Winter Road Maintenance Workshop

Great Swamp Watershed Association

Harding, NJ

October 22, 2009

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United Water New Jersey

Four-Reservoir System & Inter-Basin Transfers

- Oradell, Lake Tappan, Lake DeForest & Woodcliff Lake Reservoirs (13.9 BG/52.6 million m^3)
- Wanaque South (Wanaque & Monksville Reservoirs (36.6 BG/138.6 million m^3)
- Passaic, Pompton & Ramapo Rivers
- Saddle River Diversion (Safe Yield - 9 MGD/34,090 m^3)
- Hirshfeld Diversion (Safe Yield – 1.5 MGD/5,681 m^3)
- Sparkill Diversion (Safe Yield – 1.0 MGD/3,788 m^3)

UWNJ Property Ownership Within Watershed

Total Area of Watershed

- 113 miles^2 (292 km^2)

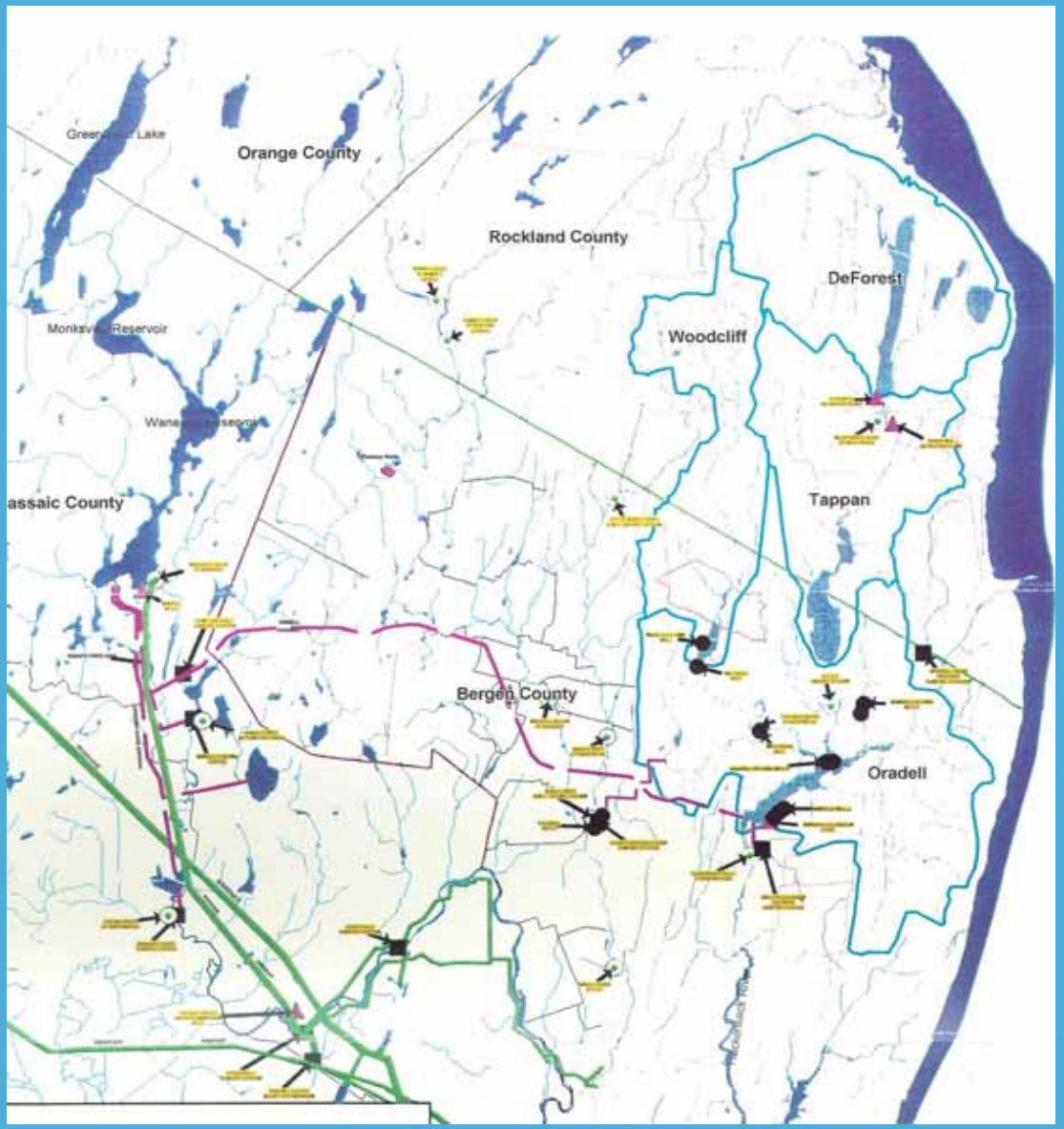
Area of Watershed Owned by UWNJ ~ 8%

Water Surface – 3,262 Acres/5.1 mi^2 (1,321 ha/13.2 km^2)

