

Briefing with Passaic River Basin Flood Advisory Commission

Passaic River Flood Risk Management

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Passaic River Basin – Purpose of Briefing

- 1. Basin Facts**
- 2. Flooding History**
- 3. Previous Studies**
- 4. Choices and Recommendations**



Passaic River Basin Facts



- 983 square mile basin
- ~2.5 million people (2000 census)
- ~50,000 people are in floodplain
- 20,000 homes, businesses, & public buildings in 35 communities
- Main Stem & major tributaries 100 year floodplain covers 40,000 acres (~60 mi²) of which half is fully developed
- One of the most densely developed floodplains on the eastern seaboard
- Extensive environmental degradation to river system coupled with significant repetitive flooding
- Nine Congressional Districts in basin



Passaic River Basin – Floodplain Today



Passaic River Basin Floodplain Today

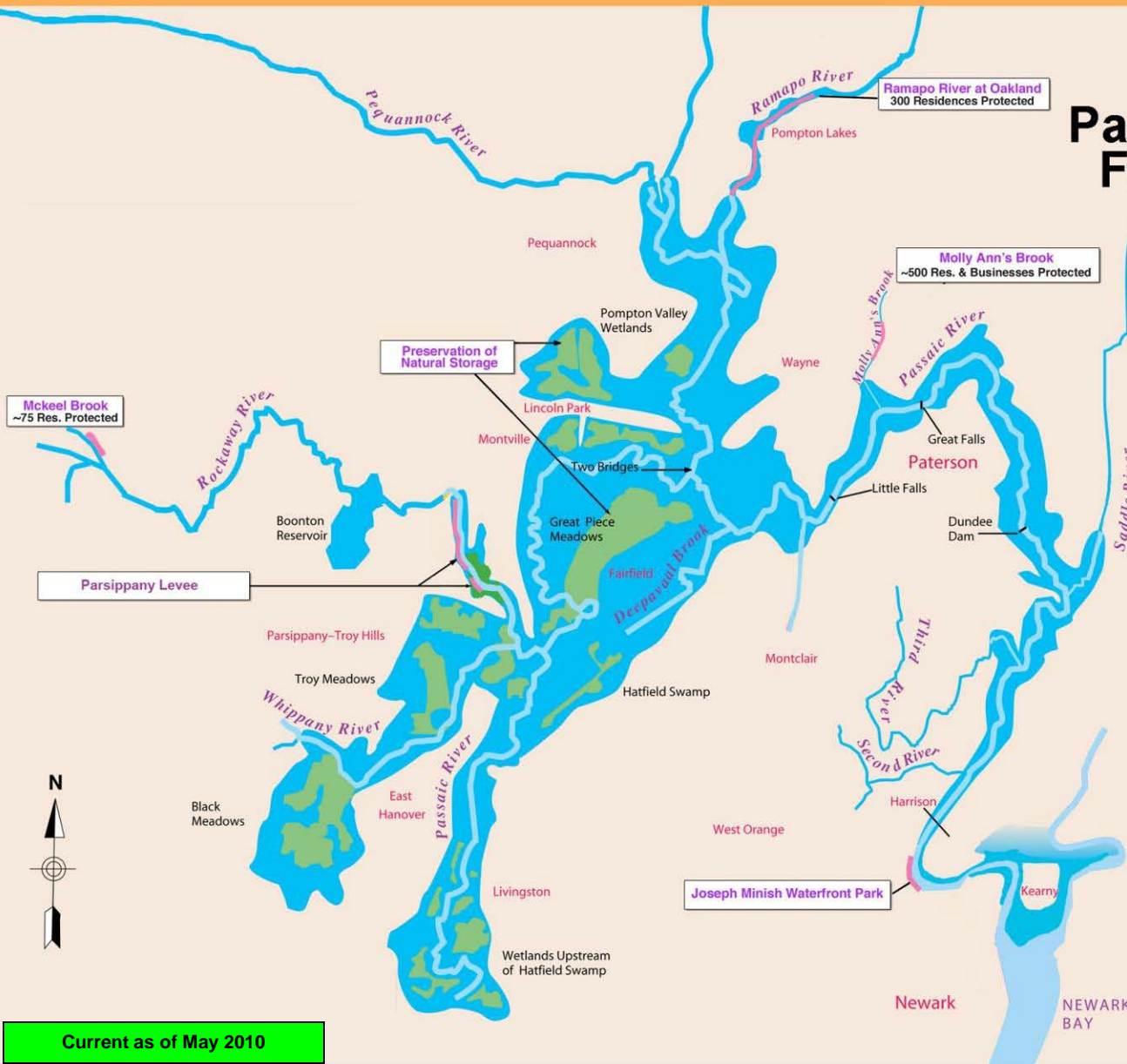
AREA IMPACTED BY 100-YEAR FLOOD (SHOWS CENTRAL BASIN AND LOWER VALLEY MAIN STEM ONLY)

