F. RELATIONSHIPS BETWEEN HABITAT MANAGEMENT STRATEGIES AND CONSERVATION HYPOTHESES

Conservation Hypothesis	UPPER GREEN RIVER SUBWATERSHED - Habitat Condition and/or Process Addressed in Habitat Management Strategies									
	Channel geomorphology (pools, LWD, riffles)	Sediment recruitment	Off-channel habitats	Refugia	Riparian areas	Access to Upper Watershed	Tributary habitats	Water Quality	Water quantity and timing of runoff	Reservoir
	(All Segments and Tributaries)	(All Segments and Tributaries)	(All Segments and Tributaries)	(Segments 9,11 and 12 and Tributaries)	(All Segments and Tributaries)	(All Segments)	(All Segments)	(All Segments and Tributaries)	(All Segments)	(Segment 8)
Up-1 (adult and juvenile fish passage around HHD)						✓				✓
Up-2 (refuge habitat and habitat complexity)	✓		✓	✓	✓		✓	✓	✓	
Up-3 (establish bull trout population above HHD)						✓				
Up-4 (sediment processes)		✓					✓			
All-1 (water quality)		✓		✓	✓			✓		
All-2 (riparian zone)	✓		✓	✓	✓			✓		
All-3 (tributary access)							✓			
All-4 (natural flows [high and low])	✓		✓	✓	✓					
All-5 (Low Impact Development etc)										
All-6 (no armoring, fill, etc)	✓	✓	✓							
	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES
	Protect areas where the river is exhibiting natural rates of channel migration and contains habitat complexity **Restore** lateral channel migration; **restore** riparian conditions by allowing natural cycle of succession **Restore** hydrologic processes to create habitat complexity **Substitute** habitat features (e.g. LWD) to create pools and collect sediment	**Protect** areas where sediment recruitment and transport processes are currently functioning **Restore** hillslope hydrology and stability; restore riparian conditions **Substitute** gravel recruitment through LWD supplementation.	**Protect** areas that have functioning off-channel habitat and exhibit natural riverine processes to maintain habitat. **Restore** areas that have some functioning off-channel habitat; **restore** lateral channel migration to create new off-channel habitat. **Substitute** hydrologic processes by creating off-channel habitat	**Protect** functioning mainstem and off-channel environments. **Restore** ecological processes to create and maintain functioning spawning and rearing habitat; **restore** riparian conditions by allowing natural cycle of succession **Substitute** ecological and hydrological processes by creating key habitats and habitat features	**Protect** late seral riparian timber stands **Restore** riparian conditions by allowing natural cycle of succession **Rehabilitate** areas of early and mid-seral riparian timber stands	**Substitute** upstream and downstream passage (e.g., trap and haul)	**Protect** areas that provide currently functioning spawning and rearing habitat **Restore** fish passage to tributaries (e.g. culvert replacement or replacement with bridge); **restore** stream channels where degradation has occurred from concentration of streamflow; **restore** riparian conditions by allowing natural cycle of succession **Rehabilitate** riparian conditions (e.g. revegetation)	**Protect** areas with functioning riparian conditions **Restore** riparian vegetation and forest roads **Rehabilitate** forest logging roads	**Protect** cool clean water **Restore** riparian and upland forests **Restore** hillslope processes by removing failing/high risk logging roads **Rehabilitate** forest logging roads	**Rehabilitate** fringe habitat of the seasonally inundated area surrounding Howard Hanson reservoir; **rehabilitate** reservoir flow conditions to better support rearing **Substitute** habitat features to create refuge from predators

Conservation Hypothesis	MIDDLE GREEN RIVER SUBWATERSHED - Habitat Condition and/or Process Addressed in Habitat Management Strategies							
	Natural channel geomorphology (pools, LWD, riffles)	**Sediment recruitment and transport (spawning substrate, shallow channel edge habitat)**	**Off-channel Habitat (side channels, secondary channels)**	**Tributaries habitats and inaccessible mainstem habitats**	**Refugia**	**Riparian Areas**	**Water Quality**	**Water Quantity (e.g. channel scour, low summer flows)**
	(Segments 4, 6, 7)	(All Segments)	(Segments 4 and 6)	(Segment 7, Soos Creek, Newaukum Creek, as well as smaller tributaries such as Burns Ck, Crisp Ck)	(Segment 4)	(Segments 4, 6, 7)	(All Segments)	(All Segments)
Mid 1 (refuge habitat and habitat complexity)	✔		✔	✔	✔	✔		✔
Mid-2 (Low Impact Development etc)				✔			✔	✔
Mid-3 (sediment recruitment)	✔	✔			✔			
Mid-4 (Newaukum & Soos Creek habitat)				✔				
Mid-5 (groundwater recharge and base flows)						✔	✔	✔
Mid-6 (fish access between TDD and HHD)				✔				
All-1 (water quality)				✔	✔		✔	
All-2 (riparian zone)	✔			✔	✔	✔	✔	
All-3 (tributary access)				✔				
All-4 (natural flows [high and low])	✔	✔	✔	✔	✔	✔	✔	✔
