

THE INFLUENCE OF SALT IN OUR GROUNDWATER

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SALT IS COMPOSED OF TWO CHEMICALS:

SODIUM (Na^+) and CHLORIDE (Cl^-)
bound together with an ionic bond :



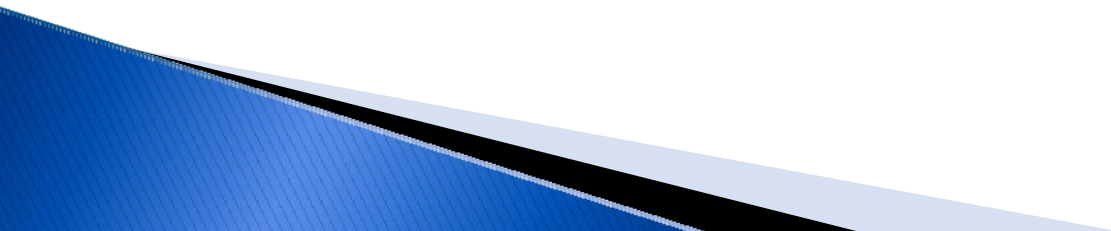
Usually we know salt as that tasty little crystal we put on our food, or as the chemical that gives the ocean its taste. Salt can exist as that crystal at most temperatures that we deal with, but dissolves very easily in water. It dissolves so well, in fact that it is very, very difficult, and very expensive to remove salt from water.

The USEPA lists sodium and chlorides as **Secondary Contaminants of Concern**.

That means they don't believe they are necessarily toxic to humans, but certain concentrations might be unhealthy, or just make water taste bad.

They have set the Recommended Upper Limit (RUL) at 50 mg/ L, or 50 parts per million (ppm) for sodium and at 250 ppm for chlorides.

For purposes of simplification, only sodium will be addressed in this presentation.



But, **IS** sodium bad for us?

Do we need to be concerned about it
in our drinking water???

Well, we can't live without salt (sodium)!

And according to many physicians we can't live
with it either!

The truth is somewhere in between.



Most studies say that we need at least 500 mg of sodium each day.

Many cardiologists will say “don’t have more than 1500 mg each day or hypertension will result.”

An upper limit of 2500 mg per day is considered the limit for good health.

So, where does the concentration of sodium in our drinking water fall?

Well, most drinking water in our area has about 20 to 75 mg/ liter. So, If you drink a quart of water you get about 40 mg.

A glass of tomato juice may have...700 mg

A bowl of chicken noodle soup....1200mg

Four slices of bacon....550mg

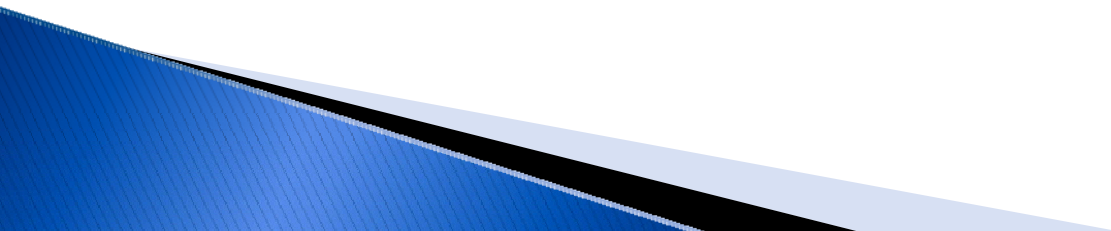
So, Drinking Water doesn't seem quite so bad



How about if you use a water softener, as many in this area do...

Well, I've read they up your regular quart of water by 75 mg...

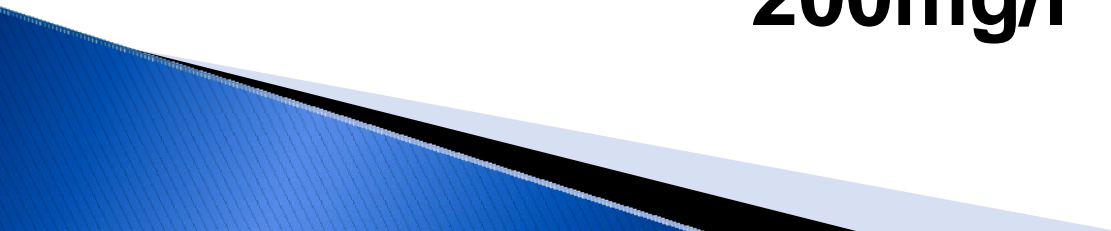
so even with a softener, you are only at 115 mg...still doesn't seem **SO** bad, unless you are on a severely restricted sodium diet.