PRESERVATION OF NATURAL STORAGE AREA

LOCAL FLOOD PROTECTION PROJECT

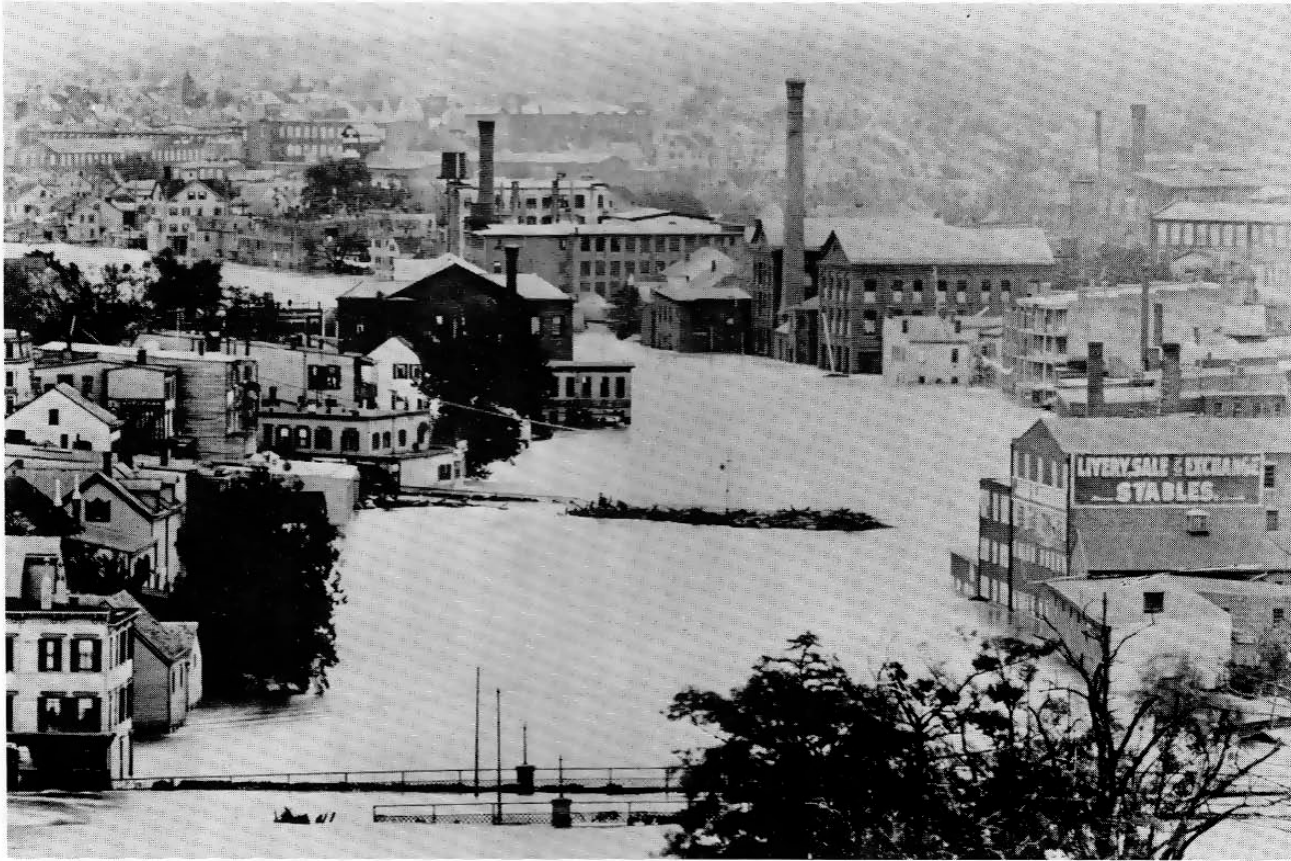
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- BASIN FLOODWARNING SYSTEM
- LIMITED FLOODWAY BUYOUT



