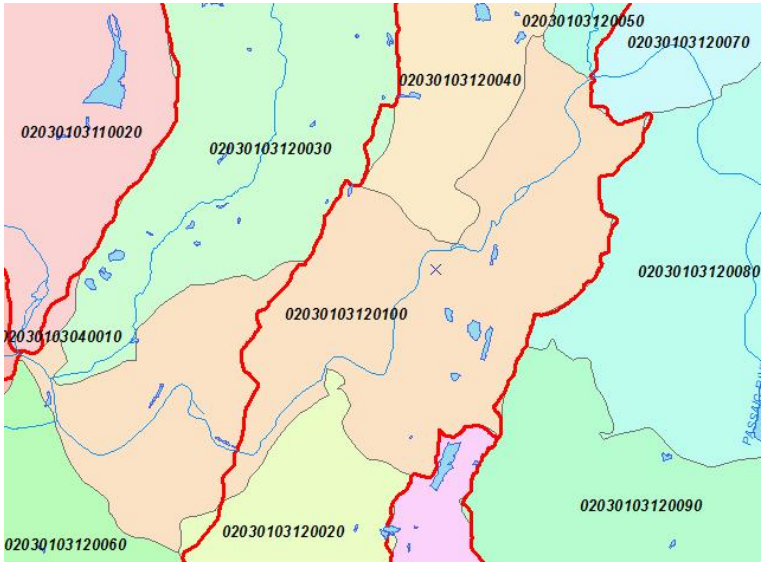
Old: Ringwood Creek flows into Wanaque Reservoir from the north. It was grouped into the HUC14 02030103070050, which is a large drainage area of small streams flowing into the Wanaque Reservoir.

New: The Ringwood Creek watershed is broken out into its own HUC14. This better matches the new HUC12s

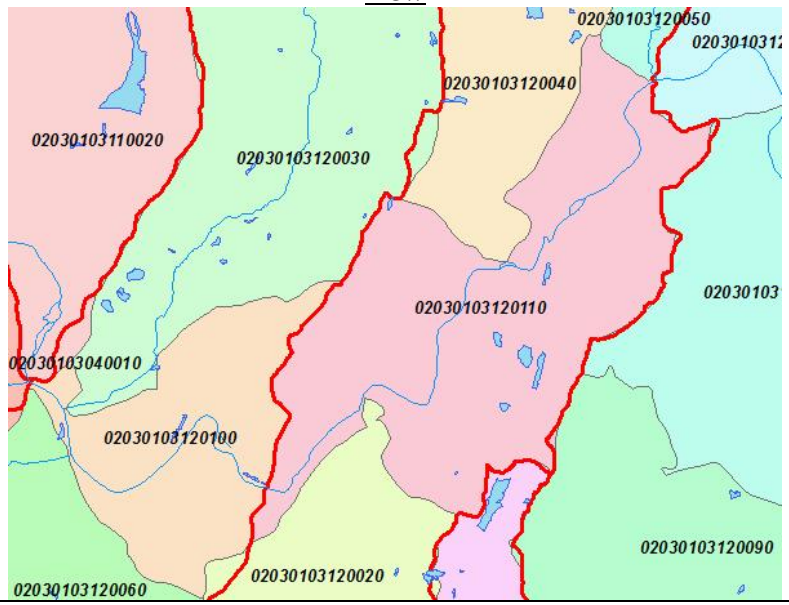
New HUC14#: 02030103070080
New HUC14 name: Ringwood Creek

A.5. Passaic River watershed between 1st and 2nd Watchung Mountains (02030103120110)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

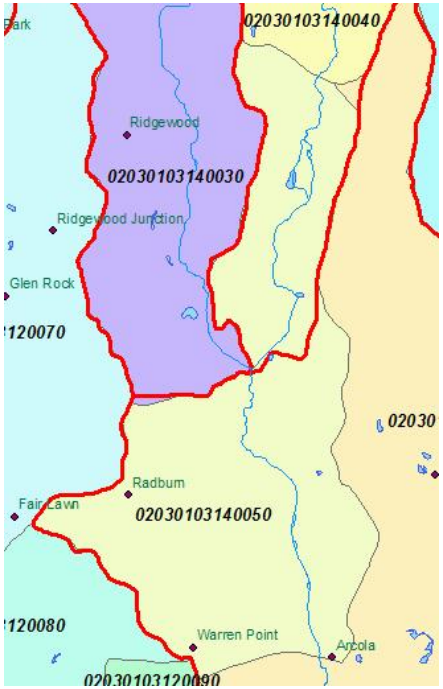
Old: The Passaic River flows through the Watchung Mountains and over the Great Falls. The HUC14 02030103120100 included the tributary area that was between the 1st and 2nd Watchung Mountains and some of the tributary area that is between the 2nd and 3rd Watchung Mountains.

New: Separate out from 02030103120100 the tributary area between the 1st and 2nd Watchung Mountains into its own HUC14. Give the new HUC14 the number 02030103120110. This breakout matches the HUC12 lines.

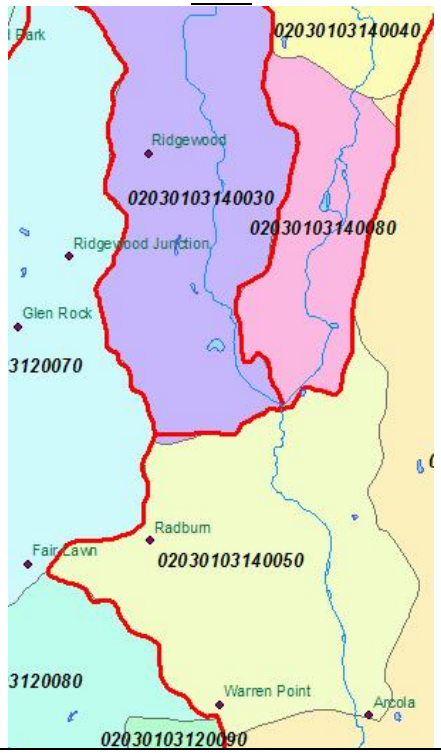
New HUC14#: 02030103120110
New HUC14 name: Passaic R lwr (Goeffle Brk to pump stn)

A.6. Saddle River & Hohokus Brook (02030103140080)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

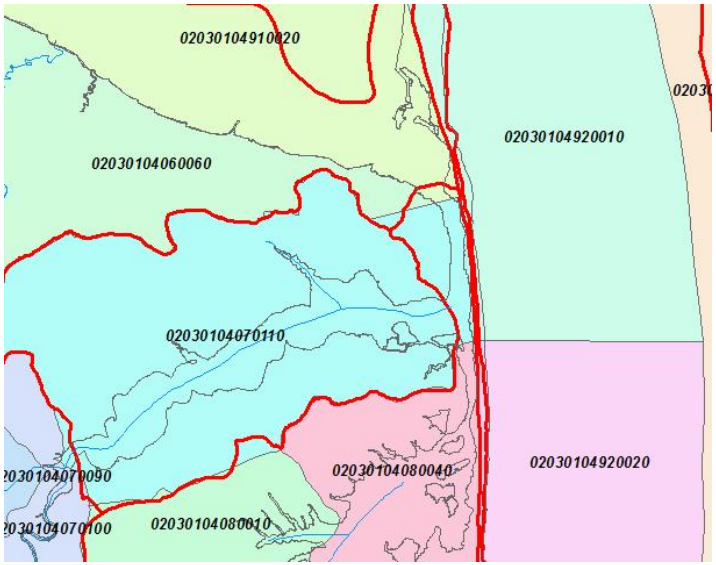
Old: The HUC14 02030103140050 includes part of the Saddle River both upstream and downstream of where Hohokus Brook enters it. (Hohokus Brook is in HUC14 020301040030).

New: Split 02030103140050 where Hohokus Brook enters the Saddle River and give a new number to the upstream portion.

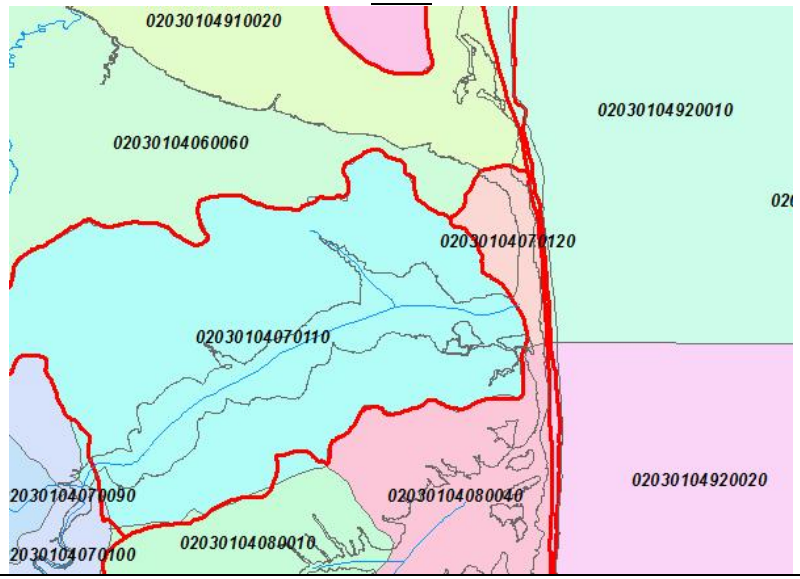
New HUC14#: 02030103140080
New HUC14 name: Saddle River (Hohokus to Ridgewood gage)

A.7. Navesink River (02030104070120)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

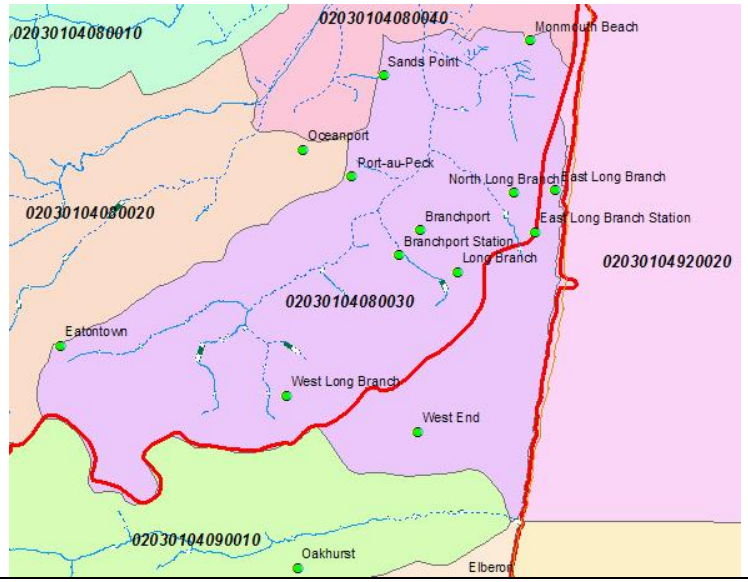
Old: The HUC14 02030104070110 incorporates the downstream portion of the Navesink River.

New: Near the mouth of the Navesink River a new HUC12 carves out a smallish splinter from this HUC14. The new HUC14 is 02030104070120 created to cover this splinter.

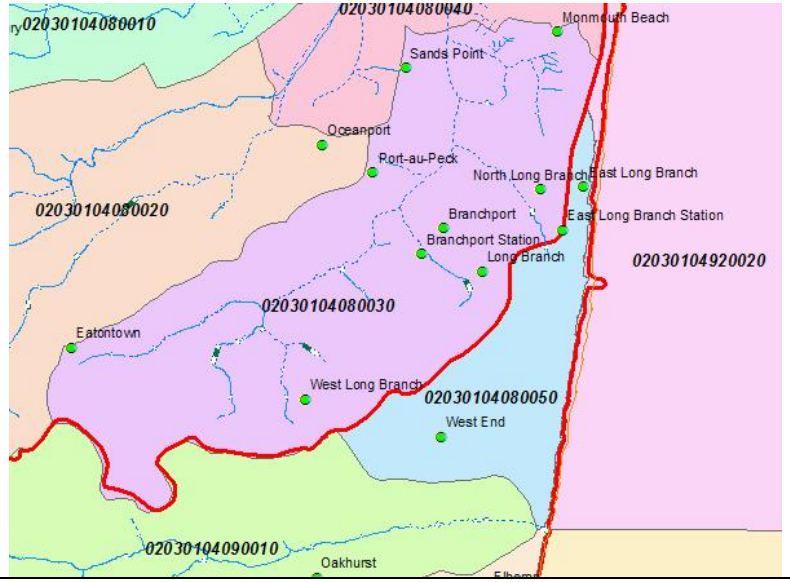
New HUC14#: 02030104070120
New HUC14 name: Navesink R mouth

A.8. Long Branch (02030104080050)

Old



New



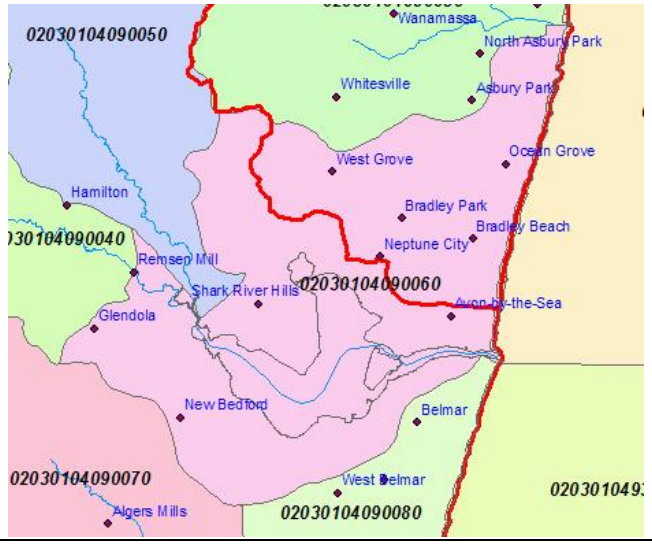
Old: The HUC14 02030104080030 has a portion that drains to Branchport Creek and a portion that probably drains, via storm drains, to the ocean.

New: The HUC14 02030104080030 is split along the HUC12 line and a new HUC14 created for that portion that drains to the ocean.

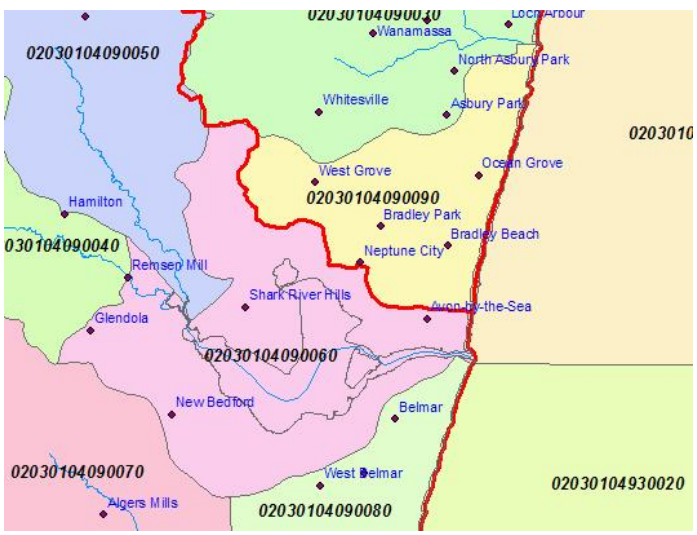
New HUC14#: 02030104080050
New HUC14 name: Long Branch direct Atlantic drainage

A.9. Shark River Outlet (02030104090090)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

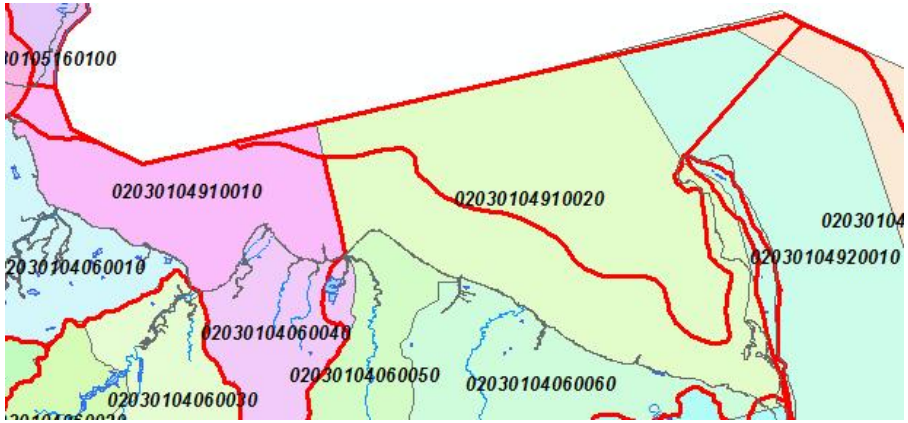
Old: The HUC14 02030104090060 covers the outlet of Shark River.

New: This HUC14 is now split by a HUC12 line. Split 02030104090060 along the HUC12 line and give the new HUC14 to the north the number 02030104090090.

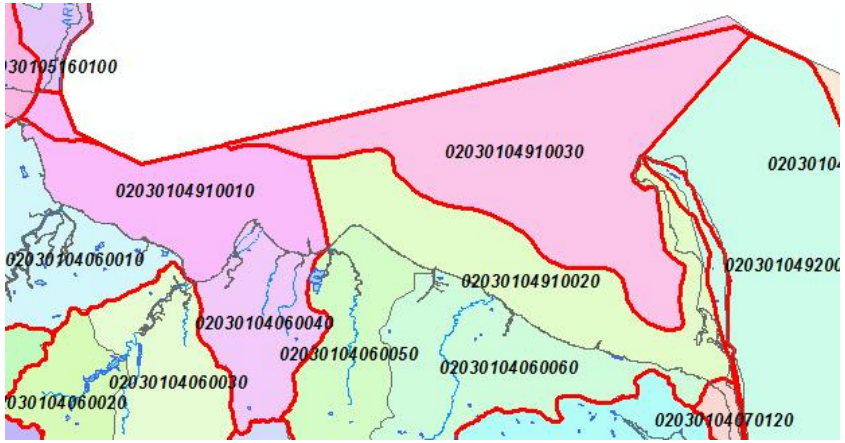
New HUC14#: 02030104090090
New HUC14 name: Atl drainage (Shark R - Deal Lk)

A.10. Raritan Bay (02030104910030)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

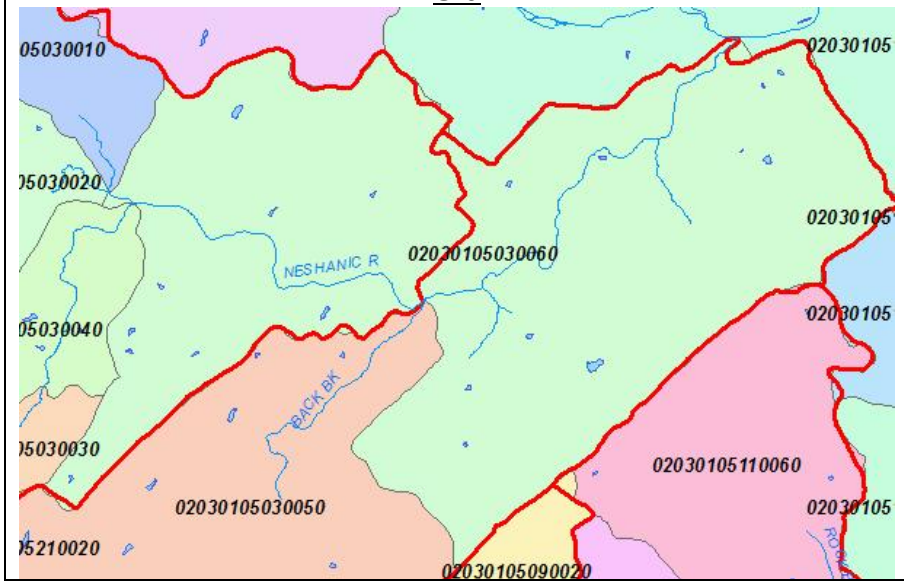
Old: The NJ part of Raritan Bay, from the coastline out to the state boundary, was covered by four HUC14s, 02030104910010, 02030104910020, 02030104920010 and 02030104920010

New: The new way to treat bay HUCs is to use bathymetry as a guide to create 'nearshore' and 'deepwater' HUCs. The existing HUC14s in Raritan Bay were revised to be 'nearshore.' A new 'deepwater' HUC14 was created to include the center of Raritan Bay.

