

**BC HYDRO AND POWER AUTHORITY**

**INVENTORY OF UNDEVELOPED  
OPPORTUNITIES AT POTENTIAL MICRO  
HYDRO SITES IN BRITISH COLUMBIA**

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## **DISCLAIMER**

This report has been written for BC Hydro for the purpose of documenting potential hydro power sites in British Columbia. Any reliance on the information contained herein is at the risk of the user. Anyone considering a micro hydro development is urged to make independent inquiry of the site, hydrology and regulatory conditions affecting such a development before proceeding. BC Hydro will not be responsible for any costs by any person howsoever incurred in the potential development of a micro hydro project or in an attempt by such person to obtain rights, contracts or other requirements necessary for a development. The mention in the report of any site, technique, product, or company is for information purposes only and shall not be considered an endorsement by BC Hydro.

## 1. INTRODUCTION

This inventory has been prepared under the sponsorship of the BC Hydro Energy Futures Program. BC Hydro intends to acquire a portion of the 10% target of its new energy requirements from renewable resources under this Program and this inventory of small undeveloped hydro power sites represents one component of the overall resource. In addition to this inventory, there is a Handbook of Micro Hydro Development that explains requirements in the development process.

Since electricity markets and BC Hydro policies are subject to change over time, prospective developers are urged to refer to the website at [www.bchydro.com](http://www.bchydro.com).

## 2. SCOPE

This inventory is aimed at the undeveloped small hydro sites in British Columbia that are from 0.1 – 2 MW and that are deemed to be within an economic connection and transmission cost from the existing electrical system. An analysis of the next size of projects from 2-5 MW is also described as indicated in Section 3 because of the relative imprecision in selecting a group of projects that is strictly under 2 MW.

Small and micro hydro technologies are often considered to be “green energy” because there are no air emissions associated with the output of the electricity. This determination, however, is site specific, since projects can be and have been constructed that are not green based on the criteria noted in Appendix 1. The determination of green within the context of micro hydro is primarily based on the need to preserve water flows for fish and the absence of a significant reservoir. There is also a discussion of the practical methods of assessing the “greenness” of a project in the Handbook noted above.

Part of this report deals with the relative economics of micro hydro generation. It will be seen that smaller scale projects have generally higher costs based on their lower economies of scale. This is based on the equipment and labour costs generally costing more per unit of electrical output for smaller projects as well as for relatively fixed items such as design and permitting which may cost as much for a smaller project as for a larger project. One of the objectives of the Energy Futures Program is to try to address, through innovation and other means, ways of lowering the development costs and making it possible for more of these projects to be developed.

## 3. BACKGROUND

This inventory of undeveloped micro hydro sites in British Columbia is based on the inventory that was part of the publication **Small Hydro Technology and Resource Assessment**, which was produced for the BC Ministry of Energy in 1983. Other inventories have also been produced at various times, notably by provincial agencies such as the Water Rights Branch, the BC Power Commission and BC Hydro. Each of these inventories has had a specific purpose but the Small Hydro Technology and Resource Assessment comes closest to the needs of the present work. When the Assessment was

done, it was targeting projects of less than 20 MW that were within an economic distance of the provincial electrical grid that encompassed mainly the power lines of BC Hydro and West Kootenay Power. For the purpose of this inventory a subset of the Assessment has been targeted, namely the projects that are from 0.1-2 MW and those that are in the 2-5 MW range.

The 1983 inventory was developed from map and regional hydrology studies. Typically 1:50,000 or 1:100,000 scale maps were reviewed to find stream basins that seemed to have development potential. Areas that were reasonably close to transmission or distribution lines were reviewed, as well as areas that were near to remote diesel stations. Stream basin areas were determined and the steepest section of creek that was over 10% slope (in grid areas) and over 5% slope (in diesel areas) was selected as the best location for an intake, penstock and powerhouse. The projects are assumed to be run-of-river (no headpond or water storage). The information on flows, penstock length, head, transmission distance and road access distance was used to estimate the principal costs of the development.

The determination of the power P available in kilowatts is a function of the design flow and the available gross head at an assumed 80% efficiency which includes headloss, as shown in the following equations:

- $P = Q H \times 7.83$  where Q and H are in  $m^3/s$  and metres respectively or
- $P = Q H \times 0.0676$  where Q and H are in cubic feet per second and feet respectively

The design flow is related to regional runoff patterns and is set as the mean annual flow, which provides a reasonable estimate of an economic plant size. In the 1983 inventory the design flow was set at the mean annual flow based on references available at the time and some simple calculations to find the least costly cost per kWh. The choice of mean annual flow is only an indicator, because other considerations apply, including:

- a relatively high electricity value, which will encourage a larger project and higher design flow;
- peaky runoff in a run of river situation, which will result in smaller design flows being optimal;
- amount and timing of fish flow releases;
- site specific considerations, such as project layout; penstock and turbine availability; storage or flow regulation; values of electricity by time of day and seasonally; and operational and lending costs.

In a complete analysis the preceding parameters and resulting costs and benefits will all combine to derive an optimal project size that may be higher or lower than the size based on the mean annual flow.

In order to provide a flow estimate for each site, a large number of streams were selected that had long term flow records. From these stream flows, average runoffs on a unit area basis for given regions were determined and used as representative of the mean unit flow at each site. Thus the design flow at a given site is based on the mean unit flow times the basin area. The investigation to determine head was hampered by the fact that the

contours were usually of 100 ft (30m) intervals which does not permit accurate estimates of the available head if the actual head over the steep section of creek was more or less than a multiple of 100 ft. In addition, sometimes the location of the contour on the map (especially on lower head sites) may be in error, resulting in an incorrect estimate of the length of penstock. Waterfalls are often shown on the maps but the head at the falls is often not indicated. These are shown as potential sites because the presence of a waterfall would usually provide a head drop over a short distance that would be suitable for a project, however the project output is indeterminate.

The available energy is based on the determination of the percentage of the mean annual flow available for power generation in a run of river situation times the available power, which accounts for seasonal variations in flow and assumes that all energy produced can be delivered to the grid. Higher energy outputs originate from streams that are coastal (60-70% of the theoretical maximum based on design flow being available all the time) or have lakes providing storage while low outputs tend to result from areas where there is a pronounced spring runoff coupled with dry summers and cold winters (25-40% of the theoretical maximum).

The original 1983 inventory did not make any allowance for instream flow releases to protect the stream environment. This inventory has been adjusted to provide for flow releases consistent with BC Hydro's criteria shown in Appendix 1. The 20% of the daily flow that is to be left in the stream provides for at least a 10% reduction in energy output at every project site, compared with the original inventory. The amount of energy reduction can be demonstrated on the two flow duration curves (**Figures 1 and 2**) included in **Appendix 1**. The coastal stream has frequent rains and higher base flows with a resulting energy reduction of 10.4% due to fish flows. The interior stream has a pronounced snowmelt runoff and very low flows at times of the year, resulting in a 10.0% energy reduction due to fish flows. In the calculations a reduction of 10% is used for all streams. Sometimes very low flows will require the plant to be shut down because some turbines cannot operate well at low flows. This will be a site specific determination and no allowance has been made because most of the sites are smaller high head sites which use impulse turbines that can operate over a wide flow range.

Since the development of the 1983 inventory experience with the independent power industry has shown that there are other projects developable which were not included in the inventory. In some instances, extensions of the provincial grid have made it possible for more projects to be economically connected. In other situations, developers have taken a creative approach to developing head, say by using tunnels and diversions to shorten what may otherwise have been a long penstock. Still other developers have optimized the sizing of the project by adapting the length of penstock to the most opportune location to develop the most head with the least amount of penstock length. The present inventory is limited to a map study and thus cannot duplicate the in depth study that eventually should be done with any project site. Some of the requirements of the in depth study needed for feasibility and optimization are described at the end of this section.

This inventory can be used in a number of different ways, depending on the needs of the user. Its main purpose is to assist individuals in finding projects in their own geographical area or other specified areas. There is no substitute for field investigation, hence each site must be checked in the field and a program of improving on the available data must be undertaken to allow more accurate estimates of costs and output. Finding a suitable site is just the beginning, for the next steps include developing a power sales contract, permitting, design, construction contracts and financing. (See Handbook for an overview of these activities.)

Agencies may use the information to provide an overview of the numbers of projects in different capacity ranges, aggregate capacity and energy potential, investment potential, and development potential at different electricity prices. The economic potential may be further refined by taking the distribution of investments into the different components of the projects. The tables provided show the typical cost distributions in different classes of project.

It was noted in Section 2 that there was a degree of imprecision in the determination of a cutoff size of 2 MW. It is for this reason that the database has been expanded to provide listings of projects in the 2-5 MW size, to ensure that there are projects above and below the 2 MW cutoff. In this inventory the sizing of a project is determined by specifying the head and the design flow which are in turn based on preliminary information. However it should be recognized that real projects are optimized to account for the following factors:

- Provision of detailed mapping may optimize the head of the project higher or lower providing a direct impact on power output;
- Detailed hydrology studies may provide better information on which to judge available flows and especially the seasonality of the flows;
- The nature of the power contract may influence the size of the development. For example, if spring and summer power was more valuable, projects that had a strong spring runoff would be developed at a higher capacity;
- Procurement opportunities may lead to sizing the project differently (usually higher) if good pricing for equipment of a size larger than that requested is offered by the supplier;
- Instream fish flow allowances could be larger or smaller than the estimates, depending on the requirements of site specific biological data.

Thus there could be projects that moved from lower than 2 MW to greater than 2 MW and vice versa depending on the noted factors. It should also be noted that the average energy output of a 2 MW project will be somewhat less than 2 MW to account for the site specific flows.

#### **4. MICRO HYDRO DATABASE**

The database is divided in two tables: **Table 4.1** shows sites with potential installed capacity less than 2 MW without allowing for 20% diversion for green generation and **Table 4.2** shows sites with potential installed capacity from 2 MW to 5 MW, also without allowing for 20% diversion. The inventory of small hydro sites is presented alphabetically by region. **Tables 4.1a** and **4.2a** contain the same information as Tables 4.1 and 4.2 respectively, sorted by cost (\$/kWh). The following information is provided for each site:

- <b>Stream Name</b>	The stream name
- <b>Lat/Long</b>	Latitude and longitude of the site.
- <b>Region</b>	Number of region where the site is (see <b>Figure 4.1</b> )
- <b>Flow</b>	Mean annual flow (m <sup>3</sup> /s)
- <b>Head</b>	Estimated vertical distance between intake and powerhouse in metres. Sites with less than 30m of head were not analyzed because of mapping limitations.
- <b>Penstock L</b>	Estimated penstock length in metres.
- <b>Penstock D</b>	Penstock diameter in metres.
- <b>Power</b>	Estimated installed capacity in kilowatts.
- <b>Cost</b>	Estimated total capital cost in thousands of dollars, including the transmission line.
- <b>Transm. Dist.</b>	Transmission line distance in km.
- <b>Capacity Factor</b>	Ratio of average power output / peak capacity
- <b>Energy</b>	Annual generation in gigawatt hours (using mean annual flow) and capacity factor.
- <b>Fish flow factor</b>	Ratio indicating the mean annual energy available in the stream allowing for fish flow requirements in accordance with BC Hydro's criteria for Green Micro-Hydro Generation (see Appendix 1).
- <b>Green Energy</b>	Annual generation in gigawatt hours (Energy multiplied by Fish flow factor)
- <b>Green Energy Cost</b>	Average cost of power production in \$/kWh. For comparison only (see comments below).

The **capital cost** of each small hydro project is based on a combination of experience curves, cost curves and unit price data, all adjusted to year 2000 price data. Separate cost curves are used for penstocks, intakes, powerhouses, and transmission lines. The accessibility of the sites is taken into account by the use of a site factor as shown below. Percentages are applied to the total for engineering services and contingency allowance.

The **cost of power** is estimated by dividing the annual cost of the project by the average 'green' energy generated each year. The annual cost of the project reflects the levelized capital costs at an 8% real discount rate, assuming a 40 year project life and adding 1% of the original capital cost for annual maintenance and operating expenses. No interest-during-construction costs were included, but these are likely to be relatively small given the short construction time for most projects. Taxes and water rents were not included and the point of sale is considered to be the grid, so wheeling charges are not included.

*(Levelized costs refer to the constant amount which if charged on each unit of energy produced over the life of the facility, would generate annual revenues equal in present value to the original capital costs. The levelized costs in this study are calculated on the basis of a real (net of inflation) discount rate and therefore refer to a charge per kWh, which is constant in real terms. One would have to escalate this constant charge by the rate of inflation to calculate the current dollar amount it corresponds to each year over the life of the project.)*

The **annual 'green' energy generation** is taken as the total number of GWh of energy which could be generated in a year. It is assumed that the plant will generate at a rate equivalent to the energy available in the water, up to the installed capacity. For run of river plants with no storage, this is taken as the theoretical annual energy (based on full generation at the installed capacity) multiplied by the capacity factor (which accounts for the periods when there is insufficient flow to meet the installed capacity) and by a fish flow factor (which accounts for the required fish flow, that cannot be used for generation). Effectively the cost per kWh of green energy is higher by the ratio 1/Fish Flow Factor. The installed capacity is the same as for full utilization of the water, since there are times when there is enough water available to allow for fish release and full generation.

The resulting cost of power (\$/kWh) is a means of comparing different sites with a common parameter, and relating the cost to current rates payable for power. Once a project has been studied further, the actual unit cost of power must be determined by a more detailed financial analysis.

In summary, the Total Project Cost is calculated in the following way:

Penstock Cost  
 Intake Cost  
Powerhouse Cost  
**Subtotal 1**

(Site Factor) x **Subtotal 1**  
 Generating Equipment Cost  
Access Road Cost  
**Subtotal 2**

Engineering (20% of Subtotal 2)

Contingency (30% of Subtotal 2)

**Subtotal 3**

Transmission Line Cost

Engineering (15% of Transmission Line Cost)

Contingency (20% of Transmission Line Cost)

**Total Capital Cost**

The Site Factor was applied to the standard unit costs to account for the higher construction cost that a contractor will face on isolated sites. It ranges from 1.0 for a site near a large city, to 1.5 for an isolated site as shown below.

**Typical BC Site Factors**

Within 1/2 hour drive of City > 50,000 population	1.0
Within 1 hour drive of City > 50,000 population	1.1
Within 1/2 hour drive of Town < 50,000 population	1.2
Within 1 hour drive of Town < 50,000 population	1.3
Fly or barge in	1.4
Fly in only from anywhere	1.5

Engineering includes all the engineering work such as site visits, preliminary and final design, permitting and approvals, tendering, engineering during construction, inspection and commissioning. Contingency accounts for weather related events or probable increase in material or labour costs that could affect the estimated cost of the project, as well as potential design changes during construction.

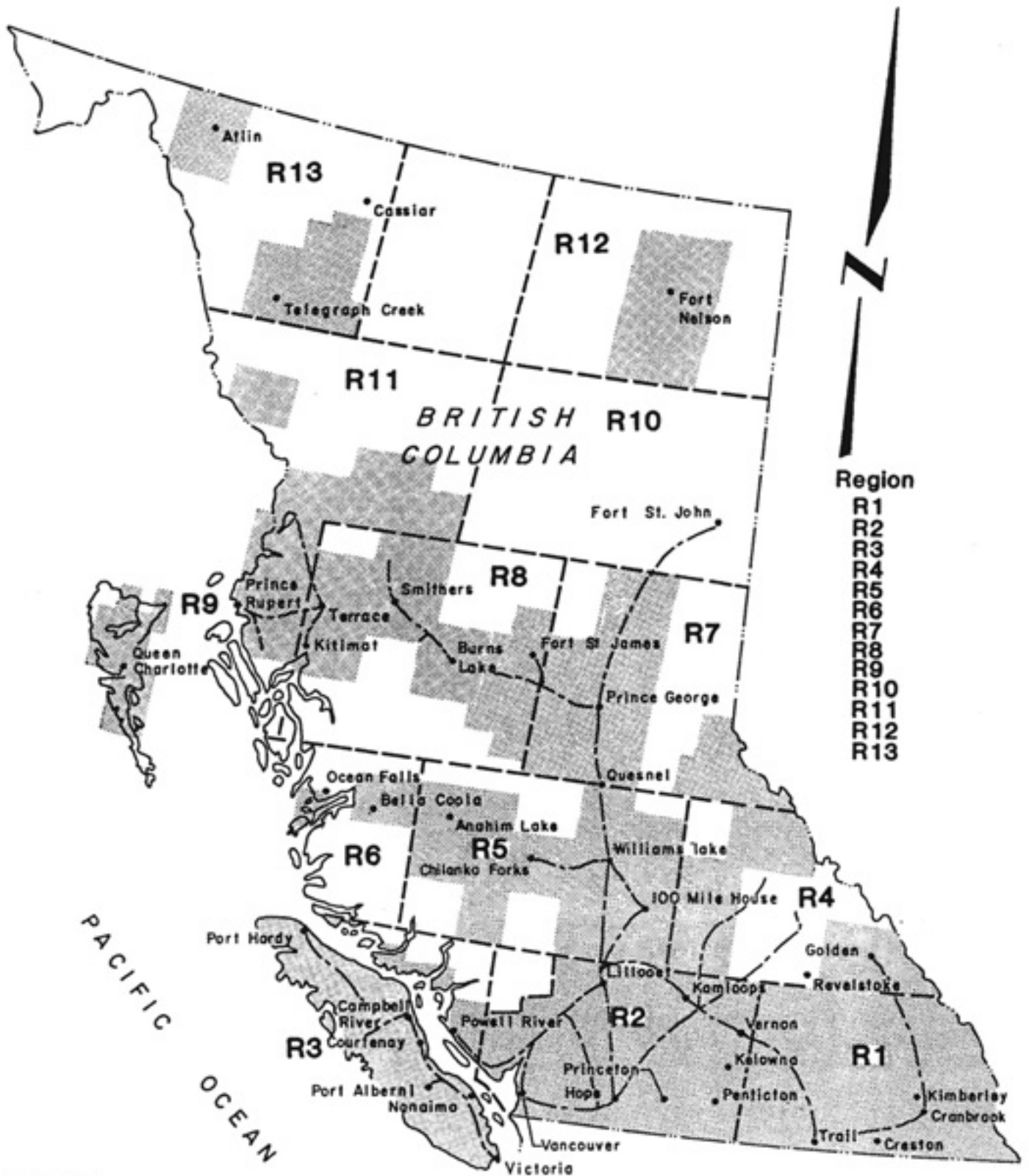


TABLE 4.1 Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
1 ARTHURS CR	4941/11843	1	0.4	280	2000 0.44	900	5,377	50	40%	3.2	0.90	2.8	0.178
2 ASSINIBOINE CR	5048/11540	1	0.53	240	1500 0.48	1,000	8,881	47	50%	4.4	0.90	3.9	0.211
3 BEHRMAN CR	5030/11652	1	0.7	240	850 0.88	1,300	4,852	34	50%	5.7	0.90	5.1	0.089
4 BEN ABLE CR	5016/11609	1	0.63	180	1400 0.53	900	5,221	33	50%	3.9	0.90	3.5	0.138
5 BRUCE CR	5034/11615	1	2.4	50	400 0.88	900	4,446	12	52%	4.1	0.90	3.7	0.113
6 CHAMPION CR	4914/11735	1	0.95	92	500 0.58	700	2,189	4	40%	2.5	0.90	2.2	0.093
7 CHRISTIAN CR	5024/11848	1	0.19	200	900 0.36	300	1,497	2	45%	1.2	0.90	1.1	0.132
8 COPPERCROWN CR	5022/11621	1	0.3	183	1000 0.41	400	2,338	24	50%	1.8	0.90	1.6	0.139
9 CORN CR	4904/11640	1	2.3	60	800 0.96	1,100	3,326	4	55%	5.3	0.90	4.8	0.065
10 CREIGHTON CR	5012/11846	1	0.3	200	1800 0.39	500	1,705	2	47%	2.1	0.90	1.9	0.086
11 DAVIS CR	5008/11657	1	0.8	122	500 0.52	800	1,578	0.5	47%	3.3	0.90	3.0	0.050
12 DENNIS CR	5002/11722	1	0.71	182	1250 0.55	1,000	2,641	2	45%	3.9	0.90	3.5	0.070
13 DOG CR	4924/11807	1	1.3	50	400 0.71	500	3,687	35	40%	1.8	0.90	1.6	0.219
14 DRUMMIE CR	5052/11805	1	1.3	150	700 0.63	1,500	2,549	7	45%	5.9	0.90	5.3	0.045
15 EAST CR	5042/11653	1	2.9	50	500 0.99	1,100	8,637	72	52%	5.0	0.90	4.5	0.180
16 FALL CR	5036/11853	1	0.45	500	1000 0.41	1,800	2,347	1.5	45%	7.1	0.90	6.4	0.034
17 FENWICK CR	5028/11537	1	2	50	650 0.91	800	4,495	40	50%	3.5	0.90	3.2	0.134
18 FERRY CR	5015/11839	1	1.1	150	3100 0.78	1,300	4,060	1	51%	5.8	0.90	5.2	0.073
19 GILLIS CR	5004/11642	1	1.8	120	1200 0.82	1,700	6,624	14	50%	7.4	0.90	6.7	0.093
20 GOATSKIN CR	4943/11839	1	1.2	100	1000 0.71	900	6,270	60	50%	3.9	0.90	3.5	0.166
21 HALL CR	5041/11706	1	1.8	100	850 0.8	1,400	4,784	51	53%	6.5	0.90	5.8	0.077
22 HIDDEN CR	4914/11710	1	1.5	30	250 0.75	400	2,005	5	40%	1.4	0.90	1.3	0.149
23 HOLSTEIN CR	5018/11835	1	0.29	150	1200 0.41	300	1,605	1	45%	1.2	0.90	1.1	0.142
24 HOPE CR	5028/11711	1	0.76	240	1250 0.53	1,400	3,692	24	47%	5.8	0.90	5.2	0.067
25 HUNTERS CR	5041/11847	1	1.3	150	1900 0.77	1,500	4,431	10	45%	5.9	0.90	5.3	0.078
26 IRON CR	5043/11836	1	0.22	550	2000 0.36	900	2,736	22	47%	3.7	0.90	3.3	0.077
27 JOHN CR	5016/11701	1	0.62	180	1200 0.51	900	2,207	4.5	47%	3.7	0.90	3.3	0.062
28 KAIN CR	5051/11635	1	0.95	250	1100 0.56	1,900	3,792	16	52%	8.7	0.90	7.8	0.046
29 LADYBIRD CR	4925/11740	1	2	120	600 0.76	1,900	2,959	2.5	40%	6.7	0.90	6.0	0.046
30 LEGERWOOD CR	5058/11846	1	0.53	250	1300 0.47	1,000	2,594	1.5	45%	3.9	0.90	3.5	0.069
31 LEXINGTON CR	5050/11737	1	0.55	450	1700 0.45	1,900	6,005	58	53%	8.8	0.90	7.9	0.071
32 LITTLE GLACIER CR	5026/11655	1	1.3	60	600 0.72	600	2,940	26	50%	2.6	0.90	2.4	0.117
33 LOFTUS CR	5056/11849	1	0.75	250	1000 0.51	1,500	2,378	0.5	45%	5.9	0.90	5.3	0.042
34 LOST LEDGE CR	5006/11656	1	0.28	430	1700 0.36	900	1,639	0.5	47%	3.7	0.90	3.3	0.046
35 LUXOR CR	5046/11610	1	0.97	100	1400 0.7	800	2,802	3	52%	3.6	0.90	3.3	0.080
36 MABLE CR	5037/11836	1	0.22	250	800 0.36	400	2,447	11	47%	1.6	0.90	1.5	0.155
37 MEADOW CR	5018/11703	1	0.62	180	1300 0.52	900	2,498	4	47%	3.7	0.90	3.3	0.070
38 MENHINICK CR	5049/11739	1	0.6	200	900 0.47	900	4,375	53	53%	4.2	0.90	3.8	0.109
39 MIDGE CR	4922/11652	1	5.6	30	1000 1.6	1,300	7,472	33	55%	6.3	0.90	5.6	0.124

TABLE 4.1 Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
40 MURPHY CR	4910/11744	1	0.95	60	500 0.63	400	1,503	2.5	40%	1.4	0.90	1.3	0.112
41 OCTOPUS CR	4945/11806	1	0.68	150	650 0.49	800	2,255	6	40%	2.8	0.90	2.5	0.084
42 OUTLET CR	5020/11830	1	0.6	150	1400 0.54	700	2,607	3	45%	2.8	0.90	2.5	0.099
43 PAYNE CR	5037/11751	1	1.6	100	400 0.67	1,300	3,676	45	53%	6.0	0.90	5.4	0.064
44 QUARRIE CR	5016/11459	1	1.2	50	550 0.72	500	2,438	12	50%	2.2	0.90	2.0	0.116
45 RIOULX CR	5017/11805	1	0.9	200	2000 0.64	1,400	5,975	30	45%	5.5	0.90	5.0	0.113
46 SCHROEDER CR	5002/11653	1	0.64	300	2300 0.53	1,500	3,502	0.5	47%	6.2	0.90	5.6	0.059
47 SEPTET CR	5048/11641	1	1.4	150	950 0.69	1,600	4,365	34	52%	7.3	0.90	6.6	0.062
48 SLEWISKIN CR	5008/11747	1	3.4	60	1200 1.2	1,600	4,188	2	45%	6.3	0.90	5.7	0.069
49 SMYTH CR	5032/11843	1	0.29	600	2000 0.36	1,400	2,874	15	45%	5.5	0.90	5.0	0.054
50 SOWSAP CR	5026/11846	1	0.42	200	2100 0.49	700	2,774	3.5	45%	2.8	0.90	2.5	0.105
51 STEWART CR	4907/11815	1	0.19	250	1050 0.31	400	2,198	8	40%	1.4	0.90	1.3	0.164
52 STOCKDALE CR	5035/11635	1	2.6	50	700 1	1,000	6,299	38	52%	4.6	0.90	4.1	0.144
53 TEMPLETON CR	5048/11629	1	1	250	1700 0.62	2,000	5,615	21	52%	9.1	0.90	8.2	0.064
54 TOWN CR	5046/11745	1	0.49	400	1400 0.44	1,500	4,364	44	53%	7.0	0.90	6.3	0.065
55 UNNAMED CR	5021/11648	1	0.3	240	900 0.36	600	2,076	19	50%	2.6	0.90	2.4	0.082
56 UNNAMED CR	5020/11651	1	0.28	300	1150 0.36	700	2,054	14	50%	3.1	0.90	2.8	0.070
57 UNNAMED CR	4959/11600	1	0.16	560	1550 0.31	700	3,334	33	40%	2.5	0.90	2.2	0.142
58 UNNAMED CR	5006/11646	1	0.18	550	1650 0.31	800	2,095	8	50%	3.5	0.90	3.2	0.062
59 UNNAMED CR	5007/11644	1	0.22	490	1400 0.3	800	2,336	13	50%	3.5	0.90	3.2	0.070
60 UNNAMED CR	5009/11638	1	0.46	240	1000 0.44	900	3,870	21	50%	3.9	0.90	3.5	0.102
61 UNNAMED CR	5021/11651	1	0.32	430	2000 0.41	1,100	2,971	15	55%	5.3	0.90	4.8	0.058
62 UNNAMED CR	5058/11836	1	0.5	300	700 0.4	1,200	1,721	7	45%	4.7	0.90	4.3	0.038
63 UNNAMED CR	5055/11807	1	0.85	250	1150 0.54	1,700	2,755	1	45%	6.7	0.90	6.0	0.043
64 UNNAMED CR	4959/11603	1	0.75	300	1100 0.5	1,800	5,040	37	40%	6.3	0.90	5.7	0.083
65 VAN HOUTEN CR	4940/11807	1	0.57	150	700 0.47	700	3,099	16	40%	2.5	0.90	2.2	0.132
66 VICTOR CR	5057/11824	1	0.5	300	550 0.4	1,200	1,607	6	45%	4.7	0.90	4.3	0.035
67 ANDERSON CR	4911/12143	2	0.21	850	1500 0.31	1,400	3,035	5	63%	7.7	0.90	7.0	0.041
68 BASTION CR	5051/11905	2	0.24	300	1000 0.36	600	1,809	17	45%	2.4	0.90	2.1	0.080
69 BLURTON CR	5041/11902	2	0.48	400	1600 0.44	1,500	2,383	1	45%	5.9	0.90	5.3	0.042
70 BOBB CR	5051/12233	2	0.8	300	1400 0.53	1,900	6,100	22	52%	8.7	0.90	7.8	0.074
71 BREMNER CR	4940/12201	2	3.1	60	200 0.83	1,500	2,747	7	55%	7.2	0.90	6.5	0.040
72 CADWALLADER CR	5046/12248	2	4.8	50	600 1.2	1,900	4,284	0.5	52%	8.7	0.90	7.8	0.052
73 CHASE CR	5049/11941	2	0.99	100	500 0.58	800	1,591	0	45%	3.2	0.90	2.8	0.053
74 CHEEKYE R	4948/12306	2	1.7	120	1200 0.81	1,600	4,279	7	55%	7.7	0.90	6.9	0.058
75 CORNING CR	5054/11932	2	0.52	100	700 0.49	400	1,251	0	45%	1.6	0.90	1.4	0.083
76 CYPRESS CR	4920/12314	2	1.3	105	825 0.7	1,100	1,782	0	55%	5.3	0.90	4.8	0.035
77 DURUISEAU CR	4905/12021	2	0.29	250	1600 0.41	600	2,806	24	45%	2.4	0.90	2.1	0.124
78 EATON CR	4915/12123	2	0.3	850	2150 0.36	2,000	4,525	16	63%	11.0	0.90	9.9	0.043