- Lake DeForest – 1,130 Acres (457 ha)
- Lake Tappan - 1,165 Acres (471 ha)
- Oradell – 796 Acres (322 ha)
- Woodcliff Lake – 171 Acres (69 ha)

Land Area– 2,676 Acres/4.2mi^2 (1084 ha/10.8 km^2)

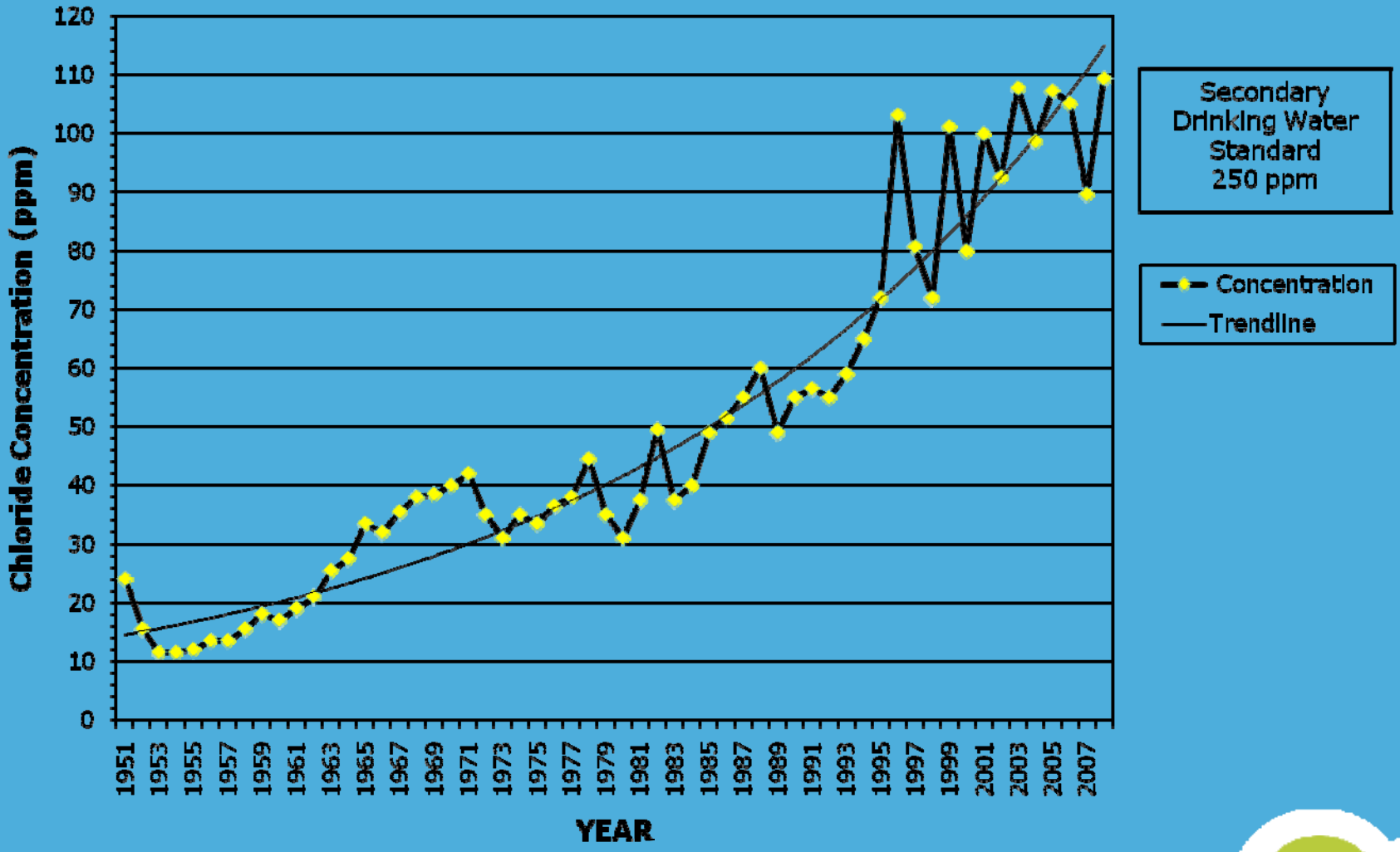
United Water New Jersey
Surface Water Supply