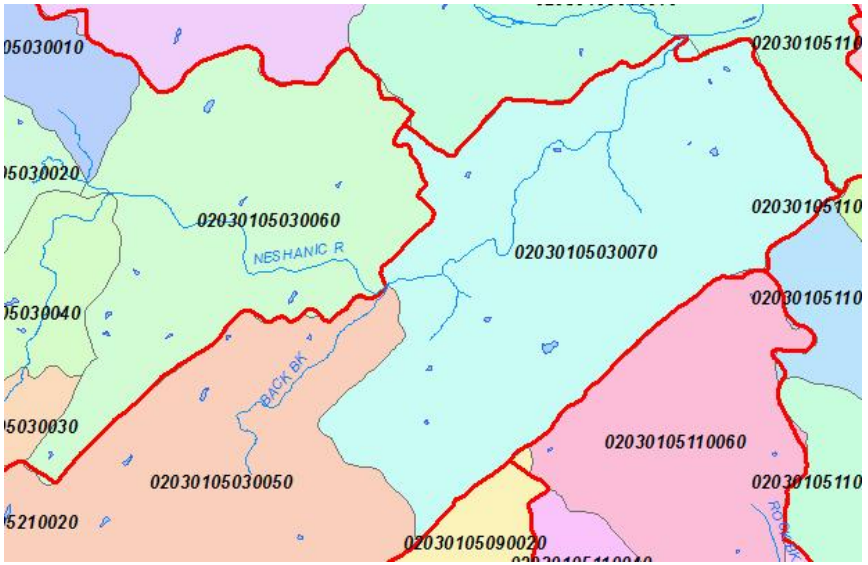
New HUC14#: 02030104910030
New HUC14 name: Raritan Bay (deepwater)

A.11. Lower Neshanic River (02030105030070)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

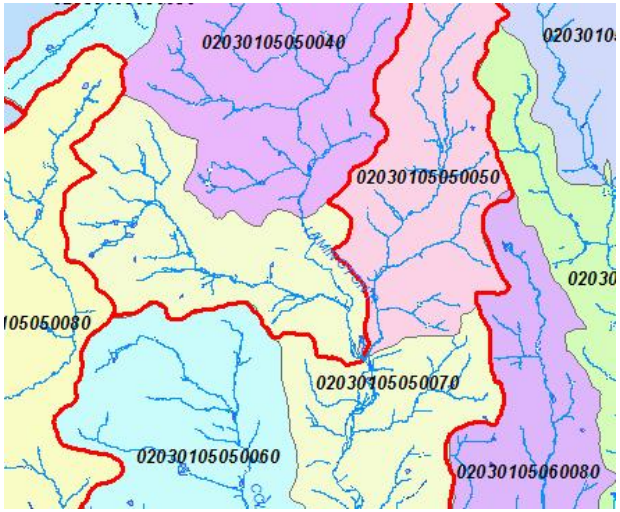
Old: The HUC14 02030105030060 includes the lower Neshanic River, both upstream and downstream of where Black Brook enters.

New: Split the lower Neshanic River watershed where Black Brook enters. Give old number to the upstream portion.

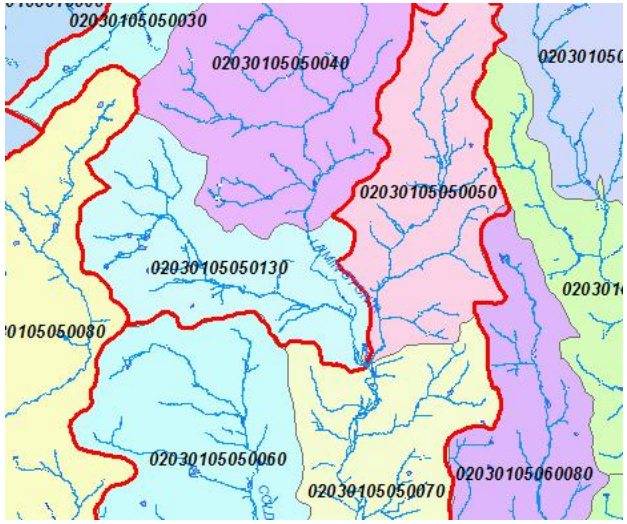
New HUC14#: 02030105030070
New HUC14 name: Neshanic R (below Black Brk)

A.12. Lamington River, Hertzog Brook (02030105050130)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

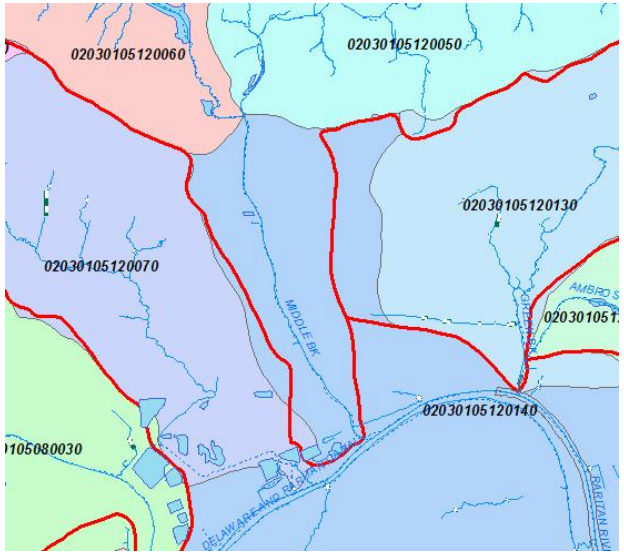
Old: The HUC14 02030105050070 includes a lot of the lower Lamington River watershed.

New: This HUC14 is split where Hertzog Brook enters. This is primarily done to match the HUC12 boundary.

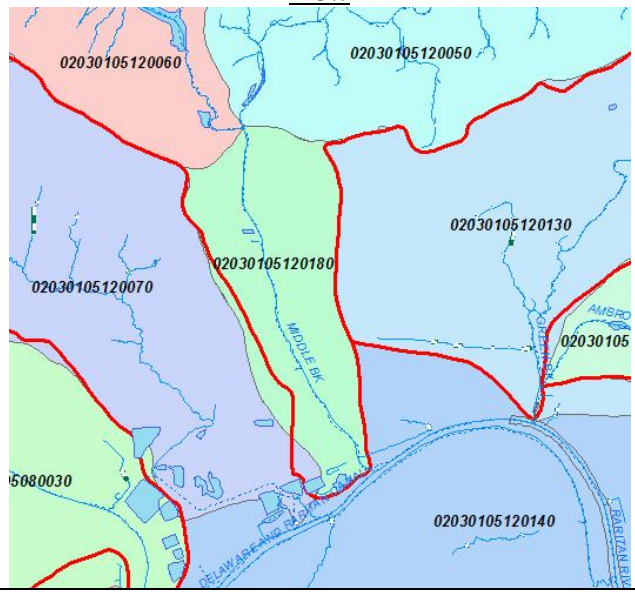
New HUC14#: 02030105050130
New HUC14 name: Lamington R(Hertzog Brk to Pottervsille gage)

A.13. Raritan River - Middle Brook (02030105120180)

Old



New



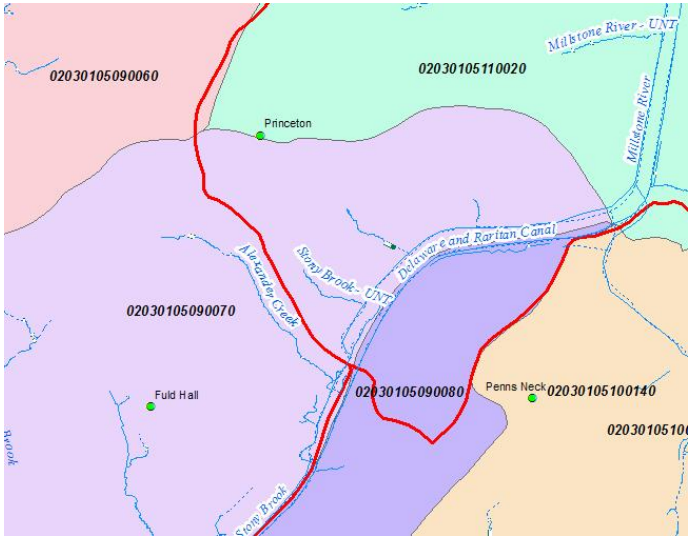
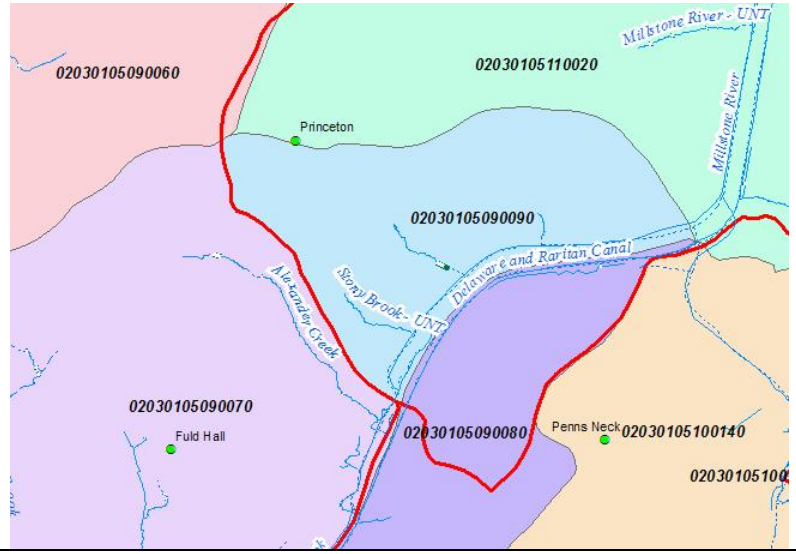
(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: The HUC14 02030105120140 includes several tributaries that drain to the Raritan River in the South Bound Brook area. This includes Middle Brook which enters the Raritan from the north.

New: Break out Middle Brook into its own HUC14. This is done to match the HUC12 boundary.

New HUC14#: 02030105120180
New HUC14 name: Middle Brook

A.14. Princeton - Stony Brook Drainage (02030105090090)

Old	New
	

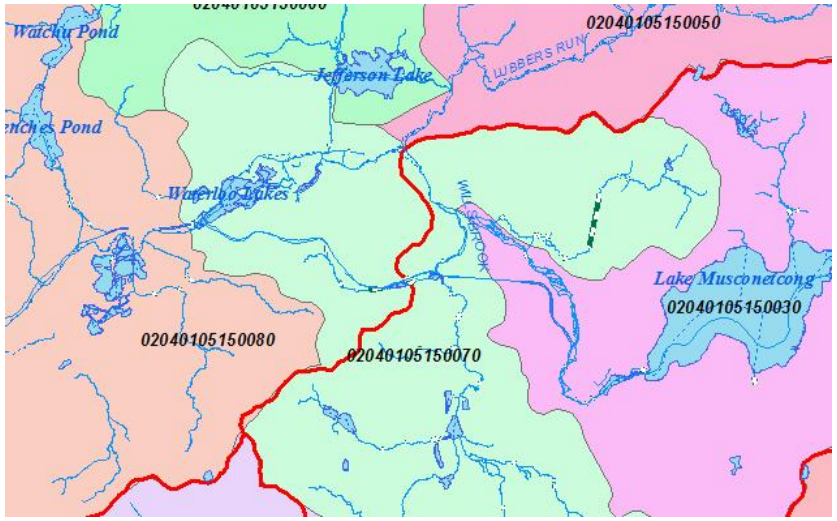
Old: The HUC14 02030105090070 is includes the Stony Brook watershed (Harrison St to Rt 206). The HUC12 is keyed to where Alexander Creek enters Stony Brook.

New: Split HUC14 02030105090070 along the HUC12 line. Create a new HUC14 for the downstream extent.

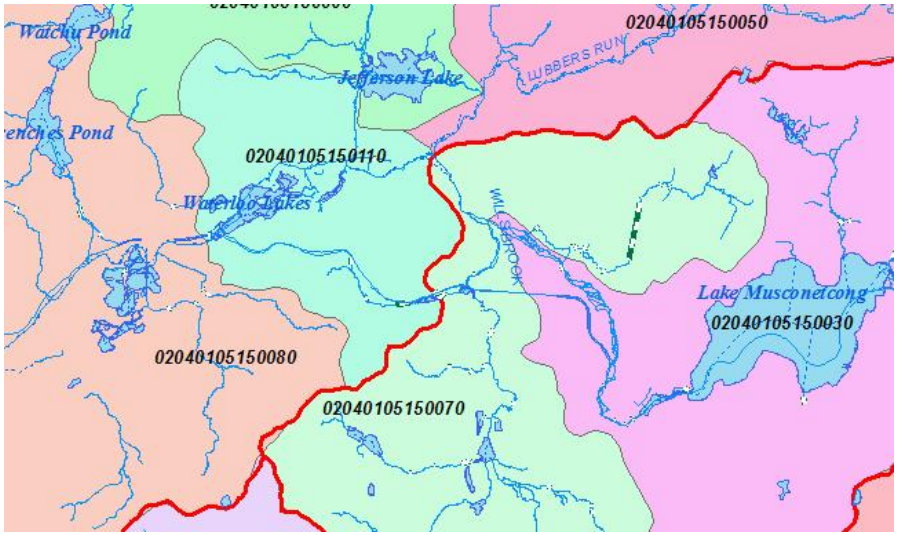
New HUC14#: 02030105090090
New HUC14 name: Stony Brook - Princeton drainage

A.15. Musconetcong River (02040105150110)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

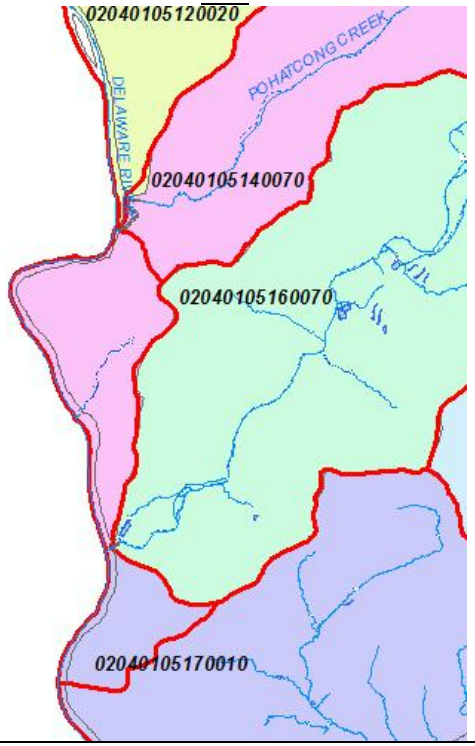
Old: The Musconetcong River drainage downstream of Lake Musconetcong is confused due to modifications originally made to supply water to the Morris Canal. Branching and interweating sream channels make a clean watershed divide impossible.

New: Break out the downstream portion of 02040105150070 into a new HUC14. This matches the HUC12 lines in the area.

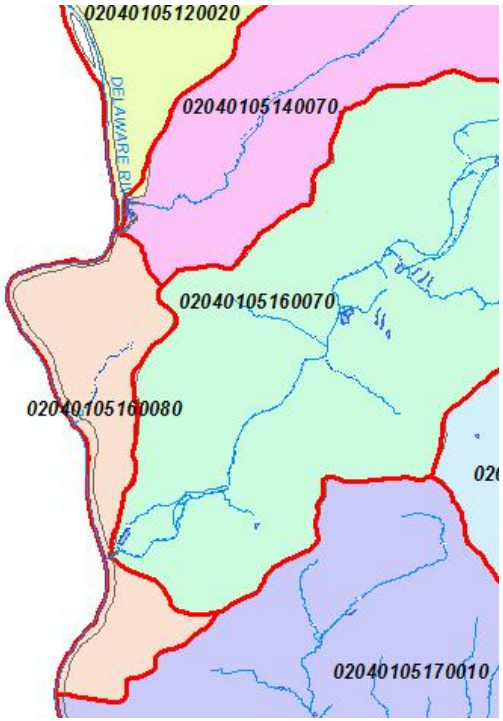
New HUC14#: 02040105150110
New HUC14 name: Musconetcong R (Waterloo area)

A.16. Delaware River direct drainage near Musconetcong River (02040105160080)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

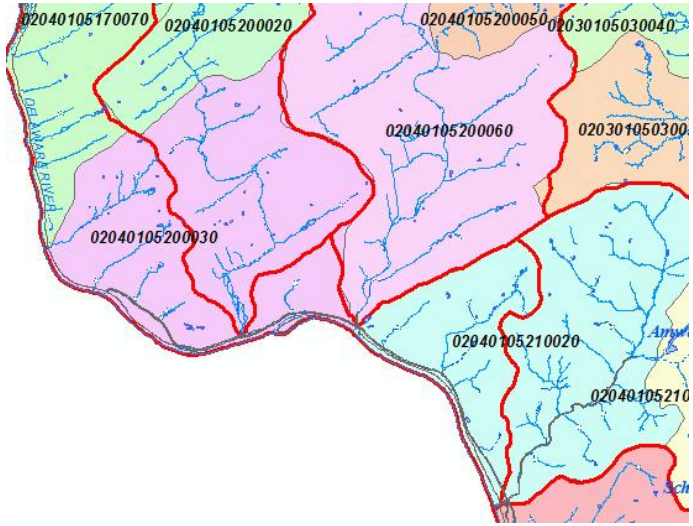
Old: Areas that drain directly to the Delaware River just north and south of where the Musconetcong River enters the Delaware are grouped with watersheds to the north (02040105140070) and south (02040105170010).

New: Create a new HUC14 that includes portions of both 02040105140070 and 02040105170010. This better matches the watersheds entering the Delaware River from the Pennsylvania side.

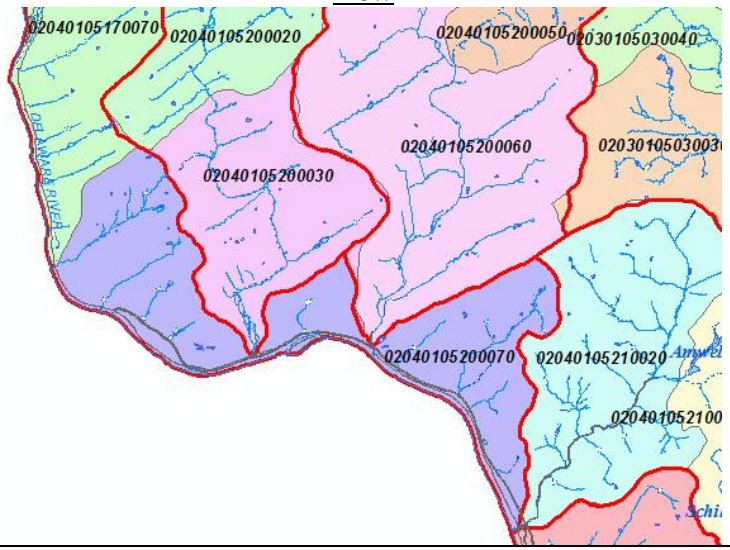
New HUC14#: 02040105160080
New HUC14 name: Riegelsville (direct Del. R. drainage)

A.17. Delaware River direct drainage near Lockatong and Alexauken Creeks (04020105200070)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

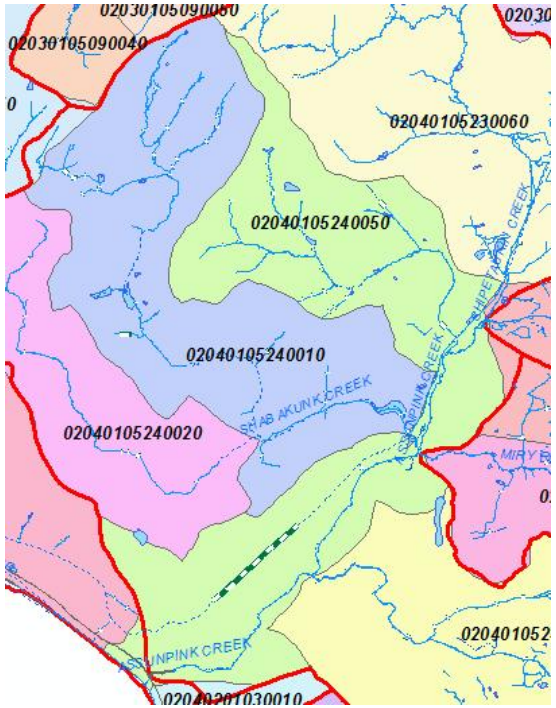
Old: The Lockatong Creek watershed (04020105200030) and the Alexauken Creek watershed (02040105210020) include some areas that drain directly to the Delaware River.