TABLE 4.1 Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
79 FOLEY CR	4908/12133	2	0.85	240	2800 0.64	1,600	5,977	14	60%	8.4	0.90	7.6	0.074
80 HICKS CR	4911/12121	2	0.81	120	900 0.58	800	3,179	25	63%	4.4	0.90	4.0	0.075
81 HILLS CR	5043/11904	2	0.68	250	1250 0.51	1,300	2,831	3	45%	5.1	0.90	4.6	0.058
82 HUMMING BIRD CR	5046/11900	2	0.3	250	750 0.36	600	1,103	1	45%	2.4	0.90	2.1	0.049
83 KEARY CR	5049/12225	2	0.6	400	2800 0.52	1,900	5,839	12	52%	8.7	0.90	7.8	0.070
84 LAFORGUE CR	4914/12109	2	0.62	300	1200 0.47	1,500	4,498	27	60%	7.9	0.90	7.1	0.059
85 LAKEVIEW CR	4909/12010	2	0.32	550	2900 0.41	1,400	4,818	20	45%	5.5	0.90	5.0	0.091
86 MAIMEN CR	4917/12124	2	0.39	610	3150 0.44	1,900	4,762	11	60%	10.0	0.90	9.0	0.050
87 MARA CR	5046/11900	2	0.46	250	1000 0.44	900	1,389	1	45%	3.5	0.90	3.2	0.041
88 MOWHOKAM CR	5002/12131	2	1.4	100	1000 0.76	1,100	3,021	3	50%	4.8	0.90	4.3	0.065
89 NOEL CR	5046/12248	2	3.2	50	400 0.99	1,300	3,310	2	52%	5.9	0.90	5.3	0.058
90 PAUL CR	4915/12001	2	0.67	120	400 0.47	600	2,190	1	40%	2.1	0.90	1.9	0.109
91 PAVILION CR	5054/12146	2	0.15	350	2350 0.36	400	1,686	0	50%	1.8	0.90	1.6	0.100
92 PLACER CR	4911/12034	2	0.69	250	1900 0.55	1,400	4,218	25	45%	5.5	0.90	5.0	0.080
93 POST CR	4905/12128	2	1.1	125	500 0.59	1,100	2,971	17	60%	5.8	0.90	5.2	0.054
94 POTLATCH CR	4935/12319	2	0.43	150	1300 0.47	500	2,061	1	55%	2.4	0.90	2.2	0.089
95 RED CR	4931/12023	2	0.28	260	1250 0.41	600	2,372	4	40%	2.1	0.90	1.9	0.118
96 REINECKER CR	5047/11913	2	0.96	100	500 0.58	800	1,903	4	45%	3.2	0.90	2.8	0.063
97 SHAKAN CR	5016/12112	2	0.86	50	200 0.53	300	1,447	2	43%	1.1	0.90	1.0	0.134
98 SHULAPS CR	5056/12217	2	0.58	200	1550 0.52	900	4,244	30	52%	4.1	0.90	3.7	0.108
99 SWANEE CR	4915/12123	2	0.23	460	1900 0.36	800	2,616	17	60%	4.2	0.90	3.8	0.065
100 TEXAS CR	5031/12150	2	2.3	100	800 0.87	1,800	4,963	23	50%	7.9	0.90	7.1	0.066
101 TRETHERWAY CR	4942/12205	2	7.5	30	150 1.3	1,800	4,228	0	55%	8.7	0.90	7.8	0.051
102 TRUAX CR	5053/12238	2	1	200	700 0.55	1,600	2,936	18	52%	7.3	0.90	6.6	0.042
103 UNNAMED CR	4905/12043	2	0.18	150	825 0.36	200	1,477	11	50%	0.9	0.90	0.8	0.176
104 UNNAMED CR	4918/12004	2	0.08	600	1300 0.2	400	1,380	1	40%	1.4	0.90	1.3	0.103
105 UNNAMED CR	4941/12335	2	0.18	793	1800 0.31	1,100	2,585	0	57%	5.5	0.90	4.9	0.049
106 UNNAMED CR	4940/12335	2	0.15	1037	2400 0.25	1,200	3,276	0	60%	6.3	0.90	5.7	0.054
107 UNNAMED CR	4915/12115	2	0.93	180	1300 0.61	1,300	3,935	25	60%	6.8	0.90	6.1	0.060
108 UNNAMED CR	4944/12332	2	0.44	397	700 0.41	1,400	2,082	5	55%	6.7	0.90	6.1	0.032
109 UNNAMED CR	4912/12120	2	0.26	670	2050 0.36	1,400	4,230	24	63%	7.7	0.90	7.0	0.057
110 UNNAMED CR	4929/12125	2	0.45	425	2600 0.45	1,500	3,769	3	60%	7.9	0.90	7.1	0.050
111 UNNAMED CR	4909/12115	2	0.9	245	1500 0.59	1,700	4,885	30	63%	9.4	0.90	8.4	0.054
112 UNNAMED CR	4941/12316	2	0.41	580	1700 0.41	1,900	3,717	2.5	55%	9.2	0.90	8.2	0.042
113 WHITE CR	5051/11919	2	0.6	50	300 0.5	200	1,005	0	60%	1.1	0.90	0.9	0.100
114 WHITECAP CR	5043/12218	2	0.73	200	950 0.52	1,100	2,415	1	52%	5.0	0.90	4.5	0.050
115 WILLIS CR	4925/12025	2	0.6	150	1200 0.53	700	2,819	9	45%	2.8	0.90	2.5	0.107
116 WRAY CR	4920/12118	2	0.83	305	2000 0.57	2,000	4,670	12	60%	10.5	0.90	9.5	0.046
117 ZENITH CR	4952/12316	2	0.11	1159	2800 0.25	1,000	4,133	15	60%	5.3	0.90	4.7	0.082

TABLE 4.1 Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
118 ADRIAN CR	4948/12527	3	1.8	50	625 0.87	700	2,352	0	65%	4.0	0.90	3.6	0.062
119 AHAMINGUS CR	4941/12607	3	0.99	40	100 0.52	300	1,155	0.5	65%	1.7	0.90	1.5	0.071
120 ARTLISH R	5008/12655	3	5.9	30	600 1.5	1,400	6,955	30	65%	8.0	0.90	7.2	0.091
121 ATLUCK CR	5018/12656	3	8.6	30	700 1.7	2,000	6,362	16	65%	11.4	0.90	10.2	0.058
122 BANCROFT	4934/12552	3	2.2	100	560 0.8	1,700	6,940	26	65%	9.7	0.90	8.7	0.075
123 BARR CR	4955/12647	3	3.5	30	400 1.1	800	4,426	10	65%	4.6	0.90	4.1	0.101
124 BEDWELL R	4927/12536	3	3.1	50	500 1	1,200	4,313	32	62%	6.5	0.90	5.9	0.069
125 BEECH CR	4936/12512	3	1.3	50	125 0.57	500	1,494	8.2	65%	2.8	0.90	2.6	0.055
126 BIG TREE	5015/12545	3	1.7	100	1900 0.92	1,300	3,889	1.5	67%	7.6	0.90	6.9	0.053
127 BRODRICK CR	4950/12653	3	1.4	120	1650 0.79	1,300	4,520	21	65%	7.4	0.90	6.7	0.064
128 BURMAN R	4936/12550	3	4.4	50	250 1	1,700	6,950	26	65%	9.7	0.90	8.7	0.075
129 BUTTERWORT/ELK CR	4948/15553	3	2.6	50	375 0.91	1,000	4,020	6.3	65%	5.7	0.90	5.1	0.074
130 CANTON CR	4949/12628	3	3.1	30	800 1.2	700	3,447	1.5	65%	4.0	0.90	3.6	0.090
131 CANTON CR EAST	4950/12628	3	1.1	30	150 0.61	300	1,816	4.4	65%	1.7	0.90	1.5	0.111
132 CANTON CR WEST	4950/12628	3	2	30	300 0.86	500	2,587	4	65%	2.8	0.90	2.6	0.095
133 CIRIACO CR	4956/12649	3	0.49	90	550 0.46	300	2,422	8	65%	1.7	0.90	1.5	0.148
134 CLUXEWE R	5029/12709	3	1.8	60	550 0.82	800	2,951	11	65%	4.6	0.90	4.1	0.068
135 COMOX CR	4932/12515	3	2	50	125 0.67	800	2,525	18	65%	4.6	0.90	4.1	0.058
136 CRAFT CR	5024/12715	3	1.2	180	1800 0.71	1,700	4,764	18	65%	9.7	0.90	8.7	0.051
137 DICK BOOTH CR	5041/12731	3	1.3	90	1500 0.82	900	3,054	2.5	68%	5.4	0.90	4.8	0.059
138 DRINKWATER CR	4926/12530	3	3.3	50	250 0.92	1,300	5,156	23	62%	7.1	0.90	6.4	0.076
139 EHATISAHT CR	4953/12651	3	1.5	60	800 0.82	700	5,155	17	65%	4.0	0.90	3.6	0.135
140 FAIRY CR	4836/12420	3	0.55	50	125 0.44	200	1,254	5.5	51%	0.9	0.90	0.8	0.146
141 FELLOWS CR	4840/12353	3	0.45	50	250 0.44	200	1,710	15	51%	0.9	0.90	0.8	0.200
142 FLEET CR	4835/12403	3	5	50	750 1.3	2,000	5,429	24	51%	8.9	0.90	8.0	0.063
143 FRIEND CR	4958/12648	3	0.38	90	300 0.41	300	1,229	3	65%	1.7	0.90	1.5	0.075
144 HEADQUARTERS CR	4942/12507	3	1.5	50	250 0.68	600	1,668	1.4	65%	3.4	0.90	3.1	0.051
145 HECTATE LAKE	4953/12647	3	1.1	30	500 0.76	300	2,359	16	65%	1.7	0.90	1.5	0.144
146 HENSHAW CR #1	4936/12532	3	2.5	50	500 0.94	1,000	4,764	43	65%	5.7	0.90	5.1	0.087
147 HENSHAW CR #2	4936/12532	3	2.6	50	500 0.95	1,000	4,591	43	65%	5.7	0.90	5.1	0.084
148 HESQUIAT PT CR	4925/12623	3	1.5	40	700 0.87	500	4,112	38	65%	2.8	0.90	2.6	0.151
149 HOISS CR	4942/12634	3	1.3	60	950 0.8	600	3,332	17	65%	3.4	0.90	3.1	0.102
150 KAOUK R	5005/12652	3	3.6	60	1400 1.3	1,700	6,108	18	65%	9.7	0.90	8.7	0.066
151 KASHULT CR	5012/12719	3	1.5	60	950 0.83	700	4,261	32	64%	3.9	0.90	3.5	0.113
152 KAUWINCH R	5014/12716	3	1.2	120	900 0.68	1,100	4,684	24	64%	6.2	0.90	5.6	0.079
153 KENDRICK CR	4944/12639	3	1.6	30	620 0.91	400	3,435	23	65%	2.3	0.90	2.0	0.157
154 KILPALA R	5026/12703	3	4.1	60	1700 1.4	1,900	9,575	17	65%	10.8	0.90	9.7	0.092
155 KINMAN CR	5021/12655	3	1.5	90	1050 0.8	1,100	3,549	21	68%	6.6	0.90	5.9	0.056
156 LEINER R	4956/12637	3	8.1	30	350 1.5	1,900	4,986	4	65%	10.8	0.90	9.7	0.048

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157 LUTES CR	4953/12646	3	1.5	60	450 0.74	700	3,878	14	65%	4.0	0.90	3.6	0.101
158 MACKTUSH CR	4906/12451	3	2.9	50	625 1	1,100	3,104	10	62%	6.0	0.90	5.4	0.054
159 MALKSOPE R	5010/12722	3	1.1	60	1050 0.77	500	3,607	26	64%	2.8	0.90	2.5	0.134
160 MAMAT CR	4959/12655	3	0.63	60	600 0.56	300	1,889	6	65%	1.7	0.90	1.5	0.115
161 MARBLE R	5016/12720	3	0.93	60	900 0.7	400	3,925	17	65%	2.3	0.90	2.0	0.180
162 MARGARET CR	4926/12527	3	2.9	50	250 0.87	1,100	4,931	23	62%	6.0	0.90	5.4	0.086
163 MATCHLEE CR	4939/12603	3	1.4	40	100 0.59	400	3,444	11	65%	2.3	0.90	2.0	0.158
164 MCKELVIE CR	4956/12639	3	2.4	90	600 0.86	1,700	3,011	4	65%	9.7	0.90	8.7	0.032
165 MEGIN R TRIBUTARY	4932/12601	3	1.3	40	275 0.69	400	5,087	47	65%	2.3	0.90	2.0	0.233
166 MEMEKAY R	5010/12547	3	4.1	50	1000 1.3	1,600	4,591	7.5	67%	9.4	0.90	8.5	0.051
167 MOOYAH R	4937/12625	3	1.7	40	900 0.95	500	3,997	32	65%	2.8	0.90	2.6	0.146
168 MUCHALAT R	4935/12619	3	2	60	350 0.78	900	3,527	12	65%	5.1	0.90	4.6	0.072
169 NAKA CR	5028/12625	3	3.2	60	750 1.1	1,500	7,024	31	64%	8.4	0.90	7.6	0.087
170 NARROWGUT CR	5000/12707	3	1.8	30	400 0.87	400	4,057	27	65%	2.3	0.90	2.0	0.186
171 NEWCASTLE CR	5022/12607	3	2	90	850 0.85	1,400	3,600	15	64%	7.8	0.90	7.1	0.048
172 NOR/MID MEMEKAY R	5011/12547	3	4.1	50	1250 1.3	1,600	6,022	5.5	67%	9.4	0.90	8.5	0.067
173 NORA CR	5008/12602	3	1.1	152	1200 0.67	1,300	3,981	22	64%	7.3	0.90	6.6	0.057
174 OKTWANCH R	4947/12615	3	1.6	30	400 0.83	400	2,072	0.9	65%	2.3	0.90	2.0	0.095
175 OUOUKINSH R	5013/12725	3	0.92	120	1100 0.63	900	4,616	21	64%	5.0	0.90	4.5	0.095
176 PALMERSTON ST	5027/12616	3	1.7	90	725 0.79	1,200	4,106	28	64%	6.7	0.90	6.1	0.064
177 PEGGATTEM CR	5038/12759	3	1.5	30	550 0.87	400	3,282	29	68%	2.4	0.90	2.1	0.144
178 PERRY R	4954/12637	3	5.2	30	600 1.4	1,200	3,963	3	65%	6.8	0.90	6.1	0.060
179 PRETTY GIRL L	4930/12614	3	1.7	80	400 0.72	1,100	3,910	32	65%	6.3	0.90	5.6	0.065
180 RALPH R	4938/12531	3	1.7	50	375 0.78	700	3,777	39	65%	4.0	0.90	3.6	0.099
181 SAN JUAN R	4836/12359	3	2.3	50	750 0.97	900	3,558	18	51%	4.0	0.90	3.6	0.092
182 SEBALHALL CR	4947/12624	3	2.5	30	400 0.99	600	3,116	10	65%	3.4	0.90	3.1	0.095
183 SHEPHERD CR	4938/12531	3	3.2	50	500 1	1,300	4,812	39	65%	7.4	0.90	6.7	0.068
184 SHUSHARTIE R	5049/12752	3	4.9	30	750 1.4	1,200	6,119	28	68%	7.1	0.90	6.4	0.089
185 SOMBRIO R	4831/12417	3	0.87	50	380 0.6	300	1,365	0.5	51%	1.3	0.90	1.2	0.106
186 SONGHEES CR	5047/12735	3	4.5	30	450 1.3	1,100	4,401	8	68%	6.6	0.90	5.9	0.070
187 SWAH CR	5001/12620	3	1.4	60	700 0.78	700	2,113	1.9	65%	4.0	0.90	3.6	0.055
188 TABOLT CR TRIB	4930/12606	3	1.5	40	250 0.71	500	3,117	28	65%	2.8	0.90	2.6	0.114
189 TAHSISH R	5016/12705	3	3.7	30	500 1.2	900	5,202	45	65%	5.1	0.90	4.6	0.106
190 TAHSISH R	5013/12703	3	3	60	500 0.97	1,400	5,069	45	64%	7.8	0.90	7.1	0.067
191 TEIHSUM R	5020/12721	3	2.3	60	1700 1.1	1,100	5,382	17	65%	6.3	0.90	5.6	0.090
192 TLOOLS CR	4952/12545	3	3	50	625 1.1	1,200	2,971	1	65%	6.8	0.90	6.1	0.045
193 TRENT R	4935/12459	3	2	50	880 0.95	800	2,781	4	65%	4.6	0.90	4.1	0.064
194 TUGWELL CR	4825/12350	3	0.65	50	625 0.59	300	1,784	5	51%	1.3	0.90	1.2	0.139
195 UNNAMED CR	4924/12617	3	0.38	40	150 0.41	100	2,242	29	65%	0.6	0.90	0.5	0.411

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196 UNNAMED CR	4955/12648	3	0.49	30	90 0.44	100	2,153	9	65%	0.6	0.90	0.5	0.394
197 UNNAMED CR	4923/12607	3	0.41	40	400 0.48	100	1,867	13	65%	0.6	0.90	0.5	0.342
198 UNNAMED CR	4921/12601	3	0.37	40	250 0.44	100	2,210	16	65%	0.6	0.90	0.5	0.405
199 UNNAMED CR	4927/12605	3	0.57	40	220 0.48	200	2,562	30	65%	1.1	0.90	1.0	0.235
200 UNNAMED CR	4923/12604	3	0.77	40	300 0.57	200	2,110	17	65%	1.1	0.90	1.0	0.193
201 UNNAMED CR	4952/12650	3	1	30	350 0.69	200	2,210	19	65%	1.1	0.90	1.0	0.202
202 UNNAMED CR	4917/12610	3	0.79	40	375 0.6	200	1,933	6.5	67%	1.2	0.90	1.1	0.172
203 UNNAMED CR	4919/12605	3	0.41	80	550 0.44	300	1,560	4.5	65%	1.7	0.90	1.5	0.095
204 UNNAMED CR	4917/12610	3	0.84	40	600 0.67	300	2,333	6.5	65%	1.7	0.90	1.5	0.142
205 UNNAMED CR	4948/12625	3	1.2	30	200 0.65	300	1,310	0.5	65%	1.7	0.90	1.5	0.080
206 UNNAMED CR	4950/12538	3	0.9	50	375 0.61	400	2,304	14	65%	2.3	0.90	2.0	0.105
207 UNNAMED CR	5013/12605	3	0.9	55	900 0.69	400	2,527	13	64%	2.2	0.90	2.0	0.118
208 UNNAMED CR	4957/12625	3	1.8	30	170 0.74	400	2,337	9	65%	2.3	0.90	2.0	0.107
209 UNNAMED CR	4957/12651	3	0.43	122	700 0.44	400	1,658	5	65%	2.3	0.90	2.0	0.076
210 UNNAMED CR	4939/12604	3	1.4	40	100 0.59	400	2,391	5	65%	2.3	0.90	2.0	0.109
211 UNNAMED CR	4948/12617	3	2	30	400 0.9	500	2,061	1.5	65%	2.8	0.90	2.6	0.075
212 UNNAMED CR	4952/12705	3	1.1	60	720 0.71	500	3,302	30	65%	2.8	0.90	2.6	0.121
213 UNNAMED CR	5008/12711	3	2.3	30	500 0.99	500	4,799	38	64%	2.8	0.90	2.5	0.179
214 UNNAMED CR	5004/12611	3	0.8	90	1200 0.65	600	4,355	12	64%	3.4	0.90	3.0	0.135
215 UNNAMED CR	5011/12524	3	0.8	100	1400 0.65	600	4,145	9	67%	3.5	0.90	3.2	0.123
216 UNNAMED CR	5030/12654	3	1.4	60	500 0.73	700	2,032	1.6	68%	4.2	0.90	3.8	0.051
217 UNNAMED CR	4947/12644	3	1.5	60	1150 0.87	700	4,160	19	65%	4.0	0.90	3.6	0.109
218 UNNAMED CR	5018/12712	3	1	90	600 0.62	700	3,749	27	65%	4.0	0.90	3.6	0.098
219 UNNAMED CR	5029/12721	3	1.2	90	600 0.65	800	2,857	10	65%	4.6	0.90	4.1	0.065
220 UNNAMED CR	5005/12625	3	2	60	1250 0.99	900	3,051	0.8	64%	5.0	0.90	4.5	0.063
221 UNNAMED CR	5010/12618	3	1.4	90	800 0.74	1,000	3,126	14	64%	5.6	0.90	5.0	0.058
222 UNNAMED CR	5008/12637	3	2.2	60	675 0.91	1,000	3,483	11	65%	5.7	0.90	5.1	0.064
223 UNNAMED CR	5020/12626	3	1.1	120	1000 0.67	1,000	5,929	23	64%	5.6	0.90	5.0	0.110
224 UNNAMED CR	5005/12628	3	1.5	90	1320 0.83	1,100	3,038	1.2	64%	6.2	0.90	5.6	0.051
225 UNNAMED CR	4929/12614	3	1.7	80	400 0.72	1,100	3,829	30	65%	6.3	0.90	5.6	0.064
226 UNNAMED CR	5021/12607	3	1.2	120	1000 0.68	1,100	3,301	19	64%	6.2	0.90	5.6	0.056
227 UNNAMED CR	5010/12620	3	0.74	244	1450 0.54	1,400	3,970	13	64%	7.8	0.90	7.1	0.053
228 UNNAMED CR	5010/12637	3	2	90	1200 0.92	1,400	4,039	7	65%	8.0	0.90	7.2	0.053
229 UNNAMED CR	5029/12624	3	1.3	152	1250 0.7	1,500	6,396	33	64%	8.4	0.90	7.6	0.079
230 UNNAMED CR	5007/12636	3	1.7	120	1000 0.78	1,600	5,251	9	65%	9.1	0.90	8.2	0.060
231 UNNAMED CR	5029/12222	3	1.2	180	1850 0.71	1,700	4,836	8	65%	9.7	0.90	8.7	0.052
232 UPANA CR	4948/12605	3	5.8	30	800 1.5	1,400	4,587	0.1	65%	8.0	0.90	7.2	0.060
233 UTLUH CR	5019/12725	3	1.5	60	920 0.84	700	4,740	10	65%	4.0	0.90	3.6	0.124
234 WADY CR	5024/12717	3	1.2	180	825 0.61	1,700	4,718	16	65%	9.7	0.90	8.7	0.051

TABLE 4.1 Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
235 WALT LAKE CR	4953/12408	3	0.7	150	600 0.49	800	2,553	16	65%	4.6	0.90	4.1	0.058
236 WARD CR	4947/12604	3	0.86	30	200 0.58	200	1,122	0.4	65%	1.1	0.90	1.0	0.103
237 WILFRED CR	4928/12451	3	1.5	50	313 0.71	600	1,670	3.5	62%	3.3	0.90	2.9	0.053
238 WILSON CR	4939/12610	3	1.4	40	400 0.76	400	2,380	11	65%	2.3	0.90	2.0	0.109
239 YOOKWA CR	5004/12628	3	2.5	30	800 1.1	600	3,274	3	64%	3.4	0.90	3.0	0.102
240 ADOLPH CR #2	5231/11924	4	2.7	61	700 1	1,300	5,588	29	50%	5.7	0.90	5.1	0.102
241 AZURE R #1	5235/11948	4	3.4	61	800 1.1	1,600	12,326	60	50%	7.0	0.90	6.3	0.183
242 AZURE R #2	5232/11947	4	8	30	900 1.8	1,900	14,497	60	50%	8.3	0.90	7.5	0.182
243 CAMP CR	5239/11911	4	2.6	91	1100 0.98	1,900	4,078	2	50%	8.3	0.90	7.5	0.051
244 CHUA CHUA CR	5121/12007	4	0.5	450	1900 0.44	1,800	3,246	2	43%	6.8	0.90	6.1	0.050
245 CIRQUE CR	5126/11706	4	0.4	123	700 0.44	400	2,181	2	52%	1.8	0.90	1.6	0.125
246 DAVE HENRY CR #1	5246/11904	4	3.2	61	850 1.1	1,500	4,627	15	50%	6.6	0.90	5.9	0.073
247 HOLT CR	5120/11710	4	0.8	92	1500 0.68	600	3,121	3	52%	2.7	0.90	2.5	0.119
248 KIMMEL CR	5243/11925	4	1.7	91	820 0.79	1,200	5,018	10	50%	5.3	0.90	4.7	0.100
249 MCLENNAN R	5250/11920	4	4.9	30	800 1.4	1,200	4,829	4	50%	5.3	0.90	4.7	0.096
250 MCLENNAN R @ N.ARM	5251/11921	4	3.3	61	1250 1.2	1,600	5,531	5.5	50%	7.0	0.90	6.3	0.082
251 OLDMAN CR	5129/11715	4	0.5	123	750 0.46	500	2,626	5	52%	2.3	0.90	2.0	0.120
252 PACKSADDLE CR	5248/11908	4	1.6	122	1250 0.8	1,500	4,254	7.5	50%	6.6	0.90	5.9	0.068
253 PETERSON CR	5112/12010	4	0.3	100	300 0.36	200	1,118	3	43%	0.8	0.90	0.7	0.155
254 SKULL CR	5109/12013	4	0.18	100	250 0.3	100	1,260	7	43%	0.4	0.90	0.3	0.349
255 SWIFT CR #2	5251/11916	4	3.7	61	1425 1.3	1,800	5,154	0.9	50%	7.9	0.90	7.1	0.068
256 YELLOWJACKET CR	5243/11903	4	3.3	61	400 0.96	1,600	3,671	17	50%	7.0	0.90	6.3	0.055
257 CHESHI CR	5128/12422	5	0.8	92	450 0.54	600	3,283	22	45%	2.4	0.90	2.1	0.145
258 DESERTERS CR	5249/12232	5	0.5	100	220 0.41	400	1,434	2	37%	1.3	0.90	1.2	0.115
259 JAMISON CR	5132/12426	5	0.4	396	3400 0.47	1,200	7,231	15	45%	4.7	0.90	4.3	0.159
260 KLINAKLINI CR	5152/12456	5	2.5	61	650 0.94	1,200	5,593	11	45%	4.7	0.90	4.3	0.123
261 LINCOLN CR	5141/12424	5	0.1	213	1500 0.31	200	1,381	2	45%	0.8	0.90	0.7	0.183
262 MACKIN CR	5222/12223	5	0.5	250	2000 0.49	1,000	2,571	2	45%	3.9	0.90	3.5	0.068
263 MAYDOE CR	5208/12516	5	0.7	213	3250 0.62	1,200	8,909	35	60%	6.3	0.90	5.7	0.147
264 MCCLINCHY CR	5207/12510	5	3.1	30	800 1.2	700	6,604	33	60%	3.7	0.90	3.3	0.187
265 MCLEESE CR	5220/12217	5	0.3	150	1300 0.45	400	1,424	0	45%	1.6	0.90	1.4	0.094
266 RELIANCE CR	5123/12441	5	1.7	92	350 0.68	1,200	7,525	50	50%	5.3	0.90	4.7	0.149
267 STIKELAN CR #1	5128/12424	5	4.8	31	450 1.3	1,200	4,816	22	45%	4.7	0.90	4.3	0.106
268 UNNAMED CR	5155/12444	5	0.5	61	750 0.53	200	1,487	1	40%	0.7	0.90	0.6	0.221
269 UNNAMED CR	5144/12427	5	0.4	425	3700 0.47	1,300	4,129	1	45%	5.1	0.90	4.6	0.084
270 VALLEAU CR	5144/12443	5	1.2	92	1050 0.73	900	3,556	25	45%	3.5	0.90	3.2	0.105
271 YOUNG CR @ RAPIDS	5232/12554	5	1.2	61	900 0.78	600	4,201	20	60%	3.2	0.90	2.8	0.139
272 CHRISTENSON CR	5228/12641	6	2.8	91	1400 1.1	2,000	8,431	12	65%	11.4	0.90	10.2	0.077
273 NIEUMIAMUS CR	5225/12651	6	2.5	61	1450 1.1	1,200	5,466	10	65%	6.8	0.90	6.1	0.083

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Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
274 NOOMST CR #2	5226/12613	6	3.4	61	550 1	1,600	3,712	1	65%	9.1	0.90	8.2	0.042
275 NOOSGULCH CR	5226/12623	6	8.4	30	700 1.7	2,000	5,904	1	65%	11.4	0.90	10.2	0.054
276 TASTSQUAN CR	5222/12645	6	1.9	91	250 0.67	1,400	2,240	0.5	65%	8.0	0.90	7.2	0.029
277 TSINI-TSINI CR	5222/12606	6	1.2	213	1450 0.66	2,000	4,837	12	65%	11.4	0.90	10.2	0.044
278 BOUNDING CR	5328/12039	7	0.5	92	800 0.52	400	3,686	37	50%	1.8	0.90	1.6	0.219
279 CLYDE CR #1	5323/12022	7	1.1	183	2250 0.7	1,600	4,917	15	50%	7.0	0.90	6.3	0.073
280 CLYDE CR #2	5323/12022	7	1.1	91	900 0.68	800	3,134	16	50%	3.5	0.90	3.2	0.093
281 EAST TWIN CR	5328/12023	7	3.9	61	300 0.98	1,900	4,444	22	50%	8.3	0.90	7.5	0.056
282 EDDY CR	5314/12007	7	0.7	213	1000 0.51	1,200	3,178	10	50%	5.3	0.90	4.7	0.063
283 FLEET CR	5330/12027	7	2	91	1500 0.95	1,400	5,044	32	50%	6.1	0.90	5.5	0.086
284 HOLLIDAY CR	5311/11953	7	1.8	91	1400 0.9	1,300	4,971	28	50%	5.7	0.90	5.1	0.091
285 LEGRAND	5325/12023	7	0.5	152	1150 0.49	600	2,947	22	50%	2.6	0.90	2.4	0.117
286 MCINTOSH CR	5321/12020	7	1.2	92	800 0.69	900	2,899	12	50%	3.9	0.90	3.5	0.077
287 MCKALE R	5327/12012	7	1.1	183	1600 0.66	1,600	6,633	25	50%	7.0	0.90	6.3	0.099
288 ALICE CR	5440/12847	8	1.9	92	1200 0.89	1,400	3,388	1	60%	7.4	0.90	6.6	0.048
289 ANDERSON CR	5402/12843	8	2.6	61	900 1	1,200	3,357	5	60%	6.3	0.90	5.7	0.056
290 BOWBYES CR	5409/12842	8	1.4	122	800 0.7	1,300	3,397	8	60%	6.8	0.90	6.1	0.052
291 BUCK CR	5420/12637	8	3.7	50	900 1.2	1,400	4,103	2.3	50%	6.1	0.90	5.5	0.070
292 CHIST CR #1	5419/12824	8	3.4	31	700 1.2	800	6,111	13	60%	4.2	0.90	3.8	0.152
293 CHIST CR #2	5419/12818	8	2.7	61	975 1	1,300	7,409	16	60%	6.8	0.90	6.1	0.113
294 COLDWATER CR	5420/12840	8	2.8	91	1825 1.1	2,000	7,170	7.5	60%	10.5	0.90	9.5	0.071
295 DAHL CR	5409/12843	8	2.4	91	600 0.86	1,700	3,637	10	60%	8.9	0.90	8.0	0.042
296 DASQUE CR	5423/12855	8	3.7	61	920 1.2	1,800	7,071	16	60%	9.5	0.90	8.5	0.078
297 ERLANDSEN CR	5436/12844	8	4	61	1500 1.3	1,900	5,567	9	60%	10.0	0.90	9.0	0.058
298 GOAT CR	5443/12846	8	1.7	91	675 0.77	1,200	2,599	4	60%	6.3	0.90	5.7	0.043
299 HANKIN CR	5435/12826	8	1	91	950 0.67	700	3,406	1	60%	3.7	0.90	3.3	0.097
300 HARDSCRABBLE CR	5442/12820	8	2.9	61	350 0.9	1,400	4,304	8	60%	7.4	0.90	6.6	0.061
301 HOWSON CR	5433/12721	8	2	50	700 0.91	800	5,159	28	50%	3.5	0.90	3.2	0.154
302 HUMPHRYS CR	5411/12830	8	1.4	122	1900 0.82	1,300	4,453	13	60%	6.8	0.90	6.1	0.068
303 MOLYBDENUM CR	5434/12845	8	1	152	1100 0.63	1,200	2,846	8.5	60%	6.3	0.90	5.7	0.047
304 NABEELAH CR	5408/12832	8	1.4	92	900 0.75	1,000	2,807	6	60%	5.3	0.90	4.7	0.056
305 PINKUT CR FALLS #1	5427/12527	8	6	31	400 N/A	1,500	5,351	30	43%	5.7	0.90	5.1	0.099
306 RALEY CR	5412/12842	8	1.5	91	1250 0.82	1,100	4,109	15	60%	5.8	0.90	5.2	0.074
307 SHANNON CR	5440/12730	8	1.5	122	1200 0.77	1,400	4,729	17	60%	7.4	0.90	6.6	0.067
308 SINCLAIR CR	5437/12730	8	0.7	100	1500 0.62	500	2,819	17	50%	2.2	0.90	2.0	0.134
309 STE CROIX	5442/12819	8	1.7	122	1400 0.83	1,600	3,766	6	60%	8.4	0.90	7.6	0.047
310 TROUT CR	5451/12719	8	1.6	50	500 0.79	600	1,753	0	60%	3.2	0.90	2.8	0.058
311 UNNAMED CR	5405/12830	8	1	61	950 0.73	500	2,635	5	60%	2.6	0.90	2.4	0.105
312 UNNAMED CR	5415/12846	8	0.7	122	800 0.54	700	3,900	21	60%	3.7	0.90	3.3	0.111

