

EVALUATION OF HABITAT ENHANCEMENT STRUCTURES
ON MILES 18.0 - 19.0 OF THE DUNGENESS RIVER, AUGUST 1988

Joseph M. Hiss

U.S. Fish and Wildlife Service
Fisheries Assistance Office
Olympia, Washington

March 3, 1989

INTRODUCTION

In the summer of 1987 the Olympic National Forest installed eight habitat enhancement structures in the Dungeness River between river miles 18.0 and 19.0. This area has a fairly steep gradient with about a 20:1 riffle:pool ratio in summer. Boulders and large cobble predominate. The few pools in the area are also poor in gravel, having primarily bedrock and large boulders on the bottom. As a result, the structures were designed to trap gravel that was being lost to downstream reaches and thus enhance spawning area for salmon and steelhead in National Forest lands. These structures consisted of anchored logs and boulders and were designed to create shallow backwaters upstream where gravel could settle out and be available for spawning.

METHODS

On August 19, 1988 we inspected the structures for all aspects of potential and actual fish use, using mask and snorkel. Visibility was about three feet, which allowed fair visibility of bottom type in all but the deepest pools. We sketched each structure and noted whatever fish habitat features it had apparently created.

RESULTS AND DISCUSSION

The structures all appeared to be staying in place, as we saw no evidence of logs being torn from their moorings. Unfortunately, few of the structures fulfilled their purpose of enhancing spawning habitat, at least at the flow observed (Table 1). However, the gravel that was accumulated at higher elevations and was dry in August may become available to spawning coho and steelhead at higher flows.

The main habitat benefit has been an increase in holding habitat for adult spring chinook and potentially for summer steelhead. We saw no adult salmon, although previous years' surveys of the area indicated they should have been there.

Table 1. Salmonid habitat values as of August, 1988, associated with Forest Service habitat enhancement structures placed in the Dungeness River, Miles 18.0 to 19.0, in the summer of 1987.

Structure number	Adult holding	Spawning	Rearing
1	yes	no	yes
2	yes	no	yes
3	no	marginal	yes
4	yes	no	marginal
5	yes	no	not noted
6	yes	no	not noted
7	yes	yes	no
8	no	no	yes

Another result has been the creation of slow backwaters suitable for rearing fry, especially steelhead and coho. The mediocre visibility prevented a good evaluation of actual juvenile use.

The boulder and log at Structure Number 6 were associated with erosion of the right bank and this could eventually undermine the road. Bedload entering from the active slide on the left bank could accelerate the process. A detailed listing of our observations regarding fish habitat improvement is found in the captions of Figures 1 through 8, which describe each structure inspected.

RECOMMENDATIONS

Based on the above observations, we suggest:

1. Reviewing the literature on habitat enhancement in streams of similar gradient to see if structures can be modified to trap gravel more effectively, and
2. At Structure Number Six, tilting the log so most of the flow tends toward the left bank, and placing more boulders along the right bank to further guide the flow away from the road.