New: Create a new HUC14 that includes small watersheds draining directly to the Delaware River. This has three disconnected portions. It matches better with drainage into the Delaware from the Pennsylvania side.

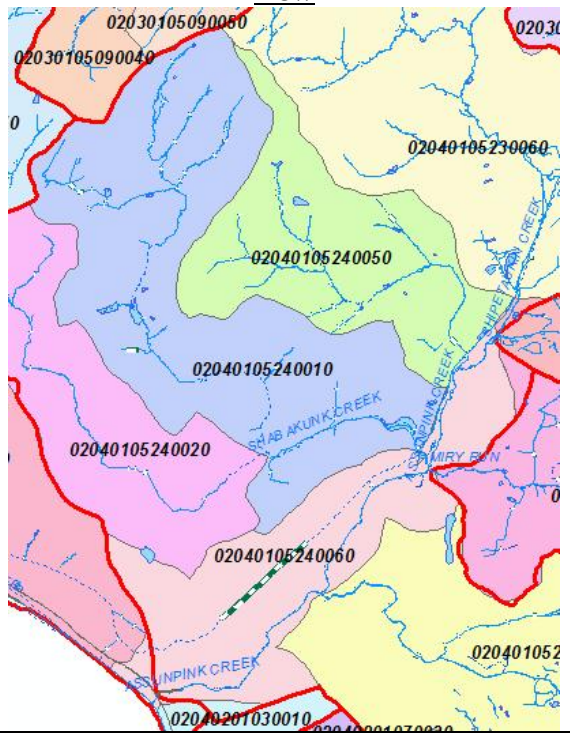
New HUC14#: 04020105200070
New HUC14 name: DelR -Lambertville to Bulls Island

A.18. Lower Assunpink Creek and the Little Shabakunk tributary (02040105240060)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: The HUC14 02040105240050 includes the lower Assunpink Creek and the Little Shabakunk trib.

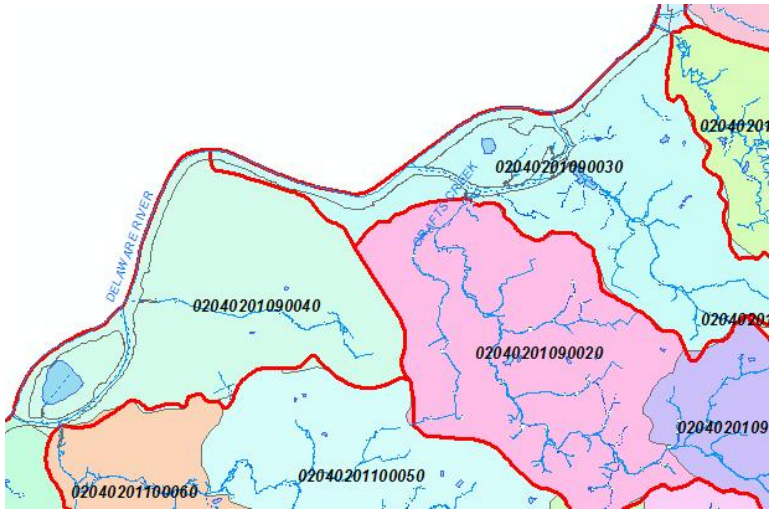
New: Break out the Little Shabakunk tributary from the lower Assunpink. Use the old # for the Little Shabakunk and give a new HUC14 # to the lower Assunpink.

New HUC14#: 02040105240060
New HUC14 name: Assunpink Creek (below Shipetaukin Ck)

A.19. Crystal and Bustleton Creeks (02040201090040)

Old

New



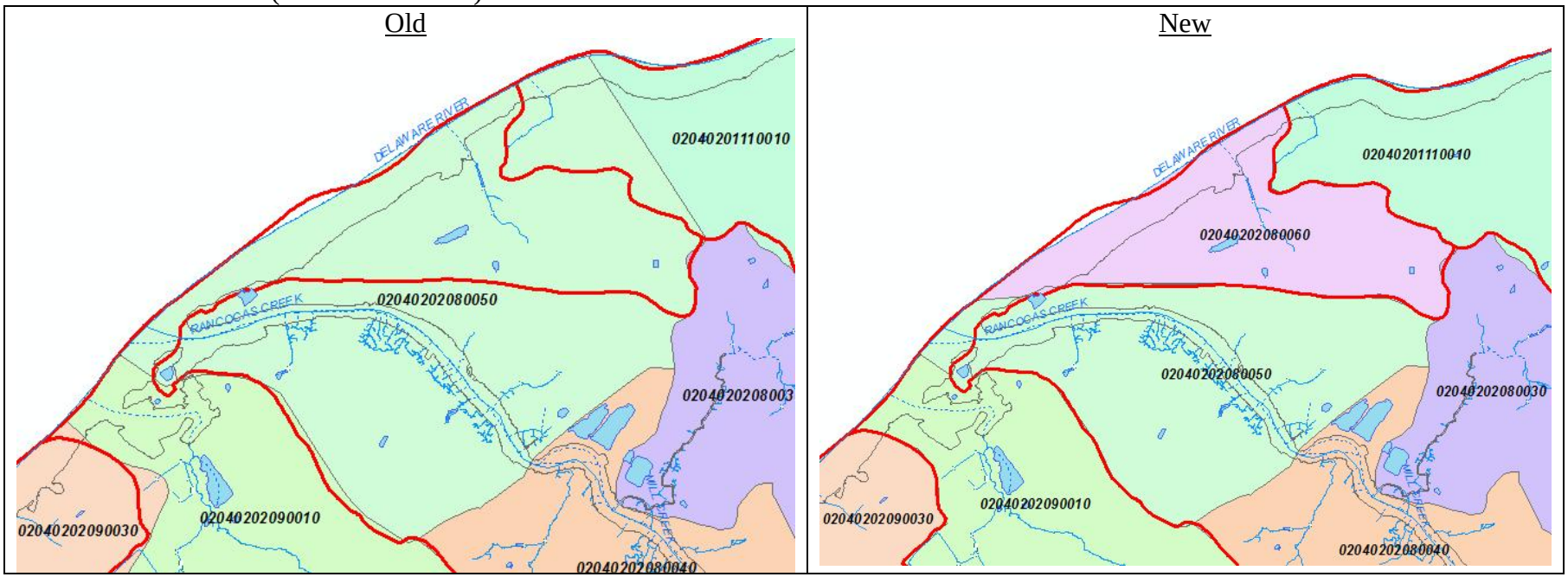
(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: the HUC14 02040201090030 includes the Crystal Creek watershed and Bustleton's creek drainage and some direct drainage to the Delaware.

New: Break out Bustleton's Creek watershed and nearby area into its own HUC14.

New HUC14#: HUC14 02040201090040
New HUC14 name: LDRV tribs (Bustleton Creek area)

A.20. Rancocas Creek (02040202080050)



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

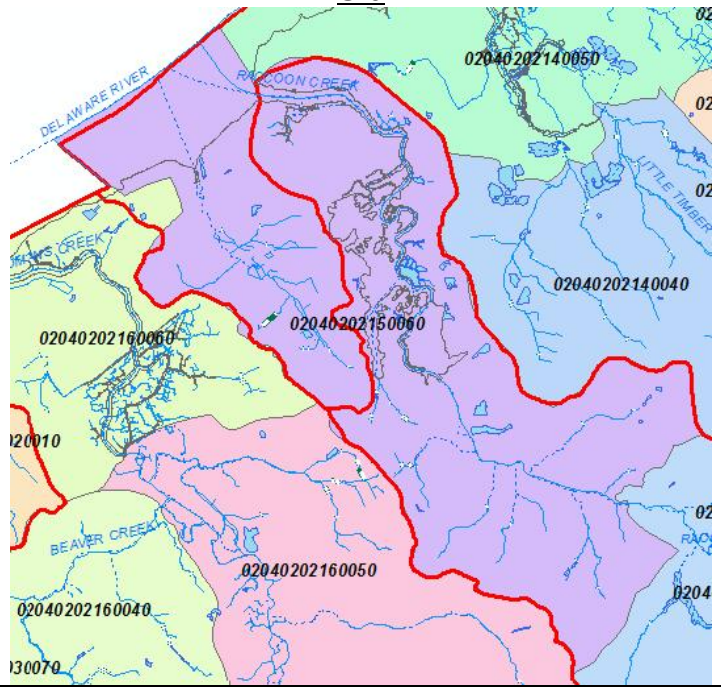
Old: The HUC14 02040202080050 includes the lower Rancocas Creek and some area to the north that drains directly to the Delaware River.

New: Split out of 02040202080050 that area to the north that drains directly to the Delaware River. This matches better the HUC12 boundary and drainage to the Delaware River on the Pennsylvania side.

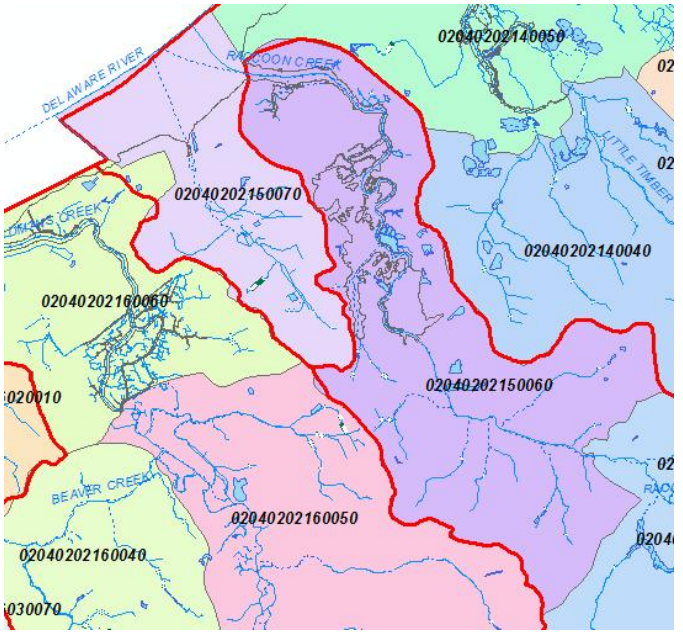
New HUC14#: 02040202080050
New HUC14 name: LRDV trib - Delanco/Edgewater

A.21. Raccoon and Birch Creeks (02040202150070)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

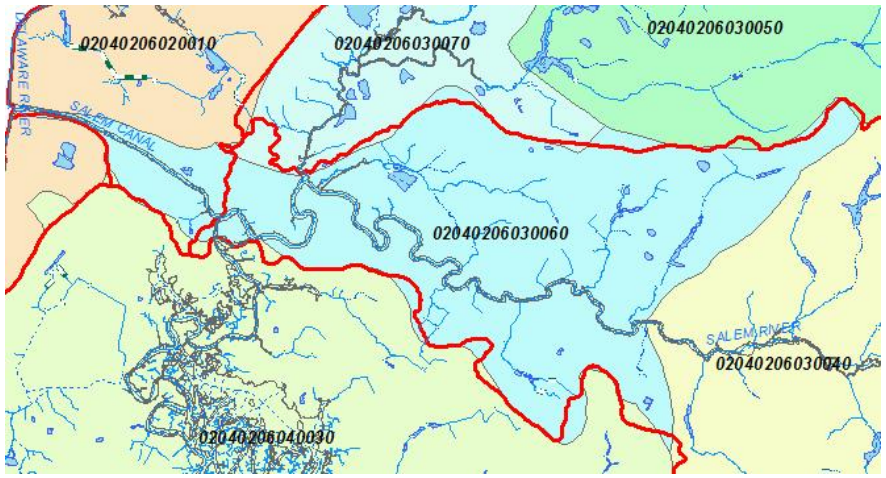
Old: The HUC14 02040202150060 includes the lower Raccoon Creek watershed as well as the Birch Creek watershed (just to the south of Raccoon Creek).

New: Break out the Raccoon Creek watershed into its own HUC14. This better matches the HUC12 line and drainage into the Delaware River from Pennsylvania.

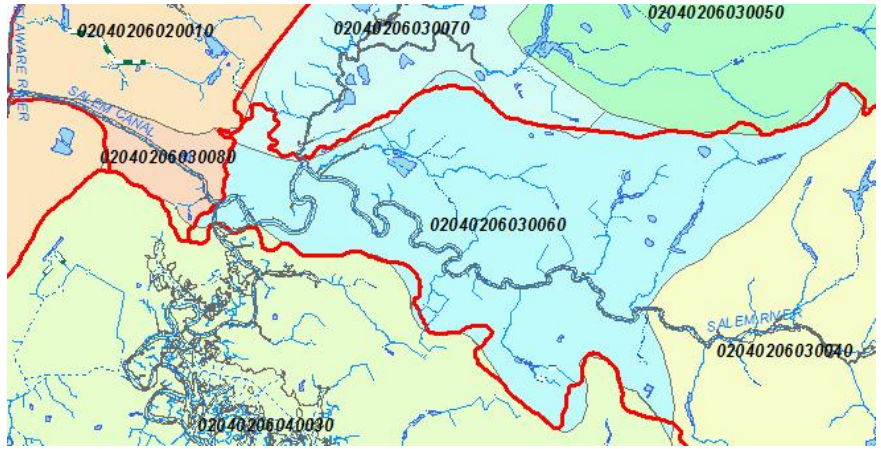
New HUC14#: 02040202150070
New HUC14 name: Birch Creek

A.22. Salem River & Canal (02040206030080)

Old



New



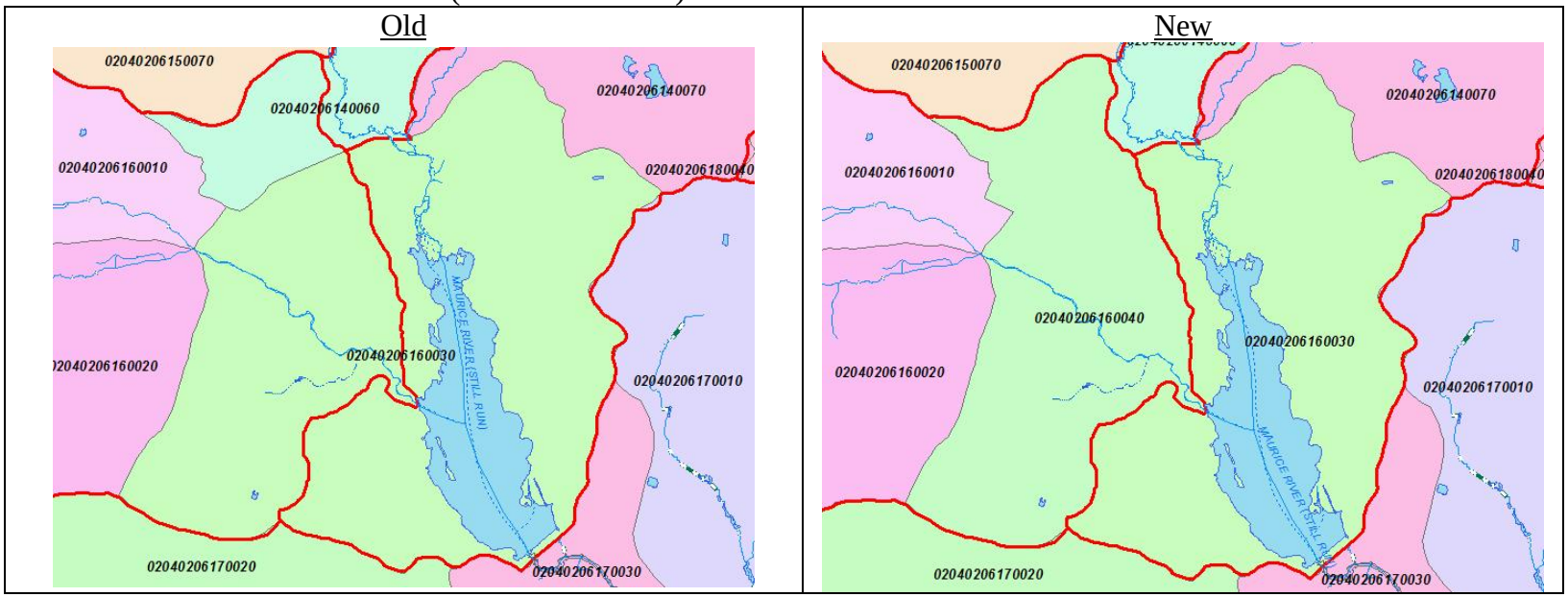
(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: The Salem Canal provides a short cut from the Delaware River to the Salem River. The HUC14 02040206030060 includes part of the Salem River and the Salem Canal. (Note, the Salem River flows to the south at the Salem Canal confluence.)

New: Split out the Salem Canal direct drainage watershed into its own HUC14. This better matches the hydrography and the HUC12 boundaries.

New HUC14#: 02040206030080
New HUC14 name: Salem Canal

A.23. Mill Creek near Union Lake (02040206160040)



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

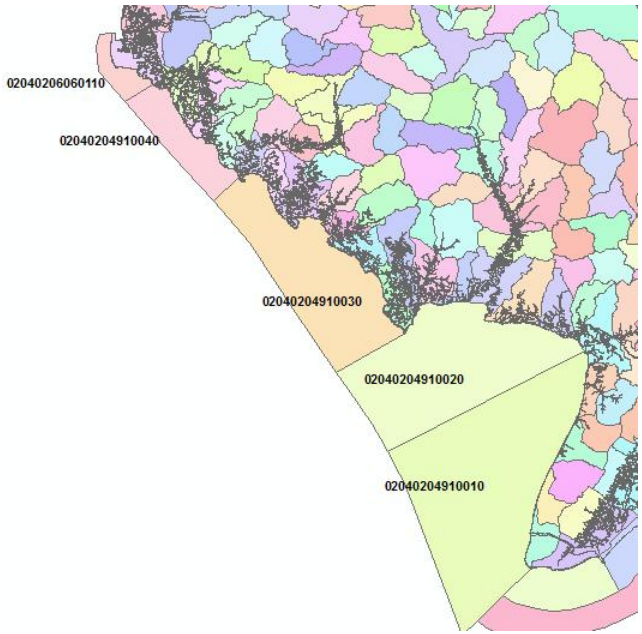
Old: The HUC14 02040206160030 includes the downstream portion of Mill Creek as well as portion of the Maurice River upstream of Union Lake and some direct drainage to Union Lake.

New: Break out the downstream portion of Mill Creek into its own HUC14.