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313 UNNAMED CR	5419/12824	8	1.2	91	850 0.7	900	4,085	10	60%	4.7	0.90	4.3	0.090
314 UNNAMED CR	5405/12820	8	2.6	91	900 0.95	1,900	7,552	22	60%	10.0	0.90	9.0	0.079
315 UNNAMED CR	5423/12853	8	1.4	183	1250 0.7	2,000	6,219	15	60%	10.5	0.90	9.5	0.062
316 WHITE CR	5424/12841	8	1.3	152	1750 0.75	1,500	4,996	8	60%	7.9	0.90	7.1	0.066
317 AYTON CR	5411/12943	9	4.5	31	400 1.2	1,100	4,189	6	70%	6.7	0.90	6.1	0.065
318 COLONEL JOHNSON CR	5413/13009	9	0.3	276	800 0.36	600	1,765	5	70%	3.7	0.90	3.3	0.050
319 HAANS CR SANDSPIT	5313/13153	9	1.5	62	1900 0.95	700	4,645	4	65%	4.0	0.90	3.6	0.122
320 MARION CR	5422/13003	9	1	122	1600 0.7	1,000	4,243	20	70%	6.1	0.90	5.5	0.072
321 SACHS CR	5312/13158	9	1.2	91	850 0.7	900	2,419	5	65%	5.1	0.90	4.6	0.049
322 TALA HAAT CR	5446/13004	9	3.1	30	300 1	700	3,523	5	65%	4.0	0.90	3.6	0.092
323 TLELL R	5322/13200	9	2.2	30	600 1	500	5,598	14	65%	2.8	0.90	2.6	0.205
324 UNNAMED CR	5308/13153	9	1.3	30	600 0.84	300	2,961	11	70%	1.8	0.90	1.7	0.168
325 UNNAMED CR	5410/12956	9	0.1	650	2000 0.23	500	2,342	0.5	70%	3.1	0.90	2.8	0.080
326 UNNAMED CR	5405/12956	9	3.8	30	400 1.2	900	4,215	12	70%	5.5	0.90	5.0	0.080
327 UNNAMED CR	5427/13004	9	0.6	274	1100 0.47	1,300	4,321	30	70%	8.0	0.90	7.2	0.057
328 UNNAMED CR	5406/12955	9	5.6	31	600 1.4	1,400	5,454	12	70%	8.6	0.90	7.7	0.066
329 UNNAMED CR	5411/12945	9	1.5	122	1300 0.78	1,400	4,182	10	70%	8.6	0.90	7.7	0.051
330 BARNEY GULCH	5557/12958	11	0.5	457	2000 0.45	1,800	3,597	2	55%	8.7	0.90	7.8	0.043
331 BEAR R	5607/12946	11	5.1	30	450 1.3	1,200	5,000	28	55%	5.8	0.90	5.2	0.090
332 BLACKSTOCK CR	5540/12745	11	0.8	92	550 0.56	600	2,754	20	50%	2.6	0.90	2.4	0.109
333 CARRIGAN CR	5538/12745	11	0.72	91	650 0.55	500	2,576	16	50%	2.2	0.90	2.0	0.123
334 CASCADE R	5603/13002	11	4.1	61	350 1	2,000	4,430	17	55%	9.6	0.90	8.7	0.048
335 CAUSQUA CR	5502/12716	11	1	91	550 0.62	700	2,279	4.5	50%	3.1	0.90	2.8	0.078
336 GLACIER CR	5559/12956	11	2.9	61	600 0.99	1,400	3,895	7	55%	6.7	0.90	6.1	0.060
337 INSECT CR	5503/12829	11	1.3	152	2550 0.81	1,500	8,257	13	60%	7.9	0.90	7.1	0.109
338 JUNIPER CR	5507/12742	11	1.2	91	1550 0.79	900	4,777	8	60%	4.7	0.90	4.3	0.105
339 LUND CR	5510/12720	11	0.54	153	1000 0.49	600	3,172	16	50%	2.6	0.90	2.4	0.126
340 MILL CR	5506/12807	11	3.4	61	1125 1.2	1,600	4,307	3	60%	8.4	0.90	7.6	0.053
341 UNNAMED CR	5526/12846	11	0.9	152	1050 0.59	1,100	4,179	16	50%	4.8	0.90	4.3	0.090
342 UNNAMED CR	5503/12807	11	2.6	61	950 1	1,200	4,291	3.3	60%	6.3	0.90	5.7	0.071
343 UTSUN CR	5527/12735	11	0.74	122	1450 0.61	700	2,906	5	50%	3.1	0.90	2.8	0.099
344 WILSON CR	5503/12817	11	1.1	122	1525 0.71	1,100	3,214	5	60%	5.8	0.90	5.2	0.058
345 CLASSY CR	5801/13047	13	0.84	152	900 0.57	1,000	4,188	17	45%	3.9	0.90	3.5	0.111
346 DODJATIN CR	5753/13118	13	0.78	122	750 0.55	700	2,846	12	45%	2.8	0.90	2.5	0.108
347 EIGHT MILE CR	5758/13105	13	0.27	91	150 0.31	200	1,813	10	45%	0.8	0.90	0.7	0.240
348 FOURTH OF JULY CR	5940/13339	13	1.8	92	1600 0.92	1,300	4,578	8	30%	3.4	0.90	3.1	0.140
349 HARTZ CR	5803/13100	13	0.33	213	1600 0.45	600	2,933	9	45%	2.4	0.90	2.1	0.129
350 HITCHCOCK CR	5955/13348	13	1.8	62	1025 0.9	900	4,639	40	30%	2.4	0.90	2.1	0.205
351 MEEHAUS CR	5805/13043	13	0.97	92	670 0.62	700	4,044	20	45%	2.8	0.90	2.5	0.153

TABLE 4.1 Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. <i>SORTED:Alphabetic by region</i>	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
352 NINE MILE CR	5759/13102	13	0.2	213	950 0.36	300	1,667	13	45%	1.2	0.90	1.1	0.147
353 TELEGRAPH CR	5754/13110	13	0.56	152	1200 0.51	700	2,048	0	45%	2.8	0.90	2.5	0.077

TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
1 TASTSQUAN CR	5222/12645	6	1.9	91	250 0.67	1,400	2,240	0.5	65%	8.0	0.90	7.2	0.029
2 UNNAMED CR	4944/12332	2	0.44	397	700 0.41	1,400	2,082	5	55%	6.7	0.90	6.1	0.032
3 MCKELVIE CR	4956/12639	3	2.4	90	600 0.86	1,700	3,011	4	65%	9.7	0.90	8.7	0.032
4 FALL CR	5036/11853	1	0.45	500	1000 0.41	1,800	2,347	1.5	45%	7.1	0.90	6.4	0.034
5 CYPRESS CR	4920/12314	2	1.3	105	825 0.7	1,100	1,782	0	55%	5.3	0.90	4.8	0.035
6 VICTOR CR	5057/11824	1	0.5	300	550 0.4	1,200	1,607	6	45%	4.7	0.90	4.3	0.035
7 UNNAMED CR	5058/11836	1	0.5	300	700 0.4	1,200	1,721	7	45%	4.7	0.90	4.3	0.038
8 BREMNER CR	4940/12201	2	3.1	60	200 0.83	1,500	2,747	7	55%	7.2	0.90	6.5	0.040
9 MARA CR	5046/11900	2	0.46	250	1000 0.44	900	1,389	1	45%	3.5	0.90	3.2	0.041
10 ANDERSON CR	4911/12143	2	0.21	850	1500 0.31	1,400	3,035	5	63%	7.7	0.90	7.0	0.041
11 LOFTUS CR	5056/11849	1	0.75	250	1000 0.51	1,500	2,378	0.5	45%	5.9	0.90	5.3	0.042
12 TRUAX CR	5053/12238	2	1	200	700 0.55	1,600	2,936	18	52%	7.3	0.90	6.6	0.042
13 BLURTON CR	5041/11902	2	0.48	400	1600 0.44	1,500	2,383	1	45%	5.9	0.90	5.3	0.042
14 UNNAMED CR	4941/12316	2	0.41	580	1700 0.41	1,900	3,717	2.5	55%	9.2	0.90	8.2	0.042
15 DAHL CR	5409/12843	8	2.4	91	600 0.86	1,700	3,637	10	60%	8.9	0.90	8.0	0.042
16 NOOMST CR #2	5226/12613	6	3.4	61	550 1	1,600	3,712	1	65%	9.1	0.90	8.2	0.042
17 EATON CR	4915/12123	2	0.3	850	2150 0.36	2,000	4,525	16	63%	11.0	0.90	9.9	0.043
18 UNNAMED CR	5055/11807	1	0.85	250	1150 0.54	1,700	2,755	1	45%	6.7	0.90	6.0	0.043
19 GOAT CR	5443/12846	8	1.7	91	675 0.77	1,200	2,599	4	60%	6.3	0.90	5.7	0.043
20 BARNEY GULCH	5557/12958	11	0.5	457	2000 0.45	1,800	3,597	2	55%	8.7	0.90	7.8	0.043
21 TSINI-TSINI CR	5222/12606	6	1.2	213	1450 0.66	2,000	4,837	12	65%	11.4	0.90	10.2	0.044
22 DRUMMIE CR	5052/11805	1	1.3	150	700 0.63	1,500	2,549	7	45%	5.9	0.90	5.3	0.045
23 TLOOLS CR	4952/12545	3	3	50	625 1.1	1,200	2,971	1	65%	6.8	0.90	6.1	0.045
24 KAIN CR	5051/11635	1	0.95	250	1100 0.56	1,900	3,792	16	52%	8.7	0.90	7.8	0.046
25 LOST LEDGE CR	5006/11656	1	0.28	430	1700 0.36	900	1,639	0.5	47%	3.7	0.90	3.3	0.046
26 WRAY CR	4920/12118	2	0.83	305	2000 0.57	2,000	4,670	12	60%	10.5	0.90	9.5	0.046
27 LADYBIRD CR	4925/11740	1	2	120	600 0.76	1,900	2,959	2.5	40%	6.7	0.90	6.0	0.046
28 STE CROIX	5442/12819	8	1.7	122	1400 0.83	1,600	3,766	6	60%	8.4	0.90	7.6	0.047
29 MOLYBDENUM CR	5434/12845	8	1	152	1100 0.63	1,200	2,846	8.5	60%	6.3	0.90	5.7	0.047
30 NEWCASTLE CR	5022/12607	3	2	90	850 0.85	1,400	3,600	15	64%	7.8	0.90	7.1	0.048
31 CASCADE R	5603/13002	11	4.1	61	350 1	2,000	4,430	17	55%	9.6	0.90	8.7	0.048
32 ALICE CR	5440/12847	8	1.9	92	1200 0.89	1,400	3,388	1	60%	7.4	0.90	6.6	0.048
33 LEINER R	4956/12637	3	8.1	30	350 1.5	1,900	4,986	4	65%	10.8	0.90	9.7	0.048
34 HUMMING BIRD CR	5046/11900	2	0.3	250	750 0.36	600	1,103	1	45%	2.4	0.90	2.1	0.049
35 UNNAMED CR	4941/12335	2	0.18	793	1800 0.31	1,100	2,585	0	57%	5.5	0.90	4.9	0.049
36 SACHS CR	5312/13158	9	1.2	91	850 0.7	900	2,419	5	65%	5.1	0.90	4.6	0.049
37 MAIMEN CR	4917/12124	2	0.39	610	3150 0.44	1,900	4,762	11	60%	10.0	0.90	9.0	0.050
38 UNNAMED CR	4929/12125	2	0.45	425	2600 0.45	1,500	3,769	3	60%	7.9	0.90	7.1	0.050
39 CHUA CHUA CR	5121/12007	4	0.5	450	1900 0.44	1,800	3,246	2	43%	6.8	0.90	6.1	0.050

TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
40 DAVIS CR	5008/11657	1	0.8	122	500 0.52	800	1,578	0.5	47%	3.3	0.90	3.0	0.050
41 COLONEL JOHNSON CR	5413/13009	9	0.3	276	800 0.36	600	1,765	5	70%	3.7	0.90	3.3	0.050
42 WHITECAP CR	5043/12218	2	0.73	200	950 0.52	1,100	2,415	1	52%	5.0	0.90	4.5	0.050
43 UNNAMED CR	5411/12945	9	1.5	122	1300 0.78	1,400	4,182	10	70%	8.6	0.90	7.7	0.051
44 UNNAMED CR	5030/12654	3	1.4	60	500 0.73	700	2,032	1.6	68%	4.2	0.90	3.8	0.051
45 WADY CR	5024/12717	3	1.2	180	825 0.61	1,700	4,718	16	65%	9.7	0.90	8.7	0.051
46 TRETHERWAY CR	4942/12205	2	7.5	30	150 1.3	1,800	4,228	0	55%	8.7	0.90	7.8	0.051
47 HEADQUARTERS CR	4942/12507	3	1.5	50	250 0.68	600	1,668	1.4	65%	3.4	0.90	3.1	0.051
48 MEMEKAY R	5010/12547	3	4.1	50	1000 1.3	1,600	4,591	7.5	67%	9.4	0.90	8.5	0.051
49 CAMP CR	5239/11911	4	2.6	91	1100 0.98	1,900	4,078	2	50%	8.3	0.90	7.5	0.051
50 CRAFT CR	5024/12715	3	1.2	180	1800 0.71	1,700	4,764	18	65%	9.7	0.90	8.7	0.051
51 UNNAMED CR	5005/12628	3	1.5	90	1320 0.83	1,100	3,038	1.2	64%	6.2	0.90	5.6	0.051
52 CADWALLADER CR	5046/12248	2	4.8	50	600 1.2	1,900	4,284	0.5	52%	8.7	0.90	7.8	0.052
53 BOWBYES CR	5409/12842	8	1.4	122	800 0.7	1,300	3,397	8	60%	6.8	0.90	6.1	0.052
54 UNNAMED CR	5029/12222	3	1.2	180	1850 0.71	1,700	4,836	8	65%	9.7	0.90	8.7	0.052
55 CHASE CR	5049/11941	2	0.99	100	500 0.58	800	1,591	0	45%	3.2	0.90	2.8	0.053
56 UNNAMED CR	5010/12620	3	0.74	244	1450 0.54	1,400	3,970	13	64%	7.8	0.90	7.1	0.053
57 UNNAMED CR	5010/12637	3	2	90	1200 0.92	1,400	4,039	7	65%	8.0	0.90	7.2	0.053
58 BIG TREE	5015/12545	3	1.7	100	1900 0.92	1,300	3,889	1.5	67%	7.6	0.90	6.9	0.053
59 MILL CR	5506/12807	11	3.4	61	1125 1.2	1,600	4,307	3	60%	8.4	0.90	7.6	0.053
60 WILFRED CR	4928/12451	3	1.5	50	313 0.71	600	1,670	3.5	62%	3.3	0.90	2.9	0.053
61 POST CR	4905/12128	2	1.1	125	500 0.59	1,100	2,971	17	60%	5.8	0.90	5.2	0.054
62 NOOSGULCH CR	5226/12623	6	8.4	30	700 1.7	2,000	5,904	1	65%	11.4	0.90	10.2	0.054
63 UNNAMED CR	4940/12335	2	0.15	1037	2400 0.25	1,200	3,276	0	60%	6.3	0.90	5.7	0.054
64 MACKTUSH CR	4906/12451	3	2.9	50	625 1	1,100	3,104	10	62%	6.0	0.90	5.4	0.054
65 UNNAMED CR	4909/12115	2	0.9	245	1500 0.59	1,700	4,885	30	63%	9.4	0.90	8.4	0.054
66 SMYTH CR	5032/11843	1	0.29	600	2000 0.36	1,400	2,874	15	45%	5.5	0.90	5.0	0.054
67 YELLOWJACKET CR	5243/11903	4	3.3	61	400 0.96	1,600	3,671	17	50%	7.0	0.90	6.3	0.055
68 BEECH CR	4936/12512	3	1.3	50	125 0.57	500	1,494	8.2	65%	2.8	0.90	2.6	0.055
69 SWAH CR	5001/12620	3	1.4	60	700 0.78	700	2,113	1.9	65%	4.0	0.90	3.6	0.055
70 ANDERSON CR	5402/12843	8	2.6	61	900 1	1,200	3,357	5	60%	6.3	0.90	5.7	0.056
71 EAST TWIN CR	5328/12023	7	3.9	61	300 0.98	1,900	4,444	22	50%	8.3	0.90	7.5	0.056
72 NABEELAH CR	5408/12832	8	1.4	92	900 0.75	1,000	2,807	6	60%	5.3	0.90	4.7	0.056
73 UNNAMED CR	5021/12607	3	1.2	120	1000 0.68	1,100	3,301	19	64%	6.2	0.90	5.6	0.056
74 KINMAN CR	5021/12655	3	1.5	90	1050 0.8	1,100	3,549	21	68%	6.6	0.90	5.9	0.056
75 UNNAMED CR	5427/13004	9	0.6	274	1100 0.47	1,300	4,321	30	70%	8.0	0.90	7.2	0.057
76 NORA CR	5008/12602	3	1.1	152	1200 0.67	1,300	3,981	22	64%	7.3	0.90	6.6	0.057
77 UNNAMED CR	4912/12120	2	0.26	670	2050 0.36	1,400	4,230	24	63%	7.7	0.90	7.0	0.057
78 HILLS CR	5043/11904	2	0.68	250	1250 0.51	1,300	2,831	3	45%	5.1	0.90	4.6	0.058

TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
79 COMOX CR	4932/12515	3	2	50	125 0.67	800	2,525	18	65%	4.6	0.90	4.1	0.058
80 CHEEKYE R	4948/12306	2	1.7	120	1200 0.81	1,600	4,279	7	55%	7.7	0.90	6.9	0.058
81 TROUT CR	5451/12719	8	1.6	50	500 0.79	600	1,753	0	60%	3.2	0.90	2.8	0.058
82 WILSON CR	5503/12817	11	1.1	122	1525 0.71	1,100	3,214	5	60%	5.8	0.90	5.2	0.058
83 ERLANDSEN CR	5436/12844	8	4	61	1500 1.3	1,900	5,567	9	60%	10.0	0.90	9.0	0.058
84 UNNAMED CR	5010/12618	3	1.4	90	800 0.74	1,000	3,126	14	64%	5.6	0.90	5.0	0.058
85 ATLUCK CR	5018/12656	3	8.6	30	700 1.7	2,000	6,362	16	65%	11.4	0.90	10.2	0.058
86 NOEL CR	5046/12248	2	3.2	50	400 0.99	1,300	3,310	2	52%	5.9	0.90	5.3	0.058
87 WALT LAKE CR	4953/12408	3	0.7	150	600 0.49	800	2,553	16	65%	4.6	0.90	4.1	0.058
88 UNNAMED CR	5021/11651	1	0.32	430	2000 0.41	1,100	2,971	15	55%	5.3	0.90	4.8	0.058
89 SCHROEDER CR	5002/11653	1	0.64	300	2300 0.53	1,500	3,502	0.5	47%	6.2	0.90	5.6	0.059
90 DICK BOOTH CR	5041/12731	3	1.3	90	1500 0.82	900	3,054	2.5	68%	5.4	0.90	4.8	0.059
91 LAFORGUE CR	4914/12109	2	0.62	300	1200 0.47	1,500	4,498	27	60%	7.9	0.90	7.1	0.059
92 UPANA CR	4948/12605	3	5.8	30	800 1.5	1,400	4,587	0.1	65%	8.0	0.90	7.2	0.060
93 UNNAMED CR	4915/12115	2	0.93	180	1300 0.61	1,300	3,935	25	60%	6.8	0.90	6.1	0.060
94 UNNAMED CR	5007/12636	3	1.7	120	1000 0.78	1,600	5,251	9	65%	9.1	0.90	8.2	0.060
95 GLACIER CR	5559/12956	11	2.9	61	600 0.99	1,400	3,895	7	55%	6.7	0.90	6.1	0.060
96 PERRY R	4954/12637	3	5.2	30	600 1.4	1,200	3,963	3	65%	6.8	0.90	6.1	0.060
97 HARDSCRABBLE CR	5442/12820	8	2.9	61	350 0.9	1,400	4,304	8	60%	7.4	0.90	6.6	0.061
98 ADRIAN CR	4948/12527	3	1.8	50	625 0.87	700	2,352	0	65%	4.0	0.90	3.6	0.062
99 UNNAMED CR	5423/12853	8	1.4	183	1250 0.7	2,000	6,219	15	60%	10.5	0.90	9.5	0.062
100 JOHN CR	5016/11701	1	0.62	180	1200 0.51	900	2,207	4.5	47%	3.7	0.90	3.3	0.062
101 UNNAMED CR	5006/11646	1	0.18	550	1650 0.31	800	2,095	8	50%	3.5	0.90	3.2	0.062
102 SEPTET CR	5048/11641	1	1.4	150	950 0.69	1,600	4,365	34	52%	7.3	0.90	6.6	0.062
103 REINECKER CR	5047/11913	2	0.96	100	500 0.58	800	1,903	4	45%	3.2	0.90	2.8	0.063
104 EDDY CR	5314/12007	7	0.7	213	1000 0.51	1,200	3,178	10	50%	5.3	0.90	4.7	0.063
105 UNNAMED CR	5005/12625	3	2	60	1250 0.99	900	3,051	0.8	64%	5.0	0.90	4.5	0.063
106 FLEET CR	4835/12403	3	5	50	750 1.3	2,000	5,429	24	51%	8.9	0.90	8.0	0.063
107 PAYNE CR	5037/11751	1	1.6	100	400 0.67	1,300	3,676	45	53%	6.0	0.90	5.4	0.064
108 PALMERSTON ST	5027/12616	3	1.7	90	725 0.79	1,200	4,106	28	64%	6.7	0.90	6.1	0.064
109 TRENT R	4935/12459	3	2	50	880 0.95	800	2,781	4	65%	4.6	0.90	4.1	0.064
110 BRODRICK CR	4950/12653	3	1.4	120	1650 0.79	1,300	4,520	21	65%	7.4	0.90	6.7	0.064
111 UNNAMED CR	4929/12614	3	1.7	80	400 0.72	1,100	3,829	30	65%	6.3	0.90	5.6	0.064
112 UNNAMED CR	5008/12637	3	2.2	60	675 0.91	1,000	3,483	11	65%	5.7	0.90	5.1	0.064
113 TEMPLETON CR	5048/11629	1	1	250	1700 0.62	2,000	5,615	21	52%	9.1	0.90	8.2	0.064
114 AYTON CR	5411/12943	9	4.5	31	400 1.2	1,100	4,189	6	70%	6.7	0.90	6.1	0.065
115 SWANEE CR	4915/12123	2	0.23	460	1900 0.36	800	2,616	17	60%	4.2	0.90	3.8	0.065
116 PRETTY GIRL L	4930/12614	3	1.7	80	400 0.72	1,100	3,910	32	65%	6.3	0.90	5.6	0.065
117 TOWN CR	5046/11745	1	0.49	400	1400 0.44	1,500	4,364	44	53%	7.0	0.90	6.3	0.065

TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
118 MOWHOKAM CR	5002/12131	2	1.4	100	1000 0.76	1,100	3,021	3	50%	4.8	0.90	4.3	0.065
119 UNNAMED CR	5029/12721	3	1.2	90	600 0.65	800	2,857	10	65%	4.6	0.90	4.1	0.065
120 CORN CR	4904/11640	1	2.3	60	800 0.96	1,100	3,326	4	55%	5.3	0.90	4.8	0.065
121 TEXAS CR	5031/12150	2	2.3	100	800 0.87	1,800	4,963	23	50%	7.9	0.90	7.1	0.066
122 KAOUK R	5005/12652	3	3.6	60	1400 1.3	1,700	6,108	18	65%	9.7	0.90	8.7	0.066
123 WHITE CR	5424/12841	8	1.3	152	1750 0.75	1,500	4,996	8	60%	7.9	0.90	7.1	0.066
124 UNNAMED CR	5406/12955	9	5.6	31	600 1.4	1,400	5,454	12	70%	8.6	0.90	7.7	0.066
125 HOPE CR	5028/11711	1	0.76	240	1250 0.53	1,400	3,692	24	47%	5.8	0.90	5.2	0.067
126 NOR/MID MEMEKAY R	5011/12547	3	4.1	50	1250 1.3	1,600	6,022	5.5	67%	9.4	0.90	8.5	0.067
127 SHANNON CR	5440/12730	8	1.5	122	1200 0.77	1,400	4,729	17	60%	7.4	0.90	6.6	0.067
128 TAHSHISH R	5013/12703	3	3	60	500 0.97	1,400	5,069	45	64%	7.8	0.90	7.1	0.067
129 PACKSADDLE CR	5248/11908	4	1.6	122	1250 0.8	1,500	4,254	7.5	50%	6.6	0.90	5.9	0.068
130 CLUXEWE R	5029/12709	3	1.8	60	550 0.82	800	2,951	11	65%	4.6	0.90	4.1	0.068
131 SHEPHERD CR	4938/12531	3	3.2	50	500 1	1,300	4,812	39	65%	7.4	0.90	6.7	0.068
132 HUMPHRYS CR	5411/12830	8	1.4	122	1900 0.82	1,300	4,453	13	60%	6.8	0.90	6.1	0.068
133 MACKIN CR	5222/12223	5	0.5	250	2000 0.49	1,000	2,571	2	45%	3.9	0.90	3.5	0.068
134 SWIFT CR #2	5251/11916	4	3.7	61	1425 1.3	1,800	5,154	0.9	50%	7.9	0.90	7.1	0.068
135 LEGERWOOD CR	5058/11846	1	0.53	250	1300 0.47	1,000	2,594	1.5	45%	3.9	0.90	3.5	0.069
136 BEDWELL R	4927/12536	3	3.1	50	500 1	1,200	4,313	32	62%	6.5	0.90	5.9	0.069
137 SLEWISKIN CR	5008/11747	1	3.4	60	1200 1.2	1,600	4,188	2	45%	6.3	0.90	5.7	0.069
138 UNNAMED CR	5007/11644	1	0.22	490	1400 0.3	800	2,336	13	50%	3.5	0.90	3.2	0.070
139 BUCK CR	5420/12637	8	3.7	50	900 1.2	1,400	4,103	2.3	50%	6.1	0.90	5.5	0.070
140 UNNAMED CR	5020/11651	1	0.28	300	1150 0.36	700	2,054	14	50%	3.1	0.90	2.8	0.070
141 DENNIS CR	5002/11722	1	0.71	182	1250 0.55	1,000	2,641	2	45%	3.9	0.90	3.5	0.070
142 SONGHEES CR	5047/12735	3	4.5	30	450 1.3	1,100	4,401	8	68%	6.6	0.90	5.9	0.070
143 MEADOW CR	5018/11703	1	0.62	180	1300 0.52	900	2,498	4	47%	3.7	0.90	3.3	0.070
144 KEARY CR	5049/12225	2	0.6	400	2800 0.52	1,900	5,839	12	52%	8.7	0.90	7.8	0.070
145 AHAMINGUS CR	4941/12607	3	0.99	40	100 0.52	300	1,155	0.5	65%	1.7	0.90	1.5	0.071
146 UNNAMED CR	5503/12807	11	2.6	61	950 1	1,200	4,291	3.3	60%	6.3	0.90	5.7	0.071
147 LEXINGTON CR	5050/11737	1	0.55	450	1700 0.45	1,900	6,005	58	53%	8.8	0.90	7.9	0.071
148 COLDWATER CR	5420/12840	8	2.8	91	1825 1.1	2,000	7,170	7.5	60%	10.5	0.90	9.5	0.071
149 MUCHALAT R	4935/12619	3	2	60	350 0.78	900	3,527	12	65%	5.1	0.90	4.6	0.072
150 MARION CR	5422/13003	9	1	122	1600 0.7	1,000	4,243	20	70%	6.1	0.90	5.5	0.072
151 FERRY CR	5015/11839	1	1.1	150	3100 0.78	1,300	4,060	1	51%	5.8	0.90	5.2	0.073
152 CLYDE CR #1	5323/12022	7	1.1	183	2250 0.7	1,600	4,917	15	50%	7.0	0.90	6.3	0.073
153 DAVE HENRY CR #1	5246/11904	4	3.2	61	850 1.1	1,500	4,627	15	50%	6.6	0.90	5.9	0.073
154 BOBB CR	5051/12233	2	0.8	300	1400 0.53	1,900	6,100	22	52%	8.7	0.90	7.8	0.074
155 BUTTERWORT/ELK CR	4948/15553	3	2.6	50	375 0.91	1,000	4,020	6.3	65%	5.7	0.90	5.1	0.074
156 RALEY CR	5412/12842	8	1.5	91	1250 0.82	1,100	4,109	15	60%	5.8	0.90	5.2	0.074

TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
157 FOLEY CR	4908/12133	2	0.85	240	2800 0.64	1,600	5,977	14	60%	8.4	0.90	7.6	0.074
158 BANCROFT	4934/12552	3	2.2	100	560 0.8	1,700	6,940	26	65%	9.7	0.90	8.7	0.075
159 BURMAN R	4936/12550	3	4.4	50	250 1	1,700	6,950	26	65%	9.7	0.90	8.7	0.075
160 FRIEND CR	4958/12648	3	0.38	90	300 0.41	300	1,229	3	65%	1.7	0.90	1.5	0.075
161 HICKS CR	4911/12121	2	0.81	120	900 0.58	800	3,179	25	63%	4.4	0.90	4.0	0.075
162 UNNAMED CR	4948/12617	3	2	30	400 0.9	500	2,061	1.5	65%	2.8	0.90	2.6	0.075
163 UNNAMED CR	4957/12651	3	0.43	122	700 0.44	400	1,658	5	65%	2.3	0.90	2.0	0.076
164 DRINKWATER CR	4926/12530	3	3.3	50	250 0.92	1,300	5,156	23	62%	7.1	0.90	6.4	0.076
165 MCINTOSH CR	5321/12020	7	1.2	92	800 0.69	900	2,899	12	50%	3.9	0.90	3.5	0.077
166 HALL CR	5041/11706	1	1.8	100	850 0.8	1,400	4,784	51	53%	6.5	0.90	5.8	0.077
167 IRON CR	5043/11836	1	0.22	550	2000 0.36	900	2,736	22	47%	3.7	0.90	3.3	0.077
168 CHRISTENSON CR	5228/12641	6	2.8	91	1400 1.1	2,000	8,431	12	65%	11.4	0.90	10.2	0.077
169 TELEGRAPH CR	5754/13110	13	0.56	152	1200 0.51	700	2,048	0	45%	2.8	0.90	2.5	0.077
170 CAUSQUA CR	5502/12716	11	1	91	550 0.62	700	2,279	4.5	50%	3.1	0.90	2.8	0.078
171 DASQUE CR	5423/12855	8	3.7	61	920 1.2	1,800	7,071	16	60%	9.5	0.90	8.5	0.078
172 HUNTERS CR	5041/11847	1	1.3	150	1900 0.77	1,500	4,431	10	45%	5.9	0.90	5.3	0.078
173 UNNAMED CR	5405/12820	8	2.6	91	900 0.95	1,900	7,552	22	60%	10.0	0.90	9.0	0.079
174 KAUWINCH R	5014/12716	3	1.2	120	900 0.68	1,100	4,684	24	64%	6.2	0.90	5.6	0.079
175 UNNAMED CR	5029/12624	3	1.3	152	1250 0.7	1,500	6,396	33	64%	8.4	0.90	7.6	0.079
176 UNNAMED CR	5405/12956	9	3.8	30	400 1.2	900	4,215	12	70%	5.5	0.90	5.0	0.080
177 UNNAMED CR	5410/12956	9	0.1	650	2000 0.23	500	2,342	0.5	70%	3.1	0.90	2.8	0.080
178 PLACER CR	4911/12034	2	0.69	250	1900 0.55	1,400	4,218	25	45%	5.5	0.90	5.0	0.080
179 BASTION CR	5051/11905	2	0.24	300	1000 0.36	600	1,809	17	45%	2.4	0.90	2.1	0.080
180 UNNAMED CR	4948/12625	3	1.2	30	200 0.65	300	1,310	0.5	65%	1.7	0.90	1.5	0.080
181 LUXOR CR	5046/11610	1	0.97	100	1400 0.7	800	2,802	3	52%	3.6	0.90	3.3	0.080
182 ZENITH CR	4952/12316	2	0.11	1159	2800 0.25	1,000	4,133	15	60%	5.3	0.90	4.7	0.082
183 MCLENNAN R @ N.ARM	5251/11921	4	3.3	61	1250 1.2	1,600	5,531	5.5	50%	7.0	0.90	6.3	0.082
184 UNNAMED CR	5021/11648	1	0.3	240	900 0.36	600	2,076	19	50%	2.6	0.90	2.4	0.082
185 CORNING CR	5054/11932	2	0.52	100	700 0.49	400	1,251	0	45%	1.6	0.90	1.4	0.083
186 UNNAMED CR	4959/11603	1	0.75	300	1100 0.5	1,800	5,040	37	40%	6.3	0.90	5.7	0.083
187 NIEUMIAMUS CR	5225/12651	6	2.5	61	1450 1.1	1,200	5,466	10	65%	6.8	0.90	6.1	0.083
188 OCTOPUS CR	4945/11806	1	0.68	150	650 0.49	800	2,255	6	40%	2.8	0.90	2.5	0.084
189 UNNAMED CR	5144/12427	5	0.4	425	3700 0.47	1,300	4,129	1	45%	5.1	0.90	4.6	0.084
190 HENSHAW CR #2	4936/12532	3	2.6	50	500 0.95	1,000	4,591	43	65%	5.7	0.90	5.1	0.084
191 FLEET CR	5330/12027	7	2	91	1500 0.95	1,400	5,044	32	50%	6.1	0.90	5.5	0.086
192 MARGARET CR	4926/12527	3	2.9	50	250 0.87	1,100	4,931	23	62%	6.0	0.90	5.4	0.086
193 CREIGHTON CR	5012/11846	1	0.3	200	1800 0.39	500	1,705	2	47%	2.1	0.90	1.9	0.086
194 NAKA CR	5028/12625	3	3.2	60	750 1.1	1,500	7,024	31	64%	8.4	0.90	7.6	0.087
195 HENSHAW CR #1	4936/12532	3	2.5	50	500 0.94	1,000	4,764	43	65%	5.7	0.90	5.1	0.087

TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
196 BEHRMAN CR	5030/11652	1	0.7	240	850 0.88	1,300	4,852	34	50%	5.7	0.90	5.1	0.089
197 POTLATCH CR	4935/12319	2	0.43	150	1300 0.47	500	2,061	1	55%	2.4	0.90	2.2	0.089
198 SHUSHARTIE R	5049/12752	3	4.9	30	750 1.4	1,200	6,119	28	68%	7.1	0.90	6.4	0.089
199 TEIHSUM R	5020/12721	3	2.3	60	1700 1.1	1,100	5,382	17	65%	6.3	0.90	5.6	0.090
200 UNNAMED CR	5419/12824	8	1.2	91	850 0.7	900	4,085	10	60%	4.7	0.90	4.3	0.090
201 BEAR R	5607/12946	11	5.1	30	450 1.3	1,200	5,000	28	55%	5.8	0.90	5.2	0.090
202 CANTON CR	4949/12628	3	3.1	30	800 1.2	700	3,447	1.5	65%	4.0	0.90	3.6	0.090
203 UNNAMED CR	5526/12846	11	0.9	152	1050 0.59	1,100	4,179	16	50%	4.8	0.90	4.3	0.090
204 ARTLISH R	5008/12655	3	5.9	30	600 1.5	1,400	6,955	30	65%	8.0	0.90	7.2	0.091
205 LAKEVIEW CR	4909/12010	2	0.32	550	2900 0.41	1,400	4,818	20	45%	5.5	0.90	5.0	0.091
206 HOLLIDAY CR	5311/11953	7	1.8	91	1400 0.9	1,300	4,971	28	50%	5.7	0.90	5.1	0.091
207 TALA HAAT CR	5446/13004	9	3.1	30	300 1	700	3,523	5	65%	4.0	0.90	3.6	0.092
208 SAN JUAN R	4836/12359	3	2.3	50	750 0.97	900	3,558	18	51%	4.0	0.90	3.6	0.092
209 KILPALA R	5026/12703	3	4.1	60	1700 1.4	1,900	9,575	17	65%	10.8	0.90	9.7	0.092
210 GILLIS CR	5004/11642	1	1.8	120	1200 0.82	1,700	6,624	14	50%	7.4	0.90	6.7	0.093
211 CHAMPION CR	4914/11735	1	0.95	92	500 0.58	700	2,189	4	40%	2.5	0.90	2.2	0.093
212 CLYDE CR #2	5323/12022	7	1.1	91	900 0.68	800	3,134	16	50%	3.5	0.90	3.2	0.093
213 MCLEESE CR	5220/12217	5	0.3	150	1300 0.45	400	1,424	0	45%	1.6	0.90	1.4	0.094
214 CANTON CR WEST	4950/12628	3	2	30	300 0.86	500	2,587	4	65%	2.8	0.90	2.6	0.095
215 OKTWANCH R	4947/12615	3	1.6	30	400 0.83	400	2,072	0.9	65%	2.3	0.90	2.0	0.095
216 SEBALHALL CR	4947/12624	3	2.5	30	400 0.99	600	3,116	10	65%	3.4	0.90	3.1	0.095
217 UNNAMED CR	4919/12605	3	0.41	80	550 0.44	300	1,560	4.5	65%	1.7	0.90	1.5	0.095
218 OUOUKINSH R	5013/12725	3	0.92	120	1100 0.63	900	4,616	21	64%	5.0	0.90	4.5	0.095
219 MCLENNAN R	5250/11920	4	4.9	30	800 1.4	1,200	4,829	4	50%	5.3	0.90	4.7	0.096
220 HANKIN CR	5435/12826	8	1	91	950 0.67	700	3,406	1	60%	3.7	0.90	3.3	0.097
221 UNNAMED CR	5018/12712	3	1	90	600 0.62	700	3,749	27	65%	4.0	0.90	3.6	0.098
222 OUTLET CR	5020/11830	1	0.6	150	1400 0.54	700	2,607	3	45%	2.8	0.90	2.5	0.099
223 MCKALE R	5327/12012	7	1.1	183	1600 0.66	1,600	6,633	25	50%	7.0	0.90	6.3	0.099
224 PINKUT CR FALLS #1	5427/12527	8	6	31	400 N/A	1,500	5,351	30	43%	5.7	0.90	5.1	0.099
225 RALPH R	4938/12531	3	1.7	50	375 0.78	700	3,777	39	65%	4.0	0.90	3.6	0.099
226 UTSUN CR	5527/12735	11	0.74	122	1450 0.61	700	2,906	5	50%	3.1	0.90	2.8	0.099
227 KIMMEL CR	5243/11925	4	1.7	91	820 0.79	1,200	5,018	10	50%	5.3	0.90	4.7	0.100
228 WHITE CR	5051/11919	2	0.6	50	300 0.5	200	1,005	0	60%	1.1	0.90	0.9	0.100
229 PAVILION CR	5054/12146	2	0.15	350	2350 0.36	400	1,686	0	50%	1.8	0.90	1.6	0.100
230 BARR CR	4955/12647	3	3.5	30	400 1.1	800	4,426	10	65%	4.6	0.90	4.1	0.101
231 LUTES CR	4953/12646	3	1.5	60	450 0.74	700	3,878	14	65%	4.0	0.90	3.6	0.101
232 YOOWA CR	5004/12628	3	2.5	30	800 1.1	600	3,274	3	64%	3.4	0.90	3.0	0.102
233 HOISS CR	4942/12634	3	1.3	60	950 0.8	600	3,332	17	65%	3.4	0.90	3.1	0.102
234 ADOLPH CR #2	5231/11924	4	2.7	61	700 1	1,300	5,588	29	50%	5.7	0.90	5.1	0.102

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235 UNNAMED CR	5009/11638	1	0.46	240	1000 0.44	900	3,870	21	50%	3.9	0.90	3.5	0.102
236 UNNAMED CR	4918/12004	2	0.08	600	1300 0.2	400	1,380	1	40%	1.4	0.90	1.3	0.103
237 WARD CR	4947/12604	3	0.86	30	200 0.58	200	1,122	0.4	65%	1.1	0.90	1.0	0.103
238 VALLEAU CR	5144/12443	5	1.2	92	1050 0.73	900	3,556	25	45%	3.5	0.90	3.2	0.105
239 UNNAMED CR	5405/12830	8	1	61	950 0.73	500	2,635	5	60%	2.6	0.90	2.4	0.105
240 SOWSAP CR	5026/11846	1	0.42	200	2100 0.49	700	2,774	3.5	45%	2.8	0.90	2.5	0.105
241 JUNIPER CR	5507/12742	11	1.2	91	1550 0.79	900	4,777	8	60%	4.7	0.90	4.3	0.105
242 UNNAMED CR	4950/12538	3	0.9	50	375 0.61	400	2,304	14	65%	2.3	0.90	2.0	0.105
243 TAHSISH R	5016/12705	3	3.7	30	500 1.2	900	5,202	45	65%	5.1	0.90	4.6	0.106
244 STIKELAN CR #1	5128/12424	5	4.8	31	450 1.3	1,200	4,816	22	45%	4.7	0.90	4.3	0.106
245 SOMBRIO R	4831/12417	3	0.87	50	380 0.6	300	1,365	0.5	51%	1.3	0.90	1.2	0.106
246 WILLIS CR	4925/12025	2	0.6	150	1200 0.53	700	2,819	9	45%	2.8	0.90	2.5	0.107
247 UNNAMED CR	4957/12625	3	1.8	30	170 0.74	400	2,337	9	65%	2.3	0.90	2.0	0.107
248 DODJATIN CR	5753/13118	13	0.78	122	750 0.55	700	2,846	12	45%	2.8	0.90	2.5	0.108
249 SHULAPS CR	5056/12217	2	0.58	200	1550 0.52	900	4,244	30	52%	4.1	0.90	3.7	0.108
250 PAUL CR	4915/12001	2	0.67	120	400 0.47	600	2,190	1	40%	2.1	0.90	1.9	0.109
251 UNNAMED CR	4947/12644	3	1.5	60	1150 0.87	700	4,160	19	65%	4.0	0.90	3.6	0.109
252 WILSON CR	4939/12610	3	1.4	40	400 0.76	400	2,380	11	65%	2.3	0.90	2.0	0.109
253 MENHINICK CR	5049/11739	1	0.6	200	900 0.47	900	4,375	53	53%	4.2	0.90	3.8	0.109
254 INSECT CR	5503/12829	11	1.3	152	2550 0.81	1,500	8,257	13	60%	7.9	0.90	7.1	0.109
255 BLACKSTOCK CR	5540/12745	11	0.8	92	550 0.56	600	2,754	20	50%	2.6	0.90	2.4	0.109
256 UNNAMED CR	4939/12604	3	1.4	40	100 0.59	400	2,391	5	65%	2.3	0.90	2.0	0.109
257 UNNAMED CR	5020/12626	3	1.1	120	1000 0.67	1,000	5,929	23	64%	5.6	0.90	5.0	0.110
258 UNNAMED CR	5415/12846	8	0.7	122	800 0.54	700	3,900	21	60%	3.7	0.90	3.3	0.111
259 CLASSY CR	5801/13047	13	0.84	152	900 0.57	1,000	4,188	17	45%	3.9	0.90	3.5	0.111
260 CANTON CR EAST	4950/12628	3	1.1	30	150 0.61	300	1,816	4.4	65%	1.7	0.90	1.5	0.111
261 MURPHY CR	4910/11744	1	0.95	60	500 0.63	400	1,503	2.5	40%	1.4	0.90	1.3	0.112
262 RIOULX CR	5017/11805	1	0.9	200	2000 0.64	1,400	5,975	30	45%	5.5	0.90	5.0	0.113
263 CHIST CR #2	5419/12818	8	2.7	61	975 1	1,300	7,409	16	60%	6.8	0.90	6.1	0.113
264 BRUCE CR	5034/11615	1	2.4	50	400 0.88	900	4,446	12	52%	4.1	0.90	3.7	0.113
265 KASHULT CR	5012/12719	3	1.5	60	950 0.83	700	4,261	32	64%	3.9	0.90	3.5	0.113
266 TABOLT CR TRIB	4930/12606	3	1.5	40	250 0.71	500	3,117	28	65%	2.8	0.90	2.6	0.114
267 MAMAT CR	4959/12655	3	0.63	60	600 0.56	300	1,889	6	65%	1.7	0.90	1.5	0.115
268 DESERTERS CR	5249/12232	5	0.5	100	220 0.41	400	1,434	2	37%	1.3	0.90	1.2	0.115
269 QUARRIE CR	5016/11459	1	1.2	50	550 0.72	500	2,438	12	50%	2.2	0.90	2.0	0.116
270 LITTLE GLACIER CR	5026/11655	1	1.3	60	600 0.72	600	2,940	26	50%	2.6	0.90	2.4	0.117
271 LEGRAND	5325/12023	7	0.5	152	1150 0.49	600	2,947	22	50%	2.6	0.90	2.4	0.117
272 UNNAMED CR	5013/12605	3	0.9	55	900 0.69	400	2,527	13	64%	2.2	0.90	2.0	0.118
273 RED CR	4931/12023	2	0.28	260	1250 0.41	600	2,372	4	40%	2.1	0.90	1.9	0.118

TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
274 HOLT CR	5120/11710	4	0.8	92	1500 0.68	600	3,121	3	52%	2.7	0.90	2.5	0.119
275 OLDMAN CR	5129/11715	4	0.5	123	750 0.46	500	2,626	5	52%	2.3	0.90	2.0	0.120
276 UNNAMED CR	4952/12705	3	1.1	60	720 0.71	500	3,302	30	65%	2.8	0.90	2.6	0.121
277 HAANS CR SANDSPIT	5313/13153	9	1.5	62	1900 0.95	700	4,645	4	65%	4.0	0.90	3.6	0.122
278 CARRIGAN CR	5538/12745	11	0.72	91	650 0.55	500	2,576	16	50%	2.2	0.90	2.0	0.123
279 UNNAMED CR	5011/12524	3	0.8	100	1400 0.65	600	4,145	9	67%	3.5	0.90	3.2	0.123
280 KLINAKLINI CR	5152/12456	5	2.5	61	650 0.94	1,200	5,593	11	45%	4.7	0.90	4.3	0.123
281 DURUISEAU CR	4905/12021	2	0.29	250	1600 0.41	600	2,806	24	45%	2.4	0.90	2.1	0.124
282 UTLUH CR	5019/12725	3	1.5	60	920 0.84	700	4,740	10	65%	4.0	0.90	3.6	0.124
283 MIDGE CR	4922/11652	1	5.6	30	1000 1.6	1,300	7,472	33	55%	6.3	0.90	5.6	0.124
284 CIRQUE CR	5126/11706	4	0.4	123	700 0.44	400	2,181	2	52%	1.8	0.90	1.6	0.125
285 LUND CR	5510/12720	11	0.54	153	1000 0.49	600	3,172	16	50%	2.6	0.90	2.4	0.126
286 HARTZ CR	5803/13100	13	0.33	213	1600 0.45	600	2,933	9	45%	2.4	0.90	2.1	0.129
287 VAN HOUTEN CR	4940/11807	1	0.57	150	700 0.47	700	3,099	16	40%	2.5	0.90	2.2	0.132
288 CHRISTIAN CR	5024/11848	1	0.19	200	900 0.36	300	1,497	2	45%	1.2	0.90	1.1	0.132
289 SHAKAN CR	5016/12112	2	0.86	50	200 0.53	300	1,447	2	43%	1.1	0.90	1.0	0.134
290 FENWICK CR	5028/11537	1	2	50	650 0.91	800	4,495	40	50%	3.5	0.90	3.2	0.134
291 MALKSOPE R	5010/12722	3	1.1	60	1050 0.77	500	3,607	26	64%	2.8	0.90	2.5	0.134
292 SINCLAIR CR	5437/12730	8	0.7	100	1500 0.62	500	2,819	17	50%	2.2	0.90	2.0	0.134
293 EHATISAHT CR	4953/12651	3	1.5	60	800 0.82	700	5,155	17	65%	4.0	0.90	3.6	0.135
294 UNNAMED CR	5004/12611	3	0.8	90	1200 0.65	600	4,355	12	64%	3.4	0.90	3.0	0.135
295 BEN ABLE CR	5016/11609	1	0.63	180	1400 0.53	900	5,221	33	50%	3.9	0.90	3.5	0.138
296 TUGWELL CR	4825/12350	3	0.65	50	625 0.59	300	1,784	5	51%	1.3	0.90	1.2	0.139
297 YOUNG CR @ RAPIDS	5232/12554	5	1.2	61	900 0.78	600	4,201	20	60%	3.2	0.90	2.8	0.139
298 COPPERCROWN CR	5022/11621	1	0.3	183	1000 0.41	400	2,338	24	50%	1.8	0.90	1.6	0.139
299 FOURTH OF JULY CR	5940/13339	13	1.8	92	1600 0.92	1,300	4,578	8	30%	3.4	0.90	3.1	0.140
300 HOLSTEIN CR	5018/11835	1	0.29	150	1200 0.41	300	1,605	1	45%	1.2	0.90	1.1	0.142
301 UNNAMED CR	4959/11600	1	0.16	560	1550 0.31	700	3,334	33	40%	2.5	0.90	2.2	0.142
302 UNNAMED CR	4917/12610	3	0.84	40	600 0.67	300	2,333	6.5	65%	1.7	0.90	1.5	0.142
303 PEGGATTEM CR	5038/12759	3	1.5	30	550 0.87	400	3,282	29	68%	2.4	0.90	2.1	0.144
304 HECTATE LAKE	4953/12647	3	1.1	30	500 0.76	300	2,359	16	65%	1.7	0.90	1.5	0.144
305 STOCKDALE CR	5035/11635	1	2.6	50	700 1	1,000	6,299	38	52%	4.6	0.90	4.1	0.144
306 CHESHI CR	5128/12422	5	0.8	92	450 0.54	600	3,283	22	45%	2.4	0.90	2.1	0.145
307 FAIRY CR	4836/12420	3	0.55	50	125 0.44	200	1,254	5.5	51%	0.9	0.90	0.8	0.146
308 MOOYAH R	4937/12625	3	1.7	40	900 0.95	500	3,997	32	65%	2.8	0.90	2.6	0.146
309 NINE MILE CR	5759/13102	13	0.2	213	950 0.36	300	1,667	13	45%	1.2	0.90	1.1	0.147
310 MAYDOE CR	5208/12516	5	0.7	213	3250 0.62	1,200	8,909	35	60%	6.3	0.90	5.7	0.147
311 CIRIACO CR	4956/12649	3	0.49	90	550 0.46	300	2,422	8	65%	1.7	0.90	1.5	0.148
312 HIDDEN CR	4914/11710	1	1.5	30	250 0.75	400	2,005	5	40%	1.4	0.90	1.3	0.149

TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
313 RELIANCE CR	5123/12441	5	1.7	92	350 0.68	1,200	7,525	50	50%	5.3	0.90	4.7	0.149
314 HESQUIAT PT CR	4925/12623	3	1.5	40	700 0.87	500	4,112	38	65%	2.8	0.90	2.6	0.151
315 CHIST CR #1	5419/12824	8	3.4	31	700 1.2	800	6,111	13	60%	4.2	0.90	3.8	0.152
316 MEEHAUS CR	5805/13043	13	0.97	92	670 0.62	700	4,044	20	45%	2.8	0.90	2.5	0.153
317 HOWSON CR	5433/12721	8	2	50	700 0.91	800	5,159	28	50%	3.5	0.90	3.2	0.154
318 PETERSON CR	5112/12010	4	0.3	100	300 0.36	200	1,118	3	43%	0.8	0.90	0.7	0.155
319 MABLE CR	5037/11836	1	0.22	250	800 0.36	400	2,447	11	47%	1.6	0.90	1.5	0.155
320 KENDRICK CR	4944/12639	3	1.6	30	620 0.91	400	3,435	23	65%	2.3	0.90	2.0	0.157
321 MATCHLEE CR	4939/12603	3	1.4	40	100 0.59	400	3,444	11	65%	2.3	0.90	2.0	0.158
322 JAMISON CR	5132/12426	5	0.4	396	3400 0.47	1,200	7,231	15	45%	4.7	0.90	4.3	0.159
323 STEWART CR	4907/11815	1	0.19	250	1050 0.31	400	2,198	8	40%	1.4	0.90	1.3	0.164
324 GOATSKIN CR	4943/11839	1	1.2	100	1000 0.71	900	6,270	60	50%	3.9	0.90	3.5	0.166
325 UNNAMED CR	5308/13153	9	1.3	30	600 0.84	300	2,961	11	70%	1.8	0.90	1.7	0.168
326 UNNAMED CR	4917/12610	3	0.79	40	375 0.6	200	1,933	6.5	67%	1.2	0.90	1.1	0.172
327 UNNAMED CR	4905/12043	2	0.18	150	825 0.36	200	1,477	11	50%	0.9	0.90	0.8	0.176
328 ARTHURS CR	4941/11843	1	0.4	280	2000 0.44	900	5,377	50	40%	3.2	0.90	2.8	0.178
329 UNNAMED CR	5008/12711	3	2.3	30	500 0.99	500	4,799	38	64%	2.8	0.90	2.5	0.179
330 MARBLE R	5016/12720	3	0.93	60	900 0.7	400	3,925	17	65%	2.3	0.90	2.0	0.180
331 EAST CR	5042/11653	1	2.9	50	500 0.99	1,100	8,637	72	52%	5.0	0.90	4.5	0.180
332 AZURE R #2	5232/11947	4	8	30	900 1.8	1,900	14,497	60	50%	8.3	0.90	7.5	0.182
333 LINCOLN CR	5141/12424	5	0.1	213	1500 0.31	200	1,381	2	45%	0.8	0.90	0.7	0.183
334 AZURE R #1	5235/11948	4	3.4	61	800 1.1	1,600	12,326	60	50%	7.0	0.90	6.3	0.183
335 NARROWGUT CR	5000/12707	3	1.8	30	400 0.87	400	4,057	27	65%	2.3	0.90	2.0	0.186
336 MCCLINCHY CR	5207/12510	5	3.1	30	800 1.2	700	6,604	33	60%	3.7	0.90	3.3	0.187
337 UNNAMED CR	4923/12604	3	0.77	40	300 0.57	200	2,110	17	65%	1.1	0.90	1.0	0.193
338 FELLOWS CR	4840/12353	3	0.45	50	250 0.44	200	1,710	15	51%	0.9	0.90	0.8	0.200
339 UNNAMED CR	4952/12650	3	1	30	350 0.69	200	2,210	19	65%	1.1	0.90	1.0	0.202
340 HITCHCOCK CR	5955/13348	13	1.8	62	1025 0.9	900	4,639	40	30%	2.4	0.90	2.1	0.205
341 TLELL R	5322/13200	9	2.2	30	600 1	500	5,598	14	65%	2.8	0.90	2.6	0.205
342 ASSINIBOINE CR	5048/11540	1	0.53	240	1500 0.48	1,000	8,881	47	50%	4.4	0.90	3.9	0.211
343 BOUNDING CR	5328/12039	7	0.5	92	800 0.52	400	3,686	37	50%	1.8	0.90	1.6	0.219
344 DOG CR	4924/11807	1	1.3	50	400 0.71	500	3,687	35	40%	1.8	0.90	1.6	0.219
345 UNNAMED CR	5155/12444	5	0.5	61	750 0.53	200	1,487	1	40%	0.7	0.90	0.6	0.221
346 MEGIN R TRIBUTARY	4932/12601	3	1.3	40	275 0.69	400	5,087	47	65%	2.3	0.90	2.0	0.233
347 UNNAMED CR	4927/12605	3	0.57	40	220 0.48	200	2,562	30	65%	1.1	0.90	1.0	0.235
348 EIGHT MILE CR	5758/13105	13	0.27	91	150 0.31	200	1,813	10	45%	0.8	0.90	0.7	0.240
349 UNNAMED CR	4923/12607	3	0.41	40	400 0.48	100	1,867	13	65%	0.6	0.90	0.5	0.342
350 SKULL CR	5109/12013	4	0.18	100	250 0.3	100	1,260	7	43%	0.4	0.90	0.3	0.349
351 UNNAMED CR	4955/12648	3	0.49	30	90 0.44	100	2,153	9	65%	0.6	0.90	0.5	0.394

**TABLE 4.1a Inventory of Small Hydro Sites (less than 2MW)**

Stream Name No. <i>SORTED: by cost</i>	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
352 UNNAMED CR	4921/12601	3	0.37	40	250 0.44	100	2,210	16	65%	0.6	0.90	0.5	0.405
353 UNNAMED CR	4924/12617	3	0.38	40	150 0.41	100	2,242	29	65%	0.6	0.90	0.5	0.411

TABLE 4.2 Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
1 ASHER CR	5036/11729	1	3.4	150	2100 1.1	4,000	12,181	54	53%	18.6	0.90	16.7	0.068
2 BEATRICE CR	4950/11728	1	4.1	165	750 0.98	5,300	8,363	7	45%	20.9	0.90	18.8	0.042
3 BEATTON CR	5044/11744	1	2.8	150	2000 1	3,300	8,615	50	63%	18.2	0.90	16.4	0.049
4 BERNARD CR	4952/11651	1	1.7	180	1200 0.75	2,400	5,323	20	45%	9.5	0.90	8.5	0.059
5 BOYD CR	5053/11734	1	2.2	250	1800 0.84	4,300	11,870	64	53%	20.0	0.90	18.0	0.062
6 BRENNER CR	5013/11730	1	3.5	120	1900 1.2	3,300	8,919	26	47%	13.6	0.90	12.2	0.068
7 CAMPBELL CR	4957/11651	1	2.7	240	2400 0.97	5,100	12,247	28	45%	20.1	0.90	18.1	0.064
8 CARIBOU CR	4959/11750	1	6.1	120	1350 1.3	5,700	9,142	2.5	45%	22.5	0.90	20.2	0.042
9 CASCADE CR	5025/11707	1	1.9	180	1800 0.84	2,700	5,275	14.5	57%	13.5	0.90	12.1	0.041
10 CLINT CR	5013/11654	1	2.4	243	2000 0.89	4,600	7,684	1	50%	20.1	0.90	18.1	0.040
11 CLUTE CR	5001/11653	1	0.81	609	3200 0.55	3,900	9,017	8	50%	17.1	0.90	15.4	0.055
12 COCHRANE CR	4940/11844	1	0.53	500	2600 0.47	2,100	6,863	45	40%	7.4	0.90	6.6	0.097
13 COOKE CR	5037/11850	1	1.9	200	2100 0.86	3,000	5,521	0.5	45%	11.8	0.90	10.6	0.049
14 COOPER CR	5012/11659	1	4.6	183	5100 1.4	6,600	21,728	1.5	47%	27.2	0.90	24.5	0.083
15 CRAWFORD CR	5045/11759	1	1.1	250	1300 0.61	2,200	4,207	21	53%	10.2	0.90	9.2	0.043
16 CULTUS CR	4920/11647	1	3.9	123	1800 1.2	3,800	8,525	27	55%	18.3	0.90	16.5	0.049
17 DERRY CR	5046/11833	1	1.3	300	2350 0.71	3,100	6,130	22	45%	12.2	0.90	11.0	0.052
18 DIORITE CR	4958/11540	1	1.3	490	4100 0.72	5,000	12,906	2	40%	17.5	0.90	15.8	0.077
19 EAST CR #1	5039/11702	1	7	50	500 1.4	2,700	6,667	42	53%	12.5	0.90	11.3	0.055
20 EAST CR #2	5039/11701	1	7	100	1150 1.4	5,500	11,726	45	53%	25.5	0.90	23.0	0.048
21 FITZSTUBBS CR	5009/11722	1	11	60	2000 2.1	5,200	13,741	13	47%	21.4	0.90	19.3	0.067
22 FOSTHALL CR	5022/11757	1	8.8	60	225 1.3	4,100	7,197	34	47%	16.9	0.90	15.2	0.044
23 GIEGERICH CR	5043/11707	1	4.6	100	1100 1.2	3,600	8,970	55	53%	16.7	0.90	15.0	0.056
24 GWILLIM CR	4945/11728	1	2.4	240	1100 0.8	4,500	5,597	1	45%	17.7	0.90	16.0	0.033
25 HADOW CR	5040/11748	1	1.4	400	950 0.59	4,400	7,831	41	53%	20.4	0.90	18.4	0.040
26 HALFWAY HOTSPRINGS	5029/11751	1	13	60	1300 2	6,100	12,510	22	47%	25.1	0.90	22.6	0.052
27 HELLROARER CR	4935/11845	1	0.71	400	1750 0.5	2,200	5,459	30	40%	7.7	0.90	6.9	0.074
28 KELLIE CR	5055/11734	1	1.8	250	1150 0.71	3,500	10,099	65	53%	16.2	0.90	14.6	0.065
29 LAIDLAW CR	5052/11714	1	2.2	150	1400 0.88	2,600	8,083	73	53%	12.1	0.90	10.9	0.070
30 LASCA CR	4936/11709	1	1.5	300	2100 0.72	3,500	5,460	1	45%	13.8	0.90	12.4	0.041
31 LATEWHOS CR	5027/11843	1	0.65	450	2600 0.51	2,300	4,224	8	45%	9.1	0.90	8.2	0.049
32 LOKI CR	4950/11651	1	0.87	430	2400 0.57	2,900	6,278	14	45%	11.4	0.90	10.3	0.057
33 MCDONALD CR	5034/11625	1	1.8	250	1100 0.71	3,500	6,652	36	52%	15.9	0.90	14.3	0.044
34 MCDOUGAL CR	5058/11737	1	3.4	150	850 0.95	4,000	12,334	80	53%	18.6	0.90	16.7	0.069
35 MULVEHILL CR	5051/11807	1	1.9	150	550 0.7	2,200	3,515	17	45%	8.7	0.90	7.8	0.042
36 NEXT CR	4918/11645	1	3.6	120	1100 1.1	3,400	6,093	25	55%	16.4	0.90	14.7	0.039
37 POPLAR CR	5026/11708	1	4.2	120	2700 1.3	3,900	10,575	17	47%	16.1	0.90	14.5	0.069
38 POWDER CR	4953/11651	1	1.4	370	2500 0.7	4,100	8,458	23	45%	16.2	0.90	14.5	0.055
39 RAPID CR	5027/11710	1	1.2	300	2400 0.67	2,800	6,196	21	47%	11.5	0.90	10.4	0.056