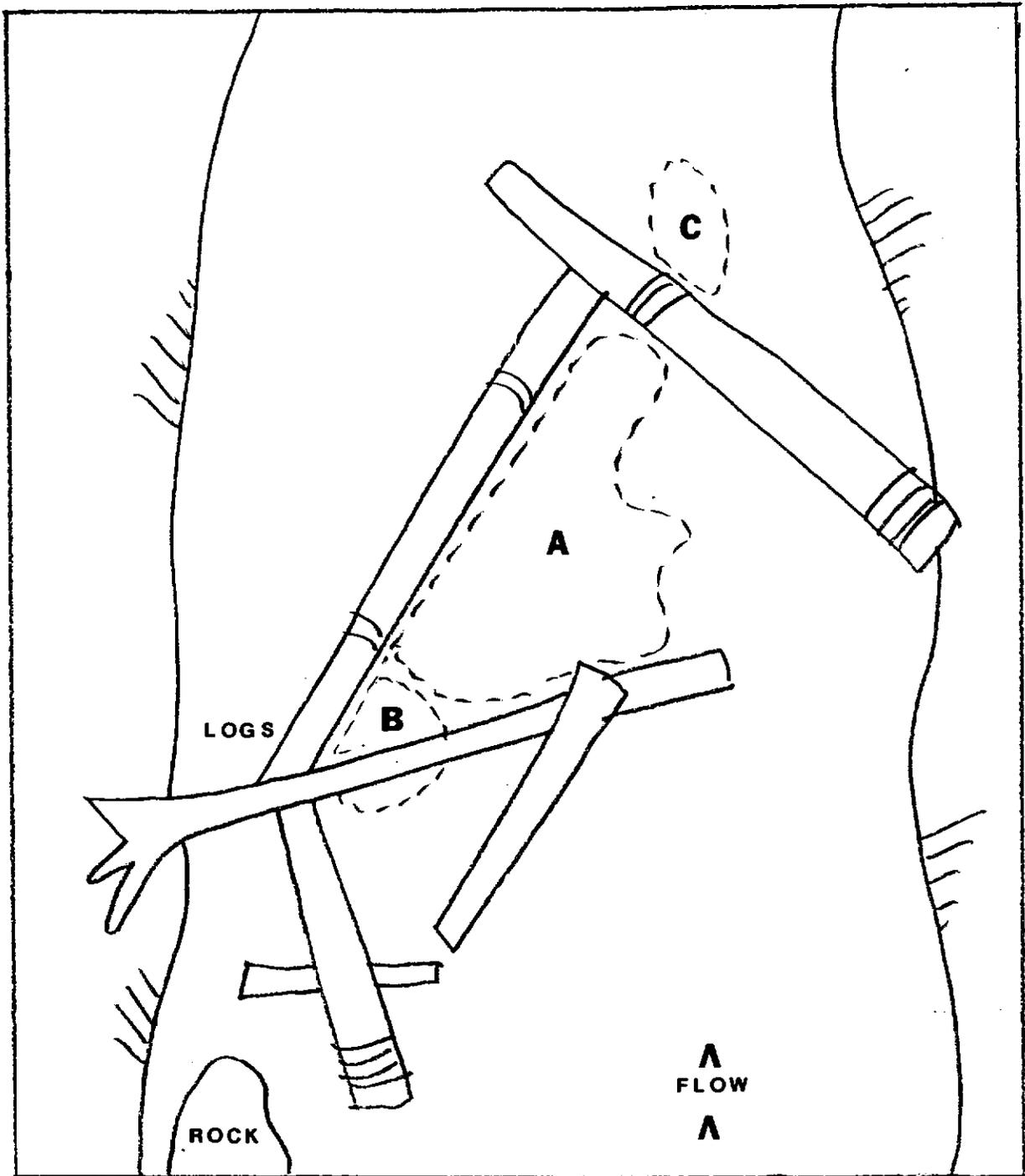


Figure 1. Forest Service Habitat Enhancement Structure Number One. A = gravel accumulation; submerged but velocity low and turbulent, thus poorly suited for spawning. B = Overhead log cover, good for adult holding; observed trout parr. C = plunge pool, potential adult holding area.