But the level is rising in some wells.
And, therein lies the concern.

As high as **90+ mg / liter** from some
of the towns I've spoken to.

United Water has shown upper
concentrations in some wells over
200mg/l



So, why the concern if the concentration has risen to 90 mg, or even 200mg???

Well, the big concern is that sodium concentration **IS** rising.

This shows that the behavior of people is influencing our ground water, as well as our surface water.

What is causing the rise in sodium concentration???



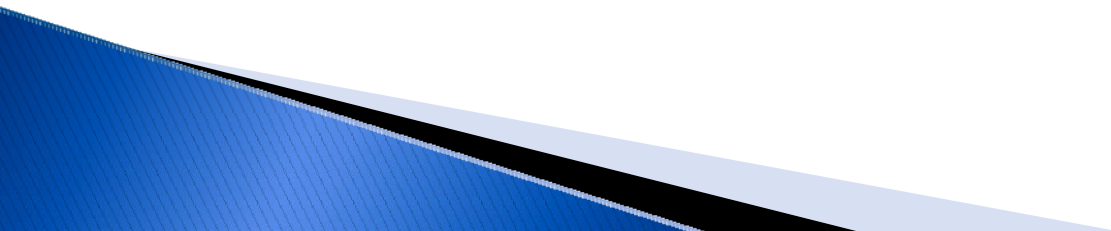
Well, the rise in sodium, or salt is due to a number of activities, all traced to human (anthropogenic) sources.

We eat salt, we excrete salt.

It stays in ground water (septics) or goes directly to WWTP's until both reach surface water.

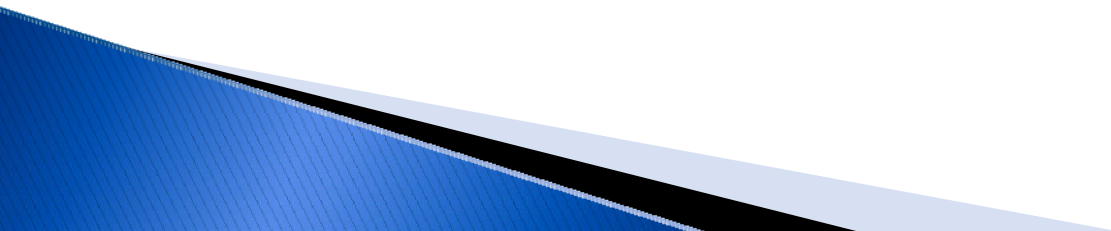
Then it is in both places, ready to be used again.

HOWEVER,



Based upon the results of well testing near roadways and salt storage areas, sodium concentration is rising DRAMATICALLY and it is primarily the fault of

Road Salt Application or Storage!!!!!!!!!!



Let me try to explain why this is the main conjecture....