TABLE 4.2 Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
40 SANCA CR	4923/11643	1	2.3	120	1000 0.88	2,200	4,973	25	55%	10.6	0.90	9.5	0.049
41 SHANNON CR	5005/11729	1	1.5	180	1700 0.76	2,100	3,696	2	47%	8.6	0.90	7.8	0.045
42 SHAW CR	4915/11643	1	1.1	240	1000 0.59	2,100	3,879	21	55%	10.1	0.90	9.1	0.040
43 SICAMOUS CR	5048/11858	1	1.6	200	1400 0.74	2,500	3,599	0	45%	9.9	0.90	8.9	0.038
44 SOUTH CRANBERRY CR	5046/11806	1	2.7	200	900 0.83	4,200	6,476	29	52%	19.1	0.90	17.2	0.035
45 TAM O'SHANTER CR	4948/11651	1	0.96	490	3000 0.6	3,700	7,529	10	45%	14.6	0.90	13.1	0.054
46 TENDERFOOT CR	5028/11713	1	1.5	240	2500 0.78	2,800	6,753	28	47%	11.5	0.90	10.4	0.061
47 TSUIUS CR	5037/11840	1	5	150	1650 1.2	5,900	9,968	7	47%	24.3	0.90	21.9	0.043
48 UNNAMED CR	5057/11824	1	1.2	300	1100 0.59	2,800	3,796	6	45%	11.0	0.90	9.9	0.036
49 UNNAMED CR	5059/11645	1	0.72	400	1100 0.47	2,300	4,760	34	52%	10.5	0.90	9.4	0.047
50 VOWELL CR	5053/11652	1	5.9	50	800 1.4	2,300	8,743	50	52%	10.5	0.90	9.4	0.087
51 WARREN CR	5058/11642	1	1.4	550	3400 0.69	6,000	14,891	30	52%	27.3	0.90	24.6	0.057
52 WEE SANDY CR	5000/11725	1	1.8	180	900 0.72	2,500	4,430	10	47%	10.3	0.90	9.3	0.045
53 WILSON CR	4935/11652	1	0.58	609	2700 0.47	2,800	5,547	12	55%	13.5	0.90	12.1	0.043
54 WILSON CR FALLS	5008/11720	1	9.2	60	550 1.5	4,300	7,809	11	47%	17.7	0.90	15.9	0.046
55 WOODBURY CR	4948/11657	1	1.9	300	3900 0.9	4,500	11,461	6	55%	21.7	0.90	19.5	0.055
56 WRAGGE CR	5004/11728	1	1.1	244	1800 0.66	2,100	4,747	2	45%	8.3	0.90	7.5	0.060
57 YARD CR	5054/11848	1	3.1	150	1550 1	3,600	5,767	0	45%	14.2	0.90	12.8	0.042
58 AIRPLANE CR	4908/12137	2	0.9	300	1400 0.56	2,100	4,646	7	63%	11.6	0.90	10.4	0.042
59 BEAR CR	4928/12146	2	1.6	365	2100 0.71	4,600	7,836	20	60%	24.2	0.90	21.8	0.034
60 BIRKENHEAD R #1	5020/12243	2	23	30	200 2	5,400	9,715	1	63%	29.8	0.90	26.8	0.034
61 BOX CANYON CR	4935/12324	2	0.76	400	1400 0.5	2,400	3,332	2	55%	11.6	0.90	10.4	0.030
62 CANTELON/YOLA CR	4913/12123	2	3	105	2000 1.1	2,500	7,135	22	63%	13.8	0.90	12.4	0.054
63 CAYOOSH CR #2	5039/12159	2	21	30	800 2.5	4,900	11,734	4	53%	22.7	0.90	20.5	0.054
64 CHICKWAT CR	4949/12343	2	3.7	180	1050 0.98	5,200	7,982	27	55%	25.1	0.90	22.5	0.033
65 CLOWHOM R	4951/12327	2	3.6	120	1000 1	3,400	9,079	25	55%	16.4	0.90	14.7	0.058
66 CLOWHOM R	4949/12323	2	7.8	60	400 1.3	3,700	7,430	19	55%	17.8	0.90	16.0	0.043
67 CLOWHOM R	4950/12329	2	1.7	320	600 0.6	4,300	9,249	27	55%	20.7	0.90	18.6	0.047
68 COGBURN CR	4933/12145	2	5.9	100	1050 1.3	4,600	8,160	35	60%	24.2	0.90	21.8	0.035
69 CONNEL CR	5039/12225	2	0.65	950	3800 0.48	4,800	11,068	0.5	52%	21.9	0.90	19.7	0.053
70 FISH HATCHERY CR	4936/12238	2	1.1	670	1600 0.53	5,800	9,834	50	55%	27.9	0.90	25.1	0.037
71 FRIES CR	4945/12309	2	1.6	180	1100 0.72	2,300	4,017	3	55%	11.1	0.90	10.0	0.038
72 FURRY CR	4935/12313	2	3.6	230	1600 1	6,500	9,858	6	57%	32.5	0.90	29.2	0.032
73 GOLD CR	4921/12227	2	5.3	50	250 1.1	2,100	4,675	16	55%	10.1	0.90	9.1	0.048
74 GREY CR	4932/12345	2	3.6	95	700 1	2,700	4,705	8	55%	13.0	0.90	11.7	0.038
75 HIGH CR	4955/12352	2	2.2	210	1000 0.77	3,600	5,907	21	55%	17.3	0.90	15.6	0.036
76 JOFFRE CR	4918/12235	2	3.8	190	900 0.96	5,700	7,136	10	57%	28.5	0.90	25.6	0.026
77 LAKE LOVELY WATER	4948/12313	2	0.75	1100	3400 0.48	6,500	14,771	9	60%	34.2	0.90	30.7	0.045
78 LIZZIE CR	5012/12228	2	3.5	230	2000 1	6,300	11,273	11	57%	31.5	0.90	28.3	0.037

TABLE 4.2 Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
79 LOST VALLEY CR	5040/12218	2	0.94	350	1050 0.52	2,600	4,282	6	52%	11.8	0.90	10.7	0.038
80 LYNN CR	4921/12301	2	4	75	1800 1.3	2,300	4,755	0	55%	11.1	0.90	10.0	0.045
81 MASELPANIK CR	4907/12115	2	2.3	300	2500 0.88	5,400	11,741	37	63%	29.8	0.90	26.8	0.041
82 MAWBY CR	4953/12318	2	0.65	580	1150 0.44	3,000	4,999	2	55%	14.5	0.90	13.0	0.036
83 MCGILLIVARY CR	5037/12226	2	1.2	350	1300 0.59	3,300	4,687	1	52%	15.0	0.90	13.5	0.033
84 MCNAIR CR	4931/12330	2	2.1	180	1600 0.86	3,000	5,470	1	55%	14.5	0.90	13.0	0.039
85 MCNULTY CR	4925/12005	2	1.3	250	1900 0.69	2,500	5,875	10	40%	8.8	0.90	7.9	0.070
86 MONMOUTH CR	4943/12311	2	0.59	470	1000 0.44	2,200	4,010	3	55%	10.6	0.90	9.5	0.039
87 NICOAMEN CR	5016/12124	2	1.5	200	600 0.36	2,300	3,613	10	50%	10.1	0.90	9.1	0.037
88 OWL CR	5022/12244	2	2.2	150	900 0.81	2,600	4,323	1	62%	14.1	0.90	12.7	0.032
89 PERKETTS CR	4953/12352	2	1.9	340	1000 0.68	5,100	6,979	15	55%	24.6	0.90	22.1	0.030
90 RAINY R	4932/12330	2	7	60	800 1.5	3,300	6,541	3	55%	15.9	0.90	14.3	0.043
91 RED TUSK CR	4947/12325	2	2.6	180	1400 0.9	3,700	6,977	13	55%	17.8	0.90	16.0	0.041
92 ROARING CR	4927/12213	2	1.4	200	900 0.65	2,200	4,538	25	55%	10.6	0.90	9.5	0.045
93 SCUZZZY CR	4949/12128	2	7.9	70	1100 1.6	4,300	8,268	3	47%	17.7	0.90	15.9	0.049
94 SIWASH CR	4934/12124	2	3	200	600 0.81	4,700	8,989	12	50%	20.6	0.90	18.5	0.046
95 SOWERBY CR	4919/12126	2	1.4	425	3400 0.71	4,700	10,653	7	63%	25.9	0.90	23.3	0.043
96 SPUZZUM CR	4939/12126	2	7.5	50	500 1.4	2,900	5,390	2	60%	15.2	0.90	13.7	0.037
97 STAWAMUS CR	4942/12307	2	2.8	274	2650 0.97	6,000	11,029	3	55%	28.9	0.90	26.0	0.040
98 TANTALUS CR	4951/12315	2	0.9	762	3000 0.45	5,400	10,436	2	55%	26.0	0.90	23.4	0.042
99 TEXAS CR	5034/12149	2	2.6	150	900 0.86	3,100	4,667	18	50%	13.6	0.90	12.2	0.036
100 THOMAS LAKE	4936/12225	2	1.1	520	1700 0.57	4,500	7,704	50	60%	23.7	0.90	21.3	0.034
101 THORNHILL CR	4940/12336	2	1.2	459	1250 0.57	4,300	6,065	0	55%	20.7	0.90	18.6	0.031
102 TIPELLA CR	4945/12210	2	4.9	90	300 0.99	3,500	4,510	0	55%	16.9	0.90	15.2	0.028
103 TOMMY CR	5050/12231	2	1.2	300	1800 0.64	2,800	5,074	20	52%	12.8	0.90	11.5	0.041
104 TSILEUH CR	4946/12126	2	0.87	700	3900 0.57	4,800	9,842	5	47%	19.8	0.90	17.8	0.052
105 TWENTYONE MILE CR	5007/12259	2	2.2	185	1000 0.8	3,200	4,965	1.5	60%	16.8	0.90	15.1	0.031
106 TZOONIE CR	4947/12343	2	11	30	320 1.7	2,600	7,003	23	55%	12.5	0.90	11.3	0.058
107 UNNAMED CR	4949/12323	2	0.38	793	1150 0.36	2,400	4,757	17	55%	11.6	0.90	10.4	0.043
108 UNNAMED CR	4945/12343	2	1.5	214	600 0.62	2,500	3,866	18	55%	12.0	0.90	10.8	0.033
109 UNNAMED CR	4940/12151	2	0.65	540	2000 0.47	2,700	7,578	55	60%	14.2	0.90	12.8	0.056
110 UNNAMED CR	4943/12345	2	1	427	1200 0.54	3,300	4,816	17	55%	15.9	0.90	14.3	0.032
111 UNNAMED CR	4945/12327	2	0.88	550	1100 0.48	3,800	4,966	11	55%	18.3	0.90	16.5	0.028
112 UNNAMED CR	5001/12321	2	1.8	275	700 0.64	3,900	7,158	15	55%	18.8	0.90	16.9	0.040
113 UNNAMED CR	4955/12348	2	0.88	579	3000 0.56	4,000	7,884	25	55%	19.3	0.90	17.3	0.043
114 UNNAMED CR	4957/12150	2	2.3	250	1500 0.83	4,500	8,500	28	47%	18.5	0.90	16.7	0.048
115 UNNAMED CR	4950/12131	2	2	300	2200 0.82	4,700	8,972	9	47%	19.4	0.90	17.4	0.048
116 UNNAMED CR	4948/12324	2	0.8	793	2700 0.49	5,000	10,111	15	55%	24.1	0.90	21.7	0.044
117 UNNAMED CR	4947/12334	2	1.4	457	1200 0.6	5,000	9,471	17	55%	24.1	0.90	21.7	0.041

TABLE 4.2 Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
118 UNNAMED CR	4945/12331	2	5.5	122	350 1	5,300	5,633	6	55%	25.5	0.90	23.0	0.023
119 UNNAMED CR	4909/12120	2	1.2	243	2100 0.69	2,300	6,593	30	63%	12.7	0.90	11.4	0.054
120 UNNAMED CR	4946/12326	2	0.62	458	1100 0.45	2,200	3,955	14	55%	10.6	0.90	9.5	0.039
121 VANCOUVER CR	4956/12348	2	8.1	60	900 1.6	3,800	8,393	25	55%	18.3	0.90	16.5	0.048
122 WEDGE CR	5010/12254	2	3.6	215	1500 1	6,100	9,166	2	60%	32.1	0.90	28.9	0.030
123 BONANZA R	5020/12644	3	4.4	60	1400 1.4	2,100	5,554	0.8	68%	12.5	0.90	11.3	0.046
124 BROWNS R# 1	4941/12509	3	5.9	50	400 1.2	2,300	4,041	2.1	65%	13.1	0.90	11.8	0.032
125 BROWNS R# 2	4942/12508	3	6.4	50	750 1.4	2,500	5,133	2	65%	14.2	0.90	12.8	0.038
126 CAMERON R	4915/12440	3	6.2	50	250 1.2	2,400	4,339	9	55%	11.6	0.90	10.4	0.039
127 CATHERINE CR	5025/12636	3	3	90	1100 1	2,100	7,563	19	68%	12.5	0.90	11.3	0.063
128 CERVUS CR @ LADY F	4951/12547	3	5.5	100	380 1.1	4,300	5,121	1.6	65%	24.5	0.90	22.0	0.022
129 CRUICKSHANK CR	4936/12515	3	5.4	150	2000 1.3	6,300	11,809	18	65%	35.9	0.90	32.3	0.034
130 ENGLISHMAN CR	4915/12421	3	10	50	1630 2	3,900	10,074	2.3	55%	18.8	0.90	16.9	0.056
131 GOLD R	4952/12606	3	20	30	900 2.5	4,700	11,664	4.4	65%	26.8	0.90	24.1	0.045
132 HANDY CR	4900/12456	3	3.8	100	310 0.89	3,000	4,771	29	62%	16.3	0.90	14.7	0.031
133 KAIPIT CR	5015/12648	3	9.7	60	700 1.6	4,600	7,655	6	65%	26.2	0.90	23.6	0.030
134 KOKISH R	5028/12648	3	5.5	60	1400 1.5	2,600	6,523	2.8	68%	15.5	0.90	13.9	0.044
135 KOKISH R	5029/12650	3	17	30	950 2.4	4,000	10,132	0.7	68%	23.8	0.90	21.4	0.044
136 KOKISH R	5027/12647	3	5.2	127	1900 1.3	5,200	9,964	3	68%	31.0	0.90	27.9	0.034
137 KUNNUM CR	5018/12614	3	2.9	91	2050 1.2	2,100	7,513	27	64%	11.8	0.90	10.6	0.067
138 MAQUILLA CR	5005/12625	3	3.4	90	1650 1.2	2,400	5,649	0.8	64%	13.5	0.90	12.1	0.044
139 MARBLE R CANYON	5026/12723	3	11	33	1700 2.2	2,800	11,136	5	70%	17.2	0.90	15.5	0.068
140 MAYNARD L	5024/12714	3	9.1	64	550 1.5	4,600	7,582	18	65%	26.2	0.90	23.6	0.030
141 MOAKWA CR	5007/12602	3	3.1	90	1250 1.1	2,200	6,124	22	64%	12.3	0.90	11.1	0.052
142 MONTAGUE CR	5020/12612	3	2.2	152	1500 0.9	2,600	6,625	22	64%	14.6	0.90	13.1	0.047
143 MYRA CR AT FALLS	4935/12534	3	5.3	50	1200 1.5	2,100	7,919	40	65%	12.0	0.90	10.8	0.069
144 PHILLIPS CR	4940/12534	3	8	50	500 1.5	3,100	9,749	27	65%	17.7	0.90	15.9	0.058
145 PIGGOTT CR	4949/12522	3	5.3	50	250 1.1	2,100	4,308	14	65%	12.0	0.90	10.8	0.038
146 PINDER CR	5015/12655	3	3	90	2100 1.2	2,100	6,444	16	65%	12.0	0.90	10.8	0.056
147 ROSEWALL C	4927/12448	3	2.9	100	630 0.91	2,300	3,368	1	62%	12.5	0.90	11.2	0.028
148 SALMON R	5005/12641	3	7.5	50	700 1.5	2,900	7,049	19	67%	17.0	0.90	15.3	0.043
149 SAUNDERS CR	4948/12601	3	3.1	90	1200 1.1	2,200	4,459	2	65%	12.5	0.90	11.3	0.037
150 SOUTH ENGLISHMAN R	4915/12417	3	4.6	100	2000 1.3	3,600	9,037	5	55%	17.3	0.90	15.6	0.054
151 THELWOOD CR	4933/12534	3	2.9	100	1000 1	2,300	5,314	41	65%	13.1	0.90	11.8	0.042
152 TLATLOS CR	5023/12614	3	2.1	182	2275 0.92	3,000	8,577	26	64%	16.8	0.90	15.1	0.053
153 TLUPANA R	4946/12620	3	2.9	90	1850 1.1	2,000	6,004	2	65%	11.4	0.90	10.2	0.055
154 TSABLE R	4931/12454	3	6.8	50	500 1.4	2,700	4,626	4	65%	15.4	0.90	13.8	0.031
155 UCONA R	4944/12557	3	6.6	50	200 1.1	2,600	4,771	10	65%	14.8	0.90	13.3	0.034
156 UNNAMED CR	4946/12541	3	2.5	200	1060 0.83	3,900	9,138	20	65%	22.2	0.90	20.0	0.043

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Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
157 ZEBALLOS (LITTLE) R	4959/12645	3	1.5	210	750 0.64	2,500	3,385	6	65%	14.2	0.90	12.8	0.025
158 ZEBALLOS L	5003/12646	3	5.4	90	1250 1.3	3,800	8,202	10	65%	21.6	0.90	19.5	0.040
159 ZEBALLOS R	5003/12647	3	5.6	60	800 1.3	2,600	5,458	10	65%	14.8	0.90	13.3	0.038
160 ADOLPH CR #1	5231/11923	4	2.8	213	3400 1.1	4,700	15,390	29	50%	20.6	0.90	18.5	0.078
161 ALLAN CR	5232/11907	4	4.3	91	1900 1.3	3,100	7,643	12	50%	13.6	0.90	12.2	0.059
162 BULLDOG CR	5239/11859	4	3.6	152	875 0.97	4,300	10,910	26	50%	18.8	0.90	17.0	0.060
163 CLEMINA CR	5234/11905	4	2.5	152	1300 0.9	3,000	5,458	10	50%	13.1	0.90	11.8	0.043
164 DAVE HENRY CR #2	5245/11905	4	3.5	91	550 0.97	2,500	5,156	11	50%	11.0	0.90	9.9	0.049
165 GHITA CR	5251/11839	4	2.7	306	2750 0.94	6,500	15,392	31	50%	28.5	0.90	25.6	0.056
166 GRANT BROOK	5254/11845	4	3.9	152	1500 1.1	4,600	9,248	21	50%	20.1	0.90	18.1	0.048
167 MCLENNAN R @ S.ARM	5251/11921	4	1.4	244	1450 0.69	2,700	5,270	6	50%	11.8	0.90	10.6	0.046
168 PTARMIGAN CR	5235/11850	4	9.5	61	1600 1.8	4,500	13,136	40	50%	19.7	0.90	17.7	0.070
169 SWIFT CR #1	5252/11913	4	3.3	91	1325 1.1	2,400	6,178	5	50%	10.5	0.90	9.5	0.061
170 UNNAMED CR	5254/11846	4	2.5	152	520 0.77	3,000	4,968	24	50%	13.1	0.90	11.8	0.039
171 UNNAMED CR	5255/11853	4	2.6	184	330 0.71	3,700	5,373	11	50%	16.2	0.90	14.6	0.035
172 JANET CR	5223/12552	5	1	610	1950 0.53	4,800	9,015	32	65%	27.3	0.90	24.6	0.034
173 MOSHER CR	5225/12558	5	1.1	457	2400 0.6	3,900	8,222	32	65%	22.2	0.90	20.0	0.039
174 STIKELAN CR #2	5127/12422	5	3.3	91	900 1	2,400	6,732	25	45%	9.5	0.90	8.5	0.074
175 UNNAMED CR	5126/12445	5	1.1	336	1350 0.58	2,900	13,355	60	50%	12.7	0.90	11.4	0.110
176 CACOOHTIN CR	5226/12619	6	1.7	214	1200 0.73	2,800	4,962	2	65%	15.9	0.90	14.3	0.032
177 CLAYTON FALLS CR	5222/12649	6	6.6	61	700 1.4	3,200	6,180	0	65%	18.2	0.90	16.4	0.035
178 MILL CR	5224/12634	6	1.1	638	2200 0.56	5,500	7,841	1.5	65%	31.3	0.90	28.2	0.026
179 NOOKLIKONNIK CR	5222/12634	6	1.7	366	2400 0.75	4,900	9,145	2	65%	27.9	0.90	25.1	0.034
180 NOOMST CR #1	5223/12615	6	1.3	427	2950 0.69	4,300	9,226	7	65%	24.5	0.90	22.0	0.039
181 NORDSCHOW CR	5218/12603	6	2.9	183	1500 0.95	4,200	9,878	20	65%	23.9	0.90	21.5	0.043
182 SALLOOMT CR	5227/12632	6	8.6	31	850 1.8	2,100	7,114	7	65%	12.0	0.90	10.8	0.062
183 SMITELY R @ FALLS	5205/12636	6	18.6	31	450 2.1	4,500	11,693	56	65%	25.6	0.90	23.1	0.048
184 SNOOTLI CR	5223/12636	6	2.2	152	1250 0.86	2,600	4,627	0.5	65%	14.8	0.90	13.3	0.033
185 THORSEN CR	5221/12642	6	6.1	80	1550 1.5	3,800	7,739	1	65%	21.6	0.90	19.5	0.037
186 TSEAPSEAHOOZ CR	5226/12624	6	1.3	274	1900 0.68	2,800	5,722	0.5	65%	15.9	0.90	14.3	0.037
187 UNNAMED CR	5221/12640	6	0.4	1036	2700 0.41	3,200	6,848	0.5	65%	18.2	0.90	16.4	0.039
188 UNNAMED CR	5210/12650	6	3.2	152	1050 0.96	3,800	7,179	31	65%	21.6	0.90	19.5	0.035
189 DORE CR #1	5316/12017	7	6.8	92	1600 1.5	4,900	9,958	13	50%	21.5	0.90	19.3	0.048
190 DORE CR #2	5313/12017	7	5.2	91	1500 1.4	3,700	8,963	17	50%	16.2	0.90	14.6	0.058
191 HORSEY CR	5308/11941	7	5.9	122	2050 1.4	5,600	12,878	14	50%	24.5	0.90	22.1	0.055
192 ROBSON R	5303/11913	7	6.1	61	1050 1.5	2,900	6,218	2.5	50%	12.7	0.90	11.4	0.051
193 SMALL CR	5304/11935	7	9.1	61	1400 1.8	4,300	10,800	7	50%	18.8	0.90	17.0	0.060
194 SWIFTCURRENT CR	5301/11917	7	5.8	61	800 1.4	2,800	5,640	0.5	50%	12.3	0.90	11.0	0.048
195 UNNAMED CR	5308/12001	7	0.9	335	1300 0.55	2,400	7,875	23	50%	10.5	0.90	9.5	0.078

TABLE 4.2 Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED:Alphabetic by region	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)		Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
196 UNNAMED CR	5321/11951	7	1.3	274	2000	0.69	2,800	13,742	32	50%	12.3	0.90	11.0	0.117
197 UNNAMED CR	5310/12002	7	0.5	549	1700	0.41	2,100	6,236	18	50%	9.2	0.90	8.3	0.071
198 BOLTON CR	5413/12826	8	4.8	61	1050	1.3	2,300	7,845	18	60%	12.1	0.90	10.9	0.068
199 CHIMDEMASH CR	5440/12822	8	4.5	122	2500	1.3	4,300	9,754	0	60%	22.6	0.90	20.3	0.045
200 KLEANZA CR	5436/12822	8	9.2	92	1200	1.6	6,600	10,222	2	60%	34.7	0.90	31.2	0.031
201 MCKAY CR	5413/12825	8	4.9	152	2750	1.4	5,800	14,277	18	60%	30.5	0.90	27.4	0.049
202 SHAMES R	5425/12845	8	4.3	61	1320	1.3	2,100	5,440	15	60%	11.0	0.90	9.9	0.051
203 UNNAMED CR	5422/12854	8	2.2	122	2100	0.99	2,100	7,887	15	60%	11.0	0.90	9.9	0.075
204 WILLIAMS CR	5424/12825	8	7.5	61	1100	1.6	3,600	7,777	6	60%	18.9	0.90	17.0	0.043
205 ARDEN CR	5419/12941	9	1.2	336	750	0.55	3,200	7,996	16	70%	19.6	0.90	17.7	0.042
206 BROWN CR	5402/12950	9	6	107	500	1.1	5,000	6,512	3	72%	31.5	0.90	28.4	0.022
207 LIGNITE CR	5355/13237	9	4.7	61	1000	1.3	2,200	8,129	35	65%	12.5	0.90	11.3	0.068
208 MCDONALD CR	5407/12954	9	1.2	315	1900	0.64	3,000	5,993	0.5	70%	18.4	0.90	16.6	0.034
209 UNNAMED CR	5420/12946	9	0.7	397	800	0.45	2,200	6,329	16	70%	13.5	0.90	12.1	0.049
210 AMERICAN CR	5608/12954	11	5.1	91	1400	1.3	3,600	9,751	25	55%	17.3	0.90	15.6	0.059
211 KELSKIIST CR	5521/12942	11	3.4	183	1550	1	4,900	9,832	28	60%	25.8	0.90	23.2	0.040
212 KSHADIN CR	5527/12903	11	3	92	1150	1.1	2,200	8,603	6	60%	11.6	0.90	10.4	0.078
213 KWINATAHL R	5525/12908	11	6.8	123	1300	1.4	6,500	14,503	1	60%	34.2	0.90	30.7	0.044
214 MARMOT R	5553/13000	11	5.6	61	650	1.3	2,700	5,474	7	55%	13.0	0.90	11.7	0.044
215 SEASKINNISH CR	5516/12859	11	2.4	136	1750	0.97	2,600	6,284	2	60%	13.7	0.90	12.3	0.048
216 SEDAN CR	5505/12812	11	4.6	61	850	1.3	2,200	5,166	8	60%	11.6	0.90	10.4	0.047
217 UNNAMED CR	5521/12840	11	1.7	183	1750	0.8	2,400	10,480	30	50%	10.5	0.90	9.5	0.104
218 BEATTY CR	5806/13111	13	3.9	92	1370	1.2	2,800	10,594	17	45%	11.0	0.90	9.9	0.100
219 PINE CR DITCH	5935/13335	13	4.5	61	700	1.2	2,100	4,507	0.5	30%	5.5	0.90	5.0	0.085

TABLE 4.2a Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
1 BROWN CR	5402/12950	9	6	107	500 1.1	5,000	6,512	3	72%	31.5	0.90	28.4	0.022
2 CERVUS CR @ LADY F	4951/12547	3	5.5	100	380 1.1	4,300	5,121	1.6	65%	24.5	0.90	22.0	0.022
3 UNNAMED CR	4945/12331	2	5.5	122	350 1	5,300	5,633	6	55%	25.5	0.90	23.0	0.023
4 ZEBALLOS (LITTLE) R	4959/12645	3	1.5	210	750 0.64	2,500	3,385	6	65%	14.2	0.90	12.8	0.025
5 MILL CR	5224/12634	6	1.1	638	2200 0.56	5,500	7,841	1.5	65%	31.3	0.90	28.2	0.026
6 JOFFRE CR	4918/12235	2	3.8	190	900 0.96	5,700	7,136	10	57%	28.5	0.90	25.6	0.026
7 TIPELLA CR	4945/12210	2	4.9	90	300 0.99	3,500	4,510	0	55%	16.9	0.90	15.2	0.028
8 ROSEWALL C	4927/12448	3	2.9	100	630 0.91	2,300	3,368	1	62%	12.5	0.90	11.2	0.028
9 UNNAMED CR	4945/12327	2	0.88	550	1100 0.48	3,800	4,966	11	55%	18.3	0.90	16.5	0.028
10 PERKETTS CR	4953/12352	2	1.9	340	1000 0.68	5,100	6,979	15	55%	24.6	0.90	22.1	0.030
11 WEDGE CR	5010/12254	2	3.6	215	1500 1	6,100	9,166	2	60%	32.1	0.90	28.9	0.030
12 BOX CANYON CR	4935/12324	2	0.76	400	1400 0.5	2,400	3,332	2	55%	11.6	0.90	10.4	0.030
13 MAYNARD L	5024/12714	3	9.1	64	550 1.5	4,600	7,582	18	65%	26.2	0.90	23.6	0.030
14 KAIPIT CR	5015/12648	3	9.7	60	700 1.6	4,600	7,655	6	65%	26.2	0.90	23.6	0.030
15 THORNHILL CR	4940/12336	2	1.2	459	1250 0.57	4,300	6,065	0	55%	20.7	0.90	18.6	0.031
16 HANDY CR	4900/12456	3	3.8	100	310 0.89	3,000	4,771	29	62%	16.3	0.90	14.7	0.031
17 KLEANZA CR	5436/12822	8	9.2	92	1200 1.6	6,600	10,222	2	60%	34.7	0.90	31.2	0.031
18 TWENTYONE MILE CR	5007/12259	2	2.2	185	1000 0.8	3,200	4,965	1.5	60%	16.8	0.90	15.1	0.031
19 TSABLE R	4931/12454	3	6.8	50	500 1.4	2,700	4,626	4	65%	15.4	0.90	13.8	0.031
20 UNNAMED CR	4943/12345	2	1	427	1200 0.54	3,300	4,816	17	55%	15.9	0.90	14.3	0.032
21 FURRY CR	4935/12313	2	3.6	230	1600 1	6,500	9,858	6	57%	32.5	0.90	29.2	0.032
22 OWL CR	5022/12244	2	2.2	150	900 0.81	2,600	4,323	1	62%	14.1	0.90	12.7	0.032
23 BROWNS R# 1	4941/12509	3	5.9	50	400 1.2	2,300	4,041	2.1	65%	13.1	0.90	11.8	0.032
24 CACOOHTIN CR	5226/12619	6	1.7	214	1200 0.73	2,800	4,962	2	65%	15.9	0.90	14.3	0.032
25 MCGILLIVARY CR	5037/12226	2	1.2	350	1300 0.59	3,300	4,687	1	52%	15.0	0.90	13.5	0.033
26 SNOOTLI CR	5223/12636	6	2.2	152	1250 0.86	2,600	4,627	0.5	65%	14.8	0.90	13.3	0.033
27 GWILLIM CR	4945/11728	1	2.4	240	1100 0.8	4,500	5,597	1	45%	17.7	0.90	16.0	0.033
28 CHICKWAT CR	4949/12343	2	3.7	180	1050 0.98	5,200	7,982	27	55%	25.1	0.90	22.5	0.033
29 UNNAMED CR	4945/12343	2	1.5	214	600 0.62	2,500	3,866	18	55%	12.0	0.90	10.8	0.033
30 KOKISH R	5027/12647	3	5.2	127	1900 1.3	5,200	9,964	3	68%	31.0	0.90	27.9	0.034
31 UCONA R	4944/12557	3	6.6	50	200 1.1	2,600	4,771	10	65%	14.8	0.90	13.3	0.034
32 BEAR CR	4928/12146	2	1.6	365	2100 0.71	4,600	7,836	20	60%	24.2	0.90	21.8	0.034
33 THOMAS LAKE	4936/12225	2	1.1	520	1700 0.57	4,500	7,704	50	60%	23.7	0.90	21.3	0.034
34 MCDONALD CR	5407/12954	9	1.2	315	1900 0.64	3,000	5,993	0.5	70%	18.4	0.90	16.6	0.034
35 BIRKENHEAD R #1	5020/12243	2	23	30	200 2	5,400	9,715	1	63%	29.8	0.90	26.8	0.034
36 NOOKLIKONNIK CR	5222/12634	6	1.7	366	2400 0.75	4,900	9,145	2	65%	27.9	0.90	25.1	0.034
37 CRUICKSHANK CR	4936/12515	3	5.4	150	2000 1.3	6,300	11,809	18	65%	35.9	0.90	32.3	0.034
38 JANET CR	5223/12552	5	1	610	1950 0.53	4,800	9,015	32	65%	27.3	0.90	24.6	0.034
39 UNNAMED CR	5255/11853	4	2.6	184	330 0.71	3,700	5,373	11	50%	16.2	0.90	14.6	0.035

