Appendix 4

Rating Curves

Reach 1

Rearing & Growth

The amount of wetted area was flow dependent and increased from about 50% at 0.1 cfsm to 90% at 1 cfsm. Blacknose dace had the greatest increase in habitat. The amount of habitat was flow dependent, increasing from 5% at 0.1 cfsm to 65% at 0.9 cfsm and declining to 55% by 1 cfsm. White sucker habitat remained between 15-20% regardless of flow. Longnose dace habitat remained under 5% regardless of flow. Atlantic salmon habitat remained between 5 -15% regardless of flow. Tessellated darter increased from 25% at 0.1 cfsm to just over 50% by 0.3 cfsm before steadily decreasing to 15% by 1 cfsm. American eel habitat increased slightly from 5% to 25% as flows increased. Brook trout habitat varied depending on flow. Habitat was between 30-40% until 0.5 cfsm where it steadily declined to about 20% at 0.9 cfsm before increasing to 25% at 1 cfsm. Common shiner habitat also varied with flow. Habitat was at 0% at 0.1 cfsm and steadily increased to approximately 55% at 0.5 cfsm and stayed relatively constant up to 1 cfsm.

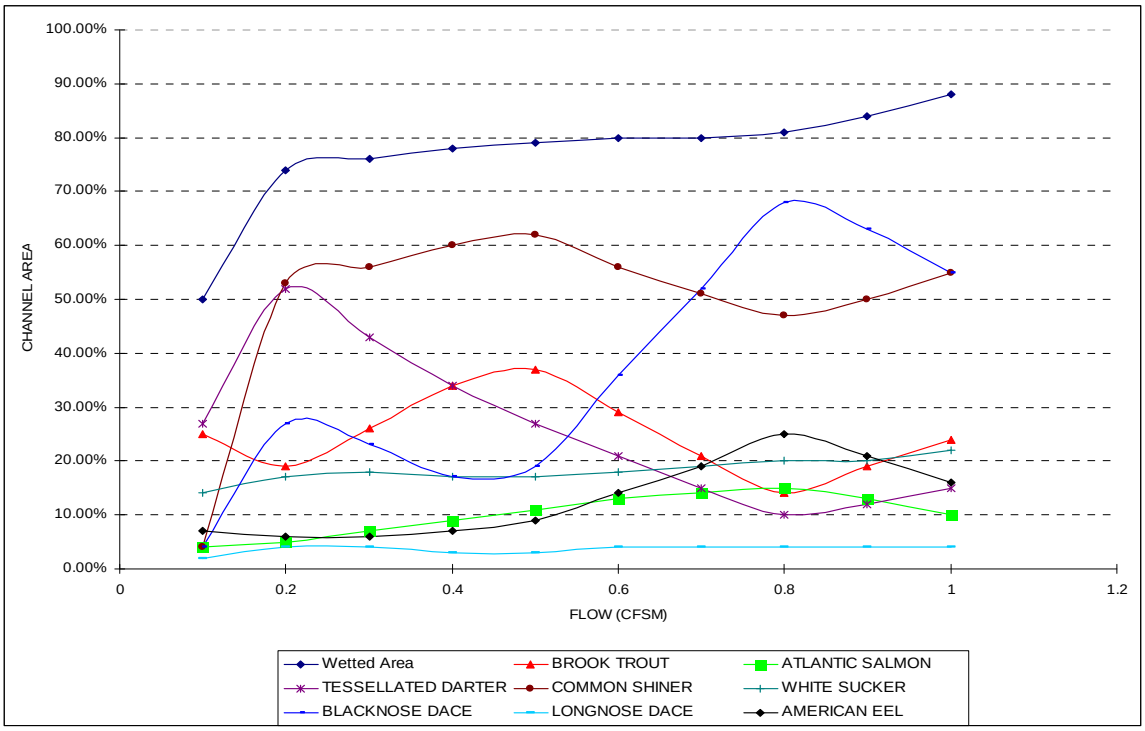

Figure 1: Reach 1 rearing and growth rating curves.

Community habitat remained between 5-30% regardless of flow. Generic fish habitat ranged from 40% at 0.1cfsm to about 75% at 1cfsm.

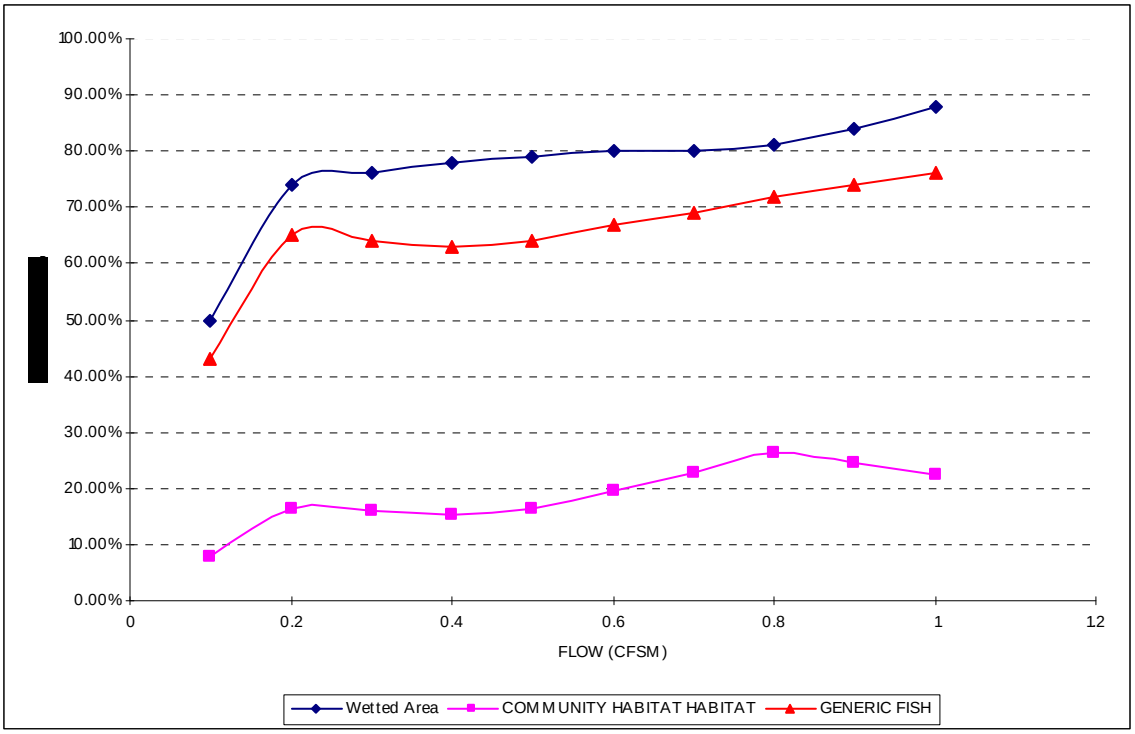

Figure 2: Reach 1 habitat.

Spawning

White sucker habitat increased initially from 30% at 0.1 cfsm to 70% at 0.5 cfsm, decreased to just above 60% at 0.8 cfsm where it remained constant as flow reached 1 cfsm. Tessellated darter habitat steadily increased to just below 80% as flow reached 0.8 cfsm and then decreased slightly to 70% at 1 cfsm. Common shiner habitat initially increased from 15% at 0.1 cfsm to just above 50% at 0.5 cfsm, decreased to just above 30% as flow reached 1 cfsm. Longnose dace habitat slowly increased from 5% at 0.2 cfsm to 25% at 0.8 cfsm and then slightly decreased to 20% at 1cfsm. Blacknose dace habitat increased from just above 10% at 0.1 cfsm to about 50% at 0.5 cfsm, decreased gradually to about 30% as flow reached 1 cfsm.

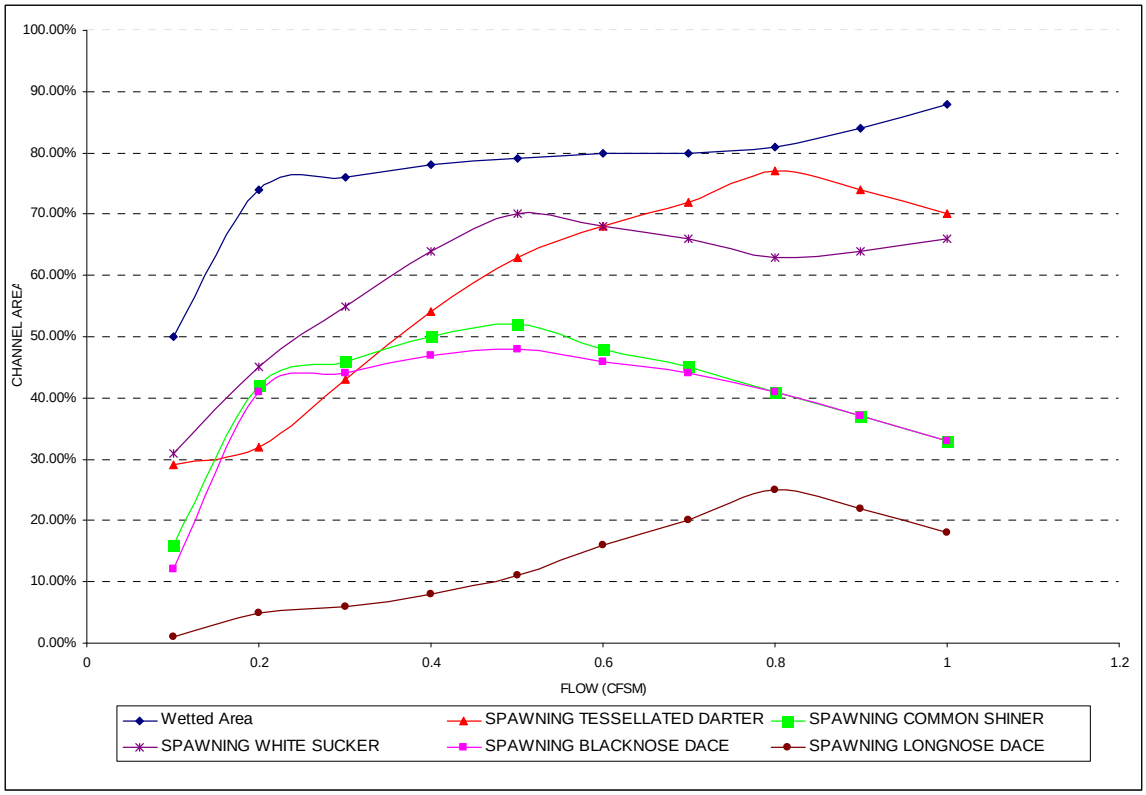

Figure 3: Reach 1 spawning rating curves.

Community habitat gradually increased from 15% at 0.1 cfsm to around 40% as flow increased to 1 cfsm. Generic fish habitat steadily increased from 30% at 0.1 cfsm to 80% at 0.8 cfsm and then decreased to just above 70% at a flow of 1 cfsm.

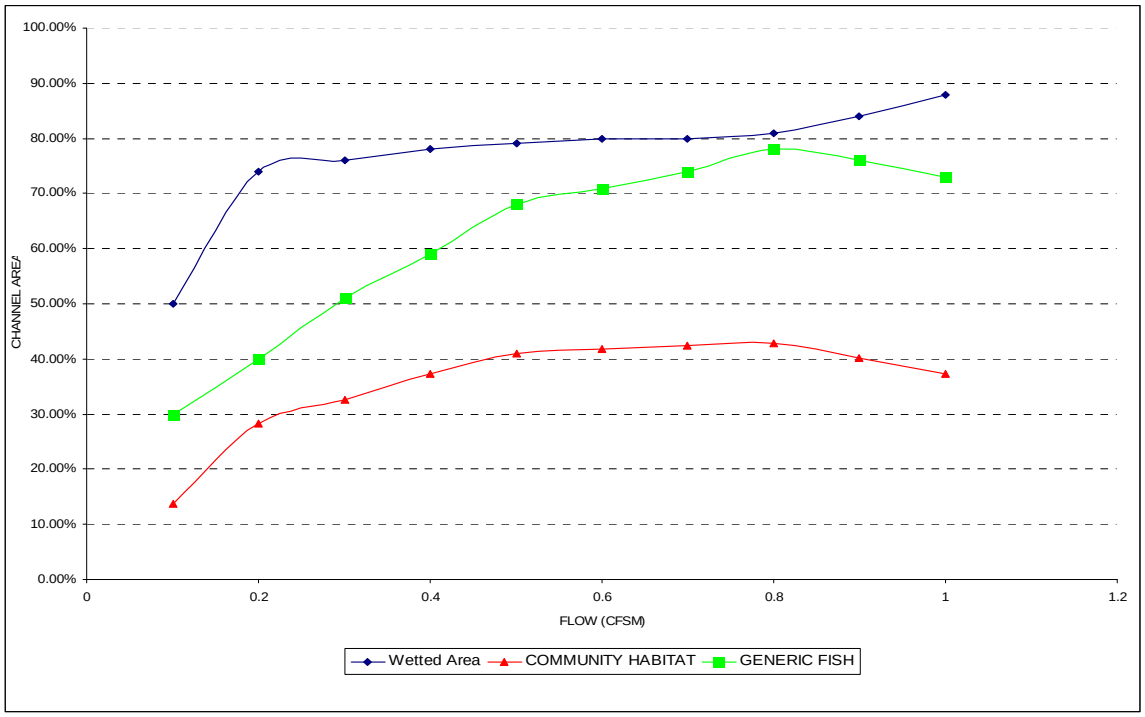

Figure 4: Reach 1 available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat initially increased from 15% at 0.1 cfsm to 50% at 0.2 cfsm, decreased gradually to 35% as flow increased to 1 cfsm. Atlantic salmon habitat increased from 5% at 0.2 cfsm to 35% at 0.8 cfsm, decreased to 30% as flow increased to 1 cfsm. American shad habitat steadily increased from 5% at 0.1 cfsm to 50% as flow reached 1 cfsm.

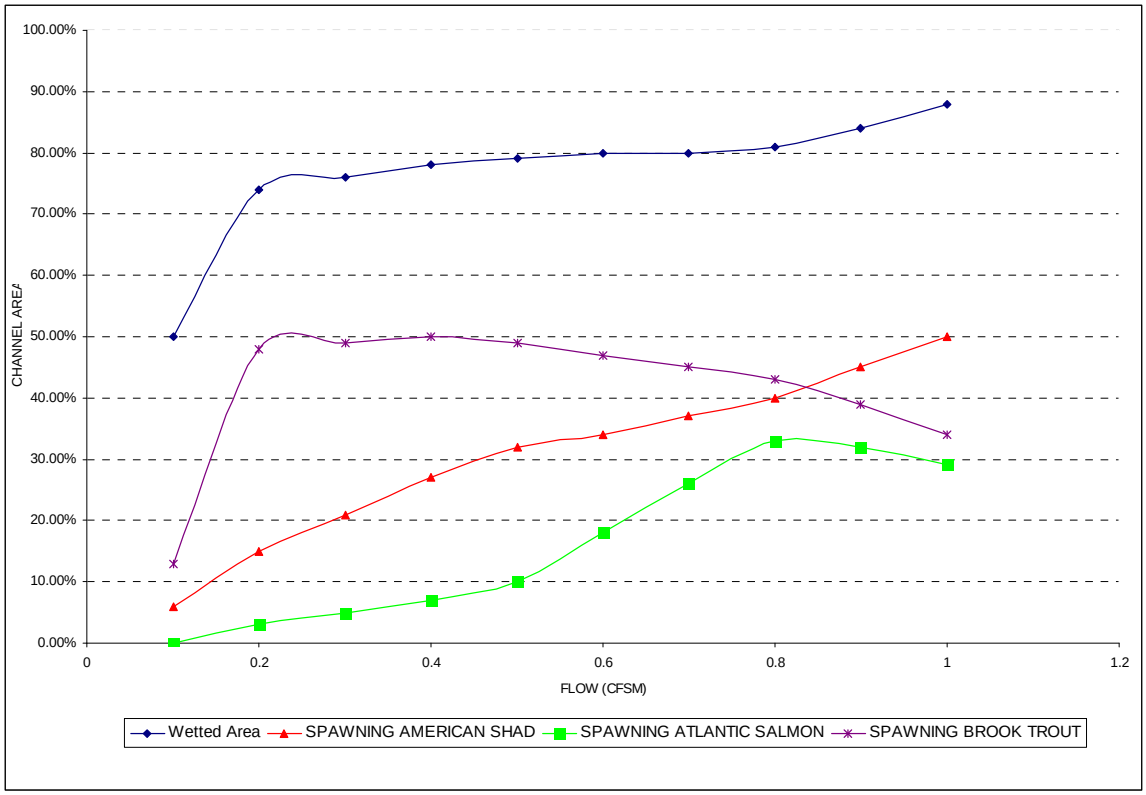

Figure 5: Reach 1 anadromous and salmonids spawning rating curves.

Reach 2

Rearing & Growth

The amount of wetted area was flow dependent and increased from almost 60% at 0.1 cfsm to 80% at 1 cfsm. Longnose dace habitat ranges from 5% to 10% regardless of flow. Blacknose dace habitat increased initially from 25% to 35% at about 0.3 cfsm before steadily decreasing to 10% by 0.9 cfsm and then slightly increased to 15% at 1 cfsm. Tessellated darter habitat increased from 25% to 45% by about 0.3 cfsm and then decreased to 10% as flows increased to 1 cfsm. American eel habitat increased from 10% at 0.1 cfsm to 55% at 0.9 cfsm before decreasing slightly to 50% at 1 cfsm. Brook trout habitat was dependent on flow. Habitat decreased from 25% to 10% at 0.5 cfsm and then increased to 30% by 1 cfsm. Common shiner habitat increased from 15% at 0.1 cfsm to about 50% by 0.2 cfsm before increasing slightly to 65% at 1 cfsm.

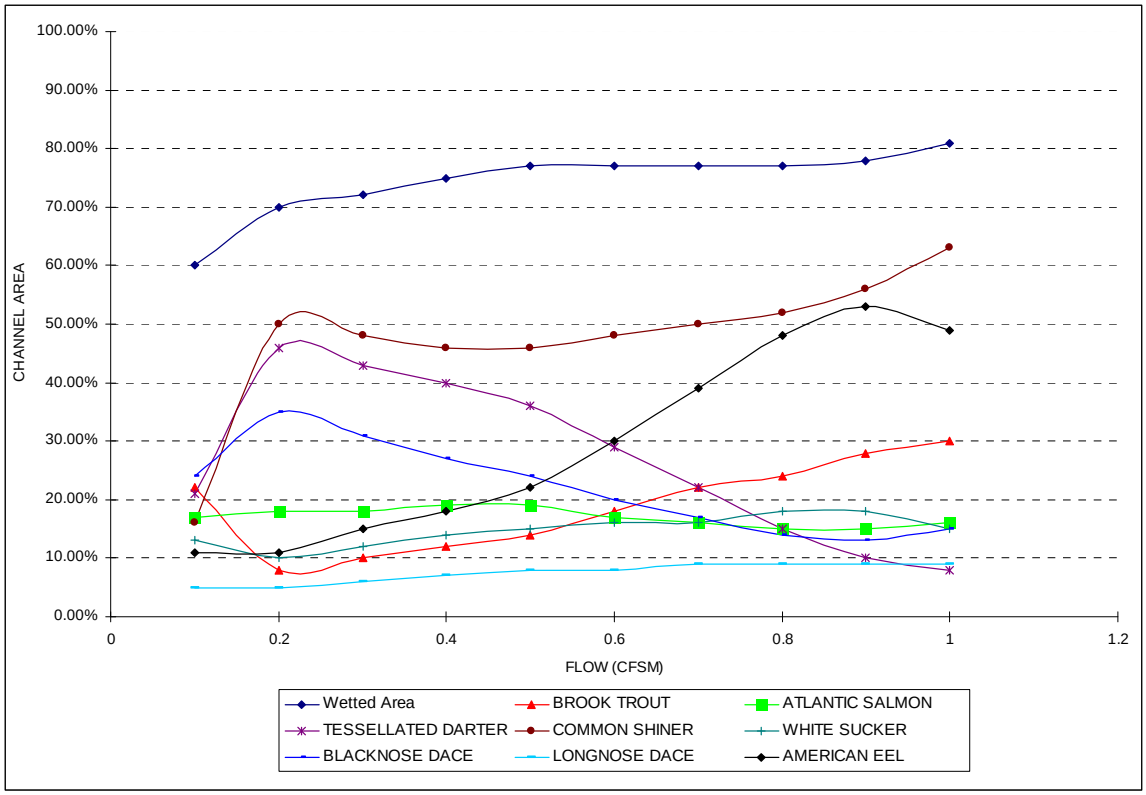

Figure 6: Reach 2 rearing and growth rating curves.

Community habitat increased from 15% to 30% as flows increased from 0.1 cfsm to 1 cfsm. Generic fish habitat increased from 45% at 0.1cfsm to about 65% at 1 cfsm.

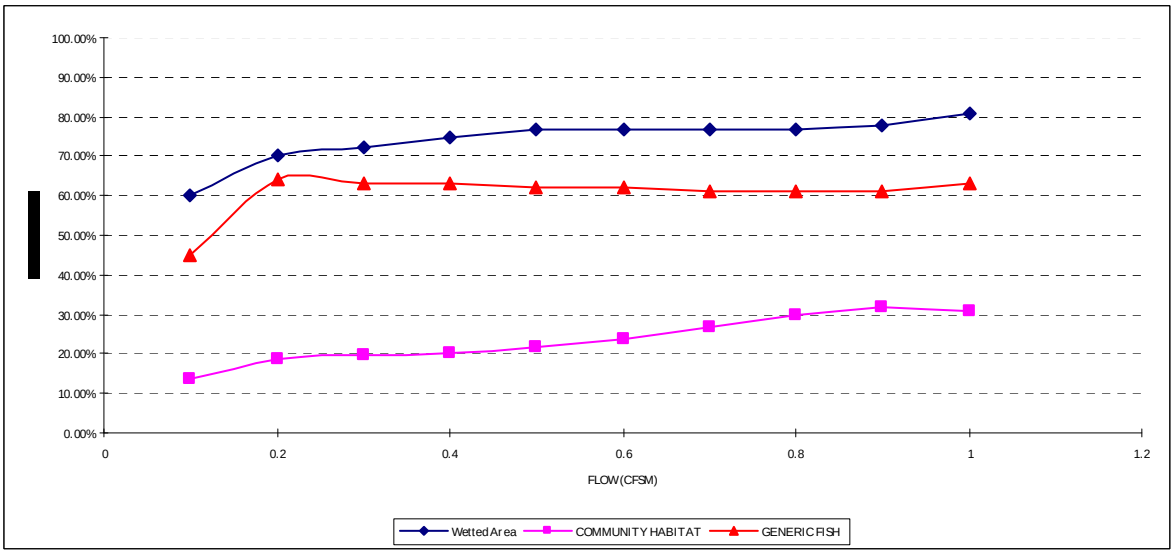

Figure 7: Reach 2 habitat.

Spawning

White sucker habitat initially increased from 35% at 0.1 cfsm to 60% at 0.2 cfsm where it remained between 55% and 60% as flow increased to 1 cfsm. Tessellated darter habitat initially decreased from 30% at 0.1 cfsm to 25% at 0.2 cfsm, increased to 50% at 0.5 cfsm and then gradually decreased to 45% as flow reached 1 cfsm. Blacknose dace and Common shiner habitat increased form 15% to around 50% at 0.2 cfsm before decreasing to 5% at 0.9 cfsm. They both then increased slightly to just below 10% at a flow of 1 cfsm. Longnose dace habitat steadily increased from 5% at 0.1 cfsm to 20% as flow increased to 1 cfsm.

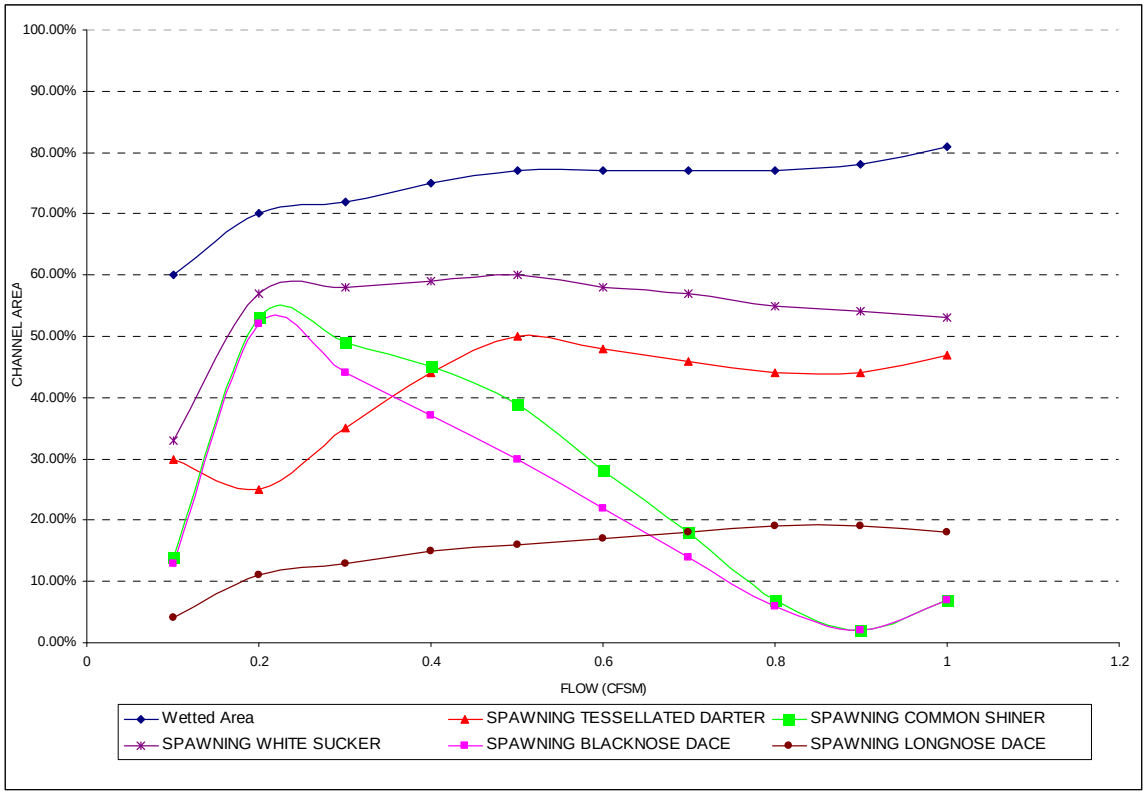

Figure 8: Reach 2 spawning rating curves.

Community habitat initially increased from 15% at 0.1 cfsm to 35% at 0.2 cfsm, decreased gradually to 20% as flow increased to 1 cfsm. Generic fish habitat increased from 30% at 0.1 cfsm to 55% as flow increased to 1 cfsm.

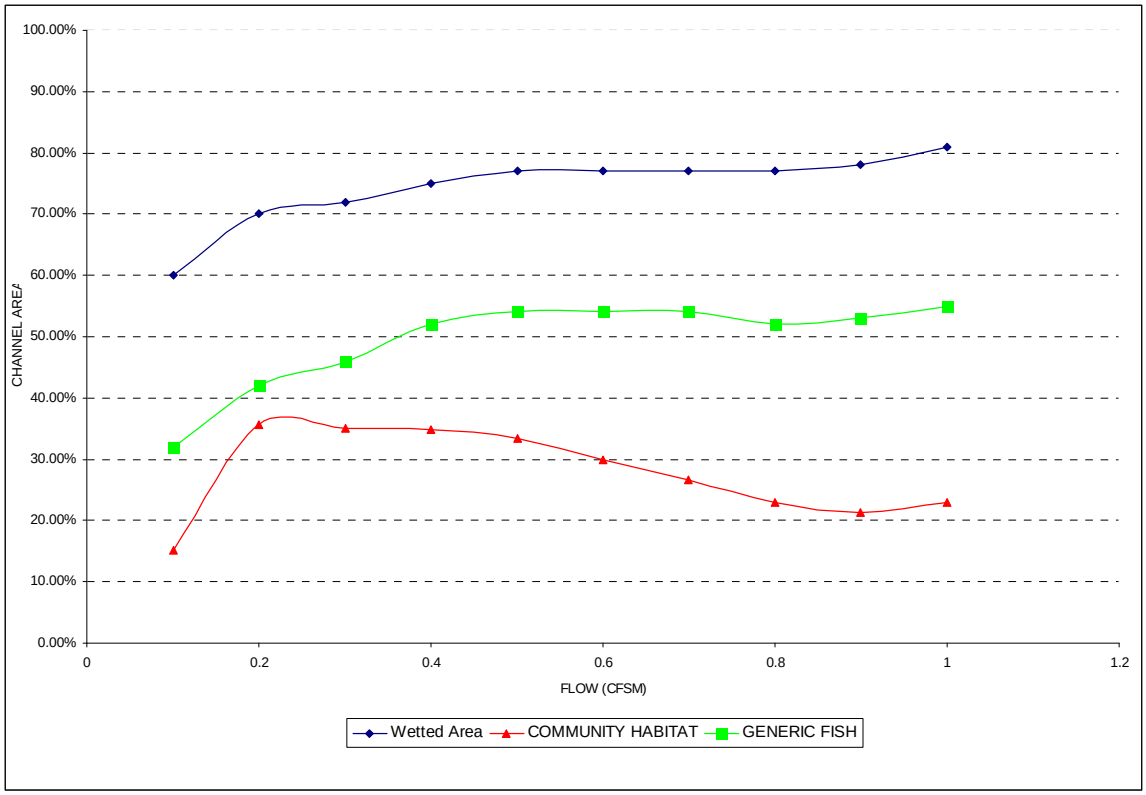

Figure 9: Reach 2 available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased sharply from 15% at 0.1 cfsm to almost 60% at 0.2 cfsm, decreased to 10% at a flow of 0.9 cfsm and then increased to 25% at a flow of 1 cfsm. Atlantic salmon habitat slowly increased from 5 % at 0.1 cfsm to 25% as flow reached 1 cfsm. American shad habitat increased from 0% at 0.1 cfsm to 20% at0.2 cfsm, decreased to 10% at 0.5 cfsm, and then increased to 45% as flow increased to 1 cfsm.

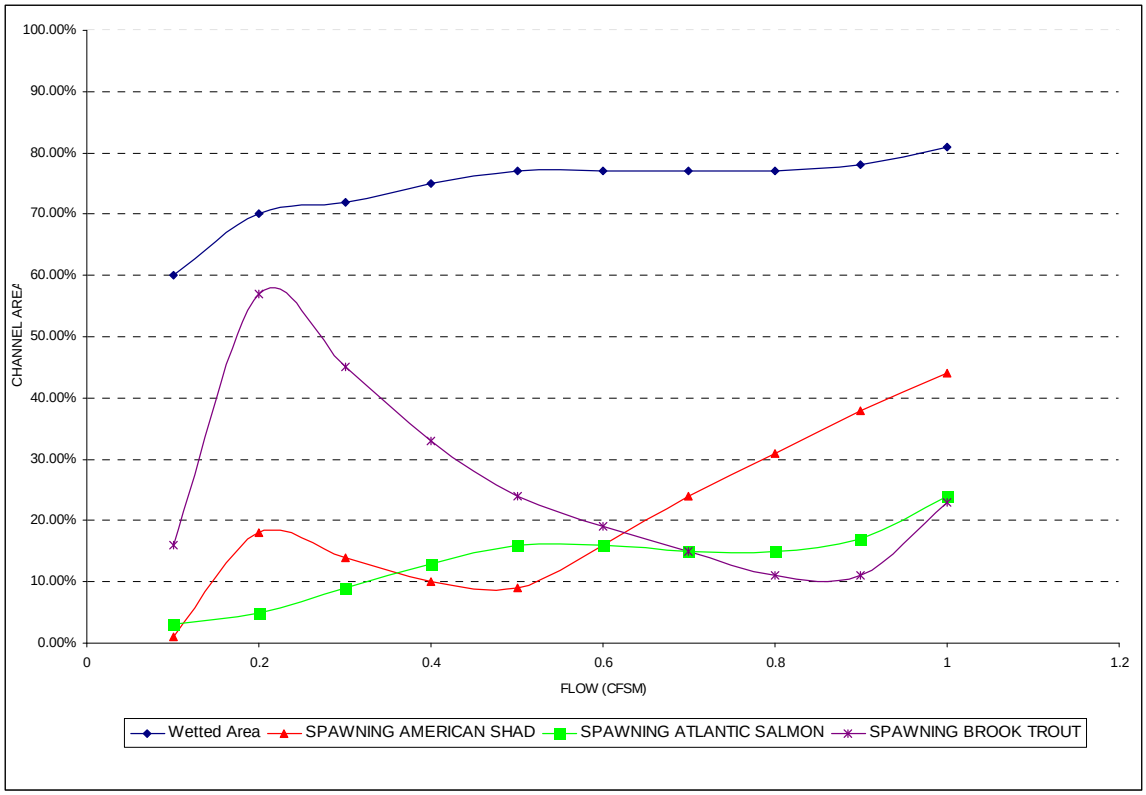

Figure 10: Reach 2 anadromous and salmonids rating curves.

Reach 3

Rearing & Growth

The amount of wetted area was flow dependent and increased from 45% at 0.1 cfsm to almost 80% at 1 cfsm. Blacknose dace had the greatest increased in habitat. It started with about 10% at 0.1 cfsm and increased to just above 45% by 0.5 cfsm where it slightly decreased to just above 40% as flows continued to increase. Tessellated darter habitat increased from 25% to 35% from 0.1 cfsm to0.2 cfsm. It decreased to 10% at 0.6 cfsm and then remained steady as flows increased to 1 cfsm. Atlantic salmon stayed between 10% and 20% regardless of flow and Longnose dace remained around 5% regardless of flow. Brook trout habitat remained between 10-20% regardless of flow. Common shiner habitat increased from 10% at 0.1 cfsm to 55% at 1 cfsm. White sucker habitat remained between 10-15% regardless of flow. American eel habitat decreased from 25% at 0.1 cfsm to 15% at0.2 cfsm and then increased steadily to 45% at 0.5 cfsm. It then decreased to about 10% at 0.8 cfsm and finally increased to 20% at 1 cfsm.

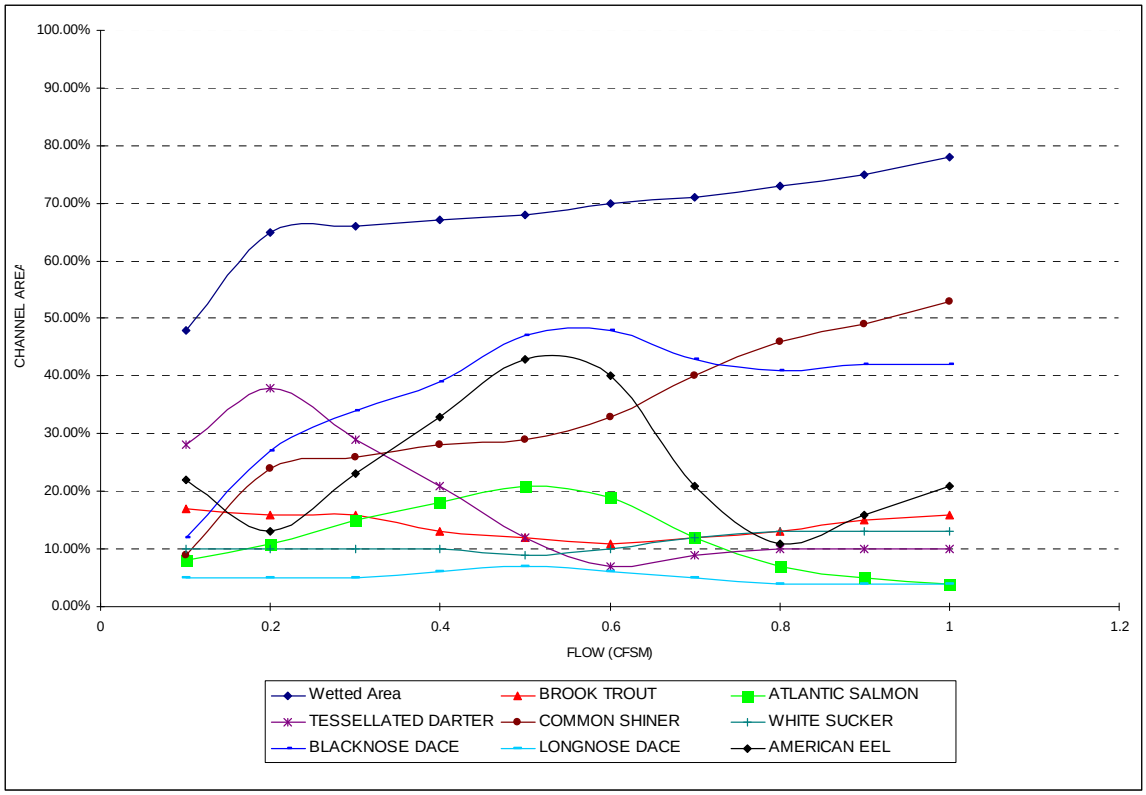

Figure 11: Reach 3 rearing and growth rating curves.

Community habitat remained between 15% and 30% regardless of flow. Generic fish habitat is 40% at 0.1 cfsm and increases to about 60% at 1 cfsm.