Here are three cross-sections of the river basin in Oakland

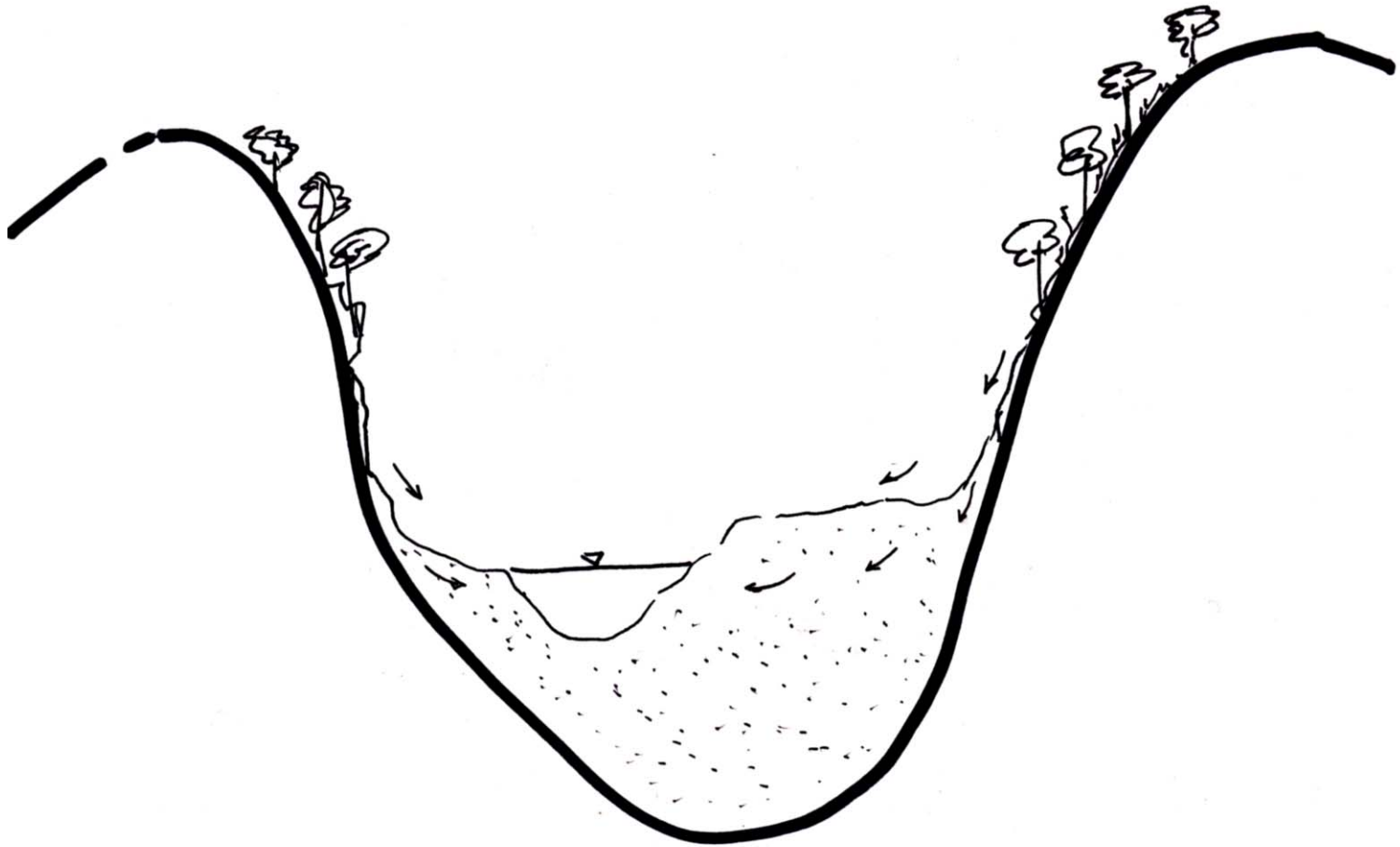
The cross-sections along all of the Ramapo are not very different.