TABLE 4.2a Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
40 UNNAMED CR	5210/12650	6	3.2	152	1050 0.96	3,800	7,179	31	65%	21.6	0.90	19.5	0.035
41 COGBURN CR	4933/12145	2	5.9	100	1050 1.3	4,600	8,160	35	60%	24.2	0.90	21.8	0.035
42 SOUTH CRANBERRY CR	5046/11806	1	2.7	200	900 0.83	4,200	6,476	29	52%	19.1	0.90	17.2	0.035
43 CLAYTON FALLS CR	5222/12649	6	6.6	61	700 1.4	3,200	6,180	0	65%	18.2	0.90	16.4	0.035
44 HIGH CR	4955/12352	2	2.2	210	1000 0.77	3,600	5,907	21	55%	17.3	0.90	15.6	0.036
45 TEXAS CR	5034/12149	2	2.6	150	900 0.86	3,100	4,667	18	50%	13.6	0.90	12.2	0.036
46 UNNAMED CR	5057/11824	1	1.2	300	1100 0.59	2,800	3,796	6	45%	11.0	0.90	9.9	0.036
47 MAWBY CR	4953/12318	2	0.65	580	1150 0.44	3,000	4,999	2	55%	14.5	0.90	13.0	0.036
48 FISH HATCHERY CR	4936/12238	2	1.1	670	1600 0.53	5,800	9,834	50	55%	27.9	0.90	25.1	0.037
49 SPUZZUM CR	4939/12126	2	7.5	50	500 1.4	2,900	5,390	2	60%	15.2	0.90	13.7	0.037
50 SAUNDERS CR	4948/12601	3	3.1	90	1200 1.1	2,200	4,459	2	65%	12.5	0.90	11.3	0.037
51 THORSEN CR	5221/12642	6	6.1	80	1550 1.5	3,800	7,739	1	65%	21.6	0.90	19.5	0.037
52 LIZZIE CR	5012/12228	2	3.5	230	2000 1	6,300	11,273	11	57%	31.5	0.90	28.3	0.037
53 NICOAMEN CR	5016/12124	2	1.5	200	600 0.36	2,300	3,613	10	50%	10.1	0.90	9.1	0.037
54 TSEAPSEAHOOZ CR	5226/12624	6	1.3	274	1900 0.68	2,800	5,722	0.5	65%	15.9	0.90	14.3	0.037
55 PIGGOTT CR	4949/12522	3	5.3	50	250 1.1	2,100	4,308	14	65%	12.0	0.90	10.8	0.038
56 BROWNS R# 2	4942/12508	3	6.4	50	750 1.4	2,500	5,133	2	65%	14.2	0.90	12.8	0.038
57 LOST VALLEY CR	5040/12218	2	0.94	350	1050 0.52	2,600	4,282	6	52%	11.8	0.90	10.7	0.038
58 GREY CR	4932/12345	2	3.6	95	700 1	2,700	4,705	8	55%	13.0	0.90	11.7	0.038
59 FRIES CR	4945/12309	2	1.6	180	1100 0.72	2,300	4,017	3	55%	11.1	0.90	10.0	0.038
60 SICAMOUS CR	5048/11858	1	1.6	200	1400 0.74	2,500	3,599	0	45%	9.9	0.90	8.9	0.038
61 ZEBALLOS R	5003/12647	3	5.6	60	800 1.3	2,600	5,458	10	65%	14.8	0.90	13.3	0.038
62 MOSHER CR	5225/12558	5	1.1	457	2400 0.6	3,900	8,222	32	65%	22.2	0.90	20.0	0.039
63 NEXT CR	4918/11645	1	3.6	120	1100 1.1	3,400	6,093	25	55%	16.4	0.90	14.7	0.039
64 UNNAMED CR	4946/12326	2	0.62	458	1100 0.45	2,200	3,955	14	55%	10.6	0.90	9.5	0.039
65 CAMERON R	4915/12440	3	6.2	50	250 1.2	2,400	4,339	9	55%	11.6	0.90	10.4	0.039
66 UNNAMED CR	5221/12640	6	0.4	1036	2700 0.41	3,200	6,848	0.5	65%	18.2	0.90	16.4	0.039
67 NOOMST CR #1	5223/12615	6	1.3	427	2950 0.69	4,300	9,226	7	65%	24.5	0.90	22.0	0.039
68 UNNAMED CR	5254/11846	4	2.5	152	520 0.77	3,000	4,968	24	50%	13.1	0.90	11.8	0.039
69 MONMOUTH CR	4943/12311	2	0.59	470	1000 0.44	2,200	4,010	3	55%	10.6	0.90	9.5	0.039
70 MCNAIR CR	4931/12330	2	2.1	180	1600 0.86	3,000	5,470	1	55%	14.5	0.90	13.0	0.039
71 ZEBALLOS L	5003/12646	3	5.4	90	1250 1.3	3,800	8,202	10	65%	21.6	0.90	19.5	0.040
72 UNNAMED CR	5001/12321	2	1.8	275	700 0.64	3,900	7,158	15	55%	18.8	0.90	16.9	0.040
73 CLINT CR	5013/11654	1	2.4	243	2000 0.89	4,600	7,684	1	50%	20.1	0.90	18.1	0.040
74 STAWAMUS CR	4942/12307	2	2.8	274	2650 0.97	6,000	11,029	3	55%	28.9	0.90	26.0	0.040
75 KELSKIIST CR	5521/12942	11	3.4	183	1550 1	4,900	9,832	28	60%	25.8	0.90	23.2	0.040
76 HADOW CR	5040/11748	1	1.4	400	950 0.59	4,400	7,831	41	53%	20.4	0.90	18.4	0.040
77 SHAW CR	4915/11643	1	1.1	240	1000 0.59	2,100	3,879	21	55%	10.1	0.90	9.1	0.040
78 CASCADE CR	5025/11707	1	1.9	180	1800 0.84	2,700	5,275	14.5	57%	13.5	0.90	12.1	0.041

TABLE 4.2a Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
79 RED TUSK CR	4947/12325	2	2.6	180	1400 0.9	3,700	6,977	13	55%	17.8	0.90	16.0	0.041
80 UNNAMED CR	4947/12334	2	1.4	457	1200 0.6	5,000	9,471	17	55%	24.1	0.90	21.7	0.041
81 MASELPANIK CR	4907/12115	2	2.3	300	2500 0.88	5,400	11,741	37	63%	29.8	0.90	26.8	0.041
82 LASCA CR	4936/11709	1	1.5	300	2100 0.72	3,500	5,460	1	45%	13.8	0.90	12.4	0.041
83 TOMMY CR	5050/12231	2	1.2	300	1800 0.64	2,800	5,074	20	52%	12.8	0.90	11.5	0.041
84 BEATRICE CR	4950/11728	1	4.1	165	750 0.98	5,300	8,363	7	45%	20.9	0.90	18.8	0.042
85 AIRPLANE CR	4908/12137	2	0.9	300	1400 0.56	2,100	4,646	7	63%	11.6	0.90	10.4	0.042
86 TANTALUS CR	4951/12315	2	0.9	762	3000 0.45	5,400	10,436	2	55%	26.0	0.90	23.4	0.042
87 MULVEHILL CR	5051/11807	1	1.9	150	550 0.7	2,200	3,515	17	45%	8.7	0.90	7.8	0.042
88 THELWOOD CR	4933/12534	3	2.9	100	1000 1	2,300	5,314	41	65%	13.1	0.90	11.8	0.042
89 YARD CR	5054/11848	1	3.1	150	1550 1	3,600	5,767	0	45%	14.2	0.90	12.8	0.042
90 CARIBOU CR	4959/11750	1	6.1	120	1350 1.3	5,700	9,142	2.5	45%	22.5	0.90	20.2	0.042
91 ARDEN CR	5419/12941	9	1.2	336	750 0.55	3,200	7,996	16	70%	19.6	0.90	17.7	0.042
92 UNNAMED CR	4955/12348	2	0.88	579	3000 0.56	4,000	7,884	25	55%	19.3	0.90	17.3	0.043
93 TSUIUS CR	5037/11840	1	5	150	1650 1.2	5,900	9,968	7	47%	24.3	0.90	21.9	0.043
94 SOWERBY CR	4919/12126	2	1.4	425	3400 0.71	4,700	10,653	7	63%	25.9	0.90	23.3	0.043
95 WILLIAMS CR	5424/12825	8	7.5	61	1100 1.6	3,600	7,777	6	60%	18.9	0.90	17.0	0.043
96 WILSON CR	4935/11652	1	0.58	609	2700 0.47	2,800	5,547	12	55%	13.5	0.90	12.1	0.043
97 UNNAMED CR	4949/12323	2	0.38	793	1150 0.36	2,400	4,757	17	55%	11.6	0.90	10.4	0.043
98 RAINY R	4932/12330	2	7	60	800 1.5	3,300	6,541	3	55%	15.9	0.90	14.3	0.043
99 UNNAMED CR	4946/12541	3	2.5	200	1060 0.83	3,900	9,138	20	65%	22.2	0.90	20.0	0.043
100 CRAWFORD CR	5045/11759	1	1.1	250	1300 0.61	2,200	4,207	21	53%	10.2	0.90	9.2	0.043
101 NORDSCHOW CR	5218/12603	6	2.9	183	1500 0.95	4,200	9,878	20	65%	23.9	0.90	21.5	0.043
102 SALMON R	5005/12641	3	7.5	50	700 1.5	2,900	7,049	19	67%	17.0	0.90	15.3	0.043
103 CLEMINA CR	5234/11905	4	2.5	152	1300 0.9	3,000	5,458	10	50%	13.1	0.90	11.8	0.043
104 CLOWHOM R	4949/12323	2	7.8	60	400 1.3	3,700	7,430	19	55%	17.8	0.90	16.0	0.043
105 MCDONALD CR	5034/11625	1	1.8	250	1100 0.71	3,500	6,652	36	52%	15.9	0.90	14.3	0.044
106 UNNAMED CR	4948/12324	2	0.8	793	2700 0.49	5,000	10,111	15	55%	24.1	0.90	21.7	0.044
107 MAQUILLA CR	5005/12625	3	3.4	90	1650 1.2	2,400	5,649	0.8	64%	13.5	0.90	12.1	0.044
108 MARMOT R	5553/13000	11	5.6	61	650 1.3	2,700	5,474	7	55%	13.0	0.90	11.7	0.044
109 KOKISH R	5028/12648	3	5.5	60	1400 1.5	2,600	6,523	2.8	68%	15.5	0.90	13.9	0.044
110 KWINATAHL R	5525/12908	11	6.8	123	1300 1.4	6,500	14,503	1	60%	34.2	0.90	30.7	0.044
111 KOKISH R	5029/12650	3	17	30	950 2.4	4,000	10,132	0.7	68%	23.8	0.90	21.4	0.044
112 FOSTHALL CR	5022/11757	1	8.8	60	225 1.3	4,100	7,197	34	47%	16.9	0.90	15.2	0.044
113 SHANNON CR	5005/11729	1	1.5	180	1700 0.76	2,100	3,696	2	47%	8.6	0.90	7.8	0.045
114 ROARING CR	4927/12213	2	1.4	200	900 0.65	2,200	4,538	25	55%	10.6	0.90	9.5	0.045
115 LYNN CR	4921/12301	2	4	75	1800 1.3	2,300	4,755	0	55%	11.1	0.90	10.0	0.045
116 WEE SANDY CR	5000/11725	1	1.8	180	900 0.72	2,500	4,430	10	47%	10.3	0.90	9.3	0.045
117 CHIMDEMASH CR	5440/12822	8	4.5	122	2500 1.3	4,300	9,754	0	60%	22.6	0.90	20.3	0.045

TABLE 4.2a Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
118 LAKE LOVELY WATER	4948/12313	2	0.75	1100	3400 0.48	6,500	14,771	9	60%	34.2	0.90	30.7	0.045
119 GOLD R	4952/12606	3	20	30	900 2.5	4,700	11,664	4.4	65%	26.8	0.90	24.1	0.045
120 SIWASH CR	4934/12124	2	3	200	600 0.81	4,700	8,989	12	50%	20.6	0.90	18.5	0.046
121 WILSON CR FALLS	5008/11720	1	9.2	60	550 1.5	4,300	7,809	11	47%	17.7	0.90	15.9	0.046
122 BONANZA R	5020/12644	3	4.4	60	1400 1.4	2,100	5,554	0.8	68%	12.5	0.90	11.3	0.046
123 MCLENNAN R @ S.ARM	5251/11921	4	1.4	244	1450 0.69	2,700	5,270	6	50%	11.8	0.90	10.6	0.046
124 CLOWHOM R	4950/12329	2	1.7	320	600 0.6	4,300	9,249	27	55%	20.7	0.90	18.6	0.047
125 SEDAN CR	5505/12812	11	4.6	61	850 1.3	2,200	5,166	8	60%	11.6	0.90	10.4	0.047
126 UNNAMED CR	5059/11645	1	0.72	400	1100 0.47	2,300	4,760	34	52%	10.5	0.90	9.4	0.047
127 MONTAGUE CR	5020/12612	3	2.2	152	1500 0.9	2,600	6,625	22	64%	14.6	0.90	13.1	0.047
128 SMITELY R @ FALLS	5205/12636	6	18.6	31	450 2.1	4,500	11,693	56	65%	25.6	0.90	23.1	0.048
129 VANCOUVER CR	4956/12348	2	8.1	60	900 1.6	3,800	8,393	25	55%	18.3	0.90	16.5	0.048
130 UNNAMED CR	4957/12150	2	2.3	250	1500 0.83	4,500	8,500	28	47%	18.5	0.90	16.7	0.048
131 GRANT BROOK	5254/11845	4	3.9	152	1500 1.1	4,600	9,248	21	50%	20.1	0.90	18.1	0.048
132 EAST CR #2	5039/11701	1	7	100	1150 1.4	5,500	11,726	45	53%	25.5	0.90	23.0	0.048
133 SEASKINNISH CR	5516/12859	11	2.4	136	1750 0.97	2,600	6,284	2	60%	13.7	0.90	12.3	0.048
134 SWIFTCURRENT CR	5301/11917	7	5.8	61	800 1.4	2,800	5,640	0.5	50%	12.3	0.90	11.0	0.048
135 GOLD CR	4921/12227	2	5.3	50	250 1.1	2,100	4,675	16	55%	10.1	0.90	9.1	0.048
136 UNNAMED CR	4950/12131	2	2	300	2200 0.82	4,700	8,972	9	47%	19.4	0.90	17.4	0.048
137 DORE CR #1	5316/12017	7	6.8	92	1600 1.5	4,900	9,958	13	50%	21.5	0.90	19.3	0.048
138 CULTUS CR	4920/11647	1	3.9	123	1800 1.2	3,800	8,525	27	55%	18.3	0.90	16.5	0.049
139 LATEWHOS CR	5027/11843	1	0.65	450	2600 0.51	2,300	4,224	8	45%	9.1	0.90	8.2	0.049
140 COOKE CR	5037/11850	1	1.9	200	2100 0.86	3,000	5,521	0.5	45%	11.8	0.90	10.6	0.049
141 SCUZZZY CR	4949/12128	2	7.9	70	1100 1.6	4,300	8,268	3	47%	17.7	0.90	15.9	0.049
142 MCKAY CR	5413/12825	8	4.9	152	2750 1.4	5,800	14,277	18	60%	30.5	0.90	27.4	0.049
143 UNNAMED CR	5420/12946	9	0.7	397	800 0.45	2,200	6,329	16	70%	13.5	0.90	12.1	0.049
144 SANCA CR	4923/11643	1	2.3	120	1000 0.88	2,200	4,973	25	55%	10.6	0.90	9.5	0.049
145 DAVE HENRY CR #2	5245/11905	4	3.5	91	550 0.97	2,500	5,156	11	50%	11.0	0.90	9.9	0.049
146 BEATTON CR	5044/11744	1	2.8	150	2000 1	3,300	8,615	50	63%	18.2	0.90	16.4	0.049
147 ROBSON R	5303/11913	7	6.1	61	1050 1.5	2,900	6,218	2.5	50%	12.7	0.90	11.4	0.051
148 SHAMES R	5425/12845	8	4.3	61	1320 1.3	2,100	5,440	15	60%	11.0	0.90	9.9	0.051
149 MOAKWA CR	5007/12602	3	3.1	90	1250 1.1	2,200	6,124	22	64%	12.3	0.90	11.1	0.052
150 TSILEUH CR	4946/12126	2	0.87	700	3900 0.57	4,800	9,842	5	47%	19.8	0.90	17.8	0.052
151 HALFWAY HOTSPRINGS	5029/11751	1	13	60	1300 2	6,100	12,510	22	47%	25.1	0.90	22.6	0.052
152 DERRY CR	5046/11833	1	1.3	300	2350 0.71	3,100	6,130	22	45%	12.2	0.90	11.0	0.052
153 CONNEL CR	5039/12225	2	0.65	950	3800 0.48	4,800	11,068	0.5	52%	21.9	0.90	19.7	0.053
154 TLATLOS CR	5023/12614	3	2.1	182	2275 0.92	3,000	8,577	26	64%	16.8	0.90	15.1	0.053
155 CAYOOSH CR #2	5039/12159	2	21	30	800 2.5	4,900	11,734	4	53%	22.7	0.90	20.5	0.054
156 TAM O'SHANTER CR	4948/11651	1	0.96	490	3000 0.6	3,700	7,529	10	45%	14.6	0.90	13.1	0.054

TABLE 4.2a Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
157 CANTELON/YOLA CR	4913/12123	2	3	105	2000 1.1	2,500	7,135	22	63%	13.8	0.90	12.4	0.054
158 UNNAMED CR	4909/12120	2	1.2	243	2100 0.69	2,300	6,593	30	63%	12.7	0.90	11.4	0.054
159 SOUTH ENGLISHMAN R	4915/12417	3	4.6	100	2000 1.3	3,600	9,037	5	55%	17.3	0.90	15.6	0.054
160 POWDER CR	4953/11651	1	1.4	370	2500 0.7	4,100	8,458	23	45%	16.2	0.90	14.5	0.055
161 HORSEY CR	5308/11941	7	5.9	122	2050 1.4	5,600	12,878	14	50%	24.5	0.90	22.1	0.055
162 TLUPANA R	4946/12620	3	2.9	90	1850 1.1	2,000	6,004	2	65%	11.4	0.90	10.2	0.055
163 CLUTE CR	5001/11653	1	0.81	609	3200 0.55	3,900	9,017	8	50%	17.1	0.90	15.4	0.055
164 WOODBURY CR	4948/11657	1	1.9	300	3900 0.9	4,500	11,461	6	55%	21.7	0.90	19.5	0.055
165 EAST CR #1	5039/11702	1	7	50	500 1.4	2,700	6,667	42	53%	12.5	0.90	11.3	0.055
166 UNNAMED CR	4940/12151	2	0.65	540	2000 0.47	2,700	7,578	55	60%	14.2	0.90	12.8	0.056
167 ENGLISHMAN CR	4915/12421	3	10	50	1630 2	3,900	10,074	2.3	55%	18.8	0.90	16.9	0.056
168 GIEGERICH CR	5043/11707	1	4.6	100	1100 1.2	3,600	8,970	55	53%	16.7	0.90	15.0	0.056
169 RAPID CR	5027/11710	1	1.2	300	2400 0.67	2,800	6,196	21	47%	11.5	0.90	10.4	0.056
170 PINDER CR	5015/12655	3	3	90	2100 1.2	2,100	6,444	16	65%	12.0	0.90	10.8	0.056
171 GHITA CR	5251/11839	4	2.7	306	2750 0.94	6,500	15,392	31	50%	28.5	0.90	25.6	0.056
172 WARREN CR	5058/11642	1	1.4	550	3400 0.69	6,000	14,891	30	52%	27.3	0.90	24.6	0.057
173 LOKI CR	4950/11651	1	0.87	430	2400 0.57	2,900	6,278	14	45%	11.4	0.90	10.3	0.057
174 PHILLIPS CR	4940/12534	3	8	50	500 1.5	3,100	9,749	27	65%	17.7	0.90	15.9	0.058
175 DORE CR #2	5313/12017	7	5.2	91	1500 1.4	3,700	8,963	17	50%	16.2	0.90	14.6	0.058
176 CLOWHOM R	4951/12327	2	3.6	120	1000 1	3,400	9,079	25	55%	16.4	0.90	14.7	0.058
177 TZOONIE CR	4947/12343	2	11	30	320 1.7	2,600	7,003	23	55%	12.5	0.90	11.3	0.058
178 AMERICAN CR	5608/12954	11	5.1	91	1400 1.3	3,600	9,751	25	55%	17.3	0.90	15.6	0.059
179 BERNARD CR	4952/11651	1	1.7	180	1200 0.75	2,400	5,323	20	45%	9.5	0.90	8.5	0.059
180 ALLAN CR	5232/11907	4	4.3	91	1900 1.3	3,100	7,643	12	50%	13.6	0.90	12.2	0.059
181 SMALL CR	5304/11935	7	9.1	61	1400 1.8	4,300	10,800	7	50%	18.8	0.90	17.0	0.060
182 WRAGGE CR	5004/11728	1	1.1	244	1800 0.66	2,100	4,747	2	45%	8.3	0.90	7.5	0.060
183 BULLDOG CR	5239/11859	4	3.6	152	875 0.97	4,300	10,910	26	50%	18.8	0.90	17.0	0.060
184 TENDERFOOT CR	5028/11713	1	1.5	240	2500 0.78	2,800	6,753	28	47%	11.5	0.90	10.4	0.061
185 SWIFT CR #1	5252/11913	4	3.3	91	1325 1.1	2,400	6,178	5	50%	10.5	0.90	9.5	0.061
186 BOYD CR	5053/11734	1	2.2	250	1800 0.84	4,300	11,870	64	53%	20.0	0.90	18.0	0.062
187 SALLOOMT CR	5227/12632	6	8.6	31	850 1.8	2,100	7,114	7	65%	12.0	0.90	10.8	0.062
188 CATHERINE CR	5025/12636	3	3	90	1100 1	2,100	7,563	19	68%	12.5	0.90	11.3	0.063
189 CAMPBELL CR	4957/11651	1	2.7	240	2400 0.97	5,100	12,247	28	45%	20.1	0.90	18.1	0.064
190 KELLIE CR	5055/11734	1	1.8	250	1150 0.71	3,500	10,099	65	53%	16.2	0.90	14.6	0.065
191 KUNNUM CR	5018/12614	3	2.9	91	2050 1.2	2,100	7,513	27	64%	11.8	0.90	10.6	0.067
192 FITZSTUBBS CR	5009/11722	1	11	60	2000 2.1	5,200	13,741	13	47%	21.4	0.90	19.3	0.067
193 MARBLE R CANYON	5026/12723	3	11	33	1700 2.2	2,800	11,136	5	70%	17.2	0.90	15.5	0.068
194 LIGNITE CR	5355/13237	9	4.7	61	1000 1.3	2,200	8,129	35	65%	12.5	0.90	11.3	0.068
195 BOLTON CR	5413/12826	8	4.8	61	1050 1.3	2,300	7,845	18	60%	12.1	0.90	10.9	0.068

TABLE 4.2a Inventory of Small Hydro Sites (greater than 2 MW and less than 5 MW)

Stream Name No. SORTED: by cost	Lat/Long	Region	Flow (m <sup>3</sup> /s)	Head (m)	Penstock L(m) D(m)	Power (kW)	Cost (\$1000)	Transm. Dist.(km)	Capacity Factor	Energy (GWh)	fish flow factor	'Green' Energy (GWh)	Cost \$/kWh
196 ASHER CR	5036/11729	1	3.4	150	2100 1.1	4,000	12,181	54	53%	18.6	0.90	16.7	0.068
197 BRENNER CR	5013/11730	1	3.5	120	1900 1.2	3,300	8,919	26	47%	13.6	0.90	12.2	0.068
198 POPLAR CR	5026/11708	1	4.2	120	2700 1.3	3,900	10,575	17	47%	16.1	0.90	14.5	0.069
199 MYRA CR AT FALLS	4935/12534	3	5.3	50	1200 1.5	2,100	7,919	40	65%	12.0	0.90	10.8	0.069
200 MCDUGAL CR	5058/11737	1	3.4	150	850 0.95	4,000	12,334	80	53%	18.6	0.90	16.7	0.069
201 PTARMIGAN CR	5235/11850	4	9.5	61	1600 1.8	4,500	13,136	40	50%	19.7	0.90	17.7	0.070
202 LAIDLAW CR	5052/11714	1	2.2	150	1400 0.88	2,600	8,083	73	53%	12.1	0.90	10.9	0.070
203 MCNULTY CR	4925/12005	2	1.3	250	1900 0.69	2,500	5,875	10	40%	8.8	0.90	7.9	0.070
204 UNNAMED CR	5310/12002	7	0.5	549	1700 0.41	2,100	6,236	18	50%	9.2	0.90	8.3	0.071
205 HELLROARER CR	4935/11845	1	0.71	400	1750 0.5	2,200	5,459	30	40%	7.7	0.90	6.9	0.074
206 STIKELAN CR #2	5127/12422	5	3.3	91	900 1	2,400	6,732	25	45%	9.5	0.90	8.5	0.074
207 UNNAMED CR	5422/12854	8	2.2	122	2100 0.99	2,100	7,887	15	60%	11.0	0.90	9.9	0.075
208 DIORITE CR	4958/11540	1	1.3	490	4100 0.72	5,000	12,906	2	40%	17.5	0.90	15.8	0.077
209 KSHADIN CR	5527/12903	11	3	92	1150 1.1	2,200	8,603	6	60%	11.6	0.90	10.4	0.078
210 ADOLPH CR #1	5231/11923	4	2.8	213	3400 1.1	4,700	15,390	29	50%	20.6	0.90	18.5	0.078
211 UNNAMED CR	5308/12001	7	0.9	335	1300 0.55	2,400	7,875	23	50%	10.5	0.90	9.5	0.078
212 COOPER CR	5012/11659	1	4.6	183	5100 1.4	6,600	21,728	1.5	47%	27.2	0.90	24.5	0.083
213 PINE CR DITCH	5935/13335	13	4.5	61	700 1.2	2,100	4,507	0.5	30%	5.5	0.90	5.0	0.085
214 VOWELL CR	5053/11652	1	5.9	50	800 1.4	2,300	8,743	50	52%	10.5	0.90	9.4	0.087
215 COCHRANE CR	4940/11844	1	0.53	500	2600 0.47	2,100	6,863	45	40%	7.4	0.90	6.6	0.097
216 BEATTY CR	5806/13111	13	3.9	92	1370 1.2	2,800	10,594	17	45%	11.0	0.90	9.9	0.100
217 UNNAMED CR	5521/12840	11	1.7	183	1750 0.8	2,400	10,480	30	50%	10.5	0.90	9.5	0.104
218 UNNAMED CR	5126/12445	5	1.1	336	1350 0.58	2,900	13,355	60	50%	12.7	0.90	11.4	0.110
219 UNNAMED CR	5321/11951	7	1.3	274	2000 0.69	2,800	13,742	32	50%	12.3	0.90	11.0	0.117

## **5. LITERATURE REVIEW**

A literature review conducted as part of the study for the Handbook and most of the information was considered relevant for the development of new micro hydro sites. Additional information may be found in the Handbook on the use of the information.

# HANDBOOK FOR MICRO HYDRO DEVELOPMENT IN BRITISH COLUMBIA

## REFERENCE LIST

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*Fish Protection Act*: Objectives, highlights and initiatives of the new Act before parliament  
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[http://qp.gov.bc.ca/bcstats/96484\\_01.htm](http://qp.gov.bc.ca/bcstats/96484_01.htm)

*Water Protection in British Columbia*  
<http://www.env.gov.bc.ca/wat/wrs/protect.html>

*Water Regulation in British Columbia*  
<http://www.env.gov.bc.ca/wat/wrs/waterreg/01.htm>

*Water Rights in British Columbia*  
Includes information on water licenses, rights and obligations of users  
<http://www.elp.gov.bc.ca/wat/wrs/rightsbc.html>

*Water Rights & Obligations*  
<http://www.elp.gov.bc.ca/wat/wrs/rights.html>

*Water Rights Information, Research and Copy Charges*  
Includes charges for copies of the official version of the *Water Act* and *The Water Protection Act*  
<http://www.elp.gov.bc.ca/wat/wrs/fs4copy.htm>

*How to Apply for a Water License*  
<http://www.elp.gov.bc.ca/wat/wrs/apply>

### HANDBOOKS & MANUALS

Canada. Department of Energy, Mines and Resources. (1980). ***Micro Hydro. Volume 1: A Survey of Potential Micro Hydro Developments for use by Remote Communities in British Columbia.*** [Report ER-809E].

Presents the results of a study to estimate micro hydro potential in remote locations of British Columbia, not served at the time of publication by BC Hydro. The province was divided into 10 regions according to major physical and climatic variations. Sub-areas represent each of the regions on the basis of population, energy demand, topography and potential water availability established from iso-flow lines.

Canada. Department of Energy, Mines and Resources. (1980). **Micro Hydro. Volume 2: Guidance Manual of procedures for Assessment of Micro Hydro Potential.** Energy Mines and Resources Canada, Ottawa. [Report ER-809E].

This manual presents procedures for the assessment of actual sites for micro hydro development. It provides direction and a step-by-step procedure for a prefeasibility level investigation from initial map studies through to preliminary site layout cost estimates, economic and financial evaluation. A case study is included.

Canada. Department of Energy, Mines and Resources. **Small Hydropower Handbook for British Columbia.** (1986). Energy, Mines and Resources Canada & Conservation and Renewable Energy Office, BC., Ottawa.

A detailed manual to assist people interested in developing a small hydro opportunity on sites which do not justify the expense of extensive professional engineering services. It does not assume any previous acquaintance with the subject. Sections focus on feasibility assessment; site exploration and layout; civil works and equipment required; permits, licenses and legal aspects; economics and financing; selection and installation of equipment; operation and maintenance information. Low Head and Cold Weather Considerations are discussed in specialized appendices. The emphasis is on providing an understanding to allow users to do as much as possible themselves, with minimal capital costs.

Canada, Department of Energy, Mines and Resources. (1986, 1989, 1990). **Small Hydro Sites and Potential Sites in British Columbia.**

A comprehensive listing of these sites, with information relevant to their potential for hydro development.

Commission of the European Communities. Directorate General for Energy. European Small Hydro Association.(1990). **Layman's Guidebook on How to Develop a Small Hydro Site.** European Small Hydro Association, Brussels. Part I: 73p. Part II: 111p.

Part I addresses non-technical readers with a general introduction, followed by chapters on economic analysis and environmental mitigation. Part II is written for non-experts, but presupposes a technical understanding of engineering terms, formulae and procedures. Three sections cover the potential of water resources, civil engineering works and electro-mechanical equipment.

Curtis, D., Langley, W. & Ramsey, R. (1999). **Going With the Flow: Small Scale Water Power Made Easy.** Maya Books, Twickenham, UK. 160p.

Although written for schemes less than 100kW, this recent guide is also intended to give useful information to the reader generally interested in small hydro schemes. Coverage includes components, site assessment, system design, economics, installation, electrical aspects, and maintenance. Case studies are presented.

Fraenkel, Peter *et al.* (1991). **Micro-hydro Power: A Guide for Development Workers.** Intermediate Technology Publications, London.160p.

Still in print, this is a comprehensive guide for the non-specialist.

Harvey Adam *et al.* (1998). **Micro-hydro Design Manual: Guide to Small-scale Water Schemes.** Intermediate Technology, London. 374p.

New edition of an established guide, available from CISTI, written to give quick and reliable methods of planning a scheme, assessing viability, and sizing and selecting components. Sections include major components, civil works, hydrology, financial evaluation and commissioning and testing. The manual provides worked examples throughout so that financial and engineering calculations can be followed in detail.

Independent Power Producers of Ontario (IPPSO). (2000). **Canadian Power Directory 2000**. IPPSO, Toronto, Ont. 331p.

Reference guide to Canadian project developers, equipment and service suppliers, financiers, associations, government agencies, consultants as other resources. Available from IPPSO.

Sigma Engineering. (1983). **Small-Hydro Power Resource in the Provincial System**. Ministry of Energy, Mines & Petroleum Resources, British Columbia. 2 Vols. Vol I: *Technology and Resource Assessment*. Vol II: *Economic and Financial Assessment*.

Provides guidelines for developing small hydro sites from a technical and regulatory viewpoint, and a step-by-step guide for establishing preliminary designs and costs. 665 potential small hydro sites in BC, including those suitable for micro schemes, are identified.

## **SUBJECT SPECIFIC REFERENCES**

Agreements to Purchase Electricity

### **Connection to Utility Distribution Systems**

Canadian Electrical Association. (1994). **Connecting Small Generators to Utility Distribution Systems. Draft Report**. CEA, Montreal, Q. [CEA 128-D-767].

BC Hydro. Customer Services. Distribution Planning & Automation Department. Engineering & Technical Services Division. (1994). **BC Hydro Connection Requirements for Non-Utility Generation, 35KV and Below**. BC Hydro, Vancouver, BC. 36p.

### **Dams**

United States Department of the Interior. Bureau of Reclamation. 3<sup>rd</sup> ed. (1987). **Design of Small Dams**. Bureau of Reclamation, Denver. 860p.

Definitive text on the planning, design, construction, operation and evaluation of small dams up to 200' high. Major sections on spillways and outlet works, ecological and environmental considerations, flood hydrology, construction and hydraulic computations.

### **Design (General)**

American Society of Civil Engineers. Energy Division. (1989). **Civil Engineering Guidelines for Planning and Designing Hydroelectric Developments. Volume 4: Small Scale Hydro**. American Society of Civil Engineers, New York, NY.

Intended for use by civil engineers in conjunction with the *Conventional Guidelines* also published by ASCE, these guidelines give an insight into problems and solutions related to all aspects of small hydro projects. Particular emphasis on the need for evaluation, planning, and design considerations.

Koch, C. P. (1990). **Small hydroelectric design manual**. C.P. Koch, New Westminster, BC. 29p. Written to help with design calculations which are essential before practical aspects of a project can be considered.

Shawinigan Consultants. (1983). **Methodology for the Design and Costing of Small Hydro Plants**. Canadian Electrical Association, Montreal, Q. 247p.

A useful manual, which presents a simplified methodology intended for project assessments at the site identification and reconnaissance levels. The six sections include layout options, technical considerations, cost estimates and project evaluation.