Current as of May 2010

Passaic River Basin - Flooding History

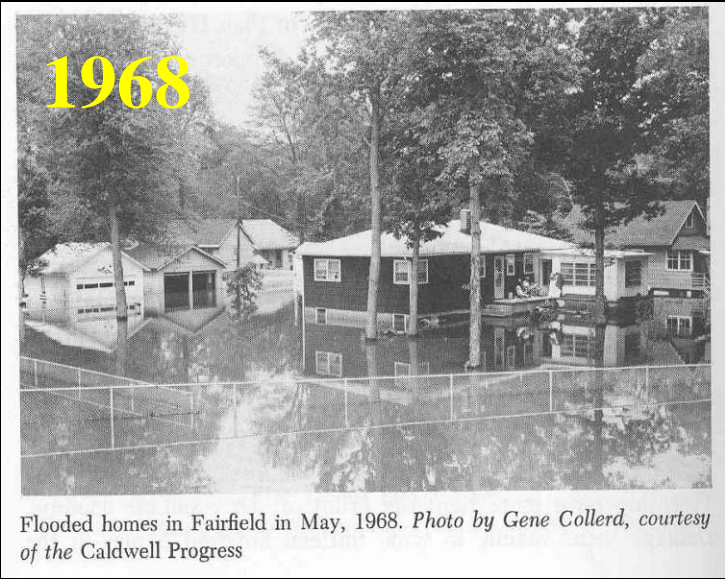
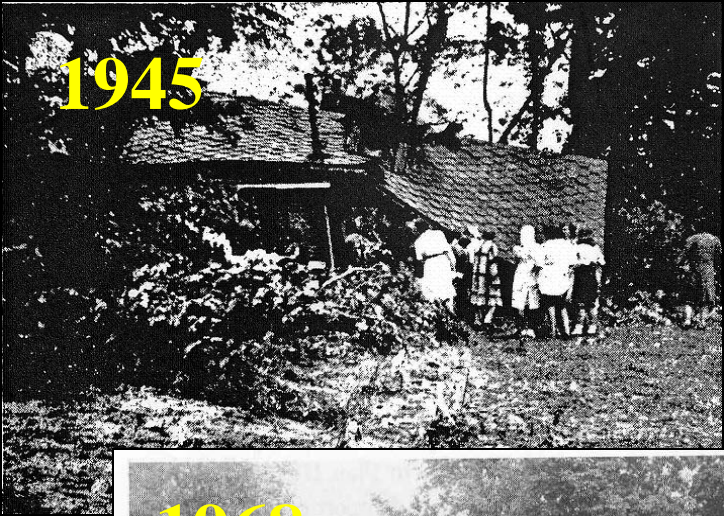


Passaic River flood of 1903 in Paterson, showing bridges awash. *Photo by G. K. Livitsanos, Passaic County Historical Collections*