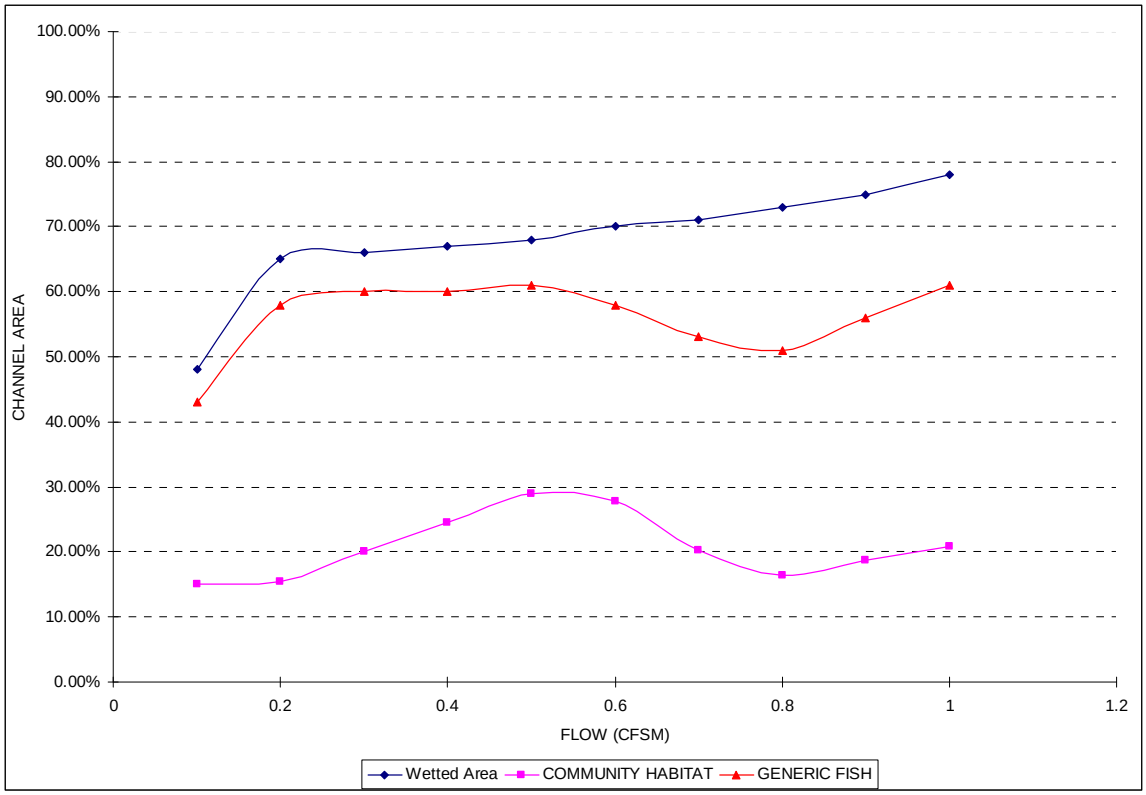

Figure 12: Reach 3 habitat.

Spawning

White sucker habitat slowly increased from 35% at 0.1 cfsm to 55% at 0.6 cfsm, it then decreased to 50% as flow reached 1 cfsm. Tessellated darter habitat initially decreased from 35% at 0.1 cfsm to 25% at 0.5 cfsm, it then increased to 55% at 0.8 cfsm before decreasing to 50% at a flow level of 1 cfsm. Blacknose dace and Common shiner habitat increased from 5% at 0.1 cfsm to 30% and 35% respectively at0.2 cfsm. They both gradually decreased to about 5% as flow reached 1 cfsm. Longnose dace habitat remained between 0% and 15% regardless of flow.

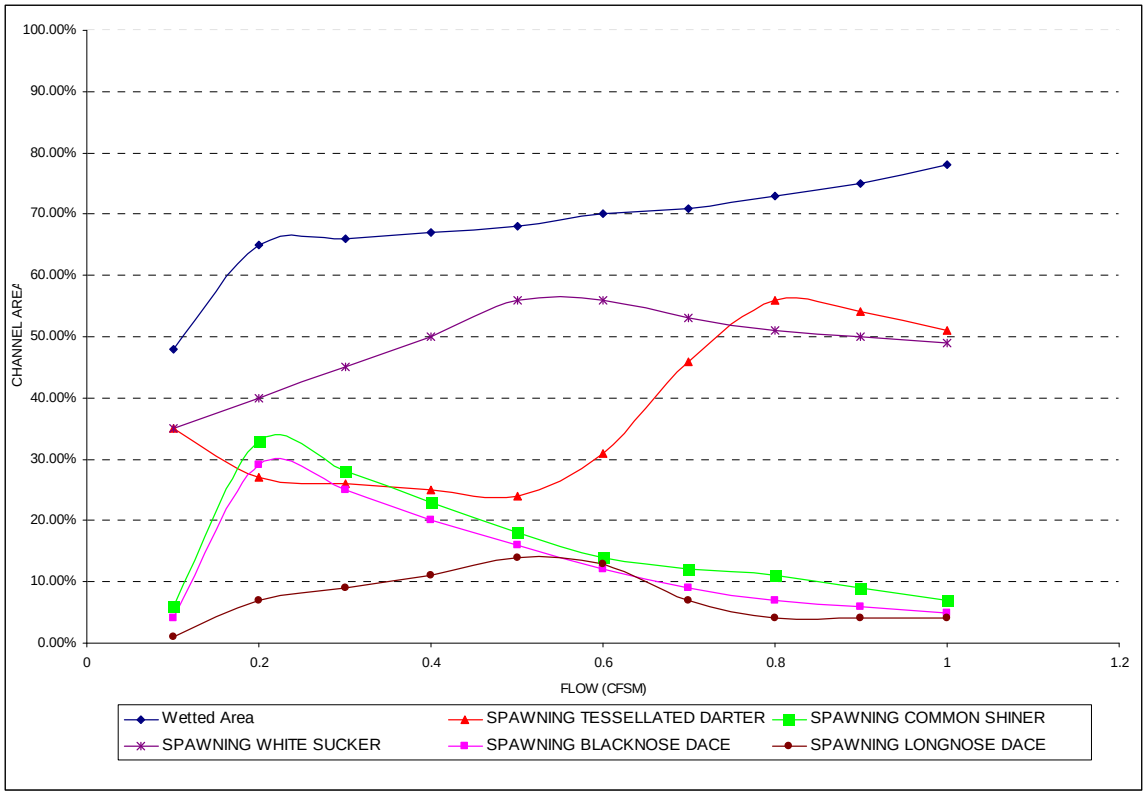

Figure 13: Reach 3 spawning curves.

Community habitat increased from 10% at 0.1 cfsm to 25% at0.2 cfsm. It slightly decreased to just below 20% as flow increased to 1 cfsm. Generic fish habitat increased from 35% at 0.1 cfsm to 60% at 0.8 cfsm before it decreased to 55% at a flow of 1 cfsm.

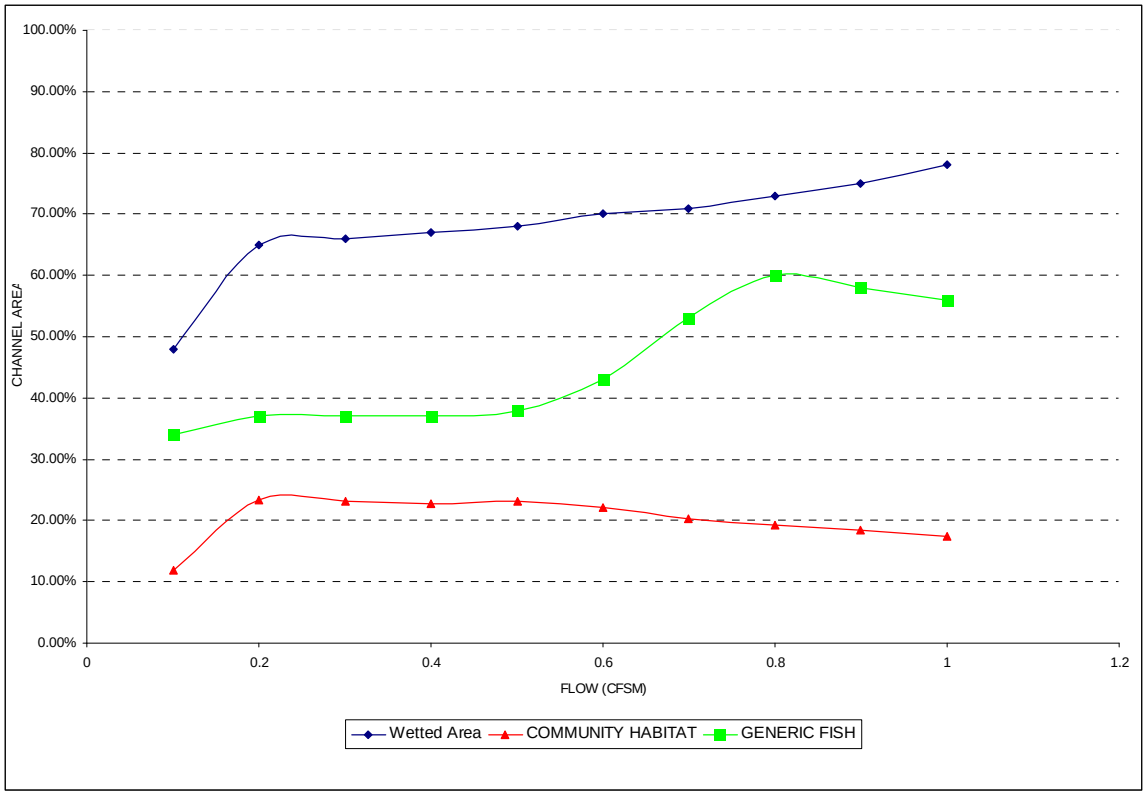

Figure 14: Reach 3 available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased from 5% at 0.1 cfsm to 30% at0.2 cfsm. It remained constant as flow increased to 0.6 cfsm, from there it increased to just below 50% as flow reached 1 cfsm. Atlantic salmon habitat steadily increased from 0% at 0.1 cfsm to 45% at 1 cfsm. American shad habitat remained at 5% at flows of 0.1 cfsm to 0.5 cfsm, increased to 50% as flow increased to 1 cfsm.

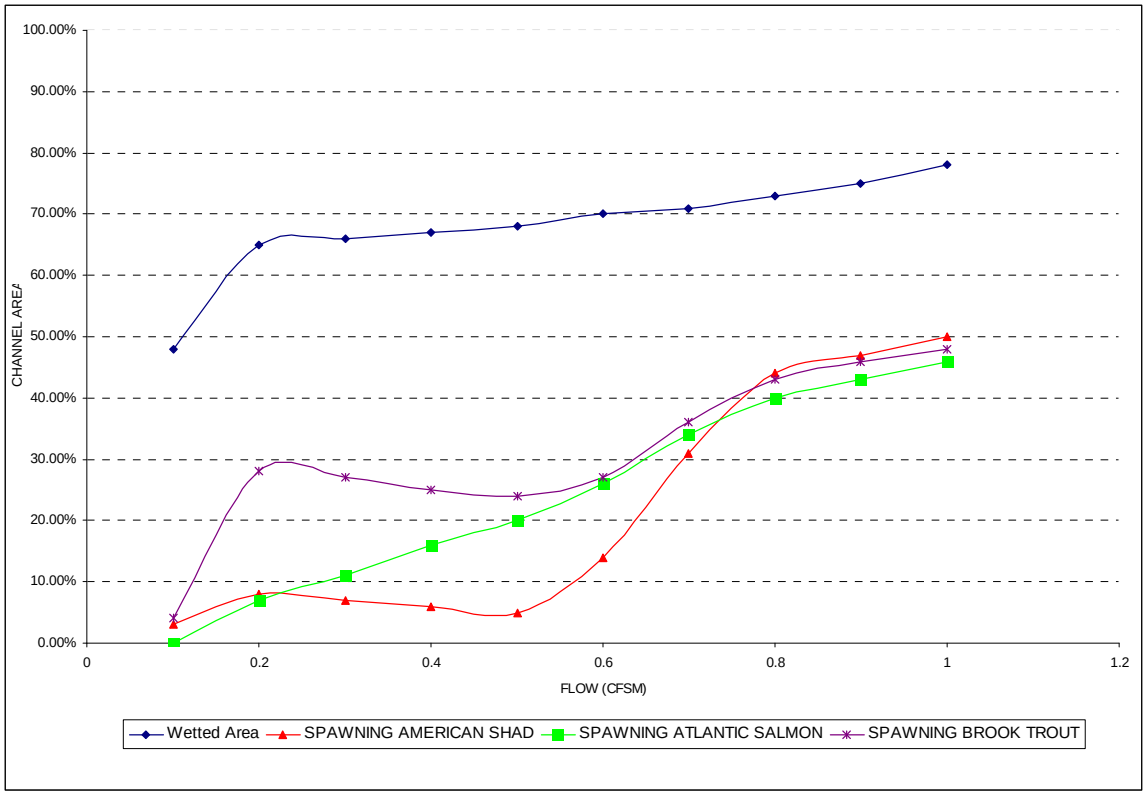

Figure 15: Reach 3 anadromous and salmonids spawning rating curves.

Reach 4

Rearing & Growth

The amount of wetted area was flow dependent and increased from 50% at 0.1 cfsm to slightly above 90% at 1 cfsm. Common shiner habitat increased from 5% at 0.1 cfsm to 65% by 0.5 cfsm and stayed between 65% and 45% while the flow increased to 1 cfsm. American eel habitat remained constant at 5% before increasing to 25% at 0.8 cfsm. It decreased to 15% at 1 cfsm. Blacknose dace habitat varied greatly in relationship to the flow. It began at 5% at 0.1 cfsm and increased to almost 30% at0.2 cfsm. It then decreased to 25% at 0.5 cfsm and increased up to 70% at 0.8 cfsm. It steadily decreased to 55% at 1 cfsm. Brook trout habitat increased from 25% at 0.1 cfsm to 40% at 0.5 cfsm. It then decreased to 15% at 0.8 cfsm and steadily increased to 25% at 1 cfsm. Tessellated darter habitat increased from 25% to 50% by 0.3 cfsm before steadily decreasing to 15% as flows increased to 1 cfsm. Atlantic salmon and Longnose dace habitat was less than 15% regardless of flow. White sucker habitat remained between 10-20% regardless of flow.

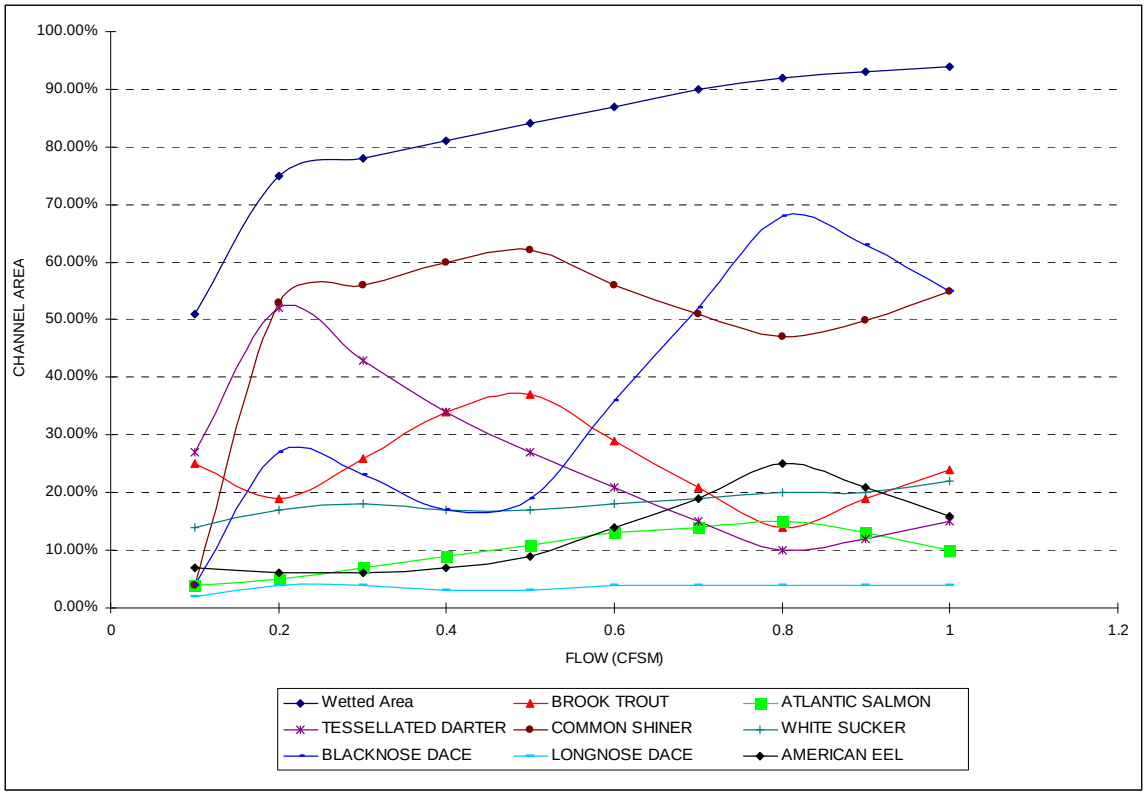

Figure 16: Reach 4 rearing and growth rating curves.

Community fish habitat increased almost linearly from 15% at 0.1 cfsm to 40% at 1 cfsm. Generic fish habitat corresponded closely with the wetted area from 45% at 0.1 cfsm to 80% at 1 cfsm.

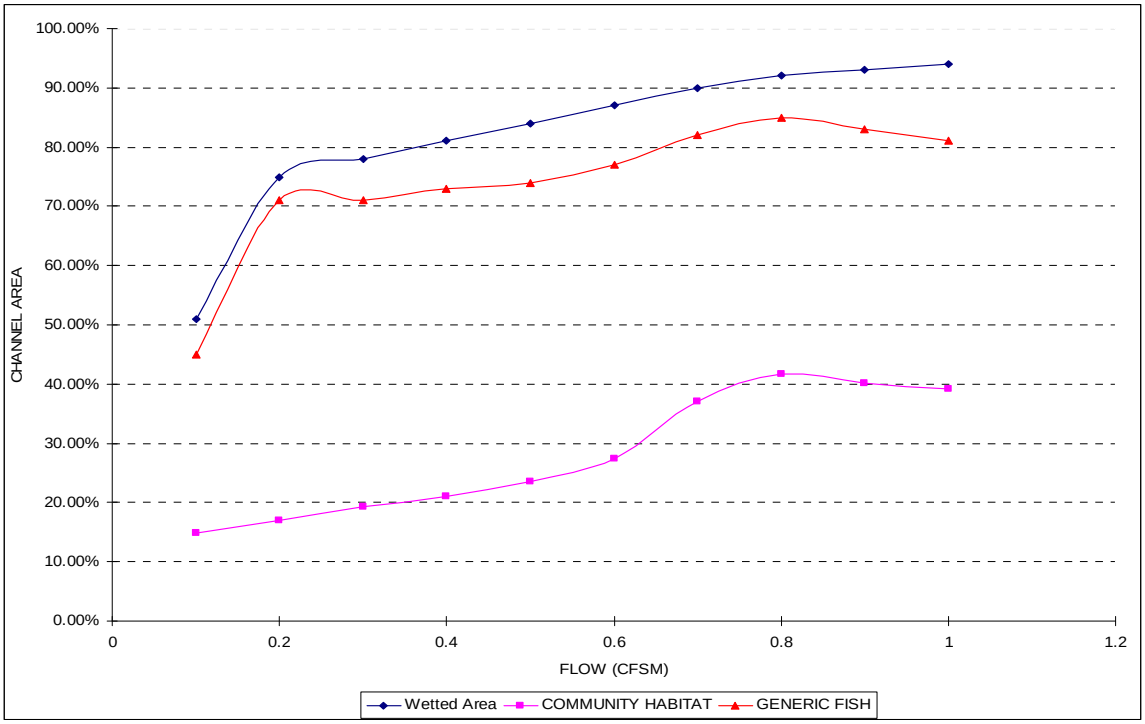

Figure 17: Reach 4 habitat.

Spawning

White sucker habitat increased from 30% at 0.1 cfsm to 55% as flow reached 1 cfsm. Tessellated darter habitat increased from 30% at 0.1 cfsm to 50% at 0.6 cfsm, decreased to 30% at 0.8 cfsm, slightly increased to 35% as flow reached 1 cfsm. Blacknose dace and Common shiner habitat increased from 0% and 10% at 0.1 cfsm to 35% and 40% respectively at0.2 cfsm, both decreased to 5% at 0.6 cfsm, both increased to just below 10% as flow reached 1 cfsm. Longnose dace initially increased from 5% at 0.1 cfsm to 10% at0.2 cfsm. It then slowly decreased to 0% as flow reached 0.7 cfsm where it remained 0% all the way up to 1 cfsm.

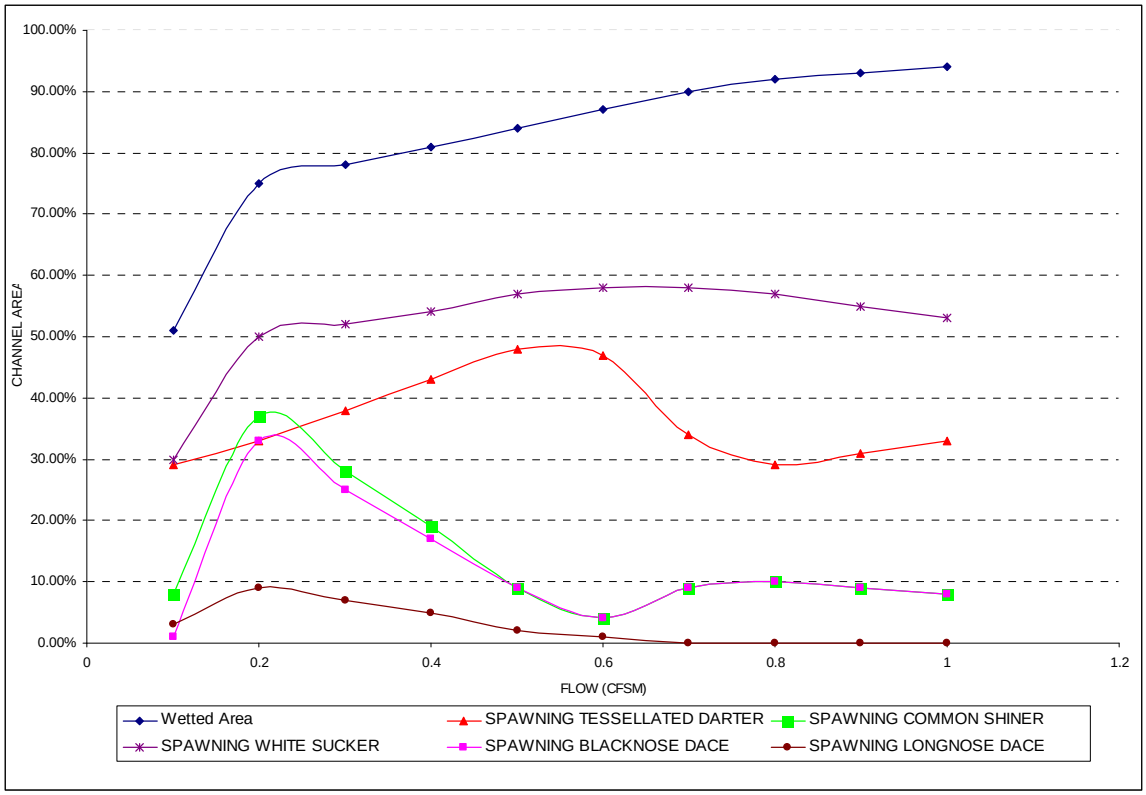

Figure 18: Reach 4 spawning rating curves.

Community habitat increased initially from 10% at 0.1 cfsm to 30% at0.2 cfsm, steadily decreased to 15% as flow increased to 1 cfsm. Generic fish habitat increased from 30% at 0.1 cfsm to 55% at 0.6 cfsm, decreased to 40% at 0.8 cfsm and then increased slightly to 45% as flow increased to 1 cfsm.

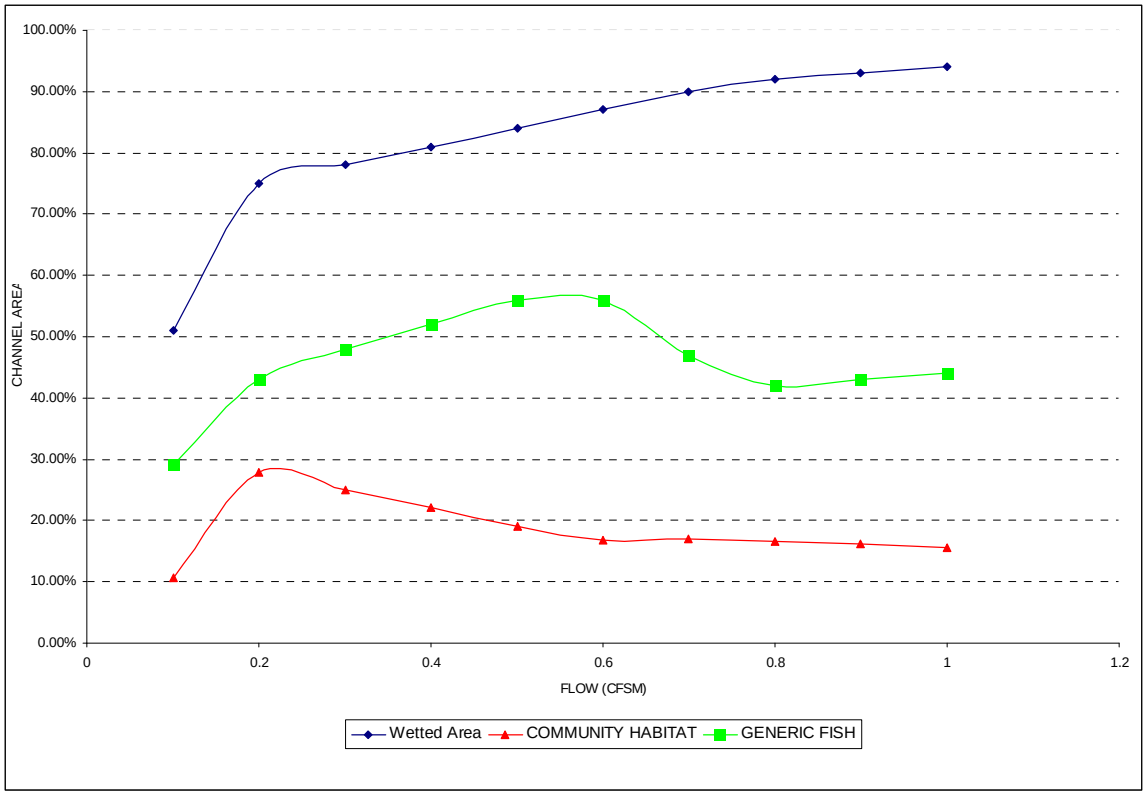

Figure 19: Reach 4 habitat.

Anadromous and Salmonids spawning

Brook trout habitat initially increased from 0% at 0.1 cfsm to 45% at 0.6 cfsm, decreased to 20% at 0.8 cfsm, increased to 35% as flow increased to 1 cfsm. Atlantic salmon habitat steadily increased with flow from 0% at 0.1 cfsm to 50% at 1 cfsm. American shad habitat also increased steadily with flow from 5% at 0.1 cfsm to just below 70% at 1 cfsm.

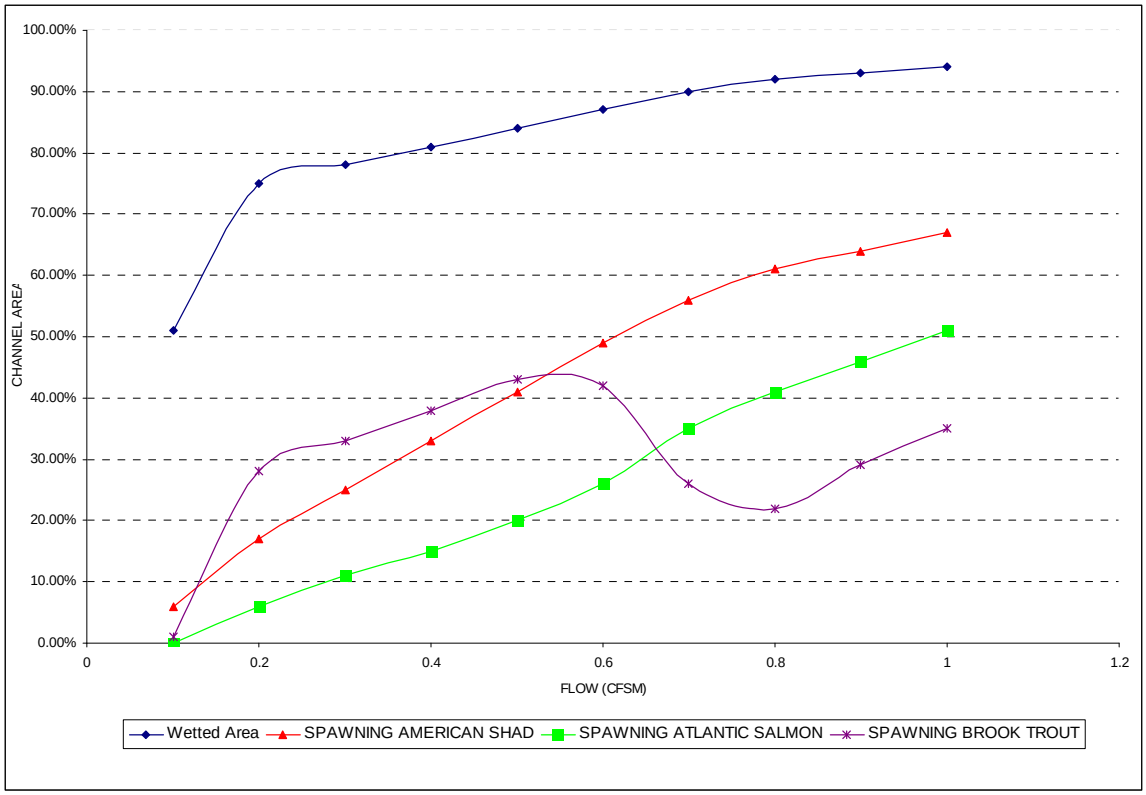

Figure 20: Reach 4 anadromous and salmonids rating curves.

Reach 5

Rearing & Growth

The amount of wetted area was flow dependent and increased from about 60% at 0.1 cfsm to 85% at 1 cfsm. White sucker habitat increased from 5% at 0.1 cfsm to 15% by 1 cfsm. American eel habitat increased from 20% at 0.1 cfsm to 45% by 0.5 cfsm, decreased to 35% at 0.8 cfsm and then increased to 45% by 1 cfsm. Blacknose dace habitat decreased from 35% at 0.2 cfsm to 20% at 0.4 cfsm before increasing to 55% by 1 cfsm. Tessellated darter habitat decreased from 40% at 0.1 cfsm to 25% at about 0.9 cfsm before increasing back to 40% by 1 cfsm. Brook trout habitat increased from 30% at 0.1 cfsm to 35% at 0.5 cfsm before decreasing to 25% as flows increased to 1 cfsm. Atlantic salmon and Longnose dace habitat remained between 15-30% regardless of flow. There was virtually no habitat for common shiner up until a flow of 1 cfsm where there was about 30% habitat.

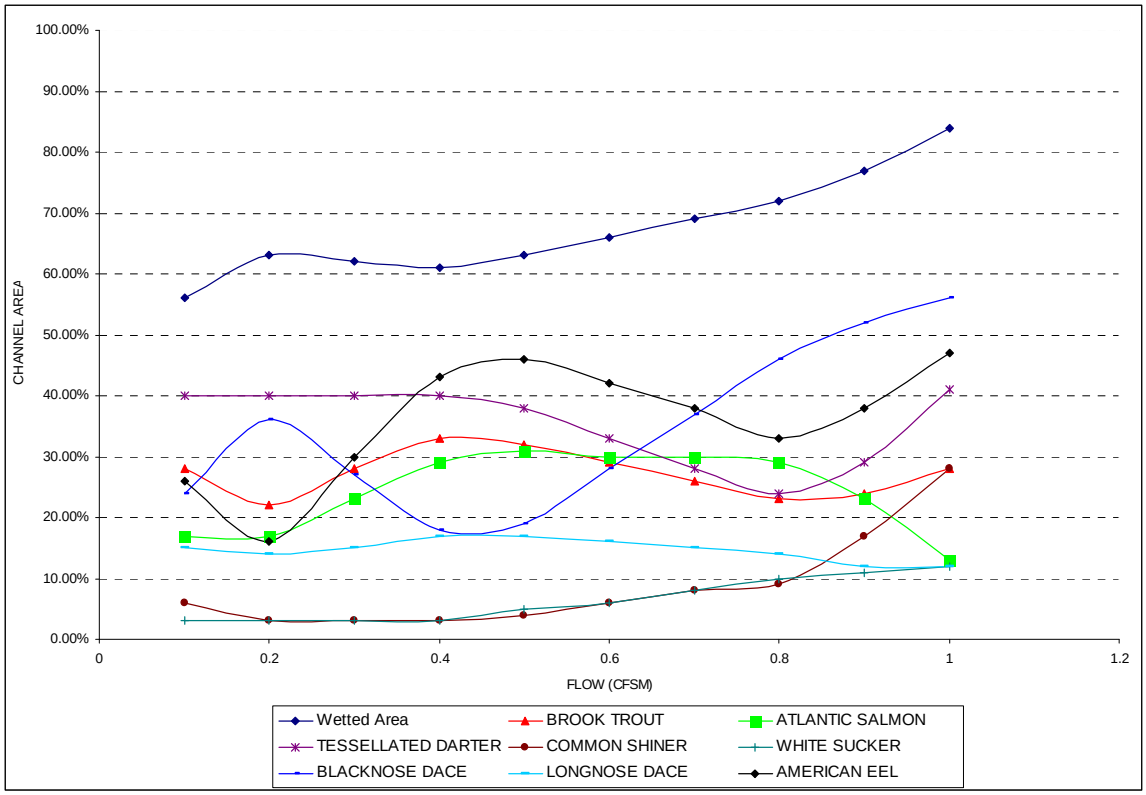

Figure 21: Reach 5 rearing and growth rating curves.

Available community habitat remained relatively constant regardless of flow. Generic fish habitat corresponded closely with the wetted curve. It increased from 55% at 0.1 cfsm to 80% at 1cfsm.

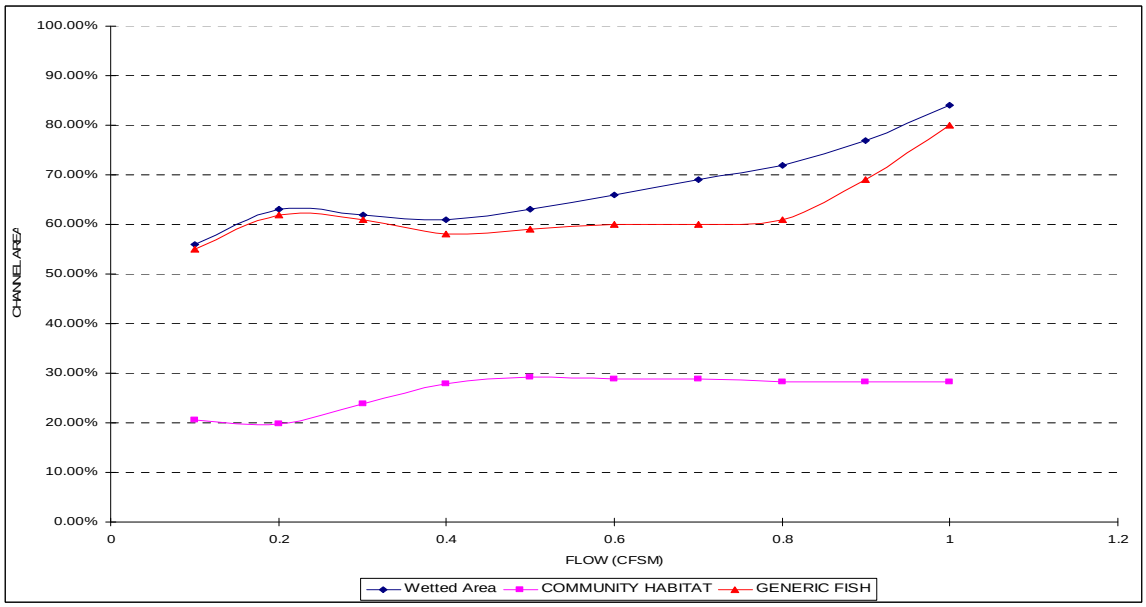

Figure 22: Reach 5 habitat.

Spawning

White sucker habitat steadily increased from just below 50% at 0.1 cfsm to 75% as flow reached 1 cfsm. Common shiner habitat initially increased from 35% at 0.1 cfsm to 50% at0.2 cfsm, decreased to 35% at 0.5 cfsm, increased to just under 70% as flow increased to 1 cfsm. Tessellated darter habitat slowly increased from 40% at 0.1 cfsm to 65% as flow reached 1 cfsm. Blacknose dace habitat initially increased from 30% at 0.1 cfsm to 45% at0.2 cfsm, decreased slightly to 30% at 0.6 cfsm, increased to 55% as flow increased to 1 cfsm. Longnose dace habitat increased gradually with flow from 0% at 0.1 cfsm to 25% at 1 cfsm.

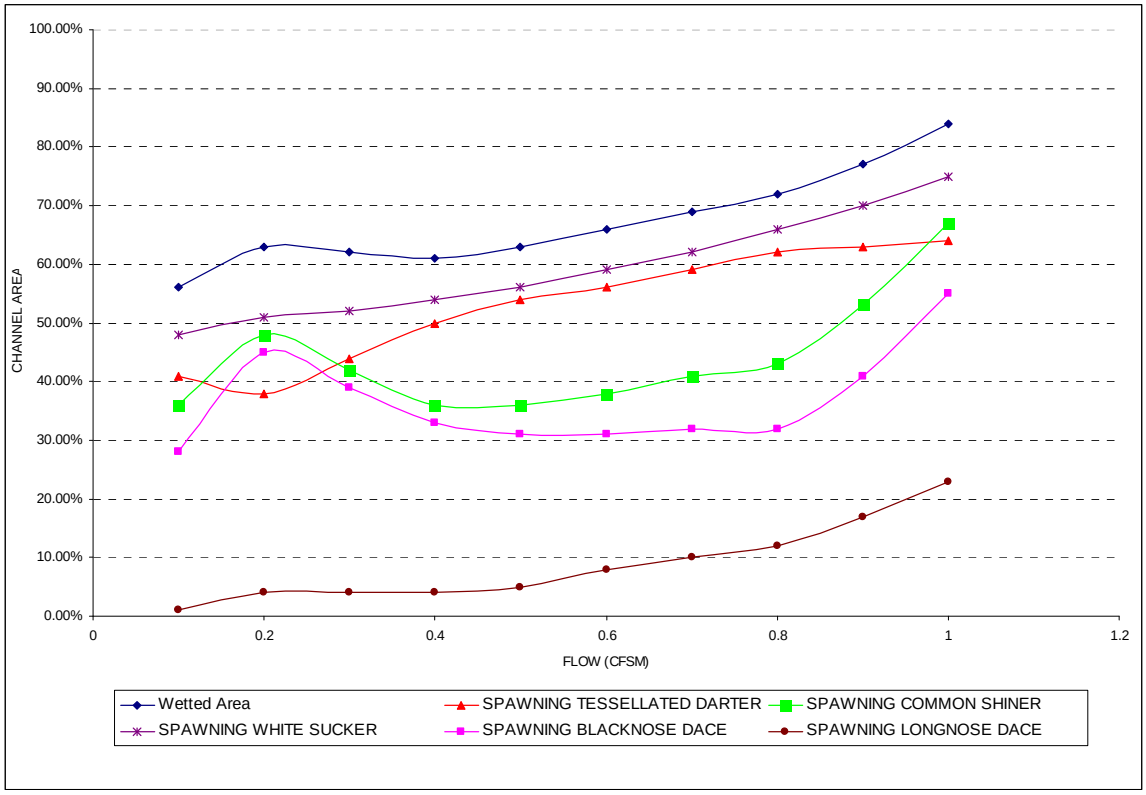

Figure 23: Reach 5 spawning rating curves.