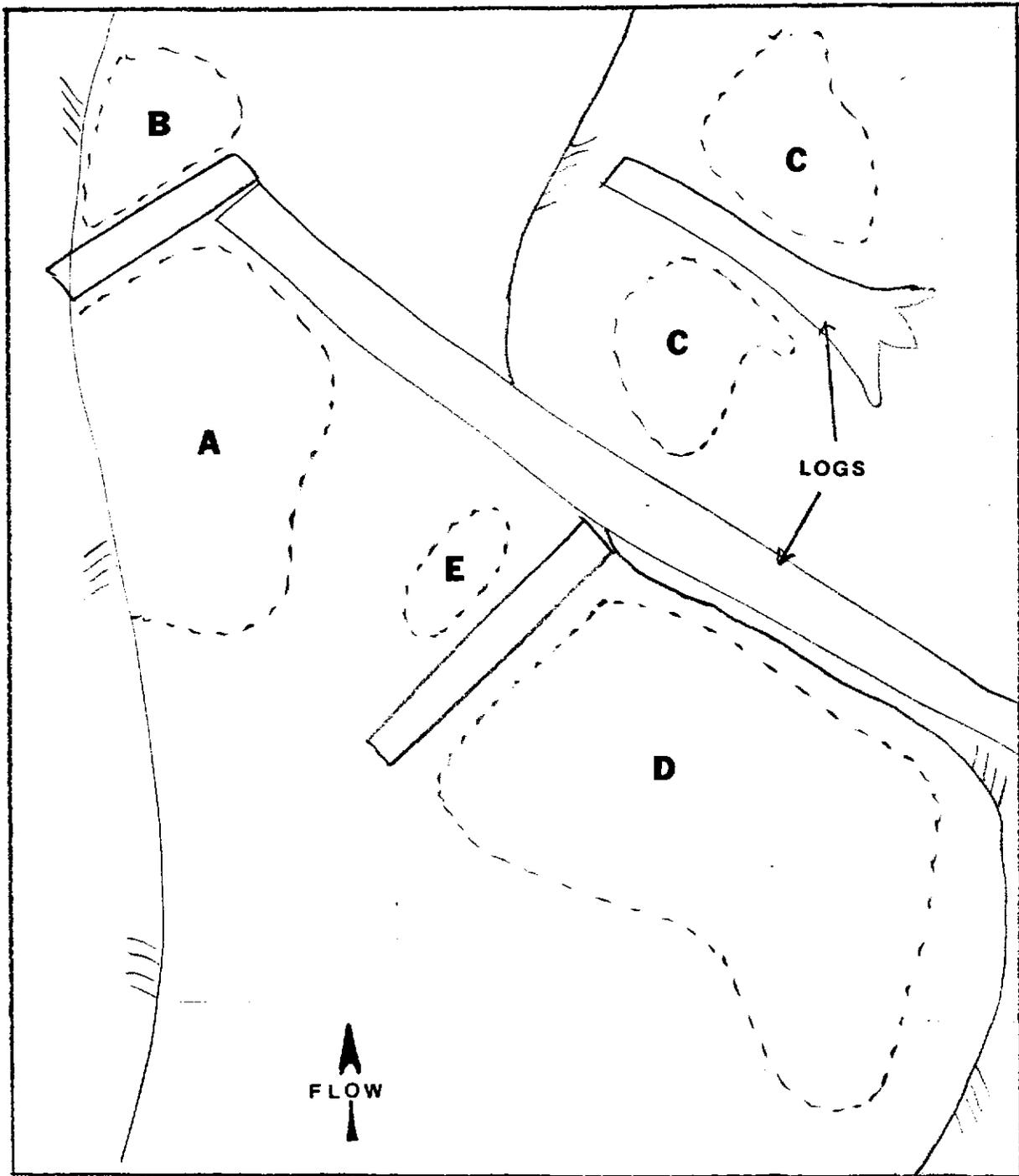


Figure 2. Forest Service Habitat Enhancement Structure Number Two. A = trout parr observed; some sediment accumulated but too fine for spawning. B = plunge pool with good bubble curtain for adult holding. C = gravel accumulations left above present water level. D = shallow, silty pool, not good for spawning but suitable for fry rearing. E = pool without good cover value.