Equivalent to 100 year flood - most of basin was undeveloped

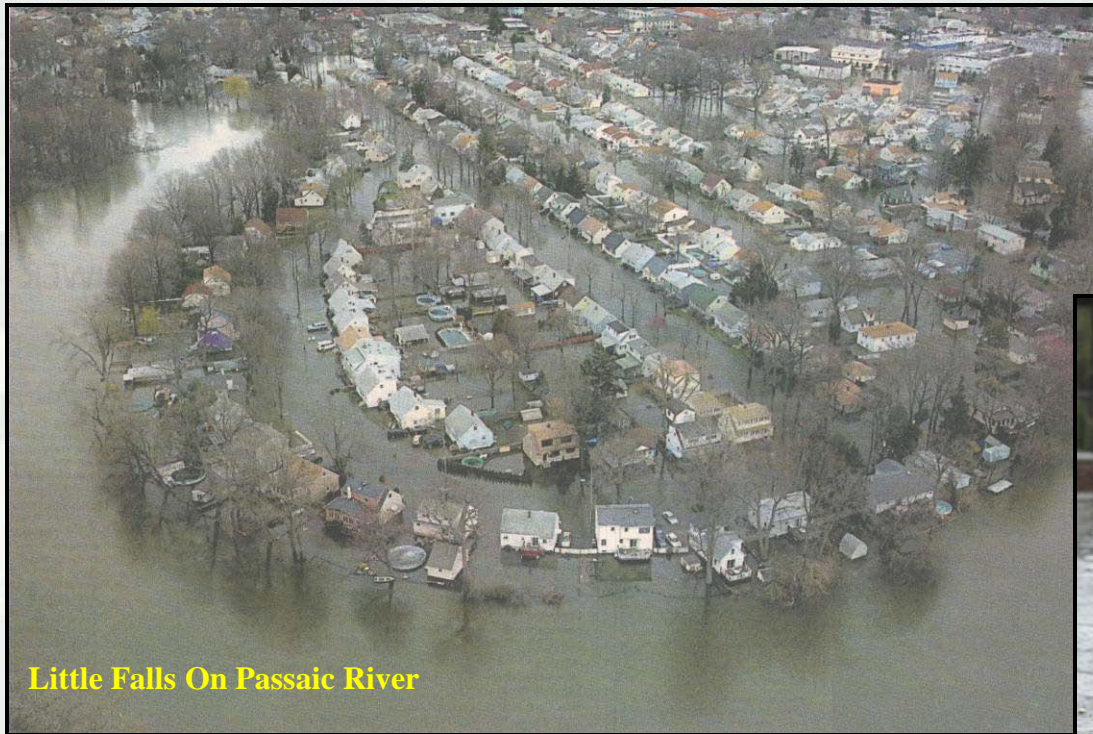


Passaic River Basin - Flooding History



Passaic River Basin – April 2007 Flood

- **5,000 people evacuated**
- **Damages over \$686,000,000**
- **10 to 20 year flood event**



Passaic River Basin – March 2010 Flood



- Damages estimated over \$772,000,000
- 20 to 25 year flood event



Passaic River Basin Flood Facts

- \$334,000,000 in damages - November 1977 Flood
- \$642,000,000 in damages - April 1984 Flood
- \$261,000,000 in damages - TS Floyd - Sept 1999
- \$686,000,000 in losses - April 2007 Flood
- \$772,000,000 in losses - Mar 2010 Flood



- The occurrence of the 100-year flood (1903 flood equivalent) would result in over \$2,240,000,000 in damages
 - Annual expected damages in the basin due to flooding are over \$161,000,000
 - Ten Federal disaster declarations since 1968
- **Since 1900:**
 - 26 lives lost
 - Estimated \$6 billion in losses

Passaic River Basin - Flooding History

Environmental Harm

Paterson City Industrial Facility April 1984



Lincoln Park Industrial Facility April 1984



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Passaic River Basin – Previous Studies

- 1900 - 1940 ----- 8 State Studies
- 1936 - 1973 ----- 5 Federal Reports
- 1976 ----- Comprehensive Study Authorized
 - 150 alternatives studied
 - Environmental impacts considered (NEPA)
 - Public Acceptance
- Project Authorizations from Congress in:
1986, 1990, 1992, 1996 & 2000



Passaic River Basin – Comprehensive Study Goals

- **Comprehensive 100-year level of protection at a minimum**
- **Minimize adverse environmental impacts and preserve 5,000+ acres of natural flood storage areas**
- **Considered future flood flow increases – modeled flows to the year 2050 to ensure accurate modeling (model shows flows increasing up to 13% for certain flood frequencies)**
- **Spun off hydraulically independent tributary projects for early implementation (Oakland, Molly Ann’s, Saddle River and others)**
- **State prohibits Floodway development**
- **Basin-wide flood warning system (constructed in 1987)**



SINGLE MEASURE BUILDING BLOCKS

1
PERMANENT EVACUATION
2
FLOODPROOF / RAISE
4
DAM AND BRIDGE MODIFICATION
6
CHANNEL MODIFICATION
11
LEVEE / FLOODWALL
17
EXISTING RESERVOIRS
18
NEW RESERVOIRS
20
PRESERVE NATURAL STORAGE AREAS
21
AQUIFER RECHARGE
23
TUNNELS **
25
TIDAL BARRIER

COMBINATION MEASURE BUILDING BLOCKS

3
Permanent Evacuation, Floodproof / Raise (Plans 1 & 2)
7
Channel, Dam & Bridge Modification (Plans 6 & 4)
13
Levee / Floodwall, Dam & Bridge Modification (Plans 11 & 4)

BASIN – WIDE PLANS (BASED ON BUILDING BLOCKS)