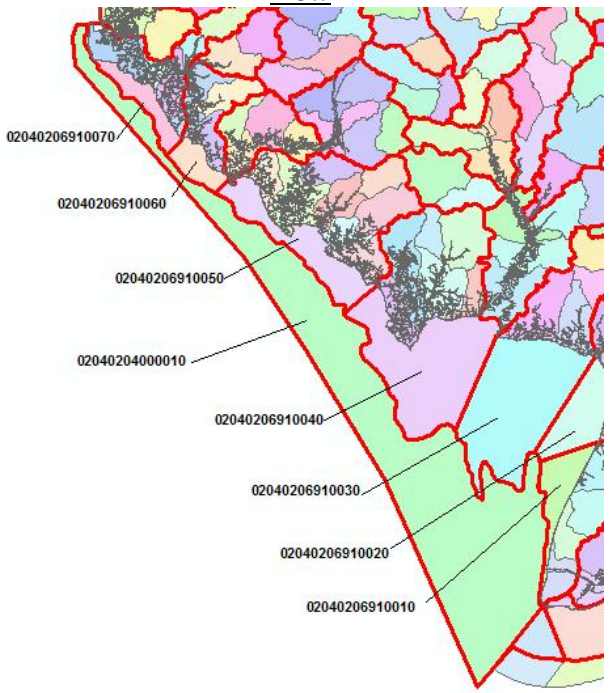
New HUC14#: 02040206160040
New HUC14 name: Mill Creek (lower)

A.24. Delaware Bay (02040204000001, 02040206901010 through 02040206910070, 02040106910070)

Old



New

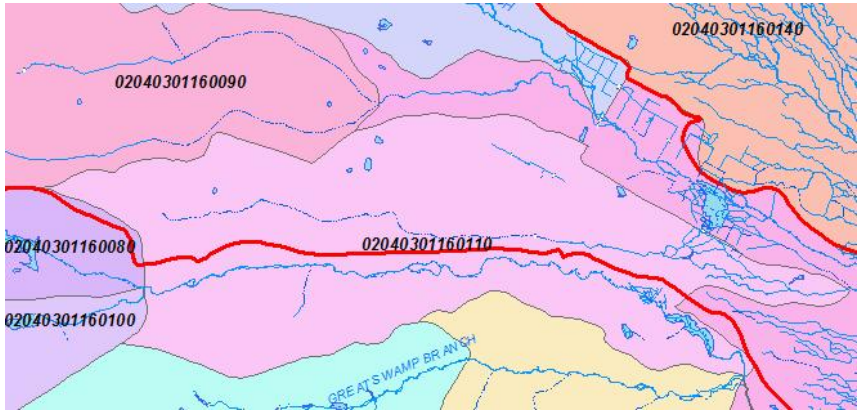
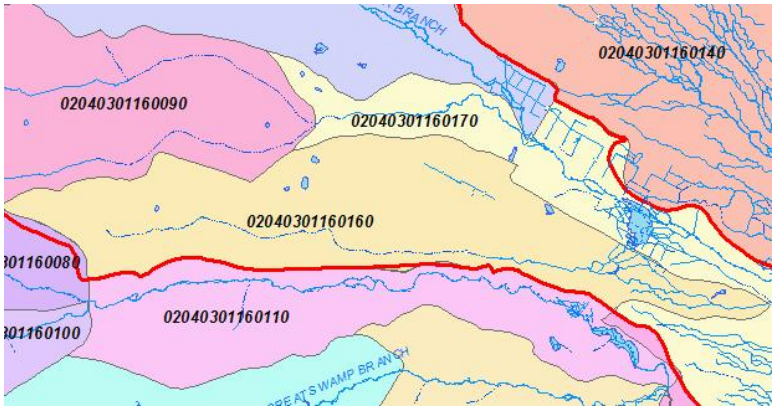


(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: A series of 5 HUC14s extended from the shoreline out to the state boundary in the center of Delaware Bay.

New:
(1) A 'deepwater' HUC12 occupies the center of Delaware Bay. This HUC12 is numbered 020402040000. A single HUC14 is nestled inside the New Jersey portion of this HUC12 and is given the number 02040204000010.
(2) A series of coastal HUC12s cover part of the shore and the 'nearshore' areas of the Bay. Within each, a single HUC14 is nestled that extends from the shore line out to the deepwater HUC. From the tip of Cape May northwards, along the Delaware Bay shore, there are a series of 7 HUC14s (02040206901010 through 02040206910070).
(3) The old HUC14 02040206060110 was at the northernmost portion of the Delaware Bay. This is deleted and its area is split between the deepwater HUC14 02040204000001 and the nearshore HUC14 02040106910070.

A.25. Albertson Brook and Gun Branch (02040301160160)

Old	New
	

(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

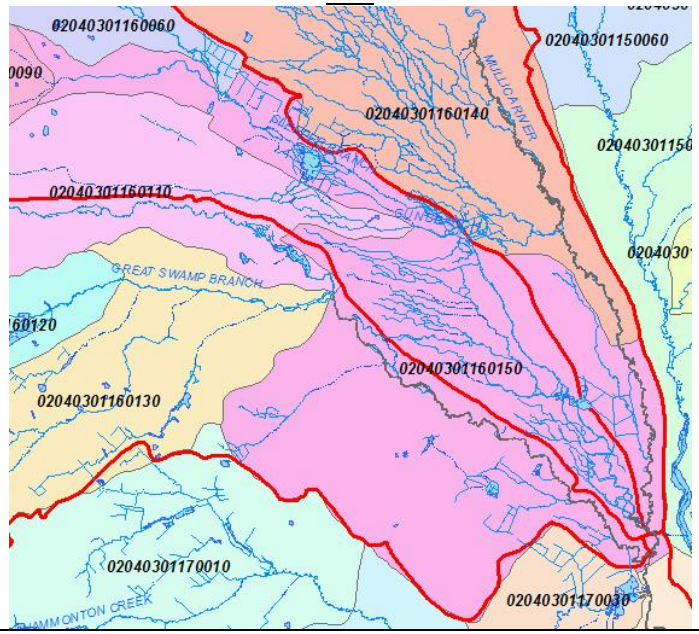
Old: The HUC14 02040301160110 includes the lower portion of the Albertsons Brook watershed but also the Gun Branch watershed just to the north.

New: Break out the Gun Branch watershed into its own HUC14.

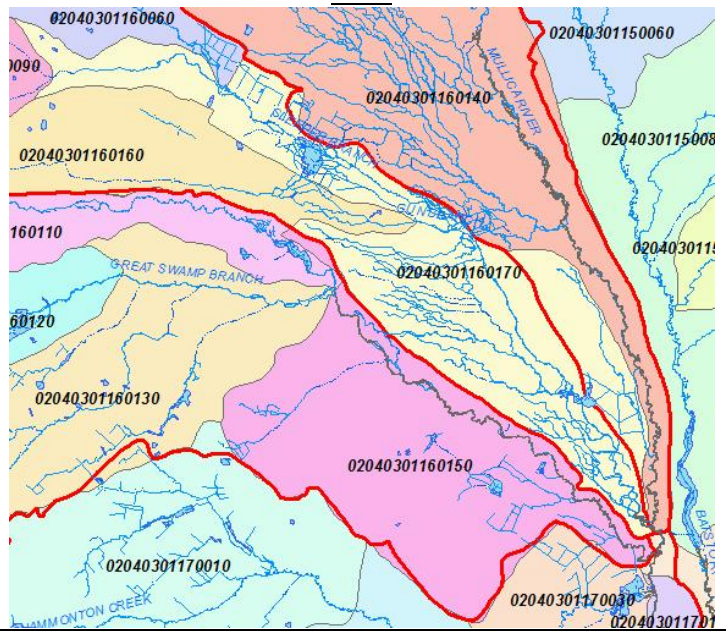
New HUC14#: 02040301160160
New HUC14 name: Gun Branch

A.26. Nescochague Creek and Sleeper Branch (02040301160170)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

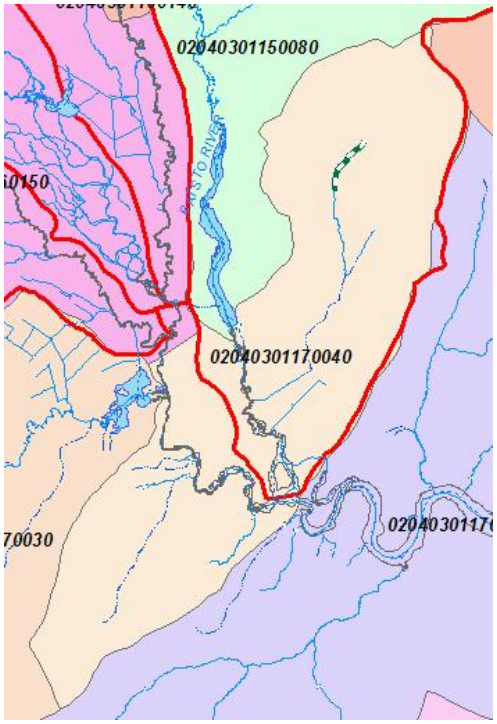
Old: The HUC14 02040301160150 incorporates both the Nescochague Creek and Sleeper Branch watershed.

New: Split the HUC14 and assign the Nescochague Creek and Sleeper Branch watersheds to different HUC14s. Sleeper Branch gets the new HUC14.

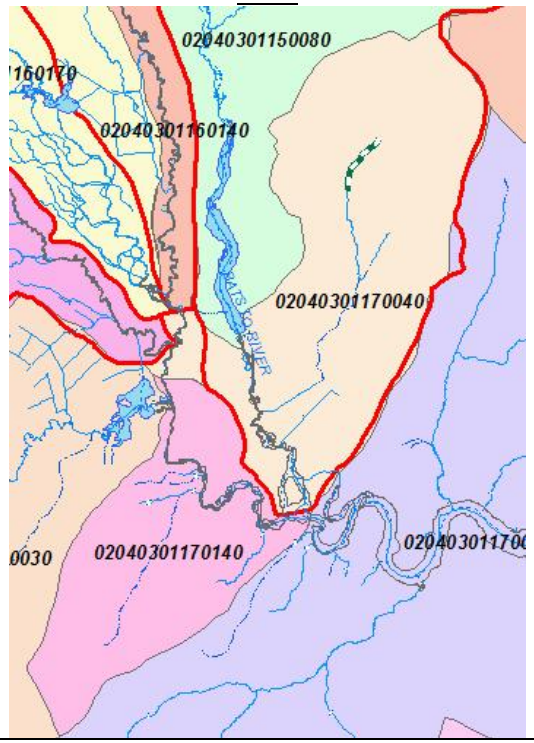
New HUC14#: 02040301160170
New HUC14 name: Sleeper Branch

A.27. Mullica and Batsto Rivers (02040301170140)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: The HUC14 02040301170040 includes portions of the watersheds of the Batsto River (to the east) and the Mullica River (to the west).

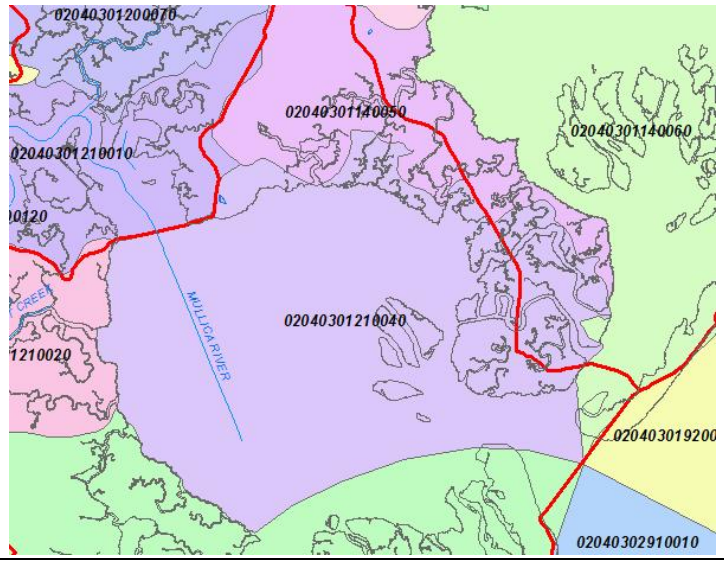
New: Separate out the Mullica River watershed out and create a new HUC14.

Note: The confluence of the Batsto and Mullica Rivers is not a clean meeting of two streams. The drainage is very complex due to interweaving of multiple small channels. Will have to revisit this later.

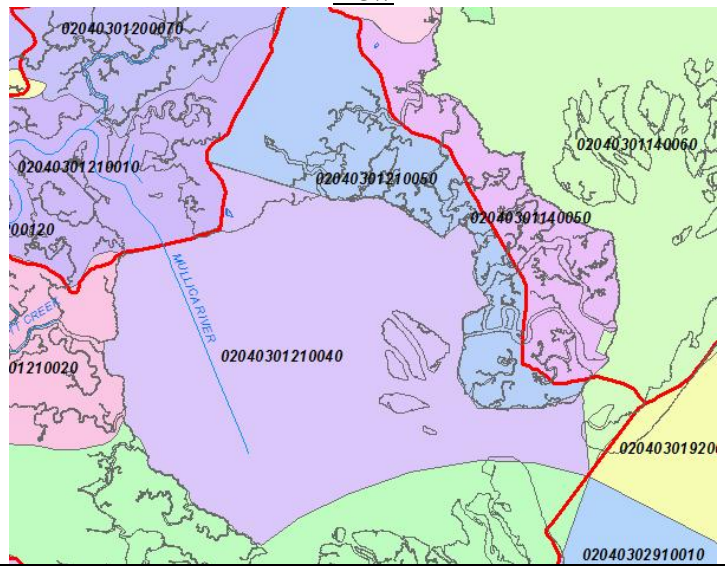
New HUC14#: 02040301170140
New HUC14 name: Mullica R. (BatstoR to Nescochague Lake)

A.28. Great Bay - Barnegat Bay (02040301210050)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

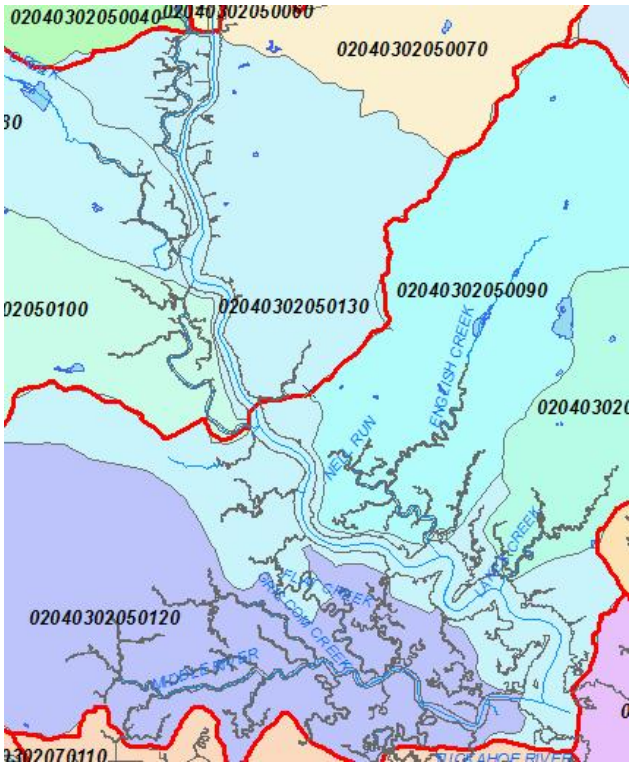
Old: The HUC14 02040301210040 includes both Great Bay and part of the peninsula that separates Great Bay from Barnegat bay to the north.

New: Redraw 02040301210040 so that it includes only Great Bay. Create a new HUC14 that covers the portion of the peninsula that drains to Great Bay. (Also redraw the watershed divide for this peninsula.)

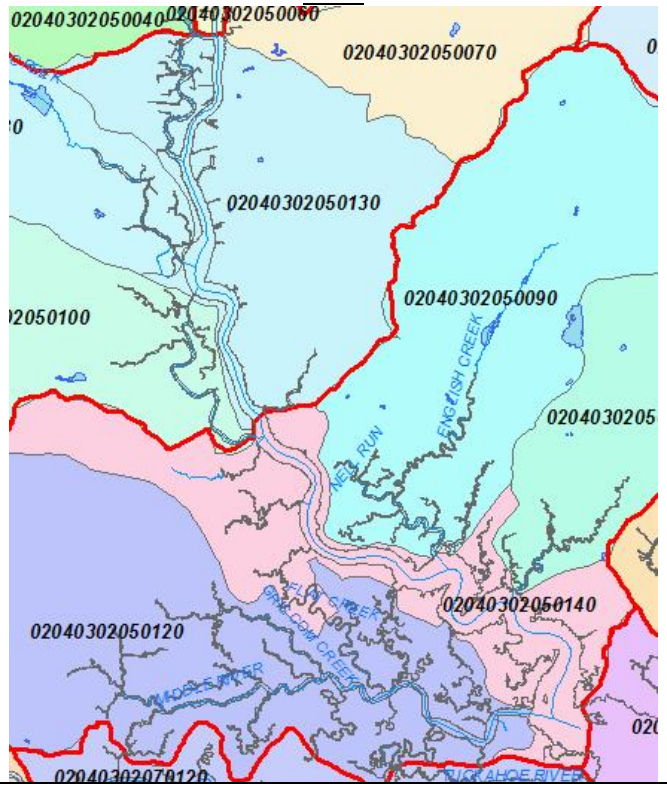
New HUC14#: 02040301210050
New HUC14 name: Great Bay tribs

A.29. Great Egg Harbor River (02040302050140)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

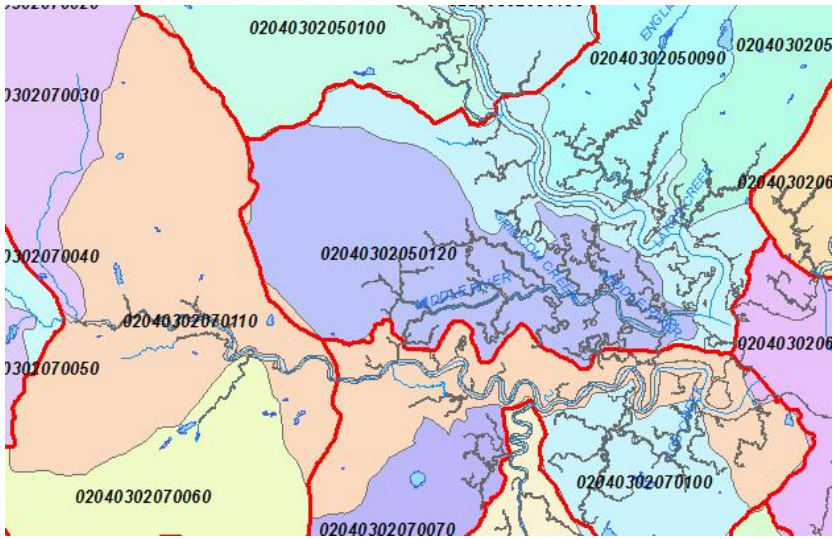
Old: The HUC14 02040302050130 includes a lot of the downstream portion of the Great Egg Harbor River.

New: Divide this HUC14 in two near the confluence of Gibson Creek. Give a new number to the downstream HUC. This matches the HUC12 boundary.