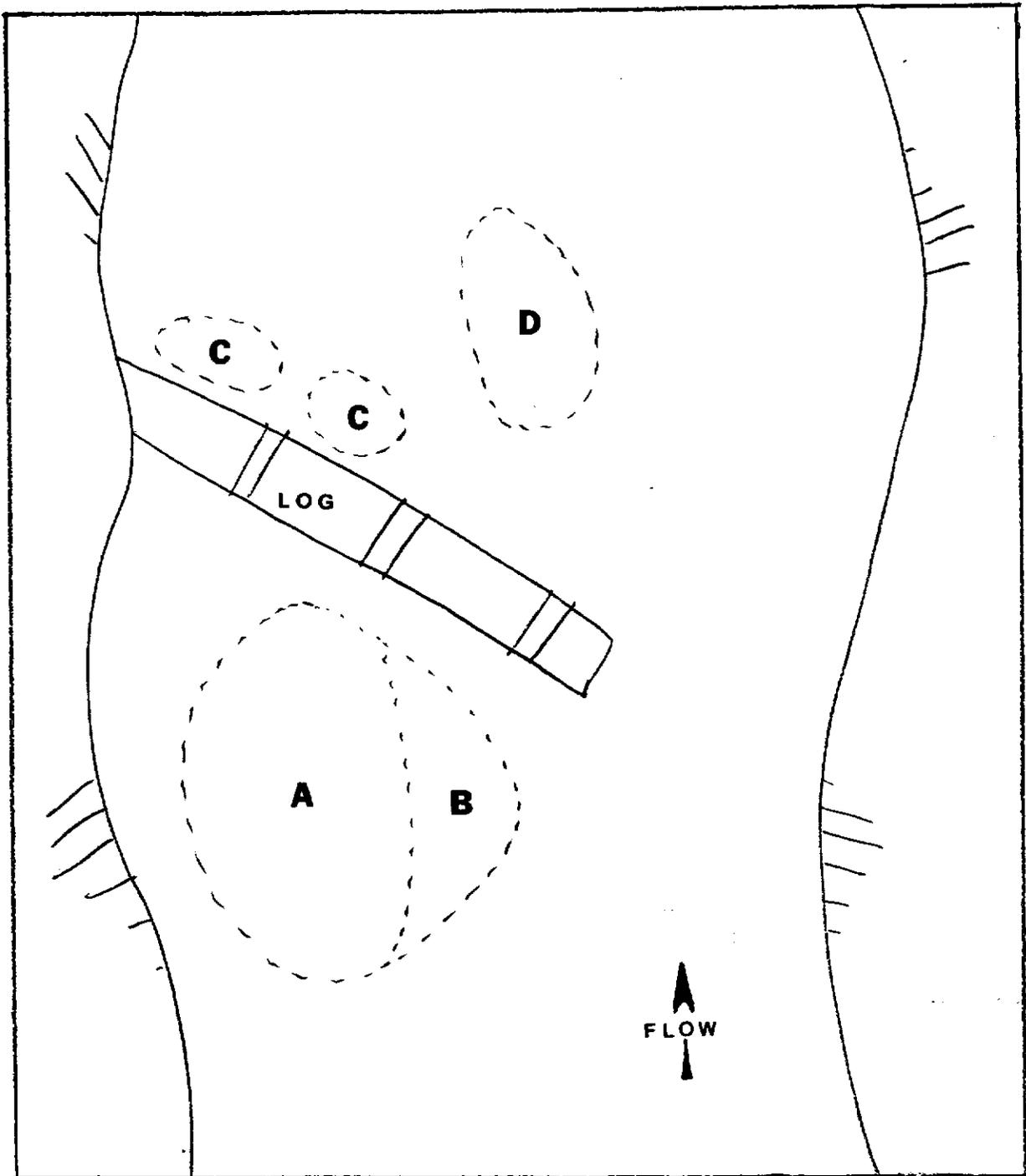


Figure 3. Forest Service Habitat Enhancement Structure Number Three. A = Silty pool, low velocity, suitable for fry rearing, observed several trout parr. B = Tail-out of pool with small gravel, marginally suitable for salmon spawning. C = Plunge pools, too calm for adult holding; observed several trout fry and parr. D = Accumulation of small gravel, marginally suitable for salmon spawning.