All-5 (Low Impact Development etc)				✔			✔	✔
All-6 (no armoring, fill, etc)	✔	✔	✔		✔	✔		✔
	STRATEGIES	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**
	Protect areas with functioning mainstem, tributary, and off-channel habitats for spawning and rearing; **protect** areas where the river is exhibiting natural rates of channel migration and contains habitat complexity **Restore** lateral channel migration to create habitat complexity **Rehabilitate** hydrologic processes to create habitat complexity **Substitute** habitat features (e.g. LWD) to create pools and habitat complexity	**Protect** areas where sediment recruitment processes are currently functioning **Restore** lateral channel migration to recruit sediments **Rehabilitate** hydrologic processes to recruit sediment **Substitute** sediment recruitment through gravel and LWD supplementation.	**Protect** areas with functioning off-channel habitat and natural riverine processes are functioning to maintain habitat **Restore** areas with some functioning off-channel habitat; restore lateral channel migration to create off-channel habitat **Rehabilitate** hydrologic processes to create off-channel habitat and maintain hydrologic connection to mainstem channel **Substitute** hydrologic processes by creating off-channel habitat	**Protect** areas with functioning spawning and rearing habitat **Restore** stream processes to create functioning spawning and rearing habitat; **restore** natural cycle of succession and plant diversity of riparian areas **Rehabilitate** downstream juvenile passage; **rehabilitate** riparian conditions **Substitute** upstream adult passage at the Tacoma Diversion Dam and Soos Creek Hatchery (e.g. trap and haul)	**Protect** areas with functioning mainstem and off-channel habitat and exhibit natural riverine processes to maintain habitat **Restore** riverine processes to create and maintain functioning mainstem and off-channel habitat **Rehabilitate** hydrological processes to support functioning habitat **Substitute** ecological and hydrological processes by creating key habitats and habitat features	**Protect** functioning riparian areas and plant diversity **Restore** natural cycle of succession and plant diversity of riparian areas **Rehabilitate** hydrologic processes to create areas for plant colonization; **rehabilitate** riparian conditions where riverine processes can not maintain natural cycle of succession (e.g. revegetation) **Substitute** ecological processes with habitat features (e.g. LWD).	**Protect** water quality from further modification where State standards are being met or exceeded; **protect** cool clean water from surface and groundwater sources **Restore** degraded water quality conditions to meet or exceed State standards	**Protect** cool clean water from surface and groundwater sources **Restore** instream flows of tributaries to support spawning and rearing habitat **Rehabilitate** instream flows of mainstem to support spawning and rearing habitat

Conservation Hypothesis	LOWER GREEN RIVER SUBWATERSHED - Habitat Condition and/or Process Addressed in Habitat Management Strategies					
	Channel Geomorphology (pools, riffles, channel edge habitat, LWD jams, channel migration, shallow water, low velocity)	**Sediment Transport and Recruitment** (spawning substrate, shallow channel edge habitat)	**Riparian Areas**	**Wetlands**	**Tributary Habitat and Access**	**Water Quality and Quantity**
Low-1 (refuge habitat and habitat complexity)	✓	✓		✓	✓	
Low-2 (sediment processes)	✓	✓			✓	
Low-3 (groundwater inflow)				✓	✓	✓
Low-4 (Black River pump station)					✓	
All-1 (water quality)			✓	✓	✓	✓
All-2 (riparian zone)	✓		✓		✓	✓
All-3 (tributary access)		✓			✓	
All-4 (natural flows [high and low])	✓	✓	✓		✓	✓
All-5 (Low Impact Development etc)				✓		✓
All-6 (no armoring, fill, etc)	✓	✓	✓		✓	✓
	STRATEGIES	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**
	Protect areas that provide low velocity and/or shallow water habitat during juvenile migration; **protect** functioning off-channel habitat. **Rehabilitate** existing banklines to create low velocity and/or shallow water habitat during juvenile migration; **rehabilitate** spawning habitat; **rehabilitate** off-channel habitat **Substitute** loss of slow water areas by creating new off-channel habitats and/or placement of LWD along banklines.	**Protect** areas with no levees/revetments where some sediment recruitment is occurring. **Rehabilitate** sediment recruitment processes. **Substitute** sediment recruitment through gravel and LWD supplementation.	**Protect** functioning riparian areas and plant diversity **Rehabilitate** riparian areas by establishing suitable native vegetation along banks of mainstem and tributaries. **Substitute** ecological processes with habitat features (e.g. LWD).	