## **Economics and Financing**

BC Hydro. Resource Planning. (1991). ***Financial Evaluation Guide for Private Power Projects***. BC Hydro, Vancouver, BC. 35p.

Explains the different components of electricity, types of costs, and factors affecting costs, and provides a guide to calculating a project's potential value.

Ontario. Ministry of Energy. (1986). ***Small Hydro '86. Proceedings. March 5-6, 1986***.

Conference papers dealing with municipal and private micro projects, with a focus on economics and financing. Largely dealing with Ontario and Quebec, but much is of general applicability.

Sigma Engineering. (1983). ***Small-Hydro Power Resource in the Provincial System. Vol II: Economic and Financial Assessment***. Ministry of Energy, Mines & Petroleum Resources, British Columbia.

Provides a step-by-step guide for establishing preliminary designs and costs.

Tudor Engineering Company. (1983). ***Simplified Methodology for Economic Screening of Potential Small-Capacity Hydroelectric Sites***. Electric Power Research Institute, Palo Alto, CA.

A step-by-step guide for users with limited technical background to estimate the power and energy output, and project costs for a potential site, and to perform preliminary economic analysis. Appendices discuss engineering design and layout, equipment, and hydrology and data collection methodology and evaluation.

## **Electrical Safety**

Electrical Industry Training Institute. (1997). ***High Voltage Substation Electrical Awareness***. EITI, Surrey, BC. 50p.

Safety manual written for electrical workers in BC, with sections on electricity, safety equipment, substation equipment, working distances, safety grounding and station inspection.

Electrical Industry Training Institute. (1998). ***High Voltage Substation Electrical Awareness for Non-Electrical Workers***. EITI, Surrey, BC. 17p

Supplement to the above publication.

## **Environmental**

Environmental & Social Systems Analysts (1991). ***Small Hydro Environmental Handbook***. Canadian Electrical Association, Montreal, Q. [CEA 950 G 741].126p.

This handbook describes three aspects of the environmental and regulatory planning of small hydro developments: government regulatory approval processes, recommended steps in the environmental planning of a project, and a detailed environmental screening process. Answers to the questions addressed will provide readers with the basis for initial contacts with provincial and municipal government representatives.

Ottawa Engineering Ltd. (1992). ***Environmental Aspects of Small Hydro Projects***.

**N.B.** See also listings for BC Government Acts and Associated Publications.

**Equipment** (see also Generators, Pumps as Turbines, Turbines)

Hulscher, Wim & Fraenkel, Peter. (1994). ***The Power Guide: An International Catalog of Small-Scale Energy***. Stylus Pub, Hendon,VA. 240p.

Mathews, Robert. 7<sup>th</sup> ed. (1998). ***Energy Alternatives Design Guide & Catalogue***. Energy Alternatives, Chase, BC. 40p.

Explanations, advice and guidance for do-it-yourself developers of the lower range of micro hydro schemes, complement a catalogue of relevant equipment.

### **Feasibility Studies**

Fritz, Jack J. (1984). ***Small & Mini Hydro Systems: Resource Assessment & Project Feasibility***. McGraw-Hill, New York. 300p.

Technical manual and guidebook consisting of a collection of technical papers by different experts on hydrology, turbine design, generators and electrical equipment, dams, site design, economics and environmental considerations. Includes a comprehensive chapter on feasibility with examples and case studies.

Lanmer Consultants Ltd. (1982). ***Considerations for Small Hydro Developments in Off-Grid Locations***. Energy, Mines and Resources Canada, Ottawa, Ont.

Ontario. Ministry of Energy. (1986). ***Streams of Power: Developing Small Scale Hydro Systems***. Renewable Energy in Canada, Toronto, Ont. 107p.

Small handbook covering the basic issues and considerations in planning a micro hydro system and a step-by-step guide to making a preliminary feasibility analysis and options available for developing a site.

Canada. Department of Natural Resources. ***RETScreen*** [Software]. NRCAN, Ottawa, Ont. Downloadable Renewable Energy Project Analysis Software, developed by the Government of Canada through the CANMET Energy Diversification Research Laboratory (CEDRL) of Natural Resources Canada. The RETScreen Small Hydro Model is based on twenty years of data and can be used to evaluate micro hydro projects using worksheets to carry out an energy model, a cost analysis and a financial summary. A hydrology worksheet is also provided. See *Useful Websites-Canadian* for the website address.

U.S. Department Of Energy. Hydrologic Engineering Center & The Institute for Water Resources. (1979). ***Feasibility studies for small scale hydropower additions: a guide manual***. US Army Corps of Engineers, Ft. Belvoir, VA.

An extensive, but readable, manual providing technical data and procedural guidance for the systematic appraisal of the viability of potential small hydropower additions to existing facilities. With emphasis on the need for detailed planning studies, six sections focus on concepts and technology, economic and financial issues, hydrologic studies, existing facility integrity in relation to dam safety, and electromechanical and civil considerations. Two case studies are used to test the manual and to illustrate the application of its data.

### **Generators**

Smith, Nigel. (1994). ***Motors As Generators for Micro-Hydro Power***. Stylus Pub VA. 82p.

This practical handbook, which is still in print and available from CISTI and Stylus Publishing, is a guide to the use of induction motors for electricity generation in remote locations. It is based on the practical experience of manufacturers and installers of induction generator units working in a number of countries.

### **Hydraulics**

Chow, Ven Te. (1981). ***Open Channel Hydraulics***. McGraw-Hill, New York, NY.

An engineering text which aims to bridge the gap between theory and practice with a simplified explanation of hydraulic theory, and a minimal use of advanced mathematics.

Sections include basic energy and momentum principles, design of channels, an analysis of various types of flow, spillways, surges and practical problems related to transitions.

Parmakian, John. (1963). ***Waterhammer Analysis***. Dover. New York, NY. 161p.

An engineering text which analyses and offers solutions to practical waterhammer problems associated with gates, pumps, pipes and other operations. Reliability of analysis methods has been demonstrated in field tests. An elementary knowledge of hydraulics and calculus is essential.

Choudry, Waterhammer Text. Has computer program listings. Same author produces a waterhammer computer program package, which is relatively expensive but covers most applications.

### **Hydrology**

Acres International Ltd. (1984). **Hydrologic Design Methodologies for Small-Scale Hydro at Ungauged Sites- Phase I**. Energy, Mines and Resources Canada, Ottawa, Ont.

Acres International Ltd. (1985). **Hydrologic Design Methodologies for Small-Scale Hydro at Ungauged Sites- Phase II**. Energy, Mines and Resources Canada, Ottawa, Ont.

Acres International Ltd. (1988). **Streamflow Analysis Methodology for Ungauged Small-Scale Hydro Sites**. Energy, Mines and Resources Canada, Ottawa, Ont.

Acres International Ltd. (1994). **Hydrologic Design Methodologies for Small-Scale Hydro at Ungauged Sites- Upgrading of Ontario and Atlantic Province Models**. Environment Canada, Water and Habitat Branch, Ottawa, Ont.

### **Intakes**

American Society of Civil Engineers. Energy Division. Committee on Hydropower Intakes. (1995). **Guidelines for the Design of Intakes for Hydroelectric Plants**. American Society of Civil Engineers, New York, NY. 469p.

State-of-the-art guidelines for the sound environmental design of intakes. Information provided on intake types and features, forebay, hydraulic design considerations, trashrack and gate design, fisheries considerations, sedimentation, and environmental factors.

Lauterjung, H. & Schmidt, G. (1989). **Planning of Intake Structures**. Vieweg, Braunschweig 122p.

A planning guide written for nonspecialists providing most important fundamentals for the planning and design of intakes. Contains description of the essential basic hydrological data required, hydraulic modes of operation and calculation methods for proof of stability. Presupposes some advanced mathematical knowledge.

### **Lessons learned**

American Society of Civil Engineers. Energy Division. Task Committee on Lessons Learned from the design, Construction and Operation of Hydroelectric Facilities. (1994). **Lessons learned from the Design, Construction and Operation of Hydroelectric Facilities**. American Society of Civil Engineers, New York, NY.

A compilation of over 70 project examples which include a number of micro hydro developments. Easy to read case studies identify specific problems, causes and effects, investigations, actions taken, and lessons learned.

### **Miscellaneous topics**

United States. Army Corps of Engineers (1981). **Waterpower '81. An International Conference on Hydropower. June 22-24, 1981. Volume 1**. USBR, Washington, DC. 898p.

American Society of Civil Engineers. (1983). **Waterpower '83. International Conference on Hydropower. September 18-21, 1983, Knoxville, Tennessee. Volume 1.** ASCE, New York, NY..556p.

American Society of Civil Engineers. (1985). **Waterpower '85. International Conference on Hydropower. Las Vegas, Nevada, September 25-27, 1985. Volume 1.** ASCE, New York, NY. 682p

These three *Waterpower* conferences of the early 1980's had a major focus on small and micro hydro, reflecting the wide interest in these areas at the time. Numerous case studies are presented, and issues discussed, many of which are still relevant.

**Renewable Energy - Small Hydro: Select Papers.** (1997). Ashgate Publishing, Aldershot, Hants. 390p

### **Penstocks**

American Society of Civil Engineers. Energy Division. Committee on Manual of Practice for Steel Penstocks. (1993). **Steel Penstocks.** American Society of Civil Engineers, New York, NY. 432p. Everything you need to know about steel penstocks: design, manufacture, installation, testing, startup, and maintenance, including branches, wyes, associated appurtenances, and tunnel liners. Extensive section on design examples, with calculations.

American Iron and Steel Institute. (1992). **Steel Plate Engineering Data-Volume 4. Buried Steel Penstocks.** (1992). American Iron and Steel Institute, Washington, DC. 87p.

A technical manual which assembles data and procedures successfully used in the design of buried penstocks. Includes sections on hydraulics, thrust restraint, pipe joints, linings and coatings, corrosion and methods of controlling it. Extensively illustrated.

American Iron and Steel Institute.(1982).**Steel Plate Engineering Data-Volume 4. Steel Penstocks and Tunnel Liners. A manual on materials, design and construction with design computations.** (1982). American Iron and Steel Institute, Washington, DC. 111p.

Most of this manual is devoted to design and construction, but important preliminary sections consider design conditions and allowable stresses pertaining to non-embedded, buried, and concrete-embedded steel penstocks, and to tunnel liners. Appendices present sample design computations. Clearly illustrated with graphics and tables, and uses text suitable to the lay person.

### **Plastic Pipes**

**Sclairpipe (high density polyethylene pipe) Design, Construction Manuals.** KWH Pipe (Canada) Ltd.

American Water Works Association (AWWA). **Standards C900 for Polyvinyl Chloride (PVC) Pressure Pipe.** AWWA.

**Uni-Bell Handbook of PVC Pipe, Design and Construction.** Uni-Bell PVC Pipe Association.

### **Protection and control**

Ottawa Engineering & Acres International Ltd. (1996). **Low Cost Protections and Control for Mini-Hydro Intertie.** Canadian Electrical Association, Montreal, Q. n.p. [CEA 9152 G 973]

A report on a study into the concerns and requirements of Canadian utilities with respect to control, protection and operation of mini-hydro interties. Identifies and evaluates low cost protection & control equipment. Includes case studies.

## Powerlines

BC Hydro. **Overhead Distribution Standards (1992): Overhead Electrical, ES43 Series.**

Kurtz, E.B. and Shoemaker, T.M. (9<sup>th</sup> Edition). **The Lineman's and Cableman's Handbook**, McGraw Hill, 1056 p.

Covers basic principles and best procedures for the construction, operation and maintenance of overhead and underground electric distribution and transmission lines.

## Pumps as Turbines

Chapallaz, J-M., Eichenberger, P. & Fischer, G.(1992). **Manual on Pumps used as Turbines**. Vieweg, Braunschweig, FRG. 221p.

Published in cooperation with MHPG, The Mini Hydro Power Group, this manual provides a detailed account of the use of pumps as turbines in micro-hydro schemes. Includes selection charts based on the test results of over 80 PATs to enable engineers or technicians select a unit for a specific purpose.

Koch, C. P. (1990). **Supplement to the small hydroelectric design manual**. C.P. Koch, New Westminster, BC. 12p.

A small manual in 3 sections: a method of estimating a centrifugal pump's performance as a turbine based on manufacturer's efficiency data, how to ascertain the suitability of a used pump with unknown data, and how to install a pump.

Williams, Arthur et al. (1995). **Pumps as Turbines : A Users Guide**. Nottingham Trent Univ., Nottingham, UK. 58p.

Reprinted in 1997, this is a practical handbook to the use of standard pump units as a low-cost alternative to conventional turbines.

## Steel pipe (see also Penstocks)

American Iron and Steel Institute. rev.ed.(1992).**Steel Plate Engineering Data-Volume 3. Welded Steel Pipe: Merits, Design Standards, Technical Data and References**. American Iron and Steel Institute, Washington, DC. 113p.

A compilation of useful and readable information for the design of water systems using welded steel pipe. Includes design criteria and procedures, joints, fittings, above ground installations, corrosion and protection coatings. Complemented with technical charts and tables.

American Water Works Association. (1987). **Steel Pipe - A Guide for Design and Installation. Manual M11**. AWWA. 174 pp.

Although intended for water supply lines, this manual also has application to steel penstocks and has sections on pipe characteristics, manufacture, hydraulics, design, joints, fittings, corrosion, handling and special details.

## Turbines

Thake, J. (1999). **Micro-Hydro Pelton Design Turbine Manual: Design, Manufacture and Installation for Small-scale Hydro-power**. Intermediate Technology Development Group London. 320p.

Recent comprehensive text on the use of Pelton turbines in micro hydro situations. Available through Stylus Publications, VA.

## References available from CISTI (Canadian Institute for Scientific and Technical Information)

For purchase or borrowing arrangements see <http://cat.cisti.nrc.ca/>

Inversin, Allen R. (1986). **Micro-hydropower sourcebook : a practical guide to design and implementation in developing countries**. NRECA International Foundation, Washington, D.C. A complete reference to the planning, construction and implementation of micro schemes.

American Energy Organization (OLADE). (1983). **Mini-hydropower stations : a manual for decision makers**. United Nations (UNIDO), New York, NY.

Canada. Centre for Mineral and Energy Technology. (1990). **Development of a stand-alone induction generator for low cost micro-hydro systems**. Centre for Mineral and Energy Technology, Ottawa, Ont.

Canada. Centre for Mineral and Energy Technology. Alternative Energy Division. (1979). **Micro-hydro power : reviewing an old concept**. NTIS, Springfield, Va.

Monition, L., Le Nir, M & Roux, R. (translated by Joan McMullan). (1984). **Micro hydroelectric power stations**. J. Wiley, New York, NY.

Kahn, A & Hinton, E. (1994). **Modelling Design Sensitivity and Optimization of Micro-Hydro Schemes: Part 1 - Characteristic Features**. Department of Civil Engineering, University of Wales, Swansea, Wales. [Internal report CR/832/94].

Kahn, A & Hinton, E. (1994). **Modelling Design Sensitivity and Optimization of Micro-Hydro Schemes: Part 2 - System Analysis and Optimization by Dynamic Programming**. Department of Civil Engineering, University of Wales, Swansea, Wales. [Internal report CR/832/94].

## **PUBLISHED PAPERS**

### **Innovative Technologies, International Perspectives and Case Studies**

Antloga do Nascimento *et al.* (1999). "The evolution of small hydro plants in Brazil: New concepts for a new age" in *Hydropower into the Next Century, Gmunden, Austria, October 1999. Conference Proceedings*. International Journal on Hydropower & Dams, Sutton, Surrey, UK. p. 71-80.

"Avoiding failure of mini hydro bearings". (1998). *International Journal on Hydropower & Dams*. 5 (4). p. 79-80.

Barnes, Marla. (1991). "Strathcona Hydro: Carrying on a dream." *Hydro Review*. 10 (7), December. p. 52-62.

Baxendale, J. (1997). "Planning the Dulyrn Eigiau small hydro scheme in Wales". *International Journal on Hydropower & Dams*. 4 (4). p. 65-68.

Beggs, S.L. . (1992). "Independent Canadian hydro: Responding to opportunities". *Hydro Review*. 11 (3), June. p. 28-32.

Bell, P.A. & Smith, N. (1995). "Increasing the efficiency of stand-alone self-excited induction generators for micro-hydroelectric schemes." *International Journal of Ambient Energy*. 16, (3), July, p 155-161.

Bouziane,S., Deschenes,C. (1998). "Testing the characteristics of a propeller micro hydro turbine". *International Journal on Hydropower & Dams*. 5 (4), p. 53-9.

- Brekke, H. (1999). "Utilizing small hydro for increased hydro production" in *Hydropower into the Next Century, Gmunden, Austria, October 1999. Conference Proceedings*. International Journal on Hydropower & Dams, Sutton, Surrey, UK. p. 81-89.
- Brown, A. (1998). "Causes of breakdowns at micro hydro systems". *International Journal on Hydropower & Dams*. 5 (4). p. 81-82.
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- "Reliable and cost effective micro hydro power". (1998) *Electrical Line*. 4 (2), March/April.p41-43. Describes a micro hydro development at Kamloops, B.C.
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## USEFUL WEBSITES

See also Websites for Manufacturers and Suppliers.

### Canadian

[http://www.de.com.au/external\\_links/canada.html](http://www.de.com.au/external_links/canada.html)

Canadian Power Related Links

<http://geonames.nrcan.gc.ca/english>

Natural Resources Canada site at which it is possible to determine latitude, longitude, and topographic map number for a particular site.

<http://www.IPPSA.com/>

Independent Power Producers Society of Alberta

<http://www.newenergy.org/newenergy/>

Website of IPPSO, the Independent Power Producers' Society of Ontario.

<http://maps.nrcan.gc.ca/topographic.html>

Use to order topographic maps for general locations from Natural Resources Canada.

<http://www.renewables.ca/index2.html>

Canadian Association for Renewable Energies: A federal non-profit association, incorporated to promote feasible applications of renewable energies. Offers frequently updated news and information. An archive holds records of previous bulletins. Useful international perspective.

<http://www.retscreen.gc.ca/>

This is the site of the downloadable Renewable Energy Project Analysis Software, RETScreen, developed by the Government of Canada through the CANMET Energy Diversification Research Laboratory (CEDRL) of Natural Resources Canada. The RETScreen Small Hydro Model is based on twenty years of data and can be used to evaluate micro hydro projects using worksheets to carry out an energy model, a cost analysis and a financial summary. A hydrology worksheet is also provided.

### Other

<http://www.crest.org/renewables/SJ/hydro/>

<http://solstice.crest.org/renewables/re-kiosk/hydro/index.shtml>

Includes three small hydro case studies. Solstice is the Internet information service of the Renewable Energy Policy Project and the Center for Renewable Energy and Sustainable Technology (REPP-CREST), and is a site dedicated to sustainable energy and development information.

<http://www.energyfinance.org/>

Welcome to the new Green Energy Finance Web Site, sponsored by the U.S. DOE and the U.S. EPA, and developed by CREST, the Center for Renewable Energy and Sustainable Technology.

<http://www.eren.doe.gov/>

U.S. Department of Energy with links.

<http://www.eren.doe.gov/consumerinfo/refbriefs/ab2.html>

*Is a Micro-Hydroelectric System Feasible for You?* An on-line paper, published by DOE. A starting point to the issues which should be considered and methods which may be used to carry

out a preliminary feasibility assessment of a micro hydroelectric system. A reference list at the end of this brief provides sources of more information.

<http://www.hydro.org/>

National Hydropower Association

<http://www.iea.org/homechoi.htm>

International Energy Agency

<http://www.osti.gov/eren/eren.html>

Energy Science and Technology Database (EDB) EREN database with links to the National Renewable Energy Laboratory, Clean Energy Basics, Renewable Electric Plant Information System & US Department of Energy Hydropower Program

<http://www.rsvp.nrel.gov/Library/nrecabks.html>

The US National Renewable Energy Laboratory

<http://www.small-hydro.com>

This site is a front-end to a database, which stores information about countries, contacts, organisations, and programs and activities related to small hydro. Links to related sites. Valuable to anyone wishing to find a complete source of Contact information, as well as information on the state of Small Hydropower in many countries.

## **PUBLISHERS & BOOKSHOPS SPECIALIZING IN ALTERNATIVE ENERGIES**

### **Canada**

<http://cat.cisti.nrc.ca/>

Canada Institute for Scientific and Technical Information, a National Research Council initiative.

### **Other**

<http://www.jademountain.com>

Jade Mountain Inc., P.O. Box 4616, Boulder, CO 80306

<http://www.mayabooks.ndirect.co.uk/index.html>

Maya Books, PO Box: 379, Twickenham TW1 2SU. UK. Tel/Fax: 44-(0)208-287-9068

e-mail: sales@mayabooks.ndirect.co.uk

<http://www.ashgate.com>

Ashgate Publishing Co., Aldershot, Hants, UK. Email: info@ashgatepub.co.uk

[Styluspub@aol.com](mailto:Styluspub@aol.com)

Stylus Publishing, P.O. Box 605, Hendon, VA. 20172-0605. Distributors in North America for publications of Intermediate Technology Publications, London. UK. Email: Styluspub@aol.com

## **SUPPLIERS & MANUFACTURERS**

**Note:** This section only provides information on specialized equipment including turbines, generators, controls, pipe, electrical and intake equipment. There is no attempt made to list sources of common construction materials such as steel, concrete, lumber, prefab buildings etc.

## **British Columbia**

### **Packaged Plants Energy Alternatives**

825 Laval Crescent  
Kamloops BC V2C 5P2  
Ph: 250-374-3943  
Toll free: 1800-265-8898  
Fax: 250-679-8589  
Email: [energyalternatives@bc.sympatico.ca](mailto:energyalternatives@bc.sympatico.ca)

### **Thomson & Howe Energy Systems**

Site 17 Box 2 SS#1  
Kimberley BC V1A 2Y3  
Phone: 250-427-4326  
Fax: 250-427-4326  
Email: [thes@cyberlink.bc.ca](mailto:thes@cyberlink.bc.ca)

### **Turbines**

#### **Boundary Electric (1985) Ltd**

7990 Columbia Drive  
PO Box 758  
Grand Forks BC V0H 1H0  
Ph: 250-442-5561  
Fax: 250-442-8322

#### **Dependable Turbines**

Unit 7, 3005 Murray Street  
Port Moody, BC V3H 1X3  
Phone: (604) 461-3121  
Fax: (604) 461-3086  
Email: [dthhydro@towncore.com](mailto:dthhydro@towncore.com)

### **Controls**

#### **Thomson Technology Inc.**

19214-94<sup>th</sup> Avenue  
Surrey BC V3T 4W2  
Ph: 604-888-0110  
Fax: 604-888-381  
Email: [tinfo@tti.bc.ca](mailto:tinfo@tti.bc.ca)  
Website: <http://www.thomsontechnology.com>

### **HDPE pipe and PVC pipe**

#### **Pacific-Polypipe Ltd.**

9515-195 Street  
Surrey BC V4N 4G3  
Ph: 604-513-8197  
Toll free: 1800-659-4545  
Fax: 604-513-8207  
Email: [gmd@istar.ca](mailto:gmd@istar.ca)  
Website: <http://www.infomine.com/pacificpoly-pipe> or <http://www.pacificpolypipe.com>

### **Prolite Plastics**

1620 Kingsway Ave.,  
Coquitlam V3C 3YG

Ph: 604-944-0282  
Fax: 604-944-8854

**Steel pipe**  
**Pipe and Piling Supplies (B.C.) Ltd.**  
1835 Kingsway Avenue  
Port Coquitlam BC V3C 1S9  
Ph: 604-942-6311  
Fax: 604-941-9364  
Website: <http://www.pipe-piling.com>

**Substations**  
**Marcus Transformer of Canada Ltd.**  
19522 96 Avenue,  
Surrey, BC  
Ph: 604-882-8488

**Best Coil Ltd.**  
12 8333 130 Street,  
Surrey, BC  
Ph: 604-543-7739

**Boundary Electric (1985) Ltd**  
7990 Columbia Drive  
PO Box 758  
Grand Forks BC V0H 1H0  
Ph: 250-442-5561

**GEC Alsthom**  
1-2155 Rosser  
Burnaby, BC  
Ph: 604-291-8881

### **Out of Province Suppliers**

**Packaged Plants, Turbines**  
**Canadian Hydro Components Ltd.**  
16 Main Street Box 640  
Almonte, ONT K0A 1A0  
Ph: 613-256-1983  
Fax: 613-256-4235  
Email: [hydro@istar.ca](mailto:hydro@istar.ca)  
Website: <http://www.canadianhydro.com>

**Canyon Industries**  
5500 Blue Heron Lane  
PO Box 574  
Deming WA 998244  
Ph: 360-592-5552  
Fax: 360-592-2235  
Email: [citurbine@aol.com](mailto:citurbine@aol.com)

**Sulzer Hydro**  
60 Worcester Road

Rexdale ONT M9W 5X2  
Ph: 416-674-2034  
Fax: 416-213-1031  
Email: [thomas.taylor@sulzer.com](mailto:thomas.taylor@sulzer.com)  
Website: <http://www.sulzer.com>

**Packaged plants, Controls  
Powerbase Automation Systems Inc.**

150 Rosamond Street  
Carelton Place, ONT. K72C 1V2  
Ph: 613-253- 5358  
Fax: 613-257-1840  
Email: [ygrandmaitre@powerbase.com](mailto:ygrandmaitre@powerbase.com)  
Website: <http://www.hydrocontrols.com/>

**Phoenix Power Control Inc.**

17921 Bothell-Everett Highway #103  
Bothell WA 98012  
Ph: 425-398-8771  
Fax: 425-398-8772  
Email: [hvernon@msn@phoenixcontrol.com](mailto:hvernon@msn@phoenixcontrol.com)

**Sulzer Hydro**

60 Worcester Road  
Rexdale ONT M9W 5X2  
Ph: 416-674-2034  
Fax: 416-213-1031  
Email: [thomas.taylor@sulzer.com](mailto:thomas.taylor@sulzer.com)

**Ice Control**

**Fleet Technology Ltd.**

311 Legget Drive  
Kanata ONT K2K 1Z8  
Ph: 613-592-2830  
Fax: 613-592-4950  
Email: [razek@fleet.co](mailto:razek@fleet.co)  
Website: <http://www.fleetech.com>

**Rubber dams**

**Bridgestone Engineered Products Co., Inc.**

18377 Beach Blvd, Ste 216  
Huntington Beach, CA 92648-1349  
Ph: 1-714-377-7346  
Fax: 1-714-377-2485  
Website: <http://www.bridgestoneengprod.com/Tan.htm>

**Obermeyer Hydro Inc.**

PO Box 668  
Fort Collins CO 80522  
Ph: 970-568-9844  
Fax: 970-568-9845  
Email: [hko@obermeyerhydro.com](mailto:hko@obermeyerhydro.com)  
Website: <http://www.obermeyerhydro.com>

**Turbines**  
**Voith Hydro Power Generation**  
**PO Box 712**  
**York PA 17405**  
Ph: 717-792-7000  
Fax: 717-792-7263  
Website: <http://www.voithyork.com/>

## **PUBLICATIONS**

The following are regularly published resources for small hydro and alternate energy information, although Energy Projects of all sizes may also be described.

### ***Hydro Review***

HCI Publications  
410 Archibald Street  
Kansas City, MO 64111-3046  
Ph: 816-931-1311  
Email: [hci@aol.com](mailto:hci@aol.com)

### ***International Water Power and Dam Construction***

PO Box 200  
Ruislip, Middlesex HA4 OSY  
United Kingdom  
Ph: 44-181-841-3970  
Email: [waterpower@wilmington.co.uk](mailto:waterpower@wilmington.co.uk)

### ***IPPSO Facto***

Independent Power Producers' Society of Ontario  
163-C Eastbourne Ave.,  
Toronto, ONT. M5P 2G5  
Ph: 416-322-6549  
Email: [IPPSO@ippso.org](mailto:IPPSO@ippso.org)

## 6. SITE CLASSIFICATION AND COMPARATIVE ANALYSIS

### Micro Hydro Database

**Table 6.1** below, shows the distribution of sites based on installed capacity and head. Low head sites are defined as sites with gross head less than 30m. Similarly, medium head sites have gross head between 30m and 150m, and high head sites have head more than 150m. Note that due to the limitations in mapping, noted in Section 3, that there is a bias away from low head sites as they are difficult to identify from maps.

**TABLE 6.1**

Installed Capacity	Total number of sites	High Head	Medium Head	Low Head
Less than 0.5 MW	78	10	51	17
0.5 MW to 1 MW	110	32	70	8
1 MW to 2 MW	165	59	93	13
2 MW to 5 MW	219	116	98	5
Total	572	217	312	43

**Table 6.2** shows the total 'green' energy available for each of the groups discussed above.

**TABLE 6.2**

Installed Capacity	Total GWh	High Head GWh	Medium Head GWh	Low Head GWh
Less than 0.5 MW	123	14	78	31
0.5 MW to 1 MW	375	98	247	30
1 MW to 2 MW	1,085	387	604	94
2 MW to 5 MW	3,427	1,848	1,475	104
Total	5,010	2,347	2,404	259

**Tables 6.3** summarizes the number of sites, with less than 2 MW capacity, in each region (see Figure 4.1) and the total capacity and energy.

**TABLE 6.3**

<b>Region</b>	<b>Number of sites</b>	<b>Total Capacity (MW)</b>	<b>Total Green Energy (GWh)</b>
1	66	69.2	260.8
2	51	59.3	252.7
3	122	102.3	519.2
4	17	20.7	80.7
5	15	12.3	46.7
6	6	10.2	52.3
7	10	11.7	46.1
8	29	36.6	169.0
9	13	11.3	61.3
10	-	-	-
11	15	16.9	74.1
12	-	-	-
13	9	6.4	20.1
<b>Total</b>	<b>353</b>	<b>356.9</b>	<b>1,583.0</b>

**Tables 6.4** summarizes the number of sites, from 2 to 5 MW capacity, in each region (see Figure 4.1) and the total capacity and energy.