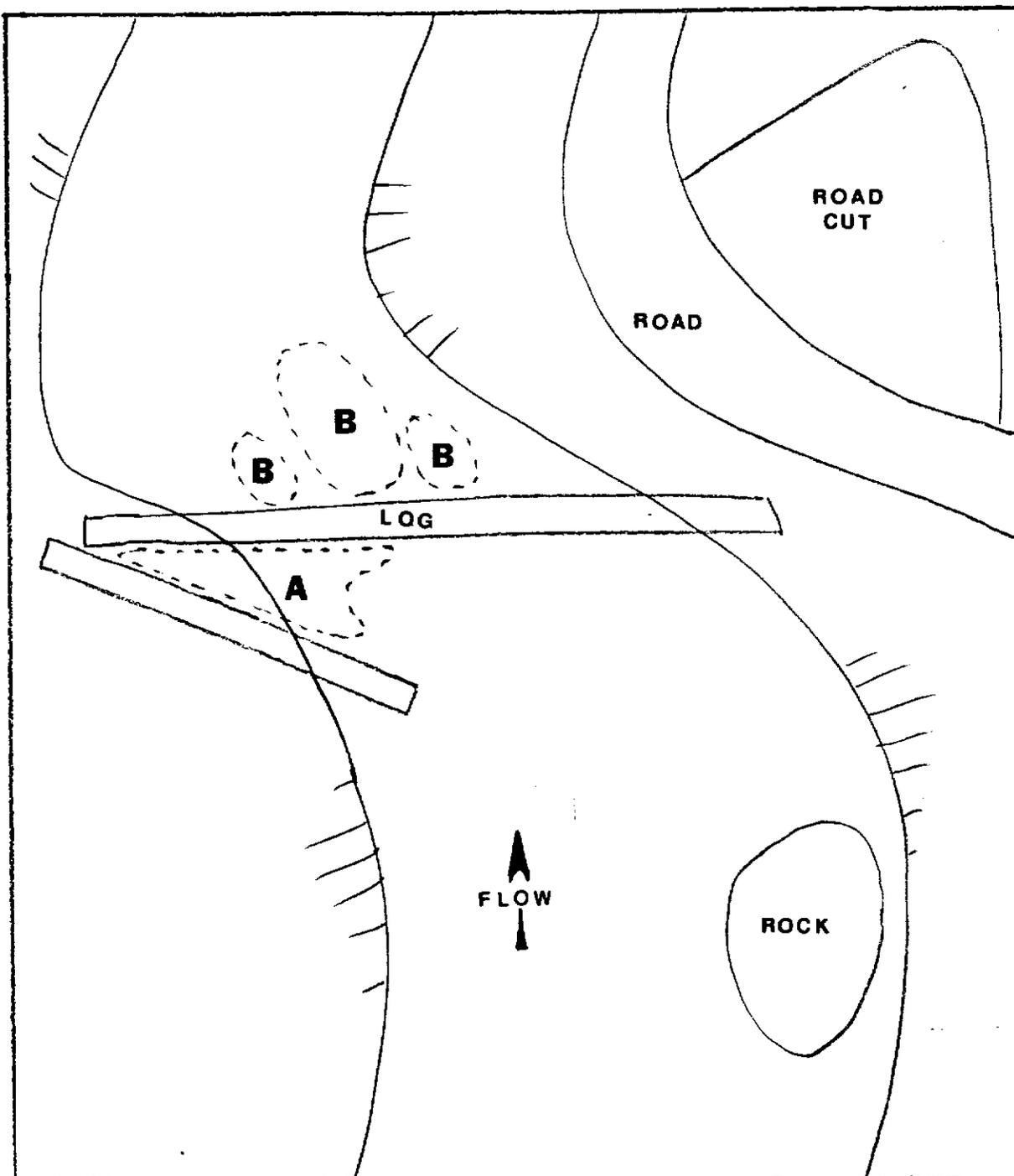


Figure 4. Forest Service Habitat Enhancement Structure Number Four. Long log is undercut along its entire length and will probably not hold back much more gravel. A = Gravel accumulation, mostly above present stream level. Portion below water at this time mostly cobbles and not suitable for spawning. B = Plunge pools providing good adult cover.