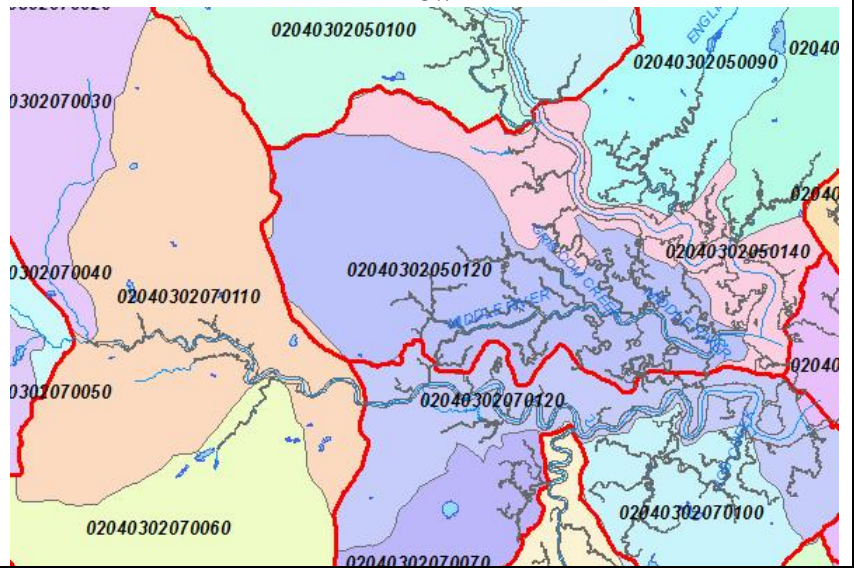
New HUC14#: 02040302050140
New HUC14 name: GreatEggHarborR (GEHBay to Gibson Crk)

A.30. Tuckahoe River (02040302070120)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

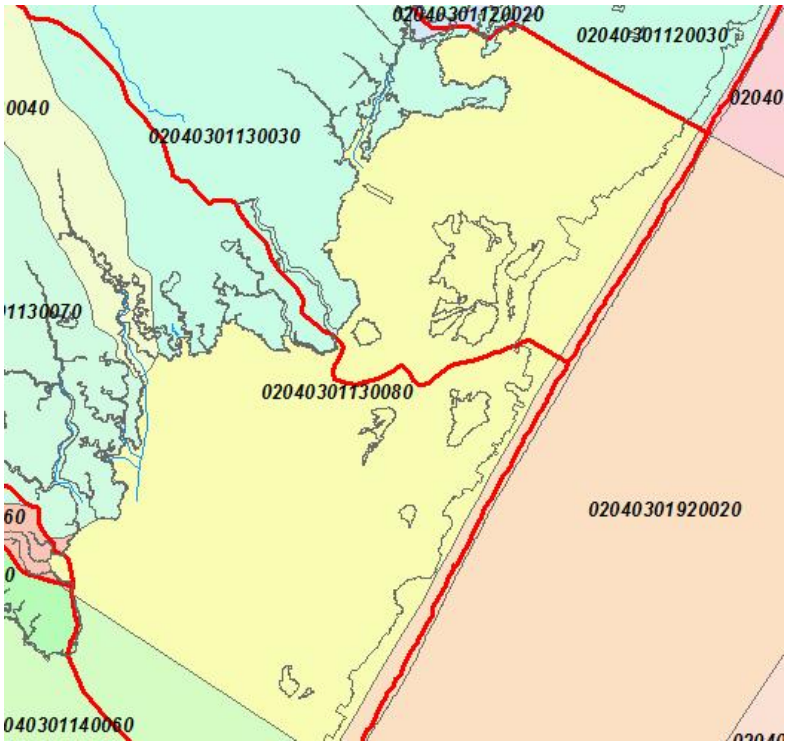
Old: The HUC14 02040302070110 is the Tuckahoe River watershed.

New: Divide the Tuckahoe River watershed downstream of the Mill Creek watershed. This matches the HUC12 boundary.

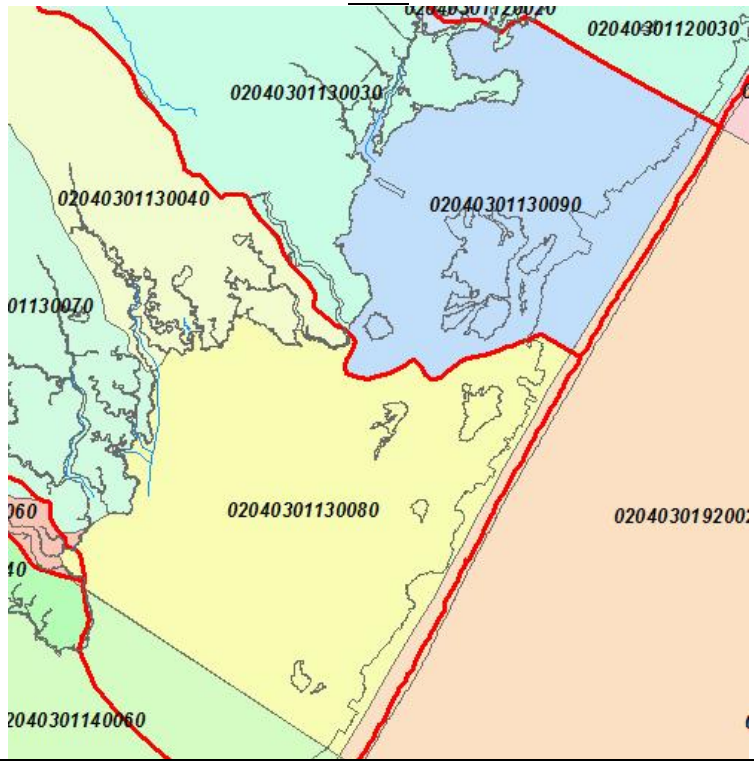
New HUC14#: 02040302070120
New HUC14 name: Tuckahoe River (lower)

A.31. Barnegat Bay (02040301130090)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

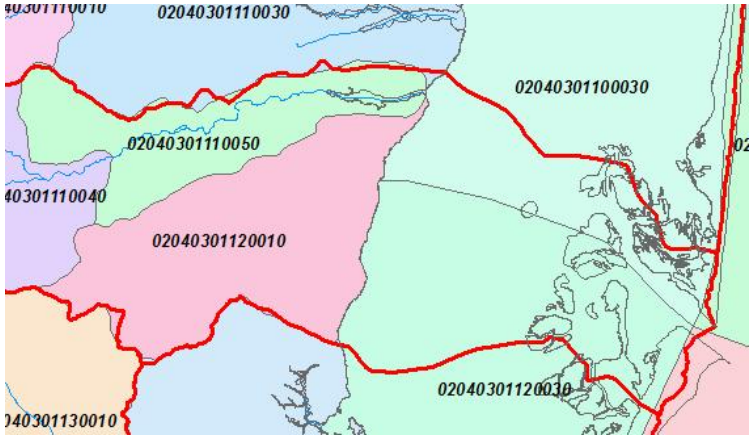
Old: The HUC14 02040301130080 covers a central portion of Barnegat Bay. This is now split by a new HUC12 line.

New: Split the HUC14. Assign the old number to the southern HUC14. Assign a new number (02040101130090) to the northern HUC14.

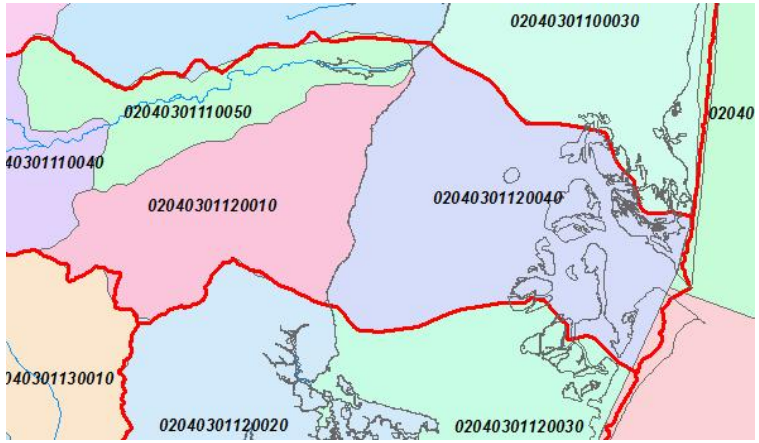
New HUC14#: 02040301130090
New HUC14 name: Manahawkin/LEH Bay (MillCrk-TurtleCove)

A.32. Barnegat Bay outlet (02040301120040)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

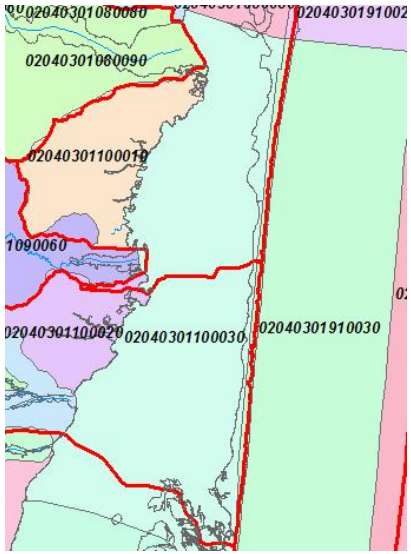
Old: The outlet of Barnegat Bay is split between two HUC14s, 02040301120030 and 02040301100030.

New: Create a new HUC14 (02040301120040) that covers just the bay mouth and matches the HUC12 lines. This new one now separates the previous HUC14s.

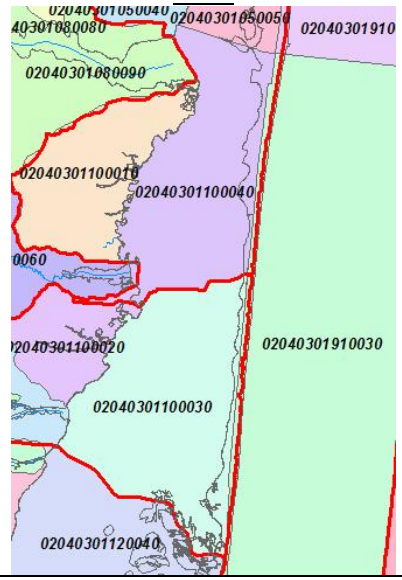
New HUC14#: 02040301120040
New HUC14 name: Barnegat Bay (Barnegat to Surf City)

A.33. Northern Barnegat Bay (02040301100040)

Old



New



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

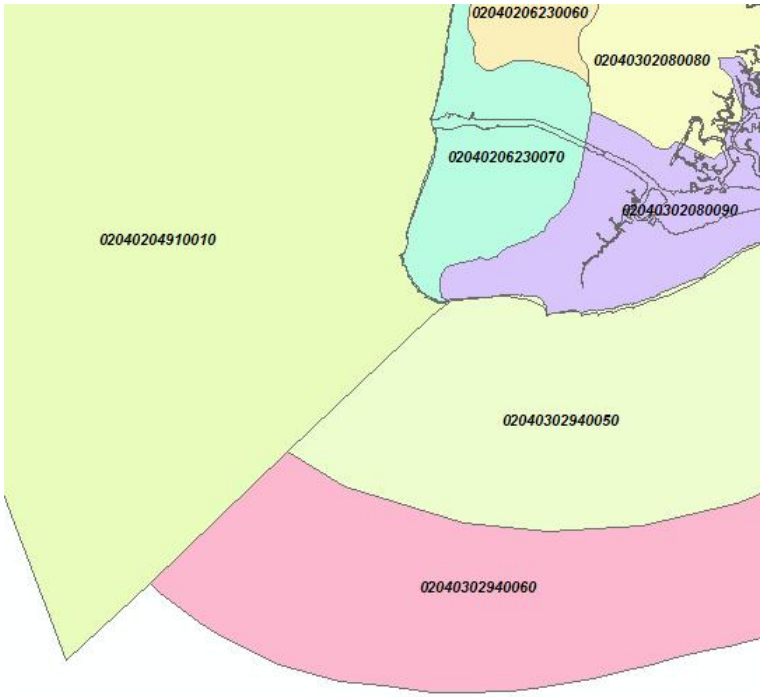
Old: The HUC14 02040301100030 covers part of northern Barnegat Bay. A HUC12 line now splits the bay here.

New: The HUC14 02040301100030 is split and this number given to the southern HUC14. Create a new HUC14 for the northern portion.

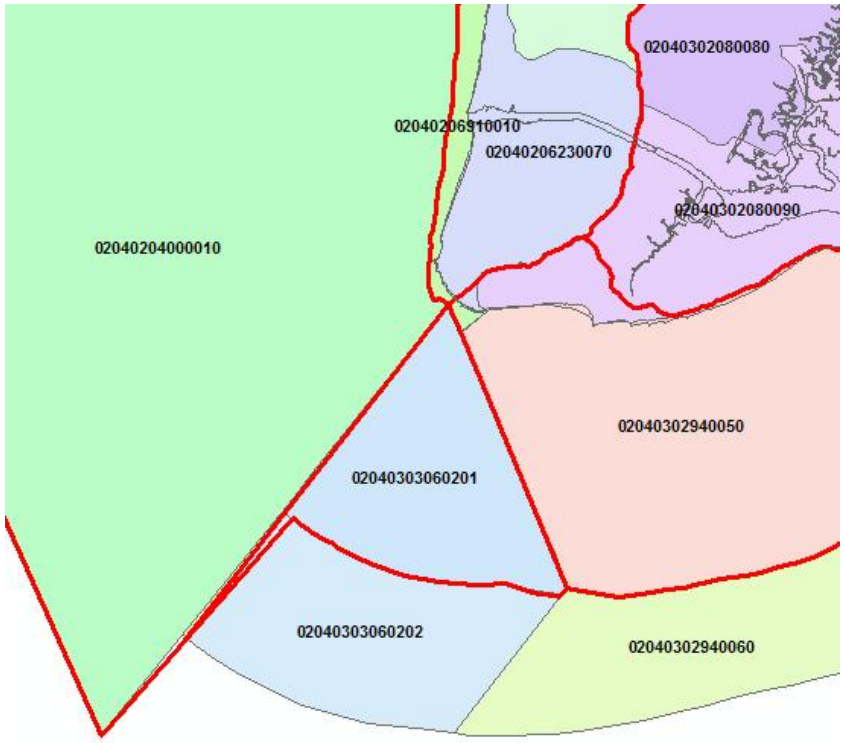
New HUC14#: 02040301100040
New HUC14 name: Barnegat Bay Cntrl (Toms R-Cedar Crk)

A.34. Cape May Point (02040303060201, 02040303060202)

Old



New



Old: Two offshore HUC14s wrapped around Cape May Point to meet with the single HUC14 in the Delaware Bay.

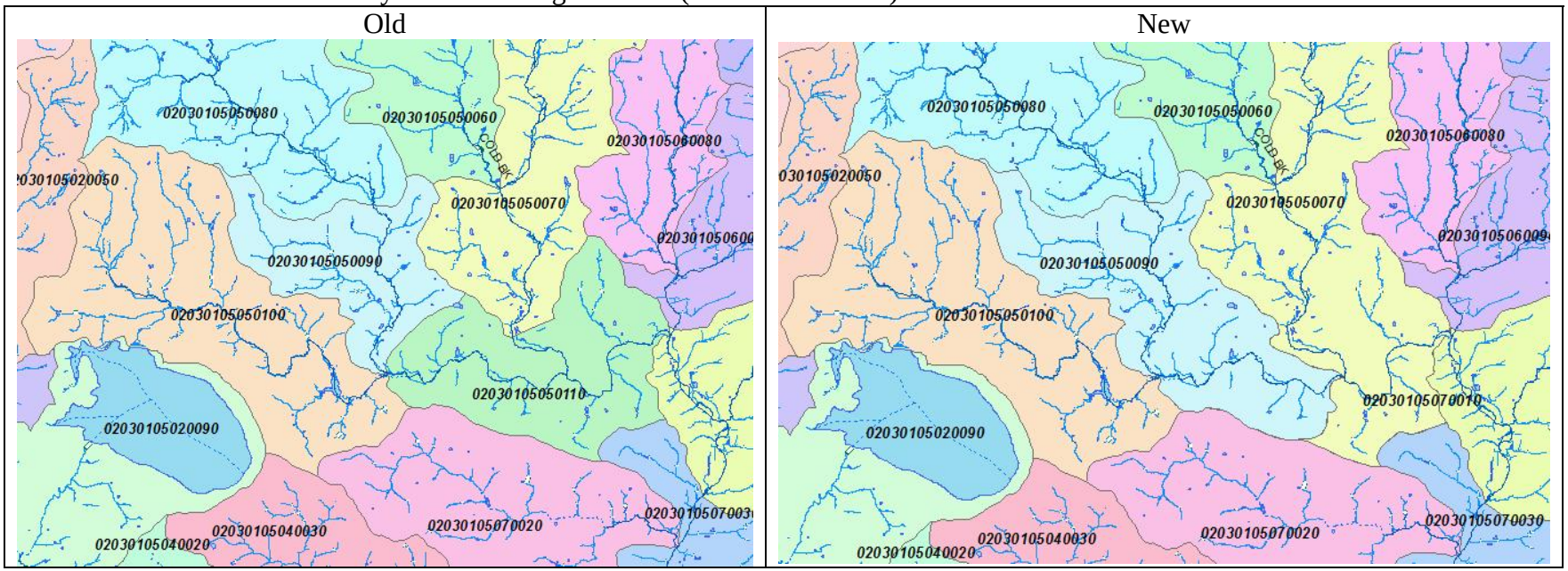
New: A new HUC12 (020403030602) now extends from the tip of Cape May Point down into Delaware. Twp HUC14s are created to match up with this new HUC12. The first (02040303060201) extends from the shoreline out to NJ's 3-mile political boundary. The second (02040303060202) extends from the 3-mile boundary out to the 5-mile boundary.

New HUC14#: 02040303060201/ 02040303060202
New HUC14 name: Atlantic Coast (off Cape May Pt)/ Cape May Tip, past NJ state boundary

Appendix B. HUC14 Deletions

Note: The HUC14 02040206060110 was also deleted. This is described in as part of case A.24 in Appendix A.

B.1. HUC14 deletion: Rockaway Creek/Lamington River (02030105050110)



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: The HUC14 02030105050110 includes the downstream part of both Rockaway Creek and part of the Lamington River. Eliminate this HUC14.

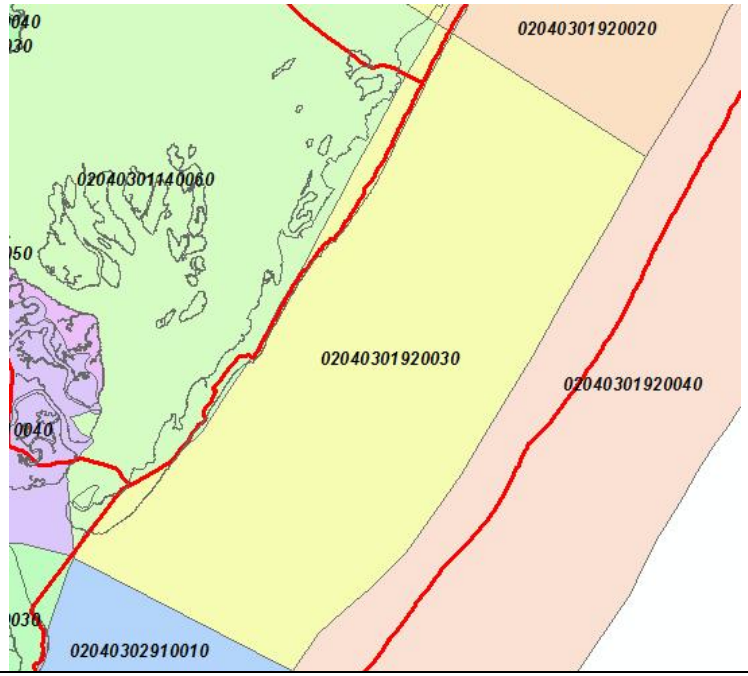
New: Eliminate 02030105050110. Assign the Rockaway Creek portion to the HUC14 02030105050090. Assign the Lamington River portion to 02030105050070.