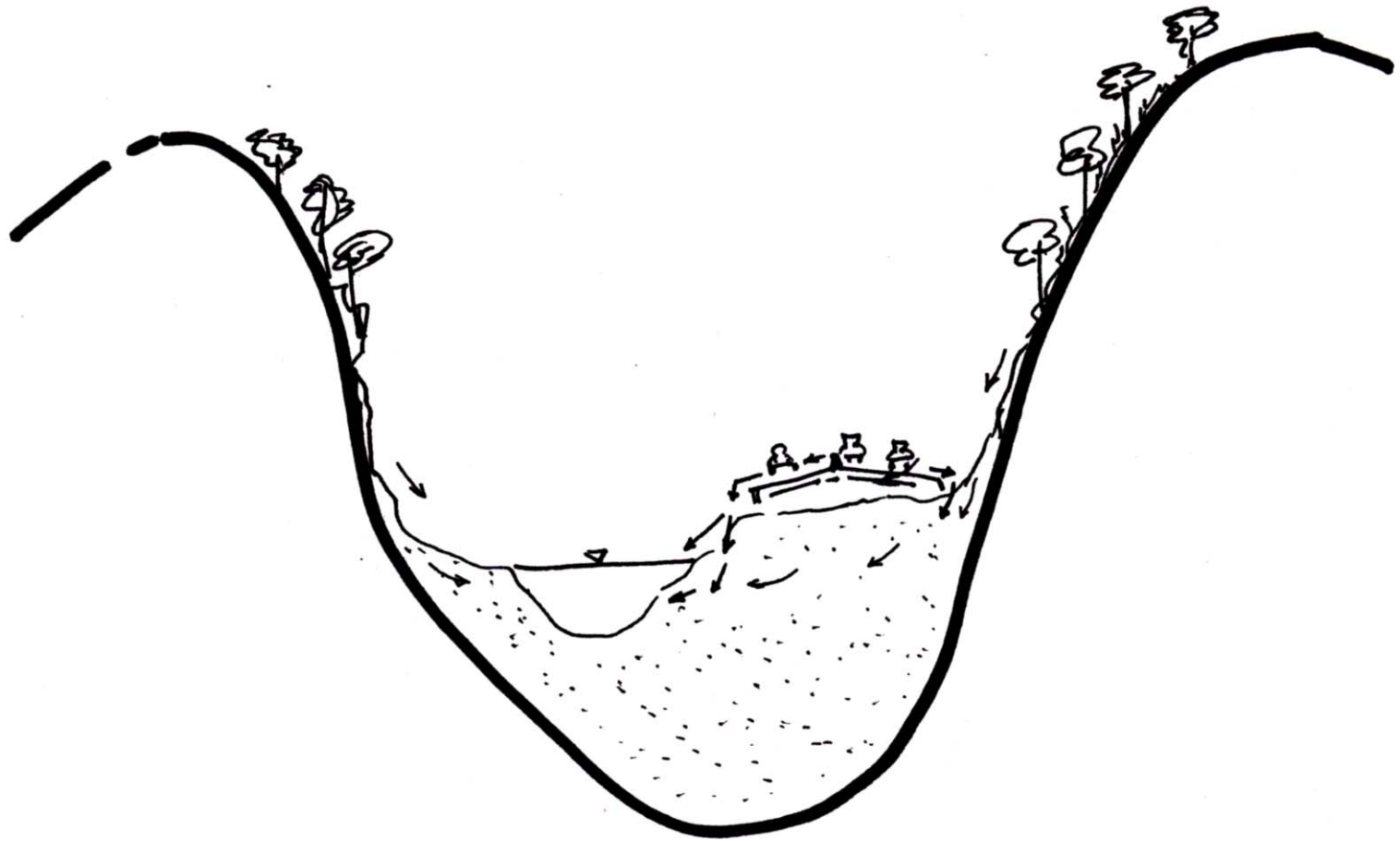
These are actually very representative of the entire Passaic River system

Here is my artistic representation of a
typical cross-section

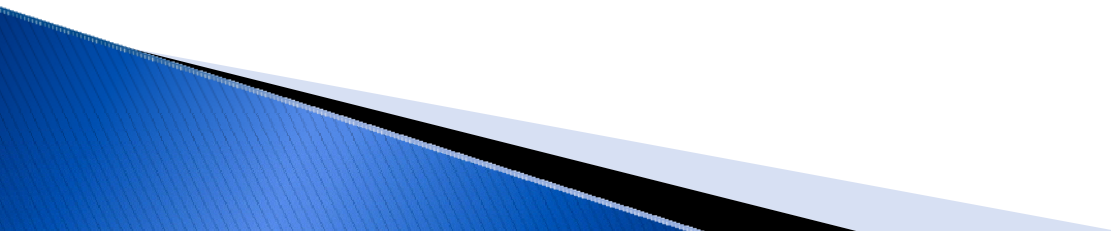
And what it means....







As you can see there is a direct connection between what happens on the surface and what affects both our surface and ground water.



As I mentioned before, there are other sources besides road salts that can increase the sodium content of our wells, such as septic systems, but the major cause does appear to be the salting.

Using an example that I know well,
but which is applicable throughout the Passaic Basin.

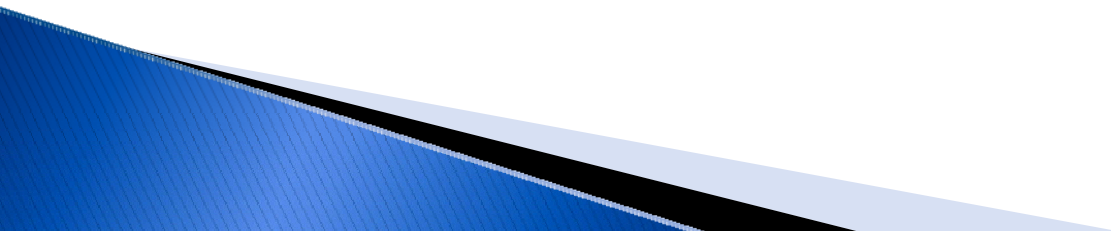
In Oakland, we have four well fields, three adjacent to the Ramapo River, one alongside Pond Brook(which is alongside Rte. 287)

Our northern Ramapo field historically shows sodium in the 20-30 mg/liter range.