PLAN 5	PLAN 12					
Permanent Evacuation, Floodproof / Raise, Dam & Bridge Modification (Plan 3 & 4)	Permanent Evacuation, Levee / Floodwall (Plans 1 & 11)					
PLAN 8	PLAN 9	PLAN 10	Plan 15	PLAN 16		
Channel Modification, Permanent Evacuation (Plans 7 & 1)	Channel Modification, Floodproof / Raise (Plans 7 & 2)	Channel Modification, Floodproof / Raise (Plan 7 & 3)	Channel Modification, Levee / Floodwall (Plans 7 & 13)	Channel Modification, Nonstructural, Levee / Floodwall (Plans 7 & 14, 3 & 15)		
PLAN 14						
Permanent Evacuation, Levee / Floodwall, Dam & Br. Mod, Flood / Raise (Plans 1 & 13, 3 & 13)						
PLAN 19	PLAN 24					
Existing & New Reservoirs (Plans 17 & 18)	Existing & New Reservoirs, Tunnels (Plans 19 & 23)					
Pres Nat, Storage in Combination with other Nonstructural and Structural Measures						
PLAN 22	PLAN 25	PLAN 26				
Aquifer Recharge, New & Existing Reservoirs (Plans 21 & 19)	Aquifer Recharge, Tunnels (Plans 21 & 23)	Aquifer Recharge, New & Existing Reservoirs, Tunnels (Plans 22 & 25)				
PLAN 28	PLAN 29	PLAN 30	PLAN 31	PLAN 32	PLAN 33	PLAN 34
Tunnels, Floodproof / Raise, Permanent Evacuation (Plans 23 & 3)	Tunnels, Channel Modification (Plans 23 & 7)	Tunnels, Levee / Floodwall (Plans 23 & 13)	Tunnels, Levee / Floodwall, Channel Modification (Plans 23 & 15)	Tunnels, Channel Modification, Nonstructural (Plans 23 & 10)	Tunnels, Levee / Floodwall, Nonstructural (Plans 23 & 14)	Tunnels, Levee / Floodwall, Channel Mod, Nonstructural (Plans 23 & 16)

**** CHANNEL MODIFICATION AND/OR LEVEES AND FLOODWALLS REQUIRED IN PORTIONS OF CENTRAL BASIN FOR MOST TUNNEL BUILDING BLOCKS TO FUNCTION**

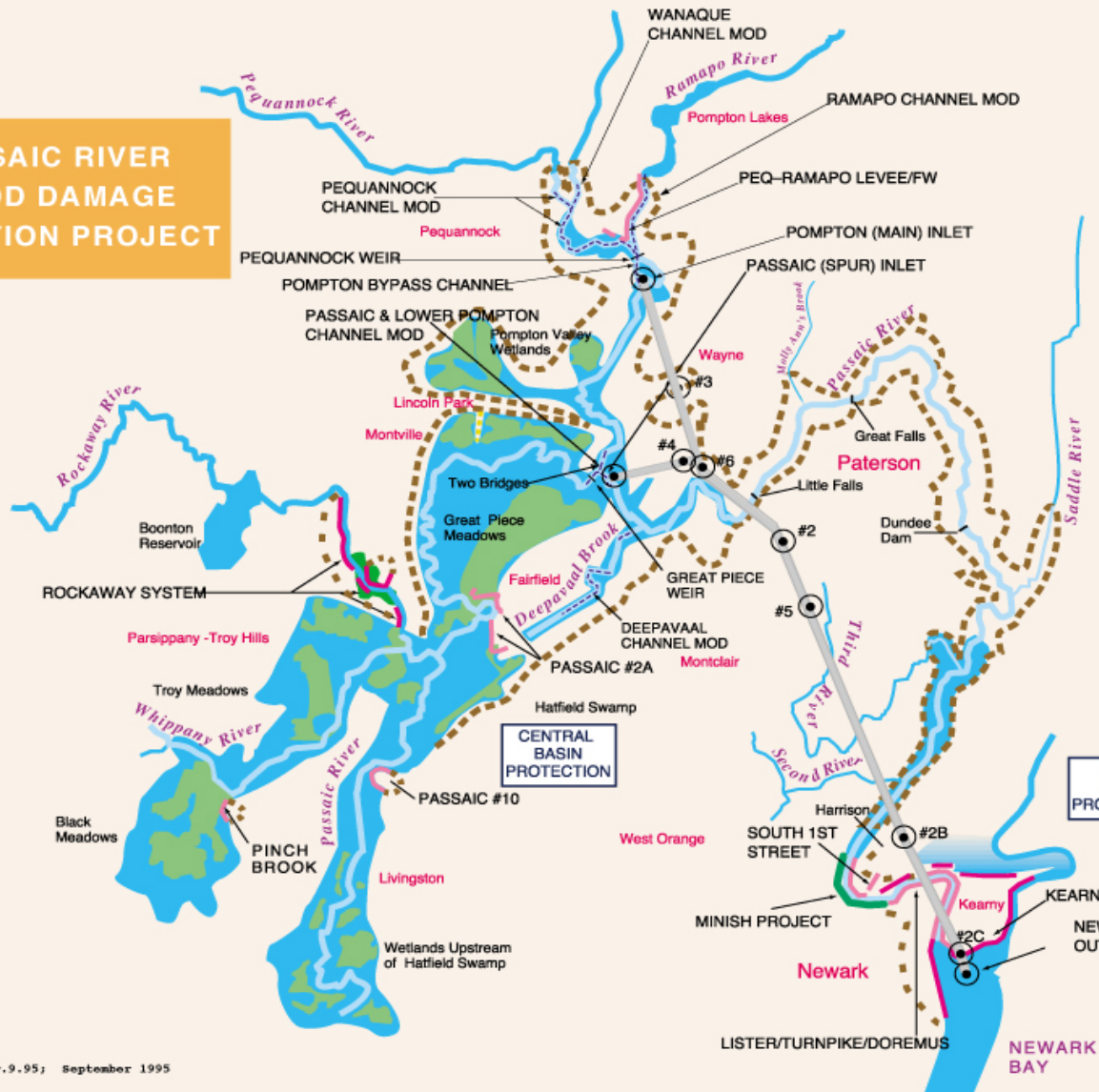
Passaic River Basin Main Stem Plan - NJDEP Selected Plan (30E) in 1984 Congress Authorized Plan in 1990