**Protect** functioning wetlands that provide habitat, hydrologic, and water quality functions **Rehabilitate** remaining wetlands adjacent to mainstem channel and lower Mill Creek to support juvenile rearing **Substitute** by creating new wetlands	**Restore** tributary access by removing fish passage barriers and modifying tributary mouth configuration **Rehabilitate** hydrologic processes to maintain adequate instream flow to provide access to tributaries; **rehabilitate** sediment recruitment to reduce channel downcutting **Substitute** sediment recruitment by gravel supplementation	**Protect** cool clean water sources that can provide refuge (e.g., White River hyporheic flow) **Restore** degraded water quality conditions **Rehabilitate** riparian conditions to provide buffers; **rehabilitate** instream flow in tributaries and mainstem; **rehabilitate** water quality by augmenting with cool clean water

Conservation Hypothesis	DUWAMISH ESTUARY SUBWATERSHED - Habitat Condition and/or Process Addressed in Habitat Management Strategies						
	Shallow Water Habitats	Sediment Recruitment	Sediment Quality	Riparian Areas	Off-channel Habitats (Palustrine, estuarine, riverine-tidal wetlands, sloughs, blind channels)	Migrational Passage	Water Quality
Duw-1 (shallow subtidal and intertidal habitat)	✓	✓			✓	✓	
Duw-2 (sediment quality)			✓				
Duw-3 (estuarine transition zone)	✓				✓		
Duw-4 (refuge habitat in freshwater intertidal area)	✓			✓	✓		
Duw-5 (sediment processes)	✓	✓					
Duw-6 (water quality)				✓			✓
All-1 (water quality)				✓			✓
All-2 (riparian zone)	✓			✓	✓		✓
All-3 (tributary access)					✓		
All-4 (natural flows [high and low])		✓					✓
All-5 (Low Impact Development etc)							✓
All-6 (no armoring, fill, etc)	✓	✓		✓		✓	
	STRATEGIES	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**	**STRATEGIES**
	Protect existing shallow channel habitat, particularly in the existing shallow water areas at the Turning Basin and Kellogg Island, and those that exist in isolated patches. Maintain existing sinuosity upstream of RM 7. **Protect** sediment and riparian processes/ conditions that influence shallow water habitat quality **Restore** intertidal mudflats (below RM 7), channel edge habitats (upstream of RM 7), and marshes (estuarine and freshwater) to create low velocity and/or shallow water habitat at expected flow levels during juvenile migration. **Restore** sediment and riparian processes/ conditions that influence shallow water habitat quality **Rehabilitate** shorelines to provide shallow water along the banks of the Duwamish River, particularly in the industrial/commercial areas between RM 1.5-5 and upstream of North Winds Weir. **Substitute** lost slow water/shallow areas, focusing actions at the mouth of the Duwamish to RM 1, between RMs 1.5-4, and upstream of RM 7.	**Protect** existing shallow water habitats. **Rehabilitate** sediment recruitment from both tidal and riverine processes. **Substitute** loss of natural sediment recruitment processes.	**Protect** "clean" sediment areas from contamination. **Rehabilitate** contaminated sediments.	**Protect** existing quality riparian zones. **Protect** connections between riparian and aquatic areas (e.g., no armoring) **Restore** native riparian communities **Restore** riparian-aquatic connections **Rehabilitate** riparian areas and functions in the entire subwatershed. **Substitute** habitat features (e.g. LWD) to stabilize banks, create slow water areas (e.g., pools upstream of RM 7) and habitat complexity.	**Protect** off-channel wetlands and sloughs. These habitats have largely been created and include Cecil B. Moses Park, Herrings House Park, T-105, Highway 509 wetlands, Hamm Creek, and Puget Creek wetlands. **Protect** upland and riparian processes/conditions that influence off-channel habitats **Rehabilitate** wetlands and sloughs where they currently exist, including re-connecting those isolated from the river channel or re-establishing wetlands/sloughs lost during development. **Substitute** off-channel habitats through creation of wetlands and sloughs.	**Protect** existing shorelines without overwater structures and minimize the occurrence of overwater structures. **Restore** shoreline areas where pilings and overwater structures can be removed. **Rehabilitate** overwater structures to reduce impacts on fish migration/behavior. **Substitute** loss of non-shaded, shallow water migration corridors and rearing areas.	**Protect** water temperatures to ensure safe salmon migration, particularly for adults. **Protect** existing water quality from pollutants/contaminants. **Restore** processes to detain and filer stormwater runoff (e.g., riparian and marsh habitats) **Rehabilitate** water quality through controlling contaminant introduction. **Substitute** for natural water treatment, particularly for commercial/industrial activities, as well as transportation corridors.