Community habitat slowly increased from 30% at 0.1 cfsm to 55% as flow reached 1cfsm. Generic fish habitat increased from just below 50% at 0.1 cfsm to 70% as flow increased to 1 cfsm.

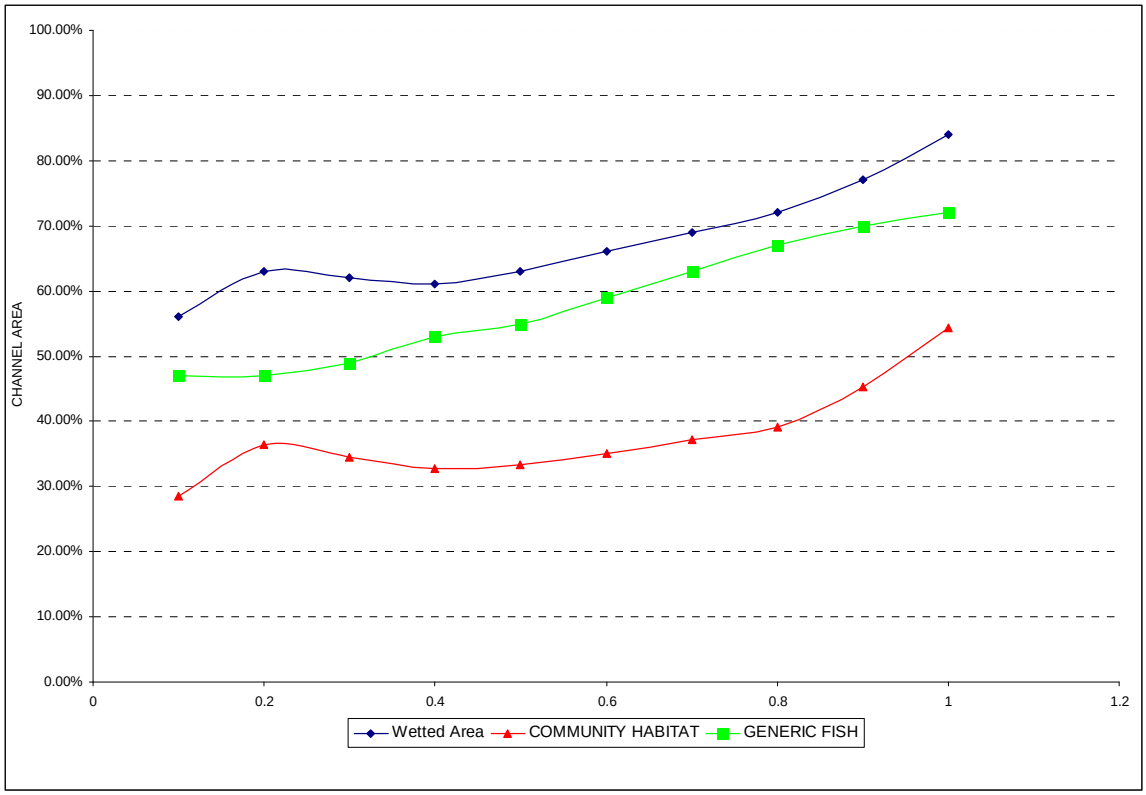

Figure 24: Reach 5 available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat initially increased from just above 20% at 0.1 cfsm to just below 40% at0.2 cfsm, decreased to 20% at 0.5 cfsm and then increased to 40% as flow increased to 1 cfsm. Atlantic salmon habitat increased slowly from 0% at 0.1 cfsm to 10% as flow reached 1 cfsm. American shad habitat increased slightly with flow from 0% at 0.1 cfsm to 5% as flow reached 1 cfsm.

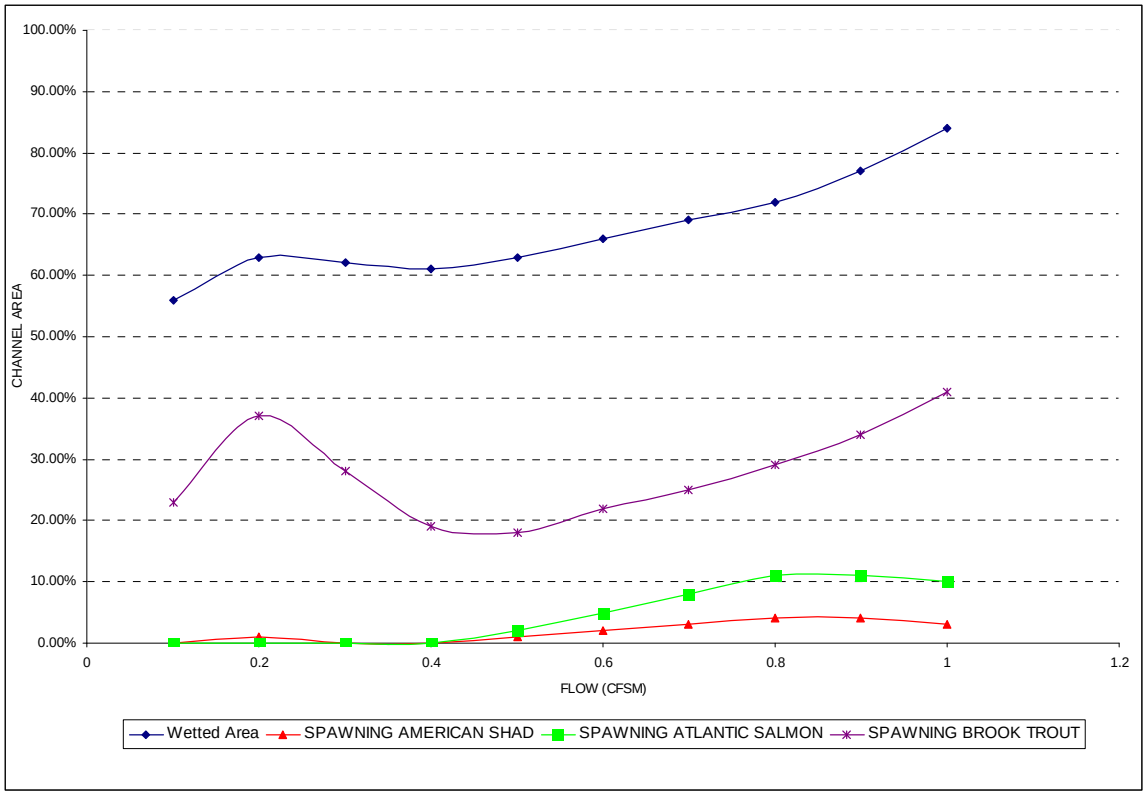

Figure 25: Reach 5 anadromous and salmonids spawning rating curves.

Reach 6

Rearing & Growth

The amount of wetted area was flow dependent and increased from about 70% at 0.1 cfsm to 100% at 1 cfsm. American eel habitat increased from 30% at 0.1 cfsm to 60% at 0.5 cfsm before slowly decreasing to 45% by 1 cfsm. Blacknose dace habitat increased from 20% at 0.1 cfsm to 50% at 0.5 cfsm before increasing to 65% by 1 cfsm. Tessellated darter habitat decreased from approximately 50% at 0.1 cfsm to 30% at 0.5 cfsm before increasing to almost 70% again by 1 cfsm. Brook trout habitat decreased from 35% at 0.1 cfsm to 15% at 0.5 cfsm, it then increased to 40% by 1 cfsm. White sucker habitat increased gradually from 15% to 25% as flow increased to 1 cfsm. Common shiner habitat increased from 5% at 0.1 cfsm to 50% at 1 cfsm. Longnose dace habitat decreased from 15% at 0.1 cfsm to 5% by 1 cfsm. Atlantic salmon habitat increased from 20% at 0.1 cfsm to 30% at0.2 cfsm. It then gradually decreased to about 15% at 1 cfsm.

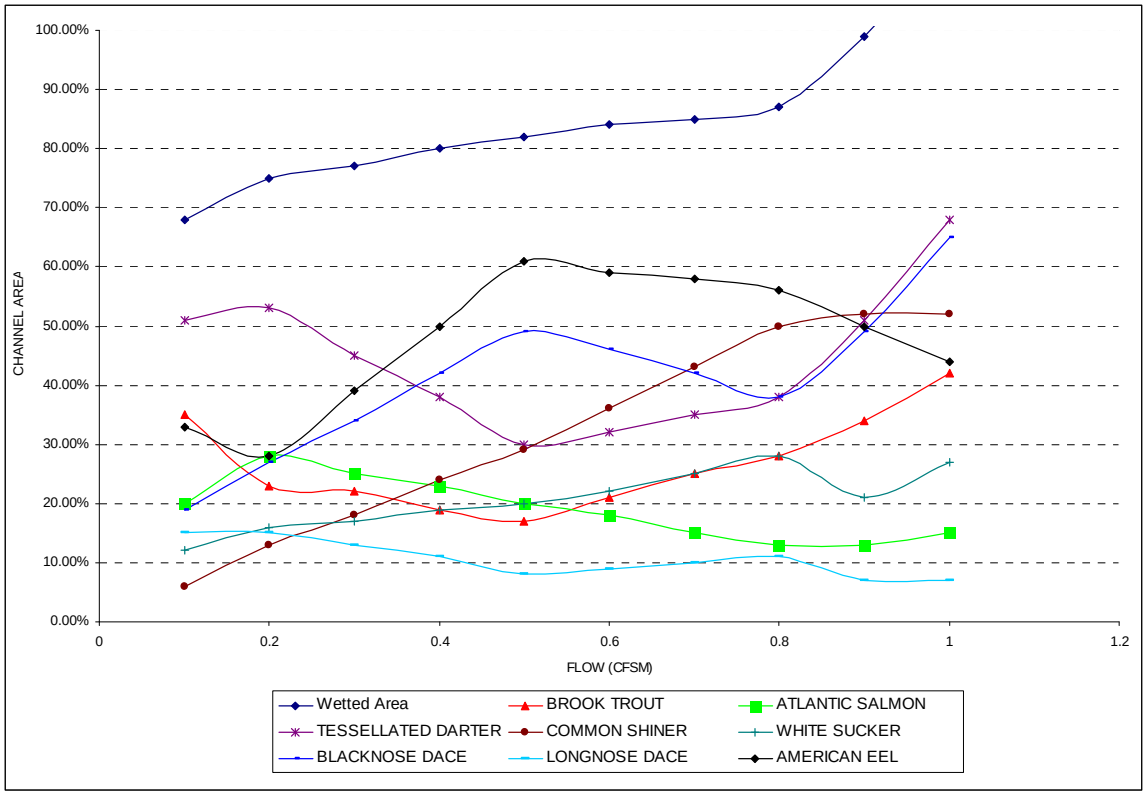

Figure 26: Reach 6 rearing and growth rating curves.

Community habitat remained at around 25% to 35% regardless of flow. Generic fish habitat corresponds closely to the wetted area curve. It increased from 65% at 0.1 cfsm to 100% at 1 cfsm.

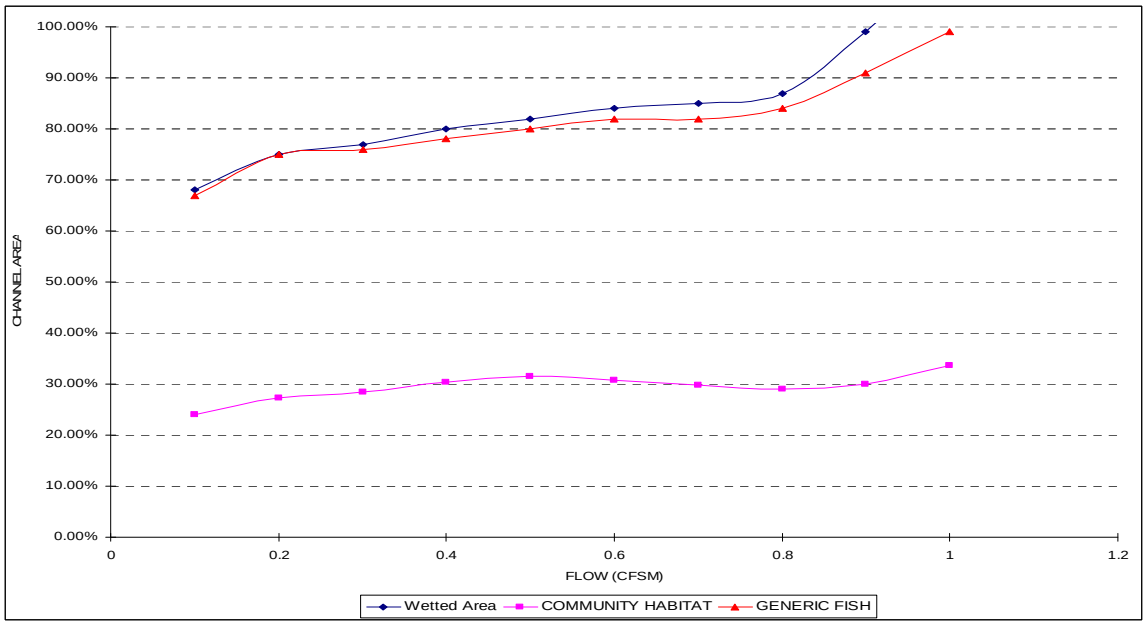

Figure 27: Reach 6 habitat.

Spawning

White sucker habitat increased from 45% at 0.1 cfsm to 75 % at 0.5 cfsm, decreased to 65% at 0.8 cfsm and then increased to 100% as flow increased to 1 cfsm. Common shiner and Blacknose dace habitat increased from 20% at 0.1 cfsm to 45% at 0.5 cfsm, they both decreased to about 35% at 0.8 cfsm and then increased to 85% and 75% respectively as flow reached 1 cfsm. Tessellated darter habitat decreased initially from 40% at 0.1 cfsm to 25% at0.2 cfsm, increased to 50% at 0.5 cfsm, decreased to 40% at 0.8 cfsm and then increased to 100% as flow reached 1 cfsm. Longnose dace habitat increased from 0% at 0.1 cfsm to 25% at 0.8 cfsm, it then decreased back down to 0% as flow increased to 1 cfsm.

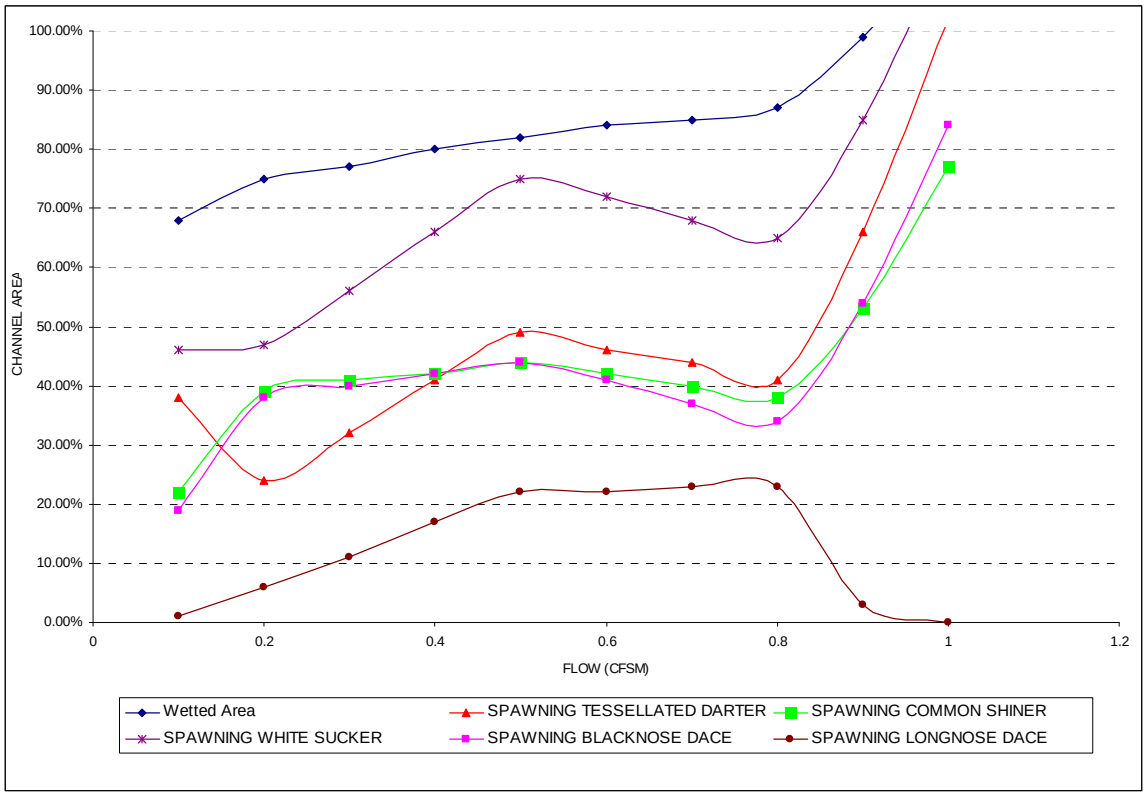

Figure 28: Reach 6 spawning rating curves.

Community habitat increased from 20% at 0.1 cfsm to 45% at 0.5 cfsm, decreased slightly to 35% at 0.8 cfsm, and then increased to 70% as flow increased to 1 cfsm. Generic fish habitat initially decreased from just above 40% at 0.1 cfsm to just below

40% at0.2 cfsm, increased to 60% at 0.5 cfsm, and then increased again to just below 70% as flow reached 1 cfsm.

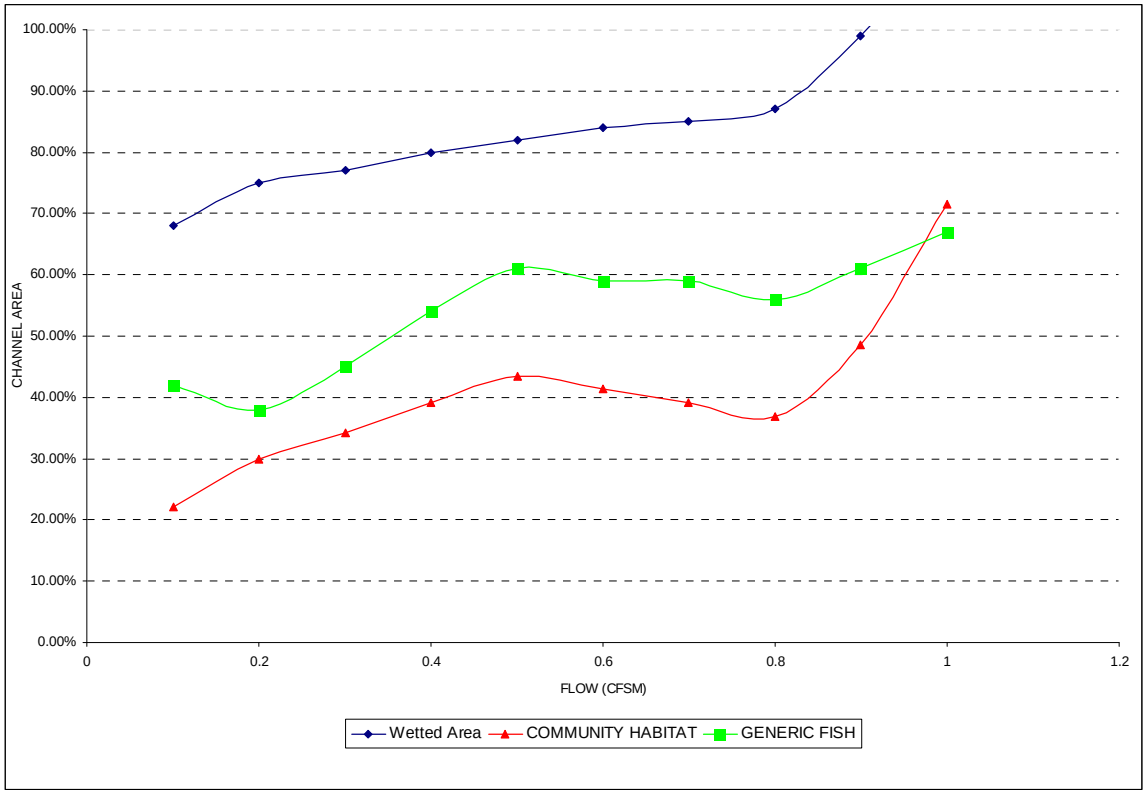

Figure 29: Reach 6 available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased from 20% at 0.1 cfsm to 45% at0.2 cfsm, gradually decreased to 35% by a flow of 0.8 cfsm, and then increased dramatically to 100% as flow increased to 1 cfsm. Atlantic salmon habitat increased gradually with flow from 0% at 0.1 cfsm to just below 30% as flow increased to 1 cfsm. American shad habitat increased from 0% at 0.1 cfsm to just below 15% at 0.8 cfsm, and then decreased to 0% as flow reached 1 cfsm.

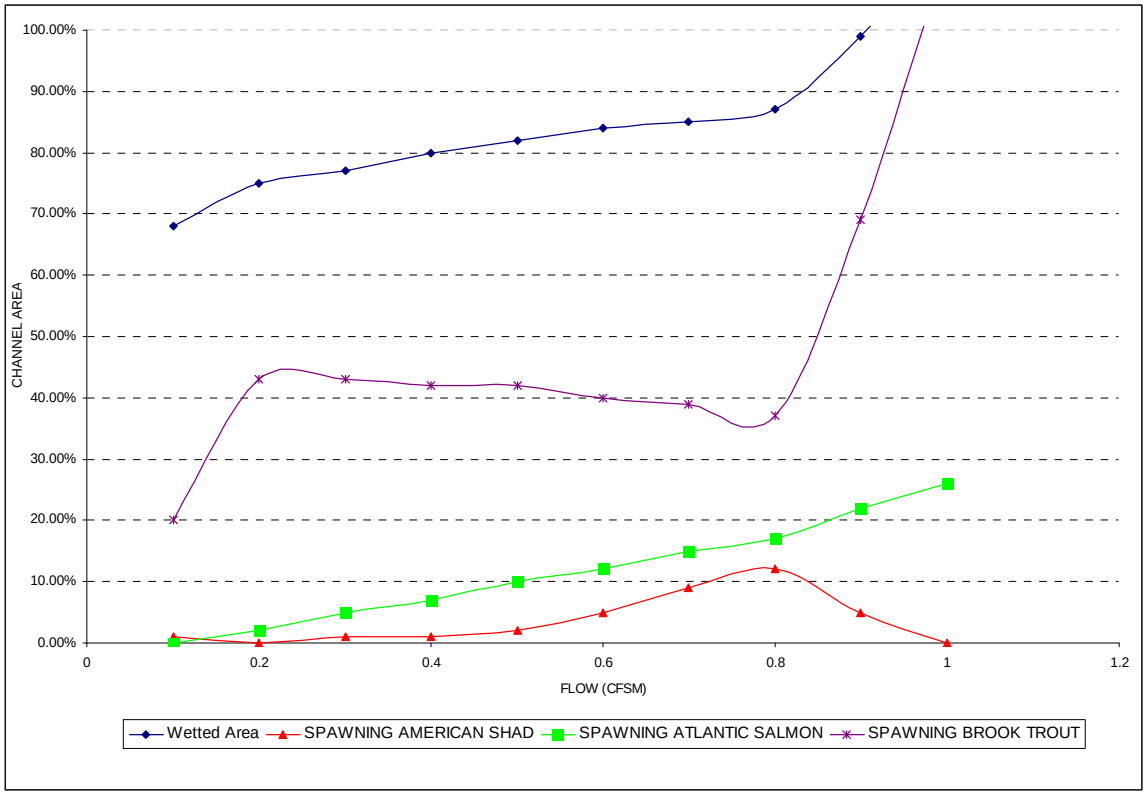

Figure 30: Reach 6 anadromous and salmonids spawning rating curves.

Reach 7

Rearing & Growth

The amount of wetted area was flow dependent and increased from about 60% at 0.1 cfsm to almost 90% at 1 cfsm. Blacknose dace habitat decreases from 35% at 0.1 cfsm to about 25% at 0.5 cfsm. It then steadily increased to 60% at 1 cfsm. American eel habitat decreased from 45% at 0.1 cfsm to 25% at0.2 cfsm. It then steadily increased to 65% at 1 cfsm. Tessellated darter habitat increased from 25% at 0.1 cfsm to 50% at 0.5 cfsm before decreasing back to 25% by 1 cfsm. Habitat for brook trout and Atlantic salmon followed the same trends. Habitat initially decreased from 35% and 25% respectively at 0.1 cfsm to about 15% for brook trout and almost 5% for Atlantic salmon at 1 cfsm. Longnose dace and white sucker also followed similar trends. Habitat increased from 10% at 0.1 cfsm to about 20% at 0.5 cfsm before decreasing to 15% and 10% respectively by 1 cfsm. There was little habitat for common shiner at low flows, however habitat did rise from 10% at 0.5 cfsm to 60% at 0.9 cfsm.

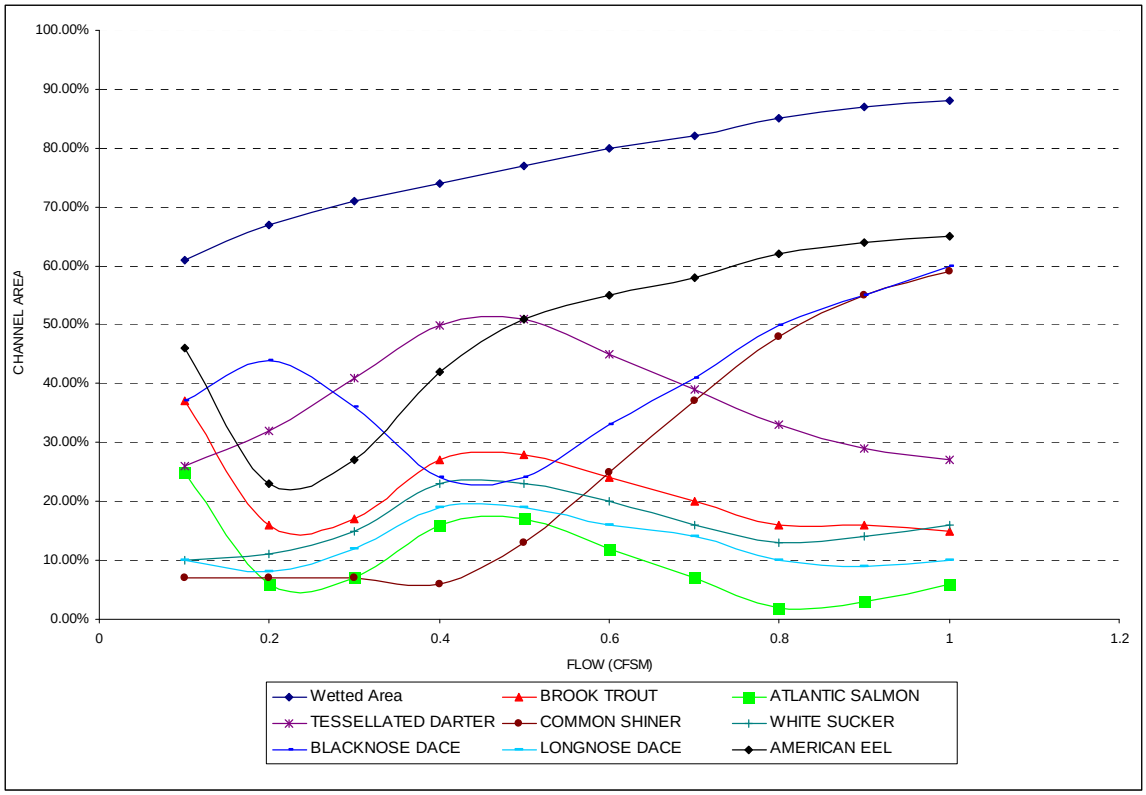

Figure 31: Reach 7 rearing and growth rating curves.

The available community habitat stayed relatively constant regardless of flow. The habitat for generic fish corresponded closely with the wetted area curve. It increased from 55% at 0.1 cfsm to 85% at 1 cfsm.

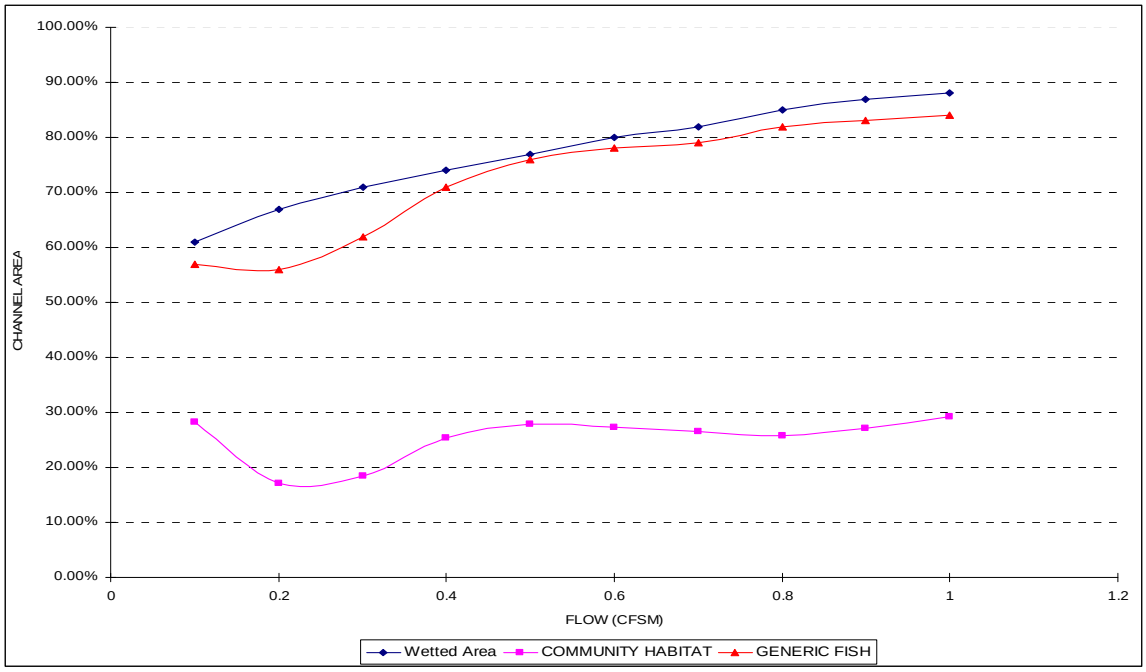

Figure 32: Reach 7 habitat.

Spawning

White sucker habitat increased from just over 50% at 0.1 cfsm to just below 80% as flow reached 1 cfsm. Common shiner and Blacknose dace habitat increased from 20% at 0.1 cfsm to just under 60% at0.2 cfsm, they both decreased to 30% and 25% respectively at 0.5 cfsm, increased to 50% and 45% as flow increased to 1 cfsm. Tessellated darter habitat remained between 50% and 40% regardless of flow. Long nose dace habitat increased from 0% at 0.1 cfsm to 10% at0.2 cfsm, decreased to 5% at 0.4 cfsm, increased to 40% as flow increased to 1 cfsm.

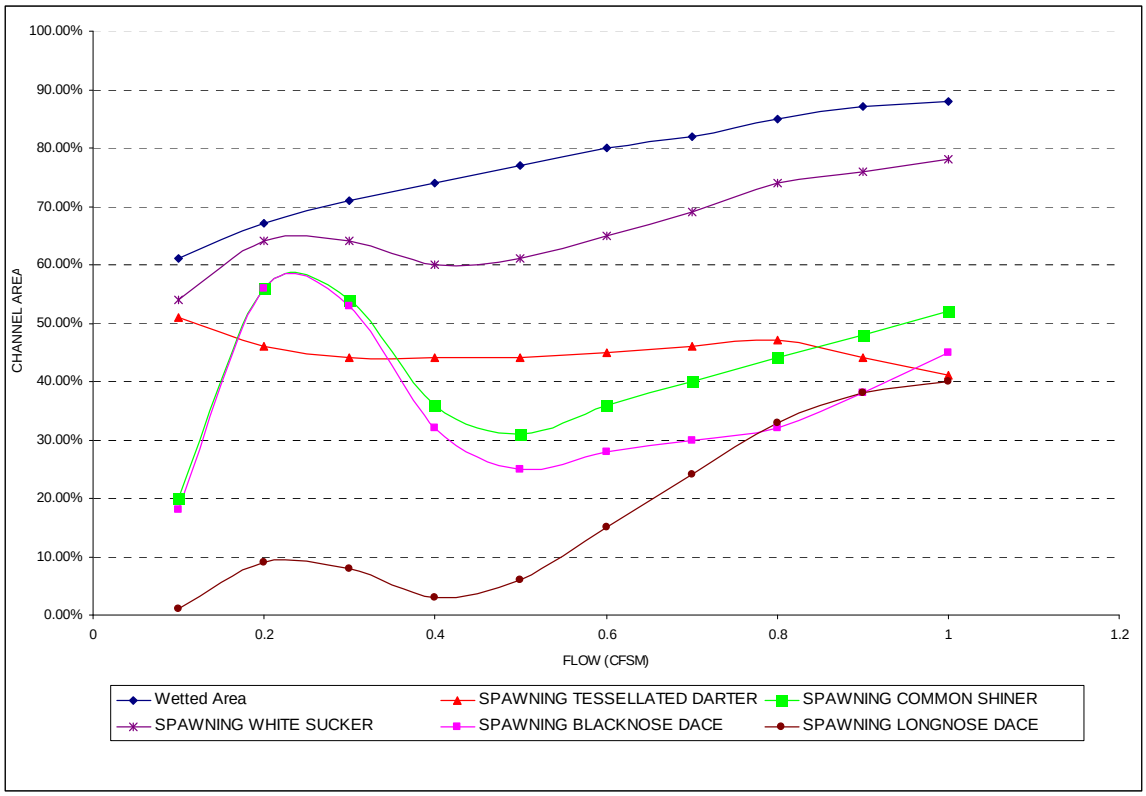

Figure 33: Reach 7 spawning rating curve.

Community habitat increased from 25% at 0.1 cfsm to 45% at 0.3 cfsm, decreased to 30% at 0.5 cfsm, increased to 50% as flow increased to 1 cfsm. Generic fish habitat decreased initially from just above 50% at 0.1 cfsm to 45% at0.2 cfsm, increased to 60% as flow increased to 1 cfsm.

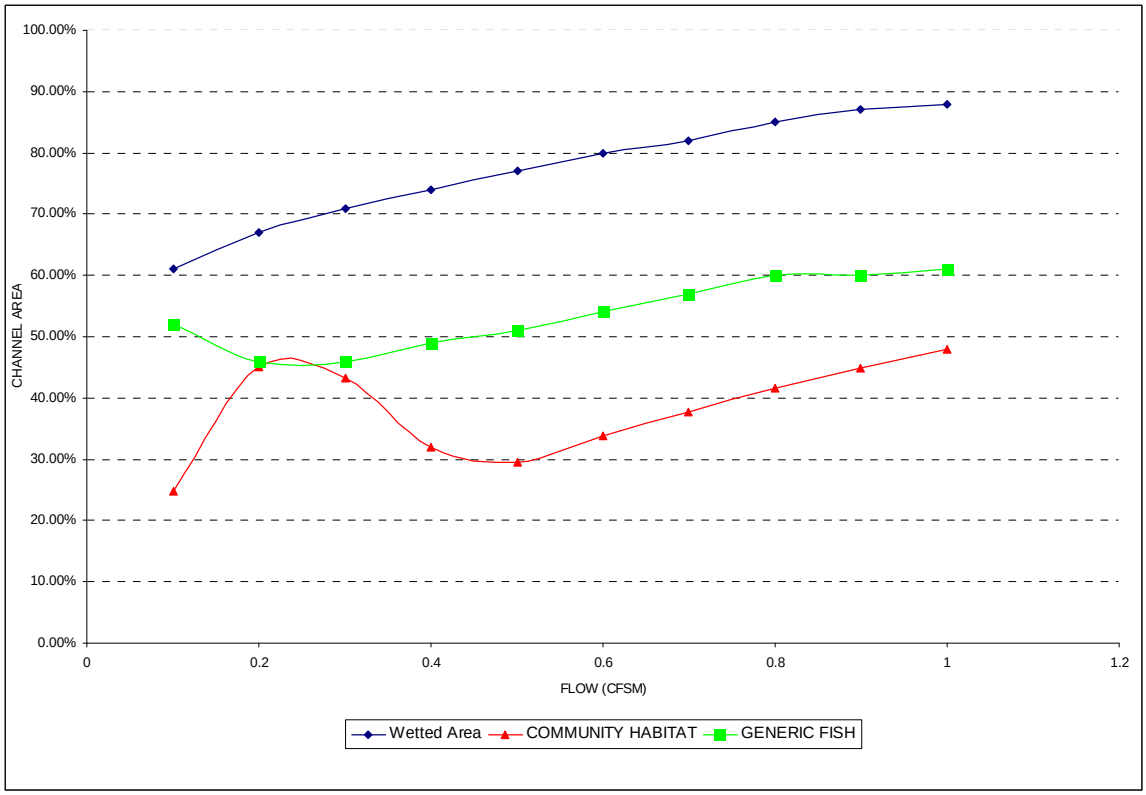

Figure 34: Reach 7 habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased from 5% at 0.1 cfsm to 35% at0.2 cfsm, decreased to 10% at 0.5 cfsm, increased to 35% at 1 cfsm. Atlantic salmon habitat increased from 0% at 0.1cfsm to 25% as flow reached 1 cfsm. American shad habitat remained under 10% regardless of flow.