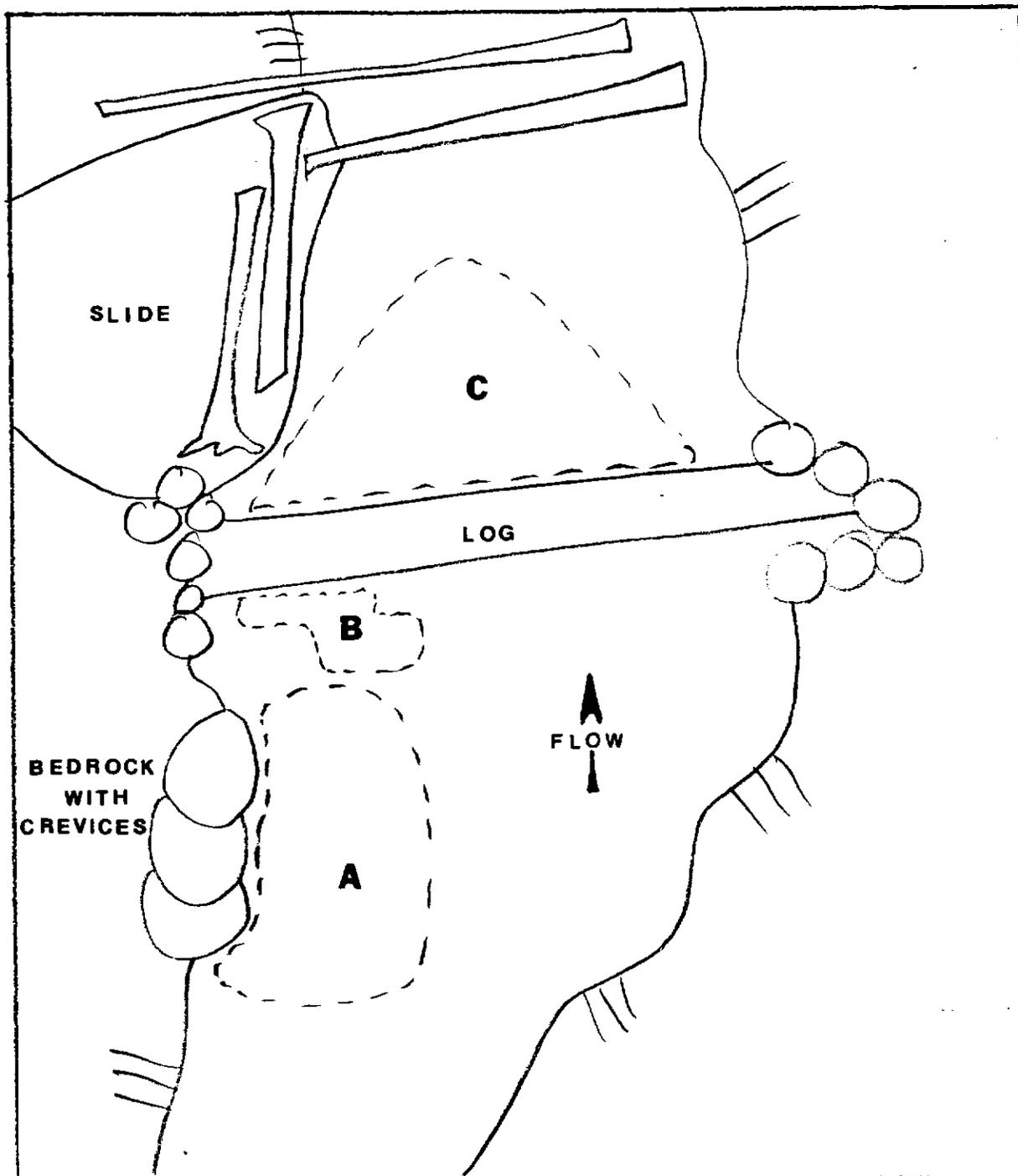


Figure 5. Forest Service Habitat Enhancement Structure Number Five. Structure has created a pool (A) giving adult fish access to steep, creviced bedrock bank with bubble curtain overhead. B = Small gravel of a size marginally useful for spawning; rest of pool has pea gravel. C = plunge pool providing good adult cover.