- **Implement strict floodplain management**
- **Preserve developable natural flood storage areas**
- **Construct underground diversion tunnel**
- **Remove limited structures**
- **Modify levees & channel in limited areas of Central Basin**
- **Build levees and Floodwalls for the Lower Valley areas**
- **Create Wetland Bank for credit purposes**



Passaic River Basin - Main Stem Plan

**PASSAIC RIVER
FLOOD DAMAGE
REDUCTION PROJECT**



PROJECT ELEMENTS

- LEVEE OR FLOODWALL █
- CHANNEL MODIFICATION ⋯
- DIVERSION TUNNEL
- PRESERVATION OF NATURAL STORAGE AREA █
- INLETS, OUTLET & SHAFTS

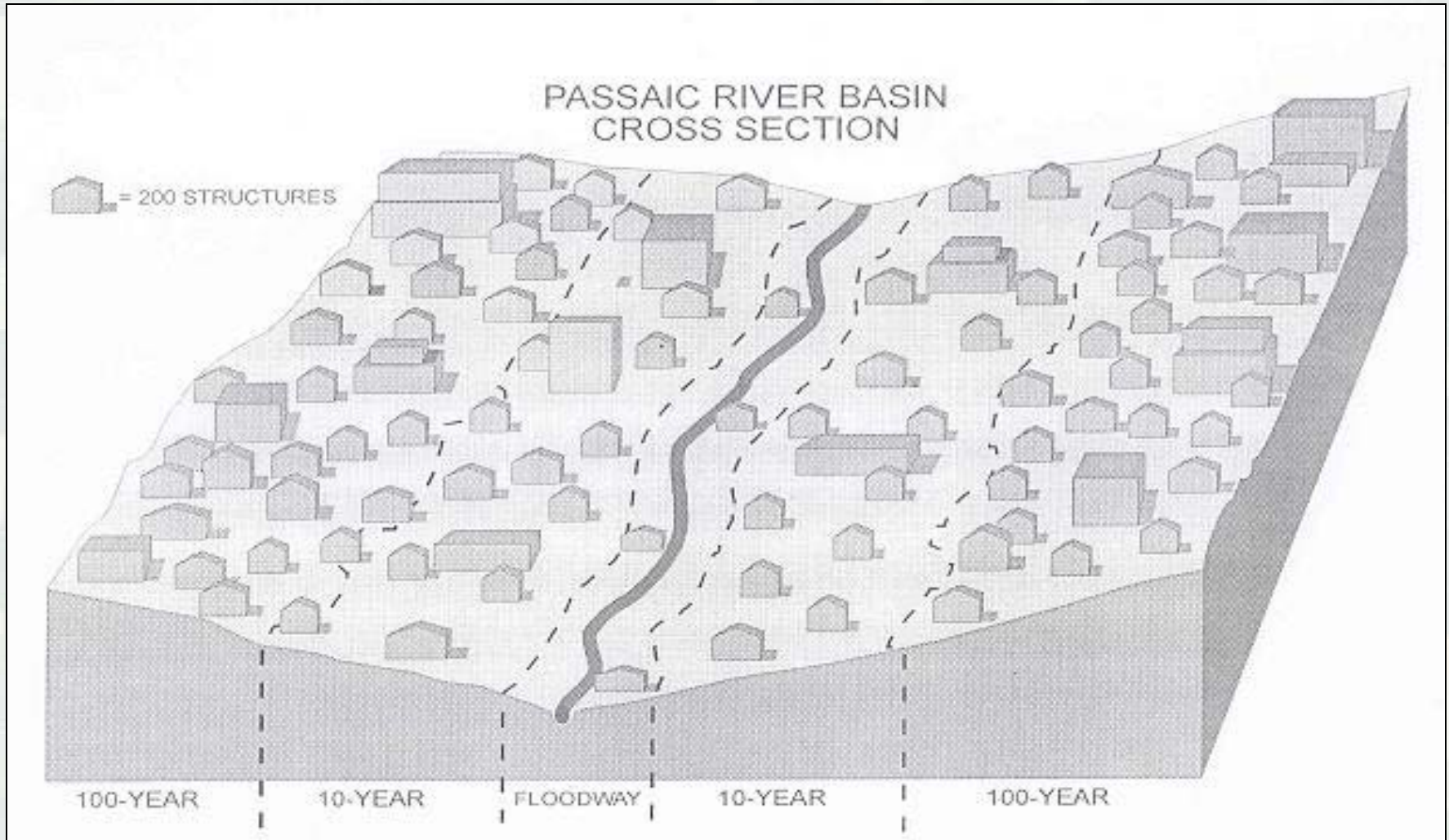
FLOOD PLAIN

- AREA IMPACTED BY 100-YEAR FLOOD █
- PROTECTED



Passaic River Basin - Buyouts

Request by State in 1995 for Nonstructural/Buy-out Studies to Compare to Main Stem Plan



Passaic River Basin – Plans Compared

Non-Structural Plans compared with Main Stem Plan in 1996

Buy-out/floodproofing or Main Stem Plan	Cost (Billions)	Structures Protected/Acquired
100 Year Floodplain	\$5.0	~13,300
50 Year Floodplain	\$4.0	~11,100
25 Year Floodplain	\$3.2	~9,500
10 Year Floodplain	\$2.3	~7,400
Floodway	\$0.2	~800
100 Year Main Stem Plan	\$1.9	+14,000

October 1994 price levels



Passaic River Basin – 1996 State Decision

- **Various Main Stem project elements to be implemented with Corps/NJDEP/Local partnership**
 - **Passaic River Preservation of Natural Flood Storage**
 - **Minish Bank Stabilization and Park, Newark**
- **Floodway Buy-out to be implemented by State (Blue Acres)**
- **State decision preserves comprehensive project authorization elements and Wetlands Bank Credits for use on projects**
- **Additional independent project elements to be selected in future by NJDEP and local stakeholders – ie. Ramapo River at Oakland, Molly Ann’s Brook, Harrison**