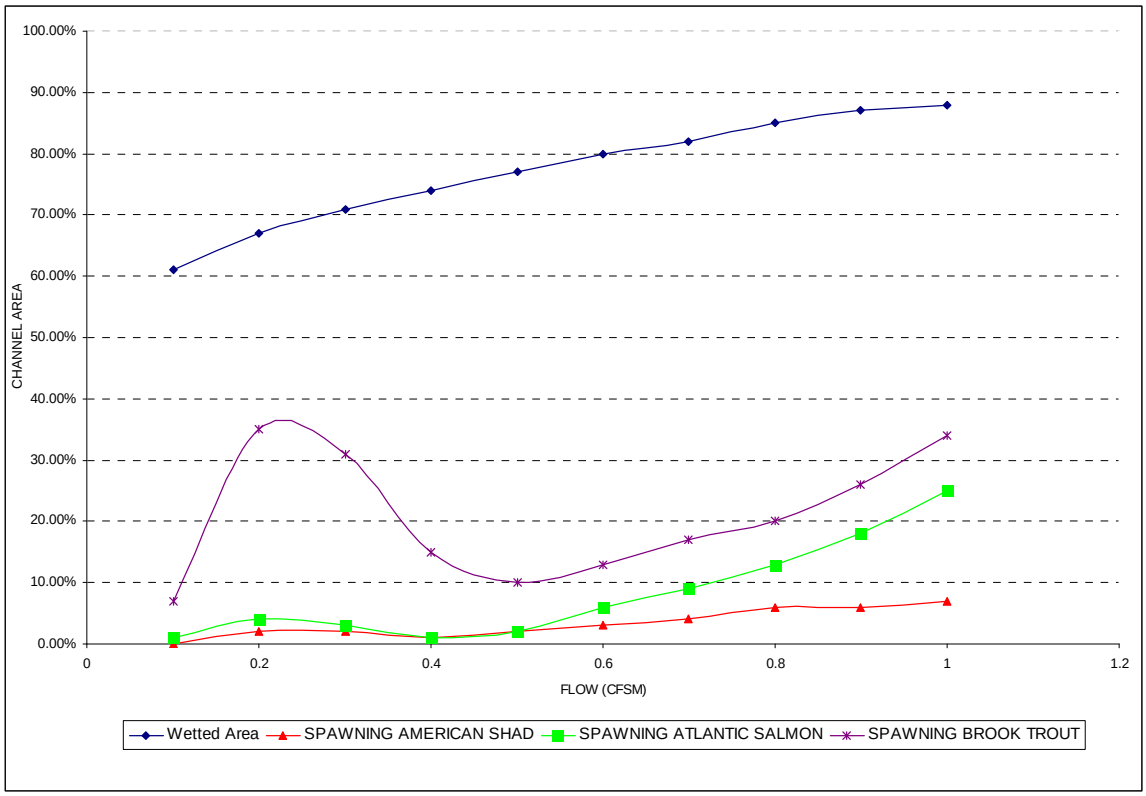

Figure 35: Reach 7 anadromous and salmonids spawning rating curves.

Reach 9

Rearing & Growth

The amount of wetted area was flow dependent and increased from 65% at 0.1 cfsm to 85% at 1 cfsm. American eel and Blacknose dace habitat increased from 40% and 30% at 0.1 cfsm to 65% and 55% at 0.6 cfsm respectively and they both remained at 55% as flows increased to 1 cfsm. Common shiner habitat increased from 5% at 0.1 cfsm to 35% as flows increased to 1 cfsm. Brook trout habitat was dependent on flow and decreased from 40% at 0.1 cfsm to 20% by 1 cfsm. Atlantic salmon habitat decreased from 35% at 0.1 cfsm to 10% by 1 cfsm. Tessellated darter habitat decreased from 40% at 0.1 cfsm to 15% at 0.6 cfsm before increasing to 25% by 1 cfsm. Longnose dace habitat decreased from about 15% at 0.1 cfsm to 5% at 0.6 cfsm before increasing to 10% by 1 cfsm. White sucker habitat remained at 5% at low flows, but increased to 15% at flows greater than 0.6 cfsm.

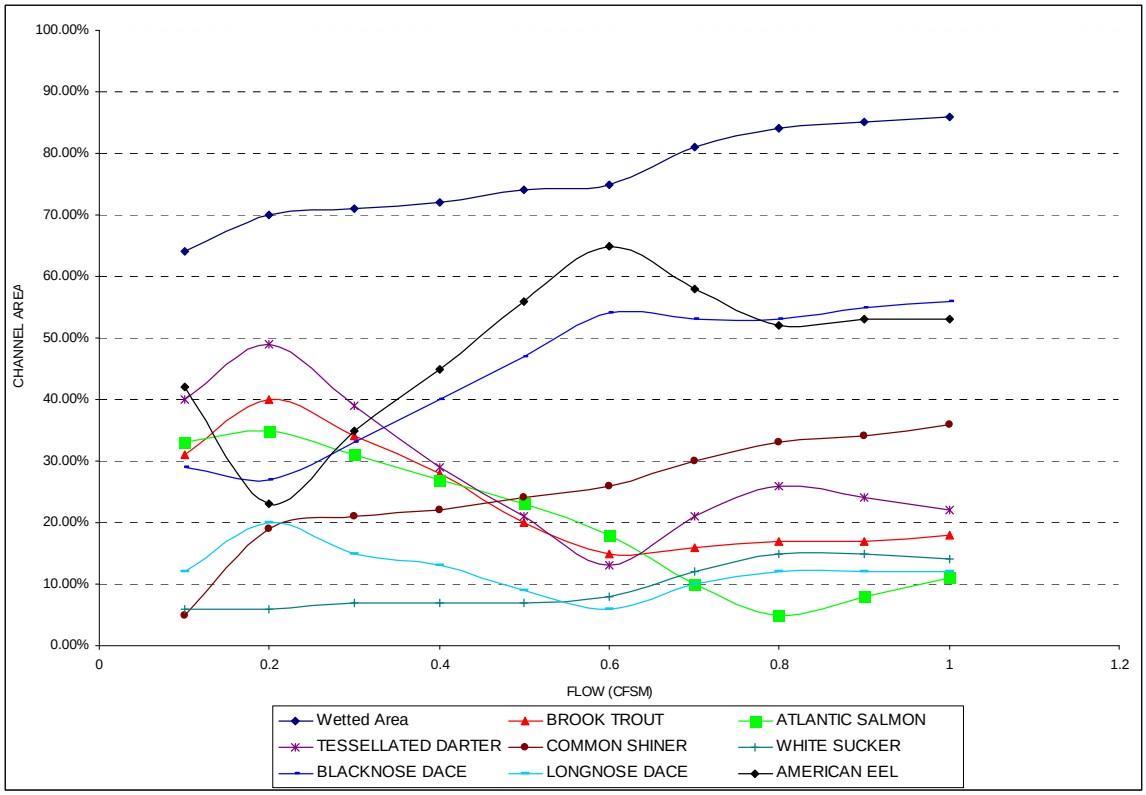

Figure 36: Reach 9 rearing and growth rating curves.

Community habitat remained constant at 30% regardless of flow. Generic fish habitat corresponds closely with the wetted area curve. It increased from 65% at 0.1 cfsm to almost 80% at 1 cfsm.

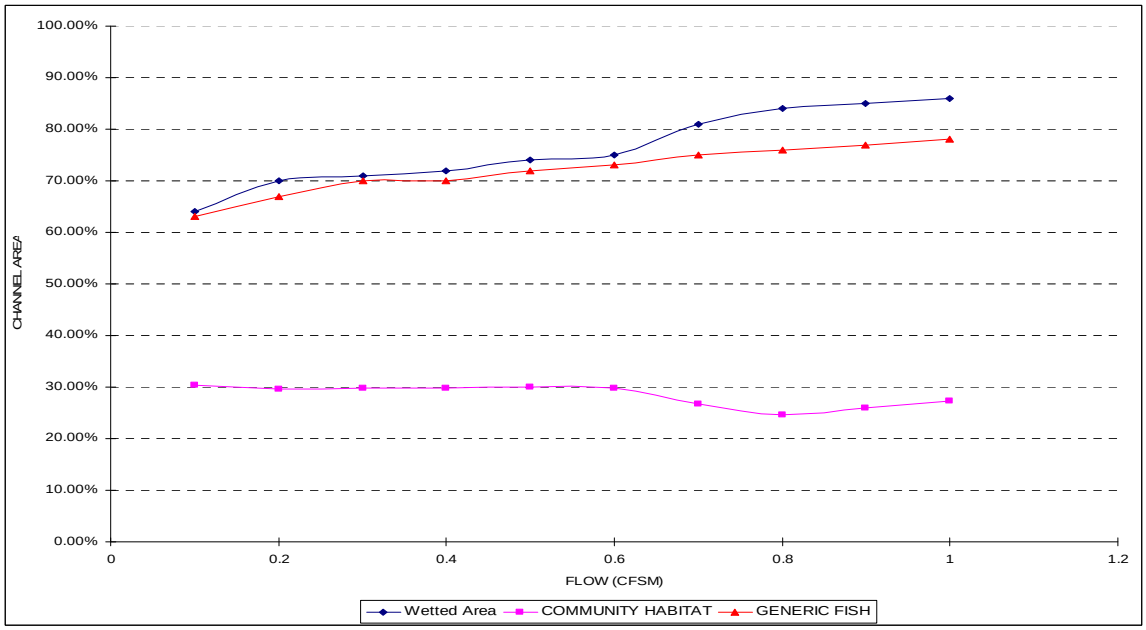

Figure 37: Reach 9 habitat.

Spawning

White sucker habitat decreased initially from 45% at 0.1 cfsm to 40% at0.2 cfsm, increased to just above 60% as flow increased to 1 cfsm. Common shiner and Blacknose dace habitat increased from 20% and 15% at 0.1 cfsm to just above 30% at0.2 cfsm, both decreased slightly to 25% at 0.6 cfsm, and then increased to just above 40% and just below 40% respectively at 1 cfsm. Tessellated darter habitat decreased initially from 45% at 0.1 cfsm to 20% at0.2 cfsm, increased to 40% at 0.6 cfsm, decreased to 30% as flow reached 1 cfsm. Longnose dace habitat increased from 5% at 0.1 cfsm to 40% at 0.6 cfsm where it remained constant as flow increased to 1 cfsm.

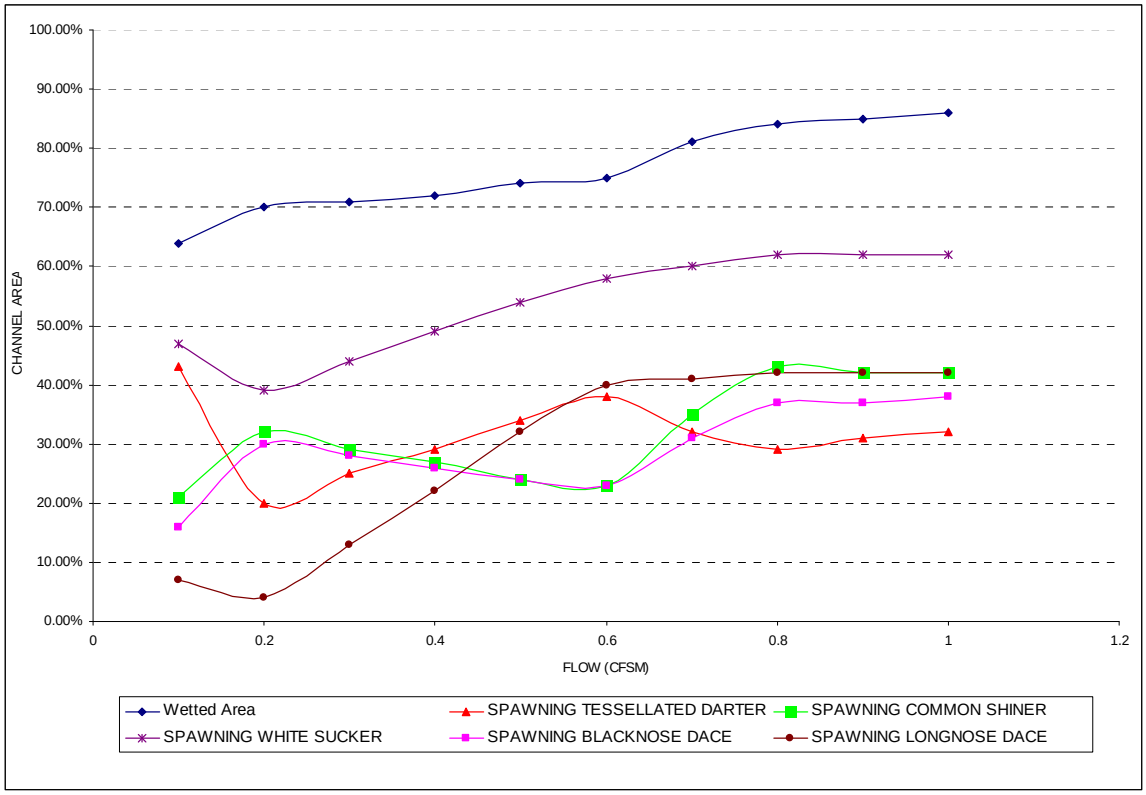

Figure 38: Reach 9 spawning rating curves.

Community habitat increased gradually with flow from 25% at 0.1 cfsm to 40% as flow increased to 1 cfsm. Generic fish habitat decreased initially from 45% at 0.1 cfsm to just below 40% at0.2 cfsm, increased to 60% as flow increased to 1 cfsm.

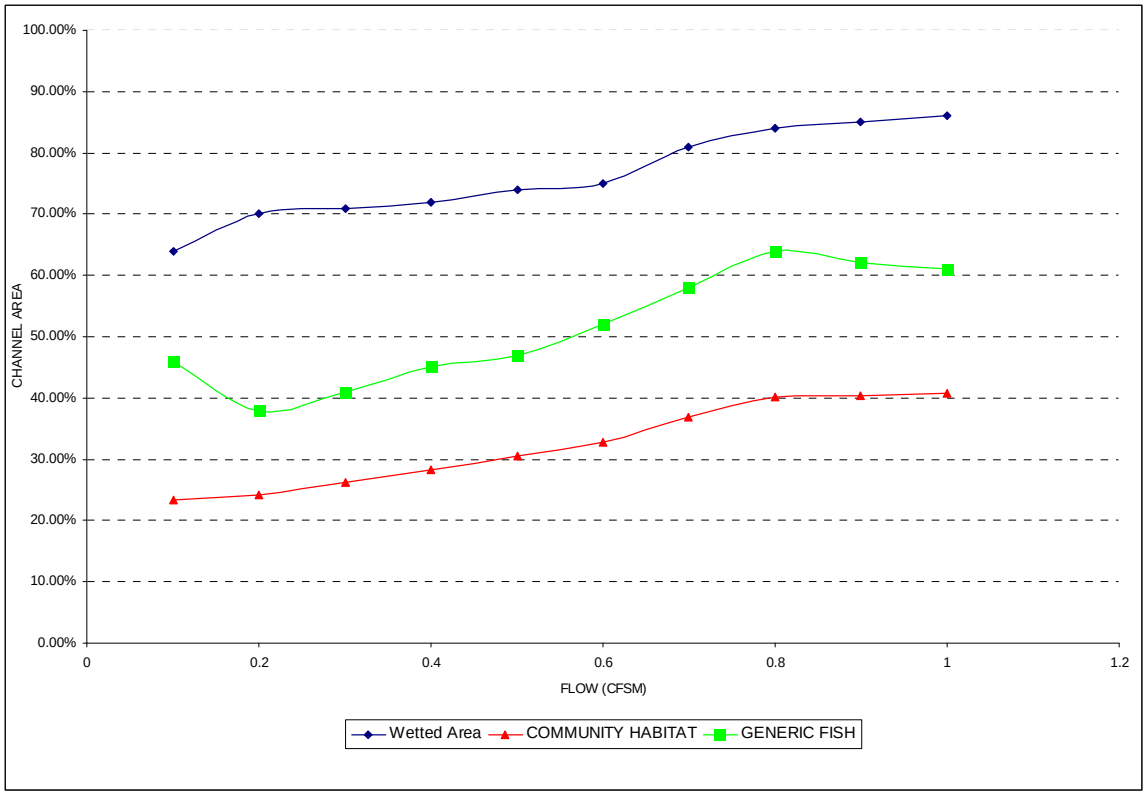

Figure 39: Reach 9 available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased initially from 20% at 0.1 cfsm to 30% at0.2 cfsm, decreased to just above 15% at 0.6 cfsm, increased to 25% as flow reached 1 cfsm. Atlantic salmon habitat remained below 15% regardless of flow. American shad habitat remained under 10% regardless of flow.

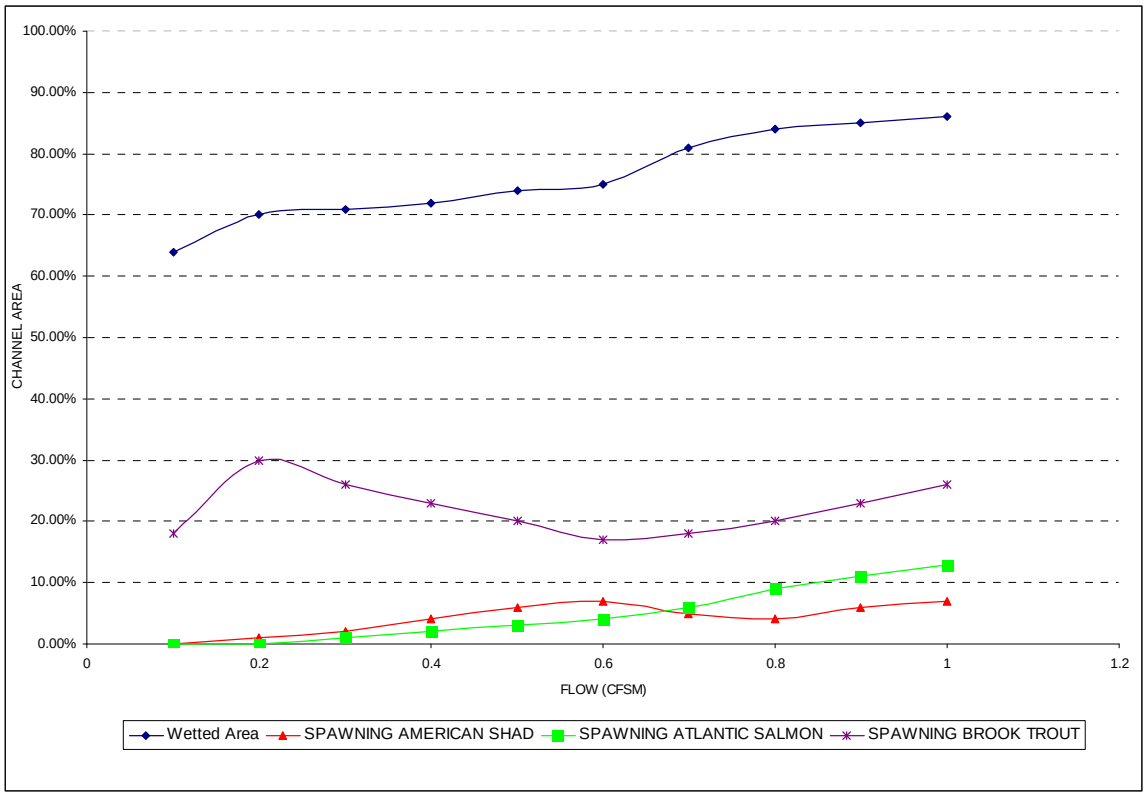

Figure 40: Reach 9 anadromous and salmonids spawning rating curves.

Reach 10

Rearing & Growth

The amount of wetted area was flow dependent and increased from 75% at 0.1 cfsm to 100% at 1 cfsm. Blacknose dace habitat increased from 30% at 0.1 cfsm to 45% by 1 cfsm. Tessellated darter habitat initially increased from about 40% at 0.1 cfsm to 65% between 0.2 and 0.3 cfsm before decreasing to approximately 25% by 1 cfsm. American eel habitat initially decreased from about 40% at 0.1 cfsm to 20% between 0.2 and 0.3 cfsm before steadily increasing to 55 % by 1 cfsm. Atlantic salmon and Common shiner habitat increased from 20% and 10% at 0.1 cfsm to almost 45% and 35% at 0.6 cfsm. Atlantic salmon decreased to 30% and Common Shiner continued to increase to 70% at 1 cfsm. Brook trout habitat was 40% at 0.1 cfsm and then undulated as flows increased with its highest value of 45% at 0.5 cfsm and its lowest value of 10% between 0.7 and 0.8 cfsm. White sucker habitat remained between 10-20% regardless of flow. Longnose dace habitat remained at about 15% regardless of flow.

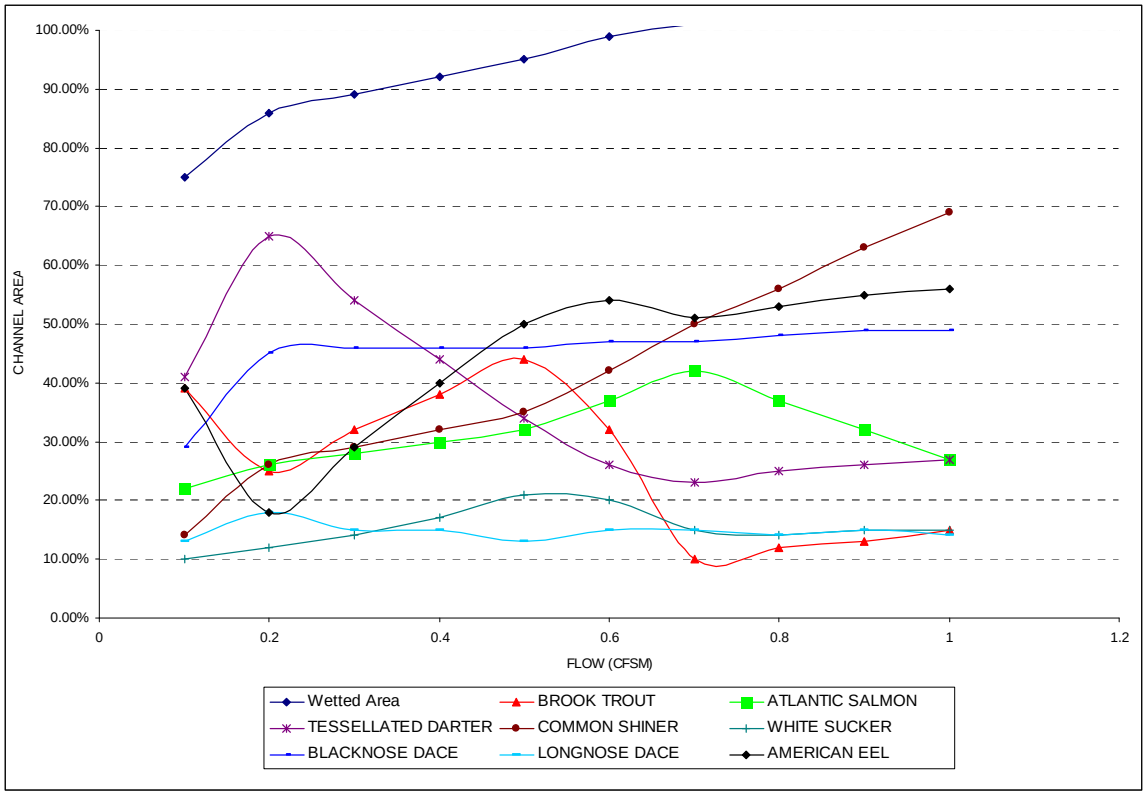

Figure 41: Reach 10 rearing and growth rating curves.

Community habitat remained between 25% and 35% regardless of flow. Generic habitat increased from 70% at 0.1 cfsm to about 90% at 0.5 cfsm. It then decreased slightly to 75% at 0.7 cfsm and finally increased slightly to 85% at 1 cfsm.

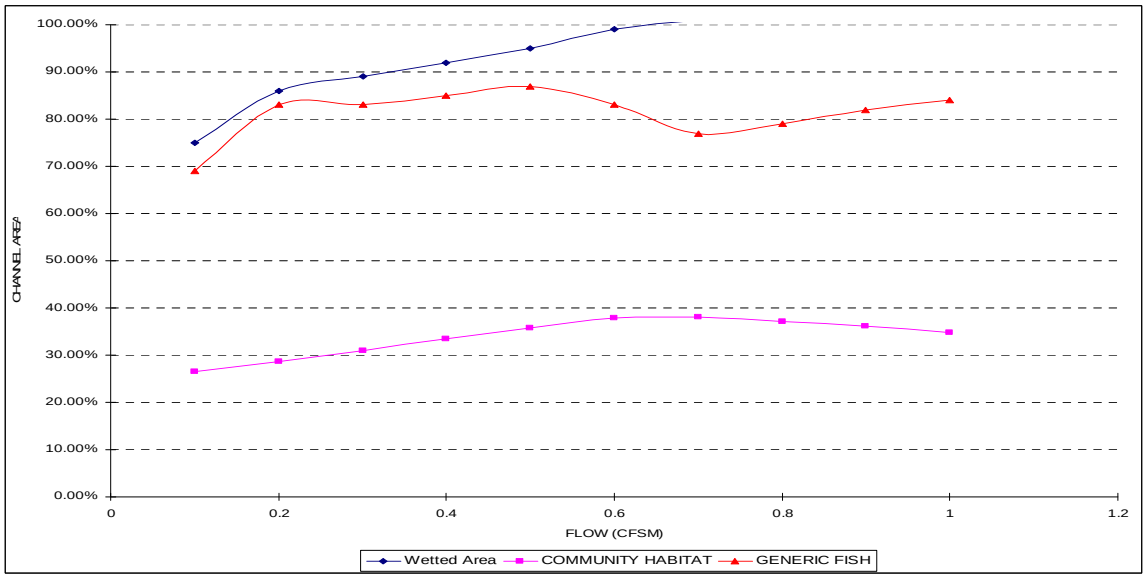

Figure 42: Reach 10 habitat.

Spawning

White sucker habitat increased from 55% at 0.1 cfsm to just below 90% as flow reached 1 cfsm. Common shiner and Blacknose dace habitat increased from 30% and 25% at 0.1 cfsm to 55% at0.2 cfsm, both decreased to just above 40% and just below 40% respectively as flow increased to 1 cfsm. Tessellated darter habitat decreased initially from 50% at 0.1 cfsm to 30% at0.2 cfsm, increased to 70% at 0.8 cfsm where it remained constant as flow increased to 1 cfsm. Longnose dace habitat increased with flow from 5% at 0.1 cfsm to 35% at 0.7 cfsm where it remained constant as flow increased to 1 cfsm.

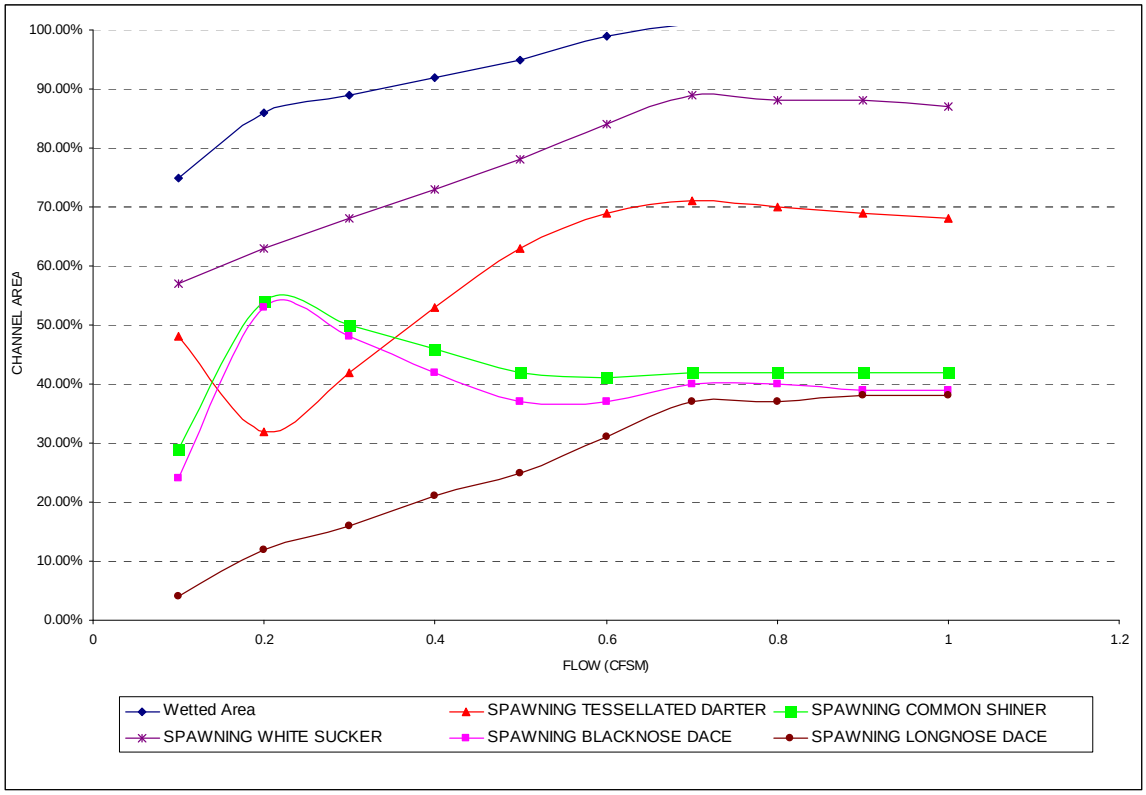

Figure 43: Reach 10 spawning rating curve.

Community habitat increased from 30% at 0.1 cfsm to 50% at 1 cfsm. Generic fish habitat increased from 55% at 0.1 cfsm to 85% at 0.7 cfsm, and then slightly decreased to 80% as flow reached 1 cfsm.

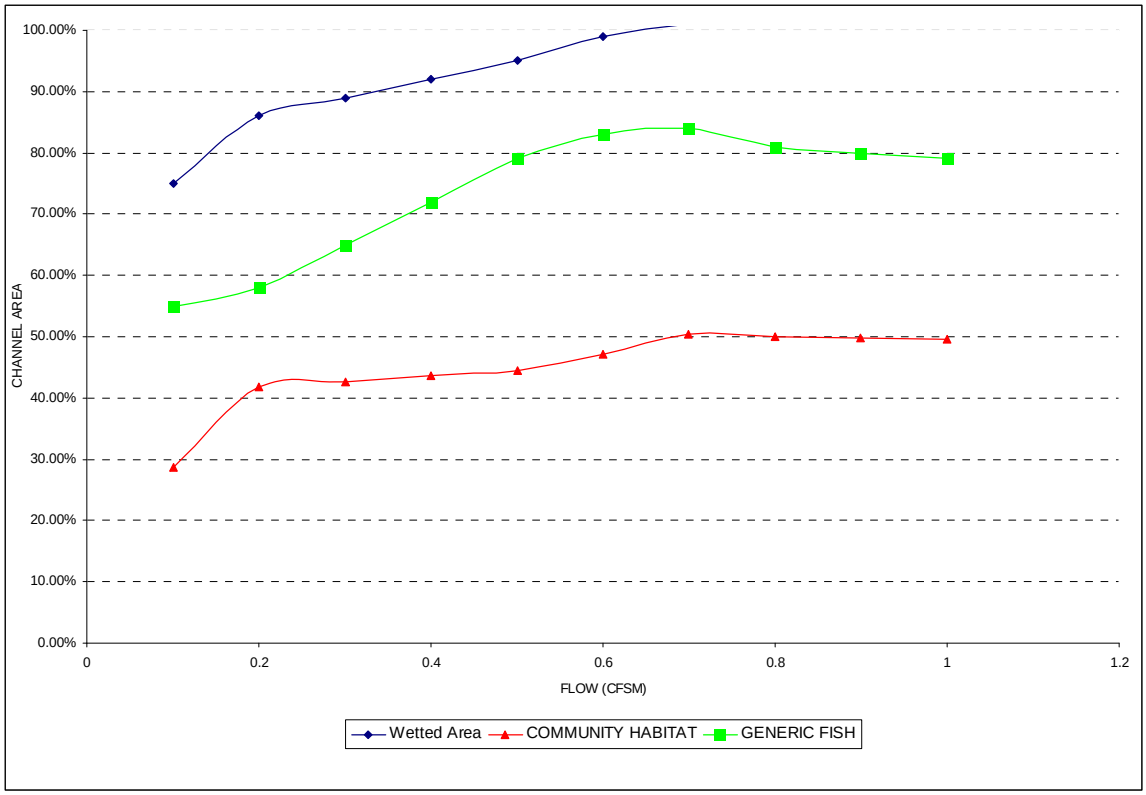

Figure 44: Reach 10 available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased initially from 20% at 0.1 cfsm to 40% at0.2 cfsm, decreased to 20% at 0.5 cfsm, increased to 50% at 0.7 cfsm, decreased to 45% as flow reached 1 cfsm. Atlantic salmon habitat increased from 0% at 0.1 cfsm to 40% as flow increased to 1 cfsm. American shad habitat decreased initially from just below 10% at 0.1 cfsm to about 3% at0.2 cfsm, increased to 30% as flow increased to 1 cfsm.

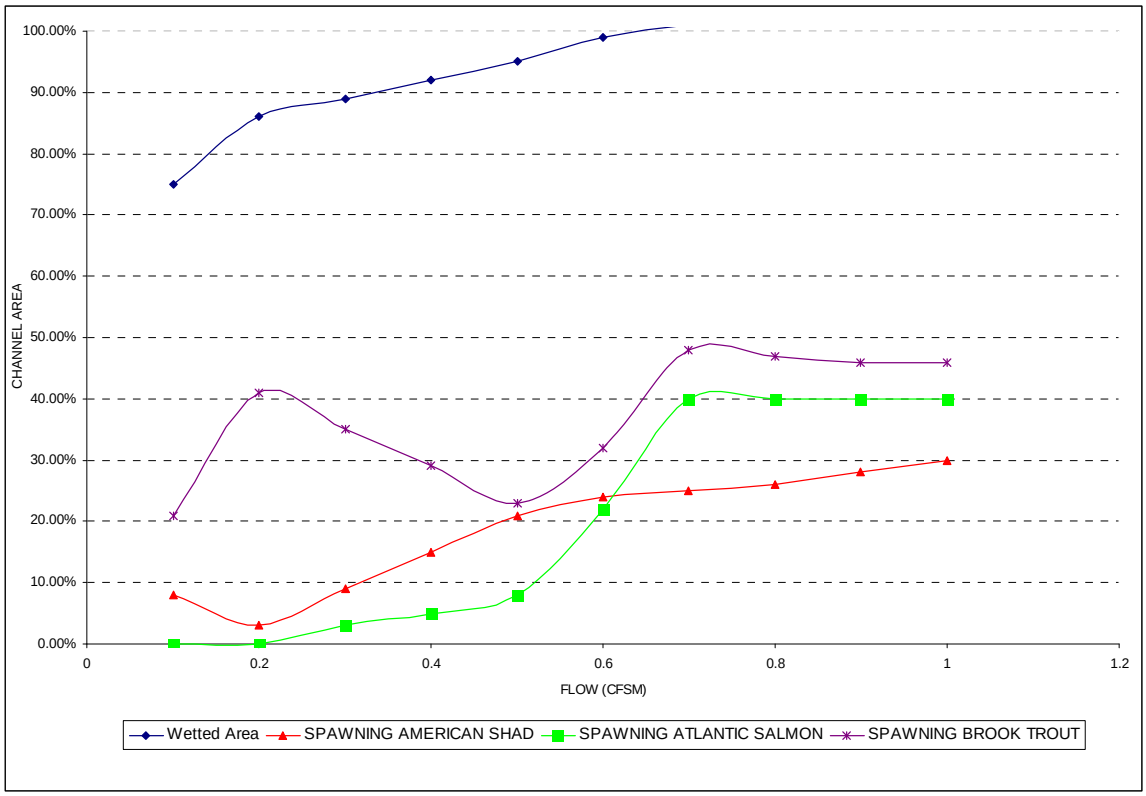

Figure 45: Reach 10 anadromous spawning rating curve.

River restoration simulation

Results of assessment methods were integrated into a GIS model that can be used to test management scenarios that would enhance habitat in addition to PISF. Based on known habitat needs of aquatic species geomorphologic setting, and historical information, we can simulate river channel improvements due to flow or other habitat manipulations (e.g. bank stabilization, or connecting side arms) by changing habitat attributes recorded during the surveys. The potential of these measures can be analyzed by simulation of the gain in fish habitat.

Reach 1

Wetted area increased from about 60% at 0.1 cfsm to 100% as flows increased to 1 cfsm. Atlantic salmon habitat increases from 25% at 0.1 cfsm to 75% at 0.8 cfsm, before decreasing to 60% at 1 cfsm. Blacknose dace habitat increased from 25% at 0.1 cfsm to 30% between 0.2 and 0.3 cfsm, decreased to almost 20% at 0.5 cfsm, increased to 80% at about 0.8 cfsm and then decreased to 55% at 1 cfsm. Tessellated darter habitat increased from 15% at 0.1 cfsm to almost 30% between 0.2 and 0.3 cfsm, decreased to

5% at 0.8 cfsm and then increased to 10% by 1 cfsm. American eel habitat increased from 10% at 0.1 cfsm to 35% at 0.8 cfsm and then decreased to 20% by 1 cfsm. Longnose dace and White Sucker habitat stayed between 10% and 20% regardless of flow. Brook trout habitat decreased from 50% at 0.1 cfsm to just above 15% at0.2 cfsm, increased to 50% by 0.5 cfsm and decreased to just above 25% at 1 cfsm. Common shiner habitat increased from 10% at 0.1 cfsm to almost 80% at 0.5 cfsm, decreased to 45% between 0.7 and 0.8 cfsm and then increased to 70% at 1 cfsm.