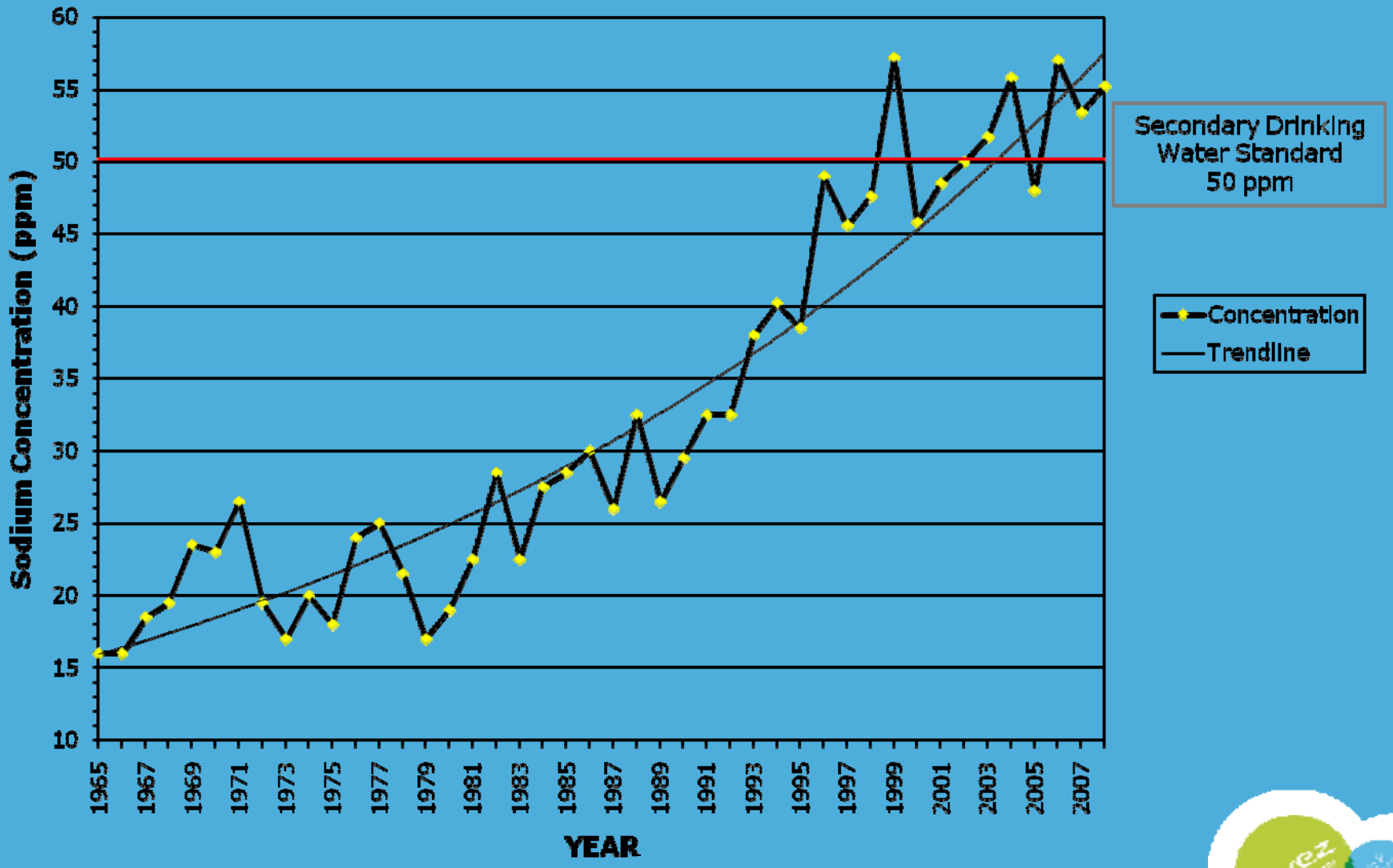
Floatables Control Upstream of Reservoirs

Stormwater Management
Detention Basin

Finished Water Quality – Chloride
Annual Average Concentration



Finished Water Quality – Sodium
Annual Average Concentration



Sodium Levels in Wells

Year	Andover	Arlington Hills	Barry Lakes	Grandview	Highland Lakes	Lake Conway	Sunset Ridge	Walnut Hills	Woodridge	Vernon Valley
1998						79.9	60		38	
1999	2.37				72.2				45.7	
2000	66.6	70.7	53.9	94.4		88.3	48.5			
2001		90.9		94.4		95				
2002		81	68	140	73	95			66	
2003	71	75	80		128	95		250		
2004	81	81	76	120	120	120	72	250	66	
2005	71	86	80	110	160	110	73	250	58	
2006	65	88	81	90	200	120	67	220	65	
2007	65	87	128	84	154	120	69	211	78.3	
2008	61	99	84	107	237	151	77	220	120	
2009	62	104	130	107	227	153	84	216	110	51