Passaic River Basin – Floodplain Today



Passaic River Basin Floodplain Today

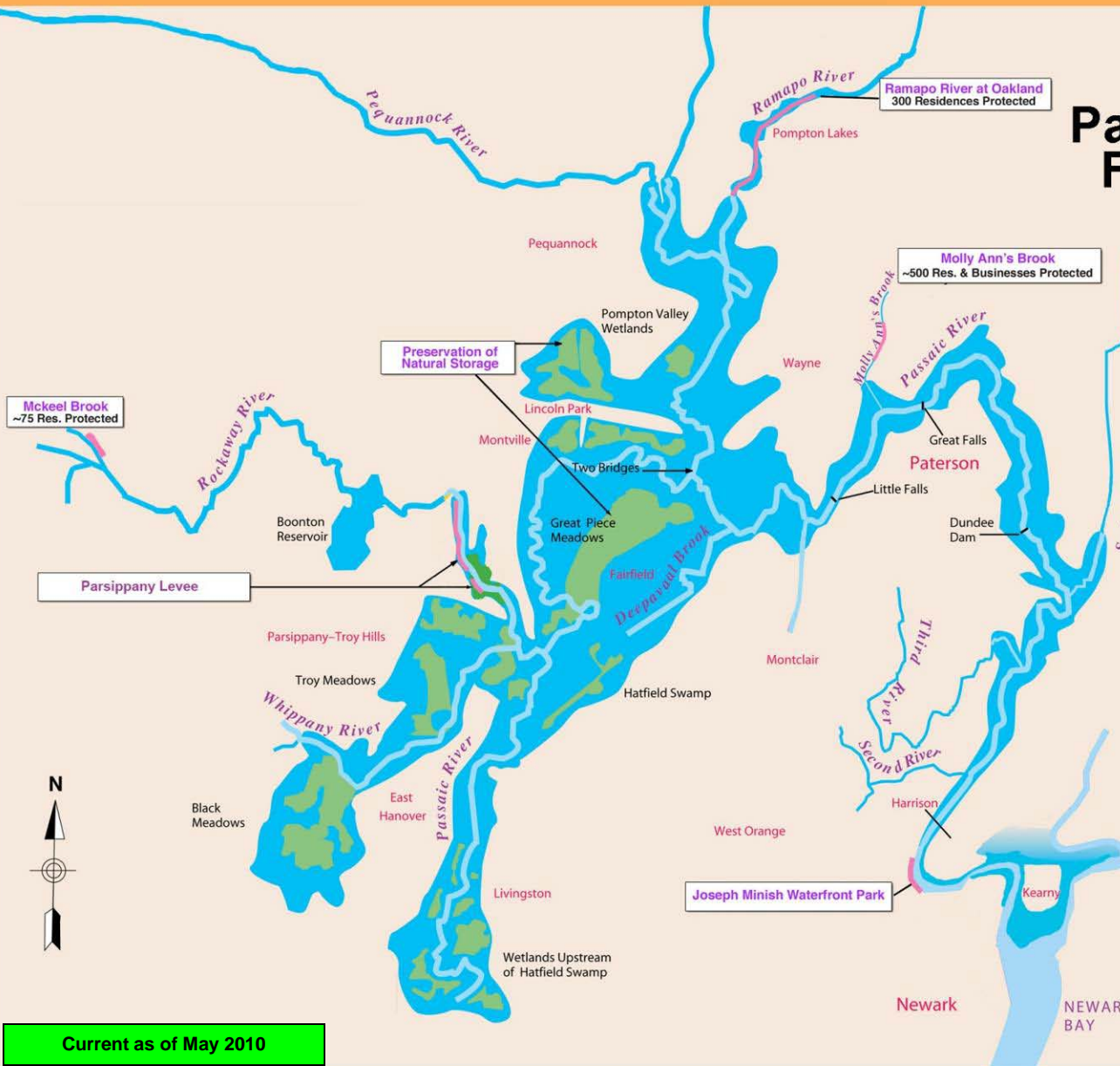
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Ramapo River at Oakland
300 Residences Protected

Molly Ann's Brook
~500 Res. & Businesses Protected

Mckeel Brook
~75 Res. Protected

Parsippany Levee

Preservation of Natural Storage

Joseph Minish Waterfront Park

Current as of May 2010

Passaic River Basin – Choices

- 1. Implement a comprehensive basin wide flood risk management plan and gain benefits**
- 2. Implement smaller local plans accruing limited benefits**
- 3. No action - potential flood damages with continued risk to life and additional economic and environmental losses**

COSTS = \$BILLIONS



Passaic River Basin – Direction

New York District recommendations:

- **Establish a State Sanctioned Passaic River Basin Flood Commission**
- **Re-evaluate the Main Stem Project – a comprehensive project combining structural & non-structural elements**
- **Enforce floodplain & upland development regulations (real zero net fill)**
- **Allow communities to pursue stream clearing and de-snagging**
- **Continue to advance the smaller tributary projects**
- **Continue Preservation of Natural Flood Storage Areas**
- **Continue Floodway Buy-out**