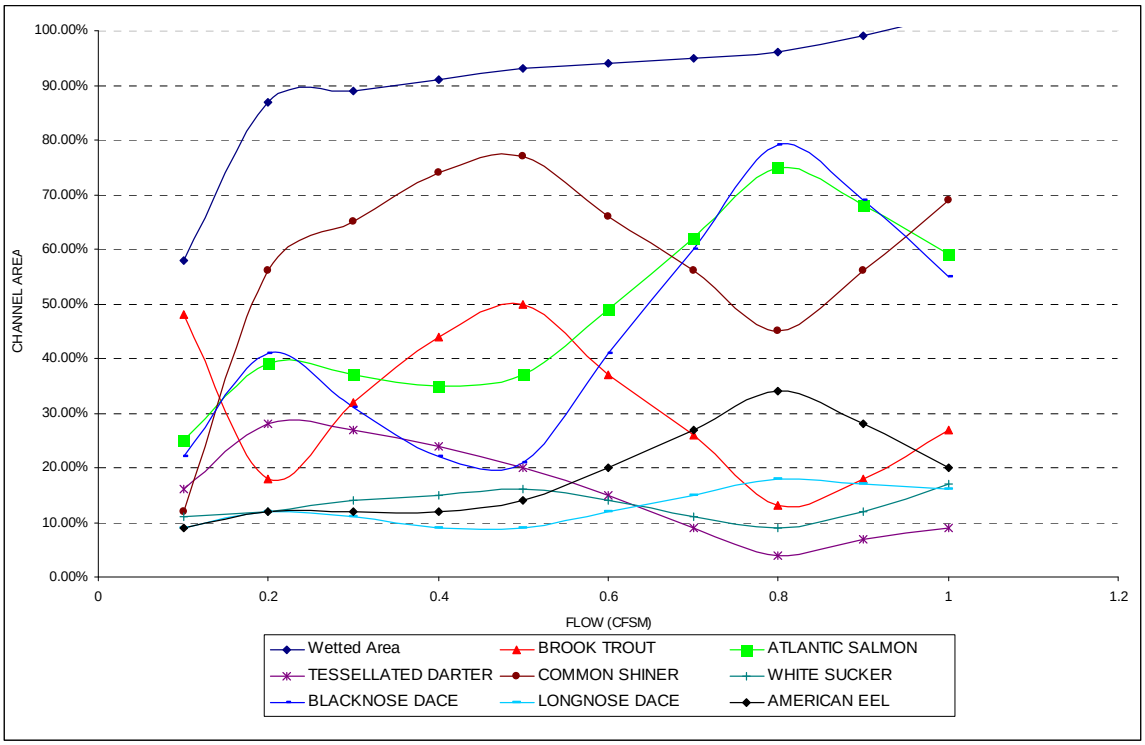

Figure 46: Reach 1 simulated rearing and growth rating curves.

Community habitat slowly increased from 15% to 30% as flow goes from 0.1 cfsm to 1 cfsm. Generic fish habitat increased from 55% at 0.1 cfsm to just above 80% at 1 cfsm.

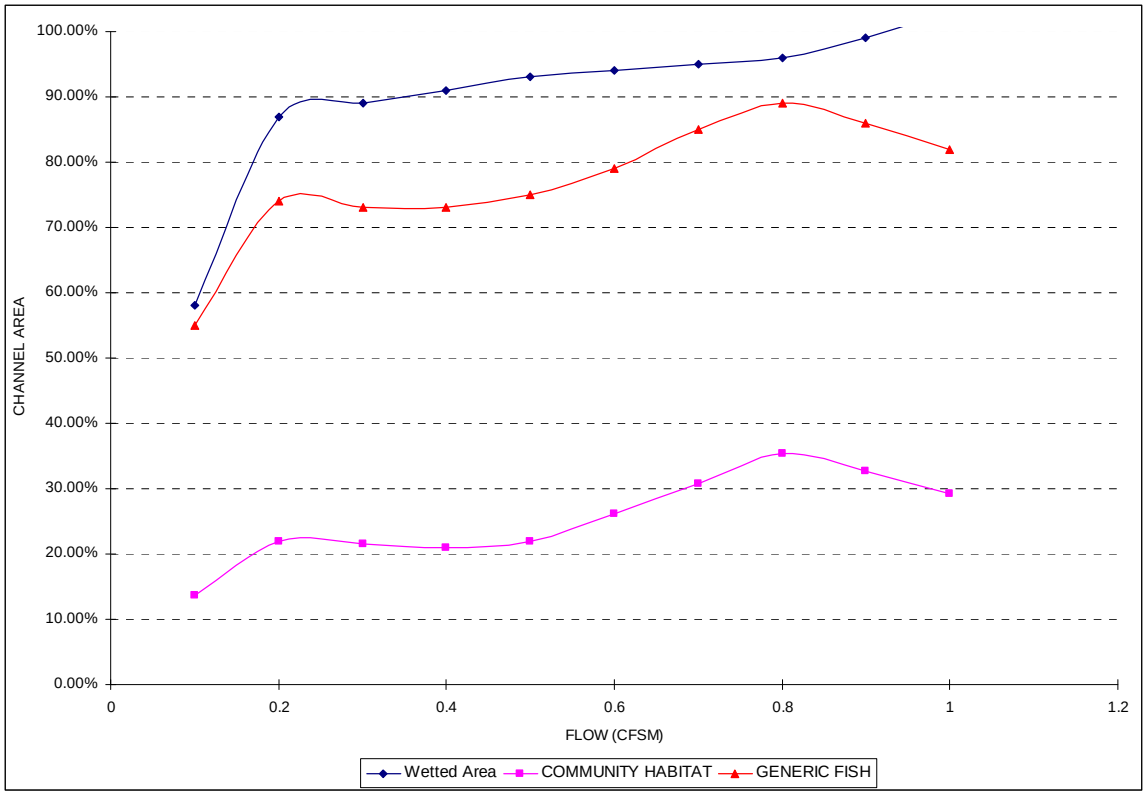

Figure 47: Reach 1 simulated habitat.

Spawning

Blacknose dace and Common shiner habitat increased from 20% at 0.1 cfsm to just above 60% at0.2 cfsm, decreased to 55% and 60% at 0.5 cfsm, both increased to 70% at 0.8 cfsm and then decreased to 60% respectively by 1 cfsm. White sucker habitat increased from 40% at 0.1 cfsm to 75% at0.2 cfsm, continued to increase to 95% at 0.8 cfsm and then decreased slightly to 90% when the flow reached 1 cfsm. Tessellated darter habitat increased from 35% at 0.1 cfsm to just below 80% at a flow of 1 cfsm. Longnose dace habitat increased sharply from 5% at 0.1 cfsm to 40% at0.2 cfsm, decreased to just above 30% at 0.4 cfsm before increasing to 75% at 0.8 cfsm. It finally decreased to 50% as flow reached 1 cfsm.

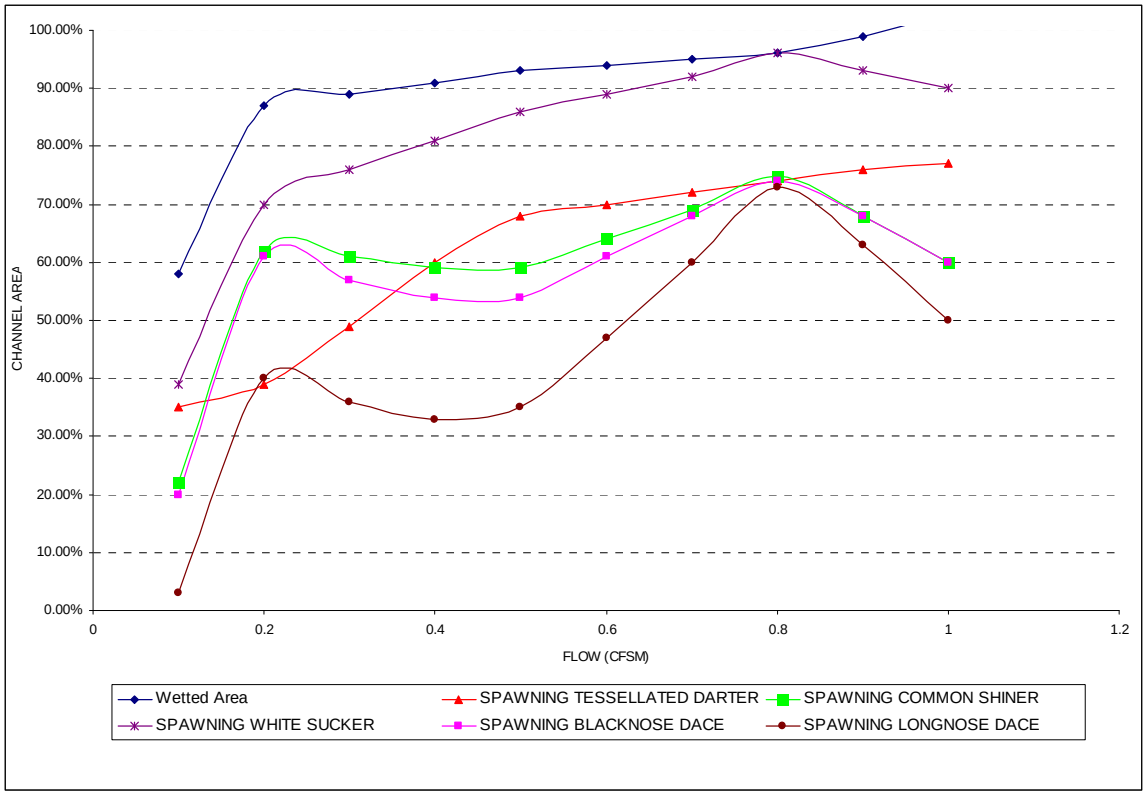

Figure 48: Reach 1 simulated spawning rating curves.

Community habitat increased from 20% at 0.1 cfsm to 50% at0.2 cfsm, slowly increased to just below 80% at 0.8 cfsm and then decreased to just above 60% at 1 cfsm. Generic fish habitat increased from 35% at 0.1 cfsm to almost 90% at 0.6 cfsm, continued to increase to 95% at a flow of 1 cfsm.

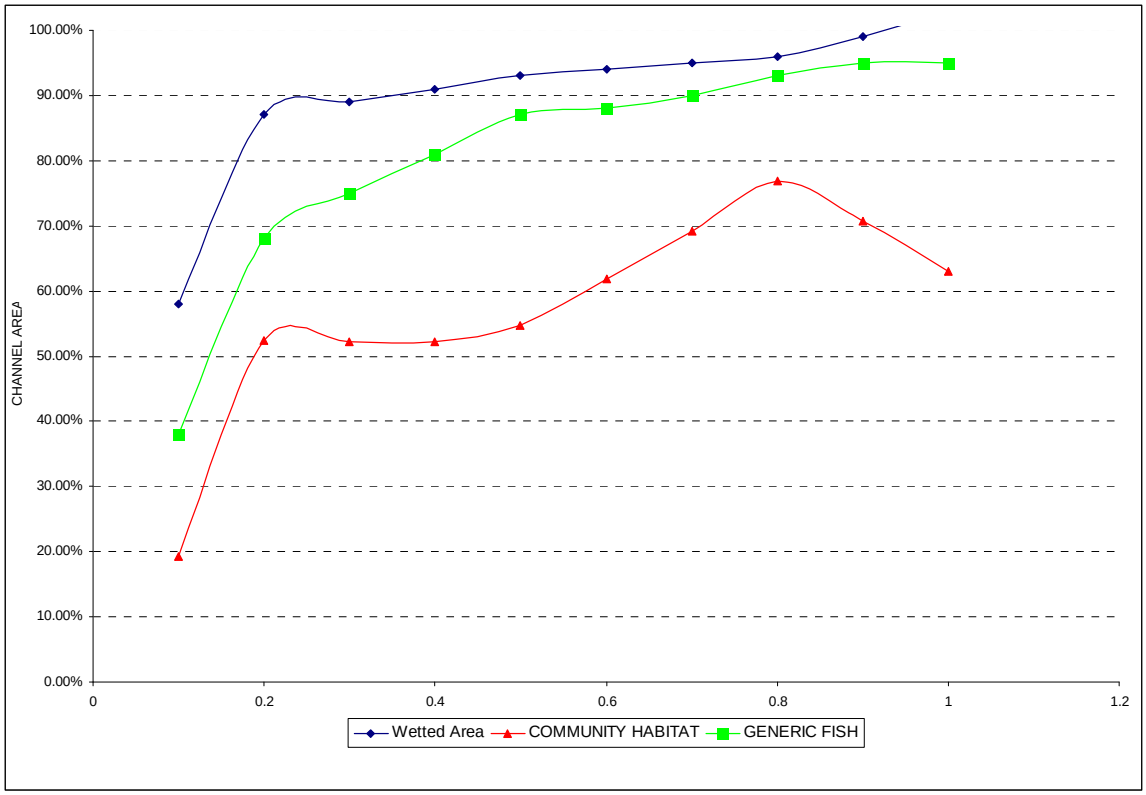

Figure 49: Reach 1 simulated available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased from 20% at 0.1 cfsm to 70% at a flow of0.2 cfsm, decreased slightly to 55% at 0.5 cfsm, increased to 85% at 0.8 cfsm and finally decreased to 65% at 1 cfsm. Atlantic salmon habitat increased from 5% at0.2 cfsm to 30% at 0.6 cfsm and continued to increase to 60% at 0.8 cfsm and then decreased to just above 45% at a flow of 1cfsm. American shad habitat increased from 5% at 0.1 cfsm to 30% at 0.5 cfsm, decreased to 15% at 0.8 cfsm and then increased to just below 40% as flows reached 1 cfsm.

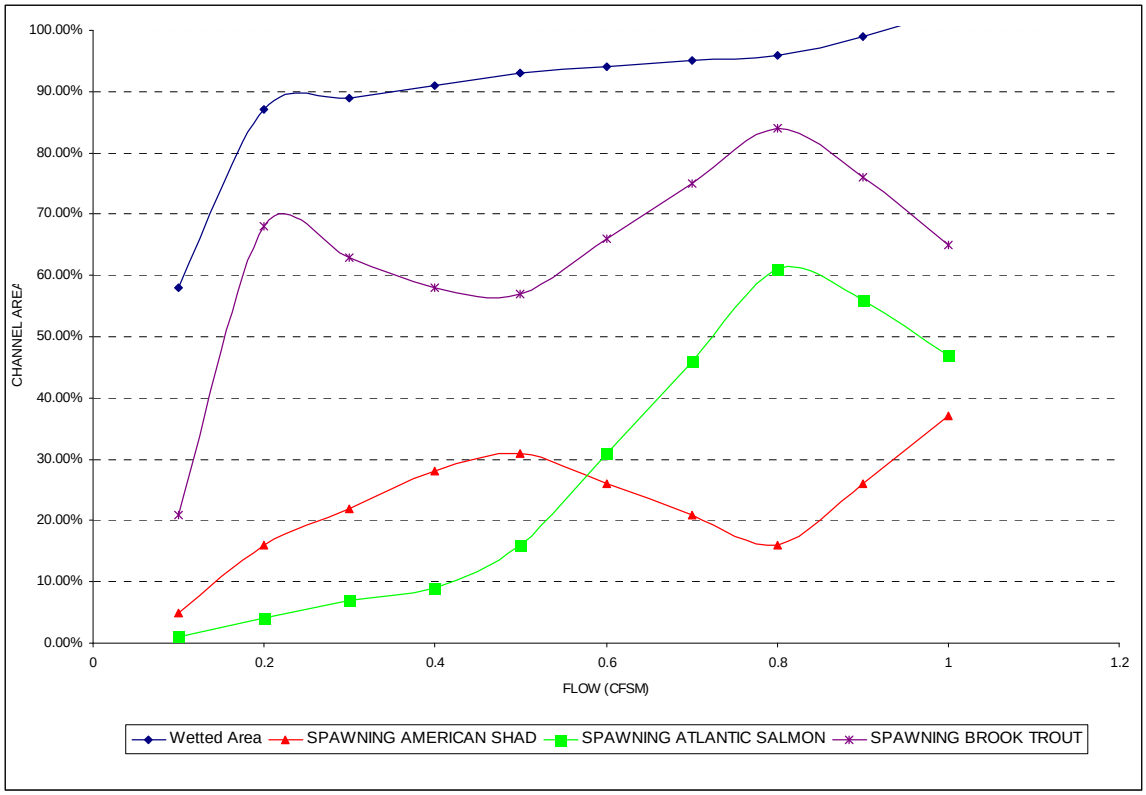

Figure 50: Reach 1 simulated anadromous and salmonids spawning rating curves.

Reach 2

Wetted area increased from about 60% at 0.1 cfsm to 100% as flows increased to 1 cfsm. Blacknose dace and Atlantic salmon habitat increased from 25% at 0.1 cfsm to 60% and 55% between 0.2 and 0.3 cfsm, decreased to 15% and 20% at about 0.9 cfsm and then increased to about 20% and 30% respectively at 1 cfsm. Tessellated darter habitat increased from about 20% at 0.1 cfsm to 40% at 0.5 cfsm and then decreased to 25% as flow increased to 1 cfsm. American eel habitat increased from 10% at 0.1 cfsm to 45% between 0.2 and 0.3 cfsm, decreased to 25% at 0.5 cfsm and then increased to almost 60% as flows increased to 1 cfsm. Longnose dace habitat remained between 5% and 15% regardless of flow. Brook trout and white sucker habitat decreased from 25% and 10% at 0.1 cfsm to almost 10% and almost 5% between 0.2 and 0.3 cfsm, increased to 35% and about 25% at about 0.9 cfsm and then decreased slightly to about 30% and 20% respectively at 1 cfsm. Common shiner habitat steadily increased from 35% at 0.1 cfsm to 85% as flows increased to 1 cfsm.

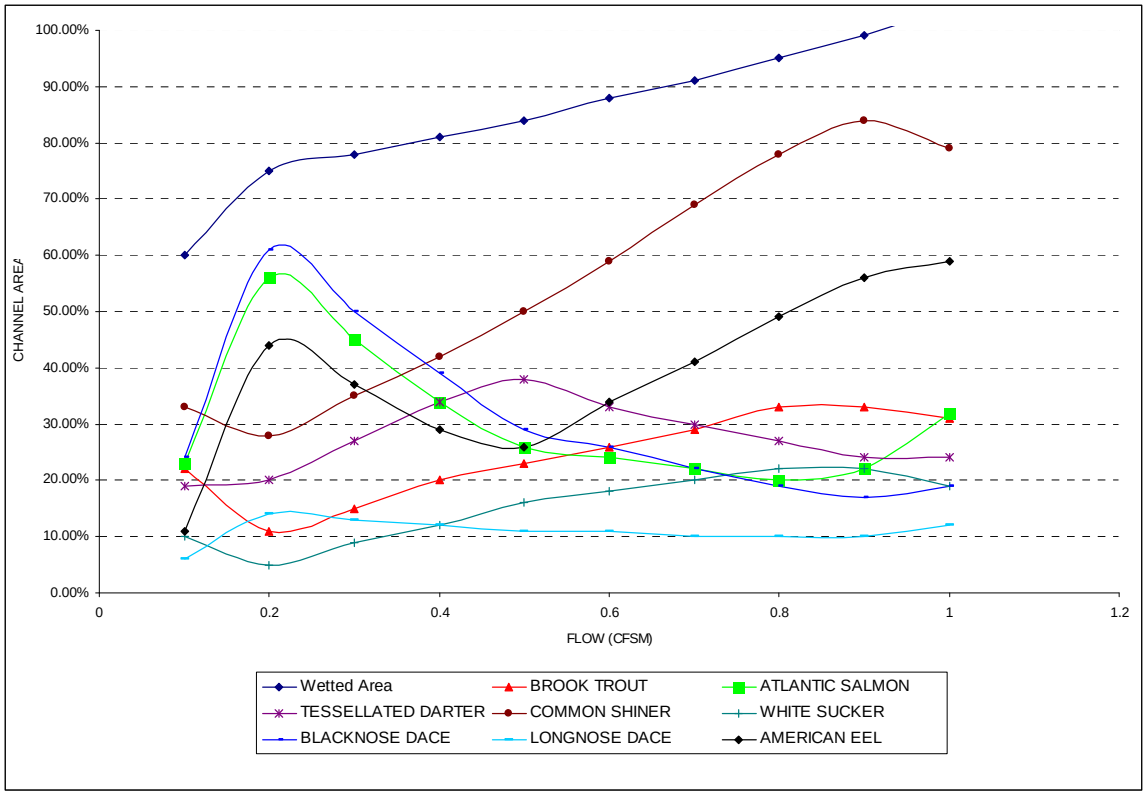

Figure 51: Reach 2 simulated rearing and growth rating curves.

Community habitat increased from 15% at 0.1 cfsm to 35% at0.2 cfsm. It then slightly decreased back down to 25% at 0.5 cfsm before steadily increasing to 40% at 1 cfsm. Generic fish habitat had a sharp increase from 50% at 0.1 cfsm to 75% at0.2 cfsm. It then steadily increased to almost 90% as flow increased to 1 cfsm.

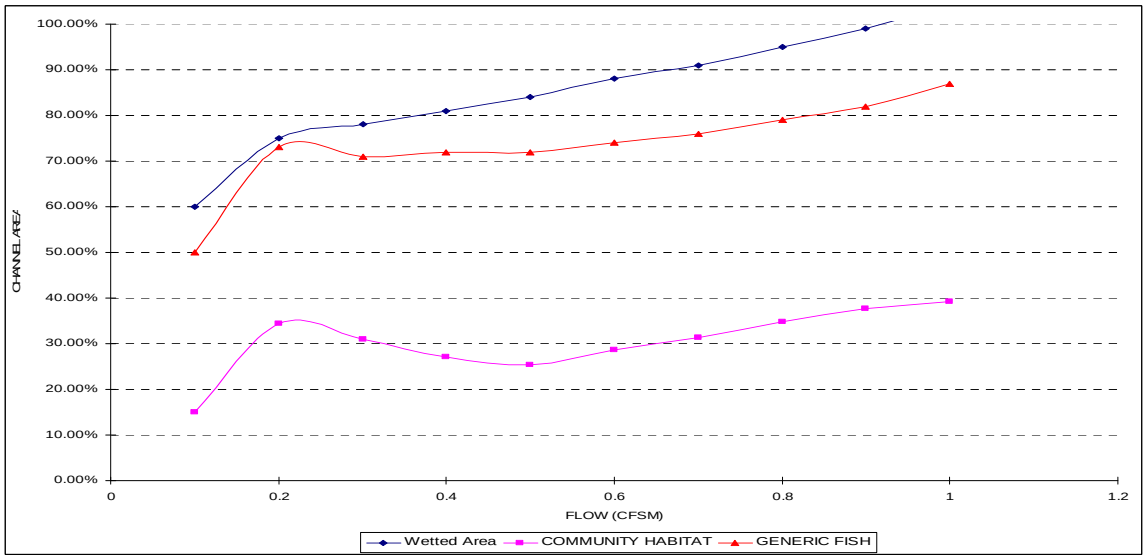

Figure 52: Reach 2 simulated habitat.

Spawning

Common shiner habitat increased sharply from just above 20% at 0.1 cfsm to just above 60% at0.2 cfsm, it then decreased steadily to 10% at 1 cfsm. White sucker habitat initially increased from 35% at 0.1 cfsm to 70% at0.2 cfsm, it remained between 60% and 70% as flows reached 1 cfsm. Tessellated darter habitat decreased initially from 20% at 0.1 cfsm to 10% at0.2 cfsm, it then increased to 50% at 0.5 cfsm and then slowly decreased to just above 40% as flows reached 1 cfsm. Longnose dace habitat increased significantly from 5% at 0.1 cfsm to 45% at0.2 cfsm, it then decreased to just below 20% at 0.5 cfsm before increasing to 35% at a flow of 1 cfsm. Blacknose dace habitat increased from 20% at 0.1 cfsm to 60% at0.2 cfsm, it then steadily decreased to 5 % as flow reached 1 cfsm.

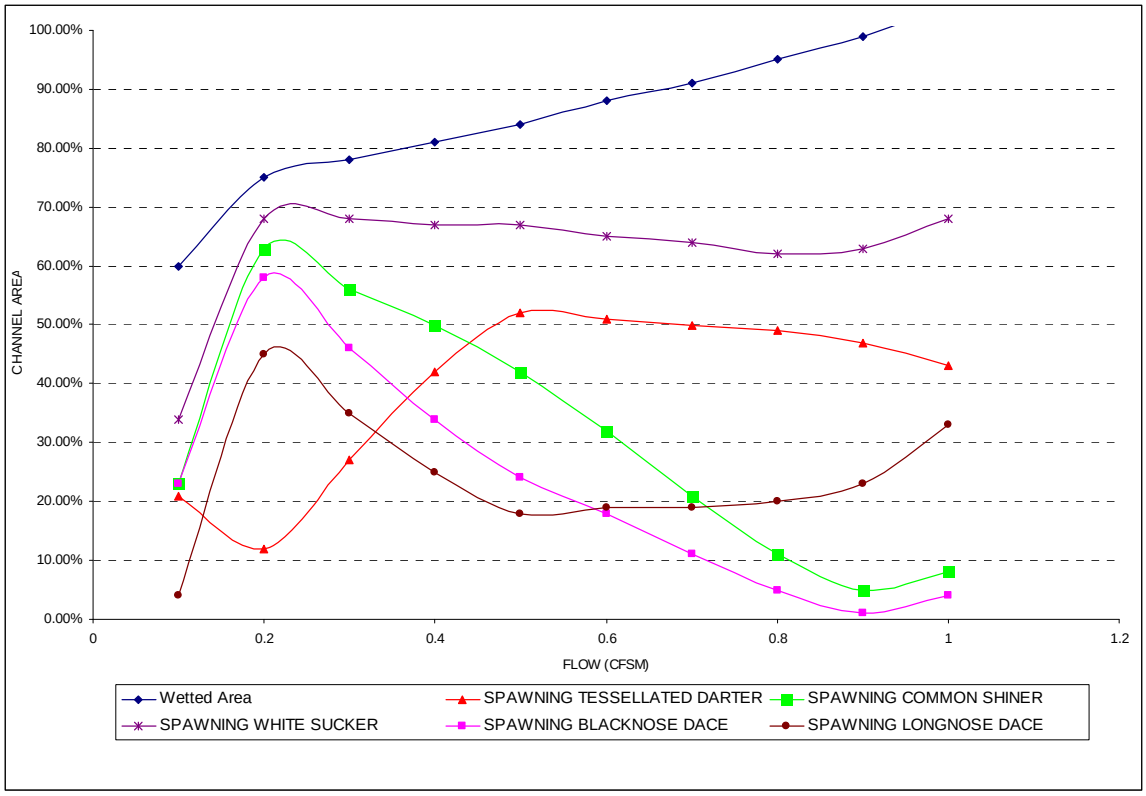

Figure 53: Reach 2 simulated spawning rating curves.

Community habitat increased from 15% at 0.1 cfsm to 50% at0.2 cfsm, slowly decreased to 25% at 0.9 cfsm and then increased slightly to 30% at 1 cfsm. Generic fish habitat increased initially from 35% at 0.1 cfsm to just above 60% at0.2 cfsm where it remained constant as flows reached 1 cfsm.

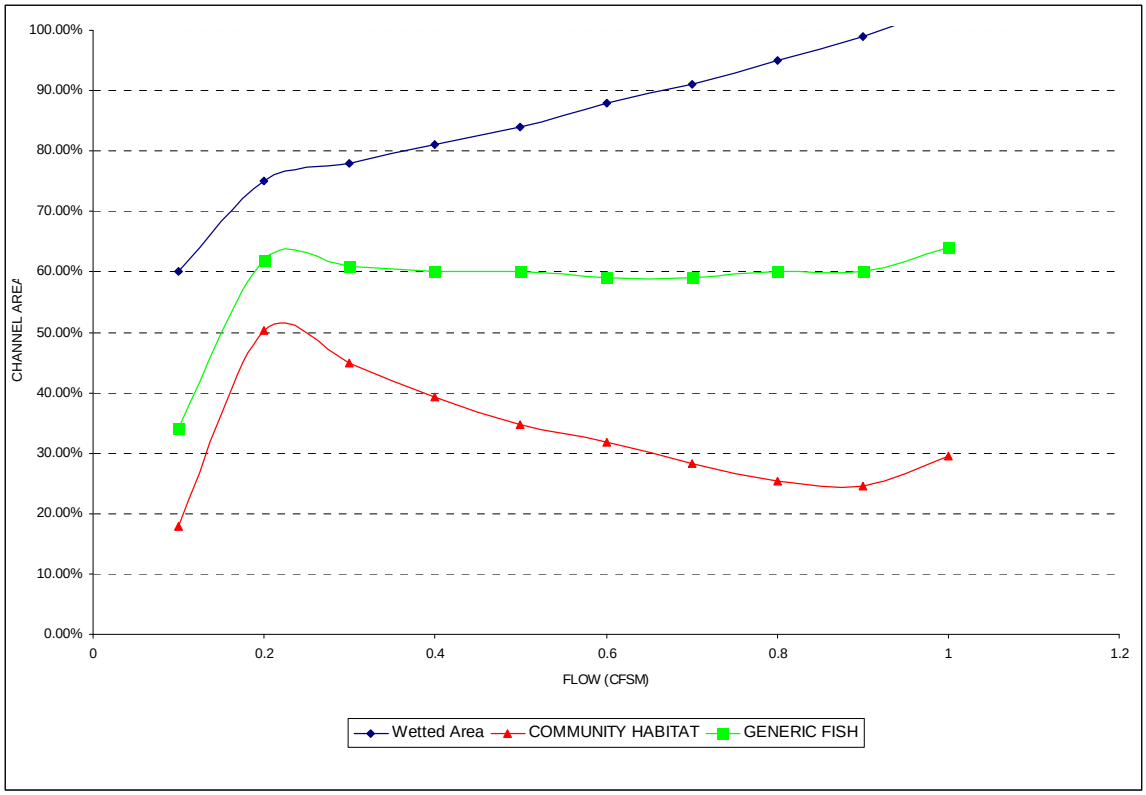

Figure 54: Reach 2 simulated available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat initially increased from 25% at 0.1 cfsm to 55% at0.2 cfsm, it then decreased to 10% at a flow of 0.8 cfsm, increased slightly to 15% at a flow of 1 cfsm. Atlantic salmon habitat steadily increased from 5% at 0.1 cfsm to 20% as flow reached 1 cfsm. American Shad habitat increased from 5% at0.2 cfsm to 40% at 0.9 cfsm and then decreased to 35% at a flow of 1 cfsm.

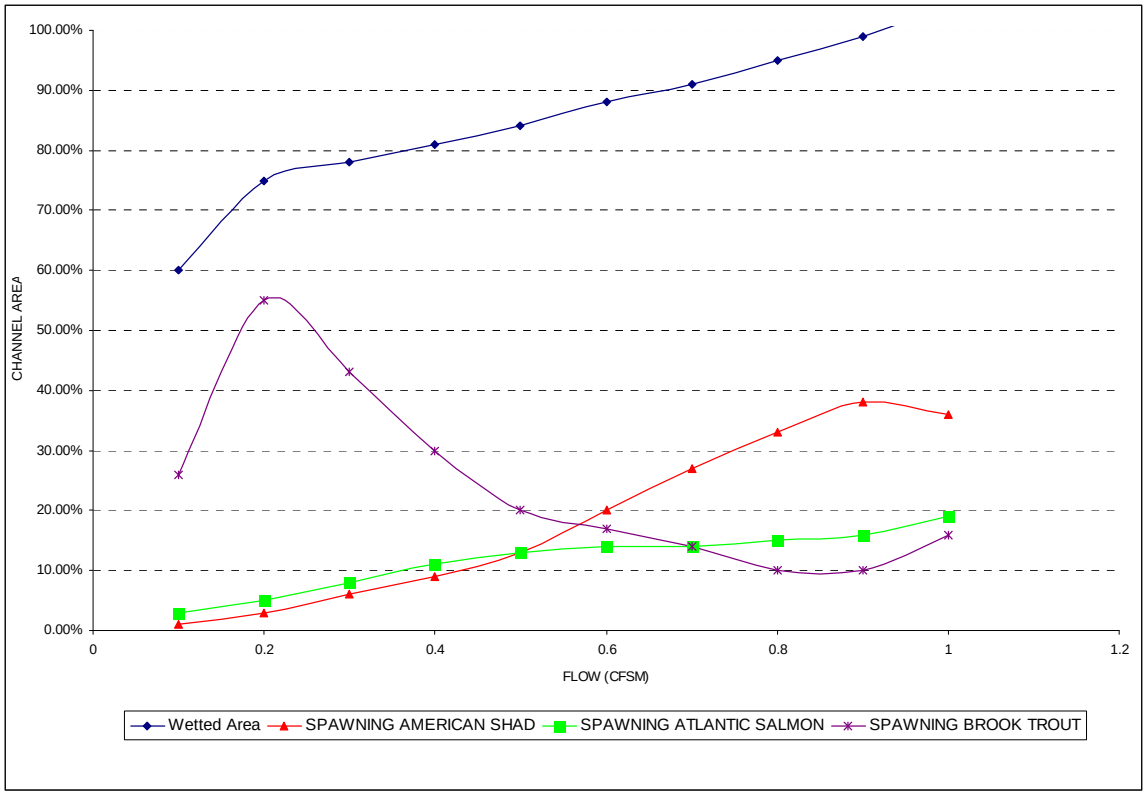

Figure 55: Reach 2 simulated anadromous and salmonids spawning rating curves.

Reach 3

Wetted area increased from about 50% at 0.1 cfsm to 80% as flow increased to 1 cfsm. Atlantic salmon habitat initially increased from 10% at 0.1 cfsm to 50% between 0.2 and 0.3 cfsm and then steadily decreased to 20% as flow increased to 1 cfsm. Blacknose dace habitat increased from 15% at 0.1 cfsm to almost 35% between 0.2 and 0.3 cfsm, decreased to 30% at 0.5 cfsm and then increased to 35% by 1 cfsm. Tessellated darter habitat decreased from 25% at 0.1 cfsm to 5% as flow increased to 1 cfsm. American eel habitat increased from 25% at 0.1 cfsm to 55% at 0.5 cfsm, decreased to 15% between 0.7 and 0.8 cfsm and then increased to 25% at 1 cfsm. Longnose dace habitat initially increased from 5% at 0.1 cfsm to almost 15% between 0.2 and 0.3 cfsm and then decreased to 5% as flow increased to 1 cfsm. Brook trout and white sucker habitat decreased from 20% and almost 10% at 0.1 cfsm to 10% and 5% at 0.5 cfsm and then increased to 15% and 10% respectively by 1 cfsm. Common shiner habitat increased steadily from 15% at 0.1 cfsm to almost 70% as flow increased to 1 cfsm.

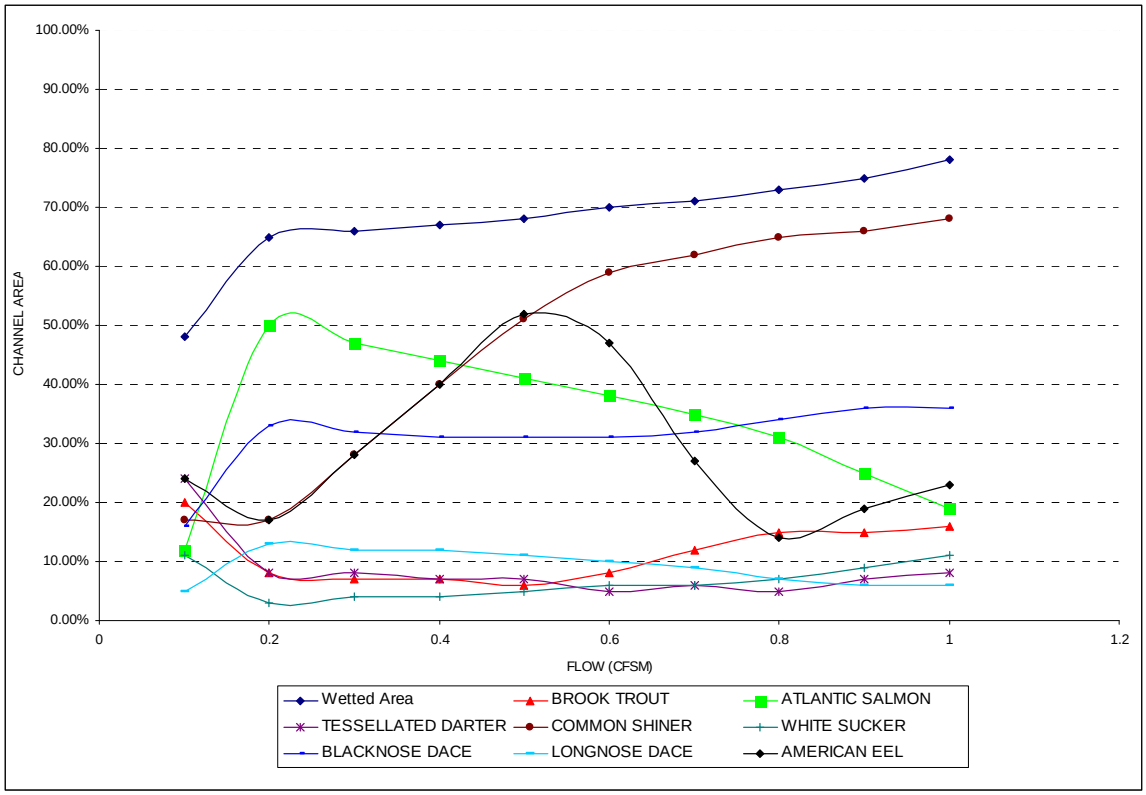

Figure 56: Reach 3 simulated rearing and growth rating curves.

Community habitat increased from 15% at 0.1 cfsm to 35% at 0.5 cfsm, before decreasing to just below 25% at 1 cfsm. Generic fish habitat increased initially from 45% at 0.1 cfsm to 60% at 0.5 cfsm. It then decreased to 45% at 0.8 cfsm before increasing to almost 60% at 1 cfsm.

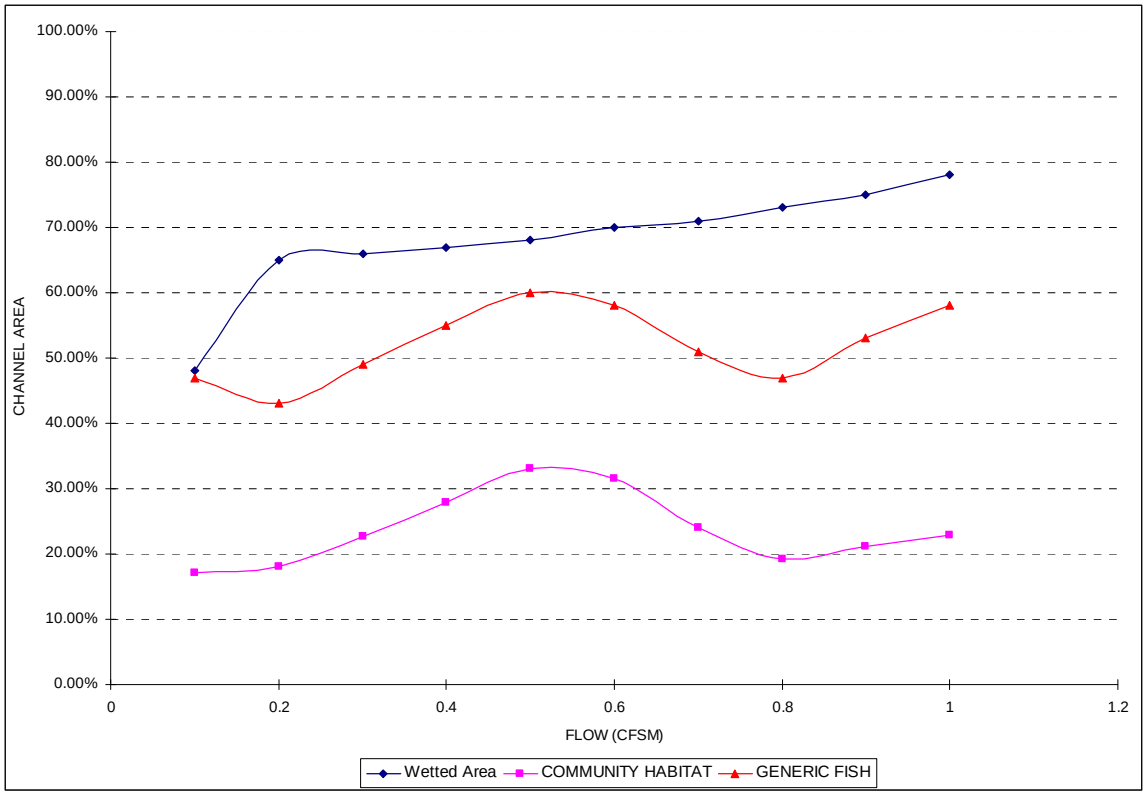

Figure 57: Reach 3 simulated habitat.