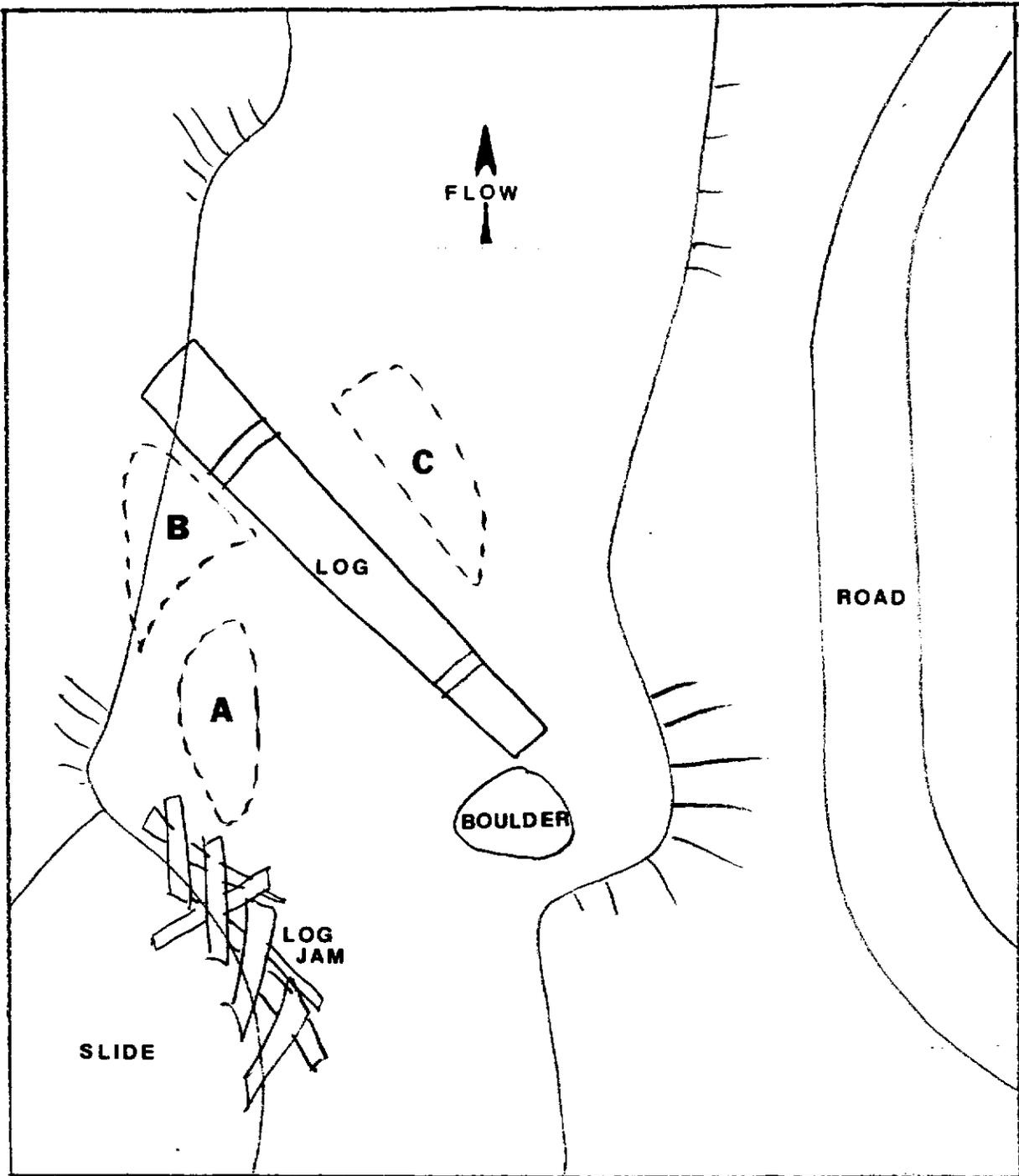


Figure 6. Forest Service Habitat Enhancement Structure Number Six. Sloped log weir. Right bank is being eroded opposite the log and boulder, and this process may eventually threaten the road. Weir has created pool at base of slide (A) with overhead turbulence providing additional cover value for adult salmon or steelhead. The bottom of the pool consists mainly of cobble and boulders, even at its edges, so has not provided additional spawning habitat. B = gravel accumulation; the current is slow and eddying, thus not useful for spawning at this flow level. C = plunge pool with bubble curtain, suitable for adult holding.

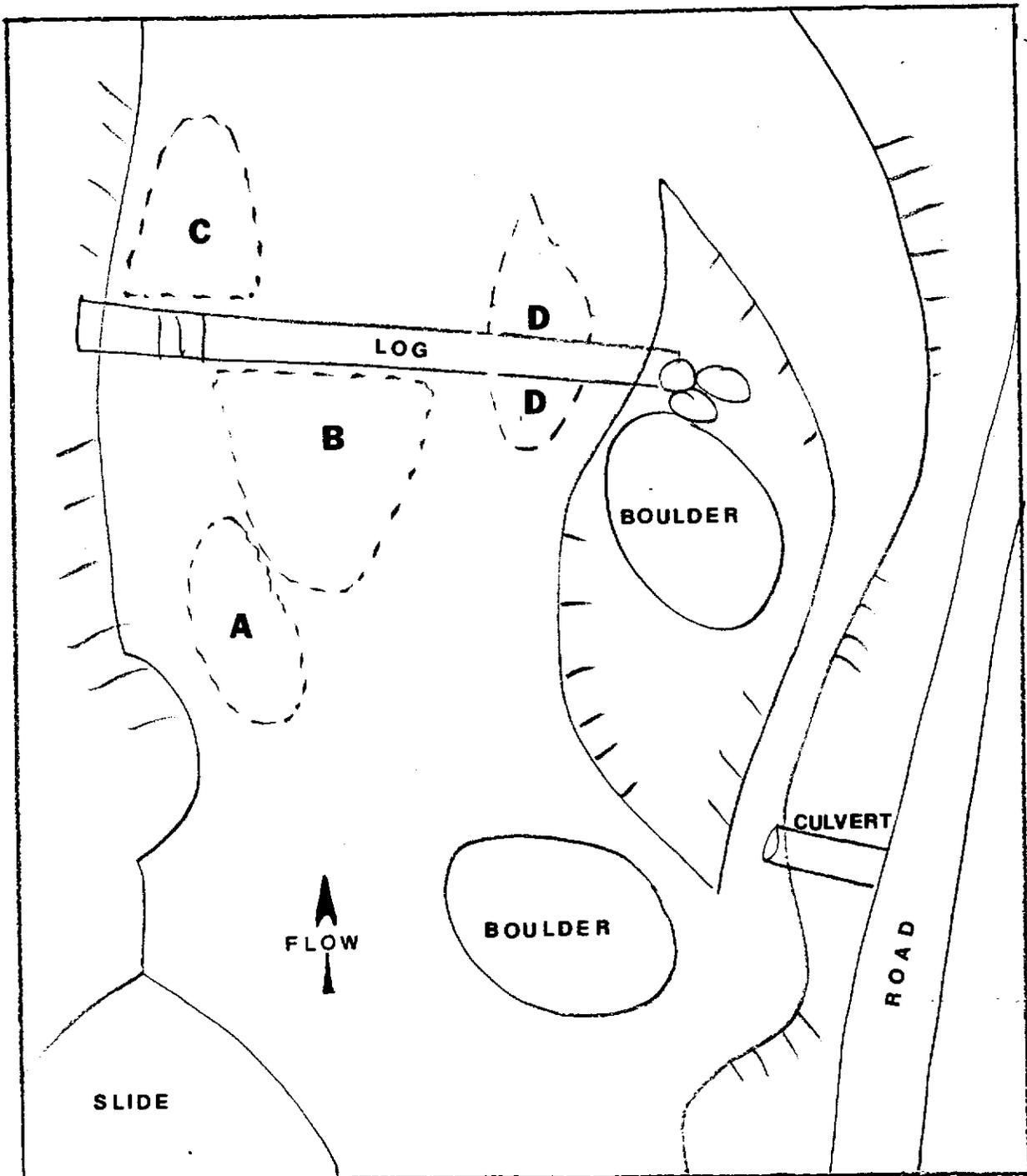


Figure 7. Forest Service Habitat Enhancement Structure Number Seven. Weir may be diverting enough flow to the right bank to potentially begin eroding the bank. Structure has created a pool (A) deep enough for adult holding. B = Good accumulation of spawning gravel, best quality seen among these structures. C = plunge pool with fair cover value for adults.