Our middle one shows sodium in the 60 to 90 mg/liter range

Our southern one shows sodium in the 15-20 mg/liter range

What is the difference between these wells? The middle one is just downstream from Rte. 287 and near the hub of the Borough.

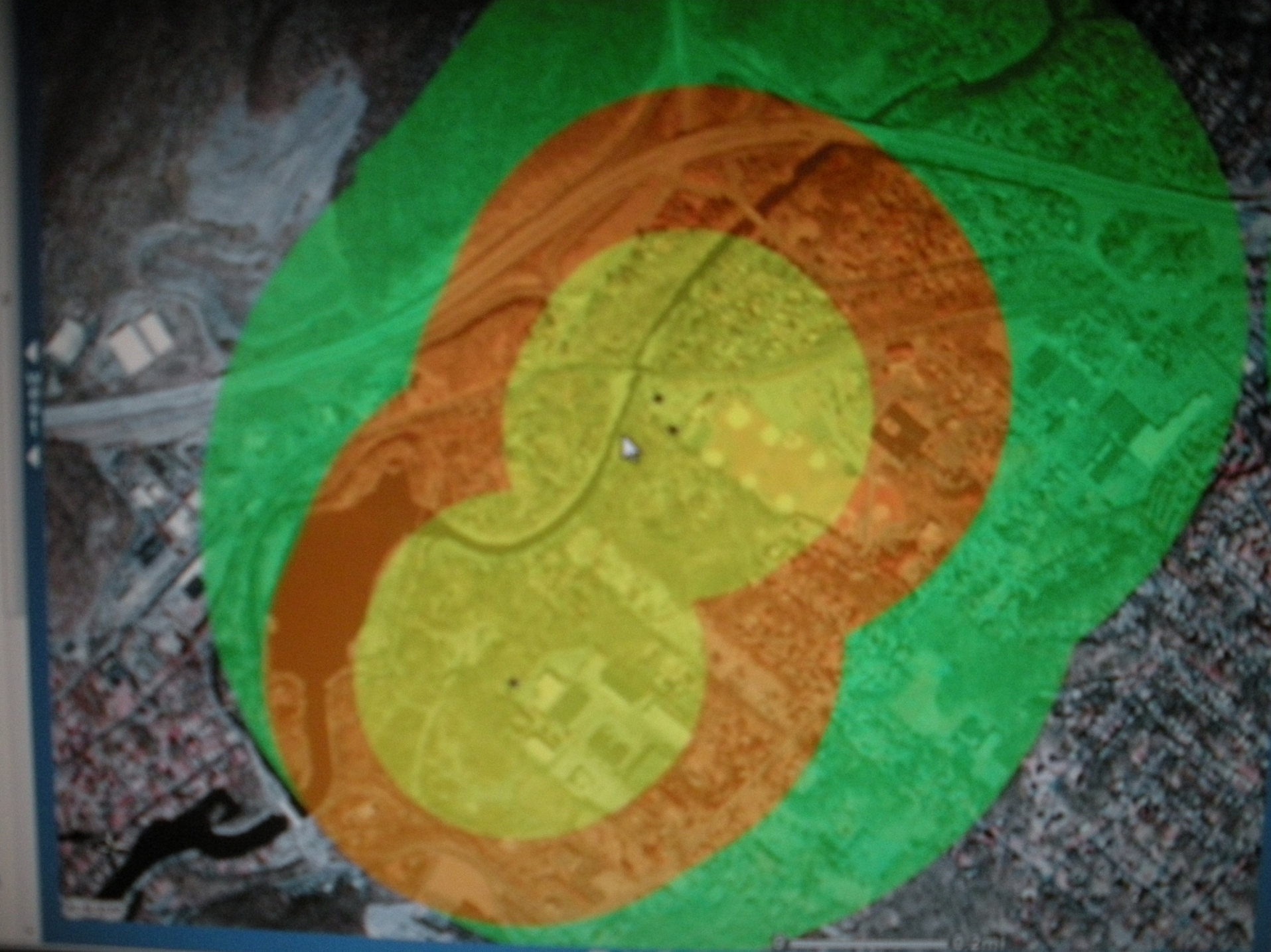


The NJDEP has prepared maps of every community well in the State showing the time it would take a pollutant to influence that well.