Spawning

Blacknose dace and Common shiner habitat increased from just above 10% at 0.1 cfsm to 50% at0.2 cfsm, they both decreased to just below 10% at 0.6 cfsm where they both remained between 5% and 10% as flow reached 1 cfsm. Longnose dace habitat slowly increased from just below 10% at0.2 cfsm to 20% at 0.8 cfsm where it slightly decreased to 15% as flow reached 1 cfsm. White sucker habitat increased from 40% at 0.1 cfsm to 60% at 0.5 cfsm, decreased to just below 40% at 0.8 cfsm and then increased to just above 40% at a flow of 1 cfsm. Tessellated darter habitat decreased from just below 30% at 0.1 cfsm to 15% at 0.5 cfsm, increased to just below 40% as flow reached 1 cfsm.

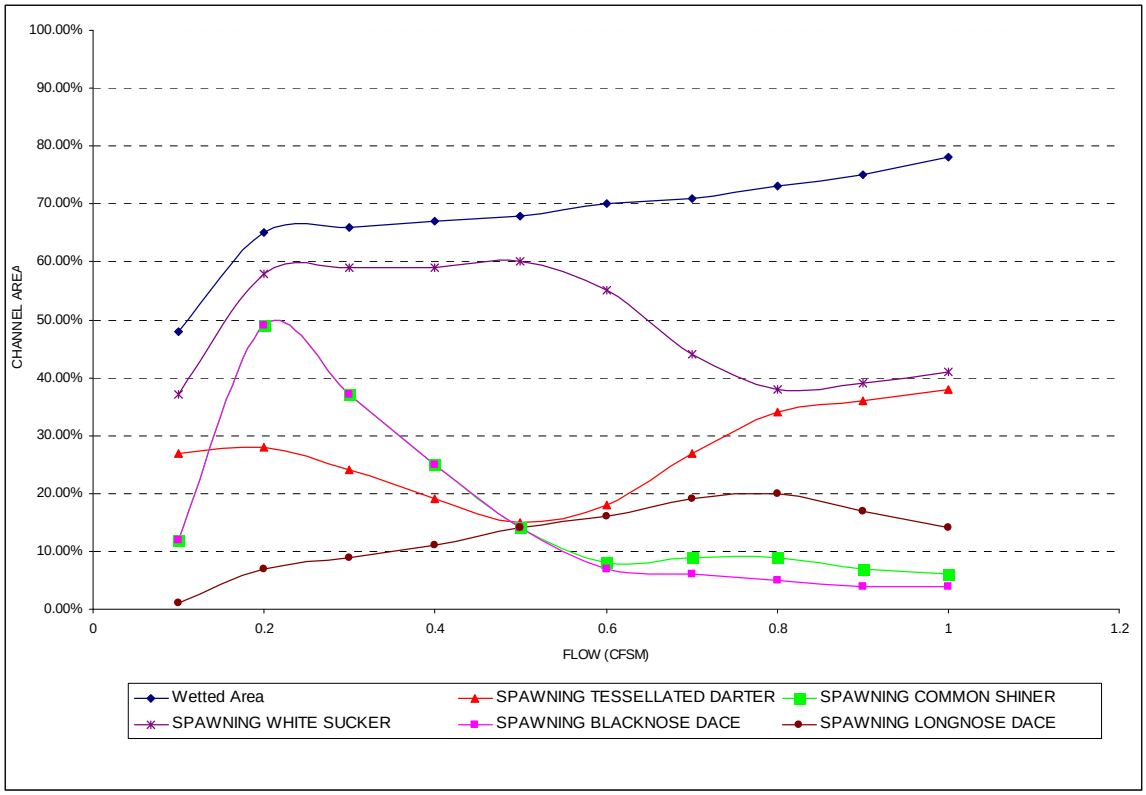

Figure 58: Reach 3 simulated spawning rating curves.

Community habitat initially increased from 15% at 0.1 cfsm to 35% at0.2 cfsm, decreased slowly to just below 20% as flow reached 1 cfsm. Generic fish habitat increased from 35% at 0.1 cfsm to 55% at0.2 cfsm, it increased to 65% at 0.8 cfsm and then decreased to 60% as flow reached 1 cfsm.

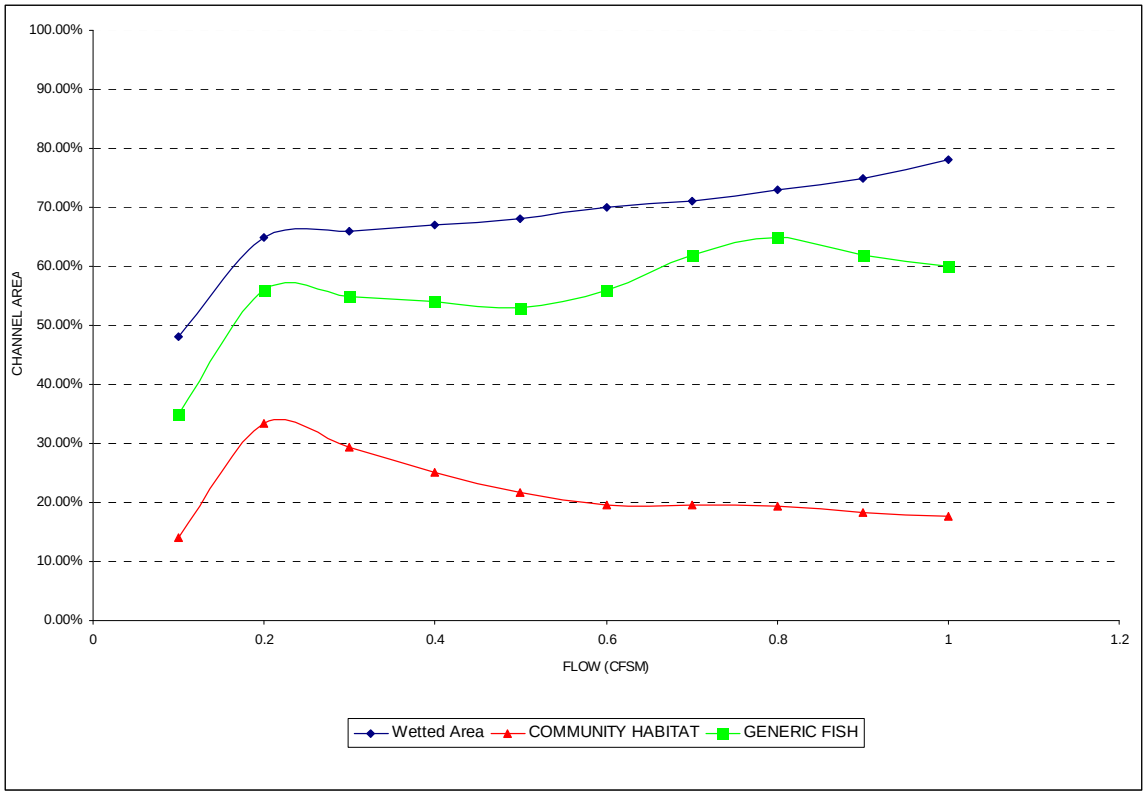

Figure 59: Reach 3 simulated available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased from just above 10% at 0.1 cfsm to just below 30% at0.2 cfsm, decreased to 15% at 0.5 cfsm, increased to just above 40% at a flow of 1 cfsm. Atlantic salmon habitat increased from 5% at 0.1 cfsm to just below 40% at 0.5 cfsm, increased to just above 40% as flow reached 1 cfsm. American shad habitat remained at 5% as flow increased from 0.1 cfsm to 0.5 cfsm. It then increased to 45% as flow reached 1 cfsm.

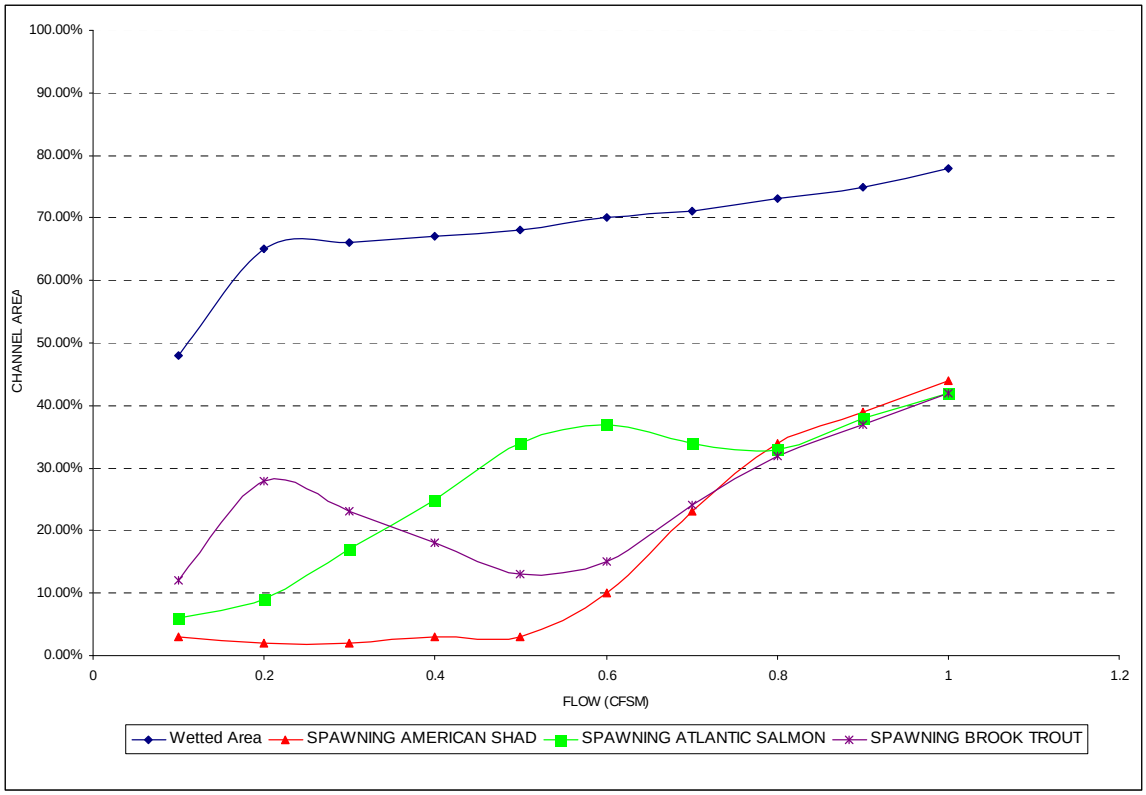

Figure 60: Reach 3 simulated anadromous and salmonids spawning rating curves.

Reach 4

Wetted area increased from about 50% at 0.1 cfsm to almost 95% as flow increased to 1 cfsm. Atlantic salmon habitat increased from 20% at 0.1 cfsm to almost 50% between 0.2 and 0.3 cfsm, decreased to 25% at about 0.6 cfsm, increased to 30% between 0.7 and 0.8 and then decreased to 25% at 1 cfsm. Blacknose dace habitat increased from 25% at 0.1 cfsm to 50% between 0.2 and 0.3 cfsm, decreased to 15% at 0.6 cfsm, increased to 45% between 0.7 and 0.8 cfsm and stayed the same as flow increased to 1 cfsm. Tessellated darter and white sucker habitat increased from about 15% and about 5% at 0.1 cfsm to almost 30% and almost 20% at 0.6 cfsm and then decreased to 15% and 10% respectively by 1 cfsm. American eel habitat increased from 20% at 0.1 cfsm to 70% at 0.7 and 0.8 cfsm and then decreased to 60% at 1 cfsm. Longnose dace habitat remained between 5% and 15% regardless of flow. Brook trout habitat decreased from 20% at 0.1 cfsm to 5% between 0.2 and 0.3 cfsm, increased to 20% at 1 cfsm. Common shiner habitat increased from 15% at 0.1 cfsm to almost 80% at

about 0.6 cfsm, decreased to 60% between 0.7 and 0.8 cfsm and then increased to 75% by 1 cfsm.

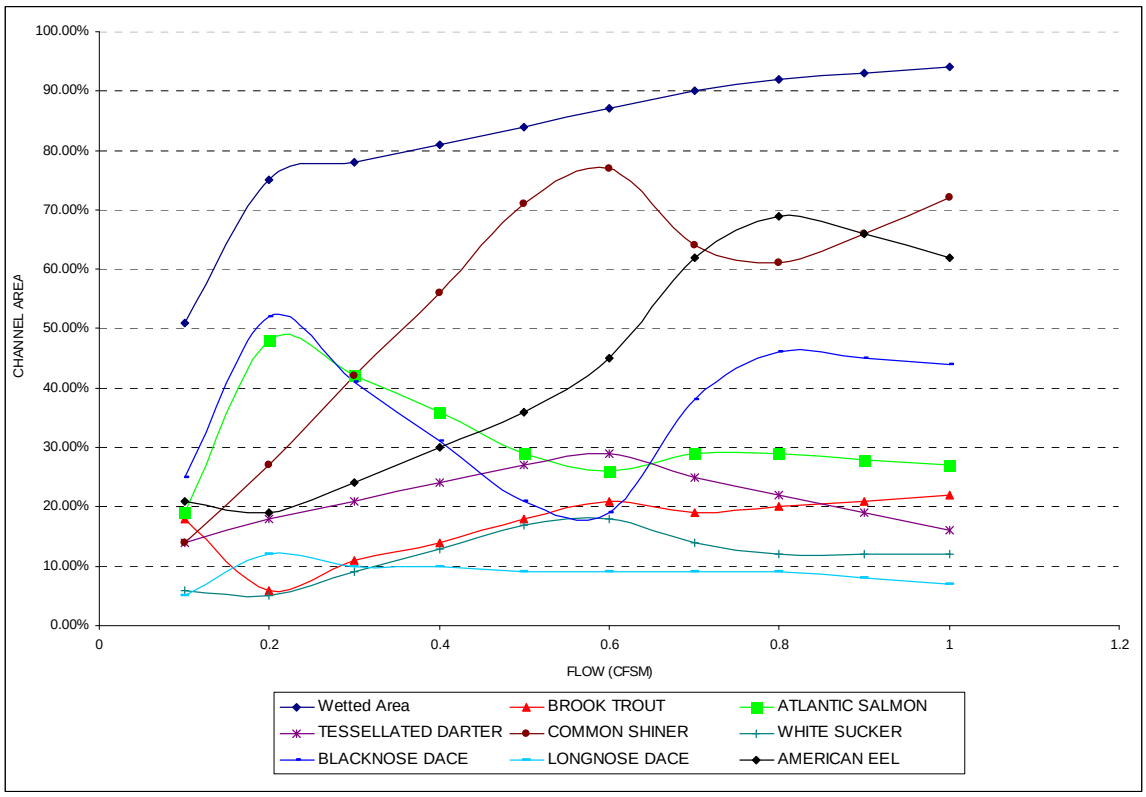

Figure 61: Reach 4 simulated rearing and growth rating curves.

Community habitat slowly increased with flow from 15% at 0.1 cfsm to 40% at 1 cfsm. Generic fish habitat corresponds closely to the wetted area curve; it increases from 50% at 0.1 cfsm to 80% at 1 cfsm.

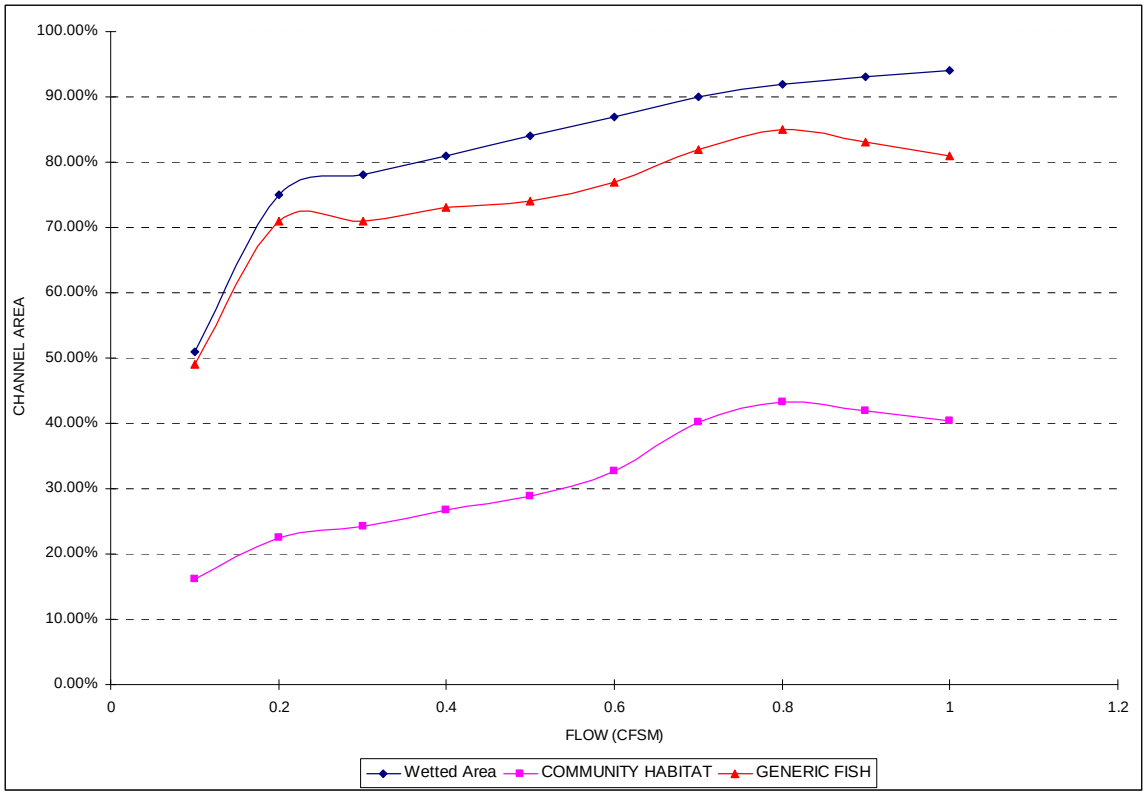

Figure 62: Reach 4 simulated habitat.

Spawning

Common shiner and Blacknose dace habitat increased from just below 5% at 0.1 cfsm to 50% at0.2 cfsm, they both decreased to 5% at 0.6 cfsm, and then both slightly increased to 10% as flow reached 1 cfsm. White sucker habitat increased from 35% at 0.1 cfsm to 55% at0.2 cfsm where it remained between 45% and 55% as flow increased to 1 cfsm. Tessellated darter habitat decreased initially from 30% at 0.1 cfsm to 5% at0.2 cfsm, increased to 45% at 0.6 cfsm, decreased to 10% at 0.8 cfsm and finally increased to 20% as flow reached 1 cfsm. Longnose dace habitat decreased steadily from 20% at 0.1 cfsm to 0% by 0.7 cfsm. It remained at 0% as flow increased to 1 cfsm.

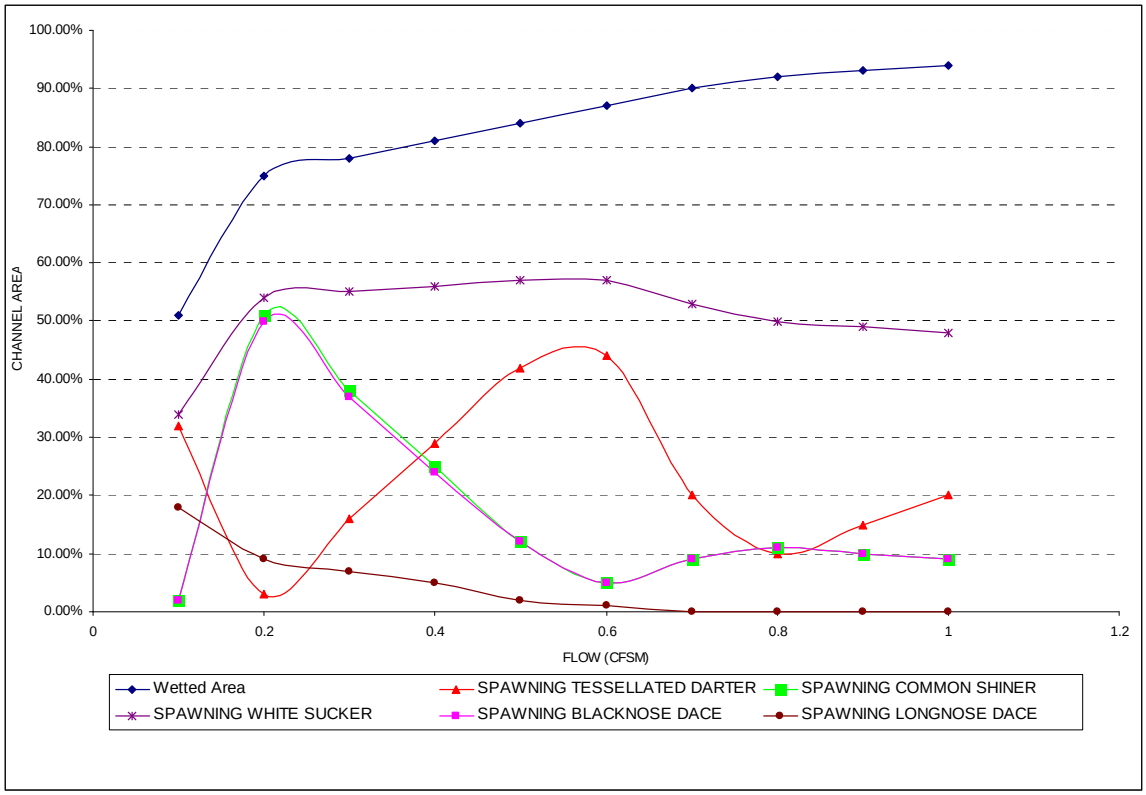

Figure 63: Reach 4 simulated spawning rating curves.

Community habitat increased initially from 15% at 0.1 cfsm to just above 30% at0.2 cfsm, decreased steadily to 15% as flow reached 1 cfsm. Generic fish habitat increased from 35% at 0.1 cfsm to 55% at 0.5 cfsm, decreased to just above 20% at 0.8 cfsm and then increased to 30% as flow reached 1 cfsm.

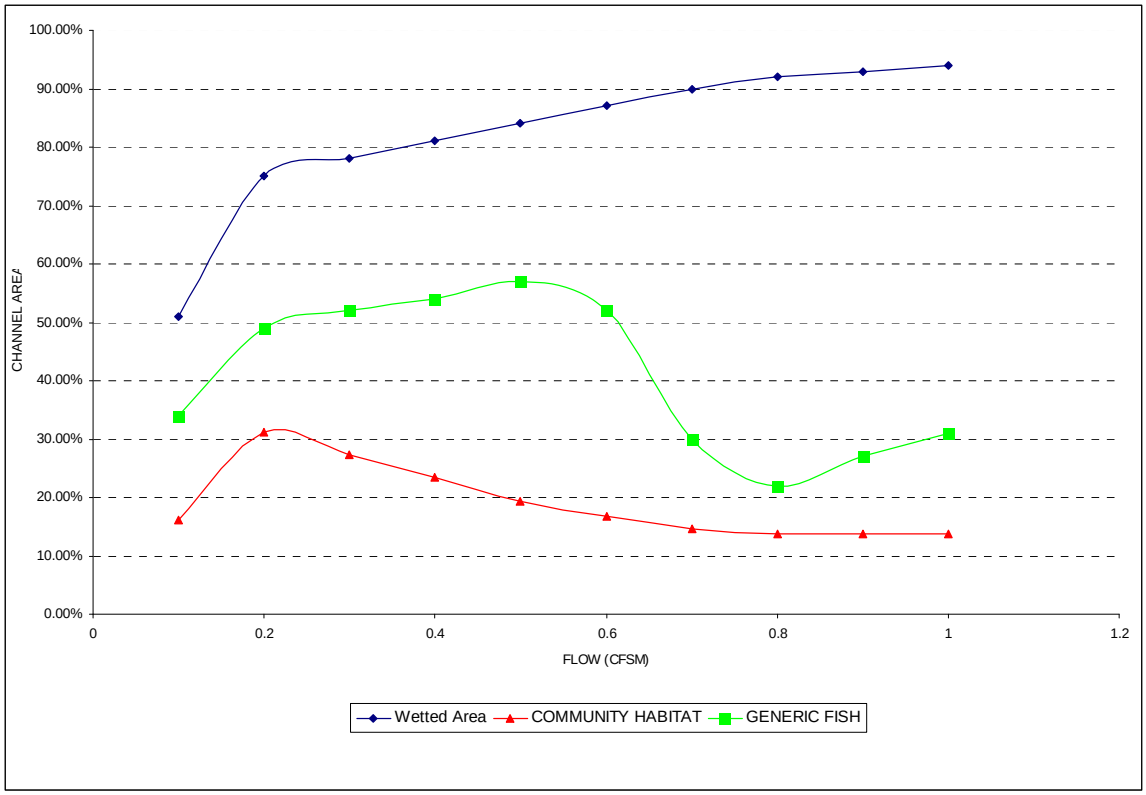

Figure 64: Reach 4 simulated available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased significantly from 5% at 0.1 cfsm to 55% at 0.6 cfsm, decreased to 20% at 0.8 cfsm, and finally increased to 35% as flow reached 1 cfsm. Atlantic salmon and American shad habitat both increased from about 5% at 0.1 cfsm to 40% and 45% at 0.6 cfsm, increased slightly to just below 55% and 50% respectively by 1 cfsm.

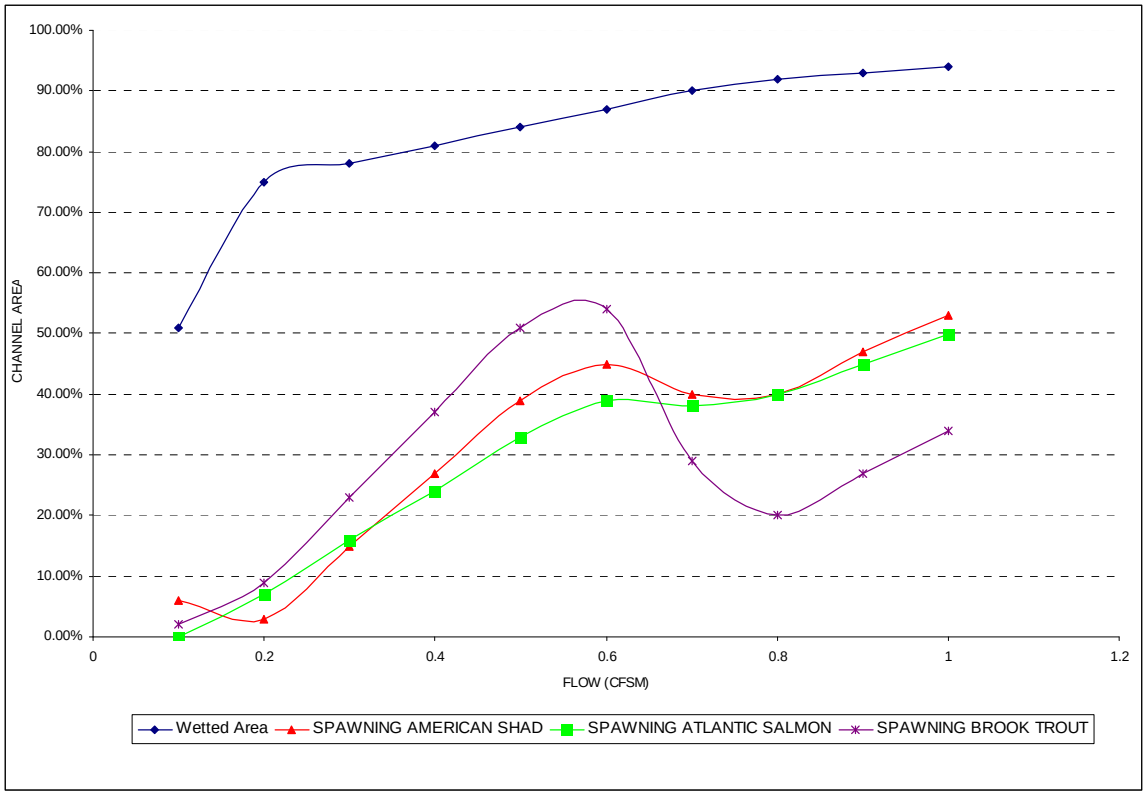

Figure 65: Reach 4 anadromous and salmonids spawning rating curves.

Reach 5

Wetted area increased from 50% at 0.1 cfsm to 95% as flows increased to 1 cfsm. Atlantic salmon habitat decreased from 25% at 0.1 cfsm to 15% at 0.5 cfsm, increased to 25% at about 0.9 cfsm and then decreased to 15% at 1 cfsm. Blacknose dace habitat decreased from 35% at 0.1 cfsm to 20% at 0.5 cfsm and then increased to 50% as flows increased to 1 cfsm. American eel and tessellated darter habitat increased from 20% and 30% at 0.1 cfsm to 45% and 35% at 0.5 cfsm, decreased to 35% and 25% at about 0.9 cfsm and then increased to 45% and 35% respectively at 1 cfsm. Longnose dace habitat decreased from about 20% at 0.1 cfsm to about 10% as flows increased to 1 cfsm. White sucker habitat increased from below 5% at 0.1 cfsm to 15% by 1 cfsm. Brook trout habitat increased from 45% at 0.1 cfsm to 50% at 0.4 cfsm and then decreased to 35% as flows increased to 1 cfsm. Common shiner habitat increased from virtually none at low flow to 15% by 1 cfsm.

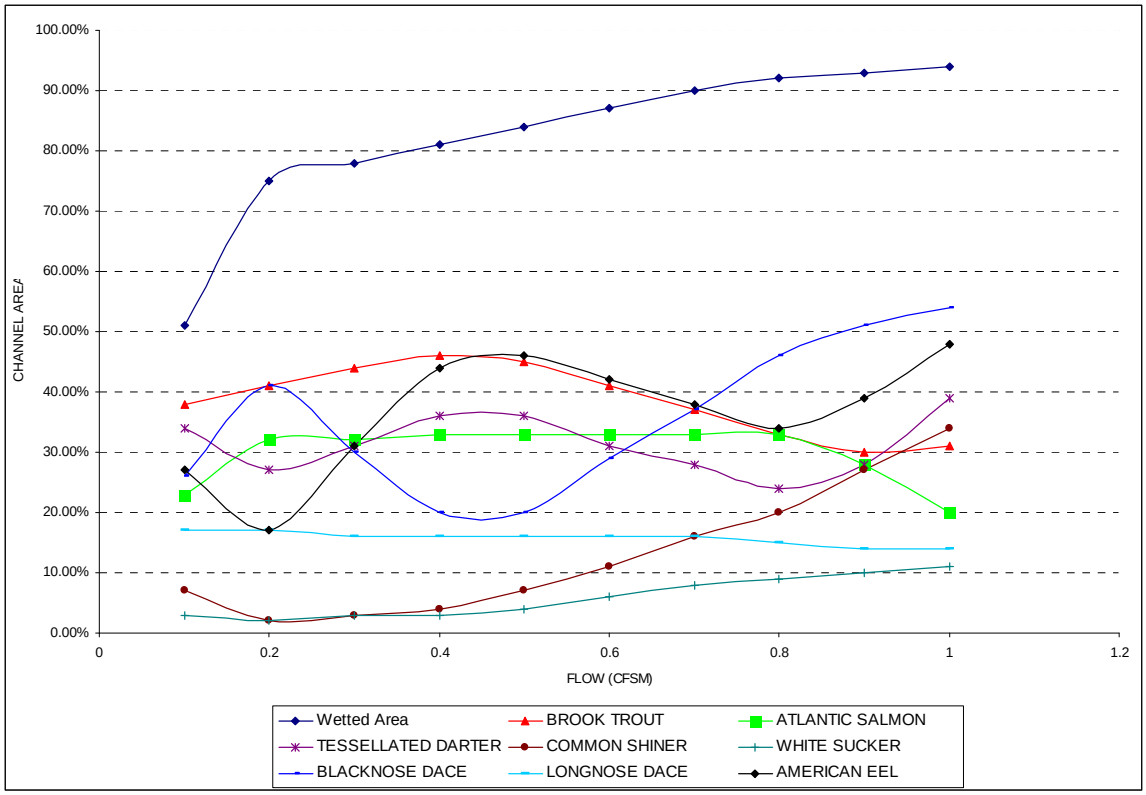

Figure 66: Reach 5 simulated rearing and growth rating curves.

Community habitat remains between 25% and 35% regardless of flow. Generic fish habitat directly corresponds with the wetted area curve; it increases from 55% at 0.1 cfsm to 75% at 1 cfsm.

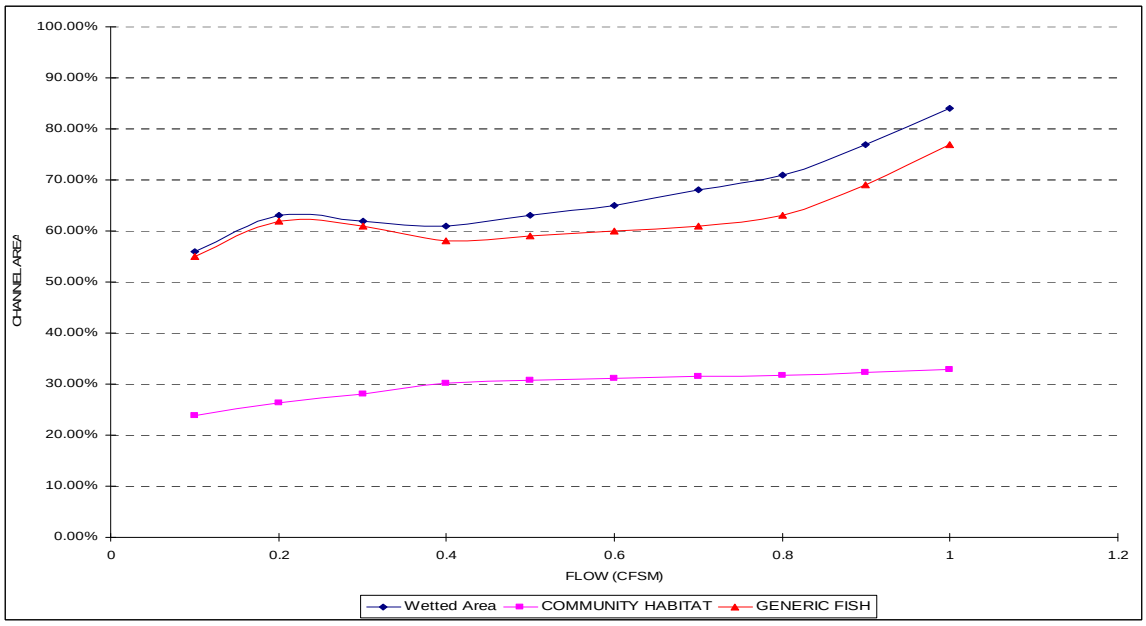

Figure 67: Reach 5 simulated habitat.

Spawning

Longnose dace, Blacknose dace, Common shiner, White sucker, and Tessellated darter all follow the same pattern increasing respectively from 35%, 45%, 50%, 50%, and 55% at 0.1 cfsm to 55%, 75%, 75%, 80% and 80% as flow reached 1 cfsm.

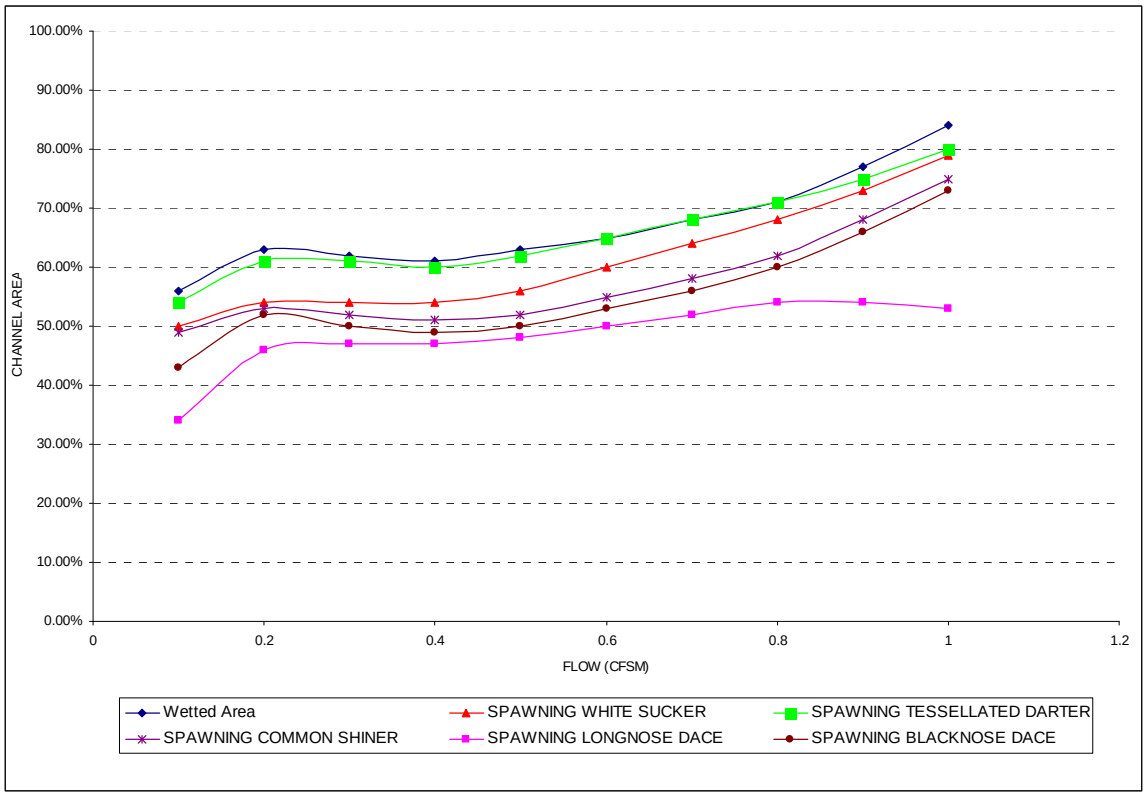

Figure 68: Reach 5 simulated spawning rating curves.