\

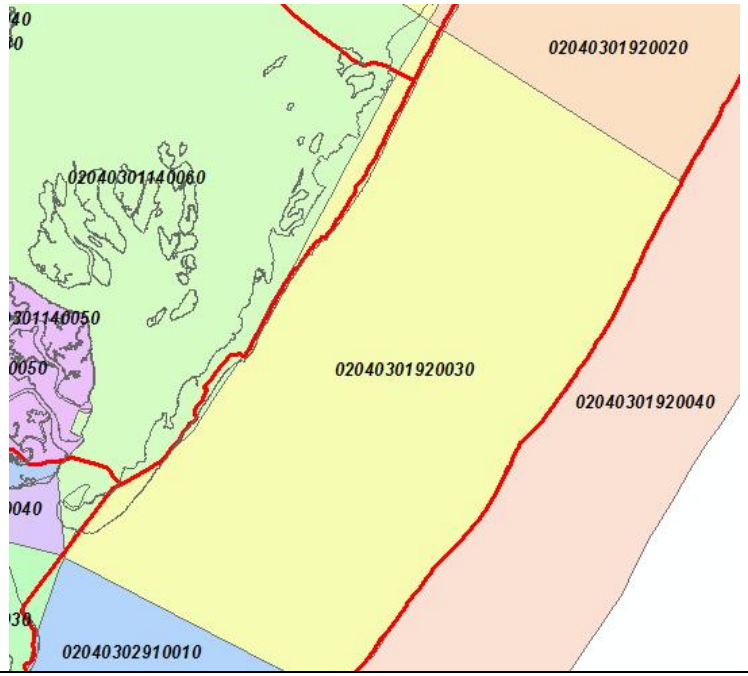
Appendix C. Significant HUC14 revisions

C.1. Offshore 3-mile boundary of HUC14s extended to 3 nautical miles

Old



New

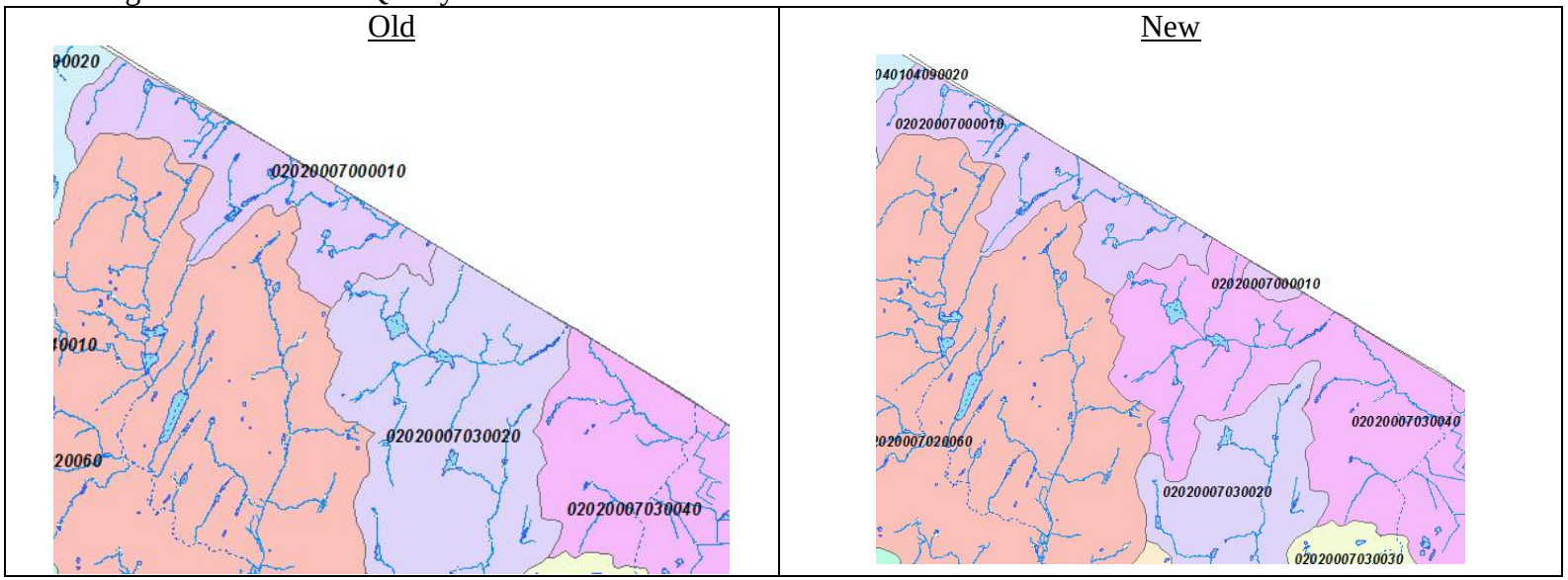


(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: When the offshore HUC14s were first created in the late 1990's the outer boundary of the nearshore HUC14 was set 3 miles off shore. This was done in order to match the State's political boundary. (The farshore HUC14s extends two additional miles, from the 3-mile boundary out to 5 miles.) However this was done using statute miles, which are 5,280 feet to the mile. Thus the boundary between the nearshore HUC14s and the farshore HUC14s was created by buffering the NJ coast line by 15,840 feet. However, the political boundary of New Jersey is actually located 3 nautical miles off shore, where a nautical mile is 6,076 feet. Thus the border should actually be 18,288 feet offshore. The HUC12 coverage corrected this mistake.

New: All Atlantic Coastal nearshore HUC14s were extended out to the 3 nautical mile line to match the HUC12s. The outer boundary of the farshore HUC14s was not changed.

C.2. Rutgers Creek tribs & Quarryville Brook

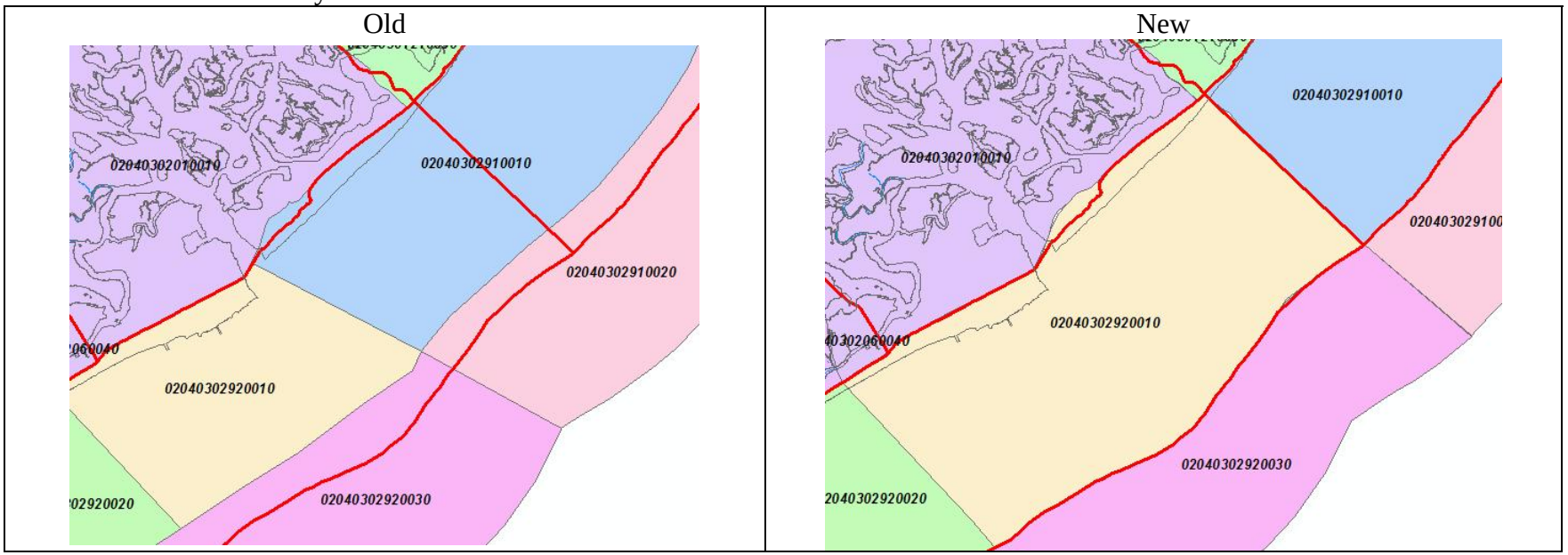


(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

This isn't a new HUC14 but a significant revision of three current ones. HUCs 02020007030020 (Quarryville Brook) was shrunk, with all area in it not actually in the Quarryville Brook added to neighboring HUC14s. Most of its northern extent was added to the HUC14 to the east, 02020007030040 (Wallkill River, state line to Owens gage). A small portion was added to the HUC14 to the northwest, 02020007000010 (Rutgers Creek Tribs) which causes this HUC14 to have two disconnected portions.

This redistribution of drainage areas makes hydrologic sense when drainage in New York is considered. Looking at only the streams in NJ doesn't give the full picture. This redistribution matches up with the HUC12 lines.

C.3. offshore Atlantic City



(HUC14s are shaded in pastels and labeled in black; HUC12 boundaries shown in red.)

Old: The HUC14 02040302910010 is now split by a HUC12 line. The HUC12 doesn't extend past the NJ's 3-mile boundary but this also shows a mismatch with the outer HUC14s.

New: The 02040302920010-02040302910010 HUC14 boundary and the 02040302920030-02040302910020 HUC14 boundary are shifted to the north to match the HUC 12 line.

NOTE: This also show the altering the 3-mile boundary which is described above in C.1.

Appendix D. List of all changes made to HUC14 boundaries

Boundary Modifications

HUC14s involved	Description of HUC14 Boundary Change
02020007040010, 02020007040020	Move boundary between 02020007040010 (shrinks) and 02020007040020 (expands) along Black Creek about 600' upstream so that new ponds (from new hydrograpy) are entirely within 02020007040020.
02020007000010, 02020007030020, 02020007030040	Significant revisions to 02020007030020 (Quarryville Brook), 02020007030040 (Wallkill River, state line to Owens gage) and 02020007000010 (Rutgers Creek Tribs) to reflect hydrography in New York. See case C.2. above.
02020007030040, 02020007040030	Move boundary between 02020007030040 (shrinks) and 02020007040030 (expands) to the west to reflect drainage of Pochuck Creek unnamed tributary that flows into New York.
02030103010030, 02030103010040	Move HUC14 boundary between 02030103010030 (expands) and 02030103010040 (shrinks) to the east to reflect new hydrography that better defines the boundary between the Great Brook and Loantaka Brook watersheds.
02030103100070, 02030103010060	Move boundary between 02030103100070 (expands) and 02030103100060 (shrinks) to the east to reflect new hydrography so that Smith's Pond, and other waters draining west, are in 02030103100070.
02030103020040, 02030103020050	Move boundary between 02030103020040 (shrinks) and 02030103020050 (expands) so that Speedwell Lake and Lake Pocahontas are in 02030103020050.
02030103030070, 02030105050010	Move boundary between 02030103030070 (expands) and 02030105050010 (shrinks) to southwest to reflect changes in drainage caused by a quarry.
02030103050040, 02030103070010	Move boundary between 02030103050040 (expands) and 02030103070010 (shrinks) a bit to the east to reflect new hydrography that better delineates watershed of unnamed tributary to Clinton Brook.
02030103070040, 02030103070070	Move boundary between 02030103070070 (expands) and 02030103070040 (shrinks) to the north a bit. Post Brook Farms Lake moved into 02030103070070 based on topography.
02030103120090, 02030103140060	Move boundary between 02030103120090 (shrinks) and 02030103140060 (expands) a bit to the west to reflect new hydrography that better define the watersheds of Fleischer Brook (to the west) and Saddle River (to the east).
02030104010020, 02030103150050	Move the boundary between 02030104010020 (expands) and 02030103150050 (shrinks) to match topography as defined by HUC12 boundary.
02030103180030, 02030103180050	Move boundary between 02030103180030 (expands) and 02030103180050 (shrinks) south on the Hackensack River to the confluence with Overpeck Creek.
02030103018060, 02030103018080, 02030103018070,	Move boundaries between these three HUC14s so that Peach Island Creek and its unnamed tributaries are entirely within 02030103018060. This better matches the new hydrograpy.
02030103150050, 02030104010020	Move boundary between 02030103150050 (shrinks) and 02030104010020 (expands) to the north to better match drainage on other side of Passaic River and not split watershed of unnamed tributary to Newark Bay. This matches HUC12 line.
02030104100010, 02030105140010	Move HUC14 boundary between 02030105140010 (expands) and 02030104100010 (shrinks) a bit to the east to reflect new hydrography that better defines watersheds of unnamed tributaries to Manalapan Brook (to the west) and Manasquan River (to the east).
02030104020030, 02030104030010	Warinanco Park moved to 02030104030010 from 02030104020030 to reflect probable drainage.
02030104030010, 02030104050050	Move HUC14 boundary between 02030104050050 (expands) and 02030104030010 (shrinks) a bit to the east to reflect new hydrography that better defines watershed of

HUC14s involved	Description of HUC14 Boundary Change
	an unnamed tributary to Rahway River.
02030104050090, 02030104050100	Move boundary between 02030104050100 (expands) and 02030104050090 (shrinks) a bit to the west to reflect new hydrography that better defines watershed of an unnamed tributary to Rahway River.
02030104030010, 02030104050120	Move boundary between 02030104030010 (expands) and 02030104050120 (shrinks) to the south so that all area north of mouth of Rahway River is in 02030104030010.
02030104080020, 02030104090010	Move boundary between 02030104080020 (expands) and 02030104090010 (shrinks) to the south based on topography. This matches the HUC12 line.
02030104910010, 02030104910010, 02030104920010, 02030104920030	Raritan Bay HUC14s, and those just north east of Sandy Hook, revised as part of 'deepwater' and 'nearshore' HUC14 approach to defining offshore HUCs. See case A.10. above.
02030105010010, 02030105050010	Move border between 02030105010010 (shrinks) and 02030105050010 (expands) a bit to the west to reflect new hydrography that better defines watersheds of Drakes Brook (to the west) and Lamington River (to the east).
02030105020040, 02030105020070	Move boundary between 02030105020040 (shrinks) and 02030105020070 (expands) a bit to the north to put all of Lingerts Pond in 02030105020070. This moves boundary upstream on South Branch Raritan River to where Spruce Run enters.
02030105020100, 02030105040010	Move boundary between 02030105020100 (expands) and 02030105040010 (shrinks) a bit downstream to confluence of unnamed tributary with S. Br. Raritan River
02030105030050, 02040105210020	Move boundary between 02030105030050 (shrinks) and 02040105210020 (expands) a bit to the east to reflect new hydrography that better defines watershed boundary between unnamed tributaries of Alexuken Creek and Black Brook.
02030105070010, 02030105080010	Move boundary between 02030105070010 (shrinks) and 02030105080010 (expands) a bit to the northwest to reflect new hydrography that better defines watershed of Peters Brook.
02030105090010, 02040105210040	Move boundary between 2030105090010 (expands) and 02040105210040 (shrinks) to the southwest to reflect new hydrography that better defines the watersheds of Moores Creek (to the south) and Peters Brook (to the north).
02030105100070, 02030105100010	Move boundary between 02030105100070 (shrinks) and 02030105100010 (expands) a bit to north to reflect new hydrography that better defines watershed boundary between unnamed tributaries of Cranbury Brook (to the north) and Millstone River (to the south).
02030105100070, 02030105100020	Move boundary between 02030105100070 (shrinks) and 02030105100020 (expands) a bit to north to reflect new hydrography that better defines watershed boundary between unnamed tributaries of Cranbury Brook (to the north) and Millstone River (to the south).
02030105110120, 02030105130050	Move boundary between 02030105130050 (expands) and 02030105110120 (shrinks) a bit to the north to reflect new hydrography that better defines watershed of an unnamed tributary to Lawrence Brook (to the south).
02030105110150, 02030105110160	Move boundary between 02030105110150 (expands) and 02030105110160 (shrinks) a bit to east to reflect new hydrography that better defines watershed boundary between two unnamed tributaries to Royce Brook.
02030105120050, 02030105120130	Move boundary between 02030105120050 (expands) and 02030105120130 (shrinks) a bit to the south to reflect new hydrography that better defines watershed of an unnamed tributary to the East Branch Middle Brook (to the north).
02030105120080, 02010105160080	Move boundary between 02010105160080 (expands) and 02030105120080 (shrinks) a bit to west to reflect new hydrography that better defines watershed of an unnamed tributary to Mill Brook (to the east).
02030105120130, 02030105120180	Move boundary between 02030105120130 (expands) and 02030105120180 (shrinks) a bit to the west to reflect new hydrography that better defines the Green Brook wa-

HUC14s involved	Description of HUC14 Boundary Change
	tershed (to the east).
02030105120150, 02030105130070	Move boundary between 02030105120150 (expands) and 02030105130070 (shrinks) a bit to the east to reflect altered hydrography development near Mile Run unnamed tributary.
02030105130050, 02030105130010	Delete a small lobe of the HUC14 02030105130050 that extends south and add it to 02030105130010 to reflect new hydrography that better defines the watershed of Great Ditch.
02030105130070, 02030105160070, 02030105160100,	Junction between 02030105130070, 02030105160100 and 02030105160070 (south of Raritan River, east of Lawrence Book) changed to match better new hydrography of altered area.
02030105160030, 02030105160040	Move boundary between 02030105160030 (expands) and 02030105160040 (shrinks) to reflect new hydrography that better defines drainage of an uncoded tributary in the Iresick Brook watershed.
02030105160040, 02030105160060	Move boundary between 02030105160040 (expands) and 02030105160060 (shrinks) to the northeast to reflect new hydrography. New pond (bog?) put into Deep Run watershed.
02040104110020, 02040104240020	Move boundary between 0204010411020 (shrinks) and 02040104240020 (expands) a bit to the northwest to match the topography and HUC12 boundary.
02040105030010, 02040105040010	Move boundary between 02040105030010 (shrinks) and 02040105040010 (expands) boundary to the south to reflect new hydrography that better defines the Swartzwood Creek watershed (to the south) and Culvers Creek watershed (to the north).
02040105030020, 02040105040030	Move boundary between 02040105040030 (expands) and 02040105030020 (shrinks) a bit to south to reflect new hydrography that better defines watersheds of unnamed tributaries to Swartzwood Creek (to the south) and Paulins Kill (to the north).
02040105040050, 02040105070010	Move boundary between 2040105040050 (expands) and 02040105070010 (shrinks) a bit to south to reflect new hydrography that better defines watershed of an unnamed tributary to Paulins Kill (to the north).
02040105040070, 02040105040080	Move boundary between 02040105040070 (expands) and 02040105040080 (shrinks) a bit to south to reflect new hydrography that better defines watersheds of several unnamed tributaries to Paulins Kill.
02040105050010, 02040105100030	Move boundary between 02040105050010 (expands) and 02040105100030 (shrinks) a bit to the south to reflect new hydrography that better defines watersheds of unnamed tributaries to Beaver Book (to the south) and Paulins Kill (to the north).
02040105050020, 02040105050050	Move boundary between 02040105050050 (shrinks) and 02040105050020 (expands) so that an unnamed tributary to the Paulins Kill, that enters the Paulins Kill just upstream of Blair Creek from the north is added to 02040105050020. This matches the HUC12 boundary.
02040105070040, 02040105070060	Move boundary between 2040105070060 (shrinks) and 02040105070040 (expands) a bit to the south to reflect new hydrography that better defines watersheds of several unnamed tributaries of the Pequest River.
02040105170030, 02040105170050	Move boundary between 02040105170030 (expands) and 02040105170050 (shrinks) to the south to match the HUC12 boundary. This moves a small area that drains directly to the Delaware R. into the upper Harihokake watershed (02040105170030) and out of the the Nishisakawick Creek watershed (02040105170050). This better reflects drainage entering the Delaware from Pennsylvania.
02040105170050, 020401052000	Move boundary between 02040105200020 (expands) and 02040105170050 (shrinks) a bit to northwest to reflect new hydrography that better defines watershed of an unnamed tributary to Lockatong Creek (to the south).
02040105170060, 02040105170070	Move the boundary between 02040105170060 (shrinks) and 02040105170070 (expands) a bit to the north. This moves an unnamed tributary to the Delaware from one