These maps are available on the NJDEP web page in the i-Map choice.

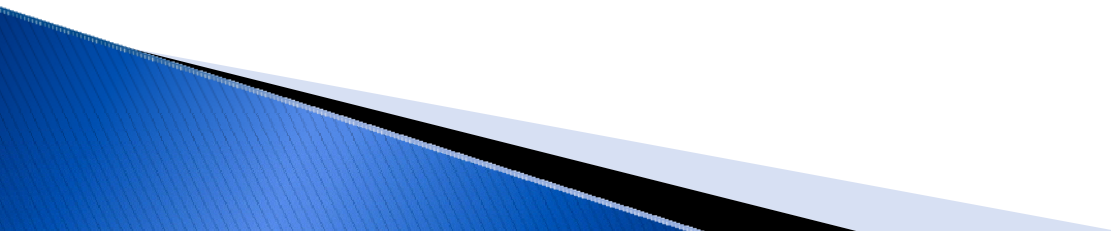
The following picture shows the *Zone of Influence* for a well site in Oakland.

If you look carefully you will see that Rte 287 is clearly within the 2 to 5 year Zone of Influence for our central wells. And they are also near the most blacktopped area of the Borough



Similar situations are happening in other towns along the Ramapo...and along the all the tributaries to the Passaic River

This summer I did have the opportunity: Thanks to the Groundwater Protection Committee of the Passaic River Coalition, to research this situation even further, because I was sure the problem is much more widespread, as was the GWPC.



As I stated earlier, I don't think that the sodium problem is so serious right now, **HOWEVER**, I am quite worried about the fact that sodium is continuing to increase and is also a precursor of other chemicals that travel more slowly and that may arrive in the near future.

Think about those cross-sections: Pollutants can only leave one way... toward the downstream end, but they can enter our groundwater and take many, many years to move on.

There is no question that in the Ramapo there is a direct hydraulic link between our surface and ground water, especially as we pump more and more water from our aquifer for our increase in population.

This situation exists everywhere that open ground exists.

This summer we surveyed ninety-seven (97) municipalities in the Passaic River Basin. We asked if their salt (sodium) levels had been increasing, If so, were the affected wells throughout the municipality, or only in certain areas.

And, because we believe that there is a direct correlation with road salting, we also asked about their de-icing practices.

The short answers are:

We sent out 97 surveys.