Conservation Hypothesis	MARINE NEARSHORE SUBWATERSHED - Habitat Condition and/or Process Addressed in Habitat Management Strategies							
	Sediment Recruitment and Transport (habitat formation and maintenance)	Shallow Water Habitats (natural depth/elevation contours of beaches and flats)	Riparian Areas (including LWD)	Tributary Streams and Pocket Estuaries	Water Quality and Quantity; freshwater inputs including springs, seeps, small streams	Submerged Aquatic Vegetation (SAV)	Beaches and Backshore (natural beach and backshore form; accumulation of organic debris and large wood; establishment of natural vegetation)	Salt Marshes
Near-1 (sediment quality)								
Near-2 (vegetated shallows and marshes)		✓		✓		✓	✓	✓
Near-3 (sediment processes)	✓	✓		✓		✓	✓	✓
Near-4 (forage fish habitat)	✓	✓				✓	✓	
Near-5 (pocket estuaries)		✓	✓	✓	✓	✓	✓	✓
All-1 (water quality)			✓	✓	✓			
All-2 (riparian zone)		✓		✓	✓	✓	✓	✓
All-3 (tributary access)				✓				
All-4 (natural flows [high and low])	✓	✓	✓	✓	✓	✓	✓	✓
All-5 (Low Impact Development etc)				✓	✓			
All-6 (no armoring, fill, etc)	✓	✓	✓		✓	✓	✓	✓
	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES	STRATEGIES
	Protect sediment recruitment and transport processes through protection of existing bluffs and sediment drift cells to create shallow water habitat (e.g. beach feeding bluffs) **Restore** sediment recruitment and transport processes through re-connecting feeder bluffs in armored areas and restoring sediment drift **Rehabilitate/Substitute** sediment recruitment and transport processes (e.g., beach nourishment)	**Protect** remaining shallow water habitat **Restore** shallow water habitats (e.g., remove structures; remove fill, or fill in dredged areas) **Rehabilitate/Substitute** shallow water habitats (e.g., beach nourishment)	**Protect** intact riparian areas and associated functions **Restore** riparian vegetation and buffers to achieve a suite of functions **Rehabilitate/Substitute** riparian ecosystem processes and functions	**Protect** tributary stream mouths and the hydrologic and sediment processes responsible for formation and maintenance of small stream mouths, estuaries, and deltas **Restore** hydrologic and sediment process; **restore** tributaries (e.g., reduce confinement/remove constraints). **Rehabilitate** hydrologic process of tributaries to mimic natural conditions	**Protect** water quality where State standards are being meet or exceeded; **protect** cool, clean surface and ground water; **protect** current water quantity from further modification **Restore** water quality to meet or exceed State standards; **restore** water quantity **Rehabilitate** shoreline areas to reduce water quality impacts (e.g., reduce impervious area, contaminant runoff) and improve pollution abatement functions (e.g., riparian vegetation, treatment)	**Protect** existing eelgrass, kelp, and other macroalgae **Restore** eelgrass and kelp beds by allowing natural processes to occur **Rehabilitate/Substitute** SAV by transplanting eelgrass	**Protect** beaches and backshore areas and associated plant communities (e.g., halophytes) **Restore** beaches, backshore and associated plant communities; riparian and sediment processes **Rehabilitate/Substitute** beaches, backshore, and associated plant communities	**Protect** remaining salt marshes **Restore** salt marshes **Rehabilitate/Substitute** salt marshes, vegetation, hydrology, and sediments