Community habitat increased from 45% at 0.1 cfsm to 70% as flow reached 1 cfsm. Generic fish habitat increased from 50% at 0.1 cfsm to just below 75% as flow reached 1 cfsm.

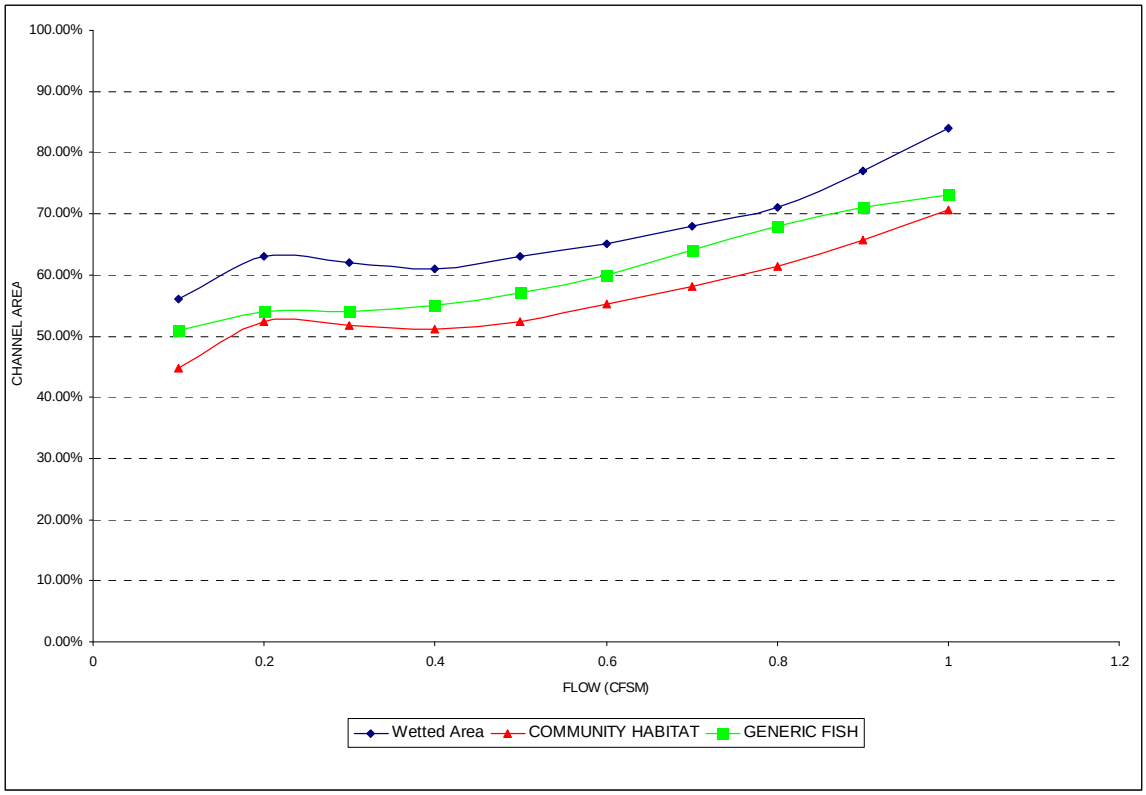

Figure 69: Reach 5 simulated available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased from 35% at 0.1 cfsm to 55% at0.2 cfsm, decreased to 40% at 0.5 cfsm, increased to just below 60% at a flow of 1 cfsm. Atlantic salmon habitat increased initially from 15% at 0.1 cfsm to 35% at0.2 cfsm, decreased to 10% at 0.4 cfsm, increased to 40% at 0.8 cfsm, and then decreased to 30% at a flow of 1 cfsm. American shad habitat increased steadily from 50% at 0.1 cfsm to 80% at 1 cfsm.

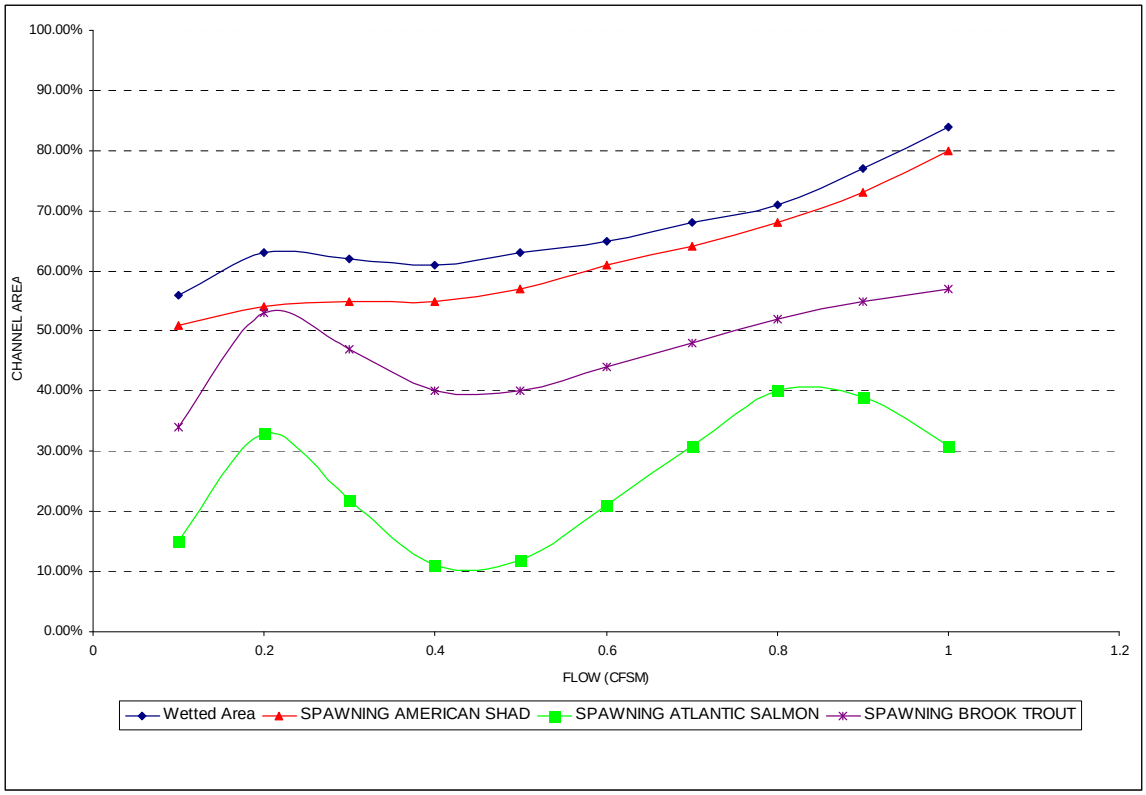

Figure 70: Reach 5 simulated anadromous and salmonids spawning rating curves.

Reach 6

Wetted area increased from about 70% at 0.1 cfsm to 100% as flows increased to 1 cfsm. Atlantic salmon habitat increased from 25% at 0.1 cfsm to 50% at 0.5 cfsm, decreased to 25% between 0.7 and 0.8 cfsm and then increased to 75% at 1 cfsm. Blacknose dace habitat increased from 25% at 0.1 cfsm to 40% at 0.5 cfsm, decreased to 35% between 0.7 and 0.8 cfsm and then increased to 100% by 1 cfsm. Tessellated darter habitat decreased from almost 50% at 0.1 cfsm to 10% at 0.5 cfsm, increased to 80% at 1 cfsm. American eel habitat steadily increased from 35% at 0.1 cfsm to almost 80% at 0.5 cfsm and then decreased to 30% as flows increased to 1 cfsm. Longnose dace habitat remained between 10% and 20% regardless of flow. White sucker habitat remained below 25% regardless of flow. Brook trout habitat decreased from about 40% at 0.1 cfsm to 15% at 0.5 cfsm and then increased to almost 30% as flows increased to 1 cfsm. Common shiner habitat increased from 10% at 0.1 cfsm to 35% at about 0.6 cfsm and then increased to 90% at 1 cfsm.

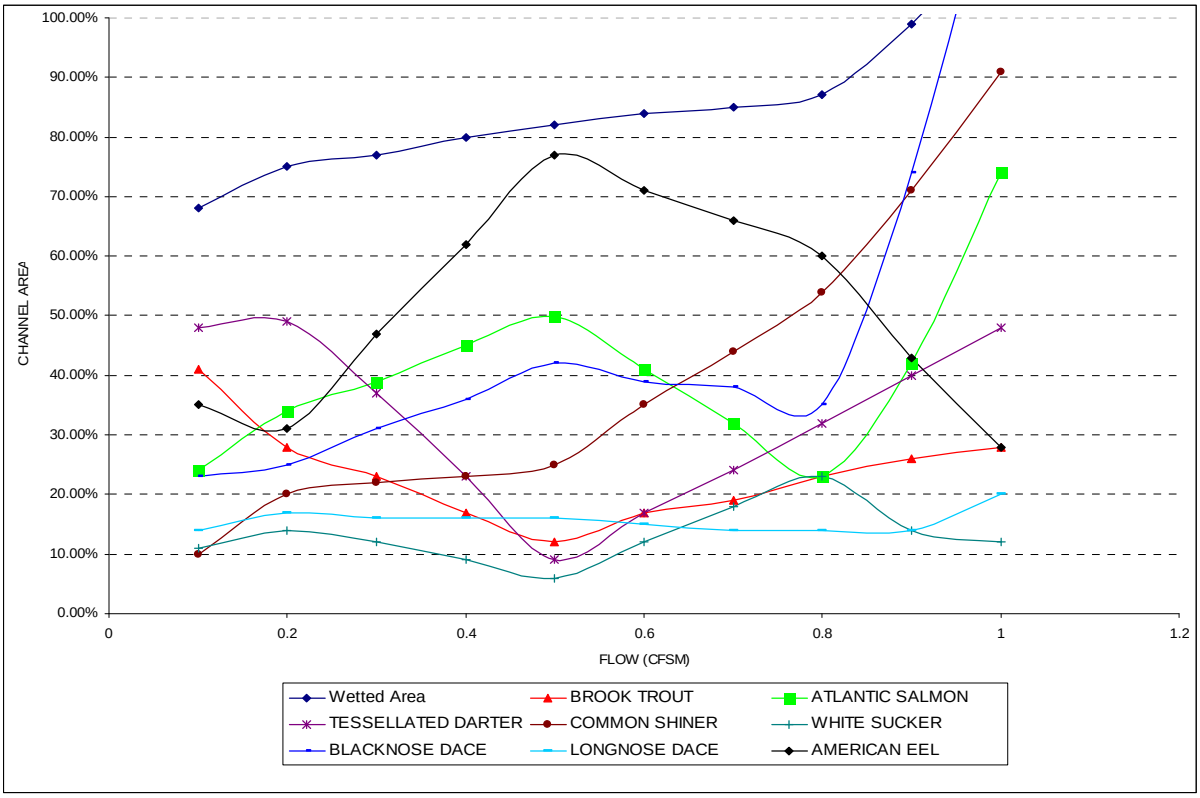

Figure 71: Reach 6 simulated rearing and growth rating curves.

Community habitat increased from 25% at 0.1 cfsm to just above 65% at 1 cfsm. Generic fish habitat directly corresponds with the wetted area curve. It increased from 65% at 0.1 cfsm to 100% at 1 cfsm.

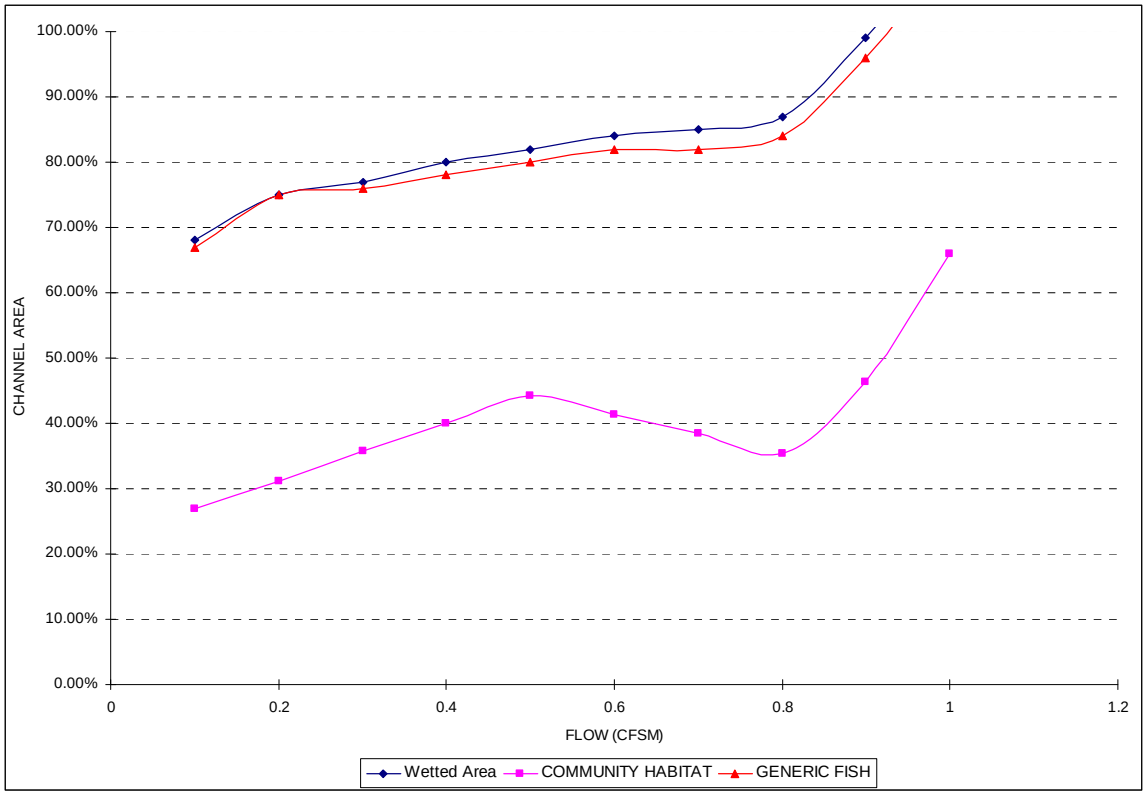

Figure 72: Reach 6 simulated habitat.

Spawning

Blacknose dace and Common shiner habitat remained around 40% as flow increased from 0.1 cfsm to 0.5 cfsm; they then increased to 100% as flow reached 1 cfsm. White sucker habitat increased from just below 50% at 0.1 cfsm to just below 80% at 0.5 cfsm, decreased to 65% at 0.8 cfsm, increased to 100% as flow reached 1 cfsm. Tessellated darter habitat remained at 65% as flow increased from 0.1 cfsm to 0.5 cfsm, increased to 100% as flow reached 1 cfsm. Longnose dace habitat increased from 30% at 0.1 cfsm to 55% at 0.5 cfsm, decreased to 40% at 0.8 cfsm, and finally increased to just below 90% as flow reached 1 cfsm.

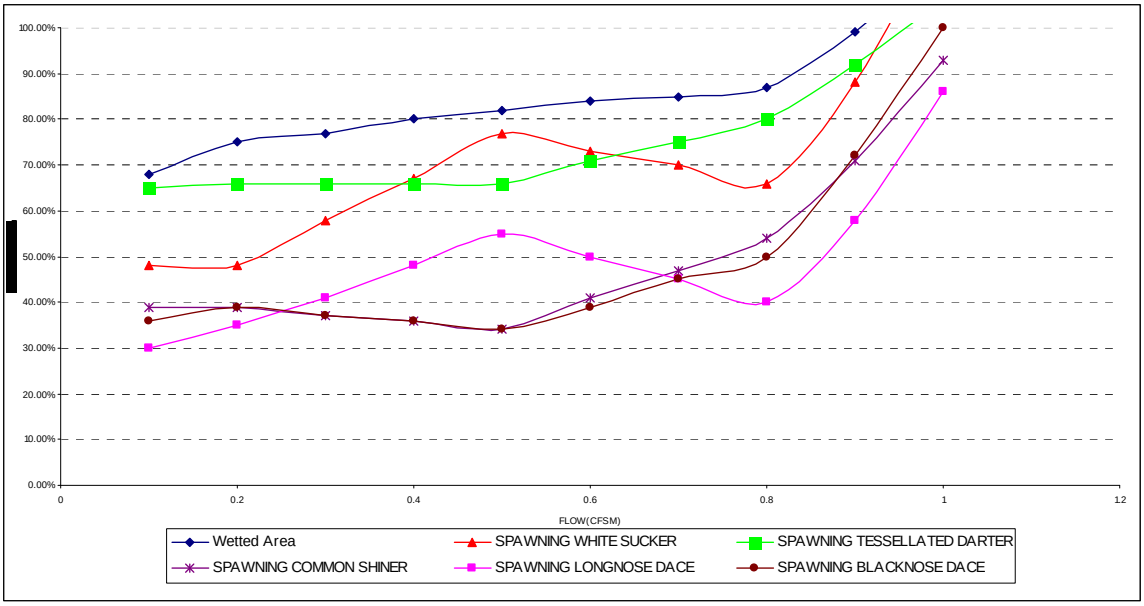

Figure 73: Reach 6 simulated spawning rating curves.

Community habitat increased from 40% at 0.1 cfsm to 55% at 0.8 cfsm, increased to 100% as flow reached 1 cfsm. Generic fish habitat decreased initially from 50% at 0.1 cfsm to just above 40% at0.2 cfsm, increased to 65% at 0.5 cfsm where it remained constant until a flow of 0.8 cfsm. From there it increased to 90% as flow reached 1 cfsm.

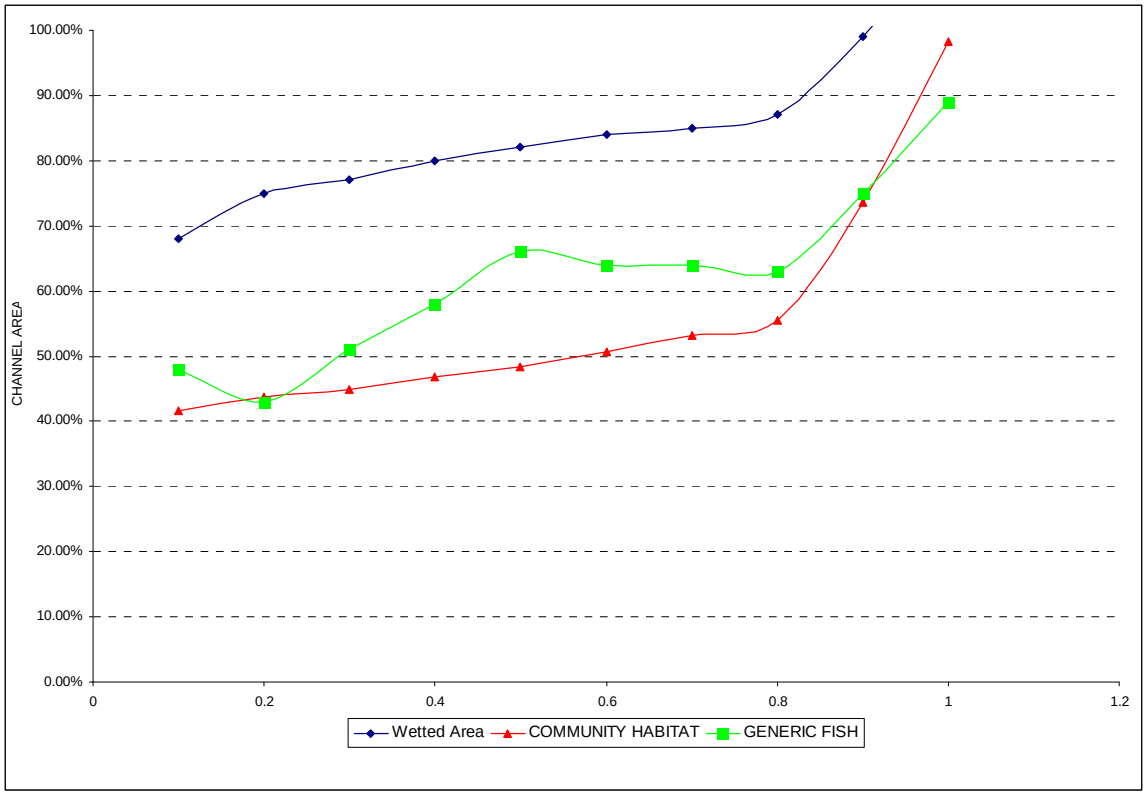

Figure 74: Reach 6 simulated available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased initially from 25% at 0.1 cfsm to just above 40% at0.2 cfsm, decreased to 30% at 0.5 cfsm, increased to 100% as flow increased to 1 cfsm. Atlantic salmon habitat increased from 10% at 0.1 cfsm to 20% at0.2 cfsm where it remained constant up until 0.5 cfsm. From there it increased to 100% as flow increased to 1 cfsm. American shad habitat increased from around 50% at around 0.1 cfsm to 100% as flow increased to 1 cfsm.

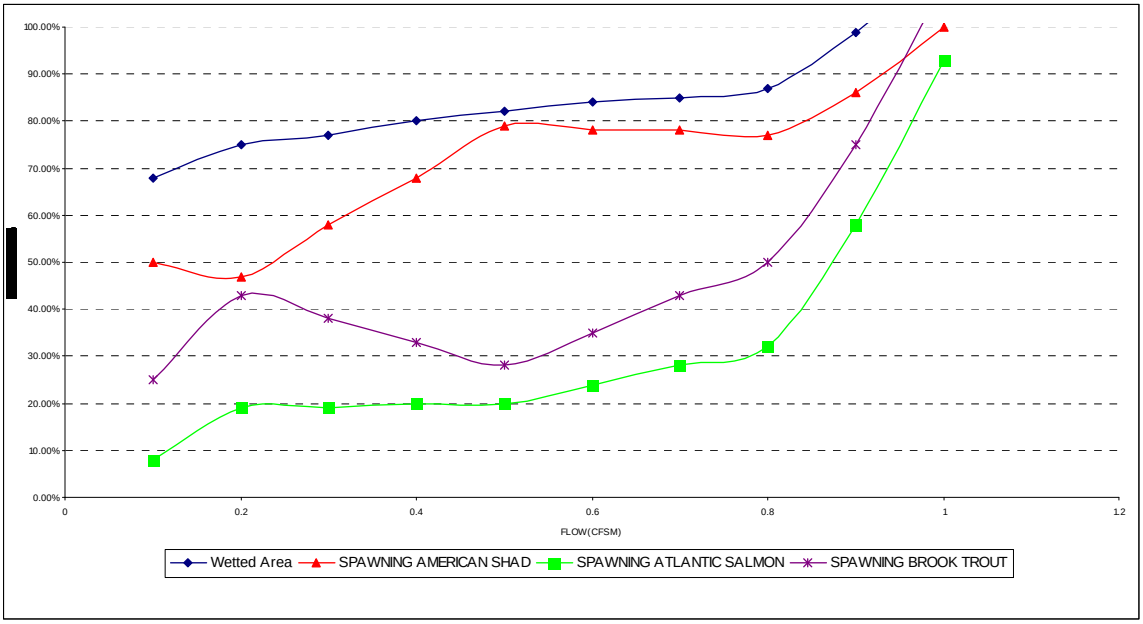

Figure 75: Reach 6 simulated anadromous and salmonids spawning rating curves.

Reach 7

Wetted area increased from 60% at 0.1 cfsm to almost 90% as flow increased to 1 cfsm. Atlantic salmon habitat decreased from 35% at 0.1 cfsm to 10% at about 0.9 cfsm and then increased to 15% at 1 cfsm. Blacknose dace habitat decreased from 35% at 0.1 cfsm to 20% at 0.5 cfsm and then increased to 60% as flow increased to 1 cfsm. Tessellated darter habitat decreased from 20% at 0.1 cfsm to 10% between 0.2 and 0.3 cfsm, increased to 50% at 0.5 cfsm and then decreased to 20% by 1 cfsm. American eel habitat initially decreased from 50% at 0.1 cfsm to 40% between 0.2 and 0.3 cfsm and then steadily increased to almost 70% as flow increased to 1 cfsm. Longnose dace habitat increased from 10% at 0.1 cfsm to 20% at 0.5 cfsm, decreased to 10% at about 0.9 cfsm and then increased to almost 15% at 1 cfsm. White sucker habitat decreased from almost 10% at 0.1 cfsm to 5% between 0.2 and 0.3 cfsm, increased to almost 25% at 0.5 cfsm, decreased to 10% at about 0.9 cfsm and then increased to 15% at 1 cfsm. Brook trout habitat decreased from almost 50% at 0.1 cfsm to 15% as flow increased to 1 cfsm. Common shiner habitat increased from below 5% at 0.1 cfsm to 65% at 1 cfsm.

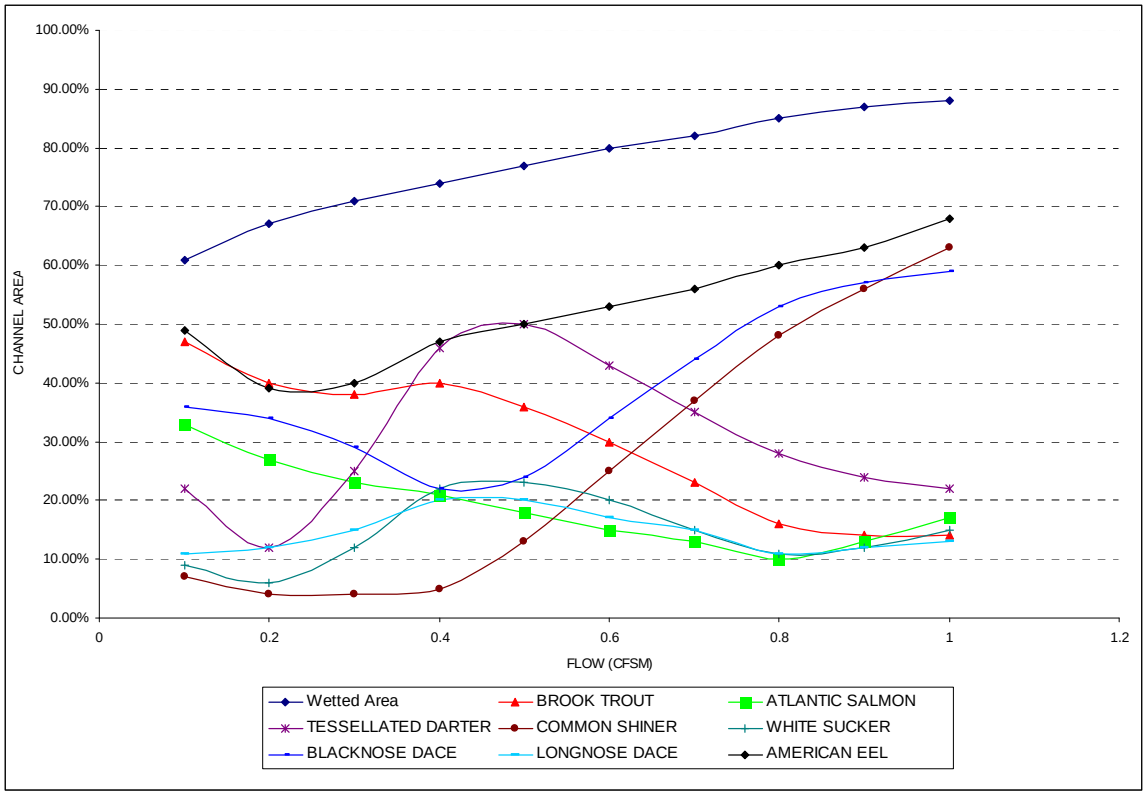

Figure 76: Reach 7 simulated rearing and growth rating curves.

Community habitat remained between 25% and 35% regardless of flow. Generic fish habitat closely resembled the wetted area curve. It increased from 60% at 0.1 cfsm to 85% at 1 cfsm.

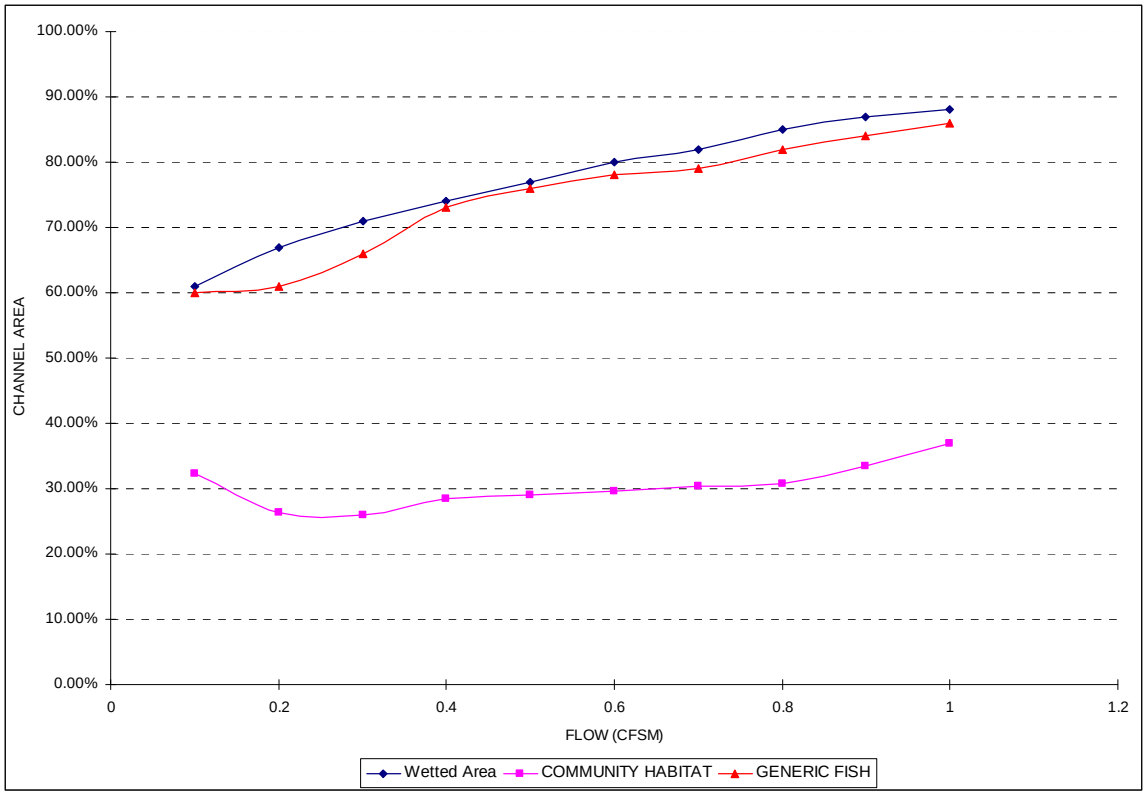

Figure 77: Reach 7 simulated habitat.

Spawning

Blacknose dace habitat increased initially from 50% at 0.1 cfsm to 65% at0.2 cfsm, decreased steadily to just above 50% as flow increased to 1 cfsm. Common shiner habitat increased initially from 50% at 0.1 cfsm to 65% at0.2 cfsm, it remained between 55% and 60% as flow increased to 1 cfsm. White sucker habitat steadily increased from just below 60% at 0.1 cfsm to just above 80% as flow increased to 1 cfsm. Tessellated darter habitat remained between 60% and 75% regardless of flow. Longnose dace habitat initially decreased from 40% at 0.1 cfsm to about 25% at0.2 cfsm, steadily increased to just below 60% as flow increased to 1 cfsm.

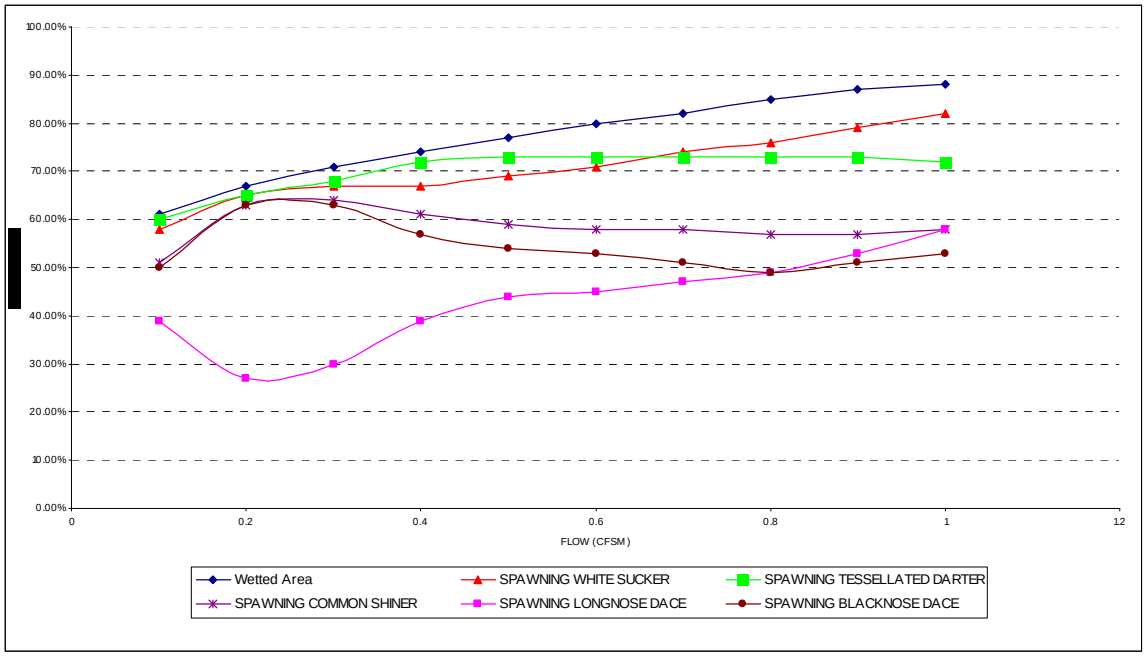

Figure 78: Reach 7 simulated spawning rating curves.

Community habitat remained between 50% and 60% regardless of flow. Generic fish habitat increased steadily from 50% at 0.1 cfsm to just below 70% as flow increased to 1 cfsm.

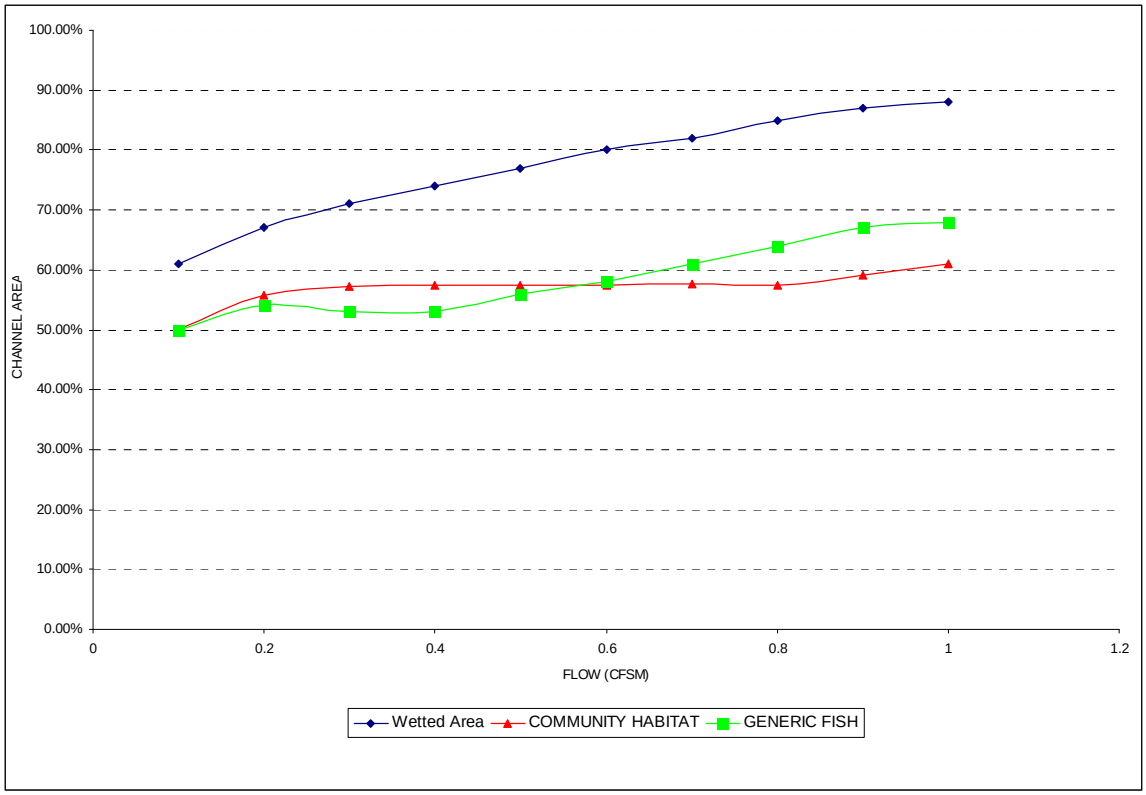

Figure 79: Reach 7 simulated available spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased from 15% at 0.1 cfsm to 25% at0.2 cfsm, decreased slightly to 20% at 0.5 cfsm, increased steadily to just below 40% as flow increased to 1 cfsm. Atlantic salmon habitat increased from 5% at 0.1 cfsm to just below 40% as flow increased to 1 cfsm. American shad habitat increased from 50% at 0.1 cfsm to 65% at0.2 cfsm, decreased to 60% at 0.4 cfsm, increased slowly to about 75% as flow increased to 1 cfsm.