HUC14s involved	Description of HUC14 Boundary Change
	HUC14 to the other. This better matches drainage into the Delaware from Pa. and matches the HUC12 boundary.
02040105170070, 02040105200020	Move boundary between 02040105200020 (expands) and 02040105170070 (shrinks) a bit to west to reflect new hydrography that better defines watershed of an unnamed tributary to Lockatong Creek (to the east).
02040105210070, 02040105240010	Move boundary between 02040105240010 (expands) and 02040105210070 (shrinks) a bit to the west to reflect new hydrography that better defines watersheds of unnamed tributaries to Ewing Creek (to the west) and Shabakunk Creek (to the east).
02040105230050, 02040105230060	Move boundary between 02040105230050 (shrinks) and 02040105230060 (expands) to the east. This takes watershed of an unnamed Shipetaukin Creek tributary out of Assunpink Creek HUC14 (02040105230050) and puts in into Shipetaukin Creek HUC14 (02040105230060). This change reflects new hydrography that better defines watersheds.
02040201040010, 02040201040030	Move boundary between 02040201040030 (expands) and 02040201040010 (shrinks) a bit to the east to reflect new hydrography that better defines watersheds of unnamed tributaries to Jumping Brook.
02040201040020, 02040201040030	Move boundary between 02040201040020 (shrinks) and 02040201040030 (expands) a bit to the west to reflect new hydrography that better defines watershed of South Run.
02040201040050, 02040201050030,	Modify boundary between 02040201040050 (expands) and 02040201050030 (shrinks) to reflect new hydrography that better defines watersheds of unnamed tributaries to Crosswicks Creek (to the west) and Beaverdam Brook (to the east).
02040201090010, 02040201100010	Modify boundary between 02040201090010 (expands) and 02040201100010 (shrinks) to reflect new hydrography that better defines watersheds of unnamed tributaries to Crafts Creek (to west) and Assiscunk Creek (to east).
02040201100030, 02040202040050, 02040202080030	Move boundary between 02040202080030 (expands) 02040201100030 (expands) and 02040202040050 (shrinks) to reflect new hydrography that better defines watersheds of Mill Creek (to west), unnamed tributary of Barkers Brook (to east), and unnamed tributary of North Branch Rancocas Creek (to the south).
02040201090010, 02040201110010	Move boundary between 02040201090010 (expands) and 02040201110010 (shrinks) a bit to the east to reflect new hydrography that better defines watersheds of Crafts and Assiscunk Creeks.
02040201110010, 02040202080060	Move boundary between 02040201110010 (expands) and 02040202080060 (shrinks) a bit to the west to match the HUC12 line.
02040202020030, 02040202030050	Move boundary between 02040202020030 (expands) and 02040202030050 (shrinks) a bit to the east. This change based on a site visit to a series of cranberry bogs that significantly alter the natural drainage. This is open to interpretation.
02040202020030, 02040202030010, 02040202030050 02040202030060	Move boundaries between 02040202020030, 02040202030010, 02040202030050, and 02040202030060 to reflect new hydrography that better defines watersheds of North Branch Rancocas Creek (to the north) and Pole Bridge Branch and Cranberry Branch (to the south). This change based on site visit. Drainage has been significantly affected by cranberry bog alterations.
02040202040010, 02040202040030	Move boundary between 02040202040010 (expands) and 02040202040030 (shrinks). This extends North Branch Rancocas Creek HUC14 (02040202040010) downstream to the Budd Run confluence.
02040202050050, 02040202050080	Move boundary between 02040202050050 (shrinks) and 02040202050080 (expands) bit to the east to reflect new hydrography that better defines watersheds of Friendship Creek (to the east) and an unnamed tributary to the South Branch Rancocas Creek (to the west).
02040202090010, 02040202090020	Move boundary between 02040202090010 (expands) and 02040202090020 (shrinks) a bit to the south to reflect new hydrography that better defines watershed of an un-

HUC14s involved	Description of HUC14 Boundary Change
	named tributary to Swede's Run (to the north).
02040202090010, 02040202090030	Move boundary between 02040202090010 (expands) and 02040202090030 (shrinks) a bit to the south to reflect new hydrography that better defines watershed of an unnamed tributary to Swede's Run (to the north). Hydrography in this area (Cinnaminson) greatly altered by development.
02040202100010, 02040202100020	Move boundary between 02040202100010 (expands) and 02040202100020 (shrinks) a bit to northwest to where the North Branch Pennsauken Creek enters Strawbridge Lake.
02040202090030, 02040202100060, 02040202110070	Shrink 02040202100060 so that it includes only the Pennsauken Creek's watershed. Give the extra area to the south (that drains directly to the Delaware River) to 02040202110070. Give the extra area to the north to 02040202090030.
02040202110050, 02040202110060	Move boundary between 02040202110050 (expands) and 02040202110060 (shrinks) downstream to the HUC12 boundary so that 02040202110050 includes the entire lower Cooper River watershed.
02040202110060, 02040202110070	Move boundary between 02040202110070 (shrinks) and 02040202110060 (expands) to the east so that 02040202110070 includes only the Pochack Creek watershed. This adds some direct Delaware River drainage to 02040202110060.
02040202120070, 02040202120080	Move boundary between 02040202120080 - Big Timber Creek (expands) and 02040202120070 - Little Timber Creek (shrinks) a bit to the north to reflect new hydrography that better defines the watersheds.
02040202140010, 02040202140020 02040202140050	Shrink 02040202140010 by moving the Nehoonsey Brook watershed into 02040202140050 and 02040202140020. This restricts 02040202140010 to the Clonmell Creek waterhed. Also groups some problematic drainage together.
02040206020010, 02040206020020, 02040206040030	Minor modifications to the boundaries 02040206020010 (expands) , 02040206020020 (expands) and 02040206040030 (shrinks) to reflect altered hydrology in the Pennsville area. This matches the HUC12 line.
02040206060090, 02040206060100	Move boundary between 02040206060090 (expands) and 02040206060100 (shrinks) a bit to the east to reflect new hydrography in Alloway Creek watershed. This matches HUC12 boundary.
02040206060060, 02040206060080	Move boundary between 02040206060060 (expands) and 02040206060080 (shrinks) downstream to the junction with Lower Alloways Creek., shrinking 02040206060080.
02040206060060, 02040206060090	Move boundary between 02040206060090 (expands) and 02040206060060 (shrinks) a bit to the east to reflect new hydrography in Alloway Creek watershed.
02040206070040, 02040206070080	Move boundary between 2040206070040 (shrink) and 02040206070080 (expands) a bit to the west. This based on a site visit that shows road acts as drainage divide.
02040206080050, 02040206090030	Move boundary between 02040206080050 (expands) and 02040206090030 (shrinks) a bit downstream to where Barrett Run enters the Conahsey River.
02040206200050, 02040206110050	Move boundary between 02040206200050 (expands) and 02040206110050 (shrinks) to the west to reflect new hydrography that better defines watershed boundary between Reubans Branch and an unnamed tributary of Dividing Creek (to the west) and an unnamed tributary of Bowkers Run (to the east).
02040206120050, 02040206140010	Move boundary between 02040206120050 (expands) and 02040206140010 (shrinks) a bit to the east to match the topography and HUC12 boundary.
02040206180050, 02040206190030	Move boundary between 02040206180050 (expands) and 02040206190030 (shrinks) a bit to the east to reflect altered hydrography due to a gravel pit and to match the HUC12 boundary.
02040301060060, 02040301060070	Move boundary between 02040301060060 (shrink) and 02040301060070 (expand) upstream to confluence of Dove Mill Branch with Toms River. This matches HUC12 boundary.
02040301080060,	Move boundary between 02040301080060 (shrinks) and 02040301080090 (expands)

HUC14s involved	Description of HUC14 Boundary Change
02040301080090	upstream to confluence of Wrangle Brook with Toms River. This matches HUC12 boundary.
02040301090060, 02040301100010	Move boundary of 02040301090060 (shrinks) and 02040301100010 (expands) a bit to the south to match new hydrography that better defines the watershed of Maple Creek.
02040301130030, 02040301130040	Move boundary of 02040301130040 (expands) and 02040301130030 (shrinks) boundary to the east to reflect new hydrography and match the HUC12 boundary. Web of tidal channels at mouth of both complicates delineation.
02040301140050, 02040301210040, 02040301210050	A small peninsula separates between Great Bay (to the south) and Barnegat Bay (to the north). Edited 02040301210040 to be mainly Great Bay. 02040301140050 is now the northern half of this peninsula, 02040301210050 now the southern half. See case A.28. above.
02040301160140, 02040301160170	Move boundary between 02040301160140 (expands) and 02040301160170 (shrinks) downstream along the Mullica River to where Sleeper Branch and Nescochague Creek enter. This means 02040301160170 does not contain any of the mainstem Mullica River.
02040301170120, 02040301170080	Move boundary between 02040301170120 (expands) and 02040301170080 (shrinks) a bit to the east to reflect new hydrography that better defines the watershed of an unnamed tributary to Landing Creek.
02040301210030, 02040302010010	Move boundary between 02040301210030 (shrinks) and 02040302010010 (expands) so that the cove that drains to Reeds Bay is included in the same HUC14 as Reeds Bay (02040302010010).
02040302030030, 02040302030040	Move boundary between 02040302030040 (shrinks) and 02040302030030 (expands) to match the HUC12 boundary.
02040302040020, 02040302040030, 02040302040070	Move boundaries between 02040302040020 (expands), 02040302040030 (shrinks) and 02040302040070. 02040302040020 now is all of Hospitality Branch above Faraway Branch. 02040302040030 is now only Faraway Branch. 02040302040070 is Hospitality Branch below Faraway Branch. This cleans up hydrography a bit.
02040302050050, 02040302050070	Move boundary between 02040302050050 (expands) and 02040302050070 (shrinks) a bit to the east to reflect new hydrography that better defines watersheds of an un-named tributary of Gravely Run (to the west) and Miry Run (to the east).
02040302920010, 02040302910010, 02040302920030, 02040302910020	The boundary between 02040302920010 (expands) and 02040302910010 (shrinks) and the boundary between 02040302920030 (expands) and 02040302910020 (shrinks) moves to the north to match the HUC 12 line. See case C.3. above.
02040302920010, 02040302910010	Boundary between 02040302920010 (expands) and 02040302910010 (shrinks) moves to north to match up with HUC12 boundary drawn. This described in case C.3. above.
02040302920030, 02040302910020	Boundary between 02040302920030 (expands) and 02040302910020 (shrinks) moves to north to match up with HUC12 boundary drawn. This described in case C.3. above.
All HUC14s with a 3-mile boundary off-shore Atlantic Coast of New Jersey.	The 3-mile boundary of all of these HUC14s was moved from the 3 statute miles to the 3 natuical miles. This reflects NJ state boundary location at 3 nautical miles. This described in case C.1. above.

D.2. HUC14s Created

NEW HUC14	Created from	Brief Description
02020007010080	02020007010040	Area upstream of Franklin Pond split out of rest of watershed that is downstream of Franklin Pond. See case A.1. above.
02030101170030	02030101170010	Hudson River off northeastern NJ split into 2 hUC14s instead of 1. See case A.2. above.
02030103010190	02030103010060	Slough Brook watershed split out into its own HUC14. See case A.3. above.
02030103070080	02030103070050	Ringwood Creek watershed upstream of Wanaque reservoir split out into its own HUC14. See case A.4. above.
02030103120110	02030103120100	Separate out Passaic River watershed between 1st and 2nd Watchung Mountains. See case A.5. above.
02030103140080	02030103140050	Saddle Brook watershed upstream of Hohokus Brook. See caset A.6. above.
02030104070120	02030104070110	Mouth of Navesink River. See case A.7. above.
02030104080050	02030104080030	Direct drainage to Atlantic Ocean and not Banchport Creek. See case A.8. above.
02030104090090	02030104090060	Direct drainage to Atlantic Ocean north of mouth of Shark River. See case A.9. above
02030104910030	02030104910010, 02030104910020, 02030104920010, 02030104920010	Redefiniton of Raritan Bay to include a central, 'deepwater HUC14' with 'nearshore' HUC14s. See case A.10. above.
02030105030070	02030105030060	Lower Neshanic River downstream of Black Brook. See case A.11. above.
02030105050130	02030105050070	Lamington River above Hertzong Brook. See case A.12. above.
02030105120180	02030105120140	Lower Middle Brook upstream of confluence with Raritan River. See case A.13. above.
02030105090090	02030105090070	Drainage to Stony Brook from Princeton. See case A.14. above.
02040105150110	02040105150070	Musconetcong River watershed downstream of Lake Musconetcong. See case A.15. above.
02040105160080	02040105140070, 02040105170010	Direct drainage to Delaware north and south of mouth of Musconetcong River. See case A.16. above.
04020105200070	04020105200030, 02040105210020	Direct drainage to Delaware near Lockatong and Alexauken Creeks. See case A.17. above.
02040105240060	02040105240050	Lower Little Shabakunk watershed. See case A.18. above.
02040201090040	02040201090030	Bustleton's Creek watershed and nearby direct drainage to Delaware River. See case A.19. above.
02040202080050	02040202080050	Direct drainage to Delaware north of Rancocas Creek mouth. See caset A.20. above.
02040202150070	02040202150060	Raccoon Creek watershed. See caset A.21. above.
02040206030080	02040206030060	Salem Canal. See case A.22. above.
02040206160040	02040206160030	Downstream portion of Mill Creek. See case A.23 above.
02040204000010	02040206901010, 02040206901020, 02040206901030, 02040206901040, 02040206060110	Deepwater Delaware Bay. See case A.24. above.

NEW HUC14	Created from	Brief Description
02040206901050, 02040206901060, 02040206901070	02040206901030, 02040206901040, 02040206060110	Nearshore Delaware Bay. See case A.24. above.
02040301160160	02040301160110	Gun Branch. See case A.25. above.
02040301160170	02040301160150	Sleeper Branch. See case A.26. above.
02040301170140	02040301170040	Lower Mullica River. See case A.27. above.
02040301210050	02040301210040	Great Bay tributaries. See case A.28. above.
02040302050140	02040302050130	Downstream portion of Great Egg Harbor River. See case A.29. above.
02040302070120	02040302070110	Lower Tuckahoe River. See case A.30. above.
02040301130090	02040301130080	North-central Barnegat Bay. See case A.31. above.
02040301120040	02040301120030, 02040301100030.	Barnegat Bay outlet. See case A.32. above.
02040301100040	02040301100030	Northern Barnegat Bay. See case A.33. above.
02040303060201, 02040303060202	02040302940050, 02040302940060	Cape May Point. See case A.34. above.

D.3. HUC14s deleted

Deleted HUC14	Area added to	Comment
02030105050110	02030105050090, 02030105050070	02030105050110 included downstream portions of Rockaway Creek Lamington River. Rockaway Creek portion assigned to 02030105050090. Lamington River portion assigned to 02030105050070. See case B.1. above.
02040206060110	02040204000001, 02040206901070	Upstream portion of Delaware Bay split between deepwater Delaware Bay HUC14 and most inland nearshore Delaware Bay HUC14. See case A.24. above.

Appendix E. Correlation of HUC14s with HUC12s

HUC14	HUC12
02020007000010	020200070206
02020007010010	020200070101
02020007010020	020200070101
02020007010030	020200070101
02020007010040	020200070103
02020007010050	020200070103
02020007010060	020200070103
02020007010070	020200070103
02020007010080	020200070101
02020007020010	020200070102
02020007020020	020200070102
02020007020030	020200070102
02020007020040	020200070102
02020007020050	020200070102
02020007020060	020200070102
02020007020070	020200070102
02020007030010	020200070104
02020007030020	020200070104
02020007030030	020200070104
02020007030040	020200070207
02020007040010	020200070203
02020007040020	020200070203
02020007040030	020200070203
02020007040040	020200070202
02020007040050	020200070202
02020007040060	020200070201
02030101170010	020301010404
02030101170020	020301010404
02030101170030	020301010405
02030103010010	020301030602
02030103010020	020301030601
02030103010030	020301030601
02030103010040	020301030601
02030103010050	020301030601
02030103010060	020301030602
02030103010070	020301030602
02030103010080	020301030603
02030103010090	020301030603
02030103010100	020301030603
02030103010110	020301030604
02030103010120	020301030604
02030103010130	020301030604
02030103010140	020301030605
02030103010150	020301030605
02030103010160	020301030605
02030103010170	020301030606
02030103010180	020301030606
02030103010190	020301030605
02030103020010	020301030301
02030103020020	020301030301
02030103020030	020301030301
02030103020040	020301030301
02030103020050	020301030303
02030103020060	020301030303
02030103020070	020301030303
02030103020080	020301030302
02030103020090	020301030302
02030103020100	020301030303
02030103030010	020301030401
02030103030020	020301030401
02030103030030	020301030401
02030103030040	020301030401
02030103030050	020301030401
02030103030060	020301030401
02030103030070	020301030401
02030103030080	020301030403
02030103030090	020301030403
02030103030100	020301030402
02030103030110	020301030402
02030103030120	020301030403
02030103030130	020301030404
02030103030140	020301030403
02030103030150	020301030404
02030103030160	020301030404
02030103030170	020301030404
02030103040010	020301030606
02030103050010	020301030501
02030103050020	020301030501
02030103050030	020301030501
02030103050040	020301030501
02030103050050	020301030502
02030103050060	020301030502
02030103050070	020301030502
02030103050080	020301030502
02030103070010	020301030101
02030103070020	020301030101
02030103070030	020301030101
02030103070040	020301030103
02030103070050	020301030103
02030103070060	020301030103
02030103070070	020301030103
02030103070080	020301030102
02030103100010	020301030204
02030103100020	020301030203
02030103100030	020301030205
02030103100040	020301030205
02030103100050	020301030205
02030103100060	020301030205
02030103100070	020301030205
02030103110010	020301030503
02030103110020	020301030503
02030103120010	020301030802
02030103120020	020301030802
02030103120030	020301030801
02030103120040	020301030802
02030103120050	020301030802
02030103120060	020301030801
02030103120070	020301030803
02030103120080	020301030803
02030103120090	020301030803
02030103120100	020301030801
02030103120110	020301030802
02030103140010	020301030701
02030103140020	020301030701
02030103140030	020301030701
02030103140040	020301030702
02030103140050	020301030703
02030103140060	020301030703
02030103140070	020301030703
02030103140080	020301030702
02030103150010	020301030804
02030103150020	020301030805
02030103150030	020301030804

HUC14	HUC12
02030103150040	020301030805
02030103150050	020301030805
02030103170010	020301030902
02030103170020	020301030902
02030103170030	020301030903
02030103170040	020301030903
02030103170050	020301030903
02030103170060	020301030903
02030103180010	020301030905
02030103180020	020301030905
02030103180030	020301030905
02030103180040	020301030904
02030103180050	020301030906
02030103180060	020301030906
02030103180070	020301030906
02030103180080	020301030906
02030103180090	020301030906
02030103180100	020301030906
02030104010010	020301040203
02030104010020	020301040203
02030104010030	020301040205
02030104020010	020301040202
02030104020020	020301040202
02030104020030	020301040202
02030104030010	020301040204
02030104050010	020301040101
02030104050020	020301040101
02030104050030	020301040101
02030104050040	020301040101
02030104050050	020301040101
02030104050060	020301040104
02030104050070	020301040102
02030104050080	020301040102
02030104050090	020301040103
02030104050100	020301040104
02030104050110	020301040201
02030104050120	020301040201
02030104060010	020301040403
02030104060020	020301040401
02030104060030	020301040401
02030104060040	020301040403
02030104060050	020301040402
02030104060060	020301040402
02030104070010	020301040301
02030104070020	020301040301
02030104070030	020301040301
02030104070040	020301040301
02030104070050	020301040301
02030104070060	020301040301
02030104070070	020301040301
02030104070080	020301040302
02030104070090	020301040302
02030104070100	020301040302
02030104070110	020301040303
02030104070120	020301040304
02030104080010	020301040304
02030104080020	020301040304
02030104080030	020301040304
02030104080040	020301040304
02030104080050	020403010800
02030104090010	020403010103
02030104090020	020403010103
02030104090030	020403010103
02030104090040	020403010104
02030104090050	020403010104
02030104090060	020403010104
02030104090070	020403010104
02030104090080	020403010104
02030104090090	020403010103
02030104100010	020403010101
02030104100020	020403010101
02030104100030	020403010102
02030104100040	020403010102
02030104100050	020403010102
02030104100060	020403010102
02030104100070	020403010102
02030104100080	020403010102
02030104100090	020403010105
02030104100100	020403010105
02030104910010	020301040403
02030104910020	020301040402
02030104910030	020301040405
02030104920010	020403010800
02030104920020	020403010800
02030104920030	020403010800
02030104930010	020403010800
02030104930020	020403010800
02030104930030	020403010800
02030105010010	020301050101
02030105010020	020301050101
02030105010030	020301050102
02030105010040	020301050102
02030105010050	020301050102
02030105010060	020301050105
02030105010070	020301050105
02030105010080	020301050105
02030105020010	020301050103
02030105020020	020301050103
02030105020030	020301050103
02030105020040	020301050103
02030105020050	020301050105
02030105020060	020301050104
02030105020070	020301050105
02030105020080	020301050105
02030105020090	020301050108
02030105020100	020301050108
02030105030010	020301050106
02030105030020	020301050106
02030105030030	020301050106
02030105030040	020301050106
02030105030050	020301050107
02030105030060	020301050106
02030105030070	020301050107
02030105040010	020301050108
02030105040020	020301050109
02030105040030	020301050109
02030105040040	020301050109
02030105050010	020301050201
02030105050020	020301050201
02030105050030	020301050201
02030105050040	020301050201
02030105050050	020301050203
02030105050060	020301050203
02030105050070	020301050203
02030105050080	020301050202
02030105050090	020301050202
02030105050100	020301050202
02030105050130	020301050201
02030105060010	020301050204
02030105060020	020301050204
02030105060030	020301050204
02030105060040	020301050204
02030105060050	020301050205
02030105060060	020301050205
02030105060070	020301050205