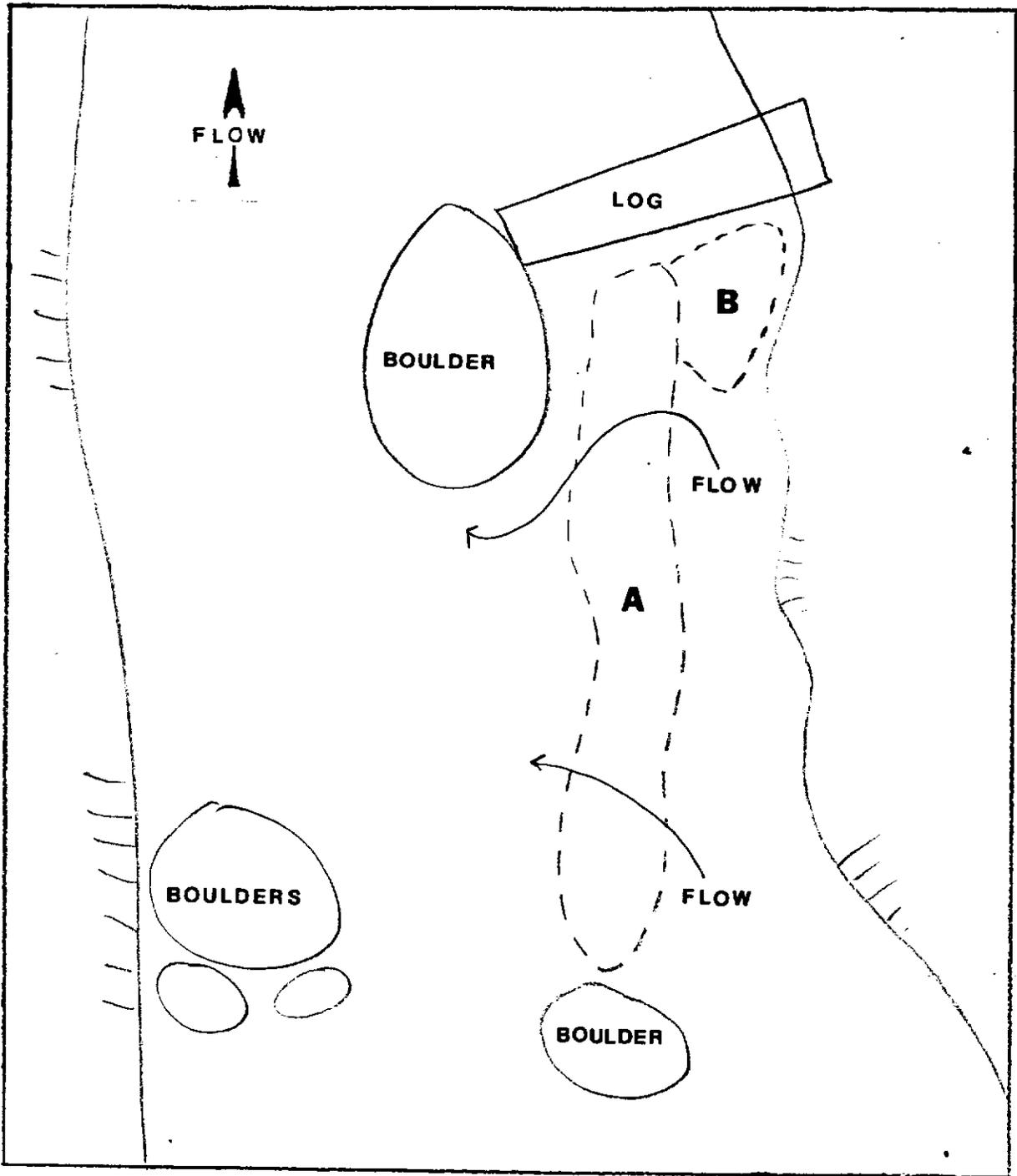


Figure 8. Forest Service Habitat Enhancement Structure Number Eight. Log is associated with a gravel and cobble bar upstream (A), whose size and form may also be due to boulder at its upstream end. Shallow depth and heavy cobble content probably prevent spawning here. Pool (B) along right bank provides good rearing area.