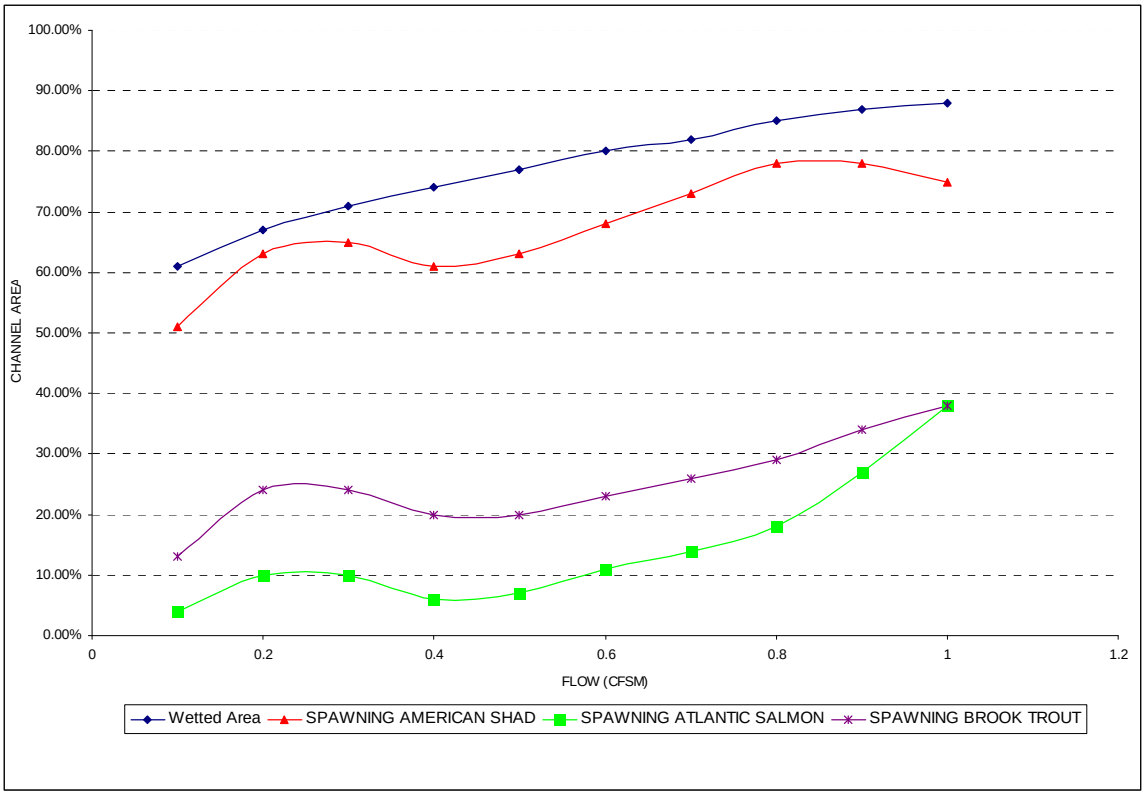

Figure 80: each 7 simulated anadromous and salmonids spawning rating curves.

Reach 9

Wetted area increased from 65% at 0.1 cfsm to 85% as flows increased to 1 cfsm. Blacknose dace and common shiner habitat increased from almost 30% and almost 15% at 0.1 cfsm to 55% and 45% respectively between 0.7 and 0.8 cfsm where they remained stable as flow increased to 1 cfsm. Tessellated darter habitat decreased from 40% at 0.1 cfsm to 5% at 0.6 cfsm, increased to 20% between 0.7 and 0.8 cfsm and then decreased to 15% at 1 cfsm. American eel habitat decreased initially from 40% at 0.1 cfsm to just above 20% at0.2 cfsm. It then steadily increased to almost 70% at 0.6 cfsm; it decreased slightly to 60% as flow increased to 1 cfsm. Atlantic salmon habitat increased initially from 35% at 0.1 cfsm to 40% at0.2 cfsm. It then slowly decreased just below 20% at 1 cfsm. Longnose dace habitat increased from 15% at 0.1 cfsm to 20% between 0.2 and 0.3 cfsm, decreased to almost 5% at 0.6 cfsm and then increased to 10% by 1 cfsm. White sucker habitat remained at about 5% at low flows until 0.8 cfsm where it increased to 15% and remained stable as flow increased to 1 cfsm. Brook trout habitat decreased from almost 45% at 0.1 cfsm to 20% as flow increased to 1 cfsm.

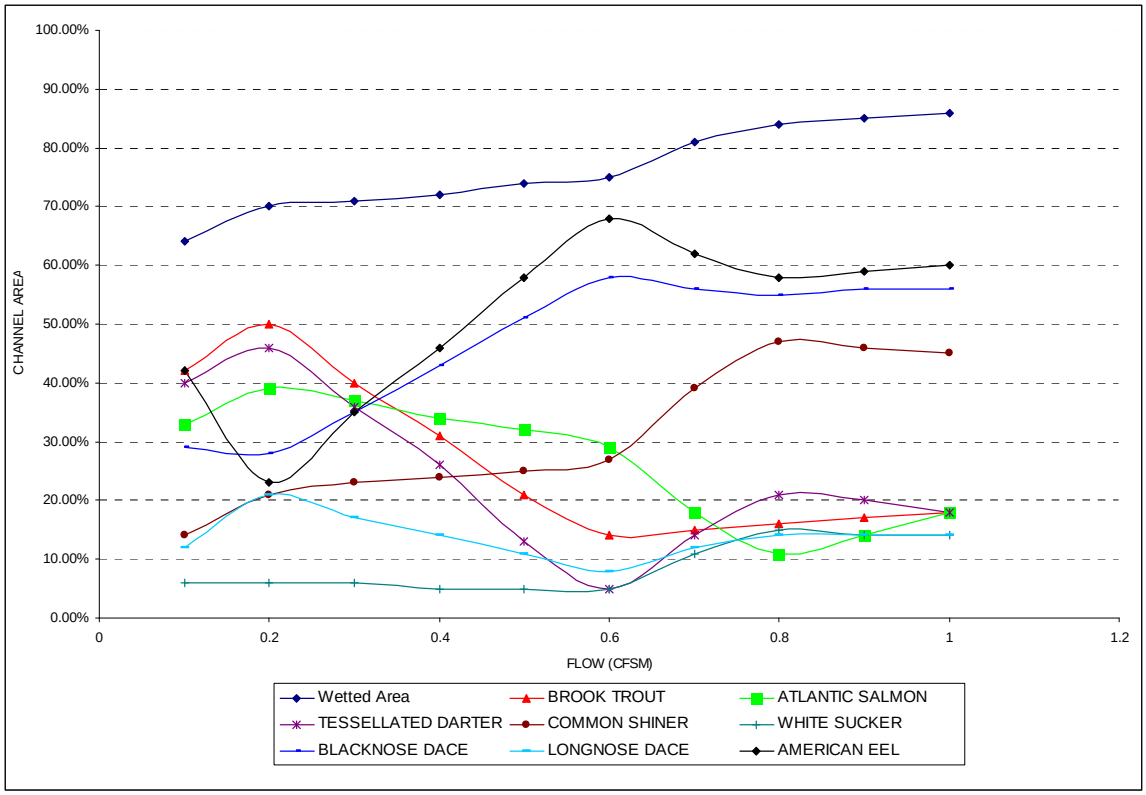

Figure 81: Reach 9 simulated rearing and growth rating curves.

Community habitat remained between 30% and 38% regardless of flow. Generic fish habitat closely resembled the wetted area curve. It increased from 65% at 0.1 cfsm to just below 80% at 1 cfsm.

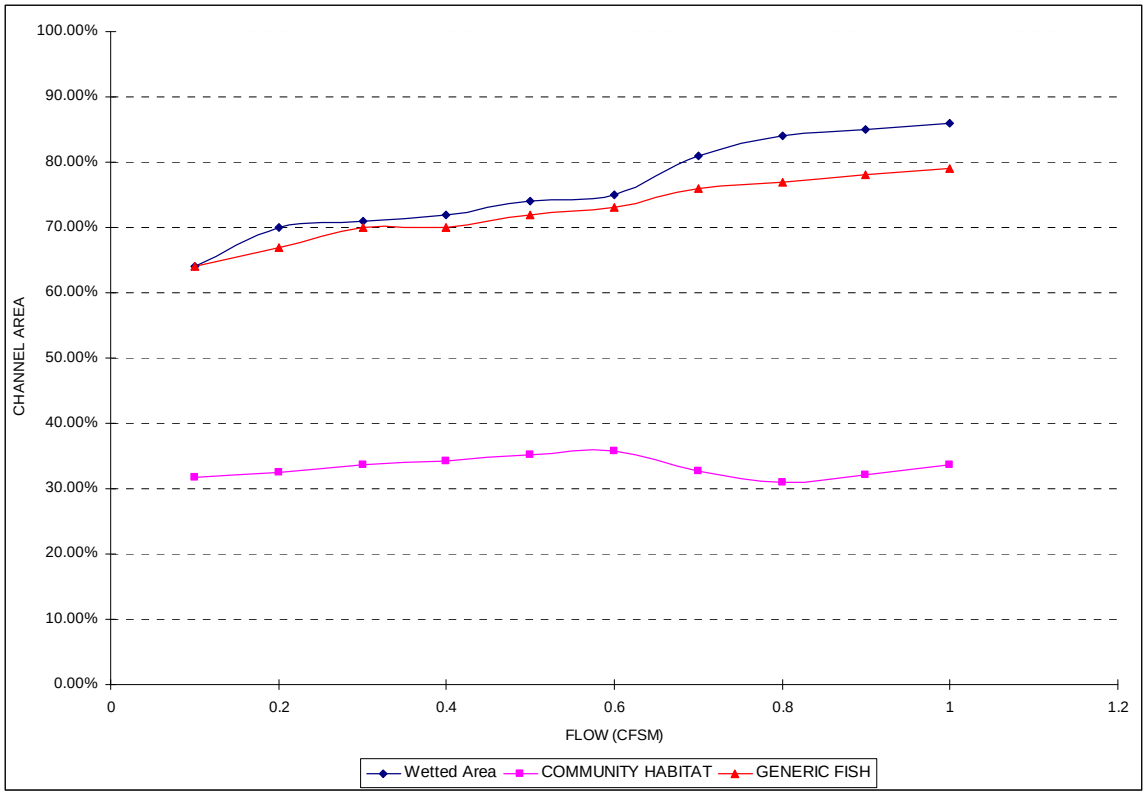

Figure 82: Reach 9 simulated habitat.

Spawning

Longnose dace habitat increases from roughly 5% at0.2 cfsm to about 50% at 0.6 cfsm where it remained steady as flow increased to 1 cfsm. Blacknose dace habitat increased from 15% at 0.1 cfsm to 30% at 0.2 cfsm, decreased to 15% by 0.6 cfsm and then increased to 35% by 1 cfsm. White sucker habitat decreased from 50% at 0.1 cfsm to 40% at0.2 cfsm where it then steadily increased to almost 70% by 1 cfsm. Common shiner habitat increased from 20% at 0.1 cfsm to 30% at0.2 cfsm, decreased slowly to 15% at 0.6 cfsm and then increased to about 40% by 1 cfsm. Tessellated darter habitat decreased from 45% at 0.1 cfsm to 20% between 0.2 and 0.3 cfsm, increased to 40% at 0.6 cfsm and then decreased to 30% by 1 cfsm.

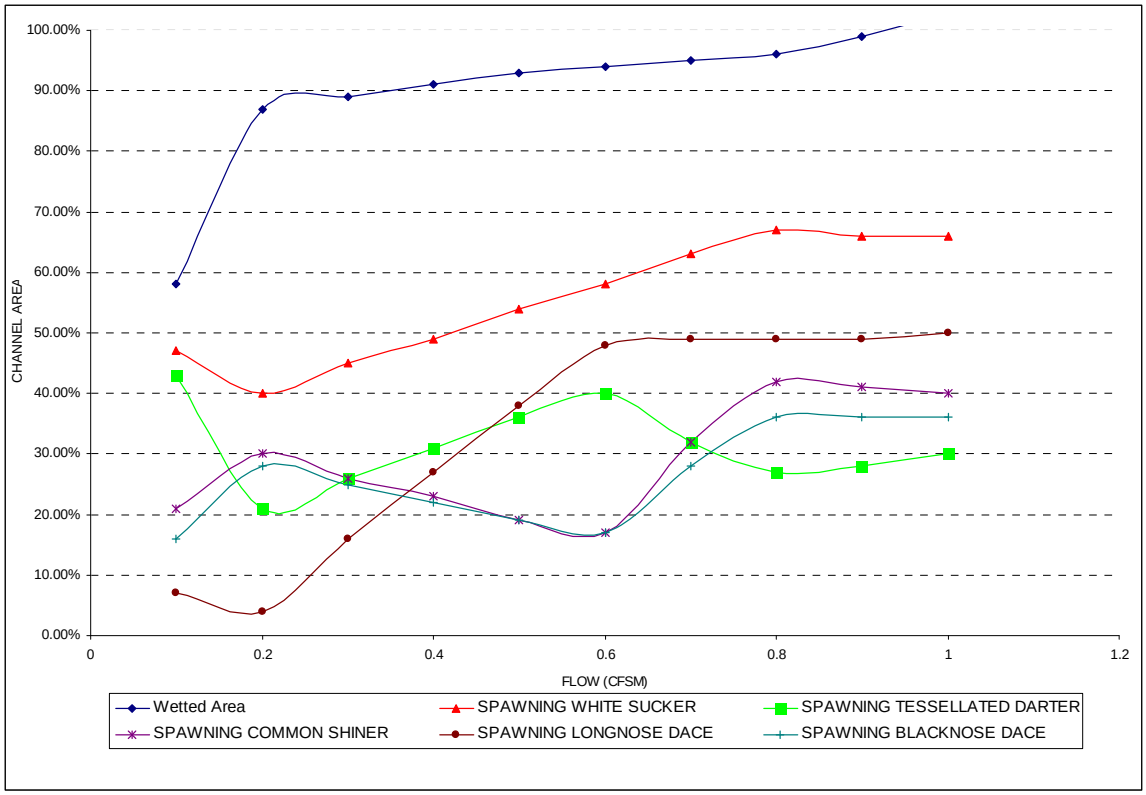

Figure 83: Reach 9 simulated spawning rating curves.

Community available spawning habitat slowly increased from roughly 25% at 0.1 cfsm to 40% at a flow of 1 cfsm. Generic fish available spawning habitat decreased from 50% at 0.1 cfsm to 40% at0.2 cfsm. It then slowly increased to about 65% by a flow of 1 cfsm.

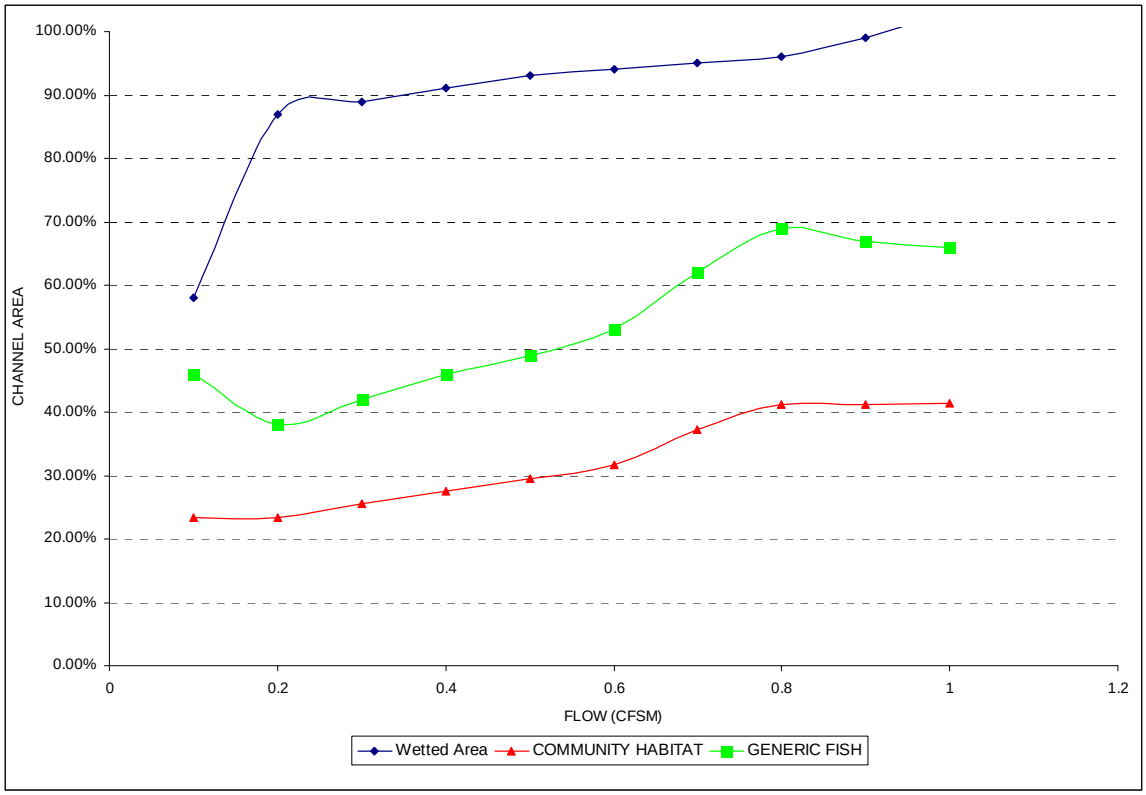

Figure 84: Reach 9 simulated spawning habitat.

Anadromous and Salmonids spawning

Brook trout habitat increased from about 20% at 0.1 cfsm to 30% at0.2 cfsm. It then slowly decreased to 10% at 0.6 cfsm before gradually increasing to just above 20% at a flow of 1 cfsm. American shad habitat remained below 10% regardless of flow. Atlantic salmon habitat gradually increased with the increasing flow levels. It reached about 5% at flow of 0.6 cfsm and maxed out at 15% at a flow of 1 cfsm.

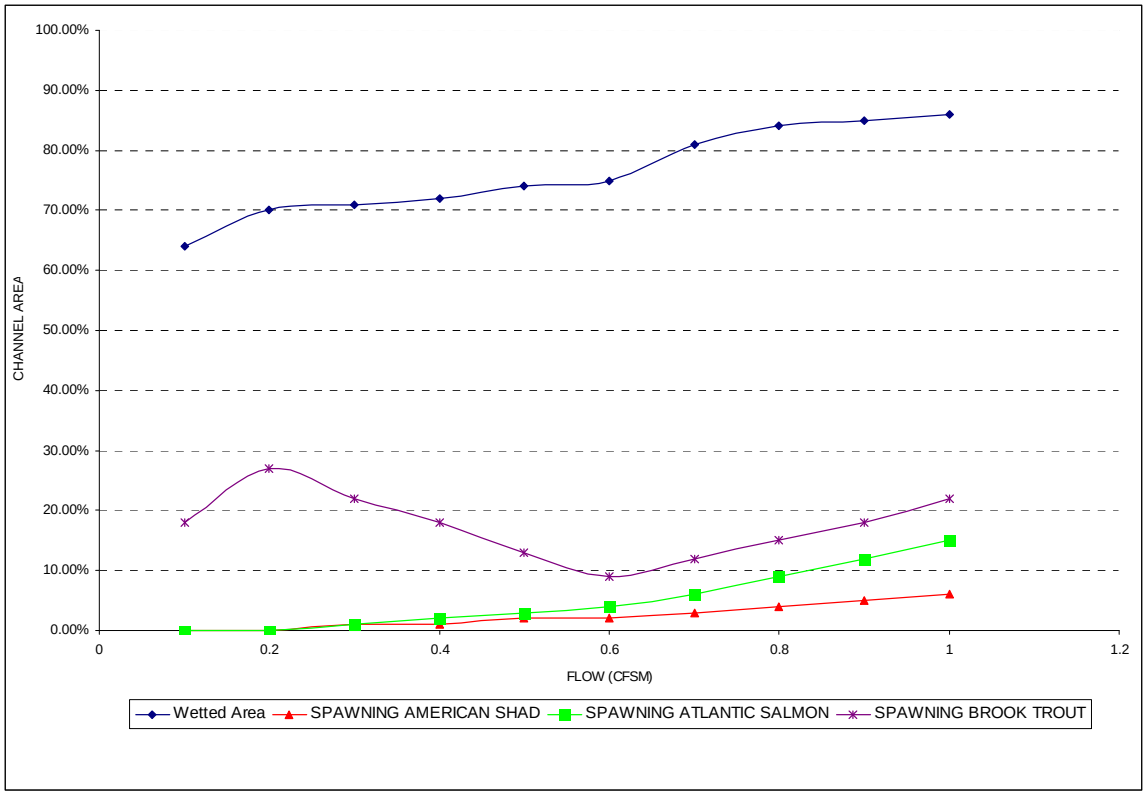

Figure 85: Reach 9 simulated anadromous and salmonids spawning rating curves.

Reach 10

Wetted area increased from about 75% at 0.1 cfsm to 100% as flow increased to 1 cfsm. Atlantic salmon habitat increased from 25% at 0.1 cfsm to 45% at 0.6 cfsm and then decreased to 35% by 1 cfsm. Blacknose dace habitat increased from 30% at 0.1 cfsm to 45% between 0.2 and 0.3 cfsm where it remained stable as flow increased to 1 cfsm. Tessellated darter habitat increased from 40% at 0.1 cfsm to 65% between 0.2 and 0.3 cfsm, decreased to 20% at 0.6 cfsm and then increased to 25% by 1 cfsm. Common shiner habitat increased from 20% at 0.1 cfsm to 65% as flow increased to 1 cfsm. American eel habitat initially decreased from 40% at 0.1 cfsm to 20% between 0.2 and 0.3 cfsm and then increased to 60% by 1 cfsm. Longnose dace habitat increased from 15% at 0.1 cfsm to 20% between 0.2 and 0.3 cfsm, decreased to 15% at 0.5 cfsm and then remained stable as flow increased to 1 cfsm. White sucker habitat increased from 10% at 0.1 cfsm to almost 20% at 0.5 cfsm, decreased to 15% between 0.7 and 0.8 cfsm and then remained stable as flow increased to 1 cfsm. Brook trout habitat decreased from 40% at

0.1 cfsm to 30% between 0.2 and 0.3 cfsm, increased to 50% at 0.5 cfsm, decreased to 10% between 0.7 and 0.8 cfsm and then increased to 15% at 1 cfsm.

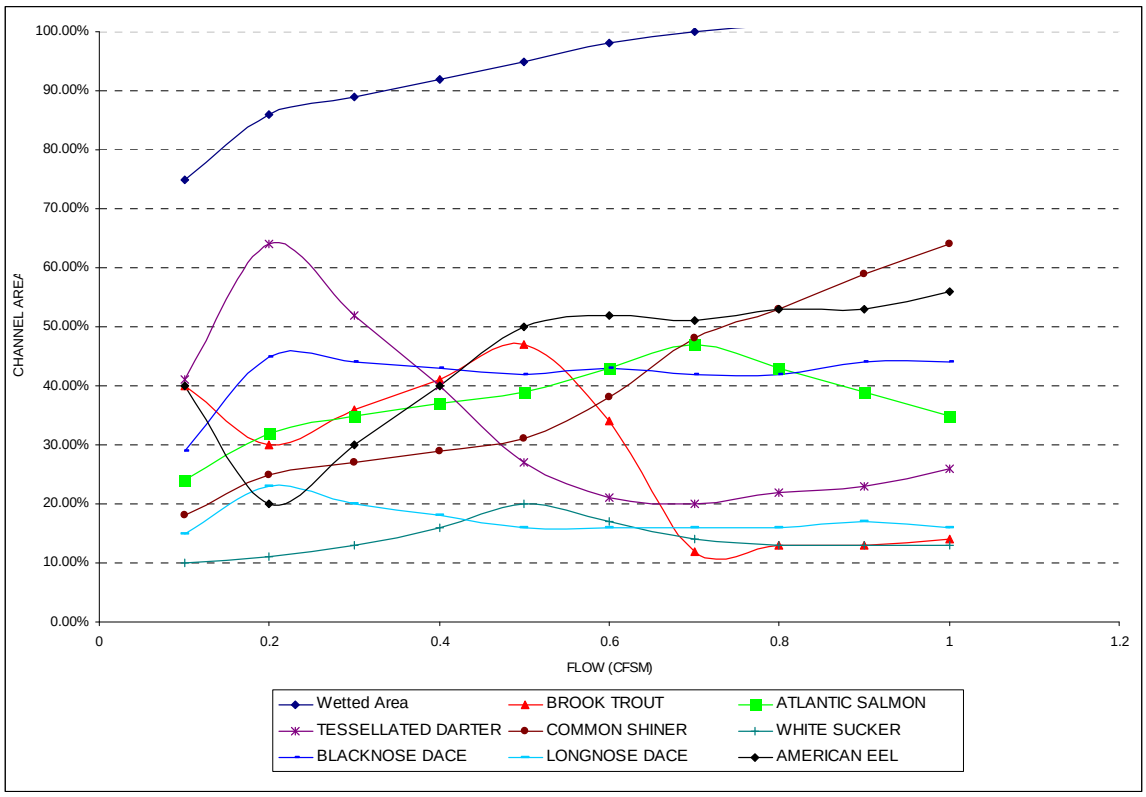

Figure 86: Reach 10 simulated rearing and growth rating curves.

Community habitat remained between 30% at 40% regardless of flow. Generic fish habitat increased from 70% at 0.1 cfsm to 85% at0.2 cfsm. It then slowly decreased to just below 80% at 1 cfsm.

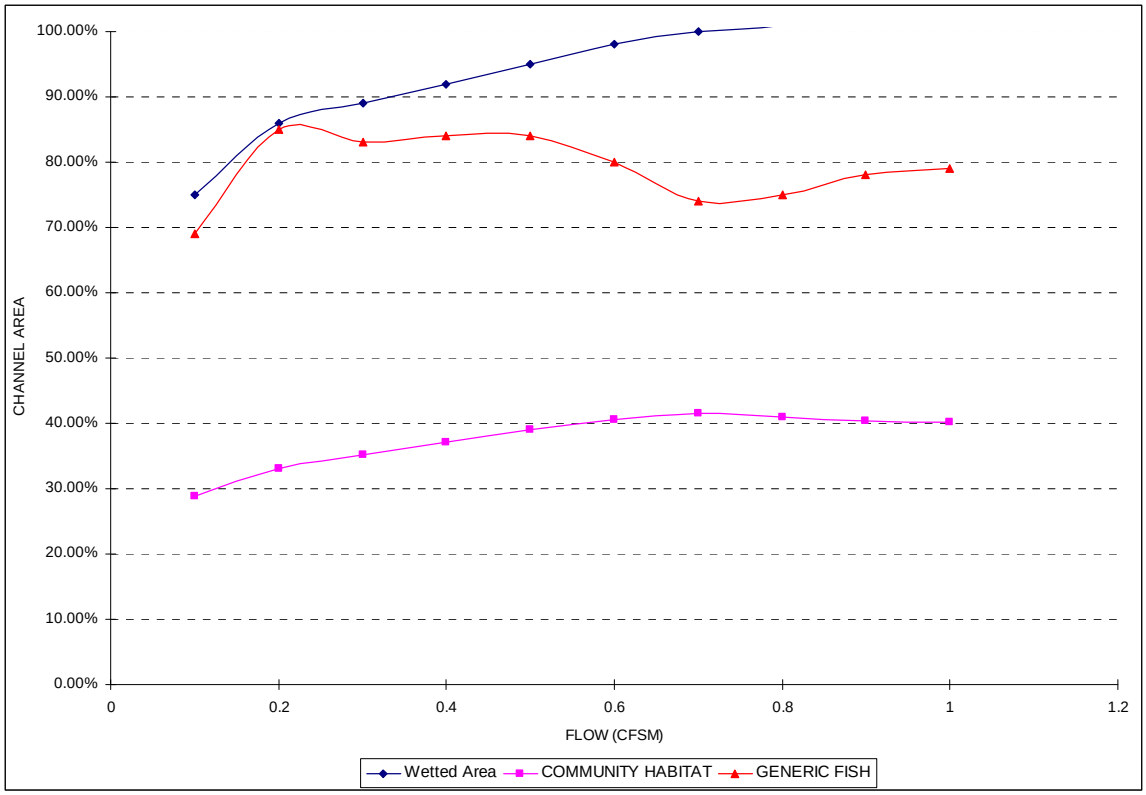

Figure 87: Reach 10 simulated habitat.

Spawning

Blacknose dace habitat increased from 25% at 0.1 cfsm to 60% between 0.2 and 0.3 cfsm, decreased to 30% at 0.6 cfsm, increased to 35% between 0.7 and 0.8 cfsm and then decreased to 30% by 1 cfsm. Common shiner habitat initially increased from about 30% at 0.1 cfsm to 60% between 0.2 and 0.3 cfsm and then decreased to 35% at 0.6 cfsm and remained constant as flow increased to 1 cfsm. White sucker habitat slowly increased from 60% at 0.1 cfsm to 75% at 0.5 cfsm and then maxed out at just above 80% as flow increased to 1 cfsm. Tessellated darter habitat decreased from almost 50% at 0.1 cfsm to just below 30% between 0.2 and 0.3 cfsm, increased to 75% between 0.7 and 0.8 cfsm and then decreased to 65% at 1 cfsm. Longnose dace habitat steadily increased from 5% at 0.1 cfsm to just above 40% at 0.7 cfsm and then decreased slightly to just below 40% by 1 cfsm.

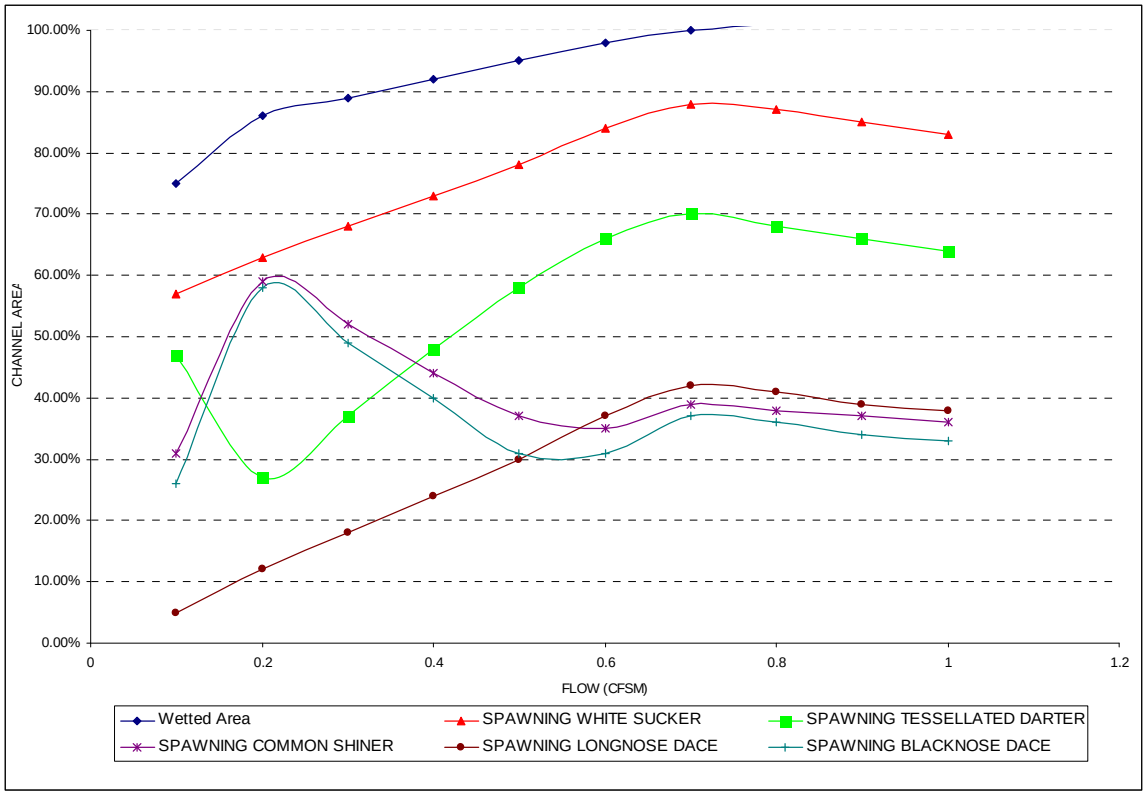

Figure 88: Reach 10 simulated spawning rating curves.

Community habitat increased from 30% at 0.1 cfsm to 45% at0.2 cfsm where it remained between 45% and 50% as flow reached 1 cfsm. Generic fish habitat increased significantly from 55% at 0.1 cfsm to 85% at 0.6 cfsm. It then slowly decreased to just above 75% at a flow of 1 cfsm.

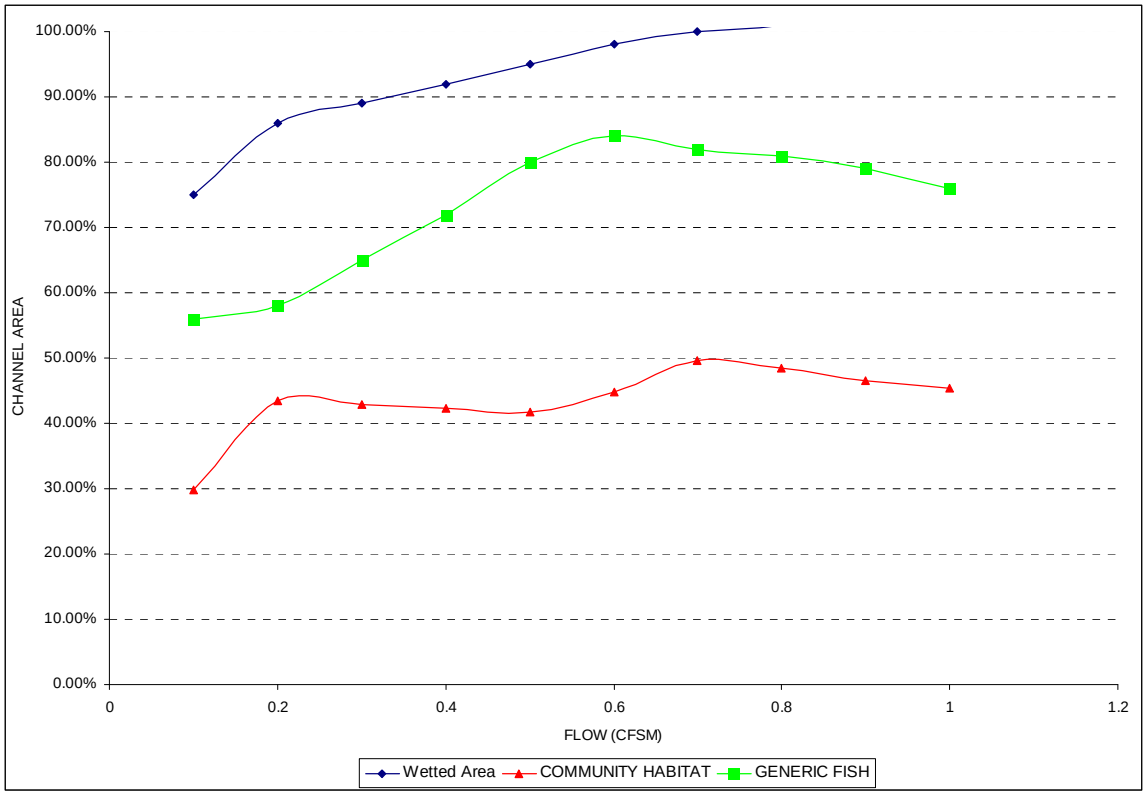

Figure 89: Reach 10 simulated available spawning habitat.

Anadromous and Salmonids spawning

Brook Trout habitat had a sharp increase from 20% at 0.1 cfsm to 40% at0.2 cfsm. It then decreased to just below 20% at 0.5 cfsm before steadily increasing to 40% by 0.7 cfsm where it remained constant as flow reached 1 cfsm. American Shad habitat slowly increased from 5% at0.2 cfsm to 30% at 1 cfsm. Atlantic salmon habitat remained below 10% until flow reached 0.6 cfsm. From there it increased to about 40% at a flow of 0.7 cfsm where it stayed constant as flow reached 1 cfsm.

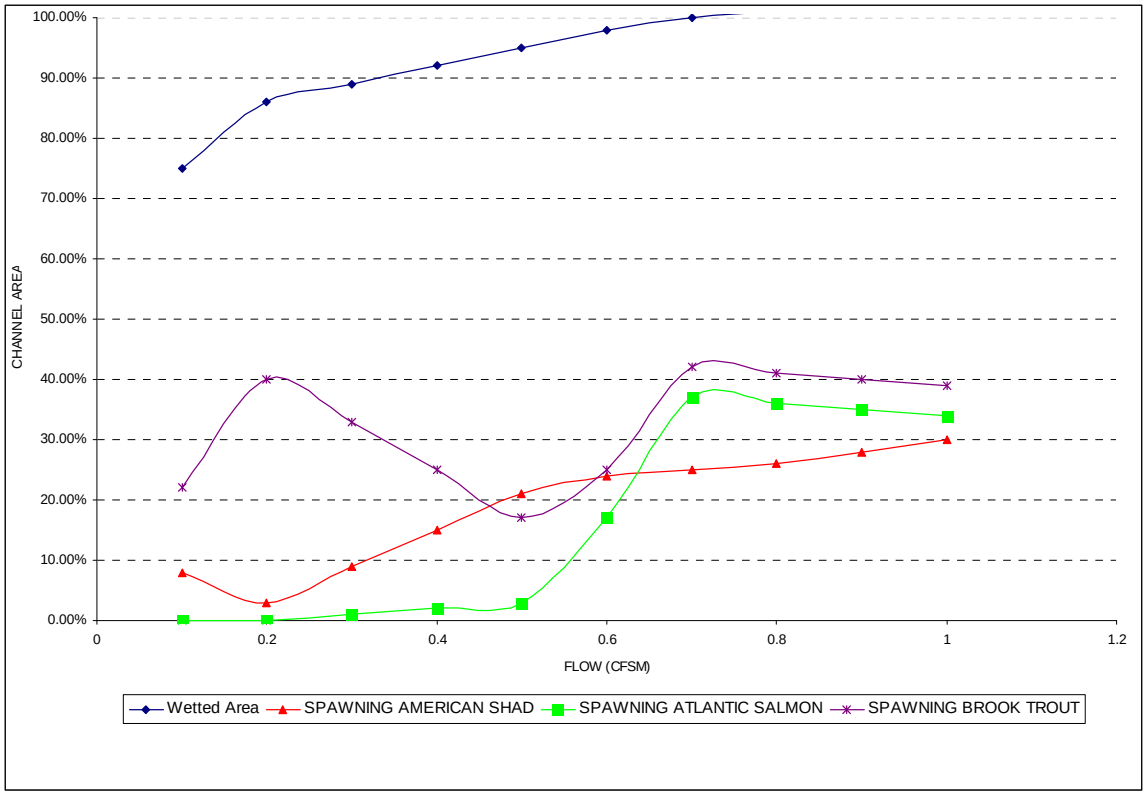

Figure 90: Reach 10 simulated anadromous and salmonids spawning rating curves.