HUC14	HUC12
02030105060080	020301050205
02030105060090	020301050205
02030105070010	020301050206
02030105070020	020301050206
02030105070030	020301050206
02030105080010	020301050501
02030105080020	020301050501
02030105080030	020301050501
02030105090010	020301050301
02030105090020	020301050301
02030105090030	020301050301
02030105090040	020301050302
02030105090050	020301050302
02030105090060	020301050302
02030105090070	020301050302
02030105090080	020301050307
02030105090090	020301050505
02030105100010	020301050307
02030105100020	020301050307
02030105100030	020301050307
02030105100040	020301050303
02030105100050	020301050303
02030105100060	020301050307
02030105100070	020301050305
02030105100080	020301050305
02030105100090	020301050305
02030105100100	020301050306
02030105100110	020301050306
02030105100120	020301050304
02030105100130	020301050304
02030105100140	020301050307
02030105110010	020301050312
02030105110020	020301050312
02030105110030	020301050312
02030105110040	020301050309
02030105110050	020301050309
02030105110060	020301050309
02030105110070	020301050309
02030105110080	020301050308
02030105110090	020301050308
02030105110100	020301050308
02030105110110	020301050312
02030105110120	020301050310
02030105110130	020301050310
02030105110140	020301050312
02030105110150	020301050311
02030105110160	020301050311
02030105110170	020301050312
02030105120010	020301050504
02030105120020	020301050504
02030105120030	020301050504
02030105120040	020301050504
02030105120050	020301050502
02030105120060	020301050502
02030105120070	020301050506
02030105120080	020301050504
02030105120090	020301050504
02030105120100	020301050504
02030105120110	020301050503
02030105120120	020301050503
02030105120130	020301050504
02030105120140	020301050506
02030105120150	020301050506
02030105120160	020301050506
02030105120170	020301050506
02030105120180	020301050502
02030105130010	020301050505
02030105130020	020301050505
02030105130030	020301050505
02030105130040	020301050505
02030105130050	020301050505
02030105130060	020301050505
02030105130070	020301050505
02030105140010	020301050401
02030105140020	020301050401
02030105140030	020301050401
02030105150010	020301050402
02030105150020	020301050402
02030105150030	020301050402
02030105150040	020301050403
02030105150050	020301050403
02030105150060	020301050403
02030105160010	020301050404
02030105160020	020301050404
02030105160030	020301050405
02030105160040	020301050404
02030105160050	020301050405
02030105160060	020301050405
02030105160070	020301050405
02030105160080	020301050507
02030105160090	020301050507
02030105160100	020301050507
02040104090010	020401040704
02040104090020	020401040308
02040104090030	020401040704
02040104110010	020401040704
02040104110020	020401040705
02040104130010	020401041001
02040104130020	020401041001
02040104130030	020401041001
02040104140010	020401041002
02040104140020	020401041002
02040104140030	020401041002
02040104140040	020401041002
02040104150010	020401041003
02040104150020	020401041003
02040104240010	020401041005
02040104240020	020401041005
02040105030010	020401050102
02040105030020	020401050102
02040105030030	020401050102
02040105040010	020401050101
02040105040020	020401050101
02040105040030	020401050101
02040105040040	020401050101
02040105040050	020401050101
02040105040060	020401050101
02040105040070	020401050101
02040105040080	020401050102
02040105040090	020401050102
02040105050010	020401050103
02040105050020	020401050103
02040105050030	020401050104
02040105050040	020401050104
02040105050050	020401050104
02040105060010	020401050601
02040105060020	020401050601
02040105070010	020401050201
02040105070020	020401050201
02040105070030	020401050201
02040105070040	020401050201
02040105070050	020401050202
02040105070060	020401050202
02040105080010	020401050202
02040105080020	020401050202

HUC14	HUC12
02040105090010	020401050202
02040105090020	020401050204
02040105090030	020401050204
02040105090040	020401050204
02040105090050	020401050204
02040105090060	020401050204
02040105100010	020401050203
02040105100020	020401050203
02040105100030	020401050203
02040105100040	020401050203
02040105110010	020401050603
02040105110020	020401050603
02040105110030	020401050603
02040105120010	020401050605
02040105120020	020401050605
02040105140010	020401050401
02040105140020	020401050401
02040105140030	020401050402
02040105140040	020401050402
02040105140050	020401050402
02040105140060	020401050402
02040105140070	020401050402
02040105150010	020401050501
02040105150020	020401050501
02040105150030	020401050501
02040105150040	020401050502
02040105150050	020401050502
02040105150060	020401050502
02040105150070	020401050501
02040105150080	020401050502
02040105150090	020401050502
02040105150100	020401050502
02040105150110	020401050502
02040105160010	020401050503
02040105160020	020401050503
02040105160030	020401050504
02040105160040	020401050504
02040105160050	020401050504
02040105160060	020401050504
02040105160070	020401050504
02040105160080	020401050605
02040105170010	020401050904
02040105170020	020401050901
02040105170030	020401050904
02040105170040	020401050902
02040105170050	020401050902
02040105170060	020401050904
02040105170070	020401050908
02040105200010	020401050905
02040105200020	020401050905
02040105200030	020401050905
02040105200040	020401050906
02040105200050	020401050906
02040105200060	020401050906
02040105200070	020401050908
02040105210010	020401050907
02040105210020	020401050907
02040105210030	020401050909
02040105210040	020401050909
02040105210050	020401050910
02040105210060	020401050910
02040105210070	020401050910
02040105210080	020401050911
02040105230010	020401050801
02040105230020	020401050801
02040105230030	020401050801
02040105230040	020401050801
02040105230050	020401050801
02040105230060	020401050803
02040105240010	020401050803
02040105240020	020401050803
02040105240030	020401050802
02040105240040	020401050803
02040105240050	020401050803
02040105240060	020401050803
02040201030010	020402010404
02040201040010	020402010101
02040201040020	020402010102
02040201040030	020402010101
02040201040040	020402010101
02040201040050	020402010101
02040201040060	020402010102
02040201040070	020402010102
02040201050010	020402010103
02040201050020	020402010103
02040201050030	020402010103
02040201050040	020402010103
02040201050050	020402010103
02040201050060	020402010105
02040201050070	020402010105
02040201060010	020402010104
02040201060020	020402010104
02040201060030	020402010104
02040201070010	020402010105
02040201070020	020402010105
02040201070030	020402010105
02040201080010	020402010401
02040201080020	020402010401
02040201080030	020402010401
02040201090010	020402010402
02040201090020	020402010402
02040201090030	020402010404
02040201090040	020402010407
02040201100010	020402010406
02040201100020	020402010406
02040201100030	020402010406
02040201100040	020402010406
02040201100050	020402010406
02040201100060	020402010406
02040201110010	020402010407
02040202020010	020402020103
02040202020020	020402020103
02040202020030	020402020103
02040202020040	020402020103
02040202030010	020402020102
02040202030020	020402020101
02040202030030	020402020101
02040202030040	020402020101
02040202030050	020402020103
02040202030060	020402020102
02040202030070	020402020102
02040202030080	020402020102
02040202030090	020402020102
02040202040010	020402020103
02040202040020	020402020103
02040202040030	020402020104
02040202040040	020402020104
02040202040050	020402020104
02040202050010	020402020201
02040202050020	020402020201
02040202050030	020402020201
02040202050040	020402020201
02040202050050	020402020201
02040202050060	020402020204
02040202050070	020402020204

HUC14	HUC12
02040202050080	020402020204
02040202050090	020402020204
02040202060010	020402020202
02040202060020	020402020202
02040202060030	020402020202
02040202060040	020402020202
02040202060050	020402020202
02040202060060	020402020203
02040202060070	020402020203
02040202060080	020402020202
02040202060090	020402020203
02040202060100	020402020203
02040202070010	020402020204
02040202070020	020402020204
02040202070030	020402020204
02040202080010	020402020302
02040202080020	020402020302
02040202080030	020402020302
02040202080040	020402020302
02040202080050	020402020302
02040202080060	020402020305
02040202090010	020402020305
02040202090020	020402020403
02040202090030	020402020403
02040202100010	020402020401
02040202100020	020402020401
02040202100030	020402020401
02040202100040	020402020401
02040202100050	020402020401
02040202100060	020402020401
02040202110010	020402020404
02040202110020	020402020404
02040202110030	020402020404
02040202110040	020402020404
02040202110050	020402020404
02040202110060	020402020405
02040202110070	020402020403
02040202120010	020402020501
02040202120020	020402020501
02040202120030	020402020502
02040202120040	020402020502
02040202120050	020402020502
02040202120060	020402020503
02040202120070	020402020503
02040202120080	020402020503
02040202120090	020402020405
02040202120100	020402020507
02040202120110	020402020507
02040202120120	020402020507
02040202130010	020402020506
02040202130020	020402020506
02040202130030	020402020506
02040202130040	020402020506
02040202130050	020402020506
02040202130060	020402020506
02040202140010	020402020507
02040202140020	020402020607
02040202140030	020402020607
02040202140040	020402020607
02040202140050	020402020607
02040202150010	020402020606
02040202150020	020402020606
02040202150030	020402020606
02040202150040	020402020606
02040202150050	020402020606
02040202150060	020402020606
02040202150070	020402020607
02040202160010	020402020608
02040202160020	020402020608
02040202160030	020402020608
02040202160040	020402020608
02040202160050	020402020608
02040202160060	020402020608
02040204000010	020402040000
02040206020010	020402060103
02040206020020	020402060105
02040206030010	020402060102
02040206030020	020402060102
02040206030030	020402060102
02040206030040	020402060102
02040206030050	020402060101
02040206030060	020402060102
02040206030070	020402060101
02040206030080	020402060103
02040206040010	020402060104
02040206040020	020402060106
02040206040030	020402060106
02040206040040	020402060106
02040206060010	020402060201
02040206060020	020402060201
02040206060030	020402060201
02040206060040	020402060201
02040206060050	020402060201
02040206060060	020402060202
02040206060070	020402060202
02040206060080	020402060203
02040206060090	020402060203
02040206060100	020402060602
02040206070010	020402060602
02040206070020	020402060602
02040206070030	020402060602
02040206070040	020402060602
02040206070050	020402060601
02040206070060	020402060601
02040206070070	020402060603
02040206070080	020402060603
02040206070090	020402060603
02040206080010	020402060301
02040206080020	020402060301
02040206080030	020402060301
02040206080040	020402060301
02040206080050	020402060301
02040206090010	020402060301
02040206090020	020402060302
02040206090030	020402060302
02040206090040	020402060302
02040206090050	020402060302
02040206090060	020402060302
02040206090070	020402060303
02040206090080	020402060303
02040206090090	020402060303
02040206090100	020402060303
02040206100010	020402060604
02040206100020	020402060604
02040206100030	020402060604
02040206100040	020402060604
02040206100050	020402060604
02040206100060	020402060604
02040206100070	020402060604
02040206110010	020402060604
02040206110020	020402060605
02040206110030	020402060605
02040206110040	020402060605
02040206110050	020402060605
02040206110060	020402060605

HUC14	HUC12
02040206110070	020402060605
02040206120010	020402060402
02040206120020	020402060402
02040206120030	020402060402
02040206120040	020402060402
02040206120050	020402060402
02040206130010	020402060401
02040206130020	020402060401
02040206130030	020402060401
02040206130040	020402060401
02040206140010	020402060405
02040206140020	020402060405
02040206140030	020402060405
02040206140040	020402060405
02040206140050	020402060405
02040206140060	020402060405
02040206140070	020402060502
02040206150010	020402060403
02040206150020	020402060403
02040206150030	020402060403
02040206150040	020402060404
02040206150050	020402060404
02040206150060	020402060404
02040206150070	020402060404
02040206160010	020402060501
02040206160020	020402060501
02040206160030	020402060502
02040206160040	020402060501
02040206170010	020402060505
02040206170020	020402060505
02040206170030	020402060505
02040206170040	020402060504
02040206170050	020402060504
02040206180010	020402060503
02040206180020	020402060503
02040206180030	020402060503
02040206180040	020402060503
02040206180050	020402060503
02040206190010	020402060506
02040206190020	020402060506
02040206190030	020402060506
02040206200010	020402060507
02040206200020	020402060507
02040206200030	020402060507
02040206200040	020402060507
02040206200050	020402060507
02040206210010	020402060703
02040206210020	020402060703
02040206210030	020402060703
02040206210040	020402060703
02040206210050	020402060702
02040206210060	020402060702
02040206220010	020402060702
02040206220020	020402060702
02040206220030	020402060702
02040206220040	020402060702
02040206230010	020402060702
02040206230020	020402060702
02040206230030	020402060701
02040206230040	020402060701
02040206230050	020402060701
02040206230060	020402060701
02040206230070	020402060701
02040206910010	020402060701
02040206910020	020402060702
02040206910030	020402060703
02040206910040	020402060605
02040206910050	020402060604
02040206910060	020402060603
02040206910070	020402060602
02040301020010	020403010201
02040301020020	020403010201
02040301020030	020403010201
02040301020040	020403010201
02040301020050	020403010201
02040301030010	020403010202
02040301030020	020403010202
02040301030030	020403010202
02040301030040	020403010202
02040301030050	020403010202
02040301040010	020403010203
02040301040020	020403010203
02040301040030	020403010203
02040301050010	020403010401
02040301050020	020403010401
02040301050030	020403010404
02040301050040	020403010404
02040301050050	020403010404
02040301060010	020403010301
02040301060020	020403010301
02040301060030	020403010301
02040301060040	020403010301
02040301060050	020403010305
02040301060060	020403010301
02040301060070	020403010305
02040301060080	020403010305
02040301070010	020403010302
02040301070020	020403010302
02040301070030	020403010302
02040301070040	020403010302
02040301070050	020403010303
02040301070060	020403010303
02040301070070	020403010303
02040301070080	020403010303
02040301070090	020403010303
02040301080010	020403010304
02040301080020	020403010304
02040301080030	020403010304
02040301080040	020403010304
02040301080050	020403010304
02040301080060	020403010305
02040301080070	020403010306
02040301080080	020403010306
02040301080090	020403010306
02040301090010	020403010402
02040301090020	020403010402
02040301090030	020403010402
02040301090040	020403010403
02040301090050	020403010403
02040301090060	020403010403
02040301100010	020403010404
02040301100020	020403010405
02040301100030	020403010405
02040301100040	020403010404
02040301110010	020403010405
02040301110020	020403010405
02040301110030	020403010405
02040301110040	020403010407
02040301110050	020403010407
02040301120010	020403010407
02040301120020	020403010406
02040301120030	020403010406
02040301120040	020403010407
02040301130010	020403010701
02040301130020	020403010701

HUC14	HUC12
02040301130030	020403010701
02040301130040	020403010703
02040301130050	020403010702
02040301130060	020403010702
02040301130070	020403010703
02040301130080	020403010703
02040301130090	020403010701
02040301140010	020403010704
02040301140020	020403010704
02040301140030	020403010704
02040301140040	020403010704
02040301140050	020403010704
02040301140060	020403010704
02040301150010	020403010605
02040301150020	020403010605
02040301150030	020403010601
02040301150040	020403010601
02040301150050	020403010605
02040301150060	020403010605
02040301150070	020403010605
02040301150080	020403010605
02040301160010	020403010603
02040301160020	020403010603
02040301160030	020403010603
02040301160040	020403010603
02040301160050	020403010602
02040301160060	020403010602
02040301160070	020403010604
02040301160080	020403010604
02040301160090	020403010602
02040301160100	020403010604
02040301160110	020403010604
02040301160120	020403010604
02040301160130	020403010604
02040301160140	020403010603
02040301160150	020403010604
02040301160160	020403010602
02040301160170	020403010602
02040301170010	020403010606
02040301170020	020403010606
02040301170030	020403010606
02040301170040	020403010605
02040301170050	020403010606
02040301170060	020403010606
02040301170070	020403010606
02040301170080	020403010606
02040301170090	020403010607
02040301170100	020403010607
02040301170110	020403010607
02040301170120	020403010607
02040301170130	020403010610
02040301170140	020403010606
02040301180010	020403010501
02040301180020	020403010501
02040301180030	020403010501
02040301180040	020403010501
02040301180050	020403010502
02040301180060	020403010502
02040301180070	020403010502
02040301190010	020403010503
02040301190020	020403010503
02040301190030	020403010503
02040301190040	020403010503
02040301190050	020403010504
02040301190060	020403010504
02040301190070	020403010504
02040301200010	020403010505
02040301200020	020403010505
02040301200030	020403010505
02040301200040	020403010608
02040301200050	020403010608
02040301200060	020403010608
02040301200070	020403010610
02040301200080	020403010610
02040301200090	020403010609
02040301200100	020403010609
02040301200110	020403010609
02040301200120	020403010609
02040301210010	020403010610
02040301210020	020403010705
02040301210030	020403010705
02040301210040	020403010705
02040301210050	020403010705
02040301910010	020403010800
02040301910020	020403010800
02040301910030	020403010800
02040301910040	020403010800
02040301920010	020403010800
02040301920020	020403010800
02040301920030	020403010800
02040301920040	020403010800
02040302010010	020403020403
02040302020010	020403020401
02040302020020	020403020401
02040302020030	020403020401
02040302020040	020403020401
02040302030010	020403020101
02040302030020	020403020101
02040302030030	020403020101
02040302030040	020403020106
02040302030050	020403020106
02040302030060	020403020106
02040302030070	020403020105
02040302030080	020403020106
02040302040010	020403020102
02040302040020	020403020102
02040302040030	020403020104
02040302040040	020403020104
02040302040050	020403020103
02040302040060	020403020104
02040302040070	020403020104
02040302040080	020403020108
02040302040090	020403020108
02040302040100	020403020201
02040302040110	020403020201
02040302040120	020403020107
02040302040130	020403020201
02040302050010	020403020202
02040302050020	020403020202
02040302050030	020403020203
02040302050040	020403020203
02040302050050	020403020202
02040302050060	020403020202
02040302050070	020403020204
02040302050080	020403020204
02040302050090	020403020205
02040302050100	020403020204
02040302050110	020403020205
02040302050120	020403020205
02040302050130	020403020204
02040302050140	020403020205
02040302060010	020403020402
02040302060020	020403020402
02040302060030	020403020402
02040302060040	020403020408

HUC14	HUC12
02040302070010	020403020301
02040302070020	020403020301
02040302070030	020403020302
02040302070040	020403020301
02040302070050	020403020301
02040302070060	020403020302
02040302070070	020403020304
02040302070080	020403020303
02040302070090	020403020303
02040302070100	020403020304
02040302070110	020403020302
02040302070120	020403020304
02040302080010	020403020407

HUC14	HUC12
02040302080020	020403020407
02040302080030	020403020406
02040302080040	020403020406
02040302080050	020403020405
02040302080060	020403020405
02040302080070	020403020405
02040302080080	020403020404
02040302080090	020403020404
02040302910010	020403010800
02040302910020	020403010800
02040302920010	020403020500
02040302920020	020403020500
02040302920030	020403020500

HUC14	HUC12
02040302930010	020403020500
02040302930020	020403020500
02040302940010	020403020500
02040302940020	020403020500
02040302940030	020403020500
02040302940040	020403020500
02040302940050	020403020500
02040302940060	020403030602
02040303060201	020403030602
02040303060202	020403030602