We received 27 responses: 28%

Of the 27 responses,

14 had municipal wells: 52%

Of the 14 with municipal wells,

12 saw an increase in sodium over the past
several years: 86%

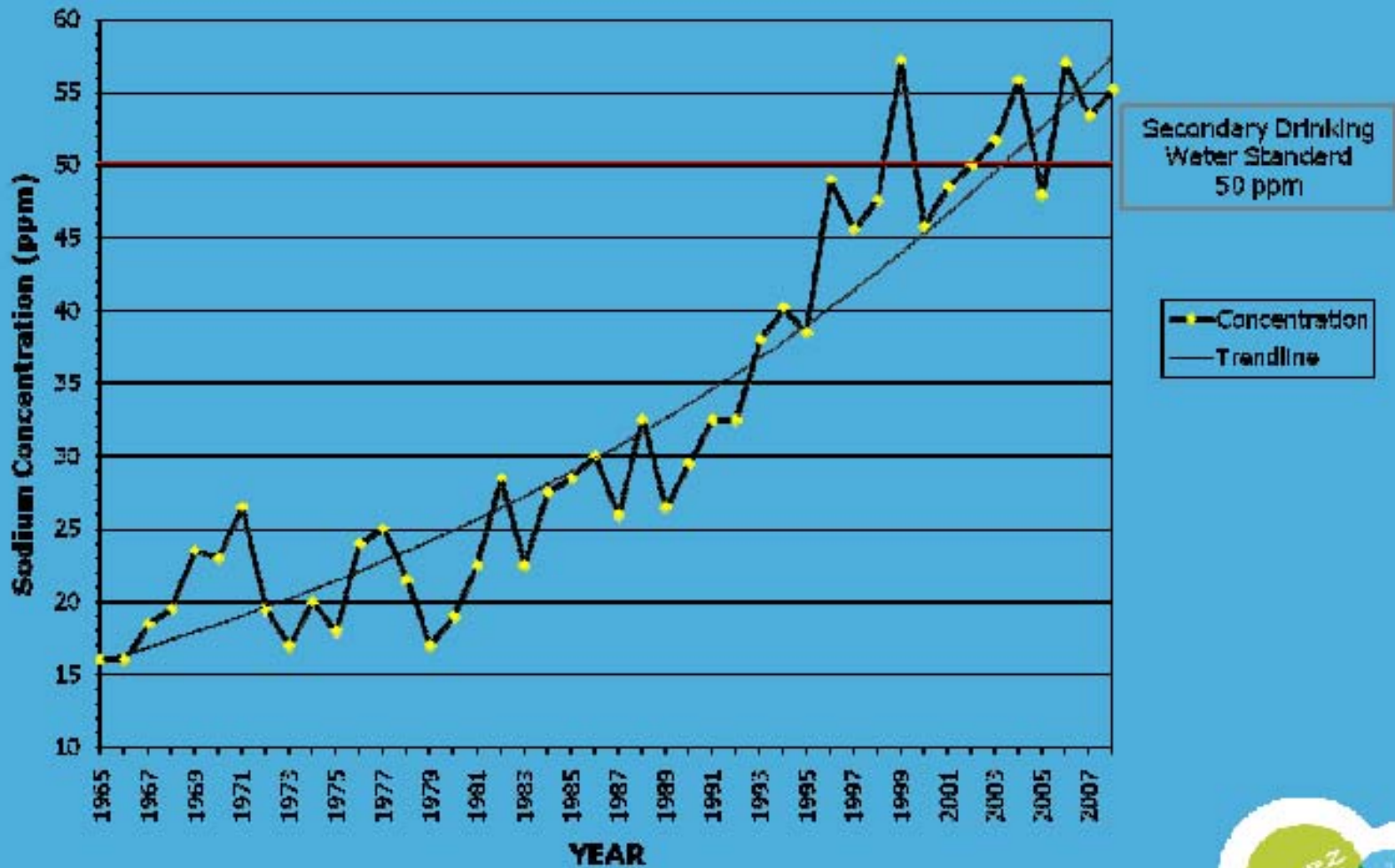
I think this result speaks for itself

We also had access to a presentation by United Water, which handles most of Bergen County's water needs, from a Great Swamp Watershed Association seminar in the Fall of 2009.

I have included two of their slides here.

I believe they more than reinforce the point that sodium concentrations are rising in our wells, and the reason is salting of roadways.

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

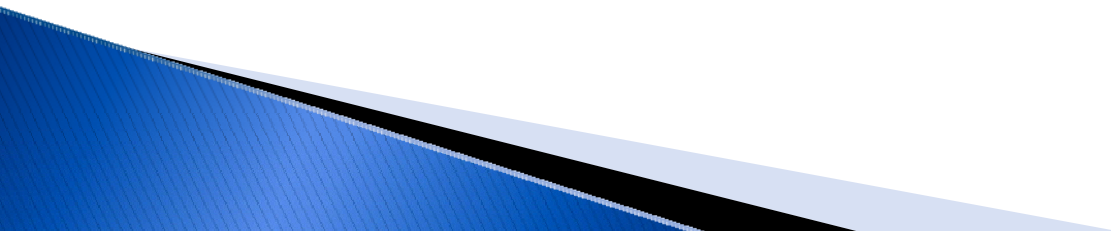


Hopefully having made the point that salt (sodium) is definitely increasing in our water, and that the most likely culprit is deicing practices, where do we go from here?

We cannot risk life by leaving roads ice and snow covered, nor can we afford costly chemical replacements, at least , not yet.

Our purpose was to bring home to you the problem and ask each of you to search for ways to reduce your use of salt.

There are a number of ways, and the speakers following me will try and give you some new ideas to bring back to your municipalities.



Please ask questions and participate in the dialog.

You can send any other questions to us :
prcwater@aol.com, Attn: GWPC