**TABLE 6.4**

<b>Region</b>	<b>Number of sites</b>	<b>Total Capacity (MW)</b>	<b>Total Green Energy (GWh)</b>
1	57	206.1	794.1
2	65	251.2	1,099.1
3	37	112.5	571.9
4	12	45.0	177.4
5	4	14.0	64.5
6	13	47.7	244.4
7	9	31.5	124.2
8	7	26.8	126.8
9	5	15.6	86.0
10	-	-	-
11	8	27.1	123.8
12	-	-	-
13	2	4.9	14.9
<b>Total</b>	<b>219</b>	<b>782.4</b>	<b>3,427.1</b>

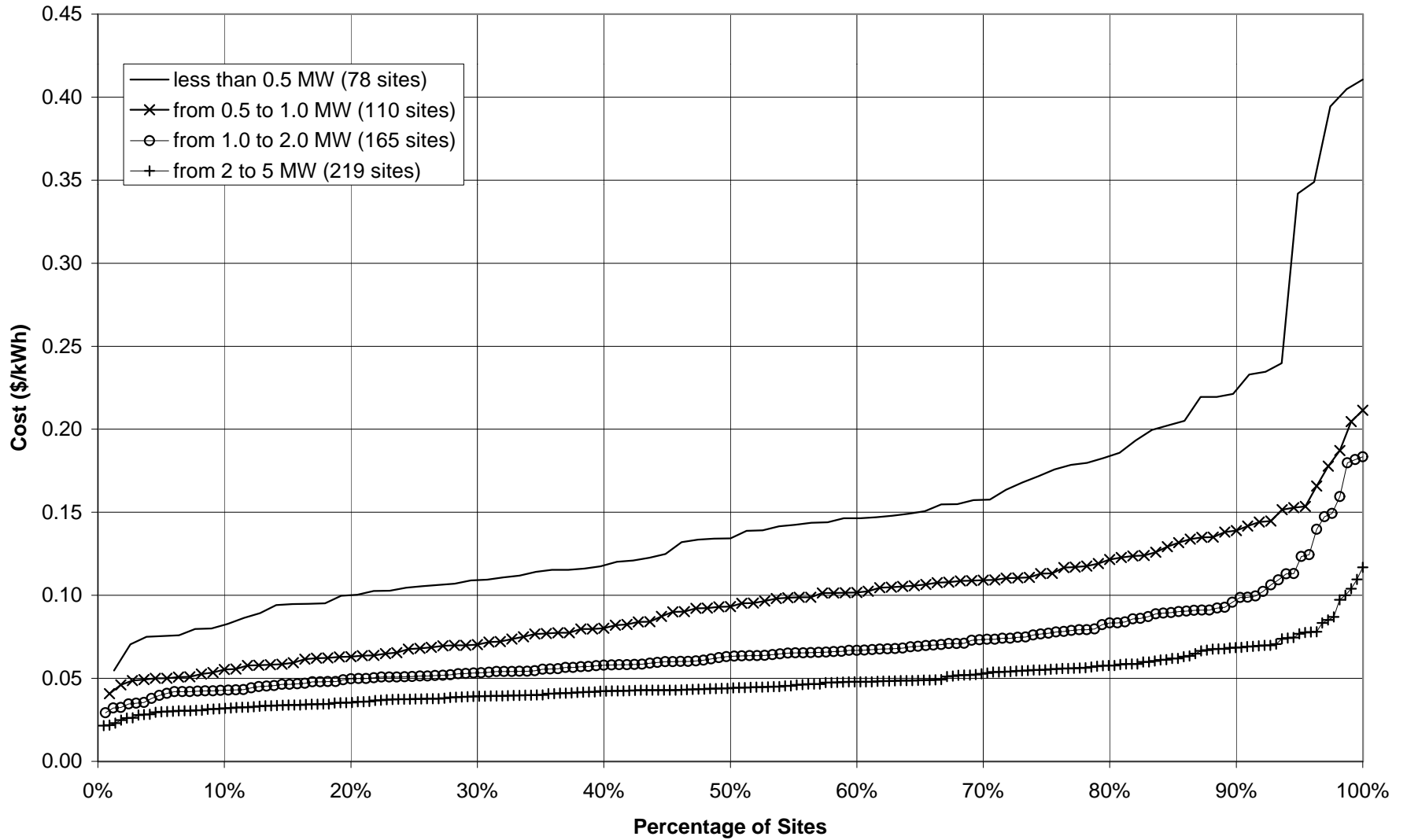
**Figure 6.1** shows the distribution of sites based on their estimated cost (\$/kWh). Sites are grouped based on their installed capacity. The figure may be used to estimate the percentage of sites that could be feasible for a given electricity price.

**Figure 6.2** shows the cumulative energy for sites with less than 2 MW and sites with 2 to 5 MW capacity. Both the total energy and the 'green' energy are shown for each group of sites.

**Figure 6.3a** combines some of the information presented in Figures 4.1 and 4.2 for sites with less than 2 MW installed capacity. The figure shows the distribution of sites based on their estimated cost and superimposes the cumulative energy of these sites. This figure may be used to estimate the total potential energy available if all sites below a certain cost are developed. **Figure 6.3b** shows similar information for the 2 to 5 MW sites.

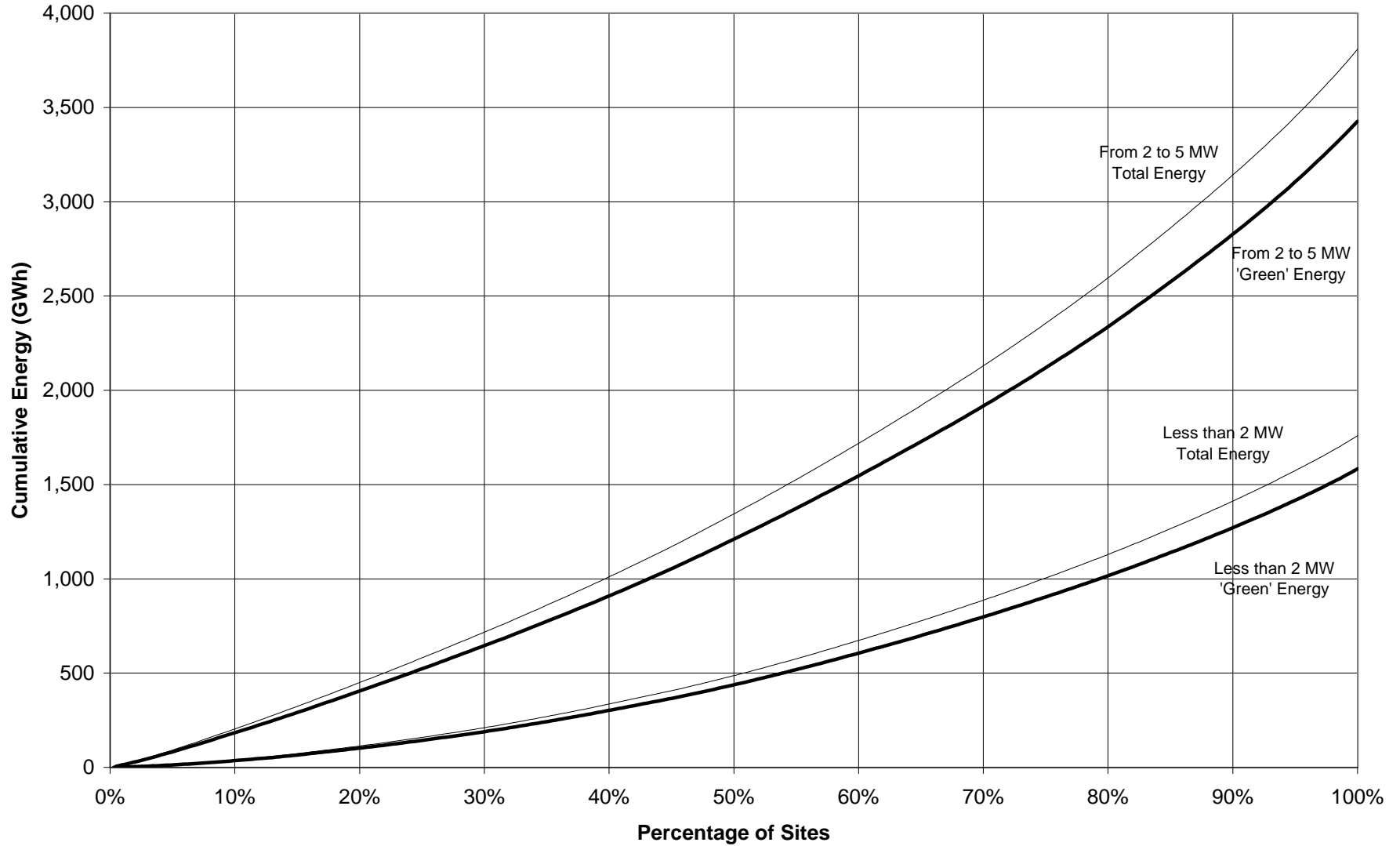
**Figure 6.4a** shows the percentages of the civil cost components for sites less than 2MW. Similar information is shown in **Figure 6.4b** for sites with capacity from 2 to 5 MW. Another comparison can be made between the relative costs of high head sites less than 2 MW (**Figure 6.5a**) and low head sites less than 2 MW (**Figure 6.5b**). As expected, the relative cost of the penstock is higher for the high head sites, however, development costs are often lower for high head sites because the penstocks and mechanical components are smaller.

Figure 6.1 Distribution of Potential Small Hydro Sites based on Cost/kWh



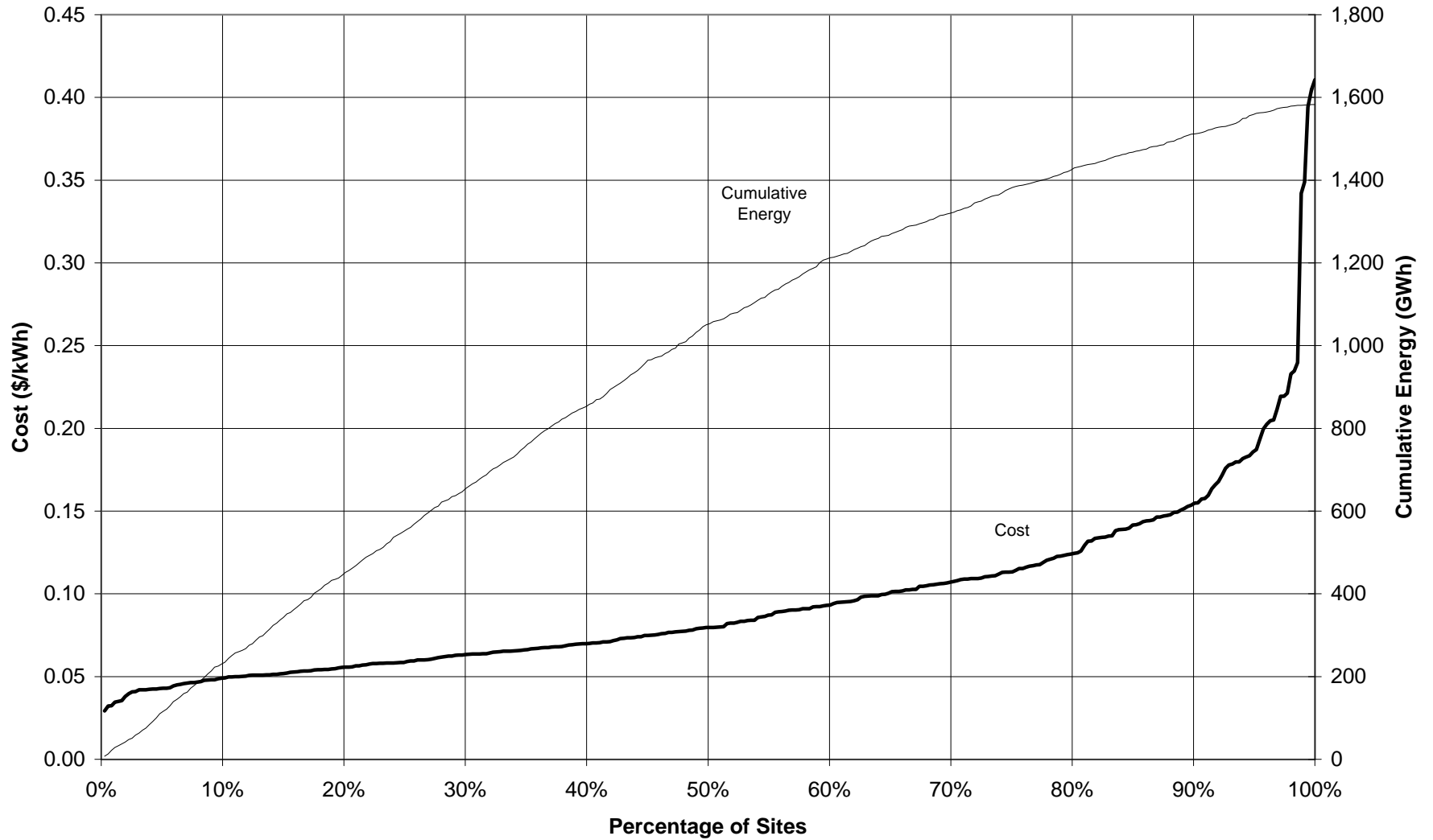
**Figure 6.2 Cumulative Energy**

Note: The Cumulative Energy shown in this chart is calculated after the sites have been ranked based on energy



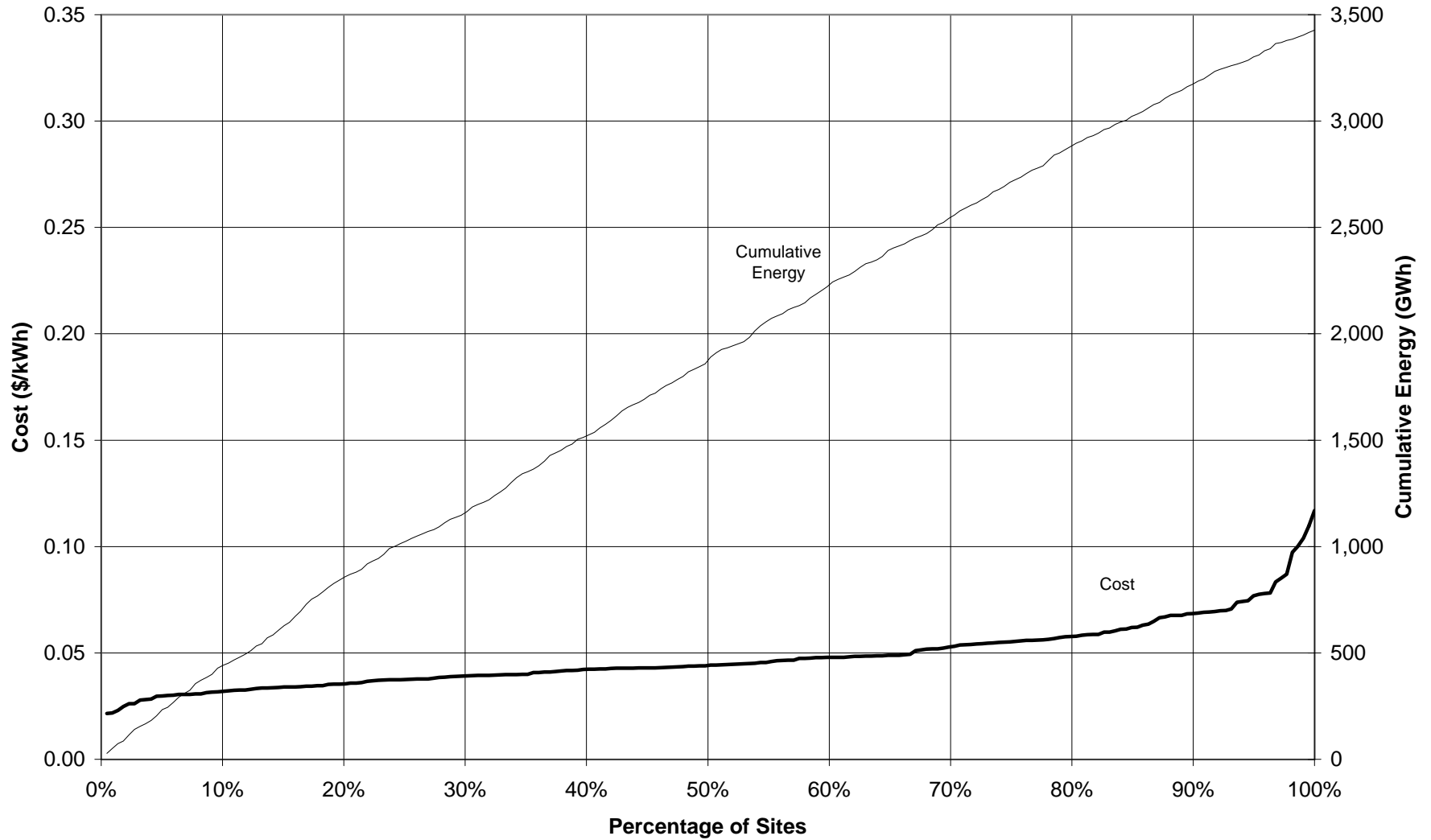
**Figure 6.3a Cost Distribution and Cumulative 'Green' Energy  
Sites with less than 2 MW installed capacity**

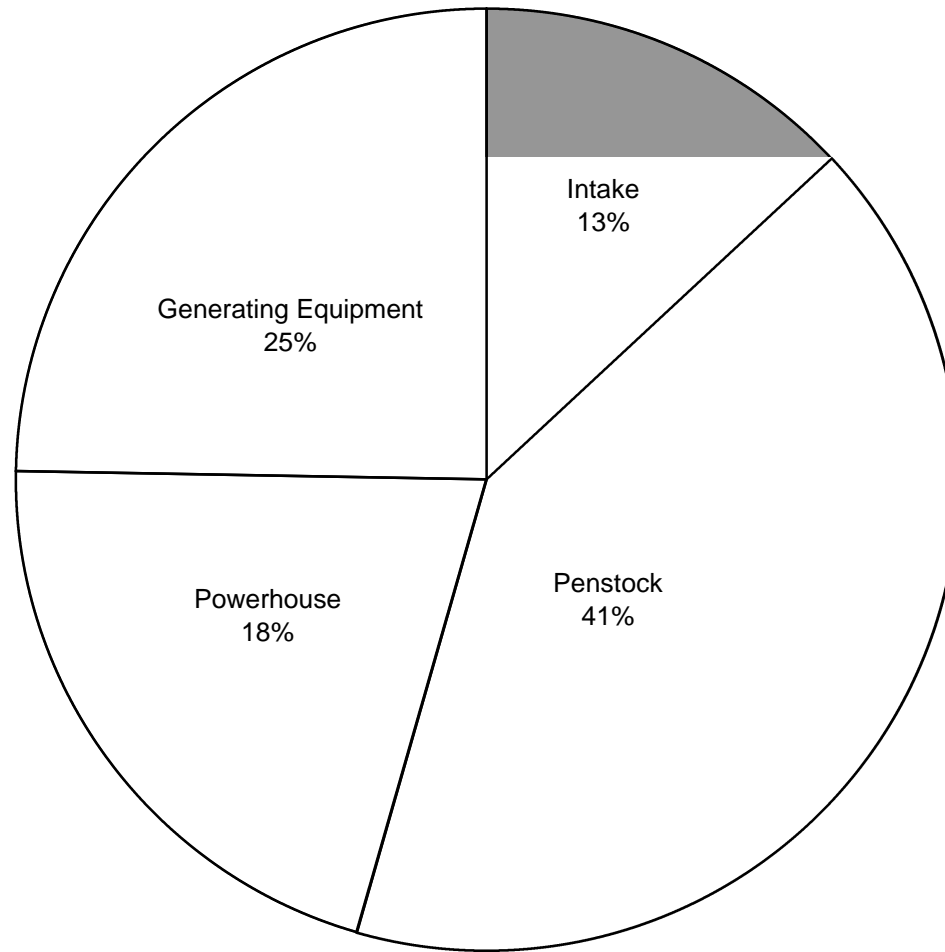
Note: The Cumulative Energy shown in this chart is calculated after the sites have been ranked based on cost



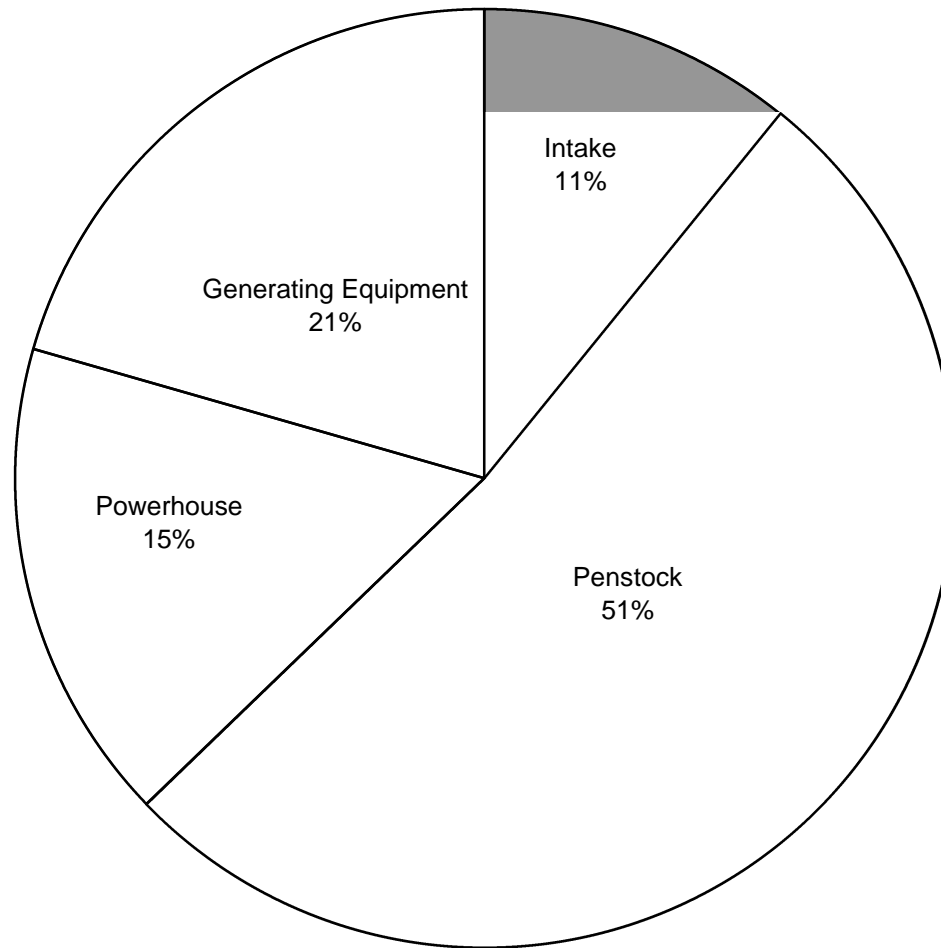
**Figure 6.3b Cost Distribution and Cumulative 'Green' Energy  
Sites with 2 to 5 MW installed capacity**

Note: The Cumulative Energy shown in this chart is calculated after the sites have been ranked based on cost

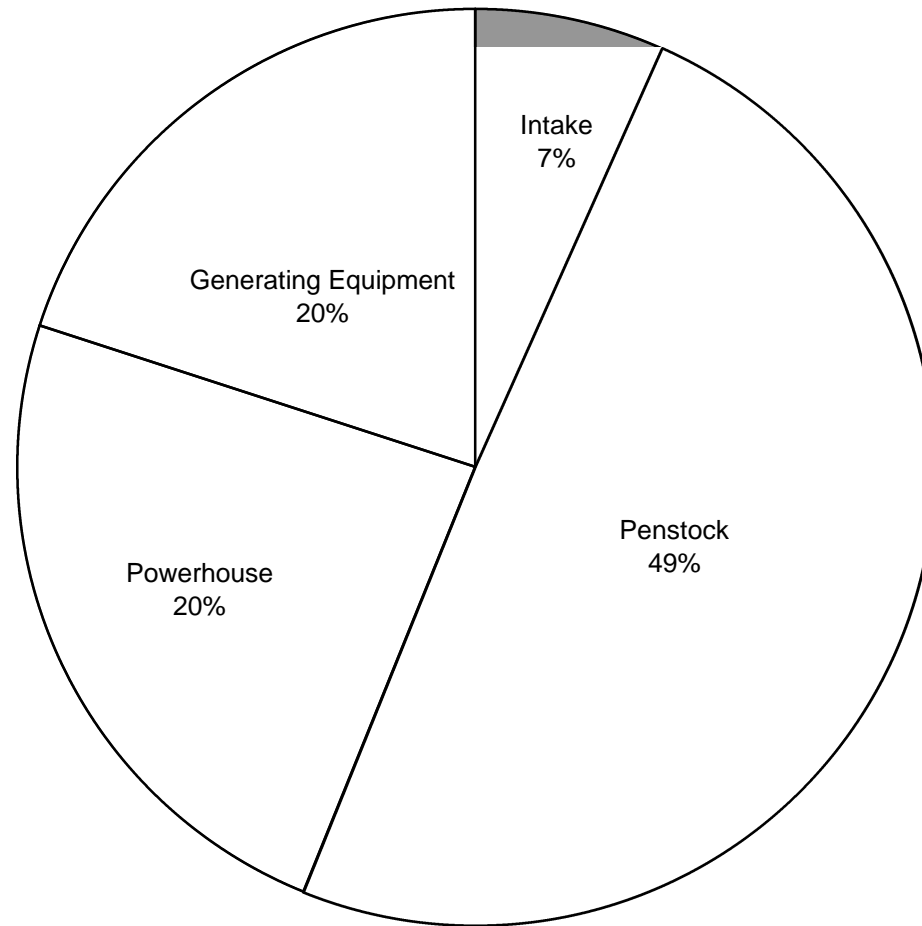




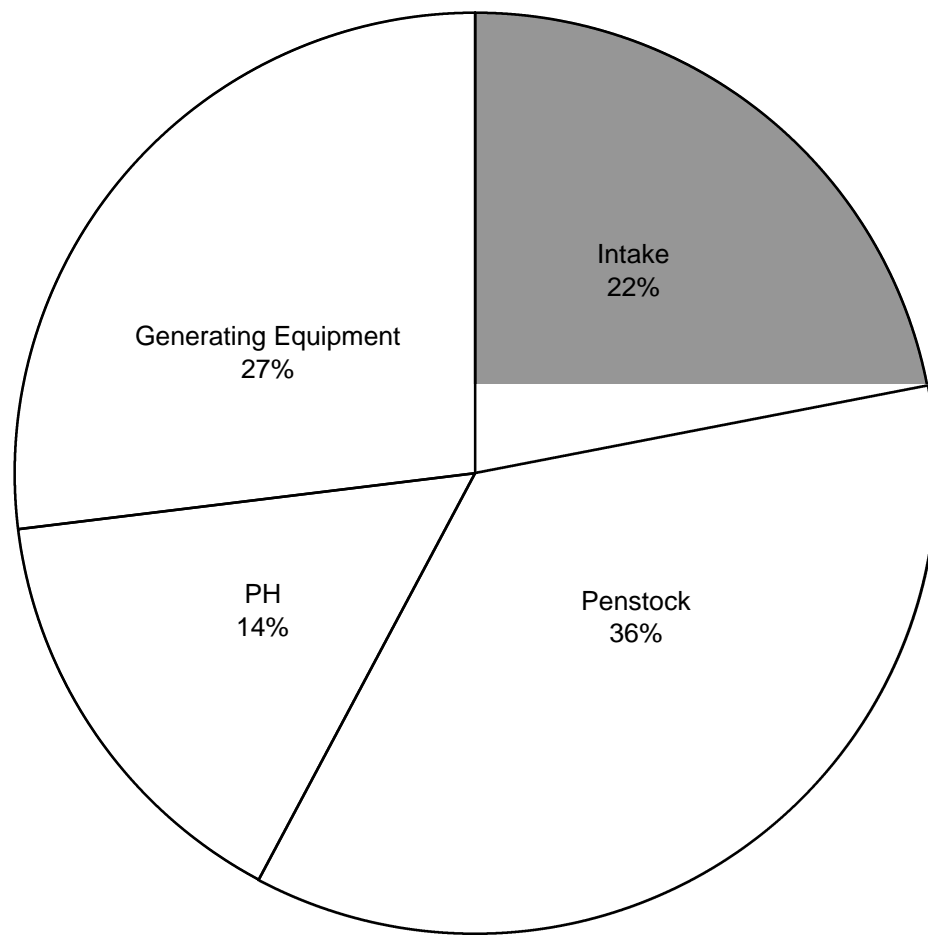
**FIGURE 6.4a**  
Civil Cost of Sites Less than 2MW



**FIGURE 6.4b**  
Civil Cost of Sites from 2 to 5MW



**FIGURE 6.5a**  
Civil Cost of Sites Less than 2MW - High Head (>150m)



**FIGURE 6.5b**  
Civil Cost of Sites Less than 2MW - Low Head (=30m)

## APPENDIX

## **BC HYDRO GUIDELINES**

### **SUBJECT: BC Hydro's Criteria for Definition of Green Micro-Hydro Generation**

#### **INTRODUCTION:**

The definition of a hydro development as capable of generating green energy depends on the scale of the development, the type of river involved, and the development design. BC Hydro wishes to explore and advance the opportunity for micro-hydro developments; defined as generators between 100kW and 2MW. Generation developments of this scale usually involve limited flows and development of as great a head as possible on steep slopes, to limit the cost of the turbine and penstock.

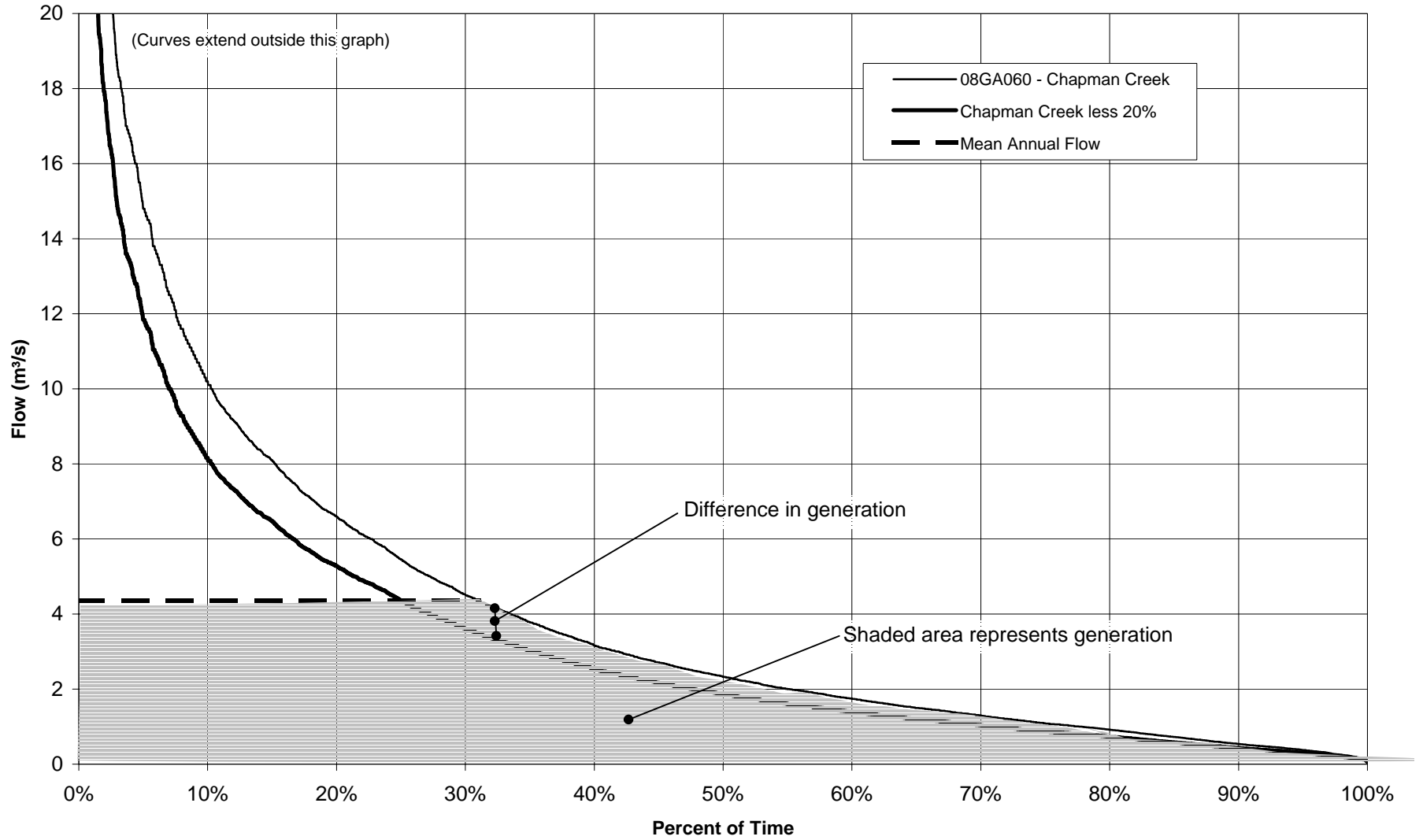
The criteria adopted for green generation from micro-hydro developments are designed to ensure that these developments have a low impact on the environment. BC Hydro will regard micro-hydro developments as "green" if they are not located on fish-bearing streams, have a low impact on the natural environment and are licensable by applicable environmental regulators. The evaluation will be applied on a case by case basis and involve an assessment of development attributes.

#### **CRITERIA:**

BC Hydro will classify micro-hydro sites as capable of green generation if at a given site the following conditions are met:

- The development is planned on a stream that is not fish bearing as defined by the Federal Fisheries Act.
- The development is not located on a "sensitive stream" as designated under the Fish Protection Act.
- The development does not divert more than 80 % of average daily flow from stream channel in a bypassed reach.
- The development does not impact any endangered, threatened or species of special concern.
- The development is licensable under the Water Act.
- The development, including flows into receiving streams and through bypassed reach, is licensable under the Fisheries Act.

**Figure A1.1 - Green Generation Reduction - Coastal stream**  
 Flow Duration Curve (08GA060 - Chapman Creek above Sechelt Diversion)



**Figure A1.2 - Green Generation Reduction - Interior stream**  
 Flow Duration Curve (08KE024 - Little Swift River at the mouth)