Watershed Management Practices

- Presentations on Best Management Practices
  - Limiting salt use or using alternate deicing chemicals
  - Riparian buffers
  - Limiting fertilizer (soil tests) & pesticide use (IPM)
- Participation on state, county & local committees
- Sponsoring & participating in river cleanups
- Letters of support for acquiring land for preservation
- Purchasing land for water quality protection

Water Quality Regulations

- Secondary Standard for Sodium is 50mg/l (ppm)*

(NJ Recommended Upper Limit)

The level in UWNJ drinking water (Haworth Plant) has been steadily increasing from consistently below 20 ppm through 1969 to an average of 54 ppm in 2008 with a range from 33 – 93 ppm.

- Secondary Standard for Chloride is 250 mg/l

Similar to sodium, this too has been increasing from less than 20 ppm in the early 1960's to an average of approx. 105 ppm in 2007 with a 2007 high of 156 ppm.

Coca-Cola® has 35mg/8 oz. or 147mg/l (147 ppm).

*For healthy individuals, the sodium intake from water is not important. Levels above the RUL may be a concern for those on a sodium restricted diet.

Alternatives to Rock Salt (Sodium Chloride)

- Calcium Magnesium Acetate (CMA)

Least aggressive, most environmentally benign but very expensive (as much as 20 times the cost of rock salt)

- Calcium Chloride – Effective at very low temperatures

Many towns now use a combination of calcium chloride and sodium chloride to obtain a more effective application and wider temperature range for melting of snow.

- Magnesium Chloride

These materials work at lower temperatures, faster melting can be expected, improves mechanical removal

Road Salt Reduction Measures

- Workshops
  - United Water New Jersey
  - Bergen Rockland Environmental Action Panel
  - Great Swamp Watershed Association, et. al.
- New Anti-Icing Application Equipment at UWNJ (2008)
  - 3000 gal. storage tank and dispensing system ($7826)
  - 500 gal. spreader system ($7200)
  - 225 gal. spreader systems ($5252 each) - 2
  - Spray rigs for salt spreaders
    - 20 gallon ($2879)
    - 40 gallon ($3042)
    - 80 gallon ($3812)
  - Brine at $0.89 cents a gallon. (Less if made in-house)

Road Salt Reduction Measures

- DESIGNED FOR YEAR ROUND USE – ICE/DUST CONTROL
- CHASSIS MOUNT OR FRAME MOUNT TO SLIDE INTO A DUMP BODY
- SINGLE & MULTI LANE CAPABILITY
- GROUND SPEED, DATA LOGGING CONTROL SYSTEMS
- POLYETHYLENE OR STAINLESS STEEL TANKS
- OPTIONAL FEATURES – HAND HOSE CAPABILITY PRESSURE WASHING

Anti-Icing with Brine Solution (Sodium Chloride)

- Applied before precipitation to prevent formation of bonded snow & ice to road surface
- Jump starts the melting process
- Effective to -6°F
- Greater amount of material remains on-site
  - Less deicer (23% salt content by weight)
  - Less manpower
  - Lower cost of maintaining safe roads
  - Minimizes environmental concerns

UWNJ Workshop Contents

- Surveys to Municipal Road Departments
  - Deicing materials used?
  - Costs of materials
  - Miles of road?
  - Varying application rates depending on location?
  - Storage of material?
  - Cleaning of catch basins?
- Speakers on:
  - Storage options
  - Spreader options
  - Pre-wetting (treating granular salt with a strong liquid melting agent such as calcium chloride) & Anti-icing (Liquid melting agents applied to bare pavement).

Best Management Practices

- Storage
- Weather Forecasting
- Pre-Wetting (Savings of ~30%) & Anti-icing
- In-Road Temperature Sensors
- On-Vehicle Temperature Sensors
- Ground Speed Controls (Calibration is important)
- Alternate Use of De-icing Material
- Regional Cooperation (Production of brines, filling stations, equipment)
- Spread Patterns
- Record Keeping

Best Management Practices?

Other Sources of Salts in the Environment

- Fertilizers
  - Virtually all fertilizer materials are salts. When they dissolve in the soil they increase the salt concentration of the soil solution. An increase in salt concentration increases the osmotic potential of the soil solution. The higher the osmotic potential of a solution, the more difficult it is for seeds or plants to extract soil water.
  - Test your soil for pH & nutrients
- Water Softening Units
  - When an ion exchanger is applied for water softening, it will replace the calcium and magnesium ions in the water with other ions, for instance sodium or potassium. The exchanger ions are added to the ion exchanger reservoir as sodium and potassium salts. It is advisable that softened water contains only up to **300mg/L of sodium**. (Netherlands)

Great Swamp Watershed Association

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