Effects of Future Development on Pocono Cr. Flow & Ecological Integrity

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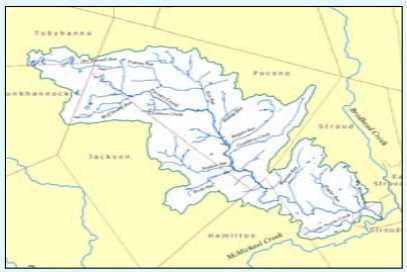
Introduction

Pocono Creek

- High quality wild trout stream
- Watershed : 18 mi length, 46.5 mi^2
- Monroe Co., PA - 2nd in growth
- Population
  - increased > 50% in past decade
  - projected to increase 60% by 2020
- Tourism based economy
- More than 50% undeveloped

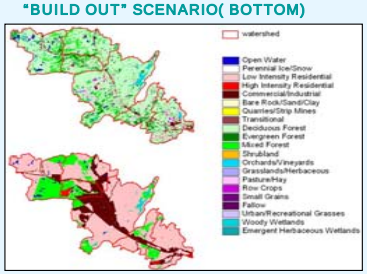


Concern

Will projected growth/land use change deplete GW & streamflows, impacting trout population ?

- Watershed impervious surface projected to increase from existing 1.3% to 33% at build out

LAND USE : YEAR 2000 (TOP)
&
"BUILD OUT" SCENARIO(BOTTOM)



Approach

- Ground water model (USGS) -MODFLOW
- Hydrology model (EPA, NRML) – Soil & Water Assessment Tool (SWAT)
- Hydroecological Integrity Assessment Process (USGS-Ft Collins) - Implements Olden & Poff (2003) approach
- Relate flow indices to trout population data in PA (USGS-Ft Collins)

Results

GW and Hydrology Models

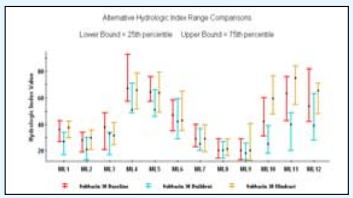
Build Out Compared to Existing Conditions

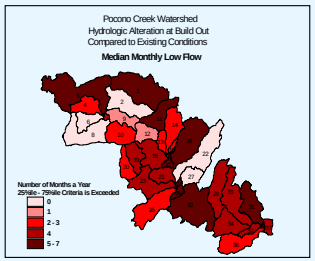
Watershed- avg. GW Recharge	31% ↓
Daily Base Flow	31% ↓
Low Flow 7Q10	11% ↓
Monthly Median Daily Flow	10% ↓
Monthly Peak of Daily Flows	21% ↑
Annual Maximum of Daily Flow	19% ↑

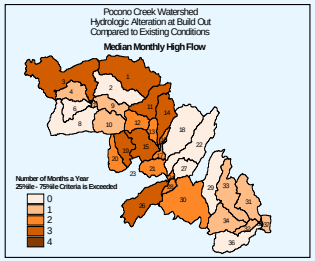
Hydroecological Integrity Assessment

Flow metric guidelines ⇨ maintain Q metric within 25th – 75th percentile of the baseline or "unaltered flow"

Sub Basin 30 Example
Baseline, buildout & hindcast
Minimum Monthly Low Flow







Frequency of low flow (< 25th %ile)
- increased in 31 of 37 sub basins
- Increase of 17% to 525%

Duration of low flow (<25th %ile)
- decreased in 33 of 37 sub basins
- decreased from 14% to 78%

Frequency of high flow (> 75th %ile)
- increased in 32 of 37 sub basins
- increase of 6% to 238%

Duration of High Flow (> 75th %ile)
- decreased in 33 of 37 sub basins
- decreased 1% to 40%

Evaluation of Hydroecological Indices - Trout Biomass Relationships

- HIP metric – trout biomass relationships ⇨ weak, highly variable
- Limited predictive power – best across longer gradients of indices
- Existing data not sufficient to support specific flow standards

Conclusions

- Build out land use change ⇨ significant flow alteration
- Without mitigating actions, significant effects on trout populations expected